SUZUKI

GSX-S750

SERVICE MANUAL

99500-37163-03E

IMPORTANT NOTICE

WARNING / CAUTION / NOTICE / NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the symbol and the words **⚠ WARNING**, **⚠ CAUTION**, ***NOTICE*** 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 serious injury.

⚠ CAUTION

Indicates a potential hazard that could result in minor or moderate injury.

NOTICE

Indicates a potential hazard that could result in motorcycle or equipment 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, CAUTIONS and NOTICES 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.

FOREWORD

This manual contains an introductory description on the SUZUKI GSX-S750 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

99011-37163-03A

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Section 00

Precautions

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Precautions

Precautions

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.
- To avoid getting burned, do not touch the engine, engine oil, radiator and exhaust system until they have cooled.

NOTICE

- Never use gasoline as cleaning solvent.
- After servicing the fuel, oil, water, exhaust or brake systems, check all lines and fittings related to the system for leaks.
- 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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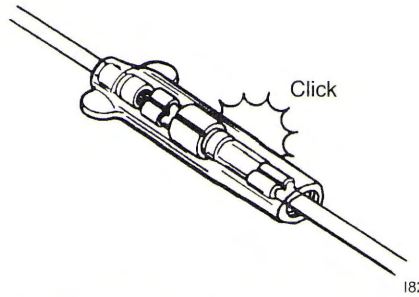
When handling the electrical parts or servicing FI system, observe the following points for the safety of the systems.

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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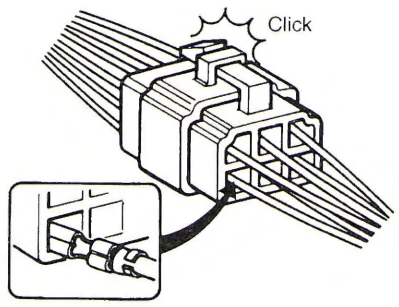
- With a lock type coupler, be sure to release the lock when disconnecting, and push it in fully to engage the lock when connecting.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.
- 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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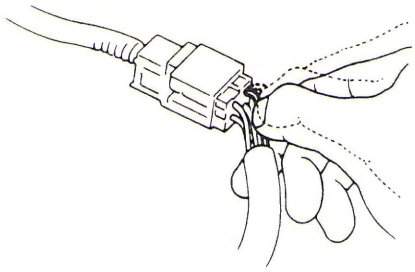
- Inspect each lead wire circuit for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.



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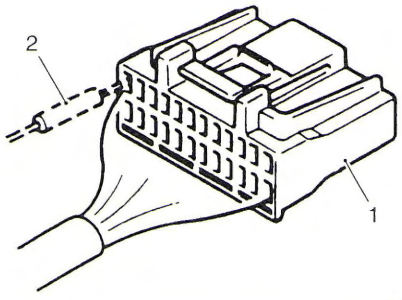
- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (rear) of the connector/coupler.



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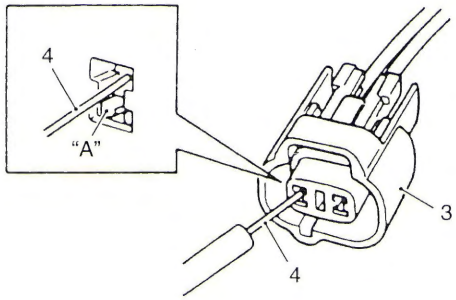
1. Coupler	2. Probe

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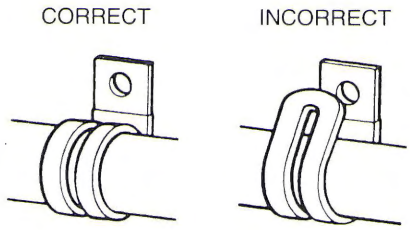
3. Coupler	4. Probe	"A": Where male terminal fits

- 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-3).
- 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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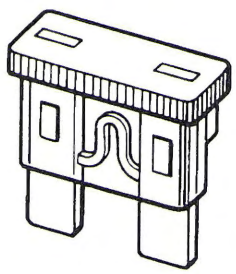
Fuse

- 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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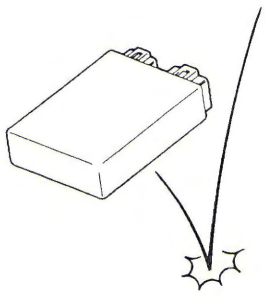
Switch

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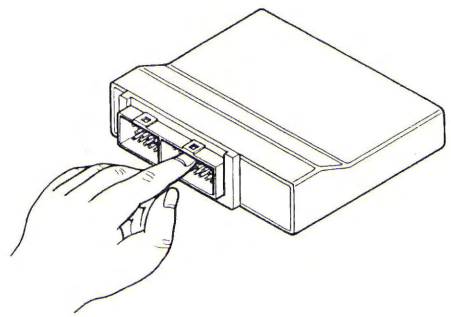
- Be careful not to touch the electrical terminals of the electronic parts (ECM, etc.). The static electricity from your body may damage them.



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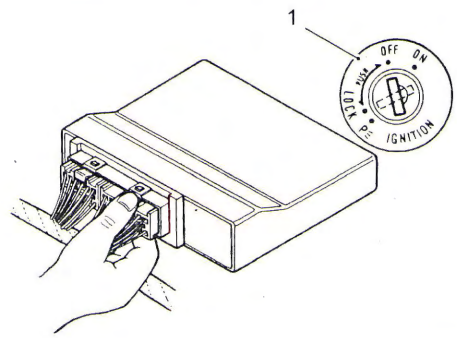
- When disconnecting and connecting the coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.



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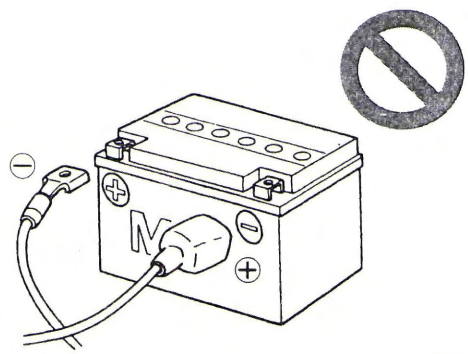
1. Ignition switch

Battery

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



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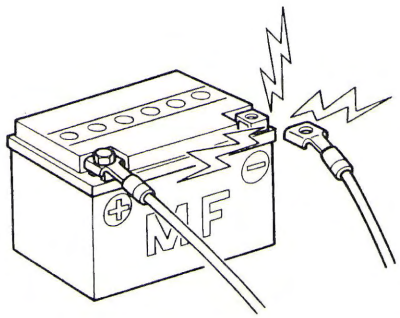
- Removing any battery terminal of a running engine is strictly prohibited. The moment such removal is made, damaging counter electromotive force will be applied to the electronic unit which may result in serious damage.



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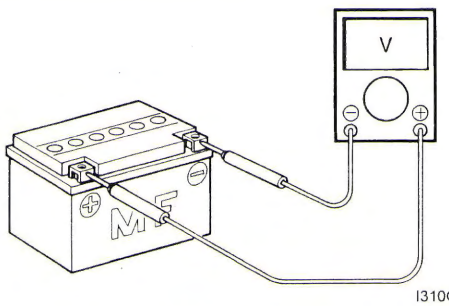
- Before measuring voltage at each terminal, check to make sure that battery voltage is 11 V or higher. Terminal voltage check with a low battery voltage will lead to erroneous diagnosis.



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- 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.

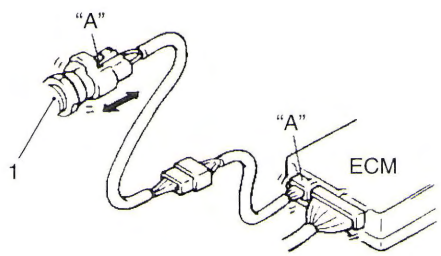
Open circuit check

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, ABS control unit/HU, etc., it is important to perform careful check, starting with items which are easier to check.

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



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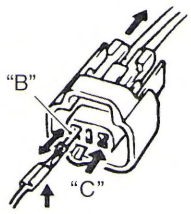
1. Sensor	"A": Check for loose connection

3) Using a test male terminal, check the female terminals of the circuit being checked for contact tension.
Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted in the coupler and locked.
If contact tension is not enough, rectify the contact to increase tension or replace. The terminals must be clean and free of any foreign material which could impede proper terminal contact.



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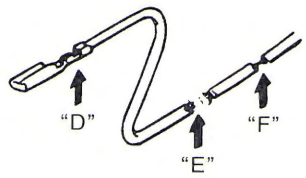
"B":	Check contact tension by inserting and removing.
"C":	Check each terminal for bend and proper alignment.

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



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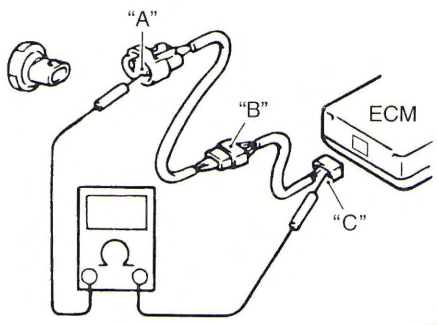
"D":	Looseness of crimping
"E":	Open
"F":	Thin wire (A few strands left)

Continuity check

1) Measure resistance across coupler "B" (between "A" and "C" in figure).
If no continuity is indicated (infinity or over limit), the circuit is open between terminals "A" and "C".



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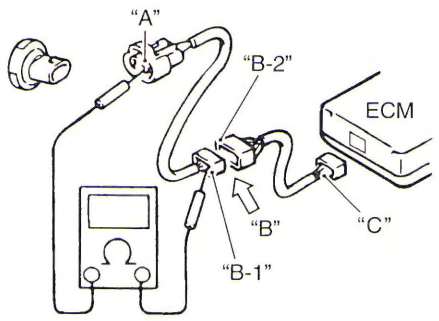
2) Disconnect the coupler "B" and measure resistance between couplers "A" and "B-1".
If no continuity is indicated, the circuit is open between couplers "A" and "B-1". If continuity is indicated, there is an open circuit between couplers "B-2" and "C" or an abnormality in coupler "B-2" or coupler "C".



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Voltage check

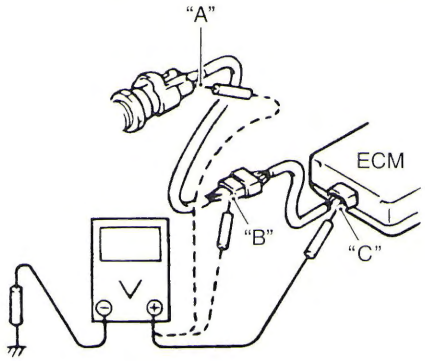
If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

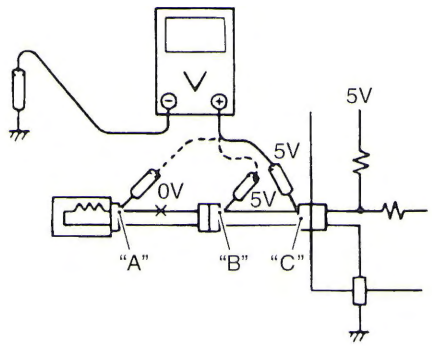
1) With all connectors/couplers connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.
2) If measurements were taken as shown in the figure and results were listed in the following, it means that the circuit is open between terminals "A" and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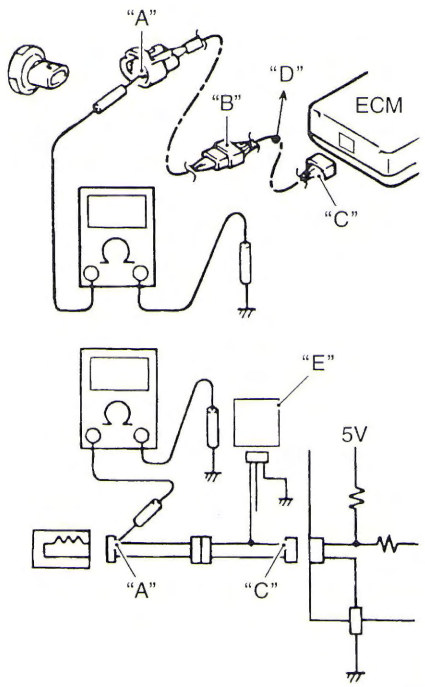
Short circuit check (Wire harness to ground)

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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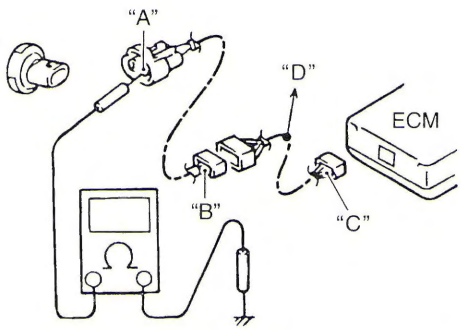
"D": To other parts	"E": Other parts

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".



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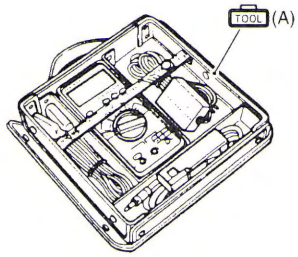
"D": To other parts

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



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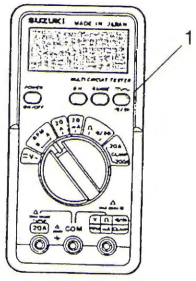
Using the testers

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



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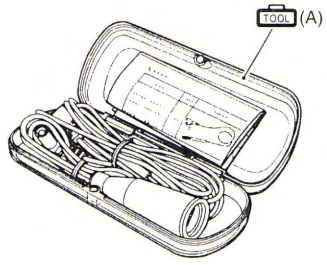
NOTE

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



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Precautions for ABS (If Equipped)

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ABS Wiring

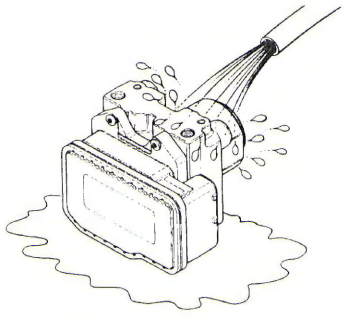
The ABS parts are connected to various lead wires. The coupler and lead wire connections, as well as the lead wire and wire harness routings must be done correctly. Make sure that the proper clamps are used and positioned correctly.

NOTE

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

ABS Control Unit/HU

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



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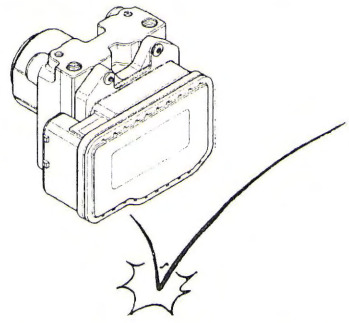
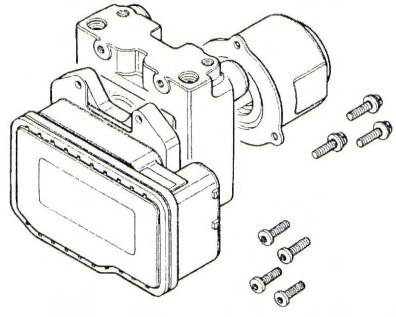
- Never subject the ABS control unit/HU to strong impacts or allow them to be dropped.



I649G1000003-02

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



I649G1000005-02

Section 0

General Information

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General Information

General Description

Abbreviations

BENF08J10101001

A:
AAT: Ambient Air Temperature
ABDC: After Bottom Dead Center
ABS: Anti-lock Brake System
AC: Alternating Current
ACL: Air Cleaner
AKI: Anti-knock index
AP: Atmospheric Pressure
API: American Petroleum Institute
APS: Atmospheric Pressure Sensor
ATDC: After Top Dead Center
A/F: Air Fuel Mixture
B:
BBDC: Before Bottom Dead Center
BTDC: Before Top Dead Center
B+: Battery Positive Voltage
C:
CKP: Crankshaft Position
CKPS: Crankshaft Position Sensor
CKT: Circuit
CLP: Clutch Lever Position
CMP: Camshaft Position
CMPS: Camshaft Position Sensor
CO: Carbon Monoxide
CPU: Central Processing Unit
CVT: Continuously Variable Transmission
D:
DC: Direct Current
DOHC: Double Over Head Camshaft
DRL: Daytime Running Light
DTC: Diagnostic Trouble code
E:
ECM: Engine Control Module
ECT: Engine Coolant Temperature
ECTS: Engine Coolant Temperature Sensor
EVAP: Evaporative Emission
EX.: Exhaust
EXCV: Exhaust control valve
EXCVA: Exhaust control valve actuator
F:
FI: Fuel Injection, Fuel Injector
FP: Fuel pump
FPR: Fuel Pressure Regulator
FTPC: Fuel Tank Pressure Control
FWD: Forward
G:
GEN: Generator
GND: Ground
GP: Gear Position
H:
HC: Hydrocarbons
HO2: Heated Oxygen
HO2S: Heated Oxygen Sensor
HU: Hydraulic Unit
I:
IAP: Intake Air Pressure
IAPS: Intake Air Pressure Sensor
IAT: Intake Air Temperature
IATS: Intake Air Temperature Sensor
I.D.: Inside Diameter
IG: Ignition
IN.: Intake
ISC: Idle Speed Control
ISCV: Idle Speed Control Valve
J:
JASO: Japanese Automobile Standards Organization
L:
LCD: Liquid Crystal Display
LED: Light Emitting Diode
LH: Left Hand
M:
Max: Maximum
MIL: Malfunction Indicator Lamp
Min.: Minimum
MTBE: Methyl Tertiary Butyl Ether
N:
NOx: Nitrogen Oxides
O:
OHC: Over Head Camshaft
O.D.: Outside Diameter
OPS: Oil Pressure Switch
P:
PAIR: Pulsed Secondary Air Injection
PCV: Positive Crankcase Ventilation
PP: Pulley Position
R:
RH: Right Hand
ROM: Read Only Memory
RON: Research Octane Number
S:
SAE: Society of Automotive Engineers
SDS: Suzuki Diagnosis System
SRAD: Suzuki Ram Air Direct
STCS: Secondary Throttle Control System
STD: Standard
STP: Secondary Throttle Position
STPS: Secondary Throttle Position Sensor
STV: Secondary Throttle Valve
STVA: Secondary Throttle Valve Actuator
T:
TC: Traction control
TO: Tip-over
TOS: Tip-over Sensor
TP: Throttle Position
TPS: Throttle Position Sensor

SAE-to-Former SUZUKI Term

BENF08J10101008

This list shows SAE (Society of Automotive Engineers) J1930 terms and abbreviations which may be used in this manual in compliance with SAE recommendations, as well as their former SUZUKI names.
Ex. SAE term (Abbreviation): Former SUZUKI term

A:
Air Cleaner (ACL): Air Cleaner, Air Cleaner Box
B:
Barometric Pressure (BARO): Barometric Pressure, Atmospheric Pressure (APS, AP Sensor)
Battery Positive Voltage (B+): Battery Voltage, +B
C:
Camshaft Position Sensor (CMP Sensor): Camshaft Position Sensor (CMPS)
Crankshaft Position Sensor (CKP Sensor): Crankshaft Position Sensor (CKPS), Crank Angle
D:
Data Link Connector (DLC): Dealer Mode Coupler
Diagnostic Test Mode (DTM): —
Diagnostic Trouble Code (DTC): Diagnostic Code, Malfunction Code
E:
Electronic Ignition (EI): —
Engine Control Module (ECM): Engine Control Module (ECM), FI Control Unit, Engine Control Unit (ECU)
Engine Coolant Level (ECL): Coolant Level
Engine Coolant Temperature (ECT): Coolant Temperature, Engine Coolant Temperature, Water Temperature
Engine Speed (RPM): Engine Speed (RPM)
Evaporative Emission (EVAP): Evaporative Emission
Evaporative Emission Canister (EVAP Canister): — (Canister)
Exhaust Control System: EXC System (EXCS)
Exhaust Control Valve: EXC Valve (EXCV)
Exhaust Control Valve Actuator: EXCV Actuator (EXCVA)
F:
Fan Control (FC): —
Fuel Level Sensor: Fuel Level Sensor, Fuel Level Gauge
Fuel Pump (FP): Fuel Pump (FP)
G:
Generator (GEN): Generator
Ground (GND): Ground (GND, GRD)
H:
Hydrocarbons (HC): Hydrocarbons
Heated Oxygen Sensor (HO2S): Heated Oxygen Sensor (HO2S), O2 sensor
I:
Intake Air Temperature (IAT): Intake Air Temperature (IAT), Air Temperature
Idle Speed Control (ISC): —
Ignition Control (IC): Electronic Spark Advance (ESA)
Ignition Control Module (ICM): —
M:
Malfunction Indicator Lamp (MIL): LED Lamp, Malfunction Indicator Lamp (MIL)
Manifold Absolute Pressure (MAP): Intake Air Pressure (IAP), Intake Vacuum
Mass Air Flow (MAF): Air Flow
O:
On-Board Diagnostic (OBD): Self-Diagnosis Function, Diagnostic
Open Loop (OL): —
P:
Power Control Module (PCM): —
Programmable Read Only Memory (PROM): —
Pulsed Secondary Air Injection (PAIR): Pulse Air Control (PAIR)
Purge Valve (Purge Valve): Purge Valve (SP Valve)
R:
Random Access Memory (RAM): —
Read Only Memory (ROM): ROM
S:
Secondary Air Injection (AIR): —
Secondary Throttle Control System (STCS): STC System (STCS)
Secondary Throttle Valve (STV): ST Valve (STV)
Secondary Throttle Valve Actuator (STVA): STV Actuator (STVA)
T:
Throttle Body (TB): Throttle Body (TB)
Throttle Body Fuel Injection (TBI): Throttle Body Fuel Injection (TBI)
Throttle Position Sensor (TP Sensor): TP Sensor (TPS)
Tank Pressure Control Valve: TPC Valve (TPCV)
Traction Control (TC): Traction Control
V:
Voltage Regulator (VR): Voltage Regulator
Volume Air Flow (VAF): Air Flow

Symbols

BENF08J10101002

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.

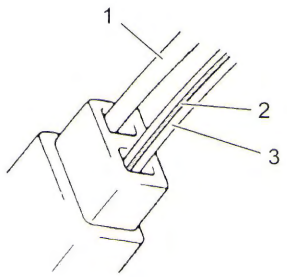
Symbol	Definition
	Torque control required. Data beside it indicate specified torque.
	Apply oil. Use engine oil unless otherwise specified.
	Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1 : 1).
	Apply SUZUKI SUPER GREASE A. 99000-25011
	Apply SUZUKI MOLYBDENUM GREASE L. 99000-25280
	Apply SUZUKI MOLY PASTE. 99000-25140
	Apply SUZUKI SILICONE GREASE. 99000-25100
	Apply SUZUKI WATER RESISTANT GREASE EP2. 99000-25350
	Apply SUZUKI BOND 1207B. 99000-31140
	Apply SUZUKI BOND 1215. 99000-31110
	Apply THREAD LOCK CEMENT 1303B. 99000-32030
	Apply THREAD LOCK CEMENT 1322D. 99000-32150
	Apply THREAD LOCK CEMENT 1360. 99000-32130
	Use SUZUKI SUPER LONG LIFE COOLANT (BLUE). 99000-99032-20X
	Use SUZUKI LONG LIFE COOLANT (GREEN). 99000-99032-12X
	Use SUZUKI FORK OIL L01. 99000-99044-L01
	Apply or use brake fluid.
	Use special tool.
	Do not reuse.
	Note on reassembly.

Wire Color Symbols

BENF08J10101003

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

There are two kinds of colored wire used in this vehicle. One is single-colored wire and the other is dual-colored (striped) wire. The single-colored wire uses only one color symbol (i.e. G). The dual-colored wire uses two color symbols (i.e. G/Y). The first symbol represents the base color of the wire and the second symbol represents the color of the stripe.



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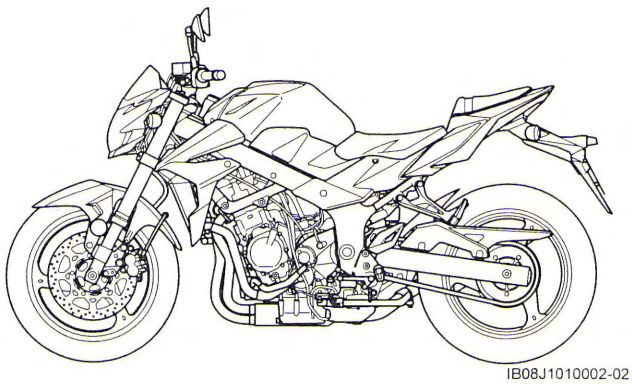
1. G (Base color)	2. Y (Stripe color)	3. G (Base Color)

Vehicle Side View

BENF08J10101004

SUZUKI GSX-S750 (2015-model)

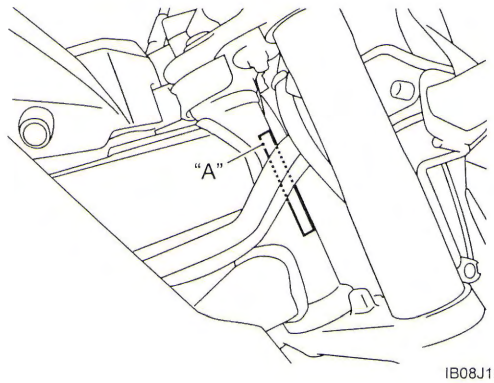


IB08J1010002-02

Vehicle Identification Number

BENF08J10101005

The frame serial number or V.I.N. (Vehicle Identification Number) "A" is stamped on the right side of the frame down tube. The engine serial number "B" is located on the lower crankcase.



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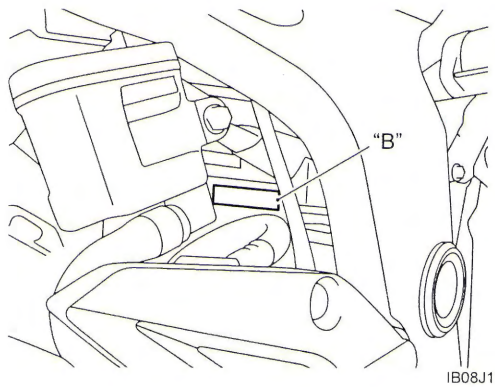


IB08J1010004-01

Country and Area Codes

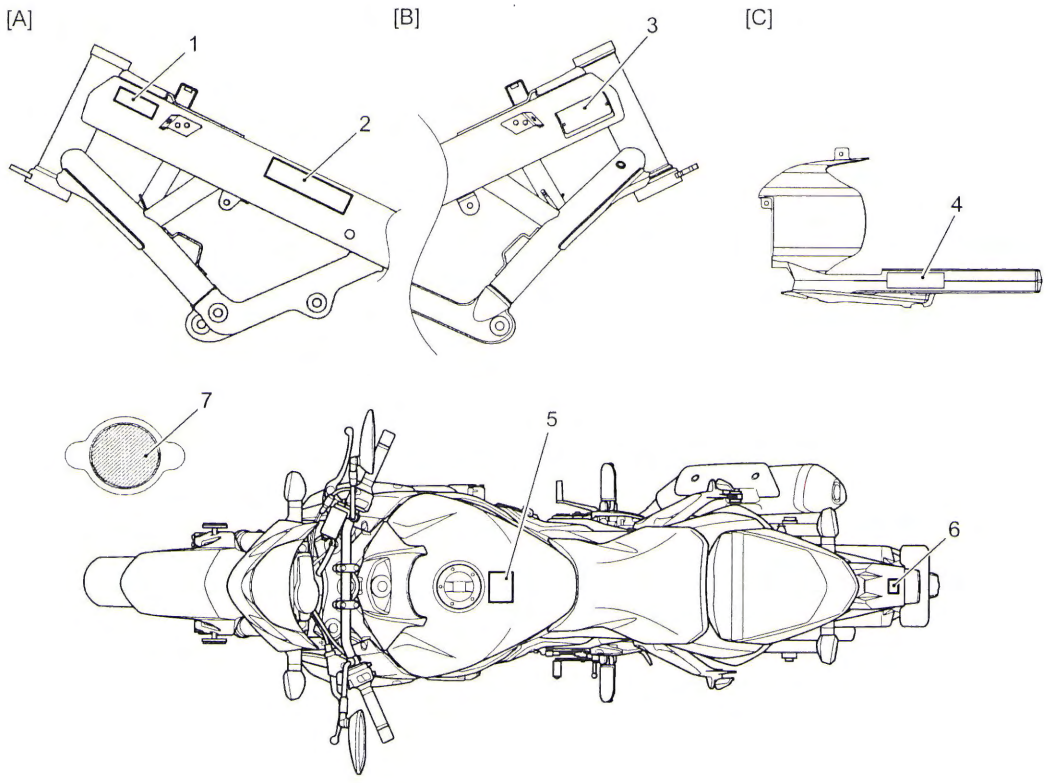
BENF08J10101006

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

Code	Country or Area
E03	U.S.A except for california

Warning, Caution and Information Labels Location

BENF08J10101007



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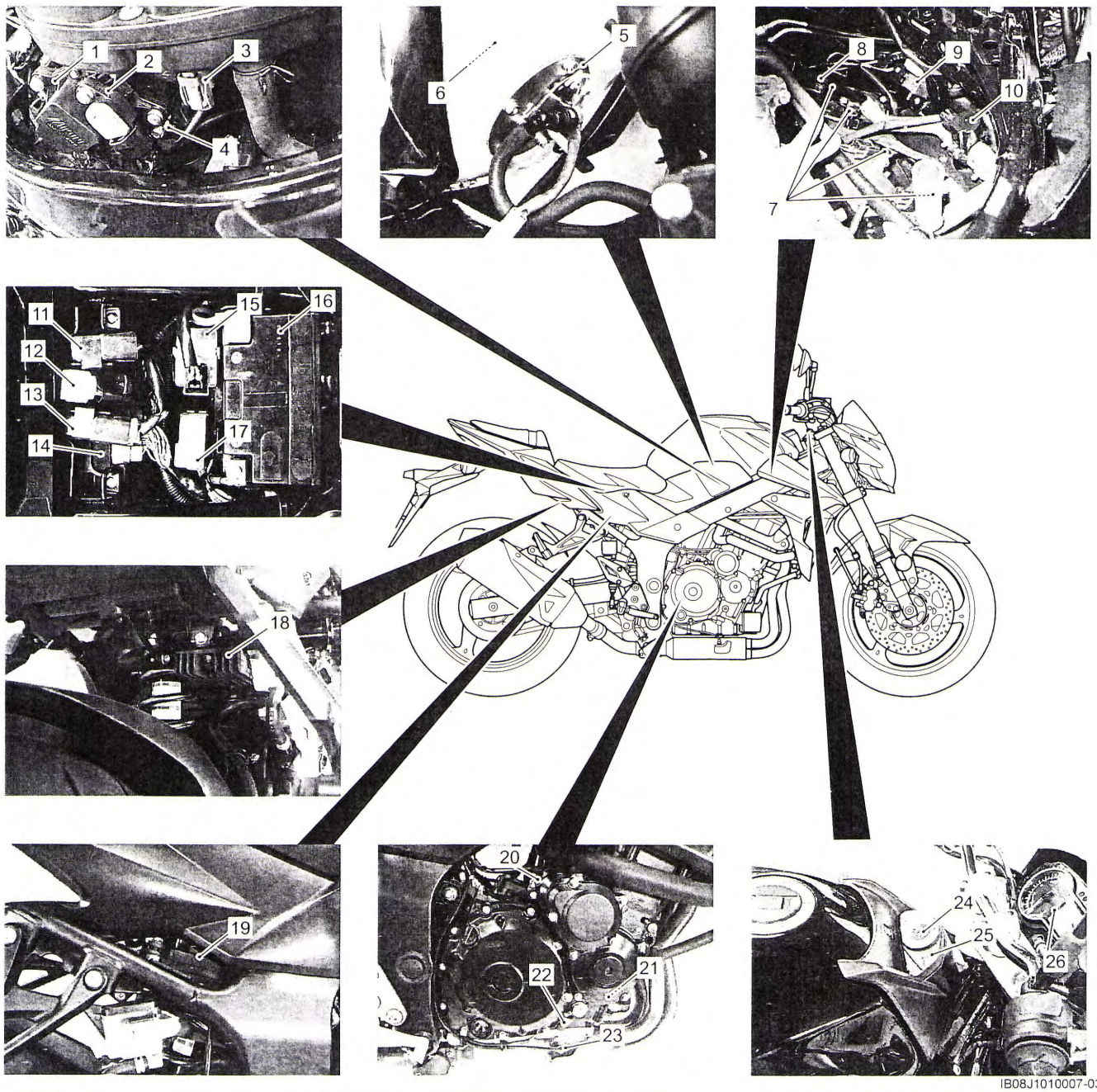
[A]: Frame (left side)	1. Noise label	4. Tire information label	7. Radiator cap label (If equipped)
[B]: Frame (right side)	2. Information label	5. General warning label	
[C]: Chain case	3. ID plate	6. Manual notice label	

Component Location

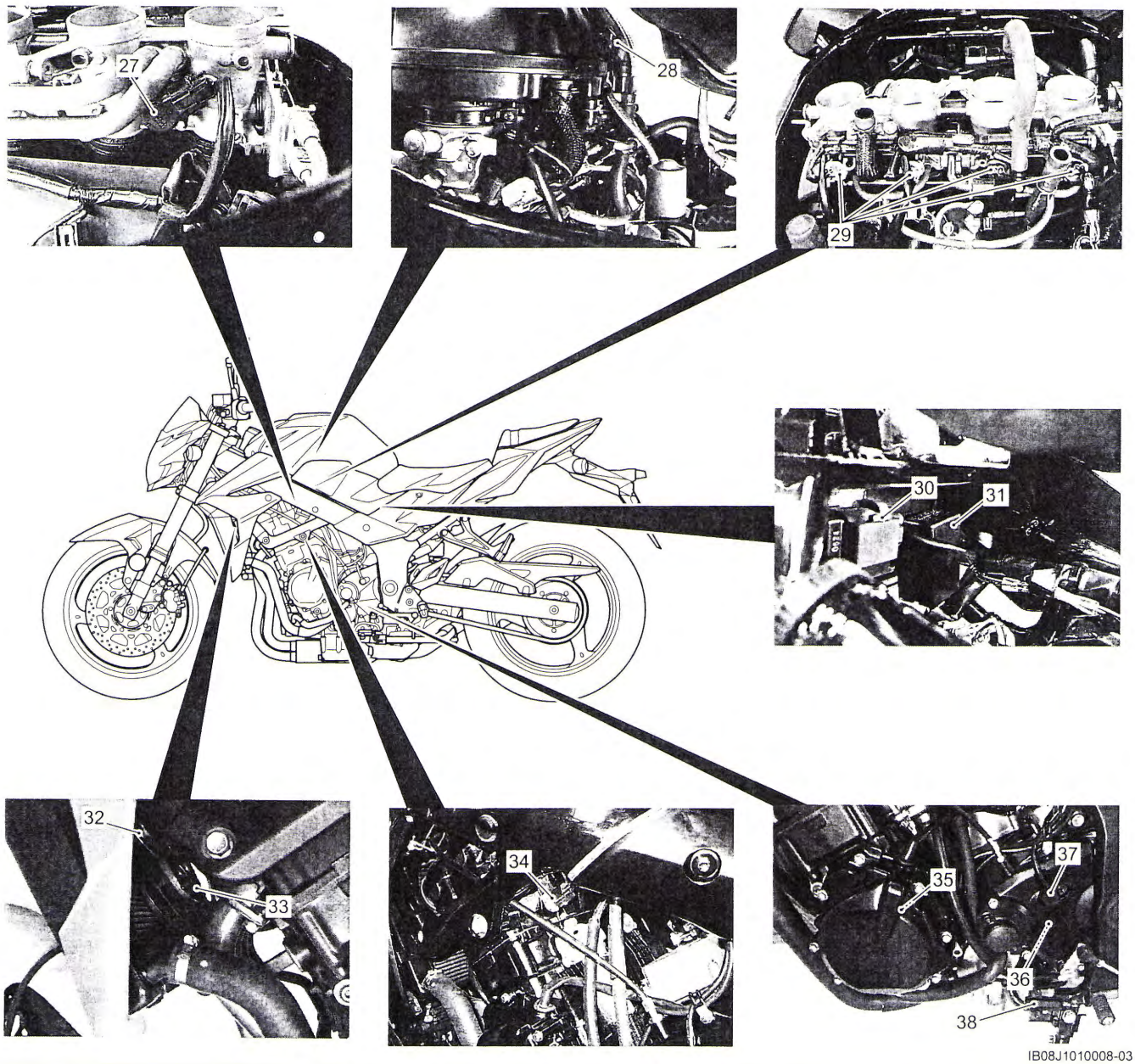
Electrical Components Location

BENF08J10103001



IB08J1010007-03

1. STV actuator	8. CMP sensor	15. Starter relay/Main fuse	22. Oil pressure switch
2. STP sensor	9. AP sensor	16. Battery	23. HO2 sensor
3. IAT sensor	10. PAIR control solenoid valve	17. Fuse box	24. Ignition switch
4. TP sensor	11. Fuel pump relay	18. Regulator/Rectifier	25. Immobilizer antenna (if equipped)
5. Fuel pump	12. Mode select coupler	19. EXCV actuator	26. Combination meter
6. Fuel level gauge	13. Cooling fan relay	20. Starter motor	
7. Ignition coil	14. ECM	21. CKP sensor	



IB08J1010008-03

27. ISC valve	30. TO sensor	33. Cooling fan	36. GP switch
28. IAP sensor	31. Turn signal/Side-stand relay	34. ECT sensor	37. Speed sensor
29. Fuel injector	32. Horn	35. Generator	38. Side-stand switch

Maintenance and Lubrication

Precautions

Precautions for Maintenance

BENF08J10200001

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 months, kilometers and miles for your convenience.

IMPORTANT: The periodic maintenance intervals and service requirements have been established in accordance with EPA regulations. Following these instructions will ensure that the motorcycle will not exceed emission standards and it will also ensure the reliability and performance of the motorcycle.

NOTE

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

Scheduled Maintenance

Periodic Maintenance Schedule Chart

BENF08J10205001

NOTE

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

Item		Interval				
	months	2	12	24	36	48
	km	1000	6000	12000	18000	24000
	miles	600	4000	7500	11000	14500
Air cleaner element (I: ☞(Page 0B-3), R: ☞(Page 0B-3))		—	I	I	R	I
Exhaust pipe bolts and muffler bolts (T: ☞(Page 0B-3))		T	—	T	—	T
Exhaust control valve (I: ☞(Page 0B-3))		I	—	I	—	I
Valve clearance (I: ☞(Page 0B-3))		—	—	—	—	I
Spark plugs (I: ☞(Page 0B-3), R: ☞(Page 0B-3))		—	I	R	I	R
Fuel hose (I: ☞(Page 0B-3))		—	I	I	I	I
Engine oil (R: ☞(Page 0B-3))		R	R	R	R	R
Engine oil filter (R: ☞(Page 0B-3))		R	—	—	R	—
Throttle cable play (I: ☞(Page 0B-3))		I	I	I	I	I
Throttle valve synchronization (I: ☞(Page 0B-3))		—	—	I	—	I
Engine coolant (R: ☞(Page 0B-3))	"SUZUKI SUPER LONG LIFE COOLANT" (Blue)	—	—	—	—	R
	"SUZUKI LONG LIFE COOLANT" (Green) or an engine coolant other than "SUZUKI SUPER LONG LIFE COOLANT" (Blue)	—	—	R	—	R
Radiator hose (I: ☞(Page 0B-3))		—	I	I	I	I
Clutch cable play (I: ☞(Page 0B-3))		—	I	I	I	I
Drive chain (I: ☞(Page 0B-3), I: ☞(Page 0B-3))		I	I	I	I	I
		Clean and lubricate every 1000 km (600 miles).				
Brakes (I: ☞(Page 0B-3))		I	I	I	I	I
Brake hose (I: ☞(Page 0B-3), R: ☞(Page 0B-3))		—	I	I	I	I
		Replace every 4 years.				
Brake fluid (I: ☞(Page 0B-3), R: ☞(Page 0B-3))		—	I	I	I	I
		Replace every 2 years.				
Tires (I: ☞(Page 0B-3))		—	I	I	I	I
Steering (I: ☞(Page 0B-4))		I	—	I	—	I
Front forks (I: ☞(Page 0B-4))		—	—	I	—	I
Rear suspension (I: ☞(Page 0B-4))		—	—	I	—	I
Chassis bolts and nuts (T: ☞(Page 0B-4))		T	T	T	T	T

Repair Instructions

Air Cleaner Element Replacement

BENF08J10206001

Replace the air cleaner element with a new one. ☞(Page 1D-6)

Air Cleaner Element Inspection and Cleaning

BENF08J10206002

Refer to "Air Cleaner Element Inspection" in Section 1D (Page 1D-6).

Exhaust Pipe Bolts and Muffler Bolts Inspection

BENF08J10206003

Refer to "Exhaust System Inspection" in Section 1K (Page 1K-15).

Exhaust Control Valve Inspection

BENF08J10206004

Refer to "Exhaust Control Valve Inspection" in Section 1K (Page 1K-9).

Valve Clearance Inspection and Adjustment

BENF08J10206005

Inspect intake and exhaust valve clearance and adjust as necessary. ☞(Page 1D-21)

Spark Plug Replacement

BENF08J10206006

Replace spark plugs with new ones. ☞(Page 1H-5)

Spark Plug Inspection and Cleaning

BENF08J10206007

Inspect spark plugs and clean as necessary. ☞(Page 1H-6)

Fuel Hose Inspection

BENF08J10206008

Inspect fuel hose for loose connection, deterioration or damage which could cause leakage. ☞(Page 1G-7)

Engine Oil Replacement

BENF08J10206010

Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).

Engine Oil Filter Replacement

BENF08J10206011

Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).

Throttle Cable Play Inspection and Adjustment

BENF08J10206013

Inspect throttle cable play and adjust it if necessary. ☞(Page 1D-8)

Throttle Valve Synchronization

BENF08J10206014

Inspect throttle valve synchronization and adjust it as necessary. ☞(Page 1D-17)

Engine Coolant Replacement

BENF08J10206018

Refer to "Engine Coolant Change" of "Cooling System Inspection" in Section 1F (Page 1F-5).

Radiator Hose Inspection

BENF08J10206019

Inspect cooling system, hose and connections for leakage, damage and cracks. ☞(Page 1F-9)

Clutch Cable Play Inspection

BENF08J10206021

Refer to "Clutch Cable Inspection and Adjustment" in Section 5C (Page 5C-2).

Drive Chain Inspection and Adjustment

BENF08J10206024

Inspect drive chain and adjust it as necessary. ☞(Page 3A-5)

Drive Chain Cleaning and Lubricating

BENF08J10206025

Refer to "Drive Chain Cleaning and Lubricating" in Section 3A (Page 3A-7).

Brake System Inspection

BENF08J10206026

Refer to "Brake System Inspection" in Section 4A (Page 4A-4).

Brake Hose Inspection

BENF08J10206027

Inspect brake hoses and connections for leakage, damage and cracks. Refer to "Front and Rear Brake Hose Inspection" of "Brake System Inspection" in Section 4A (Page 4A-4).
Repair leaky point if any.

Brake Hose Replacement

BENF08J10206028

Refer to "Brake Hose Removal and Installation" in Section 4A (Page 4A-10).

Brake Fluid Inspection

BENF08J10206029

Inspect the brake fluid level in both the front and rear brake fluid reservoirs. Refer to "Brake System Inspection" in Section 4A (Page 4A-4).

Brake Fluid Replacement

BENF08J10206030

Refer to "Brake Fluid Replacement" in Section 4A (Page 4A-8).

Tire Inspection

BENF08J10206031

Inspect tires for uneven or excessive wear or damage. If defective, replace. ☞(Page 2D-16)

Steering System Inspection

BENF08J10206032

Refer to "Steering System Inspection" in Section 6B (Page 6B-9).

Front Fork Inspection

BENF08J10206033

Refer to "Front Fork Inspection" in Section 2B (Page 2B-2).

Rear Suspension Inspection

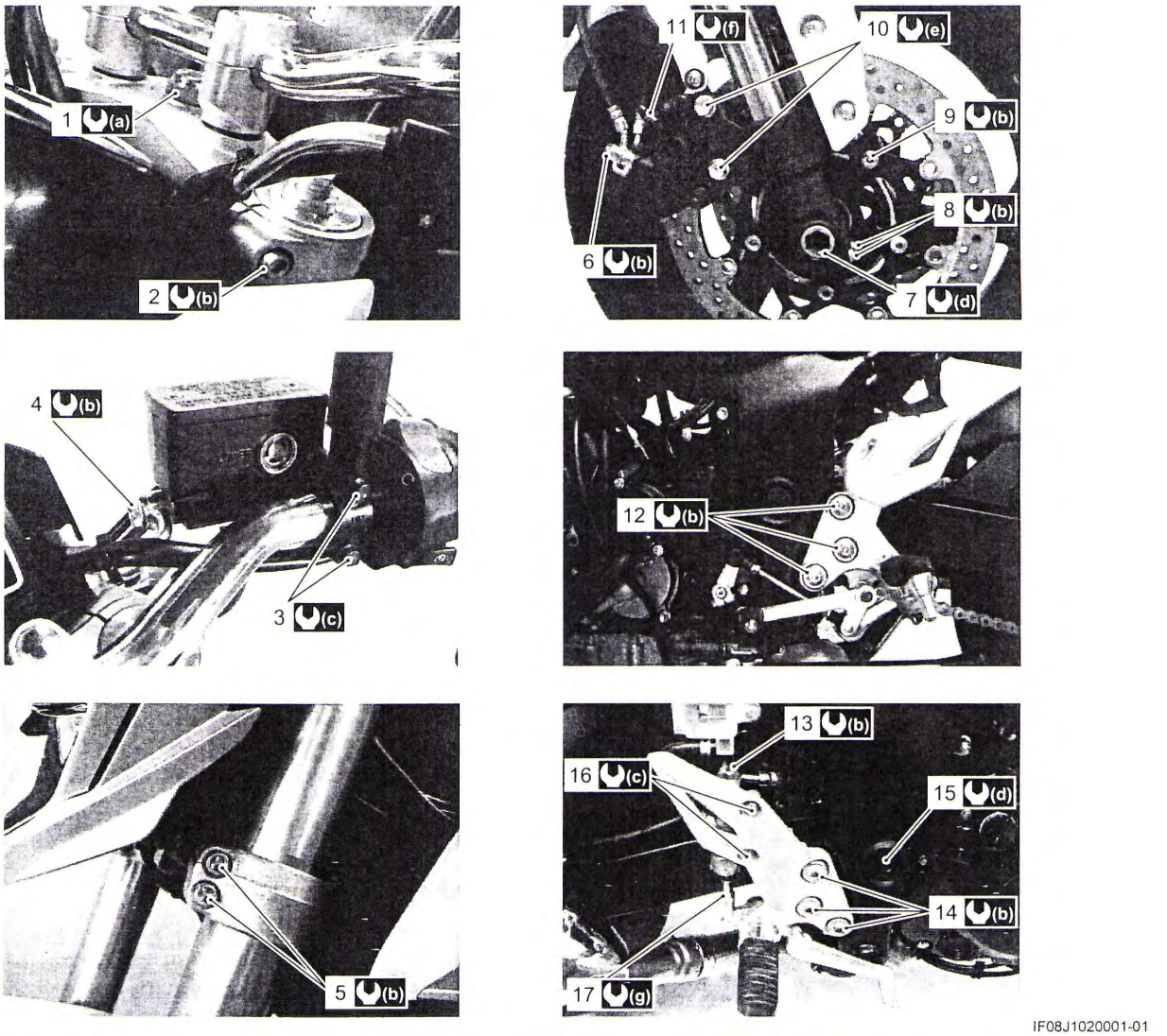
BENF08J10206034

Refer to "Rear Suspension Inspection" in Section 2C (Page 2C-3).

Chassis Bolts and Nuts Inspection

BENF08J10206035

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



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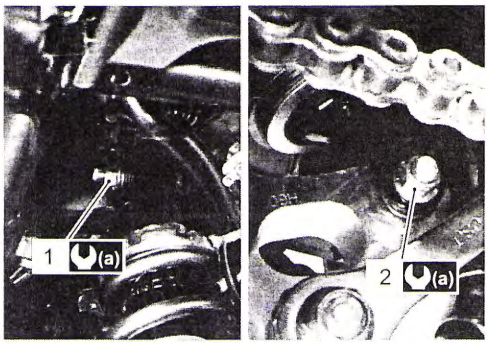
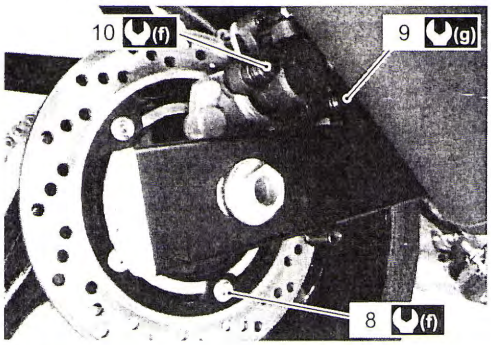
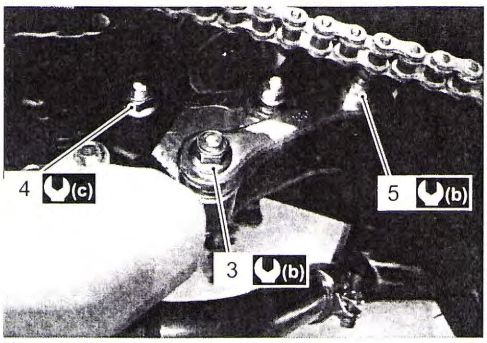
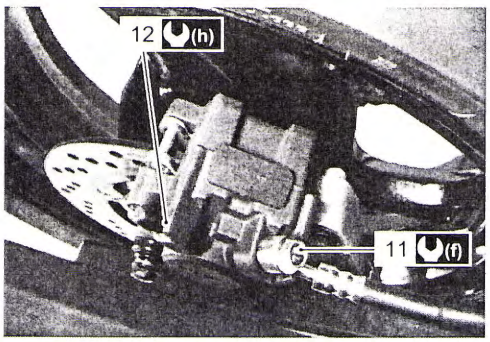
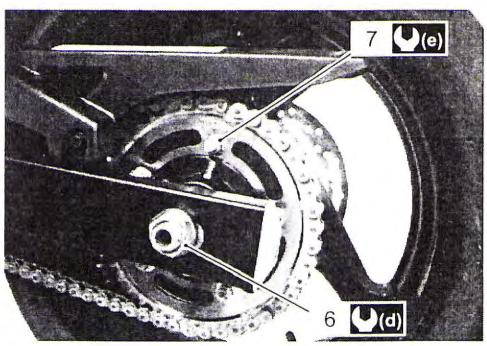
1. Steering stem head nut	9. Front brake disc bolt	17. Rear brake master cylinder rod lock-nut
2. Front fork upper clamp bolt	10. Front brake caliper mounting bolt	(a): 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
3. Front brake master cylinder mounting bolt	11. Brake caliper air bleeder valve	(b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
4. Brake hose union bolt	12. Front footrest bracket mounting bolt	(c): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
5. Front fork lower clamp bolt	13. Brake hose union bolt	(d): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
6. Brake hose union bolt	14. Front footrest bracket mounting bolt	(e): 39 N·m (3.9 kgf-m, 28.0 lbf-ft)
7. Front axle bolt	15. Swingarm pivot lock-nut	(f): 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)
8. Front axle pinch bolt	16. Rear brake master cylinder mounting bolt	(g): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)











IF08J1020002-01

1. Rear shock absorber upper mounting nut	8. Rear brake disc bolt	(c): 98 N·m (9.8 kgf-m, 71.0 lbf-ft)
2. Rear shock absorber lower mounting nut	9. Rear brake caliper sliding pin	(d): 115 N·m (11.5 kgf-m, 83.0 lbf-ft)
3. Cushion rod front mounting nut	10. Rear brake caliper mounting bolt	(e): 55 N·m (5.5 kgf-m, 40.0 lbf-ft)
4. Cushion lever mounting bolt/nut	11. Brake hose union bolt	(f): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
5. Cushion rod rear mounting nut	12. Brake caliper air bleeder valve	(g): 27 N·m (2.7 kgf-m, 19.5 lbf-ft)
6. Rear axle nut	(a): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	(h): 6 N·m (0.6 kgf-m, 4.3 lbf-ft)
7. Rear sprocket nut	(b): 78 N·m (7.8 kgf-m, 56.5 lbf-ft)	

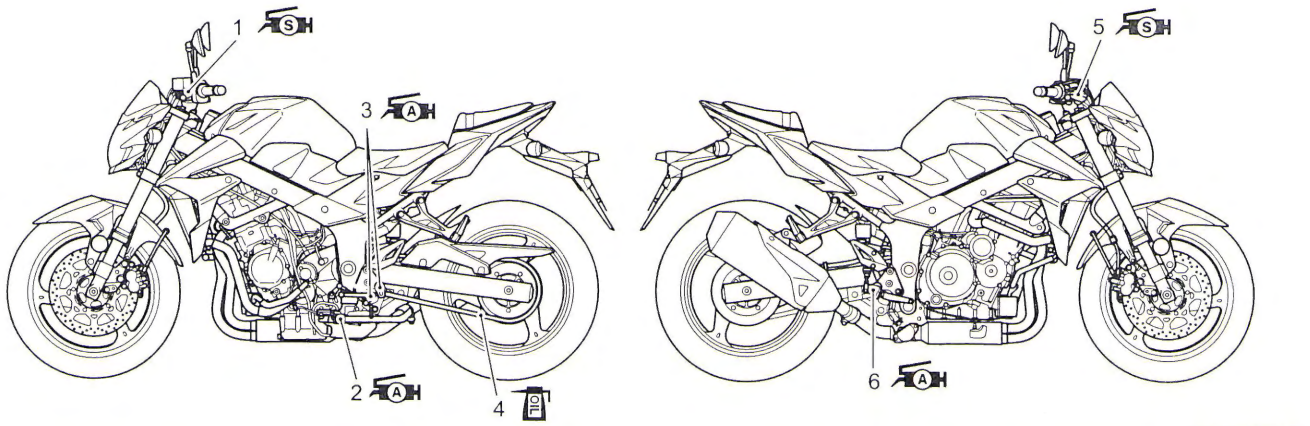
Lubrication Points

BENF08J10206036

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.**



IF08J1020003-01

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

Special Tools and Equipment

Recommended Service Material

BENF08J10208001

NOTE

Required service material(s) is also described in:
"Lubrication Points" (Page 0B-6)

Service Data

Specifications

Service Data

BENF08J10307001

Valve + Guide

Unit: mm (in)

Item		Standard	Limit
Valve diam.	IN.	27.2 (1.07)	—
	EX.	22.0 (0.87)	—
Valve clearance (when cold)	IN.	0.10 – 0.20 (0.004 – 0.008)	—
	EX.	0.20 – 0.30 (0.008 – 0.012)	—
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0014)	—
	EX.	0.030 – 0.057 (0.0011 – 0.0022)	—
Valve guide I.D.	IN. & EX.	3.985 – 4.010 (0.1569 – 0.1578)	—
Valve stem O.D.	IN.	3.975 – 3.990 (0.1565 – 0.1571)	—
	EX.	3.955 – 3.970 (0.1557 – 0.1563)	—
Valve stem deflection	IN. & EX.	—	0.35 (0.014)
Valve stem runout	IN. & EX.	—	0.05 (0.002)
Valve head thickness	IN. & EX.	—	0.5 (0.02)
Valve seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	—
Valve head radial runout	IN. & EX.	—	0.03 (0.001)
Valve spring free length	IN. & EX.	—	37.0 (1.46)
Valve spring tension	IN. & EX.	127 – 147 N (13.0 – 14.9 kgf, 28.6 – 33.0 lbs) at length 32.85 mm (1.293 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item		Standard	Limit
Cam height	IN.	36.32 – 36.36 (1.430 – 1.431)	36.02 (1.418)
	EX.	34.98 – 35.02 (1.377 – 1.379)	34.68 (1.365)
Camshaft journal oil clearance	IN. & EX.	0.025 – 0.066 (0.0010 – 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 – 0.9440)	—
Camshaft runout	—		0.10 (0.004)
Cam chain pin (at arrow "3")	14th pin		—
Cylinder head distortion	—		0.20 (0.008)

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard			Limit
Compression pressure	1 300 – 1 700 kPa (13 – 17 kgf/cm², 185 – 242 psi)			1 000 kPa (10 kgf/cm², 142 psi)
Compression pressure difference	—			200 kPa (2 kgf/cm², 28 psi)
Piston-to-cylinder clearance	0.030 – 0.040 (0.0012 – 0.0016)			0.120 (0.0047)
Cylinder bore	72.000 – 72.015 (2.8346 – 2.8352)			No nicks or Scratches
Piston diam.	71.965 – 71.980 (2.8333 – 2.8339) Measure 15 mm (0.6 in) from the skirt end.			71.880 (2.8299)
Cylinder distortion	—			0.20 (0.008)
Piston ring free end gap	1st	R	Approx. 8.2 (0.32)	6.6 (0.26)
	2nd	2R	Approx. 6.1 (0.24)	6.2 (0.24)
Piston ring end gap	1st	R	0.06 – 0.21 (0.002 – 0.008)	0.50 (0.020)
	2nd	2R	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		1.01 – 1.03 (0.0398 – 0.0406)	—
	2nd		0.81 – 0.83 (0.0319 – 0.0327)	—
	Oil		1.51 – 1.53 (0.0594 – 0.0602)	—
Piston ring thickness	1st		0.97 – 0.99 (0.0382 – 0.0390)	—
	2nd		0.77 – 0.79 (0.0303 – 0.0311)	—
Piston pin bore	16.002 – 16.008 (0.6300 – 0.6302)			16.030 (0.6311)
Piston pin O.D.	15.995 – 16.000 (0.6297 – 0.6299)			15.980 (0.6291)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard		Limit
Conrod small end I.D.	16.010 – 16.018 (0.6303 – 0.6306)		16.040 (0.6315)
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	0.032 – 0.056 (0.0013 – 0.0022)		0.080 (0.0031)
Crank pin O.D.	32.976 – 33.000 (1.2983 – 1.2992)		—
Crankshaft journal oil clearance	0.016 – 0.040 (0.0006 – 0.0016)		0.080 (0.0031)
Crankshaft journal O.D.	31.976 – 32.000 (1.2589 – 1.2598)		—
Crankshaft thrust bearing thickness	Right side	2.425 – 2.450 (0.0955 – 0.0965)	—
	Left side	2.350 – 2.500 (0.0925 – 0.0984)	—
Crankshaft thrust clearance	0.055 – 0.110 (0.0022 – 0.0043)		—
Crankshaft runout	—		0.05 (0.002)

Oil Pump

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

Clutch

Unit: mm (in)

Item	Standard		Limit
Clutch cable play	10 – 15 (0.4 – 0.6)		—
Clutch release screw	1/4 turn back		—
Clutch drive plate thickness	No. 1, 2 & 3	2.92 – 3.08 (0.115 – 0.121)	2.62 (0.103)
Clutch drive plate claw width	No. 1, 2 & 3	13.7 – 13.8 (0.539 – 0.543)	12.9 (0.508)
Clutch driven plate distortion	—		0.10 (0.004)
Clutch spring free length	73.47 (2.893)		69.8 (2.75)

Drive Train

Unit: mm (in) Except ratio

Item		Standard	Limit
Primary reduction ratio		1.857 (78/42)	—
Final reduction ratio		2.470 (42/17)	—
Gear ratios	Low	2.785 (39/14)	—
	2nd	2.052 (39/19)	—
	3rd	1.681 (37/22)	—
	4th	1.450 (29/20)	—
	5th	1.304 (30/23)	—
	Top	1.181 (26/22)	—
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	RK 525SMOZ8	—
	Links	112 links	—
	20-pitch length	—	319.4 (12.57)
Drive chain slack (on side-stand)		20 – 30 (0.8 – 1.2)	—
Gearshift lever height		40 – 50 (1.6 – 2.0)	—

Thermostat + Radiator + 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)	Intake air temperature: < 40 °C (104 °F)
	ON → OFF	Approx. 100 °C (212 °F)	
	OFF → ON	Approx. 100 °C (212 °F)	Intake air temperature: ≥ 40 °C (104 °F)
	ON → OFF	Approx. 95 °C (203 °F)	
Engine coolant type	Use an anti-freeze/coolant compatible with aluminum radiator.		—
Engine coolant including reserve	Reserve tank side	Approx. 230 ml (0.3/0.2 US/Imp qt)	—
	Engine side	Approx. 2 580 ml (2.7/2.3 US/Imp qt)	—

Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11.5 – 12.5 Ω at 20 °C (68 °F)	
Fuel pump discharge amount	167 ml (5.6/5.9 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
CMP sensor resistance	0.9 k – 1.7 kΩ		
CMP sensor peak voltage	0.7 V and more		When cranking
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. 4.3 V	
ECT sensor input voltage	4.5 – 5.5 V		
ECT sensor output voltage	0.15 – 4.85 V		
ECT sensor resistance	Approx. 2.45 kΩ at 20 °C (68 °F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor output voltage	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 k – 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	0.4 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. 0.6 V	
	Opened	Approx. 3.9 V	
STVA resistance	Approx. 7.8 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
ISC valve resistance	Approx. 20 Ω at 20 °C (68 °F)		

Throttle Body

Item	Specification
Bore size	32 mm (1.26 in)
I.D. No.	08J0
Idle r/min	1 200 ± 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 – 1.5 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			0.2 – 0.9 Ω		
Generator maximum output			Approx. 400 W at 5 000 r/min		
Generator no-load voltage (When engine is cold)			65 V (AC) and more at 5 000 r/min		
Starter motor brush length			Standard	12 (0.47)	
			Limit	6.5 (0.26)	
Regulated voltage			14.0 – 15.0 V at 5 000 r/min		
Starter relay resistance			3 – 6 Ω		
Battery	Type designation		FT12A-BS		
	Capacity		12 V 36.0 kC (10 Ah)/10 HR		
	Standard electrolyte S.G.		1.320 at 20 °C (68 °F)		
Fuse size	Headlight	HI	10 A		
		LO	10 A		
	Ignition		10 A		
	Signal		10 A		
	Fuel		10 A		
	Fan		15 A		
	Main		30 A		

Wattage

Unit: W

Item		Specification
Headlight	HI	60
	LO	55
Position light		5 x 2
Brake light/Taillight		LED
Turn signal light		21 x 4
License plate light		5
Speedometer light		LED
Tacho meter light		LED
Neutral position indicator light		LED
High beam indicator light		LED
Turn signal indicator light		LED
Oil pressure / Coolant temperature indicator light		LED
FI indicator light		LED
Immobilizer indicator light (if equipped)		LED

Brake + Wheel

Unit: mm (in)

Item		Standard	Limit
Rear brake pedal height		45 – 55 (1.8 – 2.2)	—
Brake disc thickness	Front	4.8 – 5.2 (0.19 – 0.20)	4.5 (0.18)
	Rear		
Brake disc runout		—	0.30 (0.012)
Master cylinder bore	Front	Approx. 14 (0.55)	—
	Rear		—
Master cylinder piston diam.	Front	Approx. 14 (0.55)	—
	Rear		—
Brake caliper cylinder bore	Front	Approx. 27 (1.06)	—
	Rear	Approx. 38.2 (1.50)	—
Brake caliper piston diam.	Front	Approx. 27 (1.06)	—
	Rear	Approx. 38.2 (1.50)	—
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 5.50	—
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	180/55 ZR17M/C (73 W)	—
Tire type	Front	BRIDGESTONE BT016F EE	—
	Rear	BRIDGESTONE BT016R EE	—
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	120 (4.7)	—
Front fork spring free length	289.6 (11.40)	283 (11.1)
Front fork oil level (Without spring, outer tube fully compressed)	96 (3.8)	—
Front fork oil type	SUZUKI FORK OIL L-01 or an equivalent fork oil	—
Front fork oil capacity (Each leg)	520 ml (17.6/18.3 US/Imp oz)	—
Front fork inner tube O.D	41 (1.6)	—
Front fork spring adjuster	9.0 (0.35)	—
Rear shock absorber spring adjuster	3rd position	—
Rear wheel travel	135 (5.31)	—
Swingarm pivot shaft runout	—	0.3 (0.01)

Fuel + Oil

Item	Specification		Note
Fuel type	Use only unleaded gasoline of at least 87 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.		
Fuel tank capacity	Including reserve	17.5 L (4.6/3.8 US/Imp gal)	
Engine oil type	SAE 10W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	3 200 ml (3.4/2.8 US/Imp qt)	
	Filter change	3 600 ml (3.8/3.2 US/Imp qt)	
	Overhaul	3 850 ml (4.1/3.4 US/Imp qt)	

Tightening Torque List

BENF08J10307002

Engine

Item			N·m	kgf-m	lbf-ft
Exhaust pipe bolt			23	2.3	16.5
Exhaust pipe mounting bolt			23	2.3	16.5
Muffler connecting bolt			18	1.8	13.0
Muffler cover bolt			5.5	0.55	4.0
Muffler mounting bolt			25	2.5	18.0
Speed sensor rotor bolt			28	2.8	20.5
Speed sensor bolt			4.5	0.45	3.0
Engine sprocket nut			115	11.5	83.0
Engine mounting bolt (Cylinder)			70	7.0	50.5
Engine mounting nut (Crankcase: 170 mm)			80	8.0	58.0
Engine mounting nut (Crankcase: 255 mm)			80	8.0	58.0
Cylinder head cover bolt			14	1.4	10.0
Spark plug			11	1.1	8.0
Cam chain guide No. 2 bolt			10	1.0	7.0
Cam chain guide No. 1 bolt			10	1.0	7.0
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			10	1.0	7.0
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 sleeve hub nut			150	15.0	108.5
Clutch spring set bolt			10	1.0	7.0
Starter idle gear cover bolt			10	1.0	7.0
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			120	12.0	87.0
Generator stator set bolt			11	1.1	8.0
Gearshift cam stopper bolt			10	1.0	7.0
Gearshift cam stopper plate bolt			13	1.3	9.5
Oil pressure switch			14	1.4	10.0
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]	Initial	6	0.6	4.5
		Final	11	1.1	8.0
	[M8]	Initial	15	1.5	11.0
		Final	26	2.6	19.0
Oil gallery plug	[M6]		10	1.0	7.0
	[M10]		18	1.8	13.0
	[M16]		35	3.5	25.5

Item	N·m	kgf-m	lbf-ft
Oil drain plug	23	2.3	16.5
Piston cooling oil jet bolt	10	1.0	7.0
Oil pump mounting bolt	10	1.0	7.0
Conrod cap bolt	15 N·m (1.5 kgf-m, 11.0 lbf-ft) then turn in 1/4 (90°) 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
Gearshift fork shaft retainer bolt	10	1.0	7.0
Gearshift cam bearing retainer screw	8	0.8	6.0
GP switch mounting bolt	6.5	0.65	4.7
Speed sensor mounting bolt	4.5	0.45	3.3
Starter motor mounting bolt	10	1.0	7.0
Starter motor lead wire mounting nut	6	0.6	4.5
Starter motor housing bolt	3.5	0.35	2.5
Regulator/rectifier mounting bolt	10	1.0	7.0

FI System

Item	N·m	kgf-m	lbf-ft
CMP sensor bolt	11	1.1	8.0
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 bolt	5.5	0.55	4.0
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	1.5	0.15	1.0

Cooling System

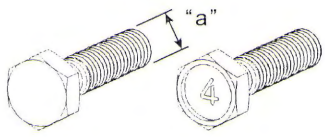
Item	N·m	kgf-m	lbf-ft
Impeller securing bolt	8	0.8	6.0
Water pump case screw	5.5	0.55	4.0
Water pump mounting bolt	10	1.0	7.0
ECT sensor	18	1.8	13.0
Thermostat connector bolt	10	1.0	7.0
Thermostat cover bolt	10	1.0	7.0
Water inlet connector bolt	10	1.0	7.0
Air bleeder bolt	5.5	0.55	4.0

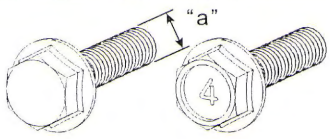
Chassis

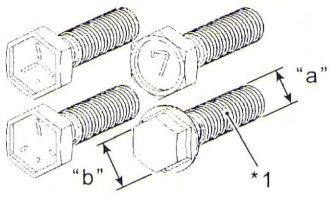
Item	N·m	kgf-m	lbf-ft
Steering stem nut	45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/2 → 1/4		
Steering stem head nut	90	9.0	65.0
Handlebar clamp bolt	23	2.3	16.5
Handlebar holder nut	45	4.5	32.5
Front fork upper clamp bolt	23	2.3	16.5
Front fork lower clamp bolt	23	2.3	16.5
Front fork cap bolt	23	2.3	16.5
Front fork inner rod lock-nut	15	1.5	11.0
Inner rod / damper rod	60	6.0	43.5
Front axle bolt	100	10.0	72.5
Front axle pinch bolt	23	2.3	16.5
Front master cylinder holder bolt (Upper and Lower)	10	1.0	7.0
Front brake caliper mounting bolt	39	3.9	28.0
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	4.3
Front brake disc bolt	23	2.3	16.5
Rear brake disc bolt	23	2.3	16.5
Rear brake caliper mounting bolt	23	2.3	16.5
Rear brake pad mounting pin	17	1.7	12.5
Pad pin plug	2.5	0.25	1.8
Rear brake master cylinder mounting bolt	10	1.0	7.0
Rear brake master cylinder rod lock-nut	18	1.8	13.0
Rear brake caliper sliding pin	27	2.7	19.5
Brake lever pivot bolt	1	0.1	0.7
Brake lever pivot bolt lock-nut	6	0.6	4.5
Swingarm pivot nut	100	10.0	72.5
Cushion lever mounting nut	98	9.8	71.0
Cushion rod front mounting nut	78	7.8	56.5
Cushion rod rear mounting nut	78	7.8	56.5
Rear shock absorber mounting nut (Upper and Lower)	50	5.0	36.0
Rear axle nut	115	11.5	83.0
Rear sprocket nut	55	5.5	40.0
Rear combination light screw	3.0	0.30	2.0
Side-stand bolt	40	4.0	29.0
Side-stand nut	50	5.0	36.0
Bank sensor bolt	18	1.8	13.0
Footrest bracket bolt	23	2.3	16.5

Tightening Torque Chart

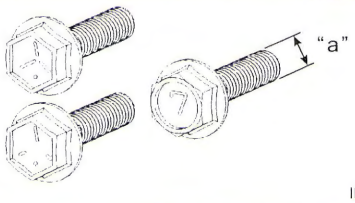
Each fastener should be tightened to the torque specified in "TIGHTENING LIST". If no description or specification is provided, refer to the following tightening torque chart for the applicable torque for each fastener.

Bolt type	Thread diameter (Normal diameter) "a" [mm]	Unit		
		N·m	kgf-m	lbf-ft
 IB14J1030006-02	4	1.5	0.15	1.0
	5	3.0	0.30	2.0
	6	5.5	0.55	4.0
	8	13	1.3	9.5
	10	29	2.9	21.0
	12	45	4.5	32.5
	14	65	6.5	47.0
	16	105	10.5	76.0
A equivalent of 4T strength fastener without flange	18	160	16.0	115.5

Bolt type	Thread diameter (Normal diameter) "a" [mm]	Unit		
		N·m	kgf-m	lbf-ft
 IB14J1030007-02	4	1.7	0.17	1.0
	5	3.3	0.33	2.5
	6	6	0.6	4.5
	8	14	1.4	10.0
	10	32	3.2	23.0
	12	50	5.0	36.0
	14	72	7.2	52.0
	16	116	11.6	84.0
A equivalent of 4T strength fastener with flange	18	176	17.6	127.5

Bolt type	Thread diameter (Normal diameter) "a" [mm]	Unit		
		N·m	kgf-m	lbf-ft
 IB14J1030008-03	4	2.3	0.23	1.5
	5	4.5	0.45	3.5
	6	10	1.0	7.0
	8	23	2.3	16.5
	10	50	5.0	36.0
	12	85	8.5	61.5
	14	135	13.5	97.5
A equivalent of 7T strength fastener without flange and small crown shape bolt *1	16	210	21.0	152.0
	18	240	24.0	173.5

*1: Small crown shape bolt (crown shape bolt with flange either "a" = 5 and "b" = 7 or "a" = 6 and "b" = 8)

Bolt type	Thread diameter (Normal diameter) "a" [mm]	Unit		
		N·m	kgf-m	lbf-ft
 IB14J1030009-03	4	2.5	0.25	2.0
	5	5	0.5	3.5
	6	11	1.1	8.0
	8	25	2.5	18.0
	10	55	5.5	40.0
	12	94	9.4	68.0
	14	149	14.9	107.5
A equivalent of 7T strength fastener with flange except small crown shape bolt	16	231	23.1	167.0
	18	264	26.4	191.0

Special Tools and Equipment

Fuel / Oil / Fluid Recommendation

BENF08J10308003

Fuel

NOTICE

Do not use leaded gasoline. If it is used, the engine and the emission control system will be damaged.

For U.S.A. and Canada

Use unleaded gasoline with an octane rating of 90 AKI or higher.
Unleaded gasoline containing up to 15% MTBE by volume may be used.
Unleaded gasoline containing up to 10% ethanol by volume may be used.
Unleaded gasoline containing up to 5% methanol by volume may be used if it contains appropriate co-solvents and corrosion inhibitors.

For other countries

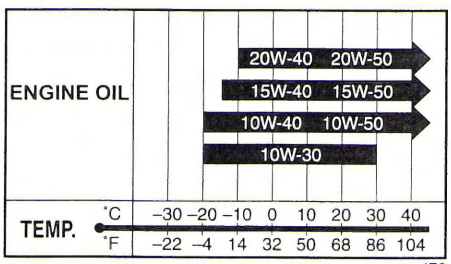
Use unleaded gasoline with an octane rating of 95 RON or higher.

Engine Oil

Use engine oils which meet the following requirements.

- API service classification: SG or higher
- JASO T903 standard: MA
- Viscosity: SAE 10W-40

If SAE 10W-40 engine oils are not available, select oils of an appropriate viscosity grade according to the following chart.



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Suzuki does not recommend the use of engine oils which have an "ENERGY CONSERVING" or "RESOURCE CONSERVING" indication in the API service symbol for any of its motorcycles / ATVs. They can affect the engine life and the clutch performance.



ID26J1030005-01

For U.S.A. and Canada

Suzuki recommends the use of SUZUKI PERFORMANCE 4 MOTOR OIL.

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.

Engine Coolant

Suzuki recommends the use of SUZUKI LONG LIFE COOLANT or SUZUKI SUPER LONG LIFE COOLANT.

Coolant 99000–99032–12X (SUZUKI LONG LIFE COOLANT (GREEN))
Coolant 99000–99032–20X (SUZUKI SUPER LONG LIFE COOLANT (BLUE))

If SUZUKI COOLANT is not available, use an anti-freeze/engine coolant compatible with an aluminum radiator, mixed with distilled water only.

For SUZUKI LONG LIFE COOLANT

NOTICE

- **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.)**

The 50:50 mixture of distilled water and ethylene glycol anti-freeze 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

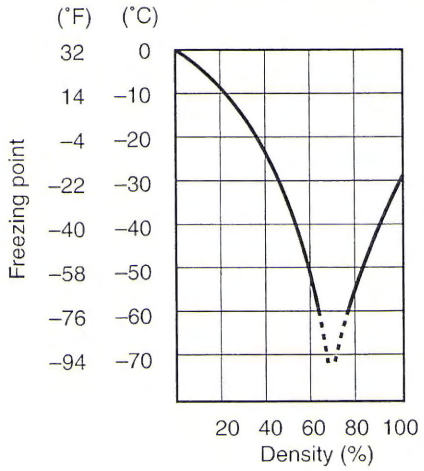

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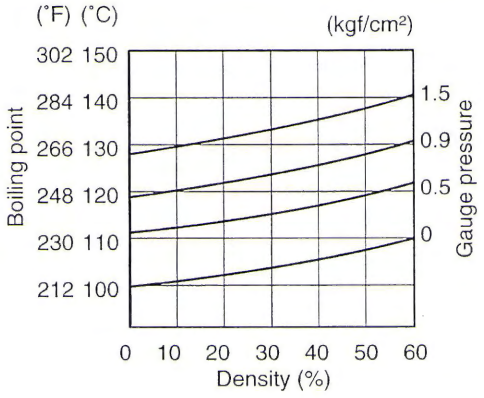
Fig.2: Engine coolant density-boiling point curve



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For SUZUKI SUPER LONG LIFE COOLANT

NOTICE

- **Ethanol or methanol base coolant or water alone should not be used in cooling system at any time as damage to cooling system could occur.**
- **Do not mix the distilled water, SUZUKI LONG LIFE COOLANT (coolant color: Green) or equivalent.**

SUZUKI SUPER LONG LIFE COOLANT will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above –36 °C (–33 °F).

Anti-freeze concentration table

Anti-freeze density	Freezing point
50%	–36 °C (–33 °F)

Water for mixing

Use distilled water only. Water other than distilled water can corrode and clog the aluminum radiator. For engine coolant mixture information, refer to "Engine Coolant" (Page 0C-11).

NOTICE

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.

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.

Front Fork Oil

Use SUZUKI FORK OIL L-01.

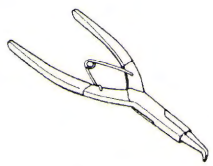
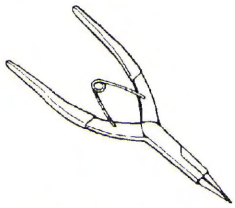
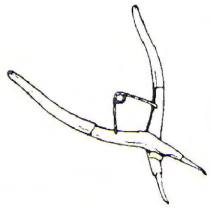
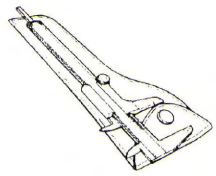
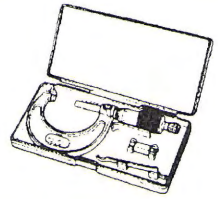
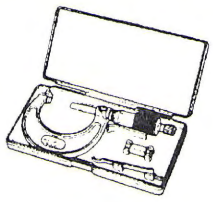
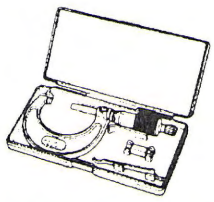
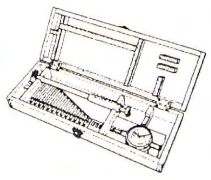
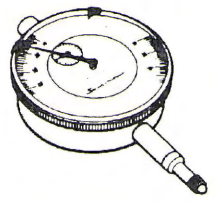
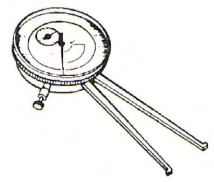
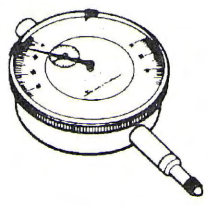
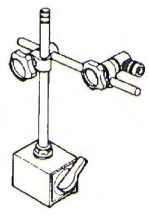
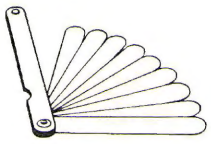
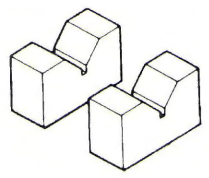
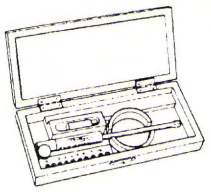
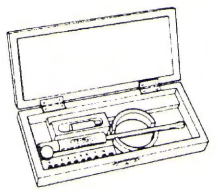
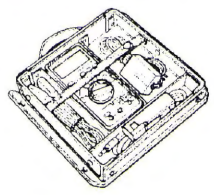
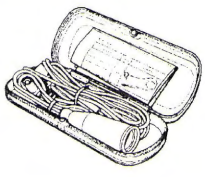
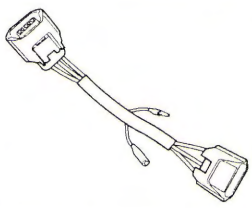
Fork oil 99000–99044–L01 (SUZUKI FORK OIL L-01)

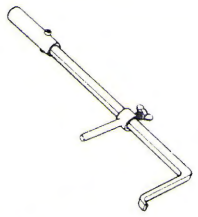
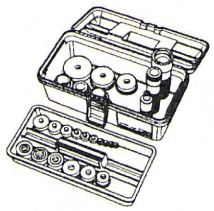
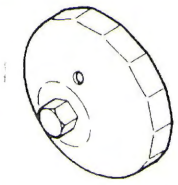
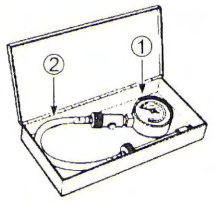
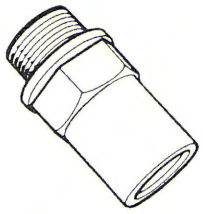
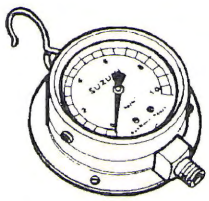
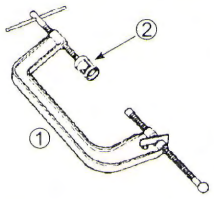
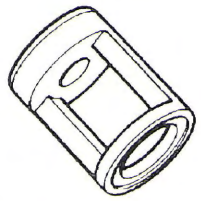
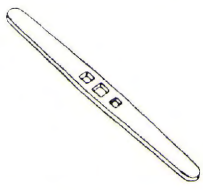
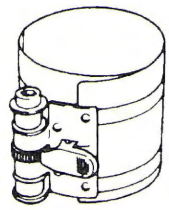
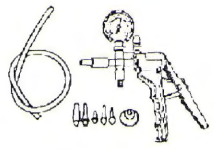
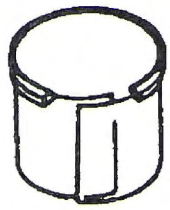
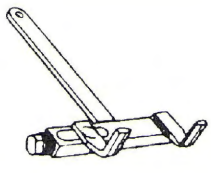
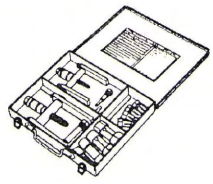
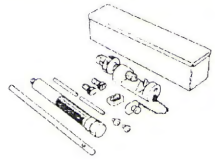
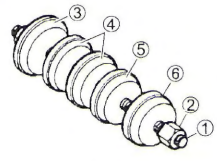
Special Tool

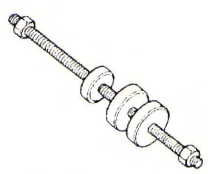
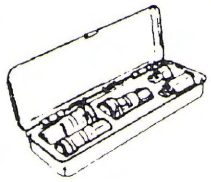
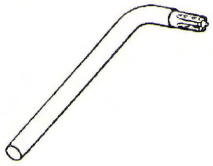
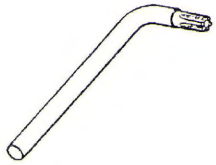
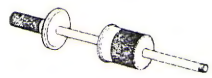
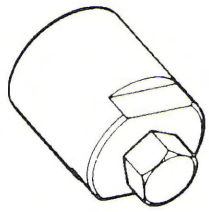
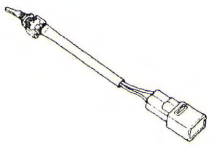
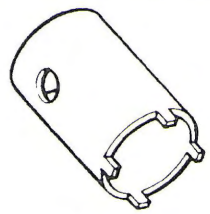
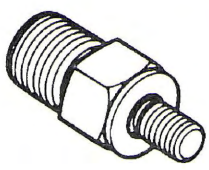
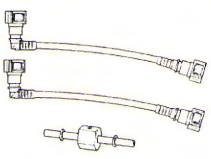
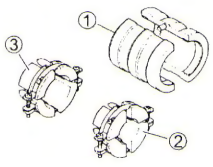
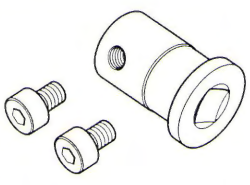
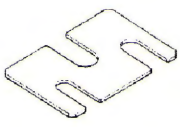
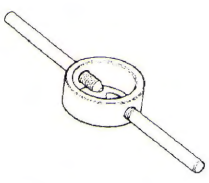
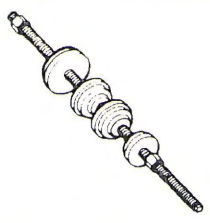
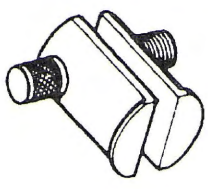
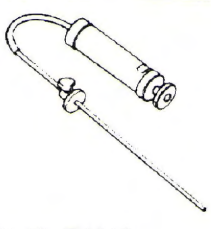
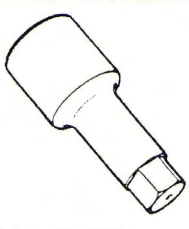
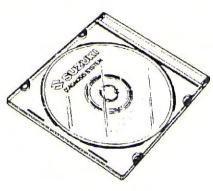
BENF08J10308002

NOTE

Torx® is the registered trademark of Camcar Division of Textron inc. U.S.A.

 **09900–06104** Snap ring pliers (External: Bent nose)	 **09900–06107** Snap ring pliers (External)	 **09900–06108** Snap ring pliers (Internal)	 **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 (1 x 0.001 mm)	 **09900–20605** Dial calipers (10 - 34 mm)
 **09900–20607** Dial gauge (10 x 0.01 mm)	 **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	 **09900–28630** TP Sensor test lead	 **09904–41010** SUZUKI Diagnostic system set	 **09910–60611** Adjustable hook wrench	 **09913–10750** Compression gauge adapter

 **09913–50121** Oil seal remover	 **09913–70210** Bearing installer set	 **09915–40620** Oil filter wrench	 **09915–64512** Compression gauge set (2500 kpa)	 **09915–74521** Oil pressure gauge hose
 **09915–74540** Oil pressure gauge attachment	 **09915–77331** Oil pressure gauge (1000 kpa)	 **09916–10911** Valve lapper set	 **09916–14510** Valve lifter	 **09916–14530** Valve lifter attachment
 **09916–33310** Valve guide reamer (ø4.0)	 **09916–34542** Reamer handle	 **09916–49030** Valve guide reamer (ø9.3)	 **09916–53310** Valve guide installer / remover	 **09916–53321** Valve guide installer attachment
 **09916–77310** Piston ring compressor	 **09916–84511** Tweezers	 **09917–47011** Vacuum pump gauge set	 **09919–28610** Sleeve protector	 **09920–34830** Starter clutch rotor holder
 **09920–53740** Clutch sleeve hub holder	 **09921–20210** Bearing remover (ø12)	 **09921–20240** Bearing remover set	 **09922–22711** Drive chain cut / rivet tool set	 **09924–84510** Bearing installer set

 **09924–84521** Bearing installer set	 **09930–10121** Spark plug socket set	 **09930–11950** Torx® wrench (T25H)	 **09930–11960** Torx® wrench (T20H)	 **09930–30104** Rotor remover sliding shaft
 **09930–34980** Rotor remover	 **09930–44521** Rotor holder	 **09930–82720** Mode selection switch	 **09940–14911** Steering stem nut socket	 **09940–30221** Front fork cylinder holder
 **09940–40211** Fuel pressure gauge adapter	 **09940–40220** Fuel pressure gauge attachment	 **09940–52841** Front fork inner rod holder	 **09940–52861** Front fork oil seal installer set	 **09940–54860** Front fork cylinder holder attachment
 **09940–92720** Spring scale (400 - 1000 g)	 **09940–94922** Front fork spring stopper plate	 **09940–94930** Front fork spacer holder	 **09941–34513** Bearing installer set	 **09941–54911** Bearing outer race remover
 **09941–74911** Steering stem bearing installer	 **09943–74111** Front fork oil level gauge	 **09944–28321** Hexagon bit socket (19 mm : 1/2 sq.)	 **99565–01010–034** CD-ROM Ver.34	

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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

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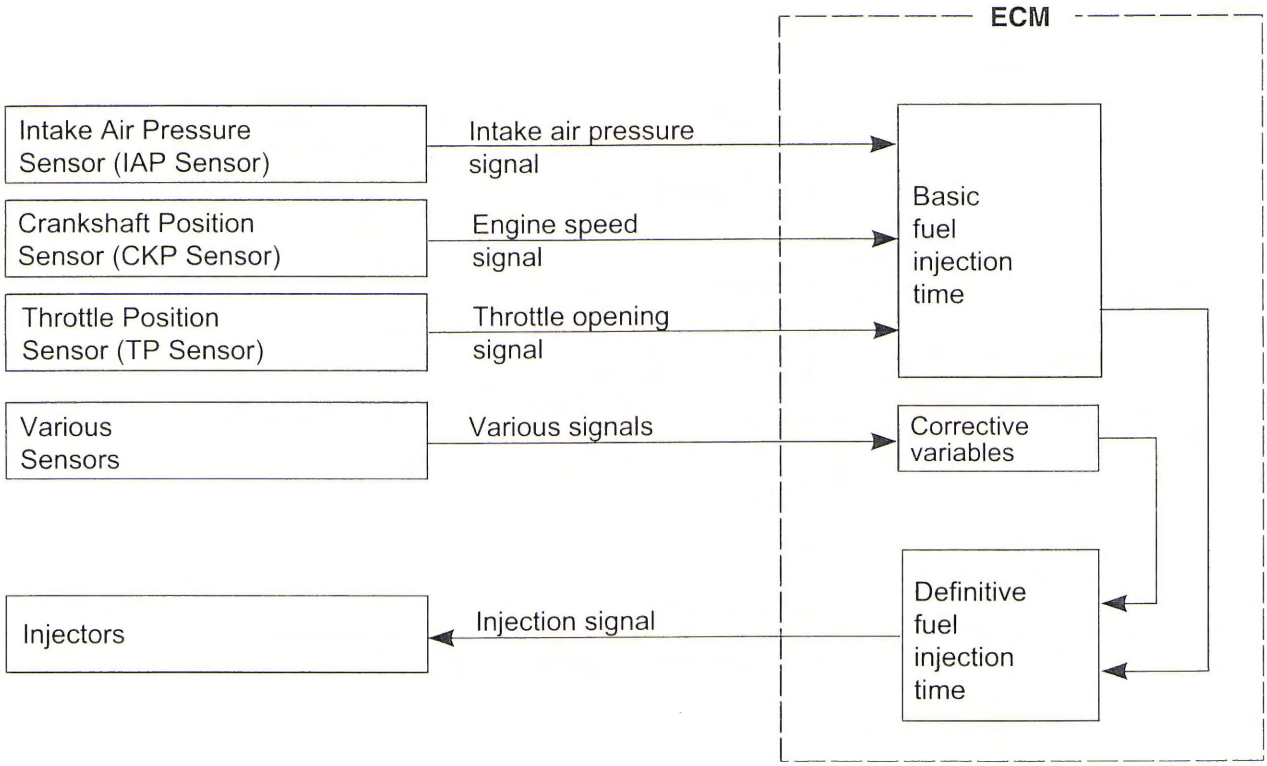
Injection Time (Injection Volume)

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 gasses. 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 SPEED SIGNAL	At high speed, the injection time (volume) is increased.
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 speed. 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 speed 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 11 600 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 11 200 r/min. ***NOTICE*** **Under no load, the engine can run over 11 200 r/min through the fuel cut-off circuit is effective, which may possibly cause engine damage. Do not run the engine without load over 11 200 r/min at anytime.**

Self-Diagnosis Function

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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 / Fuel consumption / Panel light brightness	—	—
"YES"	Engine can start	Odd / Trip / Fuel consumption / Panel light brightness and "FI" letters *1	FI indicator light turns ON.	Each 2 sec. Odd / Trip / Fuel consumption / Panel light brightness or "FI" is indicated.
	Engine can not start	"FI" letter *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 / Fuel consumption / Panel light brightness 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, FP 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.

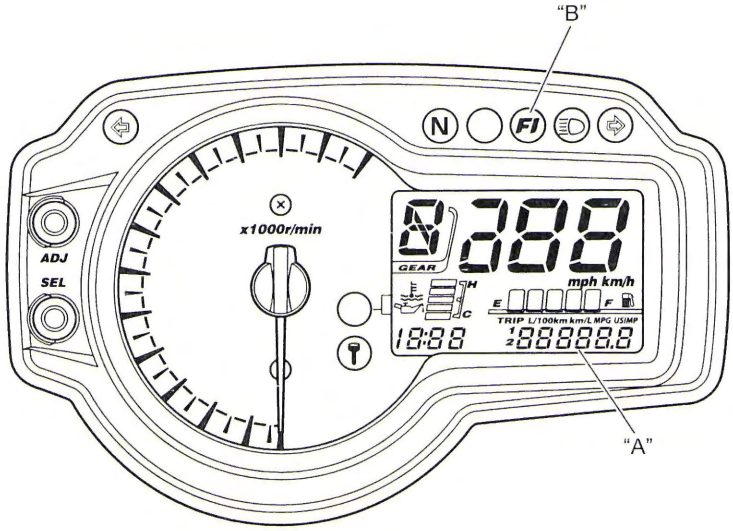
For Example:

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.

NOTE

Until starting the engine, the FI indicator light turns ON. The FI indicator light is also turned ON when engine temperature is high or oil pressure is low.



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Dealer Mode

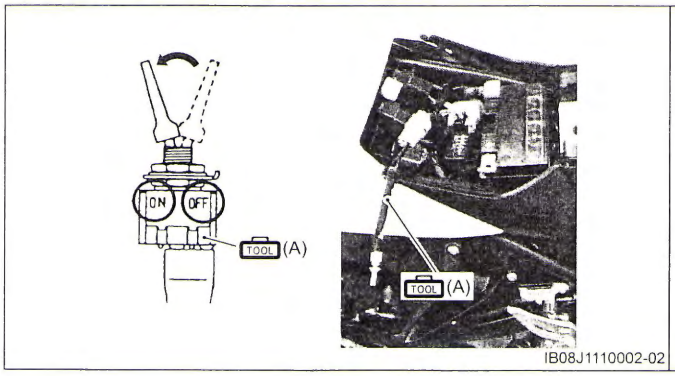
The defective function is memorized in the computer. Use the special tool's coupler to connect to the mode select switch. The memorized malfunction code is displayed on LCD (DISPLAY) panel. Malfunction means that the ECM does not receive signal from the devices. These affected devices are indicated in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

NOTE

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 select switch)



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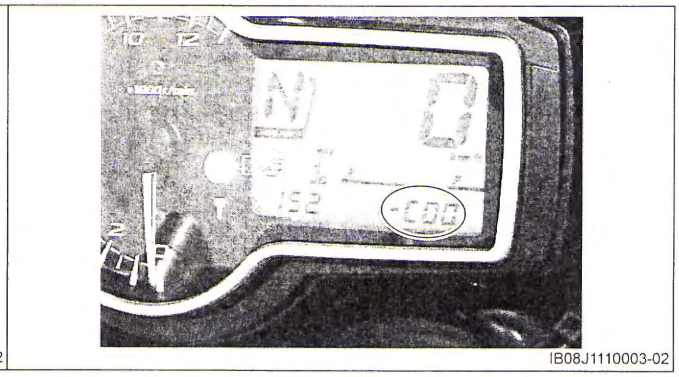

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Malfunction	LCD (display) indication	FI light indication	Indication mode
"NO"	C00	FI indicator light turns OFF.	—
"YES"	C** code is indicated from small numeral to large one.		For each 2 sec., code is indicated.

Schematic and Routing Diagram

FI System Wiring Diagram

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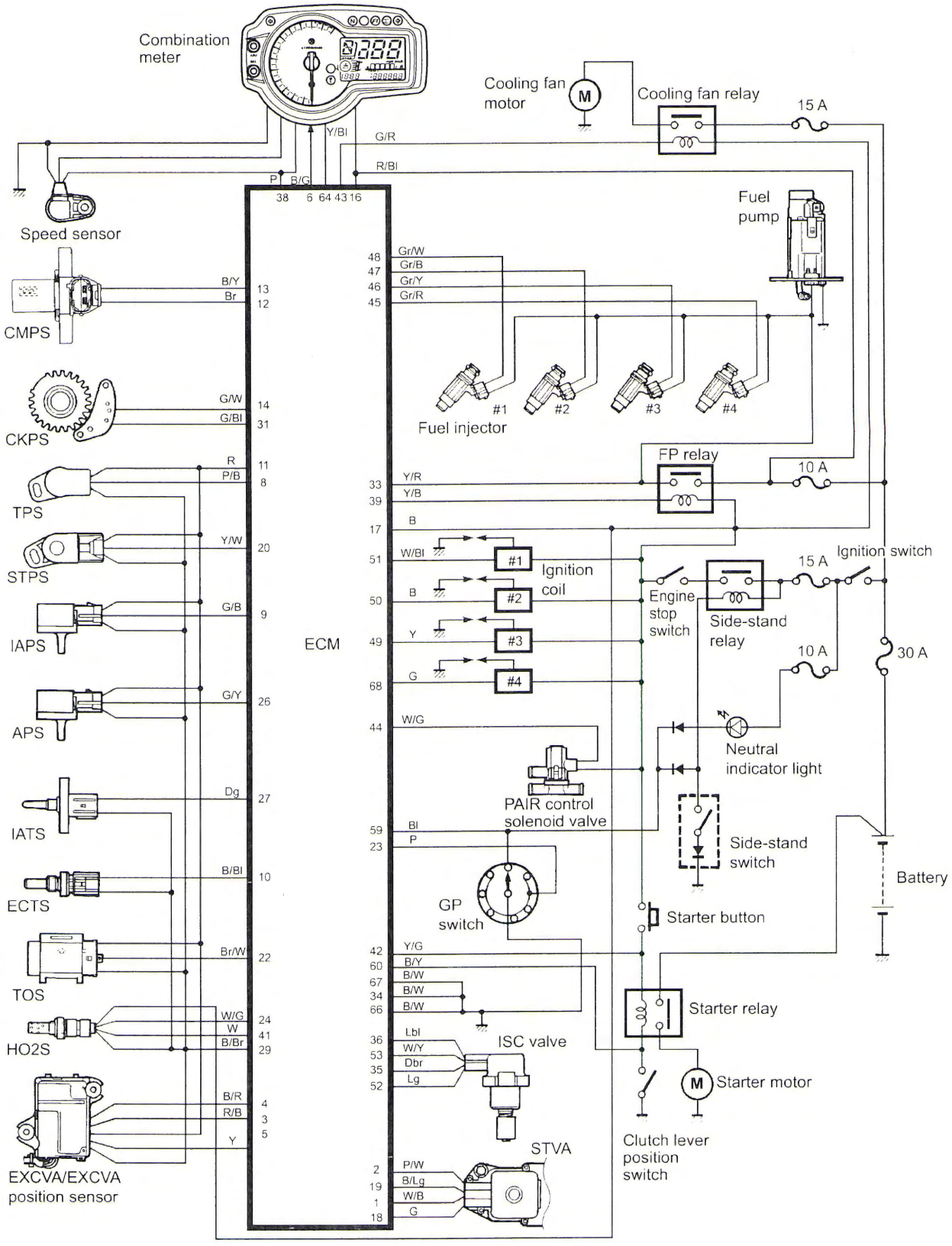

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Terminal Alignment of ECM Coupler

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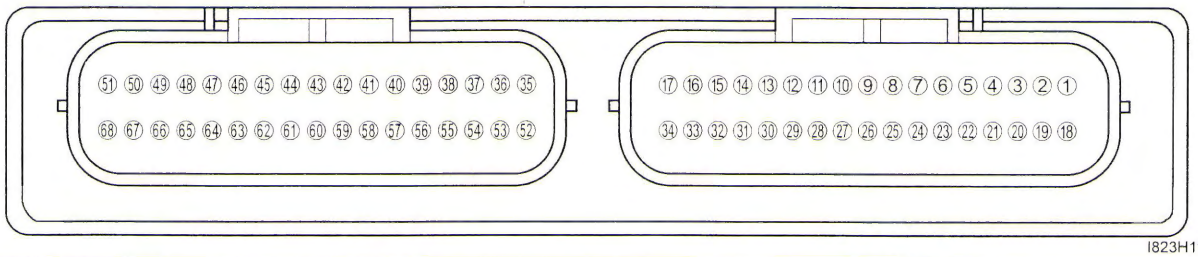

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TERMINAL NO.	CIRCUIT	TERMINAL NO.	CIRCUIT
1	STVA signal (STVA, 2A)	35	ISC valve signal (ISC, 2B)
2	STVA signal (STVA, 1A)	36	ISC valve signal (ISC, 1B)
3	EXCVA power (MO–)	37	—
4	EXCVA power (MO+)	38	Speed sensor signal
5	EXCVA position sensor (MPS)	39	Fuel pump relay (FP relay)
6	Serial data for speedometer	40	—
7	—	41	HO2 sensor heater (HO2SH)
8	TP sensor signal (TPS)	42	Starter switch
9	IAP sensor signal (IAPS)	43	Cooling fan relay (FAR)
10	ECT sensor signal (ECTS)	44	PAIR control solenoid valve (PAIR)
11	Power source for sensors (VCC)	45	Fuel injector #4
12	CMP sensor signal (CMPS–)	46	Fuel injector #3
13	CMP sensor signal (CMPS+)	47	Fuel injector #2
14	CKP sensor signal (CKPS+)	48	Fuel injector #1
15	—	49	Ignition coil #3
16	Power source for back-up (BATT)	50	Ignition coil #2
17	Power source	51	Ignition coil #1
18	STVA signal (STVA, 2B)	52	ISC valve signal (ISC, 2A)
19	STVA signal (STVA, 1B)	53	ISC valve signal (ISC, 1A)
20	STP sensor (STPS)	54	—
21	—	55	—
22	TO sensor signal (TOS)	56	—
23	GP switch signal (GP)	57	—
24	HO2 sensor signal (HO2S)	58	—
25	—	59	Neutral signal
26	AP sensor signal (APS)	60	Clutch lever switch
27	IAT sensor signal (IATS)	61	Mode select switch
28	—	62	—
29	Sensor ground (E2)	63	—
30	—	64	Tachometer
31	CKP sensor signal (CKPS–)	65	—
32	Serial data for self-diagnosis	66	General power ground (E1)
33	Power source for fuel injectors (VM)	67	Ignition system ground (E3)
34	ECM ground	68	Ignition coil #4

Component Location

FI System Parts Location

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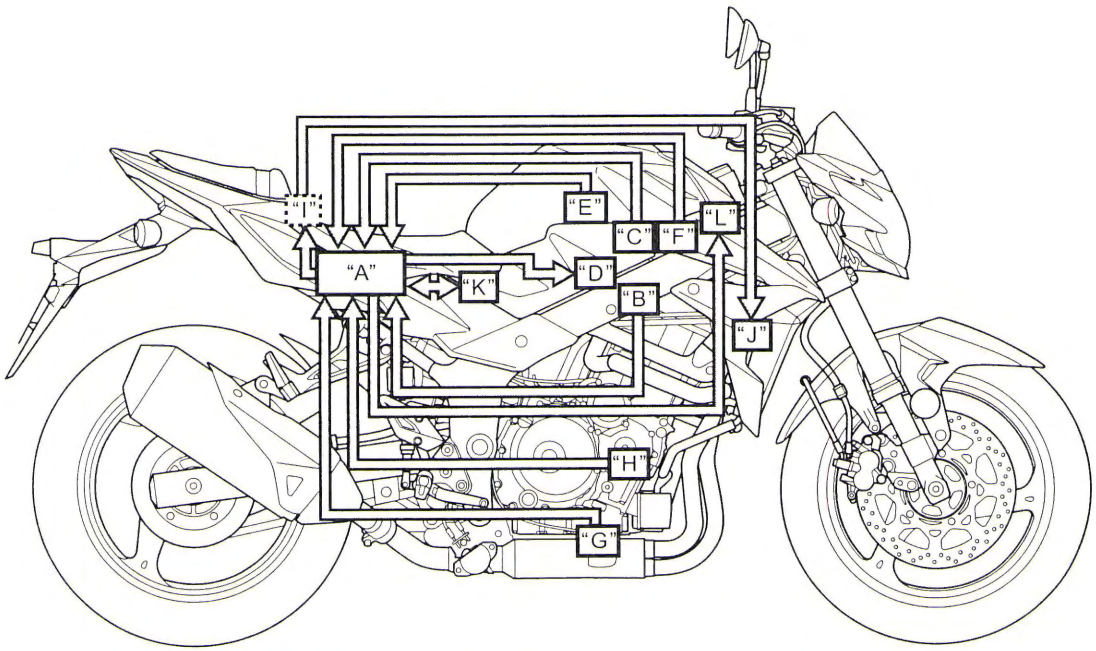

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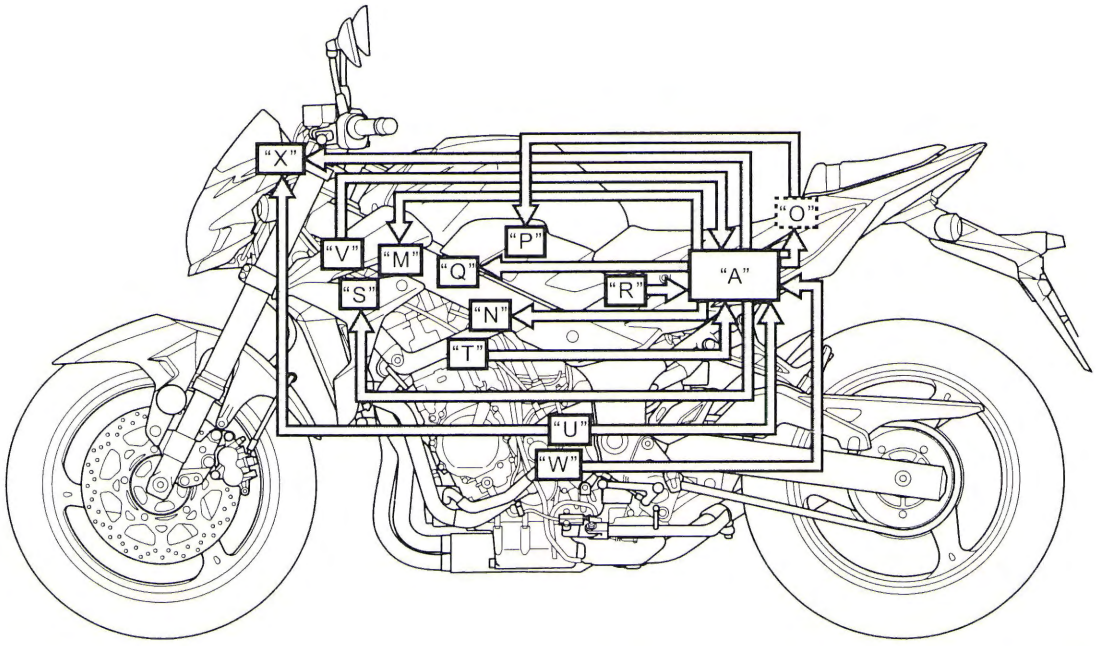
"A": ECM	"E": Intake air pressure sensor (IAPS)	"I": Cooling fan relay
"B": Throttle position sensor (TPS)	"F": Intake air temperature sensor (IATS)	"J": Cooling fan
"C": Secondary throttle position sensor (STPS)	"G": Heated oxygen sensor (HO2S)	"K": Exhaust control valve actuator (EXCVA)
"D": Secondary throttle valve actuator (STVA)	"H": Crankshaft position sensor (CKPS)	"L": PAIR control solenoid valve



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"A": ECM	"Q": ISC valve	"V": Atmospheric pressure sensor (APS)
"M": Ignition coil (IG coil)	"R": Tip-over sensor (TOS)	"W": Gear position switch (GP switch)
"N": Fuel injector	"S": Camshaft position sensor (CMPS)	"X": Combination meter
"O": Fuel pump relay (FP relay)	"T": Engine coolant temperature sensor (ECTS)	
"P": Fuel pump (FP)	"U": Speed sensor	

Diagnostic Information and Procedures

Engine Symptom Diagnosis

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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 FP 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 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.*

Condition	Possible cause	Correction / Reference Item
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 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 sensor.	*Replace.*
	Defective CMP sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective FP 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.*
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.*
	Worn cam chain guide	*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.*
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.*

Condition	Possible cause	Correction / Reference Item
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.*
	Unbalancing throttle valve synchronization.	*Adjust.*
	Defective STP sensor or STVA.	*Replace.*
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 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.*
	TP sensor out of adjustment.	*Adjust.*
	Clogged air cleaner element.	*Replace.*
	Unbalancing 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.*

Condition	Possible cause	Correction / Reference Item
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.*
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

BENF08J11104002

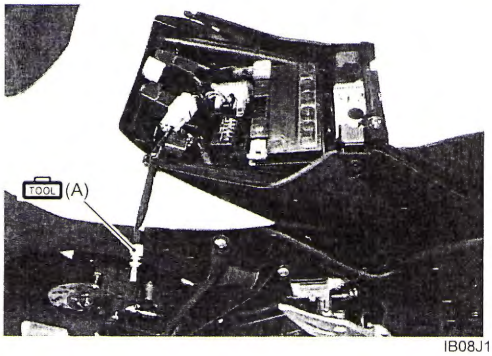
Use of Mode Select Switch

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 will erase memorized information in ECM memory.**
- **DTC stored in ECM memory can be checked by the special tool.**
- **Before checking DTC, read self-diagnosis function "User mode and dealer mode" (Refer to "Self-Diagnosis Function" (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 coupler at the wiring harness.

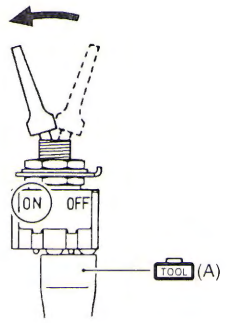
Special tool
TOOL (A): 09930–82720 (Mode select switch)



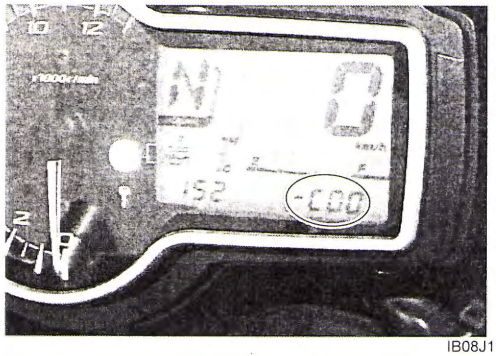
IB08J1110007-03

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 select switch)



I718H1110006-04



IB08J1110003-02

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 / SDS coupler.
8) Reinstall the front seat.

Use of SDS

NOTE

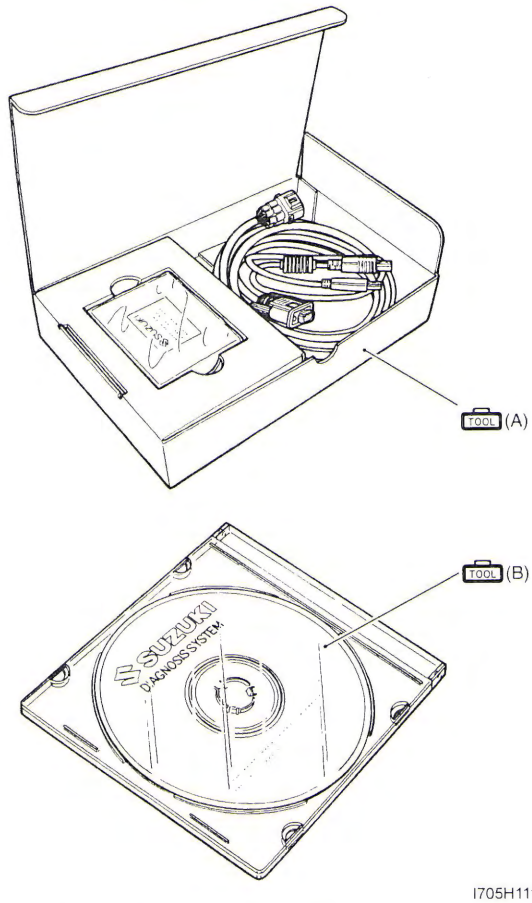
- **Do not disconnect the coupler from ECM, battery cable from battery, ECM ground wire from the engine or main fuse before confirming DTC (Diagnostic Trouble Code) stored in memory. Such disconnection will erase the memorized information in ECM memory.**
- **DTC stored in ECM memory can be checked by 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 (SDS Set)
TOOL (B): 99565–01010–034 (CD-ROM Ver.34)

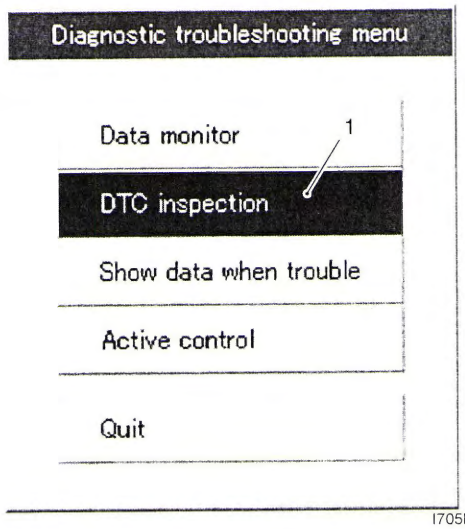


IB08J1110008-01



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.**
- **Not only SDS is used for detecting Diagnostic Trouble Codes but also for reproducing and checking on screen the failure condition as described by customers using the trigger. (Refer to "Show Data When Trouble (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.

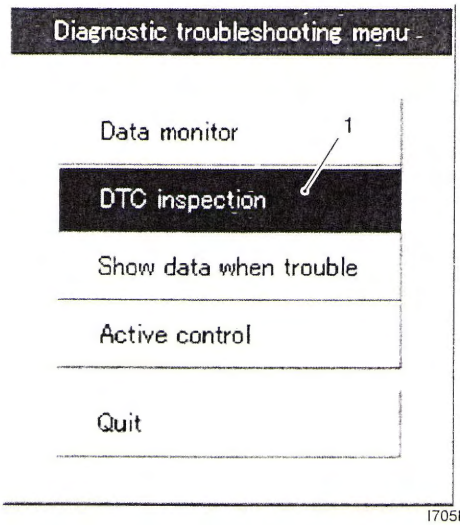
Use of SDS Diagnosis Reset Procedures

BENF08J11104003

NOTE

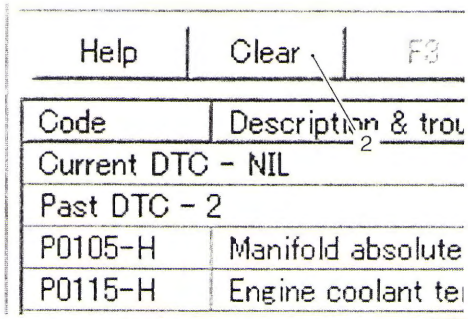
The DTC is memorized in the ECM also when the lead wire coupler of any sensor is disconnected. Therefore, when a lead wire coupler has been disconnected at the time of diagnosis, erase the stored history DTC using SDS.

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



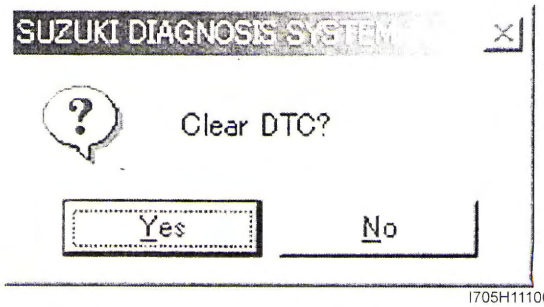
I705H1110003-01

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).

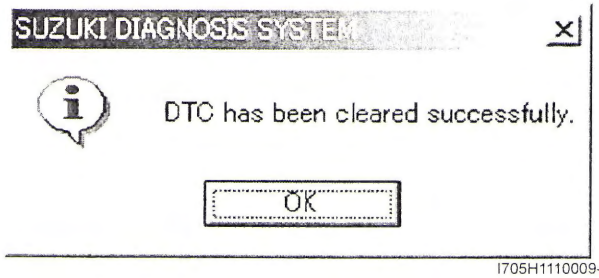


I705H1110005-01

6) Follow the displayed instructions.

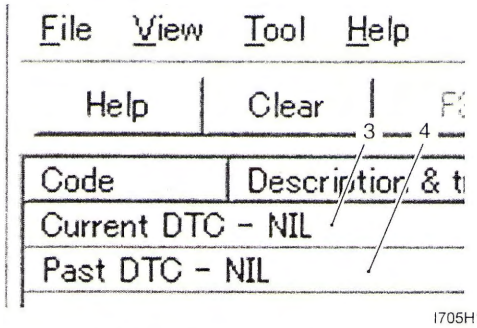


I705H1110006-01



I705H1110009-01

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)

BENF08J11104004

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.

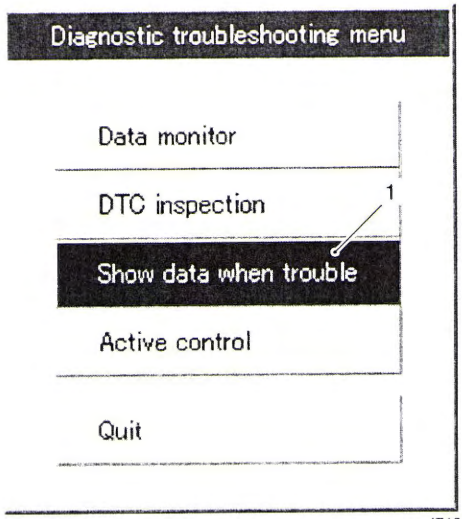
Failure #1

P0105-H Manifold absolute pressure circuit malfunction 1

Item	Pre-detect	Detect poi...	Post-dete...
Vehicle speed	0.0	0.0	0.0
Engine speed	0	0	0
Throttle position	27.9	27.9	27.9
Manifold absolute pressure 1	140.2	144.1	146.0
Engine coolant / oil temperature	67.3	67.3	67.3
Gear position	N	N	N

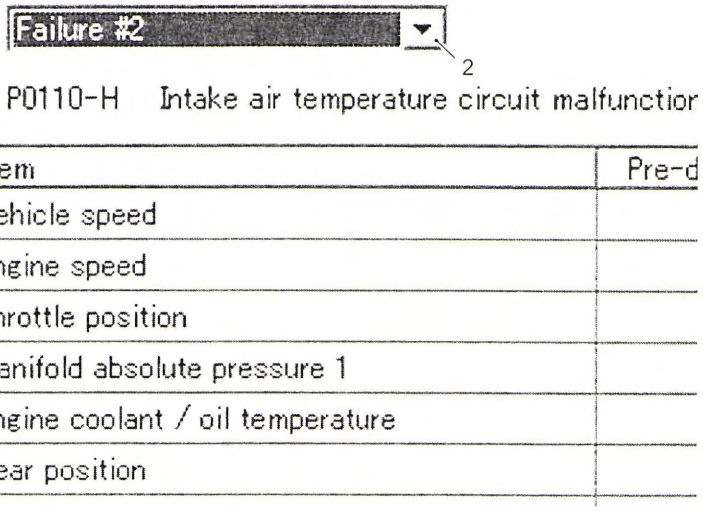
IB08J1110009-02

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.



IB08J1110010-02

SDS Check

BENF08J11104005

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.)

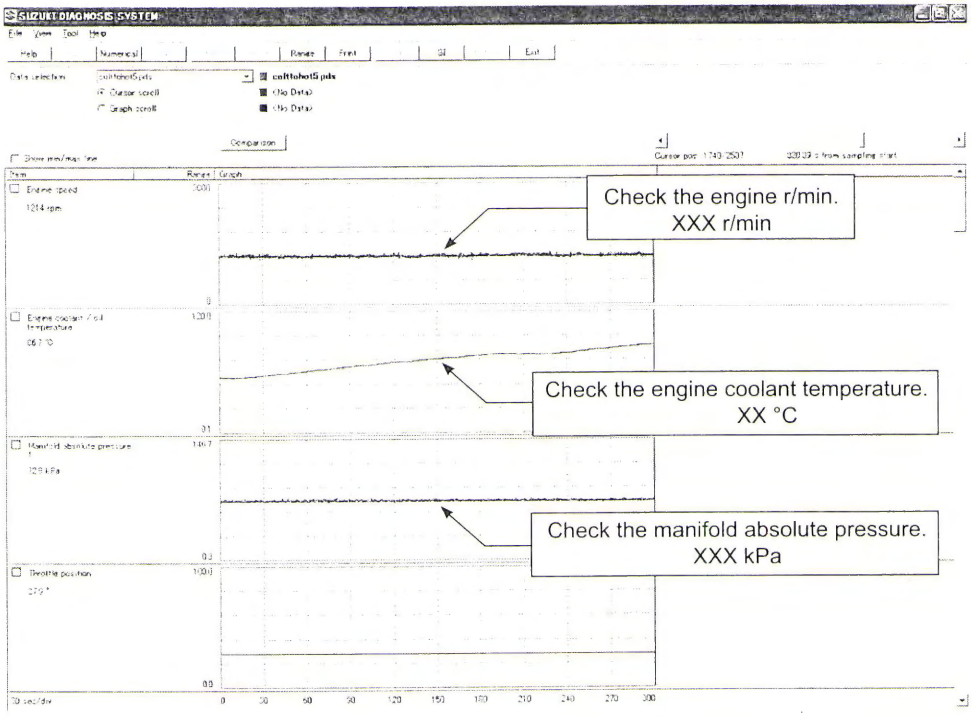
Special tool
(TOOL) : 09904–41010 (SDS set)
(TOOL) : 99565–01010–034 (CD-ROM Ver.34)

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.**

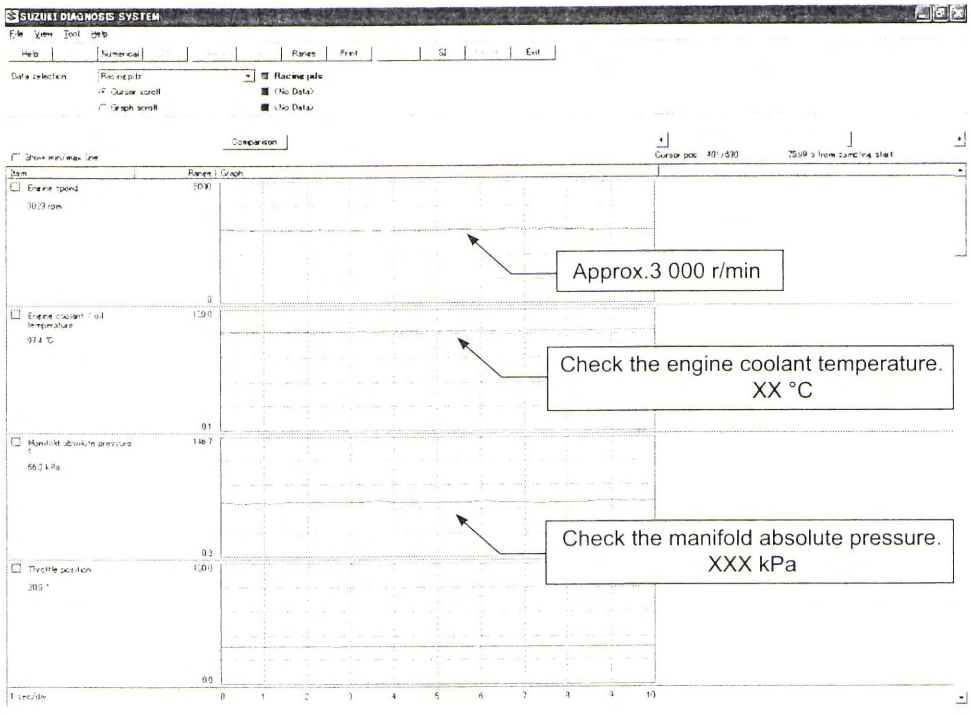
Sample

Data sampled from cold starting through warm-up



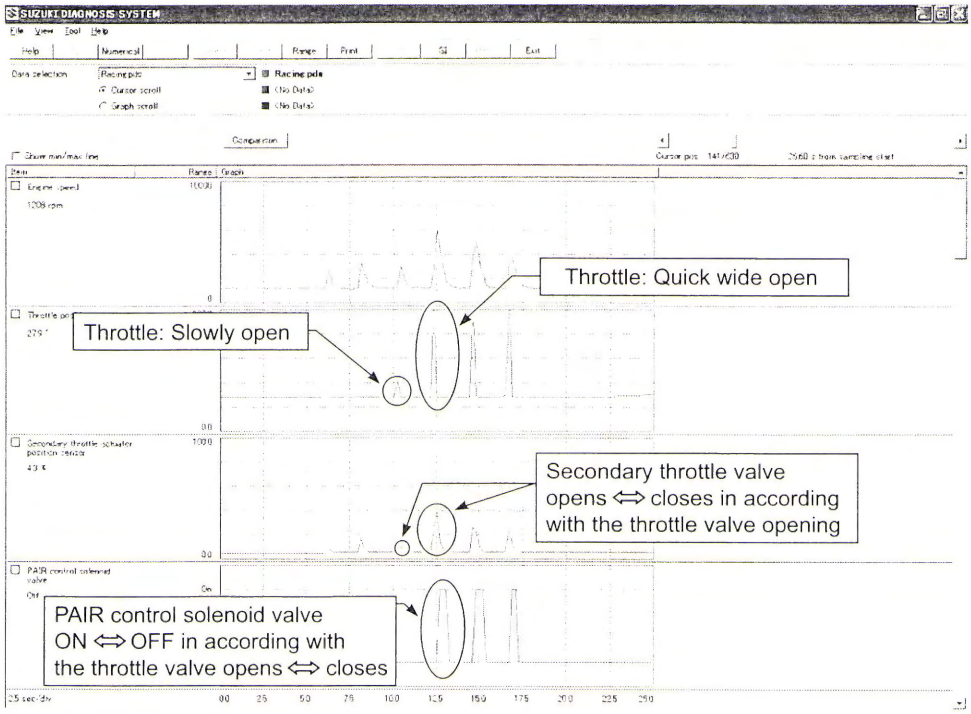
IB08J1110011-04

Data at 3 000 r/min under no load



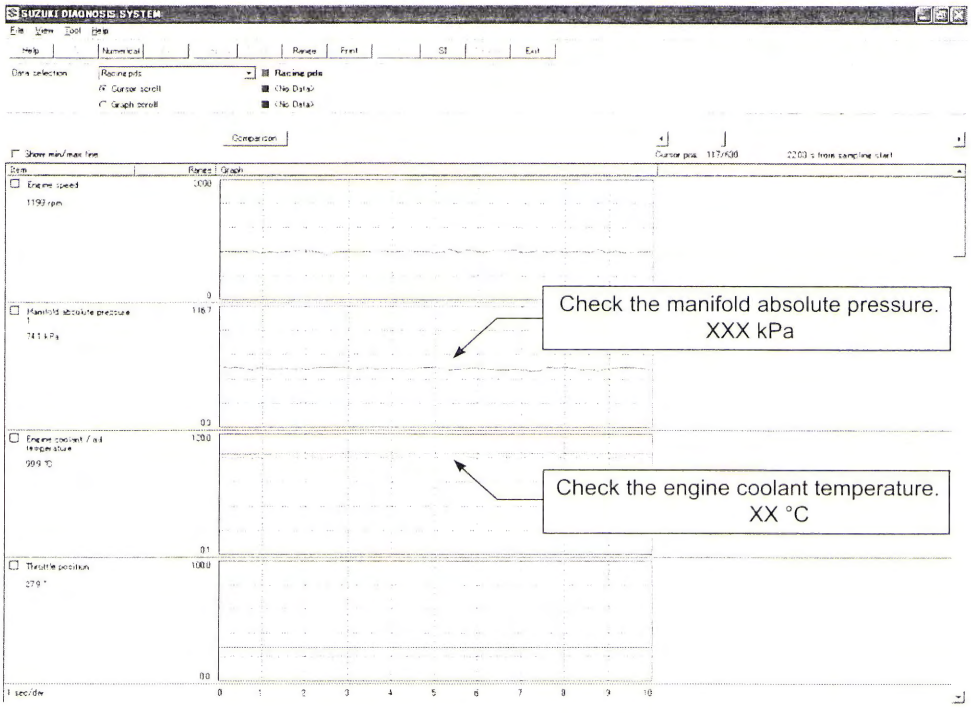
IB08J1110211-02

Data at the time of racing



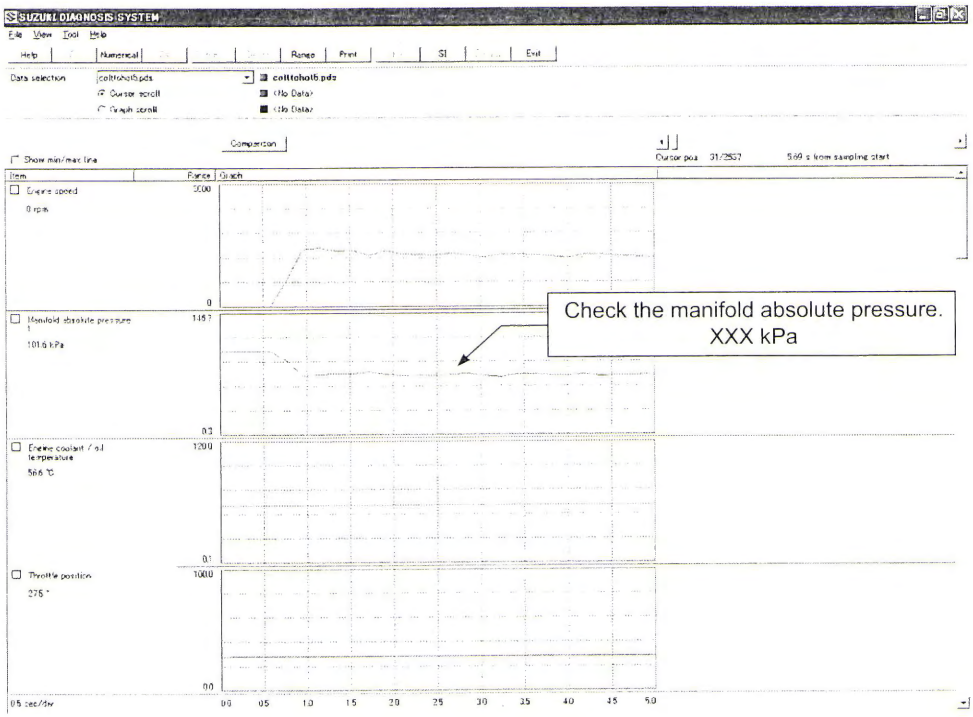
IB08J1110012-03

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



IB08J1110013-03

Data of manifold absolute pressure operation at the time of starting



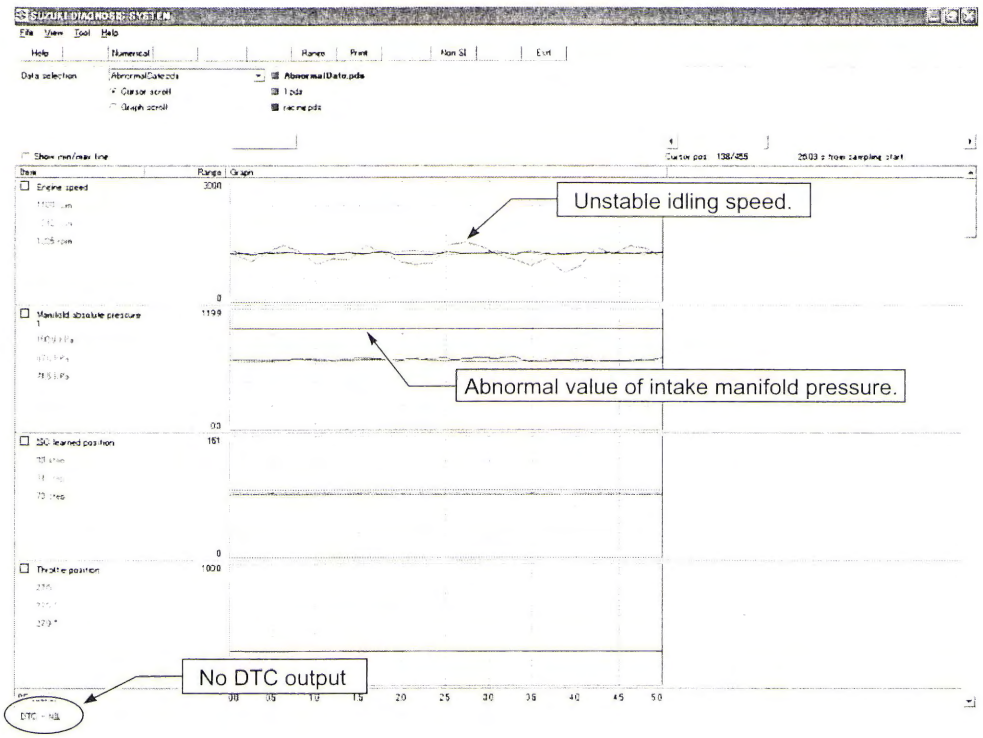
IB08J1110014-03

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.



IB08J1110213-02

DTC Table

BENF08J11104006

Code	Malfunction Part	Remarks
C00	None	No defective part
C11 (P0340) ☞(Page 1A-28)	Camshaft position sensor (CMPS)	
C12 (P0335) ☞(Page 1A-31)	Crankshaft position sensor (CKPS)	Pick-up coil signal, signal generator
C13 (P0105-H/L) ☞(Page 1A-34)	Intake air pressure sensor (IAPS)	
C14 (P0120-H/L) ☞(Page 1A-38)	Throttle position sensor (TPS)	*1
C15 (P0115-H/L) ☞(Page 1A-41)	Engine coolant temperature sensor (ECTS)	
C21 (P0110-H/L) ☞(Page 1A-44)	Intake air temperature sensor (IATS)	
C22 (P1450-H/L) ☞(Page 1A-47)	Atmospheric pressure sensor (APS)	
C23 (P1651-H/L) ☞(Page 1A-50)	Tip-over sensor (TOS)	
C24 (P0351) ☞(Page 1A-53)	Ignition signal #1 (IG coil #1)	For #1 cylinder

Code	Malfunction Part	Remarks
C25 (P0352) ☞(Page 1A-53)	Ignition signal #2 (IG coil #2)	For #2 cylinder
C26 (P0353) ☞(Page 1A-53)	Ignition signal #3 (IG coil #3)	For #3 cylinder
C27 (P0354) ☞(Page 1A-53)	Ignition signal #4 (IG coil #4)	For #4 cylinder
C28 (P1655) ☞(Page 1A-53)	Secondary throttle valve actuator (STVA)	
C29 (P1654-H/L) ☞(Page 1A-58)	Secondary throttle position sensor (STPS)	
C31 (P0705) ☞(Page 1A-61)	Gear position signal (GP switch)	
C32 (P0201) ☞(Page 1A-64)	Injector signal #1	For #1 cylinder
C33 (P0202) ☞(Page 1A-64)	Injector signal #2	For #2 cylinder
C34 (P0203) ☞(Page 1A-64)	Injector signal #3	For #3 cylinder
C35 (P0204) ☞(Page 1A-64)	Injector signal #4	For #4 cylinder
C40 (P0505) ☞(Page 1A-67)	Idle speed control valve (ISC valve)	
C41 (P0230-H/L, P2505) ☞(Page 1A-71) / ☞(Page 1A-73)	Fuel pump control system (FP control system), ECM/PCM power input signal	Fuel pump, FP relay
C42 (P1650) ☞(Page 1A-75)	Ignition switch signal (Anti-theft)	Immobilizer antenna (if equipped)
C44 (P0130, P0135) ☞(Page 1A-78)	Heated oxygen sensor (HO2S)	
C46 (P1657-H/L, P1658) ☞(Page 1A-86)	Exhaust control valve actuator (EXCVA)	
C49 (P1656) ☞(Page 1A-93)	PAIR control solenoid valve	
C60 (P0480) ☞(Page 1A-96)	Cooling fan control system	Cooling fan relay
C65 (P0506/P0507) ☞(Page 1A-100)	Idle speed control system	
C91 (P0500) ☞(Page 1A-101)	Vehicle speed sensor	

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 speed is 1 200 r/min, slightly turn the throttle position sensor and bring the line to the middle.

Fail-Safe Function Table

BENF08J11104007

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	"YES"	"YES"
		#2, #3 & #4 cylinders can run.	
	#2 fuel-cut	"YES"	"YES"
		#1, #3 & #4 cylinders can run.	
	#3 fuel-cut	"YES"	"YES"
		#1, #2 & #4 cylinders can run.	
	#4 fuel-cut	"YES"	"YES"
		#1, #2 & #3 cylinders can run.	
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.	
STVA	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"
GP signal	GP 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"
EXCVA	EXCVA 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"
Vehicle speed sensor	—	"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

BENF08J11104008

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 speed 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 Temperature Frequency	□ Fair / □ Cloudy / □ Rain / □ Snow / □ Always / □ Other □ Hot / □ Warm / □ Cool / □ Cold (°C / °F) / □ Always □ 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 1E (Page 1E-6).
- Engine coolant level and leakage. Refer to "Cooling Circuit Inspection" in Section 1F (Page 1F-5).
- Fuel leakage. Refer to "Fuel Hose Inspection" in Section 1G (Page 1G-7).
- Clogged air cleaner element. Refer to "Air Cleaner Element Inspection" in Section 1D (Page 1D-6).
- Battery condition.
- Throttle cable play. Refer to "Throttle Cable Play Inspection and Adjustment" in Section 1D (Page 1D-8).
- 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-15).
- Each coupler disconnection.
- Clogged radiator fins. Refer to "Radiator Inspection and Cleaning" in Section 1F (Page 1F-7).

Malfunction Code and Defective Condition Table

BENF08J11104009

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, rotor tip, 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 signal circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	IAP sensor signal 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 signal circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TP sensor signal 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 signal circuit open or ground circuit open
	L		Sensor voltage is lower than specified value.	IAT sensor signal 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 signal circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	AP sensor signal 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 signal circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TO sensor signal 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		STVA	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 signal circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	STP sensor signal circuit open or shorted to ground or VCC circuit open
C31		GP signal	GP signal voltage should be higher than the following for 3 seconds and more. GP 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		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.	Fuel injector, wiring/coupler connection, power supply to the injector
P0201/P0202 P0203/P0204				
C40/P0505		ISC valve	The circuit voltage of motor drive is unusual.	ISC valve circuit open or shorted to ground
C41		FP relay	No voltage is applied to the fuel pump, although FP relay is turned ON, or voltage is applied to fuel pump although FP relay is turned OFF.	FP relay, lead wire/coupler connection, power source to FP relay and fuel injectors
P0230	H		Voltage is applied to fuel pump although FP relay is turned OFF.	FP relay switch circuit shorted to power source FP relay (switch side)
	L		No voltage is applied to the fuel pump, although FP relay is turned ON.	FP relay circuit open or short FP 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

Malfunction Code	Detected Item	Detected Failure Condition	Check For
C42 P1650	Immobilizer antenna	When the I.D. agreement is not verified. ECM does not receive communication signal from the immobilizer antenna.	Immobilizer/anti-theft system (if equipped)
C44/P0130	HO2 sensor	HO2 sensor output voltage is not input to ECM during specified running condition. C44 (P0130) is indicated.	Output state of HO2 sensor
C44/P0135		The Heater can not operate so that heater operation voltage is not supplied to the HO2 sensor heater circuit, C44 (P0135) is indicated.	HO2 sensor heater circuit open or shorted to ground Battery voltage supply to the HO2 sensor
C46	EXCVA	EXCVA position sensor produces following voltage. 0.1 V ≤ sensor voltage < 4.9 V In other than the above range, C46 (P1657) 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
P1657 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 P1656	PAIR control solenoid valve	PAIR control solenoid valve voltage is not input to ECM.	PAIR control solenoid valve, lead wire/coupler connection
C60 P0480	Cooling fan relay	Cooling fan relay signal is not input to ECM.	Cooling fan relay, lead wire/ coupler connection
C65/P0506	ISC valve (Idle speed)	Idle speed dropped lower than desired idle speed by more than specified range.	Air passage clogged ISC valve is fixed ISC valve preset position is incorrect
C65/P0507		Idle speed rose higher than desired idle speed by more than specified range.	ISC valve hose connection ISC valve is fixed ISC valve preset position is incorrect
C91 P0500	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

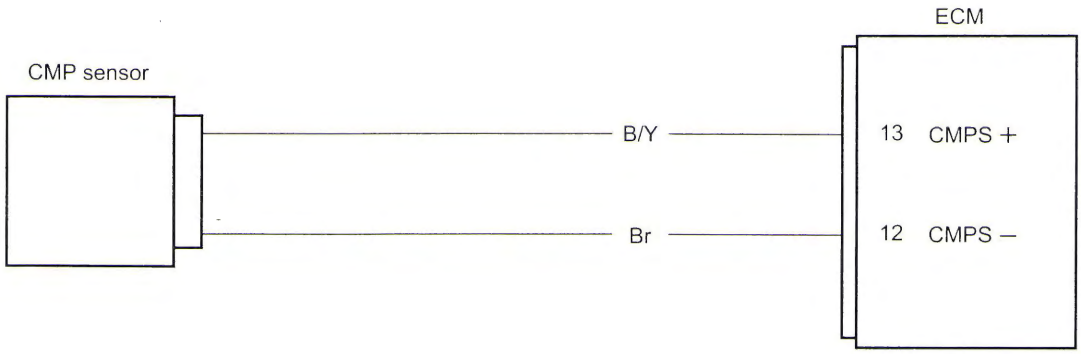
DTC "C11" (P0340): CMP Sensor Circuit Malfunction

BENF08J11104010

Detected Condition and Possible Cause

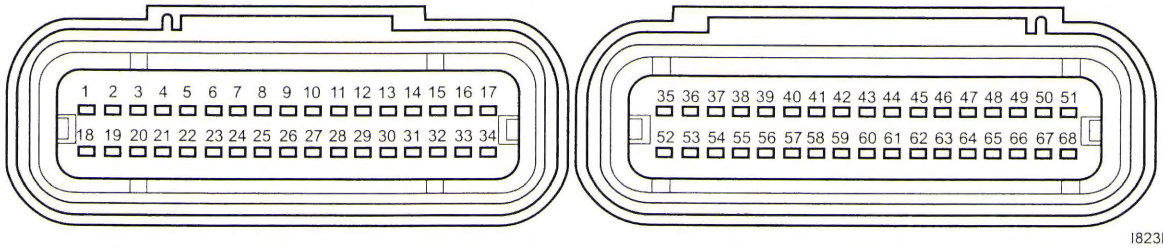
Detected Condition	Possible Cause
The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	• Metal particles or foreign material being stuck on the CMP sensor and intake cam pin. • CMP sensor circuit open or short. • CMP sensor malfunction. • ECM malfunction.

Wiring Diagram



IB08J1110015-02

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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

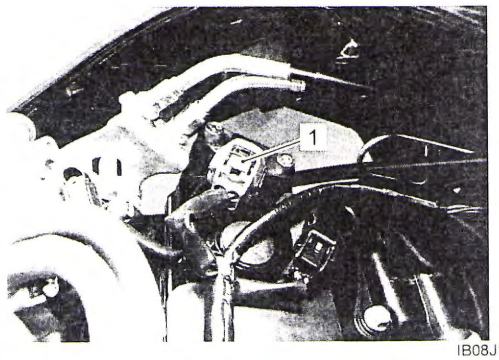
After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures" (Page 1A-14).

Step 1

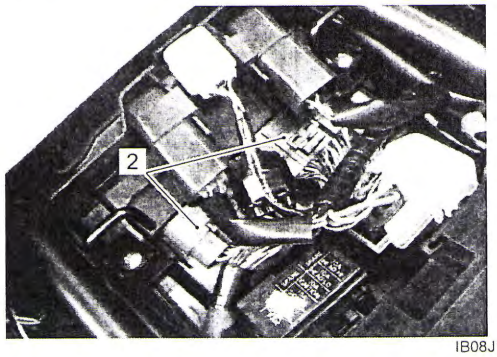
CMP sensor signal circuit check

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 CMP sensor coupler (1) and ECM couplers (2).



IB08J1110016-02



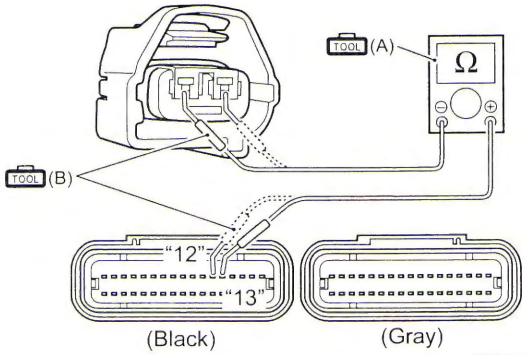
IB08J1110017-02

4) Check for proper terminal connection to the CMP sensor coupler and ECM couplers.
5) If connections are OK, check the following points.
   - Resistance

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

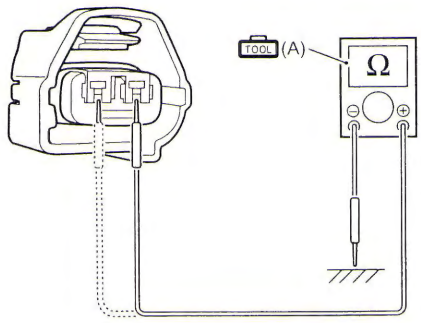
     Tester knob indication
     Resistance (Ω)

     – B/Y wire and Br wire: less than 1 Ω



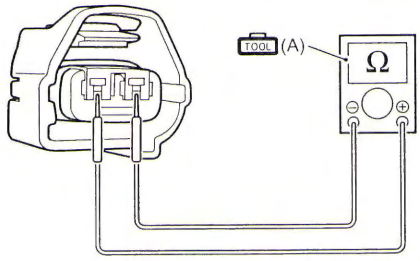
IB08J1110018-02

     – Between each of the B/Y wire and Br wire and ground: infinity



IB08J1110019-02

     – Between the B/Y wire terminal and other terminal at CMP sensor coupler: infinity



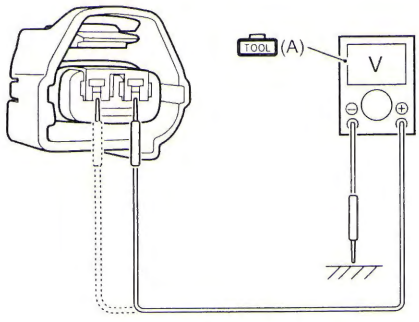
IB08J1110020-02

   - Voltage

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

     Tester knob indication
     Voltage (⎓)

     – B/Y wire and Br wire: approx. 0 V (When ignition switch is ON)



IB08J1110021-02

Is check result OK?

Yes	Go to Step 2.
No	Repair or replace the defective wire harness.

Step 2

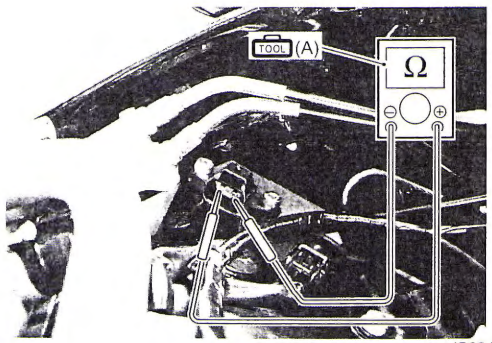
CMP sensor check

1) Measure the CMP sensor resistance.

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

Tester knob indication
Resistance (Ω)

CMP sensor resistance
0.9 k – 1.7 kΩ

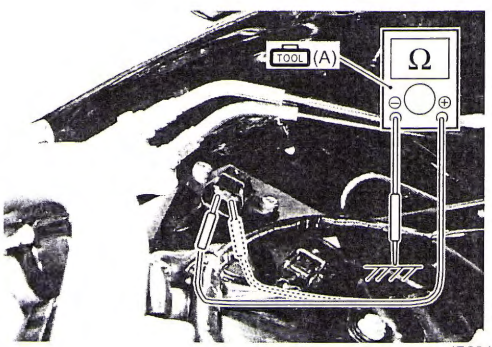


IB08J1110022-02

2) Check the continuity between each terminal and ground.

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

CMP sensor continuity
∞ Ω (Infinity) (B/Y – Ground, Br – Ground)



IB08J1110023-03

Is check result OK?

Yes — Go to Step 3.

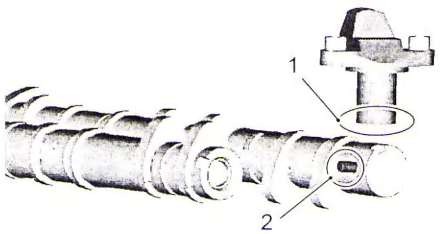
No — Replace the CMP sensor with a new one. Refer to "CMP Sensor Removal and Installation" in Section 1C (Page 1C-2).

Step 3

CMP sensor and intake cam pin check

1) Remove the CMP sensor. Refer to "CMP Sensor Removal and Installation" in Section 1C (Page 1C-2).

2) Check that end face of the CMP sensor (1) and intake cam pin (2) are free from any metal particles and damage.



IB08J1110024-02

Is check result OK?

Yes — Go to Step 4.

No — Clean or replace defective parts.

Step 4

CMP sensor peak voltage check

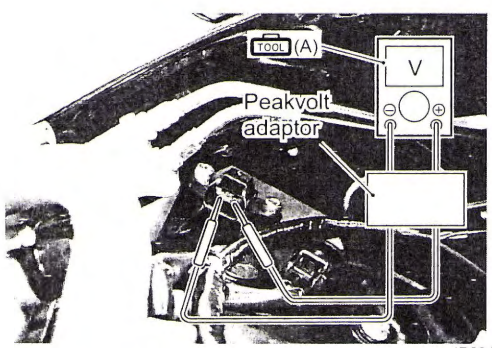
1) Connect the ECM couplers.

2) Crank the engine several seconds with the starter motor, and measure the CMP sensor peak voltage at the coupler.

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

Tester knob indication
Voltage (⎓)

CMP sensor peak voltage
0.7 V and more



IB08J1110025-02

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the CMP sensor with a new one. Refer to "CMP Sensor Removal and Installation" in Section 1C (Page 1C-2).

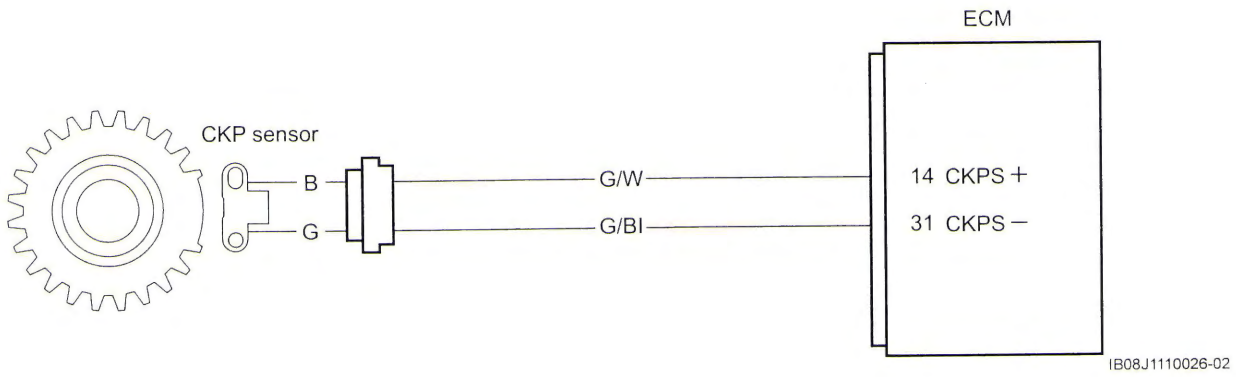
DTC "C12" (P0335): CKP Sensor Circuit Malfunction

BENF08J11104011

Detected Condition and Possible Cause

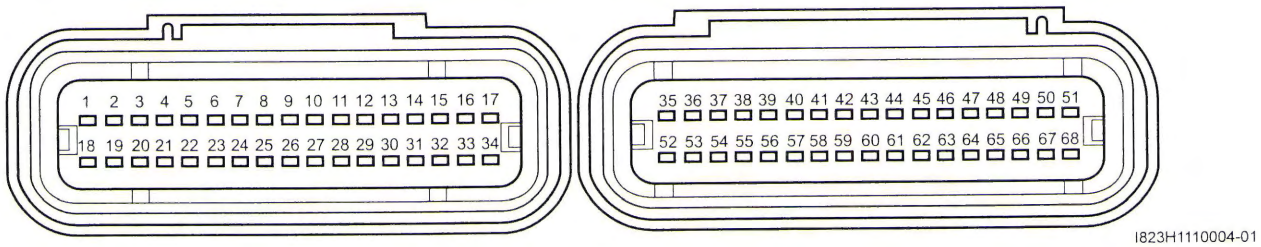
Detected Condition	Possible Cause
The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	• Metal particles or foreign material being stuck on the CKP sensor and rotor tip. • CKP sensor circuit open or short. • CKP sensor malfunction. • ECM malfunction.

Wiring Diagram



IB08J1110026-02

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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 1

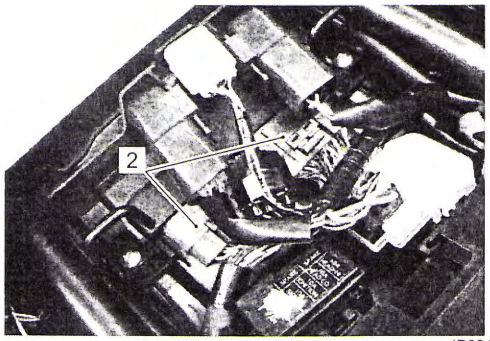
CKP sensor signal circuit check

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 CKP sensor coupler (1) and ECM couplers (2).



IB08J1110027-02



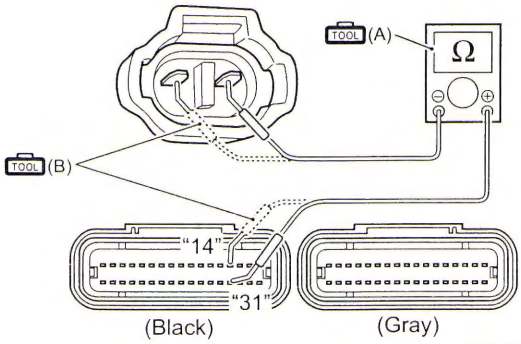
IB08J1110017-02

4) Check for proper terminal connection to the CKP sensor coupler and ECM couplers.
5) If connections are OK, check the following points.
   - Resistance

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

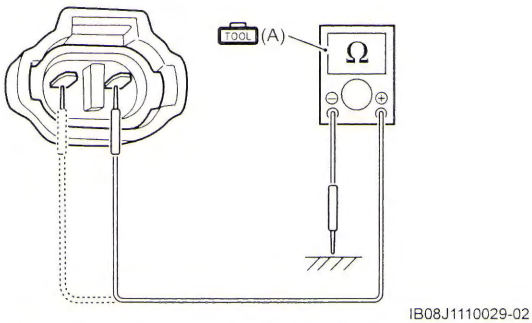
     Tester knob indication
     Resistance (Ω)

     – G/W wire and G/Bl wire: less than 1 Ω



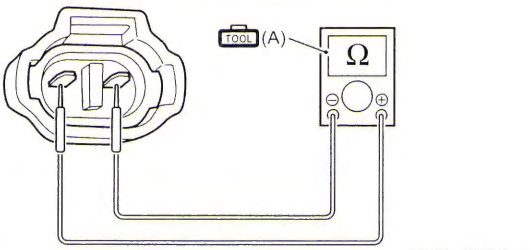
IB08J1110028-02

     – Between each of the G/W and G/L wire and ground: infinity



IB08J1110029-02

     – Between the G/W wire and other terminal at CKP sensor coupler: infinity



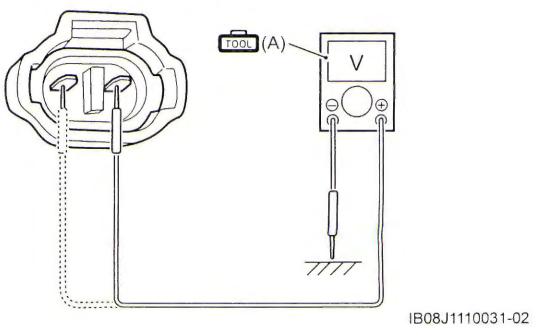
IB08J1110030-02

   - Voltage

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

     Tester knob indication
     Voltage (⎓)

     – G/W wire and G/Bl wire: approx. 0 V (When ignition switch is ON)



IB08J1110031-02

Is check result OK?

Yes	Go to Step 2.
No	Repair or replace the defective wire harness.

Step 2

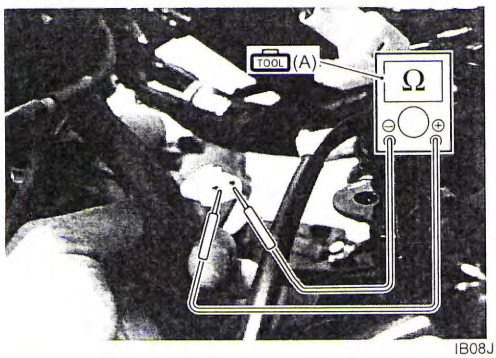
CKP sensor check

1) 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

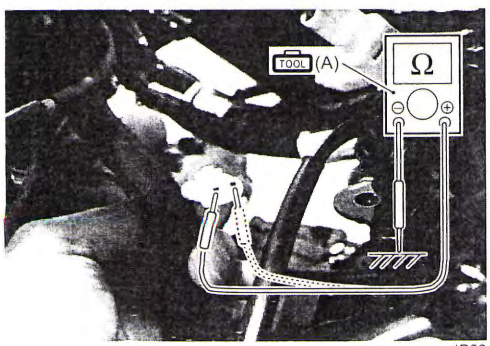


1B08J1110032-02

2) Check the continuity between each terminal and ground.

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

CKP sensor continuity
∞ Ω (Infinity) (G/W – Ground, G/Bl – Ground)



1B08J1110033-03

Is check result OK?

Yes — Go to Step 3.

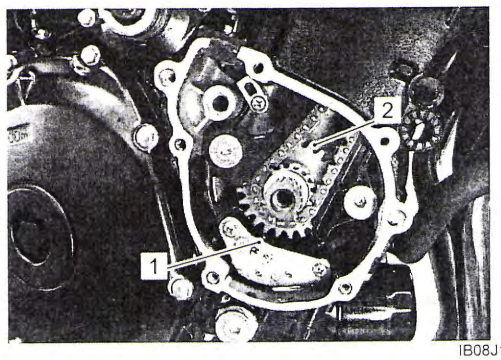
No — Replace the CKP sensor with a new one. Refer to "CKP Sensor Removal and Installation" in Section 1C (Page 1C-2).

Step 3

CKP sensor and signal rotor check

1) Remove the starter clutch. Refer to "Starter Clutch Removal and Installation" in Section 1I (Page 1I-10).

2) Check that end face of the CKP sensor (1) and signal rotor teeth (2) are free from any metal particles and damage.



1B08J1110034-02

Is check result OK?

Yes — Go to Step 4.

No — Clean or replace defective parts.

Step 4

CKP sensor signal check

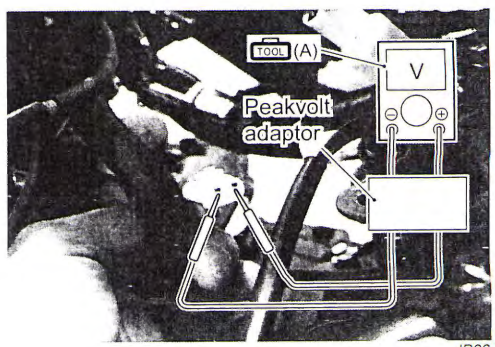
1) Connect the ECM couplers.

2) Crank the engine several seconds with the starter motor, and measure the CKP sensor peak voltage at the coupler.

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

Tester knob indication
Voltage (⎓)

CKP sensor peak voltage
0.5 V and more



1B08J1110035-02

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the CKP sensor with a new one. Refer to "CKP Sensor Removal and Installation" in Section 1C (Page 1C-2).

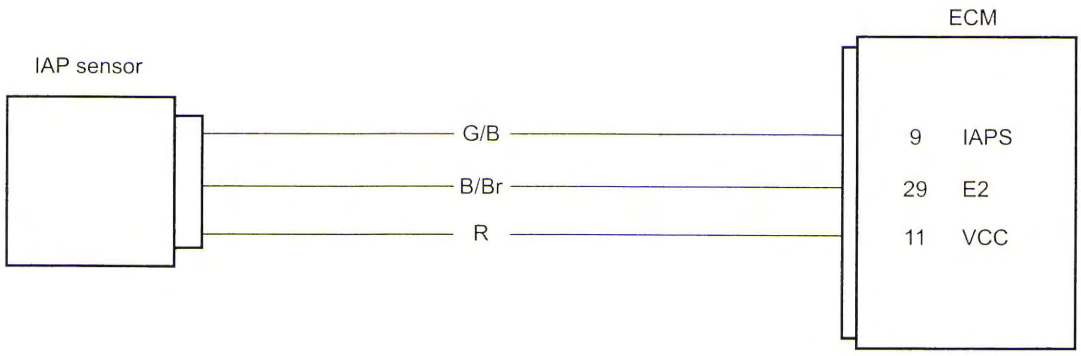
DTC "C13" (P0105-H/L): IAP Sensor Circuit Malfunction

BENF08J11104012

Detected Condition and Possible Cause

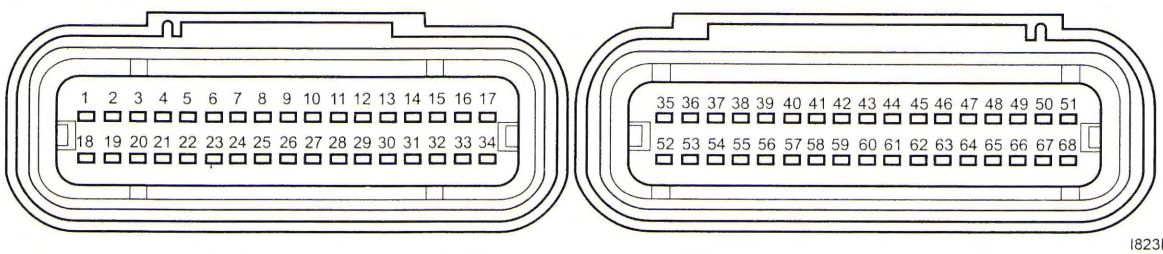
Detected Condition			Possible Cause
C13		IAP sensor voltage is not within the following range. 0.5 V ≤ Sensor voltage < 4.85 V **NOTE** **Note that atmospheric pressure varies depending on weather conditions as well as altitude. Take that into consideration when inspecting voltage.**	• Clogged vacuum 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 signal circuit is open or shorted to VCC or ground circuit open.
	L	Sensor voltage is lower than specified value.	• IAP sensor signal circuit is shorted to ground or VCC circuit open.

Wiring Diagram



IB08J1110036-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

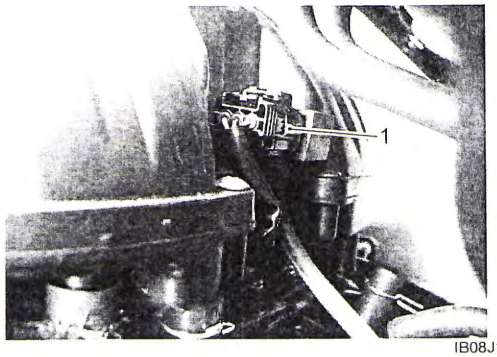
NOTE

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

Step 1

IAP sensor power supply circuit check

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 IAP sensor coupler (1).



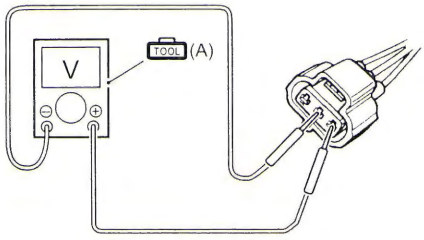
IB08J1110037-01

4) Check for proper terminal connection to the IAP sensor coupler.
5) If connections are OK, turn the ignition switch ON.
6) 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 power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: B/Br)



IB08J1110038-02

Is check result OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2

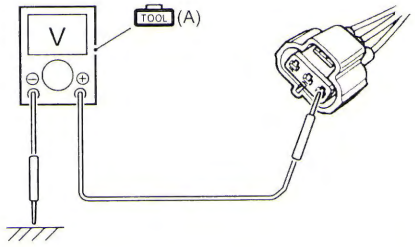
IAP sensor ground circuit check

1) Measure the voltage between the R wire and ground.

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

Tester knob indication
Voltage (⎓)

IAP sensor power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: ground)



IB08J1110068-02

Is check result OK?

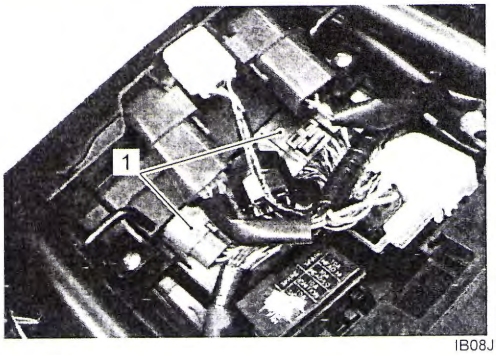
Yes Repair or replace the B/Br wire.

No Repair or replace the R wire.

Step 3

IAP sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



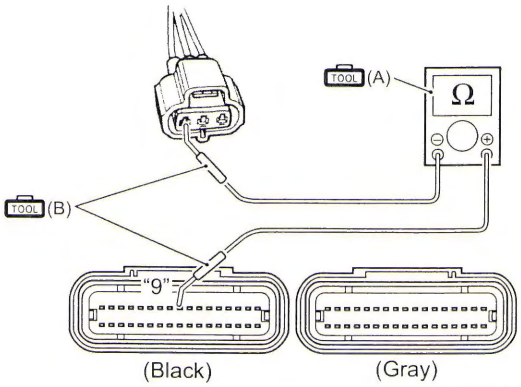
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK; check the following points.
   - Resistance

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

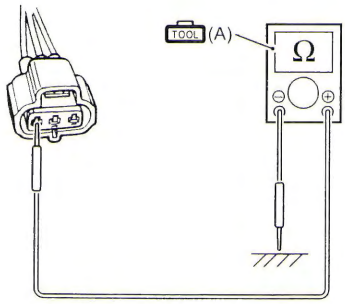
     Tester knob indication
     Resistance (Ω)

     – G/B wire: less than 1 Ω



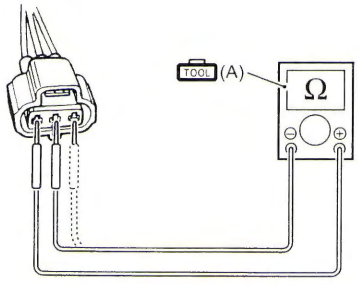
IB08J1110040-02

     – Between G/B wire and ground: infinity



IB08J1110041-03

     – G/B wire terminal and other terminal at IAP sensor connector: infinity



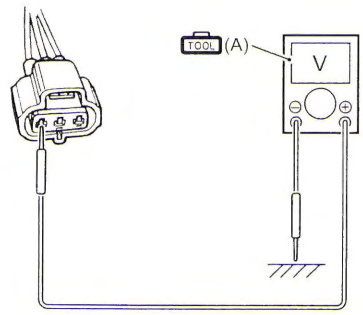
IB08J1110042-03

   - Voltage

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

     Tester knob indication
     Voltage (⎓)

     – G/B wire: approx. 0 V (When ignition switch is ON)



IB08J1110043-03

Is check result OK?

Yes	Go to Step 4.
No	Repair or replace the G/B wire.

Step 4

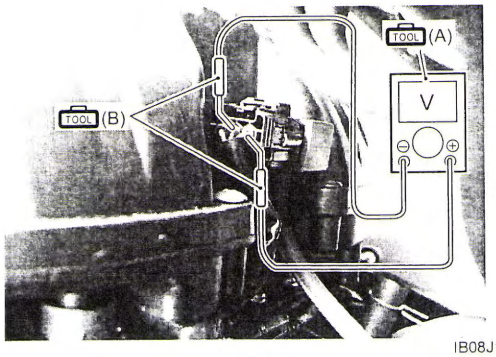
IAP sensor check 1

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

Tester knob indication
Voltage (⎓)

IAP sensor output voltage
Approx. 2.7 V at idle speed (atmospheric pressure: approx. 100 kPa (760 mmHg))
((+) terminal: G/B – (–) terminal: B/Br)



IB08J1110044-01

Is check result OK?

Yes — Go to Step 5.

No — Check the vacuum hoses for crack or damage.

If vacuum hoses are OK, replace the IAP sensor with a new one. Refer to "IAP Sensor Removal and Installation" in Section 1C (Page 1C-3).

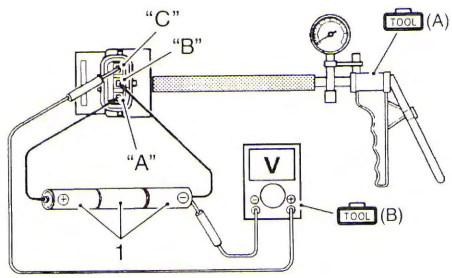
Step 5

IAP sensor check 2

1) Turn the ignition switch OFF.
2) Remove the IAP sensor. Refer to "IAP Sensor Removal and Installation" in Section 1C (Page 1C-3).
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 using the vacuum pump gauge.

Special tool
(A): 09917–47011 (Vacuum pump gauge set)
(B): 09900–25008 (Multi circuit tester set)

Tester knob indication
Voltage (⎓)



I718H1110030-02

ALTITUDE (Reference)		ATOMOSPHERIC PRESSURE		OUTPUT VOLTAGE
m	ft	kPa	mmHg	V
0 – 610	0 – 2 000	100 – 94	760 – 707	3.1 – 3.6
611 – 1 524	2 001 – 5 000	94 – 85	707 – 634	2.8 – 3.4
1 525 – 2 438	5 001 – 8 000	85 – 76	634 – 567	2.6 – 3.1
2 439 – 3 048	8 001 – 10 000	76 – 70	567 – 526	2.4 – 2.9

I823H1110023-02

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the IAP sensor with a new one. Refer to "IAP Sensor Removal and Installation" in Section 1C (Page 1C-3).

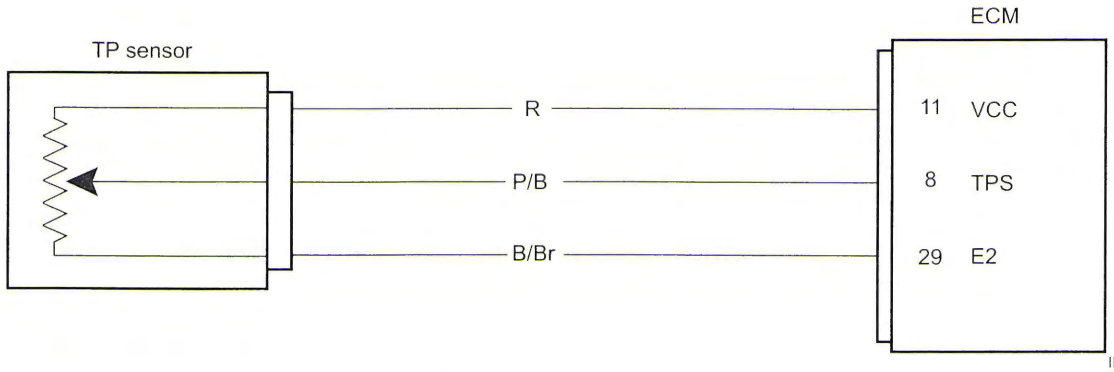
DTC "C14" (P0120-H/L): TP Sensor Circuit Malfunction

BENF08J11104013

Detected Condition and Possible Cause

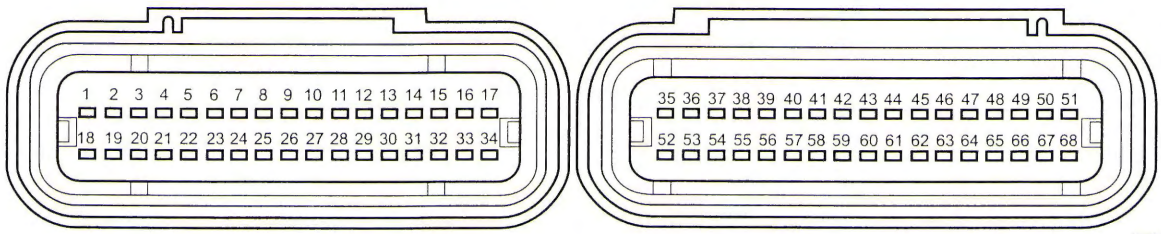
Detected Condition			Possible Cause
C14		Output voltage is not within the following range. 0.2 V ≤ Sensor voltage < 4.8 V	• TP sensor maladjusted. • TP sensor circuit open or short. • TP sensor malfunction. • ECM malfunction.
P0120	H	Sensor voltage is higher than specified value.	• TP sensor signal circuit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

Wiring Diagram



IB08J1110045-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

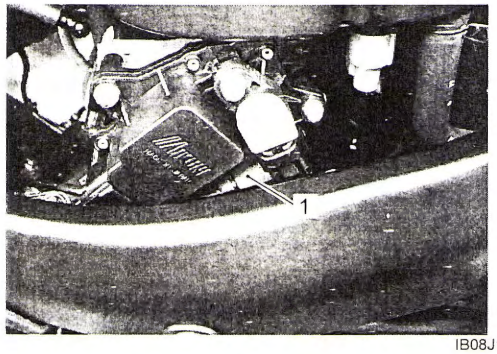
NOTE

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

Step 1

TP sensor power supply circuit check

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 TP sensor coupler (1).



IB08J1110046-02

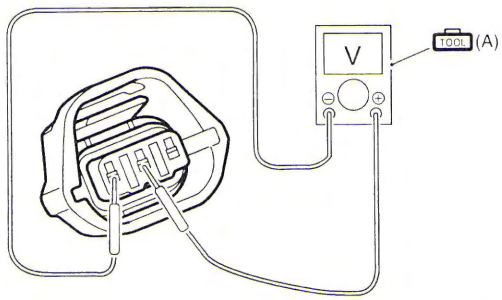
4) Check for proper terminal connection to the TP sensor coupler.
5) If connections are OK, turn the ignition switch ON.

6) Measure the voltage between the R wire and B/Br wire.

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

Tester knob indication
Voltage (⎓)

TP sensor power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: B/Br)



1B08J1110047-01

Is check result OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2

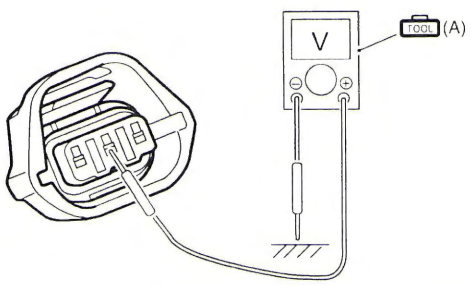
TP sensor ground circuit check

1) Measure the voltage between the R wire and ground.

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

Tester knob indication
Voltage (⎓)

TP sensor power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: ground)



1B08J1110048-02

Is check result OK?

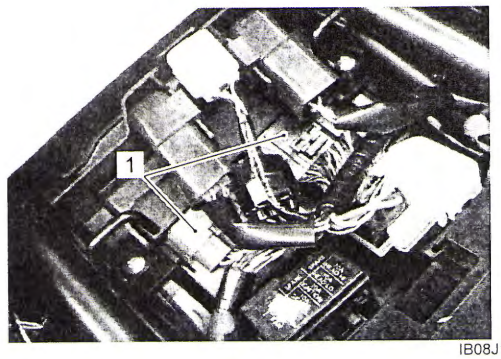
Yes Repair or replace the B/Br wire.

No Repair or replace the R wire.

Step 3

TP sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



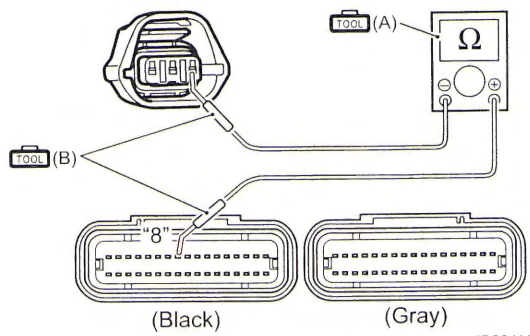
1B08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

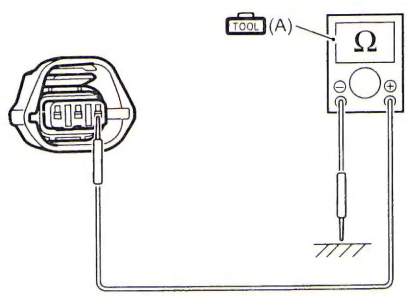
Tester knob indication
Resistance (Ω)

– P/B wire: less than 1 Ω



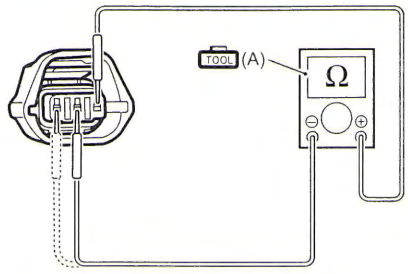
1B08J1110049-02

– Between P/B wire and ground: infinity



1B08J1110050-02

– Between P/B wire terminal and other terminal at TP sensor connector: infinity



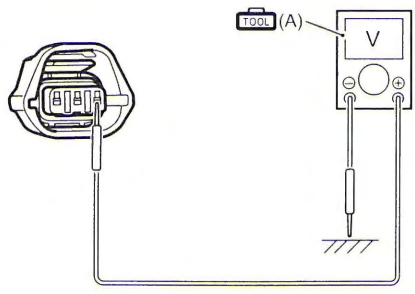
IB08J1110051-02

• Voltage

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

Tester knob indication
Voltage (⎓)

– P/B wire: approx. 0 V (When ignition switch is ON)



IB08J1110052-03

Is check result OK?

Yes Go to Step 4.

No Repair or replace the P/B wire.

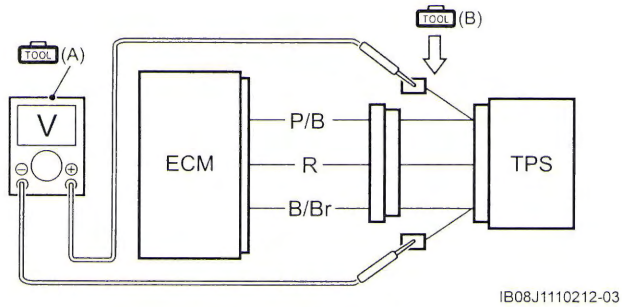
Step 4
TP sensor check

1) Turn the ignition switch OFF.
2) Connect the special tool between the TP sensor and its coupler.
3) Turn the ignition switch ON.
4) Measure the TP sensor output voltage between the P/B wire terminal (+) and B/Br wire terminal (–) with turning the throttle grip open and close.

Special tool
TOOL (A): 09900–25008 (Multi-circuit tester set)
TOOL (B): 09900–28630 (TP Sensor test lead)

Tester knob indication
Voltage (⎓)

TP sensor output voltage
Throttle valve is closed: Approx. 1.1 V
Throttle valve is opened: Approx. 4.3 V
((+) terminal: P/B – (–) terminal: B/Br)



IB08J1110212-03

Is check result OK?

Yes Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No Replace the TP sensor with a new one. Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-12).

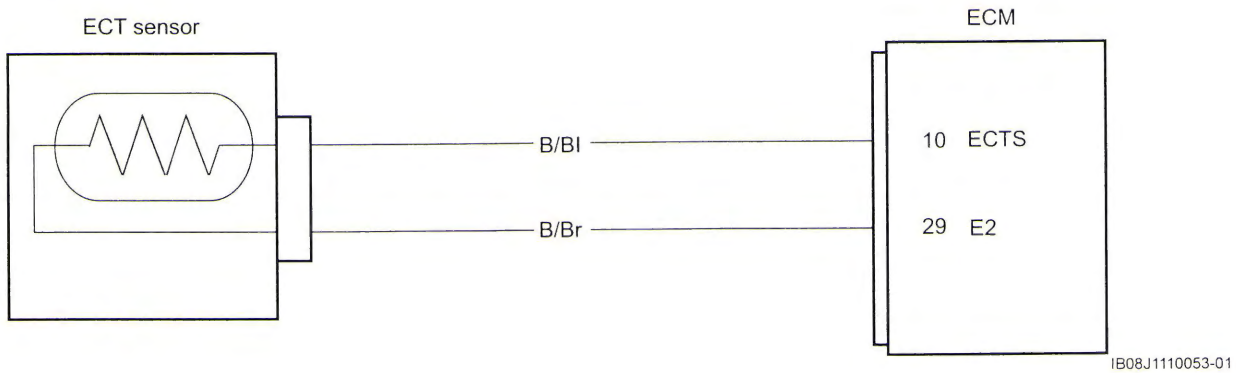
DTC "C15" (P0115-H/L): ECT Sensor Circuit Malfunction

BENF08J11104014

Detected Condition and Possible Cause

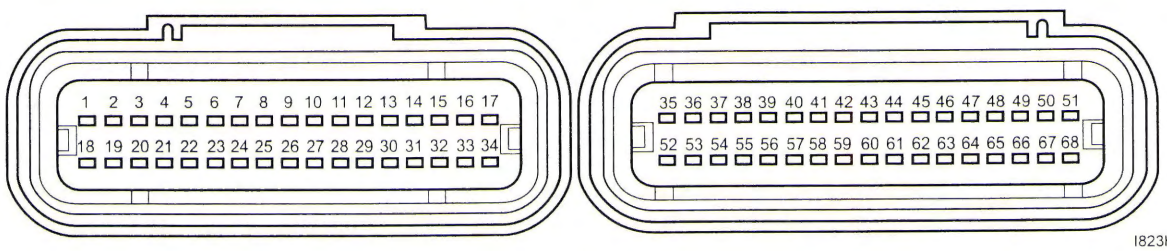
Detected Condition			Possible Cause
C15		Output voltage is not with in the following range. 0.15 V ≤ Sensor voltage < 4.85 V	• ECT sensor circuit open or short. • ECT sensor malfunction. • ECM malfunction.
P0115	H	Sensor voltage is higher than specified value.	• ECT sensor circuit is open or ground circuit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

Wiring Diagram



IB08J1110053-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

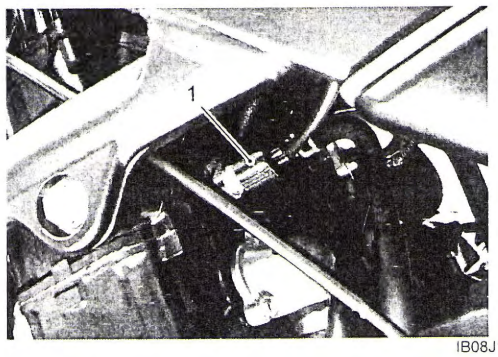
NOTE

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

Step 1

ECT sensor input voltage check

1) Turn the ignition switch OFF.
2) Disconnect the ECT sensor coupler (1).



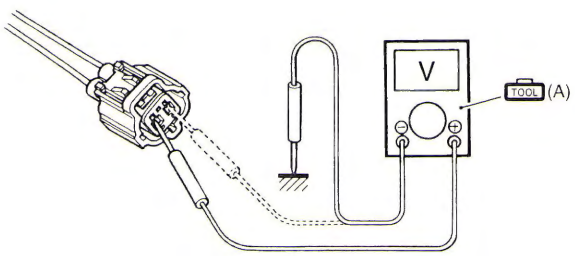
IB08J1110058-02

3) Check for proper terminal connection to the ECT sensor coupler.
4) If connections are OK, turn the ignition switch ON.
5) Measure the input voltage between the B/Bl wire and ground.
6) If OK, measure the input voltage between the B/Bl wire and B/Br wire.

Special 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 check result OK?

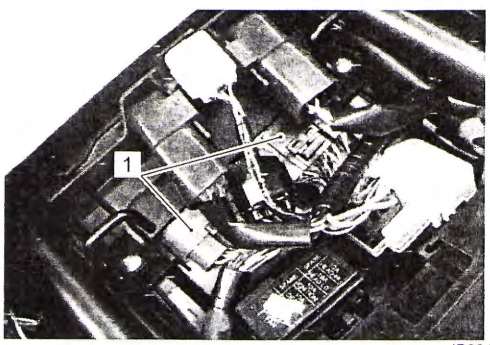
Yes Go to Step 3.

No Go to Step 2.

Step 2

ECT sensor circuit check

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 ECM couplers (1).



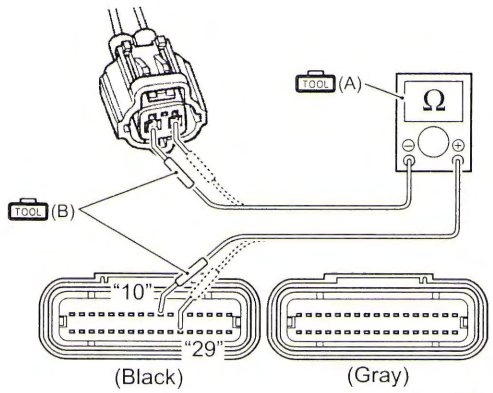
IB08J1110039-02

4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, check the following points.
   - Resistance

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

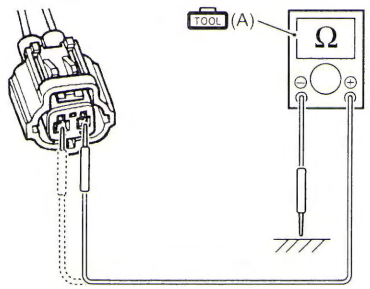
Tester knob indication
Resistance (Ω)

– B/Bl wire and B/Br wire: less than 1 Ω



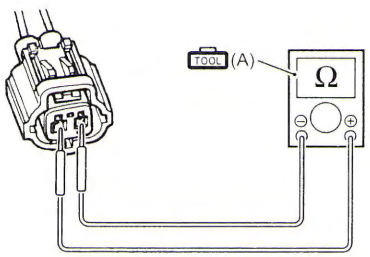
IB08J1110054-02

– Between each of B/Bl and B/Br wire and ground: infinity



IB08J1110055-03

– Between B/Bl wire terminal and other terminal at ECT sensor coupler: infinity



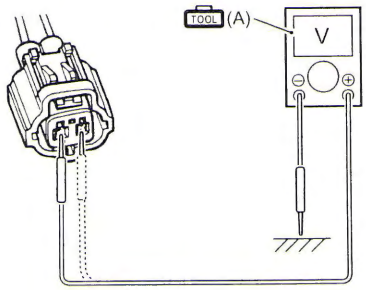
IB08J1110056-03

- Voltage

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

Tester knob indication
Voltage (⎓)

– B/Bl wire and B/Br wire: approx. 0 V (When ignition switch is ON)



1B08J1110057-03

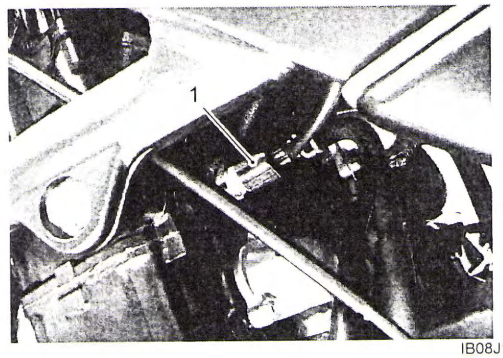
Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Repair or replace the defective wire harness.

Step 3
ECT sensor check

1) Turn the ignition switch OFF.
2) Disconnect the ECT sensor coupler (1).



1B08J1110058-02

3) Measure the ECT sensor resistance.

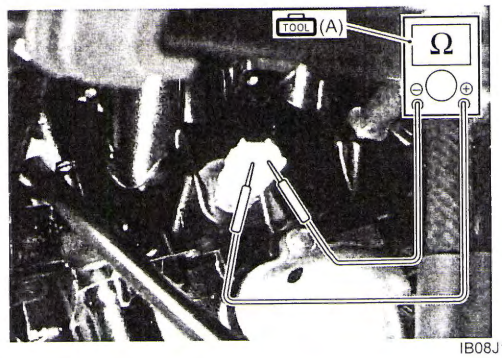
NOTE

Refer to "ECT Sensor Inspection" in Section 1C (Page 1C-5) for details.

Special 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)



1B08J1110059-01

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the ECT sensor with a new one. Refer to "ECT Sensor Removal and Installation" in Section 1C (Page 1C-4).

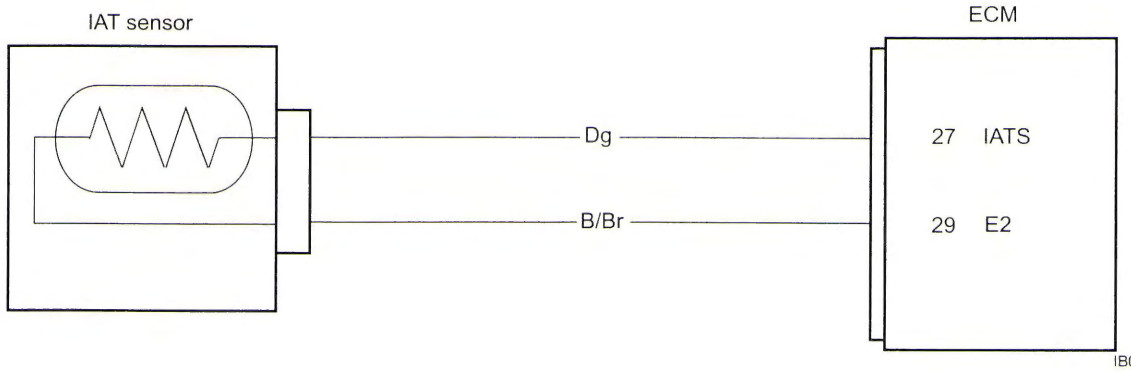
DTC "C21" (P0110-H/L): IAT Sensor Circuit Malfunction

BENF08J11104015

Detected Condition and Possible Cause

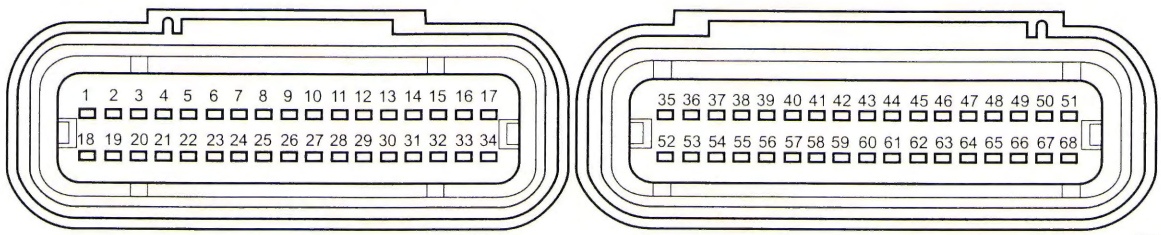
Detected Condition			Possible Cause
C21		Output voltage is not with in the following range. 0.15 V ≤ Sensor voltage < 4.85 V	• IAT sensor circuit open or short. • IAT sensor malfunction. • ECM malfunction.
P0110	H	Sensor voltage is higher than specified value.	• IAT sensor signal circuit open or ground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

Wiring Diagram



IB08J1110060-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

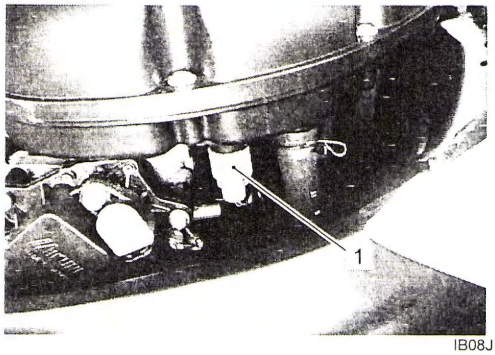
NOTE

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

Step 1

IAT sensor input voltage check

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 IAT sensor coupler (1).



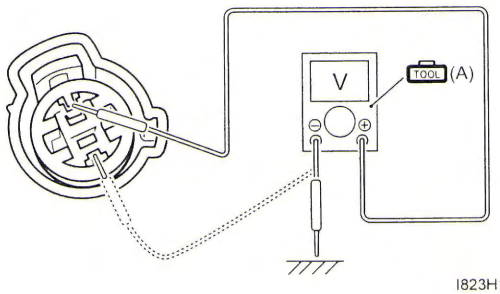
IB08J1110061-02

4) Check for proper terminal connection to the IAT sensor coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the input voltage between the Dg wire and ground.
7) If OK, measure the input voltage between the Dg wire and B/Br wire.

Special 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)



I823H1110040-04

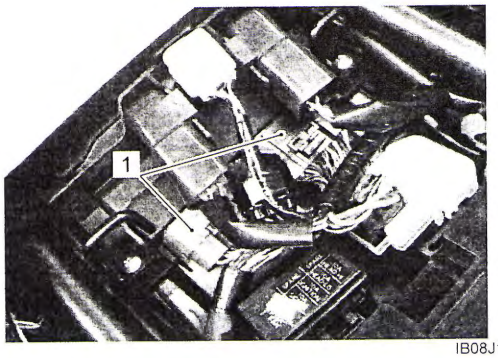
Is check result OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2
IAT sensor circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



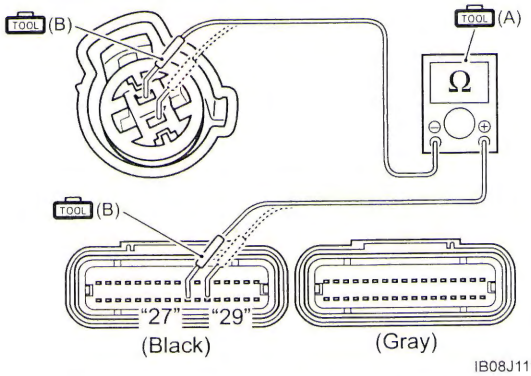
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

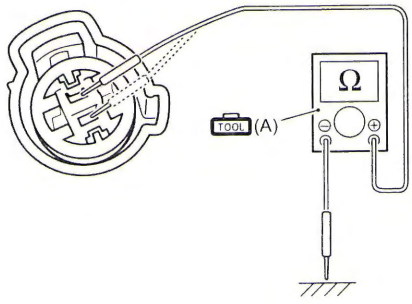
Tester knob indication
Resistance (Ω)

– Dg wire and B/Br wire: less than 1 Ω



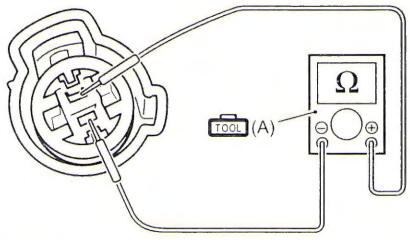
IB08J1110062-02

– Between each of Dg and B/Br wire and ground: infinity



IB08J1110063-05

– Between Dg wire terminal and other terminal at IAT sensor coupler: infinity



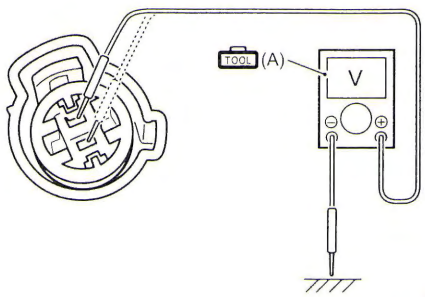
IB08J1110064-02

- Voltage

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

Tester knob indication
Voltage (⎓)

– Dg wire and B/Br wire: approx. 0 V (When ignition switch is ON)



IB08J1110065-02

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Repair or replace the defective wire harness.

Step 3
IAT sensor check

1) Turn the ignition switch OFF.
2) Measure the IAT sensor resistance.

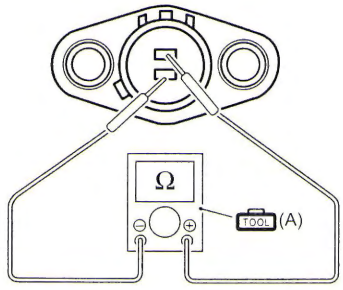
NOTE

Refer to "IAT Sensor Inspection" in Section 1C (Page 1C-6) for details.

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

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the IAT sensor with a new one. Refer to "IAT Sensor Removal and Installation" in Section 1C (Page 1C-5).

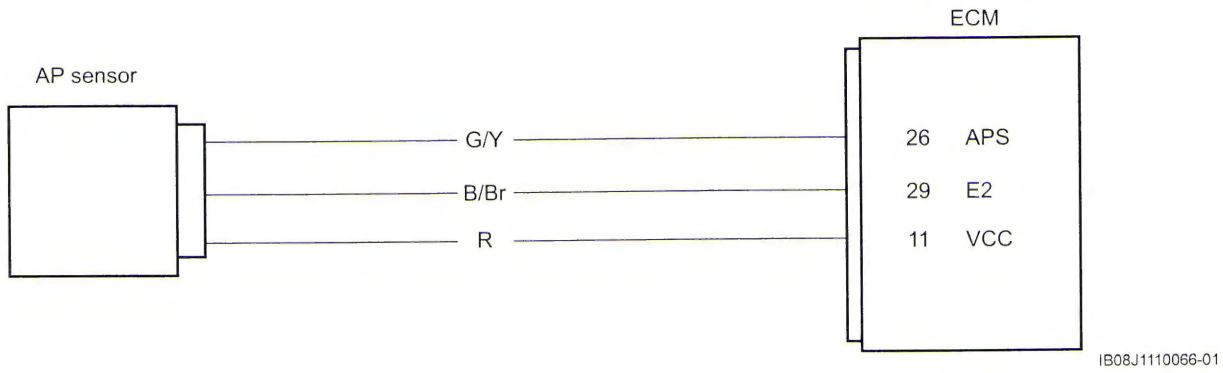
DTC "C22" (P1450-H/L): AP Sensor Circuit Malfunction

BENF08J11104016

Detected Condition and Possible Cause

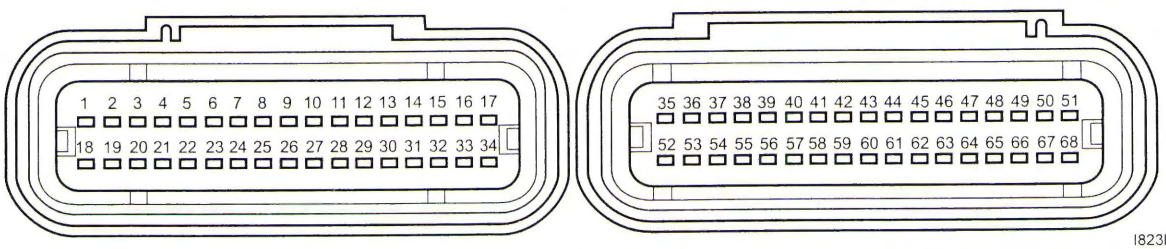
Detected Condition			Possible Cause
C22		AP sensor voltage is not within the following range. 0.5 V ≤ Sensor voltage < 4.85 V **NOTE** **Note that atmospheric pressure varies depending on weather conditions as well as altitude. Take that into consideration when inspecting voltage.**	• Clogged vacuum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

Wiring Diagram



IB08J1110066-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

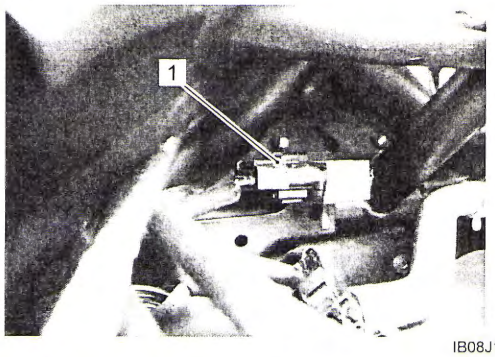
NOTE

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

Step 1

AP sensor power supply circuit check

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 AP sensor coupler (1).



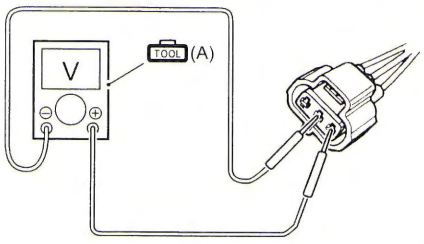
IB08J1110067-02

4) Check for proper terminal connection to the AP sensor coupler.
5) If connections are OK, turn the ignition switch ON.
6) 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: B/Br)



IB08J1110038-02

Is check result OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2

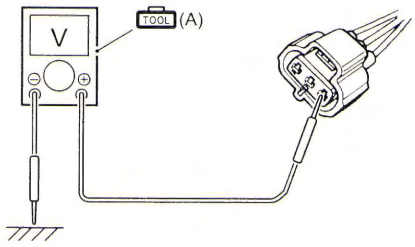
AP sensor ground circuit check

1) Measure the voltage between the R wire and ground.

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

Tester knob indication
Voltage (⎓)

AP sensor power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: ground)



IB08J1110068-02

Is check result OK?

Yes Repair or replace the B/Br wire.

No Repair or replace the R wire.

Step 3

AP sensor signal circuit check

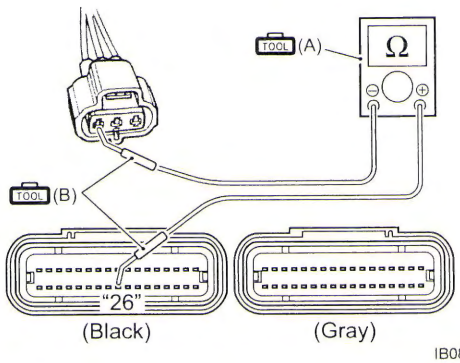
1) Turn the ignition switch OFF.
2) Remove the front seat. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
3) Disconnect the ECM couplers.
4) Check for proper terminal connection to the ECM couplers.

5) If connections are OK, check the following points.
   - Resistance

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

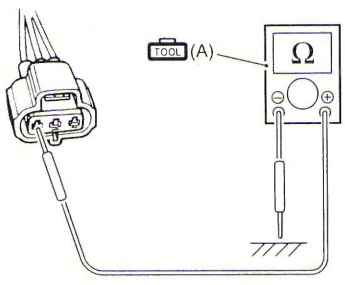
     Tester knob indication
     Resistance (Ω)

     – G/Y wire: less than 1 Ω



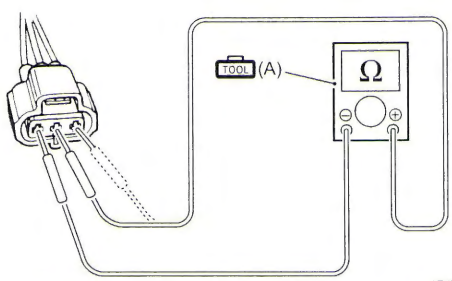
IB08J1110069-02

     – Between G/Y wire and ground: infinity



IB08J1110070-03

     – Between G/Y wire terminal and other terminal at AP sensor connector: infinity



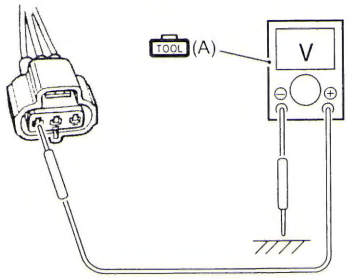
IB08J1110071-03

   - Voltage

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

     Tester knob indication
     Voltage (⎓)

     – G/Y wire: approx. 0 V (When ignition switch is ON)



IB08J1110072-02

Is check result OK?

Yes	Go to Step 4.
No	Repair or replace the G/Y wire.

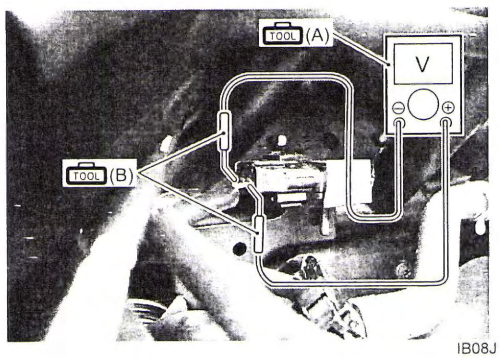
Step 4
AP sensor check

1) Turn the ignition switch OFF.
2) Connect the ECM couples and AP sensor coupler.
3) Insert the needle pointed probes to the lead wire coupler.
4) 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)



IB08J1110073-02

Is check result OK?

Yes	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).
No	Replace the AP sensor with a new one. Refer to "AP Sensor Removal and Installation" in Section 1C (Page 1C-6).

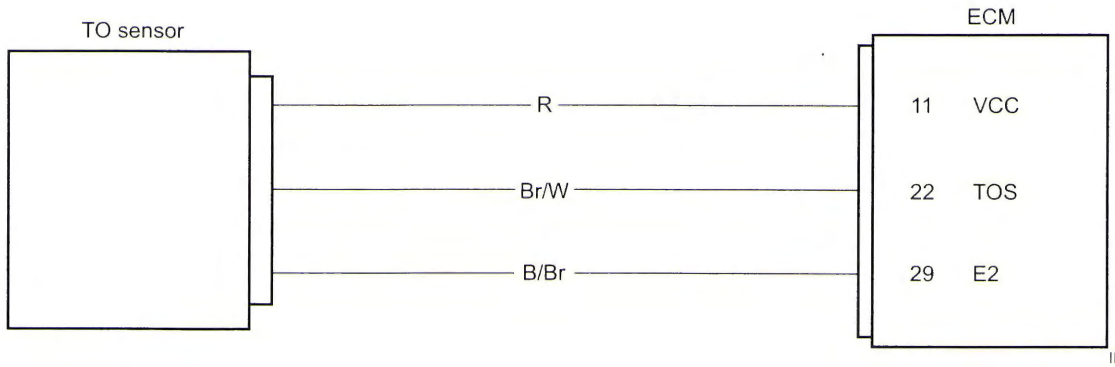
DTC "C23" (P1651-H/L): TO Sensor Circuit Malfunction

BENF08J11104017

Detected Condition and Possible Cause

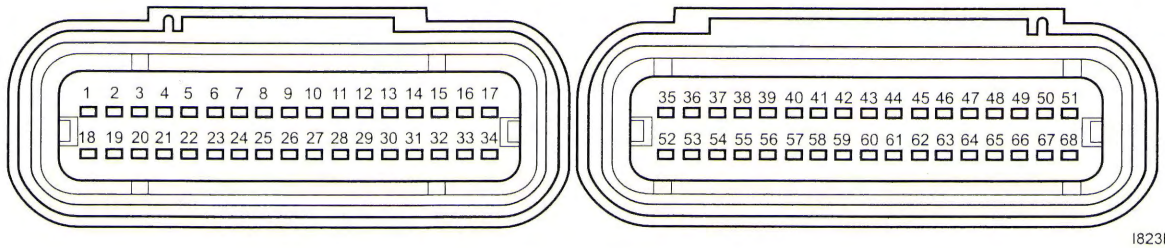
Detected Condition			Possible Cause
C23		The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V ≤ Sensor voltage < 4.8 V	• TO sensor circuit open or short. • TO sensor malfunction. • ECM malfunction.
P1651	H	Sensor voltage is higher than specified value.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

Wiring Diagram



IB08J1110074-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

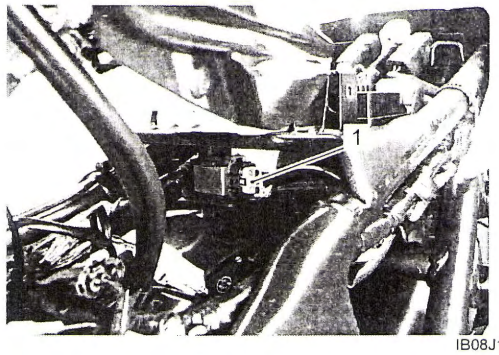
NOTE

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

Step 1

TO sensor power supply circuit check

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 left frame cover. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
4) Disconnect the TO sensor coupler (1).



IB08J1110075-02

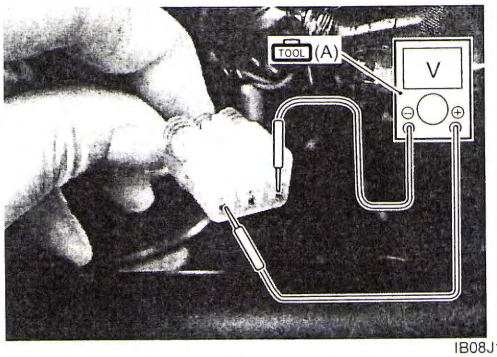
5) Check for proper terminal connection to the TO sensor coupler.
6) If connections are OK, turn the ignition switch ON.

7) Measure the voltage between the R wire and B/Br wire.

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

Tester knob indication
Voltage (⎓)

TO sensor power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: B/Br)



IB08J1110076-02

Is check result OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2

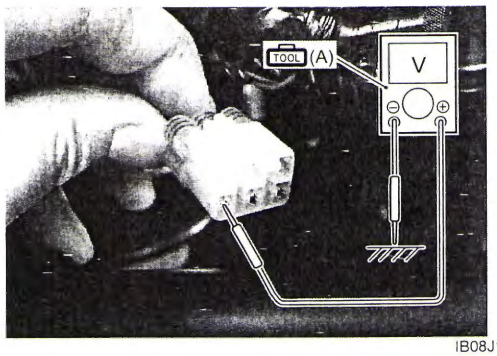
TO sensor ground circuit check

1) Measure the voltage between the R wire and ground.

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

Tester knob indication
Voltage (⎓)

TO sensor power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: ground)



IB08J1110077-02

Is check result OK?

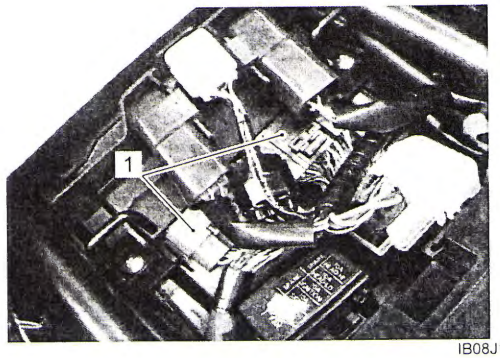
Yes Repair or replace the B/Br wire.

No Repair or replace the R wire.

Step 3

TO sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



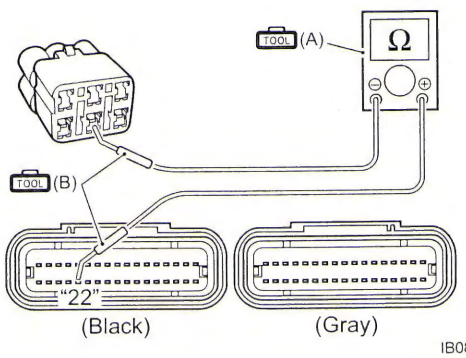
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

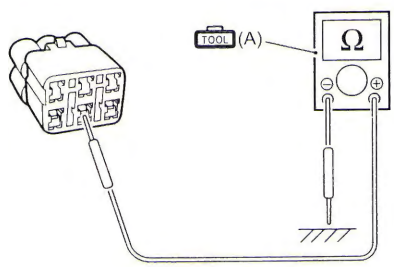
Tester knob indication
Resistance (Ω)

– Br/W wire: less than 1 Ω



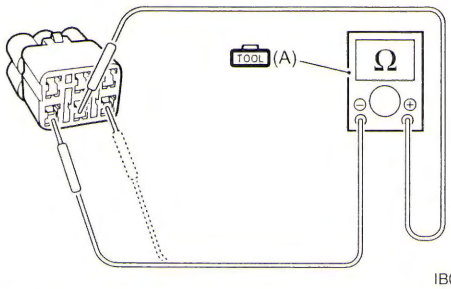
IB08J1110078-02

– Between Br/W wire and ground: infinity



IB08J1110079-02

– Between Br/W wire terminal and other terminal at TO sensor connector: infinity



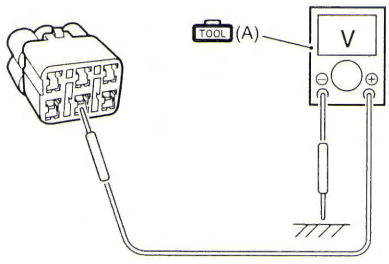
IB08J1110080-02

- Voltage

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

Tester knob indication
Voltage (⎓)

– Br/W wire: approx. 0 V (When ignition switch is ON)



IB08J1110081-02

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace the Br/W wire.

Step 4

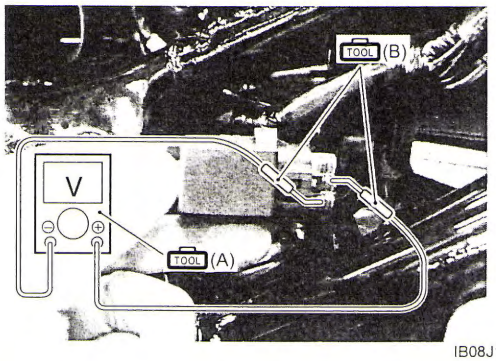
TO sensor check

1) Turn the ignition switch OFF.
2) Connect the ECM coupler and TO sensor coupler.
3) Insert the needle pointed probes to the lead wire coupler.
4) Measure the TO sensor output voltage between the Br/W 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: Br/W – (–) terminal: B/Br)

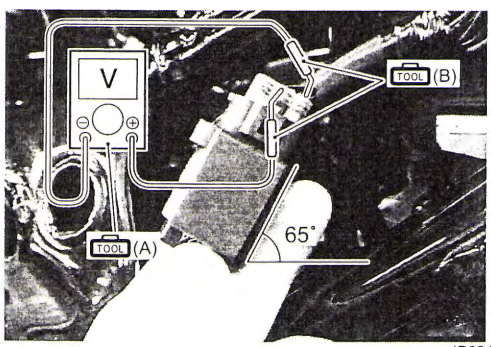


IB08J1110082-02

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. Refer to "TO Sensor Removal and Installation" in Section 1C (Page 1C-6).

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: Br/W – (–) terminal: B/Br)



IB08J1110083-02

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — 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

BENF08J11104018

NOTE

Refer to "No Spark or Poor Spark" in Section 1H (Page 1H-4) for details.

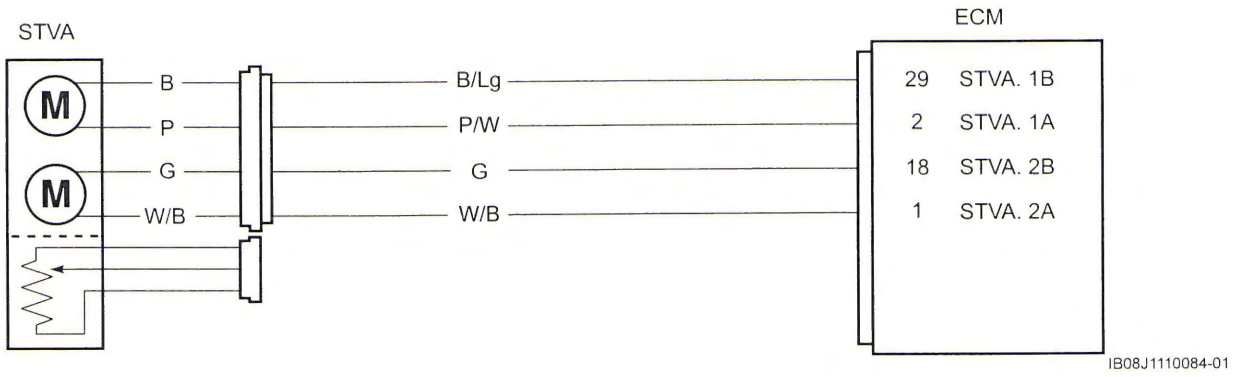
DTC "C28" (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction

BENF08J11104019

Detected Condition and Possible Cause

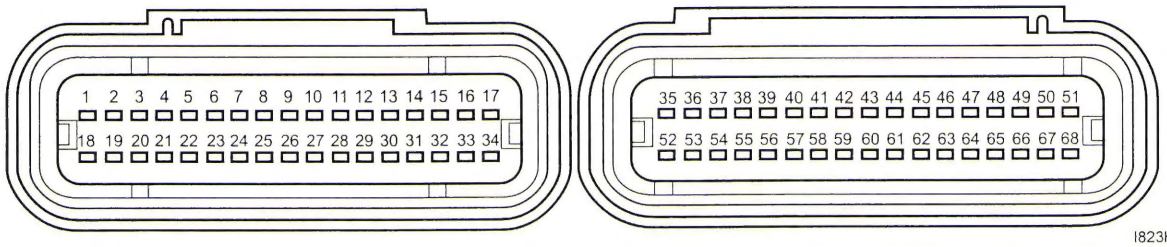
Detected Condition	Possible Cause
The operation voltage does not reach the STVA. ECM does not receive communication signal from the STVA. STVA can not operate properly or its motor locked.	• STVA malfunction. • STVA circuit open or short. • STVA motor malfunction.

Wiring Diagram



IB08J1110084-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

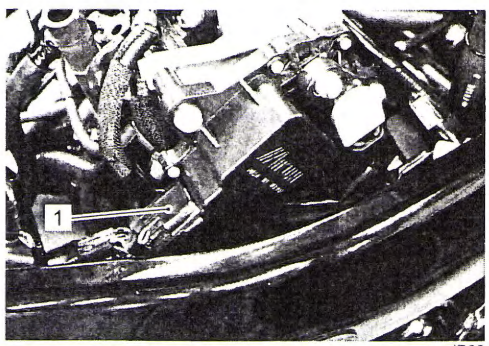
NOTE

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

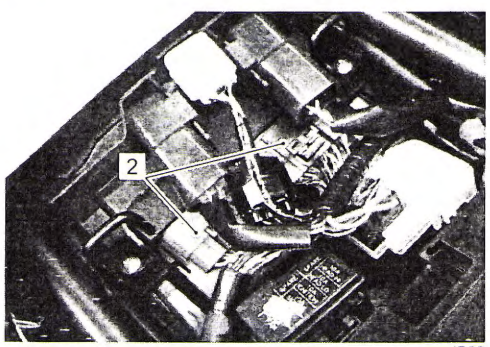
Step 1

STVA drive circuit check

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 STVA (1) and ECM couplers (2).



IB08J1110085-02



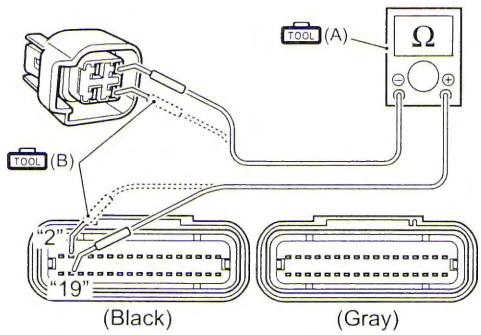
IB08J1110017-02

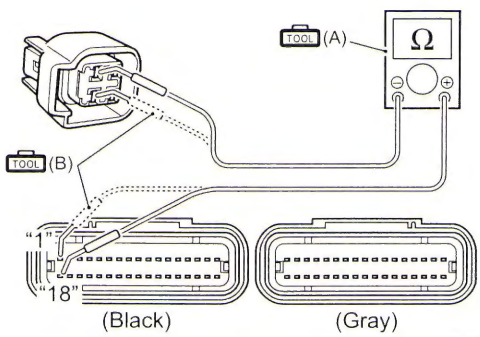
4) Check for proper terminal connection to the STVA coupler and ECM couplers.
5) If connections are OK, check the following points.
   - Resistance

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

Tester knob indication
Resistance (Ω)

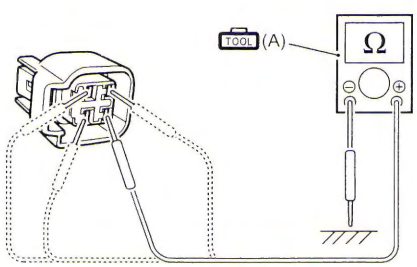
– B/Lg, P/W, G and W/B wire: less than 1 Ω





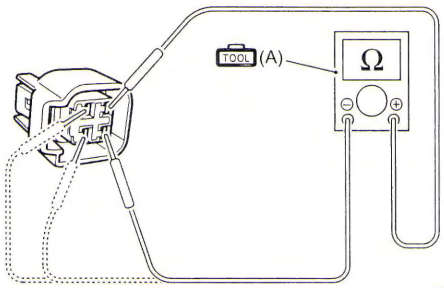
IB08J1110086-02

– Between each of B/Lg, P/W, G and W/B wire and ground: infinity



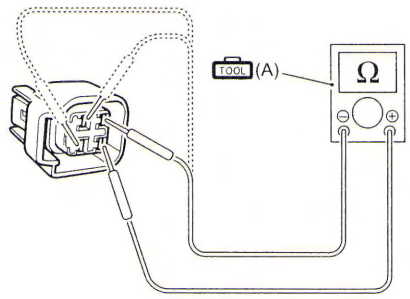
IB08J1110087-02

– Between B/Lg wire terminal and other terminal at STVA coupler: infinity



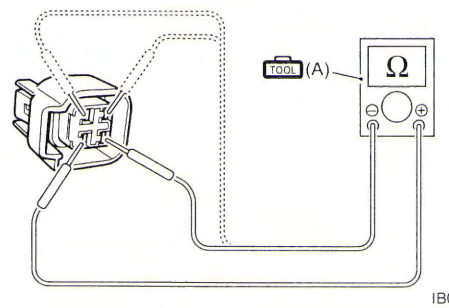
IB08J1110088-02

– Between P/W wire terminal and other terminal at STVA coupler: infinity



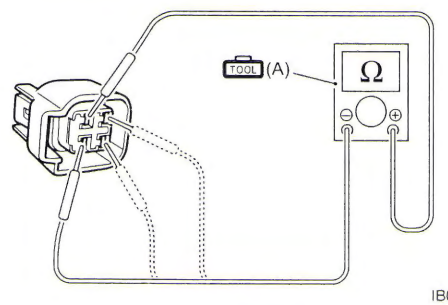
IB08J1110089-02

– Between G wire terminal and other terminal at STVA coupler: infinity



IB08J1110090-02

– Between W/B wire terminal and other terminal at STVA coupler: infinity



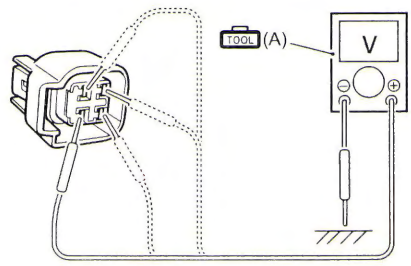
IB08J1110091-02

• Voltage

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

Tester knob indication
Voltage (⎓)

– B/Lg, P/W, G and W/B wire: approx. 0 V (When ignition switch is ON)



IB08J1110092-02

Is check result OK?

Yes	Go to Step 2.
No	Repair or replace the defective wire harness.

Step 2

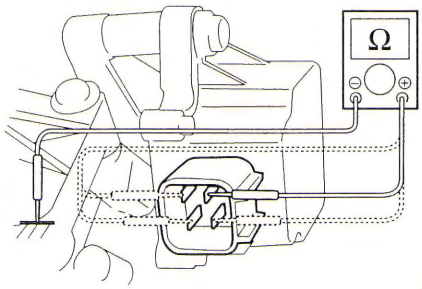
STVA check

1) Turn the ignition switch OFF.
2) Disconnect the STVA 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)

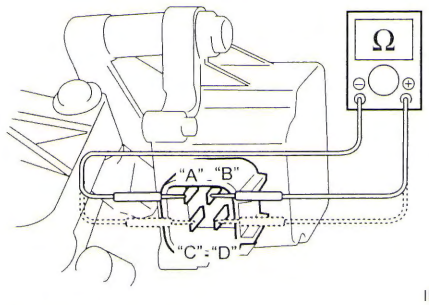


IB08J1110093-01

4) If OK, measure the STVA resistance (between the W/B wire "A" and G wire "B") and (between the B/Lg wire "C" and P/W wire "D").

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

STVA resistance
Approx. 7.8 Ω
(Terminal "A" – Terminal "B", Terminal "C" – Terminal "D")



IB08J1110094-01

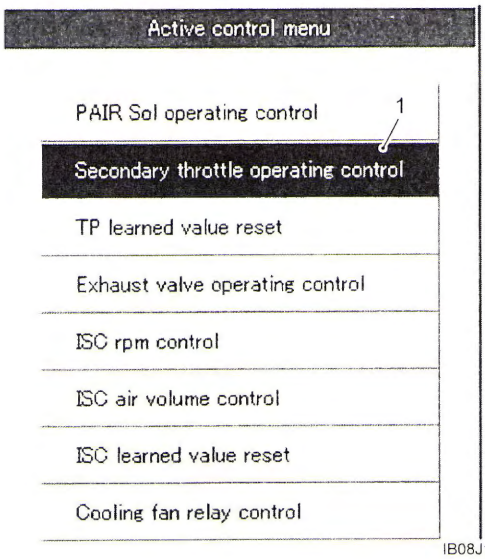
Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the throttle body assembly with a new one. Refer to "Throttle Body Removal and Installation" in Section 1D (Page 1D-11).

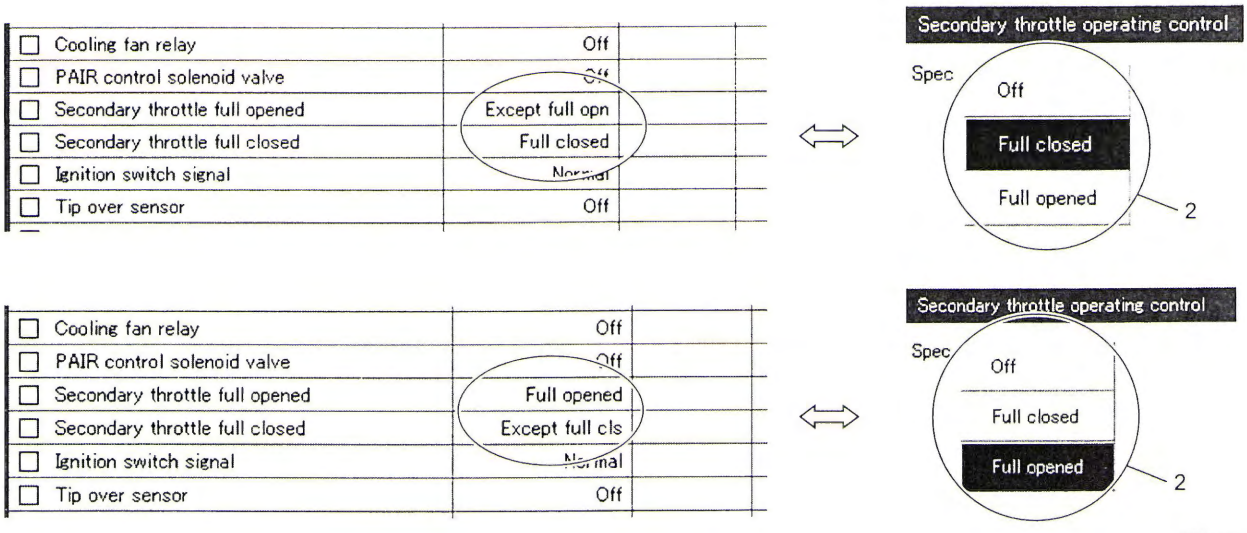
Active Control Inspection

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).



IB08J1110095-02

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



IB08J1110096-04

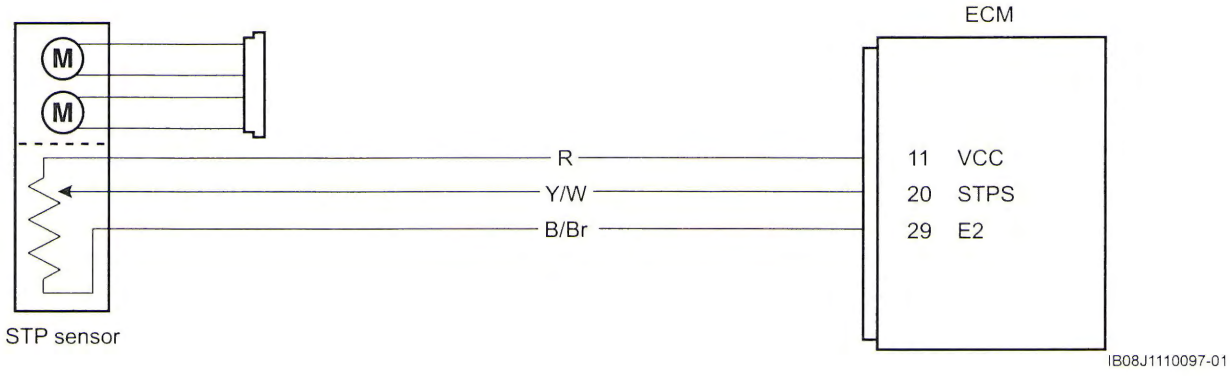
DTC "C29" (P1654-H/L): Secondary Throttle Position Sensor (STPS) Circuit Malfunction

BENF08J11104020

Detected Condition and Possible Cause

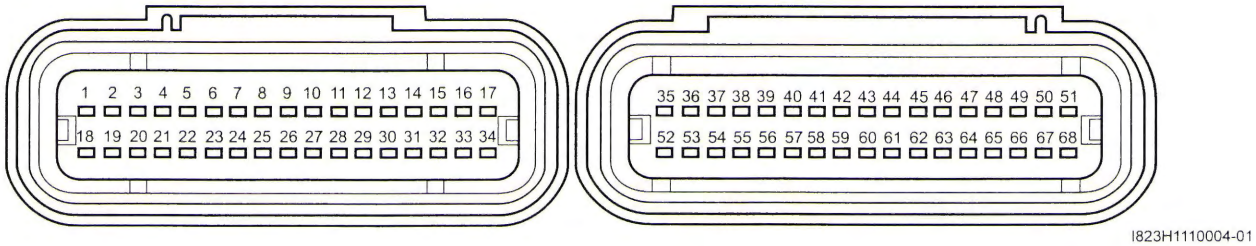
Detected Condition			Possible Cause
C29		Output voltage is not within the following range. 0.15 V ≤ Sensor voltage < 4.85 V	• STP sensor maladjusted. • STP sensor circuit open or short. • STP sensor malfunction. • ECM malfunction.
P1654	H	Sensor voltage is higher than specified value.	• STP sensor signal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

Wiring Diagram



IB08J1110097-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

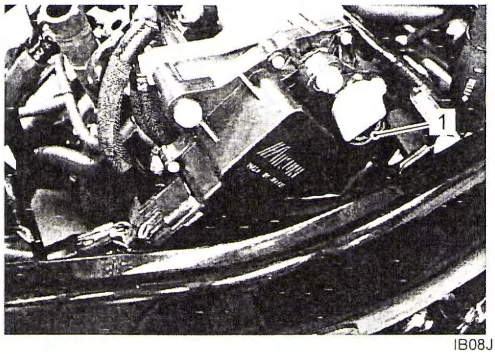
NOTE

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

Step 1

STP sensor power supply circuit check

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 STP sensor coupler (1).



IB08J1110098-02

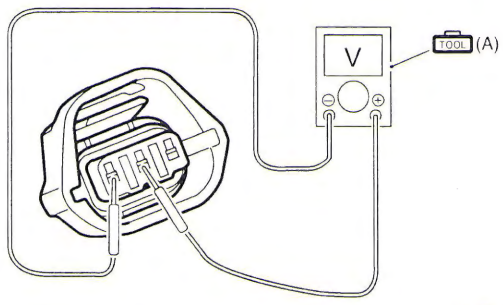
4) Check for proper terminal connection to the STP sensor coupler.

5) If connections are OK, turn the ignition switch ON.
6) 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 power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: B/Br)



IB08J1110047-01

Is check result OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2

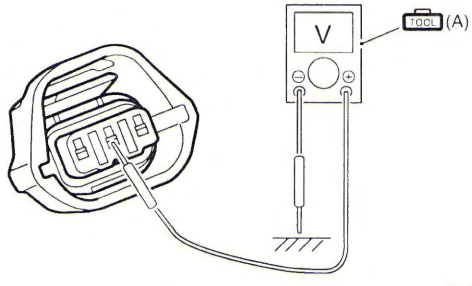
STP sensor ground circuit check

1) Measure the voltage between the R wire and ground.

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

Tester knob indication
Voltage (⎓)

STP sensor power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: Ground)



IB08J1110048-02

Is check result OK?

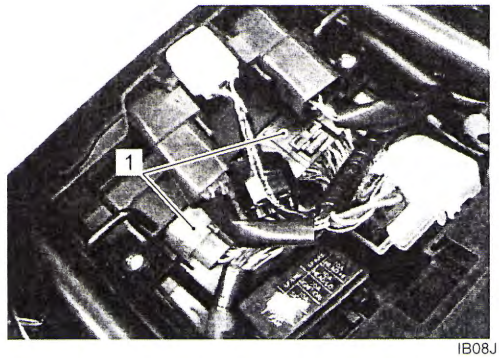
Yes Repair or replace the B/Br wire.

No Repair or replace the R wire.

Step 3

STP sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



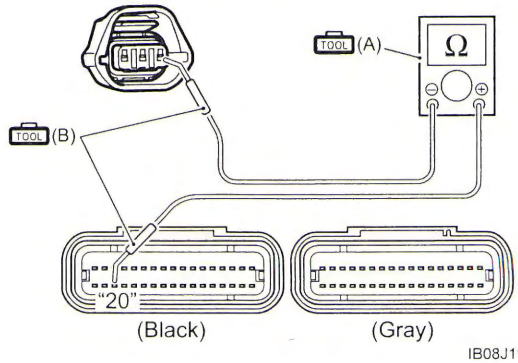
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

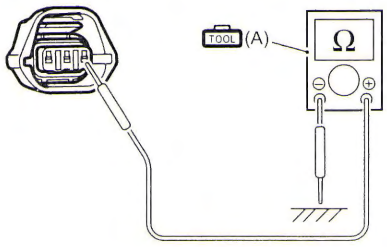
Tester knob indication
Resistance (Ω)

– Y/W wire: less than 1 Ω



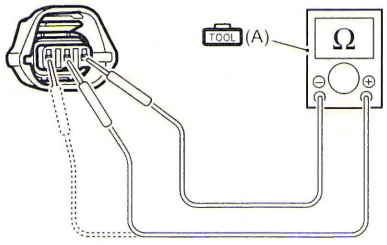
IB08J1110099-02

– Between Y/W wire and ground: infinity



IB08J1110100-02

– Between Y/W wire terminal and other terminal at STP sensor connector: infinity



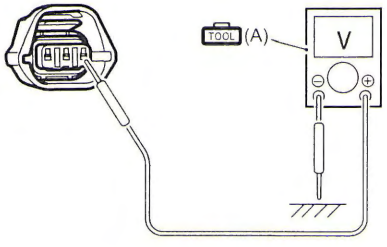
IB08J1110101-02

• Voltage

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

Tester knob indication
Voltage (⎓)

– Y/W wire: approx. 0 V (When ignition switch is ON)



IB08J1110102-02

Is check result OK?

Yes Go to Step 4.

No Repair or replace the Y/W wire.

Step 4

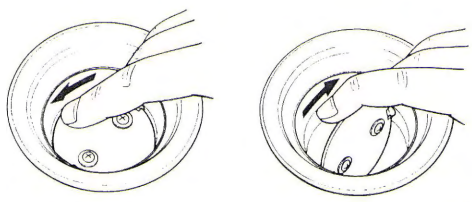
STP sensor check

1) Turn the ignition switch OFF.
2) Connect the special tool between the TP sensor and its coupler.
3) Turn the ignition switch ON.
4) Measure the STP sensor output voltage between the Y/W wire terminal (+) and B/Br wire terminal (–) by turning the secondary throttle valve (close and open) with your finger.

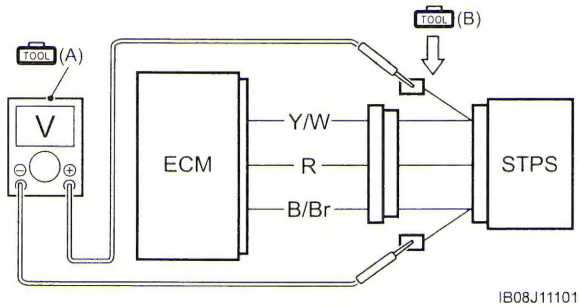
Special tool
TOOL (A): 09900–25008 (Multi-circuit tester set)
TOOL (B): 09900–28630 (TP Sensor test lead)

Tester knob indication
Voltage (⎓)

STP sensor output voltage
Throttle valve is closed: Approx. 0.6 V
Throttle valve is opened: Approx. 3.9 V
((+) terminal: Y/W – (–) terminal: B/Br)



I705H1110071-01



IB08J1110103-04

Is check result OK?

Yes Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No Replace STP sensor with a new one. Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-12).

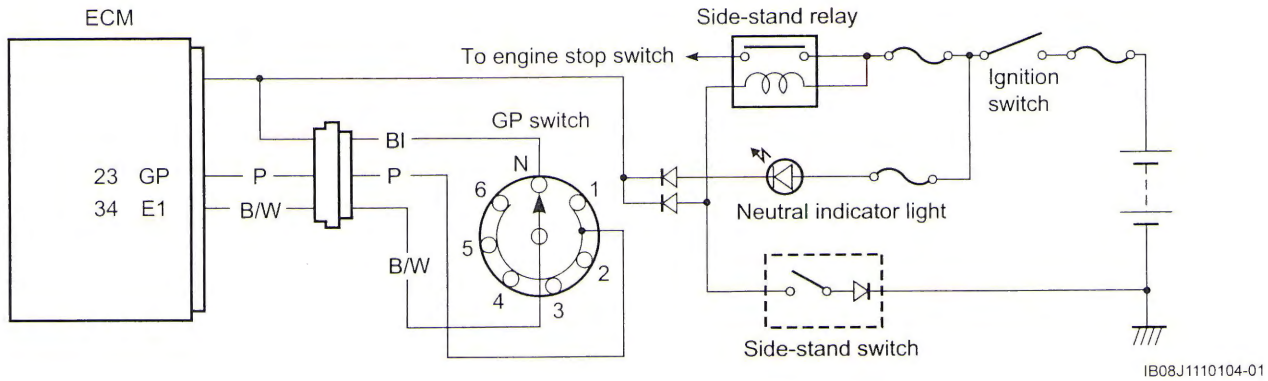
DTC "C31" (P0705): GP Switch Circuit Malfunction

BENF08J11104021

Detected Condition and Possible Cause

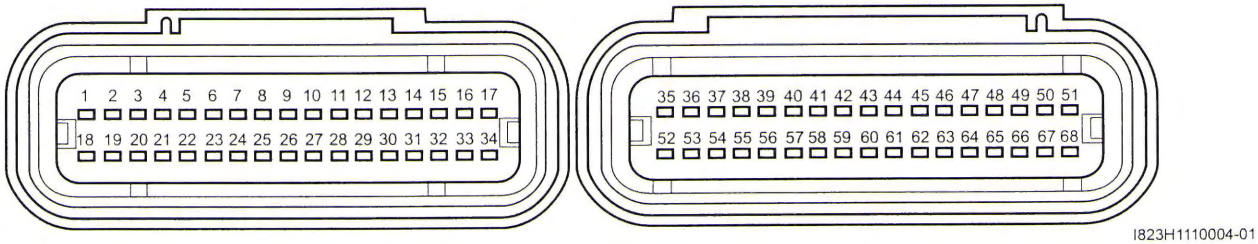
Detected Condition	Possible Cause
No GP switch voltage GP switch voltage is not within the following range. GP switch voltage > 0.6 V	• GP switch circuit open or short. • GP switch malfunction. • ECM malfunction.

Wiring Diagram



IB08J1110104-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

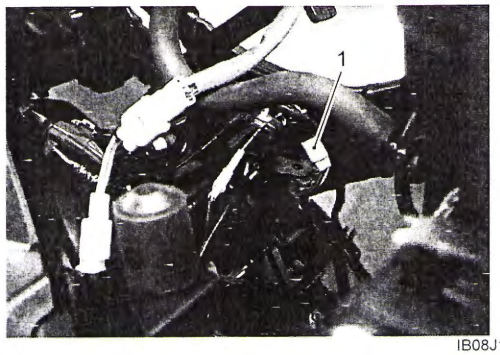
NOTE

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

Step 1

GP switch input voltage check

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 GP switch coupler (1).



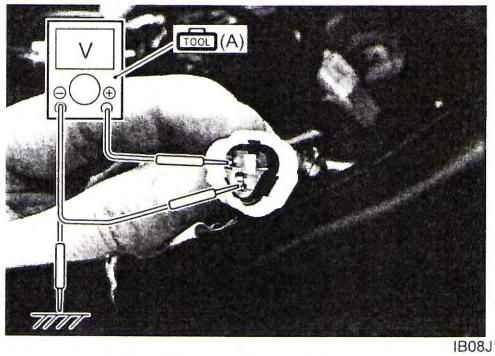
IB08J1110105-01

4) Check for proper terminal connection to the GP switch coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the input voltage between the P wire and ground.
7) If OK, measure the input voltage between the P wire and B/W wire.

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

Tester knob indication
Voltage (⎓)

GP switch input voltage
4.5 – 5.5 V
((+) terminal: P – (–) terminal: Ground, (+) terminal: P – (–) terminal: B/W)



IB08J1110106-01

Is check result OK?

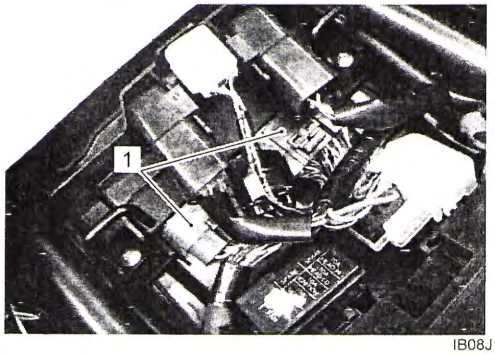
Yes Go to Step 3.

No Go to Step 2.

Step 2

GP switch circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



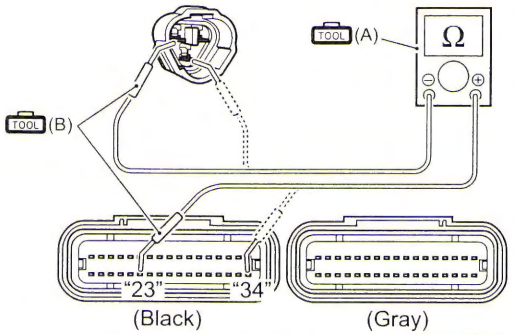
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

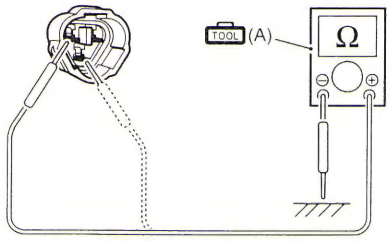
Tester knob indication
Resistance (Ω)

– P wire and B/W wire: less than 1 Ω



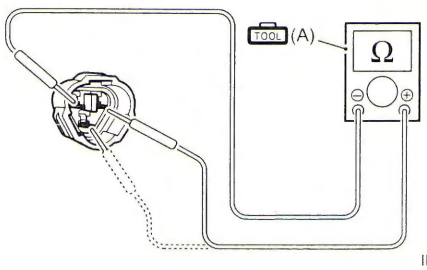
IB08J1110107-02

– Between each of P and B/W wire and ground: infinity



IB08J1110108-02

– Between P wire terminal and other terminal at GP switch coupler: infinity



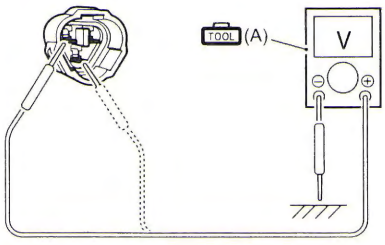
IB08J1110109-02

- Voltage

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

Tester knob indication
Voltage (⎓)

– P wire and B/W wire: approx. 0 V (When ignition switch is ON)



IB08J1110110-02

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Repair or replace the defective wire harness.

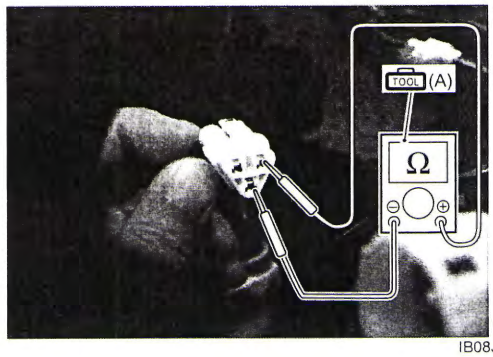
Step 3
GP switch check

1) Turn the ignition switch OFF.
2) Measure the resistance between the P wire and B/W wire, when shifting the gearshift lever from 1st to Top.

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

Tester knob indication
Resistance (Ω)

GP switch resistance
Approx. 500 Ω and more
((+) terminal: P – (–) terminal: B/W)



IB08J1110111-02

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the GP switch with a new one. Refer to "GP Switch Removal and Installation" in Section 1C (Page 1C-9).

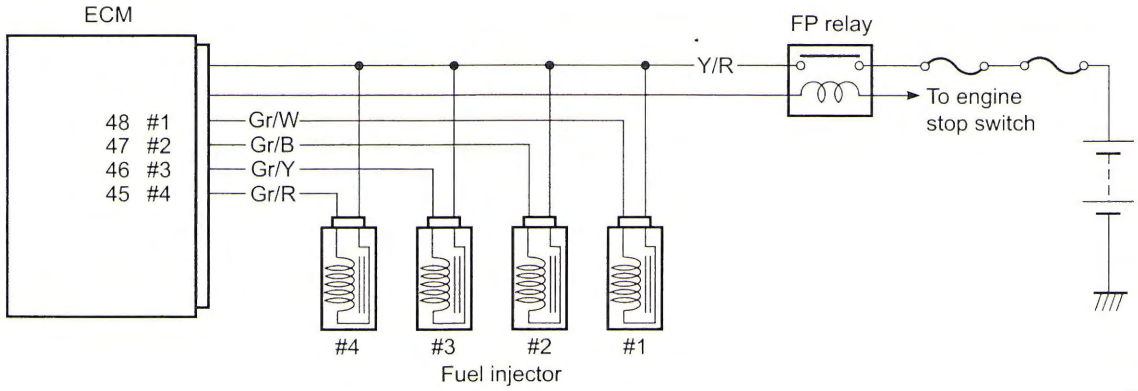
DTC "C32" (P0201), "C33" (P0202), "C34" (P0203) or "C35" (P0204): Fuel Injector Circuit Malfunction

BENF08J11104022

Detected Condition and Possible Cause

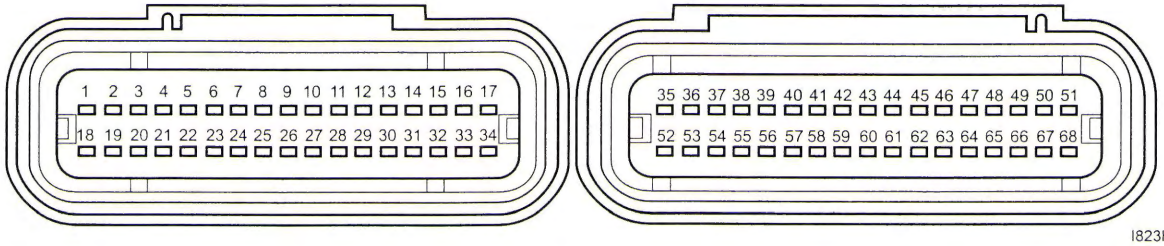
Detected Condition	Possible Cause
CKP signal is produced but fuel injector signal is interrupted by 4 times or more continuity.	• Injector circuit open or short. • Injector malfunction. • ECM malfunction.

Wiring Diagram



IB08J1110112-03

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

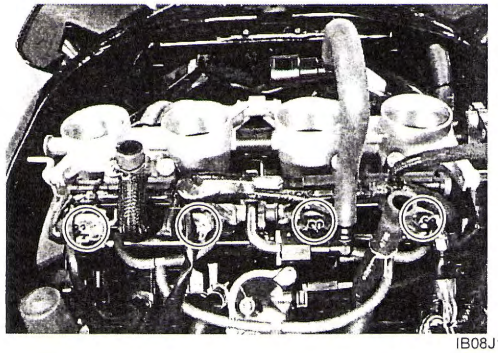
NOTE

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

Step 1

Injector power supply circuit check

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 injector coupler related to DTC.



IB08J1110113-02

4) Check for proper terminal connection to the injector coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the voltage between Y/R wire and ground.

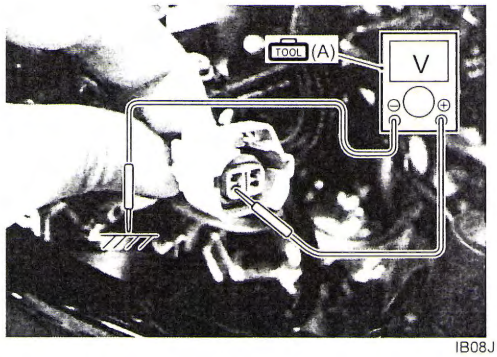
NOTE

Injector voltage can be detected only for 3 seconds after ignition switch is turned ON.

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

Tester knob indication
Voltage (⎓)

Injector power supply voltage
Battery voltage
((+) terminal: Y/R – (–) terminal: Ground)



IB08J1110114-02

Is check result OK?

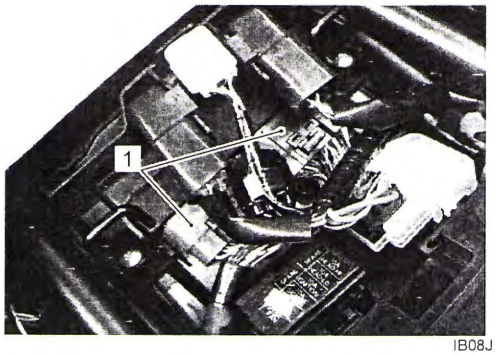
Yes Go to Step 2.

No Repair or replace the Y/R wire.

Step 2

Injector drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



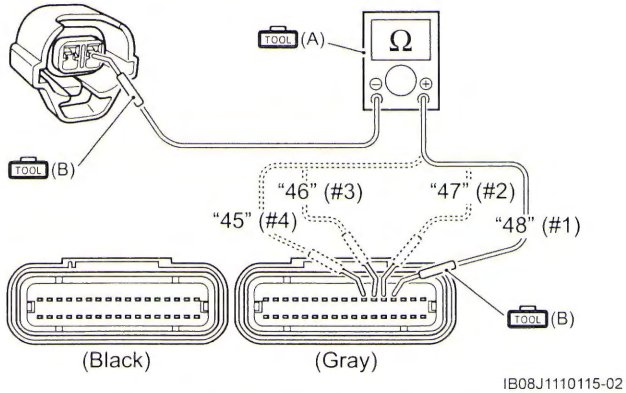
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

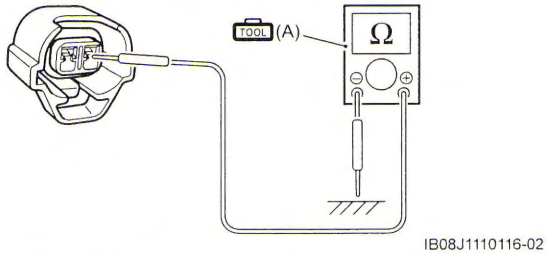
Tester knob indication
Resistance (Ω)

– Gr/W (#1), Gr/B (#2), Gr/Y (#3) or Gr/R (#4) wire: less than 1 Ω



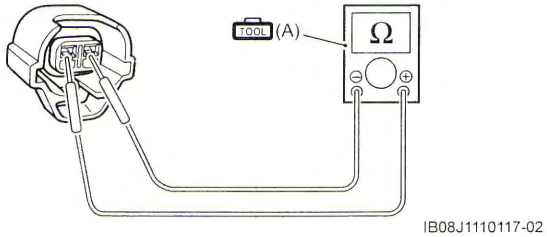
IB08J1110115-02

– Between Gr/W (#1), Gr/B (#2), Gr/Y (#3) or Gr/R (#4) wire and ground: infinity



IB08J1110116-02

– Between Gr/W (#1), Gr/B (#2), Gr/Y (#3) or Gr/R (#4) wire terminal and other terminal at injector coupler: infinity



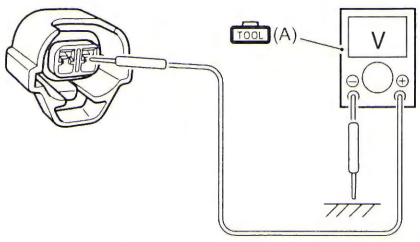
IB08J1110117-02

- Voltage

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

Tester knob indication
Voltage (⎓)

– Gr/W (#1), Gr/B (#2), Gr/Y (#3) or Gr/R (#4) wire: approx. 0 V (When ignition switch is ON)



IB08J1110118-02

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the defective wire harness.

Step 3

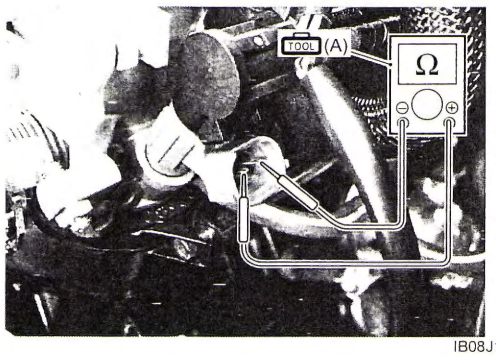
Injector resistance check

1) Turn the ignition switch OFF.
2) Measure the injector resistance between terminals.

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

Tester knob indication
Resistance (Ω)

Injector resistance
Battery voltage
Approx. 11.5 – 12.5 Ω at 20 °C (68 °F)
(Terminal – Terminal)

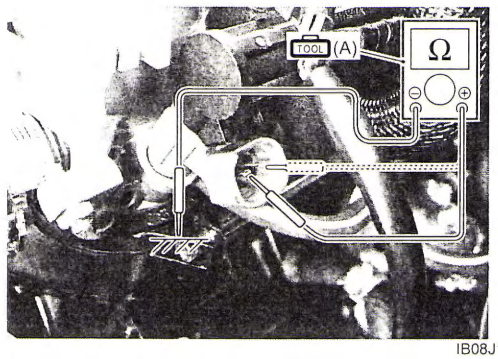


IB08J1110119-02

3) If OK, check the continuity between each terminal and ground.

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

Injector continuity
∞ Ω (Infinity)



IB08J1110120-02

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the injector with a new one. Refer to "ECT Sensor Removal and Installation" in Section 1C (Page 1C-4).

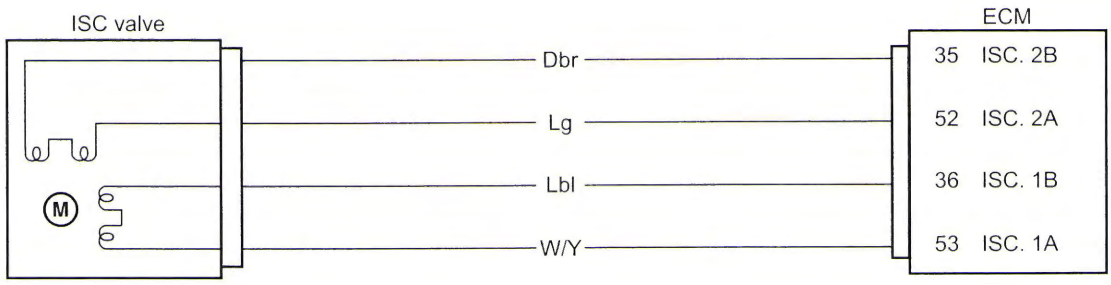
DTC "C40" (P0505): ISC Valve Circuit Malfunction

BENF08J11104023

Detected Condition and Possible Cause

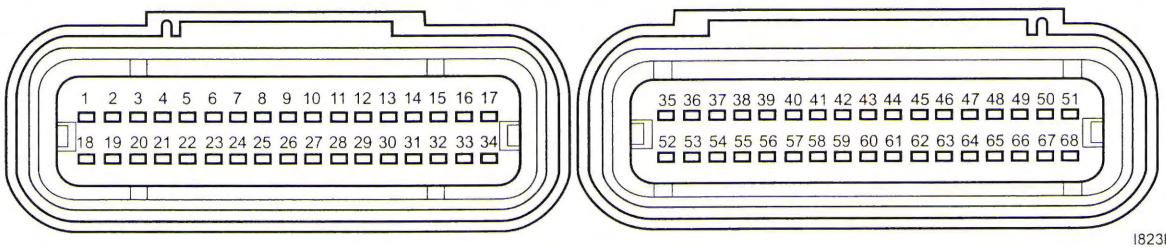
Detected Condition		Possible Cause
C40/P0505	The circuit voltage of motor drive is unusual.	• ISC valve circuit open or shorted to ground.

Wiring Diagram



IB08J1110121-02

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

- **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.**

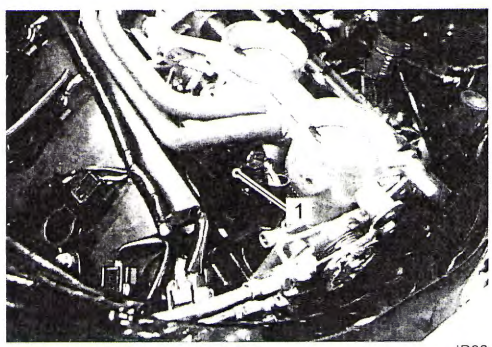
NOTE

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

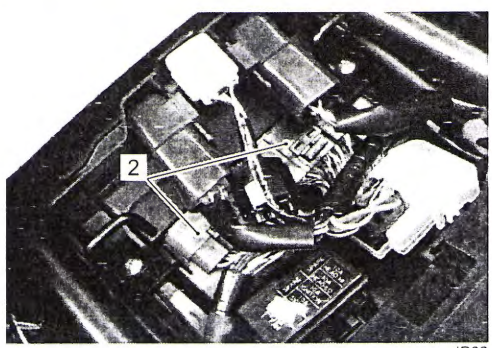
Step 1

ISC valve drive circuit check

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 ISC valve coupler (1) and ECM couplers (2).



IB08J1110122-02



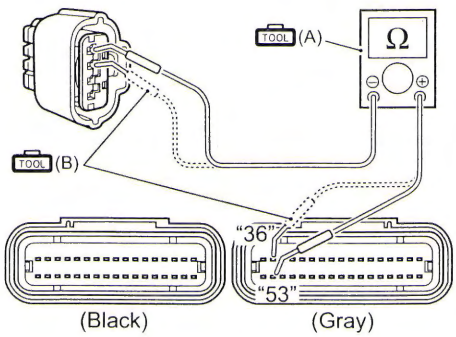
IB08J1110017-02

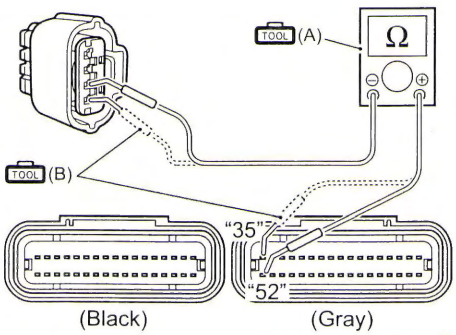
4) Check for proper terminal connection to the ISC valve coupler and ECM couplers.
5) If connections are OK, check the following points.
   - Resistance

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

     Tester knob indication
     Resistance (Ω)

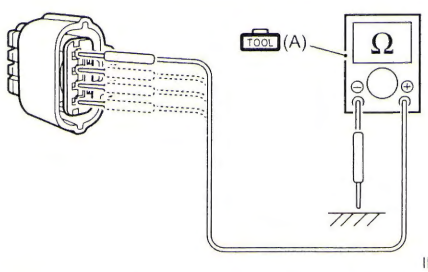
     – Dbr, Lg, Lbl and W/Y wires: less than 1 Ω





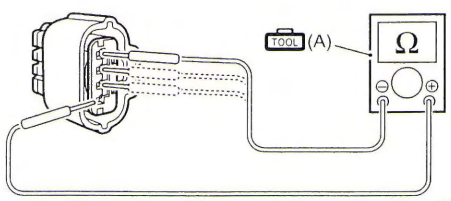
IB08J1110123-02

     – Between each of Dbr, Lg, Lbl and W/Y wire and ground: infinity



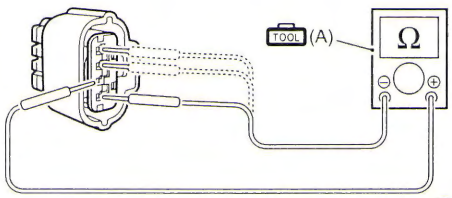
IB08J1110124-02

     – Between Dbr wire terminal and other terminal at ISC valve coupler: infinity



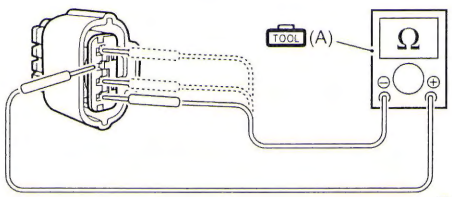
IB08J1110125-02

     – Between Lg wire terminal and other terminal at ISC valve coupler: infinity



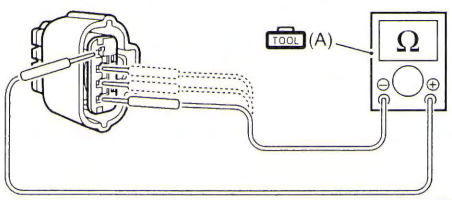
IB08J1110126-02

     – Between Lbl wire terminal and other terminal at ISC valve coupler: infinity



IB08J1110127-02

     – Between W/Y wire terminal and other terminal at ISC valve coupler: infinity



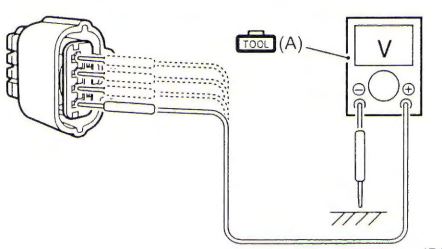
IB08J1110128-02

   - Voltage

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

     Tester knob indication
     Voltage (⎓)

     – Dbr, Lg, Lbl and W/Y wires: approx. 0 V (When ignition switch is ON)



IB08J1110129-02

Is check result OK?

Yes	Go to Step 2.
No	Repair or replace the defective wire harness.

Step 2

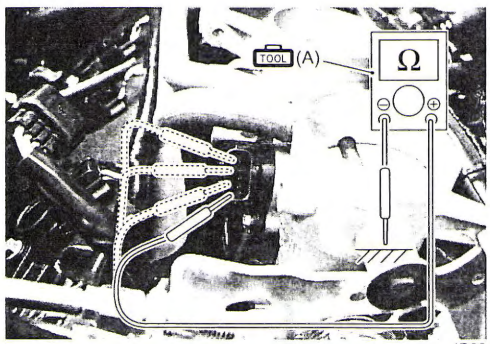
ISC valve check

1) Check the continuity between each ISC valve terminal and ground.

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

Tester knob indication
Resistance (Ω)

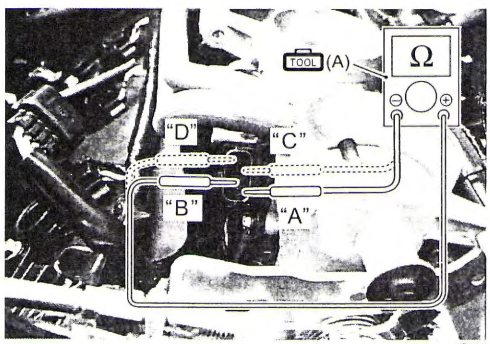
ISC valve continuity
∞ Ω (Infinity)
(Terminal – Ground)



IB08J1110130-04

2) If OK, measure the resistance (between the Dbr wire terminal "A" and Lg wire terminal "B") and (between the Lbl wire terminal "C" and W/Y wire terminal "D").

ISC valve resistance
Approx. 20 Ω at 20 °C (68 °F)
(Terminal: "A" – Terminal: "B", Terminal: "C" – Terminal: "D")



IB08J1110131-03

Is check result OK?

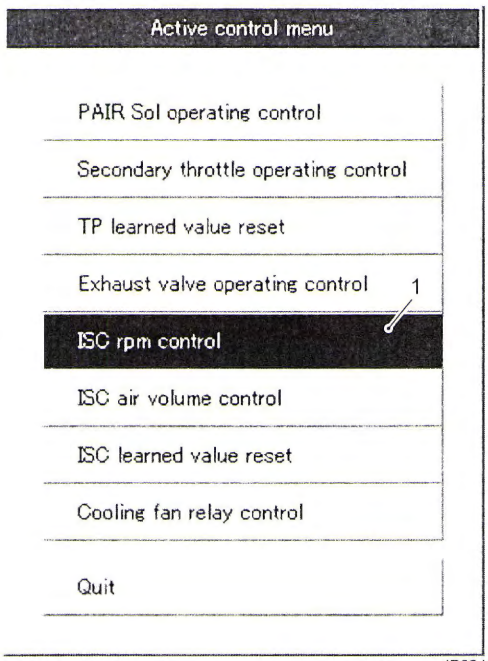
Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the throttle body assembly with a new one. Refer to "Throttle Body Removal and Installation" in Section 1D (Page 1D-11).

ACTIVE CONTROL INSPECTION (ISC RPM CONTROL)

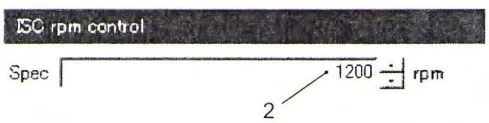
Check 1

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).

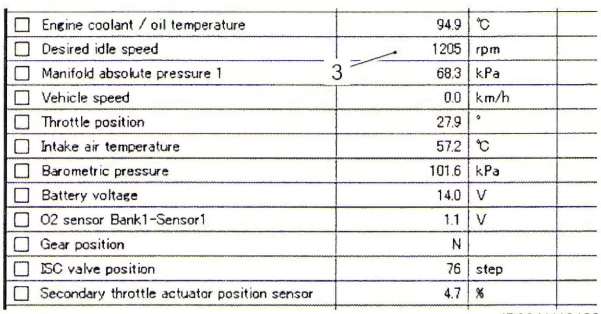


IB08J1110132-02

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



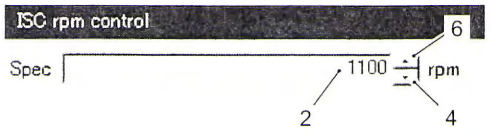
I838H1110004-01



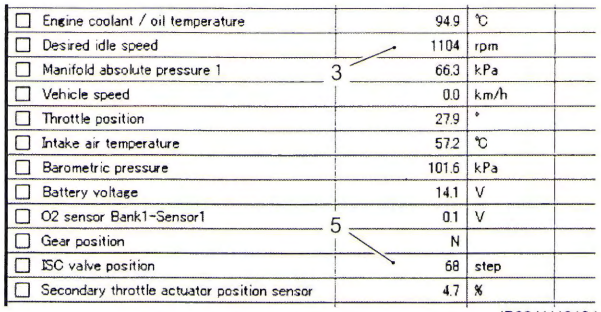
IB08J1110133-02

Check 2

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



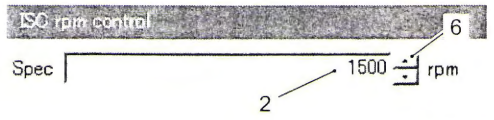
I837H1110082-01



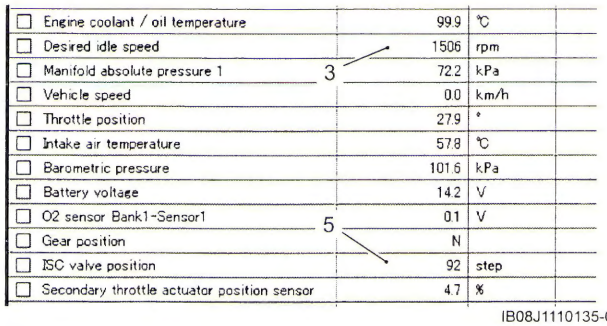
IB08J1110134-03

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.



I837H1110084-01



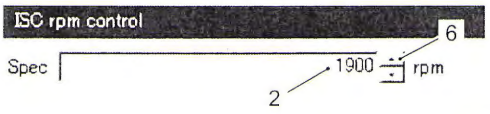
IB08J1110135-02

Check 4

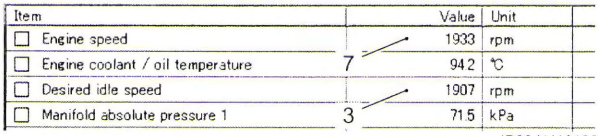
1) Click the button (6) and increase the "Spec" (2) to 1 900 rpm.
2) Check that the "Desired idle speed" (3) is approx. 1 900 rpm.
3) Check that the "Engine speed" (7) is close to 1 900 rpm.

NOTE

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



I837H1110086-01



IB08J1110136-02

If the ISC valve does not function properly, inspect the ISC valve. Refer to "ISC Valve Inspection" in Section 1C (Page 1C-8).

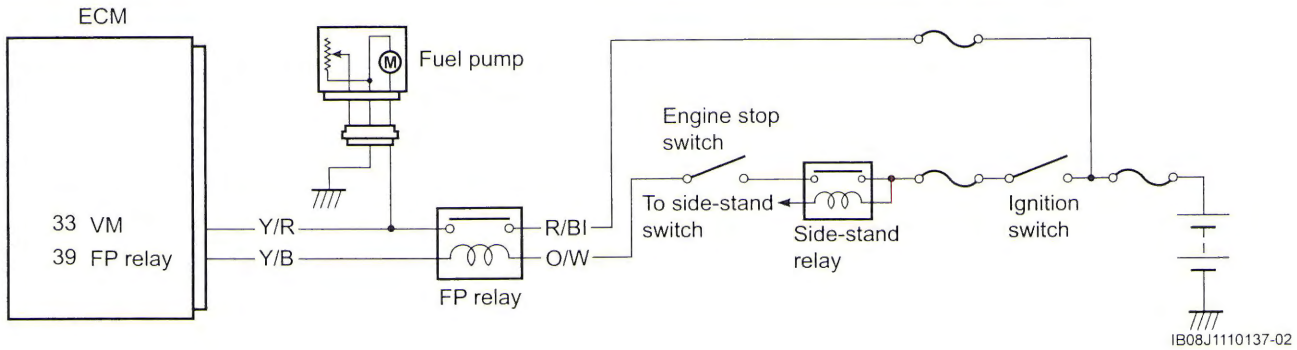
DTC "C41" (P0230-H/L): FP Relay Circuit Malfunction

BENF08J11104024

Detected Condition and Possible Cause

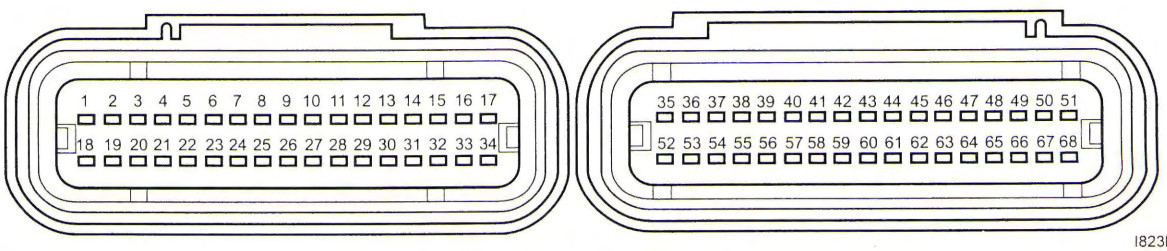
Detected Condition			Possible Cause
C41		No voltage is applied to fuel pump.	• FP relay circuit open or short. • FP relay malfunction. • FP relay switch circuit is shorted to power source. • Faulty FP relay (switch side). • FP relay coil circuit open or short. • Faulty FP relay (coil side).
P0230	H	Voltage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

Wiring Diagram



IB08J1110137-02

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

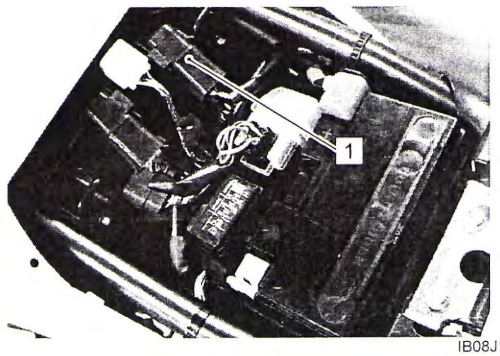
NOTE

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

Step 1

FP relay power supply circuit check

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 FP relay coupler (1).



IB08J1110138-01

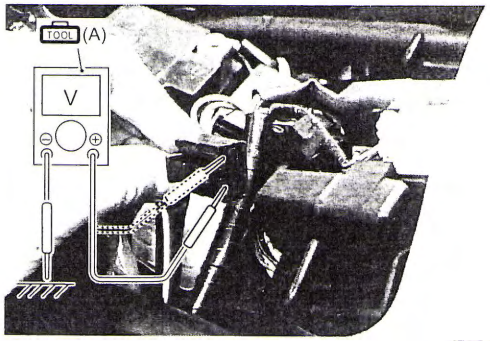
4) Check for proper terminal connection to the FP relay coupler.
5) If connections are OK, support the motorcycle with a jack.
6) Fold the side-stand to up position.
7) Turn the ignition switch ON.

8) Check the following points.
   - Voltage between O/W wire and ground is battery voltage.
   - Voltage between R/Bl wire and ground is battery voltage.

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

Tester knob indication
Voltage (⎓)

FP relay power supply voltage
Battery voltage
((+) terminal: O/W – (–) terminal: Ground, (+) terminal: R/Bl – (–) terminal: Ground)



IB08J1110139-03

Is check result OK?

Yes	Go to Step 2.
No	Repair or replace the defective wire harness.

Step 2

FP relay check
Check the FP relay. Refer to "Fuel Pump Relay Inspection" in Section 1G (Page 1G-7).

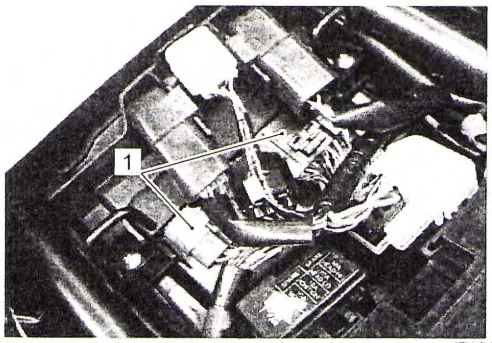
Is check result OK?

Yes	Go to Step 3.
No	Replace the FP relay.

Step 3

FP relay drive circuit and power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



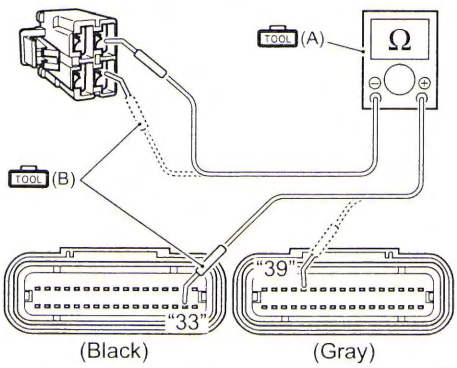
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

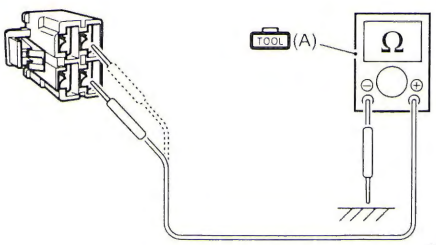
Tester knob indication
Resistance (Ω)

– Y/R wire and Y/B wire: less than 1 Ω



IB08J1110140-02

– Between each of Y/R and Y/B wire and ground: infinity



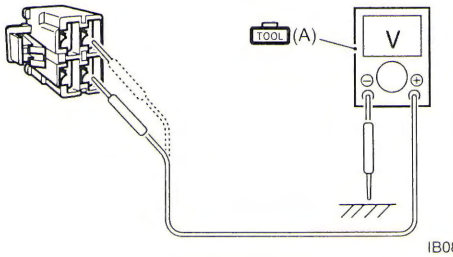
IB08J1110141-02

- Voltage

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

Tester knob indication
Voltage (⎓)

– Y/R wire and Y/B wire: approx. 0 V (When ignition switch is ON)



IB08J1110142-02

Is check result OK?

Yes	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).
No	Repair or replace the defective wire harness.

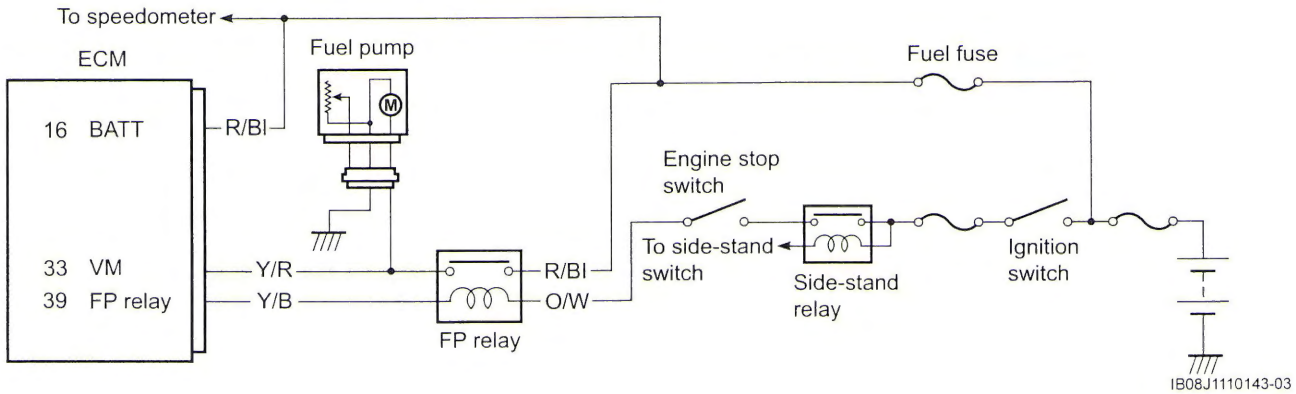
DTC "C41" (P2505): ECM Power Input Signal Malfunction

BENF08J11104025

Detected Condition and Possible Cause

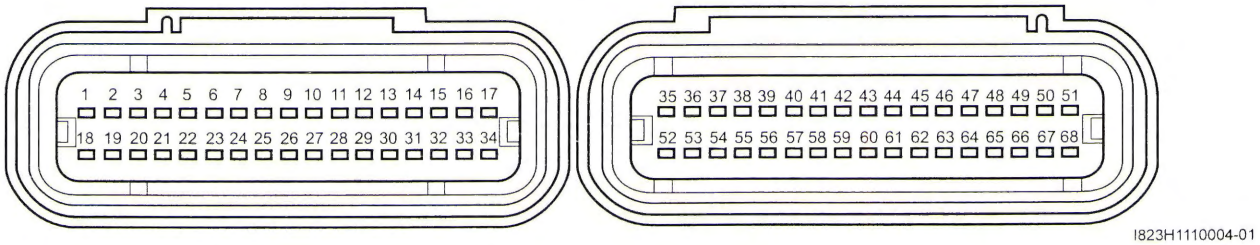
Detected Condition		Possible Cause
C41/P2505	No voltage is applied to the ECM.	• Lead wire/coupler connection of ECM terminal to fuel fuse. • Fuel fuse.

Wiring Diagram



IB08J1110143-03

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

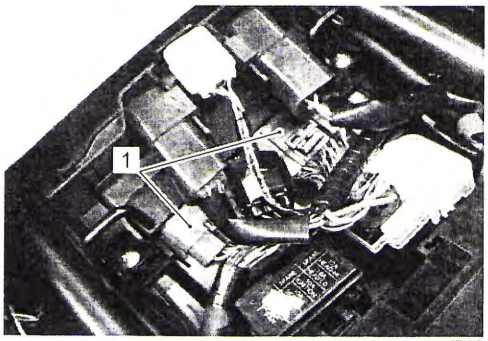
NOTE

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

Step 1

ECM power supply circuit check

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 ECM couplers (1).



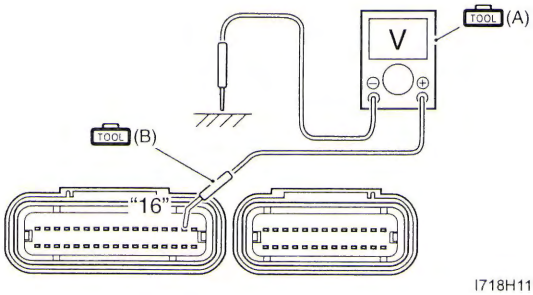
IB08J1110039-02

4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, Measure the voltage between R/Bl and ground.

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

Tester knob indication
Voltage (⎓)

ECM input voltage
Battery voltage
((+) terminal: R/Bl – (–) terminal: Ground)



I718H1110250-01

Is check result OK?

Yes	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).
No	Check FUEL fuse for blowout. If fuse is not blown, repair or replace the R/Bl wire.

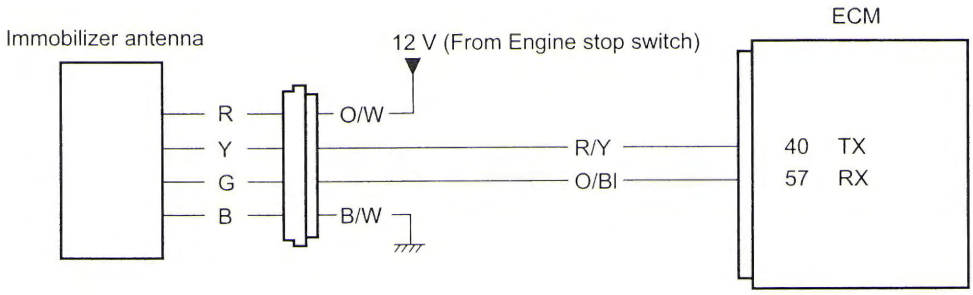
DTC "C42" (P1650): IG Switch Circuit Malfunction (If Equipped)

BENF08J11104026

Detected Condition and Possible Cause

Detected Condition	Possible Cause
When the ID agreement is not verified. ECM does not receive communication signal from the immobilizer antenna.	Immobilizer system malfunction.

Wiring Diagram



IB08J1110214-01

Troubleshooting

NOTICE

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.

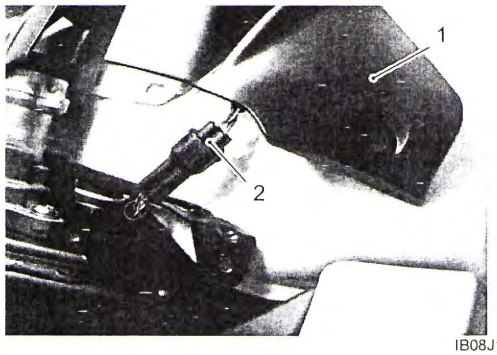
NOTE

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

Step 1

Immobilizer antenna power supply circuit check

1) Turn the ignition switch OFF.
2) Remove the ignition switch center cover (1) and disconnect the Immobilizer antenna coupler (2). Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).



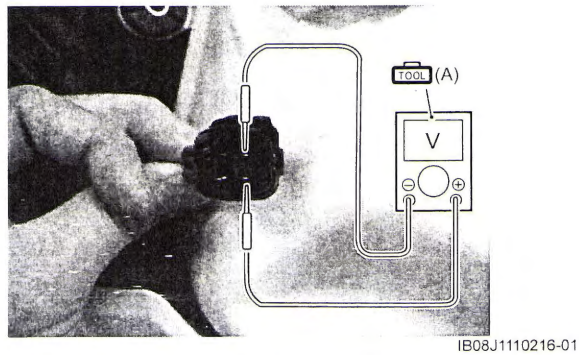
IB08J1110215-01

3) Check for proper terminal connection to Immobilizer antenna coupler.
4) If connections are OK, turn ignition switch ON.
5) Measure the voltage between O/W and B/W.

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

Tester knob indication
Voltage (⎓)

Immobilizer antenna power supply voltage
Battery voltage
((+) terminal: O/W – (–) terminal: B/W)



IB08J1110216-01

Is check result OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2

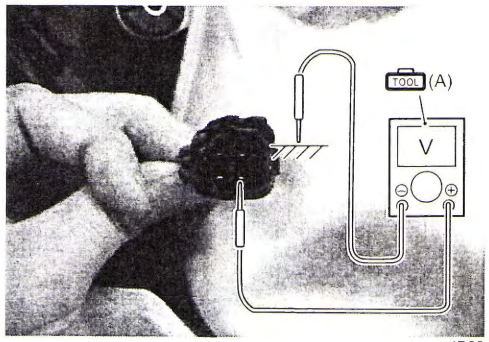
Immobilizer antenna ground circuit check

1) Measure the voltage between O/W and ground.

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

Tester knob indication
Voltage (⎓)

Immobilizer antenna power supply voltage
Battery voltage
((+) terminal: O/W – (–) terminal: ground)



IB08J1110217-01

Is check result OK?

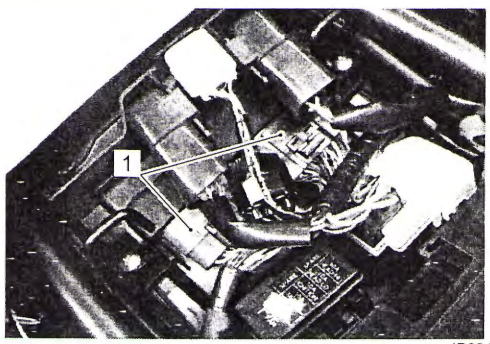
Yes — Repair or replace B/W wire.

No — Repair or replace O/W wire.

Step 3

Immobilizer antenna signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



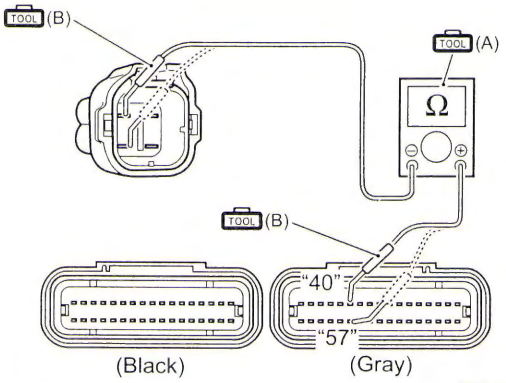
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

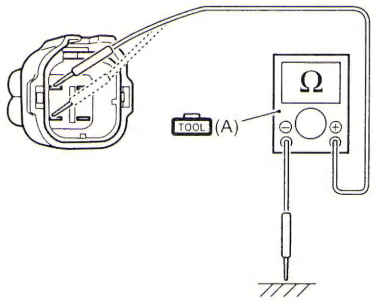
Tester knob indication
Resistance (Ω)

– R/Y wire and O/Bl wire: less than 1 Ω



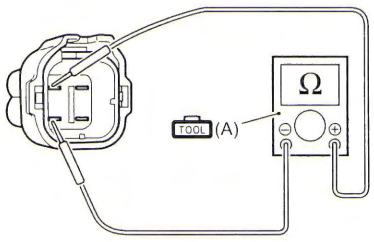
IB08J1110218-02

– Between each of R/Y and O/Bl wire and ground: infinity



IB08J1110219-02

– Between R/Y wire terminal and O/Bl wire terminal at immobilizer antenna coupler: infinity



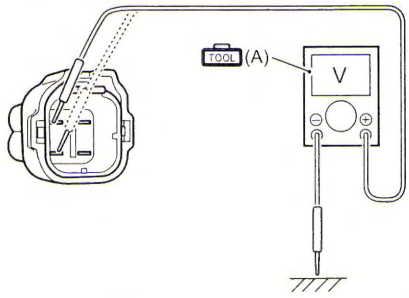
IB08J1110220-02

- Voltage

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

Tester knob indication
Voltage (⎓)

– R/Y and O/Bl wires: approx. 0 V (When ignition switch is ON)



IB08J1110221-02

Is check result OK?

Yes	• Immobilizer antenna • Transponder • ECM
No	Repair or replace defective wire harness.

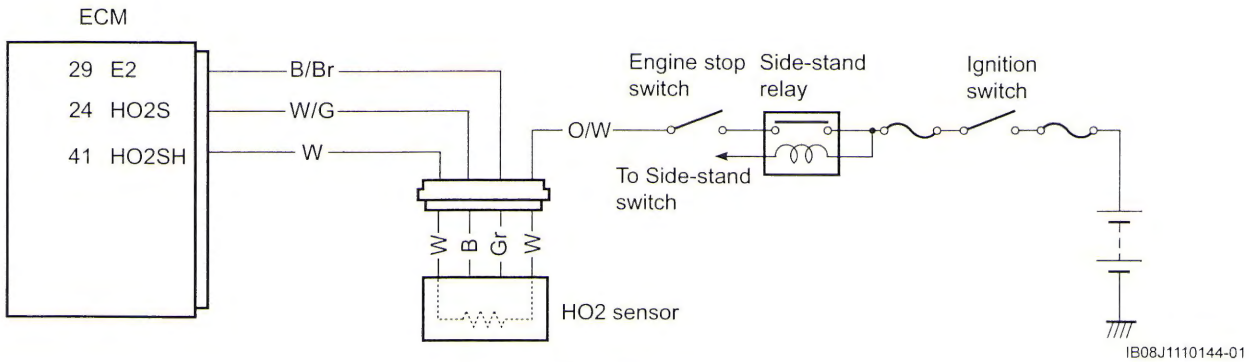
DTC "C44" (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction

BENF08J11104027

Detected Condition and Possible Cause

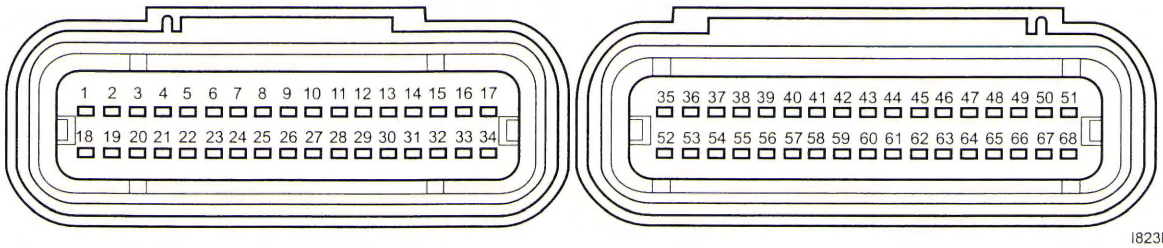
Detected Condition		Possible Cause
C44/P0130	HO2 sensor output voltage is not input to ECM specified running condition.	• Output state of HO2 sensor
C44/P0135	The heater can not operate so that heater operation voltage is not supplied to the HO2 sensor heater circuit.	• HO2 sensor heater circuit is open or shorted to ground. • Battery voltage is not supplied to the HO2 sensor.

Wiring Diagram



IB08J1110144-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

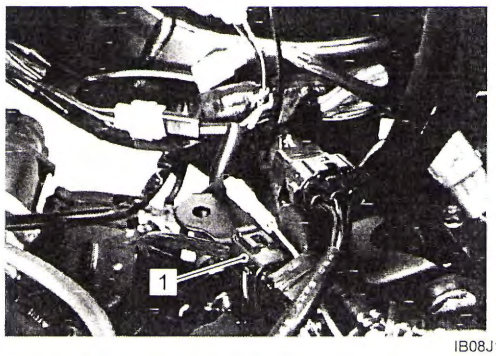
NOTE

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

Step 1

HO2 sensor heater power supply circuit check

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 HO2 sensor coupler (1).



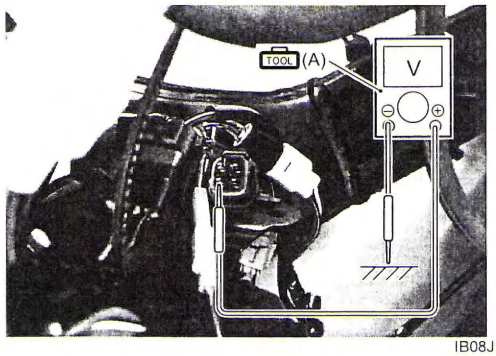
IB08J1110145-02

4) Check for proper terminal connection to the HO2 sensor coupler.
5) If connections are OK, support the motorcycle with a jack.
6) Fold the side-stand to up position.
7) Turn the ignition switch ON.
8) Measure the voltage between O/W wire and ground.

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

Tester knob indication
Voltage (⎓)

HO2 sensor heater power supply voltage
Battery voltage
((+) terminal: O/W – (–) terminal: Ground)



IB08J1110146-02

Is check result OK?

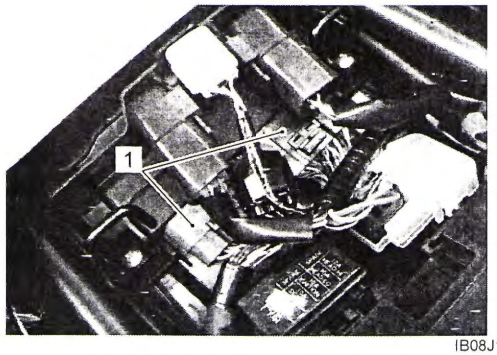
Yes Go to Step 2.

No Repair or replace the O/W wire.

Step 2

HO2 sensor circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



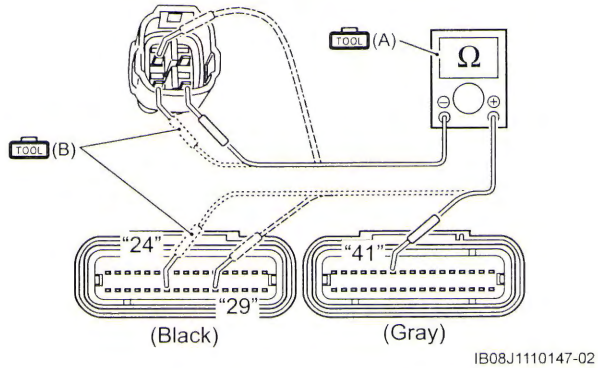
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

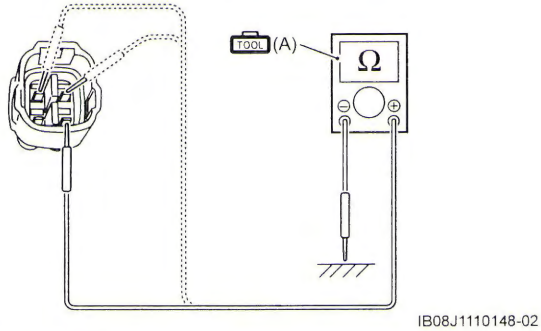
Tester knob indication
Resistance (Ω)

– W, W/G and B/Br wires: less than 1 Ω



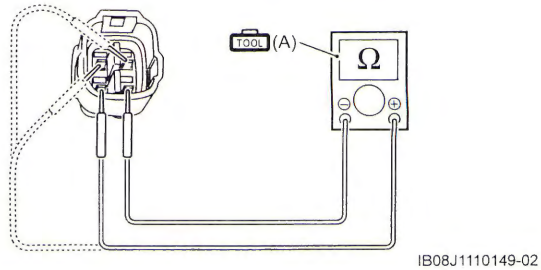
IB08J1110147-02

– Between each of W, W/G and B/Br wire and ground: infinity



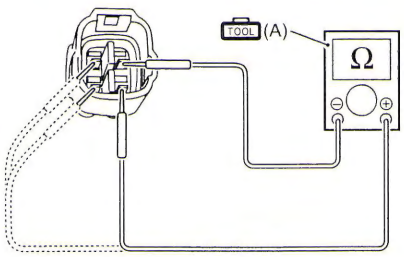
IB08J1110148-02

– Between W wire terminal and other terminal at HO2 sensor coupler: infinity



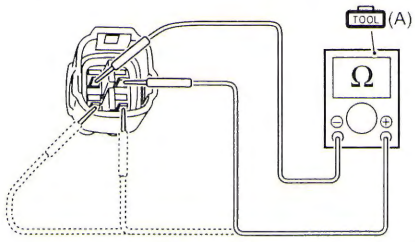
IB08J1110149-02

– Between W/G wire terminal and other terminal at HO2 sensor coupler: infinity



IB08J1110150-02

– Between B/Br wire terminal and other terminal at HO2 sensor coupler: infinity



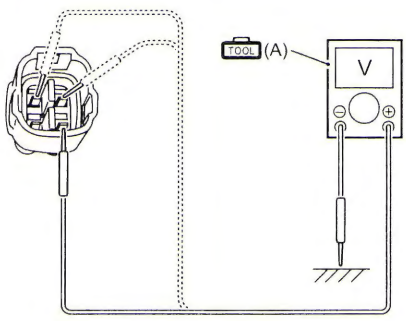
IB08J1110151-02

- Voltage

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

Tester knob indication
Voltage (⎓)

– W, W/G and B/Br wires: approx. 0 V (When ignition switch is ON)



IB08J1110152-02

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the defective wire harness.

Step 3

HO2 sensor heater check

1) Measure the resistance between terminals.

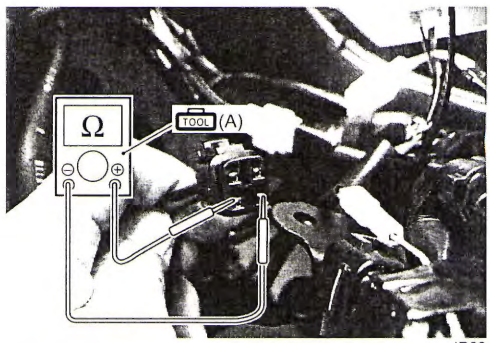
NOTE

- **Temperature of the HO2 sensor affects resistance value largely.**
- **Make sure that the HO2 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)



IB08J1110153-02

Is check result OK?

Yes — Go to Step 4.

No — Replace the HO2 sensor with a new one. Refer to "HO2 Sensor Removal and Installation" in Section 1C (Page 1C-9).

Step 4

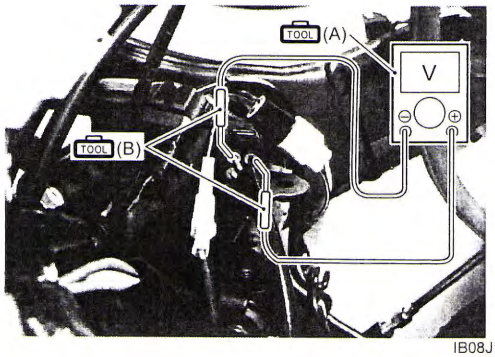
HO2 sensor output voltage check

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 wire and B/Br wire, in idling condition.

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

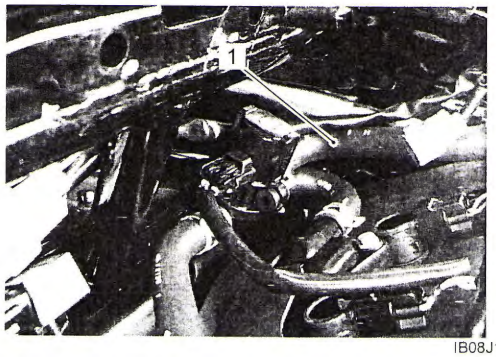
Tester knob indication
Voltage (⎓)

HO2 sensor output voltage at idle speed
0.4 V and less
((+) terminal: W/G – (–) terminal: B/Br)



IB08J1110154-03

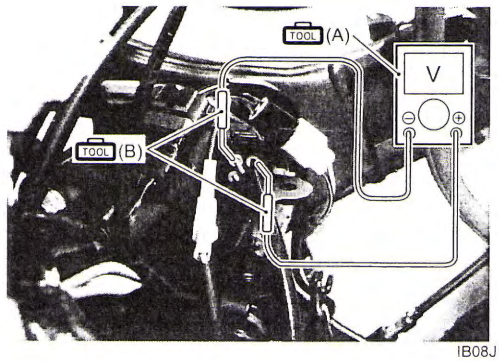
5) If OK, remove the air cleaner box and pinch the PAIR hose (1) with a proper hose clamp.



IB08J1110155-01

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)



IB08J1110154-03

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

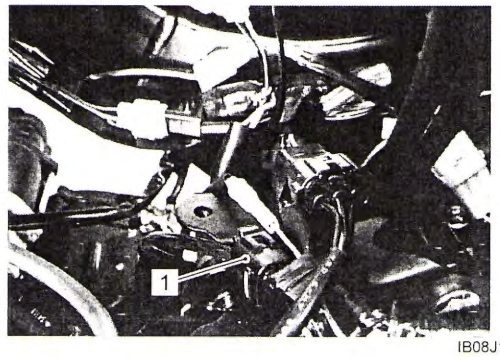
No — Replace the HO2 sensor with a new one. Refer to "HO2 Sensor Removal and Installation" in Section 1C (Page 1C-9).

P0130 for HO2 sensor (Use of SDS)

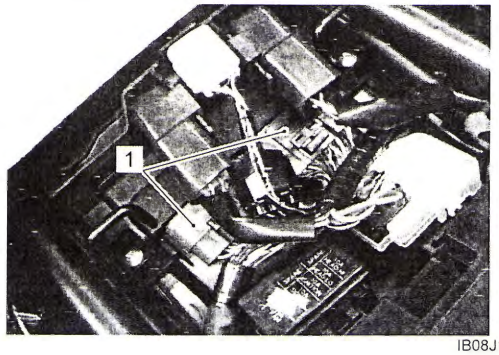
Step 1

HO2 sensor circuit check

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 HO2 sensor coupler (1) and the ECM couplers (2).



IB08J1110145-02



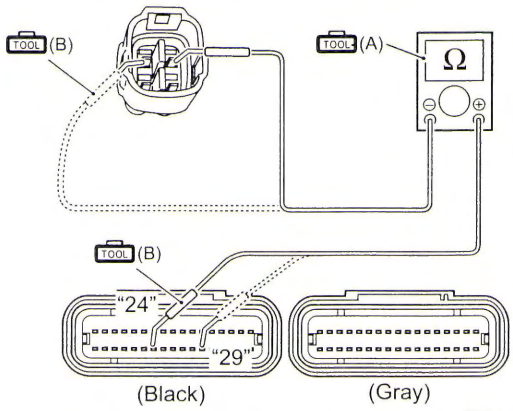
IB08J1110039-02

4) Check for proper terminal connection to the HO2 sensor coupler and the ECM couplers.
5) If connections are OK, check the following points.
   - Resistance

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

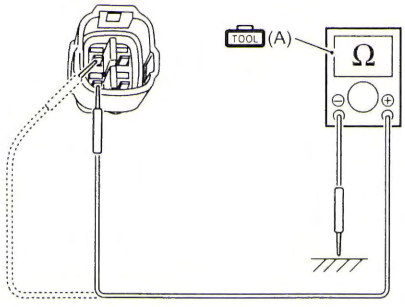
     Tester knob indication
     Resistance (Ω)

     – W/G wire and B/Br wire: less than 1 Ω



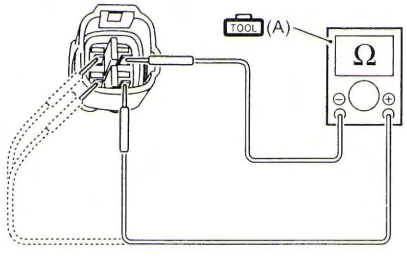
IB08J1110156-02

     – Between each of W/G and B/Br wire and ground: infinity



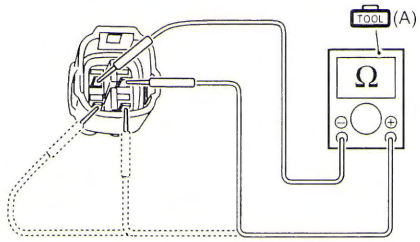
IB08J1110157-02

     – Between W/G wire terminal and other terminal at HO2 sensor coupler: infinity



IB08J1110150-02

     – Between B/Br wire terminal and other terminal at HO2 sensor coupler: infinity



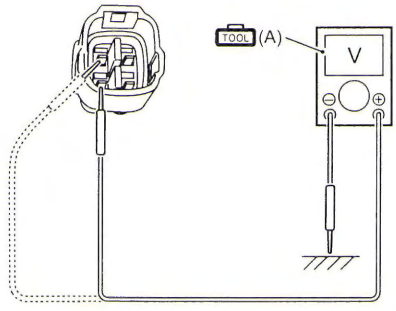
IB08J1110151-02

   - Voltage

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

     Tester knob indication
     Voltage (⎓)

     – W/G wire and B/Br wire: approx. 0 V (When ignition switch is ON)



IB08J1110158-02

Is check result OK?

Yes	Go to Step 2.
No	Repair or replace the defective wire harness.

Step 2

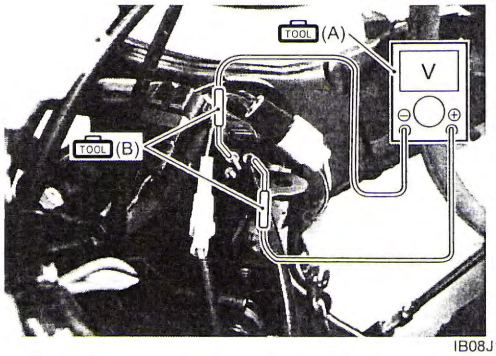
HO2 sensor output voltage check

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 wire and B/Br wire, in idling condition.

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

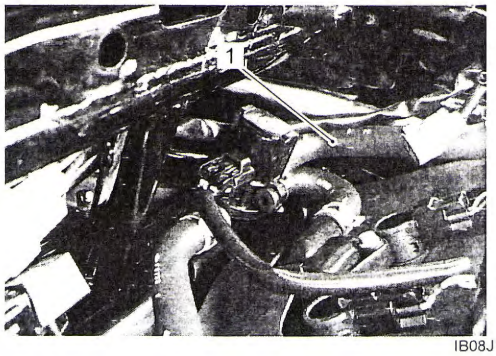
Tester knob indication
Voltage (⎓)

HO2 sensor output voltage at idle speed
0.4 V and less
((+) terminal: W/G – (–) terminal: B/Br)



IB08J1110154-03

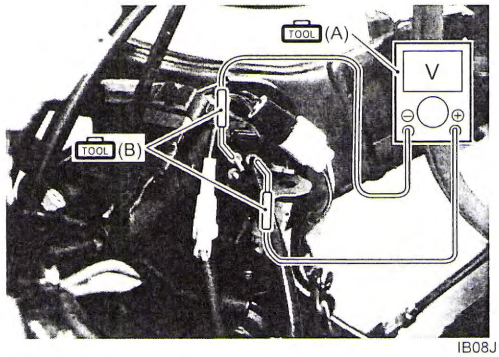
5) If OK, remove the air cleaner box and pinch the PAIR hose (1) with a proper hose clamp.



IB08J1110155-01

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)



IB08J1110154-03

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

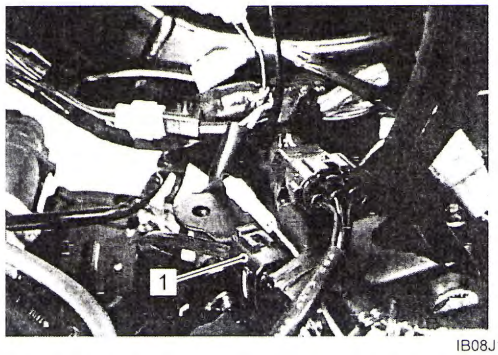
No — Replace the HO2 sensor with a new one. Refer to "HO2 Sensor Removal and Installation" in Section 1C (Page 1C-9).

P0135 for HO2 sensor (Use of SDS)

Step 1

HO2 sensor heater power supply circuit check

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 HO2 sensor coupler (1).



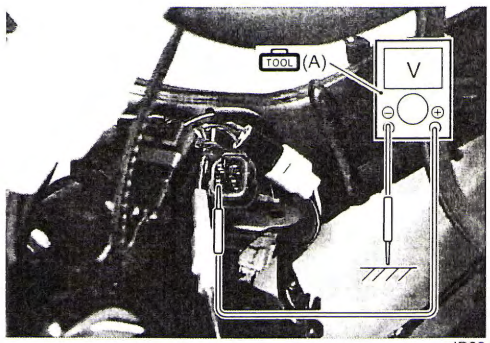
IB08J1110145-02

4) Check for proper terminal connection to the HO2 sensor coupler.
5) If connections are OK, support the motorcycle with a jack.
6) Fold the side-stand to up position.
7) Turn the ignition switch ON.
8) Measure the voltage between O/W and ground.

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

Tester knob indication
Voltage (⎓)

HO2 sensor heater power supply voltage
Battery voltage
((+) terminal: O/W – (–) terminal: Ground)



IB08J1110146-02

Is check result OK?

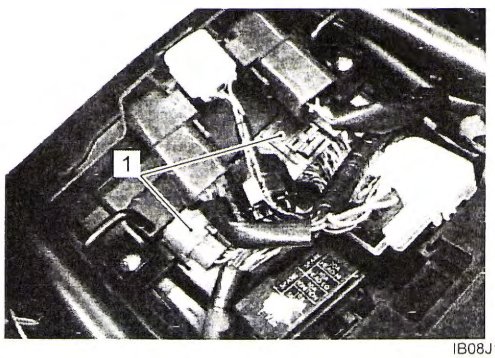
Yes Go to Step 2.

No Repair or replace the O/W wire.

Step 2

HO2 sensor heater drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



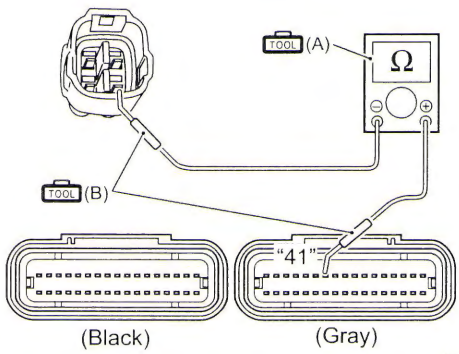
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

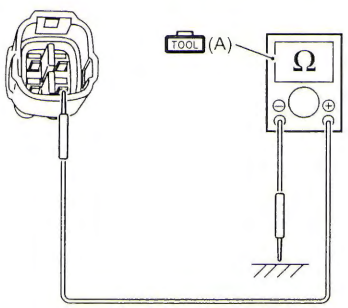
Tester knob indication
Resistance (Ω)

– W wire: less than 1 Ω



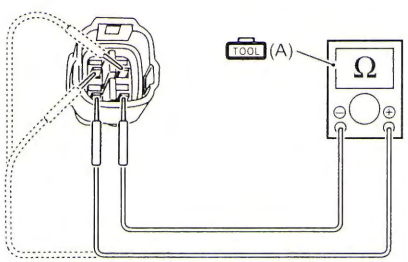
IB08J1110159-02

– Between W wire and ground: infinity



IB08J1110160-02

– Between W wire terminal and other terminal at HO2 sensor coupler: infinity



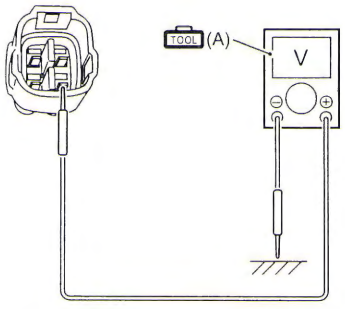
IB08J1110149-02

- Voltage

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

Tester knob indication
Voltage (⎓)

– W wire: approx. 0 V (When ignition switch is ON)



IB08J1110161-02

Is check result OK?

Yes Go to Step 3.

No Repair or replace the W wire.

Step 3

HO2 sensor heater check

1) Measure the resistance between terminals.

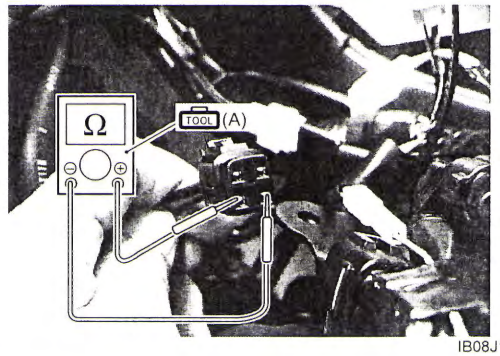
NOTE

- **Temperature of the HO2 sensor affects resistance value largely.**
- **Make sure that the HO2 sensor heater is in atmospheric temperature.**

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

Tester knob indication
Resistance (Ω)

HO2 sensor heater resistance
6.7 – 9.5 Ω at 23 °C (73 °F)
(W – W)



IB08J1110162-02

Is check result OK?

Yes Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

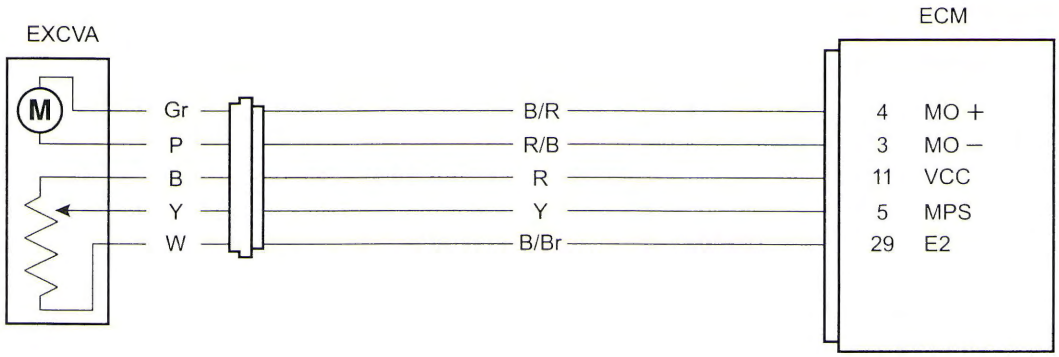
No Replace the HO2 sensor with a new one. Refer to "HO2 Sensor Removal and Installation" in Section 1C (Page 1C-9).

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

BENF08J11104028

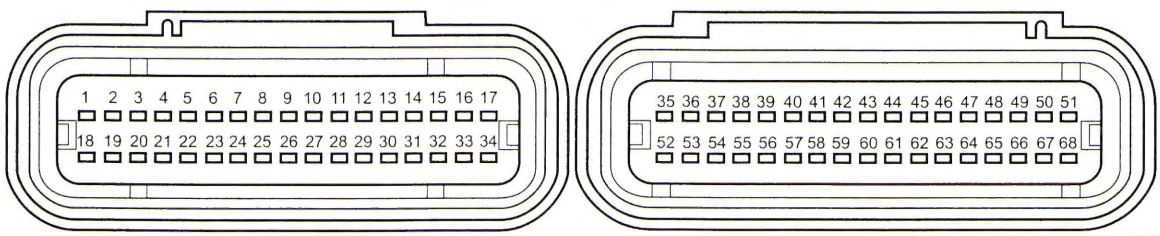
Detected Condition			Possible Cause
C46		The operation signal does not reach the EXCVA. EXCVA position sensor voltage is not within the following range. 0.1 V ≤ Sensor voltage < 4.9 V EXCVA can not operate properly.	• EXCVA maladjusted. • EXCVA circuit open or short. • EXCVA motor malfunction. • EXCVA position sensor malfunction.
P1657	H	Sensor voltage is higher than specified value.	• EXCVA position sensor signal circuit shorted to VCC or ground circuit open.
	L	Sensor voltage is lower than specified value.	• EXCVA position sensor signal circuit open or shorted to ground or VCC circuit open.
P1658		The operation signal does not reach the EXCVA motor. EXCVA can not operate properly.	• EXCVA motor circuit open or short. • EXCVA motor malfunction.

Wiring Diagram



IB08J1110163-02

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

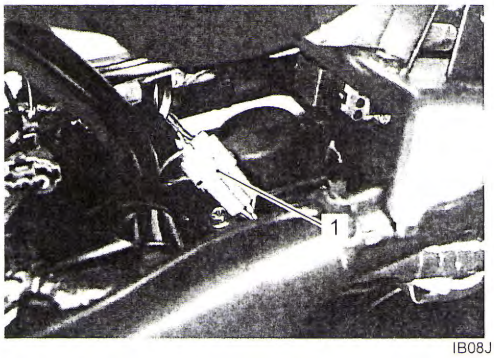
NOTE

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

Step 1

EXCVA position sensor power supply circuit check

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 EXCVA coupler (1).



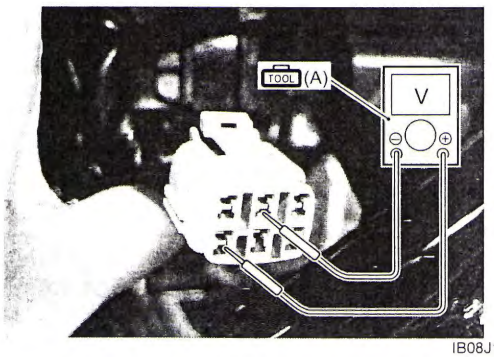
IB08J1110164-02

4) Check for proper terminal connection to the EXCVA coupler.
5) If connections are OK, turn the ignition switch ON.
6) 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 power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: B/Br)



IB08J1110165-02

Is check result OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2

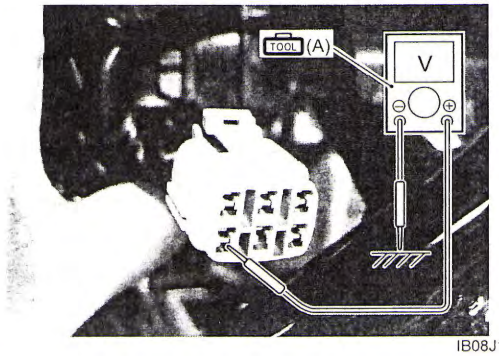
EXCVA position sensor ground circuit check

1) Measure the voltage between the R wire and ground.

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

Tester knob indication
Voltage (⎓)

EXCVA position sensor power supply voltage
4.5 – 5.5 V
((+) terminal: R – (–) terminal: ground)



IB08J1110166-02

Is check result OK?

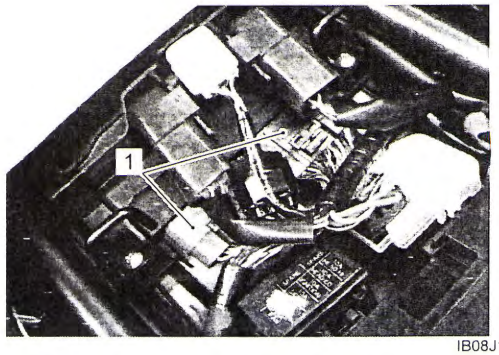
Yes Repair or replace the B/Br wire.

No Repair or replace the R wire.

Step 3

EXCVA position sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



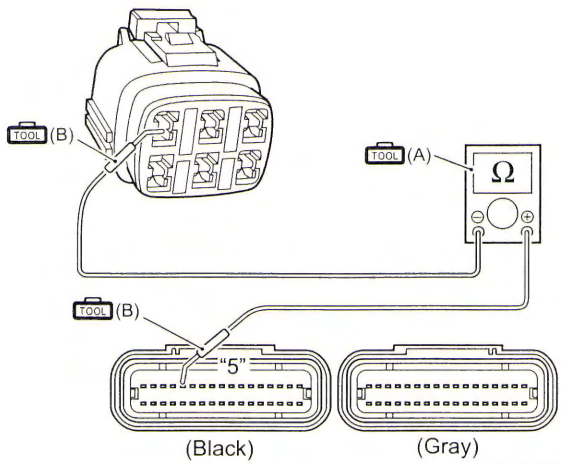
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

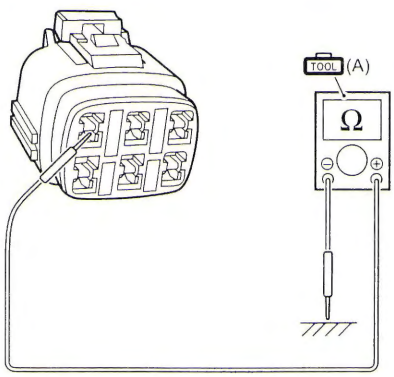
     Tester knob indication
     Resistance (Ω)

     – Y wire: less than 1 Ω



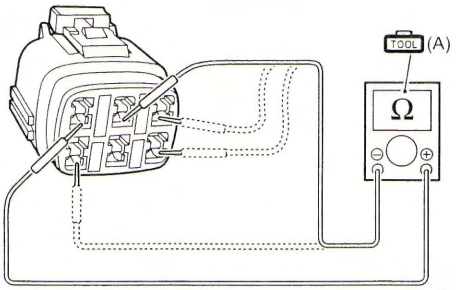
IB08J1110167-02

     – Between Y wire and ground: infinity



IB08J1110168-02

     – Between Y wire terminal and other terminal at EXCVA coupler: infinity



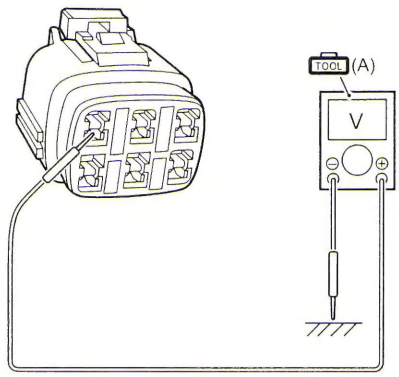
IB08J1110169-02

   - Voltage

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

     Tester knob indication
     Voltage (⎓)

     – Y wire: approx. 0 V (When ignition switch is ON)



IB08J1110170-02

Is check result OK?

Yes	Go to Step 4.
No	Repair or replace the Y wire.

Step 4
EXCV cable check

1) Turn the ignition switch OFF.
2) Check the installation of EXCV cables. Refer to "EXCV Cable Removal and Installation" in Section 1K (Page 1K-6).
3) Recheck DTC.

Is check result OK?

Yes	Go to Step 5.
No	Adjust the EXCV cables. Refer to "EXCVA Adjustment" in Section 1K (Page 1K-10).

Step 5

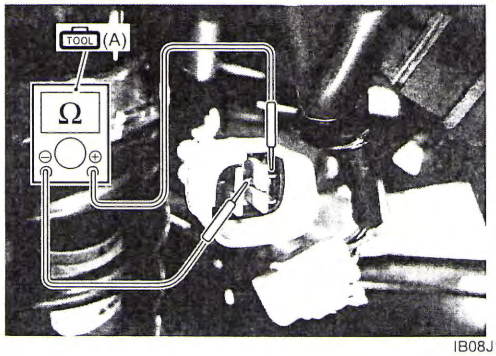
EXCVA position sensor resistance check

1) Connect the EXCVA coupler and set the EXCVA to adjustment position. Refer to "EXCV Cable Removal and Installation" in Section 1K (Page 1K-6).
2) 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)



IB08J1110171-02

Is DTC still detected?

Yes — Go to Step 6.

No — Replace the EXCVA. Refer to "EXCVA Removal and Installation" in Section 1K (Page 1K-8).

Step 6

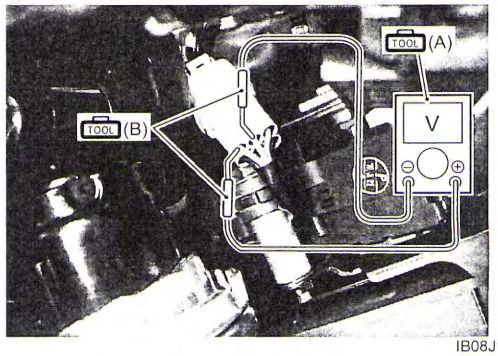
EXCVA position sensor output voltage check 1 (using SDS)

1) Turn the ignition switch OFF.
2) Connect the EXCVA and ECM couplers.
3) Set EXCV to the full closed position. Refer to "Active Control Inspection" (Page 1A-92).
4) 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)



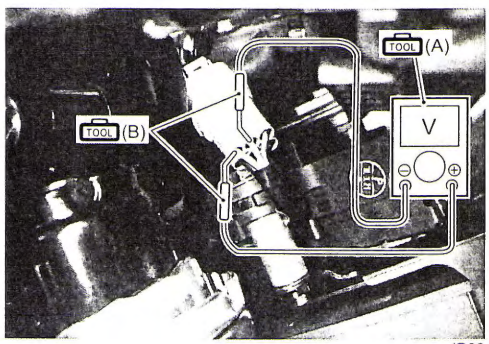
IB08J1110172-03

5) Set EXCV to the full opened position. Refer to "Active Control Inspection" (Page 1A-92).
6) 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)

Tester knob indication
Voltage (⎓)

EXCVA position sensor output voltage
EXCV is fully opened: 3.6 – 4.55 V
((+) Y – (–) W)



IB08J1110172-03

Is check result OK?

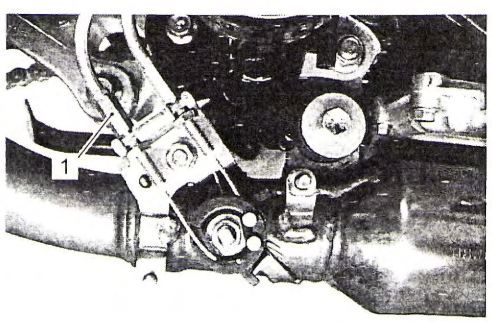
Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Go to Step 7.

Step 7

EXCVA position sensor output voltage check 2 (using SDS)

1) If the EXCVA position sensor output voltage is 0.5 V and less at EXCV fully closed position, adjust the output voltage to the specified value by turning out the No. 1 cable adjuster (1). Refer to "EXCV Cable Removal and Installation" in Section 1K (Page 1K-6).



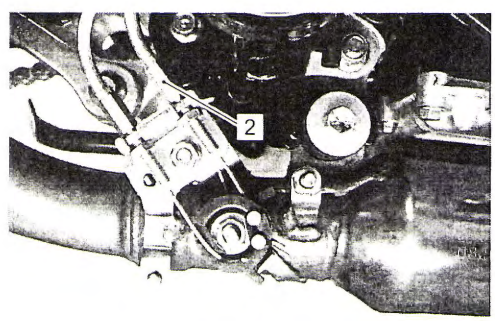
IB08J1110173-02

2) Repeat the procedure in Step 6 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).

NOTICE

- **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 the wrench.**

3) If the EXCVA position sensor output voltage is 4.5 V and more at EXCV fully opened position, adjust the output voltage to the specified value by turning out the No. 2 cable adjuster (2). Refer to "EXCV Cable Removal and Installation" in Section 1K (Page 1K-6). Repeat the procedure in Step 6 until the output voltage is set within the specified value.



IB08J1110174-02

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

Is check result OK?

Yes — Go to Step 8.

No — Replace the EXCVA. Refer to "EXCVA Removal and Installation" in Section 1K (Page 1K-8).

Step 8

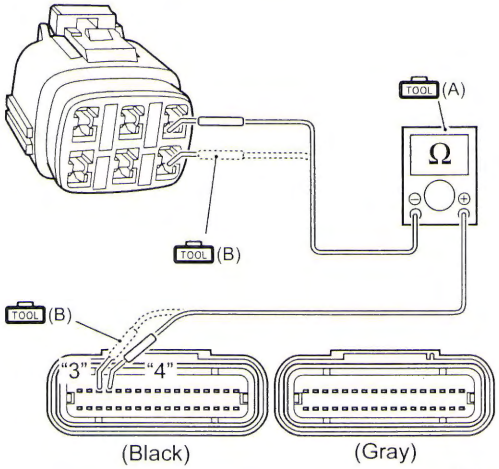
EXCVA drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the EXCVA and ECM couplers.
3) Check the following points.
   - Resistance

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

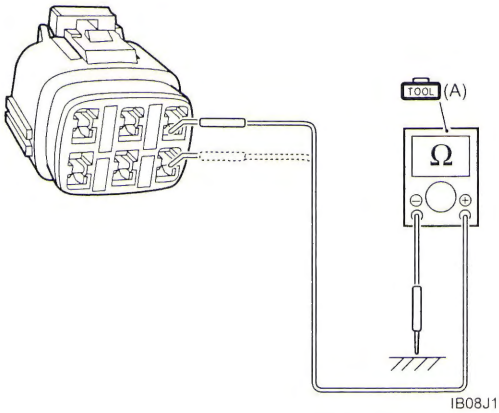
     Tester knob indication
     Resistance (Ω)

     – B/R wire and R/B wire: less than 1 Ω



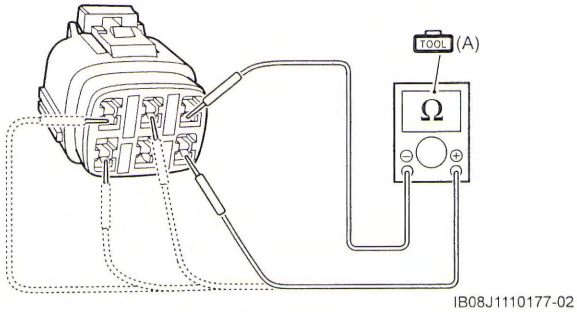
IB08J1110175-02

     – Between each of B/R and R/B wire and ground: infinity



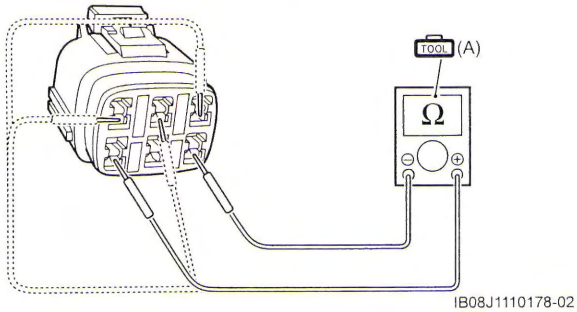
IB08J1110176-02

     – Between B/R wire terminal and other terminal at EXCVA coupler: infinity



IB08J1110177-02

     – Between R/B wire terminal and other terminal at EXCVA coupler: infinity



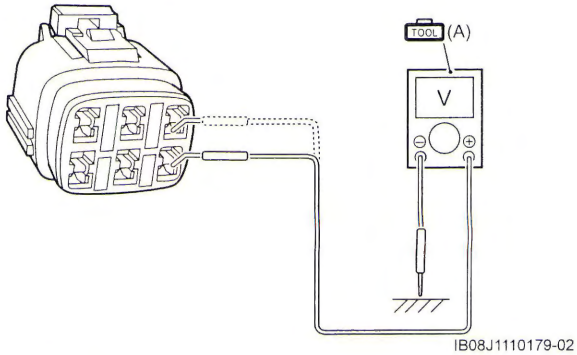
IB08J1110178-02

   - Voltage

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

     Tester knob indication
     Voltage (⎓)

     – B/R wire and R/B wire: approx. 0 V (When ignition switch is ON)



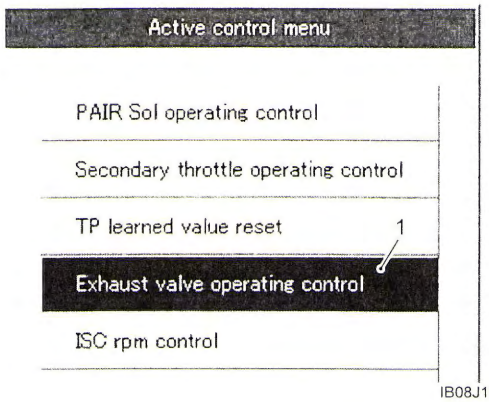
IB08J1110179-02

Is check result OK?

Yes	Replace the EXCVA. Refer to "EXCVA Removal and Installation" in Section 1K (Page 1K-8).
No	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

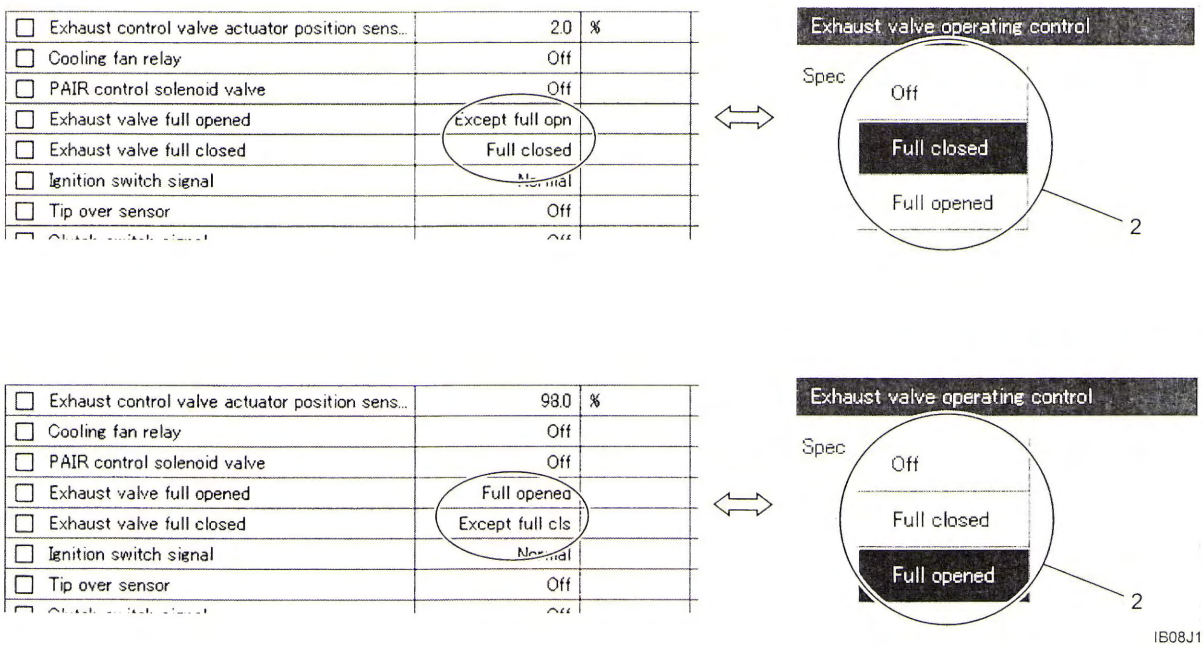
Active Control Inspection

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



IB08J1110180-02

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



IB08J1110181-03

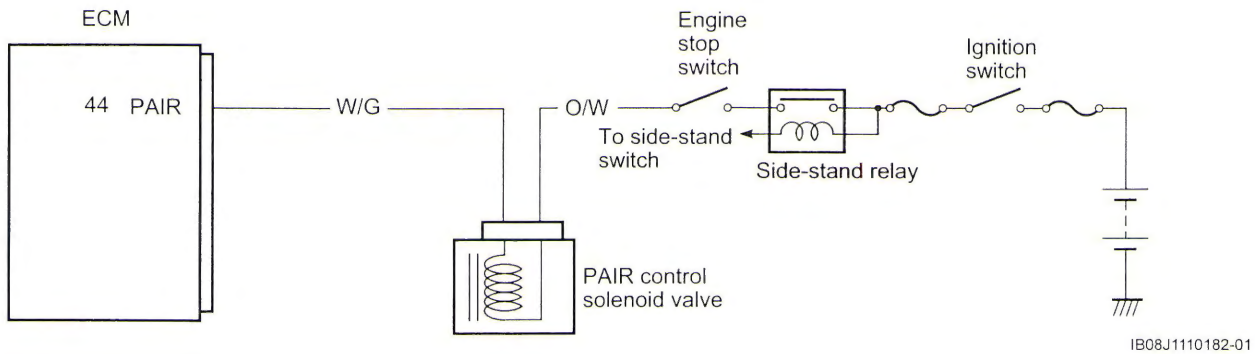
DTC "C49" (P1656): PAIR Control Solenoid Valve Circuit Malfunction

BENF08J11104029

Detected Condition and Possible Cause

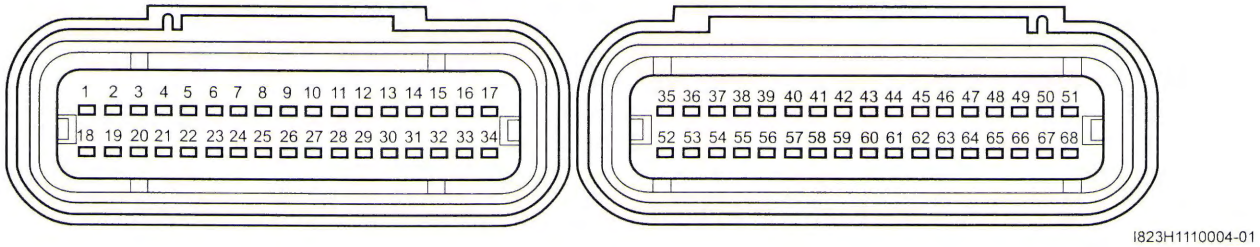
Detected Condition	Possible Cause
PAIR control solenoid valve voltage is not input to ECM.	• PAIR control solenoid valve circuit open or short. • PAIR control solenoid valve malfunction. • ECM malfunction.

Wiring Diagram



IB08J1110182-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

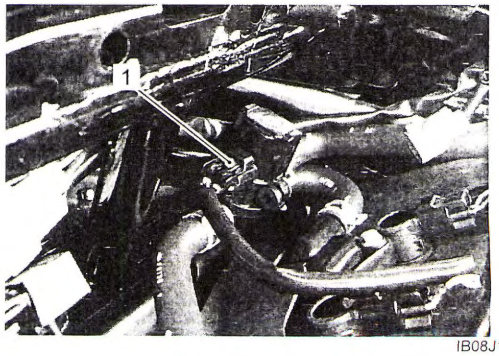
NOTE

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

Step 1

PAIR control solenoid valve power supply circuit check

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 PAIR control solenoid valve coupler (1).



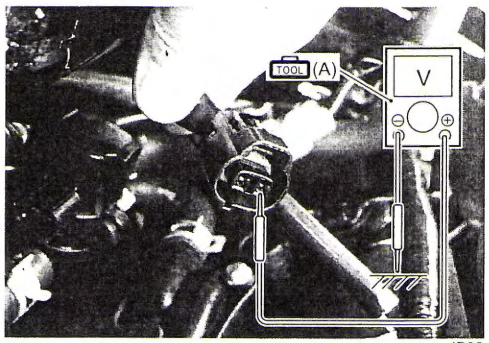
IB08J1110183-01

4) Check for proper terminal the PAIR control solenoid valve coupler.
5) If connections are OK, support the motorcycle with a jack.
6) Fold the side-stand to up position.
7) Turn the ignition switch ON.
8) Measure the voltage between O/W wire and ground.

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

Tester knob indication
Voltage (⎓)

PAIR control solenoid valve power supply voltage
Battery voltage
((+) terminal: O/W – (–) terminal: Ground)



IB08J1110184-01

Is check result OK?

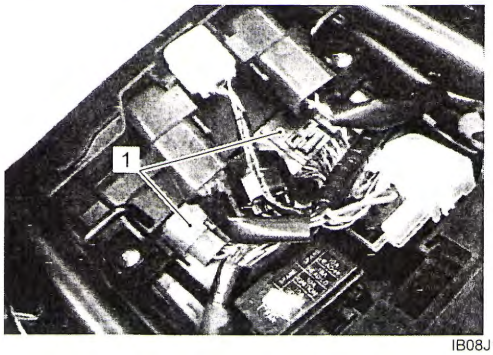
Yes Go to Step 2.

No Repair or replace the O/W wire.

Step 2

PAIR control solenoid valve drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



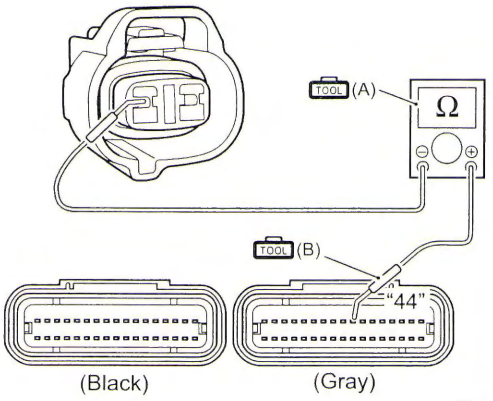
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

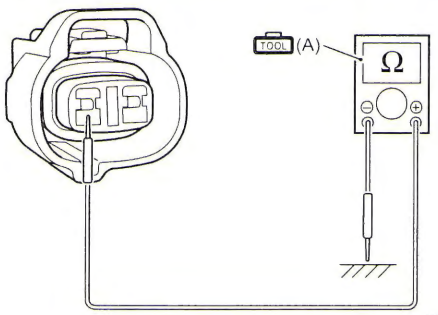
Tester knob indication
Resistance (Ω)

– W/G wire: less than 1 Ω



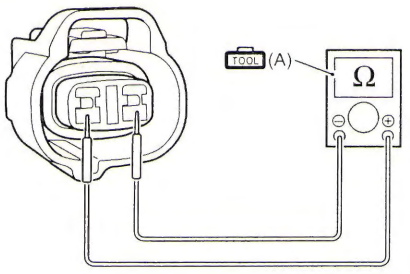
IB08J1110185-02

– Between W/G wire and ground: infinity



IB08J1110186-02

– Between W/G wire terminal and other terminal at PAIR control solenoid valve coupler: infinity



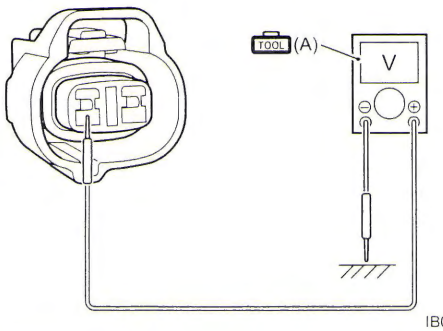
IB08J1110187-02

- Voltage

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

Tester knob indication
Voltage (⎓)

– W/G wire: approx. 0 V (When ignition switch is ON)



IB08J1110188-02

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the defective wire harness.

Step 3

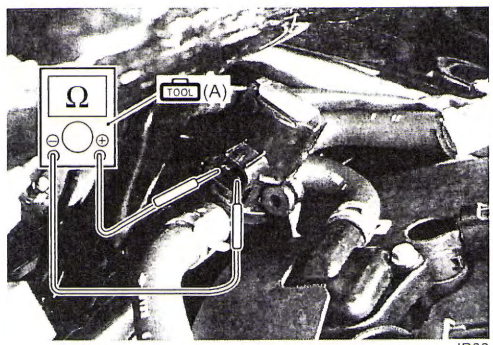
PAIR control solenoid valve check

1) Turn the ignition switch OFF.
2) Measure the PAIR control solenoid valve resistance between terminals.

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

Tester knob indication
Resistance (Ω)

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



IB08J1110189-01

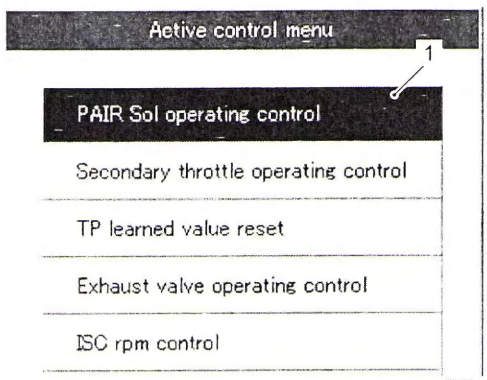
Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the PAIR control solenoid valve with a new one. Refer to "PAIR Control Solenoid Valve Removal and Installation" in Section 1B (Page 1B-7).

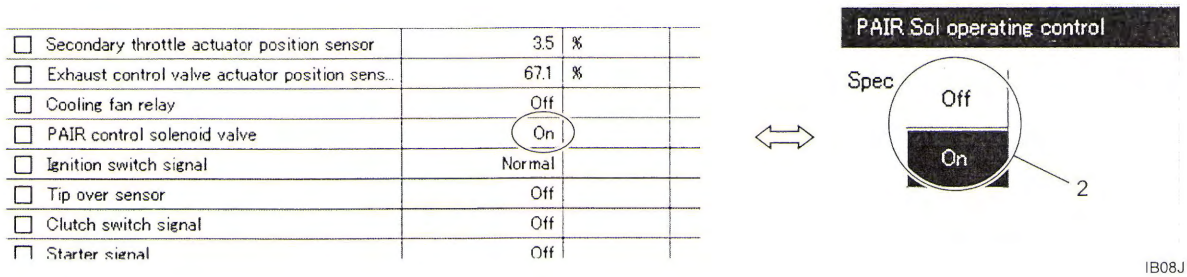
Active Control Inspection

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).



IB08J1110190-02

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



IB08J1110191-02

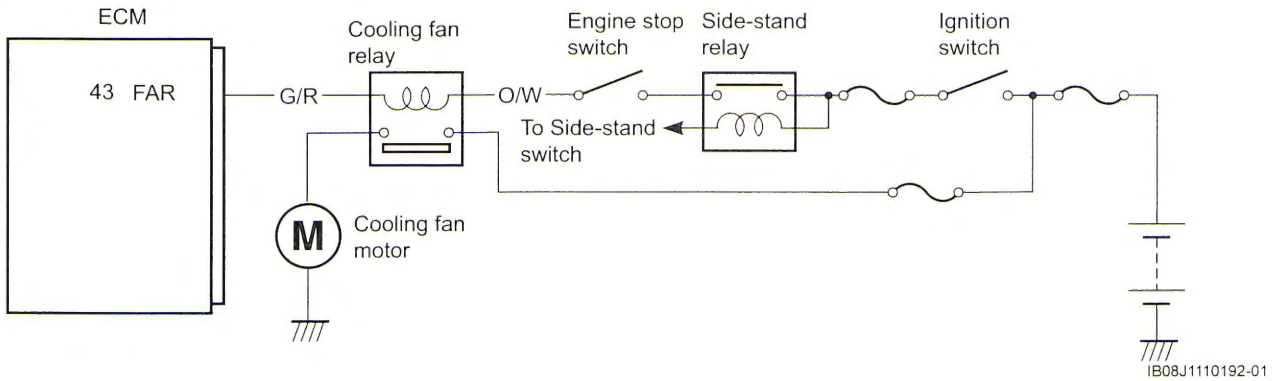
DTC "C60" (P0480): Cooling Fan Relay Circuit Malfunction

BENF08J11104030

Detected Condition and Possible Cause

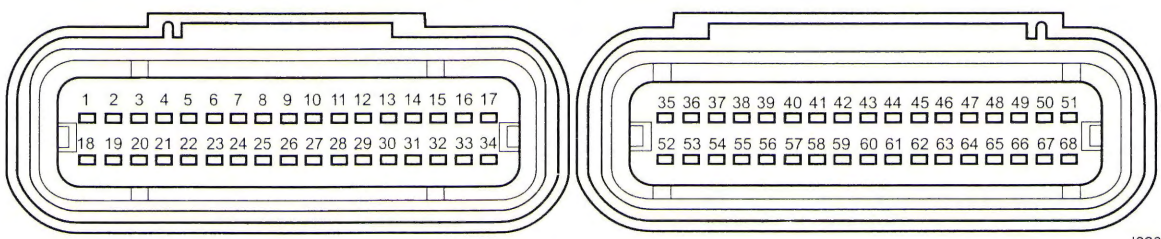
Detected Condition	Possible Cause
Cooling fan relay signal is not input to ECM.	• Cooling fan relay circuit open or short. • Cooling fan relay. • ECM malfunction.

Wiring Diagram



IB08J1110192-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

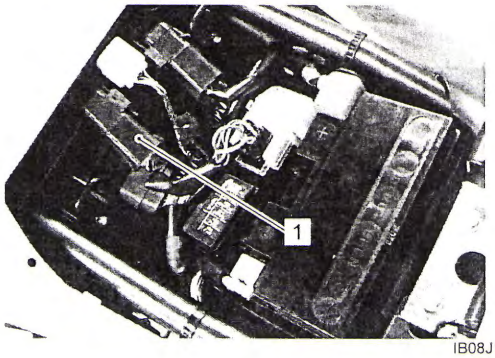
NOTE

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

Step 1

Cooling Fan relay power supply circuit check

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 cooling fan relay coupler (1).



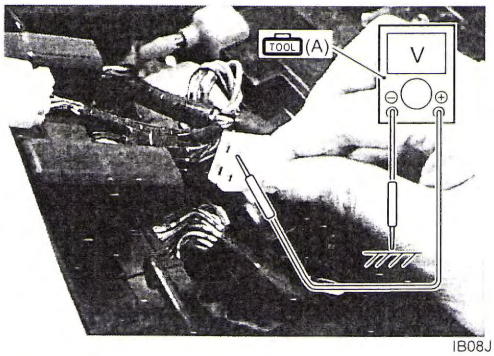
IB08J1110193-01

4) Check for proper terminal connection to the cooling fan relay coupler.
5) If connections are OK, support the motorcycle with a jack.
6) Fold the side-stand to up position.
7) Turn the ignition switch ON.
8) Measure the voltage between O/W wire and ground.

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

Tester knob indication
Voltage (⎓)

Cooling fan relay power supply voltage
Battery voltage
((+) terminal: O/W – (–) terminal: Ground)



IB08J1110194-02

Is check result OK?

Yes — Go to Step 2.

No — Repair or replace the defective wire harness.

Step 2

Cooling Fan relay check

Check the cooling fan relay. Refer to "Cooling Fan Relay Inspection" in Section 1F (Page 1F-11).

Is check result OK?

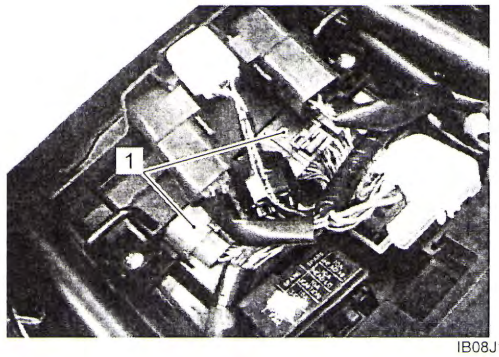
Yes — Go to Step 3.

No — Replace the cooling fan relay.

Step 3

Cooling Fan relay drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers (1).



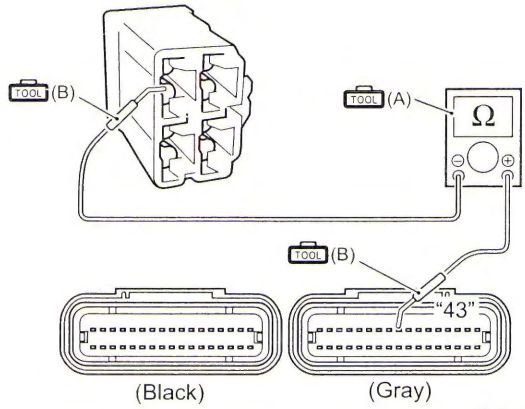
IB08J1110039-02

3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, check the following points.
   - Resistance

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

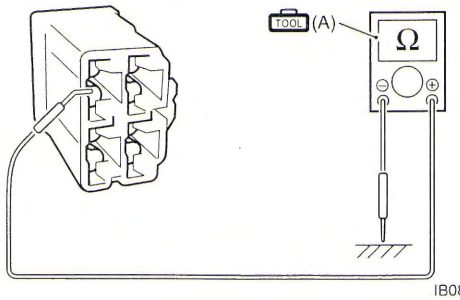
Tester knob indication
Resistance (Ω)

– G/R wire: less than 1 Ω



IB08J1110195-02

– Between G/R wire and ground: infinity



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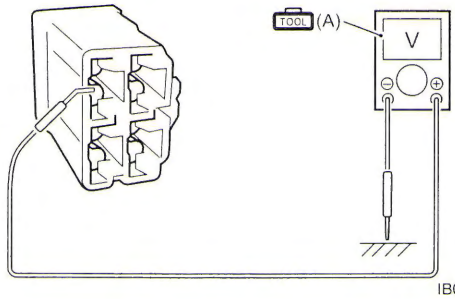
• Voltage

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

Tester knob indication
Voltage (⎓)

– G/R wire: approx. 0 V (When ignition switch is ON)



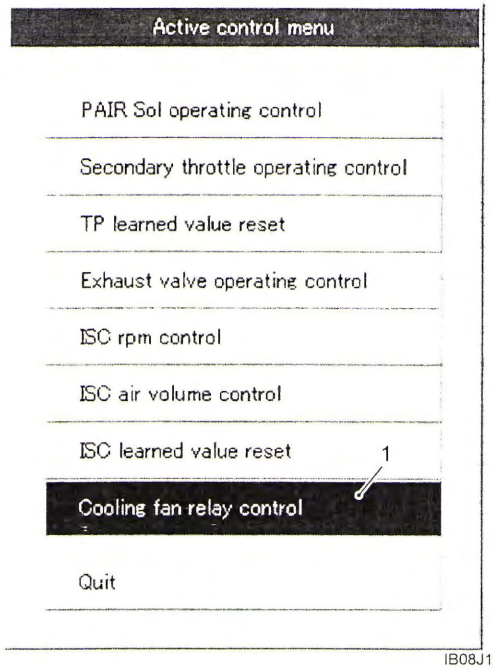
IB08J1110197-02

Is check result OK?

Yes	Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).
No	Repair or replace the G/R wire.

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).

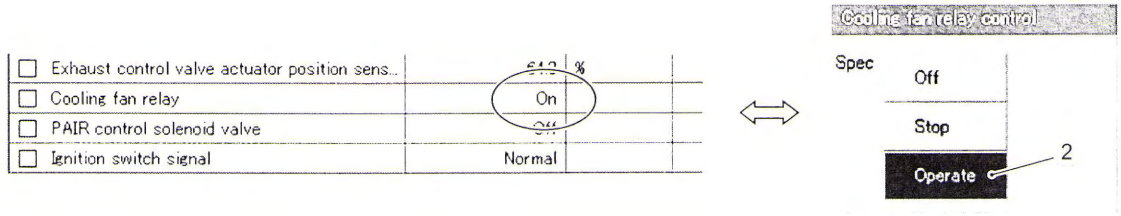


IB08J1110198-02

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.

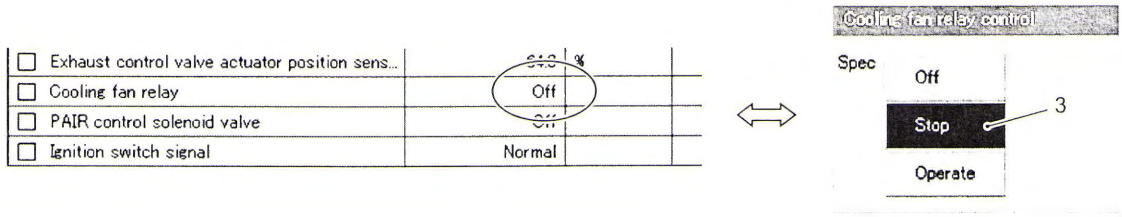
NOTE

The cooling fan relay and cooling fan motor inspection is operational at any engine coolant temperature until reaching 100 °C (212 °F).



IB08J1110199-02

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

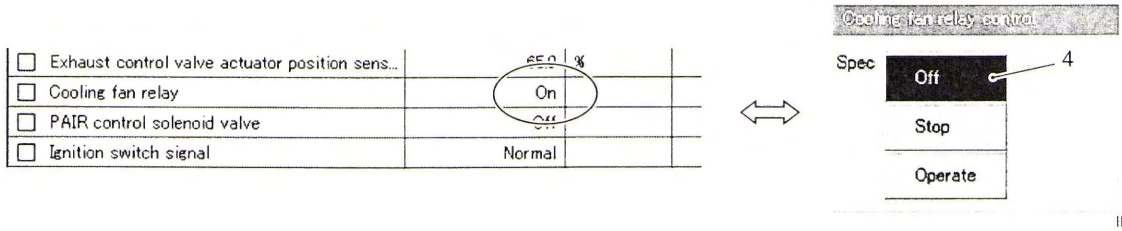


IB08J1110200-02

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) and 90 °C (194 °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.**



IB08J1110201-02

DTC "C65" (P0506 / P0507): Idle Speed Malfunction

BENF08J11104031

Detected Condition and Possible Cause

Detected Condition		Possible Cause
C65	Idle speed rose higher than or dropped lower than desired idle speed by more than specified range.	• Air passage clogged. • ISC valve is fixed. • Idle speed malfunction. • Air leakage.
P0506	Idle speed dropped lower than desired idle speed by more than specified range.	
P0507	Idle speed rose higher than desired idle speed by more than specified range.	

Troubleshooting

NOTICE

- **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.**

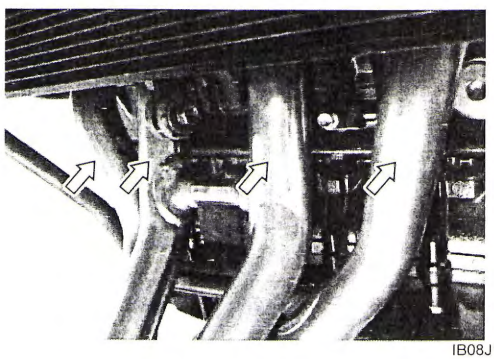
NOTE

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

Step 1

Engine combustion check

1) Run the engine at idle speed.
2) By spraying water to exhaust pipes from #1 to #4, check evaporation from each of them to make sure for equal combustion among cylinders.



IB08J1110222-01

Is check result OK?

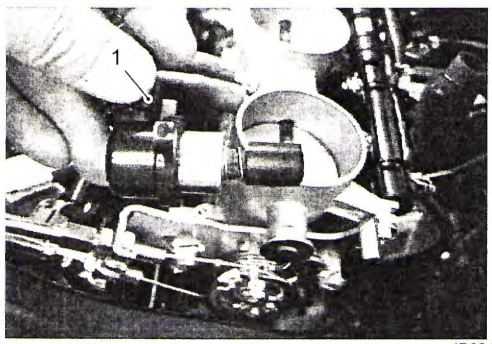
Yes — Go to Step 2.

No — Repair or replace defective parts.

Step 2

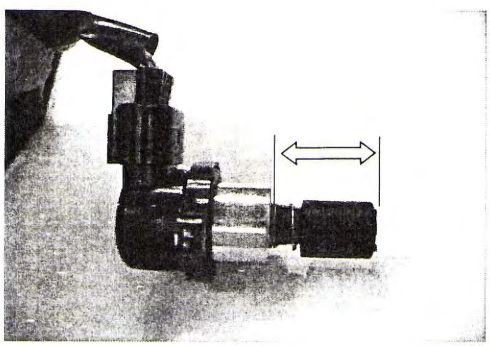
ISC valve initial check

1) Turn the ignition switch OFF.
2) Remove the ISC valve. Refer to "ISC Valve Removal and Installation" in Section 1C (Page 1C-8).
3) Connect the ISC valve coupler (1).



IB08J1110223-01

4) Turn the ignition switch ON and then OFF again.
5) While performing above step 4), check that the ISC valve moves from fully open position to fully closed position.



IB08J1110224-01

6) Execute ISC Valve Preset and Opening Initialization. Refer to "ISC Valve Preset and Opening Initialization" in Section 1C (Page 1C-9).

Is check result OK?

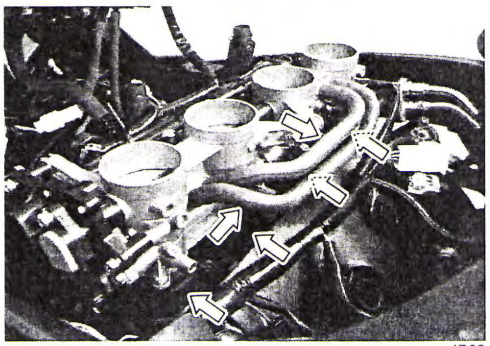
Yes — Go to Step 3.

No — Replace the ISC valve with a new one. Refer to "ISC Valve Removal and Installation" in Section 1C (Page 1C-8).

Step 3

Air intake system check

1) Check air intake system for clogging and leakage.



IB08J1110225-01

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace defective parts.

Step 4

Engine mechanical systems check

1) Check the following points related to engine mechanical system.
   - Engine compression. Refer to "Compression Pressure Check" in Section 1D (Page 1D-3).
   - Fuel pressure. Refer to "Fuel Pressure Inspection" in Section 1G (Page 1G-5).

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Repair or replace defective parts.

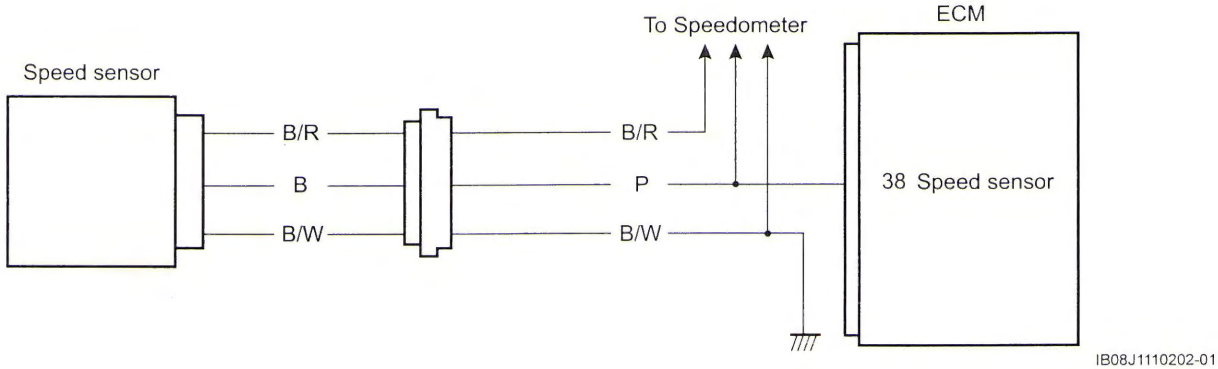
DTC "C91" (P0500): Vehicle Speed Sensor Circuit Malfunction

BENF08J11104032

Detected Condition and Possible Cause

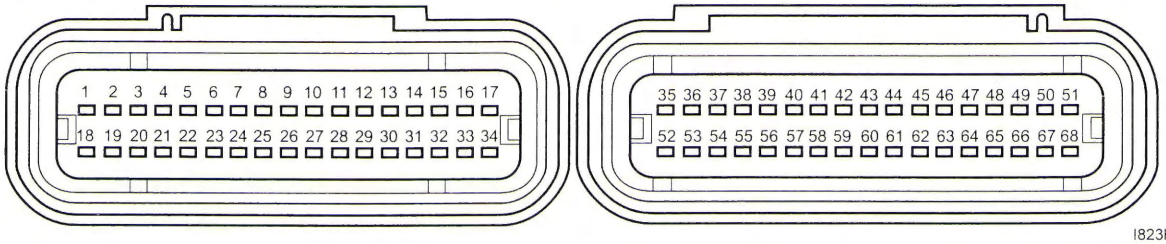
Detected Condition	Possible Cause
Speedometer does not receive signal from the vehicle speed sensor for more than 6 sec. when the motorcycle is running. ECM does not receive signal from the vehicle speed sensor for more than 6 sec. when the motorcycle is running. Failure in communication between ECM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

Wiring Diagram



IB08J1110202-01

ECM coupler (Harness side)



I823H1110004-01

Troubleshooting

NOTICE

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.

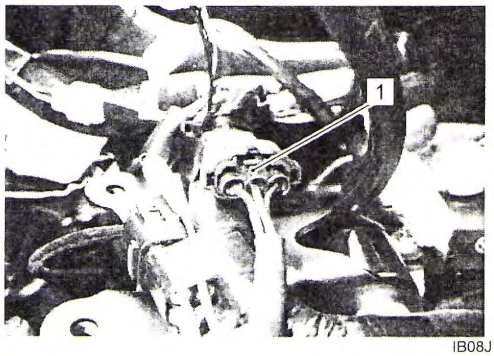
NOTE

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

Step 1

Speed sensor power supply circuit check

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 speed sensor coupler (1).



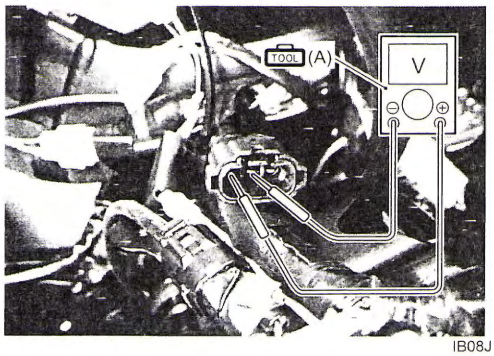
IB08J1110203-02

4) Check for proper terminal connection to the speed sensor coupler.
5) If connections are OK, turn the ignition switch ON.
6) Measure the voltage between B/R and B/W.

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

Tester knob indication
Voltage (⎓)

Speed sensor power supply voltage
Battery voltage
((+) terminal: B/R – (–) terminal: B/W)



IB08J1110204-02

Is check result OK?

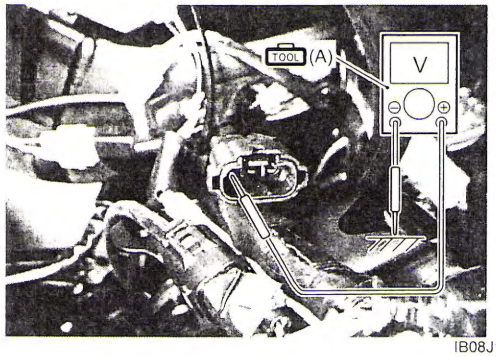
Yes Go to Step 3.

No Go to Step 2.

Step 2

Speed sensor ground circuit check

1) Measure the voltage between B/R and ground.



IB08J1110205-02

Is check result OK?

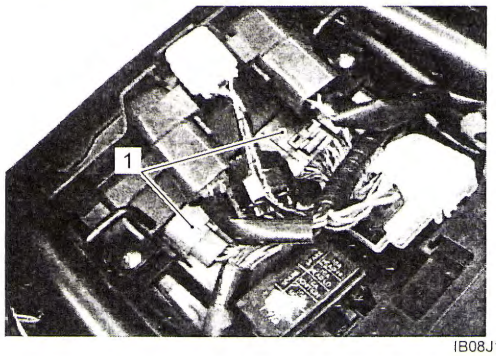
Yes Repair or replace the B/W wire.

No Repair or replace the B/R wire.

Step 3

Speed sensor signal circuit check

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 ECM couplers (1).



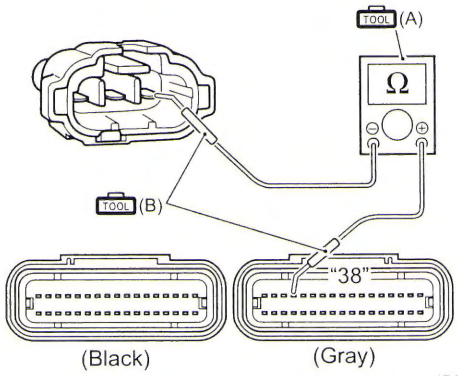
IB08J1110039-02

4) Check for proper terminal connection to the ECM couplers.
5) If connections are OK, check the following points.
   - Resistance

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

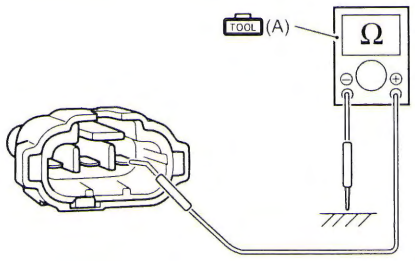
     Tester knob indication
     Resistance (Ω)

     – P wire: less than 1 Ω



IB08J1110206-03

     – Between P wire and ground: infinity



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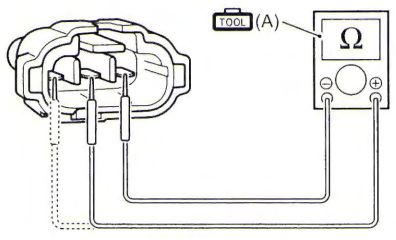
     – Between P wire terminal and other terminal at vehicle speed sensor connector: infinity



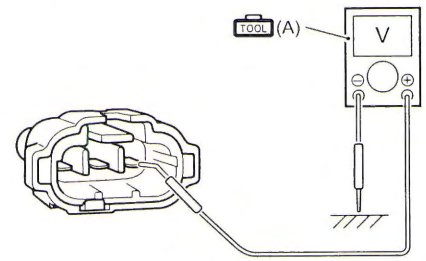
IB08J1110208-02

   - Voltage

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

     Tester knob indication
     Voltage (⎓)

     – P wire: approx. 0 V (When ignition switch is ON)



IB08J1110209-02

Is check result OK?

Yes	Go to Step 4.
No	Repair or replace the P wire.

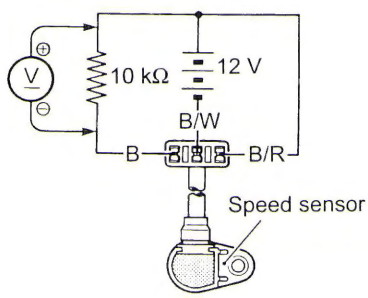
Step 4

Speed sensor check

1) 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 (⎓)

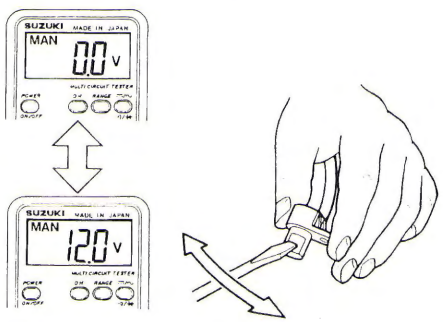


I837H1110118-01

2) 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 check result OK?

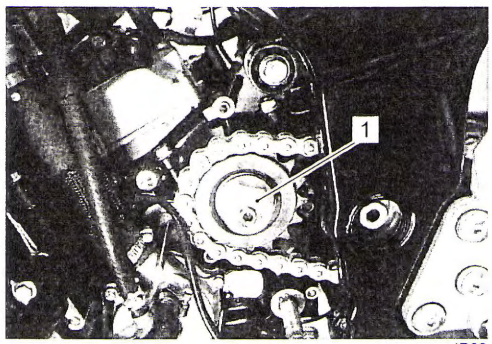
Yes — Go to Step 5.

No — Replace the speed sensor.

Step 5

Speed sensor rotor check

1) Remove the engine sprocket cover. Refer to "Engine Sprocket Removal and Installation" in Section 3A (Page 3A-2).
2) Check sensor rotor for crack and damage (1).



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Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation" in Section 1C (Page 1C-1).

No — Replace the speed sensor rotor.

Specifications

Service Data

BENF08J11107001

Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11.5 – 12.5 Ω at 20 °C (68 °F)	

FI Sensors

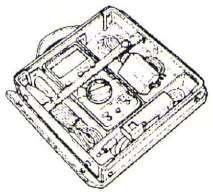
Item	Standard/Specification		Note
CMP sensor resistance	0.9 k – 1.7 kΩ		
CMP sensor peak voltage	0.7 V and more		When cranking
CKP sensor resistance	142 – 194 Ω		
CKP sensor peak voltage	0.5 V and more		When cranking
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.7 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.3 V	
ECT sensor input voltage	4.5 – 5.5 V		
ECT sensor output voltage	0.15 – 4.85 V		
ECT sensor resistance	Approx. 2.45 kΩ at 20 °C (68 °F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor output voltage	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 k – 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	0.4 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. 0.6 V	
	Opened	Approx. 3.9 V	
STVA resistance	Approx. 7.8 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
ISC valve resistance	Approx. 20 Ω at 20 °C (68 °F)		

Special Tools and Equipment

Special Tool

BENF08J11108001

09900–25008
Multi circuit tester set
1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007)



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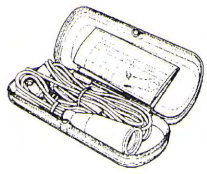
09900–25009
Needle point probe set



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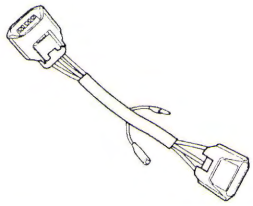
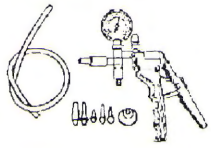
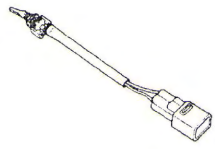
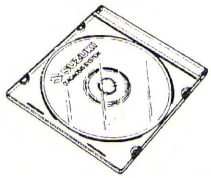
09900–28630 TP Sensor test lead ☞(Page 1A-40) / ☞(Page 1A-60) 	09904–41010 SUZUKI Diagnostic system set ☞(Page 1A-13) / ☞(Page 1A-16) 
09917–47011 Vacuum pump gauge set ☞(Page 1A-37) 	09930–82720 Mode selection switch ☞(Page 1A-4) / ☞(Page 1A-12) / ☞(Page 1A-12) 
99565–01010–034 CD-ROM Ver.34 ☞(Page 1A-13) / ☞(Page 1A-16) 	

Emission Control Devices

Precautions

Precautions for Emission Control Devices

BENF08J11200001

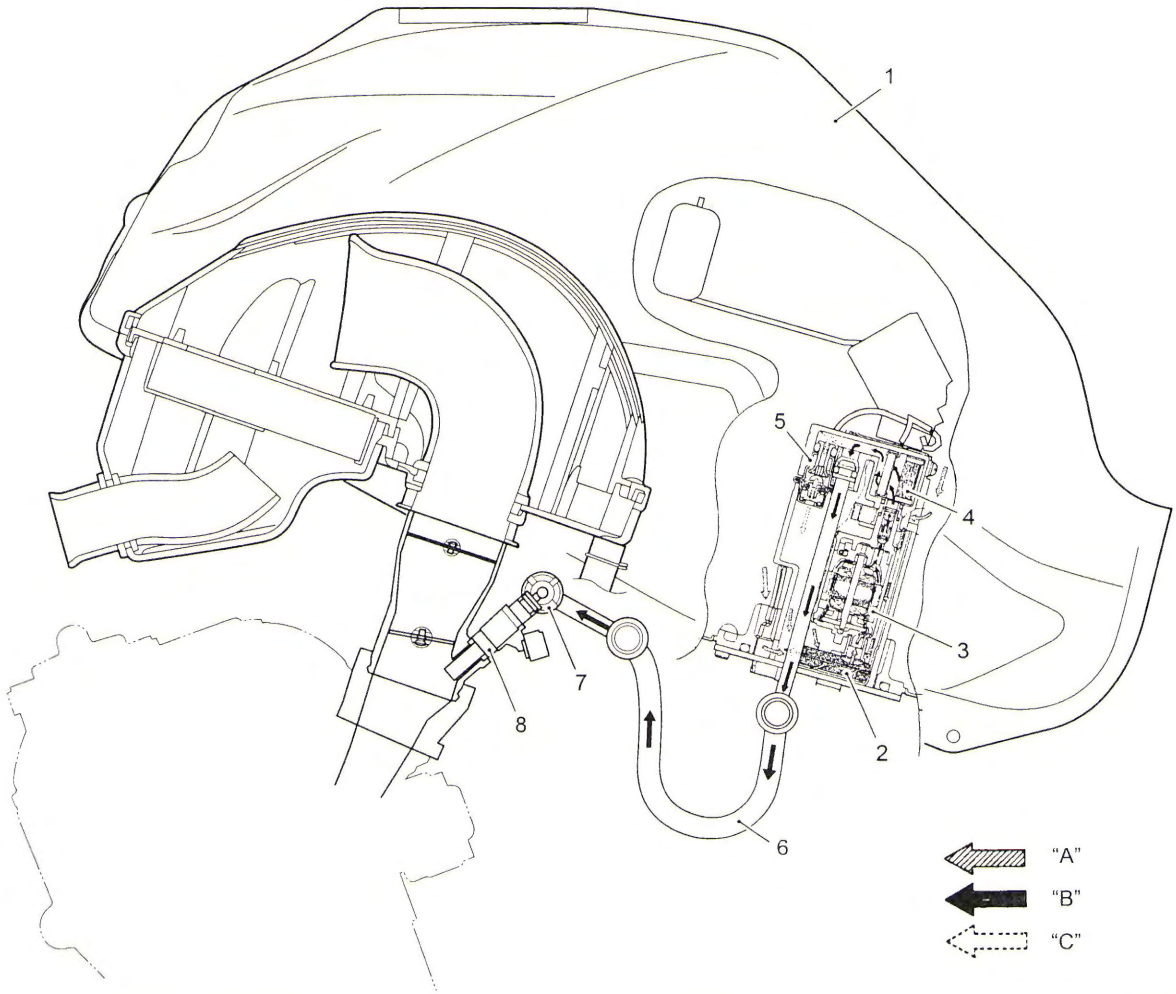
Refer to "General Precautions" in Section 00 (Page 00-1).

General Description

Fuel Injection System Description

BENF08J11201001

GSX-S750 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.



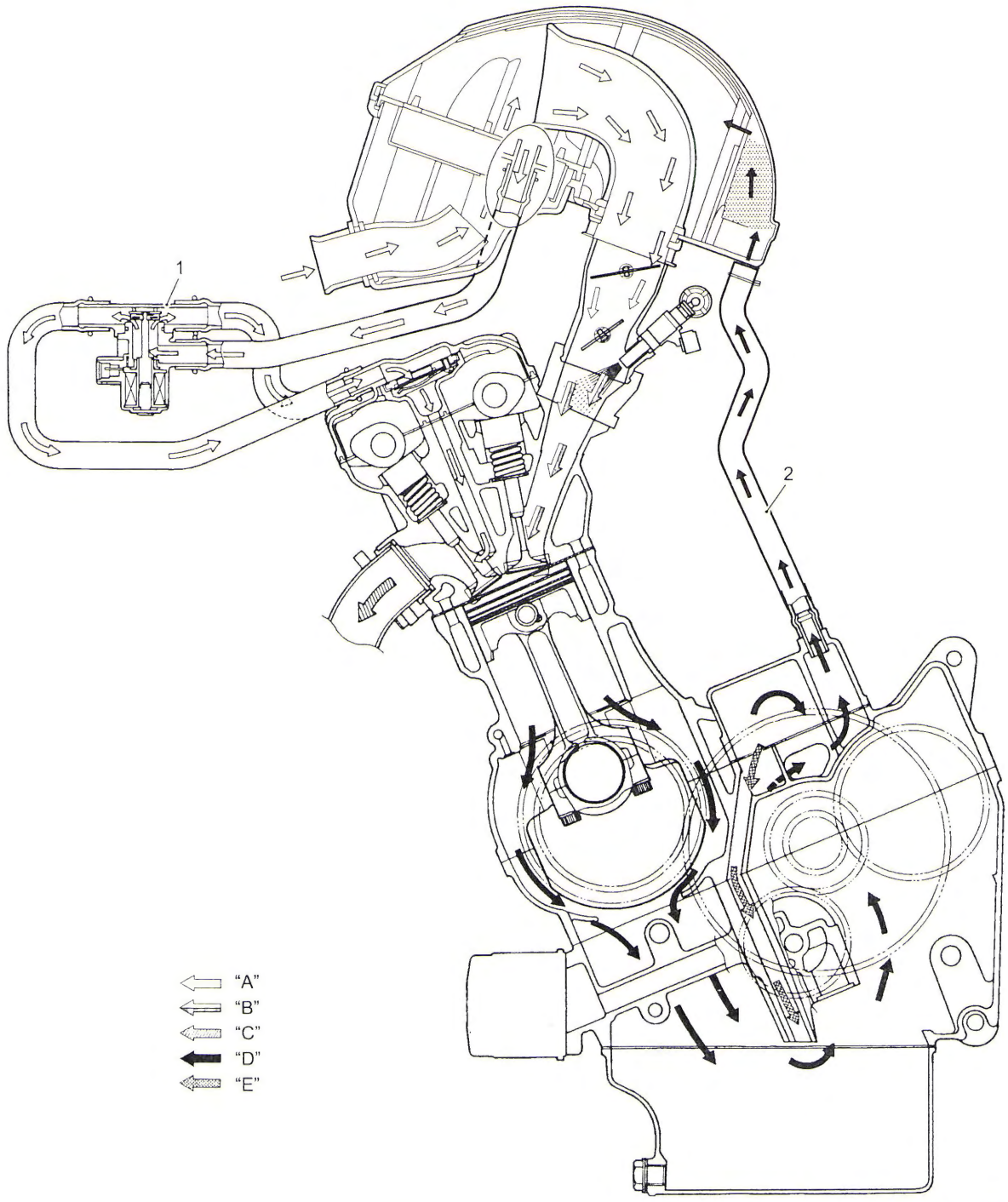
IB08J1120015-02

1. Fuel tank	4. Fuel filter cartridge (For high pressure)	7. Fuel delivery pipe	"B": Pressurized fuel
2. Fuel mesh filter (For low pressure)	5. Fuel pressure regulator	8. Fuel injector	"C": Relieved fuel
3. Fuel pump	6. Fuel feed hose	"A": Before-pressurized fuel	

Crankcase Emission Control System Description

BENF08J11201002

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.



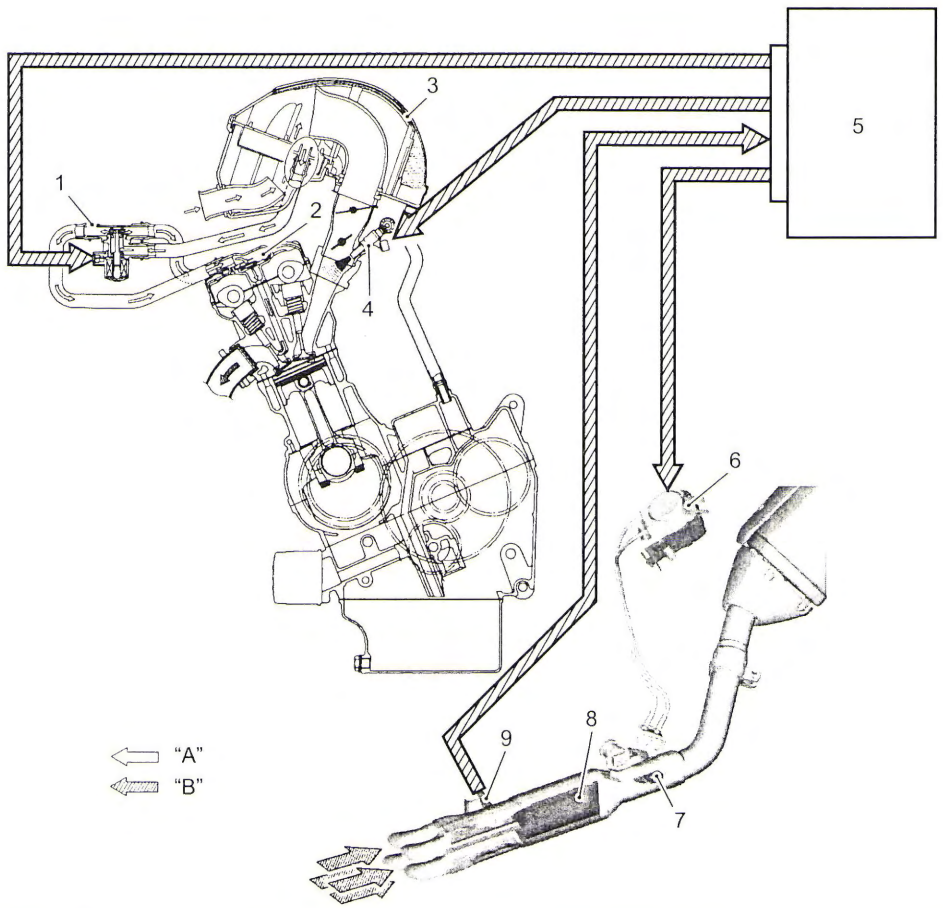
IB08J1120016-03

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

BENF08J11201003

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 port through the PAIR control solenoid valve and PAIR reed valve. The PAIR control solenoid valve is operated by the ECM, which is controlled according to the signals from TPS, ECTS, 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.



IB08J1120019-02

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

Noise Emission Control System Description

BENF08J11201004

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

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

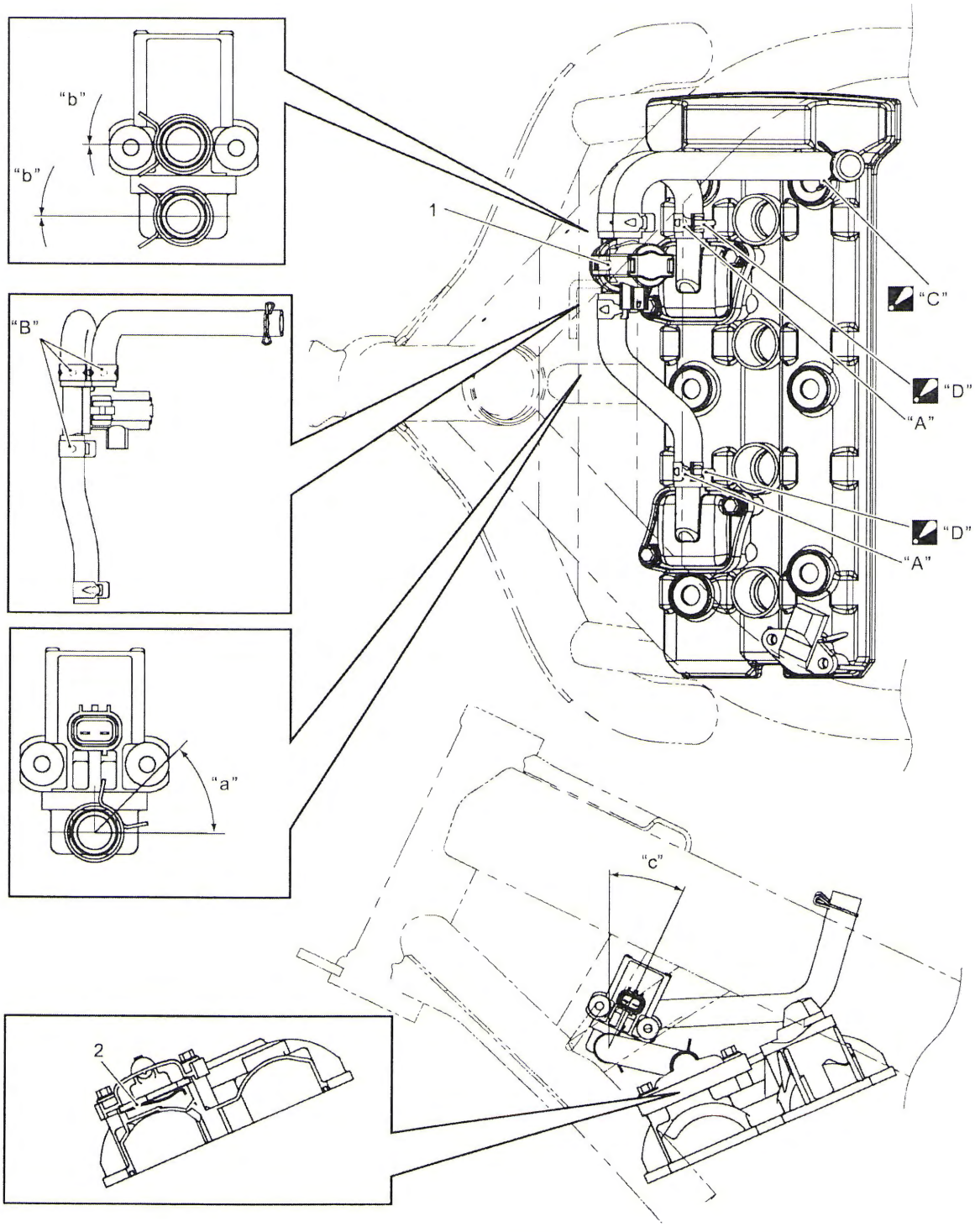
Among Those Acts Presumed to Constitute Tampering are the Acts Listed Below:

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

Schematic and Routing Diagram

PAIR System Hose Routing Diagram

BENF08J11202001



IB08J1120001-04

1. PAIR control solenoid valve	"B": Yellow marking	"a": 45°
2. PAIR reed valve	"C": Face the clamp end forward.	"b": 0°
"A": White marking	"D": Face the clamp end rearward.	"c": 25°

Repair Instructions

Heated Oxygen Sensor (HO2S) Removal and Installation

BENF08J11206001

NOTICE

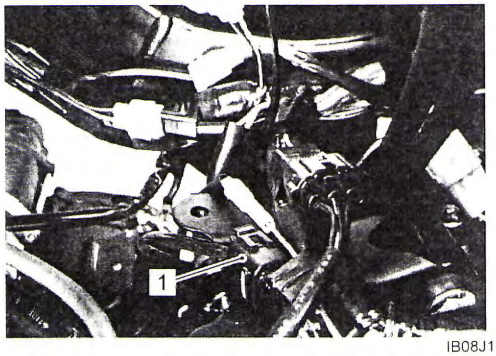
- **Be careful not to expose the HO2 sensor to excessive shock.**
- **Do not use an impact wrench when removing or installing the HO2 sensor.**
- **Be careful not to twist or damage the sensor lead wires.**

Removal

⚠ WARNING

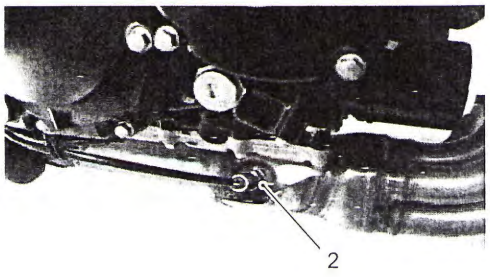
Do not remove the HO2 sensor while it is hot.

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



IB08J1110145-02

3) Release the HO2 sensor lead wire from the clamp.
4) Remove the HO2 sensor (2).



IB08J1120002-02

Installation

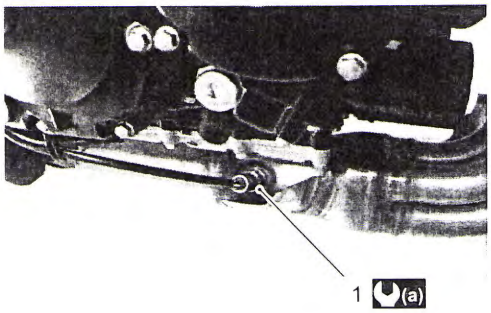
Install the HO2 sensor in the reverse order of removal. Pay attention to the following points:

NOTICE

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

- Tighten the HO2 sensor (1) to the specified torque.

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



IB08J1120003-02

Heated Oxygen Sensor (HO2S) Inspection

BENF08J11206002

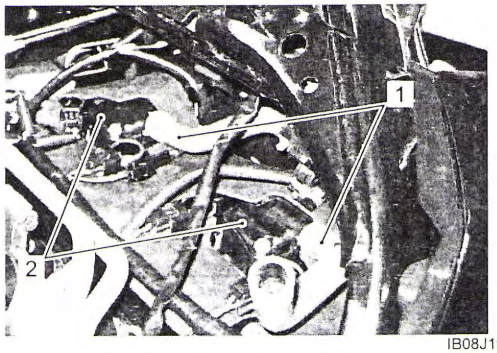
Refer to "DTC "C44" (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction" in Section 1A (Page 1A-78).

PAIR Reed Valve Removal and Installation

BENF08J11206003

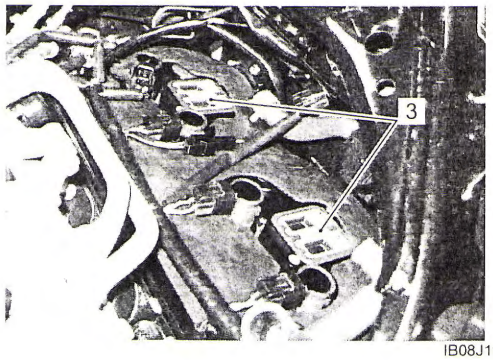
Removal

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" in Section 1D (Page 1D-7).
2) Disconnect the PAIR hose (1) from PAIR reed valve covers (2).
3) Remove the PAIR reed valve covers (2).



IB08J1120005-02

4) Remove the PAIR reed valves (3).

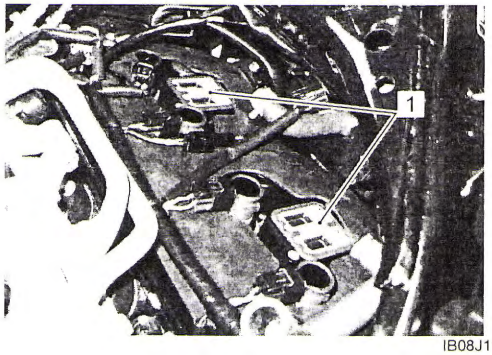


IB08J1120006-02

Installation

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

- Install the PAIR reed valves (1) as shown in the figure.



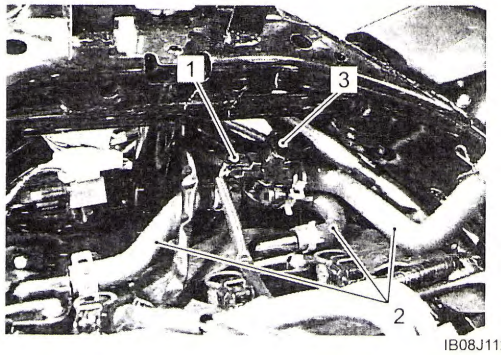
IB08J1120007-02

PAIR Control Solenoid Valve Removal and Installation

BENF08J11206004

Removal

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" in Section 1D (Page 1D-7).
2) Disconnect the PAIR control solenoid valve coupler (1) and PAIR hoses (2).
3) Remove the PAIR control solenoid valve (3).



IB08J1120008-02

Installation

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

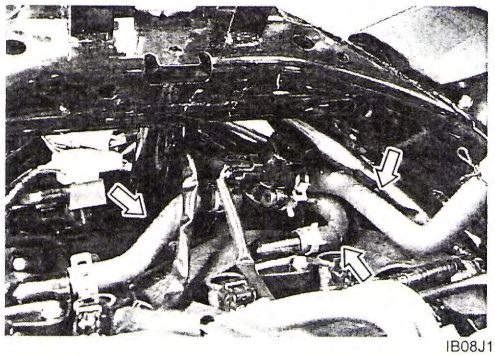
- Connect the PAIR control solenoid valve coupler and PAIR hoses securely. Refer to "PAIR System Hose Routing Diagram" (Page 1B-5).

PAIR System Inspection

BENF08J11206005

PAIR Hose

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" in Section 1D (Page 1D-7).
2) 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-5).
3) Check that the PAIR hoses are securely connected.

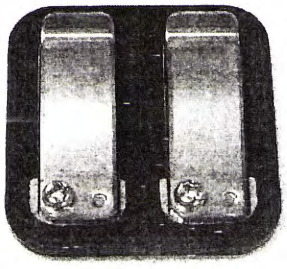


IB08J1120009-02

4) Reinstall the removed parts.

PAIR Reed Valve

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



IB08J1120010-02

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

PAIR Control Solenoid Valve

NOTE

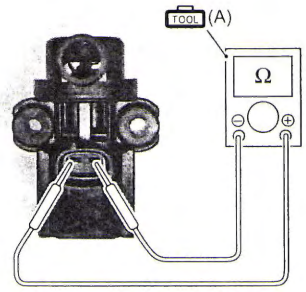
PAIR control solenoid valve can be checked without removing it from the motorcycle. Refer to "DTC "C49" (P1656): PAIR Control Solenoid Valve Circuit Malfunction" in Section 1A (Page 1A-93).

1) Remove the PAIR control solenoid valve. Refer to "PAIR Control Solenoid Valve Removal and Installation" (Page 1B-7).
2) Check the resistance between the terminals of the PAIR control solenoid valve.

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

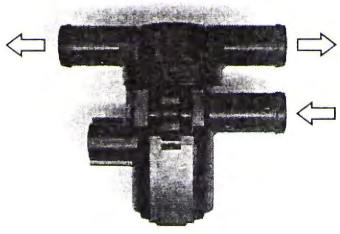
Tester knob indication
Resistance (Ω)

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



I837H1120016-01

3) Check that air flows through the air inlet port to the air outlet port. If air does not flow out, replace the PAIR control solenoid valve with a new one.



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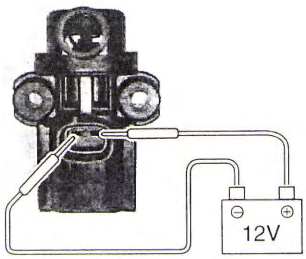
4) Connect the 12 V battery to the PAIR control solenoid valve terminals and check the air flow. If air does not flow out, the solenoid valve is in normal condition.



I837H1120015-01

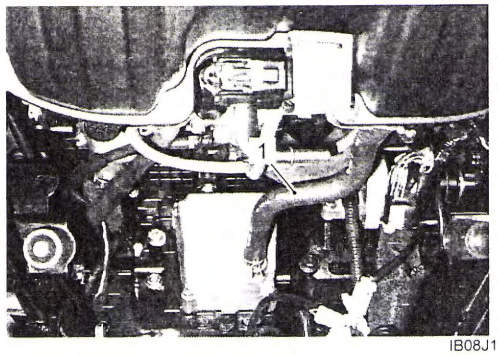
5) Reinstall the PAIR control solenoid valve. Refer to "PAIR Control Solenoid Valve Removal and Installation" (Page 1B-7).

Crankcase Breather (PCV) Hose Inspection

BENF08J11206006

Inspect the crankcase breather (PCV) hose 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 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.



IB08J1120011-02

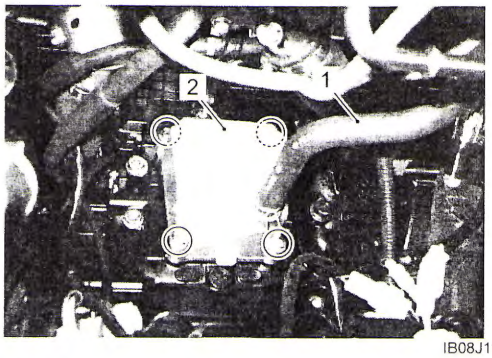
4) Install the removed parts.

Crankcase Breather (PCV) Hose / Cover Removal and Installation

BENF08J11206007

Removal

1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
2) Disconnect the crankcase breather (PCV) hose (1).
3) Remove the crankcase breather (PCV) cover (2).



IB08J1120012-02

Installation

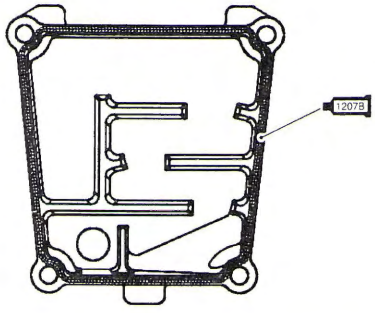
Installation is in the reverse order of removal.
Pay attention to the following points:

- Apply bond to the mating surface of the crankcase breather (PCV) cover.

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

NOTE

- **Make surfaces free from moisture, oil, dust and other foreign materials.**
- **Spread the sealant on surfaced thinly to form an even layer, and assembly the crankcase breather (PCV) cover and middle crankcase within a few minutes.**



IB08J1120014-02

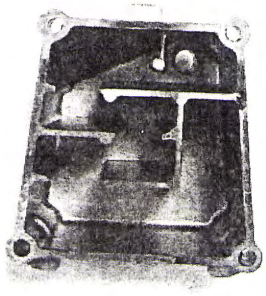
- Connect the crankcase breather (PCV) hose securely. Refer to "Throttle Body Construction" in Section 1D (Page 1D-10).

Crankcase Breather (PCV) Cover Inspection

BENF08J11206008

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

1) Remove the crankcase breather (PCV) cover. Refer to "Crankcase Breather (PCV) Hose / Cover Removal and Installation" (Page 1B-9).
2) Inspect the crankcase breather (PCV) cover for carbon deposit. If carbon deposit is found in the crankcase breather (PCV) cover, remove the carbon.



IB08J1120013-02

3) Reinstall the crankcase breather (PCV) cover. Refer to "Crankcase Breather (PCV) Hose / Cover Removal and Installation" (Page 1B-9).

Specifications

Service Data

BENF08J11207001

FI Sensors

Item	Specification	Note
HO2 sensor output voltage	0.4 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)	

Tightening Torque Specifications

BENF08J11207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
HO2 sensor	25	2.5	18.0	☞(Page 1B-6)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

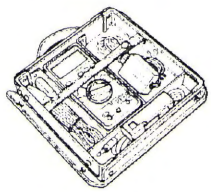
Recommended Service Material

BENF08J11208001

Material	SUZUKI recommended product or Specification		Note
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1B-9)

Special Tool

BENF08J11208002

09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 1B-8)		

Engine Electrical Devices

Precautions

Precautions for Engine Electrical Device

BENF08J11300001

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

BENF08J11303001

Refer to "Electrical Components Location" in Section 0A (Page 0A-6).

Diagnostic Information and Procedures

Engine Symptom Diagnosis

BENF08J11304001

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

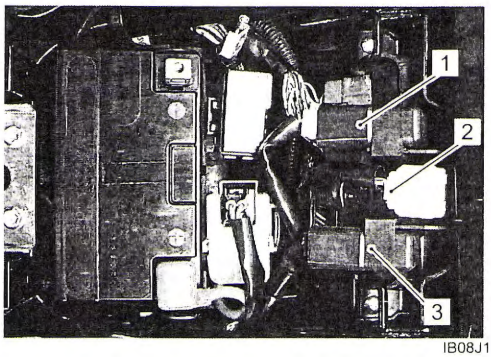
Repair Instructions

ECM Removal and Installation

BENF08J11306001

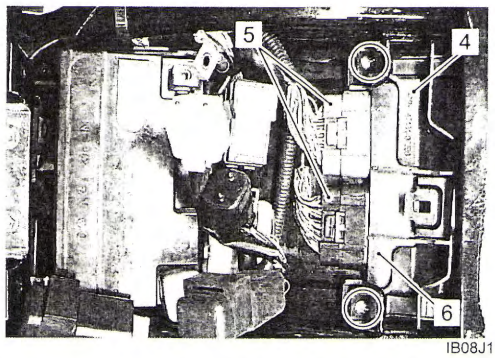
Removal

1) Remove the front seat. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Remove the battery (–) lead wire.
3) Remove the mode select coupler (2), FP relay (3) and fan relay (1) from bracket.



IB08J1130001-02

4) Remove the bracket (4).
5) Disconnect the couplers (5) and remove the ECM (6).



IB08J1130002-03

Installation

Install the ECM in the reverse order of removal.

CMP Sensor Inspection

BENF08J11306002

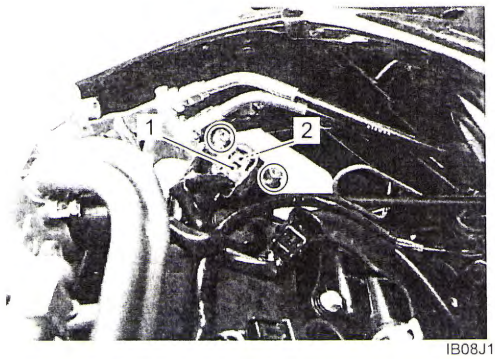
Refer to "DTC "C11" (P0340): CMP Sensor Circuit Malfunction" in Section 1A (Page 1A-28).

CMP Sensor Removal and Installation

BENF08J11306003

Removal

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" in Section 1D (Page 1D-7).
2) Disconnect the CMP sensor coupler (1).
3) Remove the CMP sensor (2).



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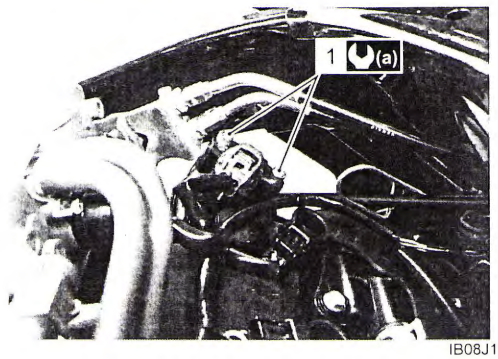
Installation

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

- When installing the CMP sensor, make sure to clean the sensor surface.
- Tighten the CMP sensor bolts (1) to the specified torque.

Tightening torque
CMP sensor bolt (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



IB08J1130004-02

CKP Sensor Inspection

BENF08J11306004

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

CKP Sensor Removal and Installation

BENF08J11306005

Removal

1) Remove the starter clutch. Refer to "Starter Clutch Removal and Installation" in Section 1I (Page 1I-10).
2) Disconnect the CKP sensor coupler (1).



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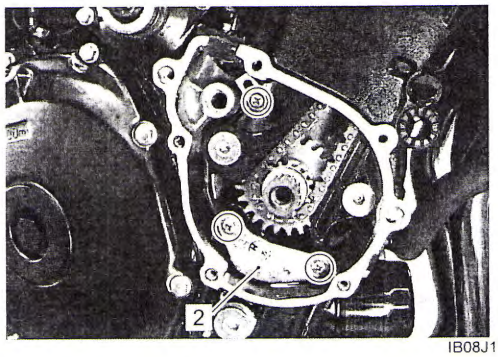
3) Remove the CKP sensor (2).



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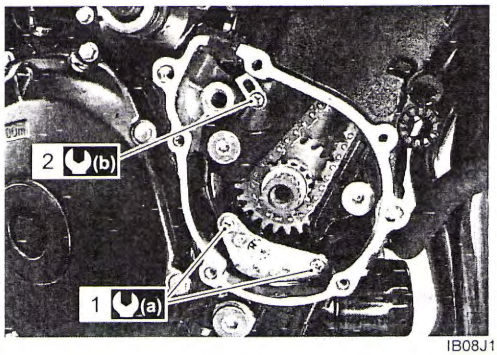
Installation

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

- Tighten the CKP sensor bolts (1) and the lead wire clamp bolt (2) to the specified torque.

Tightening torque
CKP sensor bolt (a): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)
Lead wire clamp bolt (b): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)



IB08J1130028-02

IAP Sensor Inspection

BENF08J11306006

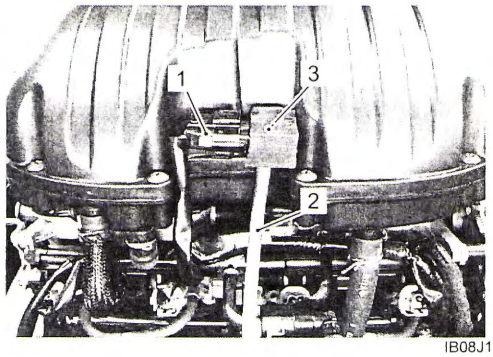
Refer to "DTC "C13" (P0105-H/L): IAP Sensor Circuit Malfunction" in Section 1A (Page 1A-34).

IAP Sensor Removal and Installation

BENF08J11306007

Removal

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



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Installation

Install the IAP sensor in the reverse order of removal.

TP Sensor Inspection

BENF08J11306008

Refer to "DTC "C14" (P0120-H/L): TP Sensor Circuit Malfunction" in Section 1A (Page 1A-38).

TP Sensor Removal and Installation

BENF08J11306009

Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-12).

Removal

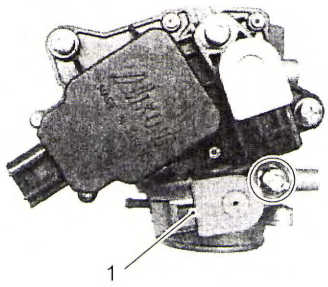
1) Remove the throttle body. Refer to "Throttle Body Removal and Installation" in Section 1D (Page 1D-11).
2) Remove the TP sensor (1) using the special tool.

Special tool

TOOL : 09930–11950 (Torx® wrench (T25H))

NOTE

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



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Installation

Install the TP sensor in the reverse order of removal. Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-12).

TP Sensor Adjustment

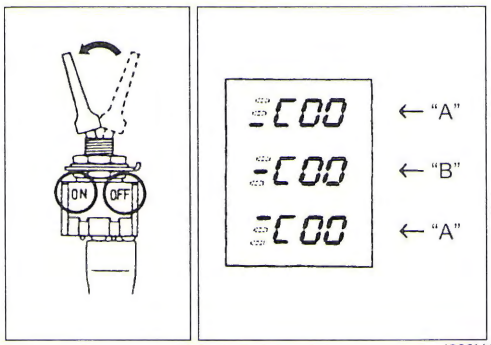
BENF08J11306010

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 select switch)

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



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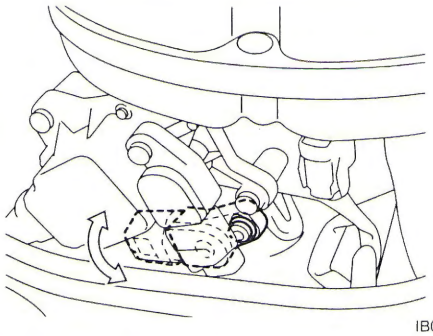
"A": Incorrect position	"B": Correct position

7) If the TP sensor adjustment is necessary, lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
8) 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 (T25H))



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9) 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)

10) Turn off the engine and reinstall the removed parts.

ECT Sensor Removal and Installation

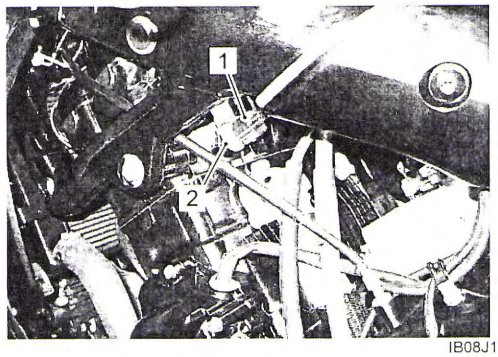
BENF08J11306011

Removal

1) Drain engine coolant. Refer to "Cooling System Inspection" in Section 1F (Page 1F-5).
2) Disconnect the coupler (1) and remove the ECT sensor (2).

NOTICE

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



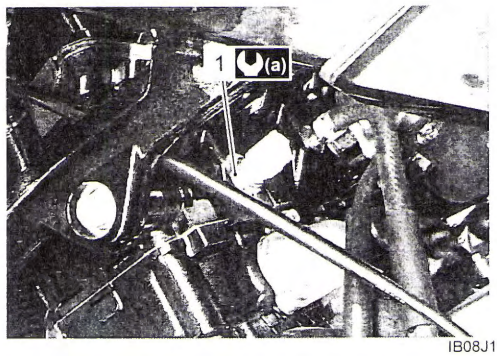
IB08J1130009-02

Installation

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

- Install the new gasket washer and tighten the ECT sensor (1) to the specified torque.

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



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- Pour engine coolant. Refer to "Cooling System Inspection" in Section 1F (Page 1F-5).

ECT Sensor Inspection

BENF08J11306012

Refer to "DTC "C15" (P0115-H/L): ECT Sensor Circuit Malfunction" in Section 1A (Page 1A-41).
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.

NOTICE

- **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

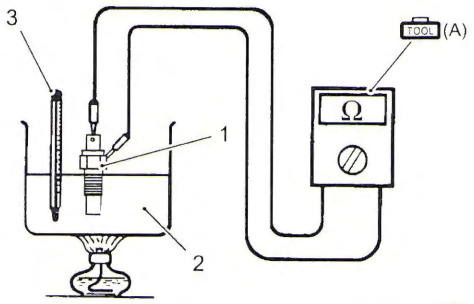
(A): 09900–25008 (Multi-circuit tester set)

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



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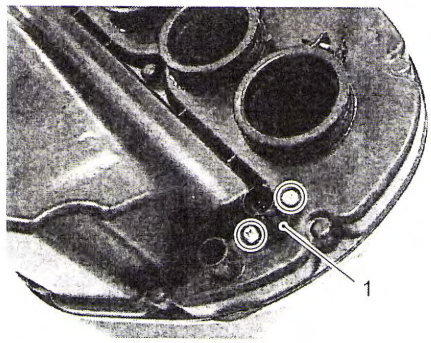
4) Install the ECT sensor. Refer to "ECT Sensor Removal and Installation" (Page 1C-4).

IAT Sensor Removal and Installation

BENF08J11306013

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.



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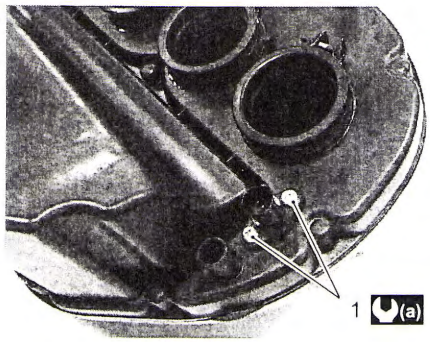
Installation

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

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

Tightening torque

IAT sensor mounting screw (a): 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)



IB08J1130013-02

IAT Sensor Inspection

BENF08J11306014

Refer to "DTC "C21" (P0110-H/L): IAT Sensor Circuit Malfunction" in Section 1A (Page 1A-44).
Inspect the IAT sensor.

NOTICE

- **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.**

NOTE

IAT sensor resistance measurement method is the same way as that of the ECT sensor. Refer to "ECT Sensor Inspection" (Page 1C-5).

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

BENF08J11306015

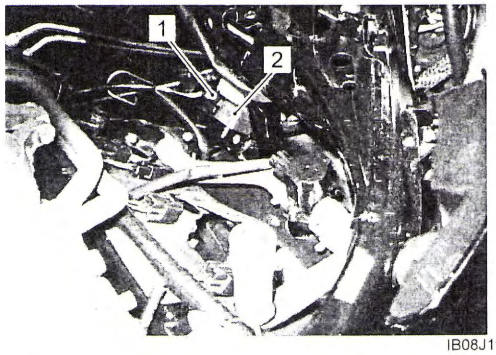
Refer to "DTC "C22" (P1450-H/L): AP Sensor Circuit Malfunction" in Section 1A (Page 1A-47).

AP Sensor Removal and Installation

BENF08J11306016

Removal

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" in Section 1D (Page 1D-7).
2) Disconnect the coupler (1) and remove the AP sensor (2).



IB08J1130014-02

Installation

Install the AP sensor in the reverse order of removal.

TO Sensor Inspection

BENF08J11306017

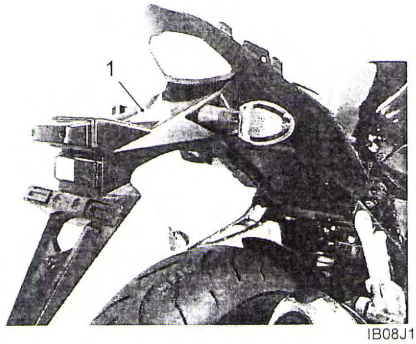
Refer to "DTC "C23" (P1651-H/L): TO Sensor Circuit Malfunction" in Section 1A (Page 1A-50).

TO Sensor Removal and Installation

BENF08J11306018

Removal

1) Remove the front and rear seats. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Remove the frame cover (LH and RH) and frame center cover. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
3) Remove the rear fender (rear) (1). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).



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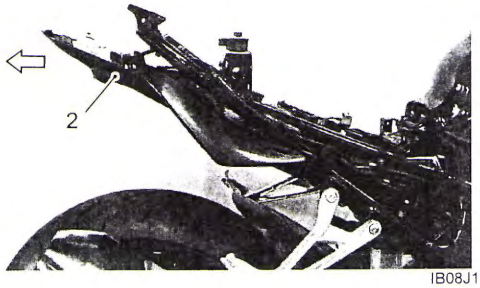
4) Move the rear fender (front) (2) to arrow direction.



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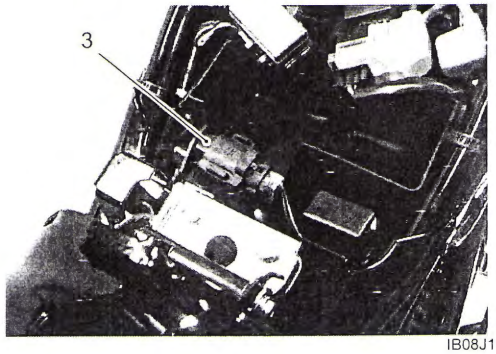
5) Disconnect the coupler and remove the TO sensor (3).



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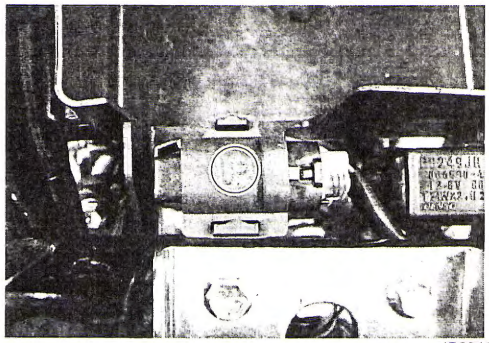
Installation

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 upward.



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STP Sensor Inspection

BENF08J11306019

Refer to "DTC "C29" (P1654-H/L): Secondary Throttle Position Sensor (STPS) Circuit Malfunction" in Section 1A (Page 1A-58).

STP Sensor Adjustment

BENF08J11306020

Adjust the STP sensor 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 STVA lead wire coupler (1).



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3) Connect the special tool between the STP sensor and its coupler.

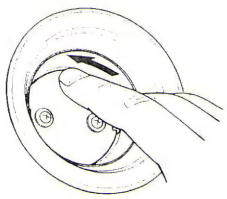
Special tool
TOOL (A): 09900–28630 (TP Sensor test lead)

4) Turn the ignition switch ON.
5) Close the secondary throttle valve by finger and measure the STP sensor output voltage the coupler (between the R wire (+) and B wire (–)).

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

Tester knob indication
Voltage (⎓)

STP sensor output voltage
ST valve is fully closed: Approx. 0.6 V



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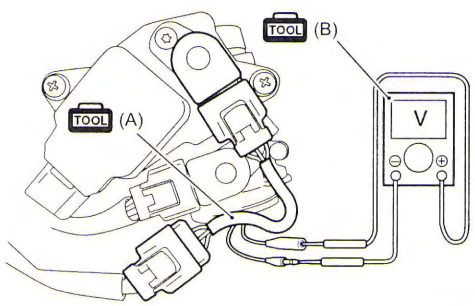

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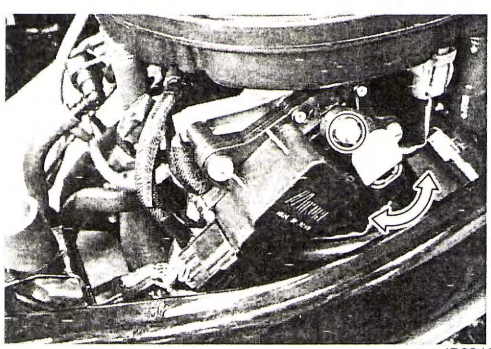
6) Move the throttle body upward by loosing the throttle body mounting screw.
7) Loosen the STP sensor mounting screw using the special tool and adjust the STP sensor until the output voltage comes within the specified value.

Special tool
TOOL : 09930–11950 (Torx® wrench (T25H))

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)



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9) Reinstall the removed parts.

STP Sensor Removal and Installation

BENF08J11306021

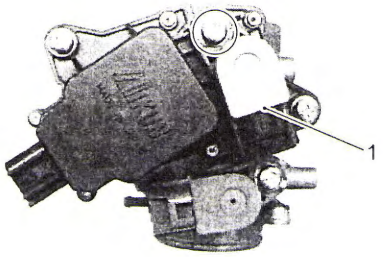
Removal

1) Remove the throttle body. Refer to "Throttle Body Removal and Installation" in Section 1D (Page 1D-11).
2) Remove the STP sensor (1) using the special tool.

Special tool
TOOL : 09930–11950 (Torx® wrench (T25H))

NOTE

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



IB08J1130022-03

Installation

Install the STP sensor in the reverse order of removal. Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-12).

STV Actuator Inspection

BENF08J11306022

Refer to "DTC "C28" (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction" in Section 1A (Page 1A-53).

STV Actuator Removal and Installation

BENF08J11306023

Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-12).

NOTE

Never remove the STV actuator from the throttle body.

ISC Valve Inspection

BENF08J11306024

Refer to "DTC "C40" (P0505): ISC Valve Circuit Malfunction" in Section 1A (Page 1A-67).

ISC Valve Removal and Installation

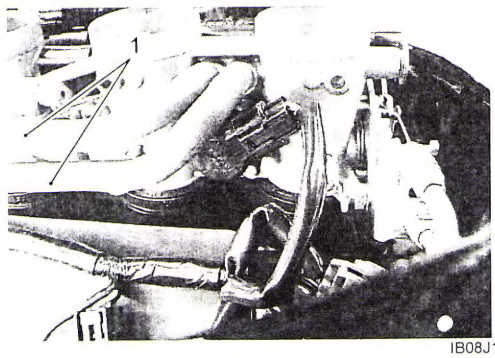
BENF08J11306025

NOTE

- **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-9).**

Removal

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" in Section 1D (Page 1D-7).
2) Remove the ISC valve hoses (1).



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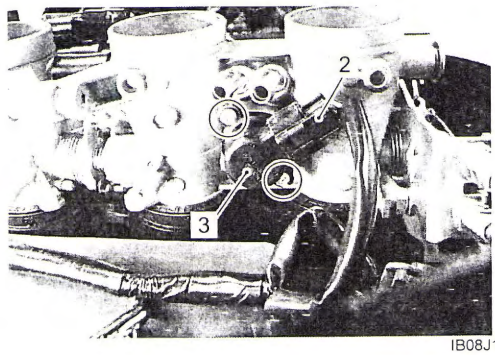
3) Disconnect the ISC valve coupler (2).
4) Remove the ISC valve (3).



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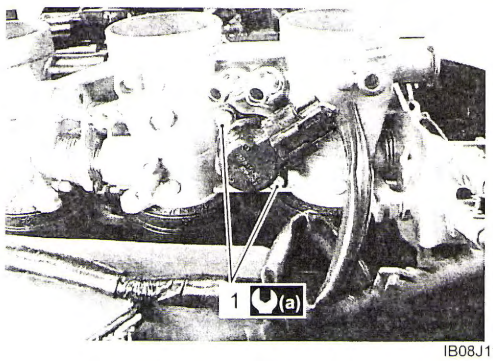
Installation

Install the ISC valve in the reverse order of removal.

- Tighten the ISC valve bolts (1) to the specified torque.

Tightening torque
ISC valve bolt (a): 2.0 N·m (0.20 kgf-m, 1.5 lbf-ft)



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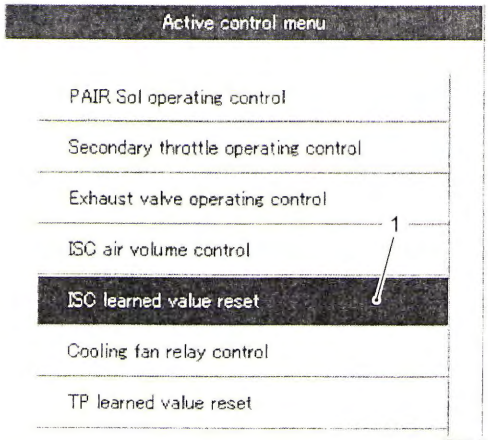
ISC Valve Preset and Opening Initialization

BENF08J11306026

When removing or replacing the ISC valve, set the ISC valve to 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 the "Active control".
4) Click the "ISC learned value reset" (1).



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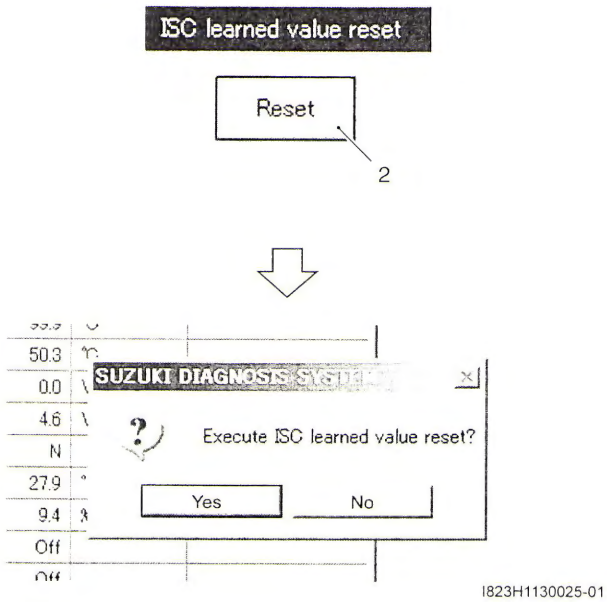
5) Click the "Reset" button (2) to clear the ISC leaned value.



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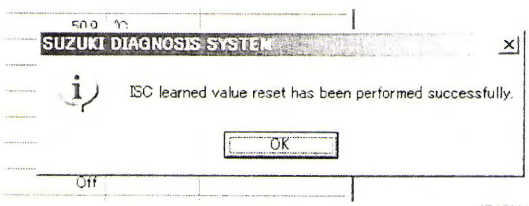
NOTE

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



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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

BENF08J11306027

Refer to "DTC "C44" (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction" in Section 1A (Page 1A-78).

HO2 Sensor Removal and Installation

BENF08J11306028

Refer to "Heated Oxygen Sensor (HO2S) Removal and Installation" in Section 1B (Page 1B-6).

GP Switch Inspection

BENF08J11306029

Refer to "Side-stand / Ignition Interlock System Parts Inspection" in Section 1I (Page 1I-8).

GP Switch Removal and Installation

BENF08J11306030

Refer to "Gear Position (GP) Switch Removal and Installation" in Section 5B (Page 5B-11).

Specifications

Service Data

BENF08J11307001

FI Sensors

Item	Standard/Specification		Note
CMP sensor resistance	0.9 kΩ – 1.7 kΩ		
CMP sensor peak voltage	0.7 V and more		When cranking
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. 4.3 V	
ECT sensor input voltage	4.5 – 5.5 V		
ECT sensor output voltage	0.15 – 4.85 V		
ECT sensor resistance	Approx. 2.45 kΩ at 20 °C (68 °F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor output voltage	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 k – 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	0.4 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. 0.6 V	
	Opened	Approx. 3.9 V	
STVA resistance	Approx. 7.8 Ω		
ISC valve resistance	Approx. 20 Ω at 20 °C (68 °F)		

Tightening Torque Specifications

BENF08J11307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
CMP sensor bolt	11	1.1	8.0	☞(Page 1C-2)
CKP sensor bolt	5.5	0.55	4.0	☞(Page 1C-2)
Lead wire clamp bolt	5.5	0.55	4.0	☞(Page 1C-2)
TP sensor mounting screw	3.5	0.35	2.5	☞(Page 1C-4)
ECT sensor	18	1.8	13.0	☞(Page 1C-4)
IAT sensor mounting screw	1.5	0.15	1.0	☞(Page 1C-5)
STP sensor mounting screw	3.5	0.35	2.5	☞(Page 1C-7)
ISC valve bolt	2.0	0.20	1.5	☞(Page 1C-9)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Tightening Torque List" in Section 0C (Page 0C-7)

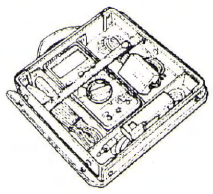
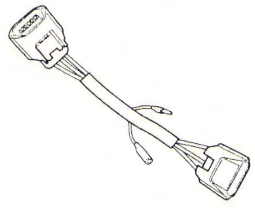
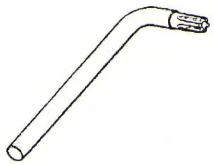
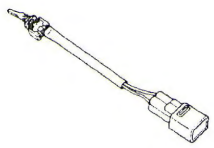
Special Tools and Equipment

Special Tool

BENF08J11308001

NOTE

Torx® is the registered trademark of Camcar Division of Textron inc. U.S.A.

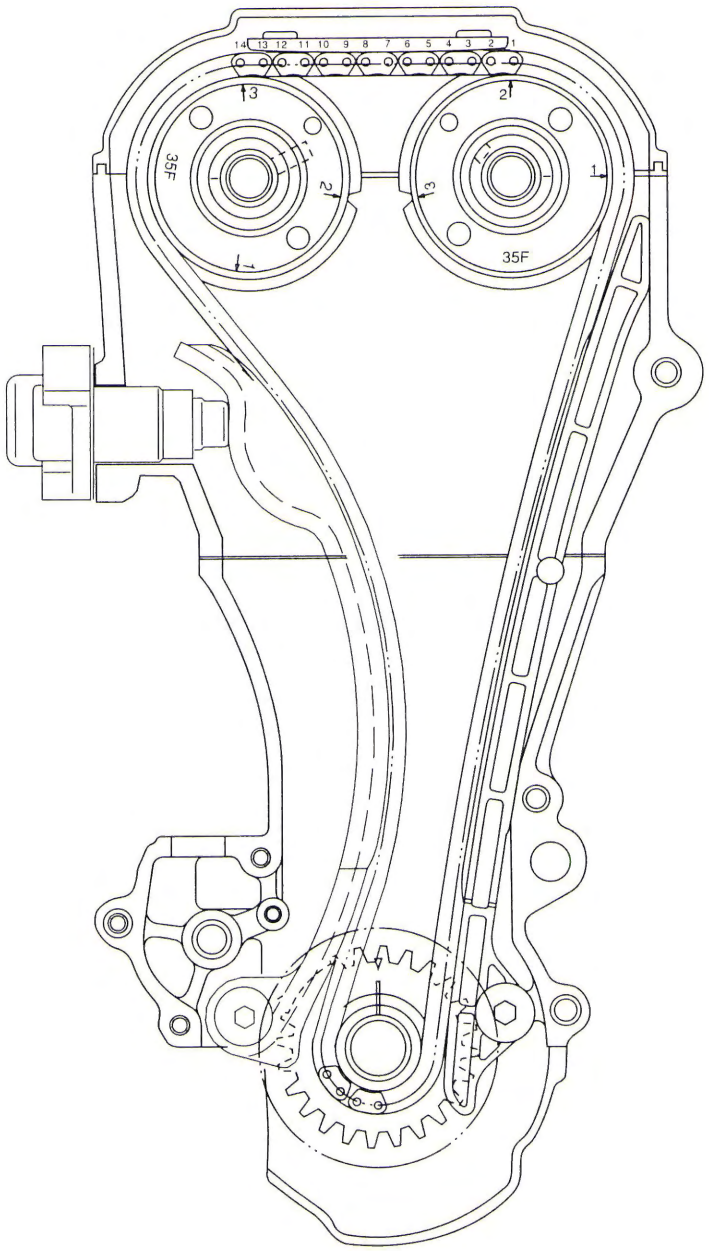
09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 1C-5) / ☞(Page 1C-7)	
09900–28630 TP Sensor test lead ☞(Page 1C-7)	
09930–11950 Torx® wrench (T25H) ☞(Page 1C-3) / ☞(Page 1C-4) / ☞(Page 1C-7) / ☞(Page 1C-8)	
09930–82720 Mode selection switch ☞(Page 1C-4)	

Engine Mechanical

Schematic and Routing Diagram

Camshaft and Sprocket Assembly Diagram

BENF08J11402001



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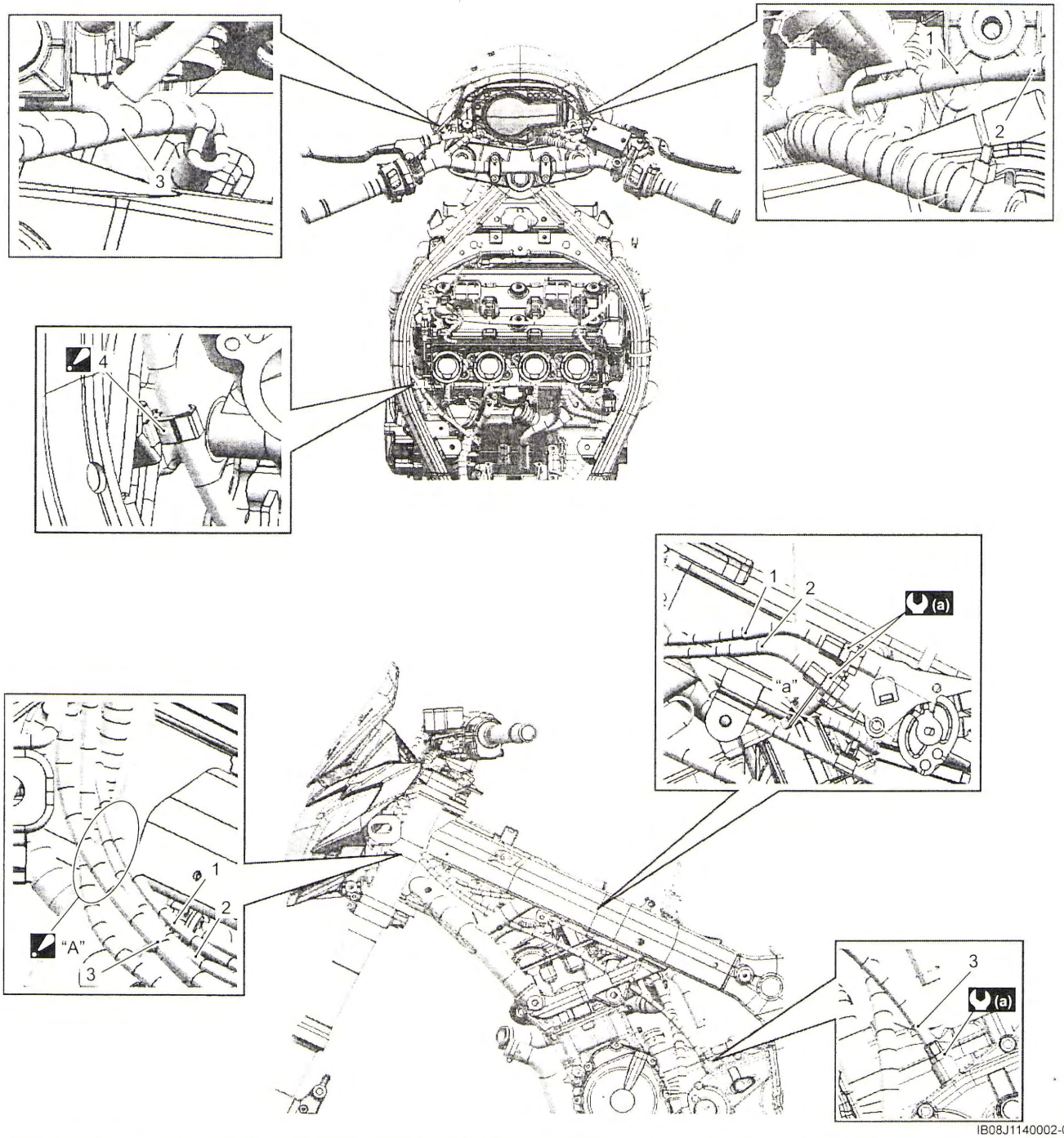
Throttle Cable Routing Diagram

BENF08J11402002



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1. Throttle cable No. 1	"A": Pass the throttle cables and clutch cable left side of frame head pipe.
2. Throttle cable No. 2	"a": 0 – 1 mm (0 – 0.04 in)
3. Clutch cable	(a) : 4.5 Nm (0.45 kgf-m, 3.3 lbf-ft)
4. Cable clamp : Clamp clutch cable of clutch cable clamp with its lock at the top.	

Diagnostic Information and Procedures

Engine Mechanical Symptom Diagnosis

BENF08J11404001

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

Compression Pressure Check

BENF08J11404002

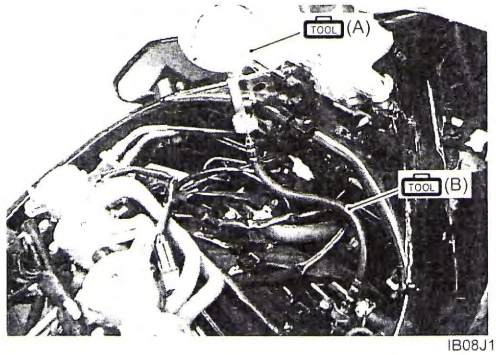
The compression pressure reading of a cylinder is a good indicator of its internal condition.
The decision to overhaul the cylinder is often based on the results of a compression test. Periodic maintenance records kept at your dealership should include compression readings for each maintenance service.

NOTE

Make sure that the battery is in fully-charged condition.

1) Warm up the engine.
2) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" (Page 1D-7).
3) Remove all the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation" in Section 1H (Page 1H-5).
4) 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): 09913–10750 (Compression gauge adapter)



IB08J1140003-02

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



IB08J1140244-02

6) Press the starter button and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.
7) Repeat this procedure with the other cylinders.

Compression pressure specification

Standard	Limit	Difference
1 300 – 1 700 kPa (13 – 17 kgf/cm², 185 – 242 psi)	1 000 kPa (10 kgf/cm², 148 psi)	200 kPa (2 kgf/cm², 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/cm², 148 psi) and less.
- The difference in compression pressure between any two cylinders is 200 kPa (2 kgf/cm², 28 psi) and more.
- All compression pressure readings are below 1 300 kPa (13 kgf/cm², 185 psi) even when they measure 1 000 kPa (10 kgf/cm², 148 psi) and more.

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

Repair Instructions

Engine Components Removable with the Engine in Place

BENF08J11406001

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" (Page 1D-6).	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-7).	Refer to "PAIR System Inspection" in Section 1B (Page 1B-7).	Refer to "PAIR Control Solenoid Valve Removal and Installation" in Section 1B (Page 1B-7).
Cylinder head cover	Refer to "Engine Top Side Disassembly" (Page 1D-30).	—	Refer to "Engine Top Side Assembly" (Page 1D-32).
Camshafts	Refer to "Engine Top Side Disassembly" (Page 1D-30).	Refer to "Camshaft Inspection" (Page 1D-37).	Refer to "Engine Top Side Assembly" (Page 1D-32).
Throttle body	Refer to "Throttle Body Removal and Installation" (Page 1D-11).	Refer to "Throttle Body Inspection and Cleaning" (Page 1D-17).	Refer to "Throttle Body Removal and Installation" (Page 1D-11).
Thermostat	Refer to "Thermostat Removal and Installation" in Section 1F (Page 1F-11).	Refer to "Thermostat Inspection" in Section 1F (Page 1F-12).	Refer to "Thermostat Removal and Installation" in Section 1F (Page 1F-11).
Crankcase breather (PCV) cover	Refer to "Crankcase Breather (PCV) Hose / Cover Removal and Installation" in Section 1B (Page 1B-9).	Refer to "Crankcase Breather (PCV) Cover Inspection" in Section 1B (Page 1B-9).	Refer to "Crankcase Breather (PCV) Hose / Cover Removal and Installation" in Section 1B (Page 1B-9).
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 1E (Page 1E-6).	—	Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).
Oil cooler	Refer to "Oil Cooler Removal and Installation" in Section 1E (Page 1E-10).	—	Refer to "Oil Cooler Removal and Installation" in Section 1E (Page 1E-10).
Oil pan	Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation" in Section 1E (Page 1E-8).	—	Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation" in Section 1E (Page 1E-8).
Oil strainer / oil pressure regulator	Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation" in Section 1E (Page 1E-8).	—	Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation" in Section 1E (Page 1E-8).

Engine Right Side

Item	Removal	Inspection	Installation
Exhaust pipes/Muffler	Refer to "Exhaust Pipe / Muffler Removal and Installation" in Section 1K (Page 1K-12).	Refer to "Exhaust System Inspection" in Section 1K (Page 1K-15).	Refer to "Exhaust Pipe / Muffler Removal and Installation" in Section 1K (Page 1K-12).
Clutch cover	Refer to "Clutch Removal" in Section 5C (Page 5C-8).	—	Refer to "Clutch Installation" in Section 5C (Page 5C-10).
Clutch plates	Refer to "Clutch Removal" in Section 5C (Page 5C-8).	Refer to "Clutch Parts Inspection" in Section 5C (Page 5C-13).	Refer to "Clutch Installation" in Section 5C (Page 5C-10).
Clutch sleeve hub	Refer to "Clutch Removal" in Section 5C (Page 5C-8).	—	Refer to "Clutch Installation" in Section 5C (Page 5C-10).
Primary driven gear	Refer to "Clutch Removal" in Section 5C (Page 5C-8).	Refer to "Clutch Parts Inspection" in Section 5C (Page 5C-13).	Refer to "Clutch Installation" in Section 5C (Page 5C-10).
Gearshift shaft	Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation" in Section 5B (Page 5B-14).	Refer to "Gearshift Linkage Inspection" in Section 5B (Page 5B-16).	Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation" in Section 5B (Page 5B-14).
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).
Oil pump	Refer to "Oil Pump Removal and Installation" in Section 1E (Page 1E-13).	Refer to "Oil Pump Inspection" in Section 1E (Page 1E-14).	Refer to "Oil Pump Removal and Installation" in Section 1E (Page 1E-13).
Oil pump driven gear	Refer to "Oil Pump Removal and Installation" in Section 1E (Page 1E-13).	—	Refer to "Oil Pump Removal and Installation" in Section 1E (Page 1E-13).
Oil pressure switch	Refer to "Oil Pressure Switch Removal and Installation" in Section 1E (Page 1E-10).	Refer to "Oil Pressure Switch Inspection" in Section 1E (Page 1E-11).	Refer to "Oil Pressure Switch Removal and Installation" in Section 1E (Page 1E-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-12).	Refer to "Starter Clutch Removal and Installation" in Section 1I (Page 1I-10).

Engine Left Side

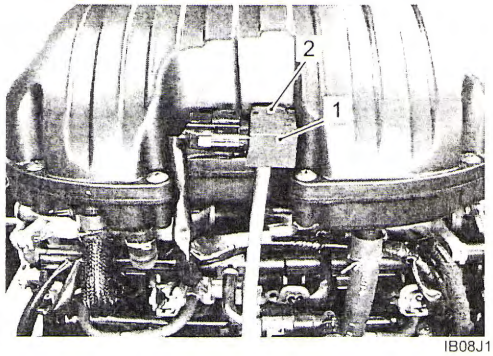
Item	Removal	Inspection	Installation
Speed sensor	Refer to "Speed Sensor Removal and Installation" in Section 9C (Page 9C-6).	Refer to "Speed Sensor Inspection" in Section 9C (Page 9C-6).	Refer to "Speed Sensor Removal and Installation" in Section 9C (Page 9C-6).
Engine sprocket	Refer to "Engine Sprocket Removal and Installation" in Section 3A (Page 3A-2).	Refer to "Drive Chain Related Parts Inspection" in Section 3A (Page 3A-6).	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-9).	Refer to "Drive Chain Inspection and Adjustment" in Section 3A (Page 3A-5).	Refer to "Drive Chain Replacement" in Section 3A (Page 3A-9).
GP switch	Refer to "Gear Position (GP) Switch Removal and Installation" in Section 5B (Page 5B-11).	Refer to "Gear Position (GP) Switch Inspection" in Section 5B (Page 5B-10).	Refer to "Gear Position (GP) Switch Removal and Installation" in Section 5B (Page 5B-11).
Generator	Refer to "Generator Removal and Installation" in Section 1J (Page 1J-5).	—	Refer to "Generator Removal and Installation" in Section 1J (Page 1J-5).
Water pump	Refer to "Water Pump Removal and Installation" in Section 1F (Page 1F-14).	Refer to "Water Pump Related Parts Inspection" in Section 1F (Page 1F-18).	Refer to "Water Pump Removal and Installation" in Section 1F (Page 1F-14).

Air Cleaner Element Removal and Installation

BENF08J11406002

Removal

1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
2) Remove the IAP sensor (1) from its bracket (2).



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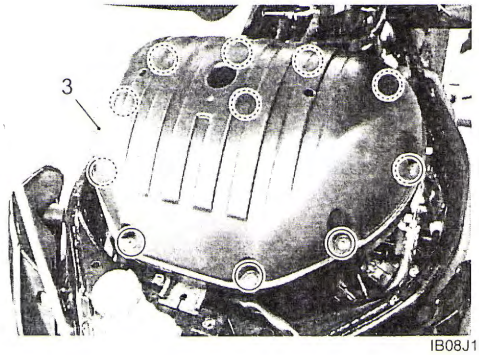
3) Remove the air cleaner box cover (3).



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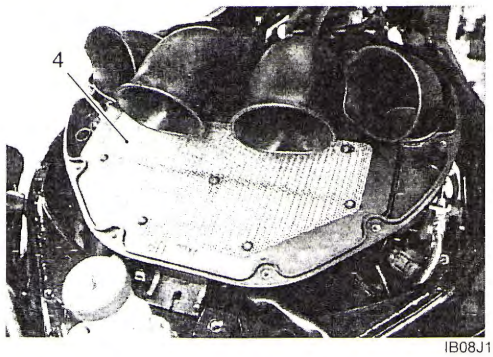
4) Remove the air cleaner element (4).



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Installation

Install the air cleaner element in the reverse order of removal.

Air Cleaner Element Inspection

BENF08J11406041

1) Remove the air cleaner element. Refer to "Air Cleaner Element Removal and Installation" (Page 1D-6).
2) Inspect the air cleaner element for clogging. If it is clogged with dirt, replace it with a new one.

NOTICE

Do not blow the air cleaner element with compressed air.

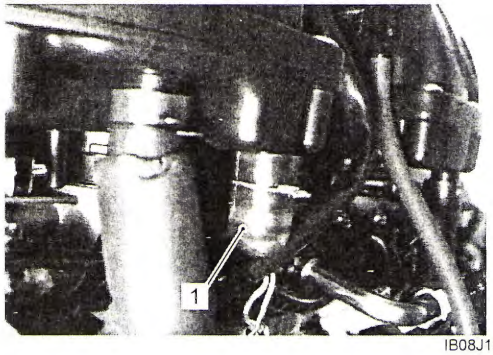
NOTE

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.



IB08J1020002-02

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



IB08J1020003-02

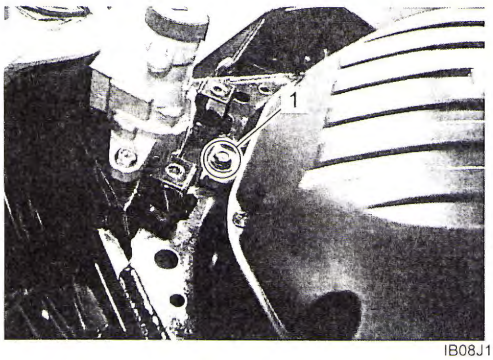
4) Reinstall the removed parts.

Air Cleaner Box Removal and Installation

BENF08J11406003

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 mounting bolt (1).



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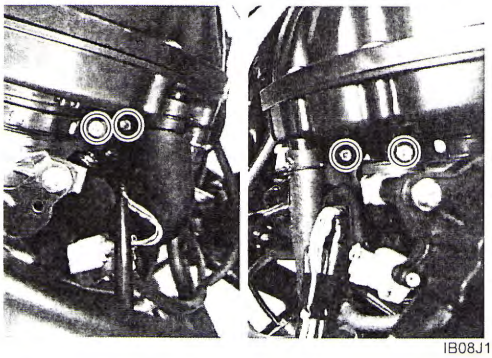
3) Loosen the air cleaner box clamp screws using a 3 mm hexagon wrench.



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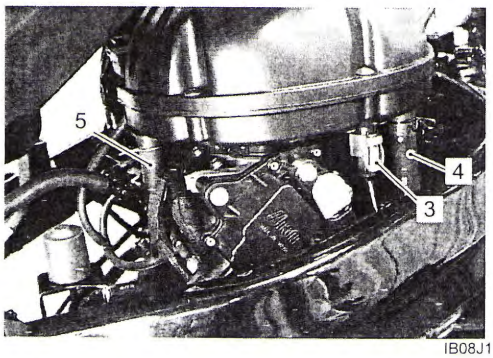
4) Lift the air cleaner box.
5) Disconnect the IAT sensor coupler (3), PAIR hose (4) and PCV hose (5).



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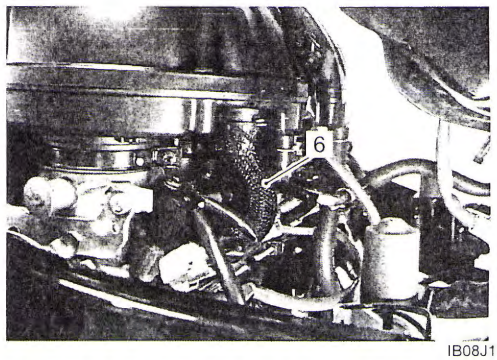
6) Disconnect the ISC valve hose (6).



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7) Remove the air cleaner box.

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-10).

Throttle Cable Removal and Installation

BENF08J11406005

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 "Handlebars Removal and Installation" in Section 6B (Page 6B-3).
3) Remove the throttle cables as shown in the cable routing diagram. Refer to "Throttle Cable Routing Diagram" (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" (Page 1D-8).

Throttle Cable Inspection

BENF08J11406006

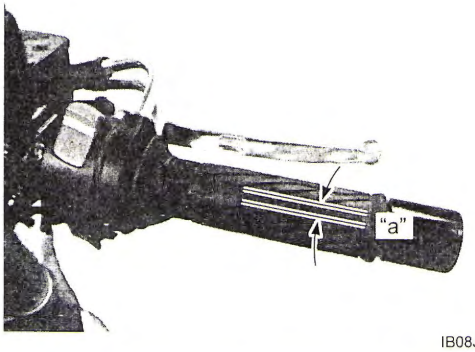
Check that the throttle grip moves smoothly from full open to full close. If it does not move smoothly, lubricate the throttle cables.

Throttle Cable Play Inspection and Adjustment

BENF08J11406007

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

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

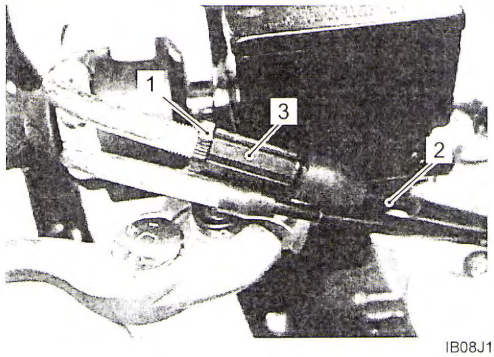


IB08J1020018-03

1) Loosen the lock-nut (1) of the throttle pulling cable (2).
2) Turn the adjuster (3) in or out until the throttle cable play "a" (at the throttle grip) is between 2.0 – 4.0 mm (0.08 – 0.16 in).
3) Tighten the lock-nut (1) while holding the adjuster (3).

⚠ 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.



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Throttle Body Components

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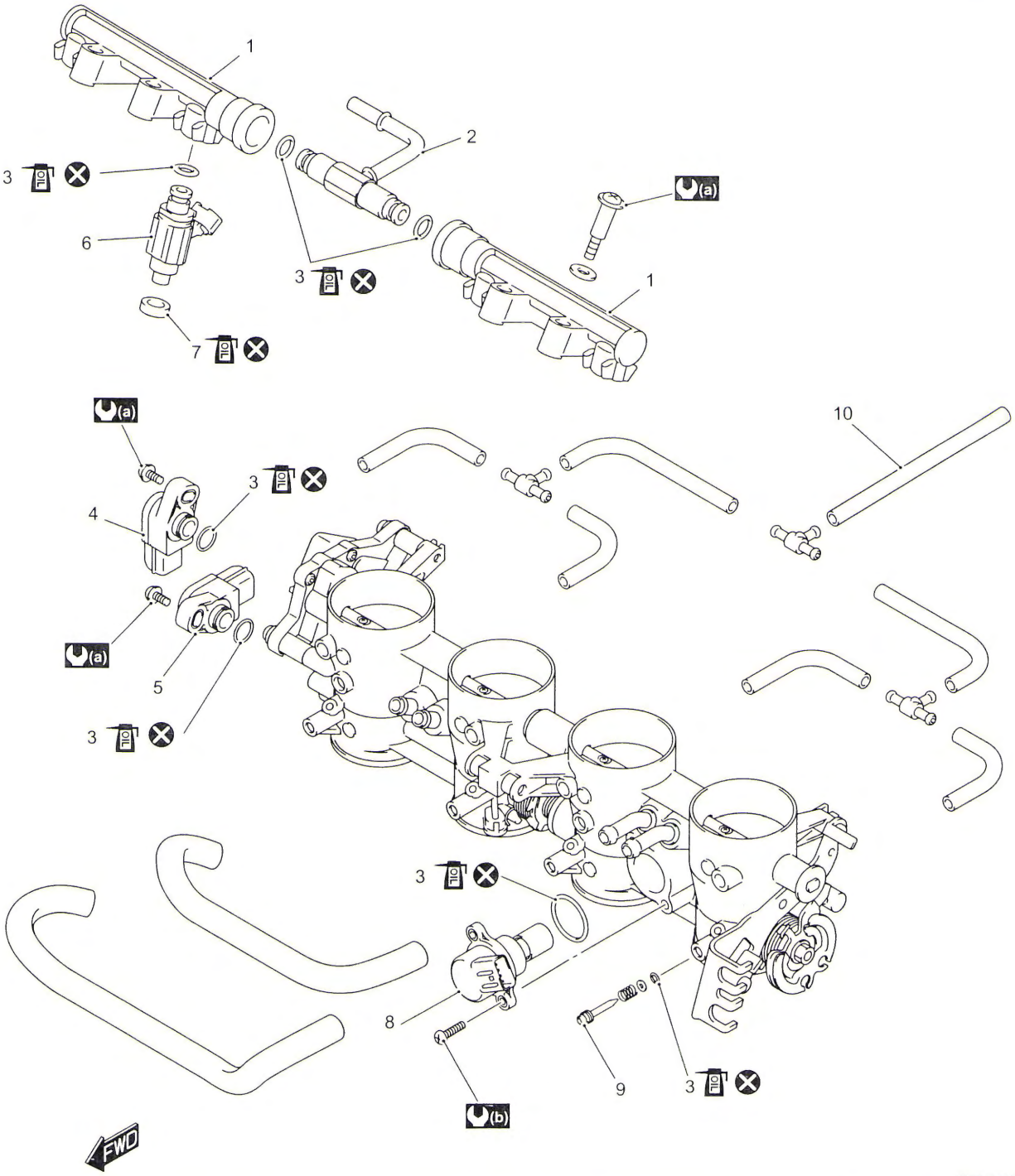
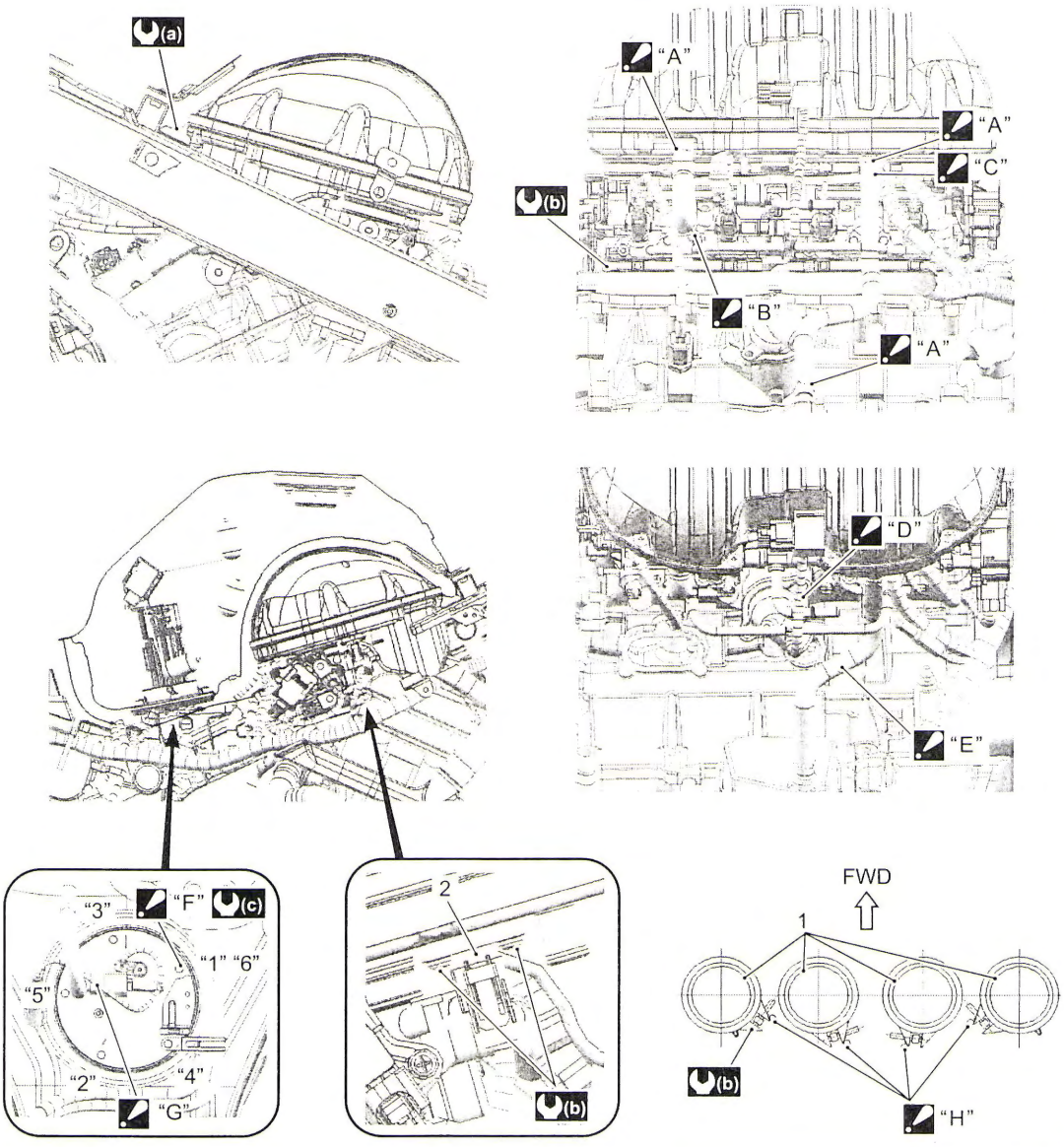


IB08J1140263-02

1. Fuel delivery pipe	5. TP sensor	9. Air screw	: Apply engine oil.
2. Fuel delivery pipe T-joint	6. Fuel injector	10. Vacuum hose	: Do not reuse.
3. O-ring	7. Cushion seal	(a) : 3.5 Nm (0.35 kgf-m, 2.5 lbf-ft)	
4. STP sensor	8. ISC valve	(b) : 2 Nm (0.2 kgf-m, 1.5 lbf-ft)	

Throttle Body Construction

BENF08J11406009



IB08J1140265-01

1.	Air cleaner outlet tube	"F":	Tighten the bolts in the ascending of numbers.
2.	IAT sensor	"G":	Pass the fuel pump lead wire above the fuel pipe of the fuel pump.
"A":	Face the clamp end backward.	"H":	After the air cleaner box clamp has contacted to the stopper, tighten the air cleaner box clamp screw.
"B":	Face the clamp end downward.	(a) :	5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)
"C":	White paint should face backward.	(b) :	1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)
"D":	Pass the respective vacuum hose over the T-joint. Pass vacuum hose detouring fuel pipe of throttle body.	(c) :	10 N·m (1.0 kgf-m, 7.0 lbf-ft)
"E":	Pass the breather hose between vacuum hose and throttle body.		

Throttle Body Removal and Installation

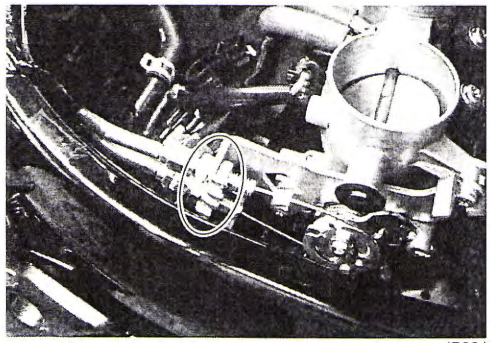
BENF08J11406010

Removal

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" (Page 1D-7).
2) Disconnect the throttle cables from their drum.

NOTICE

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



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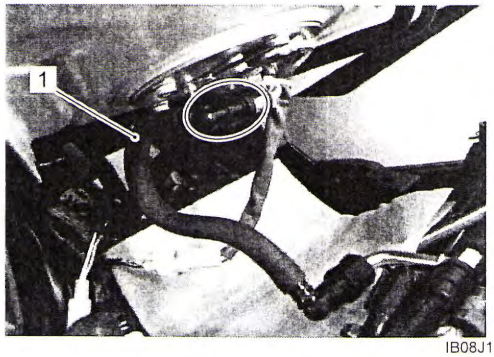
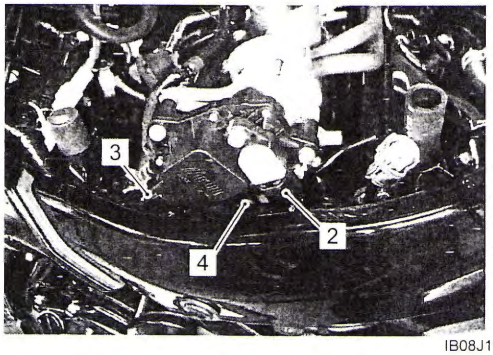
3) Place a rag under the fuel feed hose (1) and disconnect the fuel feed hose from the fuel pump.



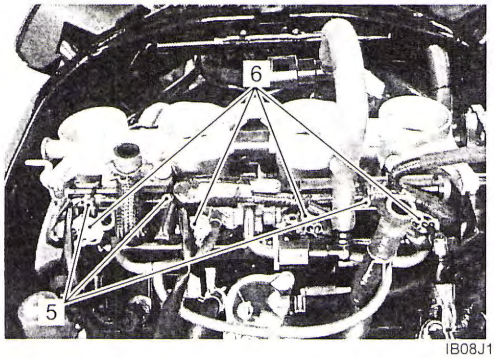
IB08J1140012-02

4) Disconnect the STP sensor coupler (2), STVA coupler (3) and TP sensor coupler (4).



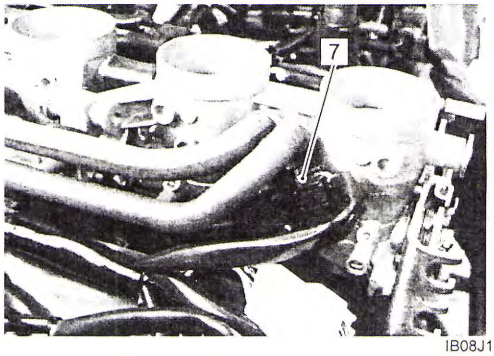
IB08J1140013-02

5) Remove the clamps (5).
6) Disconnect fuel injector couplers (6).



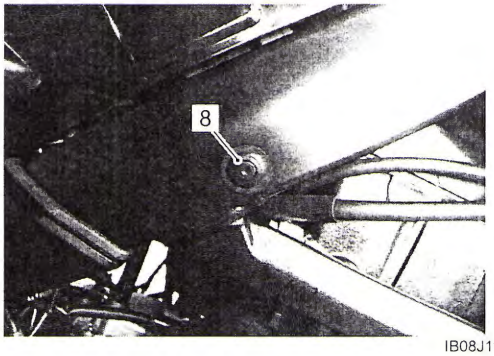
IB08J1140014-02

7) Disconnect the ISC valve coupler (7).



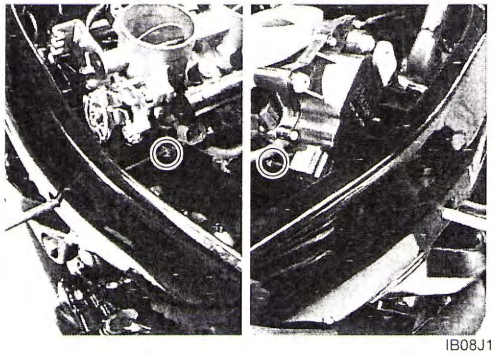
IB08J1140015-03

8) Remove the fasteners (8).



IB08J1140016-02

9) Loosen the throttle body clamp screws using a 3 mm hexagon wrench.



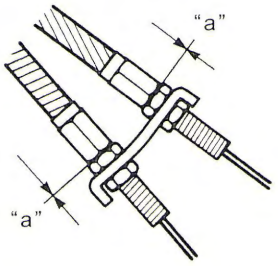
IB08J1140017-02

10) Remove the throttle body assembly.

Installation

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

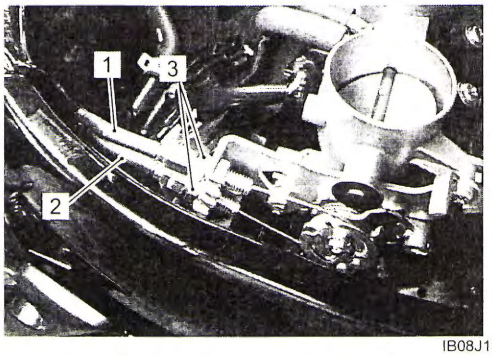
- Connect the throttle pulling cable (1) and throttle returning cable (2) to the throttle cable drum.
- Loosen each throttle cable lock-nut.
- Turn in each throttle cable adjuster fully and locate each outer cable so that the clearance "a" is 0 – 1 mm (0 – 0.04 in).



I822H1140016-01

- Tighten each lock-nut (3) to the specified torque.

Tightening torque
Throttle cable lock nut: 4.5 N·m (0.45 kgf-m, 3.3 lbf-ft)



IB08J1140019-02

- Adjust the throttle cable play. Refer to "Throttle Cable Play Inspection and Adjustment" (Page 1D-8).
- Reset the ISC valve and TP sensor learned values. Refer to "ISC Valve Reset" (Page 1D-19) and "TP Reset" (Page 1D-20).

Throttle Body Disassembly and Assembly

BENF08J11406011

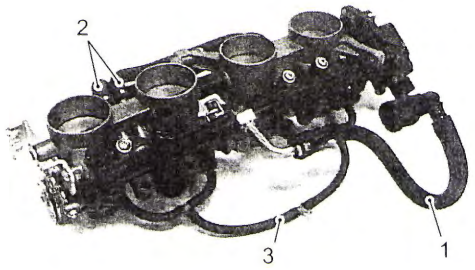
Refer to "Throttle Body Removal and Installation" (Page 1D-11).

Disassembly

NOTE

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).

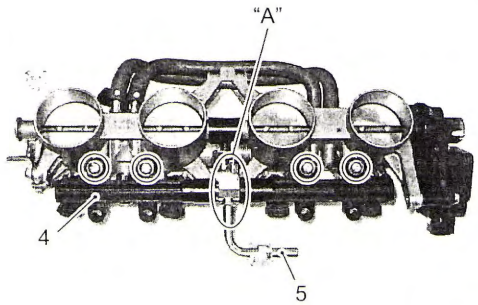


IB08J1140018-02

2) Remove the fuel delivery pipe assembly (4).

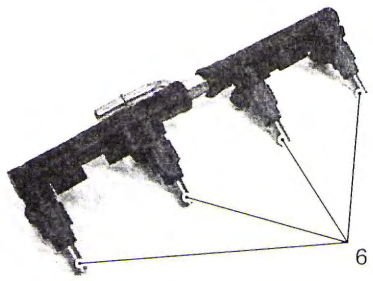
NOTICE

Be careful not to twist the fuel delivery pipe T-joint (5) when removing the fuel delivery pipes, or joint part "A" of the fuel delivery pipe get damage.



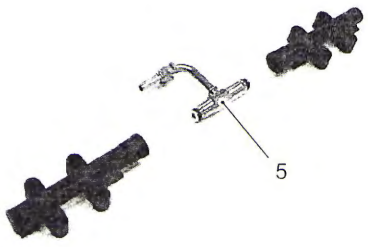
IB08J1140020-03

3) Remove the fuel injectors (6) from the fuel delivery pipes.



IB08J1140021-03

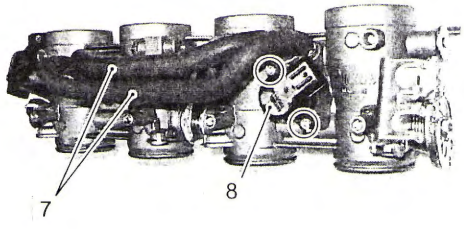
4) Remove the T-joint (5) from the fuel delivery pipes.



IB08J1140022-03

5) Remove the ISC valve hoses (7) and ISC valve (8) using special tool.

Special tool
TOOL : 09930–11960 (Torx® wrench (T20H))



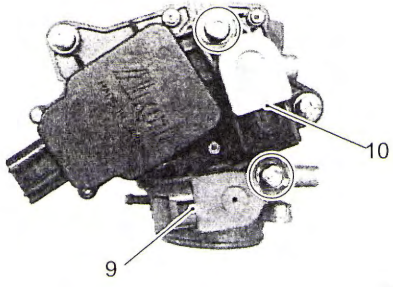
IB08J1140023-03

6) Remove the TP sensor (9) and STP sensor (10) with the special tool.

Special tool
TOOL : 09930–11950 (Torx® wrench (T25H))

NOTE

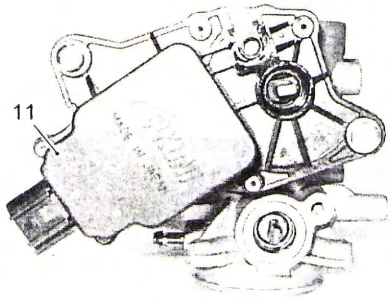
- **Prior to disassembly, mark the each sensor's original position with a paint or scribe for accurate reinstallation.**
- **The TP sensor and STP sensor can be identified by the color as follows.**
  - **TP sensor: Gray (9)**
  - **STP sensor: Gray & black (10)**



IB08J1140024-04

NOTICE

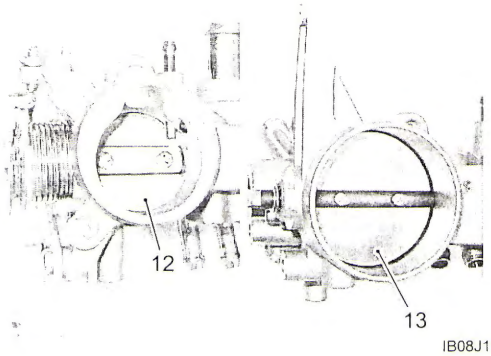
Never remove the STVA (11) from the throttle body.



IB08J1140025-03

NOTICE

Never remove the throttle valves (12) and secondary throttle valves (13).



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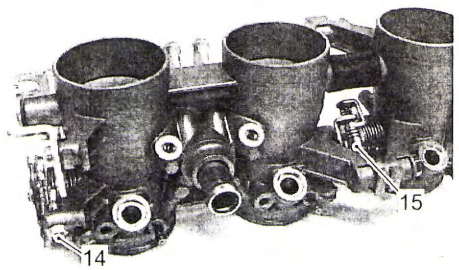
NOTE

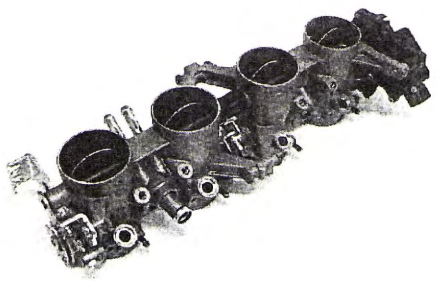
These adjusting screws (14) and (15) are factory-adjusted at the time of delivery and do not turn or remove them.



1B08J1140027-03

NOTICE

Do not separate the throttle body.



1B08J1140028-02

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 & gray) (1) and tighten the STP sensor mounting screw to the specified torque.
- Apply thin coat of engine oil to the new O-ring.

NOTICE

The TP sensor and STP sensor are not replaceable as they have the same shape but their functions are different.

NOTE

- **Align the secondary throttle shaft end "A" with the groove "B" of the STP sensor.**
- **Apply grease to the secondary throttle shaft end "A" if necessary.**

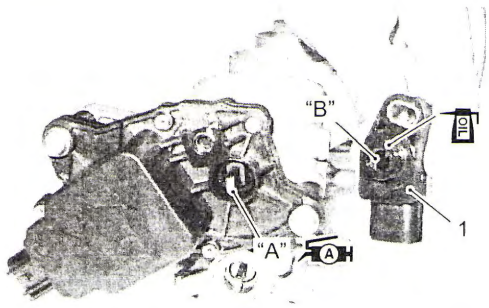
: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

Special tool

: 09930–11950 (Torx® wrench (T25H))

Tightening torque

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

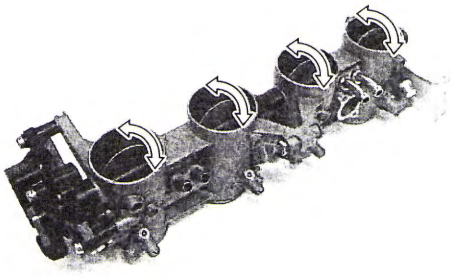


1B08J1140029-02

- Make sure the secondary throttle valves smoothly open and close.

NOTE

If necessary, adjust the STP sensor. Refer to "STP Sensor Adjustment" in Section 1C (Page 1C-7).

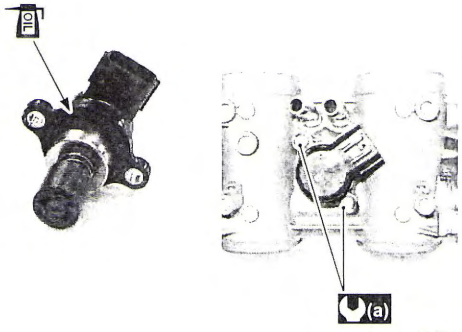


IB08J1140030-02

- 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 (T20H))

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



IB08J1140031-02

- With the throttle valves fully closed, install the TP sensor (gray) (2) and tighten the TP sensor mounting screw to the specified torque.
- Apply thin coat of engine oil to the new O-ring.

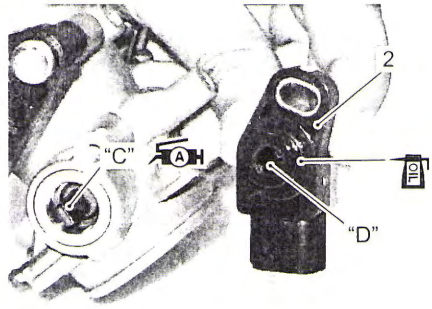
NOTE

- **Align the throttle shaft end "C" with the groove "D" of the TP sensor.**
- **Apply grease to the throttle shaft end "C" if necessary.**

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

Special tool
TOOL : 09930–11950 (Torx® wrench (T25H))

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

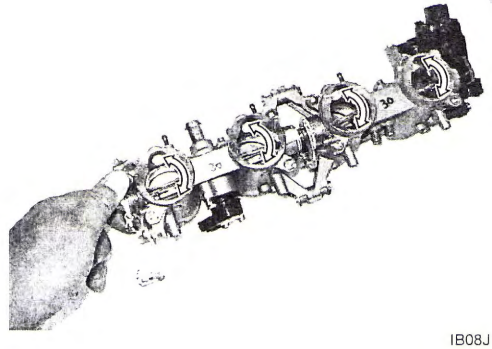


IB08J1140032-02

- Make sure the throttle valves smoothly open and close.

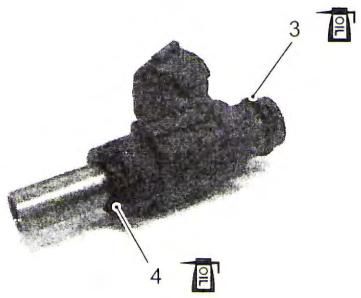
NOTE

If necessary, adjust the TP sensor. Refer to "TP Sensor Adjustment" in Section 1C (Page 1C-4).

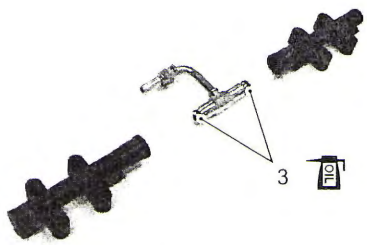


IB08J1140033-02

- Apply thin coat of engine oil to the new O-rings (3) and cushion seals (4).



IB08J1140034-03

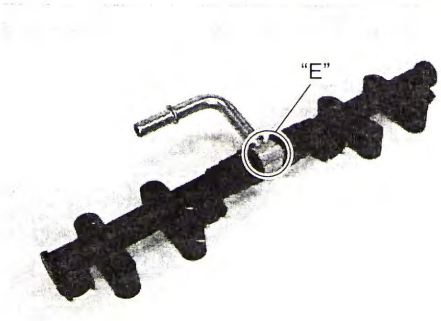


IB08J1140035-02

- Assemble the fuel delivery pipes as shown in the figure.

NOTICE

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

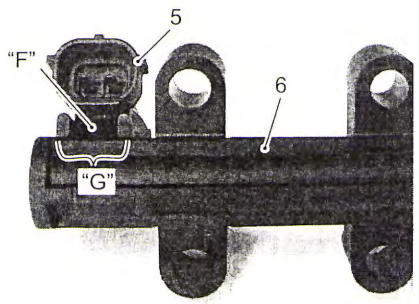


IB08J1140036-02

- Install the fuel injector (5) by pushing it straight to the delivery pipe (6).

NOTE

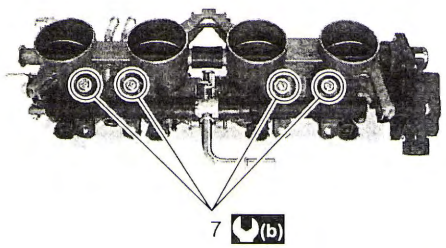
- **Never turn the injector while pushing it.**
- **Align the coupler "F" of injector with boss "G" of the delivery pipe.**



IB08J1140037-02

- Install the fuel delivery pipe assembly to the throttle body.
- Tighten the fuel delivery pipe mounting screws (7) to the specified torque.

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



IB08J1140038-02

Throttle Body Inspection and Cleaning

BENF08J11406012

Refer to "Throttle Body Disassembly and Assembly" (Page 1D-12).

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.

- Use a swab moistened with a carburetor cleaner (petroleum solvent) to clean the passageways, throttle valve, and main bore and then dry the cleaned surfaces with compressed air.

NOTICE

Do not use wire to clean passageways. Wire can damage passageways.
Never spray a cleaner (petroleum solvent) directly to the throttle valve and ISC bypass passage. The cleaner, if splayed, would work its way into the inside of the ISC valve and attack the insulation film of the coil there, causing a short circuit and eventual malfunction of the ISC valve. In addition, if a short circuit occurs in the coil, an overcurrent would flow through the ISC valve drive circuit causing the ECM to break down.
When the throttle valve is molybdenum-coated, avoid applying the cleaner to the coated surfaces. The cleaner will peel off the coating and this will impair the air-tightness of the throttle valve.
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

BENF08J11406013

Visually inspect the ISC valve if necessary.

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



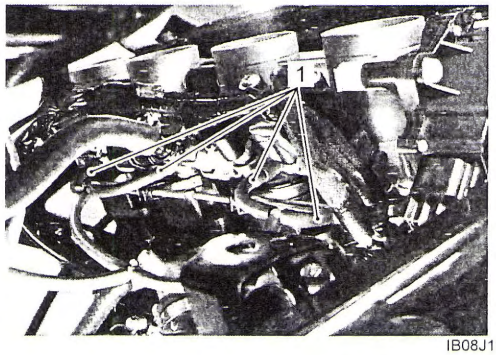
I837H1140038-01

Throttle Valve Synchronization

BENF08J11406014

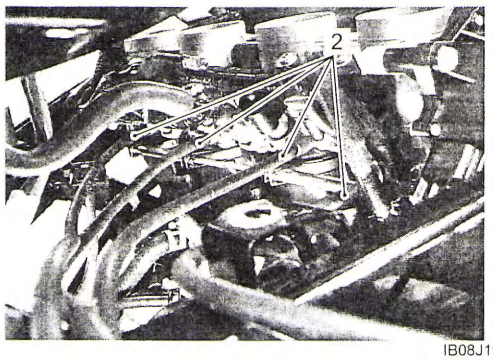
Check and adjust the throttle valve synchronization among four cylinders.

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" (Page 1D-7).
2) Disconnect the respective vacuum hoses (1) from each vacuum nipple on the throttle body.



IB08J1140039-02

3) Connect the respective vacuum tester hoses (2) to the vacuum nipples.



IB08J1140040-02

4) Set up the SDS tool. (Refer to the SDS operation manual for further details.)

5) Start the engine.

NOTICE

Avoid dirt drawn into the throttle body while running the engine without air cleaner box cover. Dirt drawn into the engine will damage the internal engine parts.

6) Click "Data monitor".

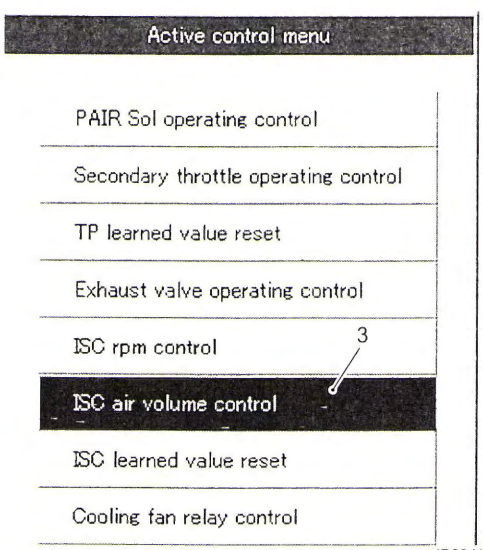
7) Warm up the engine (Water temp. more than 80 °C (176 °F) "A").

☐ Engine speed		1216	rpm
☐ Engine coolant / oil temperature	"A"	96.1	°C
☐ Desired idle speed		1205	rpm
☐ Manifold absolute pressure 1		68.9	kPa

IB08J1140251-02

8) Click "Active control".

9) Click "ISC air volume control" (3).

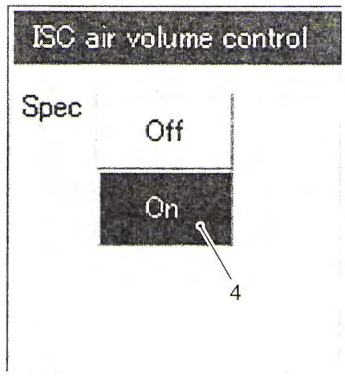


IB08J1140041-03

10) Click "ON" button (4) to fix the ISC air volume of four cylinders.

NOTE

When making this synchronization, be sure that the water temperature is within 80 – 105 °C (176 – 221 °F) "A".



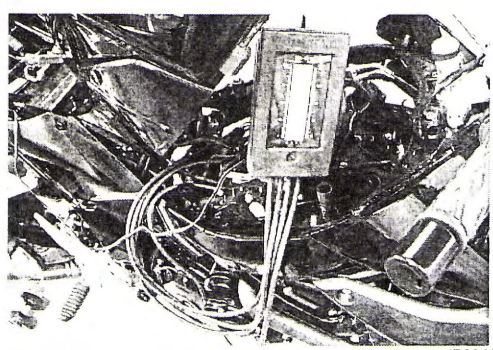
IB08J1140246-02

Item		Value	Unit
☐ Engine speed	"B" →	1179	rpm
☐ Engine coolant / oil temperature	"A" →	94.9	°C
☐ Secondary throttle actuator position sensor	"C" →	29.8	%
☐ Manifold absolute pressure 1		68.3	kPa

IB08J1140252-02

"B": Engine speed: Approx. 1 200 rpm
"C": ISC valve position: Approx. 30%

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

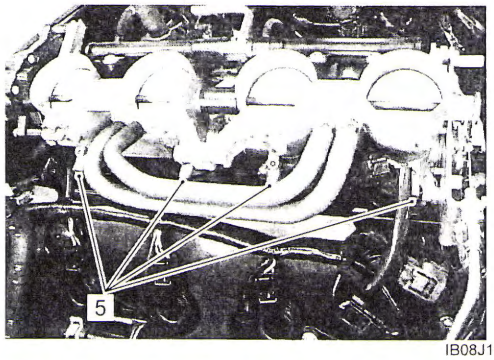


IB08J1140042-02

12) Equalize the vacuum of the cylinders by turning each air screw (5) and keep it running at idling speed.

NOTE

Always set the engine speed at idle speed.



IB08J1140043-03

13) If the adjustment is not yet correct, remove each air screw and clean them with a spray-type carburetor cleaner and blow dry with a compressed air. Also, clean the air screw passageways.

NOTE

- **Slowly turn the air screw clockwise and count the number of turns until the screw is lightly seated.**
- **Make a note of how many turns were made so the screw can be reset correctly after cleaning.**

14) Repeat the procedures from 7) to 13).

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

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

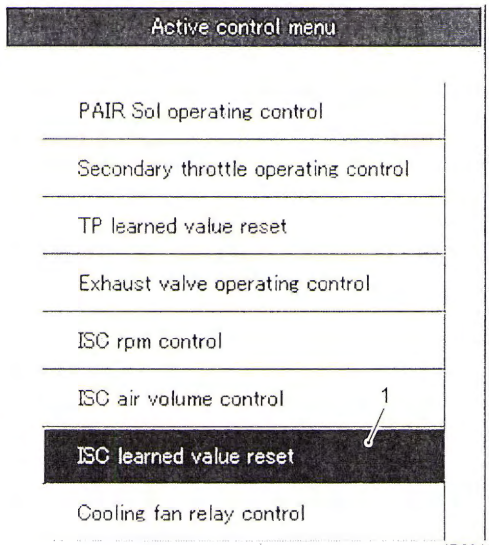
17) After completing the throttle valve synchronization, clear the DTC and reset the ISC learned value using SDS tool. Refer to "ISC Valve Preset and Opening Initialization" in Section 1C (Page 1C-9).

ISC Valve Reset

BENF08J11406015

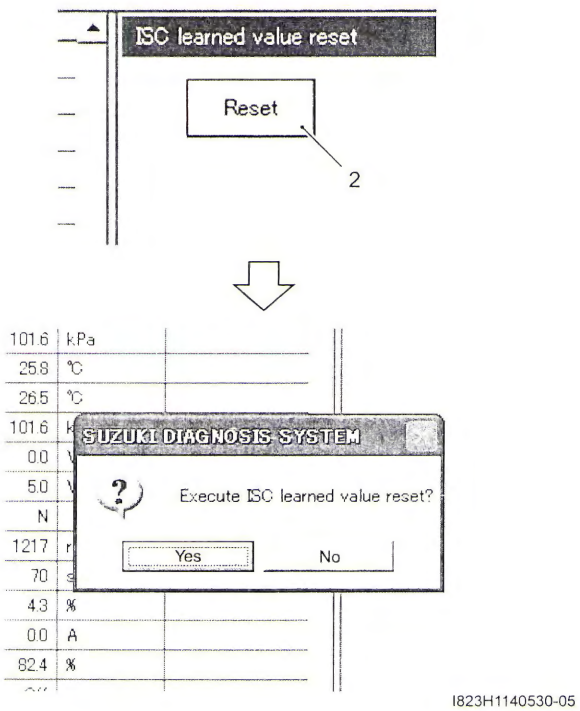
When removing ISC valve or replacing the throttle body assembly, reset the ISC valve learned value in the following procedures:

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



IB08J1140045-02

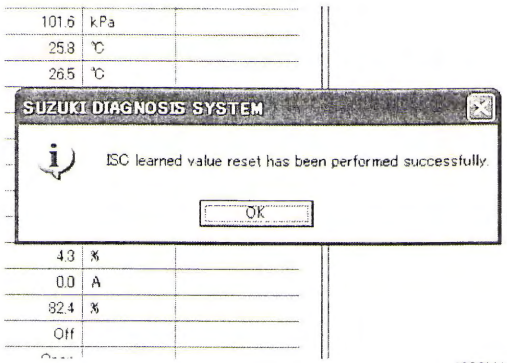
5) Click "Reset" button (2) to clear the ISC learned value.



I823H1140530-05

NOTE

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



I823H1140531-03

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

NOTE

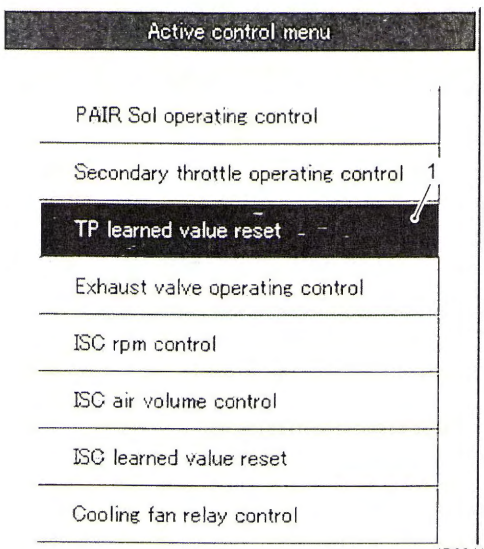
The ISC valve opening initialization is automatically started after the ignition switch is turned OFF.

TP Reset

BENF08J11406016

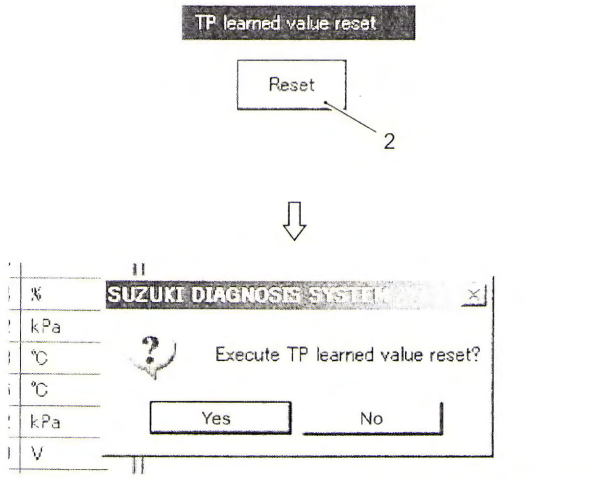
When replacing the throttle body assembly or TP sensor with a new one or reinstalling the TP sensor, reset the TP learned value in the following procedures:

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



IB08J1140044-02

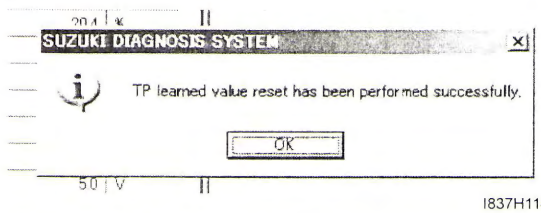
5) Click the "Reset" button (2) to clear the TP learned value.



I837H1140306-01

NOTE

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



I837H1140307-01

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

NOTE

The TP sensor opening initialization is automatically started after the ignition switch is turned OFF position.

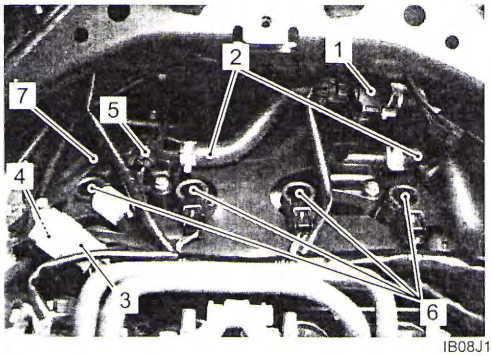
Valve Clearance Inspection and Adjustment

BENF08J11406042

Inspection

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

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" (Page 1D-7).
2) Remove the PAIR reed valve (1) and PAIR reed valve hoses (2).
3) Disconnect the left handlebar switch lead wire coupler (3).
4) Disconnect the CMP sensor coupler (4) and radiator cooling fan motor coupler (5).
5) Remove the ignition coils (6) and the cylinder head cover shield (7).



IB08J1020007-02

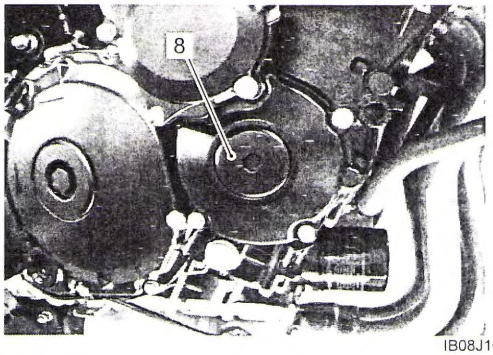
6) Remove the throttle body assembly. Refer to "Throttle Body Removal and Installation" (Page 1D-11).
7) Remove the cylinder head cover.

NOTE

The valve clearance specification of intake and exhaust valve is different.

Valve clearance (When cold)
IN: 0.10 – 0.20 mm (0.004 – 0.008 in)
EX: 0.20 – 0.30 mm (0.008 – 0.012 in)

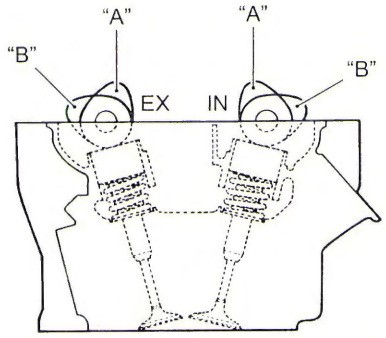
8) Remove the valve timing inspection cap (8).



IB08J1020008-02

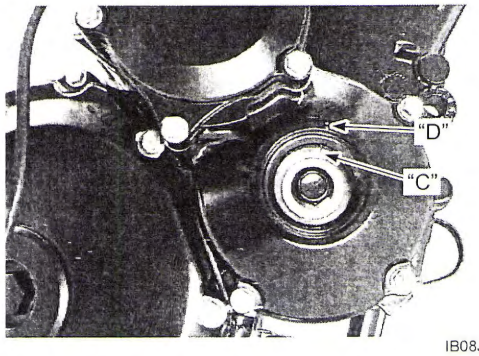
NOTE

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

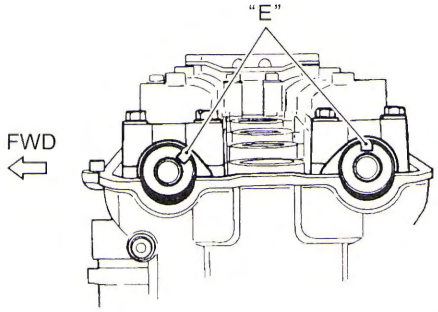


I823H1020007-01

9) Turn the crankshaft to bring the line "C" on the starter clutch to the rib "D" behind the starter clutch cover and also to bring the notches "E" on the left ends of both camshafts (EX and IN) to the positions as shown.



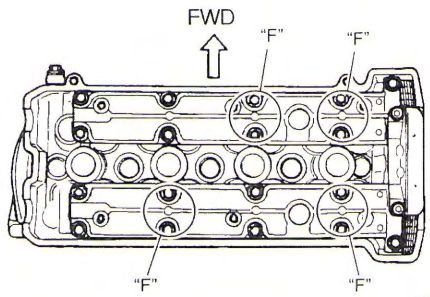
IB08J1020009-01



I837H1020009-01

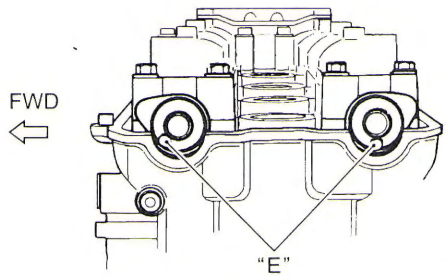
10) In this condition, read the valve clearance at the valves "F" (IN and EX of No. 4 cylinder, EX of No. 3 and IN of No. 2). If the clearance is out of specification, adjust the clearance.

Special tool
(TOOL) : 09900–20803 (Thickness gauge)



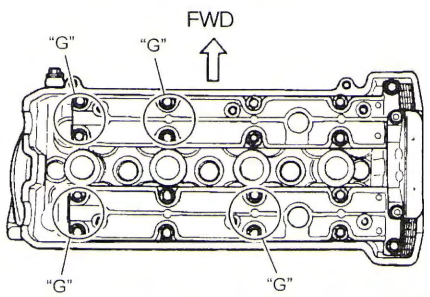
IB08J1020054-01

11) 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.



I837H1020011-01

12) Read the clearance at the rest of the valves "G" and adjust the clearance if necessary.



IB08J1020055-01

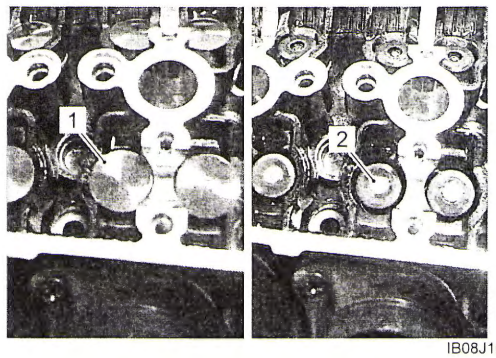
Cam position	Notch "E" position	
	Exhaust camshaft	Intake camshaft
"F"	← FWD	← FWD
"G"	← FWD	← FWD

I837H1020013-01

Adjustment

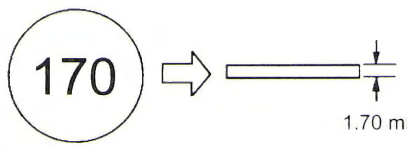
The clearance is adjusted by replacing the existing tappet shim with a thicker or thinner shim.

1) Remove the engine assembly. Refer to "Engine Assembly Removal" (Page 1D-25).
2) Remove the intake or exhaust camshaft. Refer to "Engine Top Side Disassembly" (Page 1D-30).
3) Remove the tappet (1) and shim (2) by fingers or magnetic hand.



IB08J1020011-01

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

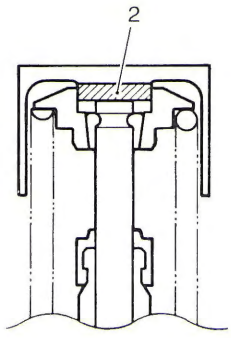


I837H1020014-01

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

NOTE

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



I718H1020002-02

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
0.00-0.04			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
0.05-0.09		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
0.10-0.20	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																				
0.21-0.25	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	2.20	
0.26-0.30	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			
0.31-0.35	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				
0.36-0.40	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					
0.41-0.45	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						
0.46-0.50	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							
0.51-0.55	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								
0.56-0.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
0.61-0.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20										
0.66-0.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20											
0.71-0.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20												
0.76-0.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20													
0.81-0.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20														
0.86-0.90	1.95	2.00	2.05	2.10	2.15	2.20															
0.91-0.95	2.00	2.05	2.10	2.15	2.20																
0.96-1.00	2.05	2.10	2.15	2.20																	
1.01-1.05	2.10	2.15	2.20																		
1.06-1.10	2.15	2.20																			
1.11-1.15	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

IB08J1020010-03

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
0.05-0.09				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
0.10-0.14			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
0.15-0.19		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
0.20-0.30	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																				
0.31-0.35	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	
0.36-0.40	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			
0.41-0.45	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				
0.46-0.50	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					
0.51-0.55	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						
0.56-0.60	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							
0.61-0.65	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								
0.66-0.70	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
0.71-0.75	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20										
0.76-0.80	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20											
0.81-0.85	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20												
0.86-0.90	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20													
0.91-0.95	1.90	1.95	2.00	2.05	2.10	2.15	2.20														
0.96-1.00	1.95	2.00	2.05	2.10	2.15	2.20															
1.01-1.05	2.00	2.05	2.10	2.15	2.20																
1.06-1.10	2.05	2.10	2.15	2.20																	
1.11-1.15	2.10	2.15	2.20																		
1.16-1.20	2.15	2.20																			
1.21-1.25	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	0.33 mm
Present shim size	1.70 mm
Shim size to be used	1.80 mm

(EXHAUST SIDE)

IB08J1020012-03

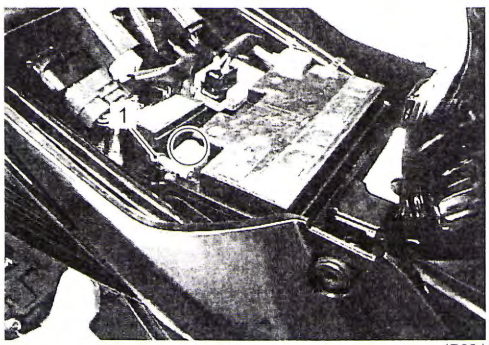
7) Install the camshafts and cam chain tension adjuster. Refer to "Engine Top Side Assembly" (Page 1D-32).
8) Rotate the engine so that the tappet is depressed fully. This will squeeze out oil trapped between the shim and the tappet that could cause an incorrect measurement, then check the clearance again to confirm that it is within the specified range.
9) After finishing the tappet clearance adjustment, reinstall the removed parts. Refer to "Engine Top Side Assembly" (Page 1D-32).
10) Install the engine assembly. Refer to "Engine Assembly Installation" (Page 1D-28).

Engine Assembly Removal

BENF08J11406017

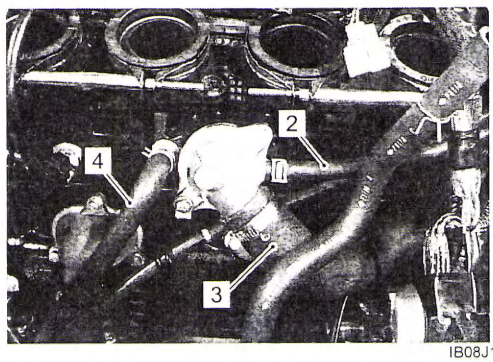
Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps:

1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
2) Disconnect the battery (–) lead wire (1).



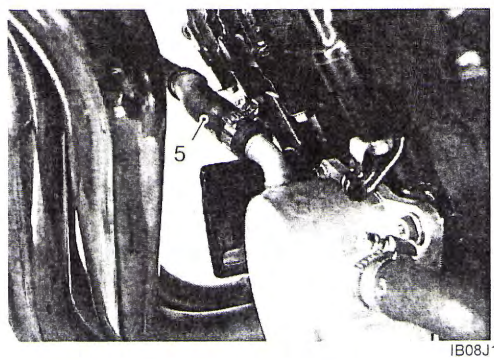
IB08J1140046-02

3) Jack up the motorcycle and fix it for safety.
4) Drain engine oil. Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).
5) Drain engine coolant. Refer to "Cooling System Inspection" in Section 1F (Page 1F-5).
6) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" (Page 1D-7).
7) Remove the throttle body assembly. Refer to "Throttle Body Removal and Installation" (Page 1D-11).
8) Remove the radiator assembly. Refer to "Radiator / Cooling Fan Motor Removal and Installation" in Section 1F (Page 1F-7).
9) Remove the radiator reservoir tank with reservoir tank inlet hose. Refer to "Radiator Reservoir Tank Removal and Installation" in Section 1F (Page 1F-10).
10) Remove the water/air bleed hose (2), radiator inlet hose (3) and water bypass hose (4).



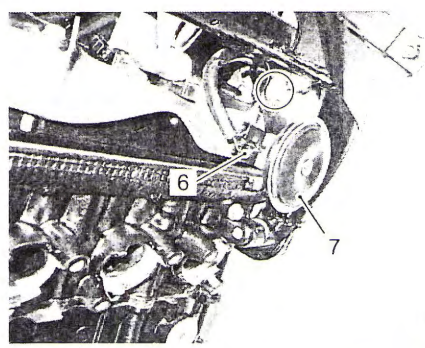
IB08J1140047-02

11) Remove the oil cooler outlet hose (5).



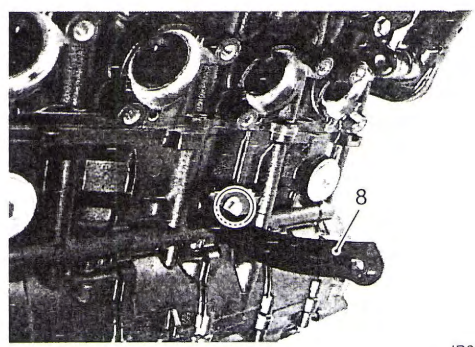
IB08J1140048-02

12) Remove the muffler and exhaust pipes along with the HO2 sensor. Refer to "Exhaust Pipe / Muffler Removal and Installation" in Section 1K (Page 1K-12).
13) Disconnect the horn coupler (6) and remove the horn (7).



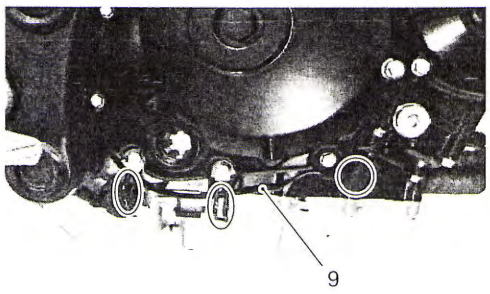
IB08J1140049-03

14) Remove the radiator mounting bracket (8).



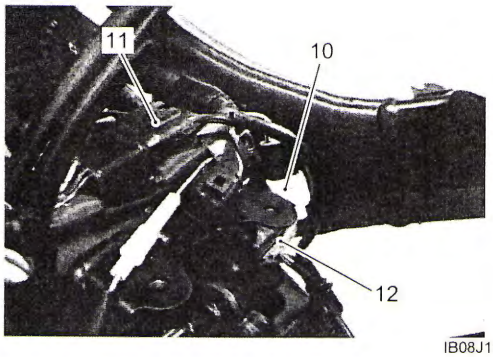
IB08J1140051-03

15) Disconnect the oil pressure switch lead wire (9).



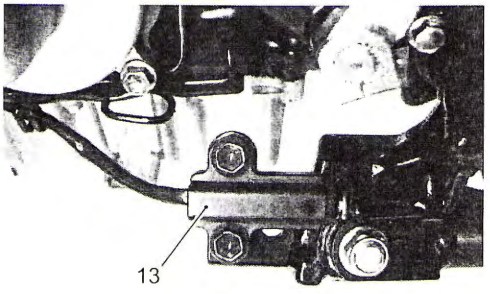
IB08J1140050-04

16) Disconnect the GP switch lead wire coupler (10), speed sensor lead wire coupler (11) and side stand switch lead wire coupler (12).



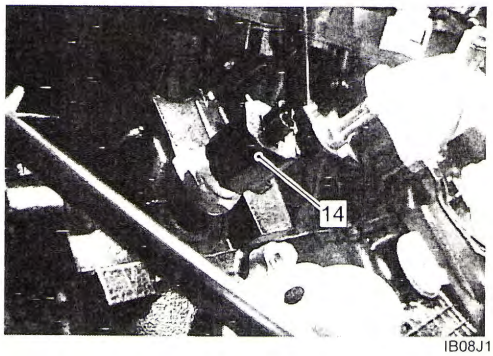
IB08J1140052-03

17) Remove the side stand switch (13).



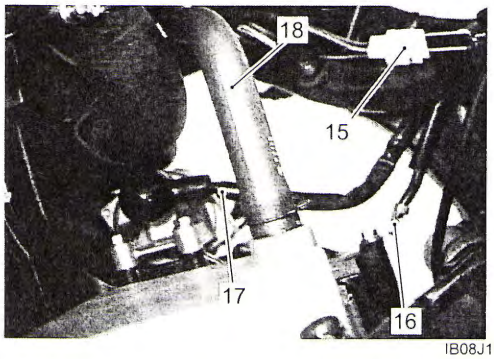
IB08J1140053-03

18) Disconnect the ECT sensor coupler (14).



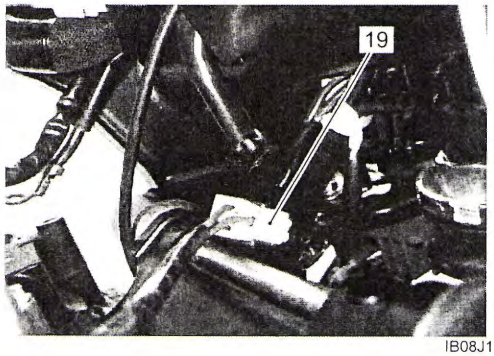
IB08J1140054-03

19) Disconnect the CKP sensor lead wire coupler (15), ground lead wire (16), starter motor lead wire (17) and crankcase breather (PCV) hose (18).



IB08J1140055-03

20) Disconnect the generator lead wire coupler (19).

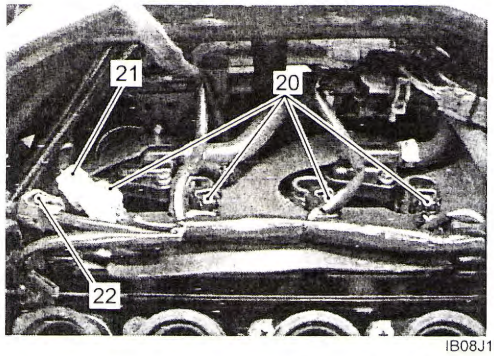


IB08J1140056-03

21) Disconnect the ignition coil/plug cap couplers (20), left handlebar switch coupler (21) and CMP sensor lead wire coupler (22).

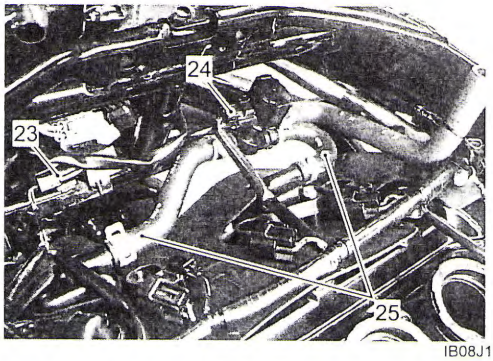
NOTICE

Do not remove the ignition coil/plug cap before disconnecting its coupler.



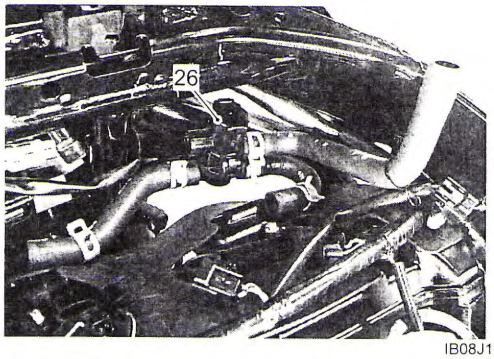
IB08J1140057-04

22) Disconnect the AP sensor coupler (23), PAIR solenoid valve coupler (24) and PAIR solenoid valve hose (25).



IB08J1140058-04

23) Remove the PAIR solenoid valve (26).

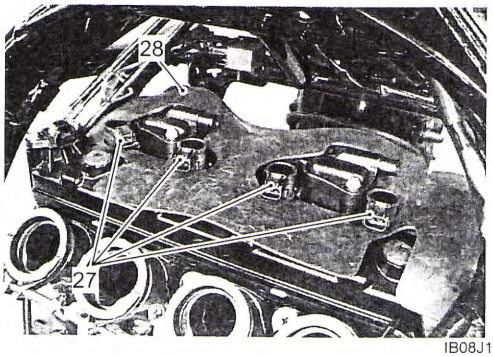


IB08J1140059-04

24) Remove the ignition coil/plug caps (27) and cylinder head cover shield (28).

NOTICE

- **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.**

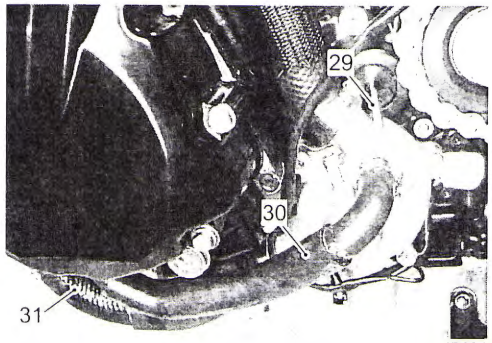


IB08J1140060-04

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

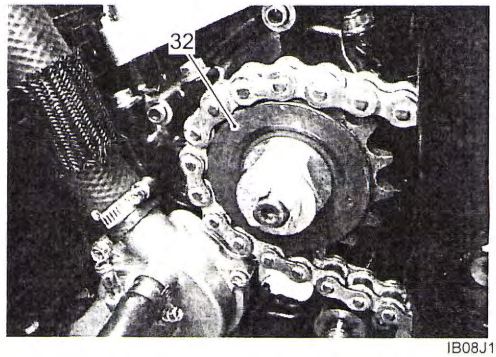
26) Remove the clutch push rod (LH) (29).

27) Remove the oil cooler inlet hose (30) and the radiator outlet hose (31).



IB08J1140062-04

28) Remove the engine sprocket (32).

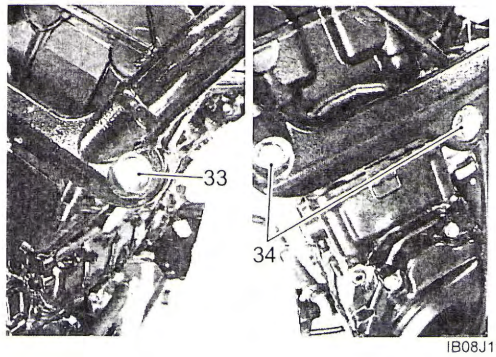


IB08J1140063-04

29) Support the engine using an engine jack.

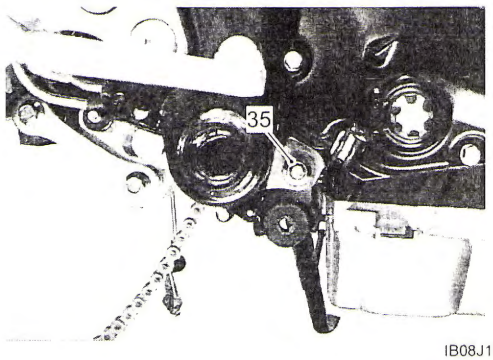
30) Remove the engine mounting bolt RH (33).

31) Remove the engine mounting bolts LH (34).



IB08J1140064-04

32) Remove the engine mounting nuts (35).



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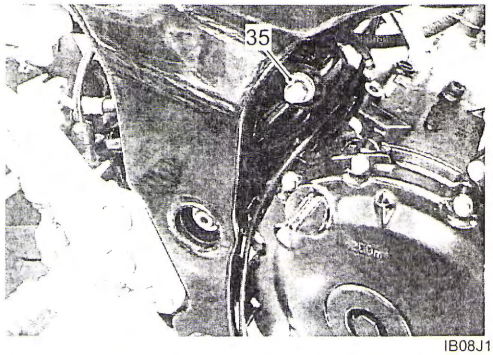


IB08J1140066-04

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

34) Remove the engine assembly.

Engine Assembly Installation

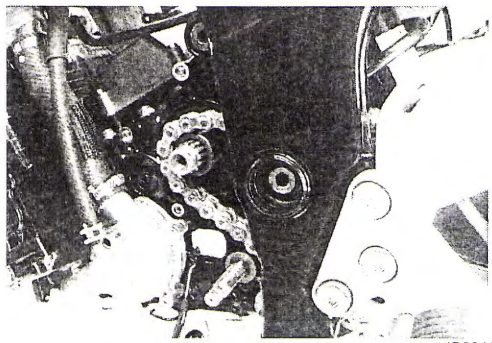
BENF08J11406018

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

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

NOTICE

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

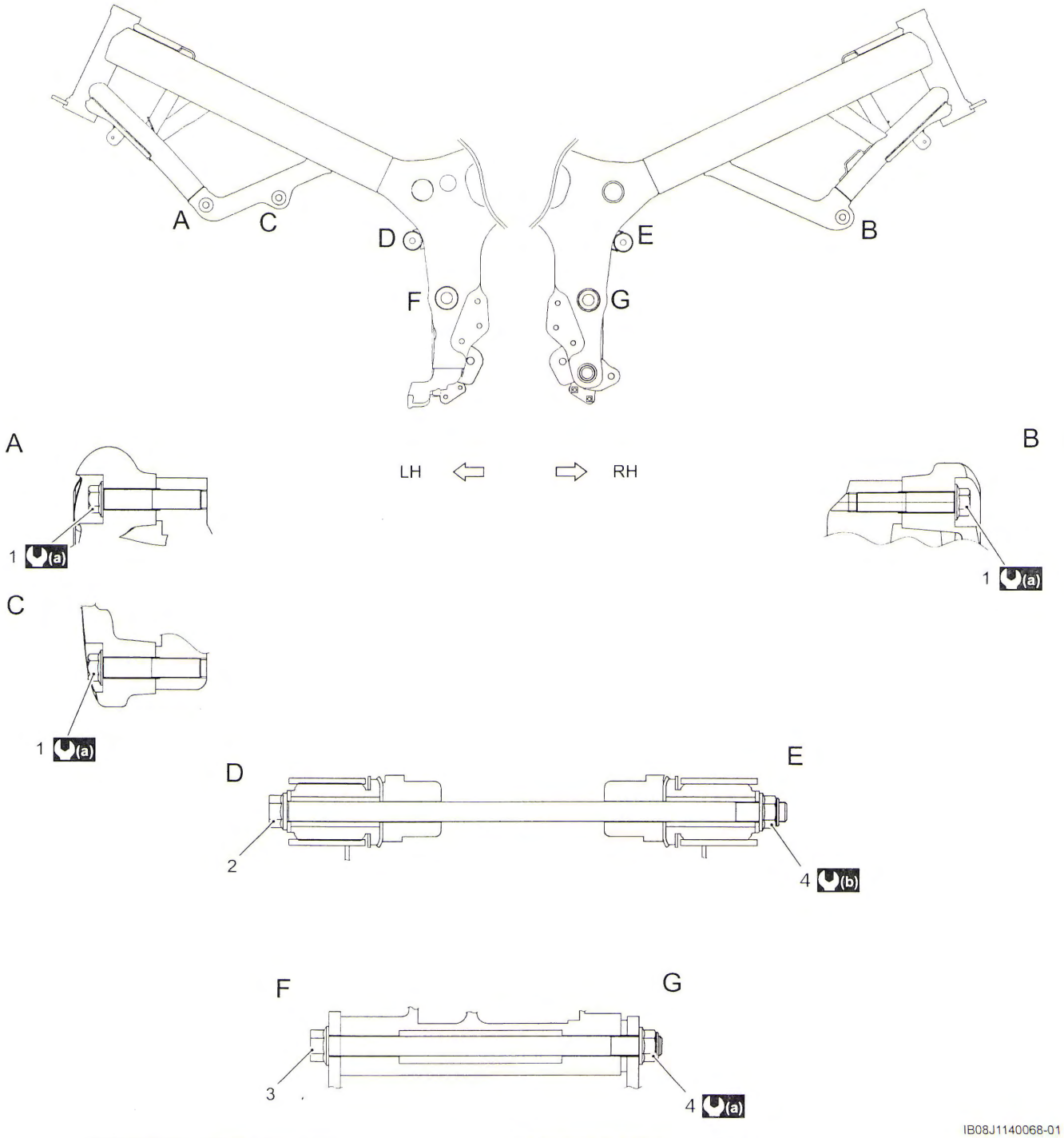


IB08J1140067-02

- Install all engine mounting bolts and tighten them temporarily.
- 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.



IB08J1140068-01

1. Engine mounting bolt (50 mm)	3. Engine mounting bolt (170 mm)	(a) : 80 N·m (8.0 kgf-m, 58.0 lbf-ft)
2. Engine mounting bolt (255 mm)	4. Engine mounting nut	(b) : 80 N·m (8.0 kgf-m, 58.0 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 "Exhaust Pipe / Muffler Removal and Installation" in Section 1K (Page 1K-12).
- Install the radiator. Refer to "Radiator / Cooling Fan Motor Removal and Installation" in Section 1F (Page 1F-7).
- Install the throttle body. Refer to "Throttle Body Removal and Installation" (Page 1D-11).
- 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-3), "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 1F (Page 1F-5) and "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).
- After finishing the engine installation, check the following items.
  - Throttle cable play
    Refer to "Throttle Cable Play Inspection and Adjustment" (Page 1D-8).
  - Throttle valve synchronization
    Refer to "Throttle Valve Synchronization" (Page 1D-17).
  - Clutch cable play
    Refer to "Clutch Cable Inspection and Adjustment" in Section 5C (Page 5C-2).
  - Drive chain slack
    Refer to "Drive Chain Inspection and Adjustment" in Section 3A (Page 3A-5).
  - Engine oil and coolant leakage
    Refer to "Cooling Circuit Inspection" in Section 1F (Page 1F-5).

Engine Top Side Disassembly

BENF08J11406019

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

NOTICE

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.

NOTE

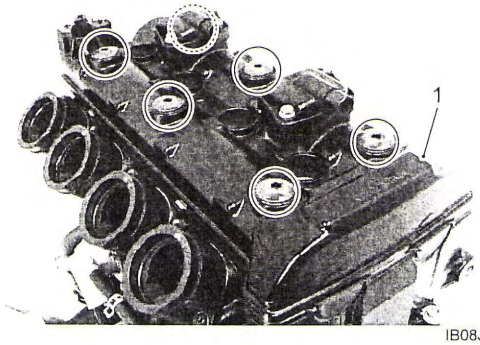
Before servicing the engine top side components (until valve clearance inspection) with the engine in place, remove the following parts:

- **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-25) and "Engine Assembly Installation" (Page 1D-28).

Cylinder Head Cover

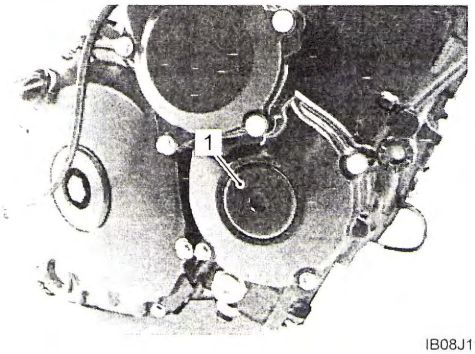
1) Remove the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation" in Section 1H (Page 1H-5).
2) Remove the cylinder head cover (1) and its gaskets.



IB08J1140069-02

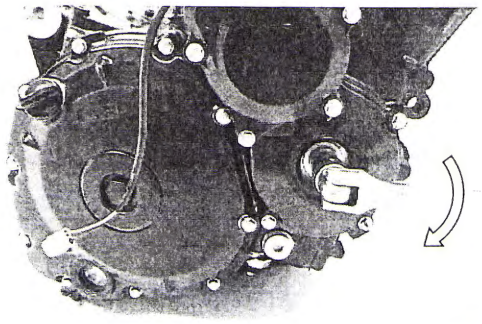
Camshafts

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

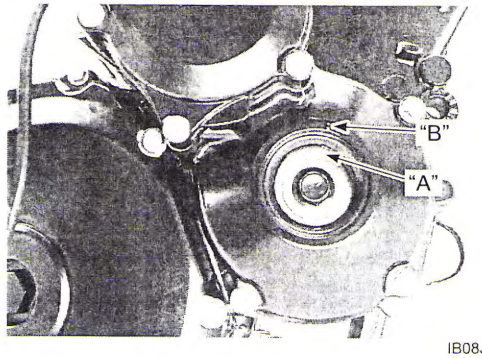


IB08J1140070-02

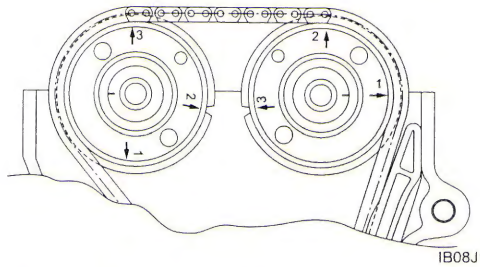
2) Turn the crankshaft to bring the line "A" on the starter clutch to the slit "B" of the valve timing inspection hole and also to bring the cams to the position as shown in the figure.



IB08J1140071-02

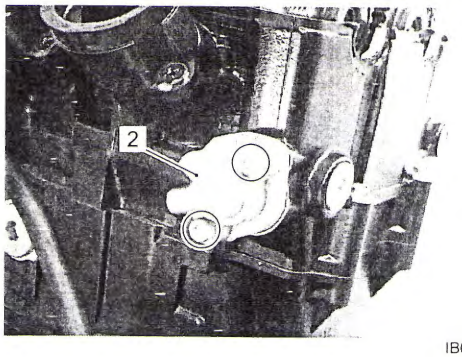


IB08J1140072-02



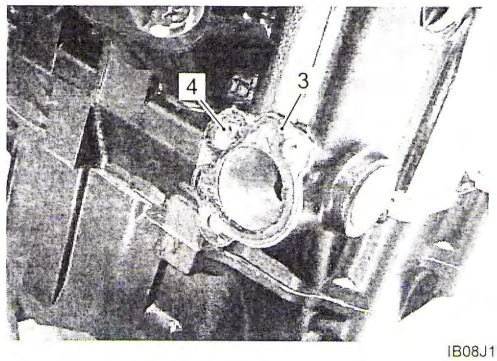
IB08J1140073-01

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



IB08J1140074-02

4) Remove the gasket (3) and oil jet (4).

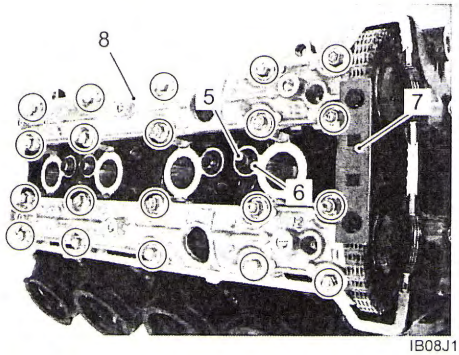


IB08J1140075-02

5) Remove the O-rings (6) and dwell pins (5).
6) Remove the cam chain guide No. 2 (7).
7) Remove the camshaft journal holders (8).

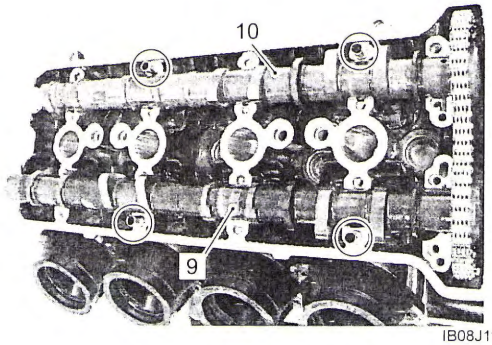
NOTE

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



IB08J1140076-03

8) Remove the dowel pins.
9) Remove the intake camshaft (9) and exhaust camshaft (10).



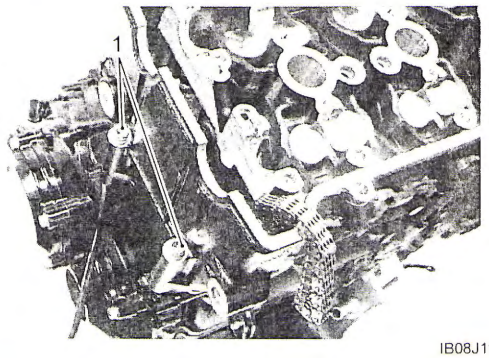
IB08J1140077-03

Cylinder Head

NOTE

The cylinder head can not be serviced with the engine installed in the frame.

1) Remove the cylinder head bolts (M6) (1).

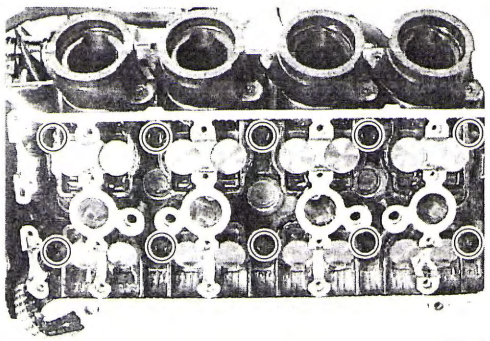


IB08J1140078-02

2) Remove the cylinder head bolts and washers.

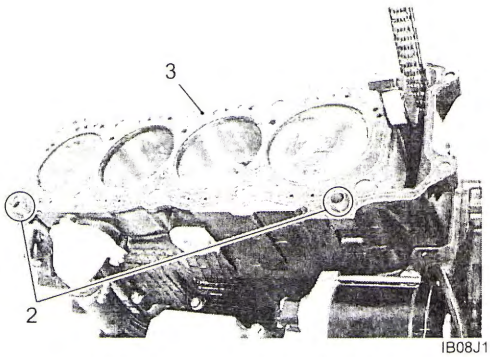
NOTE

When loosening the cylinder head bolts, loosen each bolt little by little diagonally.



IB08J1140079-02

3) Remove the cylinder head.
4) Remove the dowel pins (2) and cylinder head gasket (3).



IB08J1140080-02

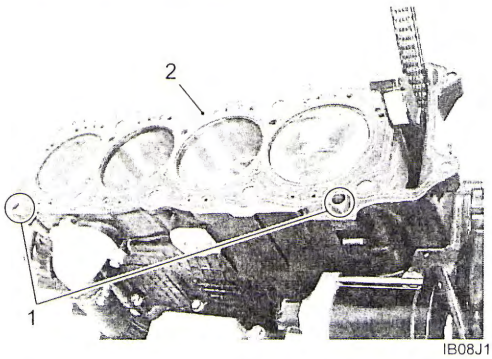
Engine Top Side Assembly

BENF08J11406020

Assemble the engine top side in the reverse order of disassembly. Pay attention to the following points:

Cylinder Head

- Fit the dowel pins (1) and a new cylinder head gasket (2) to the upper crankcase.



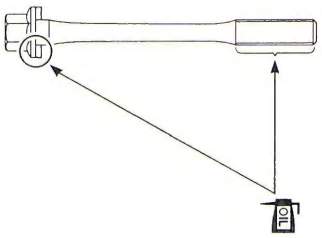
IB08J1140081-02

- Place the cylinder head on the cylinder.

NOTE

When installing the cylinder head, keep the cam chain taut.

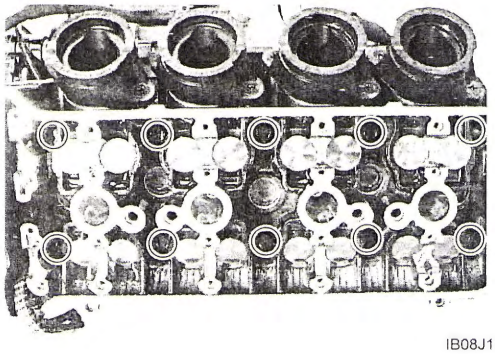
- Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.



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.

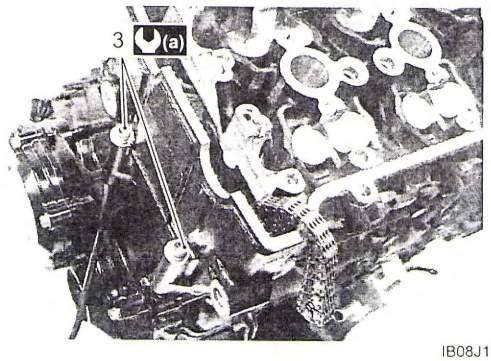
Tightening torque
Cylinder head bolt (M10): 31 N·m (3.1 kgf-m, 22.5 lbf-ft) then turn in 1/6 (60°) turn



IB08J1140079-02

- After firmly tightening the cylinder head bolts (M10), install the cylinder head bolts (M6) (3) to the specified torque.

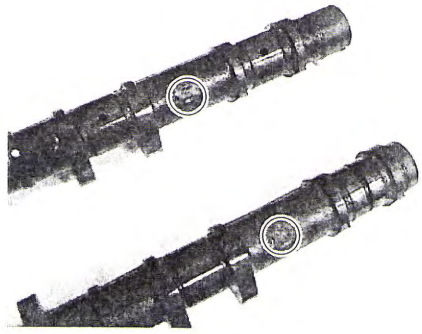
  Tightening torque
  Cylinder head bolt (M6) (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1140082-02

Camshaft

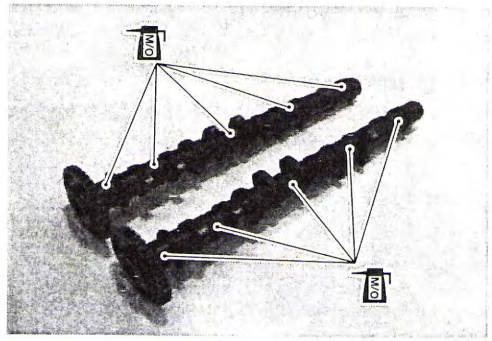
- The cam shafts are identified by the embossed letters.
  IN: Intake camshaft
  EX: Exhaust camshaft



IB08J1140098-02

- Before placing the camshafts on the cylinder head, apply molybdenum oil to their journals and cam faces.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

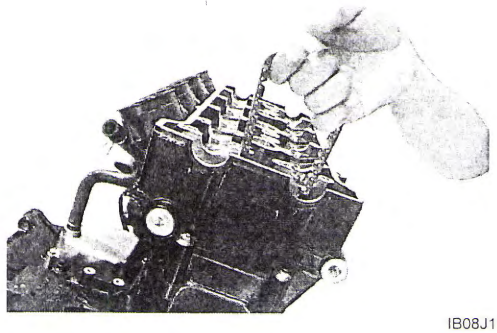


IB08J1140253-02

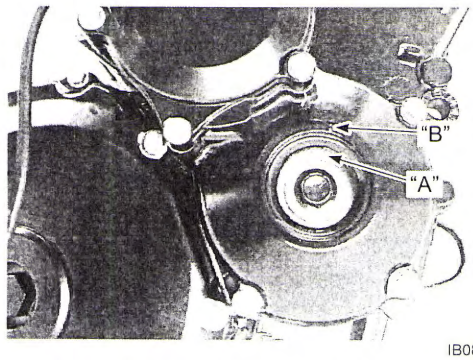
- Turn the crankshaft clockwise and align the line "A" on the starter clutch with the index mark "B" of the valve timing inspection hole while keeping the cam chain pulled upward.

NOTE

- **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 the index mark "B" and hold this position when installing the camshafts.**



IB08J1140083-02



IB08J1140072-02

- 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.

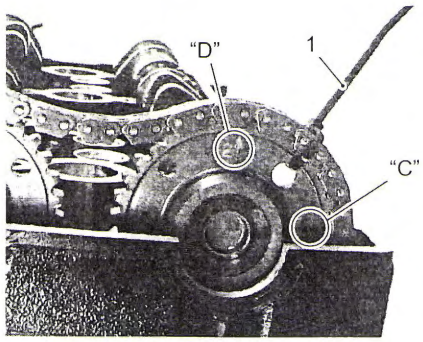
NOTE

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 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.



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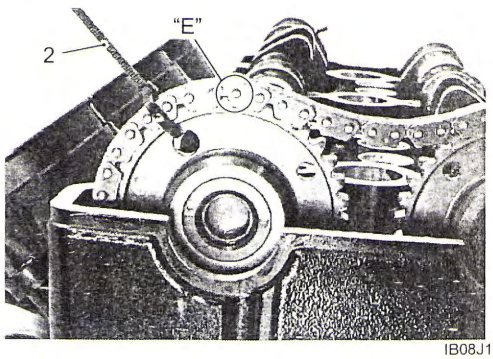

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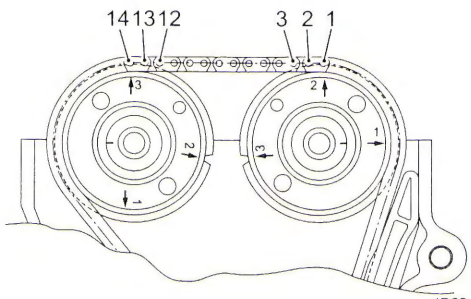
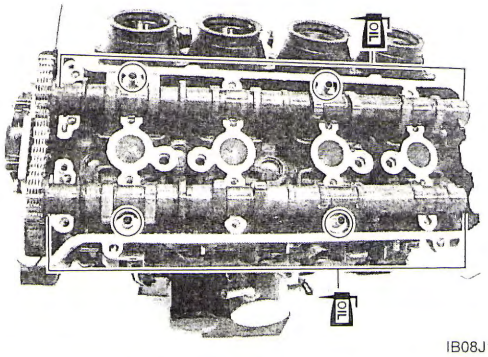


IB08J1140086-01

- Apply engine oil to journals and cam faces.
- Install the dowel pins.



IB08J1140087-02

- Have the camshaft journal holders evenly by tightening the camshaft journal holder bolts lightly, in the ascending order of numbers.

NOTICE

Damage to cylinder head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.

NOTE

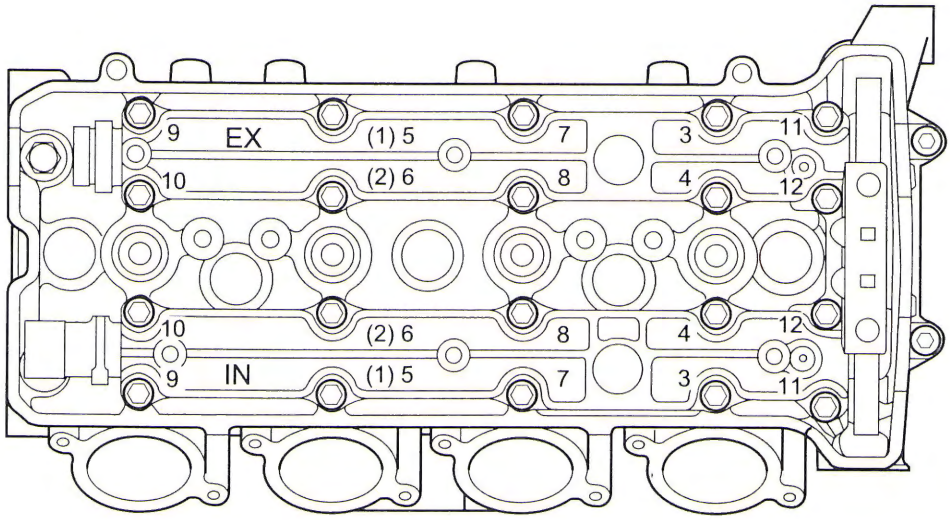
- **Each camshaft journal holder is identified with a cast-on letters "IN" and "EX".**
- **The ascending order of numbers are indicated on the camshaft journal holders.**

- 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)

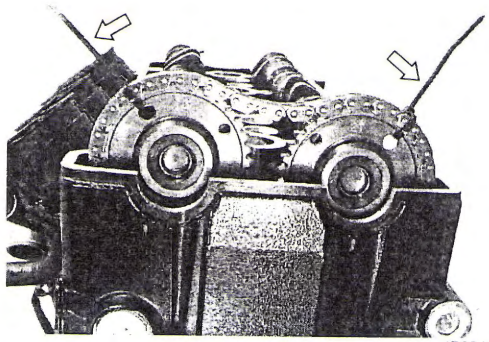
NOTICE

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 instead of these special bolts.



IB08J1140088-01

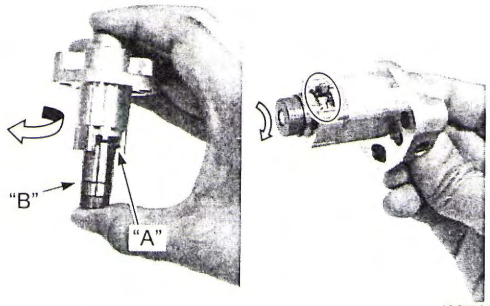
- Remove the clamps.



IB08J1140089-02

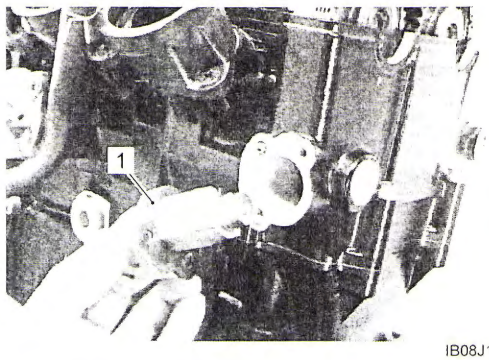
Cam Chain Tension Adjuster

- 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".
- 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).

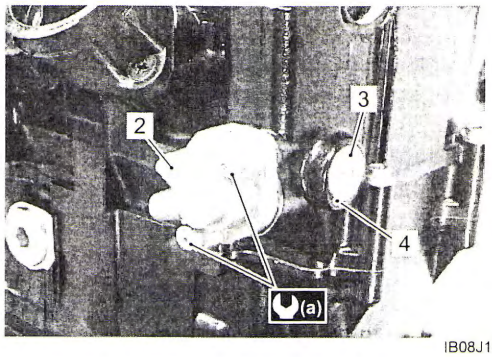


IB08J1140090-02

- Install the cam chain tension adjuster (2).

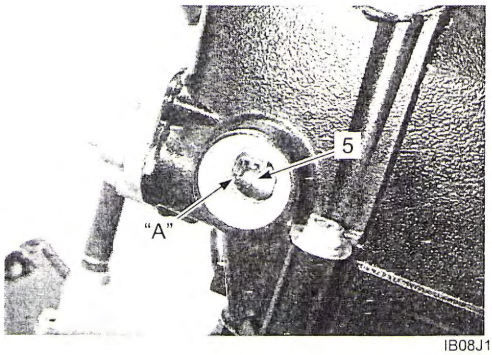
Tightening torque
Cam chain tension adjuster mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Remove the cam chain tension adjuster service cap (3) and gasket (4).



IB08J1140091-02

- 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.
- Make sure that the adjuster works properly by checking no slack at point "B".



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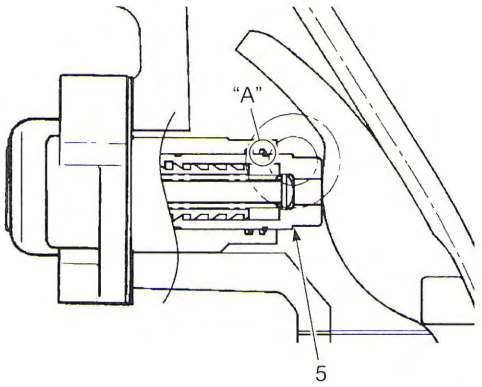

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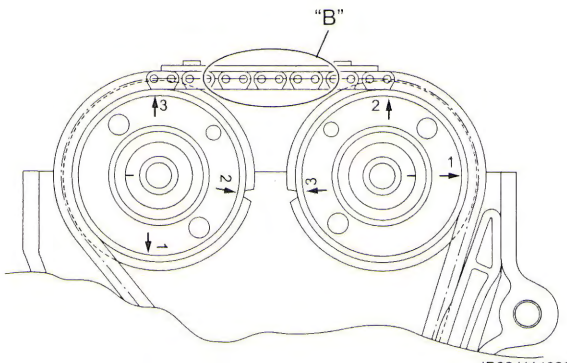


IB08J1140264-01

NOTE

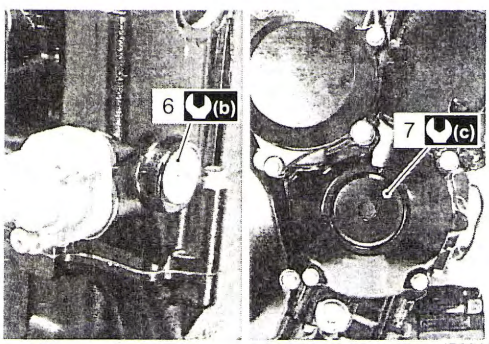
The cam chain tension adjuster cannot be serviced with the engine installed in the frame.

- Install a new gasket and tighten the cam chain tension adjuster service cap (6) to the specified torque.

Tightening torque
Cam chain tension adjuster service cap (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

- Install a new O-ring and tighten the valve timing inspection cap (7) to the specified torque.

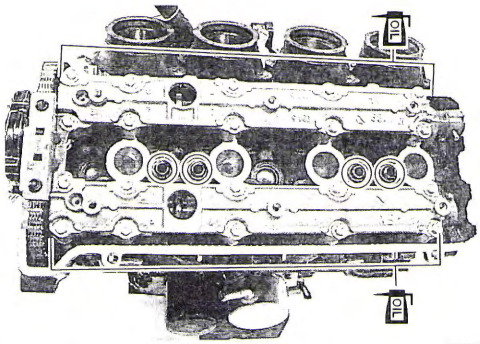
Tightening torque
Valve timing inspection cap (c): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



IB08J1140093-02

Cylinder Head Cover

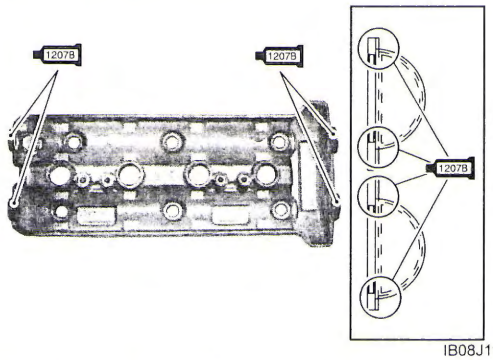
- Check and adjust the valve clearance. Refer to "Valve Clearance Inspection and Adjustment" (Page 1D-21).
- Pour engine oil in each oil pocket in the cylinder head.
- Install the dowel pins and new O-rings.



IB08J1140094-02

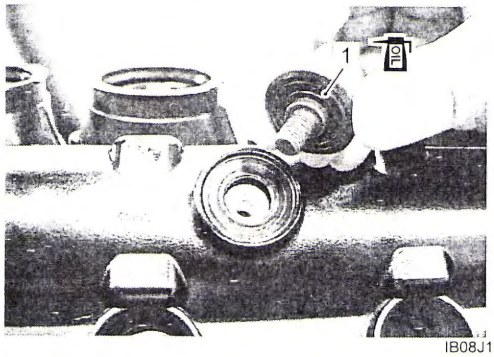
- Install a new gasket to the cylinder head cover.
- Apply bond to the cam end cap points of the gasket as shown.

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



IB08J1140095-03

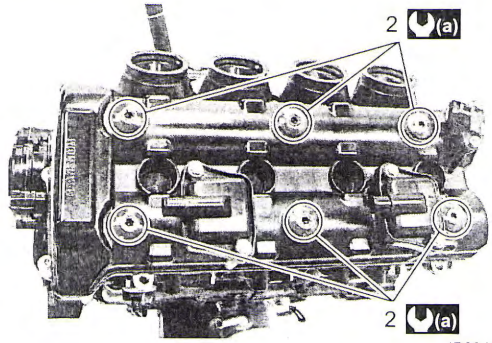
- Place the cylinder head cover on the cylinder head.
- Fit a new gasket (1) to each head cover bolt.
- Apply engine oil to both sides of the gaskets.



IB08J1140096-03

- Tighten the head cover bolts (2) to the specified torque.

Tightening torque
Head cover bolt (a): 14 N·m (1.4 kgf-m, 10.0 lbf-ft)



IB08J1140097-03

- Install the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation" in Section 1H (Page 1H-5).

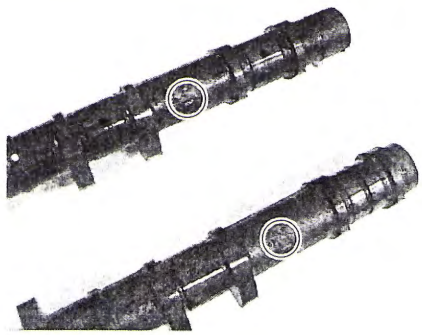
Camshaft Inspection

BENF08J11406021

Refer to "Engine Top Side Disassembly" (Page 1D-30).
Refer to "Engine Top Side Assembly" (Page 1D-32).

Camshaft Identification

The exhaust camshaft has the embossed letters "EX" and the intake camshaft has the embossed letters "IN".



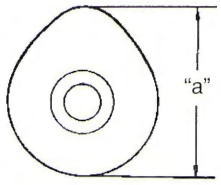
IB08J1140098-02

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 (1/100 mm, 25 – 50 mm))

Cam height "a"
Service limit (IN.): 36.02 mm (1.418 in)
Service limit (EX.): 34.68 mm (1.365 in)



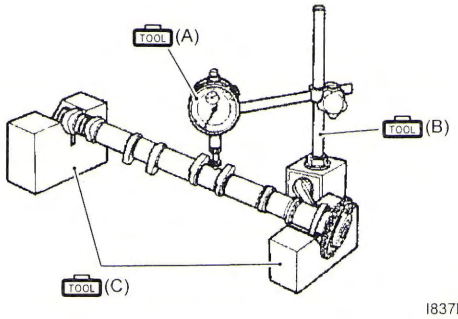
I649G1140199-02

Camshaft Runout

Measure the runout using the dial gauge. Replace the camshaft if the runout exceeds the limit.

Special tool
(TOOL) (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
(TOOL) (B): 09900–20701 (Magnetic stand)
(TOOL) (C): 09900–21304 (V-block (100 mm))

Camshaft runout (IN. & EX.)
Service limit: 0.10 mm (0.004 in)



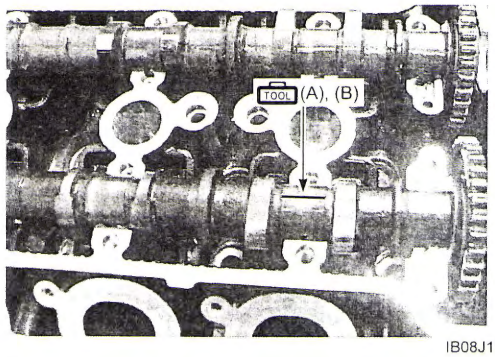
I837H1140240-02

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
(TOOL) (A): 09900–22301 (Plastigauge (0.025 – 0.076 mm))
(TOOL) (B): 09900–22302 (Plastigauge (0.051 – 0.152 mm))



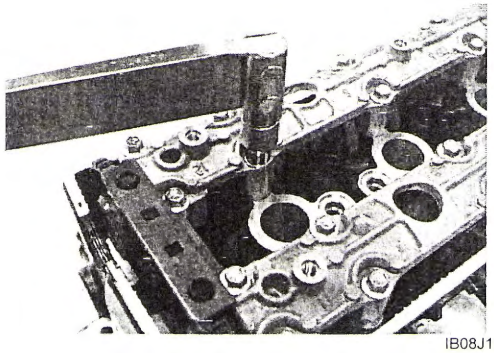
IB08J1140099-03

3) Install each camshaft journal holder to its original position. Refer to "Engine Top Side Assembly" (Page 1D-32).
4) Tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque. Refer to "Engine Top Side Assembly" (Page 1D-32).

NOTE

Do not rotate the camshafts with the plastigauge in place.

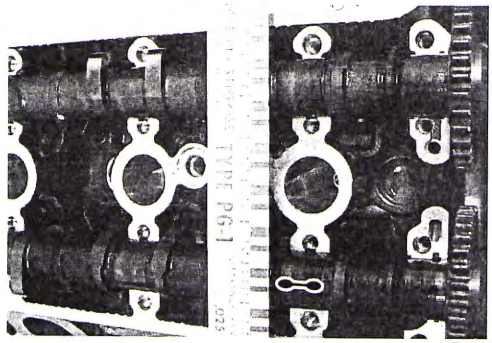
Tightening torque
Camshaft journal holder bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1140100-02

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)



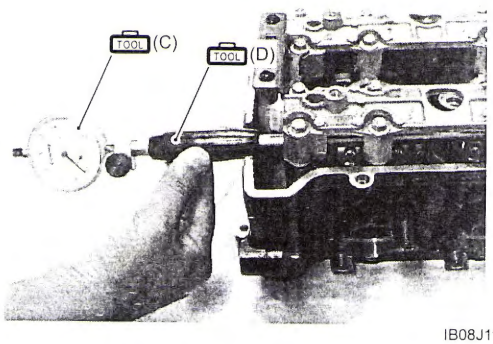
IB08J1140101-03

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
TOOL (C): 09900–20602 (Dial gauge (1/1000 mm, 1 mm))
TOOL (D): 09900–22403 (Small bore gauge (18 – 35 mm))
TOOL (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 – 0.9440 in)



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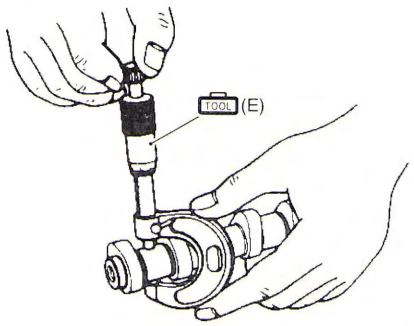


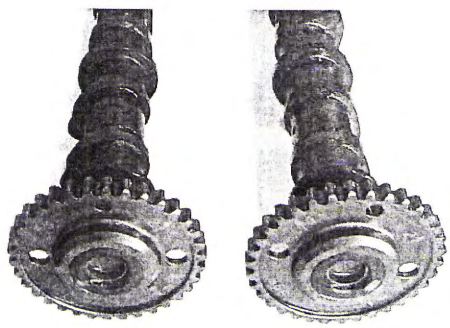
I649G1140204-03

Camshaft Sprocket

BENF08J11406022

Inspect the camshaft sprocket in the following procedures:

1) Remove the intake and exhaust camshafts. Refer to "Engine Top Side Disassembly" (Page 1D-30).
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.



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3) Install the camshafts. Refer to "Engine Top Side Assembly" (Page 1D-32).

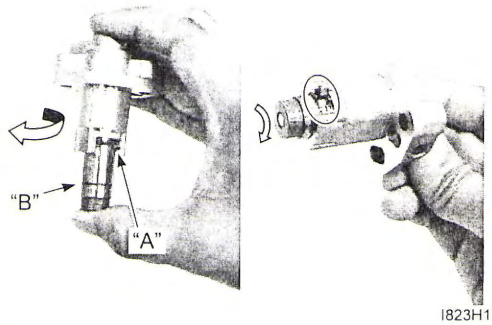
Cam Chain Tension Adjuster Inspection

BENF08J11406023

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-30).
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.



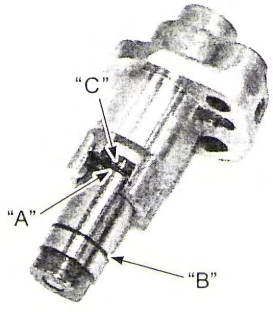
I823H1140355-01

⚠ 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.

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.

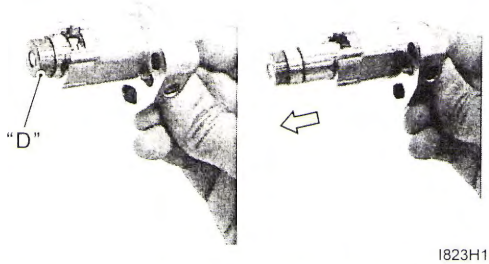


I823H1140365-01



I823H1140366-01

4) Check that the plunger goes out automatically when tapping its head "D". If it does not work smoothly, replace the cam chain tension adjuster with a new one.



I823H1140367-01

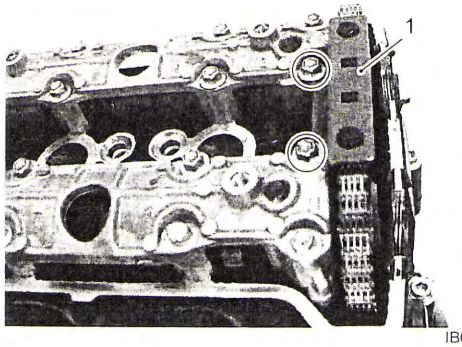
5) Install the cam chain tension adjuster. Refer to "Engine Top Side Assembly" (Page 1D-32).

Cam Chain Guide / Cam Chain Tensioner Removal and Installation

BENF08J11406024

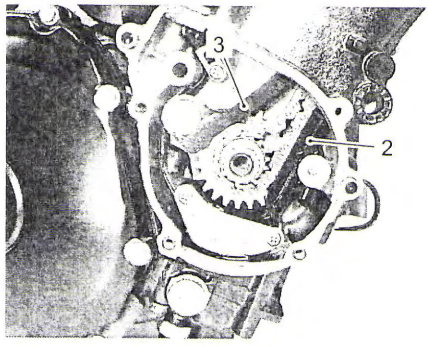
Removal

1) Remove the cylinder head cover. Refer to "Engine Top Side Disassembly" (Page 1D-30).
2) Remove the cam chain guide No. 2 (1).



IB08J1140104-02

3) Remove the engine assembly. Refer to "Engine Assembly Removal" (Page 1D-25).
4) Remove the cylinder head. Refer to "Engine Top Side Disassembly" (Page 1D-30).
5) Remove the starter clutch. Refer to "Starter Clutch Removal and Installation" in Section 1I (Page 1I-10).
6) Remove the cam chain guide No. 1 (2) and cam chain tensioner (3).



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Installation

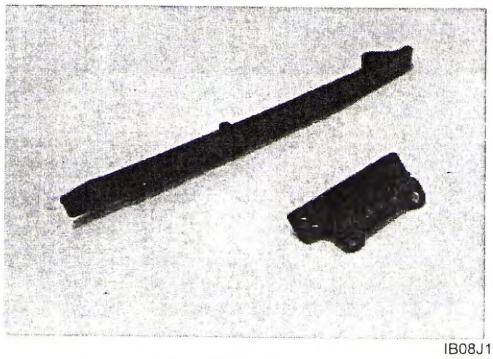
Install the cam chain guides/cam chain tensioner in the reverse order of removal.

Cam Chain Guide Inspection

BENF08J11406025

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-40).
2) Check the contacting surface of the cam chain guides. If it is worn or damaged, replace it with a new one.



IB08J1140254-01

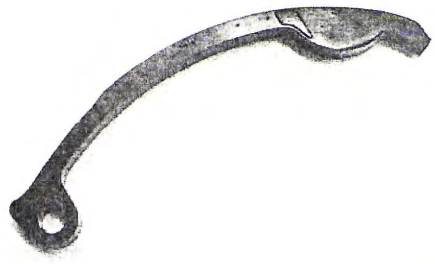
3) Install the cam chain guides. Refer to "Cam Chain Guide / Cam Chain Tensioner Removal and Installation" (Page 1D-40).

Cam Chain Tensioner Inspection

BENF08J11406026

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-40).
2) Check the contacting surface of the cam chain tensioner. If it is worn or damaged, replace it with a new one.



IB08J1140107-02

3) Install the cam chain tensioner. Refer to "Cam Chain Guide / Cam Chain Tensioner Removal and Installation" (Page 1D-40).

Cylinder Head Disassembly and Assembly

BENF08J11406027

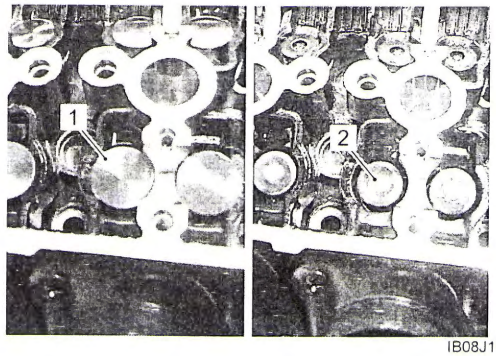
Refer to "Engine Top Side Disassembly" (Page 1D-30).
Refer to "Engine Top Side Assembly" (Page 1D-32).

NOTICE

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.



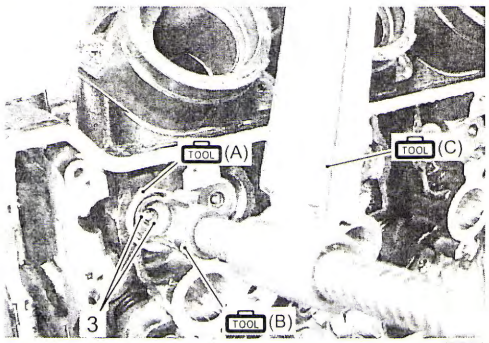
IB08J1140108-02

2) Insert the special tool (A) between the valve spring and cylinder head.
3) Using the special tools, compress the valve spring and remove the two cotter halves (3) from the valve stem.

NOTICE

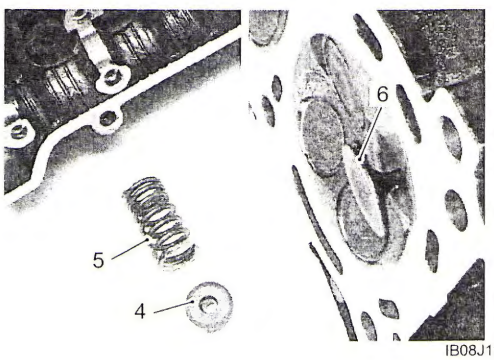
Be careful not to damage the tappet sliding surface with the special tool.

Special tool
(A): 09919–28610 (Sleeve protector)
(B): 09916–14530 (Valve spring compressor attachment)
(C): 09916–14510 (Valve lifter)
: 09916–84511 (Tweezers)



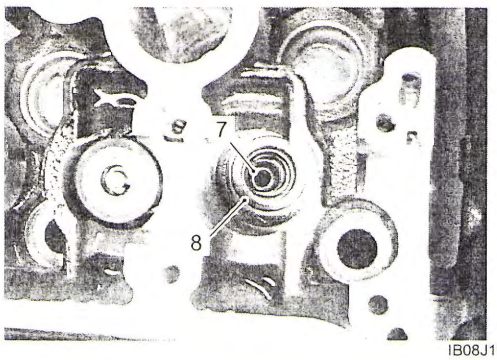
IB08J1140109-02

4) Remove the valve spring retainer (4) and valve spring (5).
5) Pull out the valve (6) from the combustion chamber side.



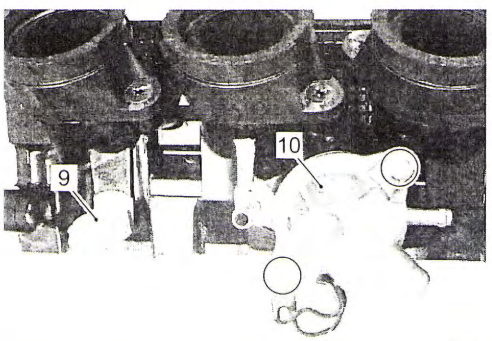
IB08J1140110-02

6) Remove the oil seal (7) and spring seat (8).
7) Remove the other valves in the same manner as described previously.



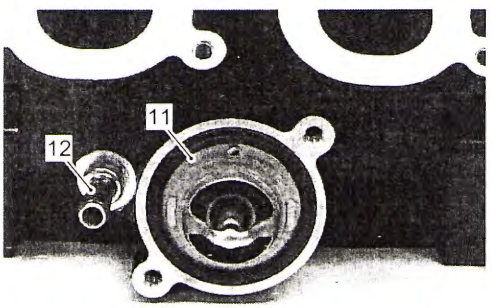
IB08J1140111-02

8) Remove the ECT sensor (9).
9) Remove the thermostat cover (10).



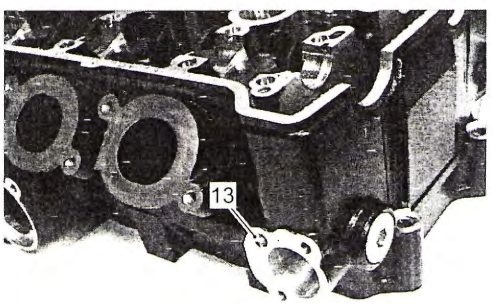
IB08J1140112-02

10) Remove the thermostat (11).
11) Remove the water bypass union (12).



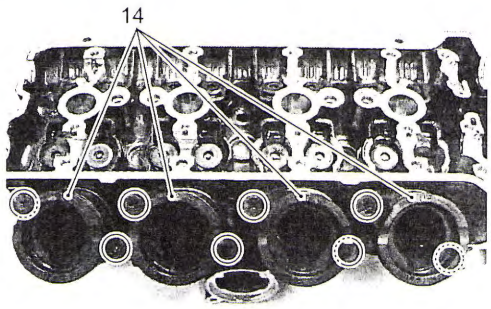
IB08J1140113-02

12) Remove the oil jet (13).



IB08J1140114-02

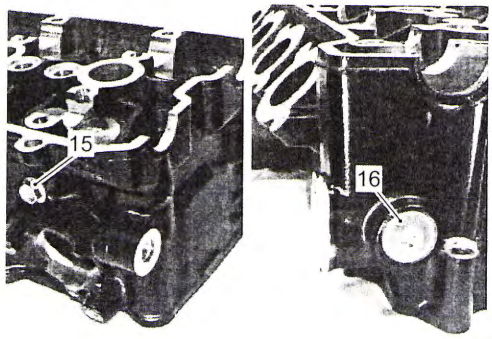
13) Remove the intake pipes (14).



IB08J1140115-02

14) Remove the oil gallery plug (15).

15) Remove the cam chain tension adjuster service cap (16).



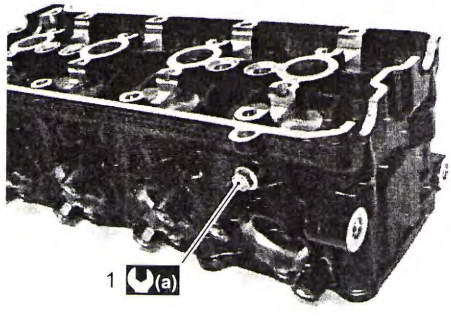
IB08J1140116-02

Assembly

Assembly is in the reverse order of disassembly. Pay attention to the following points:

- Install a new gasket and tighten the oil gallery plug (1) to the specified torque.

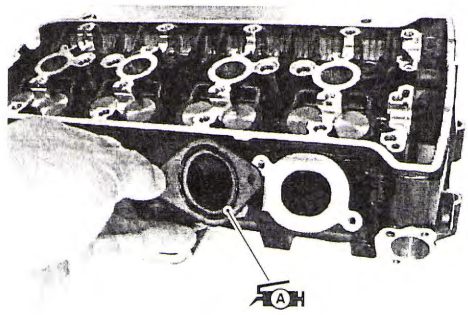
  Tightening torque
  Oil gallery plug (Cylinder head) (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1140117-02

- Apply grease to the new O-rings of the intake pipes.

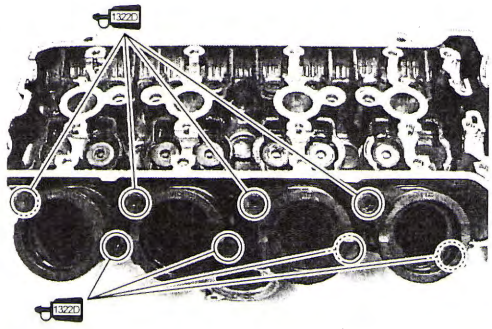
  : Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)



IB08J1140118-02

- Install the intake pipes.
- Apply thread lock to the intake pipe mounting bolts.

  1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)



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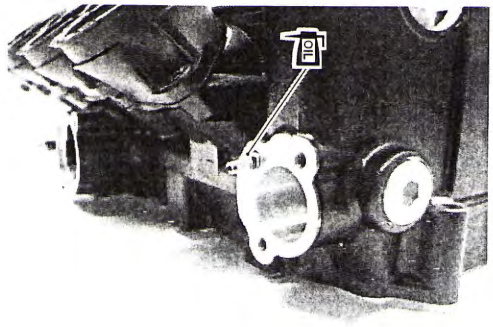
- Apply engine oil to a new O-ring and install the oil jet.



IB08J1140255-02

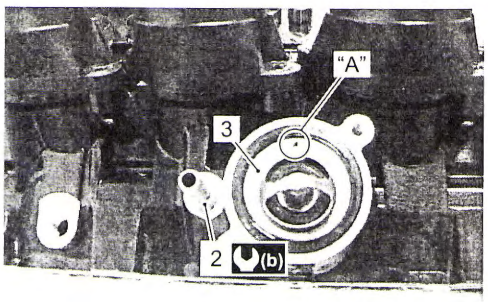
- Tighten the water bypass union (2) to the specified torque.

Tightening torque
Water bypass union (b): 12 N·m (1.2 kgf-m, 8.5 lbf-ft)

- Install the thermostat (3).

NOTE

The jiggle valve "A" of the thermostat faces upside.



IB08J1140120-02

- Tighten the thermostat cover bolts (4) to the specified torque.

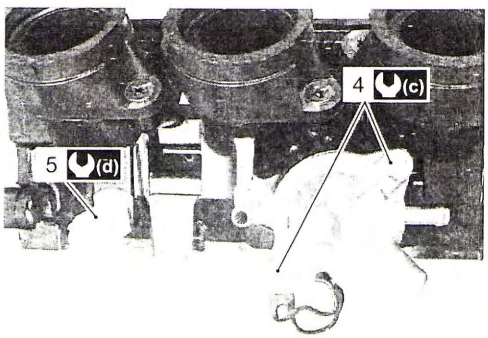
Tightening torque
Thermostat cover bolt (c): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Install a new gasket and tighten the ECT sensor (5) to the specified torque.

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

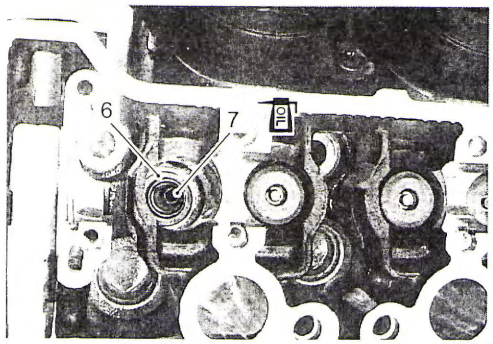
NOTICE

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



IB08J1140121-02

- Install the valve spring seat (6).
- Apply molybdenum oil to the new oil seal (7), and press-fit it into the position.



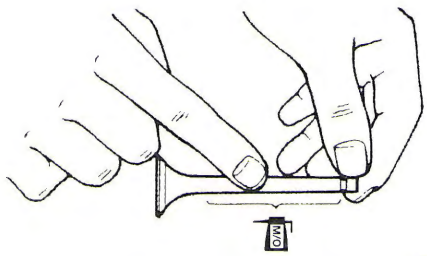
IB08J1140122-02

- Insert the valve, with its stem coated with molybdenum oil solution all around and along the full stem length without any break.

NOTICE

When inserting the valve, take care not to damage the lip of the oil seal.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



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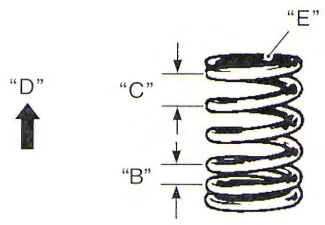
- Install the valve spring with the small-pitch portion "B" facing cylinder head.



I837H1140055-01

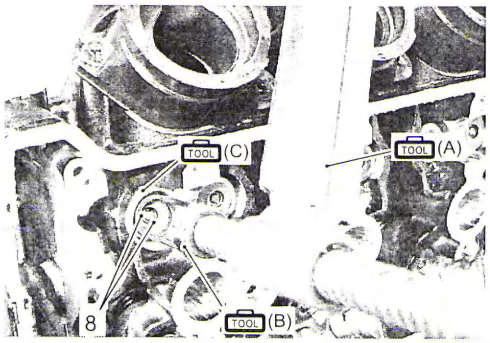
"B": Small-pitch portion	"D": Upward
"C": Large-pitch portion	"E": Paint

- Put on the valve spring retainer, and using the special tools, press down the spring, fit the cotter halves (8) to the stem end, and release the lifter to allow the cotter halves to wedge in between retainer and stem.

NOTICE

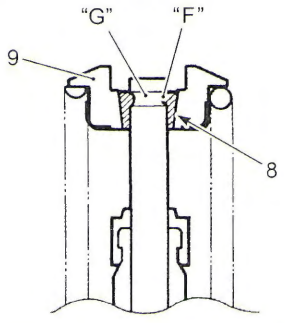
- **Be sure to restore each spring and valve to their original positions.**
- **Be careful not to damage the valve and valve stem when handling them.**
- **Be careful not to damage the tappet sliding surface with the special tool.**

Special tool
(A): 09916–14510 (Valve lifter)
(B): 09916–14530 (Valve spring compressor attachment)
(C): 09919–28610 (Sleeve protector)
: 09916–84511 (Tweezers)



IB08J1140123-02

- Be sure that the rounded lip "F" of the cotter fits snugly into the groove "G" in the stem end.



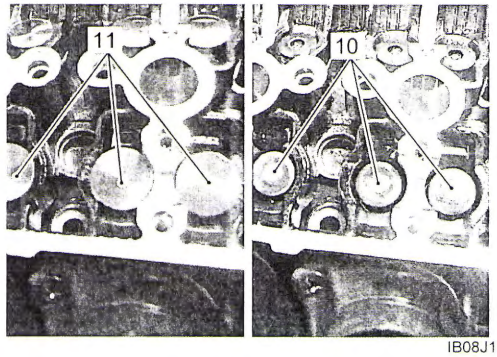
IB08J1140124-03

8. Cotter	9. Valve spring retainer

- Install the other valves and springs in the same manner as described previously.
- Install the tappet shims (10) and the tappets (11) to their original positions.
- Apply engine oil to the stem end, shim and tappet before fitting them.

NOTE

When seating the tappet shim, be sure the figure printed surface faces the tappet.



IB08J1140125-02

Cylinder Head Related Parts Inspection

BENF08J11406028

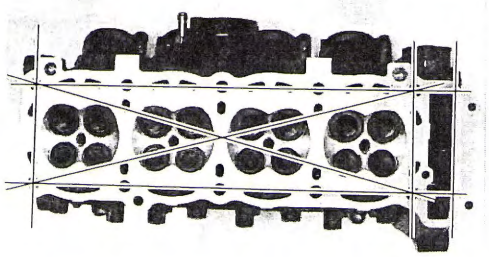
Refer to "Cylinder Head Disassembly and Assembly" (Page 1D-41).

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
: 09900–20803 (Thickness gauge)

Cylinder head distortion
Service limit: 0.20 mm (0.008 in)



IB08J1140126-02

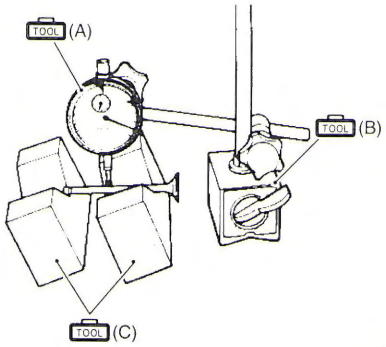
Valve Stem Runout

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

TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL (B): 09900–20701 (Magnetic stand)
TOOL (C): 09900–21304 (V-block (100 mm))

Valve stem runout (IN. & EX.)
Service limit: 0.05 mm (0.002 in)



I649G1140231-03

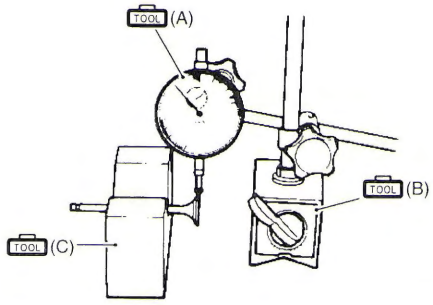
Valve Head Radial Runout

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

TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL (B): 09900–20701 (Magnetic stand)
TOOL (C): 09900–21304 (V-block (100 mm))

Valve head radial runout (IN. & EX.)
Service limit: 0.03 mm (0.001 in)



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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.



I837H1140060-01

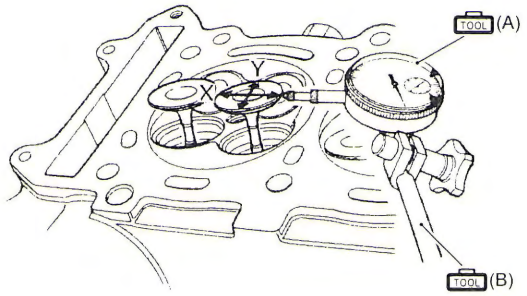
Valve Stem Deflection

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

TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL (B): 09900–20701 (Magnetic stand)

Valve stem deflection (IN. & EX.)
Service limit: 0.35 mm (0.014 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

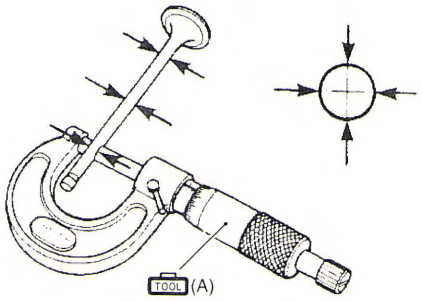
TOOL (A): 09900–20205 (Micrometer (0 – 25 mm))

Valve stem O.D.

Standard (IN.): 3.975 – 3.990 mm (0.1565 – 0.1571 in)
Standard (EX.): 3.955 – 3.970 mm (0.1557 – 0.1563 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-48).



I718H1140122-01

Valve Spring

The force of the coil spring keeps the valve seat tight. A weakened spring results in reduced engine power output and often accounts for the chattering noise coming from the valve mechanism.
Check the valve springs for proper strength by measuring their free length and also by the force required to compress them. If the spring length is less than the service limit or if the force required to compress the spring does not fall within the specified range, replace the valve spring.

Special tool

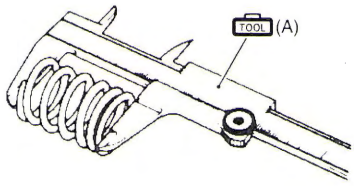
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Valve spring free length (IN. & EX.)

Service limit: 37.0 mm (1.46 in)

Valve spring tension (IN. & EX.)

Standard: 127 – 147 N (13.0 – 14.9 kgf, 28.6 – 33.0 lbs)/32.85 mm (1.293 in)



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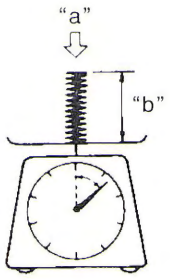

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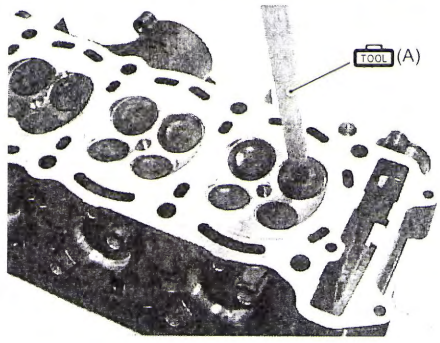
Tension "a"	Length "b"
127 – 147 N (13.0 – 14.9 kgf, 28.6 – 33.0 lbs)	32.85 mm (1.293 in)

Valve Seat Width

1) Visually check for valve seat width on each valve face. If the valve face has worn abnormally, replace the valve.
2) Coat the valve seat with a red lead (Prussian Blue) and set the valve in place.
3) Rotate the valve with light pressure.

Special tool

TOOL (A): 09916–10911 (Valve lapper set)



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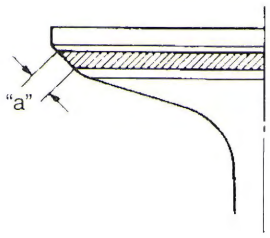
4) Check that the transferred red lead (blue) on the valve face is uniform all around and in center of the valve face.
If the seat width "a" measured exceeds the standard value, or seat width is not uniform reface the seat using the seat cutter. Refer to "Valve Seat Repair" (Page 1D-50).

Valve seat width "a" (IN. & EX.)
Standard: 0.9 – 1.1 mm (0.035 – 0.043 in)



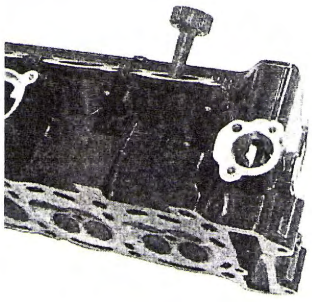
I649G1140246-02

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-50).

⚠ WARNING

Always use extreme caution when handling gasoline.



IB08J1140128-02

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" (Page 1D-21).

Valve Guide Replacement

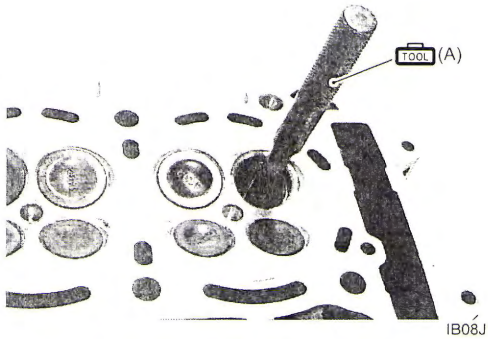
BENF08J11406029

1) Remove the cylinder head. Refer to "Engine Top Side Disassembly" (Page 1D-30).
2) Remove the valves. Refer to "Cylinder Head Disassembly and Assembly" (Page 1D-41).
3) Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

Special tool
TOOL (A): 09916–53310 (Valve guide installer & remover)

NOTE

- **Discard the removed valve guide sub-assemblies.**
- **Only oversized valve guides are available as replacement parts. (Part No. 11115-11D70)**



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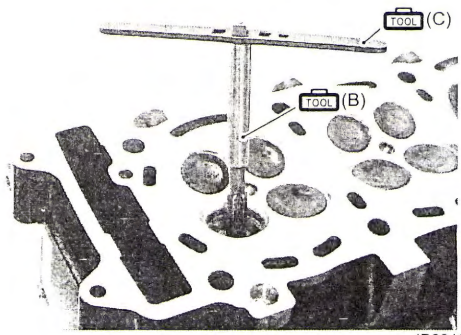
4) Refinish the valve guide holes in the cylinder head using the reamer and handle.

NOTICE

When refinishing or removing the reamer from the valve guide hole, always turn it clockwise.

Special tool
TOOL (B): 09916–49030 (Valve guide reamer (9.3 mm))
TOOL (C): 09916–34542 (Reamer handle)



IB08J1140130-02

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.

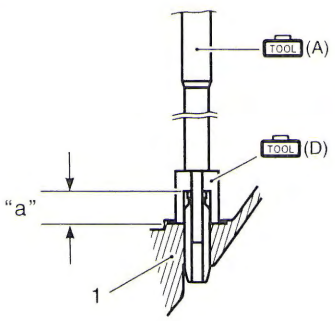
6) Apply engine oil to each valve guide and valve guide hole.

7) Drive the guide into the guide hole using the valve guide installer.

NOTICE

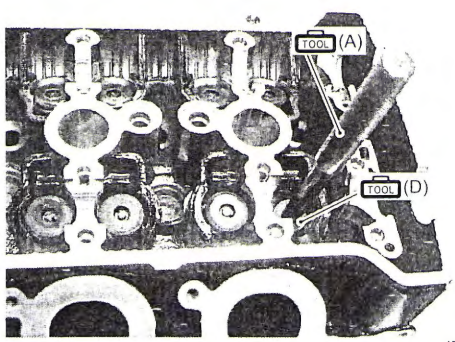
Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

Special tool
TOOL (A): 09916–53310 (Valve guide installer & remover)
TOOL (D): 09916–53321 (Valve guide installer attachment)



I838H1140077-01

1. Cylinder head	"a": 12.8 mm (0.50 in) [IN·EX]



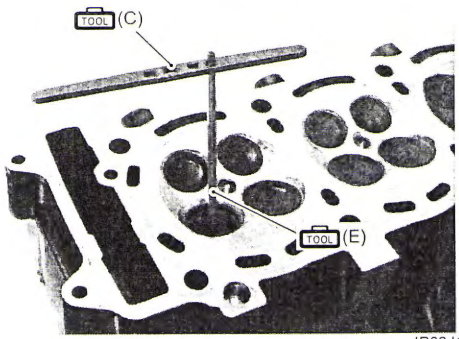
IB08J1140131-02

8) 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): 09916–33310 (Valve guide reamer (4.0 mm))



IB08J1140249-02

9) Check that valve seat width and valve seat sealing condition are within the specified range. Refer to "Cylinder Head Related Parts Inspection" (Page 1D-45).

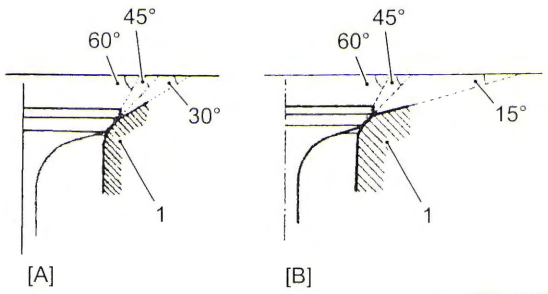
10) Reassemble the cylinder head. Refer to "Cylinder Head Disassembly and Assembly" (Page 1D-41).

11) Install the cylinder head assembly. Refer to "Engine Top Side Assembly" (Page 1D-32).

Valve Seat Repair

BENF08J11406030

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]

I837H1140069-03

[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	27.2 mm (1.07 in)	22.0 mm (0.87 in)
Valve guide I.D.	3.985 – 4.010 mm (0.1569 – 0.1578 in)	←

NOTICE

- **The valve seat contact area must be inspected after each cut.**
- **Do not use lapping compound after the final cut is made. The finished valve seat should have a velvety smooth finish but not a highly polished or shiny finish. This will provide a soft surface for the final seating of the valve which will occur during the first few seconds of engine operation.**

NOTE

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. Refer to "Valve Clearance Inspection and Adjustment" (Page 1D-21).

Engine Bottom Side Disassembly

BENF08J11406031

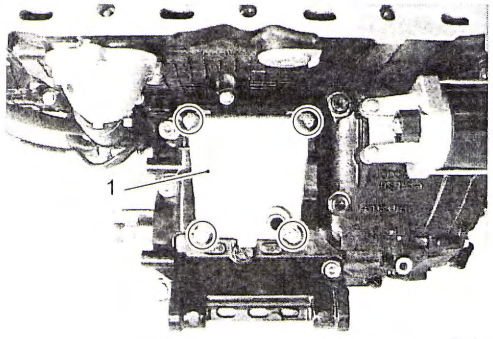
NOTE

The upper crankcase and middle 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-25).
2) Remove the engine top side. Refer to "Engine Top Side Disassembly" (Page 1D-30).

Crankcase Breather (PCV) Cover

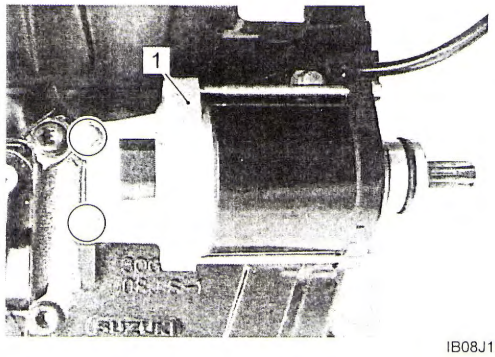
Remove the crankcase breather (PCV) cover (1).



IB08J1140132-02

Starter Motor

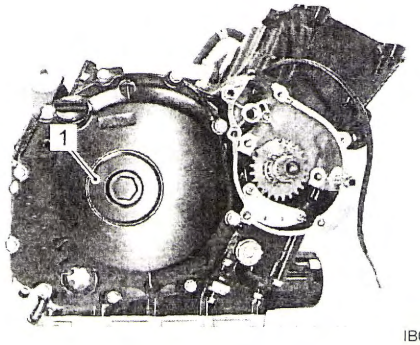
Remove the starter motor (1).



IB08J1140133-02

Clutch

Remove the clutch component parts (1). Refer to "Clutch Removal" in Section 5C (Page 5C-8).



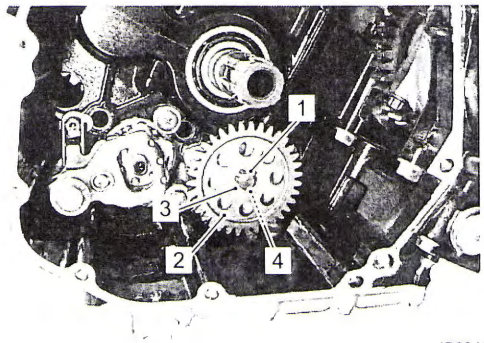
IB08J1140134-02

Oil Pump

1) Remove the snap ring (1).
2) Remove the oil pump driven gear (2).

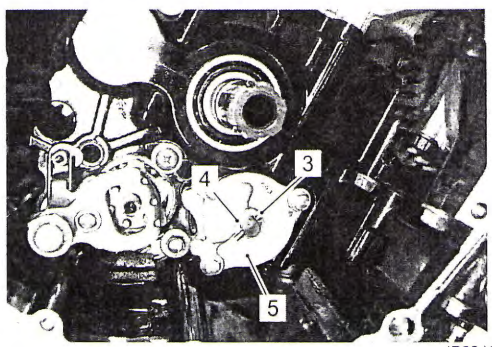
NOTE

Take care not to drop the snap ring (1), pin (3) or washer (4) into the crankcase.



IB08J1140135-02

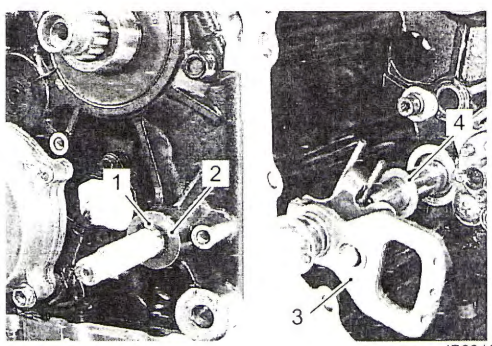
3) Remove the pin (3) and washer (4).
4) Remove the oil pump (5).



IB08J1140136-02

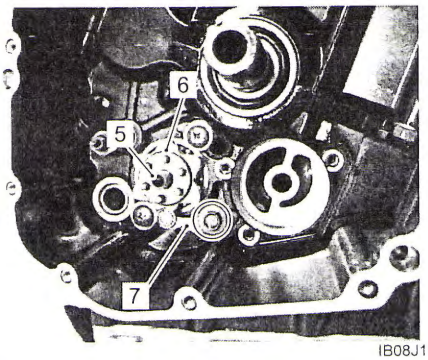
Gearshift System

1) Remove the snap ring (1) and washer (2) from the gearshift shaft.
2) Remove the gearshift shaft assembly (3) and washer (4).



IB08J1140137-03

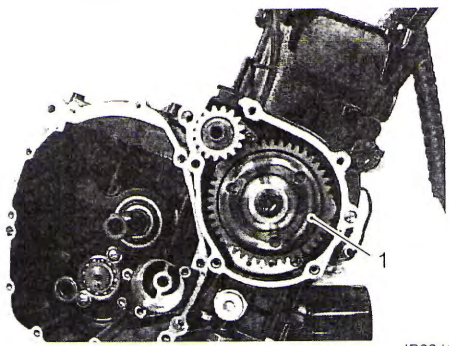
3) Remove the gearshift cam plate bolt (5) and gearshift cam plate (6).
4) Remove the gearshift cam stopper (7).



IB08J1140138-02

Starter Clutch

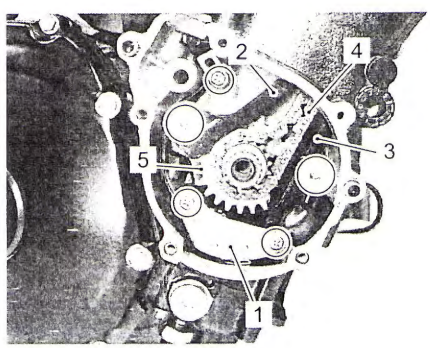
Remove the starter clutch (1). Refer to "Starter Clutch Removal and Installation" in Section 1I (Page 1I-10).



IB08J1140139-02

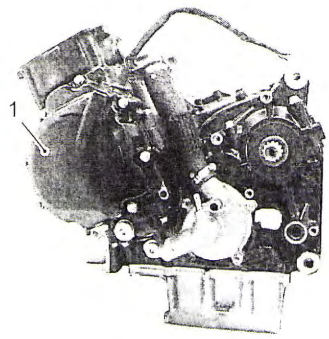
Cam Chain / Cam Chain Tensioner / Cam Chain Guide

1) Remove the CKP sensor (1).
2) Remove the cam chain tensioner (2) and cam chain guide No. 1 (3).
3) Remove the cam chain (4).
4) Remove the CKP sensor rotor/cam chain drive sprocket (5).



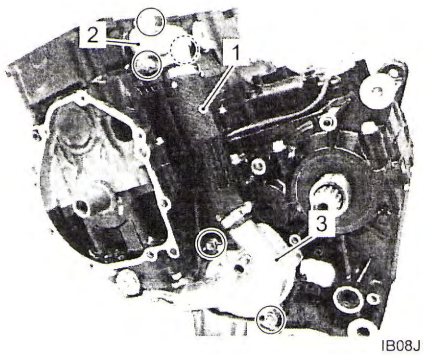
IB08J1140140-02

Generator
Remove the generator component parts (1). Refer to "Generator Removal and Installation" in Section 1J (Page 1J-5).



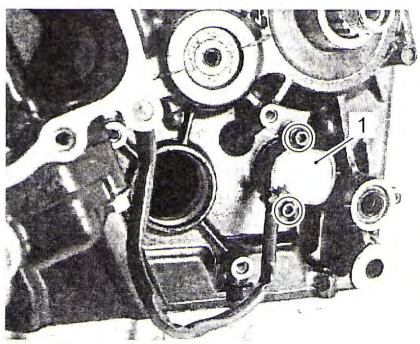
IB08J1140141-02

Water Pump
1) Remove the cylinder inlet hose (1) and water inlet connector (2).
2) Remove the water pump (3).



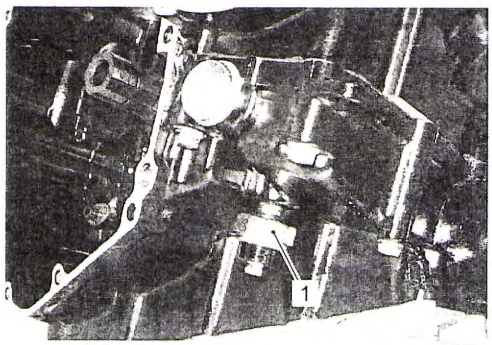
IB08J1140142-02

GP Switch
Remove the GP switch (1).



IB08J1140143-02

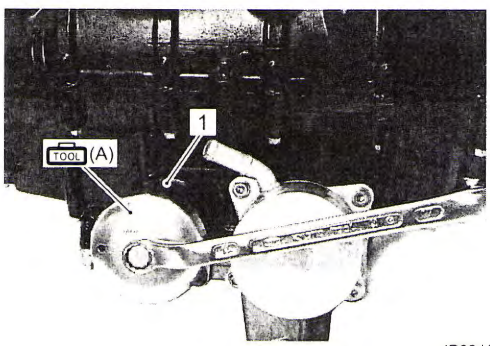
Oil Pressure Switch
Remove the oil pressure switch (1).



IB08J1140144-02

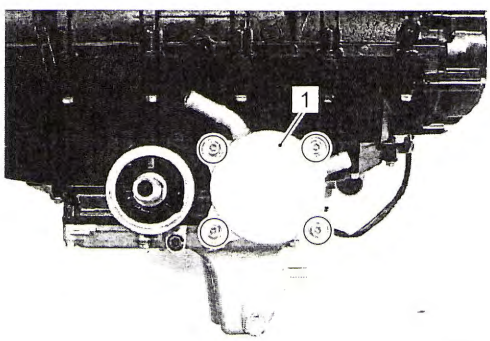
Oil Filter
Remove the oil filter (1) using the special tool.

Special tool
(A): 09915–40620 (Oil filter wrench)



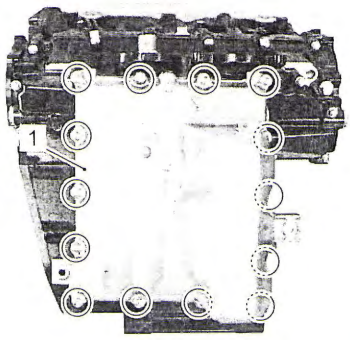
IB08J1140145-02

Oil Cooler
Remove the oil cooler (1).



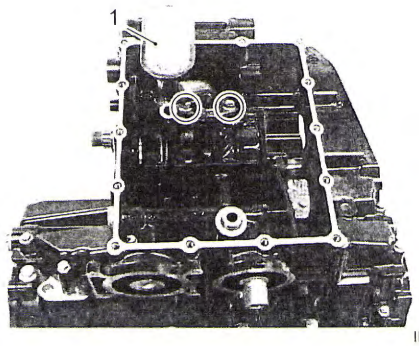
IB08J1140146-02

Oil Pan
Remove the oil pan (1).



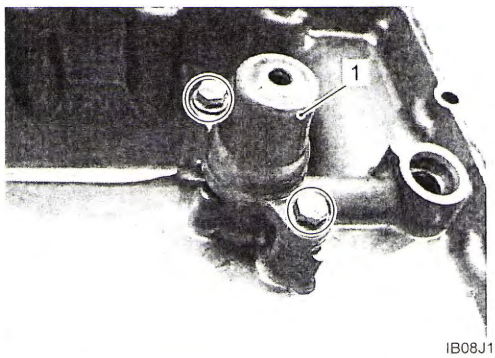
IB08J1140147-02

Oil Strainer
Remove the oil strainer (1).



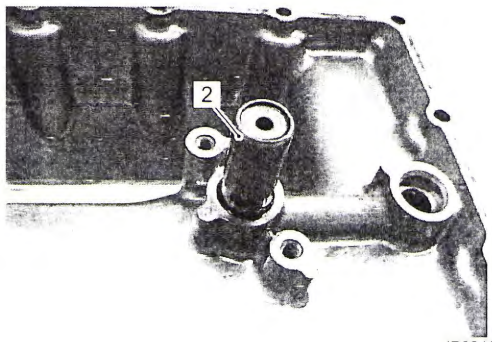
IB08J1140148-02

Oil Pressure Regulator
1) Remove the oil pressure regulator cover (1).



IB08J1140149-02

2) Remove the oil pressure regulator (2).

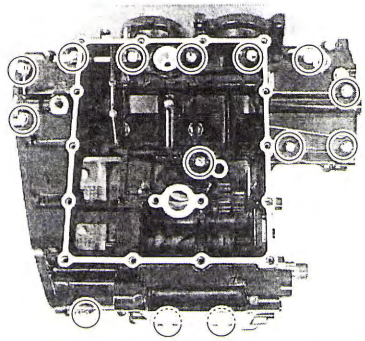


IB08J1140150-02

Lower Crankcase
1) Remove the lower crankcase bolts (M6).

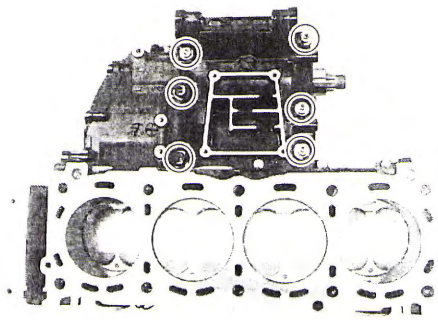
NOTE

Loosen the crankcase bolts diagonally and smaller size ones first.



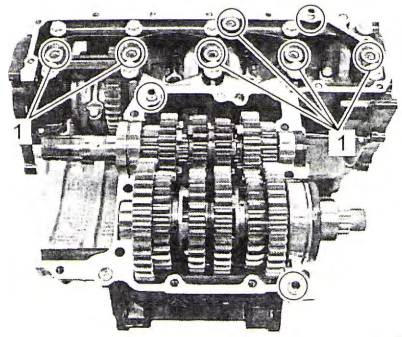
IB08J1140151-02

2) Remove the lower crankcase bolts (M8).



IB08J1140152-02

3) Make sure that all of the bolts are removed. Then, tap the sides of the lower crankcase using a plastic hammer to separate the middle and lower crankcase halves and then lift the lower crankcase off the middle crankcase.
4) Remove the dowel pins and O-ring (1).

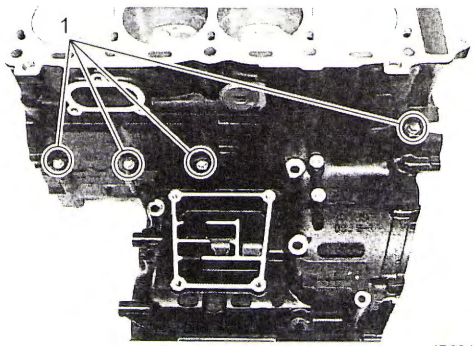


IB08J1140153-04

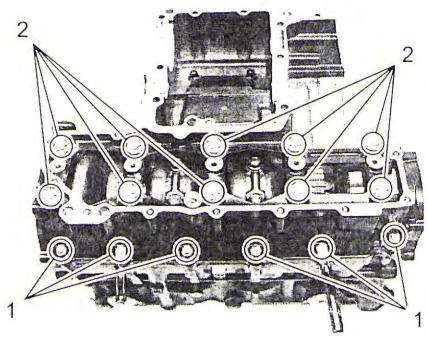
Transmission
Remove the transmission component. Refer to "Transmission Removal" in Section 5B (Page 5B-3).

Middle Crankcase

1) Remove the middle crankcase bolts (M6) (1).
2) Remove the crankshaft journal bolts (M9) (2).



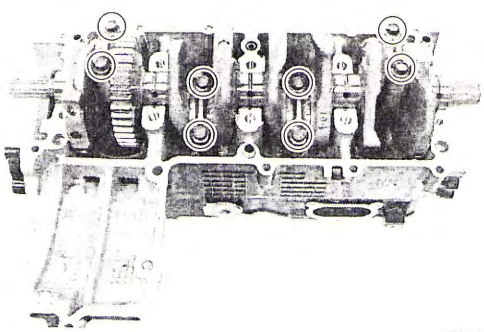
IB08J1140154-02



IB08J1140155-02

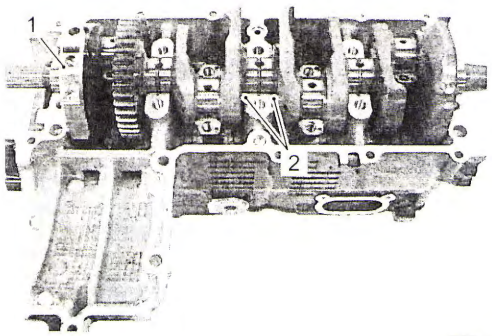
Crankshaft

1) Loosen the conrod cap bolts by using a 10 mm, 12-point socket wrench, and tap the bearing cap bolts lightly with a plastic hammer to remove the bearing cap.



IB08J1140156-02

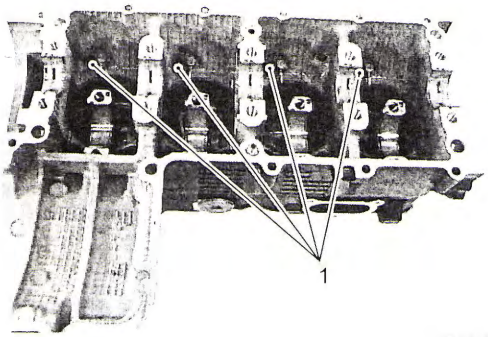
2) Remove the crankshaft (1) and thrust bearings (2).



IB08J1140157-02

Piston Cooling Oil Jet

Remove the piston cooling oil jets (1) from the upper crankcase.



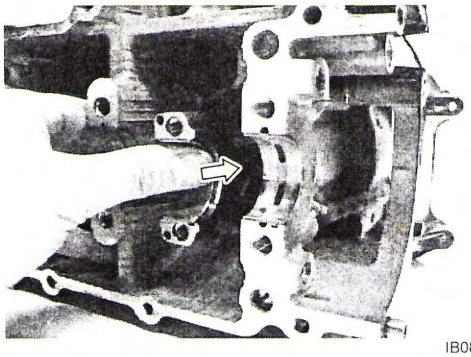
IB08J1140158-02

Piston / Conrod

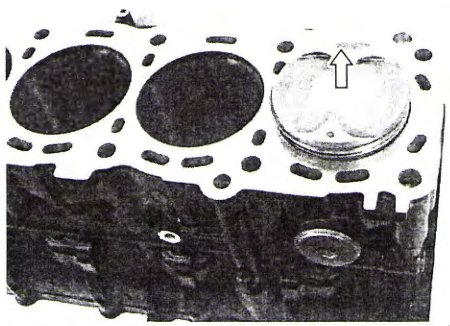
1) Push the conrod to cylinder head side and remove the piston and conrod from the upper crankcase.

NOTICE

Be careful not to damage the cylinder wall by the conrod.

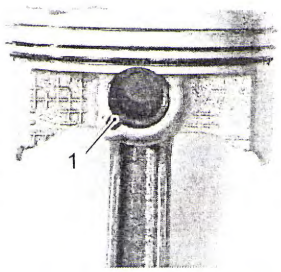


IB08J1140256-01



IB08J1140159-02

2) Remove the piston pin circlip (1).

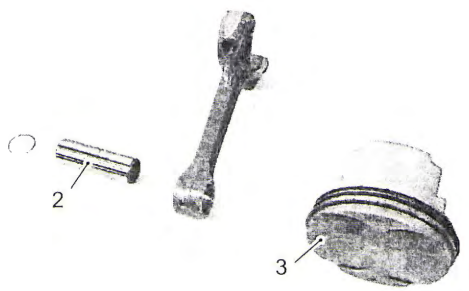


IB08J1140160-02

3) Draw out the piston pin (2) and remove the piston head (3).

NOTE

Scribe the cylinder number on the piston head.



IB08J1140161-02

Crankshaft Journal Bearing

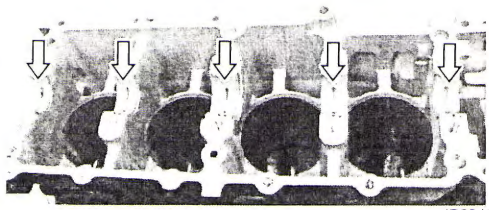
Remove the crankshaft journal bearings, upper and lower.

NOTICE

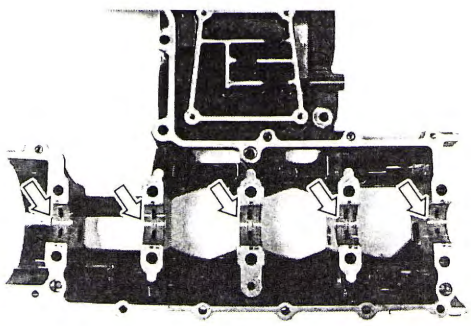
- **When removing the crankshaft journal bearings, be careful not to scratch the crankcase and the crankshaft journal bearings.**
- **Do not touch the bearing surfaces with your hands. Grasp the bearings by their edges.**

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.**



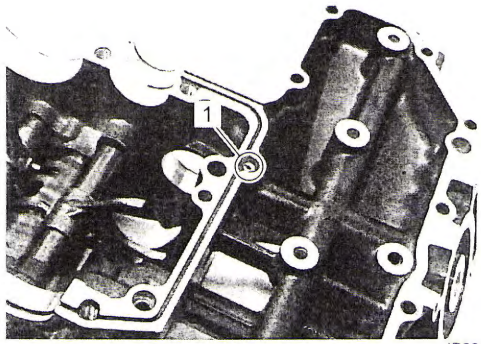
IB08J1140162-02



IB08J1140163-02

Oil Jet

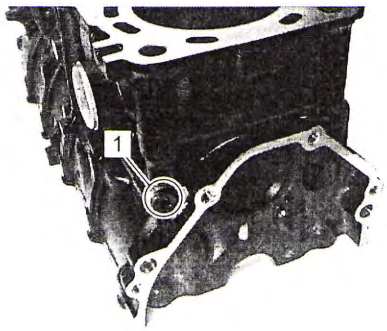
Remove the oil jet (1) (for transmission) from the lower crankcase.



IB08J1140164-03

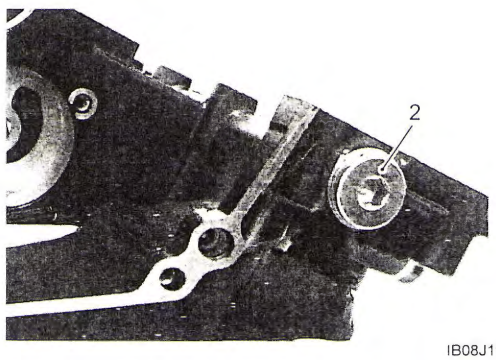
Oil Gallery Plug

1) Remove the oil gallery plug (1) from the upper crankcase.

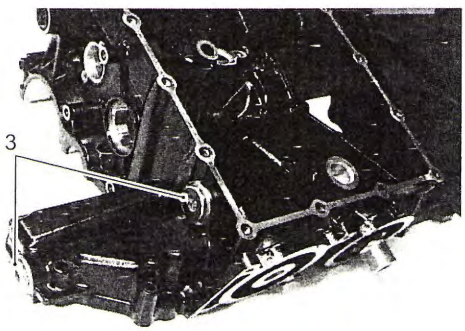


IB08J1140165-02

2) Remove the oil gallery plugs (2) and (3) from the lower crankcase.

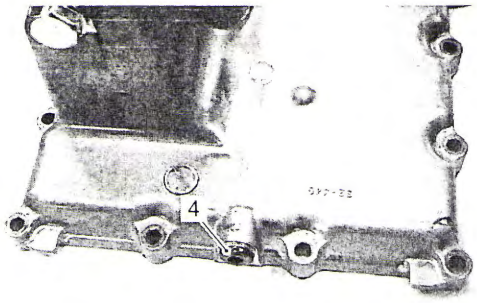


IB08J1140166-02



IB08J1140167-02

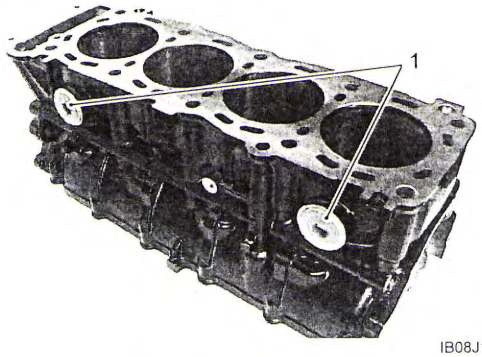
3) Remove the oil gallery plug (4) from the oil pan.



IB08J1140168-02

Water Jacket Plug

Remove the water jacket plugs (1) from the upper crankcase.



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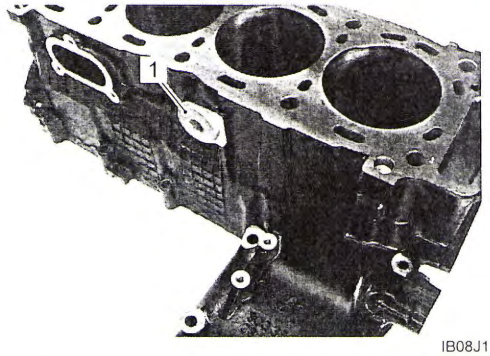
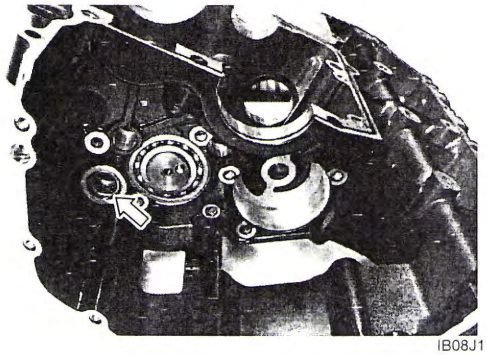


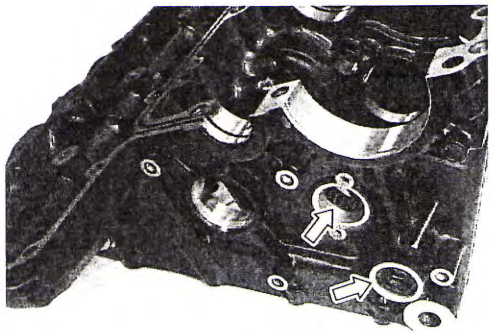
IB08J1140170-02

Oil seal / Bearing

Remove the oil seal and bearings if necessary. Refer to "Transmission Removal" in Section 5B (Page 5B-3).



IB08J1140171-02



IB08J1140172-02

Engine Bottom Side Assembly

BENF08J11406032

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.

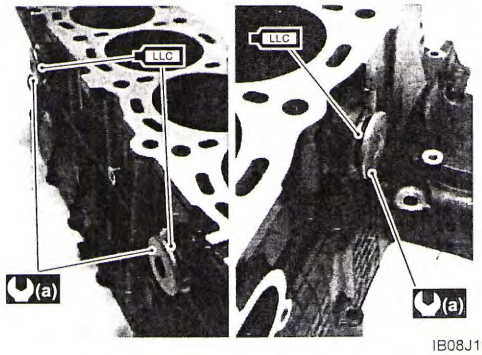
Oil Seal / Bearing

- Install the oil seal and bearings. Refer to "Transmission Installation" in Section 5B (Page 5B-4).

Water Jacket Plug

- Apply engine coolant to the new O-rings of the water jacket plugs.
- Tighten each plug to the specified torque.

Tightening torque
Water jacket plug (a): 9.5 N·m (0.95 kgf-m, 7.0 lbf-ft)

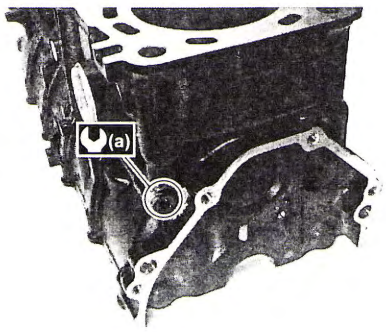


IB08J1140257-02

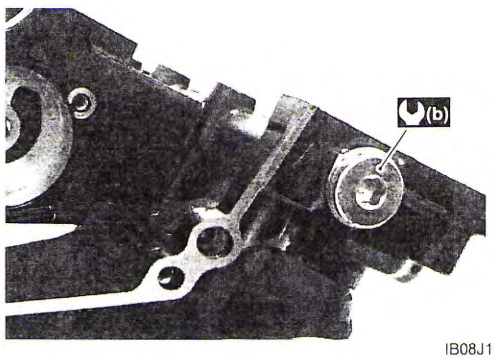
Oil Gallery Plug

- Install the new gaskets and tighten each plug (for lower and upper crankcase) to the specified torque.

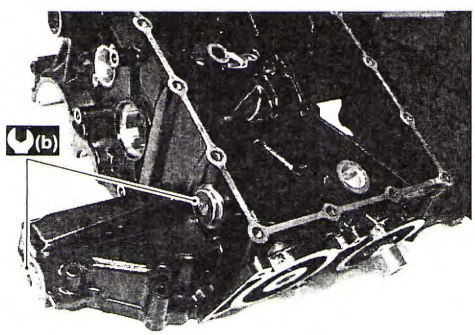
Tightening torque
Oil gallery plug (M10) (a): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)
Oil gallery plug (M16) (b): 35 N·m (3.5 kgf-m, 25.5 lbf-ft)



IB08J1140173-02



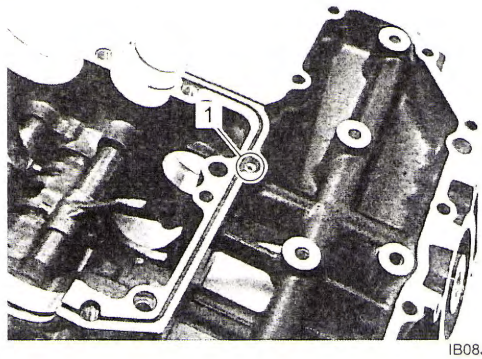
IB08J1140174-02



IB08J1140175-02

Oil Jet

- Install the oil jet (1) (for transmission).



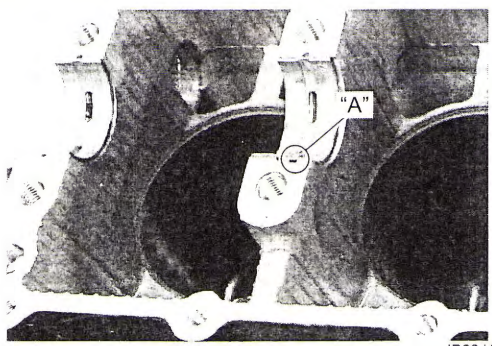
IB08J1140176-02

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.

NOTE

- **Do not touch the bearing surfaces with your hands. Grasp by the edge of the bearing shell.**
- **Inspect and select the crankshaft journal bearing if necessary. Refer to "Crankshaft Journal Bearing Inspection and Selection" (Page 1D-79).**



IB08J1140177-02

Piston and Conrod

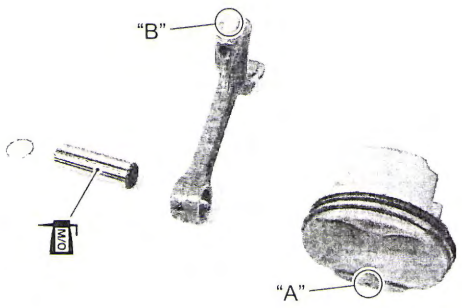
- Apply a small quantity of molybdenum oil solution onto each piston pin.

  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.

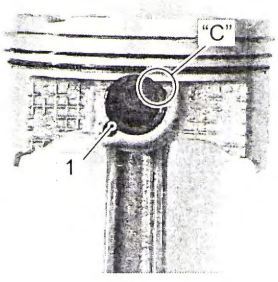


IB08J1140178-04

- Install the new piston pin circlips (1).

  NOTE

  End gap of the circlip "C" should not be aligned with the cutaway in the piston pin bore.



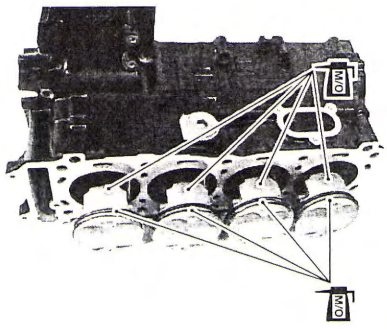
IB08J1140179-02

- 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.



IB08J1140180-03

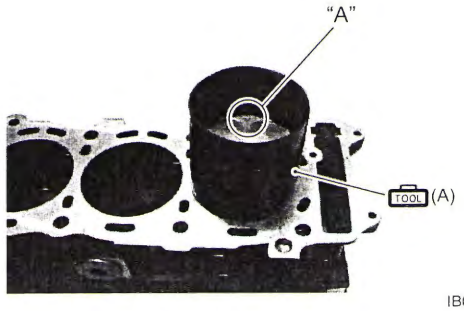
- Install the pistons with conrods into the cylinders from topside using the special tool.

  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)

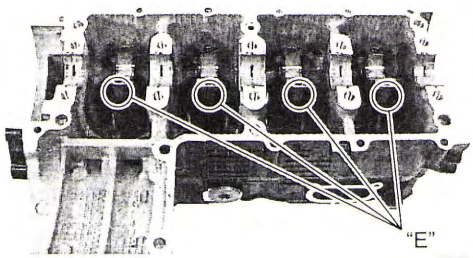


IB08J1140258-01

- Check that I.D. code "E" on each conrod faces intake side.

NOTE

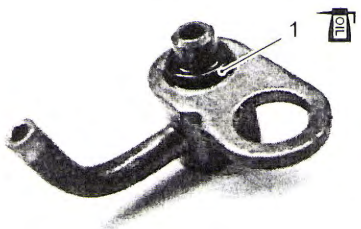
Be sure to clean the conrod big end.



IB08J1140181-02

Piston Cooling Oil Jet

- Fit the new O-ring (1) to each piston cooling oil jet and apply engine oil to them.



I837H1140133-01

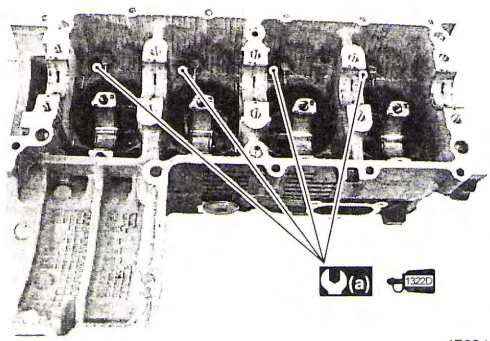
- Install each piston cooling oil jet.

NOTE

Apply a small quantity of thread lock to the bolts and tighten them to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
Piston cooling oil jet bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

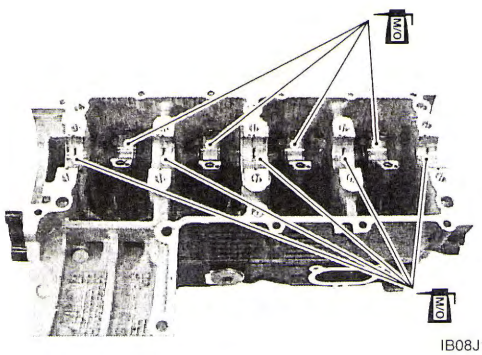


IF08J1140002-01

Crankshaft

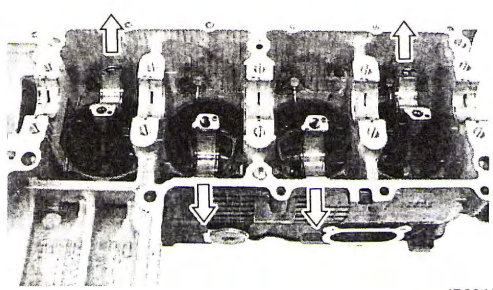
1) Apply molybdenum oil to each crank pin bearing surface and crankshaft journal bearing surface.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



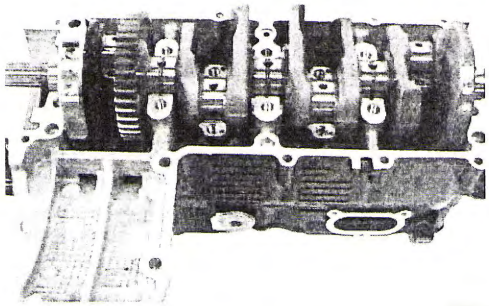
IB08J1140183-04

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.



IB08J1140184-02

3) Set the crankshaft to the conrods and upper crankcase.



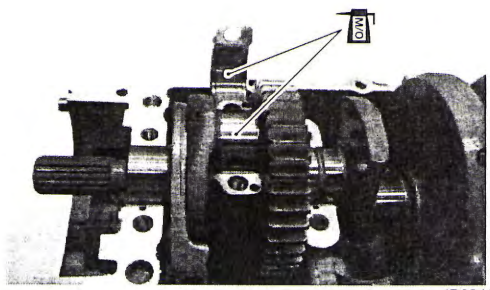
IB08J1140185-02

4) Apply molybdenum oil to each crank pin and bearing surface.

NOTICE

Be sure to clean the conrod big end.

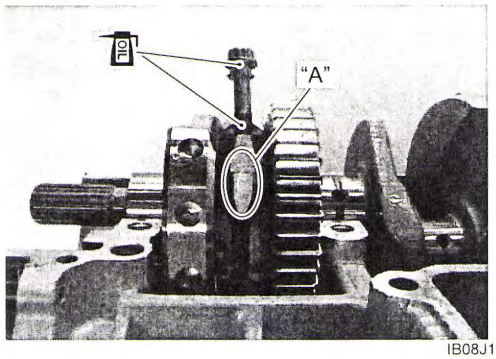
M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



IB08J1140259-02

5) When fitting the conrod cap, make sure that I.D. code "A" on each conrod faces intake side.

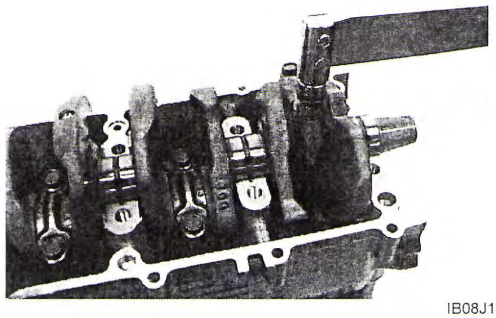
6) Apply engine oil to the washers and thread portion of the bolts.



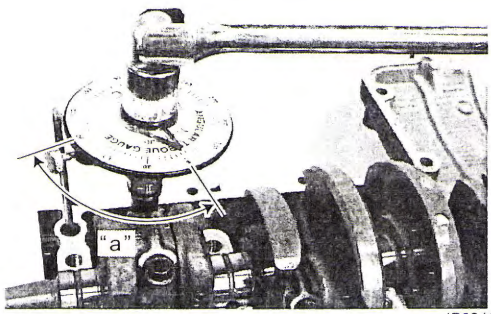
IB08J1140260-03

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: 15 N·m (1.5 kgf-m, 11.0 lbf-ft) then turn in 1/4 (90°) turn



IB08J1140186-02

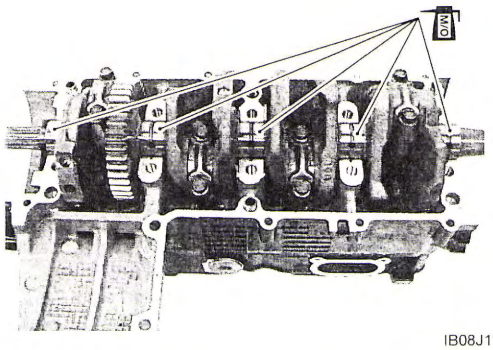


IB08J1140187-02

"a": 90°

8) Apply engine oil to the conrod big end side surfaces.
9) Check the conrod movement for smooth turning.
10) Apply molybdenum oil to each crankshaft journal and bearing lightly.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

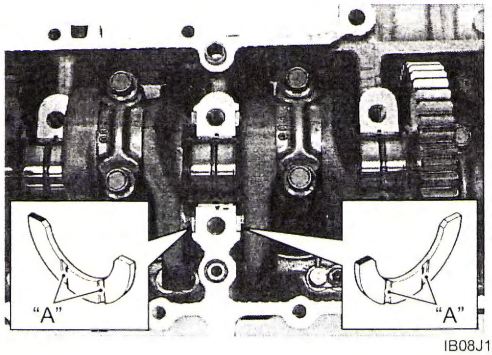


IB08J1140188-04

11) Insert the right and left-thrust bearings with the oil grooves "A" facing towards the crankshaft web.

NOTE

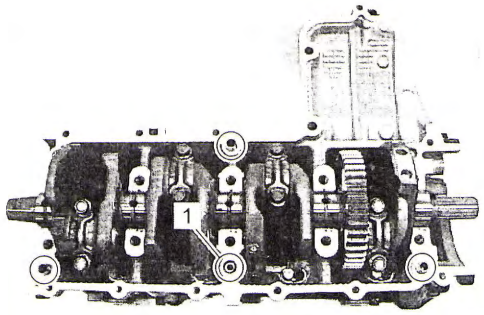
- **Right-thrust bearing has green painting.**
- **Inspect and select the crankshaft thrust clearance if necessary. Refer to "Crankshaft Thrust Clearance Inspection and Selection" (Page 1D-82).**



IB08J1140189-02

Middle Crankcase

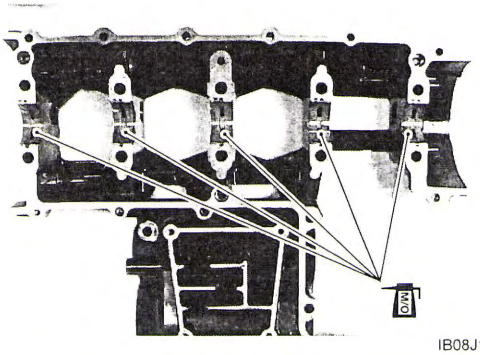
- Install the dowel pins and new O-ring (1).



IB08J1140191-02

- Apply molybdenum oil to each crankshaft journal bearing surface.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



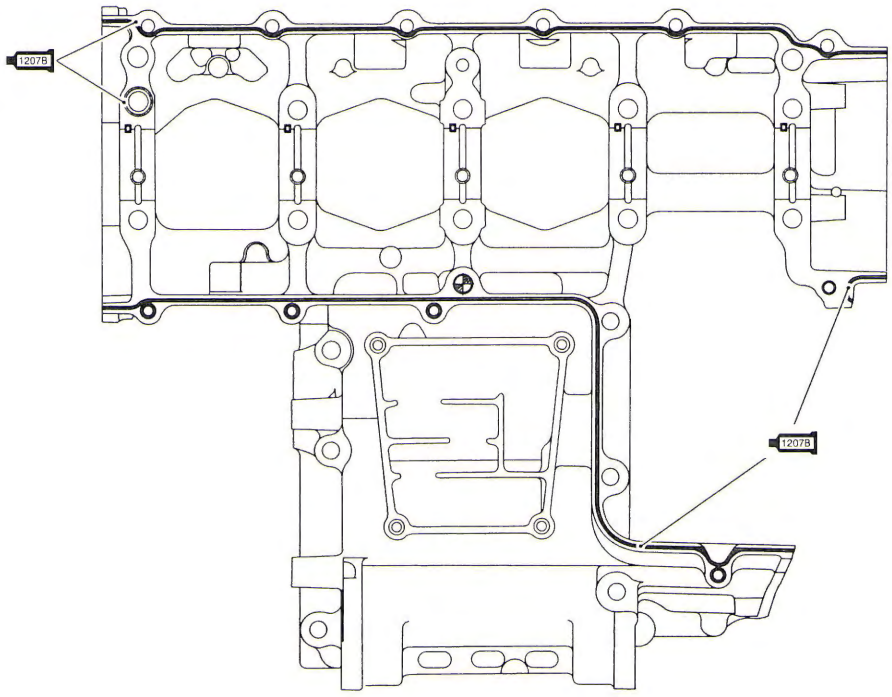
IB08J1140192-04

- Apply bond to the mating surface of the middle crankcase as follows.

NOTE

- **Make 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)



IB08J1140193-03

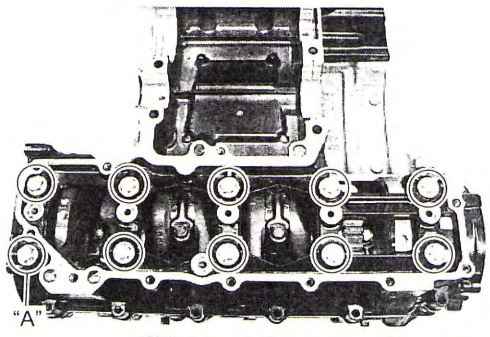
1207B : Apply bond.

- Tighten the crankshaft journal bolts (M9). Tighten each bolt a little at a time to equalize the pressure in the following two steps.

NOTE

Fit the new gasket washers to the bolts "A".

Tightening torque
Crankshaft journal bolt (M9): 18 N·m (1.8 kgf-m, 13.0 lbf-ft) then turn in 50°



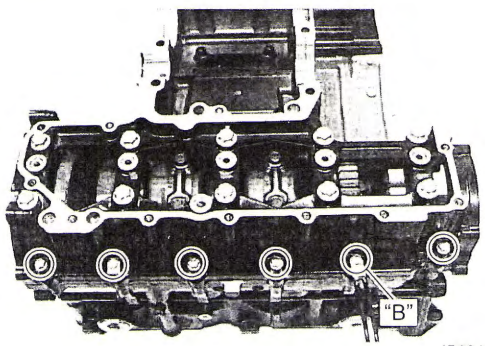
IB08J1140194-02

- Tighten the other crankcase bolts (M6) a little at a time to equalize the pressure.

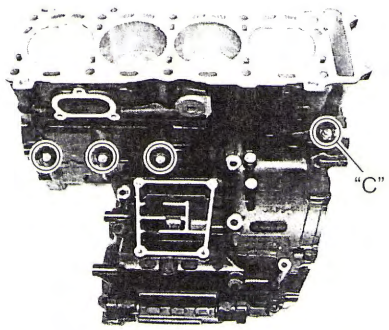
NOTE

- **Fit the clamp to the crankcase bolt "B".**
- **Fit the new gasket to the crankcase bolt "C".**

Tightening torque
Crankcase bolt (M6) (Initial): 6 N·m (0.6 kgf-m, 4.3 lbf-ft)
Crankcase bolt (M6) (Final): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



IB08J1140195-03

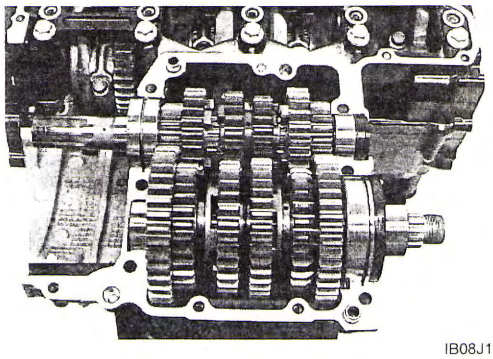


IB08J1140196-03

- After the crankshaft journal bolts and crankcase bolts have been tightened, check that the crankshaft rotates smoothly.

Transmission

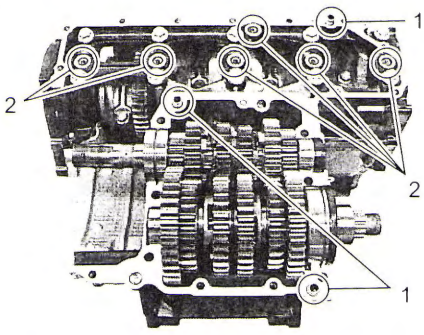
Install the transmission. Refer to "Transmission Installation" in Section 5B (Page 5B-4).



IB08J1140190-02

Lower Crankcase

- Install the dowel pins (1) and new O-rings (2).



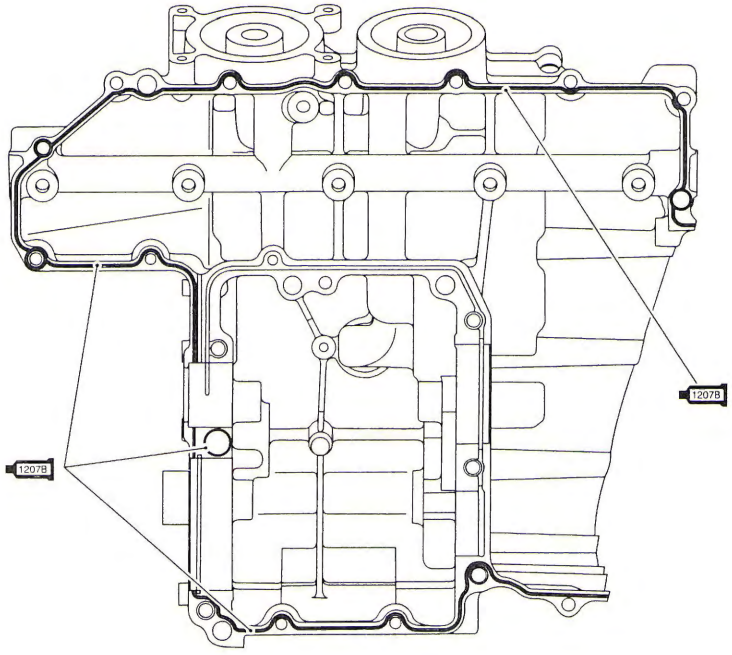
IB08J1140197-02

- 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)

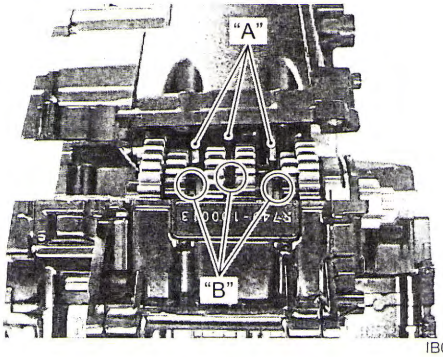


IB08J1140198-02

- Match the middle and lower crankcases.

NOTE

Align the gearshift forks "A" with their grooves "B".



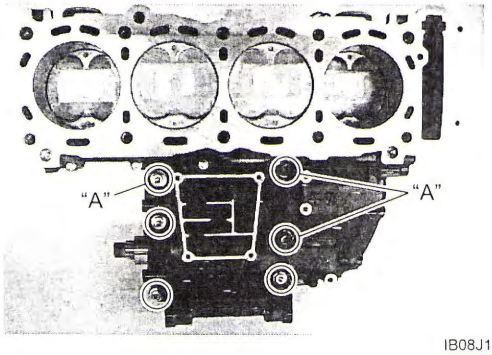
IB08J1140199-02

- Tighten the crankcase bolts a little at a time to equalize the pressure.

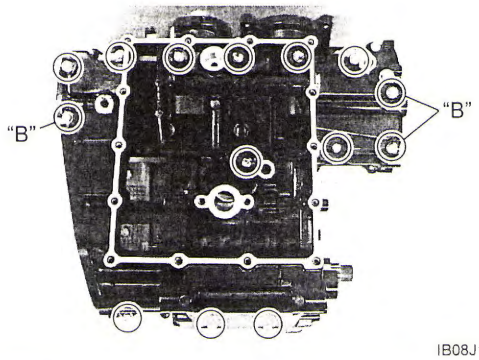
NOTE

- **Fit the new copper washer to the crankcase bolts "A".**
- **Fit the new gasket washer to the crankcase bolts "B".**

Tightening torque
Crankcase bolt (M6) (Initial): 6 N·m (0.6 kgf-m, 4.3 lbf-ft)
Crankcase bolt (M6) (Final): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
Crankcase bolt (M8) (Initial): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
Crankcase bolt (M8) (Final): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)

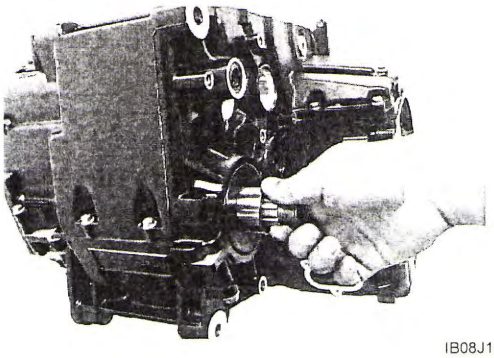


IB08J1140200-02

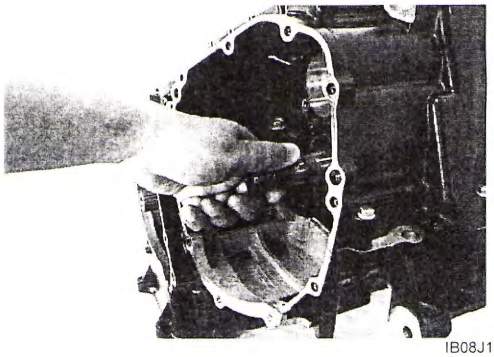


IB08J1140201-02

- Check that the driveshaft and countershaft rotate smoothly.



IB08J1140202-02



IB08J1140203-02

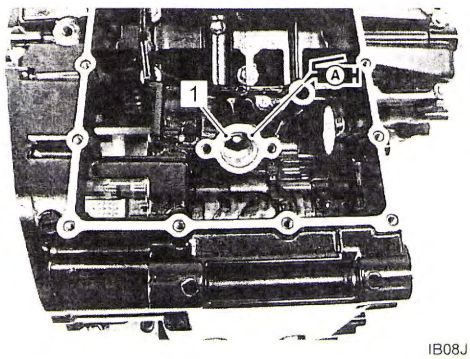
Oil Strainer

- Install a new O-ring (1).

NOTE

Apply grease to the O-ring.

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



IB08J1140204-03

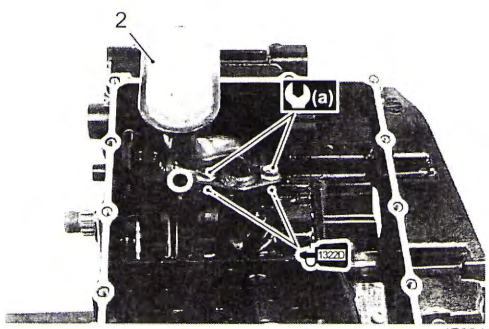
- Install the oil strainer (2).

NOTE

Apply a small quantity of thread lock to the strainer bolts and tighten it to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

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



IF08J1140003-01

Oil Pressure Regulator

- Apply grease to the new O-ring and press in the oil pressure regulator to the oil pan.

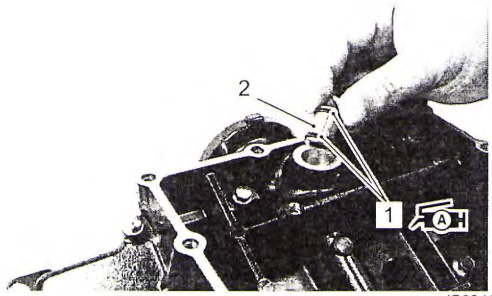
: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)

- Install the pressure regulator cover and tighten the bolts.

Oil Pan

- Apply grease to the new O-rings (1) and install the oil pipe (2).

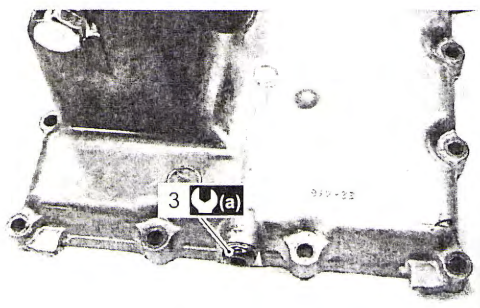
: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)



IB08J1140206-02

- Install a new gasket and tighten the oil gallery plug (3) to the specified torque.

Tightening torque
Oil gallery plug (oil pan) (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



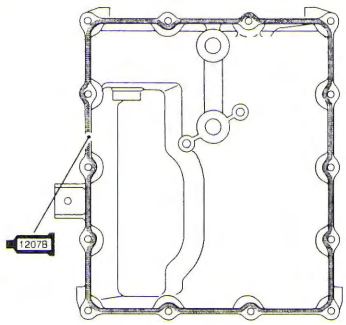
IB08J1140207-02

- Apply bond to the mating surface of the oil pan as follows.

NOTE

- **Make surfaces free from moisture, oil, dust and other foreign materials.**
- **Spread the sealant on surfaces thinly to form an even layer, and assemble the oil pan 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.**
- **Apply sealant to both mating surface of crankcases at hatched parts.**

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



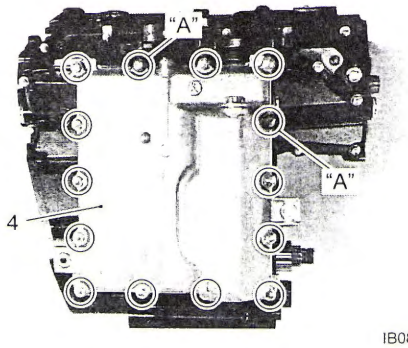
IB08J1140208-03

- Install the oil pan (4).
- Tighten the oil pan bolts diagonally to the specified torque.

NOTE

Fit the new gasket washer to the oil pan bolts "A".

Tightening torque
Oil pan bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1140209-03

Oil Cooler

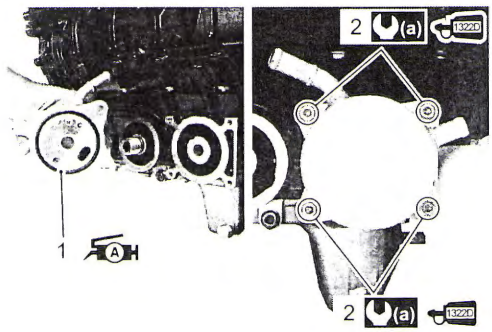
- Apply grease to the new O-ring (1).

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

- Apply thread lock to the oil cooler bolts (2) and tighten them to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
Oil cooler mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

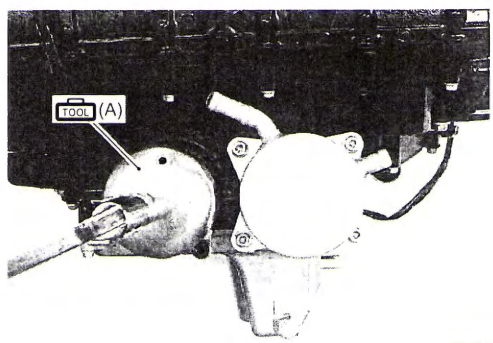


IF08J1140004-01

Oil Filter

- Install the oil filter using the special tool. Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).

Special tool
TOOL (A): 09915–40620 (Oil filter wrench)



IB08J1140211-02

Oil Pressure Switch

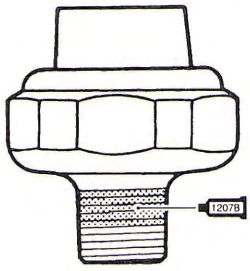
- Apply bond to the thread part of oil pressure switch and tighten oil pressure switch to the specified torque.

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

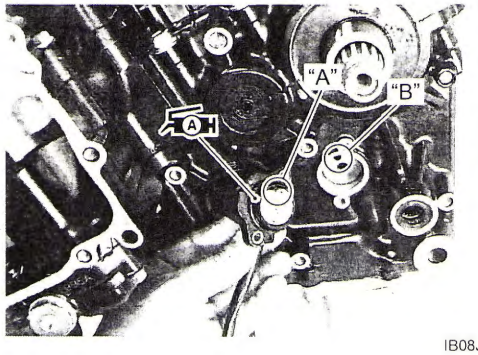
GP Switch

- Apply grease to the new O-ring.

NOTE

Align the GP switch pin "A" with the gearshift cam hole "B".

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

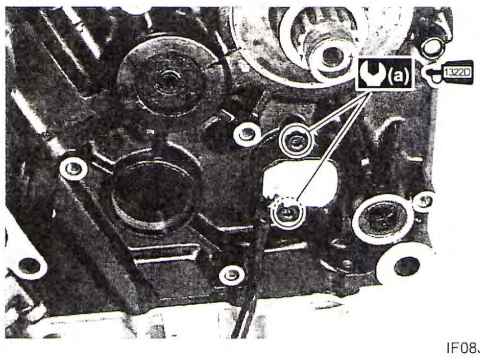


IB08J1140212-02

- Apply thread lock to the GP switch bolts and tighten them to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
GP switch mounting bolt (a): 6 N·m (0.6 kgf-m, 4.3 lbf-ft)

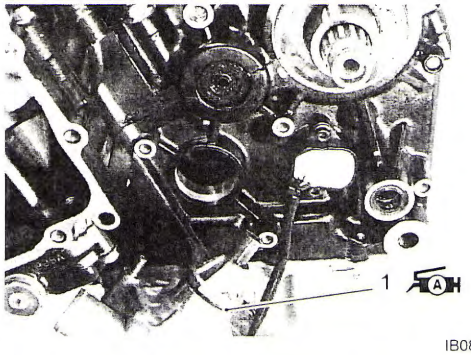


IF08J1140005-01

Water Pump

- Apply grease to the new O-ring (1).

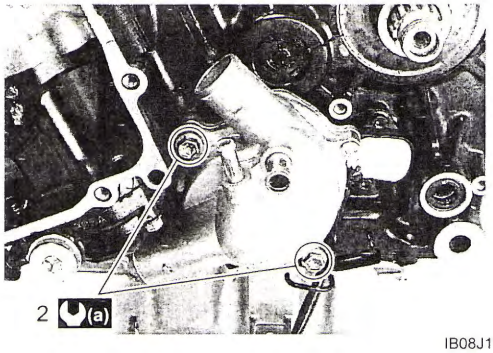
A : Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)



IB08J1140214-02

- Tighten the water pump mounting bolts (2) to the specified torque.

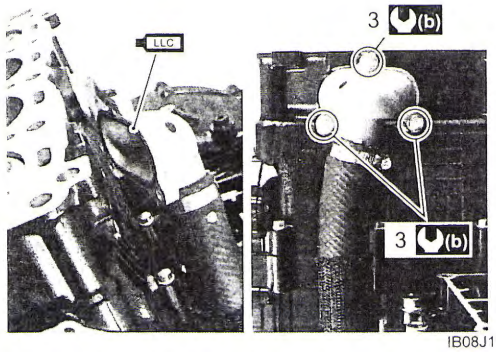
Tightening torque
Water pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1140215-02

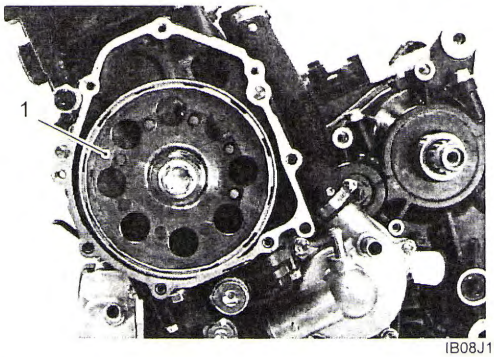
- Apply engine coolant to the new O-ring.
- Tighten the water inlet connector mounting bolts (3) to the specified torque.

Tightening torque
Water inlet connector mounting bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1140216-02

Generator Rotor
Install the generator rotor (1). Refer to "Generator Removal and Installation" in Section 1J (Page 1J-5).



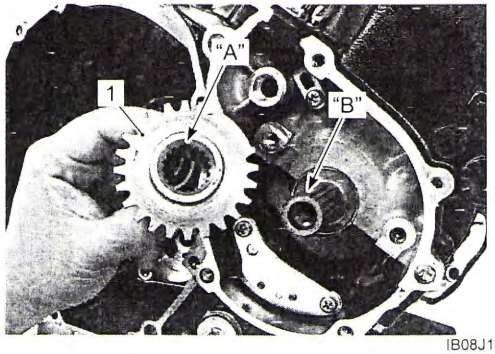
IB08J1140217-02

Cam Chain / Cam Chain Tensioner / Cam Chain Guide

- Install the CKP sensor rotor/cam chain drive sprocket (1) onto the crankshaft.

NOTE

When installing the cam chain drive sprocket, align the wide spline tooth "A" and "B".



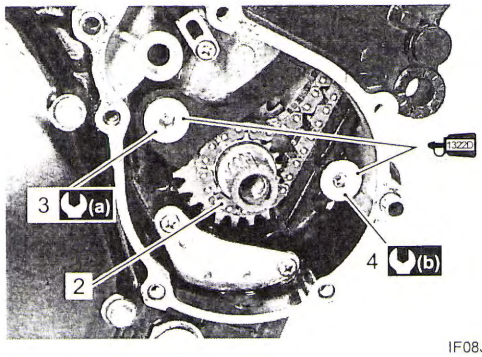
IB08J1140218-02

- Install the cam chain (2).
- Apply a small quantity of thread lock to the cam chain tensioner bolt (3) and cam chain guide No. 1 bolt (4).

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

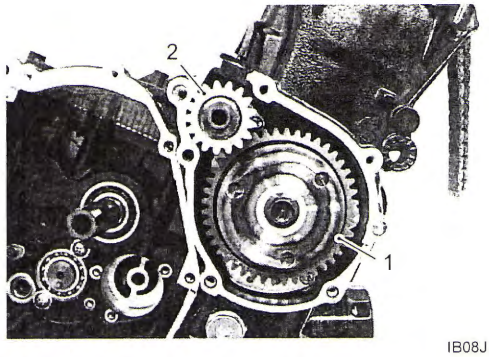
- Tighten the cam chain tensioner bolt (3) and cam chain guide No. 1 bolt (4).

Tightening torque
Cam chain tensioner bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
Cam chain guide No. 1 bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IF08J1140006-01

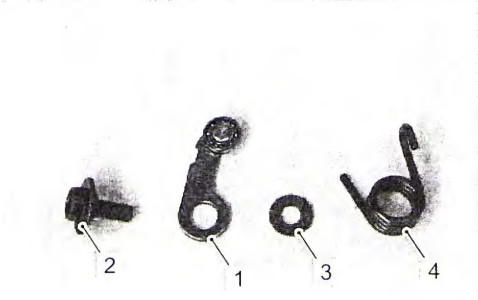
Starter Clutch / Idle Gear
Install the starter clutch (1) and idle gear (2). Refer to "Starter Clutch Removal and Installation" in Section 1I (Page 1I-10).



IB08J1140220-02

Gearshift System

- Install the gearshift cam stopper (1), bolt (2), washer (3) and return spring (4).



IB08J1140221-02

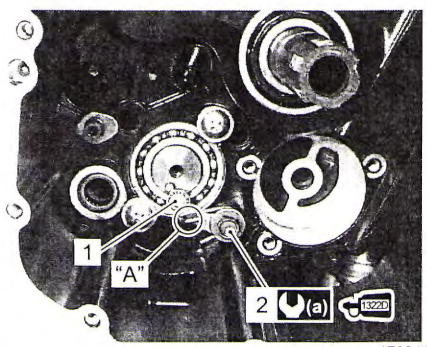
- Apply a small quantity of thread lock to the gearshift cam stopper bolt (2) and tighten it to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

NOTE

Hook the return spring end "A" to the stopper (1).

Tightening torque
Gearshift cam stopper bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

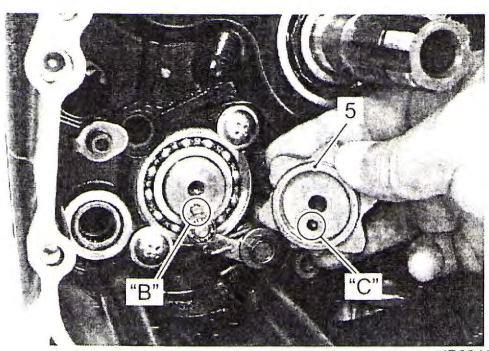


IF08J1140007-01

- Check the gearshift cam stopper moves smoothly.
- Locate the gearshift cam in the neutral position.
- Install the gearshift cam stopper plate (5).

NOTE

Align the gearshift cam pin "B" with the gearshift cam stopper plate hole "C".

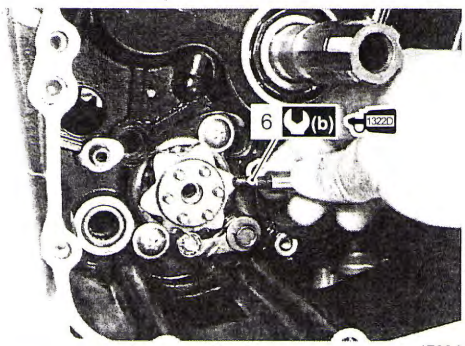


IB08J1140223-02

- Apply a small quantity of thread lock to the gearshift cam stopper plate bolt (6) and tighten it to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
Gearshift cam stopper plate bolt (b): 13 N·m (1.3 kgf-m, 9.5 lbf-ft)

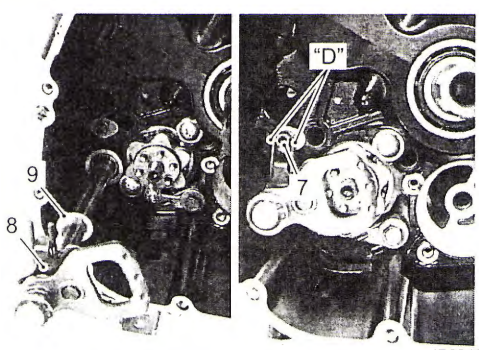


IF08J1140008-01

- Install the gearshift shaft assembly (8) and washers (9) as shown.

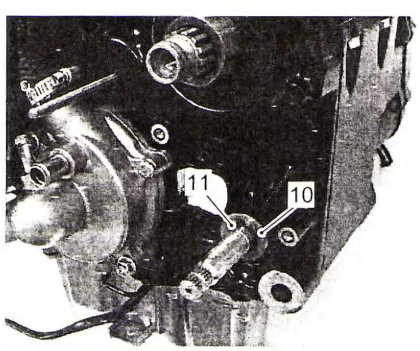
NOTE

Pinch the gearshift arm stopper (7) with return spring ends "D".



IB08J1140225-02

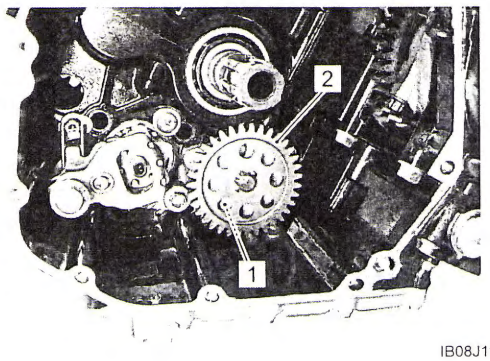
- Install the washer (10) and new snap ring (11).



IB08J1140226-02

Oil Pump

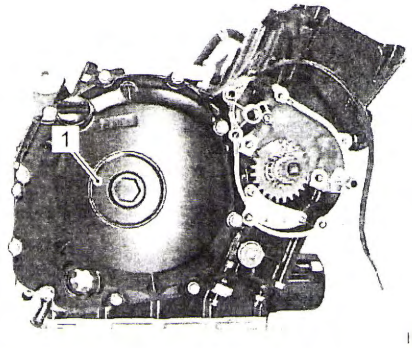
- Install the oil pump (1) and oil pump driven gear (2). Refer to "Oil Pump Removal and Installation" in Section 1E (Page 1E-13).



IB08J1140250-02

Clutch

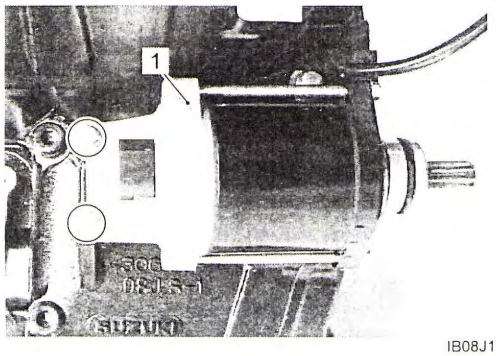
- Install the clutch component parts (1). Refer to "Clutch Installation" in Section 5C (Page 5C-10).



IB08J1140134-02

Starter Motor

- Install the starter motor (1). Refer to "Starter Motor Removal and Installation" in Section 1I (Page 1I-4).



IB08J1140133-02

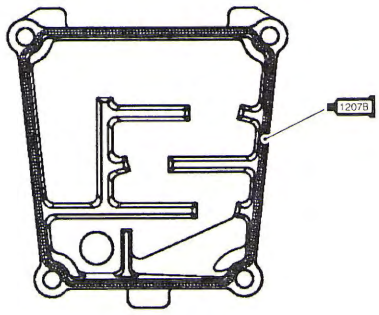
Crankcase Breather (PCV) Cover

- Apply bond to the mating surface of the crankcase breather (PCV) cover 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 crankcase breather (PCV) cover within a few minutes.**
- **Apply sealant to distorted surfaces as it forms a comparatively thick film.**

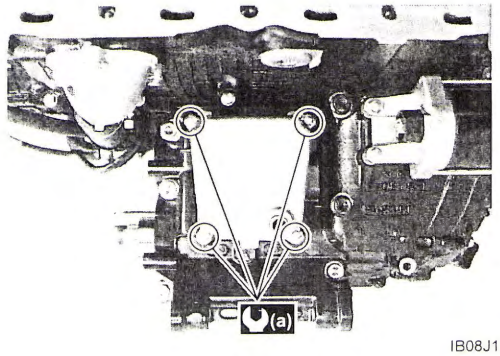
1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)



IB08J1140229-01

- Tighten the crankcase breather (PCV) cover bolts to the specified torque.

Tightening torque
Crankcase breather cover bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1140227-02

Engine Top Side

- Assemble the engine top side. Refer to "Engine Top Side Disassembly" (Page 1D-30).

Cylinder Inspection

BENF08J11406033

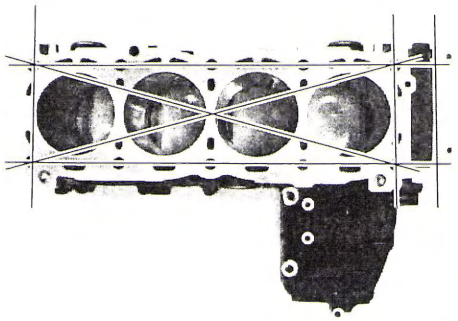
Refer to "Engine Top Side Disassembly" (Page 1D-30).
Refer to "Engine Top Side Assembly" (Page 1D-32).

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: 0.20 mm (0.008 in)



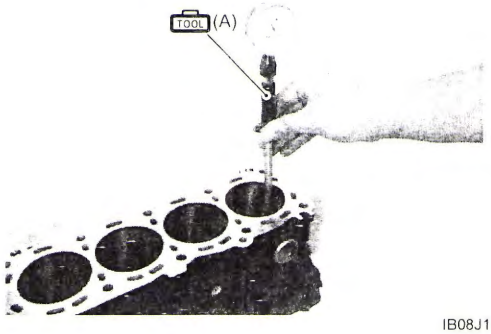
IB08J1140228-02

Cylinder Bore

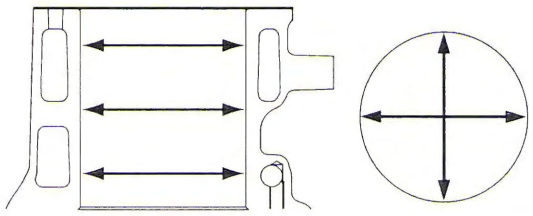
Measure the cylinder bore diameter at six places. If any one of the measurements exceed the limit, overhaul the cylinder and replace the piston with an oversize piston. The remaining cylinders must also be rebored accordingly; otherwise, the imbalance might cause excessive vibration.

Special tool
(TOOL) (A): 09900–20530 (Cylinder gauge set)

Cylinder bore
Standard: 72.000 – 72.015 mm (2.8347 – 2.8352 in)



IB08J1140230-02



I837H1140180-01

Piston-to-cylinder Clearance

Refer to "Piston and Piston Ring Inspection" (Page 1D-74).

Piston Ring Removal and Installation

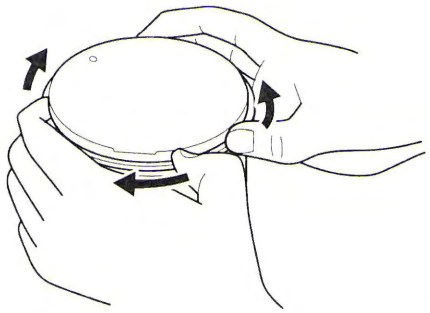
BENF08J11406034

Removal

1) Draw out the piston pin and remove the piston. Refer to "Engine Bottom Side Disassembly" (Page 1D-50).
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.



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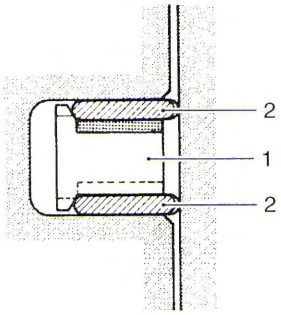
3) Remove the 2nd ring and oil ring in the same manner.

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.**

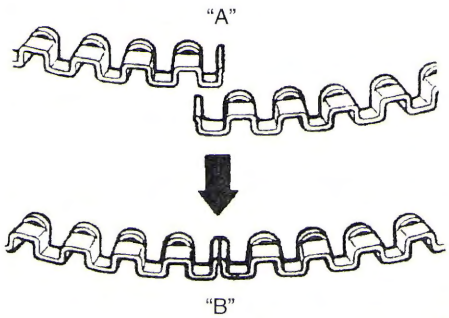
1) Install the piston rings in the order of the oil ring, second ring and top ring.
   a) The first member to go into the oil ring groove is the spacer (1).
   After placing the spacer, fit the two side rails (2).



I718H1140143-02

NOTE

When installing the spacer, be careful not to allow its two ends to overlap in the groove.



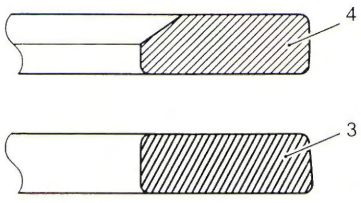
I705H1140170-02

"A": INCORRECT	"B": CORRECT

   b) Install the 2nd ring (3) and 1st ring (4) to piston.

NOTE

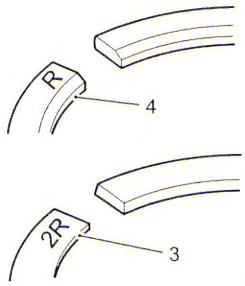
1st ring (4) and 2nd ring (3) differ in shape.



IF08J1140009-01

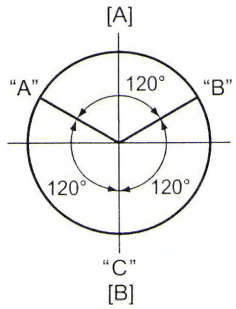
NOTE

Face the side with the stamped mark upward when assembling.



IF08J1140010-01

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.



IF08J1140011-01

"A": 2nd ring and lower side rail	[A]: EX
"B": Upper side rail	[B]: IN
"C": 1st ring and spacer	

3) Install each piston and piston pin. Refer to "Engine Bottom Side Assembly" (Page 1D-57).

Piston and Piston Ring Inspection

BENF08J11406035

Refer to "Piston Ring Removal and Installation" (Page 1D-72).

Piston Diameter

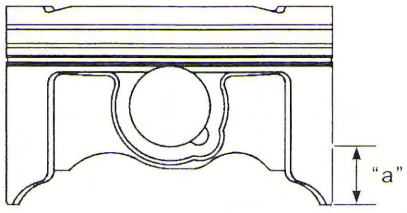
Measure the piston diameter using the micrometer at 15 mm (0.6 in) "a" from the skirt end. If the piston diameter is less than the service limit, replace the piston.

Special tool

(A): 09900–20203 (Micrometer (1/100 mm, 50 – 75 mm))

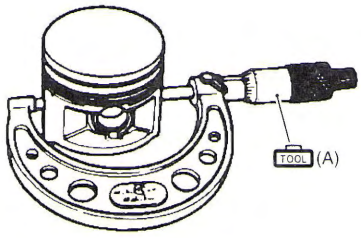
Piston diameter

Service limit: 71.880 mm (2.8299 in)



I837H1140184-01

"a": 15 mm (0.6 in)



I649G1140262-03

Piston-to-cylinder Clearance

Subtract the piston diameter from the cylinder bore diameter. If the piston-to-cylinder clearance exceeds the service limit, replace both the cylinder and the piston.

Piston-to-cylinder clearance

Service limit: 0.120 mm (0.0047 in)

Piston Ring-to-groove Clearance

Measure the side clearances of the 1st and 2nd piston rings using the thickness gauge. If any of the clearances exceed the limit, replace both the piston and piston rings.

Special tool

(A): 09900–20803 (Thickness gauge)

(B): 09900–20205 (Micrometer (0 – 25 mm))

Piston ring-to-groove clearance

Service limit (1st): 0.180 mm (0.0071 in)

Service limit (2nd): 0.150 mm (0.0059 in)

Piston ring groove width

Standard (1st): 1.01 – 1.03 mm (0.0398 – 0.0406 in)

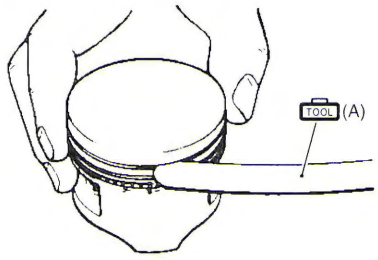
Standard (2nd): 0.81 – 0.83 mm (0.0319 – 0.0327 in)

Standard (Oil): 1.51 – 1.53 mm (0.0594 – 0.0602 in)

Piston ring thickness

Standard (1st): 0.97 – 0.99 mm (0.0382 – 0.0390 in)

Standard (2nd): 0.77 – 0.79 mm (0.0303 – 0.0311 in)



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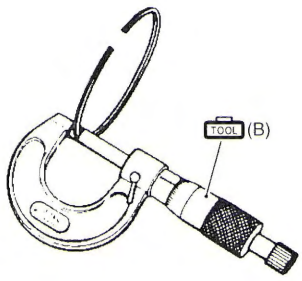


I649G1140264-03

Piston Ring Free End Gap and Piston Ring End Gap

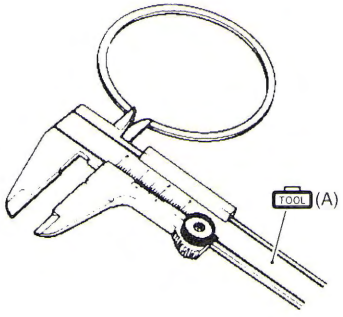
Measure the piston ring free end gap using vernier calipers. Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge. If any of the measurements exceed the service limit, replace the piston ring with a new one.

Special tool
(A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

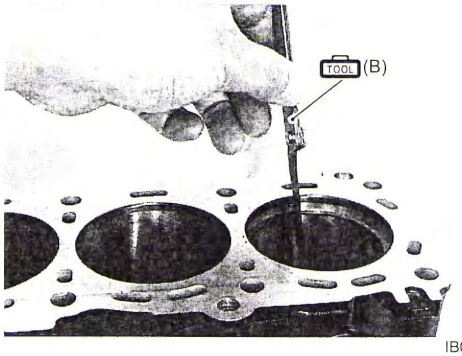
Piston ring free end gap
Service limit (1st): 6.6 mm (0.26 in)
Service limit (2nd): 4.9 mm (0.19 in)

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



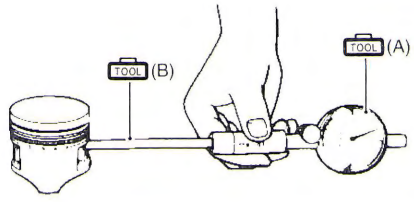
IB08J1140233-02

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 (1/1000 mm, 1 mm))
(B): 09900–22401 (Small bore gauge (10 – 18 mm))

Piston pin bore
Service limit: 16.030 mm (0.6311 in)

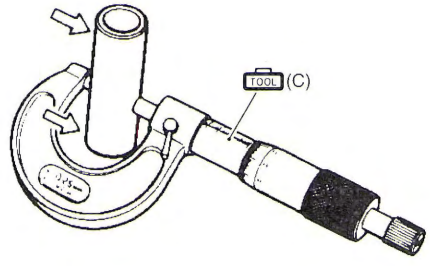


I649G1140267-03

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: 15.980 mm (0.6291 in)



I649G1140268-03

Conrod Crank Pin Bearing Removal and Installation

BENF08J11406036

Refer to "Engine Bottom Side Disassembly" (Page 1D-50).
Refer to "Engine Bottom Side Assembly" (Page 1D-57).

Removal

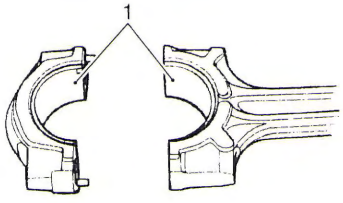
Remove the conrod crank pin bearings (1).

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.**

NOTICE

When removing the bearings, be careful not to scratch the conrods and the bearings.



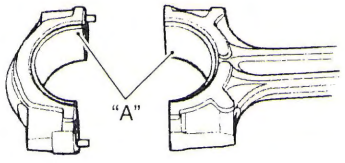
I718H1140269-01

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-77).



I823H1140578-01

Conrod and Crankshaft Inspection

BENF08J11406037

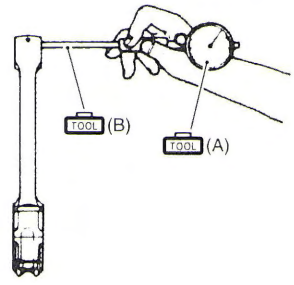
Refer to "Engine Bottom Side Disassembly" (Page 1D-50).
Refer to "Engine Bottom Side Assembly" (Page 1D-57).

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
TOOL (A): 09900–20602 (Dial gauge (1/1000 mm, 1 mm))
TOOL (B): 09900–22401 (Small bore gauge (10 – 18 mm))

Conrod small end I.D.
Service limit: 16.040 mm (0.6315 in)



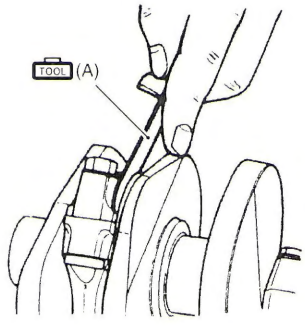
I823H1140280-01

Conrod Big End Side Clearance

1) Check the conrod big end side clearance using the thickness gauge.

Special tool
TOOL (A): 09900–20803 (Thickness gauge)

Conrod big end side clearance
Service limit: 0.3 mm (0.012 in)



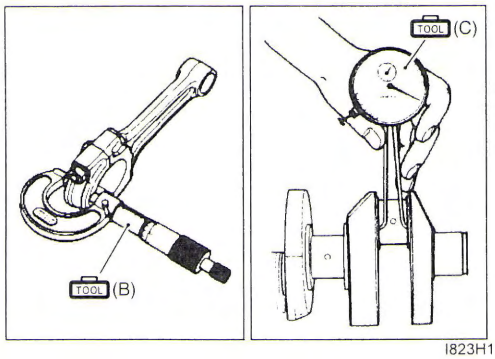
I823H1140281-01

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-57). 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 (1/100 mm, 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)

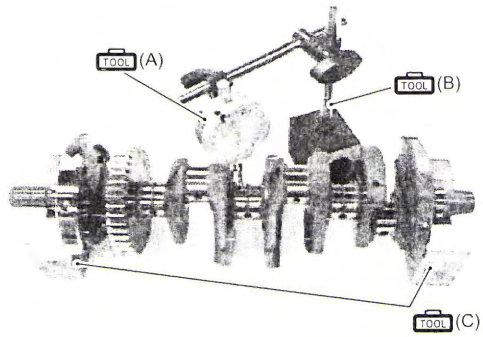


I823H1140282-01

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 (1/100 mm, 10 mm))
(B): 09900–20701 (Magnetic stand)
(C): 09900–21304 (V-block (100 mm))

Crankshaft runout
Service limit: 0.05 mm (0.002 in)



IB08J1140234-02

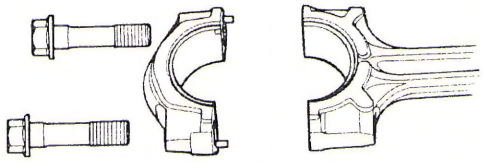
Conrod Crank Pin Bearing Inspection and Selection

BENF08J11406038

Refer to "Engine Bottom Side Disassembly" (Page 1D-50).
Refer to "Engine Bottom Side Assembly" (Page 1D-57).

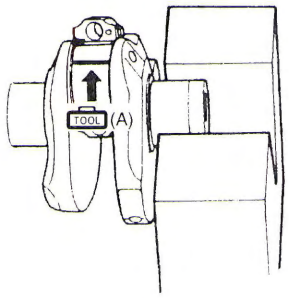
Inspection

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
(A): 09900–22301 (Plastigauge (0.025 – 0.076 mm))



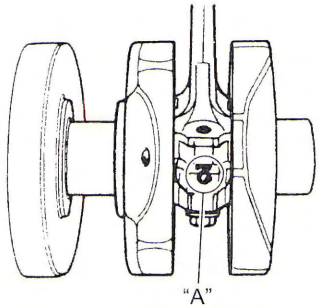
I718H1140286-01

3) Tighten the conrod cap bolts to the specified torque, in two stages.

NOTE

- **When installing the conrod cap 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: 15 N·m (1.5 kgf-m, 11.0 lbf-ft) then turn in 1/4 (90°) turn



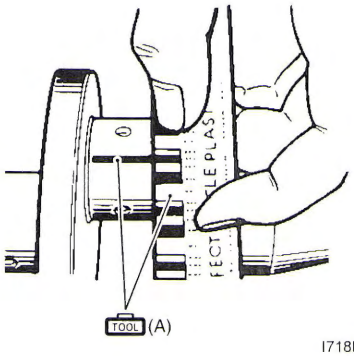
I823H1140284-02

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 (Plastigauge (0.025 – 0.076 mm))

Conrod big end oil clearance
Standard: 0.032 – 0.056 mm (0.0013 – 0.0022 in)

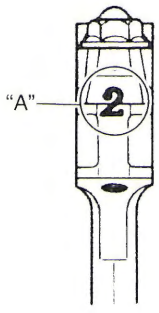
Conrod big end oil clearance
Service limit: 0.080 mm (0.0031 in)



I718H1140289-01

Selection

1) Check the corresponding conrod I.D. code numbers ([1] or [2]) "A".

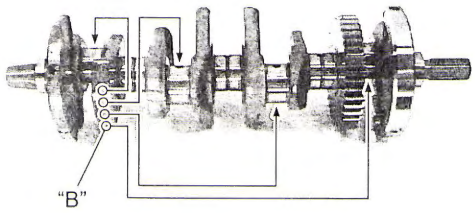


I718H1140290-01

Conrod I.D. specification

Code "A"	I.D. specification
1	36.000 – 36.008 mm (1.4173 – 1.4176 in)
2	36.008 – 36.016 mm (1.4176 – 1.4179 in)

2) Check the corresponding crank pin O.D. code numbers ([1], [2] or [3]) "B".



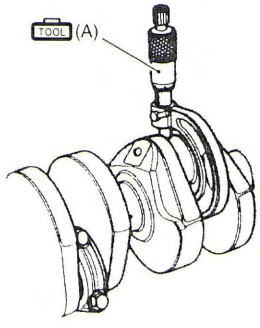
IB08J1140235-02

3) Measure the conrod crank pin O.D. using 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	32.992 – 33.000 mm (1.2989 – 1.2992 in)
2	32.984 – 32.992 mm (1.2986 – 1.2989 in)
3	32.976 – 32.984 mm (1.2983 – 1.2986 in)

Special tool
TOOL (A): 09900–20202 (Micrometer (1/100 mm, 25 – 50 mm))



I823H1140286-01

4) Select the specified bearings from the bearing selection table.

NOTE

The bearings should be replaced as a set.

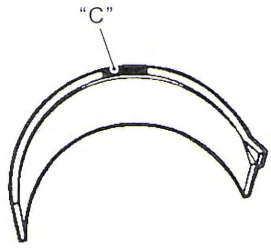
Bearing selection table

		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 (12164-35F00-0D0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)
Brown (12164-35F00-0C0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Black (12164-35F00-0B0)	1.484 – 1.488 mm (0.0584 – 0.0586 in)
Green (12164-35F00-0A0)	1.480 – 1.484 mm (0.0583 – 0.0584 in)



I823H1140595-01

"C": Color code

Crankshaft Journal Bearing Inspection and Selection

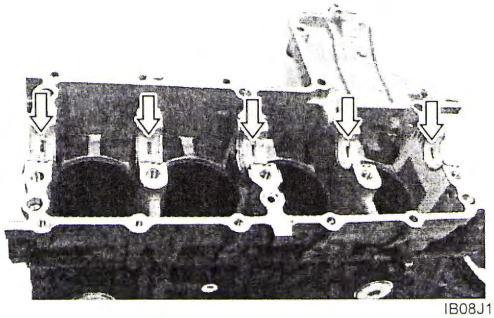
BENF08J11406039

Refer to "Engine Bottom Side Disassembly" (Page 1D-50).

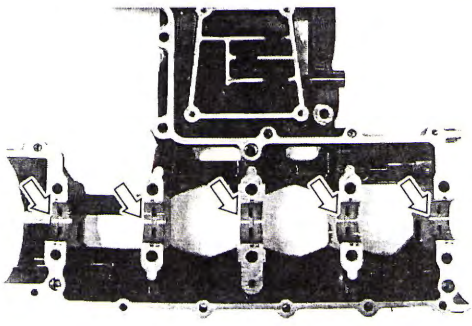
Refer to "Engine Bottom Side Assembly" (Page 1D-57).

Inspection

1) Inspect each upper and lower crankcase bearing for any damage.



IB08J1140236-02



IB08J1140163-02

2) Set the crankshaft onto the upper crankcase.

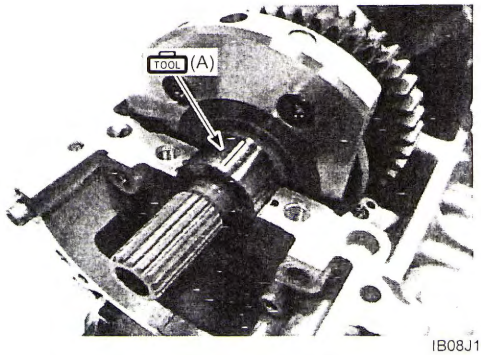
3) Install the plastigauge onto each crankshaft journal as shown in the figure.

Special tool

TOOL (A): 09900–22301 (Plastigauge (0.025 – 0.076 mm))

NOTE

Do not place the plastigauge on the oil hole.



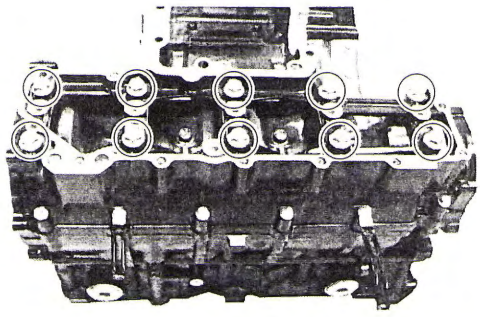
IB08J1140261-01

4) Mate the middle 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 degree turn

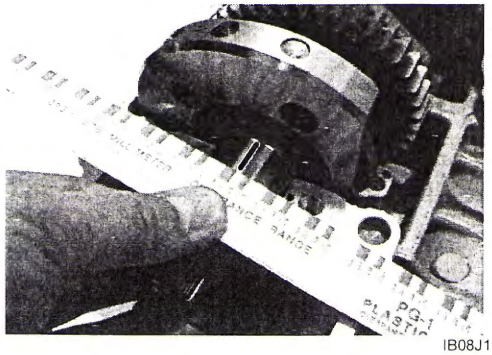


IB08J1140237-02

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 – 0.040 mm (0.0006 – 0.0016 in)

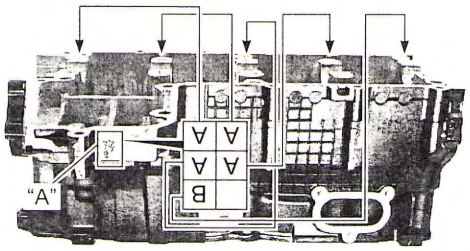
Crankshaft journal oil clearance
Service limit: 0.080 mm (0.0031 in)



IB08J1140262-01

Selection

1) Check the corresponding crankcase journal I.D. codes "A" ([A] or [B]), which are stamped on the rear of the upper crankcase.

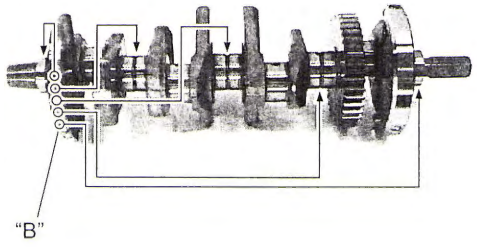


IB08J1140238-02

Crankcase journal I.D. specification

Code "A"	I.D. specification
A	35.000 – 35.008 mm (1.3780 – 1.3783 in)
B	35.009 – 35.016 mm (1.3783 – 1.3786 in)

2) Check the corresponding crankshaft journal O.D. codes "B" ([A], [B] or [C]), which are stamped on the crankshaft.



IB08J1140239-02

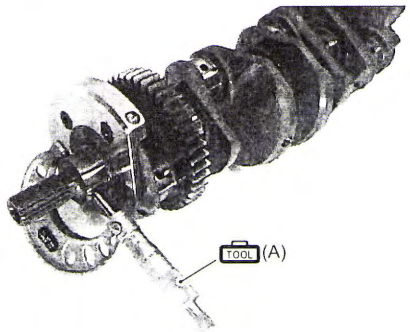
3) Measure the crankshaft O.D. using the special tool. If any of the measurements are out of specification, replace the crankshaft.

Crankshaft journal O.D. specification

Code "B"	O.D. specification
A	31.992 – 32.000 mm (1.2595 – 1.2598 in)
B	31.984 – 31.992 mm (1.2592 – 1.2595 in)
C	31.976 – 31.984 mm (1.2589 – 1.2592 in)

Special tool

TOOL (A): 09900–20202 (Micrometer (1/100 mm, 25 – 50 mm))



IB08J1140240-02

4) Select the specified bearings from the bearing selection table.

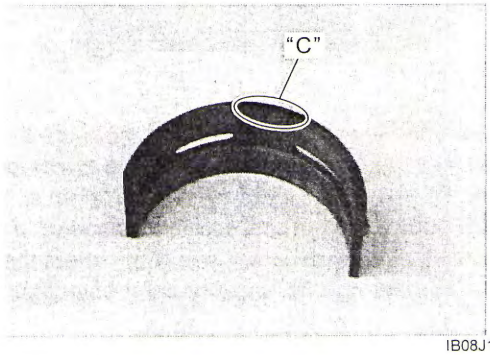
Bearing selection table

		Crankshaft O.D. "B"		
	Code	A	B	C
Crankcase I.D. "A"	A	Green	Black	Brown
	B	Black	Brown	Yellow

IB08J1140242-02

Bearing thickness specification

Color "C" (Part No.)	Thickness
Yellow (12229-35F00-0D0)	1.500 – 1.504 mm (0.0591 – 0.0592 in)
Brown (12229-35F00-0C0)	1.496 – 1.500 mm (0.0589 – 0.0591 in)
Black (12229-35F00-0B0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)
Green (12229-35F00-0A0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)



IB08J1140241-02

"C": Color code

Crankshaft Thrust Clearance Inspection and Selection

BENF08J11406040

Refer to "Engine Bottom Side Disassembly" (Page 1D-50).
Refer to "Engine Bottom Side Assembly" (Page 1D-57).

Inspection

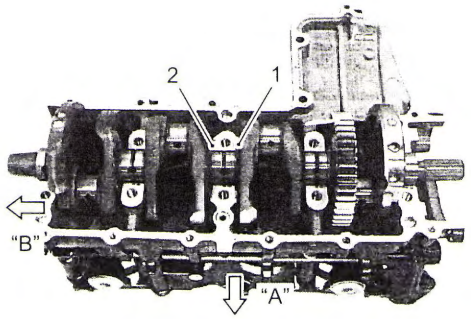
1) With the crankshaft's right-side and left-side thrust bearings inserted into the upper crankcase.
2) Measure the thrust clearance "a" between the left-side thrust bearing and crankshaft using the thickness gauge. If the thrust clearance exceeds the standard range, adjust the thrust clearance.

NOTE

Pull the crankshaft to the left (generator side) so that there is no clearance on the right-side thrust bearing.

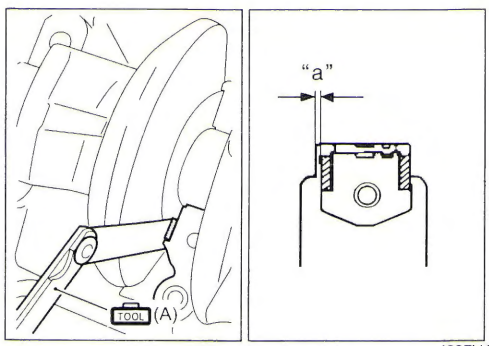
Special tool
TOOL (A): 09900–20803 (Thickness gauge)

Crankshaft thrust clearance "a"
Standard: 0.055 – 0.110 mm (0.0022 – 0.0043 in)



IB08J1140243-02

1. Right-side thrust bearing	"A": Front side
2. Left-side thrust bearing	"B": Left side



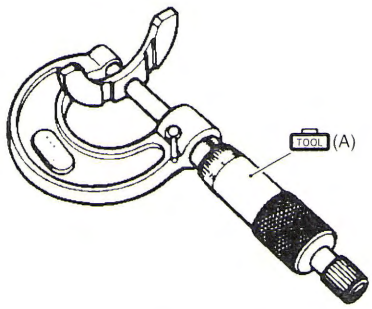
I837H1140197-02

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))

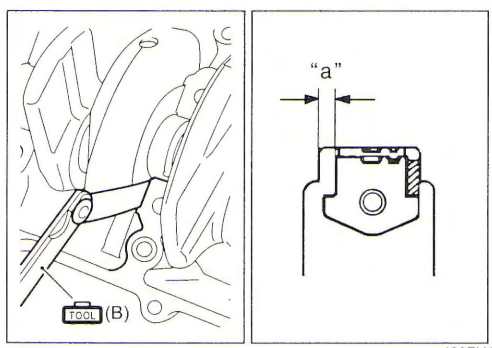
Right-side thrust bearing thickness
Standard: 2.425 – 2.450 mm (0.0955 – 0.0965 in)



I649G1140343-02

2) If the right-side thrust bearing is within the standard range, reinsert the right-side thrust bearing and remove the left-side thrust bearing.
3) With the left-side thrust bearing removed, measure the clearance "a" using the thickness gauge as shown.

Special tool
TOOL (B): 09900–20803 (Thickness gauge)



I837H1140198-02

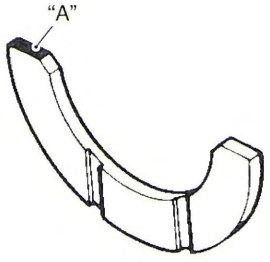
4) Select a left-side thrust bearing from the selection table.

NOTE

Right-side thrust bearing has the same specification as the GREEN (12228-17E00-0D0) of left-side thrust bearing.

Left-side thrust bearing selection table

Clearance before inserting the left-side thrust bearing	Color "A" (Part No.)	Thrust bearing thickness	Thrust clearance
2.560 – 2.585 mm (0.1008 – 0.1018 in)	White (12228-17E00-0F0)	2.475 – 2.500 mm (0.0974 – 0.0984 in)	0.060 – 0.110 mm (0.0024 – 0.0043 in)
2.535 – 2.560 mm (0.0998 – 0.1008 in)	Yellow (12228-17E00-0E0)	2.450 – 2.475 mm (0.0965 – 0.0974 in)	
2.510 – 2.535 mm (0.0988 – 0.0998 in)	Green (12228-17E00-0D0)	2.425 – 2.450 mm (0.0955 – 0.0965 in)	
2.485 – 2.510 mm (0.0978 – 0.0988 in)	Blue (12228-17E00-0C0)	2.400 – 2.425 mm (0.0945 – 0.0955 in)	
2.460 – 2.485 mm (0.0969 – 0.0978 in)	Black (12228-17E00-0B0)	2.375 – 2.400 mm (0.0935 – 0.0945 in)	
2.430 – 2.460 mm (0.0957 – 0.0969 in)	Red (12228-17E00-0A0)	2.350 – 2.375 mm (0.0925 – 0.0935 in)	0.055 – 0.110 mm (0.0022 – 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

BENF08J11407001

Valve + Guide

Unit: mm (in)

Item		Standard	Limit
Valve diam.	IN.	27.2 (1.07)	—
	EX.	22.0 (0.87)	—
Valve clearance (when cold)	IN.	0.10 – 0.20 (0.004 – 0.008)	—
	EX.	0.20 – 0.30 (0.008 – 0.012)	—
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0014)	—
	EX.	0.030 – 0.057 (0.0011 – 0.0022)	—
Valve guide I.D.	IN. & EX.	3.985 – 4.010 (0.1569 – 0.1578)	—
Valve stem O.D.	IN.	3.975 – 3.990 (0.1565 – 0.1571)	—
	EX.	3.955 – 3.970 (0.1557 – 0.1563)	—
Valve stem deflection	IN. & EX.	—	0.35 (0.014)
Valve stem runout	IN. & EX.	—	0.05 (0.002)
Valve seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	—
Valve head thickness	IN. & EX.	—	0.5 (0.02)
Valve head radial runout	IN. & EX.	—	0.03 (0.001)
Valve spring free length	IN. & EX.	—	37.0 (1.46)
Valve spring tension	IN. & EX.	127 – 147 N (13.0 – 14.9 kgf, 28.6 – 33.0 lbs) at length 32.85 mm (1.293 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item		Standard	Limit
Cam height	IN.	36.32 – 36.36 (1.430 – 1.431)	36.02 (1.418)
	EX.	34.98 – 35.02 (1.377 – 1.379)	34.68 (1.365)
Camshaft journal oil clearance	IN. & EX.	0.025 – 0.066 (0.0010 – 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 – 0.9440)	—
Camshaft runout	—		0.10 (0.004)
Cam chain pin (at arrow "3")	14th pin		—
Cylinder head distortion	—		0.20 (0.008)

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard			Limit
Compression pressure	1 300 – 1 700 kPa (13 – 17 kgf/cm², 185 – 242 psi)			1 000 kPa (10 kgf/cm², 142 psi)
Compression pressure difference	—			200 kPa (2 kgf/cm², 28 psi)
Piston-to-cylinder clearance	0.030 – 0.040 (0.0012 – 0.0016)			0.120 (0.0047)
Cylinder bore	72.000 – 72.015 (2.8346 – 2.8352)			No nicks or Scratches
Piston diam.	71.965 – 71.980 (2.8333 – 2.8339) Measure 15 mm (0.6 in) from the skirt end.			71.880 (2.8299)
Cylinder distortion	—			0.20 (0.008)
Piston ring free end gap	1st	R	Approx. 8.2 (0.32)	6.6 (0.26)
	2nd	2R	Approx. 6.1 (0.24)	6.2 (0.24)
Piston ring end gap	1st	R	0.06 – 0.21 (0.002 – 0.008)	0.50 (0.020)
	2nd	2R	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		1.01 – 1.03 (0.0398 – 0.0406)	—
	2nd		0.81 – 0.83 (0.0319 – 0.0327)	—
	Oil		1.51 – 1.53 (0.0594 – 0.0602)	—
Piston ring thickness	1st		0.97 – 0.99 (0.0382 – 0.0390)	—
	2nd		0.77 – 0.79 (0.0303 – 0.0311)	—
Piston pin bore	16.002 – 16.008 (0.6300 – 0.6302)			16.030 (0.6311)
Piston pin O.D.	15.995 – 16.000 (0.6297 – 0.6299)			15.980 (0.6291)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard		Limit
Conrod small end I.D.	16.010 – 16.018 (0.6303 – 0.6306)		16.040 (0.6315)
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	0.032 – 0.056 (0.0013 – 0.0022)		0.080 (0.0031)
Crank pin O.D.	32.976 – 33.000 (1.2983 – 1.2992)		—
Crankshaft journal oil clearance	0.016 – 0.040 (0.0006 – 0.0016)		0.080 (0.0031)
Crankshaft journal O.D.	31.976 – 32.000 (1.2589 – 1.2598)		—
Crankshaft thrust bearing thickness	Right side	2.425 – 2.450 (0.0955 – 0.0965)	—
	Left side	2.350 – 2.500 (0.0925 – 0.0984)	—
Crankshaft thrust clearance	0.055 – 0.110 (0.0022 – 0.0043)		—
Crankshaft runout	—		0.05 (0.002)

Throttle Body

Item	Specification
Bore size	32 mm (1.26 in)
I.D. No.	08J0
Idle r/min	1 200 ± 100 r/min
Throttle cable play	2.0 – 4.0 mm (0.08 – 0.16 in)

Tightening Torque Specifications

BENF08J11407002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Throttle cable lock nut	4.5	0.45	3.3	☞(Page 1D-12)
STP sensor mounting screw	3.5	0.35	2.5	☞(Page 1D-14)
ISC valve mounting screw	2	0.2	1.5	☞(Page 1D-15)
TP sensor mounting screw	3.5	0.35	2.5	☞(Page 1D-15)
Fuel delivery pipe mounting screw	3.5	0.35	2.5	☞(Page 1D-16)
Cylinder head bolt (M10)	31 N·m (3.1 kgf-m, 22.5 lbf-ft) then turn in 1/6 (60°) turn			☞(Page 1D-32)
Cylinder head bolt (M6)	10	1.0	7.0	☞(Page 1D-33)
Camshaft journal holder bolt	10	1.0	7.0	☞(Page 1D-35) / ☞(Page 1D-38)
Cam chain tension adjuster mounting bolt	10	1.0	7.0	☞(Page 1D-36)
Cam chain tension adjuster service cap	23	2.3	16.5	☞(Page 1D-36)
Valve timing inspection cap	11	1.1	8.0	☞(Page 1D-36)
Head cover bolt	14	1.4	10.0	☞(Page 1D-37)
Oil gallery plug (Cylinder head)	10	1.0	7.0	☞(Page 1D-43)
Water bypass union	12	1.2	8.5	☞(Page 1D-44)
Thermostat cover bolt	10	1.0	7.0	☞(Page 1D-44)
ECT sensor	18	1.8	13.0	☞(Page 1D-44)
Water jacket plug	9.5	0.95	7.0	☞(Page 1D-57)
Oil gallery plug (M10)	18	1.8	13.0	☞(Page 1D-58)
Oil gallery plug (M16)	35	3.5	25.5	☞(Page 1D-58)
Piston cooling oil jet bolt	10	1.0	7.0	☞(Page 1D-60)
Conrod cap bolt	15 N·m (1.5 kgf-m, 11.0 lbf-ft) then turn in 1/4 (90°) turn			☞(Page 1D-61) / ☞(Page 1D-77)
Crankshaft journal bolt (M9)	18 N·m (1.8 kgf-m, 13.0 lbf-ft) then turn in 50°			☞(Page 1D-63) / ☞(Page 1D-80)
Crankcase bolt (M6) (Initial)	6	0.6	4.3	☞(Page 1D-63) / ☞(Page 1D-65)
Crankcase bolt (M6) (Final)	11	1.1	8.0	☞(Page 1D-63) / ☞(Page 1D-65)
Crankcase bolt (M8) (Initial)	15	1.5	11.0	☞(Page 1D-65)
Crankcase bolt (M8) (Final)	26	2.6	19.0	☞(Page 1D-65)
Oil strainer bolt	10	1.0	7.0	☞(Page 1D-66)
Oil gallery plug (oil pan)	11	1.1	8.0	☞(Page 1D-66)
Oil pan bolt	10	1.0	7.0	☞(Page 1D-67)
Oil cooler mounting bolt	10	1.0	7.0	☞(Page 1D-67)
Oil pressure switch	14	1.4	10.0	☞(Page 1D-68)
GP switch mounting bolt	6	0.6	4.3	☞(Page 1D-68)
Water pump mounting bolt	10	1.0	7.0	☞(Page 1D-68)
Water inlet connector mounting bolt	10	1.0	7.0	☞(Page 1D-69)
Cam chain tensioner bolt	10	1.0	7.0	☞(Page 1D-69)
Cam chain guide No. 1 bolt	10	1.0	7.0	☞(Page 1D-69)
Gearshift cam stopper bolt	10	1.0	7.0	☞(Page 1D-70)
Gearshift cam stopper plate bolt	13	1.3	9.5	☞(Page 1D-70)
Crankcase breather cover bolt	10	1.0	7.0	☞(Page 1D-71)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Throttle Cable Routing Diagram" (Page 1D-2)

"Throttle Body Components" (Page 1D-9)

"Throttle Body Construction" (Page 1D-10)

"Engine Assembly Installation" (Page 1D-28)

"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J11408001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 1D-14) / ☞(Page 1D-15) / ☞(Page 1D-43) / ☞(Page 1D-66) / ☞(Page 1D-66) / ☞(Page 1D-66) / ☞(Page 1D-67) / ☞(Page 1D-68) / ☞(Page 1D-68)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1D-33) / ☞(Page 1D-44) / ☞(Page 1D-59) / ☞(Page 1D-59) / ☞(Page 1D-60) / ☞(Page 1D-61) / ☞(Page 1D-62) / ☞(Page 1D-62)
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1D-37) / ☞(Page 1D-62) / ☞(Page 1D-64) / ☞(Page 1D-67) / ☞(Page 1D-68) / ☞(Page 1D-71)
Thread lock cement	THREAD LOCK CEMENT 1322D	P/No.: 99000–32150	☞(Page 1D-43) / ☞(Page 1D-60) / ☞(Page 1D-66) / ☞(Page 1D-67) / ☞(Page 1D-68) / ☞(Page 1D-69) / ☞(Page 1D-70) / ☞(Page 1D-70)

NOTE

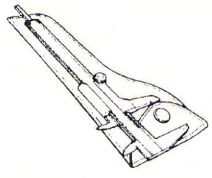
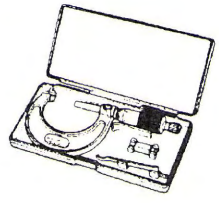
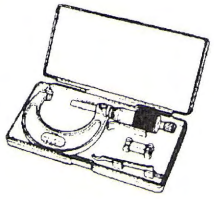
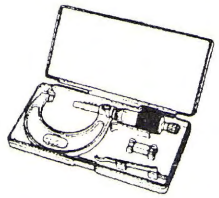
Required service material(s) is also described in:
"Throttle Body Components" (Page 1D-9)
"Engine Bottom Side Assembly" (Page 1D-57)

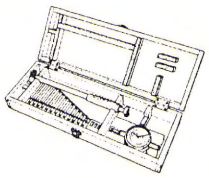
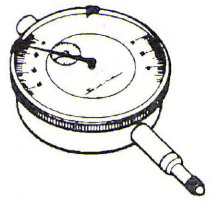
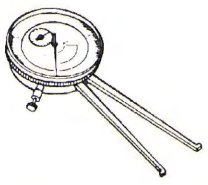
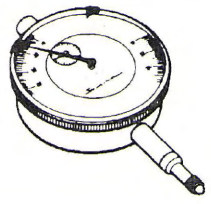
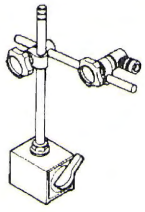
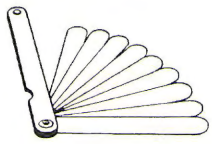
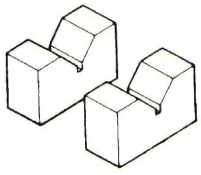
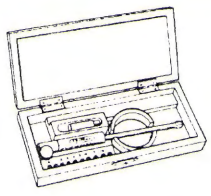
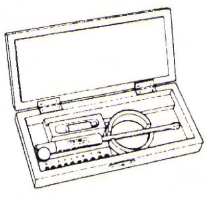
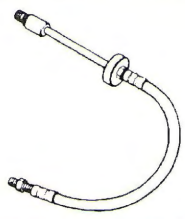
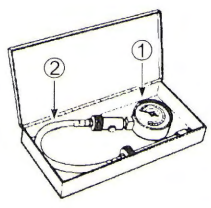
Special Tool

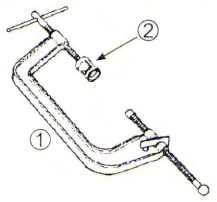
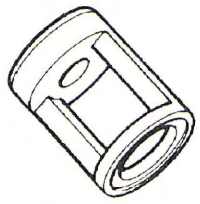
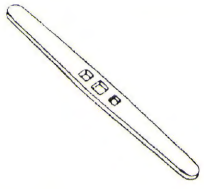
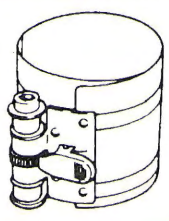
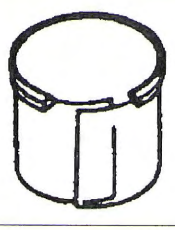
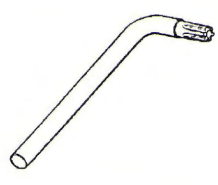
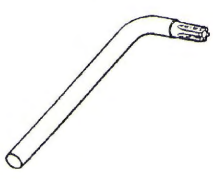
BENF08J11408002

NOTE

Torx® is the registered trademark of Camcar Division of Textron inc. U.S.A.

09900–20102 Vernier calipers (200 mm) ☞(Page 1D-47) / ☞(Page 1D-75)		09900–20202 Micrometer (25 - 50 mm) ☞(Page 1D-38) / ☞(Page 1D-78) / ☞(Page 1D-81)	
09900–20203 Micrometer (50 - 75 mm) ☞(Page 1D-74)		09900–20205 Micrometer (0 - 25 mm) ☞(Page 1D-39) / ☞(Page 1D-47) / ☞(Page 1D-74) / ☞(Page 1D-75) / ☞(Page 1D-77) / ☞(Page 1D-82)	

09900–20530 Cylinder gauge set ☞(Page 1D-72) 	09900–20602 Dial gauge (1 x 0.001 mm) ☞(Page 1D-39) / ☞(Page 1D-75) / ☞(Page 1D-76) 
09900–20605 Dial calipers (10 - 34 mm) ☞(Page 1D-77) 	09900–20607 Dial gauge (10 x 0.01 mm) ☞(Page 1D-38) / ☞(Page 1D-46) / ☞(Page 1D-46) / ☞(Page 1D-46) / ☞(Page 1D-77) 
09900–20701 Dial gauge chuck ☞(Page 1D-38) / ☞(Page 1D-46) / ☞(Page 1D-46) / ☞(Page 1D-46) / ☞(Page 1D-77) 	09900–20803 Thickness gauge ☞(Page 1D-22) / ☞(Page 1D-45) / ☞(Page 1D-72) / ☞(Page 1D-74) / ☞(Page 1D-75) / ☞(Page 1D-76) / ☞(Page 1D-82) / ☞(Page 1D-82) 
09900–21304 V blocks ☞(Page 1D-38) / ☞(Page 1D-46) / ☞(Page 1D-46) / ☞(Page 1D-77) 	09900–22301 Plastigage (0.025 - 0.076 mm) ☞(Page 1D-38) / ☞(Page 1D-77) / ☞(Page 1D-78) / ☞(Page 1D-79) 
09900–22302 Plastigage (0.051 - 0.152 mm) ☞(Page 1D-38) 	09900–22401 Small bore gauge (10 - 18 mm) ☞(Page 1D-75) / ☞(Page 1D-76) 
09900–22403 Small bore gauge (18 - 35 mm) ☞(Page 1D-39) 	09913–10750 Compression gauge adapter ☞(Page 1D-3) 
09915–40620 Oil filter wrench ☞(Page 1D-52) / ☞(Page 1D-67) 	09915–64512 Compression gauge set (2500 kpa) 1. Gauge 2. Hose (Adapter) ☞(Page 1D-3) 

09916–10911 Valve lapper set ☞(Page 1D-47) 	09916–14510 Valve lifter 1. Main unit 2. Attachment ☞(Page 1D-42) / ☞(Page 1D-45) 
09916–14530 Valve lifter attachment ☞(Page 1D-42) / ☞(Page 1D-45) 	09916–33310 Valve guide reamer (ø4.0) ☞(Page 1D-49) 
09916–34542 Reamer handle ☞(Page 1D-48) / ☞(Page 1D-49) 	09916–49030 Valve guide reamer (ø9.3) ☞(Page 1D-48) 
09916–53310 Valve guide installer / remover ☞(Page 1D-48) / ☞(Page 1D-49) 	09916–53321 Valve guide installer attachment ☞(Page 1D-49) 
09916–77310 Piston ring compressor ☞(Page 1D-59) 	09916–84511 Tweezers ☞(Page 1D-42) / ☞(Page 1D-45) 
09919–28610 Sleeve protector ☞(Page 1D-42) / ☞(Page 1D-45) 	09930–11950 Torx® wrench (T25H) ☞(Page 1D-13) / ☞(Page 1D-14) / ☞(Page 1D-15) 
09930–11960 Torx® wrench (T20H) ☞(Page 1D-13) / ☞(Page 1D-15) 	

Engine Lubrication System

Precautions

Precautions for Engine Oil

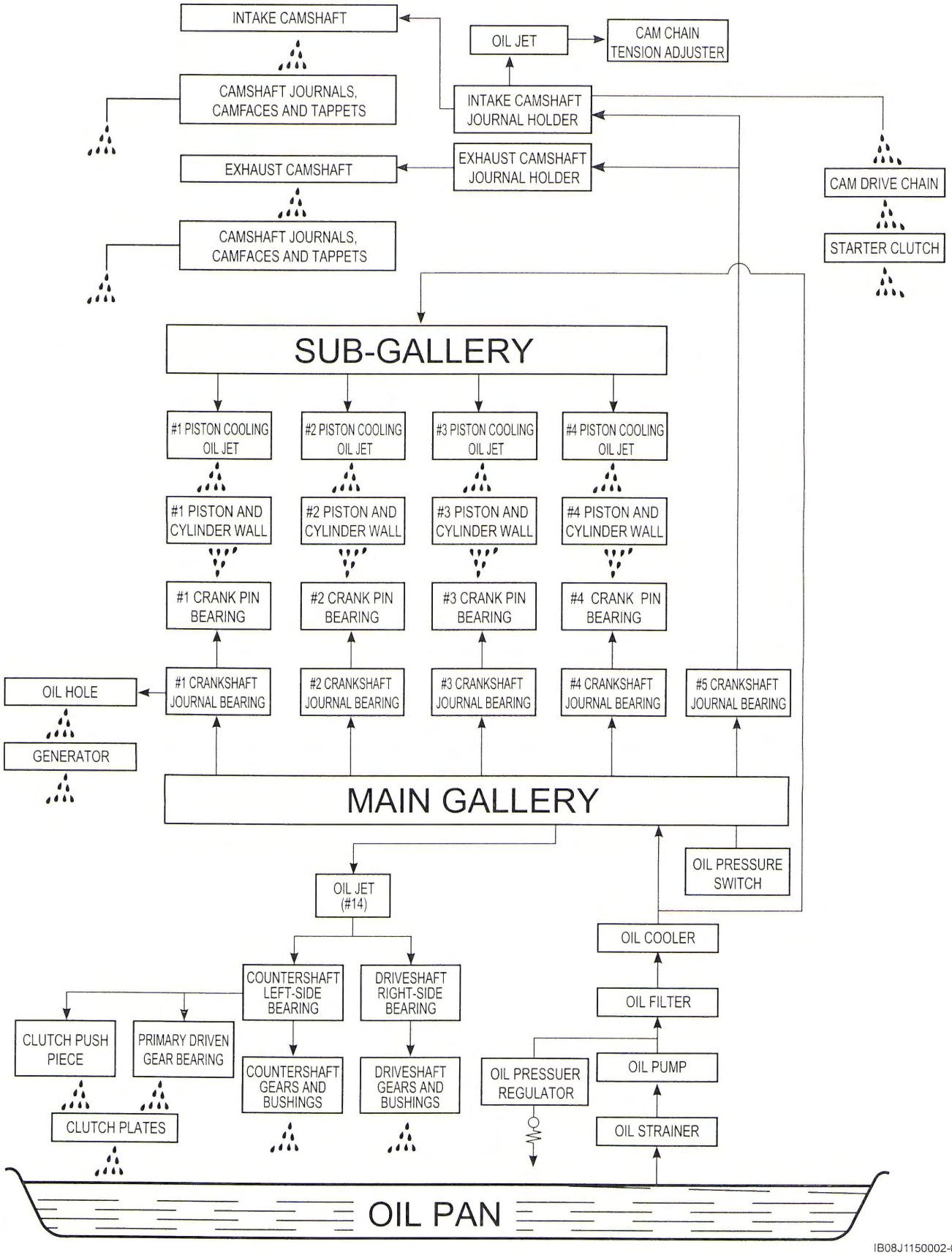
BENF08J11500001

Refer to "Fuel / Oil / Fluid Recommendation" in Section 0C (Page 0C-11).

Schematic and Routing Diagram

Engine Lubrication System Chart Diagram

BENF08J11502001



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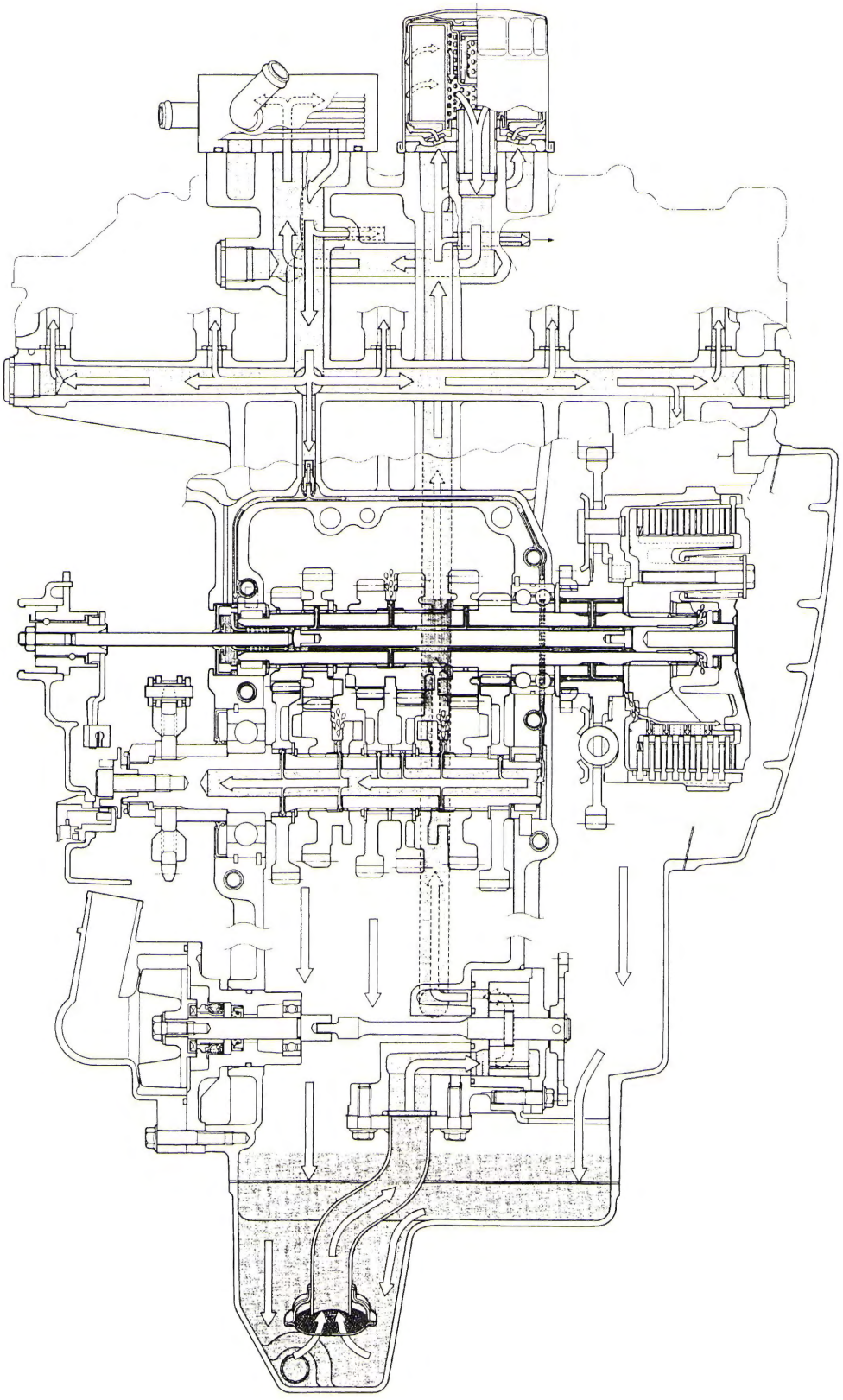
Engine Lubrication Circuit Diagram

BENF08J11502002



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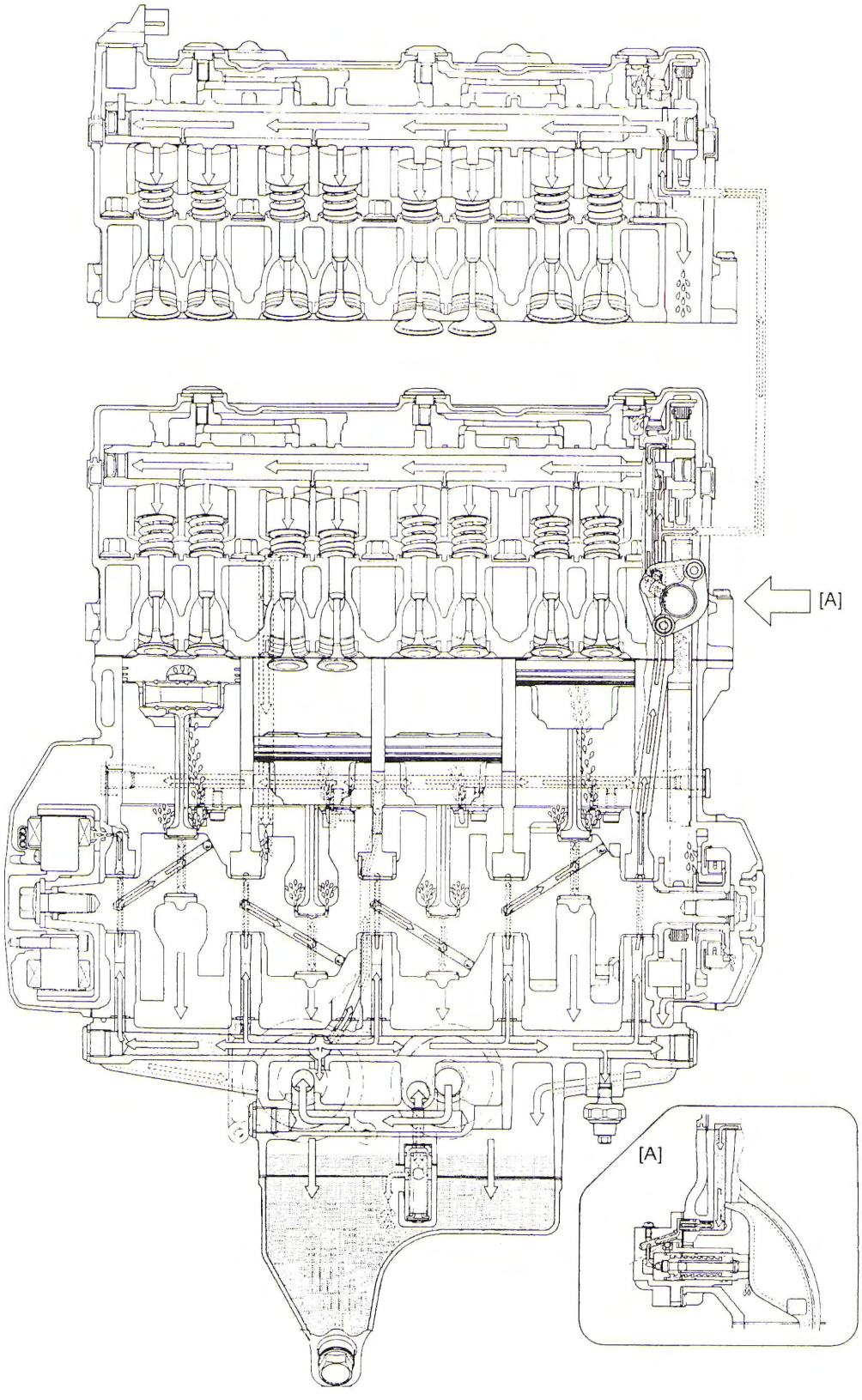


IB08J1150003-02

Diagnostic Information and Procedures

Engine Lubrication Symptom Diagnosis

BENF08J11504001

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

BENF08J11504002

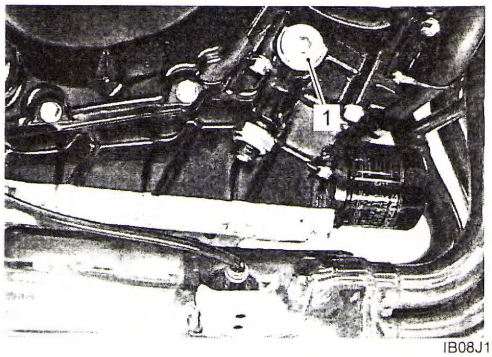
Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts.

NOTE

Before checking the oil pressure, check the following.

- **Oil level (Refer to "Engine Oil and Filter Replacement" (Page 1E-6).)**
- **Oil leaks (If leak is found, repair it.)**
- **Oil quality (If oil is discolored or deteriorated, replace it.)**

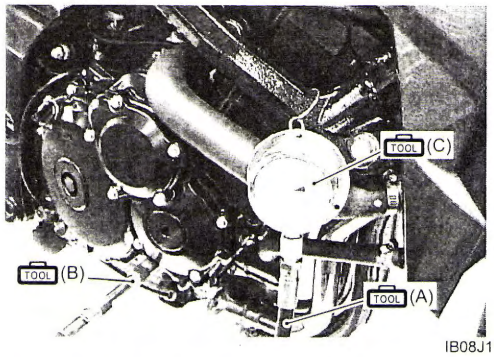
1) Start the engine and check if the oil pressure indicator light is turned on. If the light stays on, check the oil pressure indicator light circuit. If the circuit is OK, check the oil pressure in the following manner.
2) Remove the main oil gallery plug (1).



IB08J1150004-02

3) Install the oil pressure gauge and attachment to the main oil gallery.

Special tool
TOOL (A): 09915–74521 (Oil pressure gauge hose)
TOOL (B): 09915–74540 (Oil pressure gauge attachment)
TOOL (C): 09915–77331 (Meter (for high pressure))



IB08J1150005-03

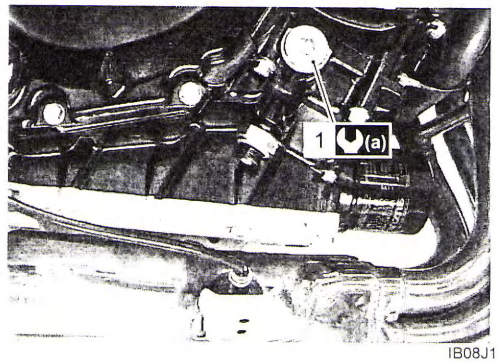
4) Warm up the engine as follows:
Summer: 10 min. at 2 000 r/min
Winter: 20 min. at 2 000 r/min
5) After warming up, increase the engine speed to 3 000 r/min (Observe the tachometer), and read the oil pressure gauge.
If the oil pressure is lower or higher than the specification, the following causes may be considered.

Oil pressure specification
100 – 400 kPa (1.0 – 4.0 kgf/cm², 14 – 57 psi) at 3 000 r/min, Oil temp. at 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

6) Stop the engine and remove the oil pressure gauge and attachment.
7) Install a new gasket and tighten the main oil gallery plug (1) to the specified torque.

Tightening torque
Main oil gallery plug (M16) (a): 35 N·m (3.5 kgf-m, 25.5 lbf-ft)



IB08J1150006-02

8) Check the engine oil level. Refer to "Engine Oil and Filter Replacement" (Page 1E-6).

Repair Instructions

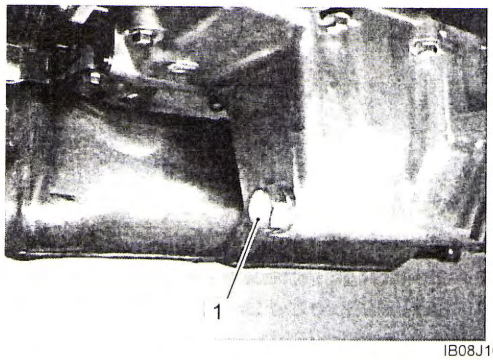
Engine Oil and Filter Replacement

BENF08J11506001

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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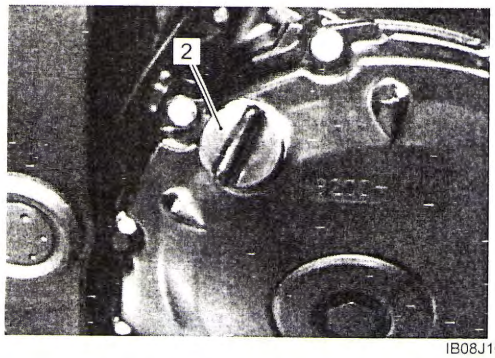

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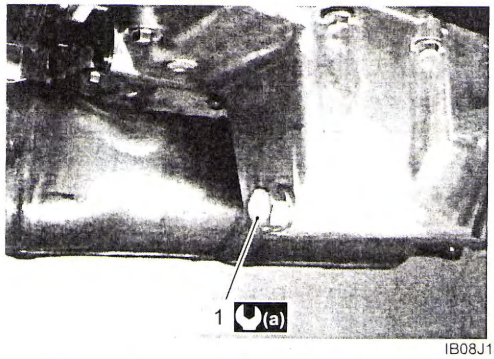
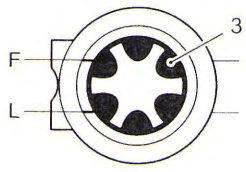
3) Install the new gasket and tighten the oil drain plug (1) to the specified torque.

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



IB08J1020016-02

4) Pour new oil through the oil filler. When performing an oil change (without oil filter replacement), the engine will hold about 3.2 L (3.4/2.8 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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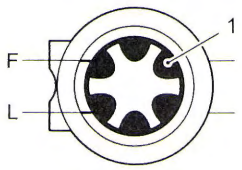
Oil Level Inspection

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".

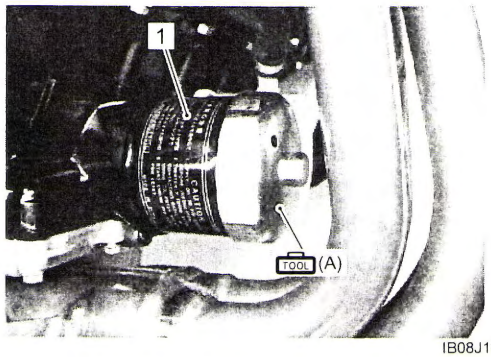


I815H1020024-01

Oil Filter Replacement

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

Special tool
(A): 09915–40620 (Oil filter wrench)



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

NOTICE

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

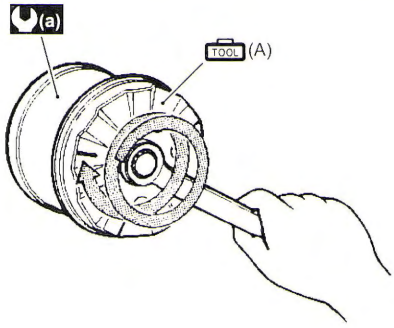
4) Install the new oil filter. Turn it by hand until you feel that the oil filter O-ring contacts the oil filter mounting surface. Then, tighten the oil filter two full turns (or to specified torque) using the special tool.

NOTE

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

Special tool
(A): 09915–40620 (Oil filter wrench)

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



I823H1020041-01

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

Necessary amount of engine oil
Oil change: 3 200 ml (3.4/2.8 US/Imp qt)
Oil and filter change: 3 600 ml (3.8/3.2 US/Imp qt)
Engine overhaul: 3 850 ml (4.1/3.4 US/Imp qt)

Engine Oil Level Inspection

BENF08J11506002

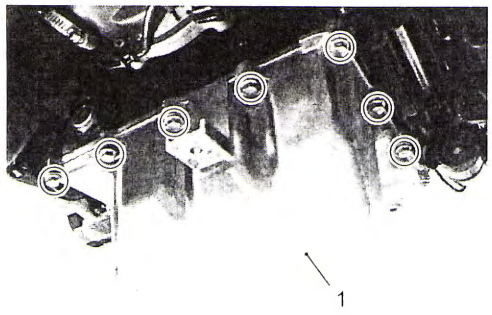
Refer to "Oil Level Inspection" of "Engine Oil and Filter Replacement" (Page 1E-6).

Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation

BENF08J11506003

Removal

1) Drain engine oil. Refer to "Engine Oil and Filter Replacement" (Page 1E-6).
2) Remove the exhaust pipe and muffler. Refer to "Exhaust Pipe / Muffler Removal and Installation" in Section 1K (Page 1K-12).
3) Remove the radiator reservoir tank. Refer to "Radiator Reservoir Tank Removal and Installation" in Section 1F (Page 1F-10).
4) Remove the oil pan (1). Refer to "Engine Bottom Side Disassembly" in Section 1D (Page 1D-50).



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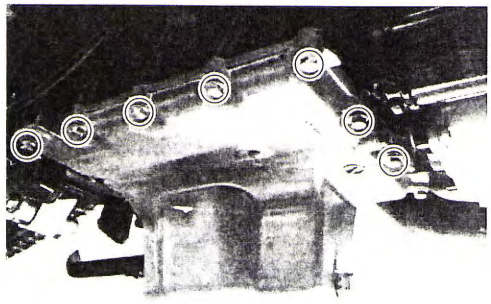

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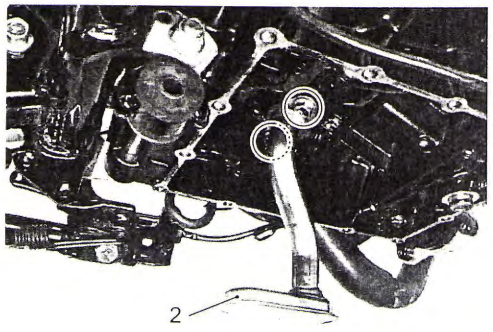
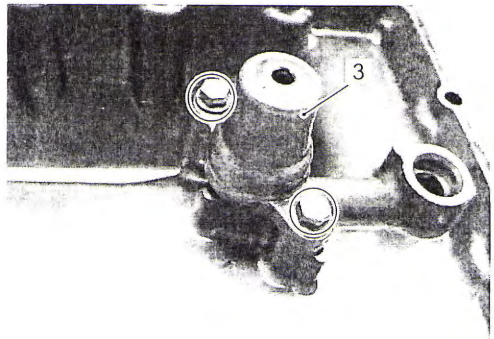
5) Remove the oil strainer (2).



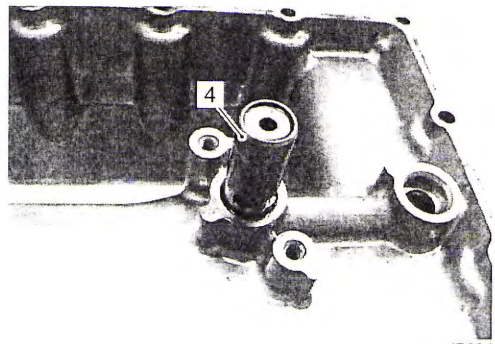
IB08J1150009-02

6) Remove the oil pressure regulator case (3).



IB08J1150010-02

7) Remove the oil pressure regulator (4).



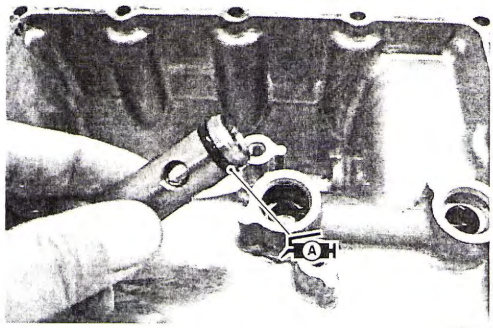
IB08J1150011-02

Installation

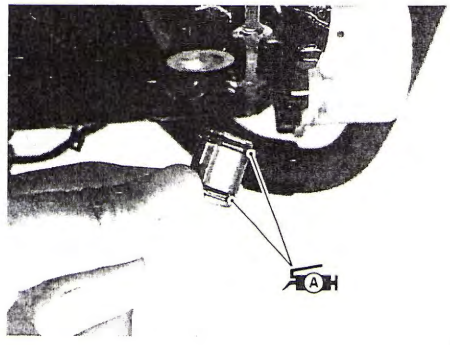
Installation is in the reverse order of removal. Pay attention to the following points:

- Apply grease to the new O-rings.

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

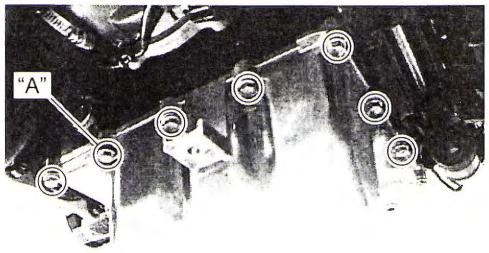


IB08J1150012-02

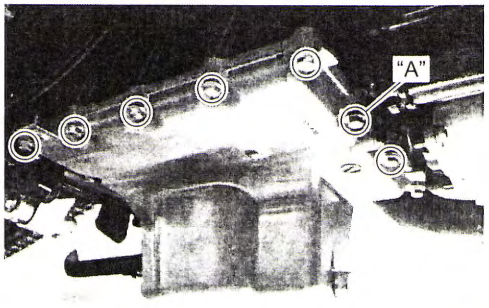


IB08J1150013-02

- Apply bond to the mating surface of the oil pan. Refer to "Engine Bottom Side Assembly" in Section 1D (Page 1D-57).
- Tighten the oil pan bolts diagonally.
- Fit the new gasket washer to the oil pan bolt "A" to prevent oil leakage.



IB08J1150015-02



IB08J1150014-02

- Pour engine oil. Refer to "Engine Oil and Filter Replacement" (Page 1E-6).

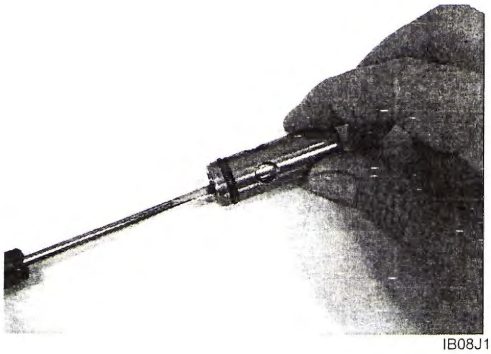
Oil Pressure Regulator / Oil Strainer Inspection

BENF08J11506004

Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation" (Page 1E-8).

Oil Pressure Regulator

Inspect the operation of the oil pressure regulator by pushing on the piston with a proper bar.
If the piston does not operate, replace the oil pressure regulator with a new one.



IB08J1150016-02

Oil Strainer

Clean the oil strainer if necessary.
Inspect the oil strainer body for damage. If necessary, replace it with a new one.



IB08J1150017-02

Oil Cooler / Oil Cooler Hose Inspection

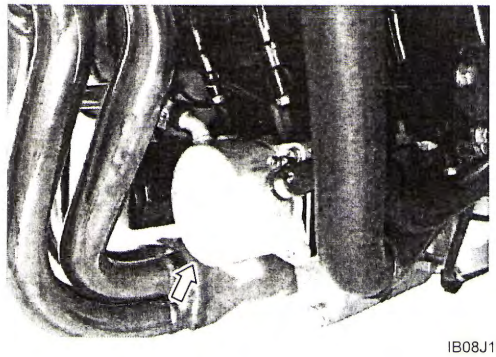
BENF08J11506005

Oil Cooler Hose Inspection

Refer to "Water Hose Inspection" in Section 1F (Page 1F-9).

Oil Cooler Inspection

Inspect the oil cooler for engine oil leakage. If any defects are found, replace the oil cooler with a new one. Refer to "Oil Cooler Removal and Installation" (Page 1E-10).



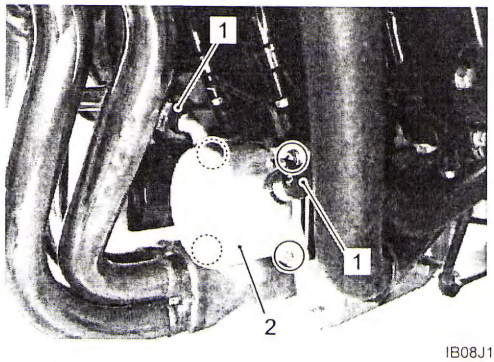
IB08J1150018-02

Oil Cooler Removal and Installation

BENF08J11506006

Removal

1) Drain engine oil and engine coolant. Refer to "Engine Oil and Filter Replacement" (Page 1E-6) and "Cooling System Inspection" in Section 1F (Page 1F-5).
2) Disconnect the oil cooler hoses (1) and remove oil cooler (2).



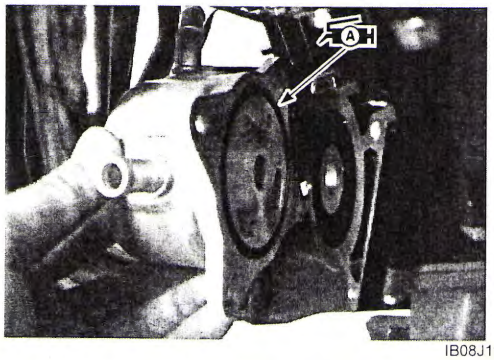
IB08J1150019-02

Installation

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

- Apply grease to the new O-ring.

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



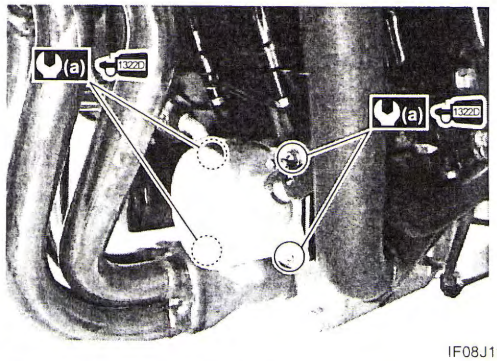
IB08J1150020-02

- Apply a small quantity of thread lock to the oil cooler mounting bolts and tighten them to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
Oil cooler mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Connect the oil cooler hoses securely. Refer to "Water Hose Routing Diagram" in Section 1F (Page 1F-3).



IF08J1150001-01

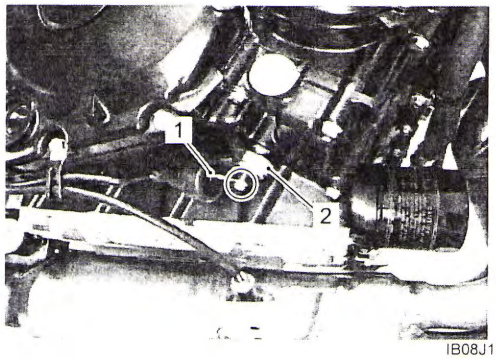
- Pour engine coolant and engine oil. Refer to "Cooling System Inspection" in Section 1F (Page 1F-5) and "Engine Oil and Filter Replacement" (Page 1E-6).

Oil Pressure Switch Removal and Installation

BENF08J11506007

Removal

1) Turn the ignition switch OFF.
2) Drain engine oil. Refer to "Engine Oil and Filter Replacement" (Page 1E-6).
3) Disconnect the oil pressure switch lead wire (1).
4) Remove the oil pressure switch (2).

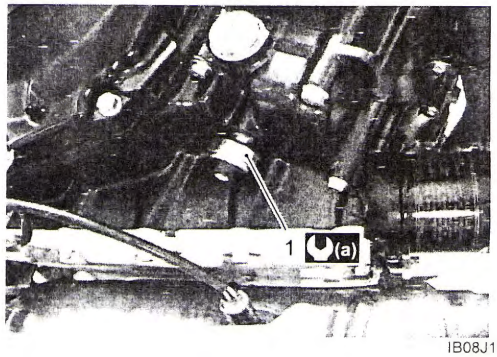


IB08J1150022-03

Installation

1) Install the oil pressure switch (1) and tighten it to the specified torque.

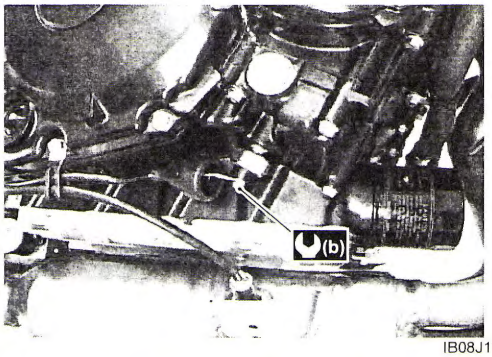
Tightening torque
Oil pressure switch (a): 14 N·m (1.4 kgf-m, 10.0 lbf-ft)



IB08J1150023-03

2) Connect the oil pressure switch lead wire securely. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-3).

Tightening torque
Oil pressure switch lead wire bolt (b): 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)



IB08J1150024-03

3) Pour engine oil. Refer to "Engine Oil and Filter Replacement" (Page 1E-6).

Oil Pressure Switch Inspection

BENF08J11506008

Refer to "Oil Pressure Indicator Inspection" in Section 9C (Page 9C-7).

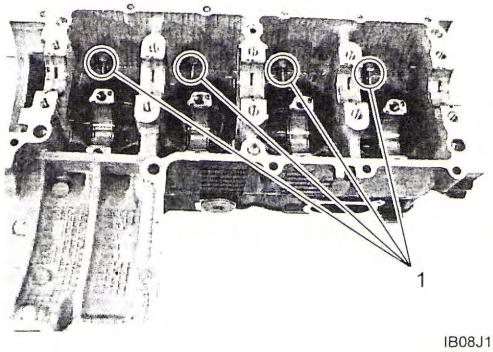
Oil Jet / Oil Gallery Jet Removal and Installation

BENF08J11506009

Oil Jet (For Pistons)

Removal

1) Remove the engine assembly. Refer to "Engine Assembly Removal" in Section 1D (Page 1D-25).
2) Remove the crankshaft assembly. Refer to "Engine Bottom Side Disassembly" in Section 1D (Page 1D-50).
3) Remove the piston cooling oil jets (1) from the upper crankcase.

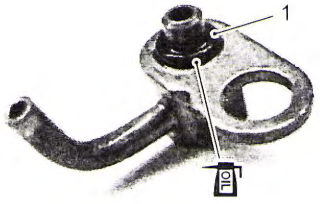


IB08J1150025-02

Installation

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

- Fit the new O-ring (1) to each piston cooling oil jet and apply engine oil to them.

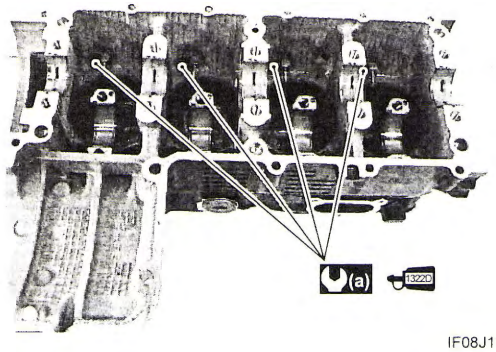


I837H1150021-01

- Apply a small quantity of thread lock to the bolts and tighten them to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
Piston cooling oil jet bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IF08J1150002-01

Oil Jet (For Cam Chain Tension Adjuster)

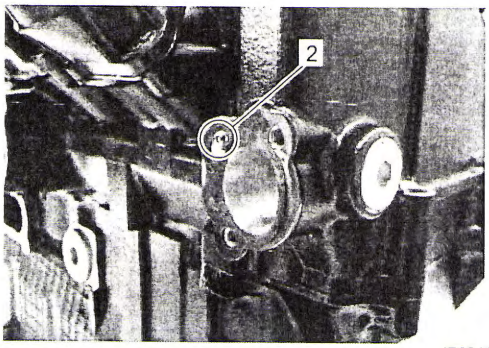
Removal

1) Remove the engine assembly. Refer to "Engine Assembly Removal" in Section 1D (Page 1D-25).
2) Remove the cam chain tension adjuster (1). Refer to "Engine Top Side Disassembly" in Section 1D (Page 1D-30).



IB08J1150037-01

3) Remove the oil jet (2).

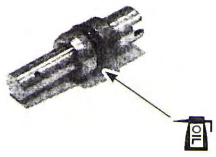


IB08J1150038-01

Installation

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

- Apply engine oil to the new O-ring.



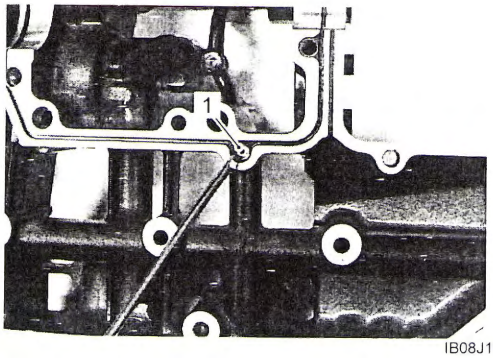
IB08J1150027-02

- Install new gasket.

Oil Jet (For Transmission)

Removal

1) Remove the engine assembly. Refer to "Engine Assembly Removal" in Section 1D (Page 1D-25).
2) Separate the crankcases, middle and lower. Refer to "Engine Bottom Side Disassembly" in Section 1D (Page 1D-50).
3) Remove the oil jet (1) (for transmission) from the lower crankcase.



IB08J1150029-02

Installation

Installation is in the reverse order of removal.

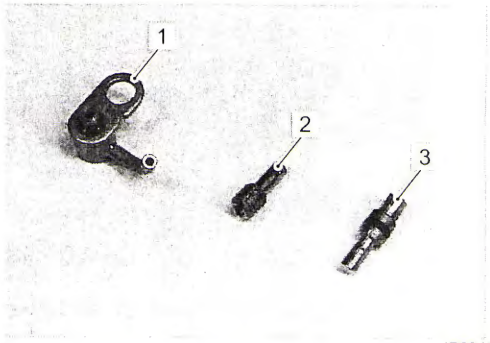
Oil Jet / Oil Hall Inspection

BENF08J11506010

Refer to "Oil Jet / Oil Gallery Jet Removal and Installation" (Page 1E-11).

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.

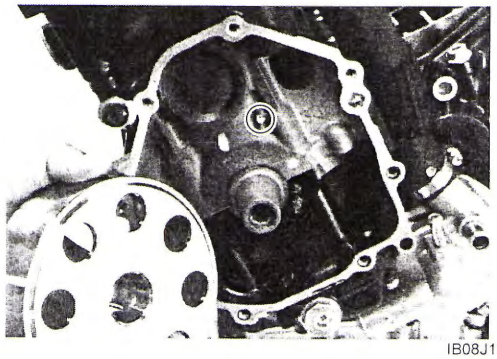


IB08J1150028-02

1.	Piston cooling jet
2.	Oil jet (For transmission)
3.	Oil jet (For cam chain tension adjuster)

Oil Hall

Inspect the oil hall for clogging. Clean the oil hall if necessary.



IB08J1150036-02

Oil Pump Removal and Installation

BENF08J11506011

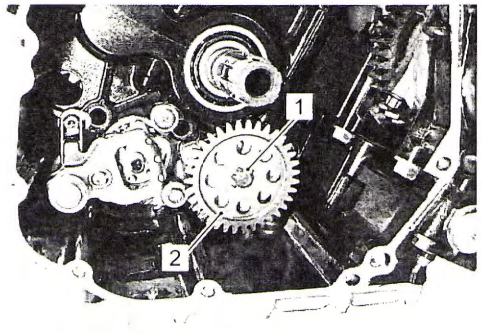
Removal

1) Drain engine oil. Refer to "Engine Oil and Filter Replacement" (Page 1E-6).
2) Remove the clutch assembly. Refer to "Clutch Removal" in Section 5C (Page 5C-8).
3) Remove the snap ring (1) and oil pump driven gear (2).

NOTE

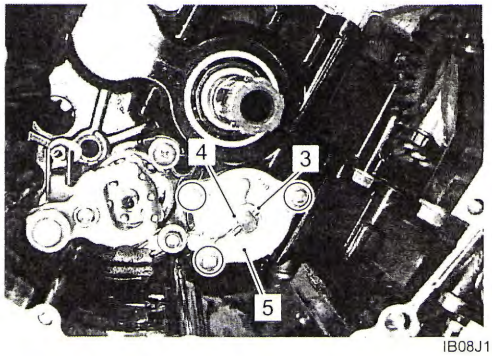
Be careful not to drop any parts into the crankcase.

Special tool
TOOL : 09900–06107 (Snap ring remover (Open type))



IB08J1150030-02

4) Remove the pin (3) and washer (4).
5) Remove the oil pump (5).



IB08J1150031-02

Installation

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

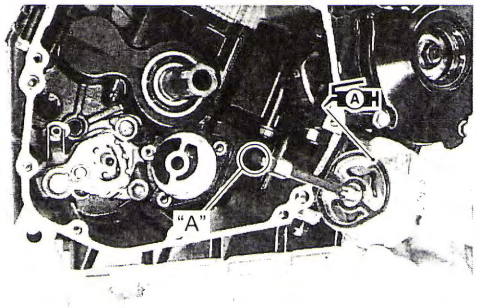
- Apply grease to the new gasket.

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

- Install the oil pump.

NOTE

Set the oil pump shaft end "A" to the water pump shaft.



IB08J1150032-02

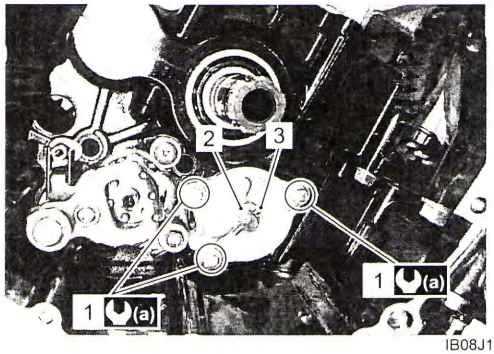
- Tighten the oil pump mounting bolts (1) to the specified torque.

Tightening torque
Oil pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Install the washer (2) and pin (3).

NOTE

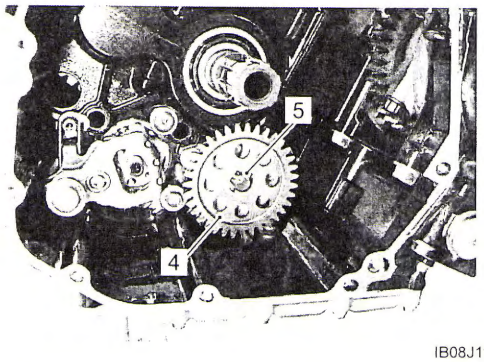
Be careful not to drop any parts into the crankcase.



IB08J1150033-02

- Install the oil pump driven gear (4) and new snap ring (5).

Special tool
TOOL : 09900–06107 (Snap ring remover (Open type))



IB08J1150034-02

- Install the clutch assembly. Refer to "Clutch Installation" in Section 5C (Page 5C-10).

Oil Pump Inspection

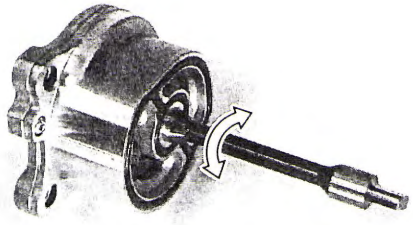
BENF08J11506012

Inspect the oil pump in the following procedures:

1) Remove the oil pump. Refer to "Oil Pump Removal and Installation" (Page 1E-13).
2) Rotate the oil pump by hand and check that it moves smoothly. If it does not move smoothly, replace the oil pump.

NOTICE

Do not attempt to disassemble the oil pump. The oil pump is available only as an assembly.



IB08J1150035-02

3) Install the oil pump. Refer to "Oil Pump Removal and Installation" (Page 1E-13).

Specifications

Service Data

BENF08J11507001

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	3 200 ml (3.4/2.8 US/Imp qt)	
	Filter change	3 600 ml (3.8/3.2 US/Imp qt)	
	Overhaul	3 850 ml (4.1/3.4 US/Imp qt)	

Tightening Torque Specifications

BENF08J11507002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Main oil gallery plug (M16)	35	3.5	25.5	☞(Page 1E-6)
Oil drain plug	23	2.3	16.5	☞(Page 1E-6)
Oil filter	20	2.0	14.5	☞(Page 1E-7)
Oil cooler mounting bolt	10	1.0	7.0	☞(Page 1E-10)
Oil pressure switch	14	1.4	10.0	☞(Page 1E-10)
Oil pressure switch lead wire bolt	1.5	0.15	1.0	☞(Page 1E-11)
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)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

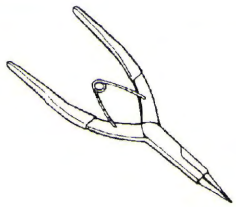
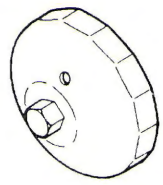
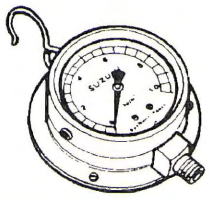
Recommended Service Material

BENF08J11508001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 1E-8) / ☞(Page 1E-10) / ☞(Page 1E-13)
Thread lock cement	THREAD LOCK CEMENT 1322D	P/No.: 99000–32150	☞(Page 1E-10) / ☞(Page 1E-11)

Special Tool

BENF08J11508002

09900–06107 Snap ring pliers (External) ☞(Page 1E-13) / ☞(Page 1E-14)		09915–40620 Oil filter wrench ☞(Page 1E-7) / ☞(Page 1E-7)	
09915–74521 Oil pressure gauge hose ☞(Page 1E-5)		09915–74540 Oil pressure gauge attachment ☞(Page 1E-5)	
09915–77331 Oil pressure gauge (1000 kpa) ☞(Page 1E-5)			

Engine Cooling System

Precautions

Precautions for Engine Cooling System

BENF08J11600001

⚠ 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

BENF08J11600002

Refer to "Fuel / Oil / Fluid Recommendation" in Section 0C (Page 0C-11).

General Description

Engine Coolant Description

BENF08J11601001

For SUZUKI Super Long Life Coolant

NOTICE

- **Ethanol or methanol base coolant or water alone should not be used in cooling system at any time as damage to cooling system could occur.**
- **Do not mix the distilled water, SUZUKI long life coolant (coolant color: Green) or equivalent.**

SUZUKI super long life coolant will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above –36 °C (–33 °F).

Anti-freeze concentration table

Anti-freeze density	Freezing point
50%	–36 °C (–33 °F)

For SUZUKI Long Life Coolant

NOTICE

- **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.)**

The 50:50 mixture of distilled water and ethylene glycol anti-freeze 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

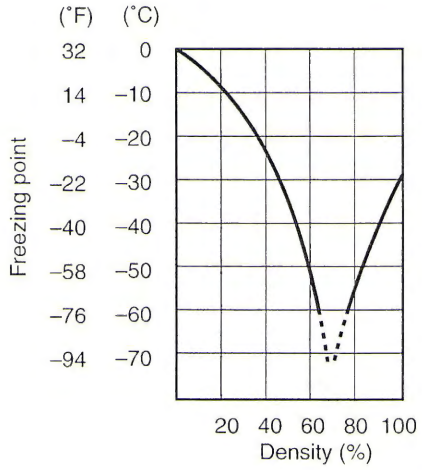


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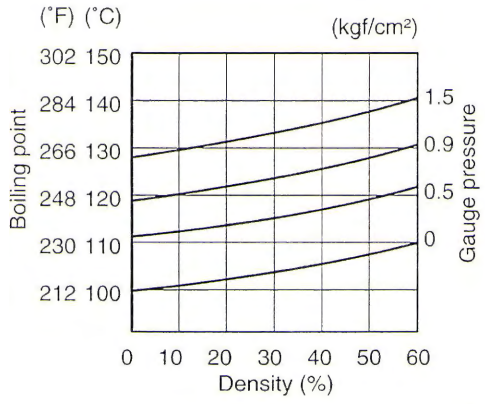
Fig. 2: Engine coolant density-boiling point curve



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Schematic and Routing Diagram

Cooling Circuit Diagram

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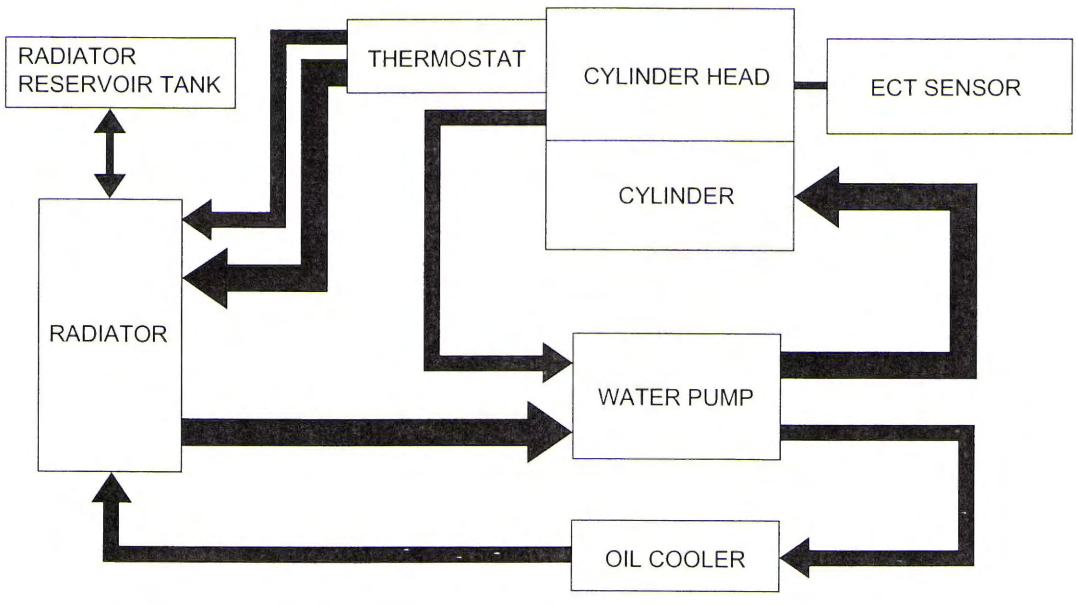

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Water Hose Routing Diagram

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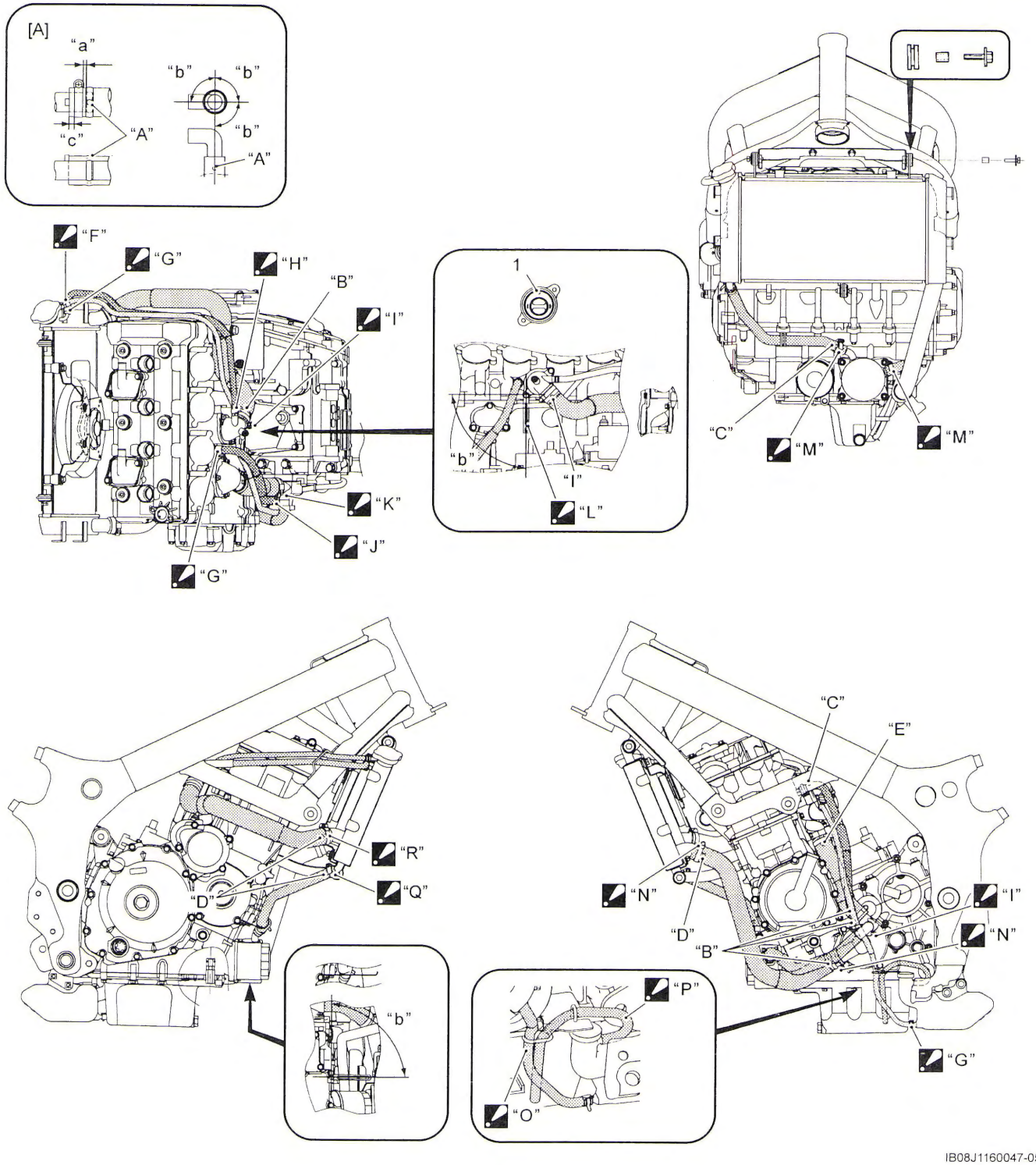

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1. Jiggle valve	"H": Clamp end should face backward.	"P": Pass the reservoir tank over flow hose through the guide. Pass the reservoir tank over flow hose inside the reservoir tank inlet hose.
"A": Marking	"I": Screw head should face backward.	"Q": Screw head should face downward.
"B": White marking	"J": Do not contact the water bypass hose to the clamp end.	"R": Screw head should face right side.
"C": Yellow marking	"K": Screw head should face left-back side.	"a": Clearance
"D": Pink marking	"L": Clamp the hoses at the marking position.	"b": 90°
"E": Blue marking	"M": Screw head should face forward.	"c": 2 – 8 mm
"F": Clamp end should face downward.	"N": Screw head should face left side.	[A]: Outline of marking position
"G": Clamp end should face left side.	"O": Pass the reservoir tank inlet hose through the guide.	

Diagnostic Information and Procedures

Engine Cooling Symptom Diagnosis

BENF08J11604001

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.*
	ISC bad 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

BENF08J11606001

⚠ WARNING

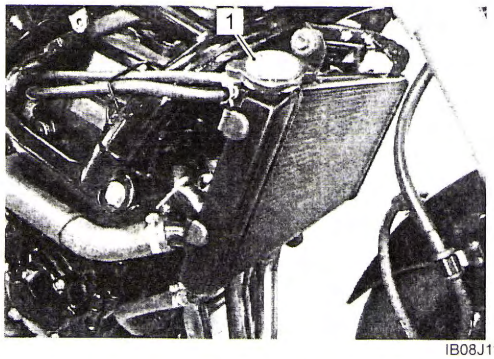
- **Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.**
- **When removing the radiator cap tester, put a rag on the filler to prevent the engine coolant from spraying out.**

Inspect the cooling circuit in the following procedures:

1) Remove the frame body cover (RH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Remove the radiator cap (1).

NOTICE

Do not exceed the radiator cap release pressure, or the radiator cap and subsequently the radiator, can be damaged.



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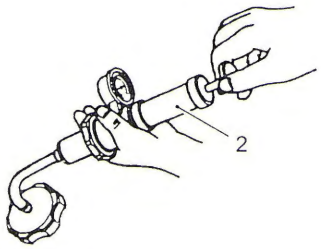
3) Connect the radiator tester (2) to the filler.
4) Pressurize the cooling system with 108 kPa (1.1 kgf/cm^2, 15.6 psi) of pressure, and then check if it holds the pressure for 10 seconds.



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5) After finishing the cooling circuit inspection, reinstall the removed parts.

Cooling System Inspection

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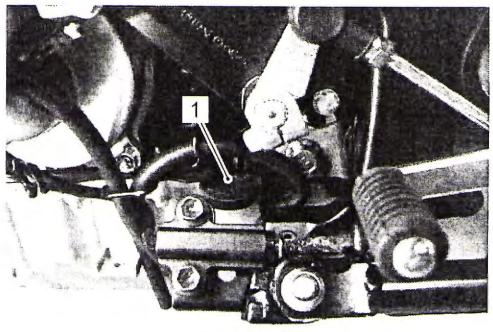
Engine Coolant Level Inspection

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 oil pan.



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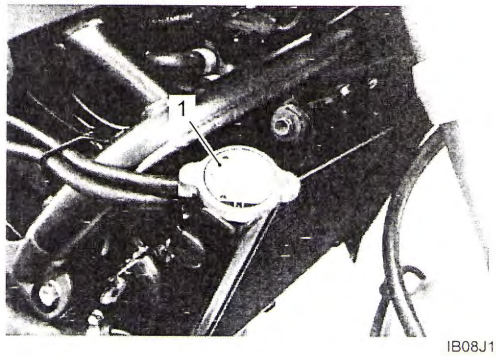
Engine Coolant Change

Refer to "Engine Coolant Description" (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 frame body cover (RH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Remove the radiator cap (1).



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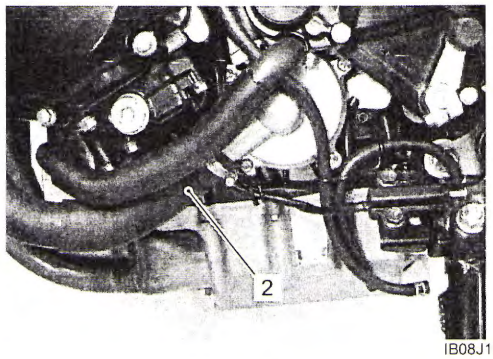
3) Drain engine coolant by disconnecting the water pump inlet hose (2).



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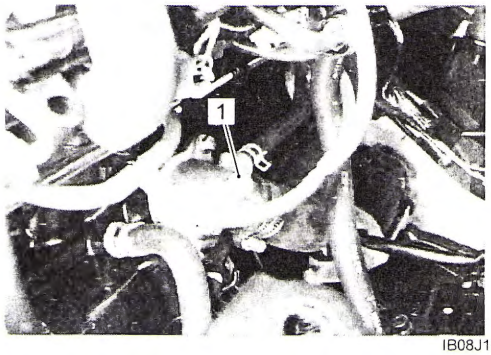
4) Flush the radiator with fresh water if necessary.
5) Reconnect the water pump inlet hose.
6) Pour the specified engine coolant up to the radiator inlet.

Engine coolant capacity (excluding reservoir)
2 580 ml (2.7/2.3 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) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
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) Add engine coolant up to the radiator inlet.
8) Repeat the procedures 5) to 6) until no air bleeds from the radiator inlet.
9) Loosen the air bleeder bolt (1) and check the engine coolant flows out.



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10) Tighten the air bleeder bolt to the specified torque.

Tightening torque
Air bleeder bolt: 5.5 N·m (0.55 kgf-m, 3.7 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.

NOTICE

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" (Page 1F-9).

Radiator Cap Inspection

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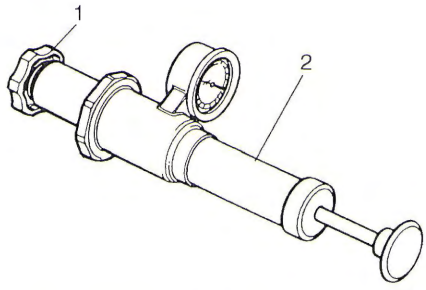
Inspect the radiator cap in the following procedures:

1) Remove the radiator cap. Refer to "Cooling Circuit Inspection" (Page 1F-5).
2) Attach the radiator cap (1) to the radiator tester (2) as shown.



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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
93.3 – 122.7 kPa (0.96 – 1.25 kgf/cm², 13.6 – 17.7 psi)

4) After finishing the radiator cap inspection, reinstall the removed parts.

Radiator Inspection and Cleaning

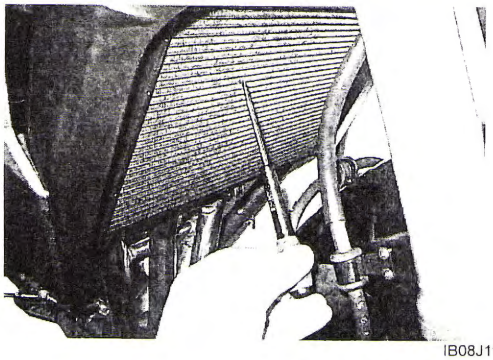
BENF08J11606003

Radiator Hose

Refer to "Cooling System Inspection" (Page 1F-5).

Radiator

Inspect the radiator for water leaks. If any defects are found, replace the radiator with a new one.
If the fins are bent or dented, repair them by carefully straightening them with the blade of a small screwdriver.



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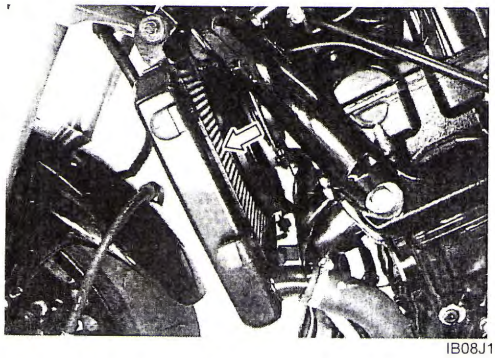
Radiator Cleaning

Blow out any foreign matter that is stuck in the radiator fins using compressed air.

NOTICE

- **Make sure not to bend the fins when using compressed air.**
- **Always apply compressed air from the engine side of engine. If compressed air is applied from the front side, dirt will be forced into the pores of radiator.**



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Radiator / Cooling Fan Motor Removal and Installation

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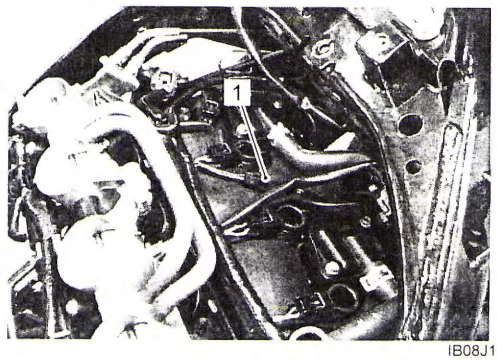
Removal

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation" in Section 1D (Page 1D-7).
2) Disconnect cooling fan motor coupler (1).



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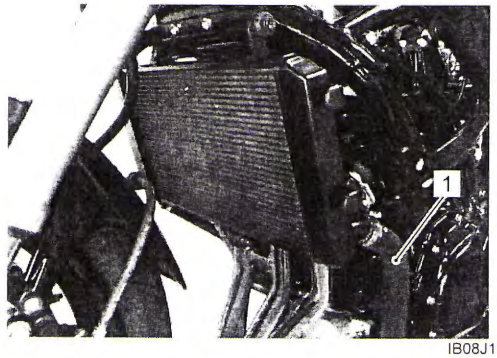
3) Remove the frame body covers (RH & LH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
4) Drain engine coolant. Refer to "Cooling System Inspection" (Page 1F-5).
5) Disconnect the radiator outlet hose (1).



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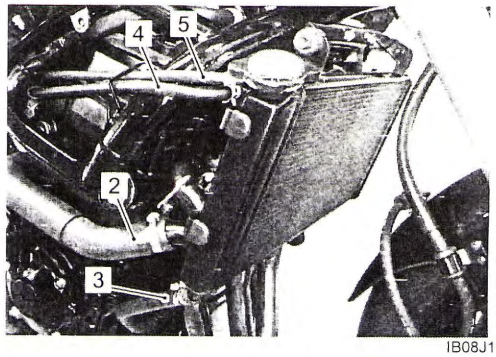
6) Disconnect the radiator inlet hose (2), oil cooler outlet hose (3), water bypass hose (4) and reservoir tank inlet hose (5).



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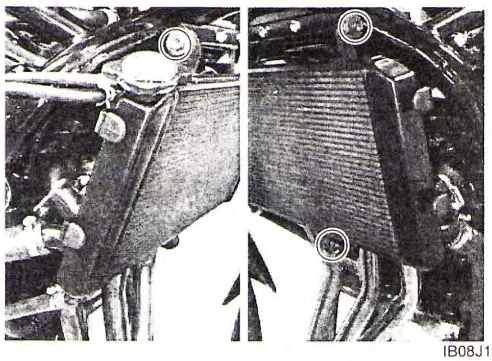
7) Remove the radiator assembly by removing the bolts.



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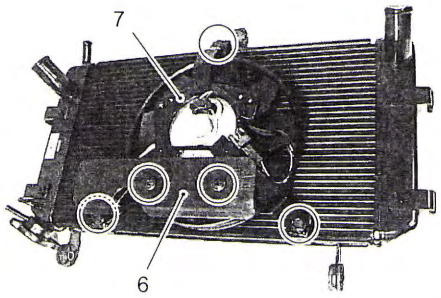
8) Remove the cooling fan motor cover (6).
9) Remove the cooling fan motor (7) from the radiator.



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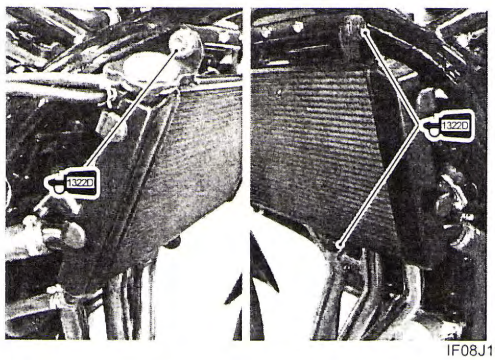
Installation

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

- Apply a small quantity of thread lock to the radiator mounting bolts.

  1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)



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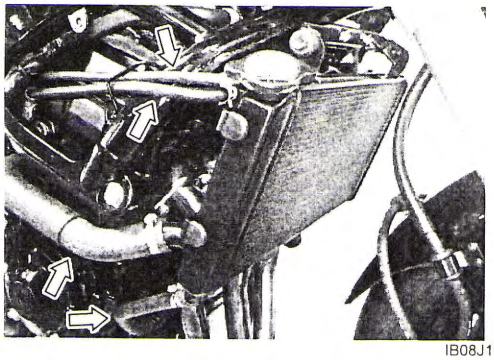
- Connect the radiator hoses securely. Refer to "Water Hose Routing Diagram" (Page 1F-3).
- Pour engine coolant. Refer to "Cooling System Inspection" (Page 1F-5).
- Bleed air from the cooling circuit. Refer to "Cooling System Inspection" (Page 1F-5).

Water Hose Inspection

BENF08J11606005

Inspect the water hoses in the following procedures:

1) Remove the frame body covers (RH & LH). 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).



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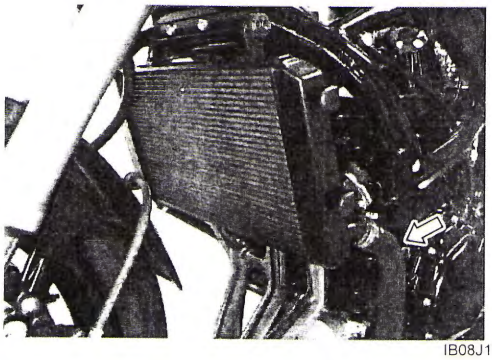

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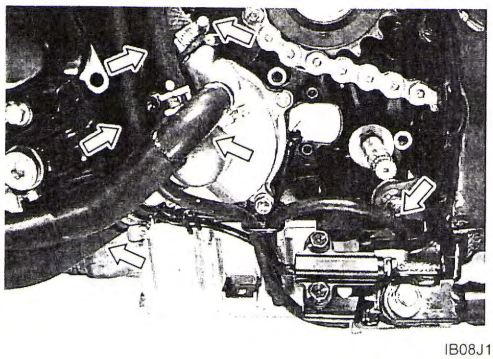

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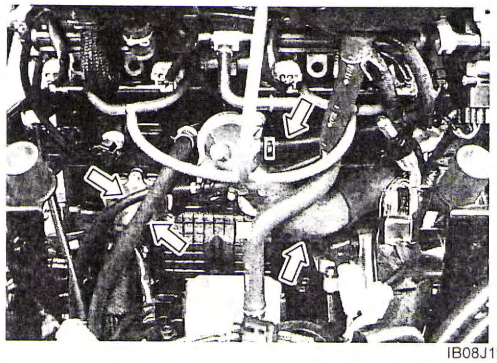

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4) After finishing the water hoses inspection, reinstall the removed parts.

Water Hose Removal and Installation

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Removal

1) Remove the frame body covers (RH & LH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Drain engine coolant. Refer to "Cooling System Inspection" (Page 1F-5).
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" (Page 1F-5).
4) Install the frame body covers (RH & LH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).

Radiator Reservoir Tank Inspection

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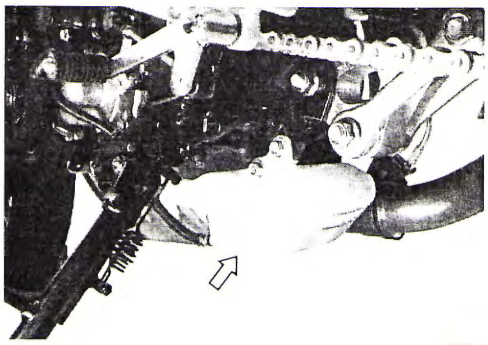
Inspect the radiator reservoir tank for leaks. If any defects are found, replace the radiator reservoir tank with a new one.



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Radiator Reservoir Tank Removal and Installation

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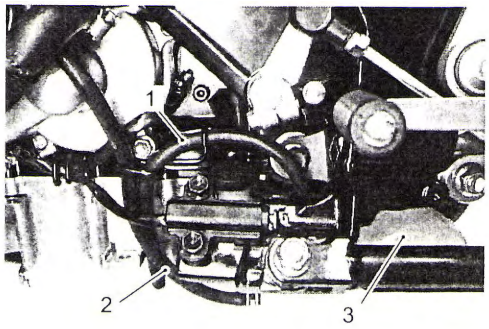
Removal

1) Disconnect the reservoir tank over flow hose (1), reservoir tank inlet hose (2) and drain the engine coolant.
2) Remove the radiator reservoir tank (3).



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Installation

Install the radiator reservoir tank in the reverse order of removal. Pay attention to the following points:

- Apply thread lock to the radiator reservoir tank mounting bolts and tighten it securely.

  1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

- Install the radiator reservoir tank as shown in the water hose routing diagram. Refer to "Water Hose Routing Diagram" (Page 1F-3).
- Fill the radiator reservoir tank to the upper level. Refer to "Cooling System Inspection" (Page 1F-5).

Cooling Fan Inspection

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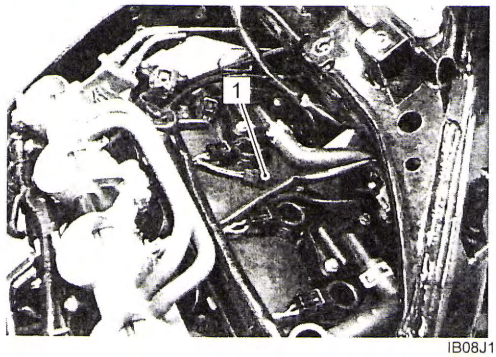
Cooling fan operating temperature

	IAT < 40 °C (104 °F)	IAT ≥ 40 °C (104 °F)
OFF → ON	Approx. 105 °C (221 °F)	Approx. 100 °C (212 °F)
ON → OFF	Approx. 100 °C (212 °F)	Approx. 95 °C (203 °F)

Inspect the cooling fan 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 cooling fan motor coupler (1).



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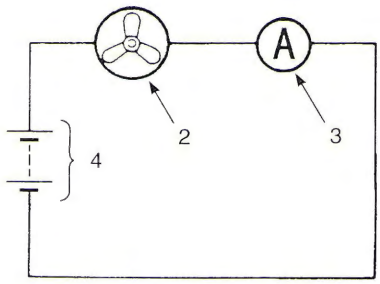
3) Test the cooling fan motor for load current with an ammeter connected as shown in the figure.
   If the fan motor does not turn, replace the cooling fan assembly with a new one. Refer to "Radiator / Cooling Fan Motor Removal and Installation" (Page 1F-7).

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.**



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2. Fan motor	3. Ammeter	4. Battery

4) Connect the cooling fan motor coupler.

Cooling Fan Relay Inspection

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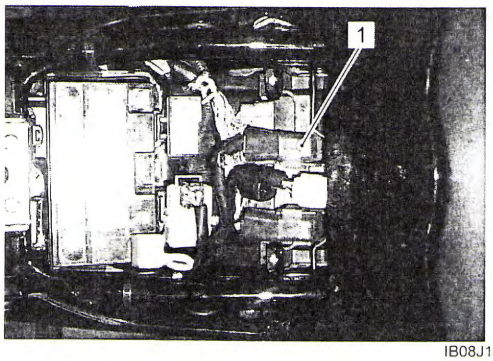
Inspect the fan relay in the following procedures:

1) Remove the seat. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Disconnect the cooling fan relay coupler and remove the cooling fan relay (1).



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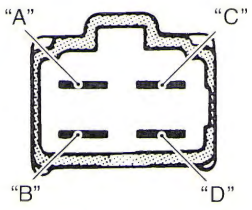
3) First check the insulation between "A" and "B" terminals with tester. Then apply 12 volts to "C" and "D" terminals, (+) to "C" and (–) to "D", and check the continuity between "A" and "B".
   If there is no continuity, replace it with a new one.

Special tool

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

Tester knob indication set

Continuity test (•))))



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4) Reinstall the removed parts.

ECT Sensor Removal and Installation

BENF08J11606011

Refer to "ECT Sensor Removal and Installation" in Section 1C (Page 1C-4).

ECT Sensor Inspection

BENF08J11606012

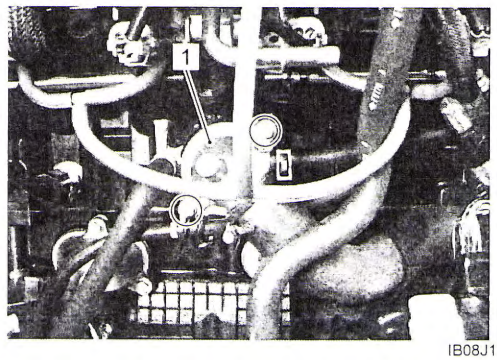
Refer to "ECT Sensor Inspection" in Section 1C (Page 1C-5).

Thermostat Removal and Installation

BENF08J11606013

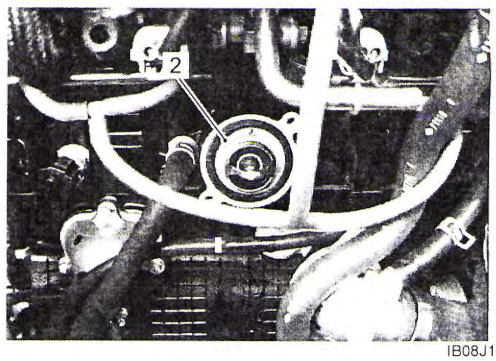
Removal

1) Drain a small amount of engine coolant. Refer to "Cooling System Inspection" (Page 1F-5).
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).



IB08J1160018-02

4) Remove the thermostat (2).



IB08J1160019-02

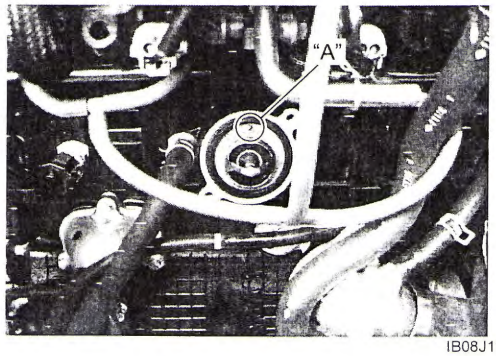
Installation

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

- Install the thermostat.

NOTE

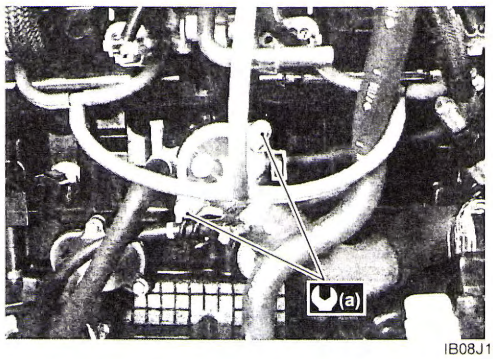
The jiggle valve "A" of the thermostat faces upside.



IB08J1160020-02

- 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)



IB08J1160021-03

- Connect the water hoses securely. Refer to "Water Hose Routing Diagram" (Page 1F-3).
- Pour engine coolant and bleed air from the cooling circuit. Refer to "Cooling System Inspection" (Page 1F-5).

Thermostat Inspection

BENF08J11606014

Inspect the thermostat in the following procedures:

1) Remove the thermostat. Refer to "Thermostat Removal and Installation" (Page 1F-11).
2) Inspect the thermostat pellet for signs of cracking.



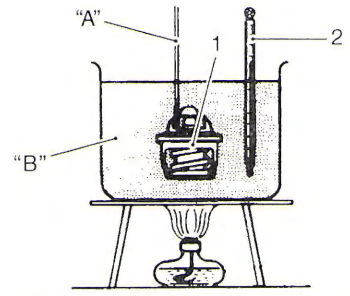
I837H1160025-01

3) Test the thermostat at the bench for control action.

NOTE

- **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

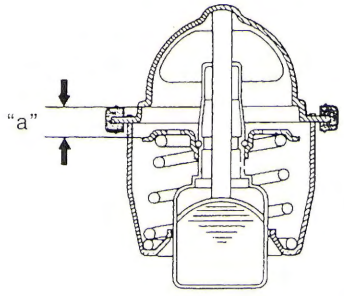
"A": String	"B": Water

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) at 95 °C (203 °F)

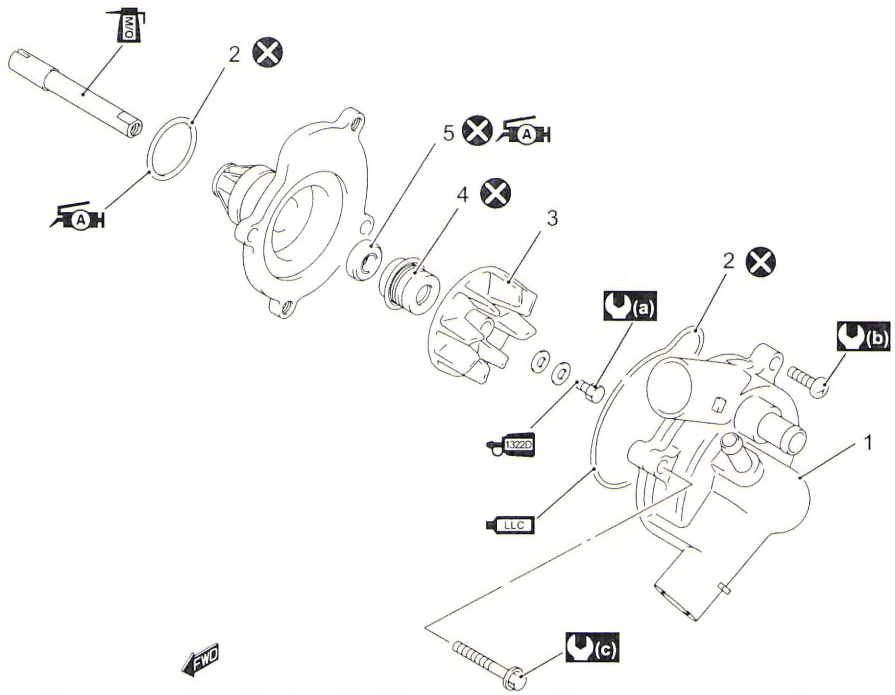


I705H1160031-04

9) Install the thermostat. Refer to "Thermostat Removal and Installation" (Page 1F-11).

Water Pump Components

BENF08J11606015

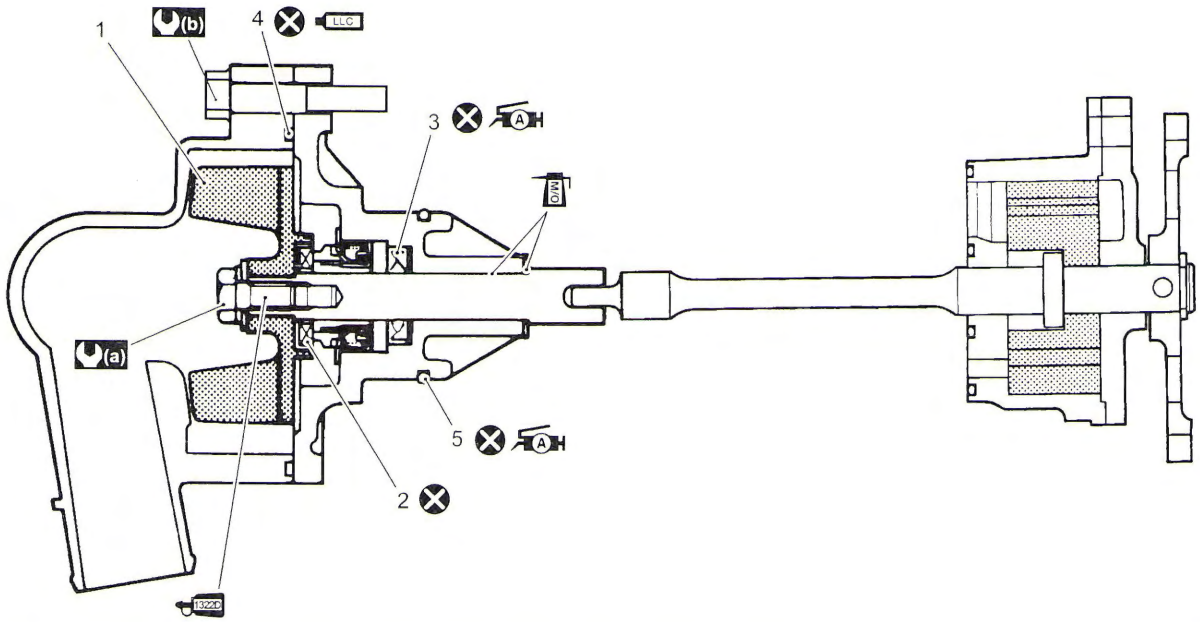


IF08J1160003-01

1. Water pump case	5. Oil seal	A H : Apply grease.	⊗ : Do not reuse.
2. O-ring	(a) : 8 N·m (0.8 kgf-m, 5.7 lbf-ft)	LLC : Apply engine coolant.	
3. Impeller	(b) : 5.5 N·m (0.55 kgf-m, 3.7 lbf-ft)	M/O : Apply molybdenum oil solution.	
4. Mechanical seal	(c) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	1322D : Apply thread lock.	

Water Pump Construction

BENF08J11606016



IF08J1160004-01

1. Impeller	4. O-ring	(b) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	1322D : Apply thread lock.
2. Mechanical seal	5. O-ring	A H : Apply grease.	M/O : Apply molybdenum oil solution.
3. Oil seal	(a) : 8 N·m (0.8 kgf-m, 5.7 lbf-ft)	LLC : Apply engine coolant.	⊗ : Do not reuse.

Water Pump Removal and Installation

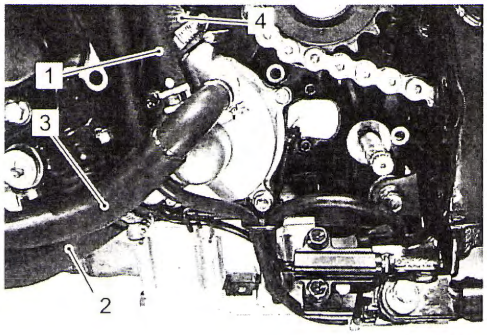
BENF08J11606017

Removal

NOTE

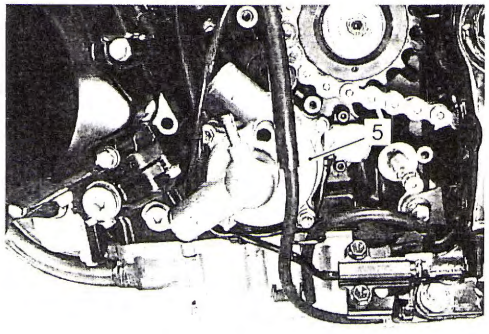
Before draining engine oil and engine coolant, inspect engine oil and coolant leakage between the water pump and crankcase. If engine oil is leaking, visually inspect the oil seal and O-ring. If engine coolant is leaking, visually inspect the mechanical seal and seal washer. Refer to "Water Pump Related Parts Inspection" (Page 1F-18).

1) Drain engine oil and coolant. Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6) and "Cooling System Inspection" (Page 1F-5).
2) Remove the engine sprocket covers. Refer to "Engine Sprocket Removal and Installation" in Section 3A (Page 3A-2).
3) Disconnect the water bypass hose (1), water pump inlet hose (2), oil cooler inlet hose (3) and cylinder inlet hose (4).



IB08J1160024-03

4) Remove the water pump (5).



IB08J1160025-02

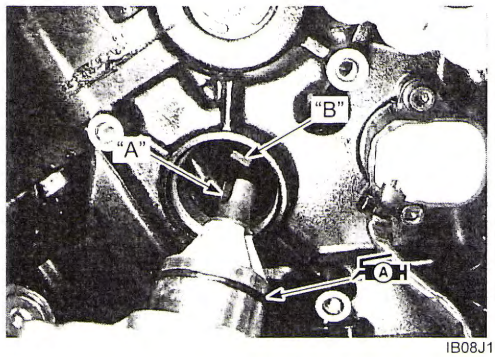
Installation

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

- Apply grease to the new O-ring.

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

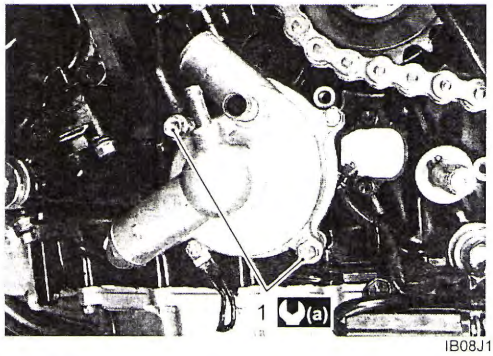
- Install the water pump assembly with the slot on the pump shaft end "A" securely engaged with the flat "B" on the oil pump shaft.



IB08J1160026-02

- 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)



IB08J1160027-02

- 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 1E (Page 1E-6) and "Cooling System Inspection" (Page 1F-5).
- Bleed air from the cooling circuit. Refer to "Cooling System Inspection" (Page 1F-5).

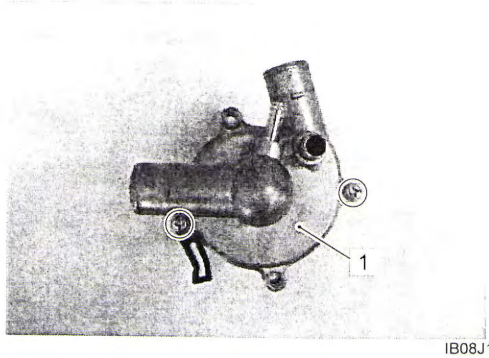
Water Pump Disassembly and Assembly

BENF08J11606018

Refer to "Water Pump Removal and Installation" (Page 1F-14).

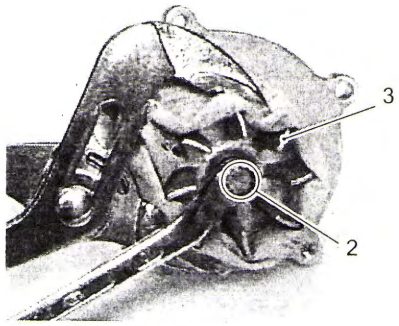
Disassembly

1) Remove the water pump case (1).



IB08J1160028-01

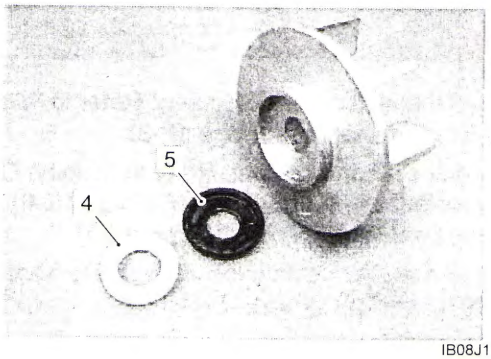
2) Remove the impeller securing bolt (2) by holding the impeller (3) with a water pump pliers.



IB08J1160029-01

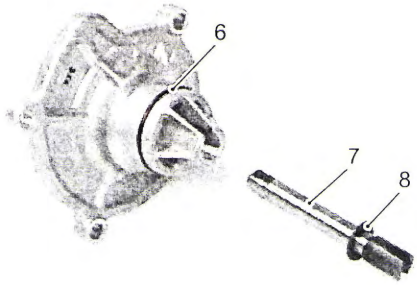
3) Remove the impeller.

4) Remove the mechanical seal ring (4) and rubber seal (5) from the impeller.



IB08J1160030-01

5) Remove the O-ring (6), impeller shaft (7) and washer (8) from the water pump body.



IB08J1160031-01

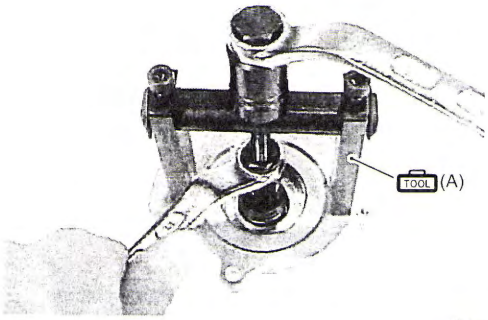
6) Remove the mechanical seal using the special tool.

NOTE

If there is no abnormal condition, the mechanical seal removal is not necessary.

Special tool

TOOL (A): 09921–20240 (Bearing remover set)

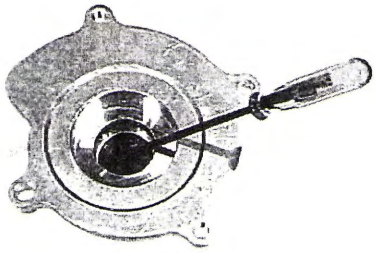


IB08J1160032-01

7) Remove the oil seal.

NOTE

If there is no abnormal condition, the oil seal removal is not necessary.



IB08J1160033-01

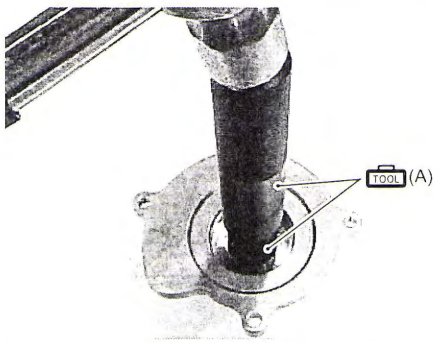
Assembly

1) Install the new oil seal using the special tool.

NOTE

The stamped mark on the oil seal should face mechanical seal side.

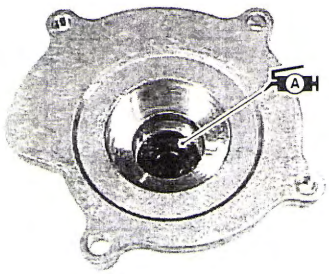
Special tool
TOOL (A): 09913–70210 (Bearing installer set)



IB08J1160034-01

2) Apply a small quantity of the grease to the oil seal lip.

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

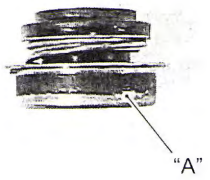


IB08J1160035-01

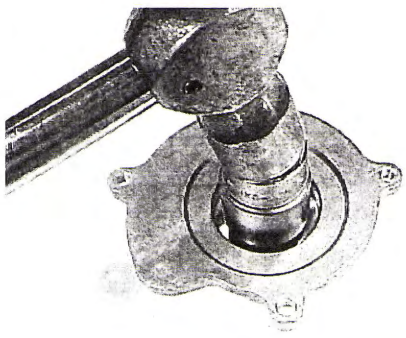
3) Install a new mechanical seal using a suitable size socket wrench.

NOTE

On new mechanical seals, the sealer "A" has been applied.



IB08J1160036-01

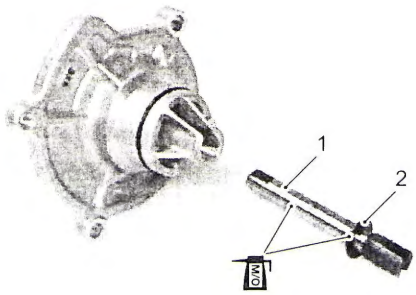


IB08J1160037-01

4) Apply molybdenum oil 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 water pump body.

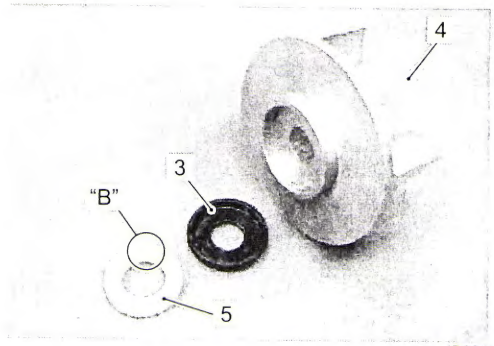


IB08J1160038-03

6) Install the rubber seal (3) into the impeller (4).
7) After wiping off the oily or greasy matter from the mechanical seal ring (5), install it into the impeller.

NOTE

The paint marked side "B" of mechanical seal ring faces the rubber seal.

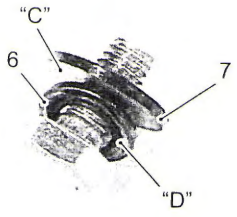


IB08J1160039-01

8) Install the washer (6) and seal washer (7) 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.

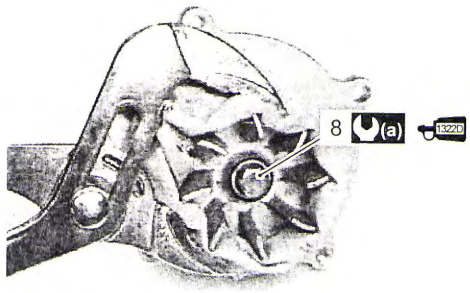


IB08J1160040-01

9) Install the impeller.
10) Apply a small quantity of thread lock to the impeller securing bolt (8) and tighten it to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
Impeller securing bolt (a): 8 N·m (0.8 kgf-m, 5.7 lbf-ft)

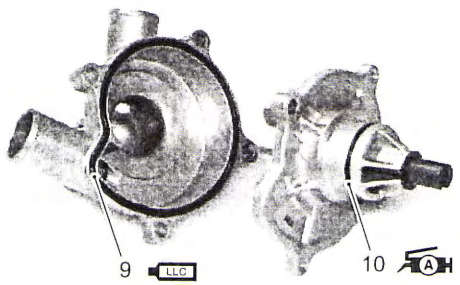


IF08J1160002-01

11) Install new O-rings (9) and (10).

NOTE

- **Apply engine coolant to the O-ring (9).**
- **Apply grease to the O-ring (10).**



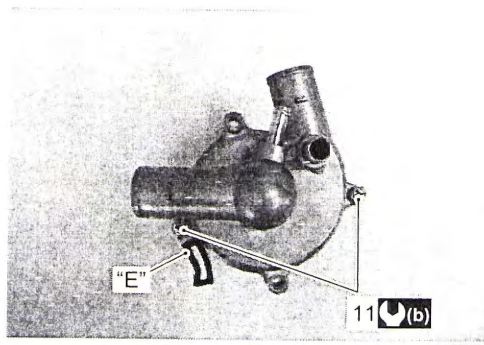
IB08J1160042-02

12) Fit the water pump case and tighten the water pump case screws (11) to the specified torque.

NOTE

Fit the clamp "E" to the water pump cover screw.

Tightening torque
Water pump case screw (b): 5.5 N·m (0.55 kgf-m, 3.7 lbf-ft)



IB08J1160043-02

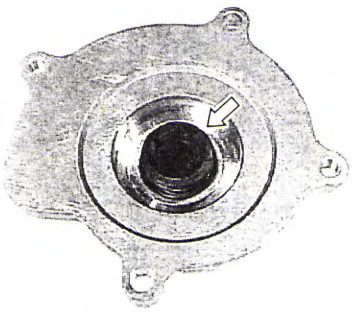
Water Pump Related Parts Inspection

BENF08J11606019

Refer to "Water Pump Disassembly and Assembly" (Page 1F-15).

Mechanical Seal

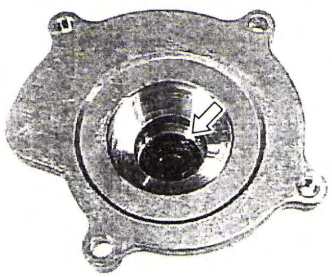
Visually inspect the mechanical seal for damage, with particular attention given to the sealing face.
Replace the mechanical seal that shows indications of leakage.



IB08J1160044-01

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.



IB08J1160045-01

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.



I823H1160051-01

Impeller / Shaft

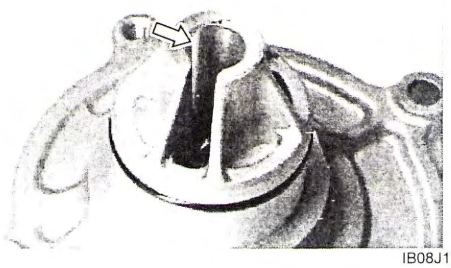
Visually inspect the impeller and its shaft for damage.
Replace the impeller or shaft if necessary.



I823H1160052-01

Impeller Shaft Journal

Visually inspect the journal for damage or scratch.
Replace the water pump body if necessary.



IB08J1160046-01

Specifications

Service Data

BENF08J11607001

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) 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)	Intake air temperature: < 40 °C (104 °F)
	ON → OFF	Approx. 100 °C (212 °F)	
	OFF → ON	Approx. 100 °C (212 °F)	Intake air temperature: ≥ 40 °C (104 °F)
	ON → OFF	Approx. 95 °C (203 °F)	
Engine coolant type	Use an anti-freeze/coolant compatible with aluminum radiator.		—
Engine coolant including reserve	Reserve tank side	Approx. 230 ml (0.3/0.2 US/Imp qt)	—
	Engine side	Approx. 2 580 ml (2.7/2.3 US/Imp qt)	—

Tightening Torque Specifications

BENF08J11607002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Air bleeder bolt	5.5	0.55	3.7	☞(Page 1F-6)
Thermostat cover bolt	10	1.0	7.0	☞(Page 1F-12)
Water pump mounting bolt	10	1.0	7.0	☞(Page 1F-14)
Impeller securing bolt	8	0.8	5.7	☞(Page 1F-17)
Water pump case screw	5.5	0.55	3.7	☞(Page 1F-17)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Water Pump Components" (Page 1F-13)

"Water Pump Construction" (Page 1F-13)

"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J11608001

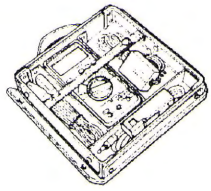
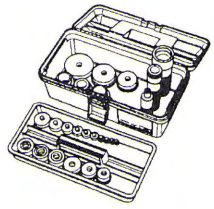
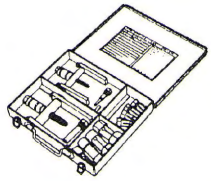
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 1F-14) / ☞(Page 1F-16)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1F-16)
Thread lock cement	THREAD LOCK CEMENT 1322D	P/No.: 99000–32150	☞(Page 1F-8) / ☞(Page 1F-10) / ☞(Page 1F-17)

NOTE

Required service material(s) is also described in:
"Water Pump Components" (Page 1F-13)
"Water Pump Construction" (Page 1F-13)

Special Tool

BENF08J11608002

09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 1F-11) 	09913–70210 Bearing installer set ☞(Page 1F-16) 
09921–20240 Bearing remover set ☞(Page 1F-15) 	

Fuel System

Precautions

Precautions for Fuel System

BENF08J11700001

⚠ 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.

NOTICE

- 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

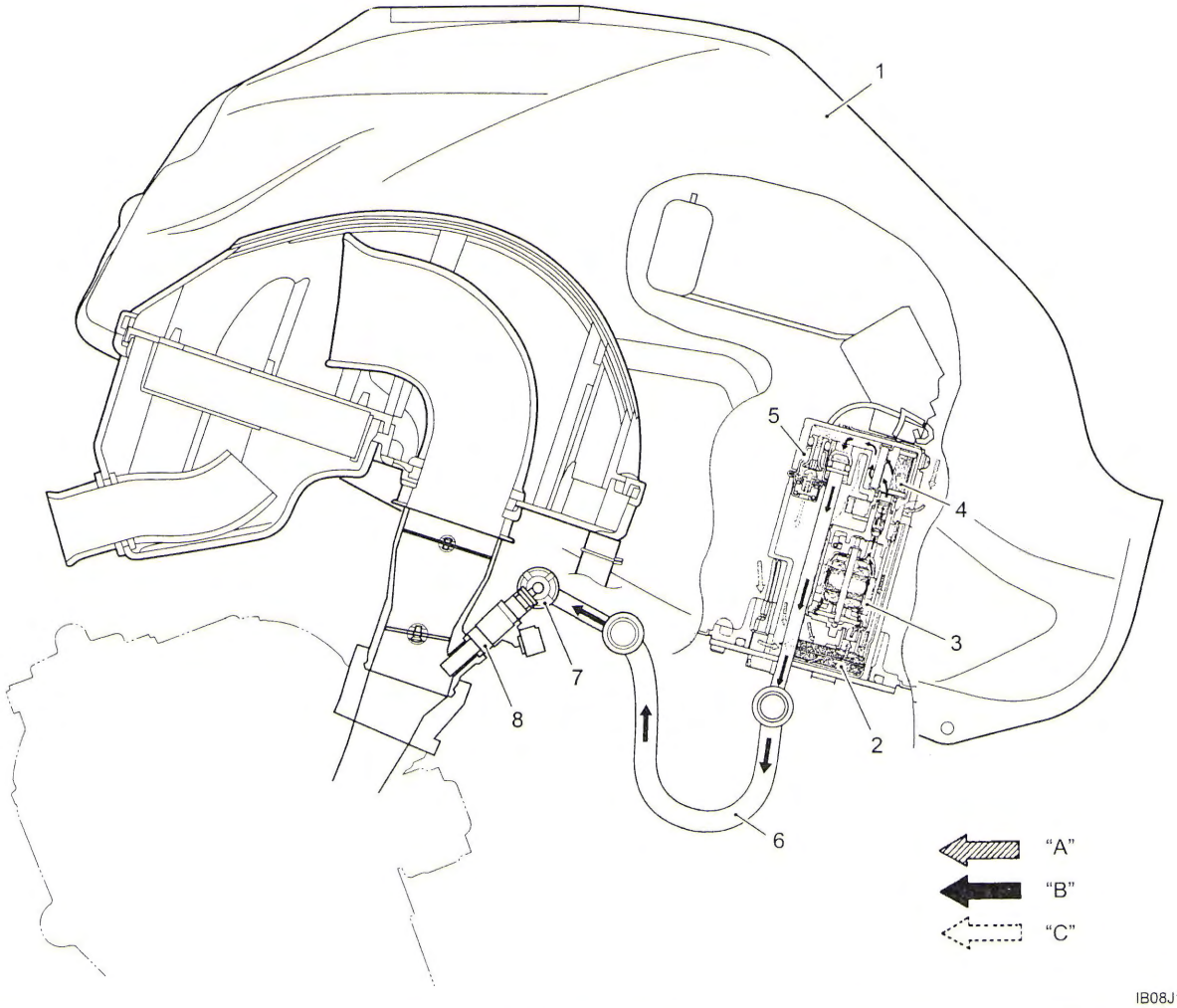
Fuel Injection System Description

BENF08J11701001

Fuel System

The fuel delivery system consists of the fuel tank (1), fuel pump (2), fuel filters (3) and (4), fuel feed hose (5), fuel delivery pipes (6), including fuel injectors (7) and 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 300 kPa (3.0 kgf/cm^2, 43 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.



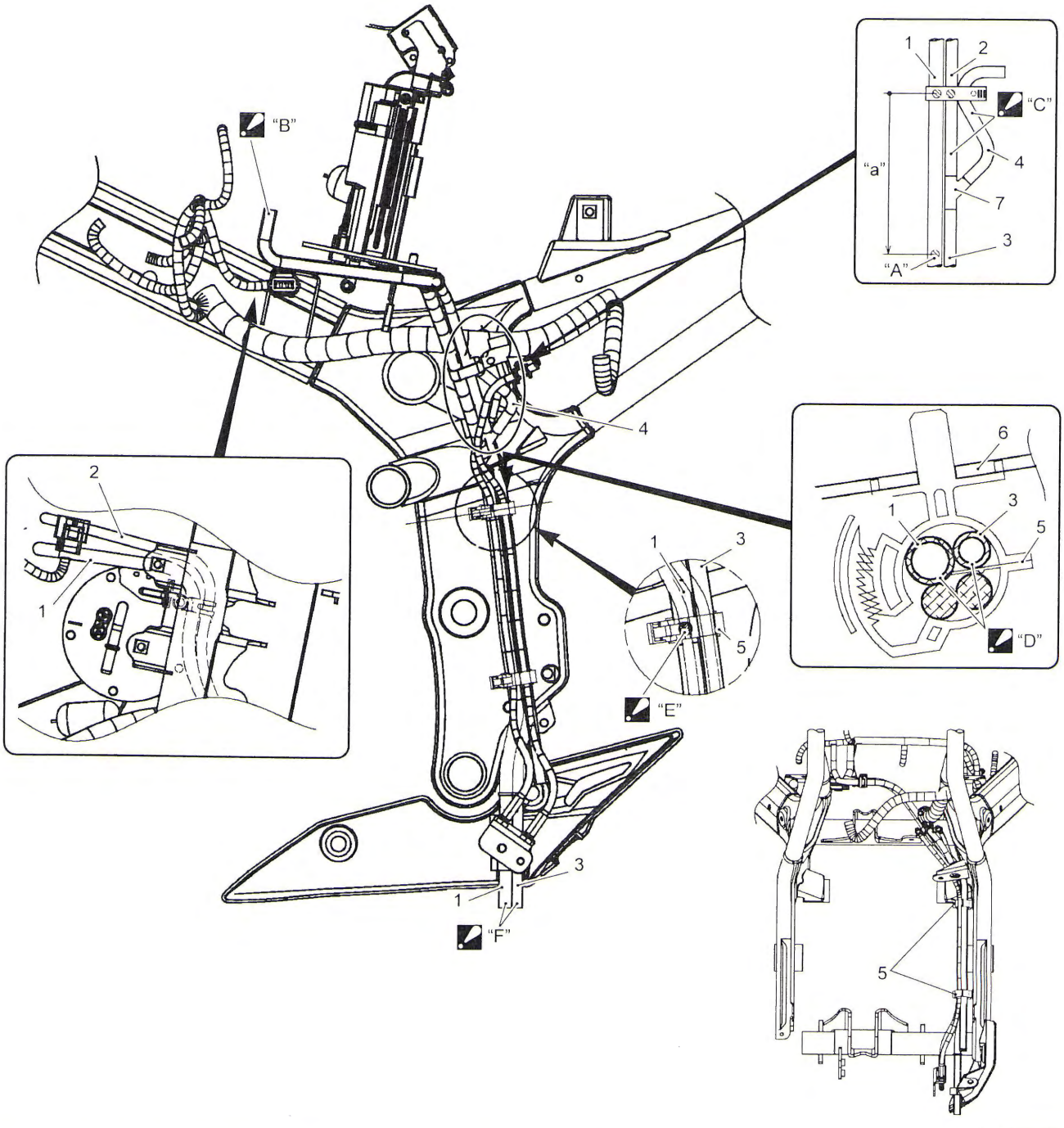
IB08J1120015-02

1. Fuel tank	4. Fuel filter cartridge (For high pressure)	7. Fuel delivery pipe	"B": Pressurized fuel
2. Fuel mesh filter (For low pressure)	5. Fuel pressure regulator	8. Fuel injector	"C": Relieved fuel
3. Fuel pump	6. Fuel feed hose	"A": Before-pressurized fuel	

Schematic and Routing Diagram

Fuel Tank Drain Hose and Breather Hose Routing Diagram

BENF08J11702001



IB08J1170001-03

1. Fuel tank water drain hose	6. Frame	"D": Arrange the hoses in parallel.
2. Fuel tank breather hose No. 1	7. 3-way joint	"E": Set the hoses with the white marking inside.
3. Fuel tank breather hose No. 2	"A": White marking	"F": Match the length of hoses.
4. Fuel tank breather hose No. 3	"B": Set the hose end to the root of tank nipple.	"a": 130 mm (5.1 in)
5. Clamp	"C": Match the direction of 3-way joint and hoses.	

Diagnostic Information and Procedures

Fuel System Diagnosis

BENF08J11704001

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 sensor.	*Replace.*
	Defective AP sensor.	*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.*
	Defective EXCVA.	*Replace.*

Repair Instructions

Fuel Pressure Inspection

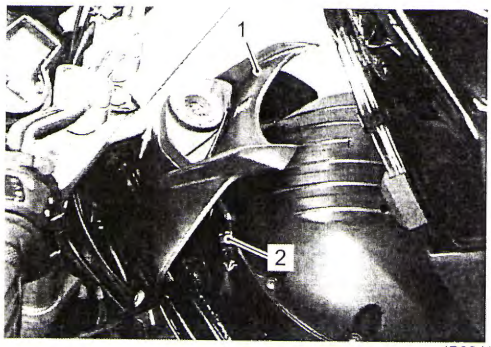
BENF08J11706001

⚠ 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) Install the fuel tank center cover (1) and connect the immobilizer antenna coupler (2) (if equipped).



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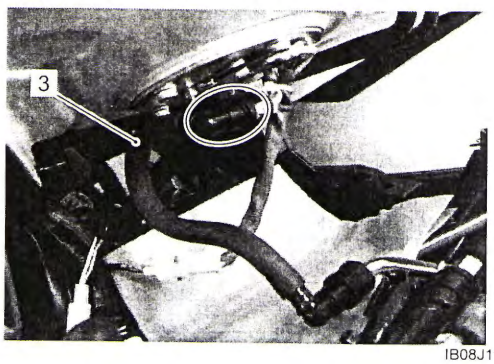
3) Place a rag under the fuel feed hose (3) and remove the fuel feed hose.



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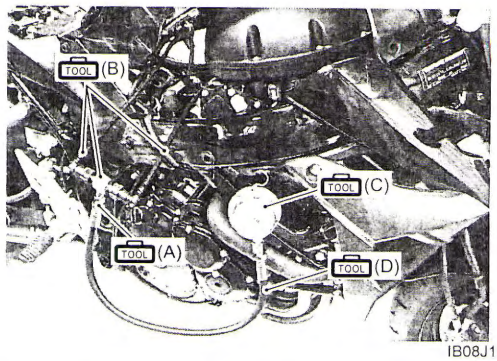
4) Install the special tools between the fuel pump and fuel delivery pipe.

Special tool
TOOL (A): 09940–40211 (Fuel pressure gauge adapter)
TOOL (B): 09940–40220 (Fuel pressure gauge hose attachment)
TOOL (C): 09915–77331 (Meter (for high pressure))
TOOL (D): 09915–74521 (Oil pressure gauge hose)



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5) 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 leakage
- Clogged fuel filter
- Pressure regulator
- Fuel pump

If the fuel pressure is higher than the specification, check for the following:

- Pressure regulator

6) Remove the special tools.

⚠ WARNING

Before removing the special tools, turn the ignition switch OFF and release the fuel pressure slowly.

7) Remove the fuel tank center cover.
8) 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

BENF08J11706002

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, TO sensor and immobilizer antenna (if equipped). Refer to "Fuel Pump Relay Inspection" (Page 1G-7), "DTC "C23" (P1651-H/L): TO Sensor Circuit Malfunction" in Section 1A (Page 1A-50) and "DTC "C42" (P1650): IG Switch Circuit Malfunction (If Equipped)" in Section 1A (Page 1A-75).
If the fuel pump relay, TO sensor, immobilizer antenna (if equipped) 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

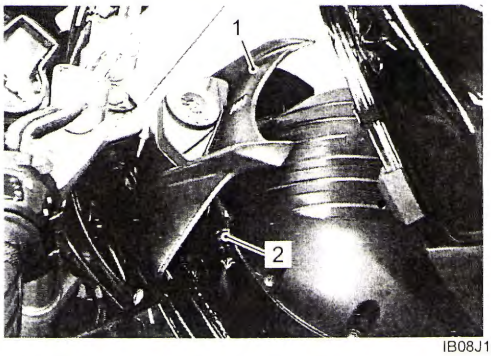
BENF08J11706003

⚠ 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) Install the fuel tank center cover (1) and connect the immobilizer antenna coupler (2) (if equipped).



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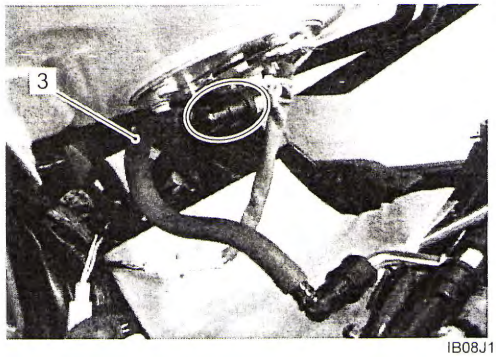
3) Place a rag under the fuel feed hose (3) and disconnect fuel feed hose from the fuel pump.



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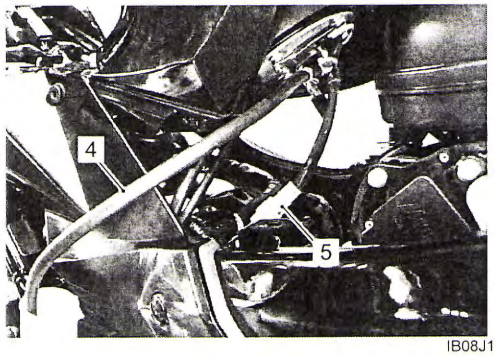
4) Connect a proper fuel hose (4) to the fuel pump.
5) Place the measuring cylinder and insert the fuel hose end into the measuring cylinder.
6) Disconnect the fuel pump lead wire coupler (5).



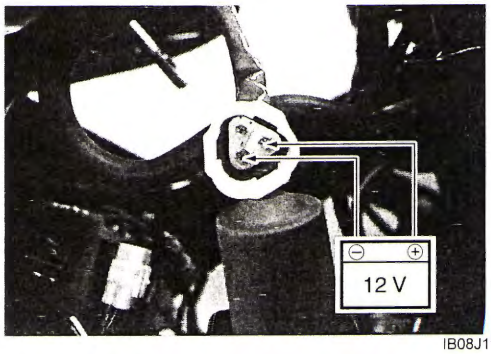
IB08J1170006-03

7) 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
167 ml (5.6/5.9 US/Imp oz) and more/10 seconds



IB08J1170007-02

8) 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).

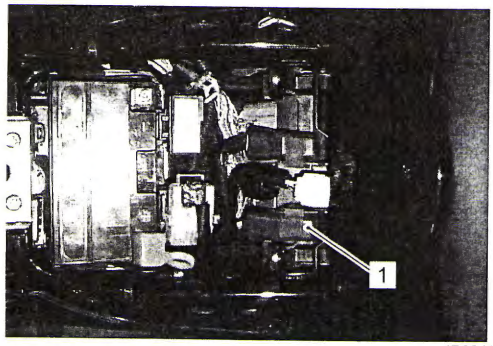
Fuel Pump Relay Inspection

BENF08J11706004

Refer to "Electrical Components Location" in Section 0A (Page 0A-6).

Inspect the fuel pump relay in the following procedures:

1) Remove the front seat. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Remove the fuel pump relay (1).



IB08J1170008-02

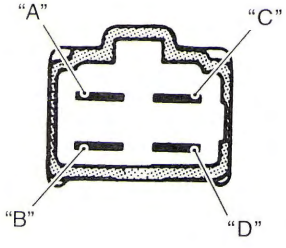
3) First, check for insulation with the tester between terminals "A" and "B". Next, check for continuity between "A" and "B" with 12 V voltage applied, positive (+) to terminal "C" and negative (–) to terminal "D". If continuity does not exist, replace the relay with a new one.

Special tool

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

Tester knob indication

Continuity test (•))))



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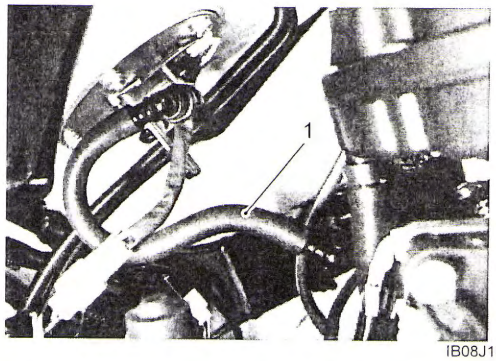
Fuel Hose Inspection

BENF08J11706005

Inspect the fuel line in the following procedures:

1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" (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.



IB08J1020013-02

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

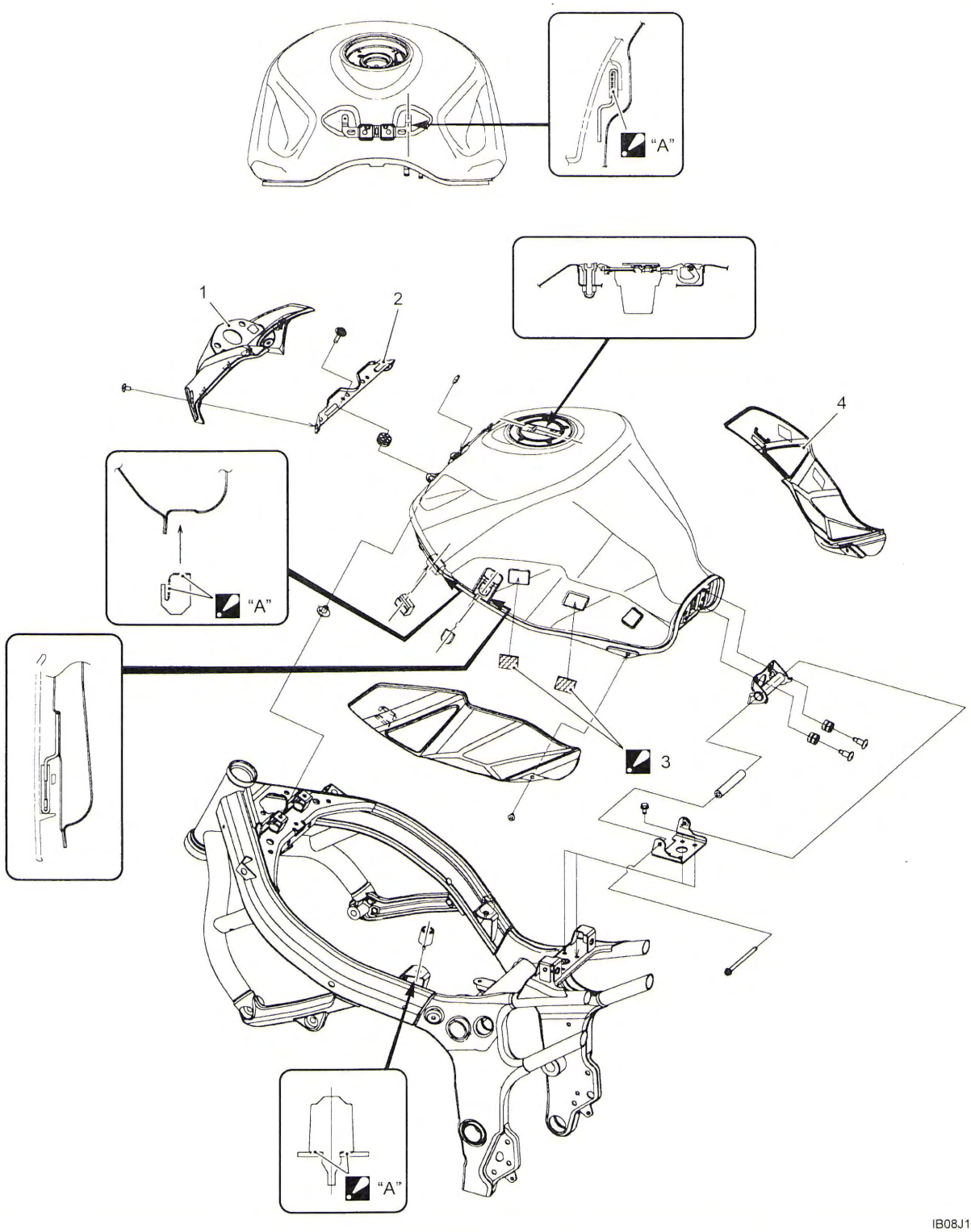
Fuel Level Gauge Inspection

BENF08J11706006

Refer to "Fuel Level Gauge Inspection" in Section 9C (Page 9C-5).

Fuel Tank Construction

BENF08J11706007



IB08J1170009-01

1. Fuel tank center cover	3. Velcro fastenings : Clean the adhesive surface before adhering the velcro fastenings.	"A": Apply adhesive agent.
2. Fuel tank center cover bracket	4. Fuel tank side cover	

Fuel Tank Removal and Installation

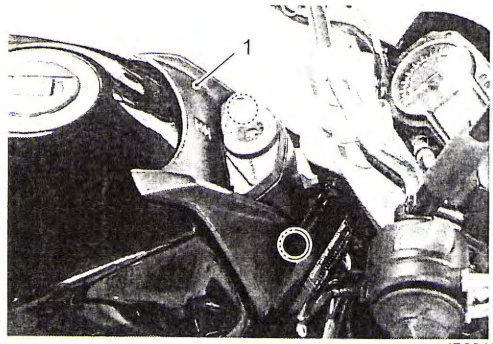
BENF08J11706008

Removal

⚠ WARNING

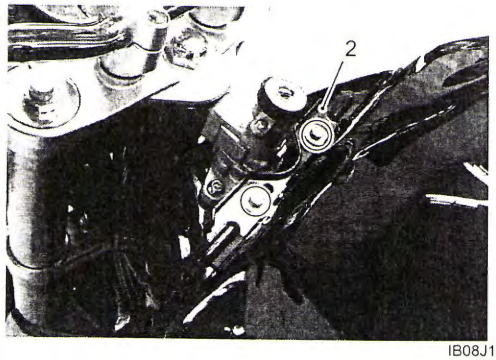
- **Keep away from fire or spark.**
- **Spilled gasoline should be wiped off immediately.**
- **Work in a well-ventilated area.**

1) Remove the front seat and frame cover (LH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Remove the fuel tank center cover (1).



IB08J1170010-02

3) Remove the fuel tank center cover bracket (2).



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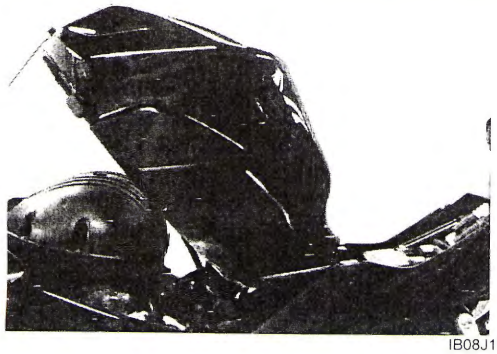
4) Lift and support the fuel tank with the prop stay.



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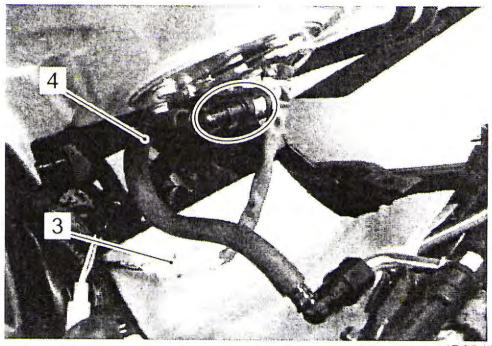
5) Disconnect the fuel pump lead wire coupler (3).
6) Place a rag under the fuel feed hose (4) and disconnect the fuel feed hose from the fuel tank.



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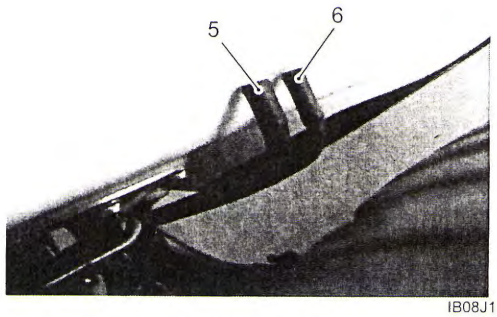
7) Disconnect the fuel tank drain hose (5).
8) Disconnect the fuel tank breather hose (6).



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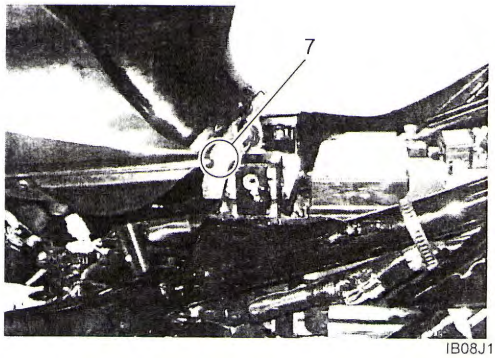
9) Remove the fuel tank by removing its bracket bolt (7).



IB08J1170015-02

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

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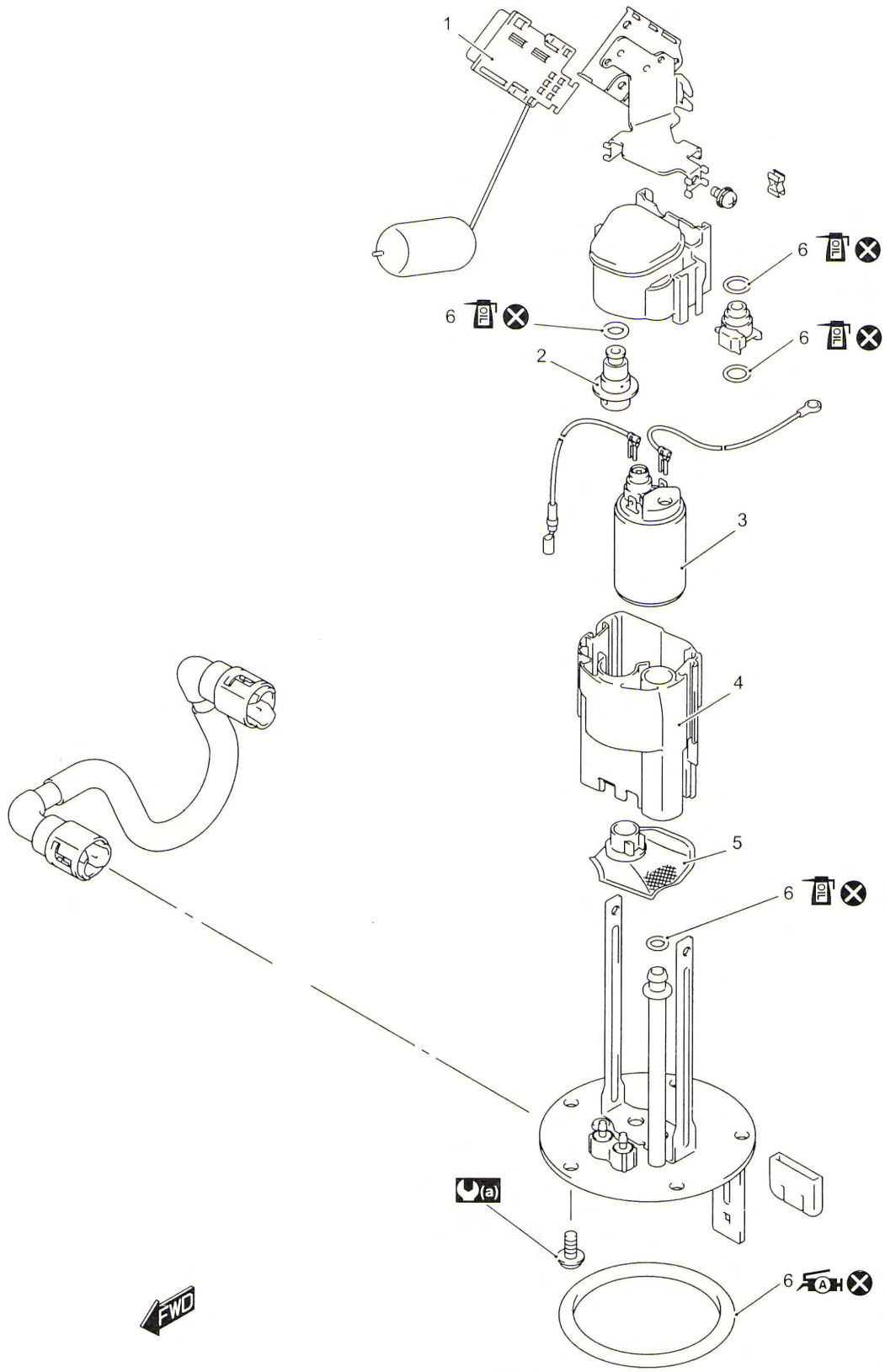


IB08J1170026-04

1. Fuel level gauge	4. Fuel pump case	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	⊗ : Do not reuse.
2. Fuel pressure regulator	5. Fuel mesh filter	: Apply engine oil.	
3. Fuel pump	6. O-ring	: Apply grease.	

Fuel Pump Disassembly and Assembly

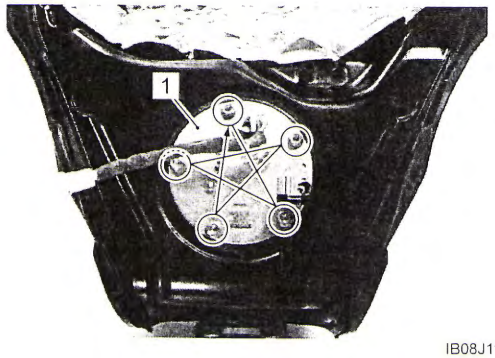
BENF08J11706010

⚠ WARNING

- **Spilled gasoline should be wipe off immediately.**
- **Keep away from fire or spark.**
- **Work in a well-ventilated area.**

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.



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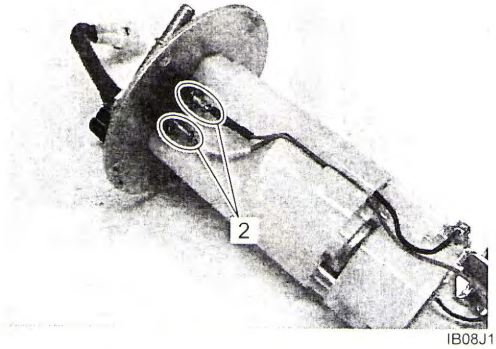
3) Disconnect the lead wires (2).



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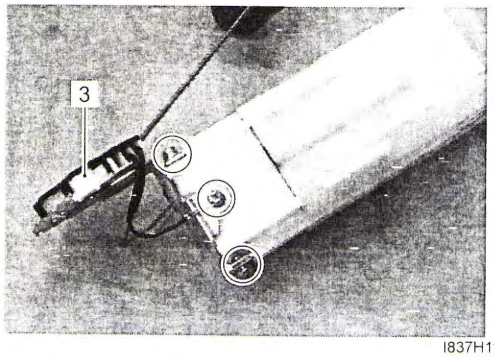
4) Remove the fuel level gauge (3).



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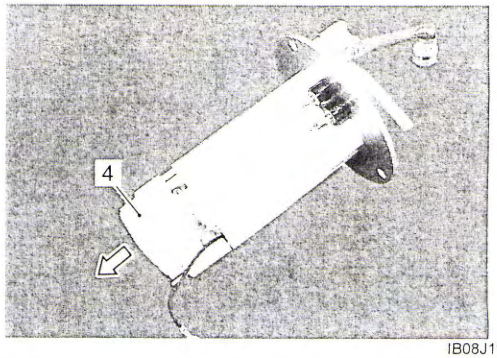
5) Remove the fuel filter cartridge (4).

NOTICE

Never remove the fuel pressure regulator (5) from the holder.



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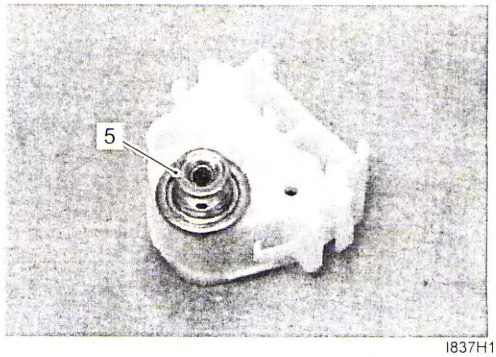

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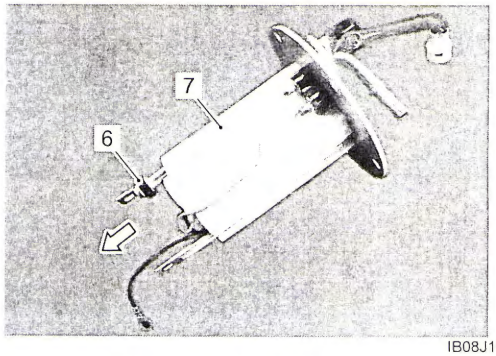
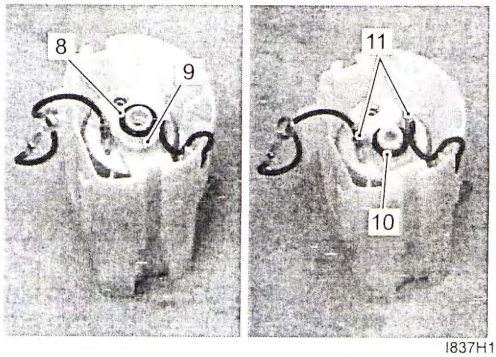
6) Remove the O-ring (6) and fuel pump case assembly (7).



IB08J1170019-01

7) Remove the O-ring (8) and joint (9).
8) Remove the O-ring (10) and lead wires (11).



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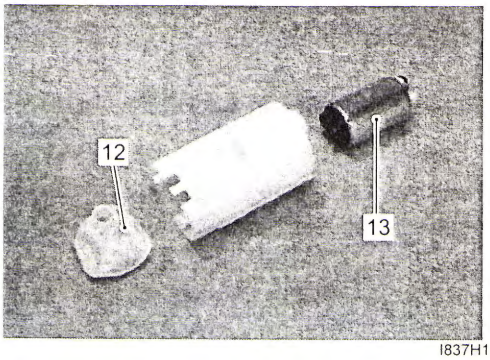
9) Remove the fuel mesh filter (12).
10) Remove the fuel pump (13).



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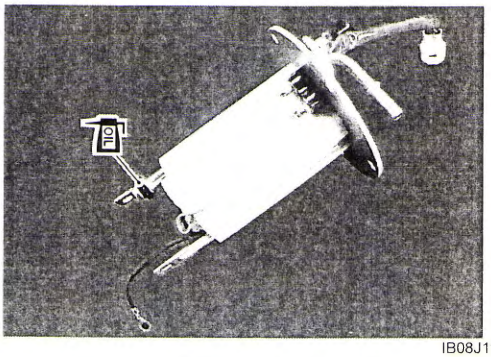
Assembly

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-ring.**



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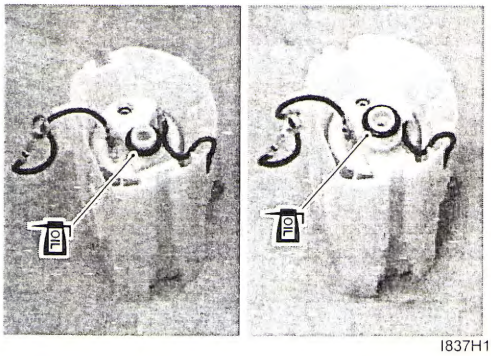

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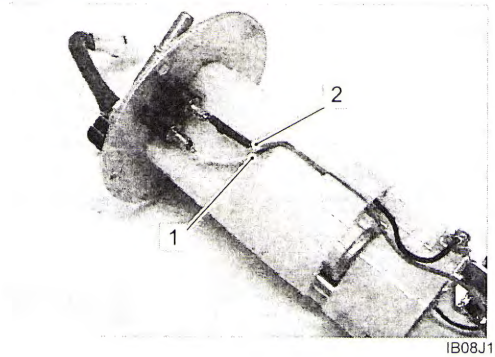
- Connect all lead wires securely so as not to cause contact failure.



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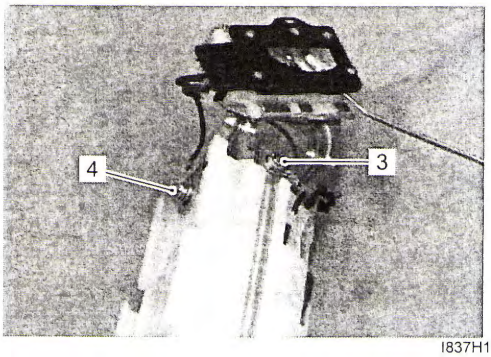

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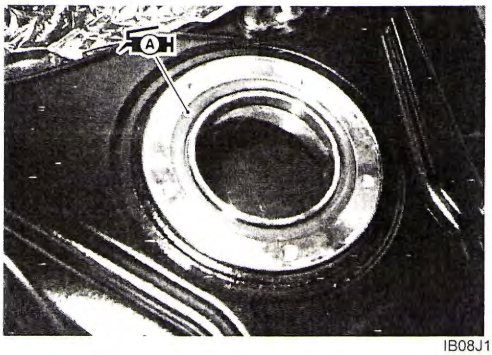
1.	Fuel pump (+) lead wire (B)
2.	Fuel level gauge (+) lead wire (R)
3.	Fuel pump (–) lead wire (B)
4.	Fuel level gauge (–) lead wire (B)

- 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.



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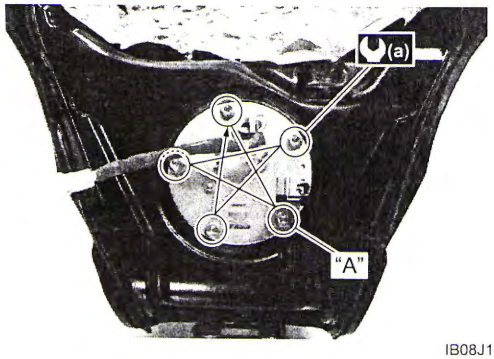
- When installing the fuel pump assembly, first tighten all the fuel pump mounting bolts lightly and then to the specified torque.

NOTE

Fit the clamp to the fuel pump mounting bolt "A".

Tightening torque
Fuel pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



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Fuel Mesh Filter Inspection and Cleaning

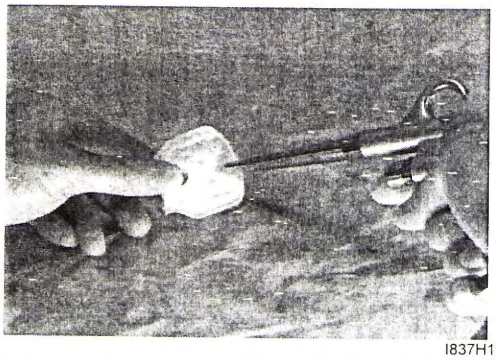
BENF08J11706011

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.



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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

BENF08J11706012

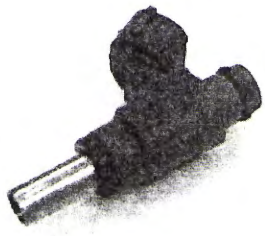
Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-12).

Fuel Injector Inspection and Cleaning

BENF08J11706013

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-12).
2) Check the fuel injector filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in the fuel lines and fuel tank.



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3) Install the fuel injector. Refer to "Throttle Body Disassembly and Assembly" in Section 1D (Page 1D-12).

Specifications

Service Data

BENF08J11707001

Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11.5 – 12.5 Ω at 20 °C (68 °F)	
Fuel pump discharge amount	167 ml (5.6/5.9 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	Gasoline used should be graded 91 octane (Research Method) or higher. Unleaded gasoline is recommended.		
Fuel tank capacity	Including reserve	17.5 L (4.6/3.8 US/Imp gal)	

Tightening Torque Specifications

BENF08J11707002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Fuel pump mounting bolt	10	1.0	7.0	☞(Page 1G-13)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Fuel Pump Components" (Page 1G-10)

"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J11708001

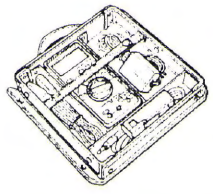
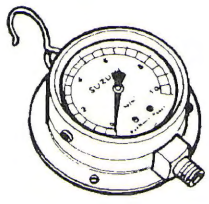
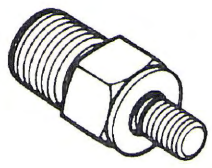
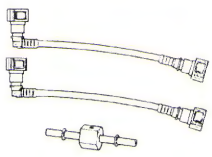
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 1G-12)

NOTE

Required service material(s) is also described in:
"Fuel Pump Components" (Page 1G-10)

Special Tool

BENF08J11708002

09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 1G-7)		09915–74521 Oil pressure gauge 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 (If Equipped)

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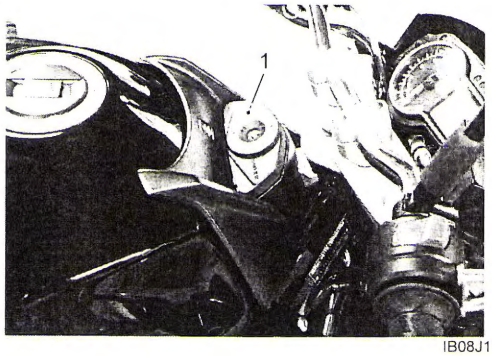
The immobilizer, an anti-theft system, is installed as a standard equipment.
The immobilizer verifies that the key ID agrees with ECM ID by means of radio communication through the immobilizer antenna. When the ID agreement is verified, the system makes the engine ready to start.



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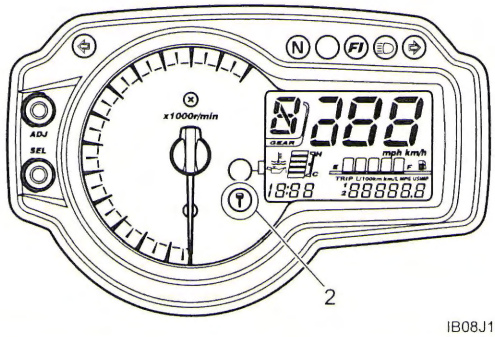

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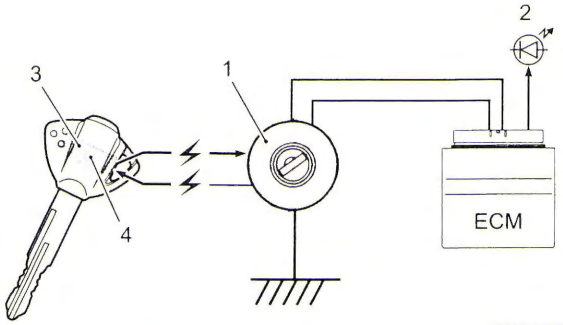
1. Immobilizer antenna	2. Indicator light



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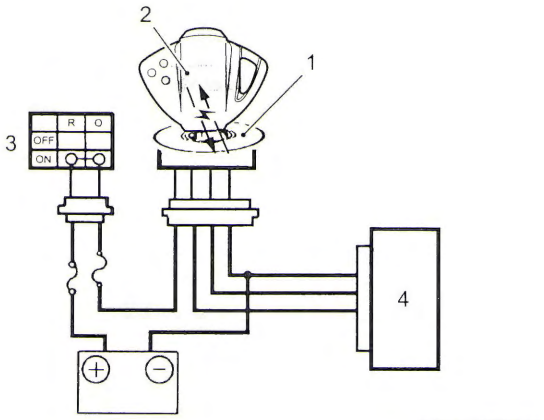
1. Immobilizer antenna	3. Transponder
2. Indicator light	4. ID

Operation

When the ignition switch is turned ON with the engine stop switch in ON, the immobilizer antenna and ECM are powered ON.
The ECM transmits a signal to the transponder through the immobilizer 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.



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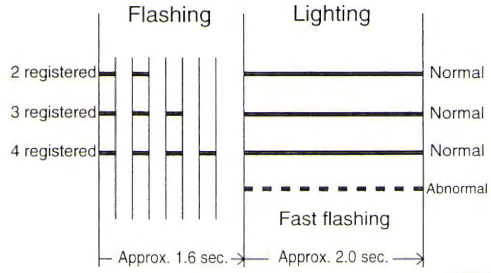
1. Immobilizer antenna	3. Ignition switch
2. Transponder	4. ECM

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.

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.**
- **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.**



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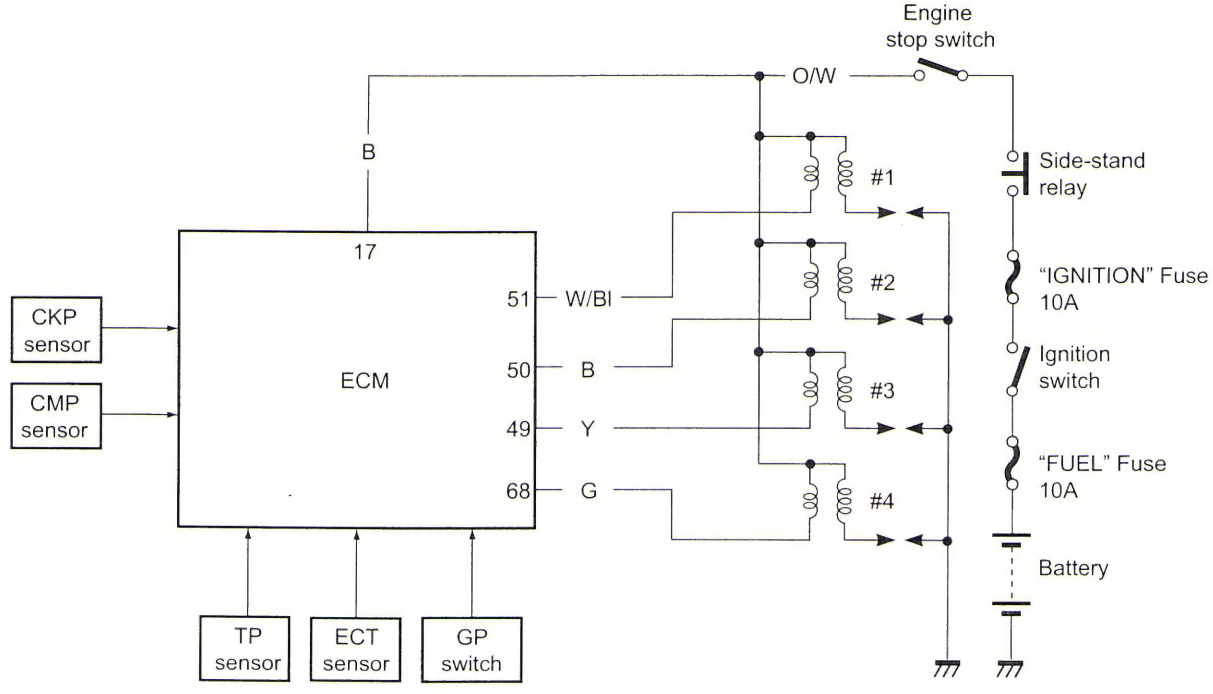
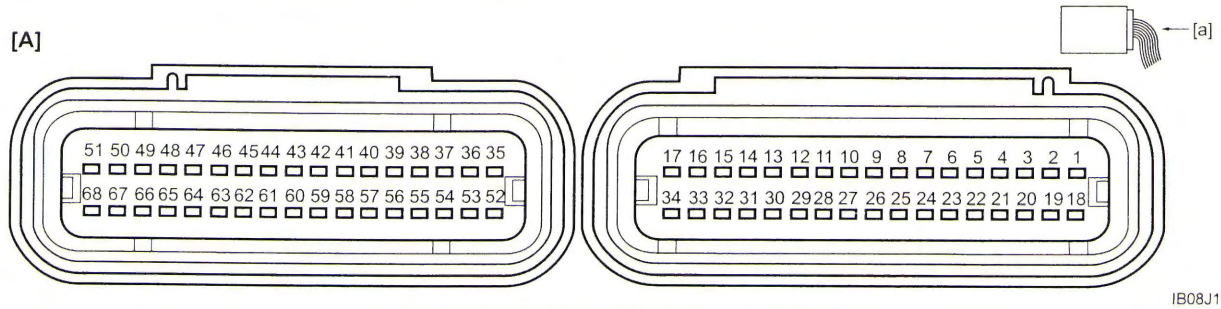
Schematic and Routing Diagram

Ignition System Diagram

BENF08J11802001

Refer to "Wire Color Symbols" in Section 0A (Page 0A-3).





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[A]: ECM coupler (view: [a])

Ignition System Components Location

BENF08J11802002

Refer to "Electrical Components Location" in Section 0A (Page 0A-6).

Diagnostic Information and Procedures

Ignition System Symptom Diagnosis

BENF08J11804001

Condition	Possible cause	Correction / Reference Item
Spark plug not sparking	Damaged spark plug.	*Replace.*
	Fouled spark plugs.	*Clean or replace.*
	Wet spark plugs.	*Clean and dry or replace.*
	Defective ignition coil/plug caps.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connections.	*Repair or replace.*
	Defective immobilizer antenna (if equipped).	*Replace.*
	Defective immobilizer transponder (if equipped).	*Replace.*
	Defective engine stop switch.	*Replace.*
	Defective side stand relay.	*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

BENF08J11804002

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 1

Check the ignition system couplers for poor connections.

Is there connection in the ignition system couplers?

Yes — Go to Step 2.

No — Poor connection of couplers.

Step 2

Measure the battery voltage between input lead wires at the ECM with the ignition switch in the "ON" position. (B and B/W)

Is the voltage OK?

Yes — Go to Step 3.

No
- Faulty ignition switch.
- Faulty turn signal/side-stand relay.
- Faulty engine stop switch.
- Broken wire harness or poor connection of related circuit couplers.

Step 3

Measure the ignition coil primary peak voltage. Refer to "Ignition Coil / Plug Cap 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?

Yes — Go to Step 4.

No — Go to Step 5.

Step 4

Inspect the spark plug(-s). Refer to "Spark Plug Inspection and Cleaning" (Page 1H-6).

Is the spark plug(-s) OK?

Yes — Go to Step 5.

No — Faulty spark plug(-s).

Step 5

Inspect the ignition coil/plug cap(-s). Refer to "Ignition Coil / Plug Cap Inspection" (Page 1H-7).

Is the ignition coil/plug cap(-s) OK?

Yes — Go to Step 6.

No
- Faulty ignition coil/plug cap(-s).
- Poor connection of the ignition coil/plug cap(-s).

Step 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?

Yes
- Faulty ECM.
- Open or short circuit in wire harness.
- Poor connection of ignition couplers.

No
- Faulty CKP sensor.
- Metal particles or foreign material being stuck on the CKP sensor and rotor tip.

Repair Instructions

Ignition Coil / Plug Cap and Spark Plug Removal and Installation

BENF08J11806001

Removal

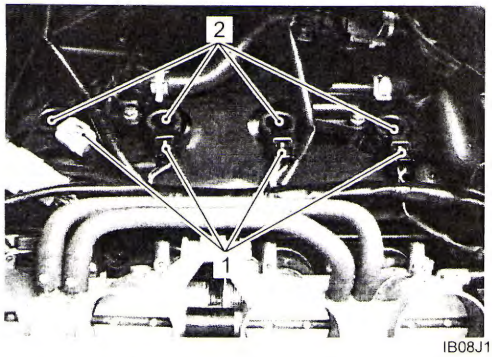
⚠ WARNING

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 all coupler (1) from ignition coil/plug caps (2).

NOTICE

Disconnect the lead wire coupler before removing the ignition coil/plug cap to avoid lead wire coupler damage.



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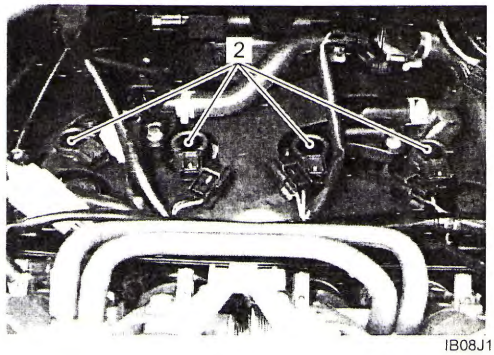
4) Remove the ignition coils/plug caps (2).

NOTICE

- **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 short/open circuit.**



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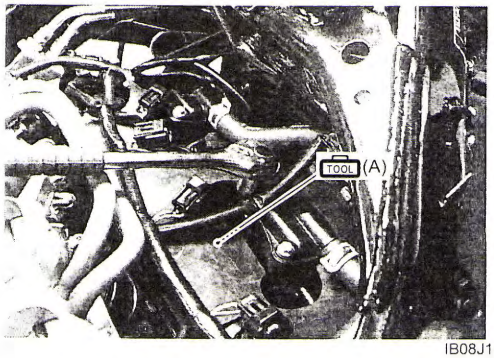
5) Remove the spark plugs with a spark plug wrench.

Special tool
TOOL (A): 09930–10121 (Spark plug wrench set)



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Installation

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

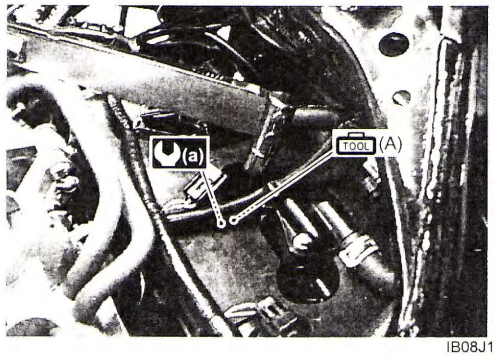
- Screw the spark plugs into the cylinder head with fingers, and then tighten them to the specified torque.

NOTICE

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 (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



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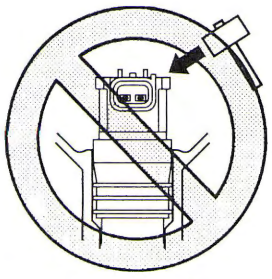
- Install the ignition coil/plug caps and connect their couplers.

NOTICE

Do not hit the ignition coil/plug cap with a plastic hammer when installing it.



INCORRECT

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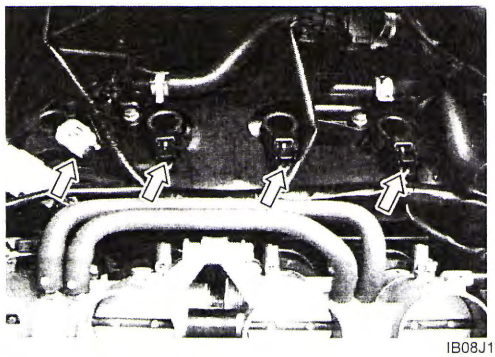

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Spark Plug Inspection and Cleaning

BENF08J11806003

Heat Range

1) Remove the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation" (Page 1H-5).
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)

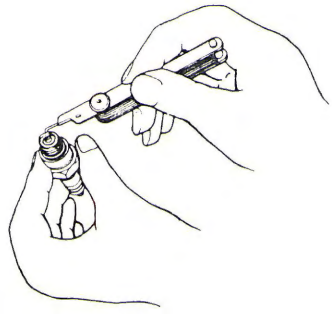
Spark Plug Gap

1) Remove the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation" (Page 1H-5).
2) Measure the spark plug gap using a wire gauge. If it is not within the specification, replace the spark plug.

NOTICE

- **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 / Plug Cap and Spark Plug Removal and Installation" (Page 1H-5).
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.

NOTICE

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)

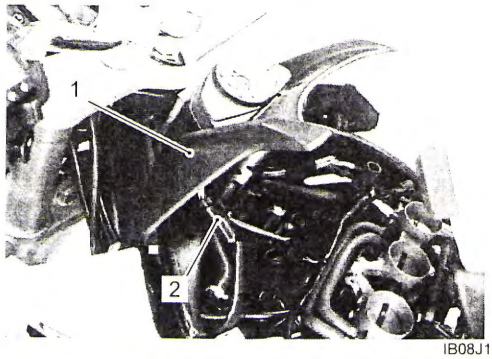
Ignition Coil / Plug Cap Inspection

BENF08J11806004

Refer to "Electrical Components Location" in Section 0A (Page 0A-6).

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) Install the fuel tank center cover (1) and connect the immobilizer coupler (2) (if equipped).



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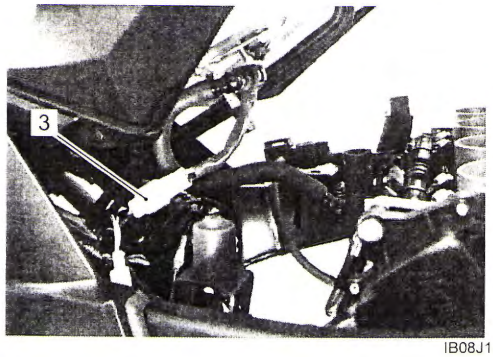
3) Disconnect the fuel pump lead wire coupler (3).



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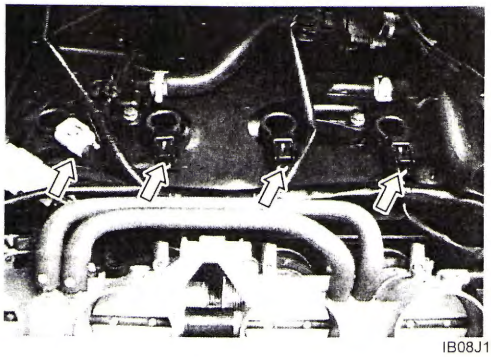
4) Disconnect all ignition coil/plug caps. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation" (Page 1H-5).



IB08J1180008-02

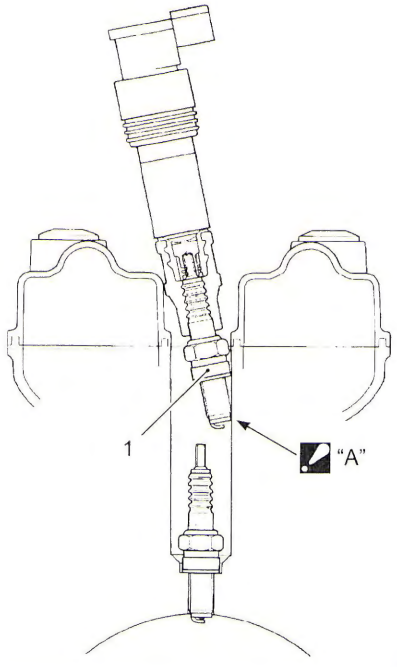
5) Connect the new spark plugs to each ignition coil/plug cap.
6) Connect all the ignition coil/plug cap couplers to the ignition coil/plug caps respectively, and ground them on the cylinder head (each spark plug hole).

NOTICE

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.

7) Insert the needle pointed probe to the coupler.

NOTE

Use the special tool to prevent the rubber of the water proof coupler from damage.

8) Connect the multi-circuit tester with the peak voltage adaptor as follows.

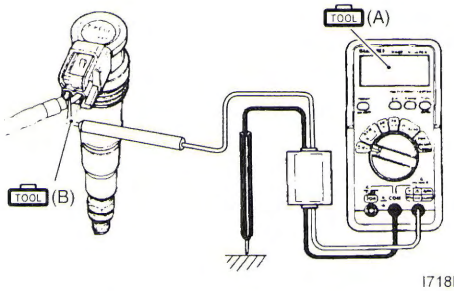
NOTE

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 pointed probe set)

Tester knob indication: Voltage (⎓)

	(+) Probe	(–) Probe
Ignition coil/Plug cap #1	W/Bl	Ground
Ignition coil/Plug cap #2	B	Ground
Ignition coil/Plug cap #3	Y	Ground
Ignition coil/Plug cap #4	G	Ground



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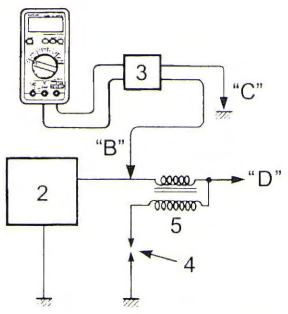


I823H1180026-01

2. ECM	"B": (+) probe
3. Peak voltage adaptor	"C": (–) probe
4. New spark plug	"D": To engine stop switch
5. Ignition coil	

9) 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.

10) Repeat the b) procedure several times and measure the highest peak voltage.
If the voltage is lower than standard range, inspect the ignition coil/plug cap and the CKP sensor.

Ignition coil primary peak voltage
80 V and more

11) After measuring the ignition coil primary peak voltage, reinstall the removed parts.

Ignition Coil / Plug Cap Resistance

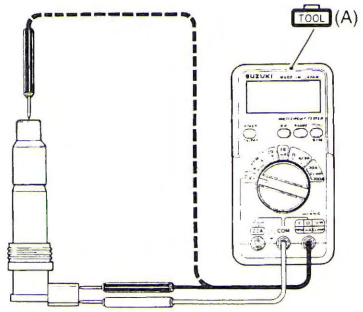
1) Remove the ignition coil/plug caps. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation" (Page 1H-5).

2) Measure the ignition coil/plug cap for resistance in both primary and secondary coils. If the resistance is not within the standard range, replace the ignition coil/plug cap with a new one.

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

Tester knob indication
Resistance (Ω)

Ignition coil resistance
Primary: 1.1 – 1.5 Ω ((+) terminal – (–) terminal)
Secondary: 6.4 – 9.6 kΩ (Spark plug cap – (–) terminal)



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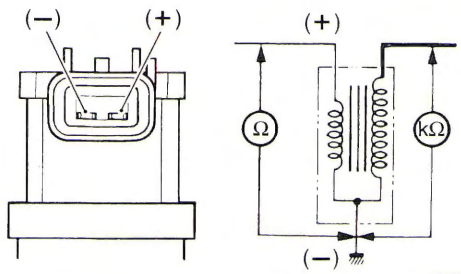


I718H1180006-02

3) After measuring the ignition coil/plug cap resistance, reinstall the removed parts.

CKP Sensor Inspection

BENF08J11806005

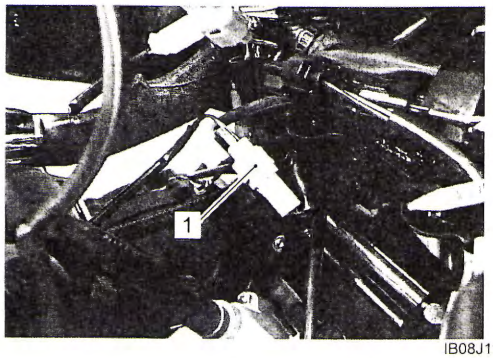
Refer to "Electrical Components Location" in Section 0A (Page 0A-6).

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.



IB08J1180011-03

3) Connect the multi-circuit tester with the peak volt adaptor as follows.

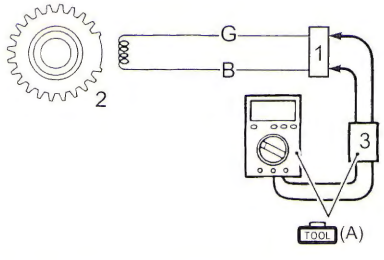
NOTE

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	G



I837H1180009-01

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 – G)

6) If the peak voltage is within the specification, check the continuity between the CKP sensor coupler and ECM coupler.

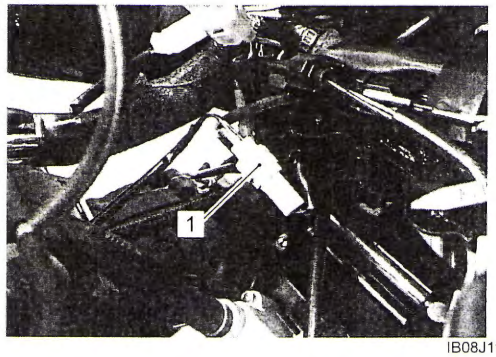
NOTICE

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).

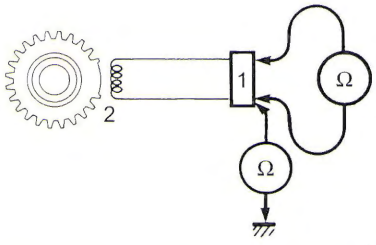


IB08J1180011-03

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 – G)
∞ 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

BENF08J11806006

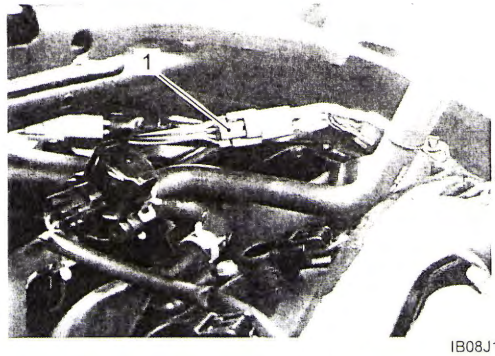
Refer to "Generator Removal and Installation" in Section 1J (Page 1J-5).

Engine Stop Switch Inspection

BENF08J11806007

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).



IB08J1180012-02

4) Inspect the engine stop switch for continuity with a tester.
If any abnormality is found, replace the right handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation" in Section 6B (Page 6B-3).

Special tool
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

BENF08J11806008

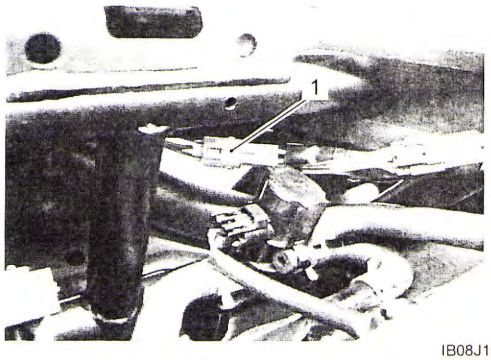
Refer to "Ignition Switch Inspection" in Section 9C (Page 9C-7).

Ignition Switch Removal and Installation

BENF08J11806009

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).



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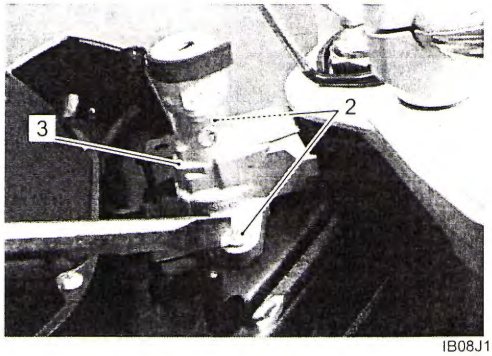
3) Remove the ignition switch mounting bolts (2) using a chisel.
4) Remove the ignition switch (3).

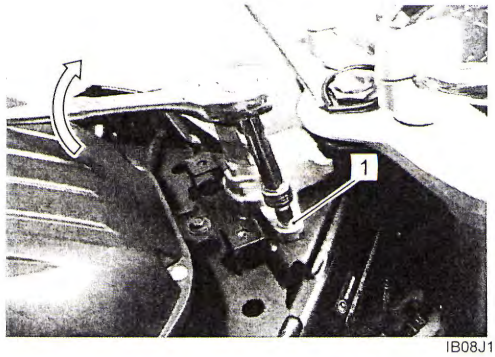


IB08J1180015-05

Installation

Install the ignition switch in the reverse order of removal. Pay attention to the following point:

- Tighten new ignition switch mounting bolts (1) using the E-8 torx® socket until head of each bolt is broken off.



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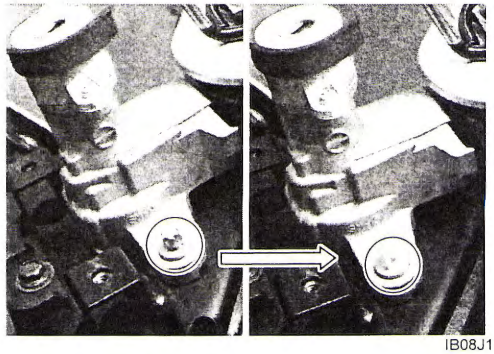


IB08J1180017-01

Specifications

Service Data

BENF08J11807001

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 – 1.5 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

BENF08J11807002

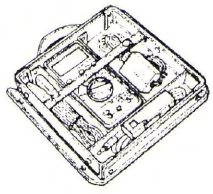
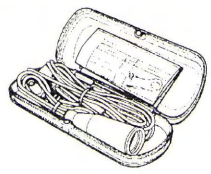
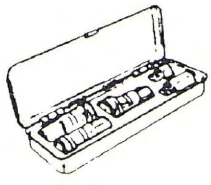
Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Spark plug	11	1.1	8.0	☞(Page 1H-5) / ☞(Page 1H-6) / ☞(Page 1H-6) / ☞(Page 1H-6)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Special Tool

BENF08J11808001

09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 1H-8) / ☞(Page 1H-8) / ☞(Page 1H-9) / ☞(Page 1H-10)		09900–25009 Needle point probe set ☞(Page 1H-8)	
09930–10121 Spark plug socket set ☞(Page 1H-5) / ☞(Page 1H-5)			

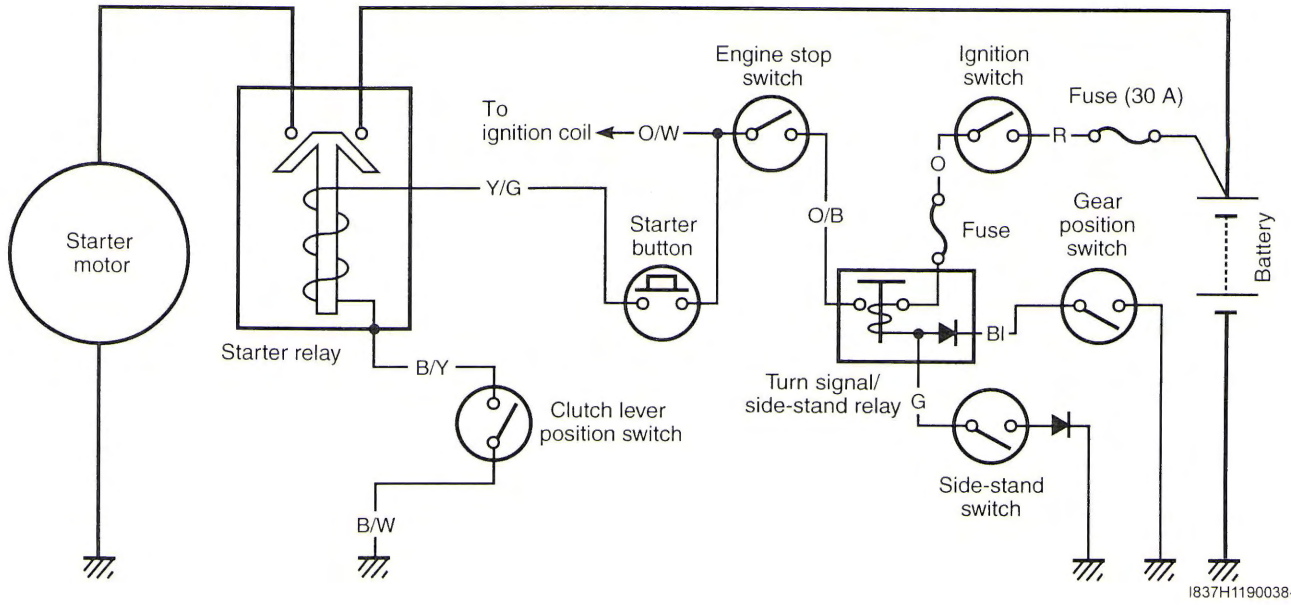
Starting System

Schematic and Routing Diagram

Starting System Diagram

BENF08J11902001

Refer to "Wire Color Symbols" in Section 0A (Page 0A-3).



Component Location

Starting System Components Location

BENF08J11903001

Refer to "Electrical Components Location" in Section 0A (Page 0A-6).

Diagnostic Information and Procedures

Starting System Symptom Diagnosis

BENF08J11904001

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.*
	Defective ignition switch	*Replace.*
	Defective engine stop switch	*Replace.*
	Defective clutch lever position switch	*Replace.*
	Defective side stand switch	*Replace.*
	Defective side stand relay	*Replace.*

Starter Motor Will Not Run

BENF08J11904002

NOTE

Make sure the fuses are not blown and the battery is fully-charged before diagnosing.

Troubleshooting

Step 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?

Yes — Go to Step 2.

No — Go to Step 3.

Step 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?

Yes
- Faulty starter relay.
- Loose or disconnected starter motor lead wire.
- Loose or disconnected between starter relay and battery (+) terminal.

No — Faulty starter motor.

Step 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?

Yes — Go to Step 4.

No
- 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.

Step 4

Check the starter relay. Refer to "Starter Relay Inspection" (Page 1I-7).

Is the starter relay OK?

Yes — Poor contact of the starter relay.

No — Faulty starter relay.

Starter Motor Runs But Does Not Crank The Engine

BENF08J11904003

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 1

Check the side-stand switch. Refer to "Side-stand / Ignition Interlock System Parts Inspection" (Page 1I-8).

Is the side-stand switch OK?

Yes — Go to Step 2.

No — Faulty side-stand switch.

Step 2

Check the starter clutch. Refer to "Starter Clutch Removal and Installation" (Page 1I-10).

Is the starter clutch OK?

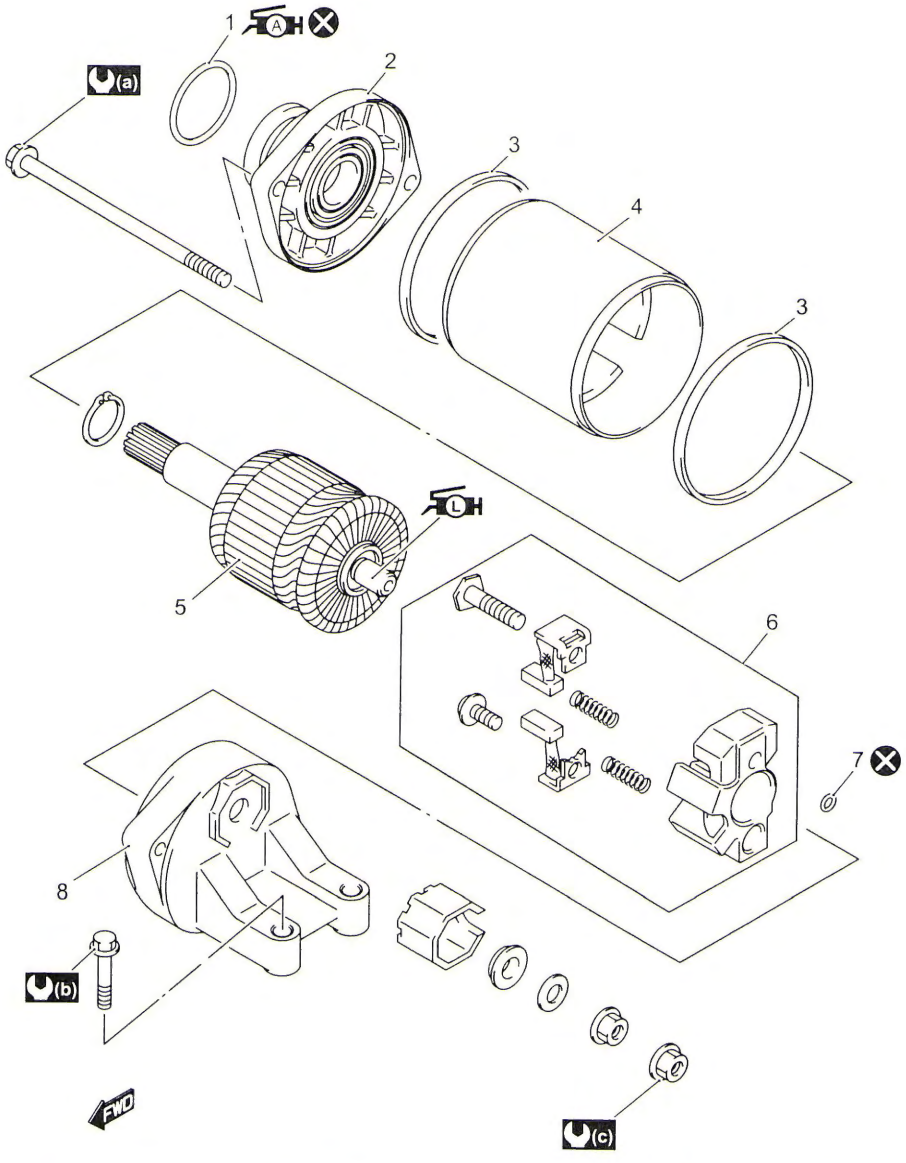
Yes
- Open circuit in wire harness.
- Poor contact of connector.

No — Faulty starter clutch.

Repair Instructions

Starter Motor Components

BENF08J11906001



IB08J1190033-03

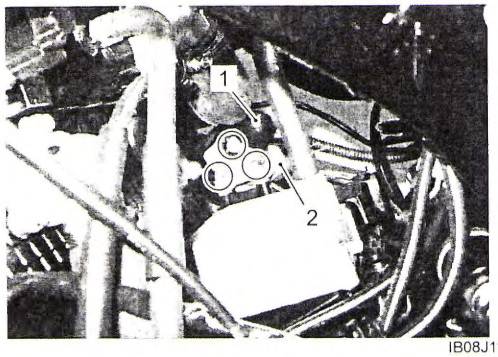
1. O-ring	6. Brush holder set	(c) : 6 N·m (0.6 kgf-m, 4.3 lbf-ft)
2. Housing end (Inside)	7. O-ring	A : Apply grease to sliding surface.
3. Square-ring	8. Housing end (Outside)	L : Apply molybdenum grease L to sliding surface.
4. Starter motor case	(a) : 5 N·m (0.5 kgf-m, 3.7 lbf-ft)	⊗ : Do not reuse.
5. Armature	(b) : 11 N·m (1.1 kgf-m, 8.0 lbf-ft)	

Starter Motor Removal and Installation

BENF08J11906002

Removal

1) Turn the ignition switch OFF and disconnect the battery (–) lead wire. Refer to "Battery Removal and Installation" in Section 1J (Page 1J-12).
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 (1).
4) Remove the starter motor (2).

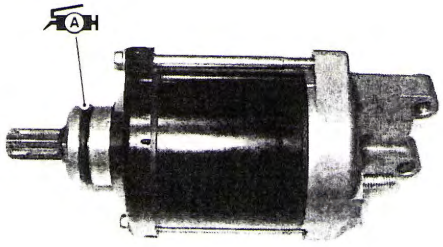


IB08J1190001-02

Installation

1) Apply grease to the new O-ring.

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



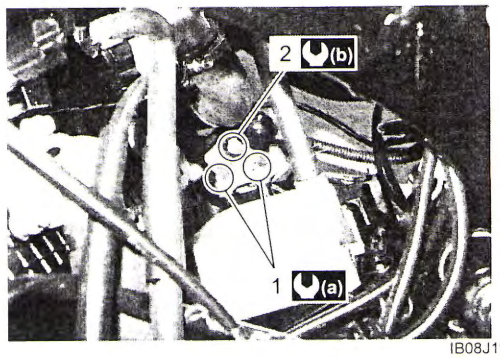
IB08J1190002-02

2) Install the starter motor.
3) Tighten the starter motor mounting bolts (1) to the specified torque.

Tightening torque
Starter motor mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

4) Tighten the starter motor lead wire mounting nut (2) to the specified torque. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-3).

Tightening torque
Starter motor lead wire mounting nut (b): 6 N·m (0.6 kgf-m, 4.3 lbf-ft)



IB08J1190003-02

Starter Motor Disassembly and Assembly

BENF08J11906003

Refer to "Starter Motor Removal and Installation" (Page 1I-4).

Disassembly

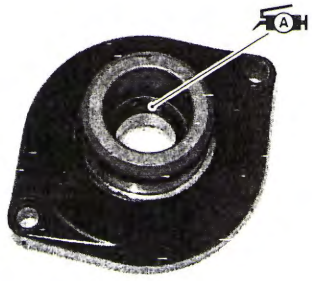
Disassemble the starter motor as shown in the starter motor components diagram. Refer to "Starter Motor Components" (Page 1I-3).

Assembly

Reassemble the starter motor in the reverse order of disassembly. Pay attention to the following points:

- Apply grease to the lip of the new oil seal.

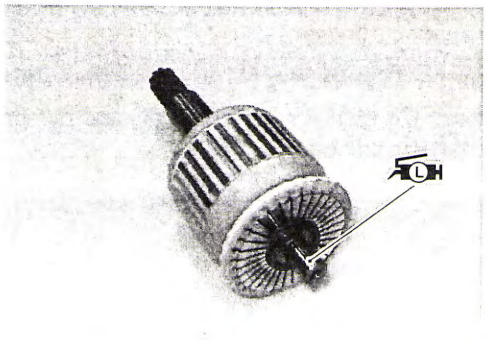
: Grease 99000–25010 (SUZUKI SUPER GREASE "A" or equivalent)



IB08J1190004-01

- Apply a small quantity of moly paste to the armature shaft.

  : Grease 99000–25280 (SUZUKI MOLYBDENUM GREASE L or equivalent)



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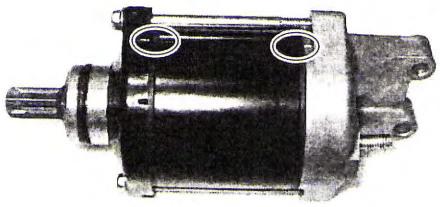
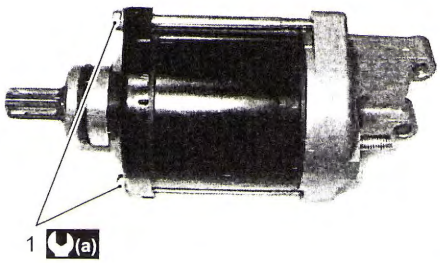
- Align the match marks on the starter motor case with the match mark on each housing end.



IB08J1190006-01

- Tighten the starter motor housing bolts (1) to the specified torque.

  Tightening torque
  Starter motor housing bolt (a): 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)



IB08J1190007-01

Starter Motor Inspection

BENF08J11906004

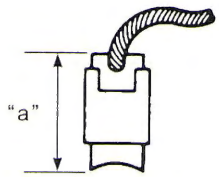
Refer to "Starter Motor Disassembly and Assembly" (Page 1I-4).

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: 6.5 mm (0.26 in)

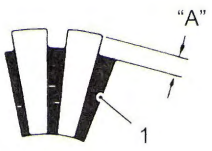
Special tool
: 09900–20102 (Vernier calipers (1/20 mm, 200 mm))



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.

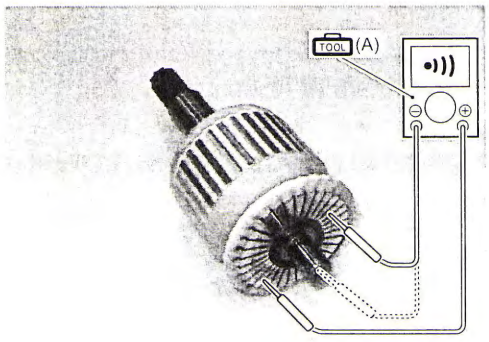


I823H1190007-01

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 (•))))



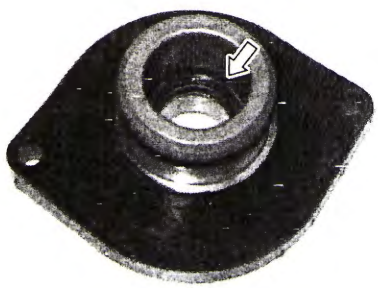
IB08J1190008-01

Bearing
Check the bearings for damage.
If any damage is found, replace the housing end.



IB08J1190009-01

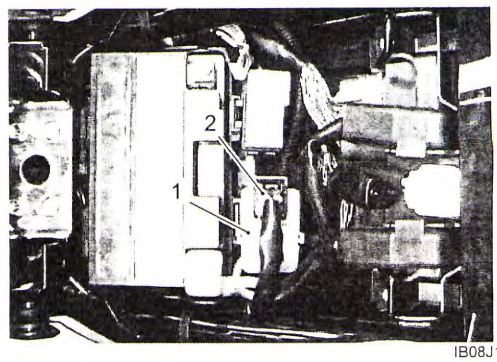
Oil Seal
Check the seal lip for damage.
If any damage is found, replace the housing end.



IB08J1190010-01

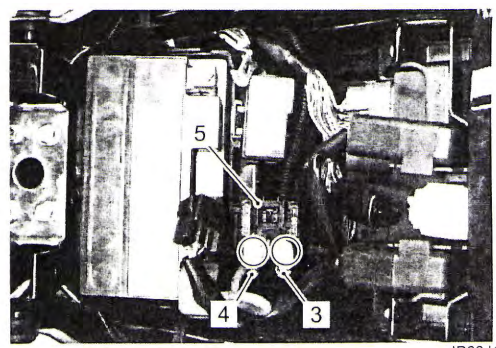
Starter Relay Removal and Installation
BENF08J11906005

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 from the battery.
4) Remove the starter relay cover (1) and disconnect the starter relay coupler (2).



IB08J1190011-02

5) Disconnect the starter motor lead wire (3) and battery (+) lead wire (4).
6) Remove the starter relay (5).



IB08J1190012-02

Installation
Install the starter relay in the reverse order of removal.

Starter Relay Inspection

BENF08J11906006

Inspect the starter relay in the following procedures:

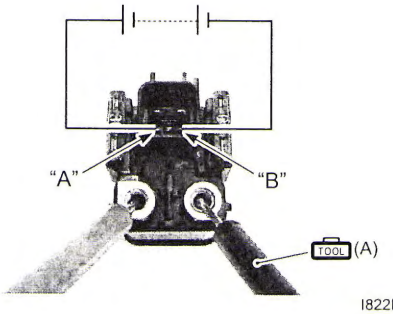
1) Remove the starter relay. Refer to "Starter Relay Removal and Installation" (Page 1I-6).
2) Apply 12 V to "A" and "B" terminals and check for continuity between the positive and negative terminals using the multi-circuit tester. If the starter relay clicks and continuity is found, the relay is ok.

NOTICE

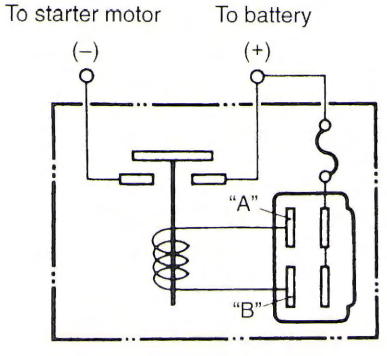
Do not apply battery voltage to the starter relay for five seconds and more, since the relay coil may overheat and get damaged.

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

Tester knob indication
Continuity test (•))))



I822H1190019-02



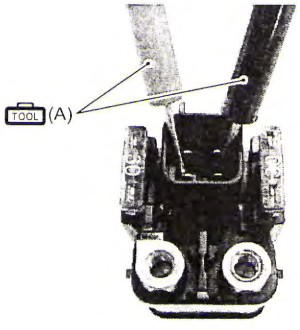
I823H1190040-02

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

Tester knob indication
Resistance (Ω)

Starter relay resistance
3 – 6 Ω



I822H1190020-01

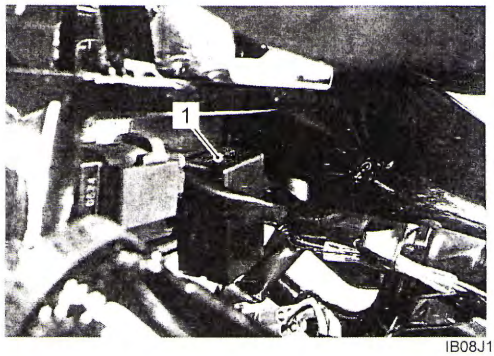
4) Install the starter relay. Refer to "Starter Relay Removal and Installation" (Page 1I-6).

Turn Signal / Side-stand Relay Removal and Installation

BENF08J11906007

Removal

1) Turn the ignition switch OFF.
2) Remove the frame cover (LH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
3) Remove the turn signal/side-stand relay (1).



IB08J1190013-02

Installation

Install the turn signal/side-stand relay in the reverse order of removal.

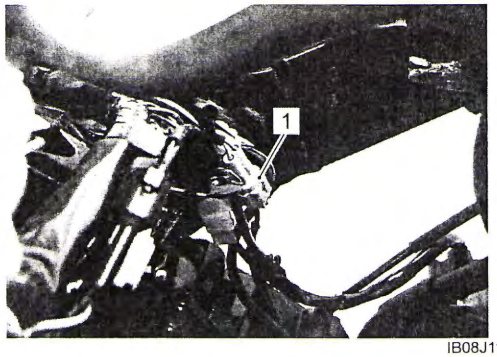
Side-stand / Ignition Interlock System Parts Inspection

BENF08J11906008

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) Lift and support the fuel tank Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
3) Disconnect the side-stand switch coupler (1).



IB08J1190014-02

4) Measure the voltage between G and B/W lead wires.

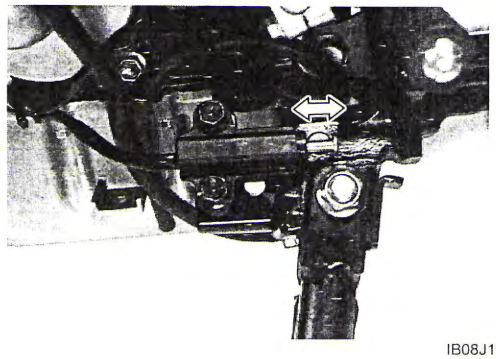
Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

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 multi-circuit tester reads less than 1.4 V when the tester probes are not connected, replace its battery.

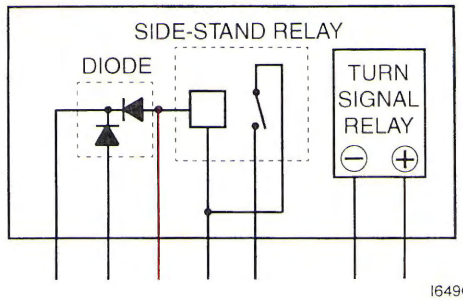


IB08J1190015-02

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.



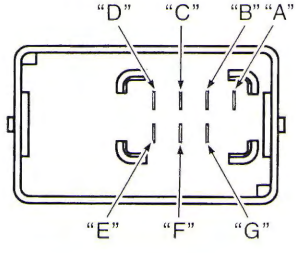
I649G1190027-02

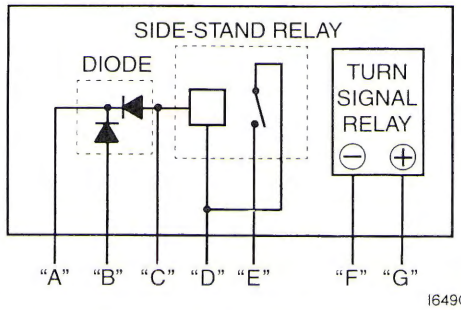
Side-stand relay

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

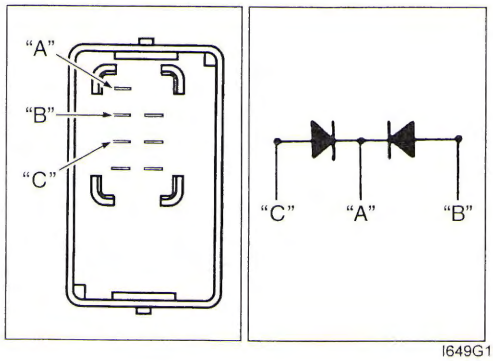
4) Install the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation" (Page 1I-7).

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	—

IB08J1190037-01

NOTE

If the multi-circuit tester reads less than 1.4 V when the tester probes are not connected, replace its battery.

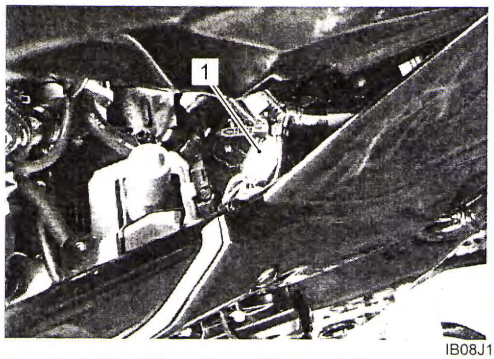
3) Install the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation" (Page 1I-7).

GP Switch

1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
2) Disconnect the GP switch lead wire coupler (1).

NOTICE

When disconnecting and connecting the GP switch lead wire coupler (1), make sure to turn off the ignition switch, or electronic parts may get damaged.



IB08J1190016-02

3) Check the continuity between BI and B/W lead wires with the transmission in "neutral".

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

Tester knob indication
Continuity test (•))))

	BI	B/W
ON (Neutral)	○———	———○
OFF (Except neutral)		

IB08J1190017-01

4) Connect the GP switch lead wire coupler to the wiring harness.
5) Insert the needle pointed probes to the lead wire coupler.
6) Support the motorcycle with a jack or wooden block.

⚠ CAUTION

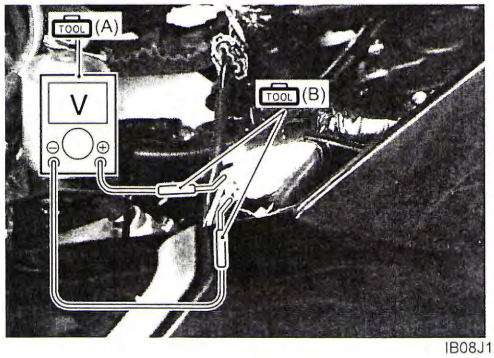
- **Do not support the motorcycle with the exhaust pipes.**
- **Make sure that the motorcycle is supported securely.**

7) Turn the ignition switch ON and side-stand to upright position.
8) 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
(A): 09900–25008 (Multi-circuit tester set)
(B): 09900–25009 (Needle pointed probe set)

Tester knob indication
Voltage (⎓)

GP switch voltage (Except neutral position)
0.6 V and more ((+) P – (–) B/W)



IB08J1190018-03

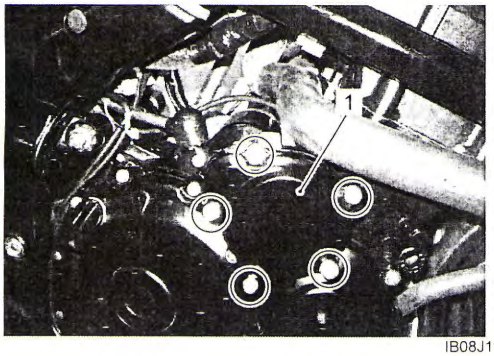
9) Turn the ignition switch OFF.
10) Install the removed parts.

Starter Clutch Removal and Installation

BENF08J11906009

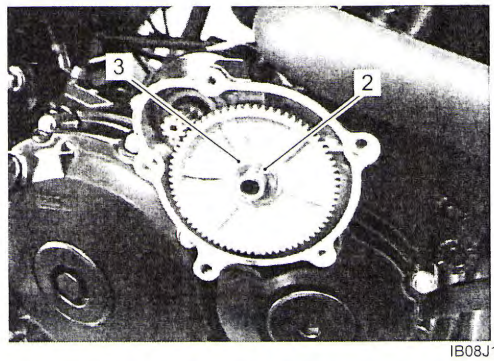
Removal

1) Drain engine oil. Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).
2) Remove the starter idle gear cover (1).



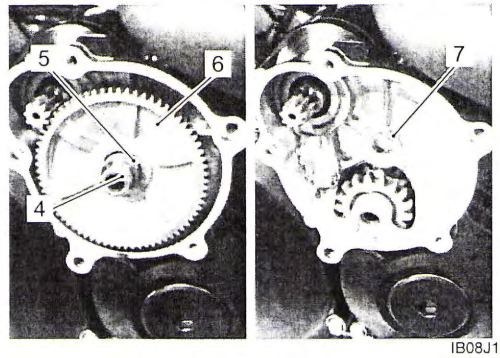
IB08J1190019-02

3) Remove the gasket and dowel pins.
4) Remove the wave washer (2) and washer (3).



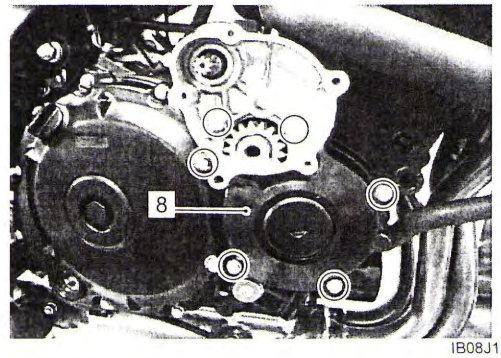
IB08J1190020-03

5) Remove the shaft (4), bearing (5), starter idle gear No. 1 (6) and thrust washer (7).



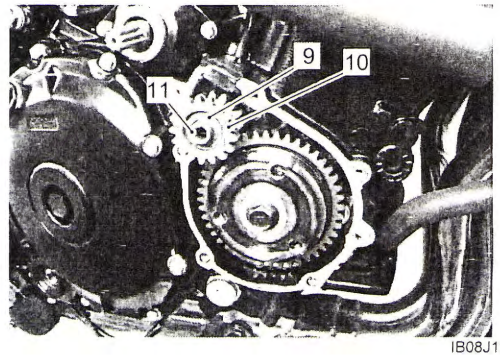
IB08J1190021-03

6) Remove the starter clutch cover (8).



IB08J1190022-03

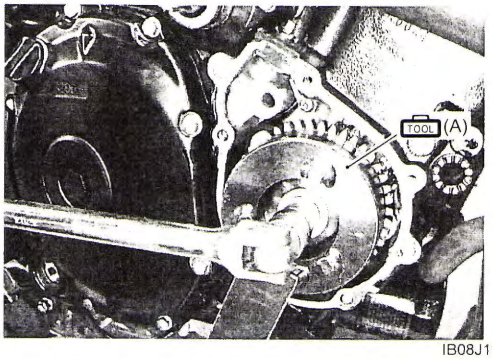
7) Remove the gasket and dowel pins.
8) Remove the wave washer (9), starter idle gear No. 2 (10) and its shaft (11).



IB08J1190023-02

9) Hold the starter clutch using the special tool.
10) Remove the starter clutch.

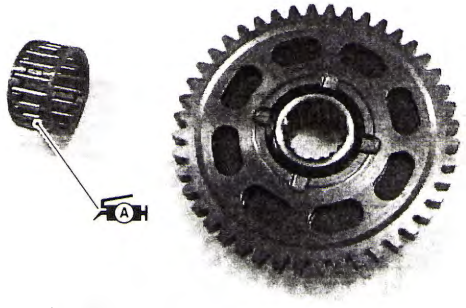
Special tool
TOOL (A): 09920–34830 (Starter clutch rotor holder)



IB08J1190024-02

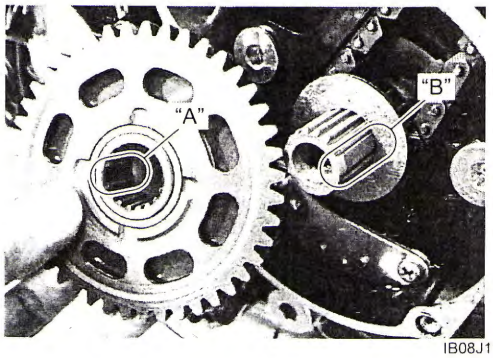
Installation
Installation is in the reverse order of removal. Pay attention to the following points:

- Apply engine oil to the starter driven gear bearing.



IB08J1190034-01

- When installing the starter clutch, align the wide spline tooth of starter clutch "A" with that of crankshaft "B".

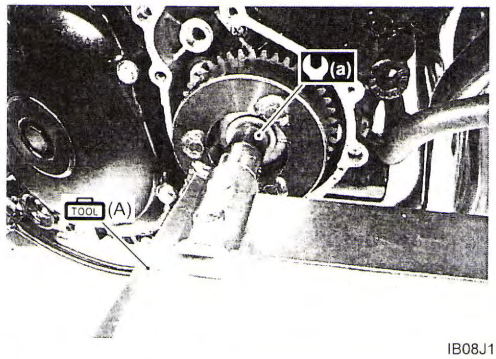


IB08J1190025-02

- With the starter clutch held immovable using the special tool, tighten the starter clutch bolt to the specified torque.

Special tool
TOOL (A): 09920–34830 (Starter clutch rotor holder)

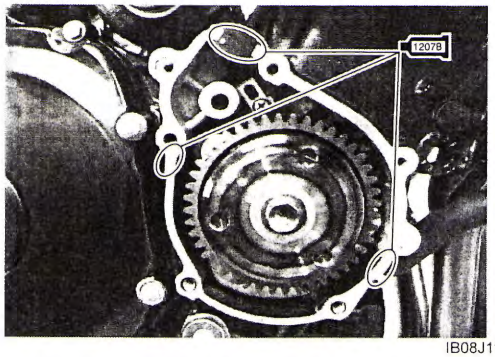
Tightening torque
Starter clutch bolt (a): 54 N·m (5.4 kgf-m, 39.0 lbf-ft)



IB08J1190026-02

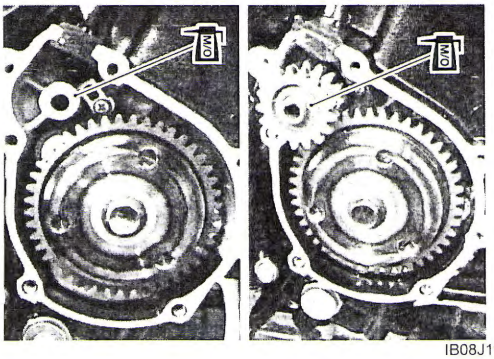
- Apply a bond lightly to the mating surfaces at the parting line between the upper and middle crankcases.

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

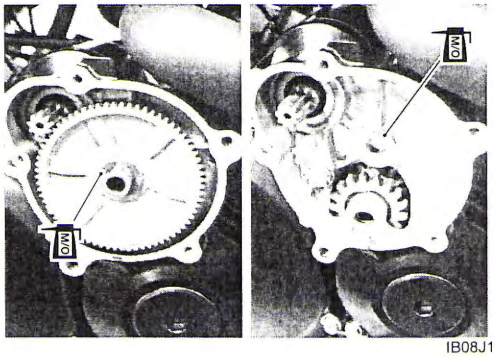


IB08J1190027-04

- Apply molybdenum oil to the boss of starter idle gear shafts.



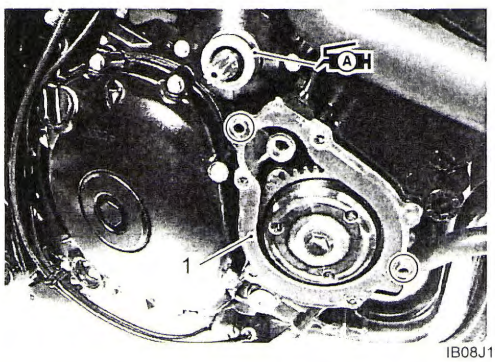
IB08J1190035-01



IB08J1190036-01

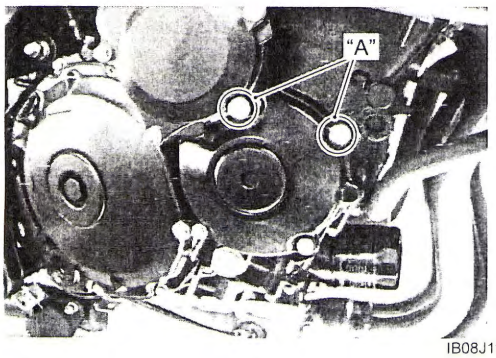
- Apply grease to the starter motor O-ring.
- Install the new gasket (1) and dwell pins.

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



IB08J1190028-03

- Fit the new gasket washer to the bolt "A".



IB08J1190032-02

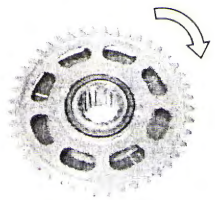
Starter Clutch Inspection

BENF08J11906010

Refer to "Starter Clutch Removal and Installation" (Page 1I-10).

Starter Clutch

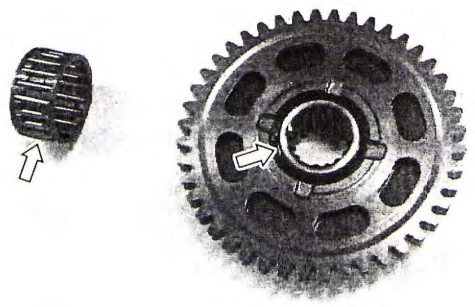
1) Install the starter driven gear onto the starter clutch.
2) Turn the starter driven gear by hand to inspect the starter clutch for a smooth movement. The gear turns in one direction only. If a large resistance is felt for rotation, inspect the starter clutch or the starter clutch contacting surface on the starter driven gear for wear or damage.
   If they are found to be damaged, replace them with new ones.



I823H1190029-01

Starter Driven Gear Bearing

Inspect the starter driven gear bearing for wear of damage.



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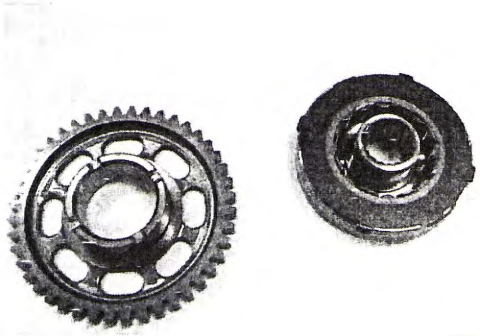


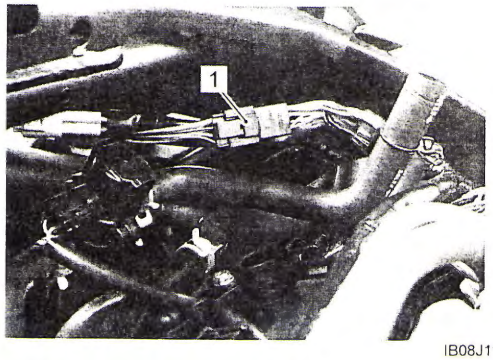
IB08J1190030-01

Starter Button Inspection

BENF08J11906011

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).



IB08J1190031-02

3) Inspect the starter button for continuity using the tester.
If any abnormality is found, replace the right handle switch assembly with a new one. Refer to "Handlebars Removal and Installation" in Section 6B (Page 6B-3).

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

Tester knob indication
Continuity (•))))

Position \ Color	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

BENF08J11907001

Electrical

Unit: mm

Item	Specification		Note
Starter motor brush length	Standard	12.0 (0.47)	
	Limit	6.5 (0.26)	
Starter relay resistance	3 – 6 Ω		

Tightening Torque Specifications

BENF08J11907002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Starter motor mounting bolt	10	1.0	7.0	☞(Page 1I-4)
Starter motor lead wire mounting nut	6	0.6	4.3	☞(Page 1I-4)
Starter motor housing bolt	3.5	0.35	2.5	☞(Page 1I-5)
Starter clutch bolt	54	5.4	39.0	☞(Page 1I-11)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:
"Starter Motor Components" (Page 1I-3)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J11908001

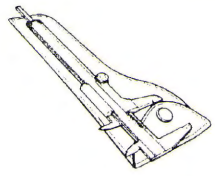
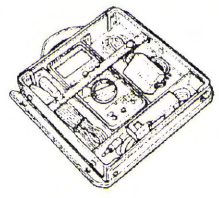
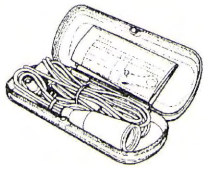
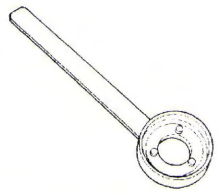
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 1I-4) / ☞(Page 1I-4) / ☞(Page 1I-12)
	SUZUKI MOLYBDENUM GREASE L or equivalent	P/No.: 99000–25280	☞(Page 1I-5)
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1I-11)

NOTE

Required service material(s) is also described in:
"Starter Motor Components" (Page 1I-3)

Special Tool

BENF08J11908002

09900–20102 Vernier calipers (200 mm) ☞(Page 1I-5) 	09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 1I-6) / ☞(Page 1I-7) / ☞(Page 1I-7) / ☞(Page 1I-8) / ☞(Page 1I-8) / ☞(Page 1I-9) / ☞(Page 1I-9) / ☞(Page 1I-10) / ☞(Page 1I-13) 
09900–25009 Needle point probe set ☞(Page 1I-10) 	09920–34830 Starter clutch rotor holder ☞(Page 1I-11) / ☞(Page 1I-11) 

Charging System

Schematic and Routing Diagram

Charging System Diagram

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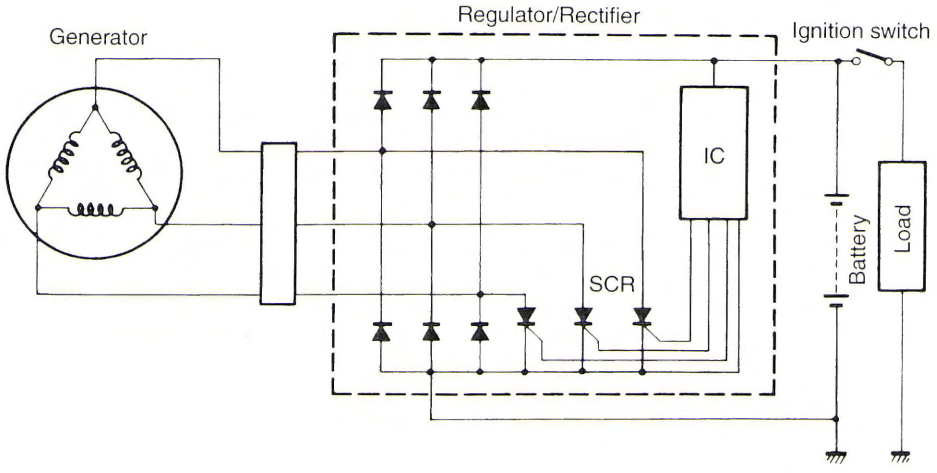

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Component Location

Charging System Components Location

BENF08J11A03001

Refer to "Electrical Components Location" in Section 0A (Page 0A-6).

Diagnostic Information and Procedures

Charging System Symptom Diagnosis

BENF08J11A04001

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

BENF08J11A04002

Troubleshooting

Step 1

Check accessories which use excessive amounts of electricity.

Are accessories being installed?

Yes — Remove accessories.

No — Go to Step 2.

Step 2

Check the battery for current leakage. Refer to "Battery Current Leakage Inspection" (Page 1J-3).

Is the battery for current leakage OK?

Yes — Go to Step 3.

No
- Short circuit of wire harness.
- Faulty electrical equipment.

Step 3

Measure the regulated voltage between the battery terminals. Refer to "Regulated Voltage Inspection" (Page 1J-3).

Is the regulated voltage OK?

Yes
- Faulty battery.
- Abnormal driving condition.

No — Go to Step 4.

Step 4

Measure the resistance of the generator coil. Refer to "Generator Inspection" (Page 1J-4).

Is the resistance of generator coil OK?

Yes — Go to Step 5.

No
- Faulty generator coil.
- Disconnected lead wires.

Step 5

Measure the generator no-load performance. Refer to "Generator Inspection" (Page 1J-4).

Is the generator no-load performance OK?

Yes — Go to Step 6.

No — Faulty generator.

Step 6

Inspect the regulator/rectifier. Refer to "Regulator / Rectifier Inspection" (Page 1J-9).

Is the regulator/rectifier OK?

Yes — Go to Step 7.

No — Faulty regulator/rectifier.

Step 7

Inspect wirings.

Is the wirings OK?

Yes — Faulty battery.

No
- Short circuit of wire harness.
- Poor contact of couplers.

Repair Instructions

Battery Current Leakage Inspection

BENF08J11A06001

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.

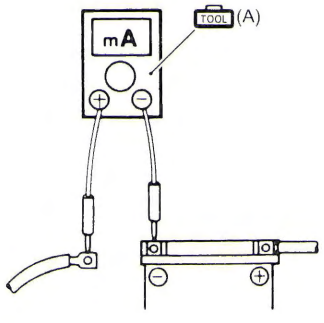
⚠ CAUTION

- **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



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5) Connect the battery (–) terminal and install the front seat. Refer to "Battery Removal and Installation" (Page 1J-12) and "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).

Regulated Voltage Inspection

BENF08J11A06002

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-4) and "Regulator / Rectifier Inspection" (Page 1J-9).

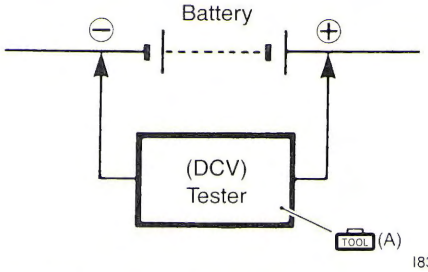
NOTE

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 – 15.0 V at 5 000 r/min



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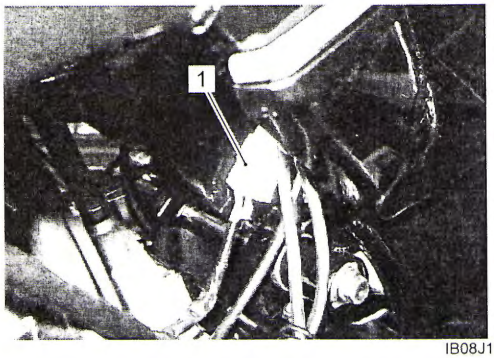
4) Install the front seat. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).

Generator Inspection

BENF08J11A06003

Generator Coil Resistance

1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
2) Disconnect the generator coupler (1).



IB08J11A0001-02

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.

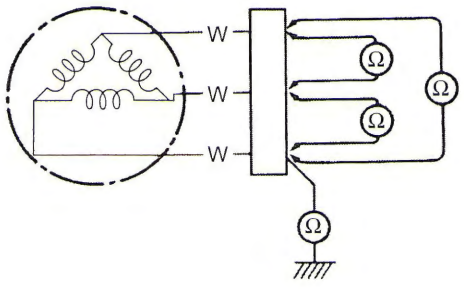
NOTE

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
0.2 – 0.9 Ω (W – W)
∞ Ω (W – Ground)

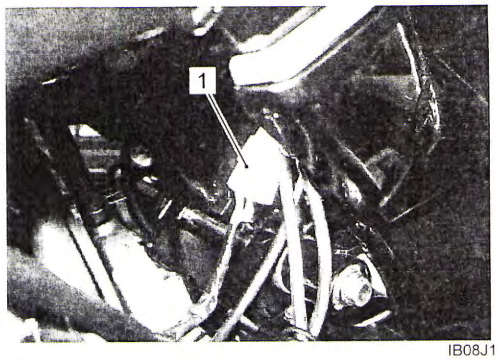


IF08J11A0003-01

4) Connect the generator coupler.
5) Install the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).

No-load Performance

1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
2) Disconnect the generator coupler (1).



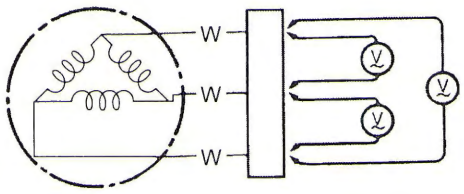
IB08J11A0001-02

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)
65 V (AC) and more at 5 000 r/min



IF08J11A0004-01

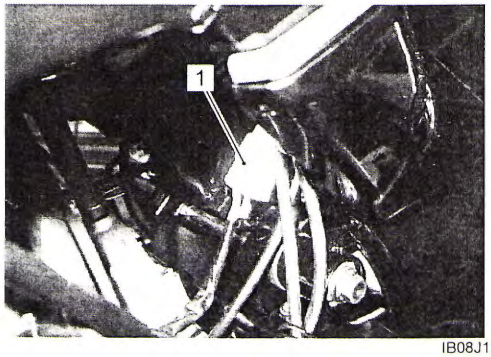
5) Connect the generator coupler.
6) Install the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).

Generator Removal and Installation

BENF08J11A06004

Removal

1) Disconnect the battery (–) lead wire. Refer to "Battery Removal and Installation" (Page 1J-12).
2) Drain engine oil. Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).
3) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
4) Disconnect the generator coupler (1).



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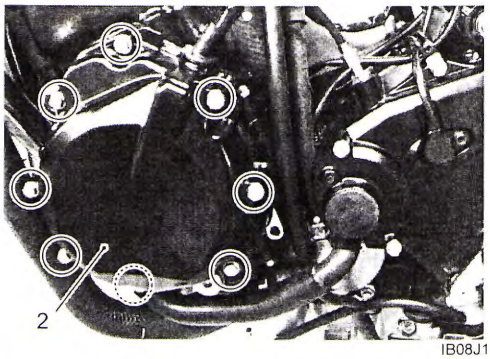
5) Remove the generator cover (2).



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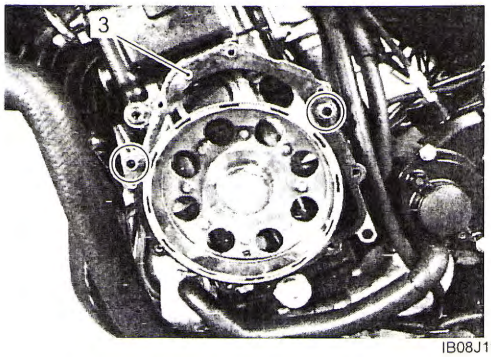
6) Remove the gasket (3) and dowel pins.



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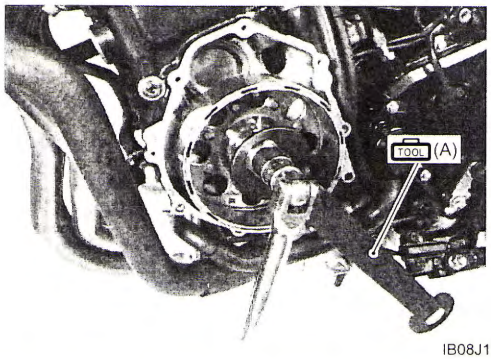
7) Hold the generator rotor using the special tool.

Special tool
TOOL (A): 09930–44521 (Rotor holder)

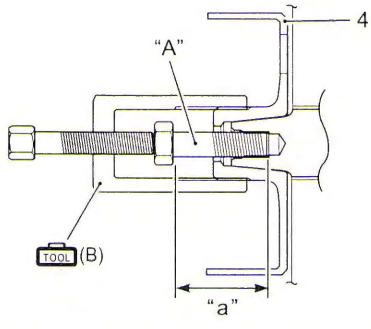
8) Remove the generator rotor bolt.



IB08J11A0004-03

9) Install a bolt "A" of suitable size to the left end of crankshaft.
10) Remove the generator rotor (4) using the special tool.

Special tool
TOOL (B): 09930–34980 (Rotor remover)



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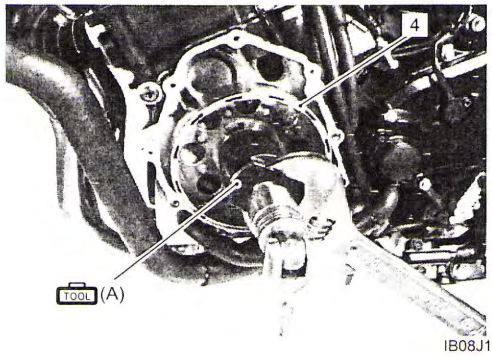
"a": M12, length: 28 – 38 mm (1.1 – 1.5 in)



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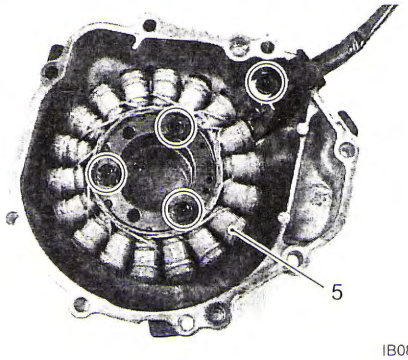
11) Remove the generator stator (5).



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Installation

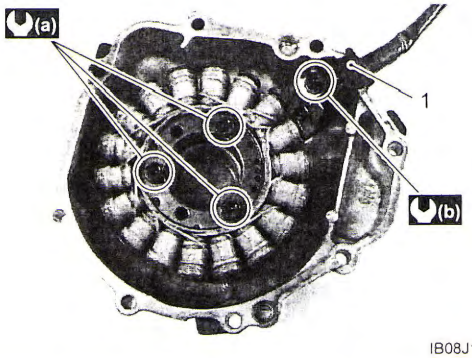
Install the generator in the reverse order of removal. Pay attention to the following points:

- Tighten the generator stator set bolts and generator lead wire set bolt to the specified torque.

NOTE

Be sure the grommet (1) is set to the generator cover.

Tightening torque
Generator stator set bolt (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
Generator lead wire set bolt (b): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



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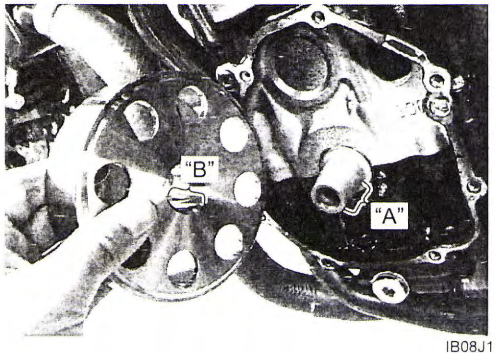
- Degrease the tapered portion "A" of generator rotor and also the crankshaft "B". Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.



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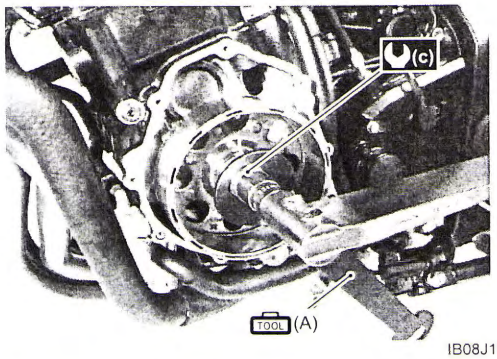
- Hold the generator rotor with using special tool and tighten its bolt to the specified torque.

Special tool
TOOL (A): 09930–44521 (Rotor holder)

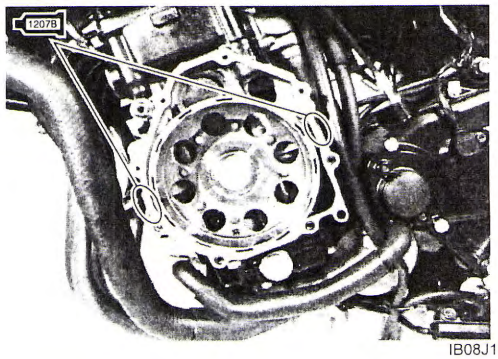
Tightening torque
Generator rotor bolt (c): 120 N·m (12.0 kgf-m, 87.0 lbf-ft)



IB08J11A0010-03

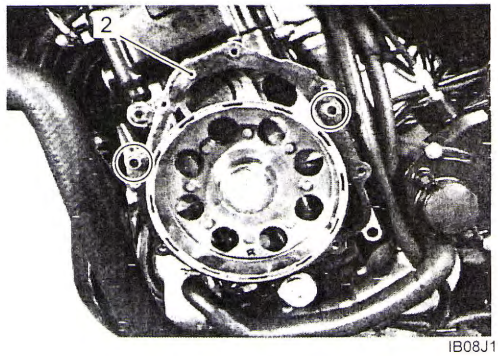
- Apply a bond lightly to the mating surfaces at the parting line between the upper and middle crankcases as shown.

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



IB08J11A0011-03

- Install the dowel pins and new gasket (2).



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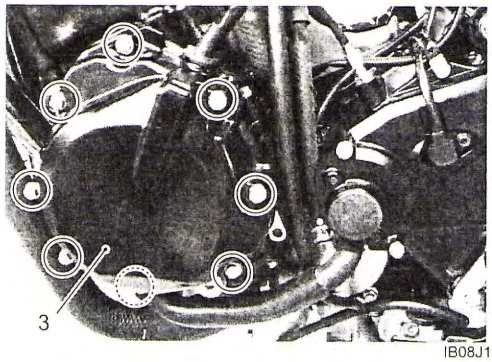
- Install the generator cover (3) and tighten the generator cover bolts.

⚠ WARNING

Be careful not to pinch the finger between the generator cover and crankcase.

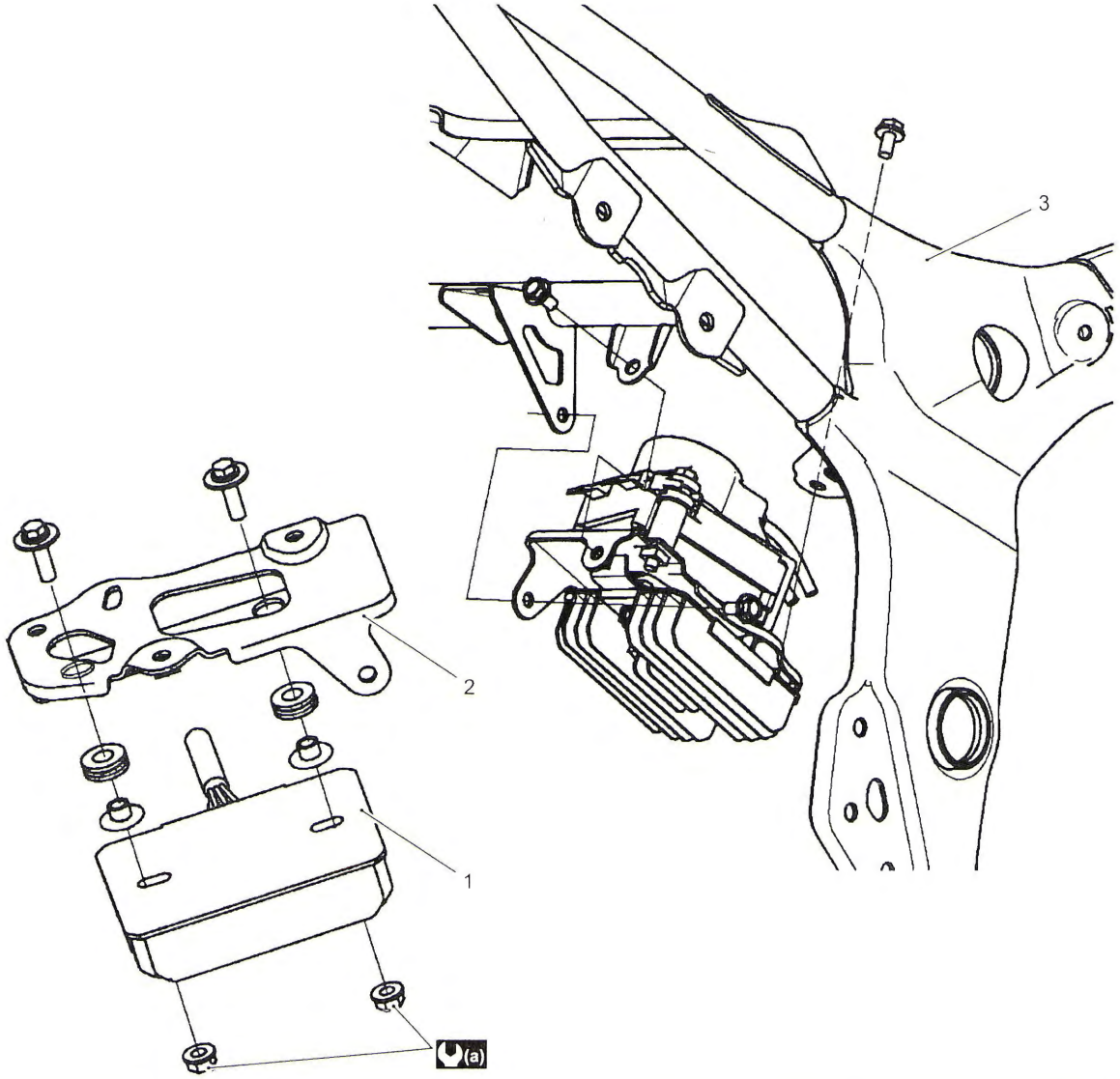


IB08J11A0012-02

- Route the generator lead wire. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-3).

Regulator / Rectifier Construction

BENF08J11A06005



IB08J11A0019-01

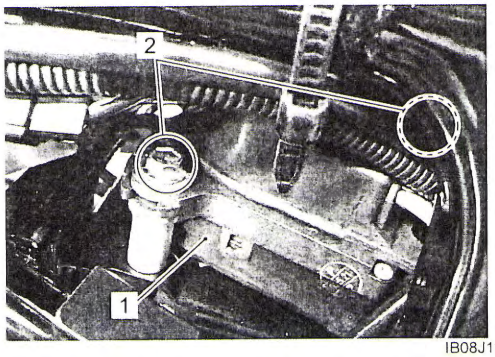
1. Regulator/rectifier	2. Regulator/rectifier bracket	3. Frame	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

Regulator / Rectifier Removal and Installation

BENF08J11A06006

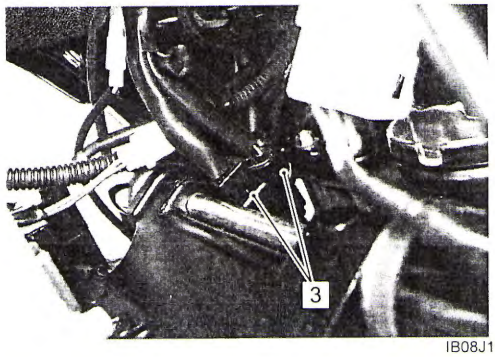
Removal

1) Turn the ignition switch OFF.
2) Lift and support fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
3) Remove the right frame cover. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
4) Move the EXCVA (1) by removing the EXCVA mounting bolts (2).



IB08J11A0013-02

5) Disconnect the regulator/rectifier couplers (3).



IB08J11A0014-02

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

BENF08J11A06007

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-8).
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-8).

NOTE

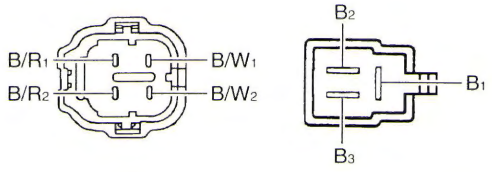
If the tester reads less than 1.4 V when the tester probes are not connected, replace its battery.

Special tool

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

Tester knob indication

Diode test (⊣◀)



I823H11A0020-04

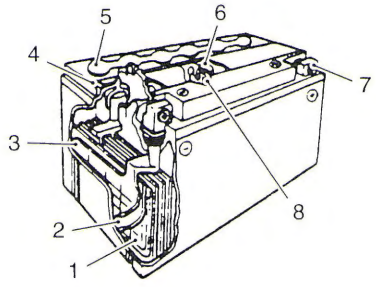
Unit: V

		(+) 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	0.1 – 0.8	0.1 – 0.8	0.1 – 0.8	0.3 – 1.0	0.3 – 1.0
	B/R_2	0	—	0.1 – 0.8	0.1 – 0.8	0.1 – 0.8	0.3 – 1.0	0.3 – 1.0
	B_1	*	*	—	*	*	0.1 – 0.8	0.1 – 0.8
	B_2	*	*	*	—	*	0.1 – 0.8	0.1 – 0.8
	B_3	*	*	*	*	—	0.1 – 0.8	0.1 – 0.8
	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

BENF08J11A06008



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

BENF08J11A06009

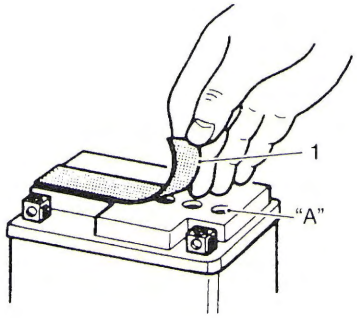
Initial Charging

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".

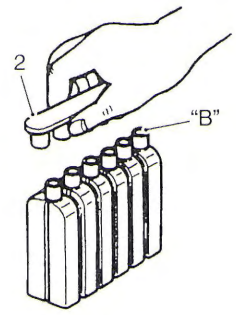


I649G11A0039-03

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.**



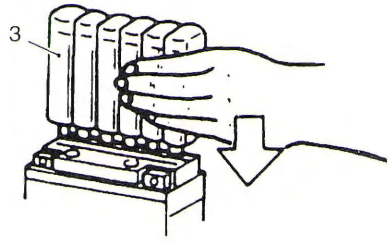
I649G11A0040-03

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.



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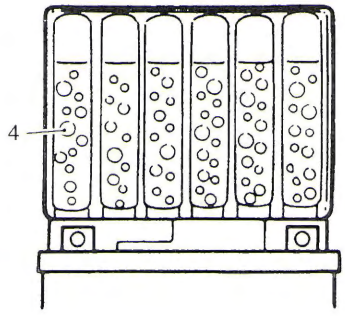
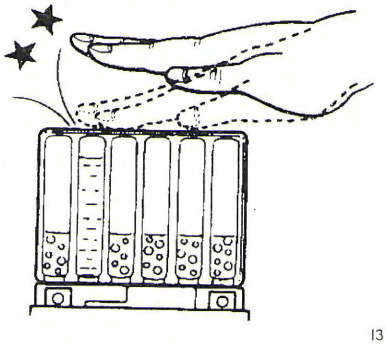
5) Make sure that air bubbles (4) rise to the top of each electrolyte container, and leave in this position for about more than 20 minutes.



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.

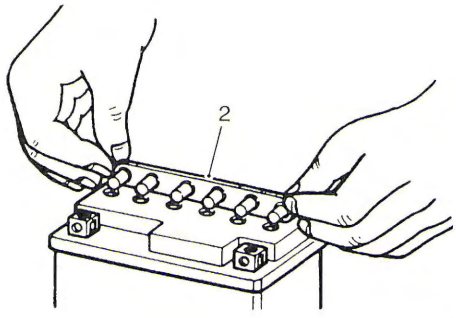


I310G11A0024-01

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.

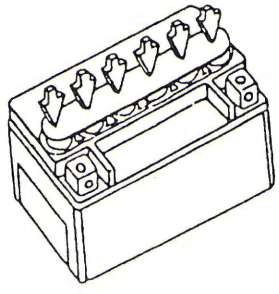
NOTICE

- **Once the caps are installed to the battery, do not remove the caps.**
- **Do not tap the caps with a hammer when installing them.**

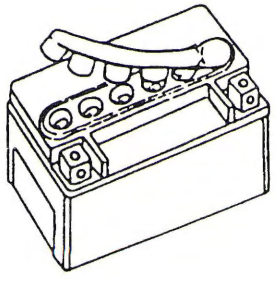


I718H11A0027-01

Correct



Incorrect



I649G11A0047-02

Charging

For initial charging, use the charger specially designed for MF battery.

NOTICE

- **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

NOTICE

Do not remove the caps on the battery top while recharging.

NOTE

When the motorcycle is not used for a long period, check the battery every 1 month to prevent the battery discharge.

1) Remove the battery from the motorcycle. Refer to "Battery Removal and Installation" (Page 1J-12).
2) Measure the battery voltage using the multi-circuit tester.
   If the voltage reading is less than the 12 V (DC), recharge the battery with a battery charger.

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

   Tester knob indication
   Voltage (⎓)

   Recharging time
   1.2 A for 5 to 10 hours or 5 A for 1 hour

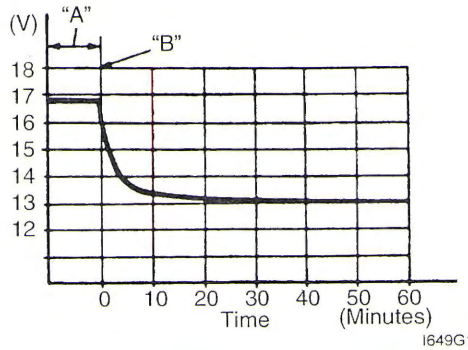
   NOTICE

   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.

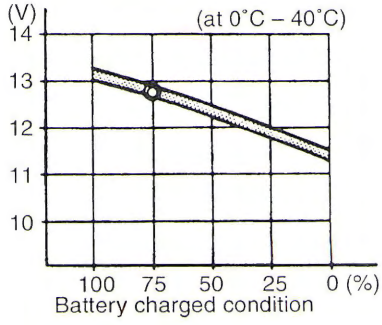
   Special tool
   TOOL : 09900–25008 (Multi circuit tester set)

   Tester knob indication
   Voltage (⎓)



I649G11A0045-02

"A": Charging period	"B": Stop charging



I705H11A0029-02

4) Install the battery to the motorcycle. Refer to "Battery Removal and Installation" (Page 1J-12).

Battery Removal and Installation

BENF08J11A06010

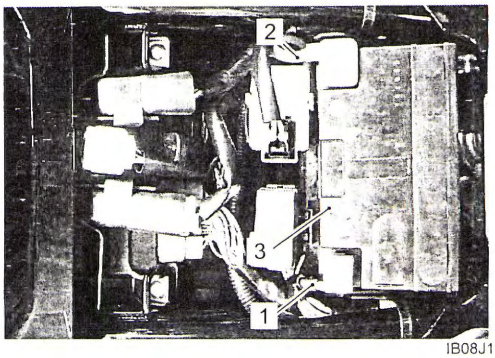
Removal

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.



IB08J11A0015-02

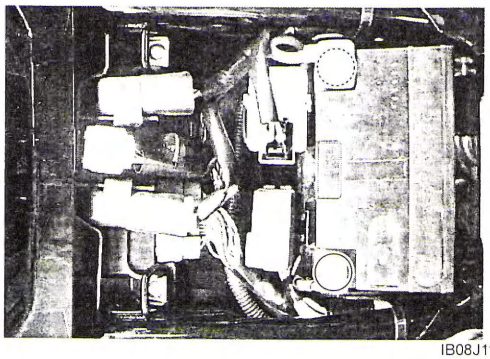
Installation

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

NOTICE

Never use anything except the specified battery.

- Tighten the battery lead wire bolts securely.



IB08J11A0016-02

Battery Visual Inspection

BENF08J11A06011

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

BENF08J11A07001

Electrical

Unit: mm

Item		Specification	Note
Generator coil resistance		0.2 – 0.9 Ω	
Generator maximum output		Approx. 400 W at 5 000 r/min	
Generator no-load voltage (When engine is cold)		65 V (AC) and more at 5 000 r/min	
Regulated voltage		14.0 – 15.0 V at 5 000 r/min	
Battery	Type designation	FT12A-BS	
	Capacity	12 V 36.0 kC (10 Ah)/10 HR	
	Standard electrolyte S.G.	1.320 at 20 °C (68 °F)	

⚠ CAUTION

Never use anything except the specified battery.

Tightening Torque Specifications

BENF08J11A07002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Generator stator set bolt	11	1.1	8.0	☞(Page 1J-6)
Generator lead wire set bolt	11	1.1	8.0	☞(Page 1J-6)
Generator rotor bolt	120	12.0	87.0	☞(Page 1J-6)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:
"Regulator / Rectifier Construction" (Page 1J-7)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

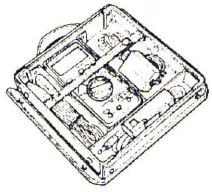
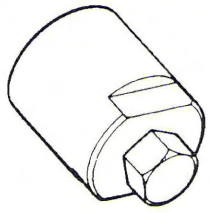
Recommended Service Material

BENF08J11A08001

Material	SUZUKI recommended product or Specification		Note
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1J-6)

Special Tool

BENF08J11A08002

09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 1J-3) / ☞(Page 1J-3) / ☞(Page 1J-4) / ☞(Page 1J-4) / ☞(Page 1J-9) / ☞(Page 1J-12) / ☞(Page 1J-12)	
09930–34980 Rotor remover ☞(Page 1J-5)	
09930–44521 Rotor holder ☞(Page 1J-5) / ☞(Page 1J-6)	

Exhaust System

Precautions

Precautions for Exhaust System

BENF08J11B00001

⚠ 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.

NOTICE

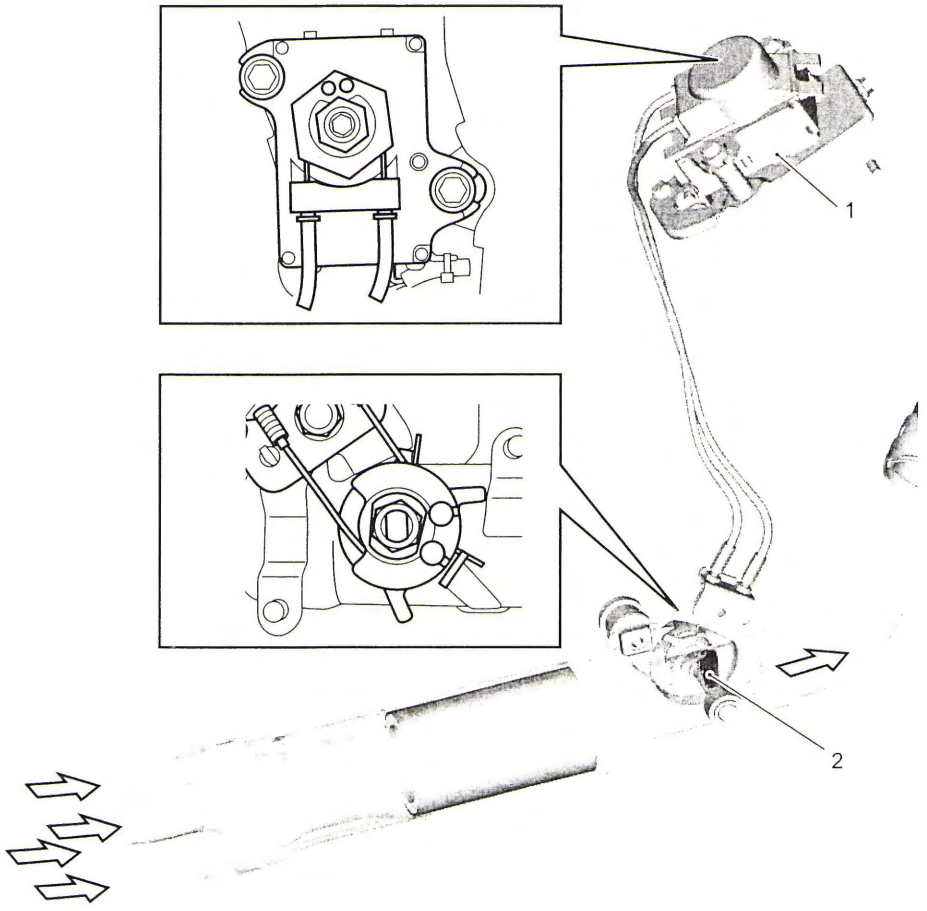
Make sure that the exhaust pipes and muffler have enough clearance from the rubber parts and plastic parts to avoid melting.

General Description

Exhaust Control System Description

BENF08J11B01001

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.



IB08J11B0001-03

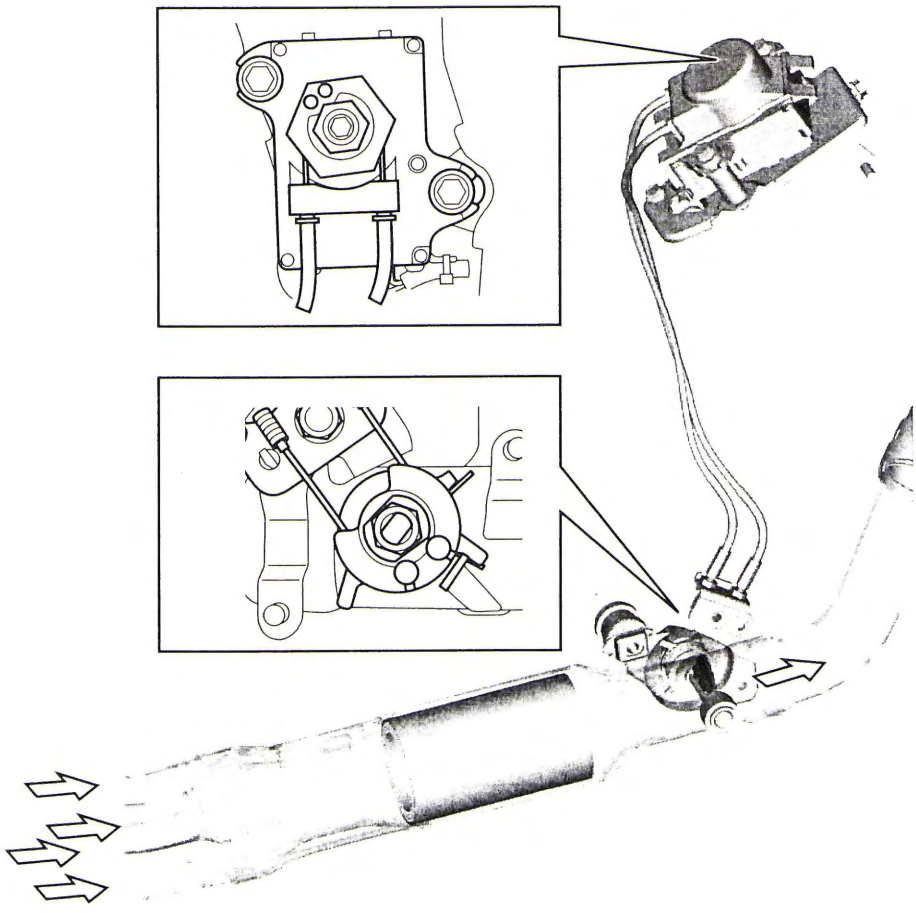
1. Exhaust control valve actuator (EXCVA)	2. Exhaust control valve (EXCV)

Exhaust Control System Operation

BENF08J11B01002

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



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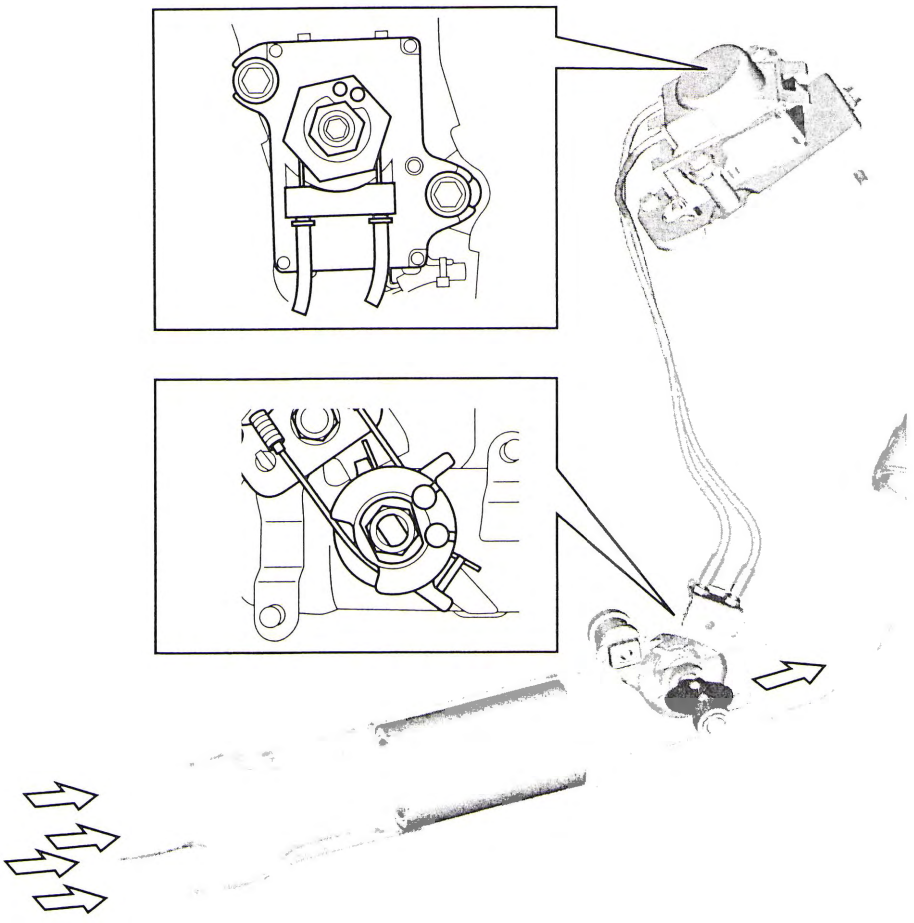
FULL OPEN

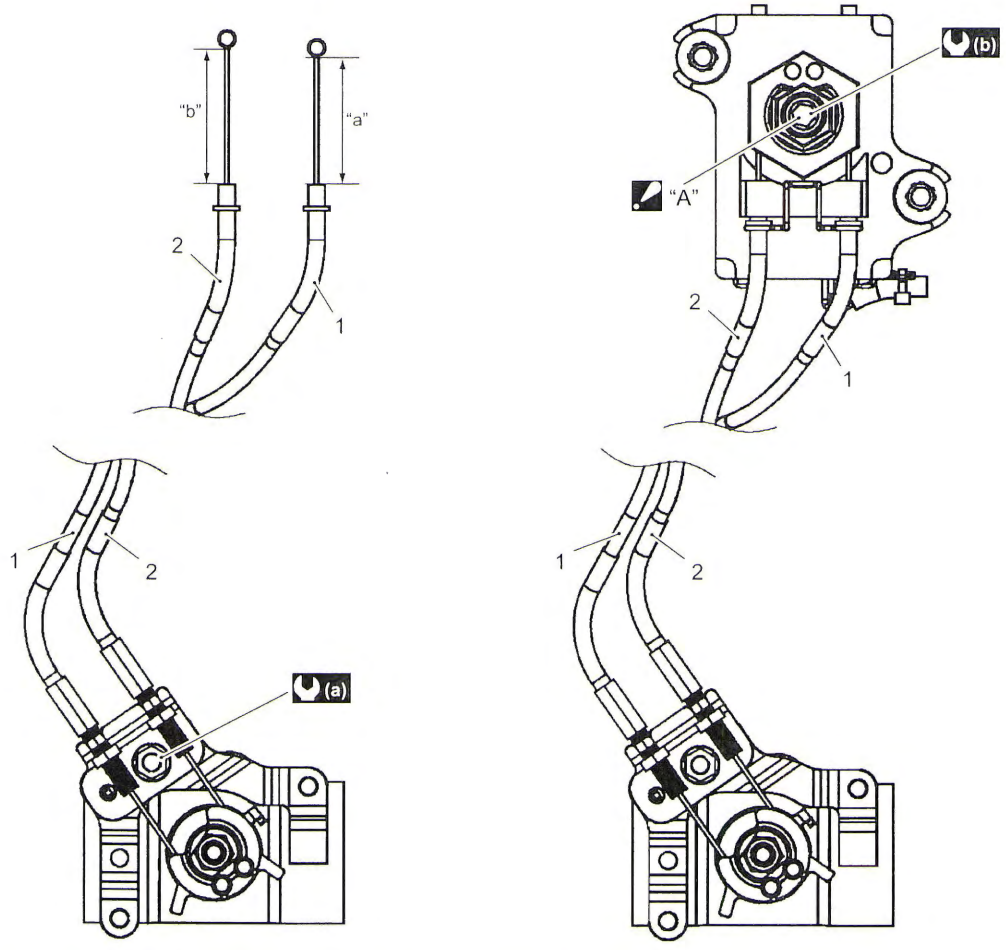


IB08J11B0003-03

Repair Instructions

Exhaust Control System Construction

BENF08J11B06001

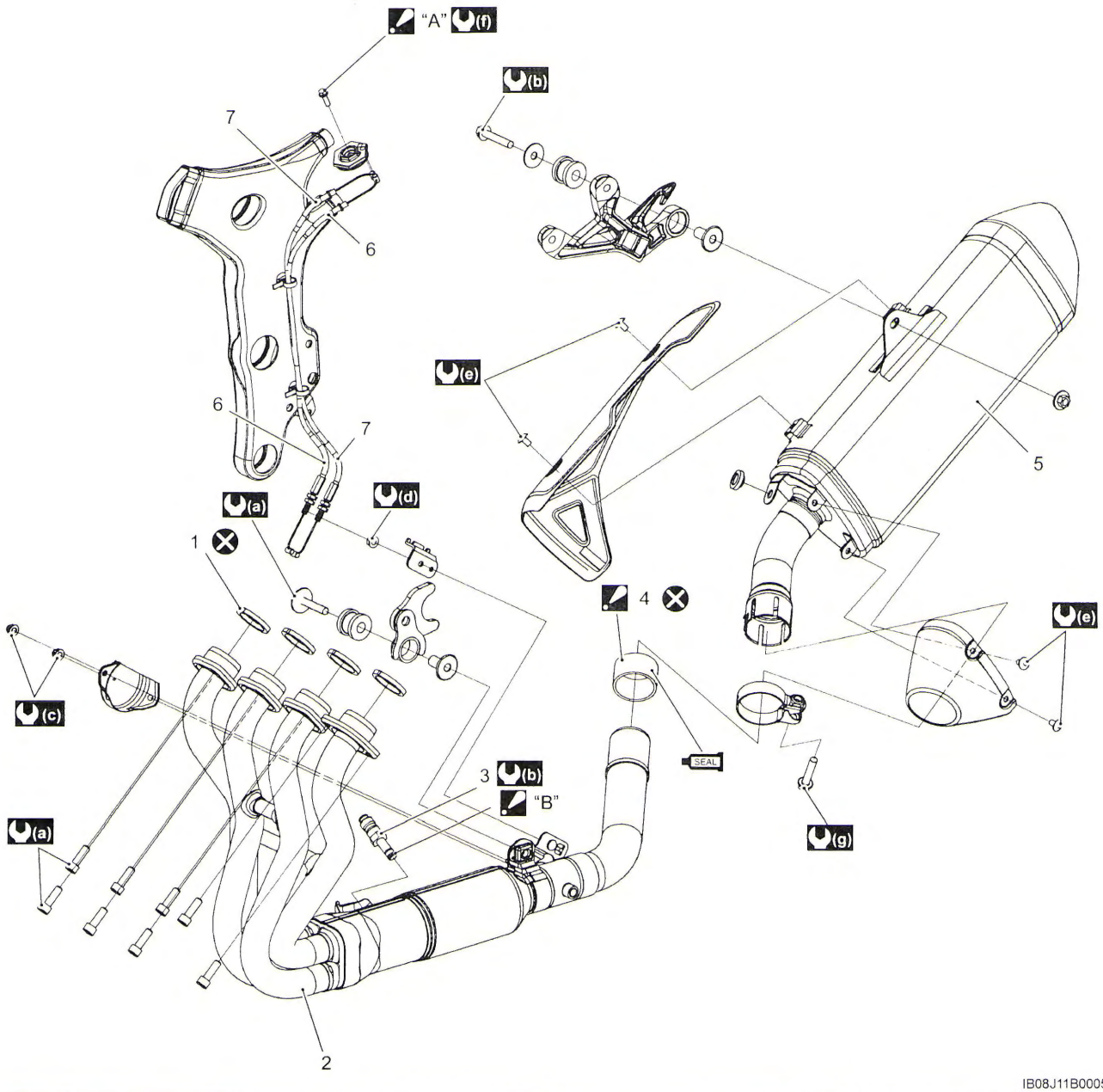


IB08J11B0004-02

1. EXCV cable No. 1	"A": When loosening or tightening the pulley bolt, be sure to fix the pulley with a wrench, or EXCVA may get damaged.	(b) : 5 N·m (0.5 kgf-m, 3.7 lbf-ft)	"b": 50 – 51 mm (1.97 – 2.010 in)
2. EXCV cable No. 2	(a) : 11 N·m (1.1 kgf-m, 8.0 lbf-ft)	"a": 44.5 – 45.5 mm (1.75 – 1.79 in)	

Exhaust System Components

BENF08J11B06002



IB08J11B0005-04

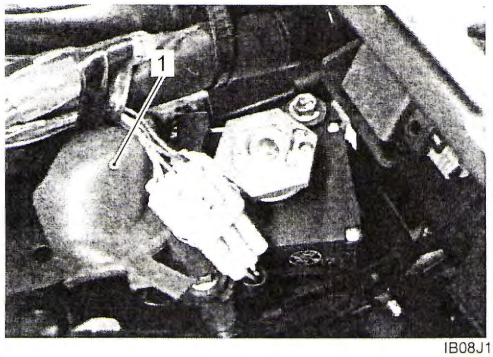
1. Exhaust pipe gasket	7. EXCV cable No. 2	(d) : 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
2. Exhaust pipe assembly	"A": When loosening or tightening the pulley bolt, be sure to fix the pulley with a wrench, or EXCVA may get damaged.	(e) : 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)
3. HO2 sensor	"B": Apply anti-seize compound to the thread part.	(f) : 5.0 N·m (0.50 kgf-m, 3.7 lbf-ft)
4. Connector : Install the connector so that the chamfer side faces the muffler body.	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	(g) : 18 N·m (1.8 kgf-m, 13.0 lbf-ft)
5. Muffler body	(b) : 25 N·m (2.5 kgf-m, 18.0 lbf-ft)	SEAL : Apply muffler seal.
6. EXCV cable No. 1	(c) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	: Do not reuse.

EXCV Cable Removal and Installation

BENF08J11B06003

Removal

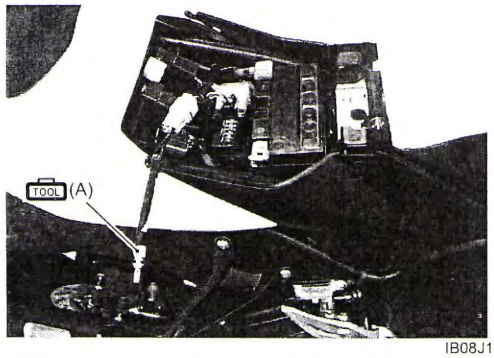
1) Turn the ignition switch OFF.
2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
3) Remove the frame cover (RH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
4) Move the EXCVA pulley cover (1) as shown.



IB08J11B0006-03

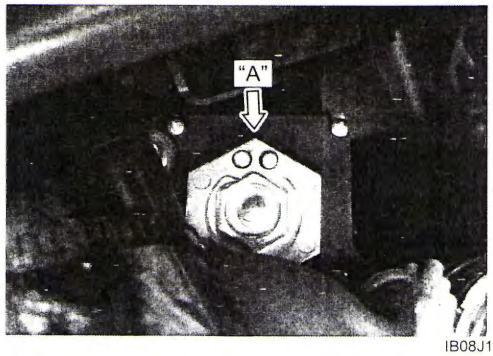
5) Connect the special tool to the mode select coupler. Refer to "Self-Diagnostic Procedures" in Section 1A (Page 1A-12).

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



IB08J11B0007-04

6) After turning the mode select switch ON, turn the ignition switch ON.
7) Check that the cable slots of the EXCVA pulley comes to the middle (Adjustment position) "A".



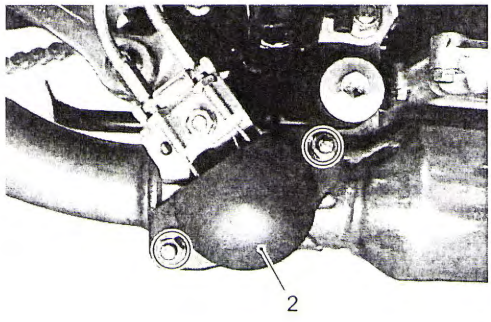
IB08J11B0008-04

8) Turn the ignition switch OFF.

NOTE

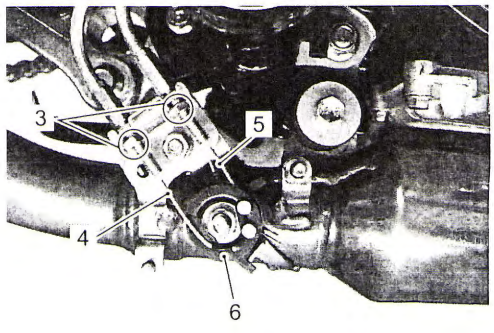
Before removing the EXCV cables, be sure to set the EXCVA pulley to the adjustment position.

9) Remove the EXCV cover (2).



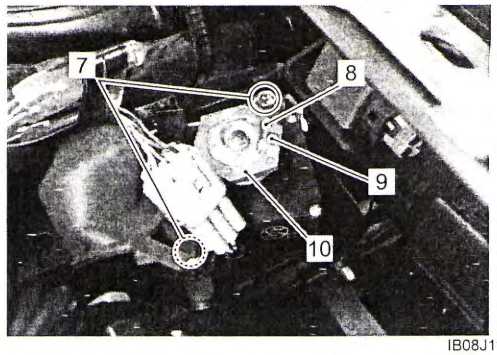
IB08J11B0009-02

10) Loosen the lock nuts (3).
11) Disconnect the No. 2 cable (5) and then No. 1 cable (4) from the EXCV pulley (6).



IB08J11B0010-02

12) Remove the EXCVA mounting bolts (7).
13) Disconnect the No. 2 cable (8) and then No. 1 cable (9) from the EXCVA pulley (10).



IB08J11B0011-03

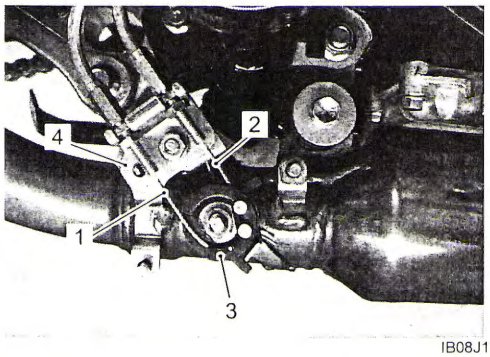
14) Remove the No. 2 cable and then No. 1 cable from the cable clamps refer to "Exhaust System Components" (Page 1K-5).

Installation

1) Set the EXCVA to the adjustment position. Refer to "Removal" (Page 1K-6).
2) Install the EXCV cable No. 1 (08J0CL) (1) and No. 2 (08J0OP) (2) to the EXCV pulley (3) and the bracket (4).

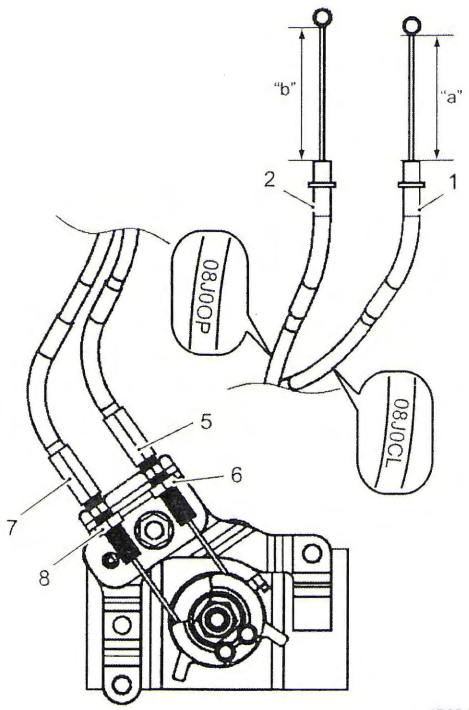
NOTE

The EXCV cables are identified by the letters.
No. 1 cable (1): 08J0CL
No. 2 cable (2): 08J0OP



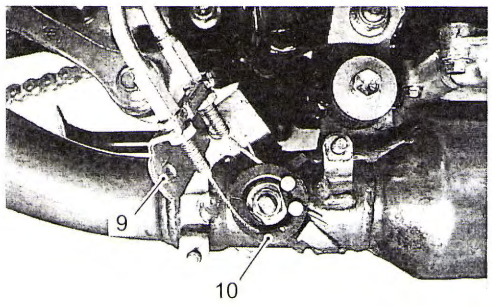
IB08J11B0012-01

3) Install the cables to the clamps. Refer to "Exhaust System Components" (Page 1K-5).
4) Adjust the inner cable length "a" of No. 1 cable in 44.5 – 45.5 mm (1.75 – 1.79 in) by turning the adjuster (7), then tighten the lock-nut (8).
5) Adjust the inner cable length "b" of No. 2 cable in 50 – 51 mm (1.97 – 2.00 in) by turning the adjuster (5), then tighten the lock-nut (6).



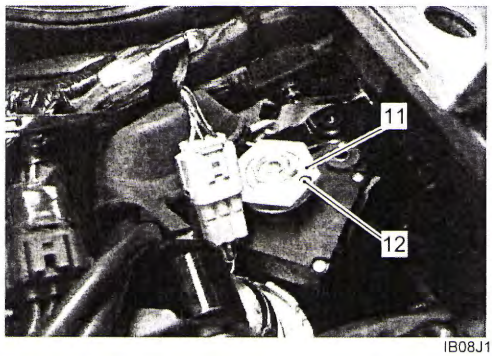
IB08J11B0013-04

6) Remove the bracket (9) with the cables.
7) Remove the cables from the EXCV pulley (10).



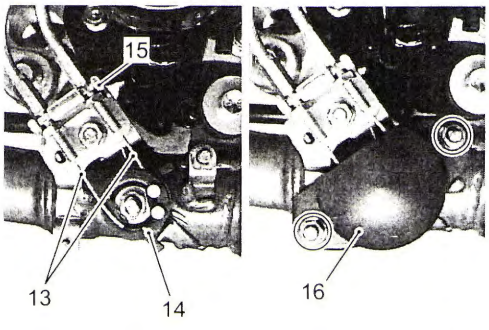
IB08J11B0014-02

8) Install the EXCV cable No. 2 (11) and No. 1 (12) to the EXCVA pulley.



IB08J11B0015-03

9) Install the EXCVA.
10) Install the EXCV cables (13) to the EXCV pulley (14) and then install to the bracket (15).
11) Install the EXCV cover (16).



IB08J11B0016-02

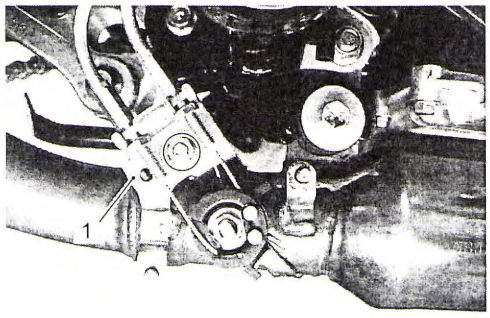
12) Install the removed exterior parts.
13) Inspect the EXCVA position sensor output voltage. Refer to "EXCVA Adjustment" (Page 1K-10).

EXCVA Removal and Installation

BENF08J11B06004

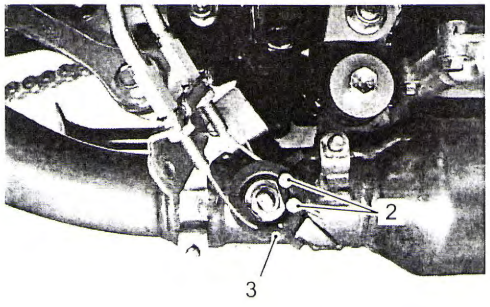
Removal

1) Set the EXCVA pulley to the middle (Adjustment position). Refer to "EXCV Cable Removal and Installation" (Page 1K-6).
2) Remove the EXCV cover and then remove the bracket (1) with EXCV cables from the exhaust pipe.



IB08J11B0017-02

3) Remove the EXCV cables (2) from the EXCV pulley (3).



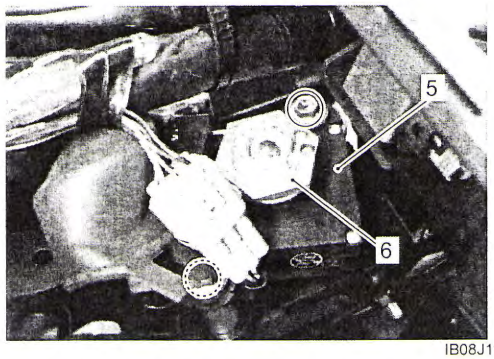
IB08J11B0018-02

4) Disconnect the EXCVA coupler (4).



IB08J11B0019-03

5) Remove the EXCVA (5).
6) Remove the EXCV cables from the EXCVA pulley (6).

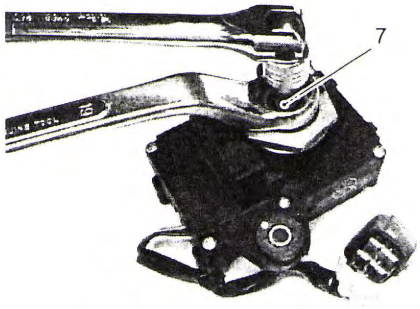


IB08J11B0020-03

7) Hold the pulley with a wrench and loosen the pulley mounting bolt (7).

NOTICE

- **When loosening or tightening the pulley bolt, be sure to fix the pulley with a wrench or EXCVA may get damaged.**
- **Do not use a wrench to turn EXCVA pulley so as not to cause damage to the internal gear of EXCVA.**



IB08J11B0021-03

8) Remove the pulley from the EXCVA body.

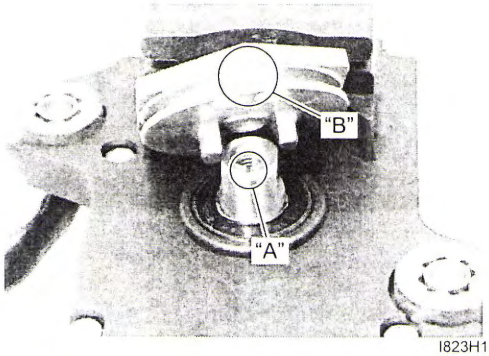
Installation

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".



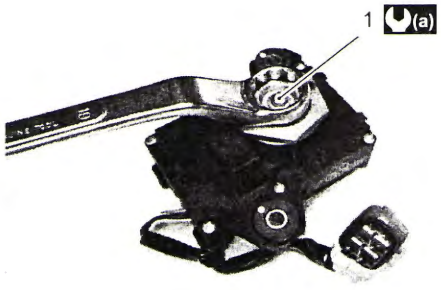
I823H11B0017-02

- Hold the pulley with a 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, 3.7 lbf-ft)

NOTICE

When loosening or tightening the pulley bolt, be sure to fix the pulley with a wrench, or EXCVA may get damaged.



IB08J11B0022-03

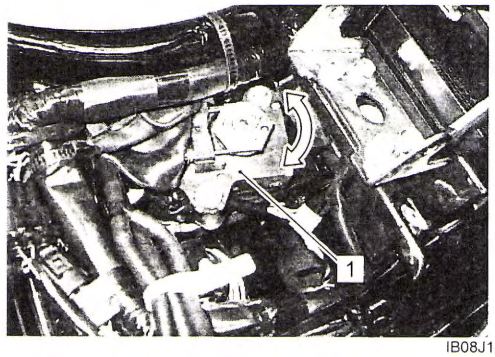
- Install the EXCVA.
- Install the EXCV cables. Refer to "EXCV Cable Removal and Installation" (Page 1K-6).
- Adjust the EXCVA. Refer to "EXCVA Adjustment" (Page 1K-10).

Exhaust Control Valve Inspection

BENF08J11B06010

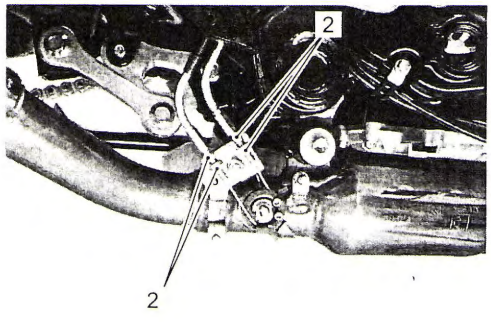
Inspect exhaust control valve as follows:

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 (LH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
3) Move the EXCVA cover and check the EXCVA (1) for its smooth movement when the ignition switch is turned on. If the EXCVA does not move smoothly, check EXCVA electrical circuit. Refer to "EXCVA Inspection" (Page 1K-9).



IB08J1020005-03

4) Remove the EXCV cover.
5) 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" (Page 1K-6).



IB08J1020006-01

EXCVA Inspection

BENF08J11B06005

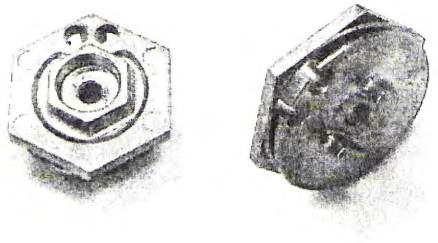
Refer to "DTC "C46" (P1657-H/L or P1658): EXCV Actuator Circuit Malfunction" in Section 1A (Page 1A-86).

EXCVA Pulley Inspection

BENF08J11B06006

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.



IB08J11B0023-02

3) Install the pulley and EXCVA. Refer to "EXCVA Removal and Installation" (Page 1K-8).

EXCVA Adjustment

BENF08J11B06007

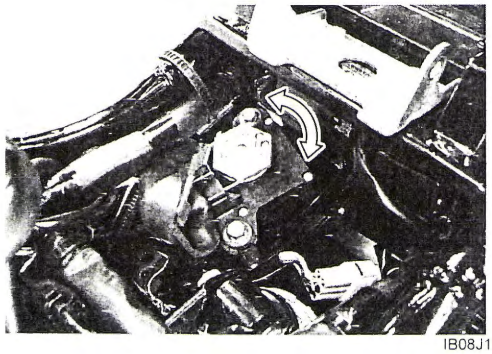
Inspect the EXCVA operation and adjust it if necessary in the following steps:

Step 1

1) Set the EXCVA to the adjustment position. Refer to "EXCV Cable Removal and Installation" (Page 1K-6).

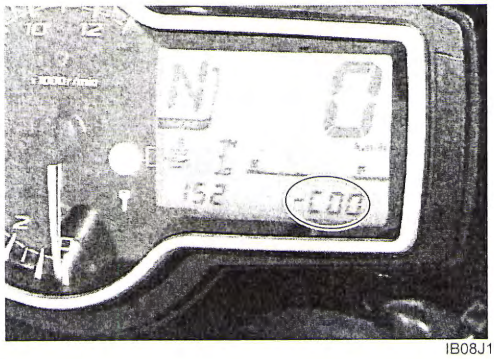
Step 2

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)



IB08J11B0024-02

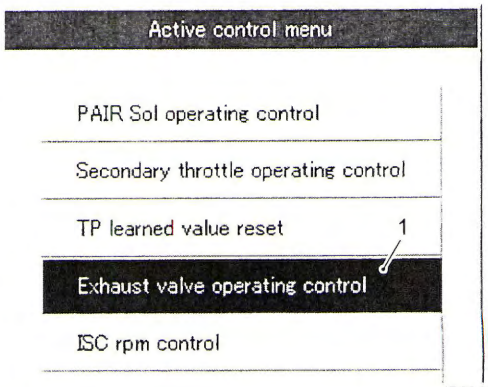
4) Turn the mode select switch ON. If DTC "C46" is not indicated on the LCD display, the adjustment is correctly completed. If "C46" is indicated, repeat the procedures from Step 3 to Step 4.



IB08J11B0025-02

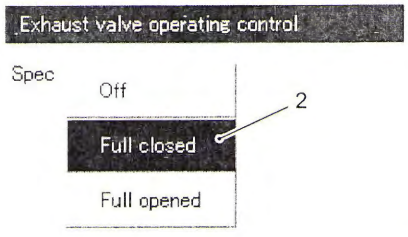
Step 3

1) Turn the ignition switch OFF.
2) Disconnect the mode select switch.
3) Set up the SDS tools. Refer to "Self-Diagnostic Procedures" in Section 1A (Page 1A-12).
4) Turn the ignition switch ON.
5) Click "Exhaust valve operating control" (1).



IB08J1110180-02

6) Click "Full closed" (2).



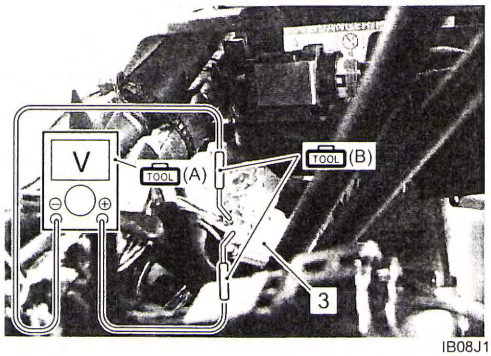
I947H11B0020-03

7) Insert the needle pointed probes into the back side of the EXCVA coupler (3). ((+) Y – (–) B/Br)
8) Measure the EXCVA position sensor output voltage at fully closed position.

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

Tester knob indication
Voltage (⎓)

EXCVA position sensor output voltage
EXCV is fully closed: 0.45 ≤ Output voltage ≤ 1.4 V ((+) Y – (–) B/Br)



IB08J11B0027-02

9) If the measured voltage is less than specification, adjust the No. 1 cable adjuster as follows:
a) Set the EXCVA to the adjustment position. Refer to "EXCV Cable Removal and Installation" (Page 1K-6).

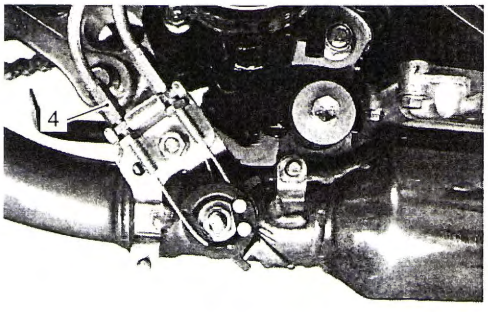
NOTICE

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

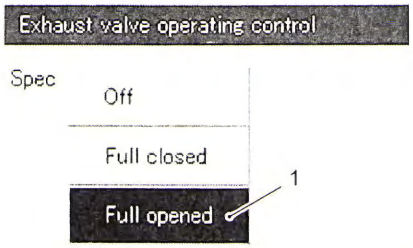
If C46 code is indicated after adjusting the voltage, increase the voltage to 0.9 V.



IB08J11B0028-03

Step 4

1) Click "Full opened" (1).

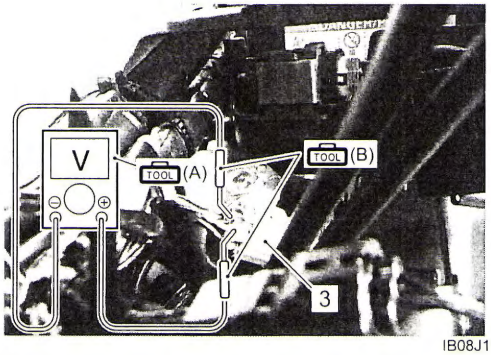


I947H11B0023-02

2) Measure the position sensor output voltage at fully opened position.

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

EXCVA position sensor out put voltage
EXCV is fully opened: 3.6 ≤ Output voltage ≤ 4.55 V ((+) Y – (–) B/Br)



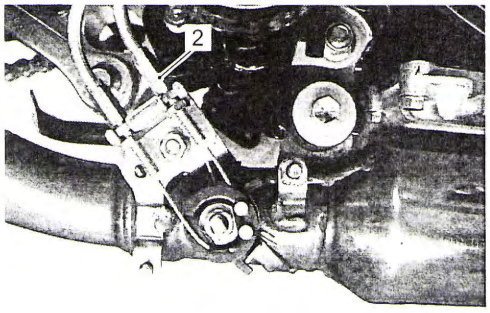
IB08J11B0027-02

3) If the measured voltage is more than specification, adjust the No. 2 cable adjuster as follows:
a) Set the EXCVA to the adjustment position. Refer to "EXCV Cable Removal and Installation" (Page 1K-6).

NOTICE

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.



IB08J11B0029-02

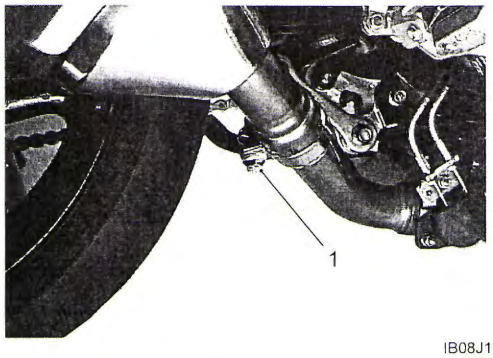
4) After adjusting the EXCV cables, perform Step 2 to confirm DTC "46" is not indicated.

Exhaust Pipe / Muffler Removal and Installation

BENF08J11B06008

Removal

1) Loosen the muffler connecting bolt (1).

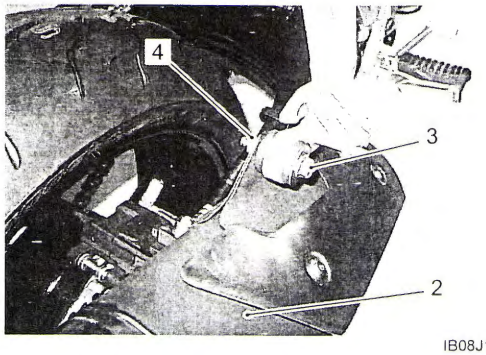


IB08J11B0030-02

2) Remove the muffler (2) by removing the mounting bolt (3) and nut (4).

NOTE

Support the muffler to prevent it from falling.



IB08J11B0031-02

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

4) Disconnect the HO2 sensor coupler (5).



IB08J11B0032-03

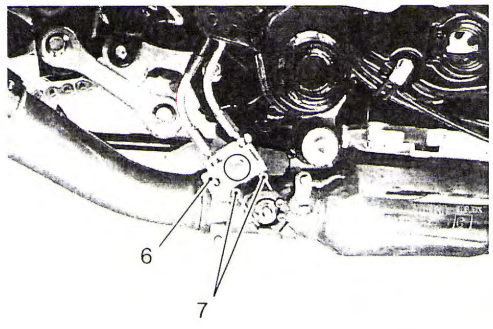
5) Release the HO2 sensor lead wire from the clamp.

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

7) Disconnect the radiator cooling fan motor coupler. Refer to "Radiator / Cooling Fan Motor Removal and Installation" in Section 1F (Page 1F-7).

8) Remove the bracket (6) with EXCV cables.

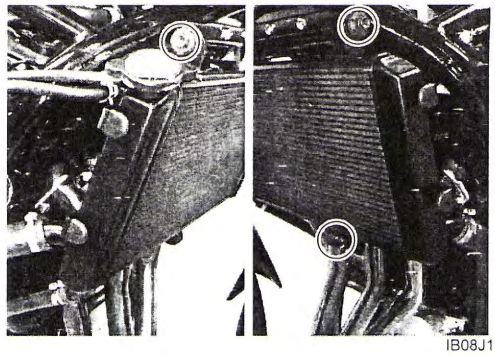
9) Disconnect the EXCV cables (7) from EXCV pulley.



IB08J11B0033-03

10) Remove the frame body cover (LH & RH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).

11) Remove the radiator mounting bolts.



IB08J11B0034-02

12) Move the radiator forward.

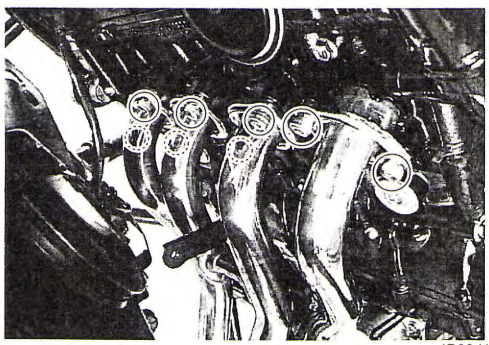
13) Remove the exhaust pipe assembly by removing the exhaust pipe bolts and exhaust pipe mounting bolt.

NOTICE

Take care not to bend the radiator fin.

NOTE

Support the exhaust pipe assembly to prevent it from falling.



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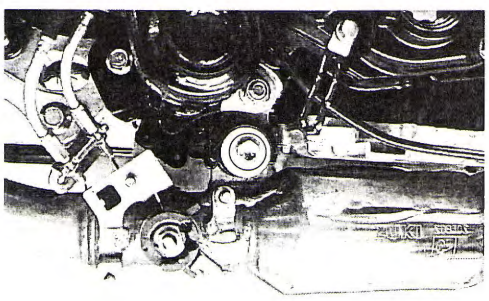

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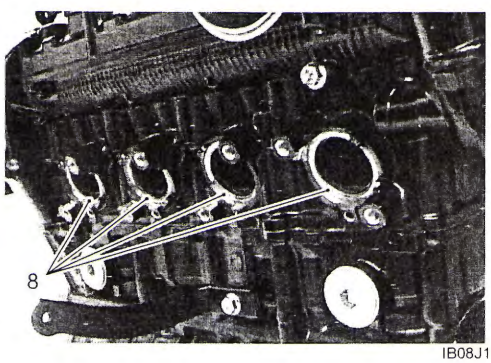
14) Remove the exhaust pipe gaskets (8).

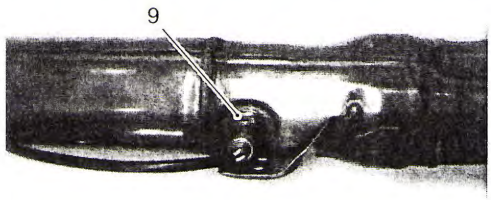


IB08J11B0037-03

15) Remove the HO2 sensor (9) from the exhaust pipe.

NOTICE

- **Be careful not to expose the HO2 sensor to an excessive shock.**
- **Be careful not to twist or damage the HO2 sensor lead wire.**



IB08J11B0038-04

Installation

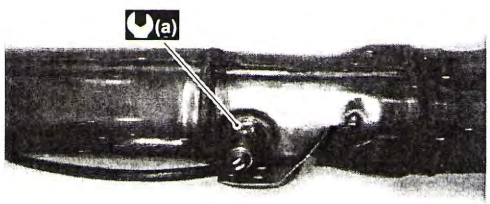
Installation is in the reverse order of removal. Pay attention to the following points:

- Apply anti-seize compound to the thread part of the HO2 sensor.
- Tighten the HO2 sensor to the specified torque.

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

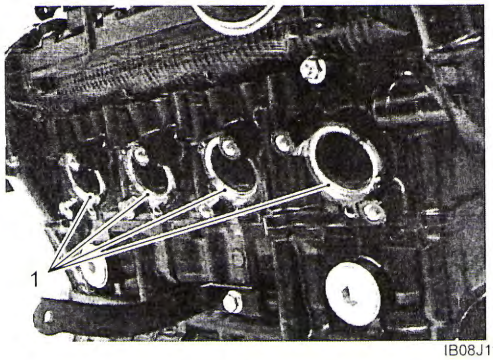
NOTICE

- **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.**



IB08J11B0039-03

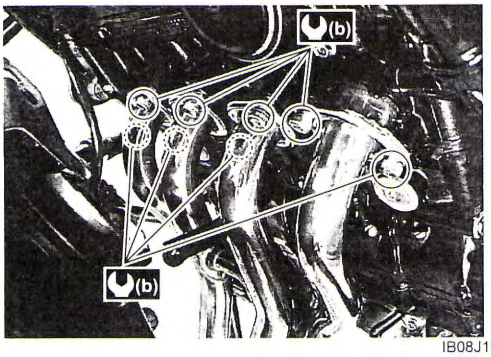
- Install the new exhaust pipe gaskets (1).



IB08J11B0040-02

- Tighten the exhaust pipe bolts and exhaust pipe mounting bolt to the specified torque.

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



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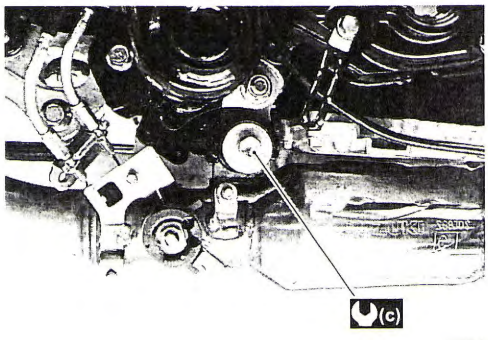
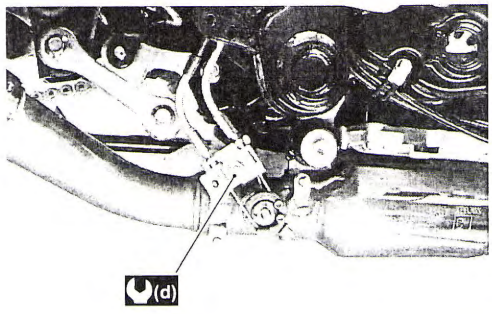


IB08J11B0042-02

- Tighten the EXCV cables mounting nut to the specified torque.

Tightening torque
EXCV cable mounting nut (d): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



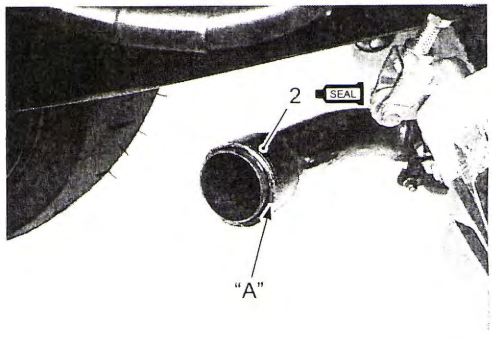
IB08J11B0043-02

- Install the new connector (2).

NOTE

- **When installing a new connector, remove all of the old sealer from the exhaust pipe and muffler. Apply the exhaust gas sealer to both the inside and outside of the new connector.**
- **The chamfer side "A" of connector (2) face the muffler.**

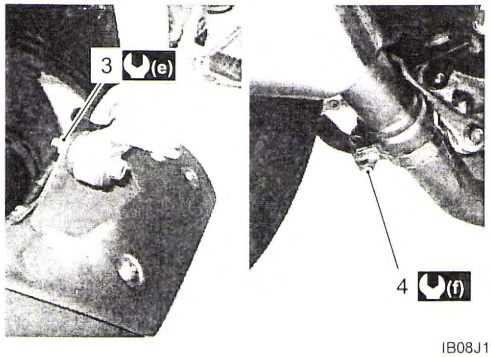
SEAL : Muffler seal (MUFFLER SEAL LOCTITE 5920 (commercially available) or equivalent)



IB08J11B0044-03

- Tighten the muffler mounting nut (3) and muffler connecting bolt (4) to the specified torque.

Tightening torque
Muffler mounting bolt (e): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)
Muffler connecting bolt (f): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



IB08J11B0045-02

Exhaust System Inspection

BENF08J11B06009

Inspect the exhaust pipe connection and muffler connection for exhaust gas leakage and mounting condition. If any defect is found, replace the exhaust pipe assembly or muffler with a new one.
Check the exhaust pipe bolts, muffler connecting bolt and muffler mounting nut are tightened to their specified torque. Refer to "Exhaust System Components" (Page 1K-5).

Specifications

Service Data

BENF08J11B07001

FI Sensors

Item	Standard/Specification		Note
HO2 sensor output voltage	0.4 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

BENF08J11B07002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
EXCVA pulley mounting bolt	5	0.5	3.7	☞(Page 1K-9)
HO2 sensor	25	2.5	18.0	☞(Page 1K-13)
Exhaust pipe bolt	23	2.3	16.5	☞(Page 1K-14)
Exhaust pipe mounting bolt	23	2.3	16.5	☞(Page 1K-14)
EXCV cable mounting nut	11	1.1	8.0	☞(Page 1K-14)
Muffler mounting bolt	25	2.5	18.0	☞(Page 1K-15)
Muffler connecting bolt	18	1.8	13.0	☞(Page 1K-15)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Exhaust Control System Construction" (Page 1K-4)
"Exhaust System Components" (Page 1K-5)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J11B08001

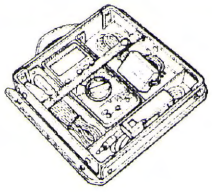
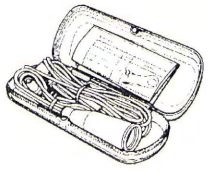
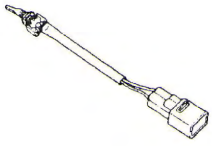
Material	SUZUKI recommended product or Specification		Note
Muffler seal	MUFFLER SEAL LOCTITE 5920 (commercially available) or equivalent	—	☞(Page 1K-14)

NOTE

Required service material(s) is also described in:
"Exhaust System Components" (Page 1K-5)

Special Tool

BENF08J11B08002

09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 1K-11) / ☞(Page 1K-11) 	09900–25009 Needle point probe set ☞(Page 1K-11) / ☞(Page 1K-11) 
09930–82720 Mode selection switch ☞(Page 1K-6) 	

Section 2

Suspension

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Precautions

Precautions

Precautions for Suspension

BENF08J12000001

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.

NOTICE

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

BENF08J12104001

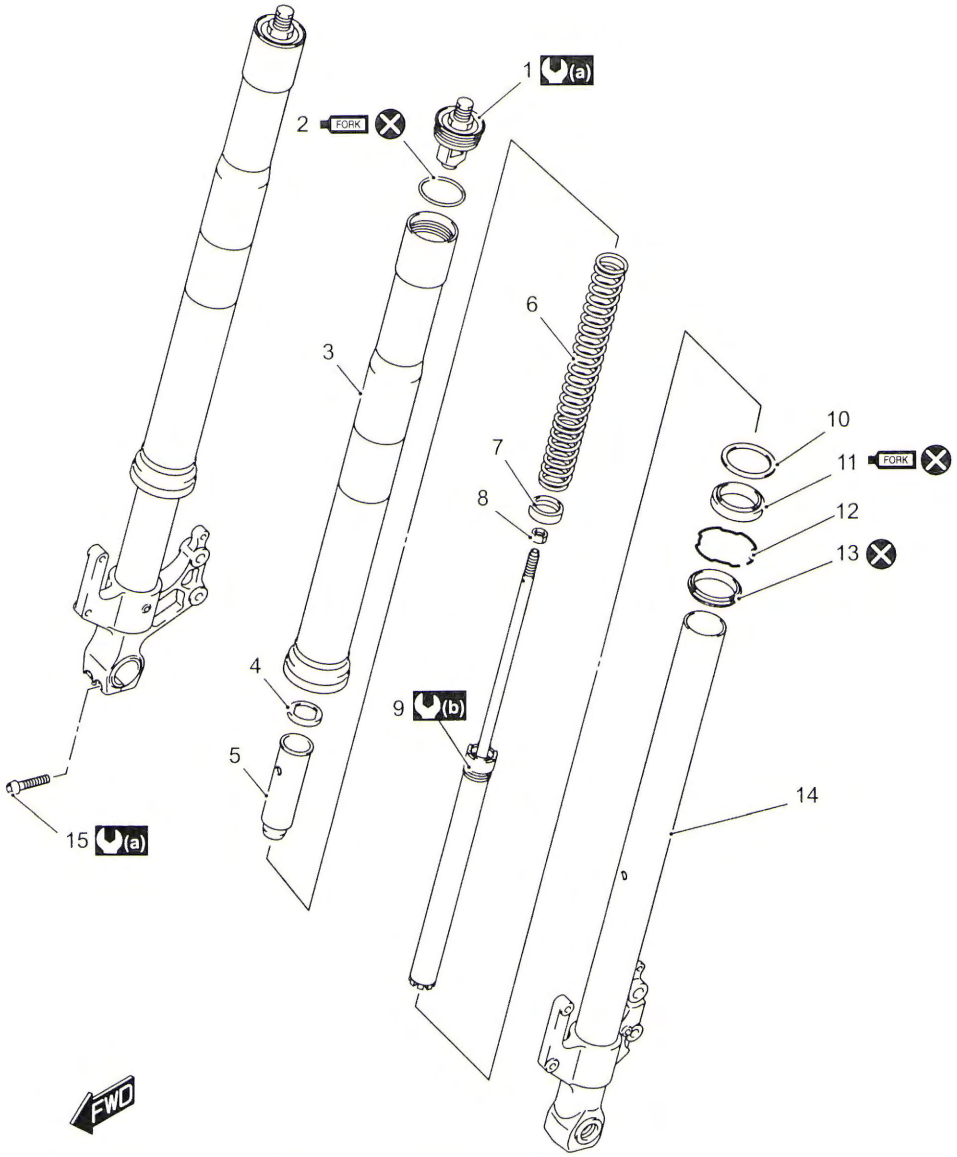
Condition	Possible cause	Correction / Reference Item
Wobbly front wheel	Distorted wheel rim.	*Replace.*
	Worn front wheel bearings.	*Replace.*
	Defective or incorrect tire.	*Replace.*
	Loose front axle.	*Tighten.*
	Loose front axle pinch bolts.	*Tighten.*
	Incorrect fork oil level.	*Adjust.*
	Incorrect 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.*
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.*
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.*
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

BENF08J12206001



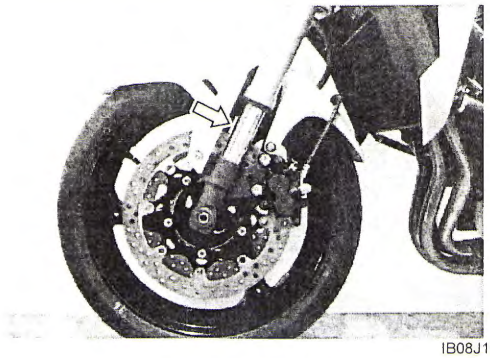
IB08J1220034-03

1. Front fork cap bolt	8. Lock-nut	15. Front axle pinch bolt
2. O-ring	9. Inner rod/damper rod (cartridge)	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
3. Outer tube	10. Oil seal retainer	(b) : 60 N·m (6.0 kgf-m, 43.5 lbf-ft)
4. Upper spring retainer	11. Oil seal	FORK : Apply fork oil.
5. Spacer	12. Oil seal stopper ring	⊗ : Do not reuse.
6. Spring	13. Dust seal	
7. Lower spring retainer	14. Inner tube	

Front Fork Inspection

BENF08J12206006

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" (Page 2B-4).



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Front Fork Removal and Installation

BENF08J12206002

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.

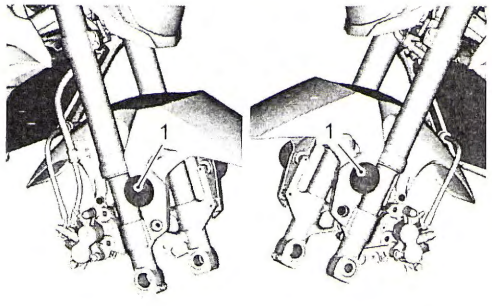
Removal

1) Remove the front wheel. Refer to "Front Wheel Assembly Removal and Installation" in Section 2D (Page 2D-4).

NOTICE

- **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) (if equipped).



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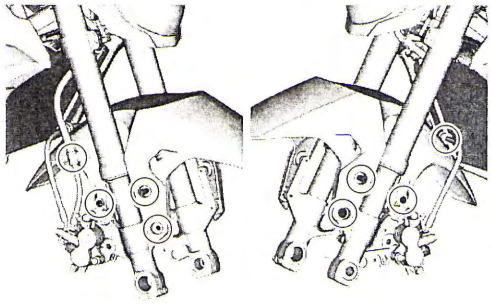
4) Remove the front fender by removing brake hose clamps and the bolts.

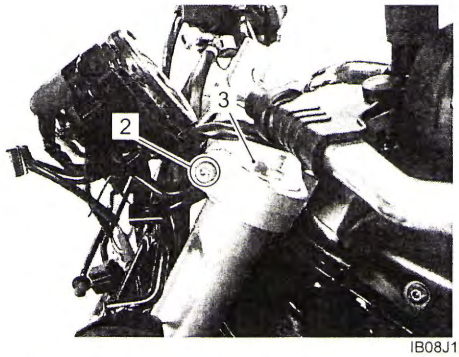


IB08J1220002-01

5) Remove the headlight. Refer to "Headlight Removal and Installation" in Section 9B (Page 9B-3).
6) Loosen the front fork upper clamp bolt (2).

NOTE

Slightly loosen the front fork cap bolt (3) to facilitate later disassembly.

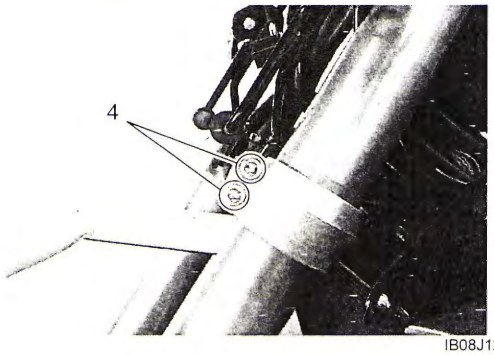


IB08J1220004-02

7) Loosen the front fork lower clamp bolts (4) and remove the front fork.

NOTE

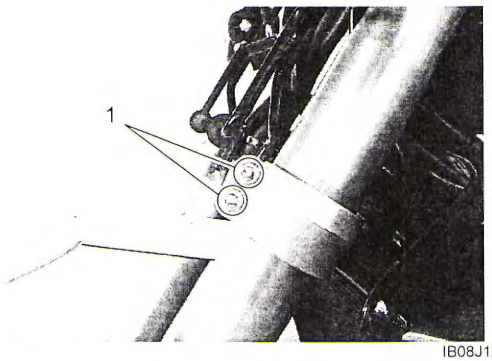
Hold the front fork by hand to prevent it sliding out of the steering stem.



IB08J1220005-02

Installation

1) Set the front fork to the steering stem lower bracket temporarily by tightening the lower clamp bolts (1).



IB08J1220006-02

2) Tighten the front fork cap bolt (2) to the specified torque.

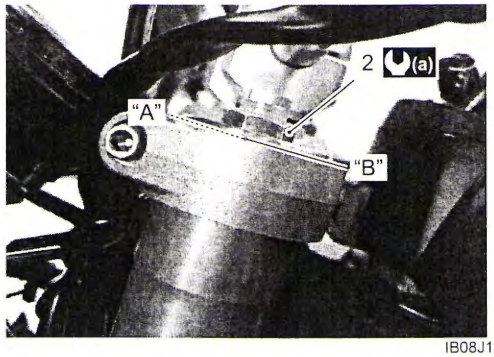
Tightening torque
Front fork cap bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

3) Loosen the lower clamp bolts.

NOTE

Hold the front fork by hand to prevent it sliding out of the steering stem.

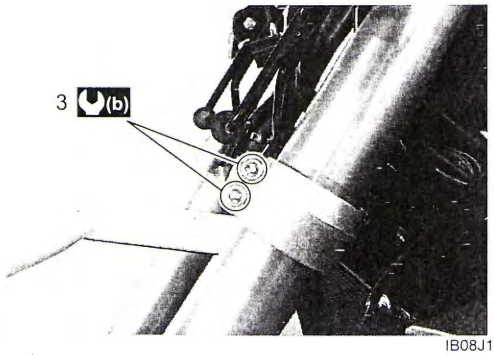
4) Set the top end of outer tube "A" to the upper surface of the upper bracket "B".



IB08J1220007-03

5) Tighten the front fork lower clamp bolts (3).

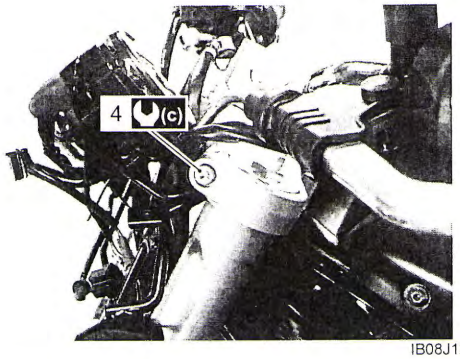
Tightening torque
Front fork lower clamp bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IB08J1220008-02

6) Tighten the front fork upper clamp bolt (4).

Tightening torque
Front fork upper clamp bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IB08J1220009-02

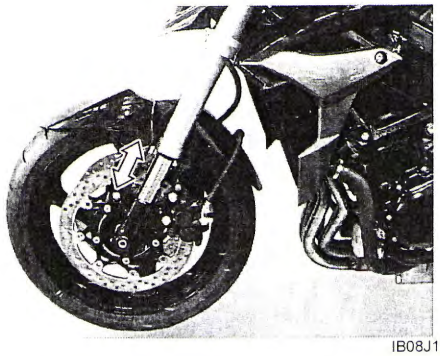
7) Install the front fender.
8) Install the reflex reflectors (if equipped).
9) Install the front wheel. Refer to "Front Wheel Assembly Removal and Installation" in Section 2D (Page 2D-4).

⚠ WARNING

After remounting the brake calipers, pump the brake lever until the pistons push the pads correctly.

NOTE

Before tightening the front axle pinch bolts, move the front fork up and down four or five times.



IB08J1220010-02

Front Suspension Adjustment

BENF08J12206003

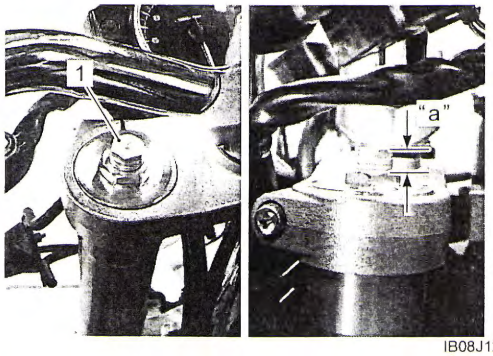
After installing the front fork, adjust the spring pre-load as follows:

⚠ WARNING

Adjust the left and right front forks to the same setting.

- Turn the spring pre-load adjuster (1) counterclockwise fully. From that position (softest), turn it clockwise to the specified position "a".

STD position
9.0 mm (0.35 in)



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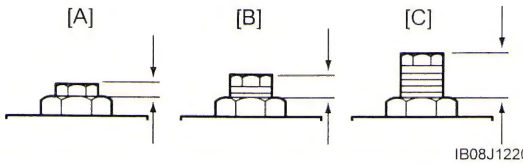


IB08J1220003-03

[A]: 4 mm (0.16 in) (maximum)	[C]: 14 mm (0.55 in) (minimum)
[B]: 9 mm (0.35 in) (STD)	

Front Fork Disassembly and Assembly

BENF08J12206004

Refer to "Front Fork Removal and Installation" (Page 2B-2).

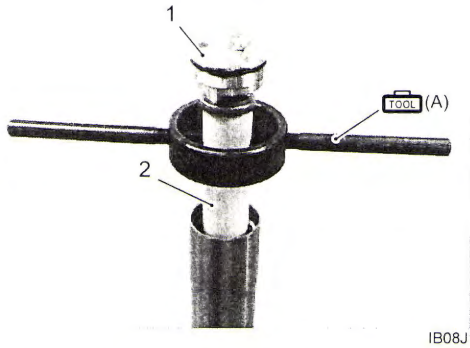
NOTE

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) Loosen the front fork cap bolt (1).
2) Install the special tool to the holes on the spacer (2).

Special tool
TOOL (A): 09940–94930 (Front fork spacer holder)



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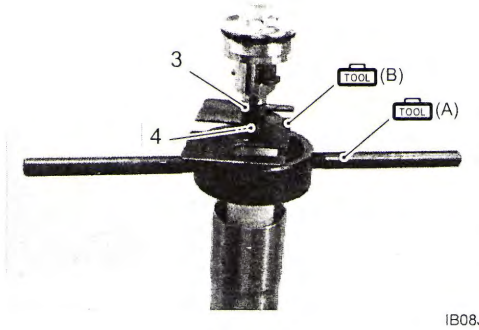
3) Compress the fork spring using the special tool (A) and insert the special tool (B) between the lock-nut (3) and spring retainer (4).

Special tool
TOOL (A): 09940–94930 (Front fork spacer holder)
TOOL (B): 09940–94922 (Front fork spring stopper plate)



IB08J1220013-02

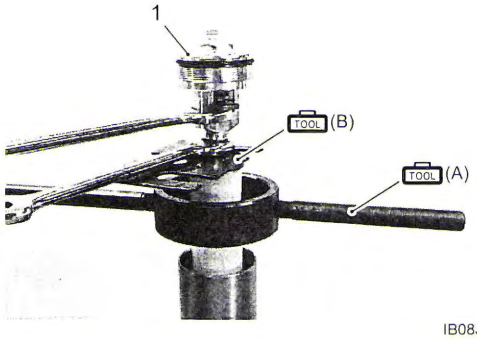
4) Remove the front fork cap bolt (1) from the inner rod/ damper rod by loosening the lock-nut.

NOTICE

After removing the front fork cap bolt (1), avoid holding the outer tube vertically by hand to prevent the inner tube from falling and damaged.

5) Compress the fork spring using special tool (A) and remove the special tool (B).

Special tool
TOOL (A): 09940–94930 (Front fork spacer holder)
TOOL (B): 09940–94922 (Front fork spring stopper plate)

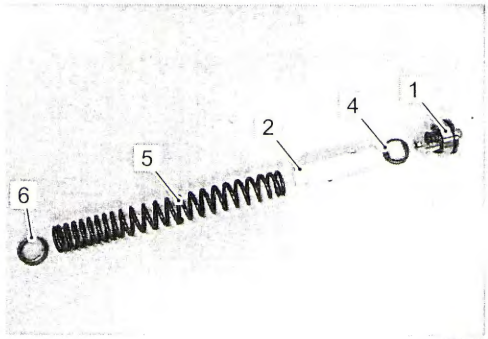


IB08J1220014-02

6) Remove the spring retainer (4), spacer (2), spring (5) and lower spring retainer (6).

NOTICE

Do not disassemble the front fork cap bolt (1).



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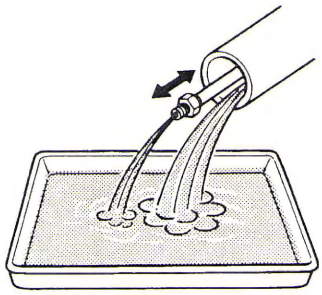
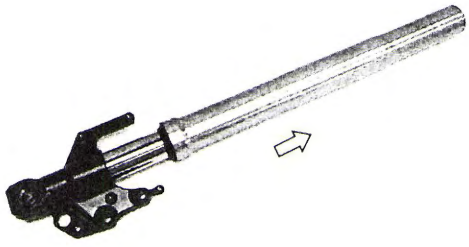
7) Invert the fork and stroke it several times to drain out fork oil.

8) Hold the fork inverted for a few minutes to drain oil.



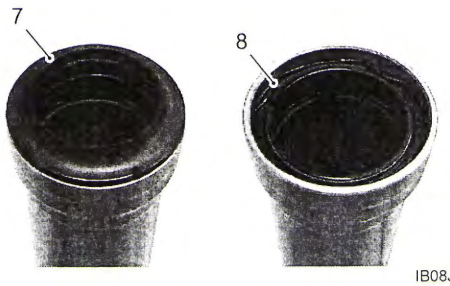
I823H1220018-01

9) Remove the outer tube from the inner tube.



IB08J1220016-02

10) Remove the dust seal (7) and oil seal stopper ring (8).

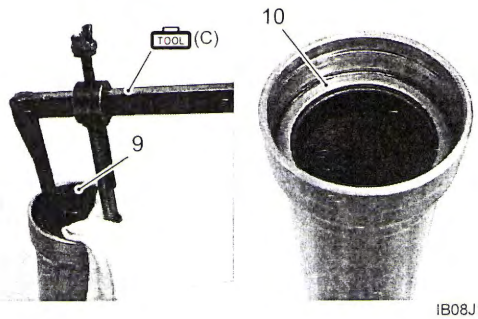


IB08J1220017-02

11) Remove the oil seal (9) using the special tool.

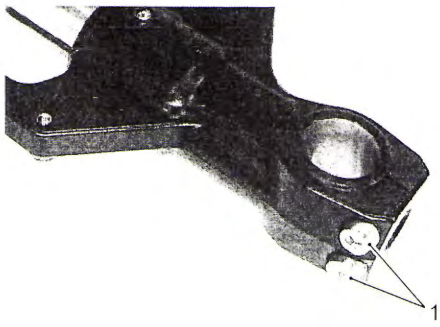
12) Remove the oil seal retainer (10).

Special tool
TOOL (C): 09913–50121 (Oil seal remover)



IB08J1220018-02

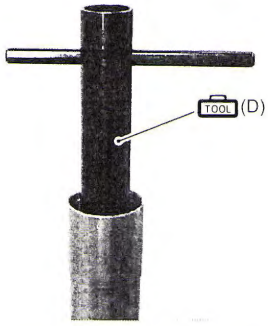
13) Remove the front axle pinch bolts (11) (RH only).



IB08J1220019-02

14) Loosen the inner rod/damper rod using the special tool.

Special tool
TOOL (D): 09940–30221 (Front fork assembling tool)



IB08J1220020-02

15) Remove the inner rod/damper rod (13).

NOTICE

Do not disassemble the inner rod/damper rod.



IB08J1220021-03

Assembly

Oil seal and dust seal

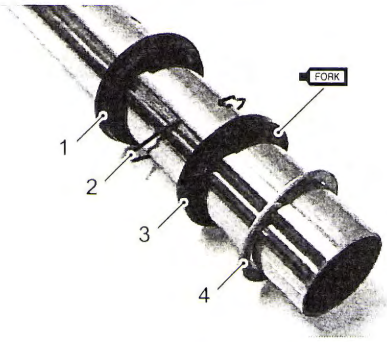
1) Install the following new parts onto the inner tube.
   - Dust seal (1)
   - Oil seal stopper ring (2)
   - Oil seal (3)
   - Oil seal retainer (4)

NOTICE

When installing the oil seal to inner tube, be careful not to damage the oil seal lip.

2) Apply fork oil to the oil seal lip.

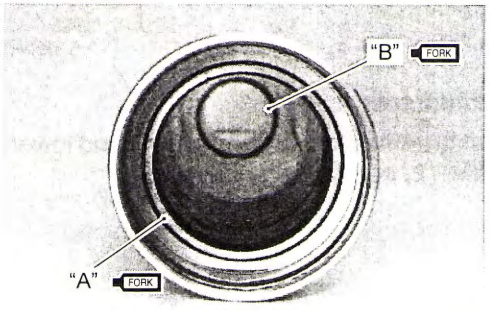
FORK : Fork Oil 99000–99044–L01 (SUZUKI FORK OIL L01 or equivalent)



IB08J1220022-03

3) Apply fork oil to the anti-friction metals "A" and "B".

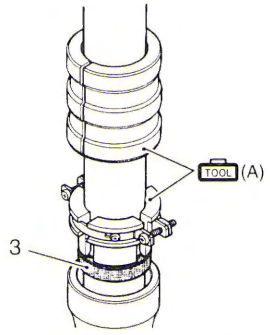
FORK : Fork Oil 99000–99044–L01 (SUZUKI FORK OIL L01 or equivalent)



IB08J1220023-03

4) Install the inner tube into the outer tube and fit the new oil seal (3) using the special tool.

Special tool
TOOL (A): 09940–52861 (Front fork oil seal installer)



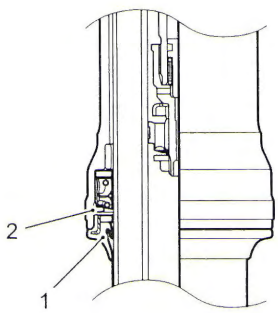
I823H1220025-01

5) Install the oil seal stopper ring (2).

NOTICE

Make sure that the oil seal stopper ring is fitted securely.

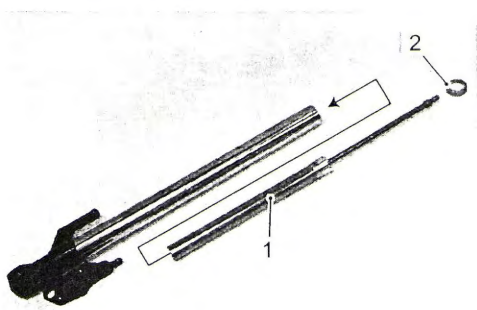
6) Install the new dust seal (1).



I823H1220066-01

Inner rod/damper rod

1) Install the inner rod/damper rod (1) and lower spring retainer (2) into the inner tube.

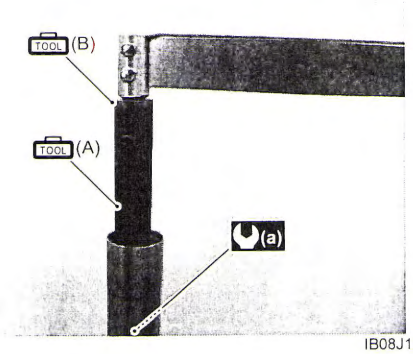


IB08J1220024-02

2) Tighten inner rod/damper rod to the specified torque using the special tools.

Special tool
TOOL (A): 09940–30221 (Front fork cylinder holder)
TOOL (B): 09940–54860 (Front fork cylinder holder attachment)

Tightening torque
Inner rod/damper rod (a): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



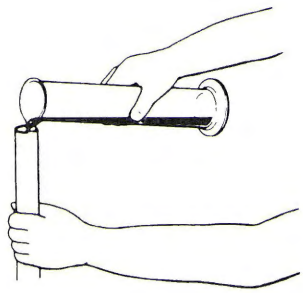
IB08J1220033-01

Fork oil

1) Place the front fork vertically without spring.
2) Compress it fully.
3) Pour specified front fork oil up to the top level of the inner tube.

FORK : Fork Oil 99000–99044–L01 (SUZUKI FORK OIL L01 or equivalent)

Front fork oil capacity (each leg)
520 ml (17.6/18.3 US/Imp oz)



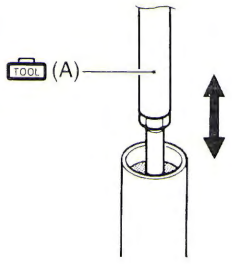
I649G1220026-02

4) Move the inner rod/damper rod slowly using the special tool (A) more than ten times until bubbles do not come out from the oil.

NOTE

Refill front fork oil up to the top of the inner tube to find bubbles while bleeding air.

Special tool
(A): 09940–52841 (Front fork inner rod holder)



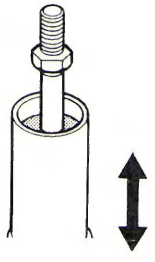
I649G1220027-05

5) Refill specified front fork oil up to the top level of the inner tube again. Move the outer tube up and down several strokes until bubbles do not come out from the oil.

6) Keep the front fork vertically and wait 5 – 6 minutes.

NOTE

- **Always keep oil level over the cartridge top end, or air may enter the cartridge during this procedure.**
- **Take extreme attention to pump out air completely.**



I649G1220028-03

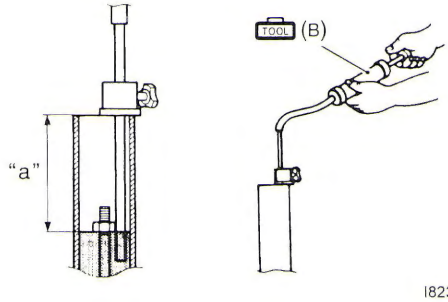
7) Hold the front fork vertically and adjust fork oil level using the special tool.

NOTE

When adjusting the fork oil level, remove the fork spring and compress the outer tube fully.

Special tool
(B): 09943–74111 (Fork oil level gauge)

Fork oil level "a"
96 mm (3.8 in)



I823H1220028-01

Fork spring

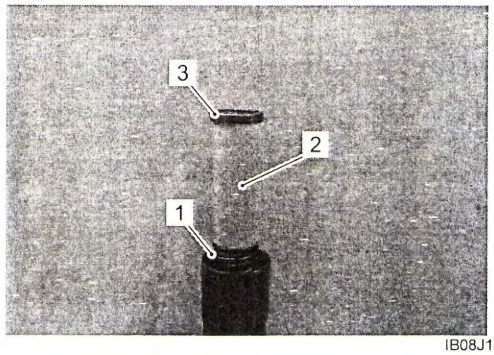
NOTE

The larger diameter "a" should face to the bottom side of the front fork.



IF08J1220001-01

Install the spring (1), spacer (2) and spring retainer (3).



IB08J1220026-03

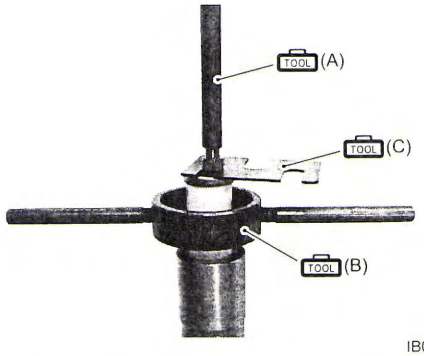
Front fork cap bolt

NOTE

Turn the inner rod/damper rod lock-nut until stops on the inner rod threads.

1) Pull up the inner rod/damper rod using the special tool (A).
2) Compress the spring using the special tool (B) and then insert the special tool (C) between the lock-nut and spring retainer.

Special tool
TOOL (A): 09940–52841 (Front fork inner rod holder)
TOOL (B): 09940–94930 (Front fork spacer holder)
TOOL (C): 09940–94922 (Front fork spring stopper plate)



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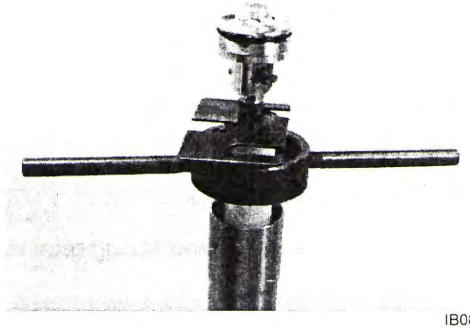
3) Slowly turn the cap bolt completely by hand until the end of the cap bolt seats on the inner-rod / damper rod.



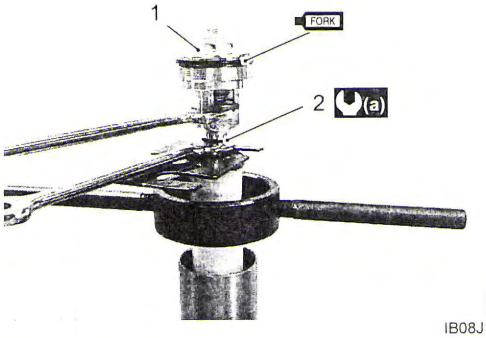
IB08J1220028-02

4) Hold the cap bolt (1) and tighten the lock-nut (2) to the specified torque.

Tightening torque
Front fork inner rod lock-nut (a): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)

5) Apply fork oil to the new O-ring.

FORK : Fork Oil 99000–99044–L01 (SUZUKI FORK OIL L01 or equivalent)



IB08J1220029-04

6) Remove the special tools.
7) Tighten the front fork cap to the outer tube temporarily.

Front Fork Parts Inspection

BENF08J12206005

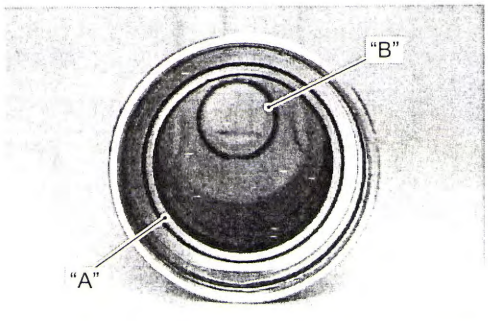
Refer to "Front Fork Disassembly and Assembly" (Page 2B-4).

Inner and Outer Tubes

- Inspect the inner tube outer surface and outer tube inner surface for scratches.
- Inspect the anti-friction metal surfaces for scratches.
- If any defects are found, replace them with the new ones.

NOTICE

Do not remove the anti-friction metals "A" and "B".



IB08J1220030-02

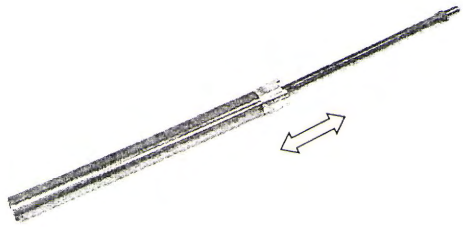
Fork Spring
Measure the fork spring free length. If it is shorter than the service limit, replace it with a new one.

Front fork spring free length
Service limit: 283 mm (11.1 in)



IB08J1220031-02

Inner Rod/Damper Rod
Move the inner rod by hand to examine it for smoothness.
If any defects are found, replace inner rod/damper rod with a new one.



IB08J1220032-02

Specifications

Service Data

BENF08J12207001

Suspension

Unit: mm (in)

Item	Standard	Limit
Front fork stroke	120 (4.7)	—
Front fork spring free length	289.6 (11.40)	283 (11.1)
Front fork oil level (Without spring, outer tube fully compressed)	96 (3.8)	—
Front fork oil type	SUZUKI FORK OIL L-01 or an equivalent fork oil	—
Front fork oil capacity (Each leg)	520 ml (17.6/18.3 US/Imp oz)	—
Front fork inner tube O.D	41 (1.6)	—
Front fork spring adjuster	9.0 (0.35)	—

Tightening Torque Specifications

BENF08J12207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front fork cap bolt	23	2.3	16.5	☞(Page 2B-3)
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)
Inner rod/damper rod	60	6.0	43.5	☞(Page 2B-7)
Front fork inner rod lock-nut	15	1.5	11.0	☞(Page 2B-9)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Front Fork Components" (Page 2B-1)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J12208001

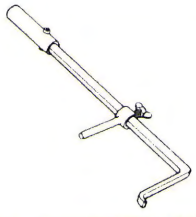
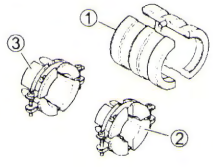
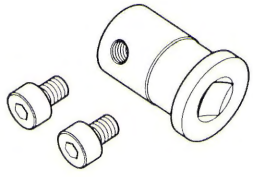
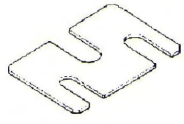
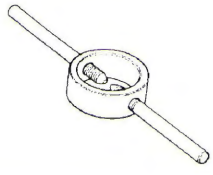
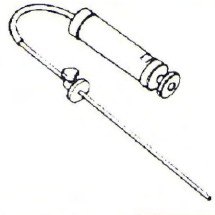
Material	SUZUKI recommended product or Specification		Note
Fork Oil	SUZUKI FORK OIL L01 or equivalent	P/No.: 99000–99044–L01	☞(Page 2B-6) / ☞(Page 2B-6) / ☞(Page 2B-7) / ☞(Page 2B-9)

NOTE

Required service material(s) is also described in:
"Front Fork Components" (Page 2B-1)

Special Tool

BENF08J12208002

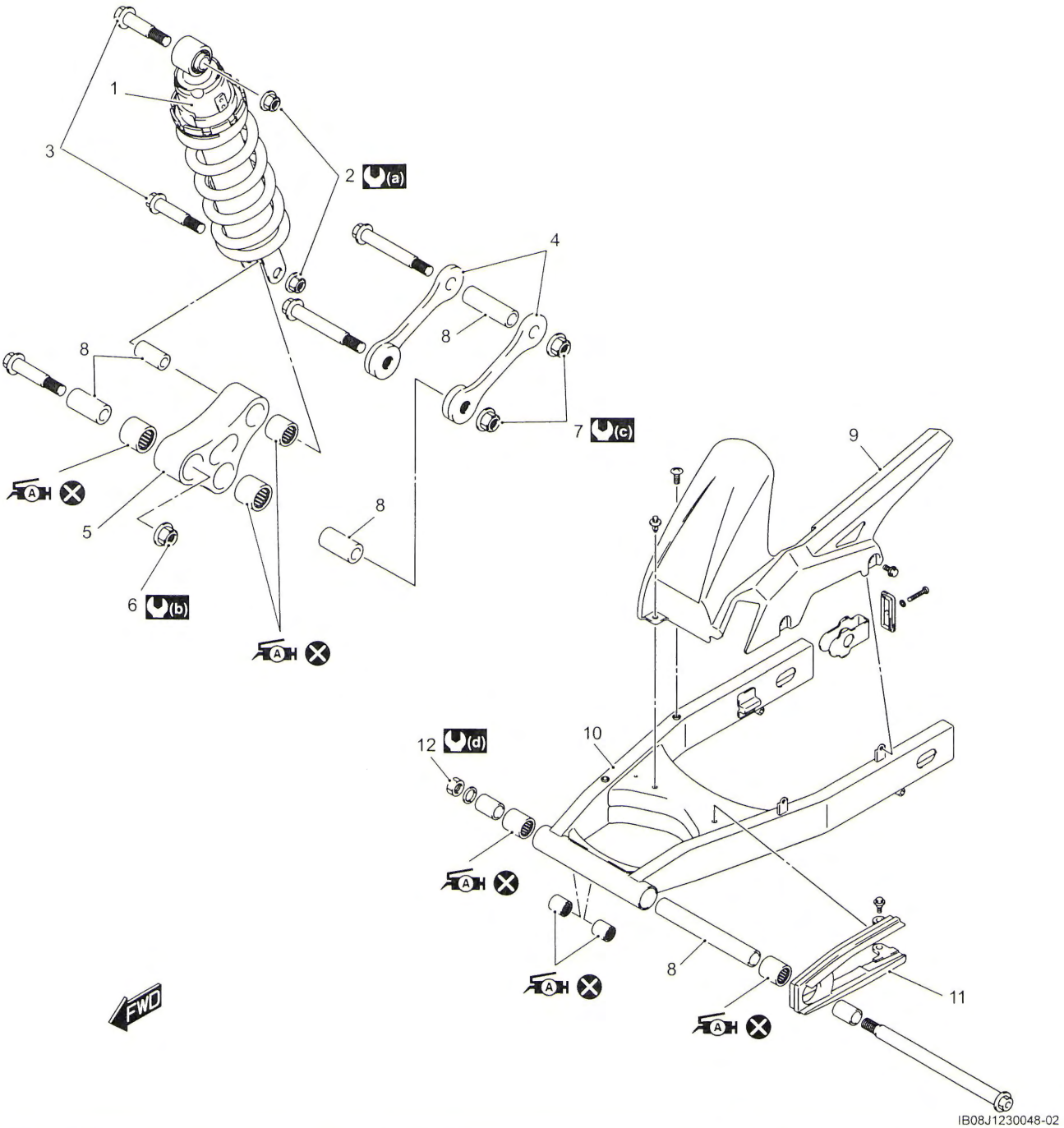
09913–50121 Oil seal remover ☞(Page 2B-5) 	09940–30221 Front fork cylinder holder ☞(Page 2B-6) / ☞(Page 2B-7) 
09940–52841 Front fork inner rod holder ☞(Page 2B-8) / ☞(Page 2B-9) 	09940–52861 Front fork oil seal installer set 1. Hammer (09941-53610) 2. Attachment (09940-52870) 3. Attachment (09940-52880) ☞(Page 2B-7) 
09940–54860 Front fork cylinder holder attachment ☞(Page 2B-7) 	09940–94922 Front fork spring stopper plate This tool is included in Front fork spacer holder set (09940-94922). ☞(Page 2B-4) / ☞(Page 2B-5) / ☞(Page 2B-9) 
09940–94930 Front fork spacer holder ☞(Page 2B-4) / ☞(Page 2B-4) / ☞(Page 2B-5) / ☞(Page 2B-9) 	09943–74111 Front fork oil level gauge ☞(Page 2B-8) 

Rear Suspension

Repair Instructions

Rear Suspension Components

BENF08J12306001

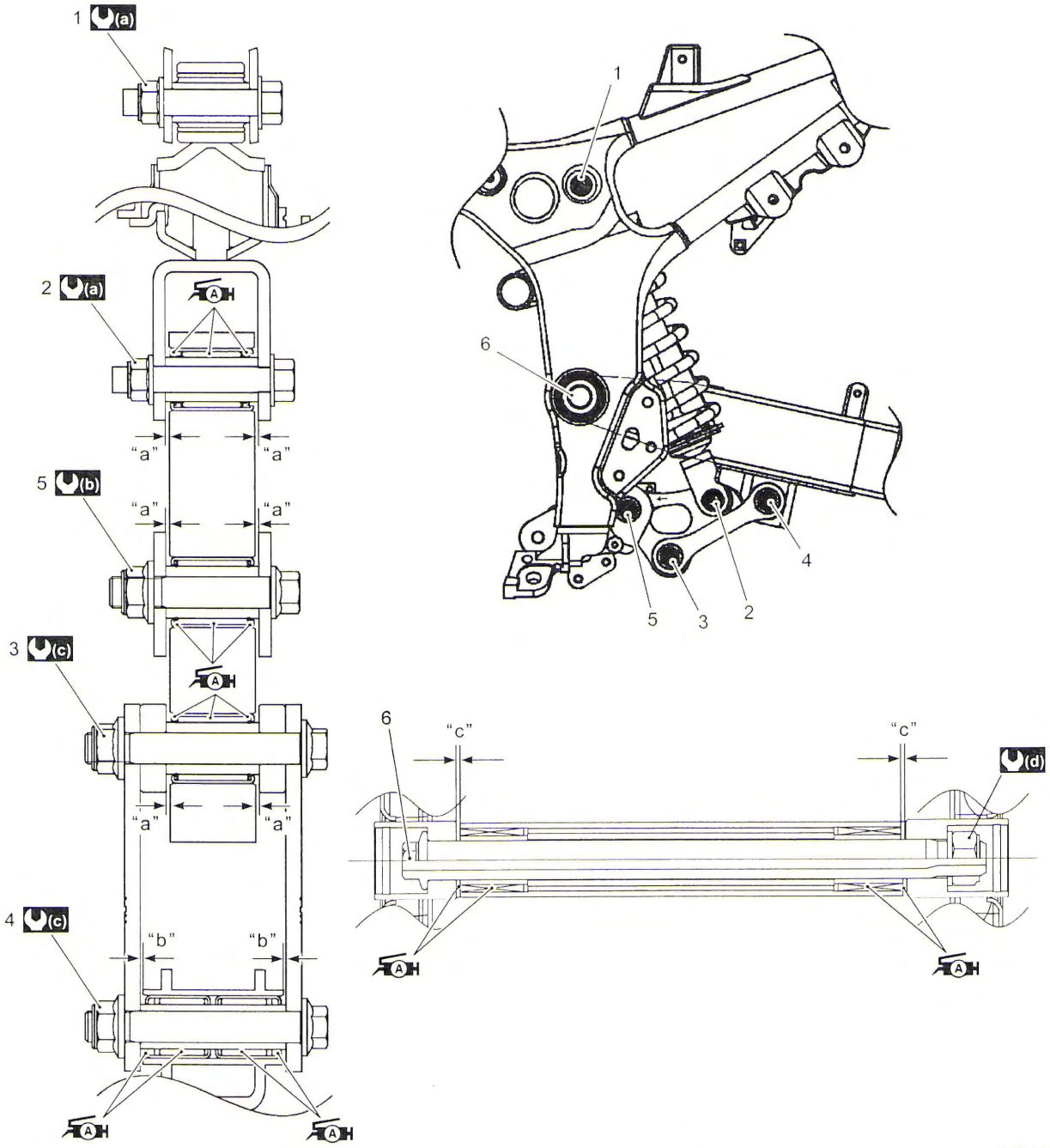


IB08J1230048-02

1. Rear shock absorber	7. Cushion rod mounting nut	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
2. Rear shock absorber mounting nut	8. Spacer	(b) : 98 N·m (9.8 kgf-m, 71.0 lbf-ft)
3. Rear shock absorber mounting bolt	9. Chain case	(c) : 78 N·m (7.8 kgf-m, 56.5 lbf-ft)
4. Cushion rod	10. Swingarm	(d) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
5. Cushion lever	11. Chain buffer	A H : Apply grease to the bearing.
6. Cushion lever mounting nut	12. Swingarm pivot nut	⊗ : Do not reuse.

Rear Suspension Assembly Construction

BENF08J12306002



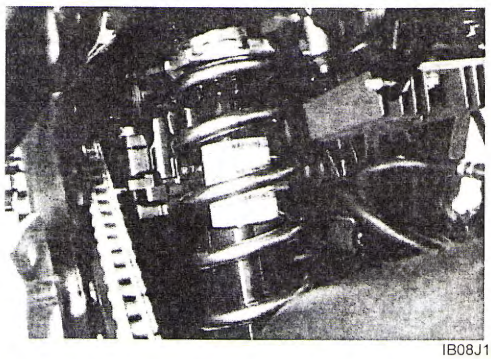
IB08J1230001-03

1. Rear shock absorber upper mounting nut	6. Swingarm pivot shaft	(b) : 98 N·m (9.8 kgf-m, 71.0 lbf-ft)
2. Rear shock absorber lower mounting nut	"a": 0.15 mm (0.006 in)	(c) : 78 N·m (7.8 kgf-m, 56.5 lbf-ft)
3. Cushion rod front mounting nut	"b": 0.10 mm (0.004 in)	(d) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
4. Cushion rod rear mounting nut	"c": 0.25 mm (0.010 in)	(A)H : Apply grease to the bearing.
5. Cushion lever mounting nut	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	

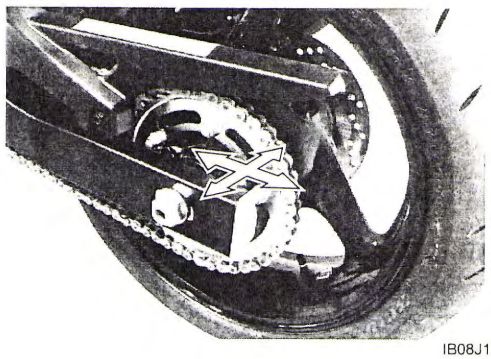
Rear Suspension Inspection

BENF08J12306016

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" (Page 2C-3), "Cushion Lever Removal and Installation" (Page 2C-5) and "Swingarm Removal and Installation" (Page 2C-8).



IB08J1020040-02



IB08J1020041-02

Rear Shock Absorber Removal and Installation

BENF08J12306003

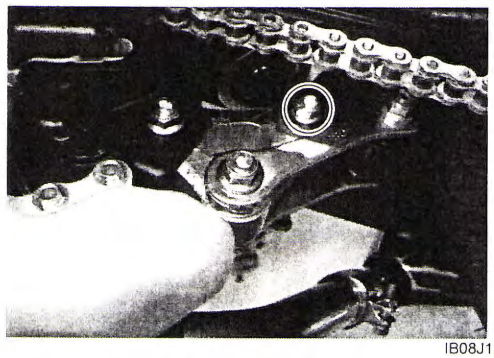
Removal

1) Support the motorcycle with a jack to relieve load on the rear shock absorber.

NOTICE

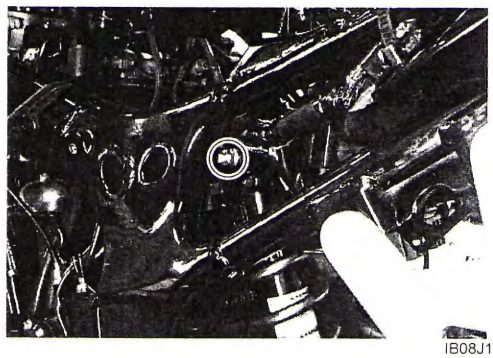
- **Do not support the motorcycle with the exhaust pipes.**
- **Make sure that the motorcycle is supported securely.**

2) Remove the frame cover (LH). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
3) Remove the rear shock absorber lower mounting bolt and nut.



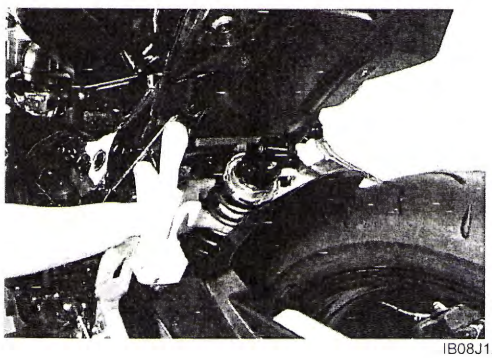
IB08J1230002-02

4) Remove the rear shock absorber upper mounting bolt and nut.



IB08J1230003-01

5) Remove the rear shock absorber upward.



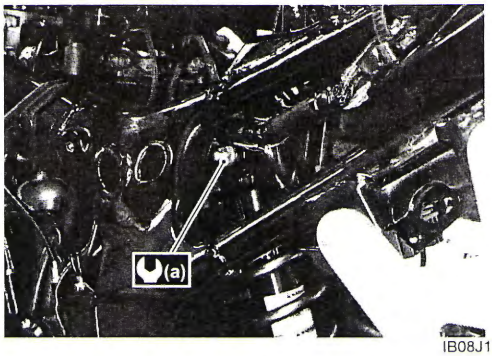
IB08J1230004-01

Installation

Install the rear shock absorber in the reverse order of removal. Pay attention to the following points:

- Temporarily install the rear shock absorber mounting bolts and nuts.
- Tighten the rear shock absorber upper mounting nut and lower mounting nut.

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)



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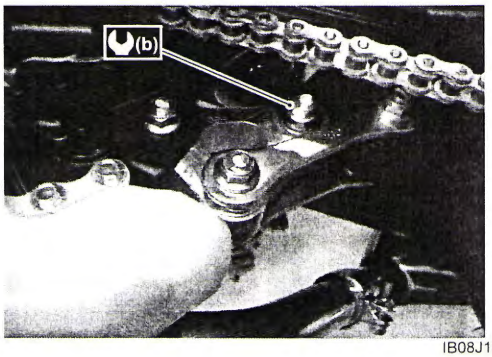


IB08J1230045-02

Rear Shock Absorber Inspection

BENF08J12306005

Inspect the rear shock absorber in the following procedures:

1) Remove the rear shock absorber. Refer to "Rear Shock Absorber Removal and Installation" (Page 2C-3).
2) Inspect the rear shock absorber for damage and oil leakage, and absorber bushing for wear and damage. If any defect is found, replace the rear shock absorber with a new one.

NOTICE

Do not attempt to disassemble the rear shock absorber. It is unserviceable.



IB08J1230005-03

3) Install the rear shock absorber. Refer to "Rear Shock Absorber Removal and Installation" (Page 2C-3).

Rear Suspension Adjustment

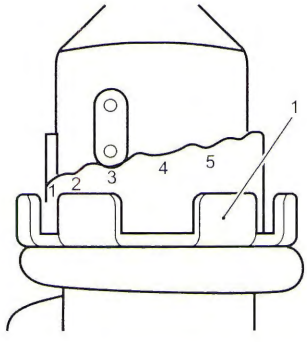
BENF08J12306006

After installing the rear suspension, adjust the spring pre-load as follows:
Turn the spring pre-load adjuster (1) to the desired position.

NOTE

Position 1 provides the softest spring tension and position 7 provides the stiffest.

STD position
3rd position



IB08J1230046-01

Rear Shock Absorber Disposal

BENF08J12306007

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.**

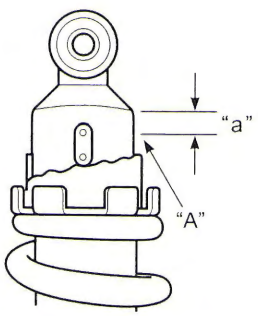
Gas Pressure Release

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.



IB08J1230007-01

"a": 20 mm (0.79 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.**



I649G1230009-03

Cushion Lever Removal and Installation

BENF08J12306008

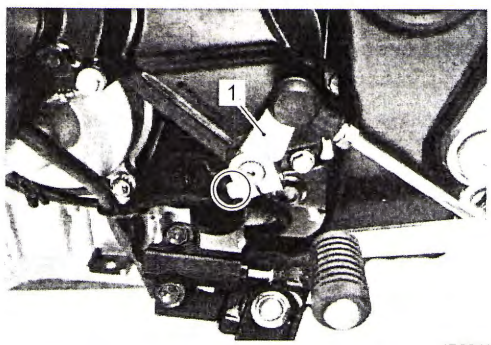
Removal

1) Support the motorcycle with a jack to relieve load on the cushion lever.

⚠ CAUTION

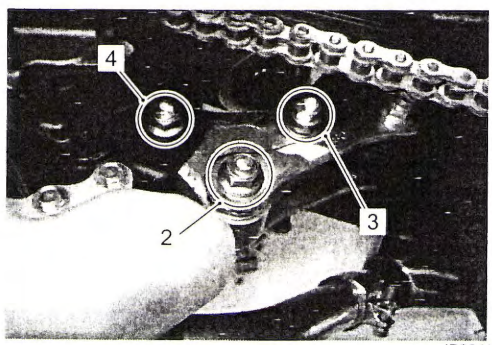
- **Do not support the motorcycle with the exhaust pipes.**
- **Make sure that the motorcycle is supported securely.**

2) Disengage the gearshift link arm (1).



IB08J1230008-02

3) Remove the cushion lever by removing the cushion rod front mounting bolt (2), shock absorber lower mounting bolt (3) and cushion lever mounting bolt (4).



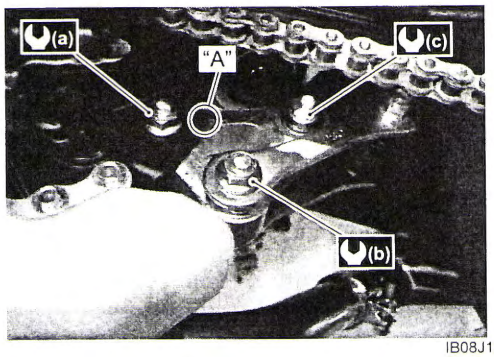
IB08J1230009-02

Installation

Install the cushion lever in the reverse order of removal. Pay attention to the following point:

- Install the cushion lever with the arrow mark "A" forward.
- Tighten each bolt and 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 front mounting nut (b): 78 N·m (7.8 kgf-m, 56.5 lbf-ft)
Rear shock absorber lower mounting nut (c): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



IB08J1230010-02

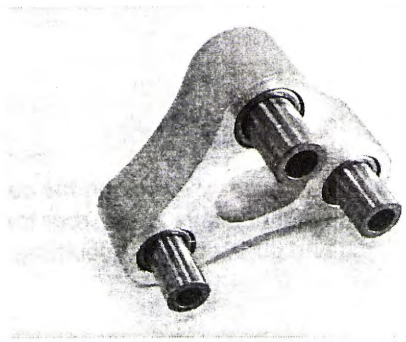
Cushion Lever Inspection

BENF08J12306009

Refer to "Cushion Lever Removal and Installation" (Page 2C-5).

Spacer

1) Remove the spacers from the cushion lever.
2) Inspect the spacers for any flaws or other damage. If any defects are found, replace the spacers with new ones.



IB08J1230011-02

Cushion Lever Bearing

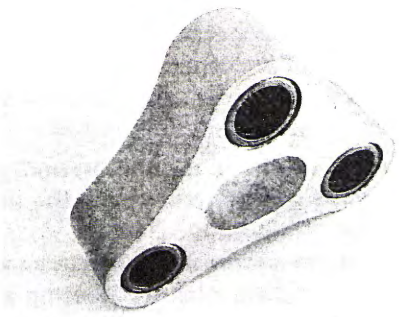
1) Insert the spacers into bearings.
2) Check the play by moving the spacers up and down. If excessive play is noted, replace the bearing with a new one. Refer to "Cushion Lever Bearing Removal and Installation" (Page 2C-6).



IB08J1230012-02

Cushion Lever

Inspect the cushion lever for damage. If any defect is found, replace the cushion lever with a new one.



IB08J1230013-02

Cushion Rod

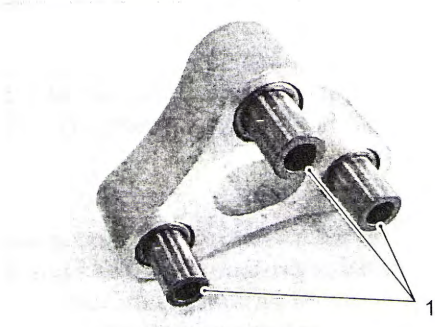
Refer to "Swingarm Related Parts Inspection" (Page 2C-10).

Cushion Lever Bearing Removal and Installation

BENF08J12306010

Removal

1) Remove the cushion lever. Refer to "Cushion Lever Removal and Installation" (Page 2C-5).
2) Remove the spacers (1).



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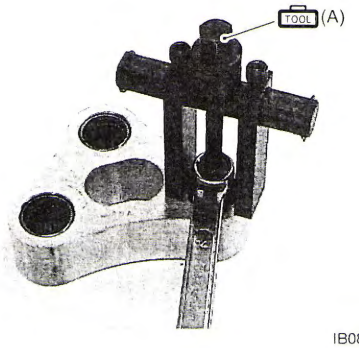
3) Remove the cushion lever bearings with the special tool.

Special tool
TOOL (A): 09921–20240 (Bearing remover set)



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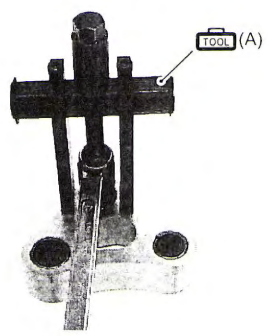
IB08J1230016-02



IB08J1230017-02

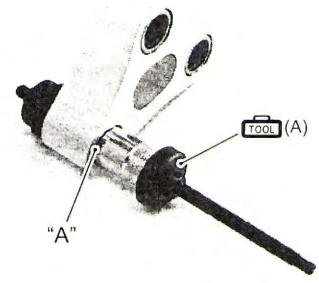
Installation

1) Press the new bearings into the cushion lever at 0.5 mm (0.02 in) depth "A" from the cushion lever surface with the special tool and suitable size socket wrench.

NOTE

When installing the bearing, stamped mark on the bearing must face outside.

Special tool
TOOL (A): 09924–84521 (Bearing installer set)



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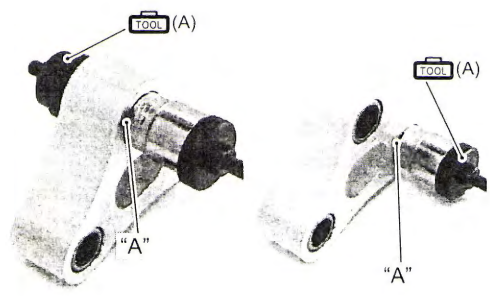

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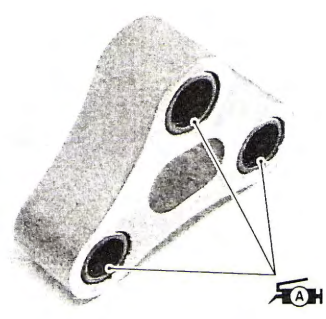
2) Apply grease to the bearings.

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



IB08J1230020-02

3) Install the cushion lever. Refer to "Cushion Lever Removal and Installation" (Page 2C-5).

Cushion Rod Removal and Installation

BENF08J12306011

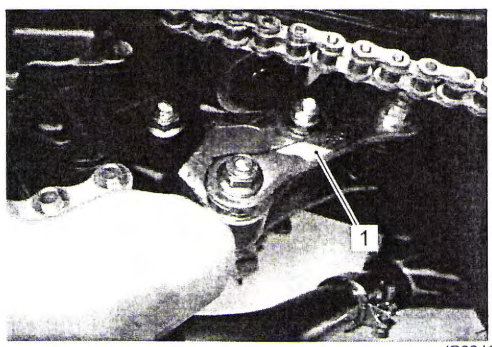
Removal

1) Support the motorcycle with a jack to be no load for the cushion lever.

⚠ CAUTION

- **Do not support the motorcycle with the exhaust pipes.**
- **Make sure that the motorcycle is supported securely.**

2) Remove the cushion rods (1) by removing bolt and nut.



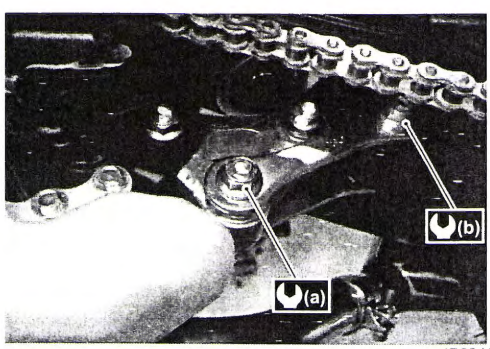
IB08J1230021-02

Installation

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

- Tighten each nut to the specified torque.

Tightening torque
Cushion rod front mounting nut (a): 78 N·m (7.8 kgf-m, 56.5 lbf-ft)
Cushion rod rear mounting nut (b): 78 N·m (7.8 kgf-m, 56.5 lbf-ft)

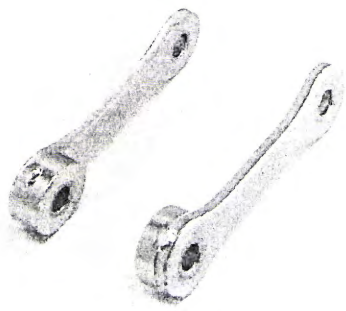


IB08J1230022-02

Cushion Rod Inspection

BENF08J12306012

Refer to "Cushion Rod Removal and Installation" (Page 2C-8).
Inspect the cushion rods for damage. If any defects are found, replace the cushion rods with a new ones.



IB08J1230023-02

Swingarm Removal and Installation

BENF08J12306013

Removal

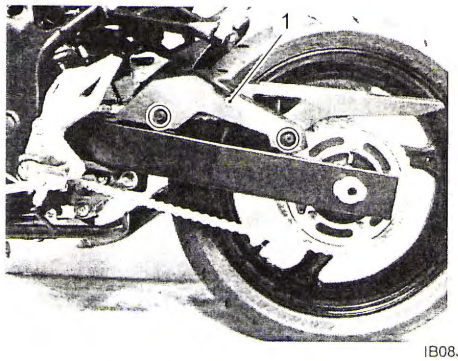
1) Support the motorcycle with a jack to be no load for the swingarm.

⚠ CAUTION

- **Do not support the motorcycle with the exhaust pipes.**
- **Make sure that the motorcycle is supported securely.**

2) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-11).

3) Remove the chain case (1).



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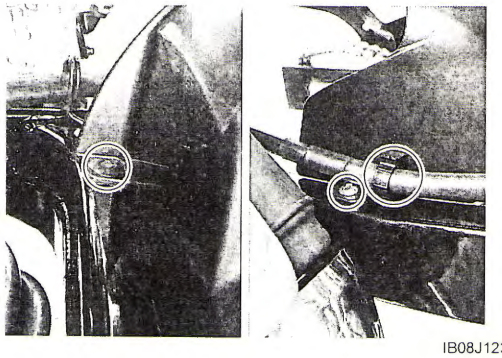
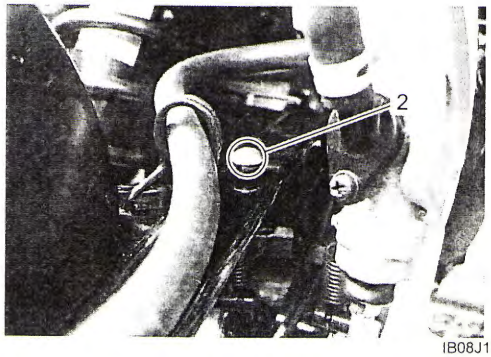


IB08J1230024-03

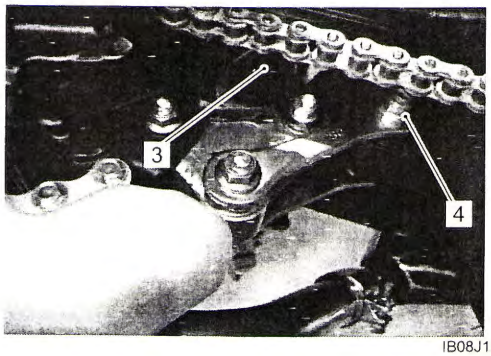
4) Remove the brake hose clamp screw (2).



IB08J1230025-02

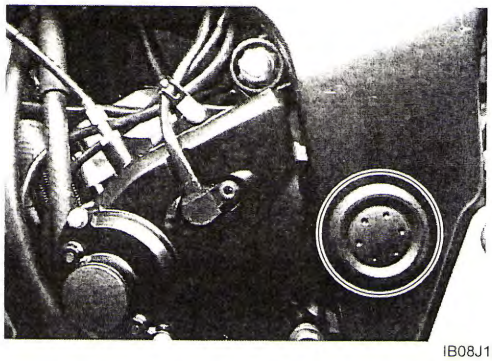
5) Remove the rear shock absorber (3). Refer to "Rear Shock Absorber Removal and Installation" (Page 2C-3).

6) Remove the cushion rod rear mounting bolt and nut (4).



IB08J1230026-02

7) Remove the swingarm pivot covers (LH & RH).



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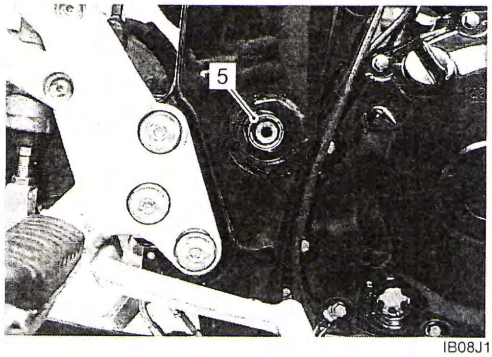
8) Remove the swingarm pivot nut (5).

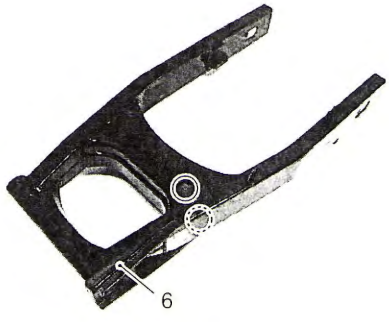


IB08J1230028-01

9) Remove the swingarm pivot shaft.

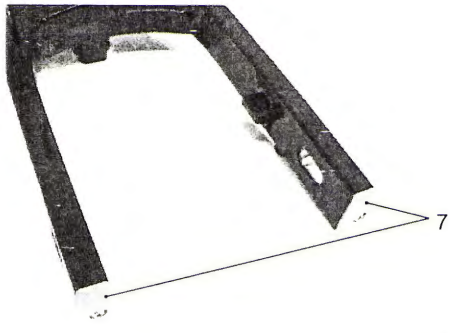
10) Remove the swingarm assembly.

11) Remove the chain buffer (6) by removing bolts.



IB08J1230029-02

12) Remove the chain adjusters (7).



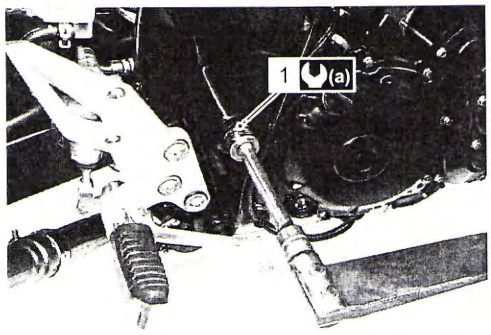
IB08J1230030-02

Installation

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

- Install the washer and swingarm pivot nut (1).
- Tighten the swingarm pivot nut to the specified torque.

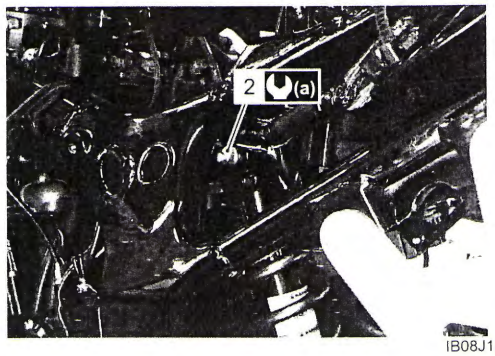
Tightening torque
Swingarm pivot nut (a): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)



IB08J1230031-02

- Tighten the rear shock absorber upper mounting nut (2), rear shock absorber lower mounting nut (3) and cushion rod rear mounting nut (4) to the specified torque.

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)
Cushion rod rear mounting nut (c): 78 N·m (7.8 kgf-m, 56.5 lbf-ft)



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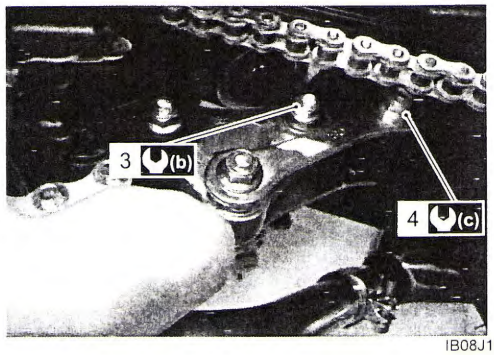


IB08J1230033-02

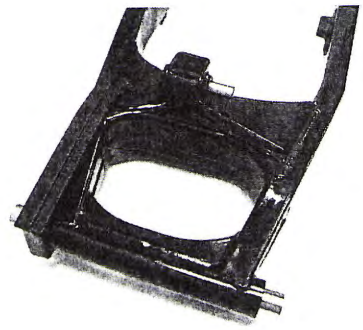
Swingarm Related Parts Inspection

BENF08J12306014

Refer to "Swingarm Removal and Installation" (Page 2C-8).

Spacers

1) Remove the spacers from the swingarm.
2) Inspect the spacers for wear and damage. If any defects are found, replace the spacers with new ones.



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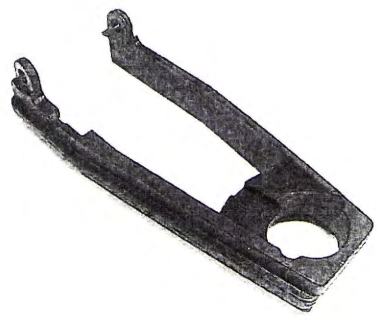
Chain Buffer

Inspect the chain buffer for wear and damage. If any defect is found, replace the chain buffer with a new one.



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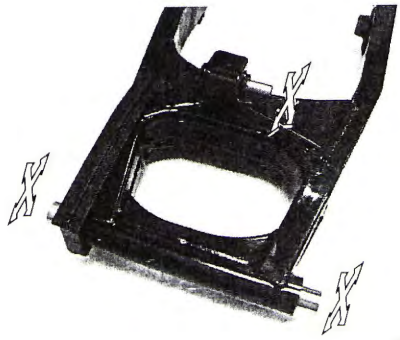
Swingarm Bearing / Cushion Rod Bearing

1) Insert the spacers into bearings.
2) Check the play by moving the spacers up and down. If excessive play is noted, replace the bearing with a new ones. Refer to "Swingarm Bearing / Cushion Rod Bearing Removal and Installation" (Page 2C-11).



IB08J1230036-03

Swingarm
Inspect the swingarm for damage. If any defect is found, replace the swingarm with a new one.

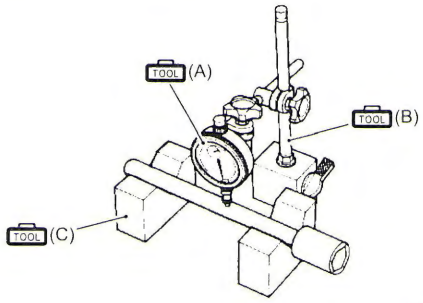


IB08J1230037-02

Swingarm Pivot Shaft
Measure the swingarm pivot shaft runout using the dial gauge. If the runout exceeds the service limit, replace the pivot shaft.

Special tool
(A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
(B): 09900–20701 (Magnetic stand)
(C): 09900–21304 (V-block (100 mm))

Swingarm pivot shaft runout
Service limit: 0.3 mm (0.01 in)



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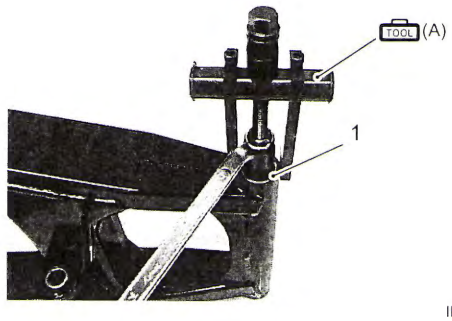
Swingarm Bearing / Cushion Rod Bearing Removal and Installation

BENF08J12306015

Removal
Swingarm bearing
1) Remove the swingarm. Refer to "Swingarm Removal and Installation" (Page 2C-8).
2) Remove the swingarm pivot bearings (1) using the special tool.

Special tool
(A): 09921–20240 (Bearing remover set)



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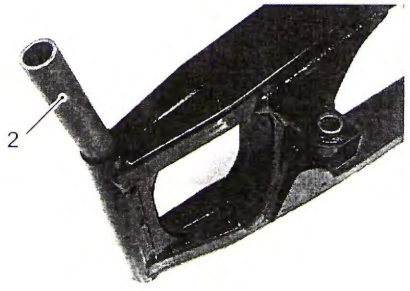
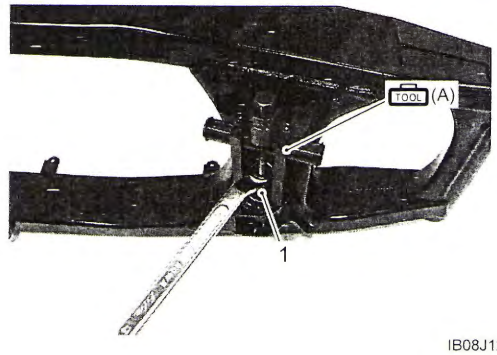
3) Remove the center spacer (2).



IB08J1230039-02

Cushion rod bearing
1) Remove the cushion rod bearing (1) using the special tool.

Special tool
(A): 09921–20240 (Bearing remover set)



IB08J1230040-02

Installation

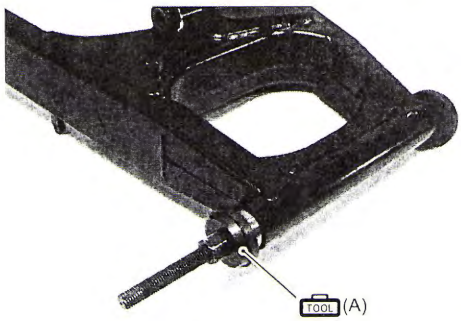
Swingarm bearing

1) Install the center spacer.
2) Press the new bearings into the swingarm pivot with the special tool.

NOTE

When installing the bearing, stamped mark on the bearing must face outside.

Special tool
TOOL (A): 09941–34513 (Steering race installer)



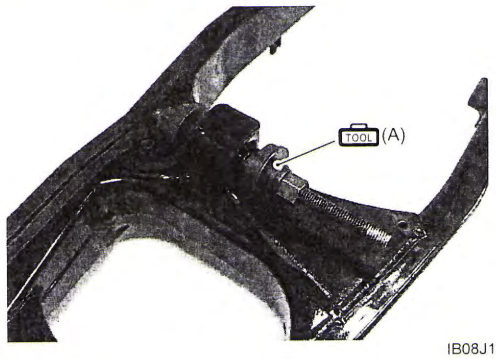
IB08J1230041-02

3) Install the swingarm. Refer to "Swingarm Removal and Installation" (Page 2C-8).

Cushion rod bearing

1) Press the cushion rod bearing with the special tool.

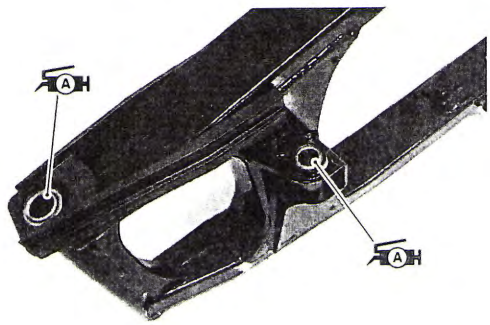
Special tool
TOOL (A): 09921–20240 (Bearing remover set)



IB08J1230042-02

2) Apply grease to the bearings.

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



IB08J1230043-02

3) Install the swingarm. Refer to "Swingarm Removal and Installation" (Page 2C-8).

Specifications

Service Data

BENF08J12307001

Suspension

Unit: mm (in)

Item	Standard	Limit
Rear shock absorber spring adjuster	3rd position	—
Rear wheel travel	135 (5.3)	—
Swingarm pivot shaft runout	—	0.3 (0.01)

Tightening Torque Specifications

BENF08J12307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear shock absorber upper mounting nut	50	5.0	36.0	☞(Page 2C-4) / ☞(Page 2C-10)
Rear shock absorber lower mounting nut	50	5.0	36.0	☞(Page 2C-4) / ☞(Page 2C-6) / ☞(Page 2C-10)
Cushion lever mounting nut	98	9.8	71.0	☞(Page 2C-6)
Cushion rod front mounting nut	78	7.8	56.5	☞(Page 2C-6) / ☞(Page 2C-8)
Cushion rod rear mounting nut	78	7.8	56.5	☞(Page 2C-8) / ☞(Page 2C-10)
Swingarm pivot nut	100	10.0	72.5	☞(Page 2C-10)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Rear Suspension Components" (Page 2C-1)

"Rear Suspension Assembly Construction" (Page 2C-2)

"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J12308001

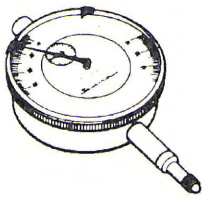
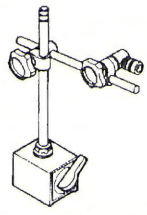
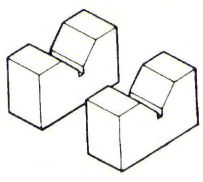
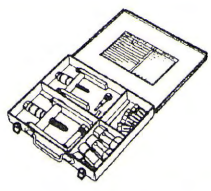
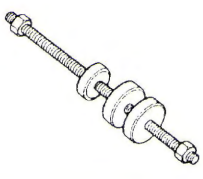
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 2C-7) / ☞(Page 2C-12)

NOTE

Required service material(s) is also described in:
"Rear Suspension Components" (Page 2C-1)
"Rear Suspension Assembly Construction" (Page 2C-2)

Special Tool

BENF08J12308002

09900–20607 Dial gauge (10 x 0.01 mm) ☞(Page 2C-11)		09900–20701 Dial gauge chuck ☞(Page 2C-11)	
09900–21304 V blocks ☞(Page 2C-11)		09921–20240 Bearing remover set ☞(Page 2C-7) / ☞(Page 2C-11) / ☞(Page 2C-11) / ☞(Page 2C-12)	
09924–84521 Bearing installer set ☞(Page 2C-7)		09941–34513 Bearing installer set ☞(Page 2C-12)	

Wheels and Tires

Precautions

Precautions for Wheel and Tire

BENF08J12400001

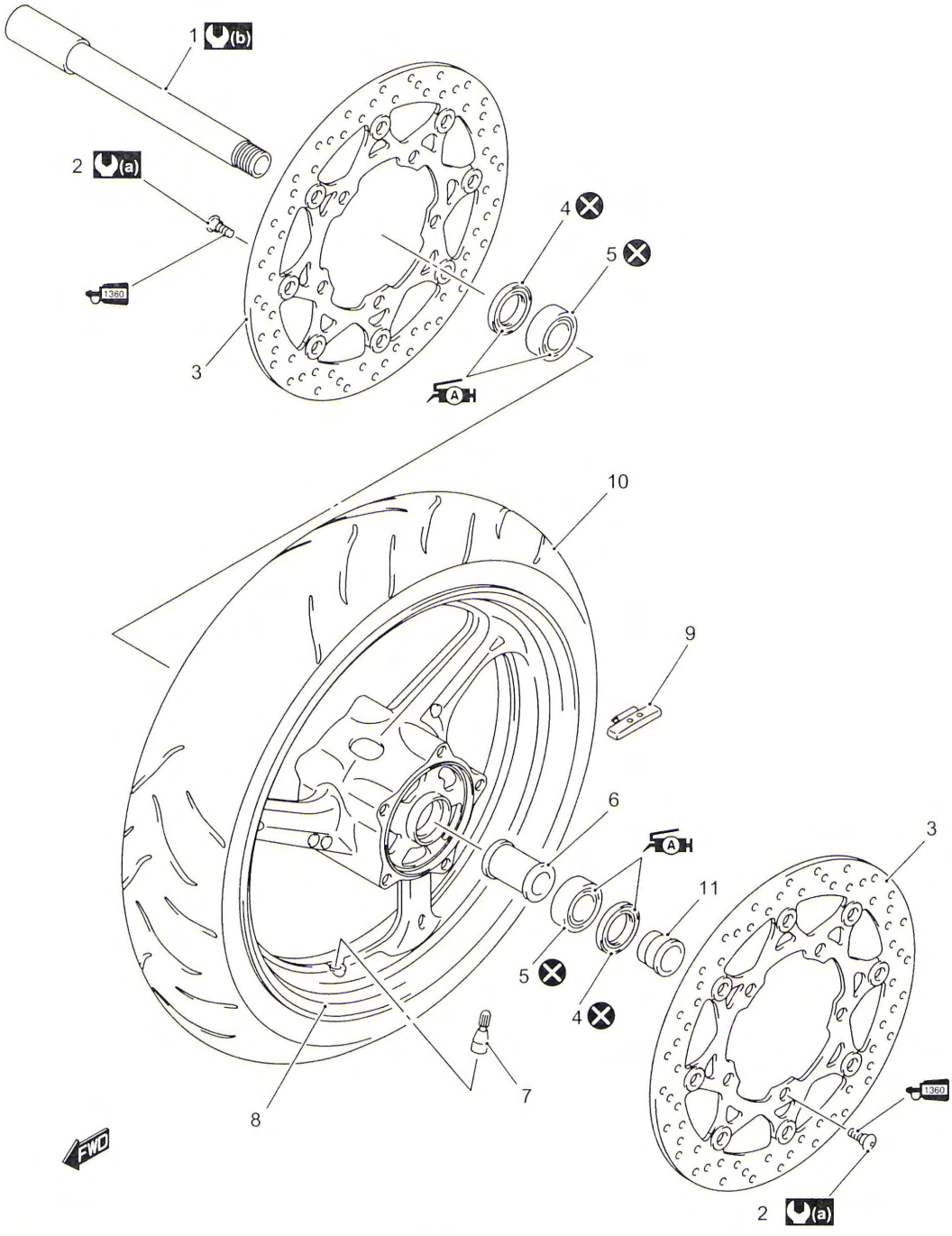
⚠ WARNING

- 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

BENF08J12406001

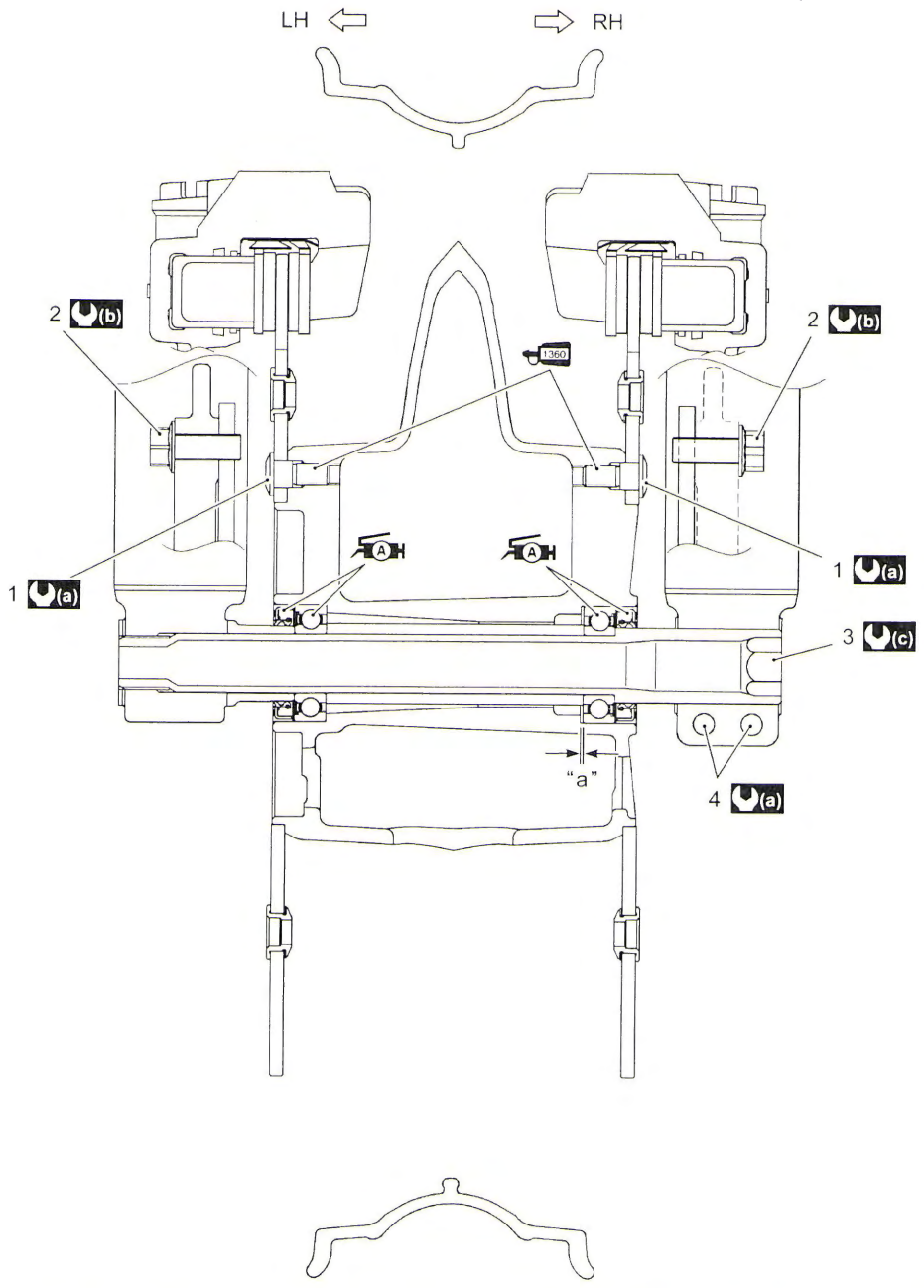


IB08J1240033-03

1. Front axle	5. Bearing	9. Wheel balancer	(b) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
2. Brake disc bolt	6. Spacer	10. Tire	A : Apply grease.
3. Brake disc	7. Air valve	11. Collar	1360 : Apply thread lock to the thread part.
4. Dust seal	8. Front wheel	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	: Do not reuse.

Front Wheel Assembly Construction

BENF08J12406003



IB08J1240001-02

1. Brake disk bolt	"a": Clearance	: Apply grease.
2. Brake caliper mounting bolt	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	1360 : Apply thread lock to the thread part.
3. Front axle	(b) : 39 N·m (3.9 kgf-m, 28.0 lbf-ft)	
4. Front axle pinch bolt	(c) : 100 N·m (10 kgf-m, 72.5 lbf-ft)	

Front Wheel Assembly Removal and Installation

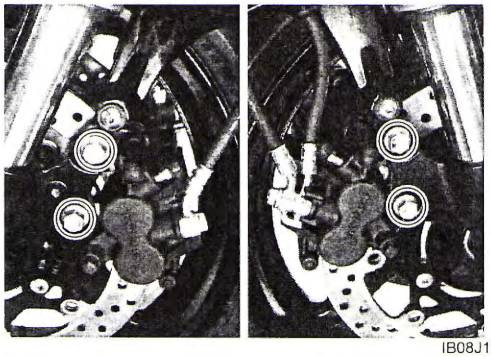
BENF08J12406005

Removal

1) Remove the brake calipers, left and right.

NOTICE

Do not operate the brake lever with the caliper removed.

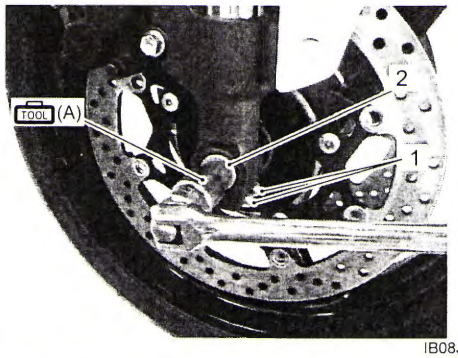


IB08J1240002-01

2) Loosen two axle pinch bolts (1) on the right front fork leg.

3) Loosen the front axle (2) using the special tool.

Special tool
TOOL (A): 09944–28321 (Hexagon socket (19 mm))



IB08J1240003-04

4) Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

NOTICE

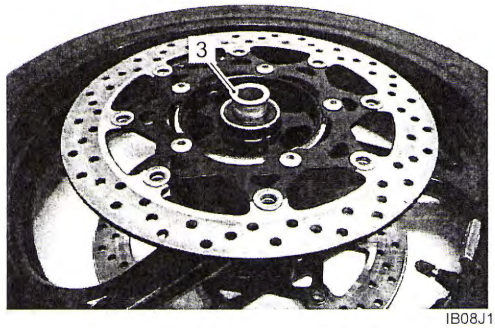
Do not carry out the work with the motorcycle resting on the side-stand. Do not support the motorcycle with the exhaust pipes. Make sure that the motorcycle is supported securely.

5) Draw out the front axle and remove the front wheel.

6) Remove the collar (3) (LH only).

NOTE

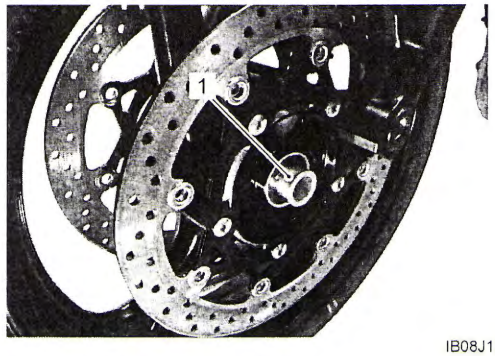
After removing the front wheel, fit the calipers temporarily to the original positions.



IB08J1240004-02

Installation

1) Install the collar (1) to the left side of the wheel.

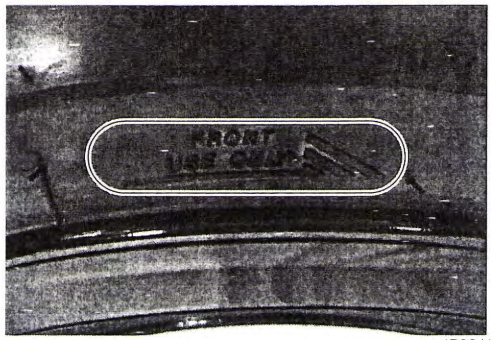


IB08J1240005-01

2) Install the front wheel with the front axle and tighten the front axle temporarily.

⚠ WARNING

The directional arrow on the tire should point to the wheel rotation, when remounting the wheel.



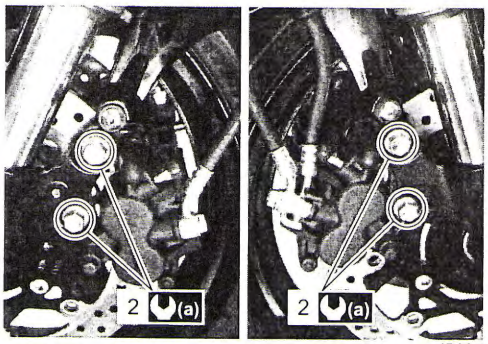
IB08J1240006-01

3) Tighten the brake caliper mounting bolts (2) to the specified torque.

⚠ WARNING

After remounting the brake calipers, pump the brake lever until the pistons push the pads correctly.

Tightening torque
Front brake caliper mounting bolt (a): 39 N·m (3.9 kgf-m, 28.0 lbf-ft)

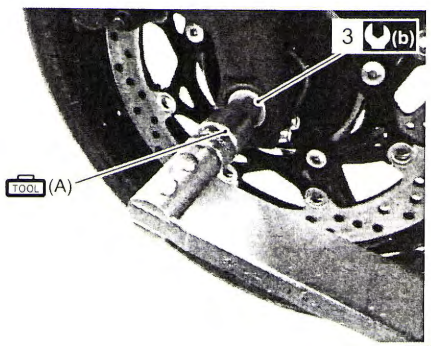


IB08J1240007-01

4) Tighten the front axle (3) to the specified torque.

Special tool
TOOL (A): 09944–28321 (Hexagon socket (19 mm))

Tightening torque
Front axle bolt (b): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)



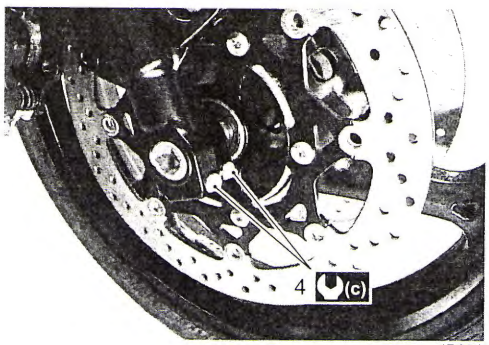
IB08J1240008-03

5) Tighten two front axle pinch bolts (4) on the right fork leg to the specified torque.

NOTE

Before tightening the front axle pinch bolts, move the front fork up and down four or five times.

Tightening torque
Front axle pinch bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IB08J1240009-01

Front Wheel Related Parts Inspection

BENF08J12406007

Refer to "Front Wheel Assembly Removal and Installation" (Page 2D-4).

Tire

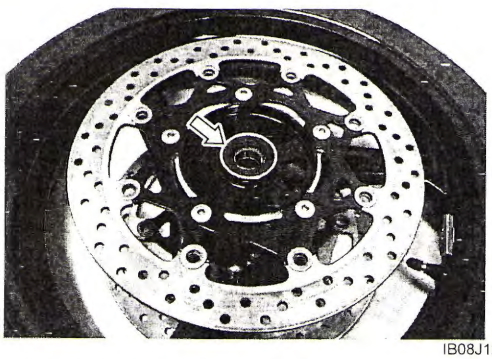
Refer to "Wheel / Tire / Air Valve Inspection and Cleaning" (Page 2D-16).

Front Brake Disc

Refer to "Front Brake Disc Inspection" in Section 4B (Page 4B-7).

Dust Seal

Inspect the dust seal lips for wear or damage. If any defects are found, replace the dust seal with a new ones. Refer to "Front Wheel Dust Seal / Bearing Removal and Installation" (Page 2D-6).



IB08J1240010-01

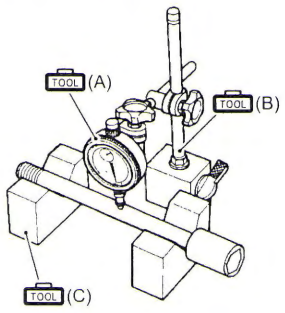
Wheel Axle

Using a dial gauge, check the wheel axle for runout. If the runout exceeds the limit, replace the axle shaft.

Special tool

(A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
(B): 09900–20701 (Magnetic stand)
(C): 09900–21304 (V-block (100 mm))

Wheel axle runout
Service limit: 0.25 mm (0.010 in)

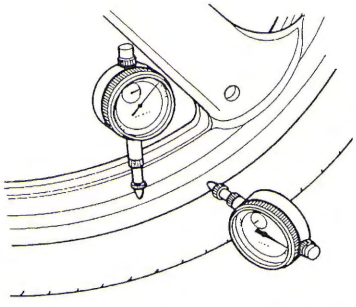


I649G1240054-03

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)

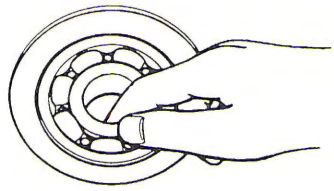


I649G1240014-02

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-6).



I649G1240015-02

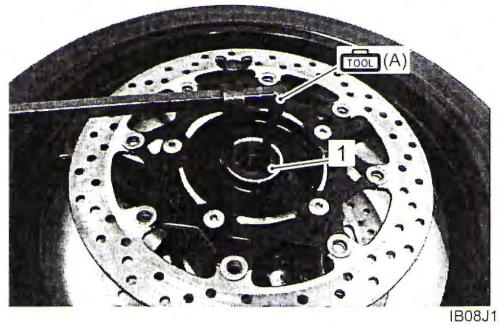
Front Wheel Dust Seal / Bearing Removal and Installation

BENF08J12406008

Removal

1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation" (Page 2D-4).
2) Remove the dust seals (1) using the special tool.

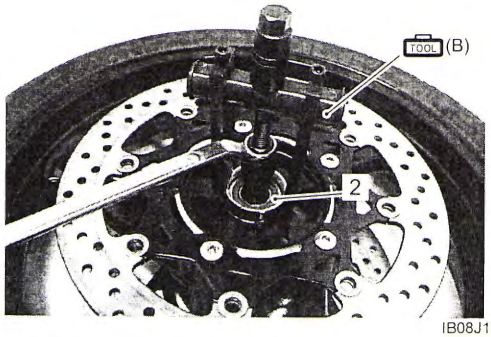
   Special tool
   (A): 09913–50121 (Oil seal remover)



IB08J1240011-01

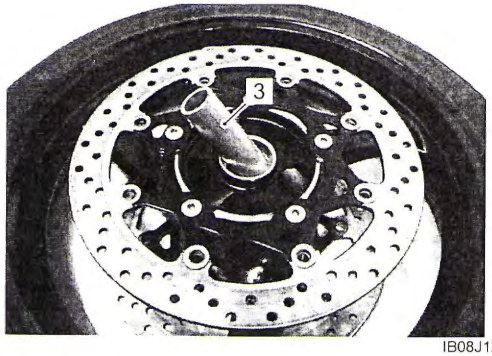
3) Remove the bearings (2) using the special tool.

Special tool
(B): 09921–20240 (Bearing remover set)



IB08J1240012-01

4) Remove the spacer (3).



IB08J1240013-01

Installation

1) Apply grease to the new wheel bearings.

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



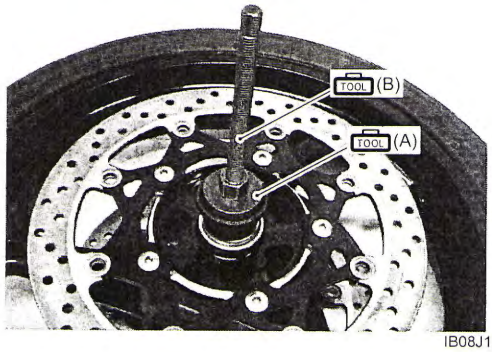
I649G1240019-02

2) First install the left wheel bearing, then install the spacer (1) and right wheel bearing with the special tool.

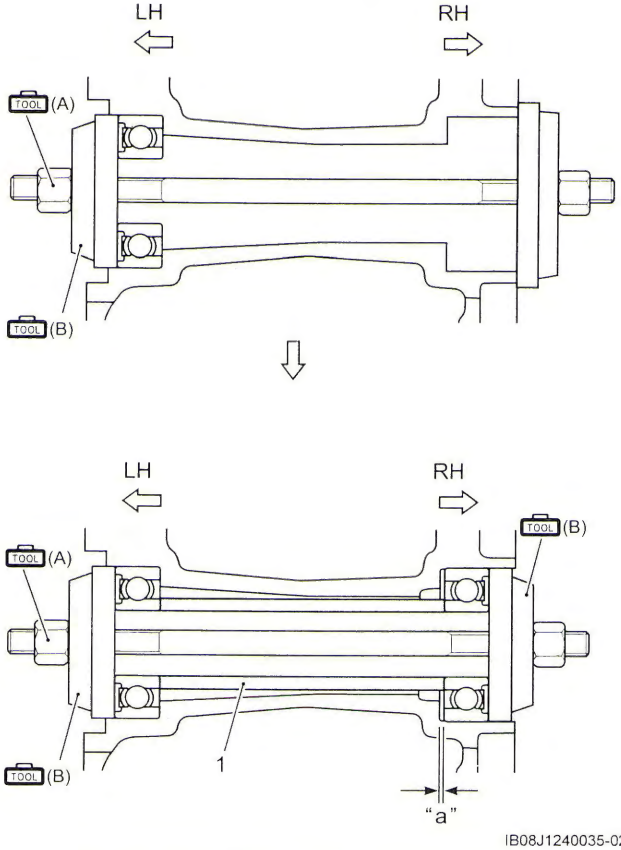
Special tool
(A): 09924–84510 (Bearing installer set)
(B): 09941–34513 (Steering race installer)

NOTE

The sealed cover of the bearing must face outside.



IB08J1240014-01

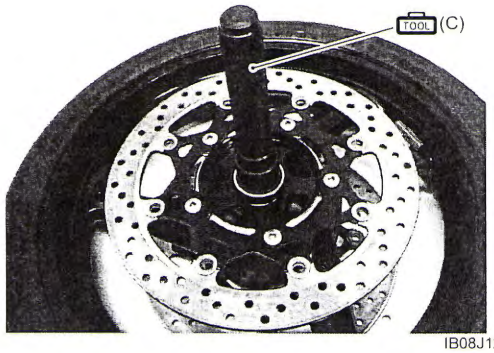


IB08J1240035-02

1. Spacer	"a": Clearance

3) Install the new dust seals with the special tool.

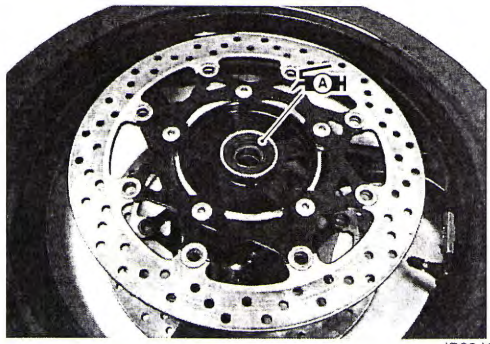
Special tool
TOOL (C): 09913–70210 (Bearing installer set)



IB08J1240015-01

4) Apply grease to the lip of dust seals.

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

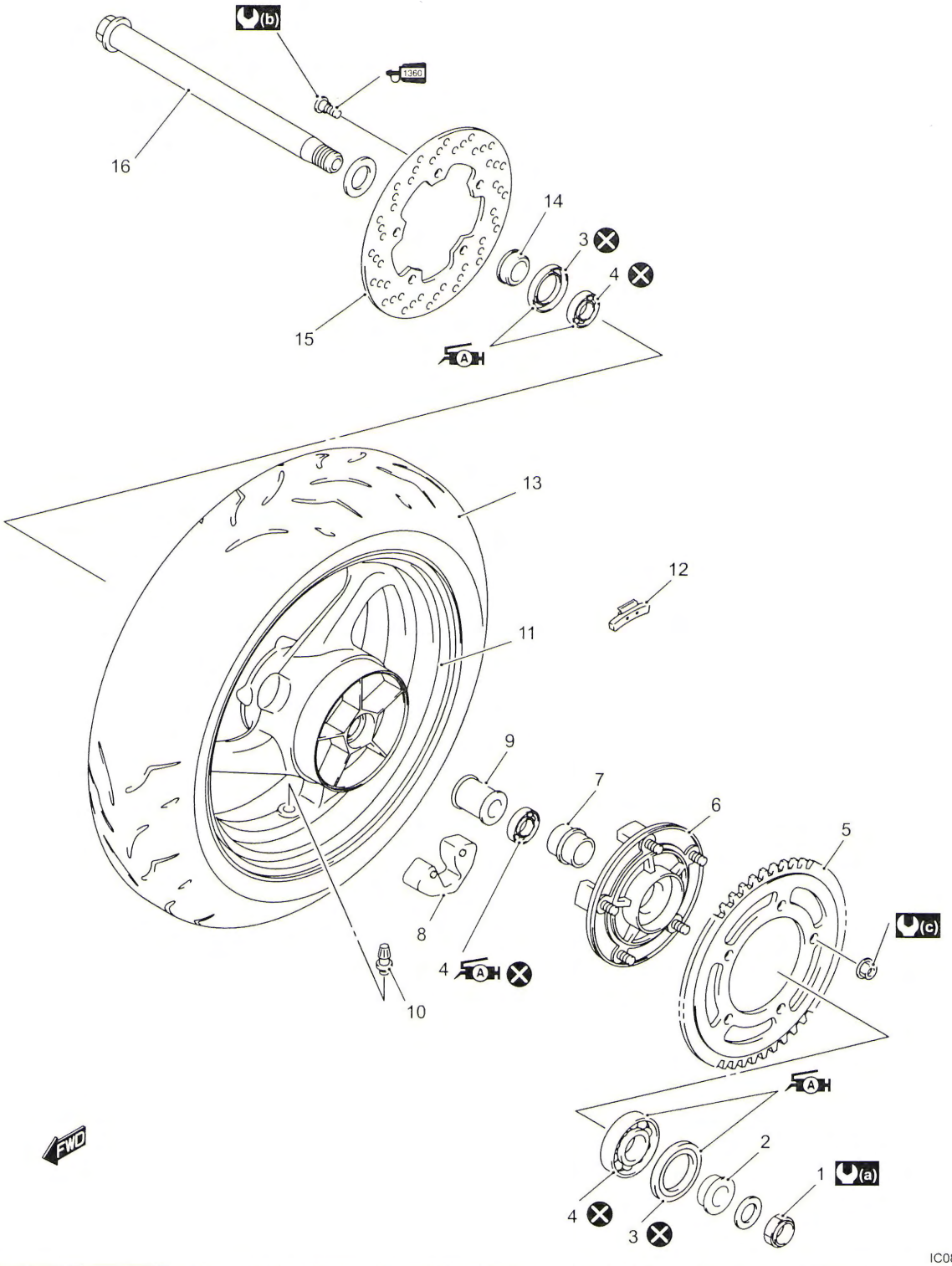


IB08J1240016-01

5) Install the front wheel assembly. Refer to"Front Wheel Assembly Removal and Installation" (Page 2D-4).

Rear Wheel Components

BENF08J12406009

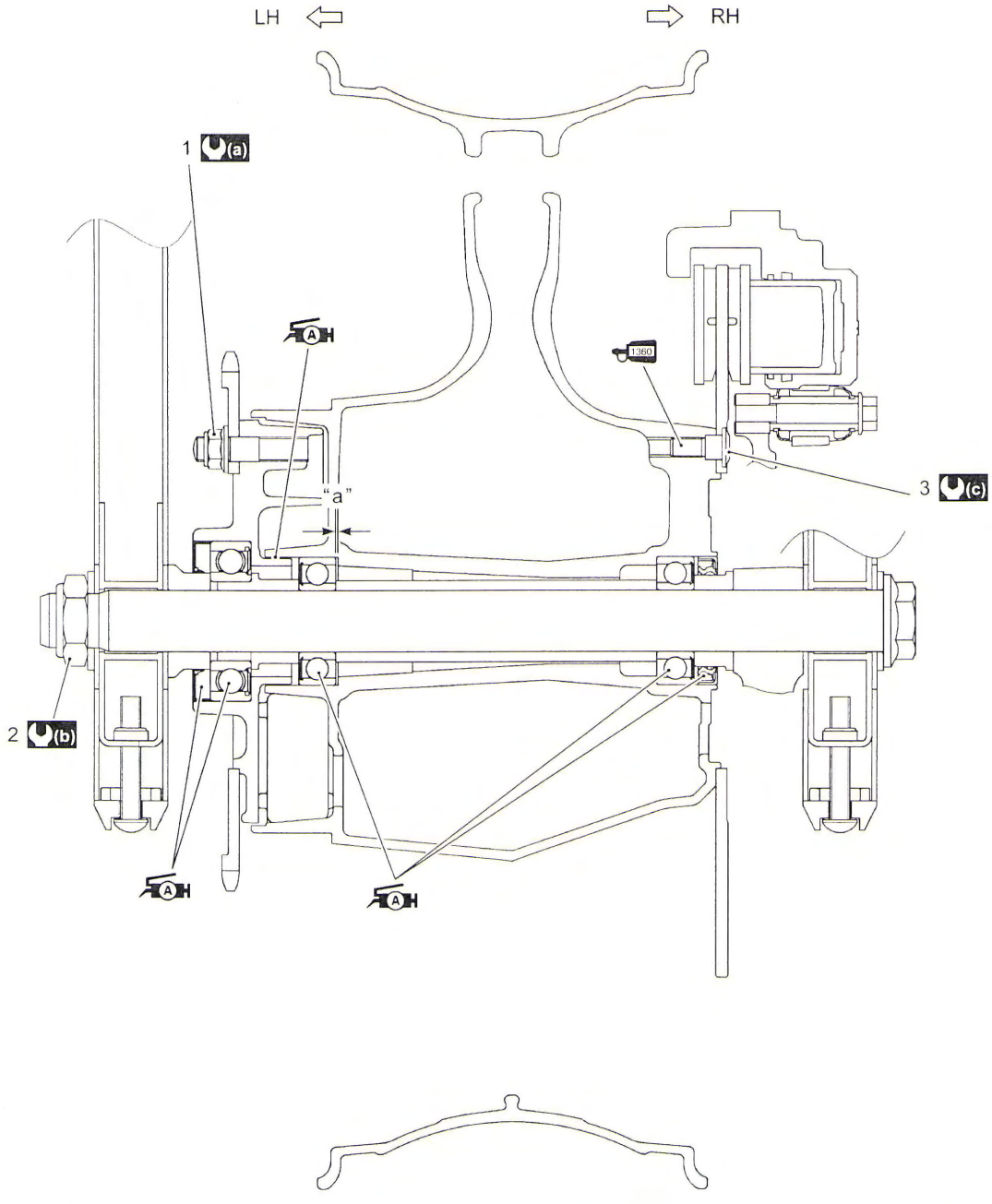


IC08J1240011-01

1. Rear axle nut	9. Spacer	(a) : 115 N·m (11.5 kgf-m, 83.0 lbf-ft)
2. Spacer	10. Air valve	(b) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
3. Dust seal	11. Rear wheel	(c) : 55 N·m (5.5 kgf-m, 40.0 lbf-ft)
4. Bearing	12. Wheel balancer	A H : Apply grease.
5. Rear sprocket	13. Tire	1360 : Apply thread lock to the thread part.
6. Sprocket mounting drum	14. Collar	⊗ : Do not reuse.
7. Retainer	15. Rear brake disc	
8. Wheel damper	16. Rear axle	

Rear Wheel Assembly Construction

BENF08J12406011



IC08J1240012-01

1. Rear sprocket nut	"a": Clearance	(c) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
2. Rear axle nut	(a) : 55 N·m (5.5 kgf-m, 40.0 lbf-ft)	A : Apply grease.
3. Brake disc bolt	(b) : 115 N·m (11.5 kgf-m, 83.0 lbf-ft)	1360 : Apply thread lock to the thread part.

Rear Wheel Assembly Removal and Installation

BENF08J12406013

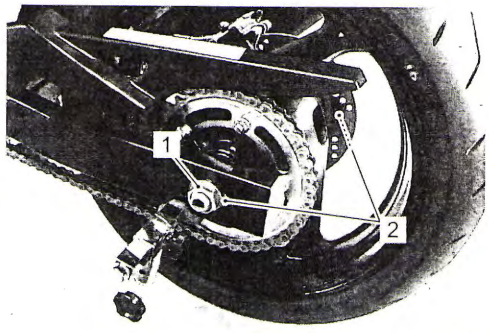
Removal

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), washer (2) and draw out the rear axle.

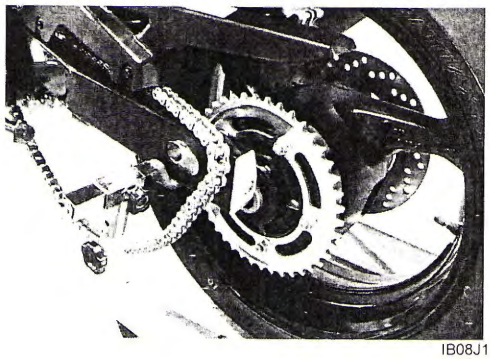


IB08J1240018-02

4) Remove the rear axle and disengage the drive chain from the rear sprocket.
5) Remove the rear wheel assembly.

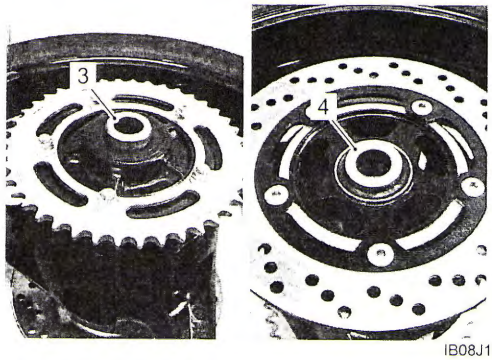
NOTICE

Do not operate the rear brake pedal with the rear wheel removed.



IB08J1240019-03

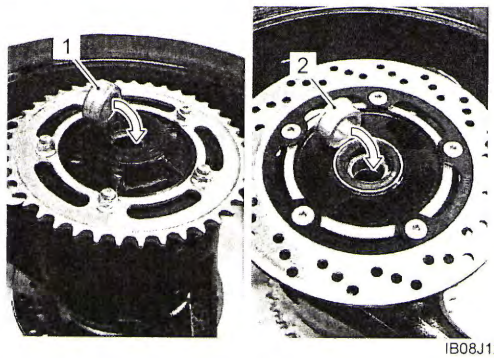
6) Remove the spacer (3) and collar (4).



IB08J1240020-02

Installation

1) Install the spacer (1) and collar (2).



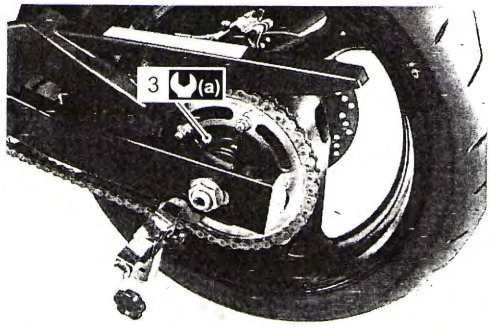
IB08J1240021-01

2) Install the rear wheel with the rear axle and tighten the rear axle nut (3) temporarily.
3) Adjust the drive chain slack after installing the rear wheel. Refer to "Drive Chain Inspection and Adjustment" in Section 3A (Page 3A-5).
4) Tighten the rear axle nut (3) to the specified torque.

Tightening torque
Rear axle nut (a): 115 N·m (11.5 kgf-m, 83.0 lbf-ft)

⚠ WARNING

After remounting the rear wheel, pump the brake pedal several times to check for proper brake operation.



IB08J1240022-02

Rear Wheel Related Parts Inspection

BENF08J12406015

Refer to "Rear Wheel Assembly Removal and Installation" (Page 2D-11).

Tire

Refer to "Wheel / Tire / Air Valve Inspection and Cleaning" (Page 2D-16).

Rear Brake Disc

Refer to "Rear Brake Disc Inspection" in Section 4C (Page 4C-7).

Wheel Damper

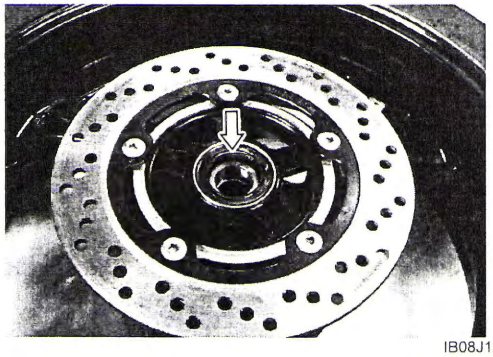
Refer to "Drive Chain Related Parts Inspection" in Section 3A (Page 3A-6).

Sprocket

Refer to "Drive Chain Related Parts Inspection" in Section 3A (Page 3A-6).

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).



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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

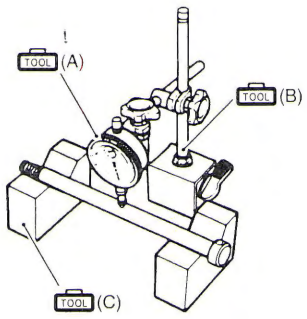
Service limit: 0.25 mm (0.010 in)

Special tool

TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))

TOOL (B): 09900–20701 (Magnetic stand)

TOOL (C): 09900–21304 (V-block (100 mm))



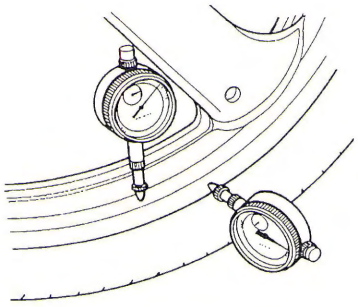
I649G1230034-03

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)

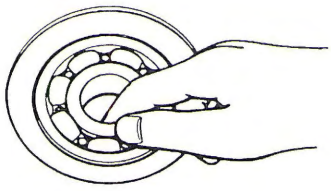


I649G1240014-02

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).



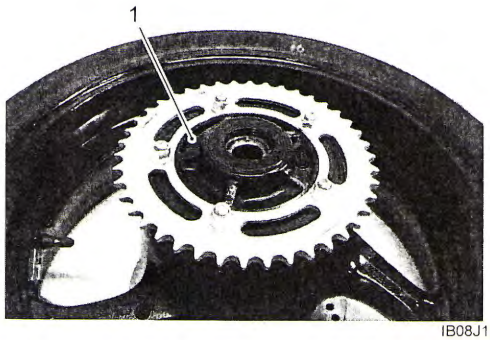
I649G1240015-02

Rear Wheel Dust Seal / Bearing Removal and Installation

BENF08J12406016

Removal

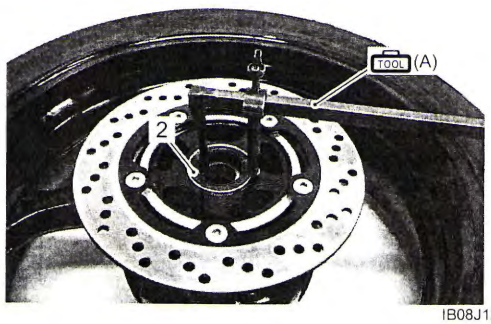
1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation" (Page 2D-11).
2) Remove the rear sprocket mounting drum assembly (1) from the rear wheel.



IB08J1240024-01

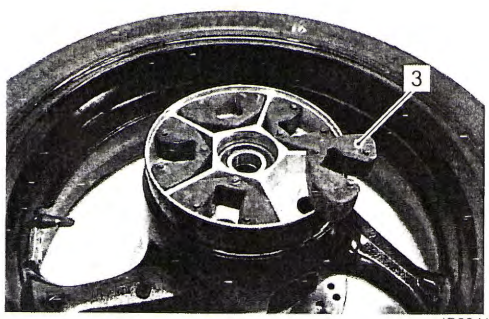
3) Remove the dust seal (2).

Special tool
TOOL (A): 09913–50121 (Oil seal remover)



IB08J1240025-01

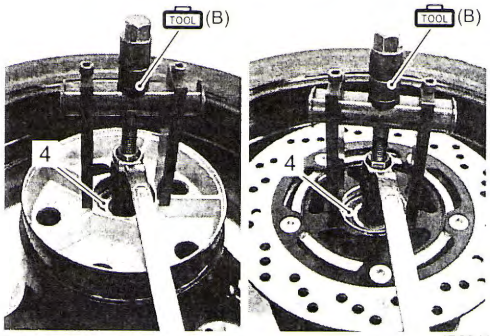
4) Remove the wheel dampers (3).



IB08J1240026-01

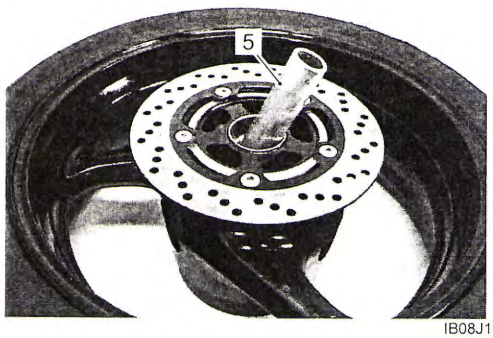
5) Remove the bearings (4) on both sides using the special tool.

Special tool
TOOL (B): 09921–20240 (Bearing remover set)



IB08J1240027-01

6) Remove the spacer (5).

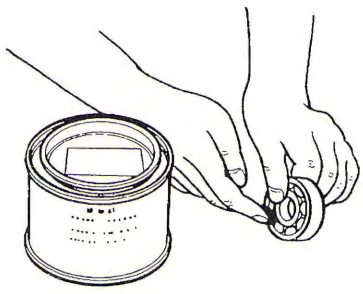


IB08J1240028-01

Installation

1) Apply grease to the new wheel bearings.

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



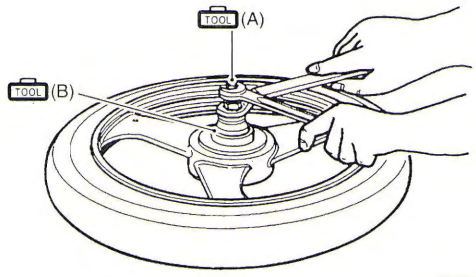
I649G1240019-02

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 (Steering race installer)
TOOL (B): 09924–84510 (Bearing installer set)

NOTE

The sealed cover of the bearing must face outside.



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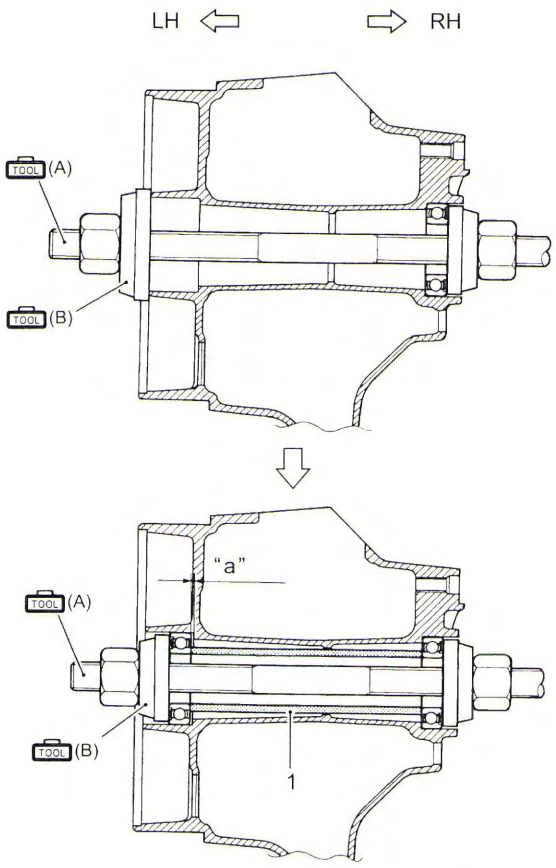

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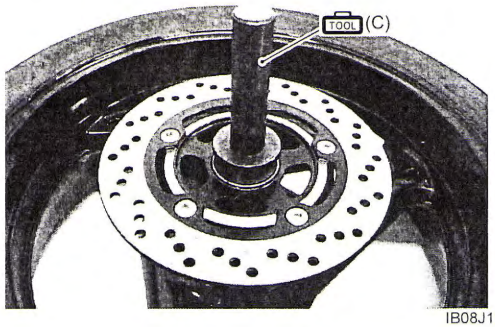
1. Spacer	"a": Clearance

3) Install a new dust seal with the special tool.

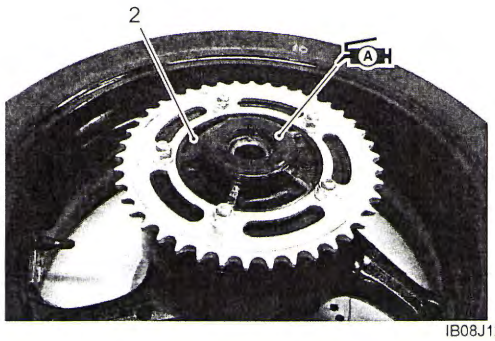
Special tool
TOOL (C): 09913–70210 (Bearing installer set)



IB08J1240029-01

4) Install the rear sprocket mounting drum assembly (2).
5) Apply grease to the dust seal lip.

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



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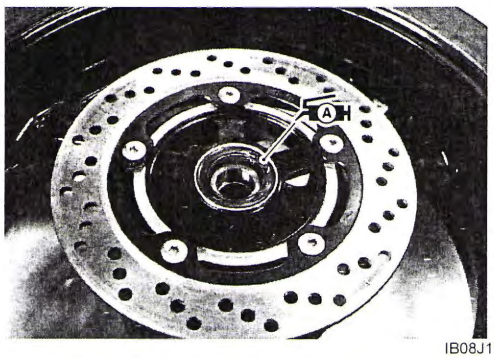


IB08J1240031-01

6) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation" (Page 2D-11).

Tire Removal and Installation

BENF08J12406017

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.

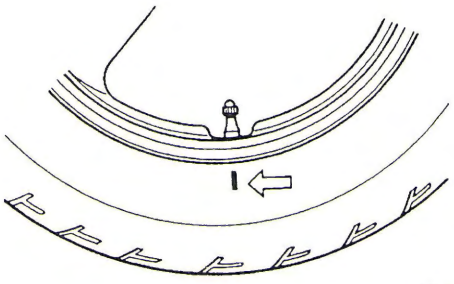
1) Removal the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation" (Page 2D-4) and "Rear Wheel Assembly Removal and Installation" (Page 2D-11).
2) Remove the mounting drum from the rear wheel. (For rear wheel)
   Refer to "Rear Wheel Dust Seal / Bearing Removal and Installation" (Page 2D-13).
3) Remove the valve core.
4) Remove the tire using the tire changer.

NOTICE

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.



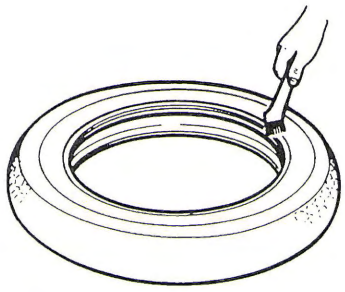
I649G1240037-02

Installation

1) Apply tire lubricant to the tire bead.

NOTICE

Never use oil, grease or gasoline on the tire bead in place of tire lubricant.



I649G1240038-02

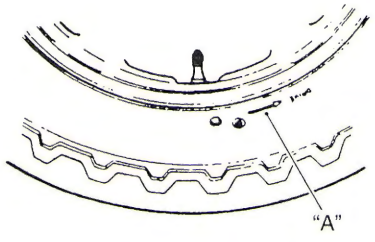
2) Install the tire onto the wheel using the tire changer.

NOTICE

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.**



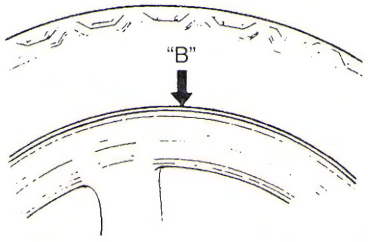
I649G1240039-02

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/cm², 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-18).

Cold inflation tire pressure

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

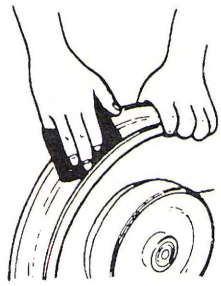
BENF08J12406018

Refer to "Tire Removal and Installation" (Page 2D-15).

Wheel

Wipe the wheel clean and check for the following points:

- Distortion and crack
- Any flaws and scratches at the bead seating area.
- Wheel rim runout. Refer to "Front Wheel Related Parts Inspection" (Page 2D-5) and "Rear Wheel Related Parts Inspection" (Page 2D-12).



I649G1240041-02

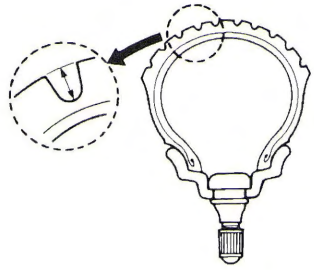
Tire

Tire must be checked for the following points:

- 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)

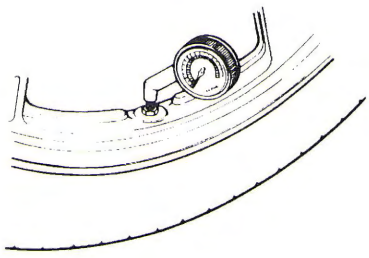


I310G1020068-02

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

Cold inflation tire pressure

	Solo 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

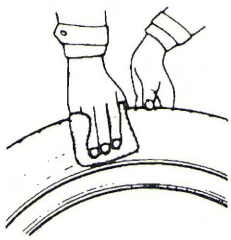
NOTICE

The standard tire fitted on this motorcycle is 120/70 ZR17 M/C (58W) for front and 180/55 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

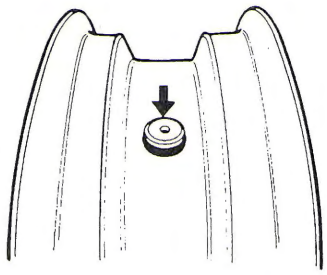
- **Front: BT016F EE**
- **Rear: BT016R EE**

- Nick and rupture on side wall
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner



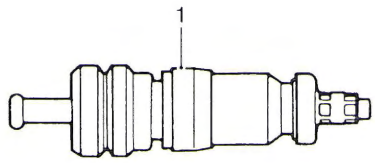
I649G1240042-02

Air Valve
Inspect the air valve for peeling and damage. If any defect is found, replace the air valve with a new one. Refer to "Air Valve Removal and Installation" (Page 2D-17).



I649G1240044-02

Inspect the valve core seal (1) for wear and damage. If any defect is found, replace the air valve with a new one. Refer to "Air Valve Removal and Installation" (Page 2D-17).



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1. Seal

Air Valve Removal and Installation

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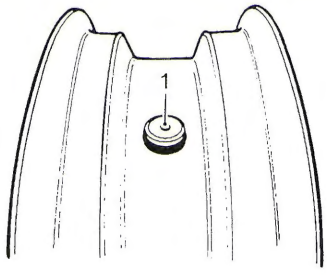
Removal

1) Remove the tire. Refer to "Tire Removal and Installation" (Page 2D-15).
2) Remove the air valve (1) from the wheel.



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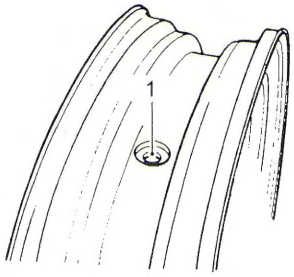
Installation

Install the new 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.



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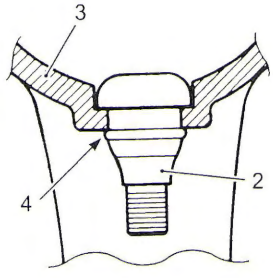
- Install the new air valve (2) in the wheel (3).

NOTICE

Be careful not to damage the valve lip (4) of the valve.

NOTE

To properly install the valve into the valve hole, apply a special tire lubricant or neutral soapy liquid to the valve.



I837H1240033-01

Wheel Balance Check and Adjustment

BENF08J12406020

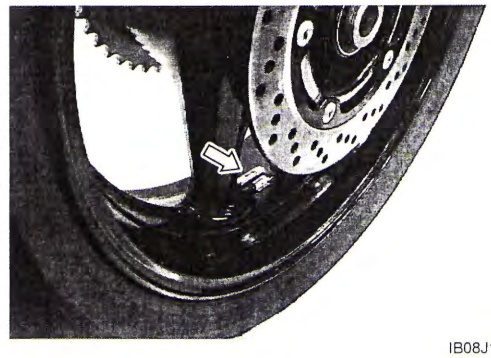
Check and adjust the wheel balance in the following procedures:

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 Dust Seal / Bearing Removal and Installation" (Page 2D-13).
3) Check the wheel balance using the balancer and adjust the wheel balance if necessary.

NOTICE

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.



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5) Recheck the wheel balance.
6) Install the mounting drum to the rear wheel. (For rear wheel)
   Refer to "Rear Wheel Dust Seal / Bearing Removal and Installation" (Page 2D-13).
7) Install the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation" (Page 2D-4) and "Rear Wheel Assembly Removal and Installation" (Page 2D-11).

Specifications

Service Data

BENF08J12407001

Wheel

Unit: mm (in)

Item		Standard	Limit
Wheel rim runout	Axial	—	2.0 (0.08)
	Radial		
Wheel axle runout	Front	—	0.25 (0.010)
	Rear		
Wheel rim size	Front	17 M/C x MT3.50	—
	Rear	17 M/C x MT5.50	—

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	180/55 ZR17M/C (73 W)	—
Tire type	Front	BRIDGESTONE BT016F EE	—
	Rear	BRIDGESTONE BT016R EE	—
Tire tread depth (Recommended depth)	Front	—	1.6 mm (0.06 in)
	Rear	—	2.0 mm (0.08 in)

Tightening Torque Specifications

BENF08J12407002

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)
Rear axle nut	115	11.5	83.0	☞(Page 2D-11)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"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)

"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J12408001

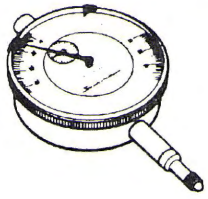
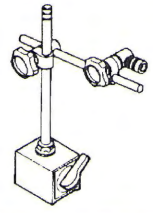
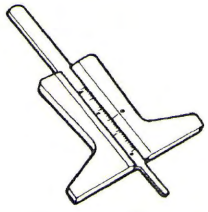
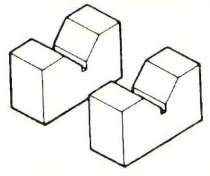
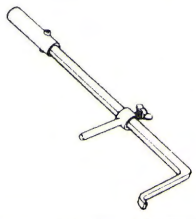
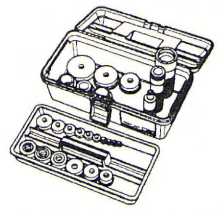
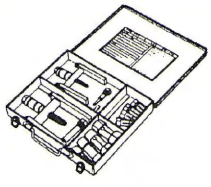
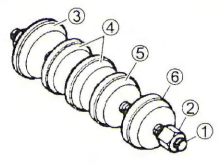
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 2D-7) / ☞(Page 2D-8) / ☞(Page 2D-13) / ☞(Page 2D-14)

NOTE

Required service material(s) is also described in:
"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

BENF08J12408002

09900–20607 Dial gauge (10 x 0.01 mm) ☞(Page 2D-6) / ☞(Page 2D-12)		09900–20701 Dial gauge chuck ☞(Page 2D-6) / ☞(Page 2D-12)	
09900–20805 Tire depth gauge ☞(Page 2D-16)		09900–21304 V blocks ☞(Page 2D-6) / ☞(Page 2D-12)	
09913–50121 Oil seal remover ☞(Page 2D-6) / ☞(Page 2D-13)		09913–70210 Bearing installer set ☞(Page 2D-8) / ☞(Page 2D-14)	
09921–20240 Bearing remover set ☞(Page 2D-7) / ☞(Page 2D-13)		09924–84510 Bearing installer set ☞(Page 2D-7) / ☞(Page 2D-14)	
09941–34513 Bearing installer set ☞(Page 2D-7) / ☞(Page 2D-14)		09944–28321 Hexagon bit socket (19 mm : 1/2 sq.) ☞(Page 2D-4) / ☞(Page 2D-5)	

Section 3

Driveline / Axle

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Precautions

Precautions

Precautions for Driveline / Axle

BENF08J13000001

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

⚠ WARNING

Never inspect or adjust the drive chain while the engine is running.

NOTICE

- **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.**

NOTE

The standard drive chain is a no joint link (endless) chain. Suzuki recommends to use a RK 525SMOZ8 drive chain as a replacement.

Drive Chain / Drive Train / Drive Shaft

Diagnostic Information and Procedures

Drive Chain and Sprocket Symptom Diagnosis

BENF08J13104001

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

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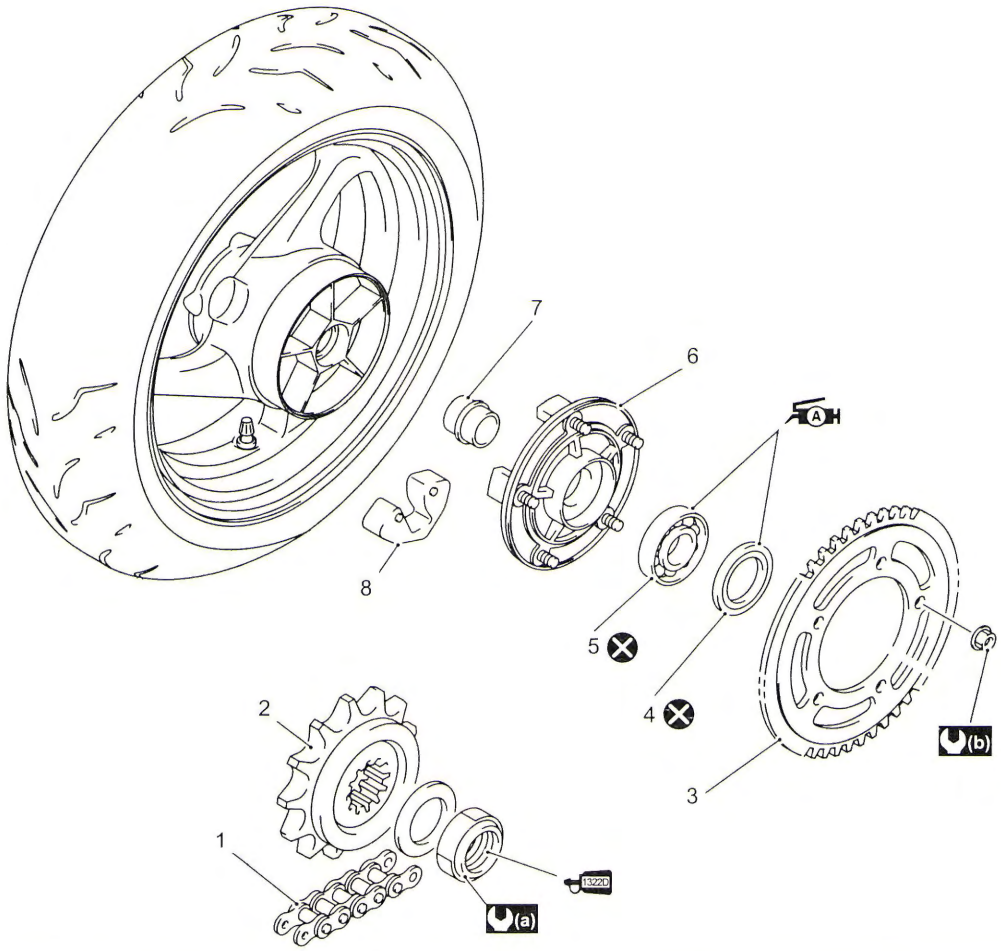


IF08J1310002-01

1. Drive chain	6. Sprocket mounting drum	: Apply grease.
2. Engine sprocket	7. Retainer	1322D : Apply thread lock to thread part.
3. Rear sprocket	8. Wheel damper	: Do not reuse.
4. Dust seal	(a) : 115 N·m (11.5 kgf-m, 83.0 lbf-ft)	
5. Bearing	(b) : 55 N·m (5.5 kgf-m, 40.0 lbf-ft)	

Engine Sprocket Removal and Installation

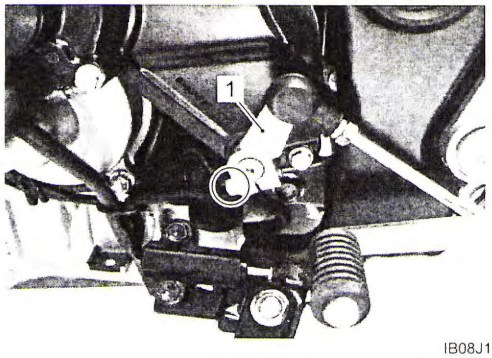
BENF08J13106002

Removal

1) Remove the gearshift link arm (1) by removing the bolt.

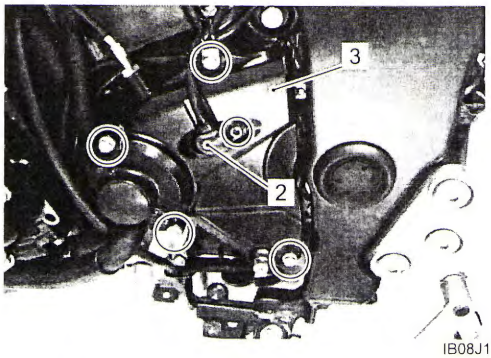
NOTE

Mark the gearshift shaft head at which the gearshift link arm slit set for correct reinstallation.



IB08J1310026-01

2) Remove the speed sensor (2).
3) Remove the engine sprocket cover (3).



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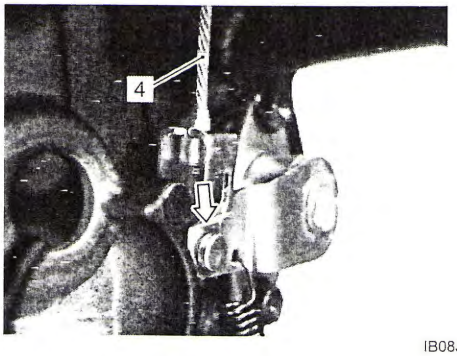
4) Remove the clutch cable (4).



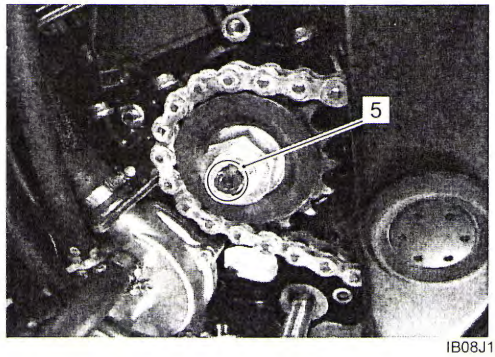
IB08J1310024-01

5) Support the motorcycle with a jack or wooden block.

⚠ CAUTION

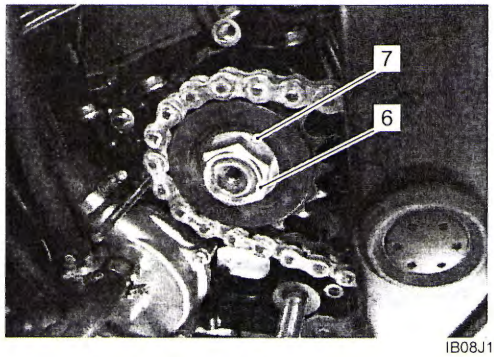
- **Do not support the motorcycle with the exhaust pipes.**
- **Make sure that the motorcycle is supported securely.**

6) Remove the speed sensor rotor (5) by removing its bolt while depressing the rear brake pedal.



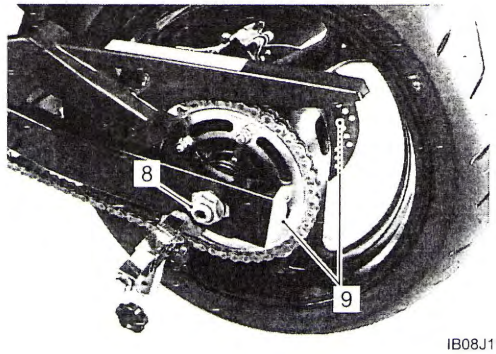
IB08J1310003-03

7) Remove the engine sprocket nut (6) while depressing the rear brake pedal.
8) Remove the washer (7).



IB08J1310004-05

9) Loosen the rear axle nut (8).
10) Loosen the chain adjusters (9) to provide additional chain slack.



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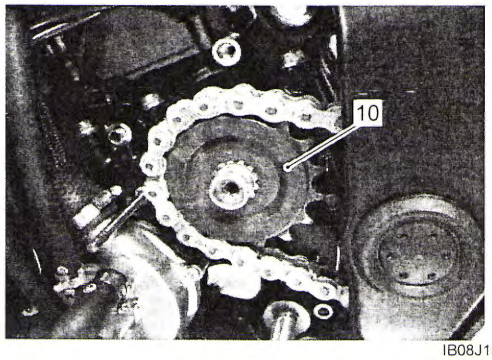
11) Remove the engine sprocket (10).



IB08J1310005-04

Installation

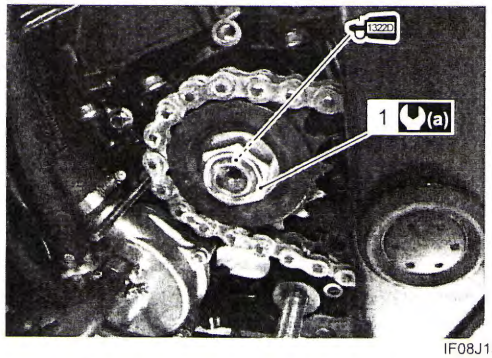
Install the engine sprocket in the reverse order of removal. Pay attention to the following points:

- Apply thread lock to the drive shaft.

  1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

- Tighten the engine sprocket nut (1) to the specified torque.

  Tightening torque
  Engine sprocket nut (a): 115 N·m (11.5 kgf-m, 83.0 lbf-ft)



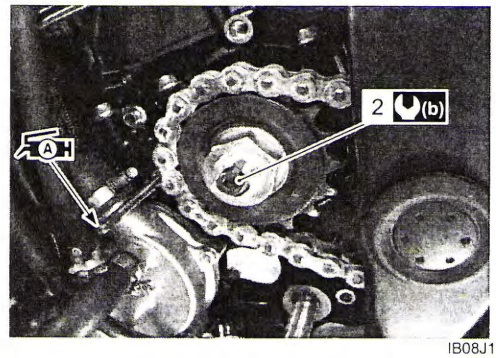
IF08J1310001-01

- 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, 20.5 lbf-ft)

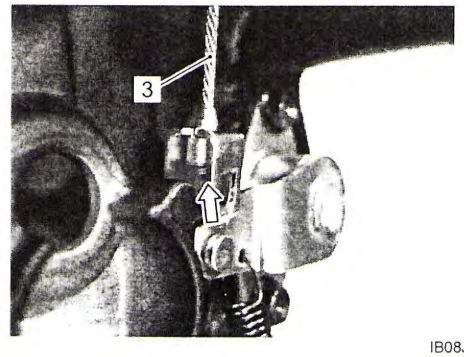
- Before installing the engine sprocket cover, apply a small quantity of grease to the clutch push rod.

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



IB08J1310007-03

- Install the clutch cable (3) and clamp the clutch cable firmly.



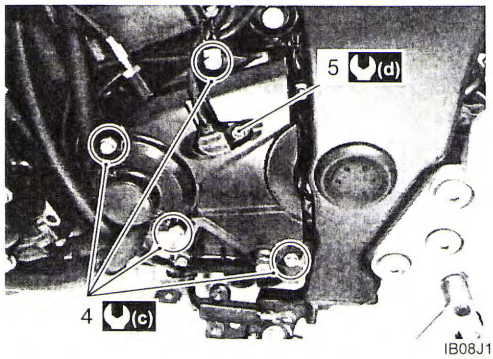
IB08J1310025-01

- Tighten the engine sprocket cover bolt (4) to the specified torque.

  Tightening torque
  Engine sprocket cover bolt (c): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Tighten the speed sensor bolt (5) to the specified torque.

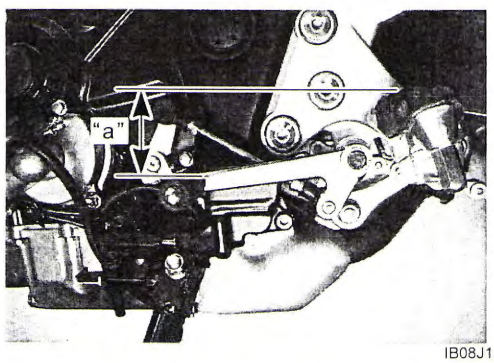
  Tightening torque
  Speed sensor bolt (d): 4.5 N·m (0.45 kgf-m, 3.3 lbf-ft)



IB08J1310008-03

- Fit the gearshift link arm to the gearshift shaft so that the gearshift lever is located at height "a" above the footrest.

  Gearshift lever height "a"
  Standard: 40 – 50 mm (1.6 – 2.0 in)



IB08J1310009-02

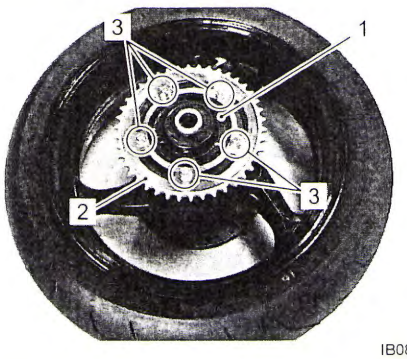
- Adjust the drive chain slack. Refer to "Drive Chain Inspection and Adjustment" (Page 3A-5).

Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation

BENF08J13106003

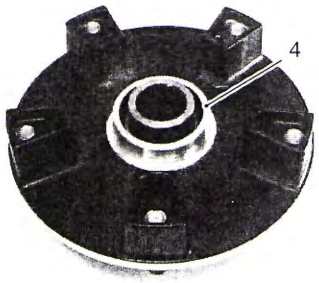
Removal

1) Remove the rear wheel assembly by disengaging the drive chain. Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-11).
2) Draw out the rear sprocket mounting drum (1) along with the rear sprocket (2) from the wheel hub.
3) Remove the rear sprocket nuts (3) and separate the rear sprocket (2) from its mounting drum (1).



IB08J1310010-01

4) Remove the retainer (4).



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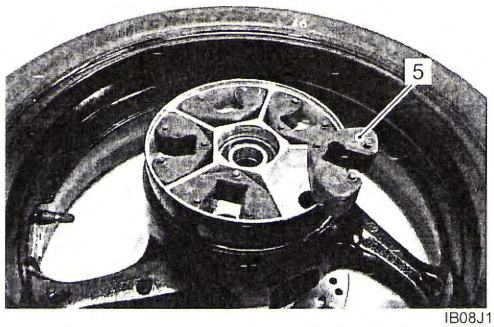
5) Remove the wheel dampers (5).



IB08J1310012-01

Installation

Install the rear sprocket and rear sprocket mounting drum in the reverse order of removal. Pay attention to the following points:

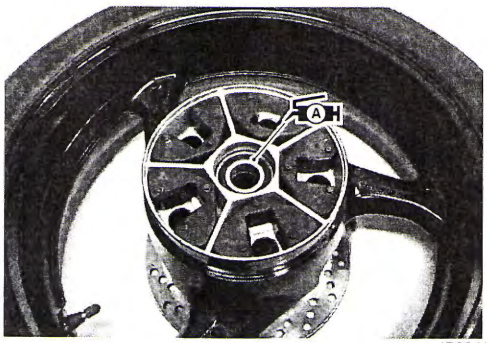
- Apply grease to the contacting surface between the rear wheel hub and rear sprocket mounting drum.

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

- Apply a special tire lubricant or neutral soapy liquid to the wheel damper surface.

NOTICE

Never use oil, grease or gasoline on the wheel damper in place of the tire lubricant.



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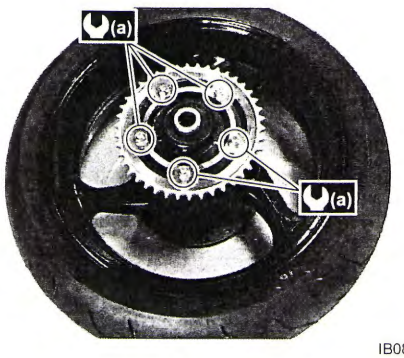
- Tighten the rear sprocket nuts to the specified torque.

Tightening torque
Rear sprocket nut (a): 55 N·m (5.5 kgf-m, 40.0 lbf-ft)



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- Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-11).

Drive Chain Inspection and Adjustment

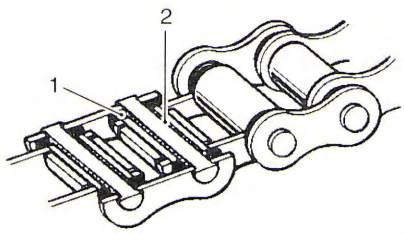
BENF08J13106007

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" (Page 3A-9).
   - 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.

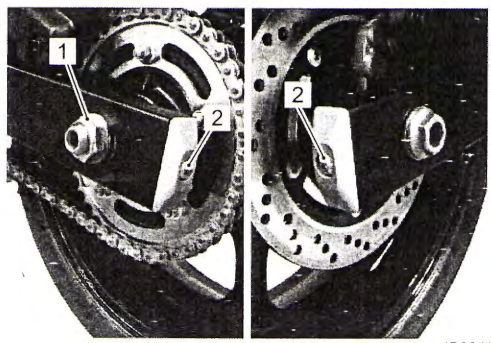


I649G1020032-02

1. O-ring seal	2. Grease

Drive Chain Length Inspection

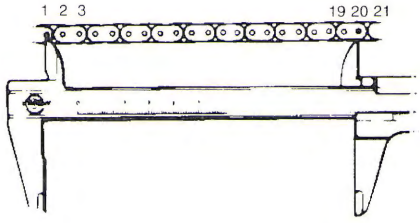
1) Loosen the rear axle nut (1).
2) Give tension to the drive chain fully by turning both chain adjuster bolts (2).



IB08J1020027-01

3) 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)



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

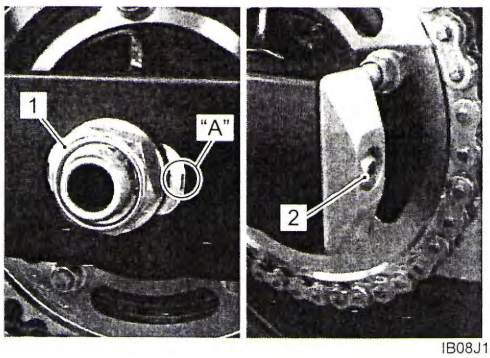
Drive Chain Slack Adjustment

1) Support the motorcycle with a jack.
2) Loosen the axle nut (1).
3) Loosen or tighten both chain adjuster bolts (2) 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.

NOTICE

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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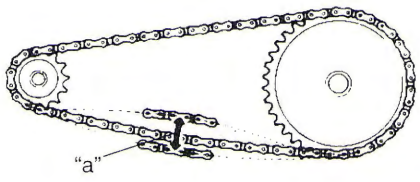

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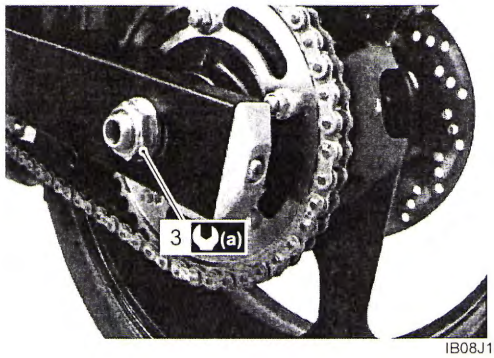
4) After adjusting the drive chain, tighten the axle nut (3) to the specified torque.

Tightening torque
Rear axle nut (a): 115 N·m (11.5 kgf-m, 83.0 lbf-ft)



IB08J1020029-01

5) Recheck the drive chain slack after tightening the axle nut.

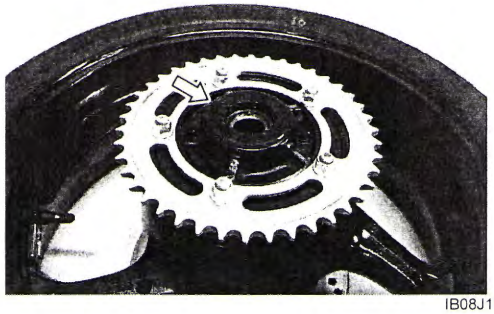
Drive Chain Related Parts Inspection

BENF08J13106004

Refer to "Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation" (Page 3A-4).

Dust Seal

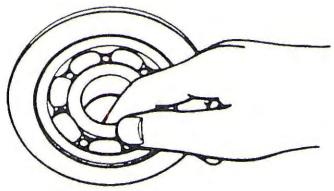
Inspect the dust seal for wear or damage. If any damage is found, replace the dust seal with a new one.



IB08J1310015-01

Bearing

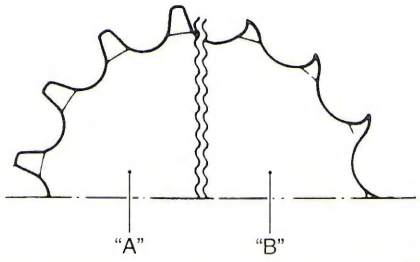
Inspect the play of the sprocket mounting drum bearing by hand while it is in the drum. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



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.

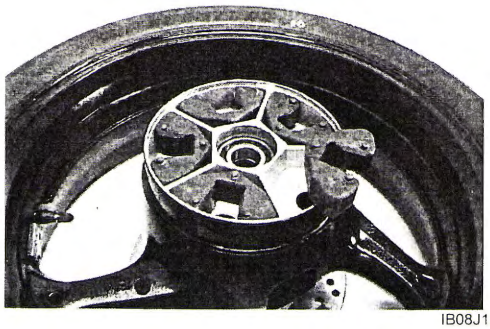


I649G1310016-02

"A": Normal wear	"B": Excessive wear

Wheel Damper

Inspect the dampers for wear and damage. Replace the damper if there is anything unusual.



IB08J1310016-01

Drive Chain Cleaning and Lubricating

BENF08J13106008

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.

NOTICE

Do not use trichloroethylene, gasoline or any similar solvent.
These fluids have too great a dissolving power for this chain and they can damage the O-rings. Use only kerosine to clean the drive chain.

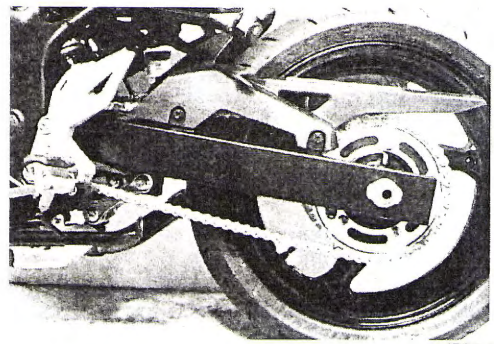
2) After cleaning and drying the chain, oil it with a heavyweight motor oil.

NOTICE

Do not use any oil sold commercially as "drive chain oil". Such oil can damage the O-rings.

NOTE

The standard drive chain is a no joint link (endless) chain. SUZUKI recommends to use a RK 525SMOZ8 drive chain as a replacement.



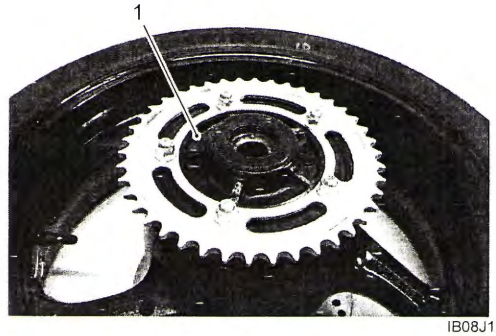
IB08J1020030-02

Sprocket Mounting Drum Dust Seal / Bearing Removal and Installation

BENF08J13106005

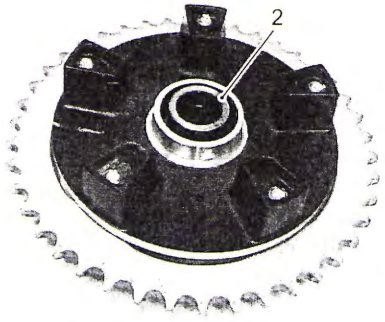
Removal

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-4).



IB08J1310017-01

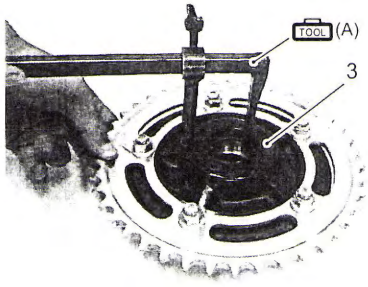
3) Remove the retainer (2).



IB08J1310018-02

4) Remove the sprocket mounting drum dust seal (3) with the special tool.

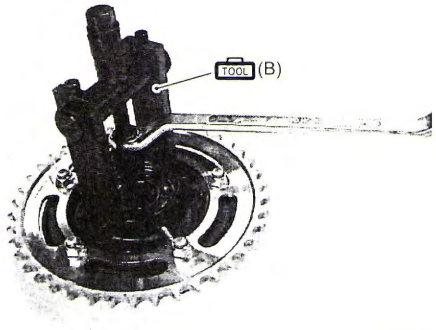
Special tool
TOOL (A): 09913–50121 (Oil seal remover)



IB08J1310019-02

5) Remove the sprocket mounting drum bearing with the special tool.

Special tool
TOOL (B): 09921–20240 (Bearing remover set)

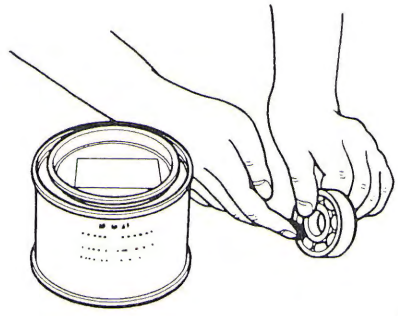


IB08J1310020-02

Installation

1) Apply grease to the new bearing before installing.

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



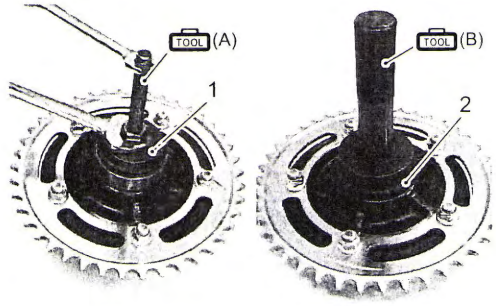
I649G1310020-02

2) Install the bearing (1) and new dust seal (2) to the sprocket mounting drum with the special tools.

NOTE

The sealed cover of the bearing must face wheel hub side.

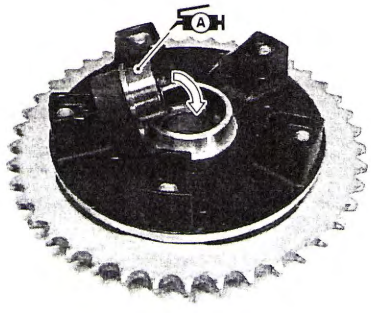
Special tool
TOOL (A): 09924–84510 (Bearing installer set)
TOOL (B): 09913–70210 (Bearing installer set)



IB08J1310021-02

3) Apply grease to the retainer before installing the rear sprocket mounting drum.

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

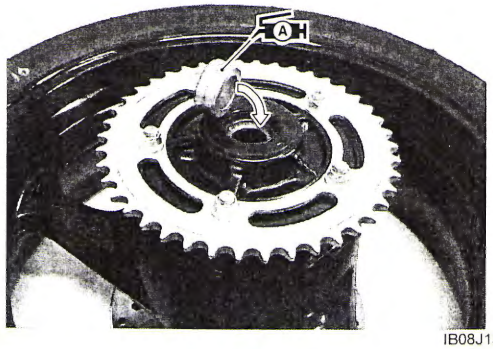


IB08J1310022-02

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-4).
5) Apply grease to the dust seal lip.

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

6) Install the spacer.



IB08J1310023-01

7) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-11).

Drive Chain Replacement

BENF08J13106006

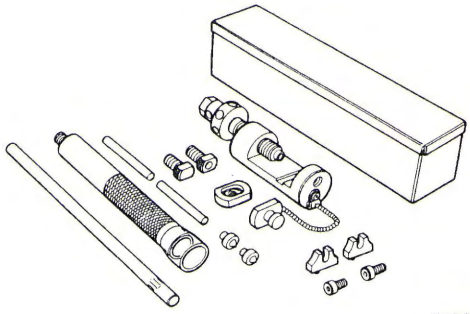
Use the special tool in the following procedures, to cut and rejoin the drive chain.

NOTE

When using the special tool, apply a small quantity of grease to the threaded parts of the special tool.

Special tool

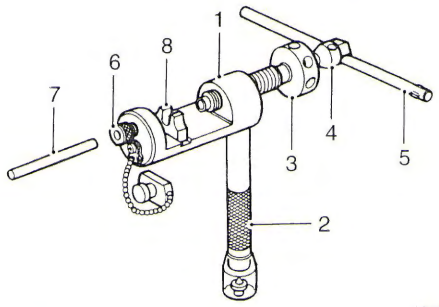
TOOL : 09922–22711 (Drive chain cutting and joining tool)



I649G1310023-02

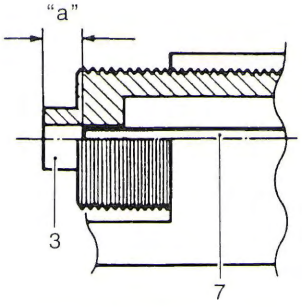
Drive Chain Cutting

1) Set up the special tool as shown in the figure.



I649G1310024-02

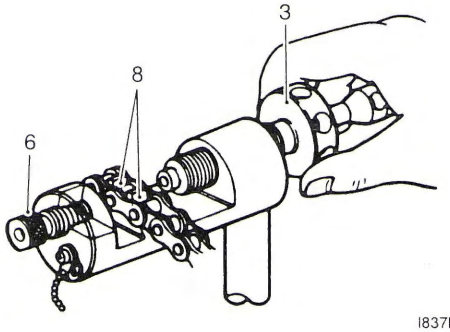
1.	Tool body
2.	Grip handle
3.	Pressure bolt [A]
4.	Pressure bolt [B]
5.	Bar
6.	Adjuster bolt (With through hole)
7.	Pin remover
8.	Chain holder (Engraved mark 500) with reamer bolt M5 x 10



I837H1310026-02

"a": 5 mm (0.2 in)

2) 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.
3) Place the drive chain link being disjointed on the chain holder (8) of the tool.
4) 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.
5) Tighten the pressure bolt [A] (3) with the bar.



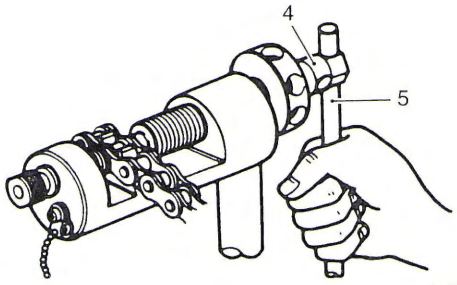
I837H1310027-02

6) Turn in the pressure bolt [B] (4) with the bar (5) and force out the drive chain joint pin (9).

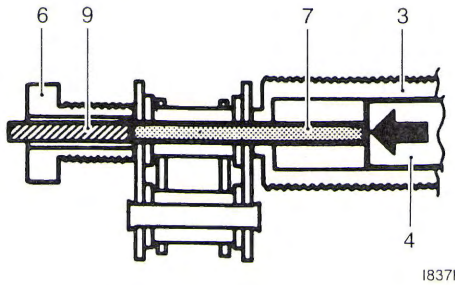
NOTE

Continue turning in the pressure bolt [B] (4) until the joint pin should been completely pushed out of the chain.

7) After the joint pin (9) is removed, loosen the pressure bolt [B] (4) and then pressure bolt [A] (3).
8) Remove the joint pin (9) of the other side of joint plate.



I649G1310027-02



I837H1310028-02

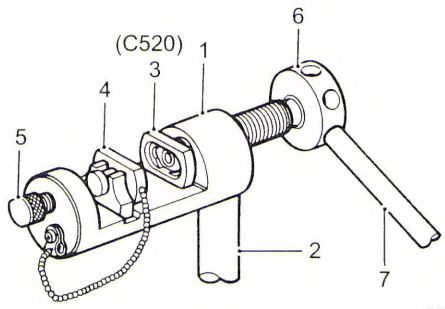
Drive Chain Connecting

⚠ 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.

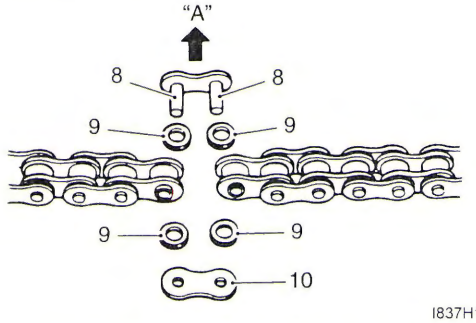


I837H1310025-01

1.	Tool body
2.	Grip handle
3.	Joint plate holder (Engraved mark "C520")
4.	Wedge holder & wedge pin
5.	Adjuster bolt (Without hole)
6.	Pressure bolt [A]
7.	Bar

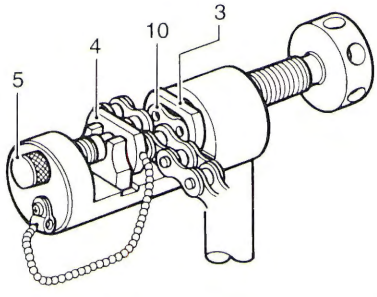
2) Apply grease to the new joint pins (8), new O-rings (9) and new plates (10).
3) Connect both ends of the drive chain with the joint pins (8) inserted from the wheel side "A" as installed on the motorcycle.

Joint set part number
RK: 27620 – 06G40



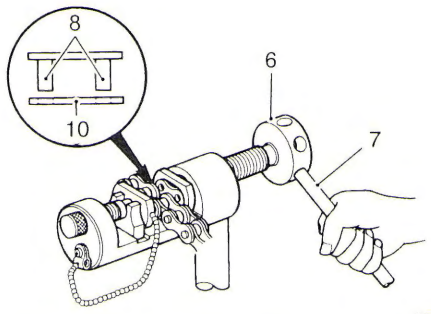
I837H1310029-01

4) Apply grease on the recessed portion of the joint plate holder (3) and set the joint plate (10).
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.



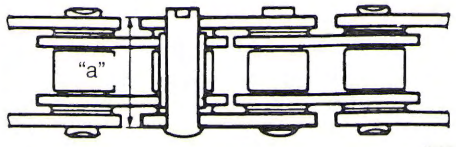
I837H1310030-01

8) Continue pressing the joint plate until the distance between the two joint plates comes to the specification.

Joint plate distance specification "a"
18.6 – 18.9 mm (0.73 – 0.74 in)

NOTICE

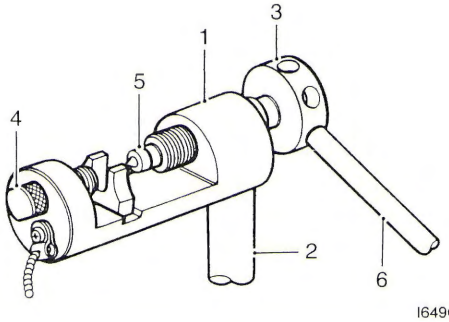
If pressing of the joint plate makes the dimension out of specification excessively, the work must be carried out again by using new joint parts.



I649G1310033-03

Joint pin staking

1) Set up the special tool as shown in the figure.



I649G1310034-02

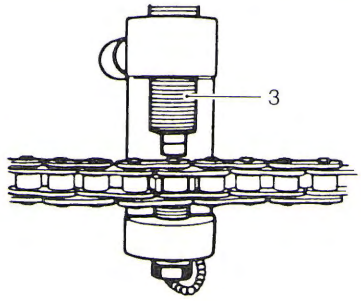
1.	Tool body
2.	Grip handle
3.	Pressure bolt [A]
4.	Adjuster bolt (Without hole)
5.	Staking pin (Stowed inside grip handle behind rubber cap)
6.	Bar

2) Apply grease to the staking pin (5).
3) 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.
4) After joining of the chain has been completed, check to make sure that the link is smooth and no abnormal condition is found.

NOTE

Should any abnormal condition be found, reassemble the chain link using the new joint parts.

Pin end diameter specification "a"
RK: 5.45 – 5.85 mm (0.215 – 0.230 in)



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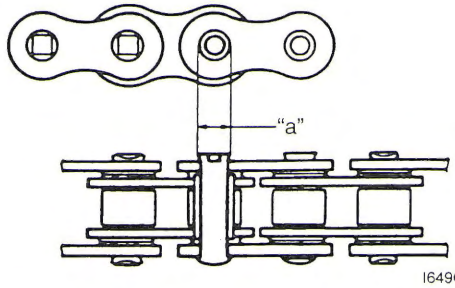


I649G1310036-03

5) Adjust the drive chain slack, after connecting it. Refer to "Drive Chain Inspection and Adjustment" (Page 3A-5).

Specifications

Service Data

BENF08J13107001

Drive Train

Unit: mm (in) Except ratio

Item	Standard		Limit
Final reduction ratio	2.470 (42/17)		—
Drive chain	Type	RK 525SMOZ8	—
	Links	112 links	—
	20-pitch length	—	319.4 (12.57)
Drive chain slack (on side-stand)	20 – 30 (0.8 – 1.2)		—
Gearshift lever height	40 – 50 (1.6 – 2.0)		—

Tightening Torque Specifications

BENF08J13107002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Engine sprocket nut	115	11.5	83.0	☞(Page 3A-3)
Speed sensor rotor bolt	28	2.8	20.5	☞(Page 3A-3)
Engine sprocket cover bolt	10	1.0	7.0	☞(Page 3A-4)
Speed sensor bolt	4.5	0.45	3.3	☞(Page 3A-4)
Rear sprocket nut	55	5.5	40.0	☞(Page 3A-5)
Rear axle nut	115	11.5	83.0	☞(Page 3A-6)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Drive Chain Related Components" (Page 3A-1)

"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J13108001

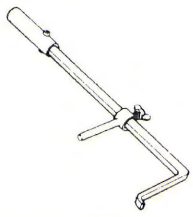
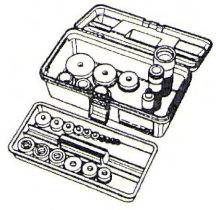
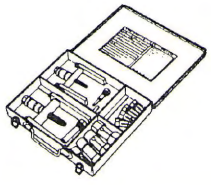
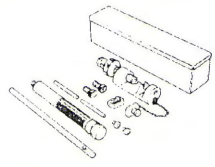
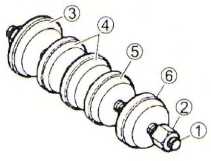
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 3A-3) / ☞(Page 3A-5) / ☞(Page 3A-8) / ☞(Page 3A-8) / ☞(Page 3A-9)
Thread lock cement	THREAD LOCK CEMENT 1322D	P/No.: 99000–32150	☞(Page 3A-3)

NOTE

Required service material(s) is also described in:
"Drive Chain Related Components" (Page 3A-1)

Special Tool

BENF08J13108002

09913–50121 Oil seal remover ☞(Page 3A-8) 	09913–70210 Bearing installer set ☞(Page 3A-8) 
09921–20240 Bearing remover set ☞(Page 3A-8) 	09922–22711 Drive chain cut / rivet tool set ☞(Page 3A-9) 
09924–84510 Bearing installer set ☞(Page 3A-8) 	

Section 4

Brakes

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Precautions

Precautions

Precautions for Brake System

BENF08J14000001

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

Brake Fluid Information

BENF08J14000002

⚠ 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.**

NOTICE

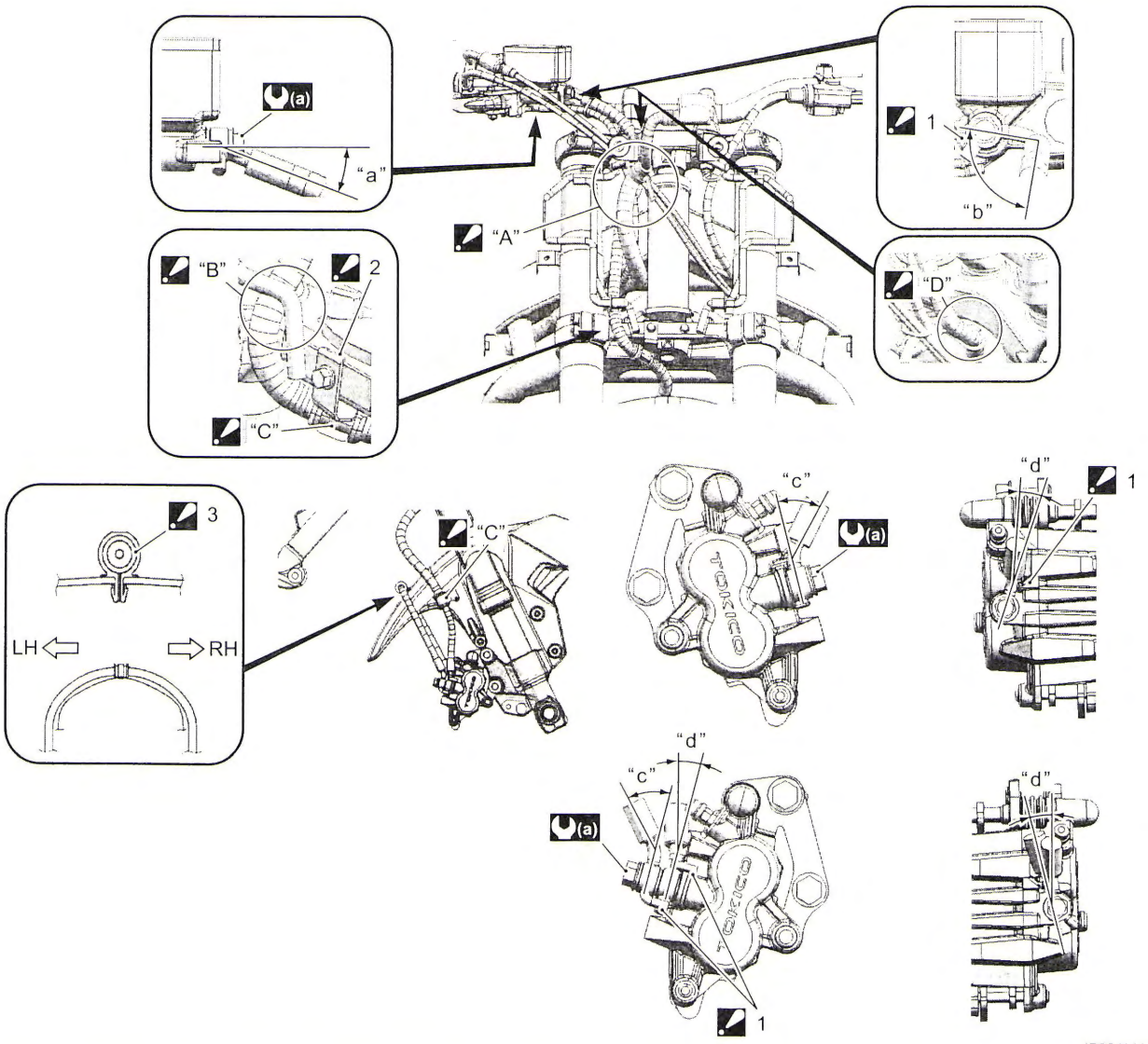
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

Brake Control System and Diagnosis

Schematic and Routing Diagram

Front Brake Hose Routing Diagram

BENF08J14102001

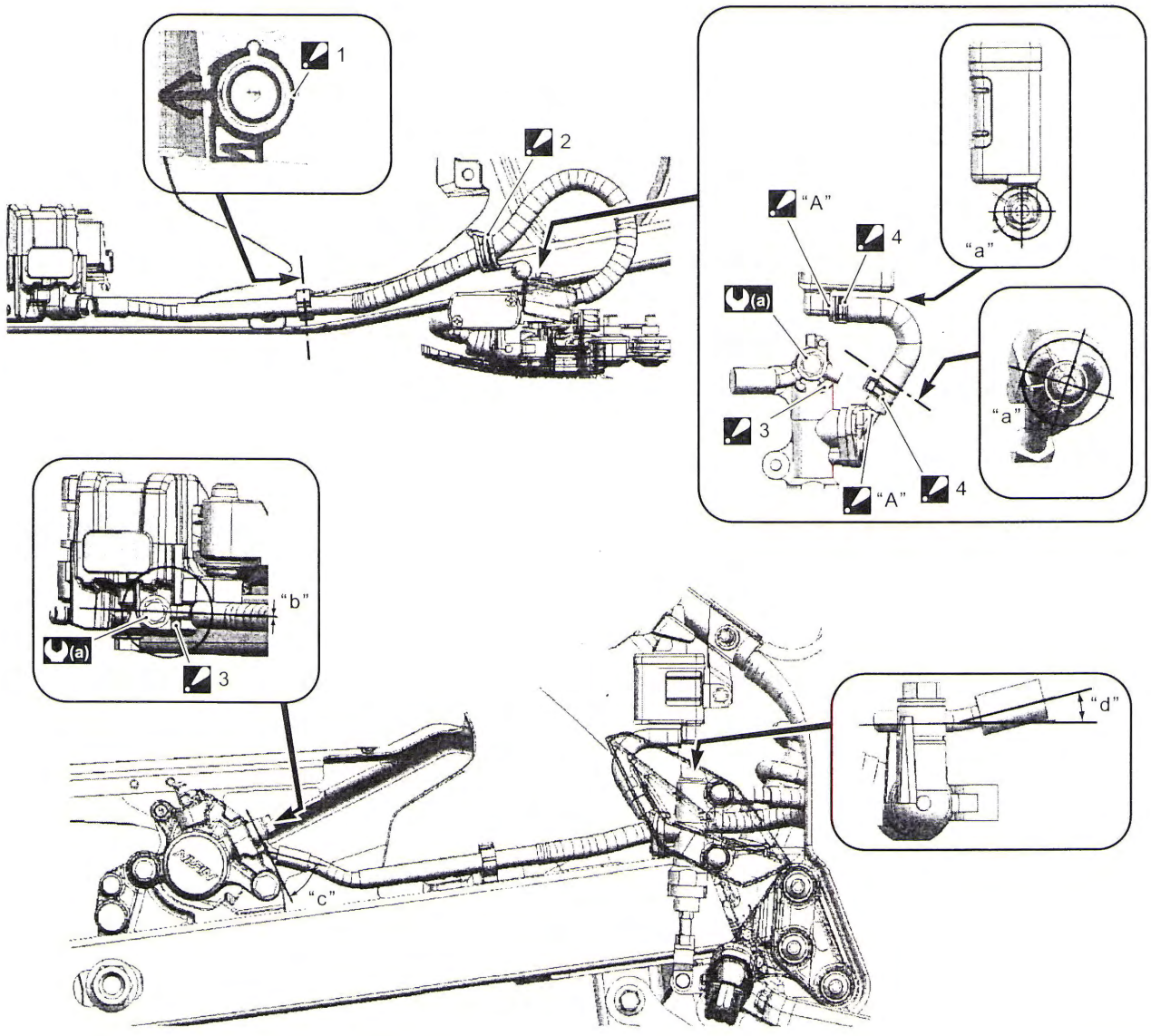


IB08J1410031-01

1. Stopper : After the brake hose union has contacted the stopper, tighten the union bolt.	"D": Pass the brake hose through the hose clamp.
2. Stopper : After positioning the clamp with the stopper, tighten the clamp bolt.	"a": 21°
3. Hose clamp : Insert the clamp end into the hole on the front fender.	"b": 90°
"A": Pass the brake hose behind the throttle cable and wiring harness.	"c": 42°
"B": Pass the brake hose behind the headlight bracket.	"d": 14°
"C": Clamp the brake hose firmly.	(a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

Rear Brake Hose Routing Diagram

BENF08J14102003



IB08J1410034-01

1. Hose clamp : Insert the clamp end into the hole on the chain case. : Clamp end should face downward. : Pass the brake hose through the hose clamp.	"a": 90°
2. Hose guide : Pass the brake hose through the hose guide.	"b": 0°
3. Stopper : After the brake hose union has contacted to the stopper, tighten the union bolt.	"c": 49°
4. Brake hose clamp :Clamp end should face left side.	"d": 14°
"A": Insert the reservoir hose firmly.	(a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

Diagnostic Information and Procedures

Brake Symptom Diagnosis

BENF08J14104001

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 cup.	*Replace piston and cup.*
	Worn piston seal and dust seal.	*Replace piston seal and dust seal.*
Brake drags	Rusty part.	*Clean and lubricate.*
	Insufficient brake lever or brake pedal pivot lubrication.	*Lubricate.*

Repair Instructions

Brake System Inspection

BENF08J14106020

⚠ 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 siliconebased 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.

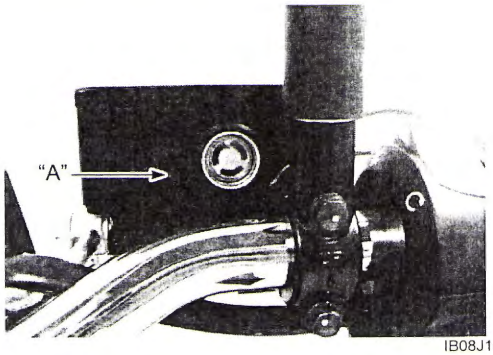
NOTICE

Brake fluid, if it leaks, will interfere with safe running and immediately discolor painted surfaces. Check the brake hoses and hose joints for cracks and oil leakage before riding.

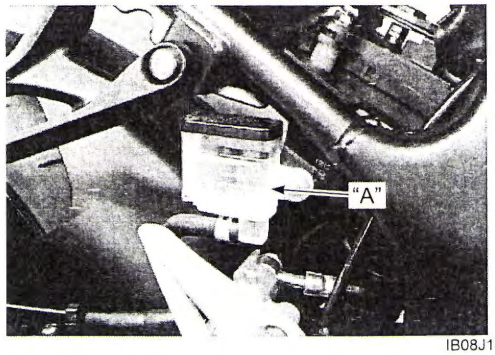
Brake Fluid Level Check

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

BF: Brake fluid (DOT 4)



IB08J1020033-03



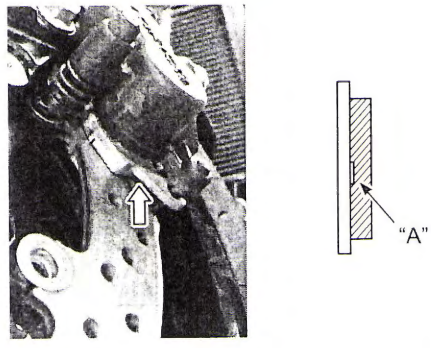
IB08J1020034-02

Brake Pads Check

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

NOTICE

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



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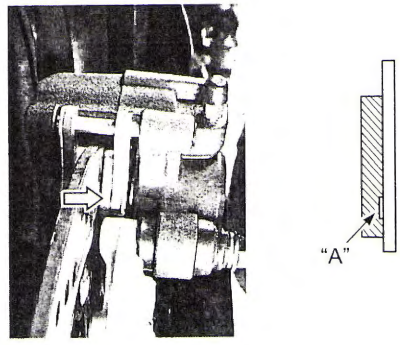
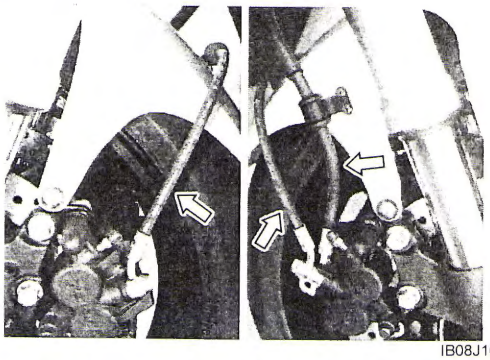


IB08J1430001-05

Front and Rear Brake Hose Inspection
Inspect the brake hoses and hose joints for crack, damage or brake oil leakage. If any defects are found, replace the brake hose with a new one. Refer to "Brake Hose Removal and Installation" (Page 4A-10).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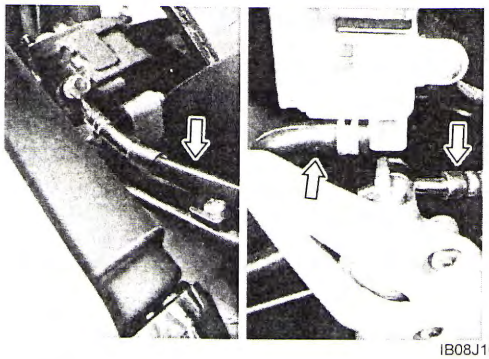
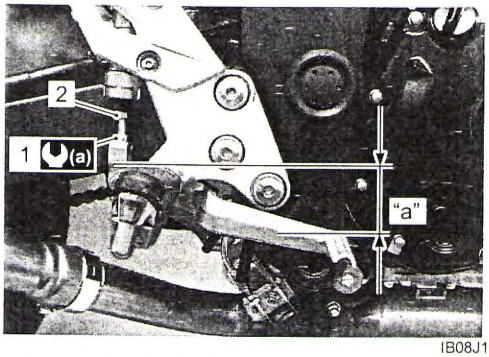

1B08J1020036-02

Brake Pedal Height Inspection and Adjustment
1) Inspect the brake pedal height "a" between the pedal top face and footrest.
   Adjust the brake pedal height if necessary.

   Brake pedal height "a"
   Standard: 45 – 55 mm (1.8 – 2.2 in)

2) Loosen the lock-nut (1).
3) Turn the push rod (2) until the brake pedal becomes 45 – 55 mm (1.8 – 2.2 in) "a" below the top of the footrest.
4) Tighten the lock-nut (1) securely.

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



1B08J1020037-02

Brake Hose Replacement
Refer to "Brake Hose Removal and Installation" (Page 4A-10).

Brake Fluid Replacement
Refer to "Brake Fluid Replacement" (Page 4A-8).

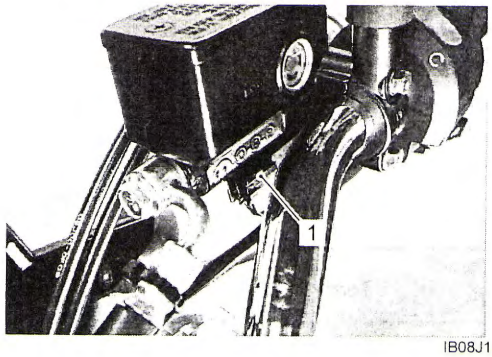
Air Bleeding from Brake Fluid Circuit
Refer to "Air Bleeding from Brake Fluid Circuit" (Page 4A-6).

Rear Brake Light Switch Adjustment
Refer to "Rear Brake Light Switch Inspection and Adjustment" (Page 4A-6).

Brake Pedal Height Inspection and Adjustment
BENF08J14106001
Refer to "Brake System Inspection" (Page 4A-4).

Front Brake Light Switch Inspection
BENF08J14106002
Inspect the front brake light switch in the following procedures:

1) Disconnect the front brake light switch coupler (1).



1B08J1410001-02

2) Inspect the switch for continuity with a tester.
   If any abnormality is found, replace the front brake light switch with a new one. Refer to "Front Brake Master Cylinder / Brake Lever Disassembly and Assembly" (Page 4A-13).

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

   Tester knob indication
   Continuity (•)))

Front brake light switch

Color / Position	Terminal (B/R)	Terminal (B/Bl)
OFF		
ON	○	○

1B08J1410002-01

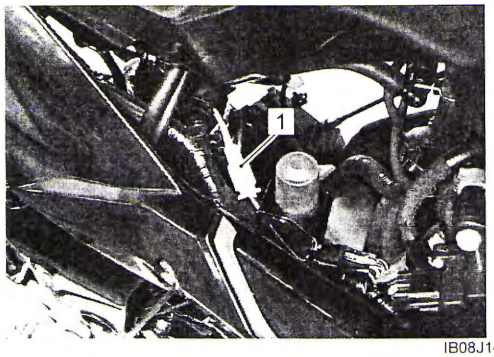
3) Connect the front brake light switch coupler (1).

Rear Brake Light Switch Inspection

BENF08J14106003

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 coupler (1).



IB08J1410003-02

3) Inspect the switch for continuity with a tester. If any abnormality is found, replace the rear brake light switch with a new one.

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

Tester knob indication
Continuity (•))))

Rear brake light switch

Color / Position	Terminal (O)	Terminal (W/B)
ON	○	○
OFF		

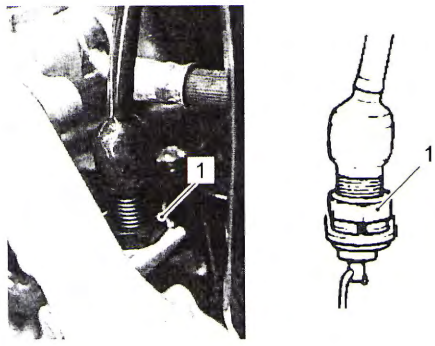
I944H1410002-02

4) Connect the rear brake light switch lead coupler (1).
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

BENF08J14106004

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.



IB08J1410004-02

Brake Fluid Level Check

BENF08J14106005

Refer to "Brake System Inspection" (Page 4A-4).

Brake Hose Inspection

BENF08J14106006

Refer to "Brake System Inspection" (Page 4A-4).

Air Bleeding from Brake Fluid Circuit

BENF08J14106007

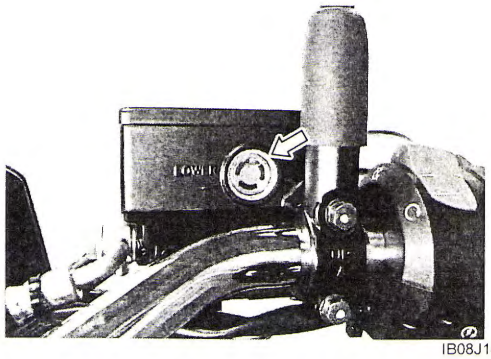
Air trapped in the brake fluid circuit acts like a cushion to absorb a large proportion of the pressure developed by the master cylinder and thus interferes with the full braking performance of the brake caliper. The presence of air is indicated by "sponginess" of the brake lever and also by lack of 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:

NOTICE

Spilled brake fluid can damage painted surfaces and plastic parts.
Be careful not to spill any fluid when filling the brake fluid reservoir. Wipe spilled fluid up immediately.

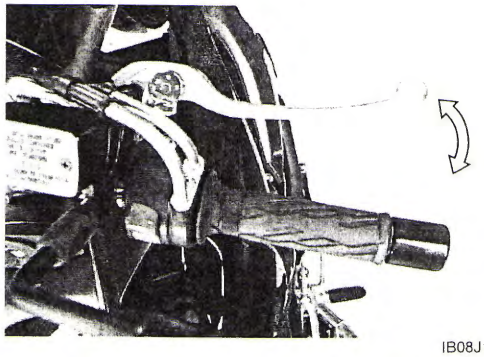
Front Brake

1) Fill the master cylinder reservoir to the top of the inspection window. Place the reservoir cap to prevent dirt from entering.



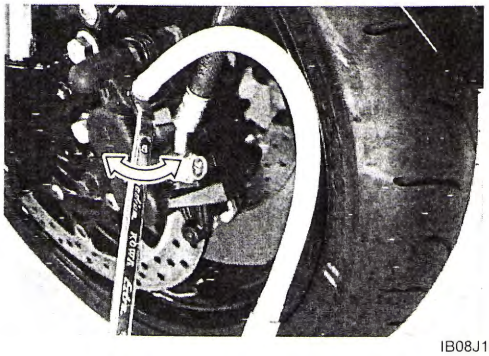
IB08J1410005-02

2) Attach a hose to the air bleeder valve, and insert the free end of the hose into a receptacle.
3) Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it.



IB08J1410006-03

4) Loosen the air bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake lever causing it to touch the handlebar grip.



IB08J1410007-02

5) Close the air bleeder valve, pump and squeeze the lever, and open the valve.
6) Repeat this process until the fluid flowing into the receptacle no longer contains air bubbles.

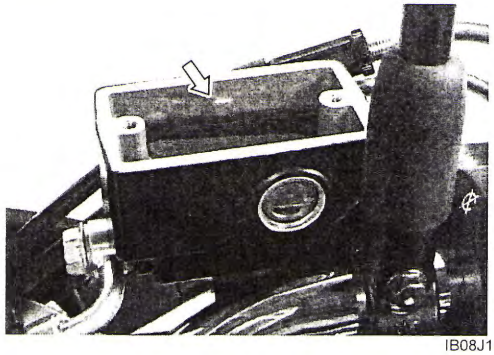
NOTE

While bleeding the brake system, replenish the brake fluid in the reservoir as necessary. Make sure that there is always some fluid visible in the reservoir.

7) Close the air bleeder valve and disconnect the hose.

Tightening torque
Air bleeder valve (Front brake): 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)

8) Fill the reservoir with brake fluid to the upper line of the reservoir.



IB08J1410008-02

9) Install the reservoir cap.

Rear Brake

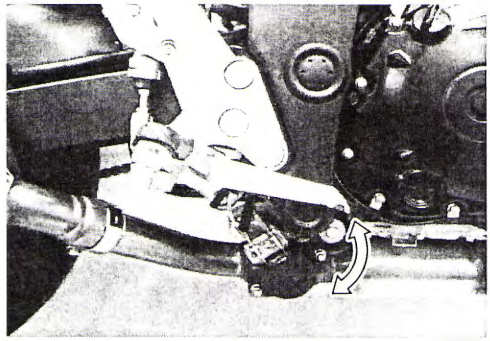
Bleed air from the rear brake system as the same manner of front brake. Pay attention to following points:

NOTE

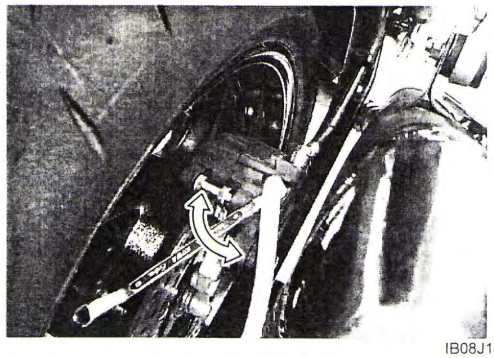
The only difference of bleeding operation from the front brake is that the rear master cylinder is actuated by a pedal.

Tightening torque

Air bleeder valve (Rear brake): 6 N·m (0.6 kgf-m, 4.3 lbf-ft)

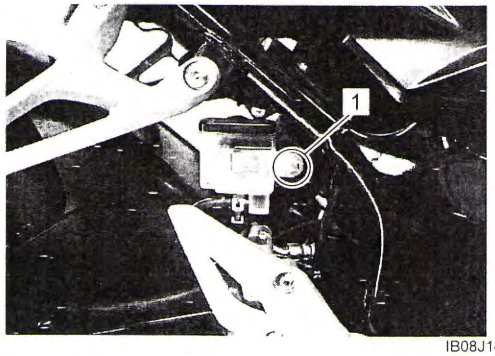


IB08J1410009-03



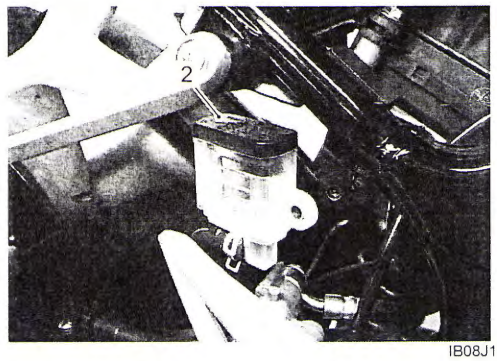
IB08J1410010-02

- Remove the reservoir tank bolt (1).



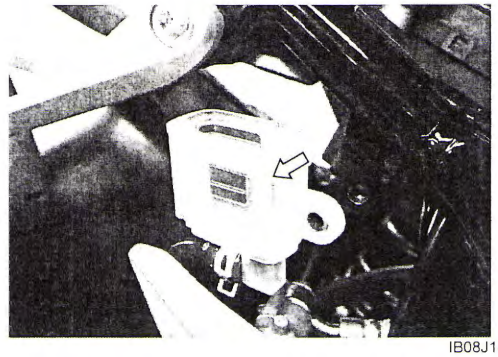
IB08J1410011-02

- Remove the reservoir cap (2) and diaphragm.



IB08J1410012-02

- Fill the reservoir with brake fluid to the upper mark of the reservoir. Place the reservoir cap to prevent dirt from entering.



IB08J1410013-02

- Install the reservoir tank.

Brake Fluid Replacement

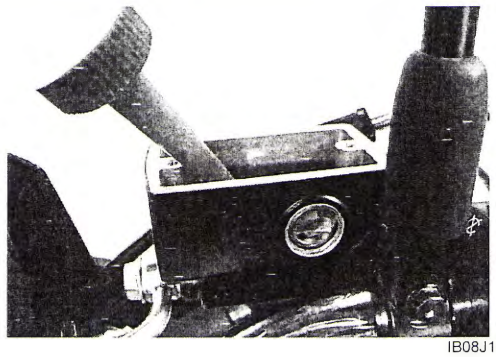
BENF08J14106008

NOTICE

Spilled brake fluid can damage painted surfaces and plastic parts.
Be careful not to spill any fluid when filling the brake fluid reservoir. Wipe spilled fluid up immediately.

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.

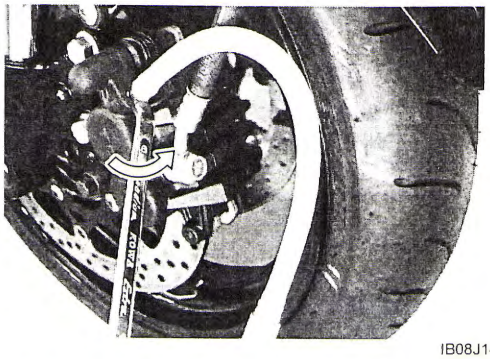


IB08J1410014-02

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.



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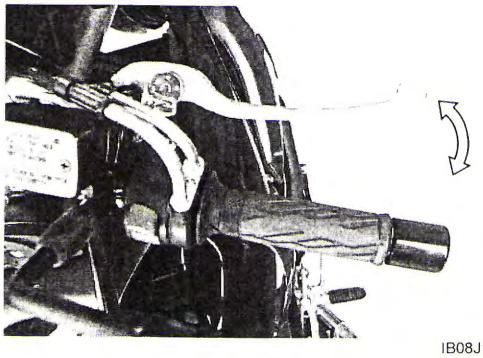
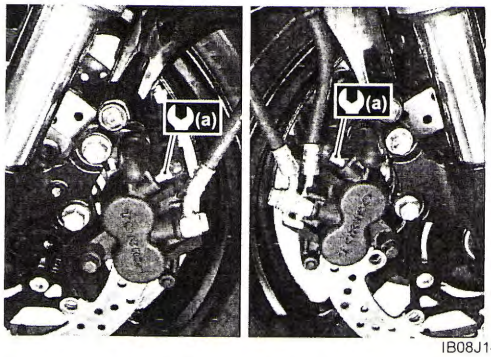


IB08J1410006-03

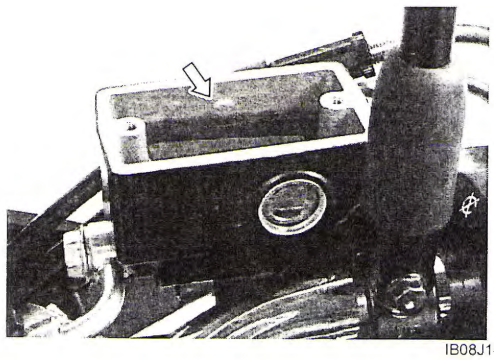
7) Close the air bleeder valve and disconnect the clear hose.

Tightening torque
Air bleeder valve (Front brake) (a): 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)



IB08J1410016-02

8) Fill the reservoir with brake fluid to the upper line reservoir.



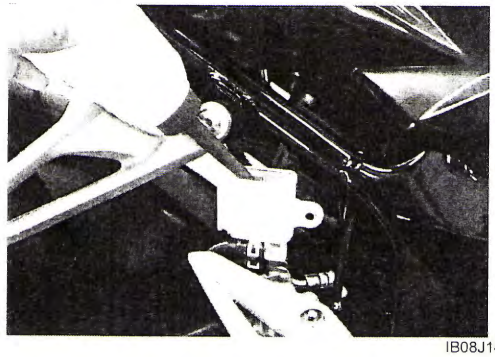
IB08J1410008-02

9) Install the reservoir cap.

Rear Brake

Replace the brake fluid from the rear brake system as the same manner of front brake.

1) Place the motorcycle on a level surface.
2) Remove the brake fluid reservoir cap and diaphragm.
3) Suck up the old brake fluid as much as possible.



IB08J1410017-02

Front Brake Master Cylinder Assembly Removal and Installation

BENF08J14106013

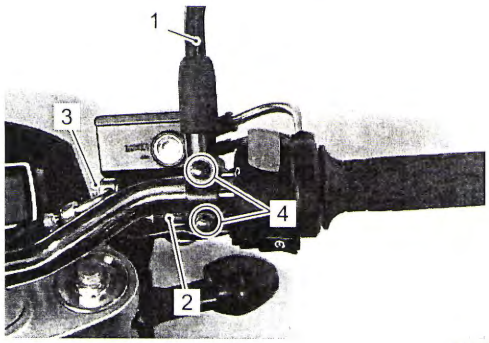
Removal

1) Remove the right rear view mirror (1).
2) Drain brake fluid. Refer to "Brake Fluid Replacement" (Page 4A-8).
3) Disconnect the front brake light switch lead coupler (2).
4) Place a clean rag underneath the brake hose union bolt (3) on the master cylinder to catch any spilt brake fluid.

NOTICE

Spilled brake fluid can damage painted surfaces and plastic parts.
Be careful not to spill any fluid when filling the brake fluid reservoir. Wipe spilled fluid up immediately.

5) Remove the brake hose union bolt (3) and disconnect the brake hose.
6) Remove the master cylinder holder bolts (4).



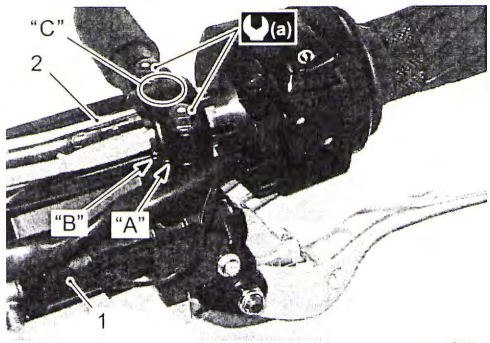
IB08J1410021-02

Installation

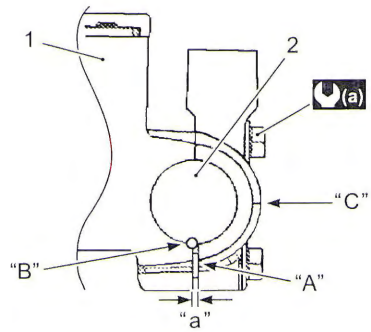
Install the front brake master cylinder in the reverse order of removal. Pay attention to the following points:

- When installing the master cylinder (1) onto the handlebars (2), align the master cylinder holder's mating surface "A" with the punch mark "B" on the handlebars (2) and tighten the upper holder bolt first.

Tightening torque
Master cylinder holder bolt (Upper and Lower) (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1410022-02

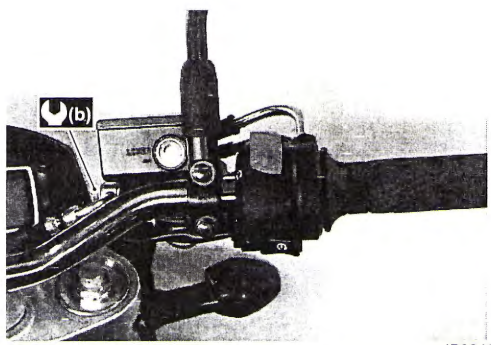


I944H1410037-01

"C": Up mark	"a": Clearance

- Install the new seal washers.
- After setting the brake hose union to the stopper, tighten the union bolt to the specified torque.

Tightening torque
Brake hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IB08J1410023-02

- Bleed air from the brake system. Refer to "Air Bleeding from Brake Fluid Circuit" (Page 4A-6).

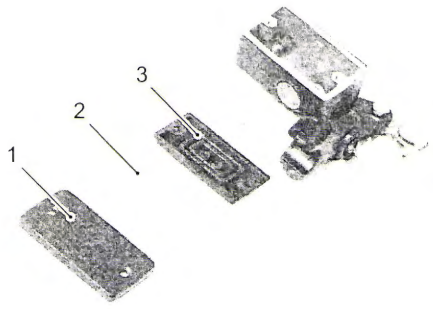
Front Brake Master Cylinder / Brake Lever Disassembly and Assembly

BENF08J14106014

Refer to "Front Brake Master Cylinder Assembly Removal and Installation" (Page 4A-12).

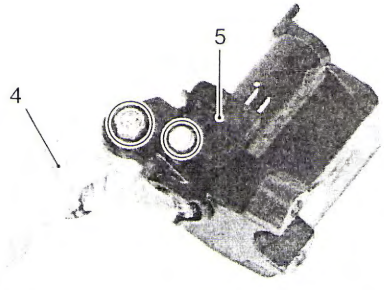
Disassembly

1) Remove the reservoir cap (1), plate (2) and diaphragm (3).



I944H1410022-01

2) Remove the brake lever (4) and brake light switch (5).

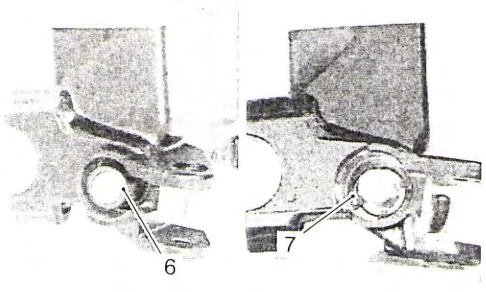


I944H1410023-01

3) Pull out the dust boot (6) and remove the snap ring (7).

Special tool

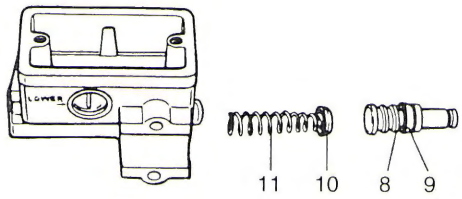
TOOL : 09900–06108 (Snap ring pliers)



I944H1410024-01

4) Remove the following parts from the master cylinder.

- Piston (8)
- Secondary cup (9)
- Primary cup (10)
- Spring (11)



I649G1410023-02

Assembly

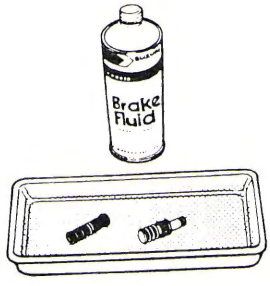
Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

NOTICE

- **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.**

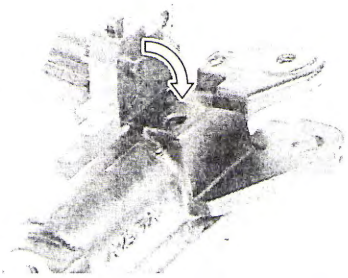
- Wash the master cylinder components with new brake fluid before reassembly.

BF: Brake fluid (DOT 4)



I649G1410024-02

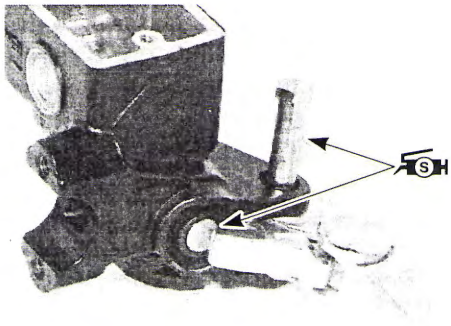
- When installing the brake light switch, align the projection on the switch with the hole in the master cylinder.



I944H1410025-01

- Apply grease to the brake lever pivot bolt.
- Apply grease to the contact point between piston and brake lever.

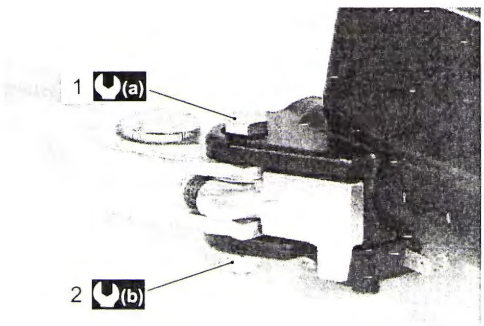
: Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



I944H1410026-01

- Tighten the brake lever pivot bolt (1) and brake lever pivot bolt lock-nut (2) to the specified torque.

Tightening torque
Brake lever pivot bolt (a): 1 N·m (0.1 kgf-m, 0.73 lbf-ft)
Brake lever pivot bolt lock-nut (b): 6 N·m (0.6 kgf-m, 4.3 lbf-ft)



I944H1410027-01

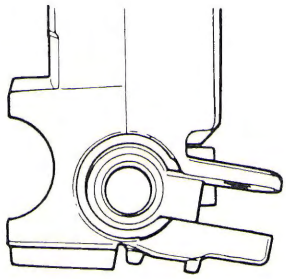
Front Brake Master Cylinder Parts Inspection

BENF08J14106015

Refer to "Front Brake Master Cylinder / Brake Lever Disassembly and Assembly" (Page 4A-13).

Master Cylinder

Inspect the master cylinder bore for any scratches or other damage.



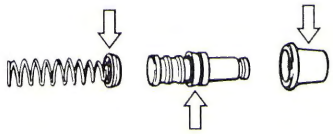
I649G1410027-02

Piston

Inspect the piston surface for any scratches or other damage.

Rubber Parts

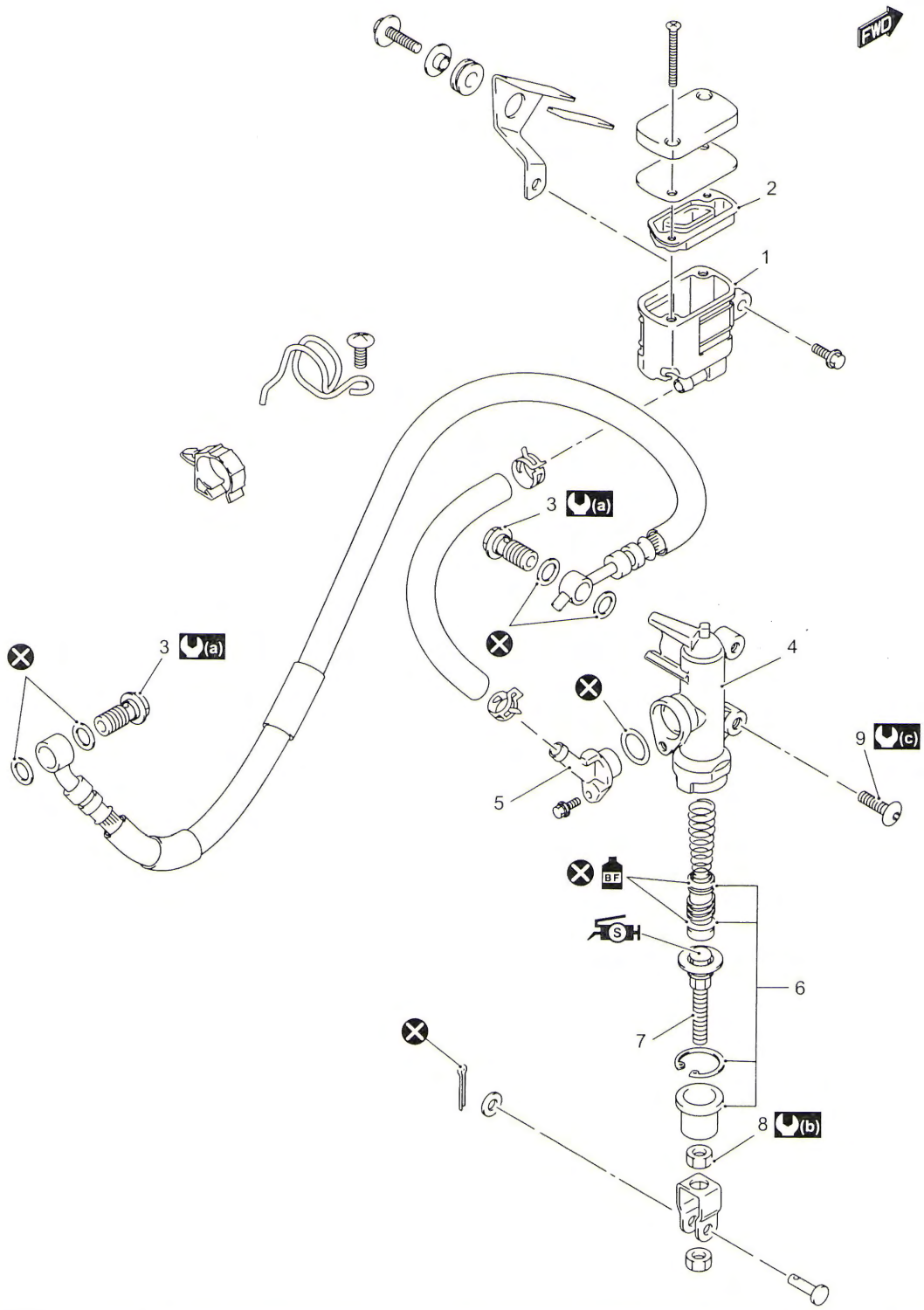
Inspect the primary cup, secondary cup and dust boot for wear or damage.



I944H1410028-01

Rear Brake Master Cylinder Components

BENF08J14106016



IB08J1410033-03

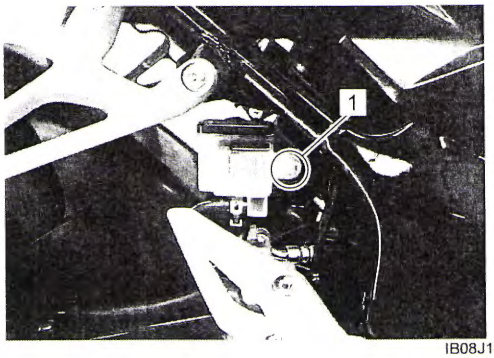
1. Reservoir tank	5. Brake hose connector	9. Rear brake master cylinder mounting bolt	S : Apply silicone grease.
2. Diaphragm	6. Piston/Cup set	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	BF : Apply brake fluid.
3. Brake hose union bolt	7. Push rod	(b) : 18 N·m (1.8 kgf-m, 13.0 lbf-ft)	: Do not reuse.
4. Master cylinder	8. Rear brake master cylinder rod lock-nut	(c) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	

Rear Brake Master Cylinder Assembly Removal and Installation

BENF08J14106017

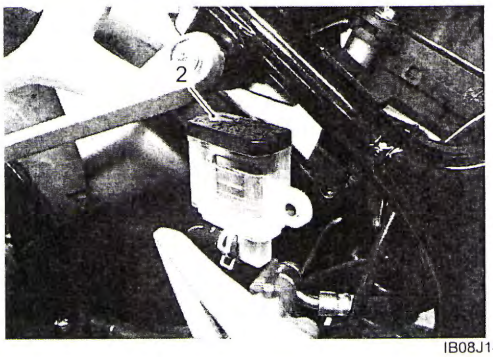
Removal

1) Remove the reservoir mounting bolt (1).



IB08J1410011-02

2) Remove the reservoir cap (2) and diaphragm.



IB08J1410012-02

3) Drain brake fluid. Refer to "Brake Fluid Replacement" (Page 4A-8).

4) Place a clean rag underneath the brake hose union bolt (3) on the rear brake master cylinder to catch any spilt brake fluid.

NOTICE

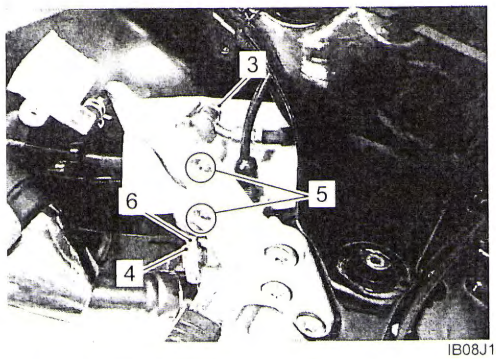
Spilled brake fluid can damage painted surfaces and plastic parts.
Be careful not to spill any fluid when filling the brake fluid reservoir. Wipe spilled fluid up immediately.

5) Remove the brake hose union bolt (3) and disconnect the brake hose.

6) Loosen the lock-nut (4).

7) Remove the master cylinder mounting bolts (5).

8) Remove the master cylinder along with the reservoir by turning the push rod (6).



IB08J1410024-02

Installation

Install the rear brake master cylinder in the reverse order of removal. Pay attention to the following points:

- Install the new seal washers.
- Tighten the rear brake master cylinder mounting bolts (1) to the specified torque.

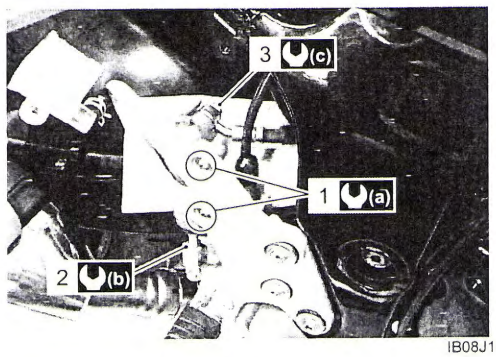
  Tightening torque
  Rear brake master cylinder mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Tighten the lock-nut (2) to the specified torque.

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

- After setting the brake hose union to the stopper, tighten the union bolt (3) to the specified torque.

  Tightening torque
  Brake hose union bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IB08J1410025-02

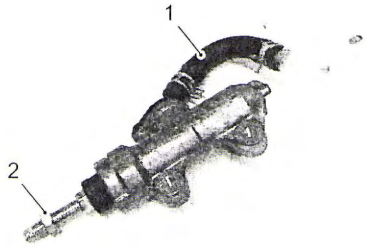
- Bleed air from the system after reassembling the master cylinder. Refer to "Brake System Inspection" (Page 4A-4).
- Adjust the brake pedal height. Refer to "Brake System Inspection" (Page 4A-4).

Rear Brake Master Cylinder Disassembly and Assembly

BENF08J14106018

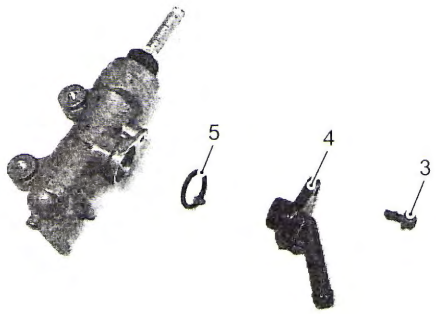
Disassembly

1) Disconnect the reservoir hose (1).
2) Remove the lock-nut (2).



IB08J1410026-02

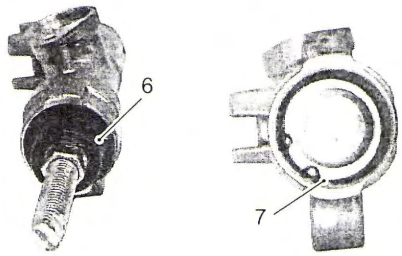
3) Remove the bolt (3), brake hose connector (4) and O-ring (5).



IB08J1410027-02

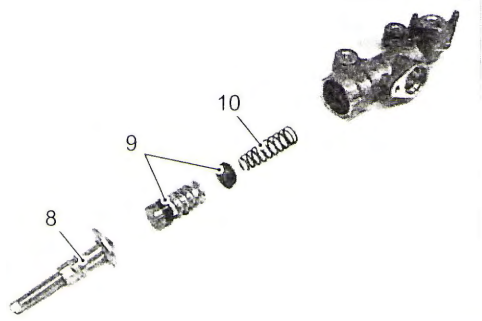
4) Pull out the dust boot (6) and remove the snap ring (7).

Special tool
TOOL : 09900–06108 (Snap ring pliers)



IB08J1410028-02

5) Remove the push rod (8), piston/cup set (9) and spring (10).



IB08J1410029-02

Assembly

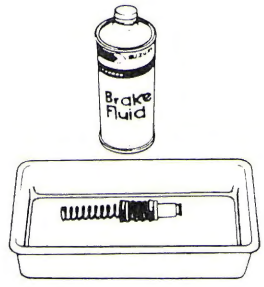
Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

NOTICE

- **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.**

- Wash the master cylinder components with new brake fluid before reassembly.

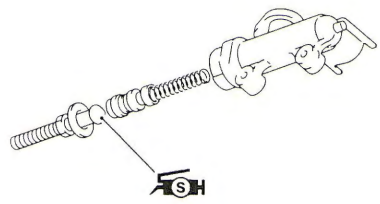
  BF: Brake fluid (DOT 4)



I649G1410036-02

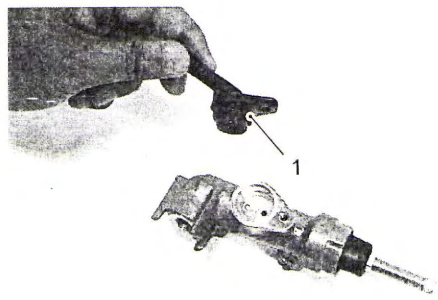
- Apply grease to the push rod end.

  SH : Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



I815H1410051-01

- Install the new O-ring (1).



IB08J1410030-02

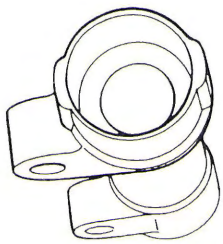
Rear Brake Master Cylinder Parts Inspection

BENF08J14106019

Refer to "Rear Brake Master Cylinder Disassembly and Assembly" (Page 4A-17).

Master Cylinder

Inspect the master cylinder bore for any scratches or other damage.



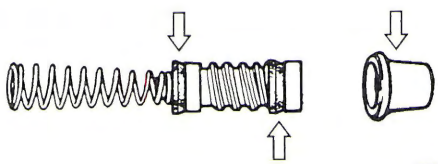
I649G1410038-02

Piston

Inspect the piston surface for any scratches or other damage.

Rubber Parts

Inspect the primary cup, secondary cup and dust boot for wear or damage.



I837H1410050-02

Specifications

Service Data

BENF08J14107001

Brake

Unit: mm (in)

Item	Standard		Limit
Rear brake pedal height	45 – 55 (1.8 – 2.2)		—
Master cylinder bore	Front	Approx. 14 (0.55)	—
	Rear		—
Master cylinder piston diameter	Front	Approx. 14 (0.55)	—
	Rear		—

Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Tightening Torque Specifications

BENF08J14107002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear master cylinder rod lock-nut	18	1.8	13.0	☞(Page 4A-5)
Air bleeder valve (Front brake)	7.5	0.75	5.5	☞(Page 4A-7) / ☞(Page 4A-9)
Air bleeder valve (Rear brake)	6	0.6	4.3	☞(Page 4A-8) / ☞(Page 4A-10)

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Master cylinder holder bolt (Upper and Lower)	10	1.0	7.0	☞(Page 4A-12)
Brake hose union bolt	23	2.3	16.5	☞(Page 4A-12) / ☞(Page 4A-16)
Brake lever pivot bolt	1	0.1	0.73	☞(Page 4A-14)
Brake lever pivot bolt lock-nut	6	0.6	4.3	☞(Page 4A-14)
Rear brake master cylinder mounting bolt	10	1.0	7.0	☞(Page 4A-16)
Rear brake master cylinder rod lock-nut	18	1.8	13.0	☞(Page 4A-16)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Front Brake Hose Routing Diagram" (Page 4A-1)
"Rear Brake Hose Routing Diagram" (Page 4A-2)
"Front Brake Master Cylinder Components" (Page 4A-11)
"Rear Brake Master Cylinder Components" (Page 4A-15)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J14108001

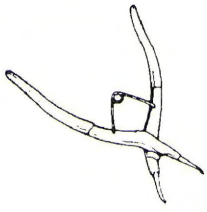
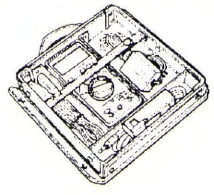
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4A-4) / ☞(Page 4A-9) / ☞(Page 4A-10) / ☞(Page 4A-13) / ☞(Page 4A-17)
Grease	SUZUKI Silicone Grease or equivalent	P/No.: 99000–25100	☞(Page 4A-14) / ☞(Page 4A-17)

NOTE

Required service material(s) is also described in:
"Front Brake Master Cylinder Components" (Page 4A-11)
"Rear Brake Master Cylinder Components" (Page 4A-15)

Special Tool

BENF08J14108002

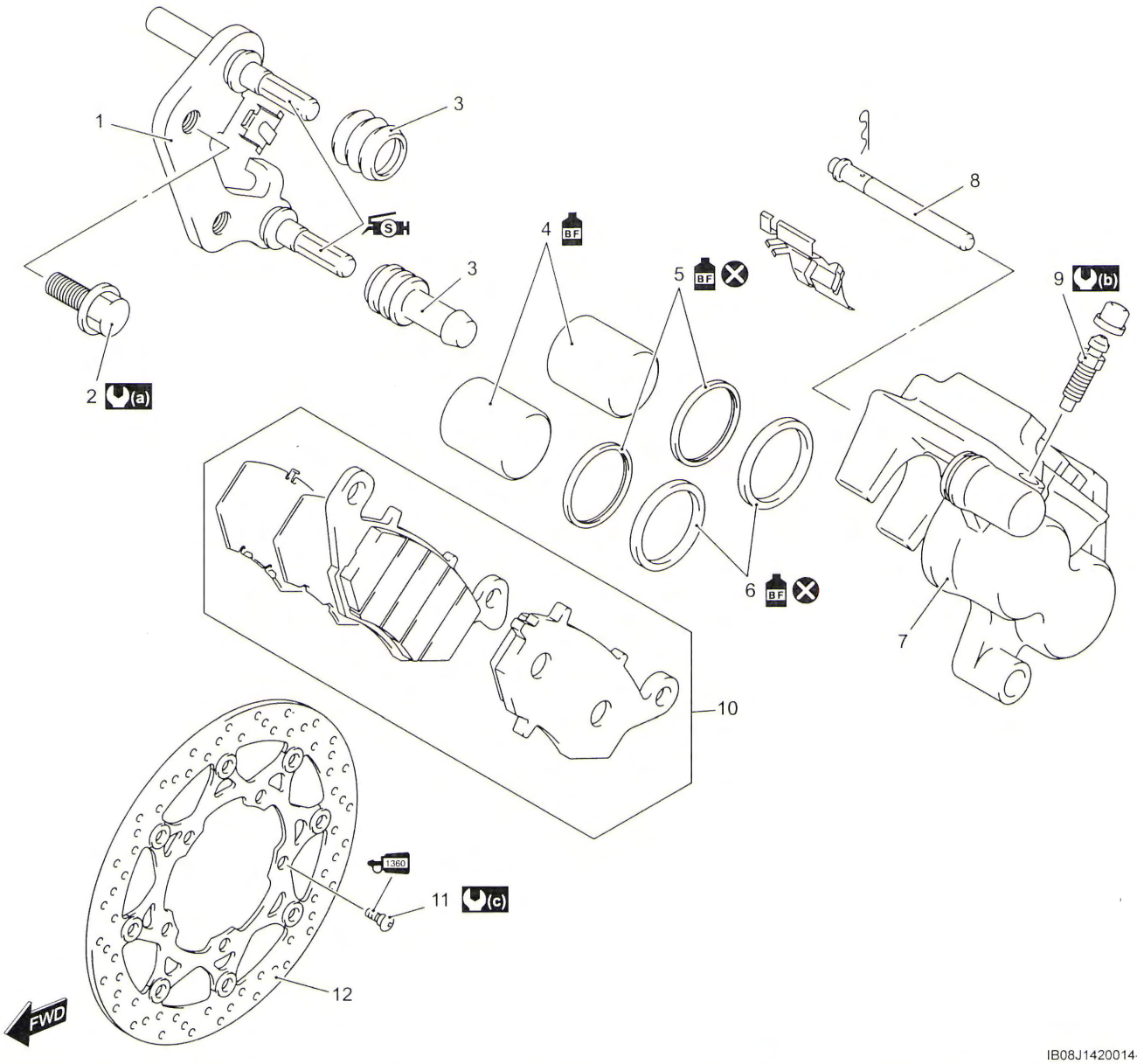
09900–06108 Snap ring pliers (Internal) ☞(Page 4A-13) / ☞(Page 4A-17)		09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 4A-5) / ☞(Page 4A-6)	

Front Brakes

Repair Instructions

Front Brake Components

BENF08J14206001



IB08J1420014-01

1. Caliper holder	8. Pad mounting pin	(c) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
2. Front brake caliper mounting bolt	9. Air bleeder bolt	S : Apply silicone grease to sliding surface.
3. Rubber boots	10. Pad set	1360 : Apply thread lock to thread part.
4. Piston	11. Brake disc bolt	BF : Apply brake fluid.
5. Piston seal	12. Front brake disc	⊗ : Do not reuse.
6. Dust seal	(a) : 39 N·m (3.9 kgf-m, 28.0 lbf-ft)	
7. Caliper	(b) : 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)	

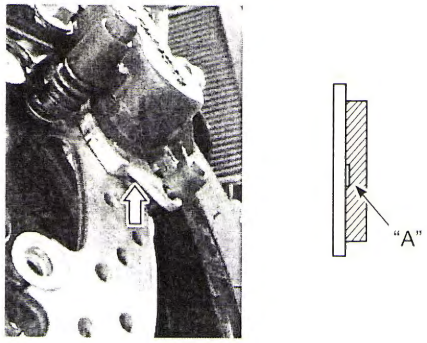
Front Brake Pad Inspection

BENF08J14206002

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).

NOTE

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



IB08J1420001-03

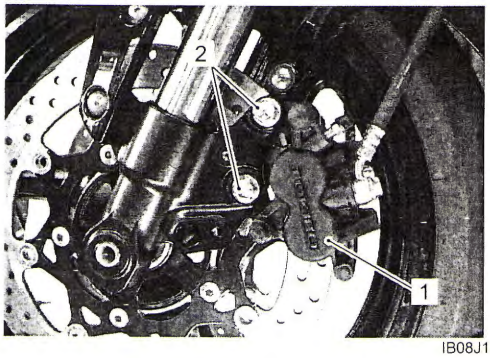
Front Brake Pad Replacement

BENF08J14206003

1) Remove the caliper (1) by removing its bolts (2).

NOTICE

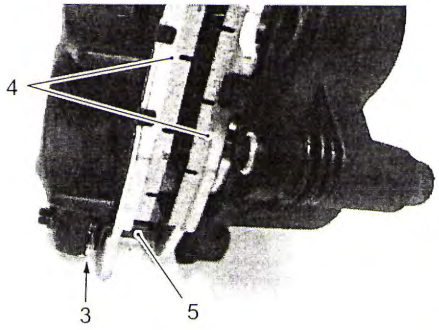
Do not operate the brake lever while dismounting the pads.



IB08J1420002-02

2) Remove the clip (3).

3) Remove the brake pads (4) by removing the pad mounting pin (5).



IB08J1420009-01

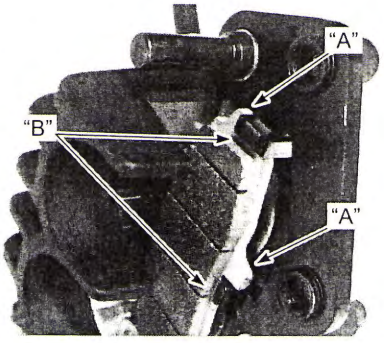
4) Clean up the caliper especially around the caliper pistons.

5) Push the piston all the way into brake caliper.

6) Install the outer pad with the detentes "A" of pad fitted to the detentes "B" on the caliper holder.

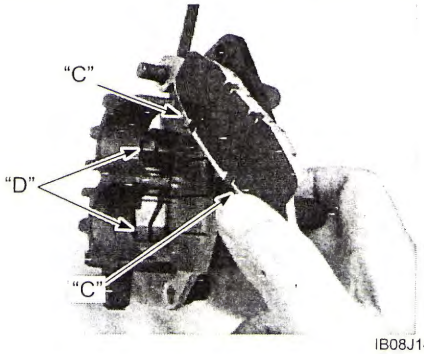
NOTE

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



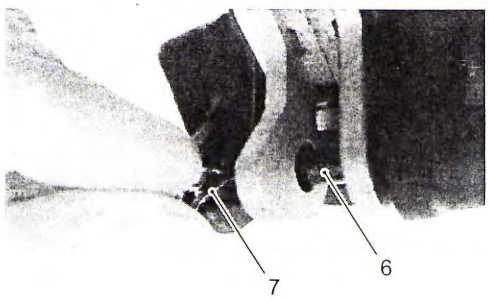
IB08J1420010-01

7) Install the inner pad by aligning the projection "C" of the inner pad with plate "D" of the pad spring.



IB08J1420011-01

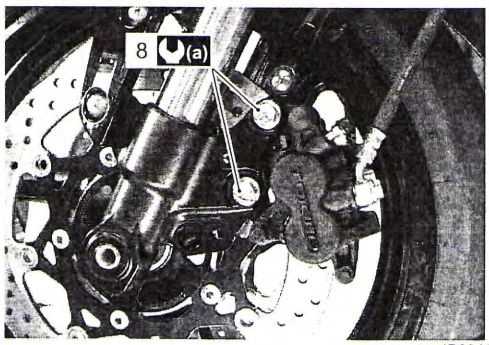
8) Install the pad mounting pin (6).
9) Install the clip (7) securely.



IB08J1420012-01

10) Remount the caliper.
11) Tighten the caliper mounting bolts (8) to the specified torque.

Tightening torque
Front brake caliper mounting bolt (a): 39 N·m (3.9 kgf-m, 28.0 lbf-ft)



IB08J1420003-02

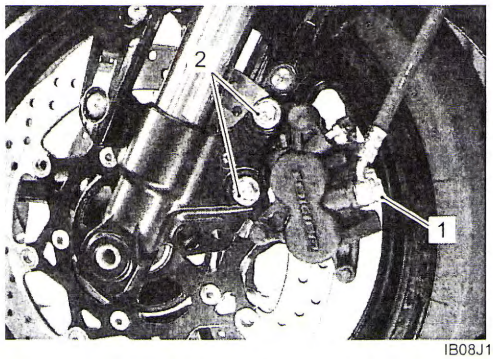
12) After replacing the brake pads, pump the brake lever several times to check for proper brake operation and then check the brake fluid level.

Front Brake Caliper Removal and Installation

BENF08J14206004

Removal

1) Drain brake fluid. Refer to "Brake Fluid Replacement" in Section 4A (Page 4A-8).
2) Place a clean rag underneath the union bolt on the brake caliper to catch any spilt brake fluid.
3) Remove the brake hoses from the caliper by removing the union bolt (1) and catch the brake fluid in a suitable receptacle.
4) Remove the brake caliper by removing the caliper mounting bolts (2).



IB08J1420004-02

Installation

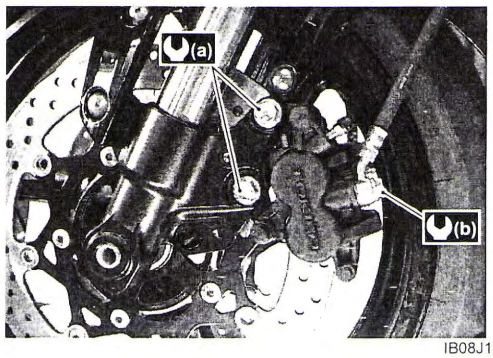
Install the brake caliper in the reverse order of removal. Pay attention to the following points:

- 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)

- Install the brake hose with union bolt and new seal washers.
- After setting the brake hose union to the stopper, tighten the union bolt to the specified torque.

Tightening torque
Front brake hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IB08J1420005-02

- Bleed air from the brake system after installing the caliper. Refer to "Brake System Inspection" 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

BENF08J14206005

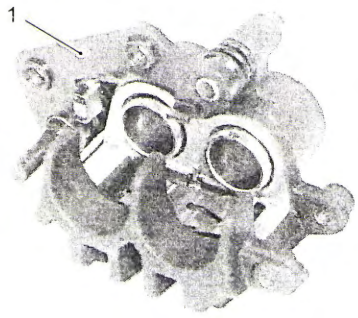
Refer to "Front Brake Caliper Removal and Installation" (Page 4B-3).

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.

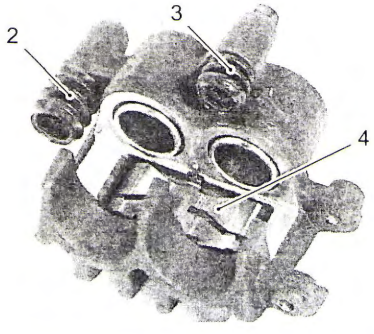
Disassembly

1) Remove the brake pads. Refer to "Front Brake Pad Replacement" (Page 4B-2).
2) Remove the caliper holder (1).



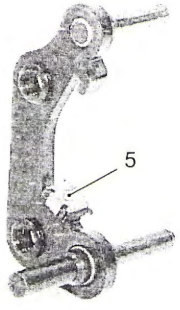
I944H1420010-01

3) Remove the rubber boots (2) and (3).
4) Remove the pad spring (4).



I944H1420011-01

5) Remove the pad guide (5).



I944H1420012-01

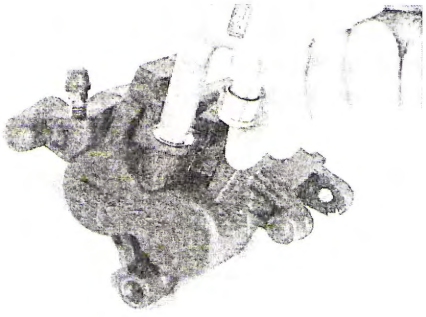
6) Place a clean rag over the pistons to prevent it from popping out and then force out the pistons using compressed air.

⚠ WARNING

Fingers can get caught between piston and caliper body when removing the piston. Do not place your fingers on the piston when removing the piston.

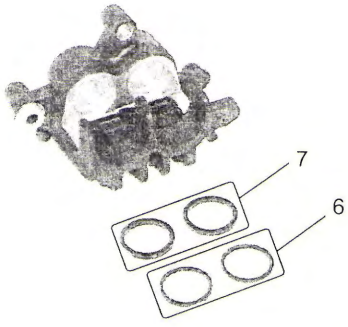
NOTICE

Do not use high pressure air to prevent piston damage.



I944H1420013-01

7) Remove the dust seals (6) and piston seals (7).



I944H1420014-02

Assembly

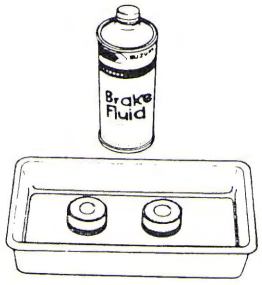
Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

- 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)

  NOTICE

  - **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.**

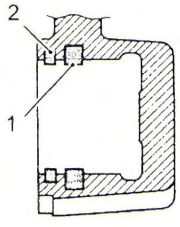


I649G1420012-02

- Apply the brake fluid to new piston seals (1) and new dust seals (2).

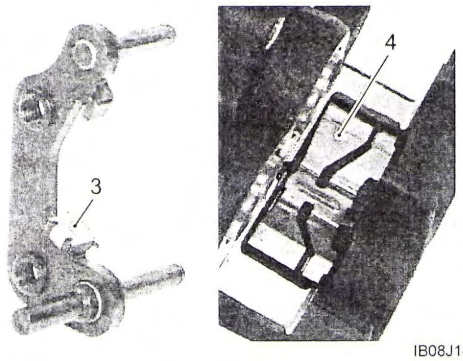
  BF: Brake fluid (DOT 4)

- Install the new piston seals (1) and dust seals (2) as shown.



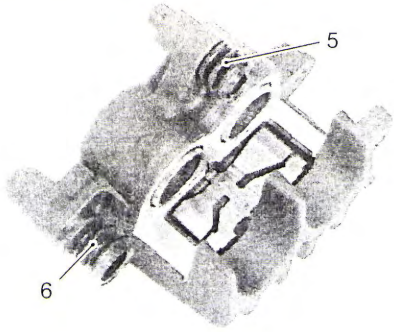
IB08J1420013-01

- Install the pad guide (3) and pad spring (4).



IB08J1420006-02

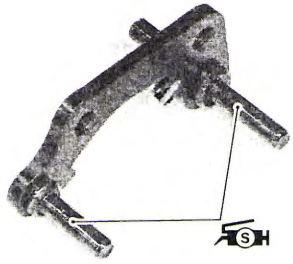
- Install the rubber boots (5) and (6).



I944H1420016-01

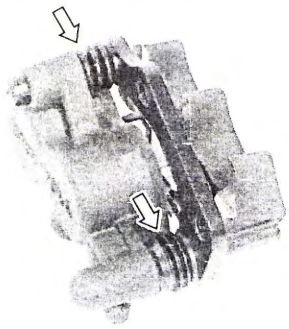
- Apply grease to the caliper holder sliding pins.

  : Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)



I944H1420017-01

- Set the boots onto the sliding pins securely.



I944H1420018-01

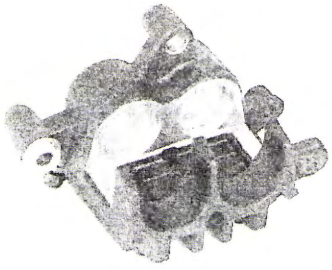
Front Brake Caliper Parts Inspection

BENF08J14206006

Refer to "Front Brake Caliper Disassembly and Assembly" (Page 4B-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.



I944H1420019-01

Brake Caliper Piston

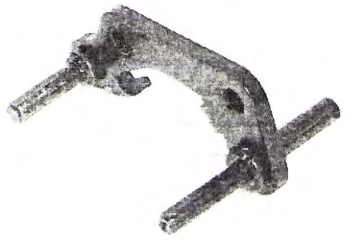
Inspect the brake caliper piston surface for any scratches or other damage. If any damage is found, replace the piston with a new one.



I944H1420020-01

Brake Caliper Holder Sliding Pin

Inspect the brake caliper holder sliding pins for wear and other damage. If any damage is found, replace the brake caliper holder with a new one.



I944H1420021-01

Brake Pad Spring and Pad Guide

Inspect the brake pad spring and pad guide for damage and excessive bend. If any defects are found, replace them with new ones.



I944H1420022-01

Rubber Boot

Inspect the rubber boots for damage. If any damages are found, replace them with the new ones.



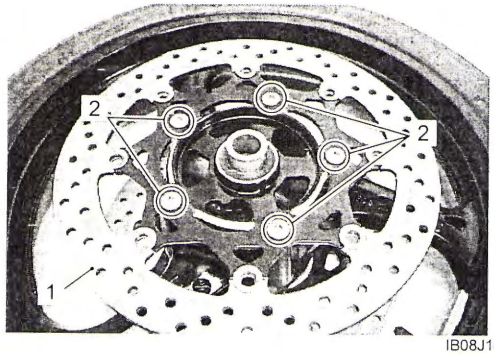
I944H1420023-01

Front Brake Disc Removal and Installation

BENF08J14206007

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 (1) by removing its bolts (2).



IB08J1420007-02

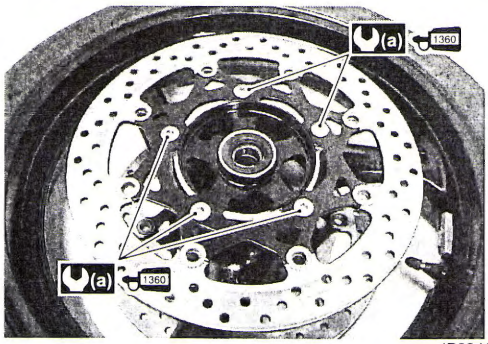
Installation

Install the front brake disc in the reverse order of removal. Pay attention to the following points:

- Make sure that the brake discs are clean and free of any grease.
- Apply thread lock to the brake disc bolts and tighten them to the specified torque.

1360 : Thread lock cement 99000–32130 (THREAD LOCK CEMENT SUPER "1360" or equivalent)

Tightening torque
Brake disc bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IB08J1420008-02

Front Brake Disc Inspection

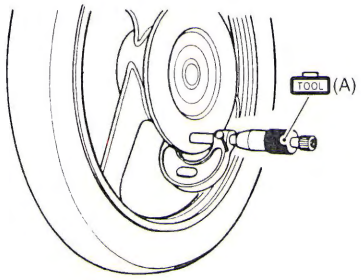
BENF08J14206008

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): 4.5 mm (0.18 in)



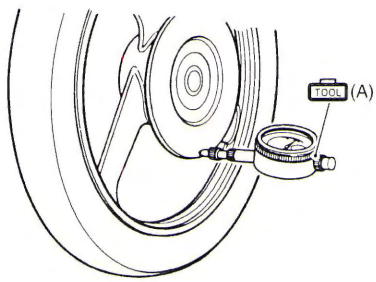
I649G1420019-03

Brake Disc Runout

1) Remove 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 (1/100 mm, 10 mm))
TOOL : 09900–20701 (Magnetic stand)

Brake disc runout
Service limit: 0.30 mm (0.012 in)



I649G1420020-03

3) Install the front brake caliper. Refer to "Front Brake Caliper Removal and Installation" (Page 4B-3).

Specifications

Service Data

BENF08J14207001

Brake

Unit: mm (in)

Item		Standard	Limit
Brake disc thickness	Front	4.8 – 5.2 (0.19 – 0.20)	4.5 (0.18)
Brake disc runout		—	0.30 (0.012)
Brake caliper cylinder bore	Front	Approx. 27 (1.06)	—
Brake caliper piston diam.	Front	Approx. 27 (1.06)	—

Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Tightening Torque Specifications

BENF08J14207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front brake caliper mounting bolt	39	3.9	28.0	☞(Page 4B-3) / ☞(Page 4B-3)
Front brake hose union bolt	23	2.3	16.5	☞(Page 4B-3)
Brake disc bolt	23	2.3	16.5	☞(Page 4B-7)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Front Brake Components" (Page 4B-1)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J14208001

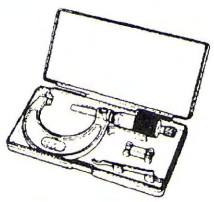
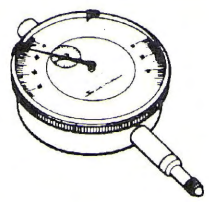
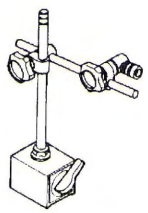
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4B-5) / ☞(Page 4B-5)
Grease	SUZUKI SILICONE GREASE or equivalent	P/No.: 99000–25100	☞(Page 4B-5)
Thread lock cement	THREAD LOCK CEMENT SUPER "1360" or equivalent	P/No.: 99000–32130	☞(Page 4B-7)

NOTE

Required service material(s) is also described in:
"Front Brake Components" (Page 4B-1)

Special Tool

BENF08J14208002

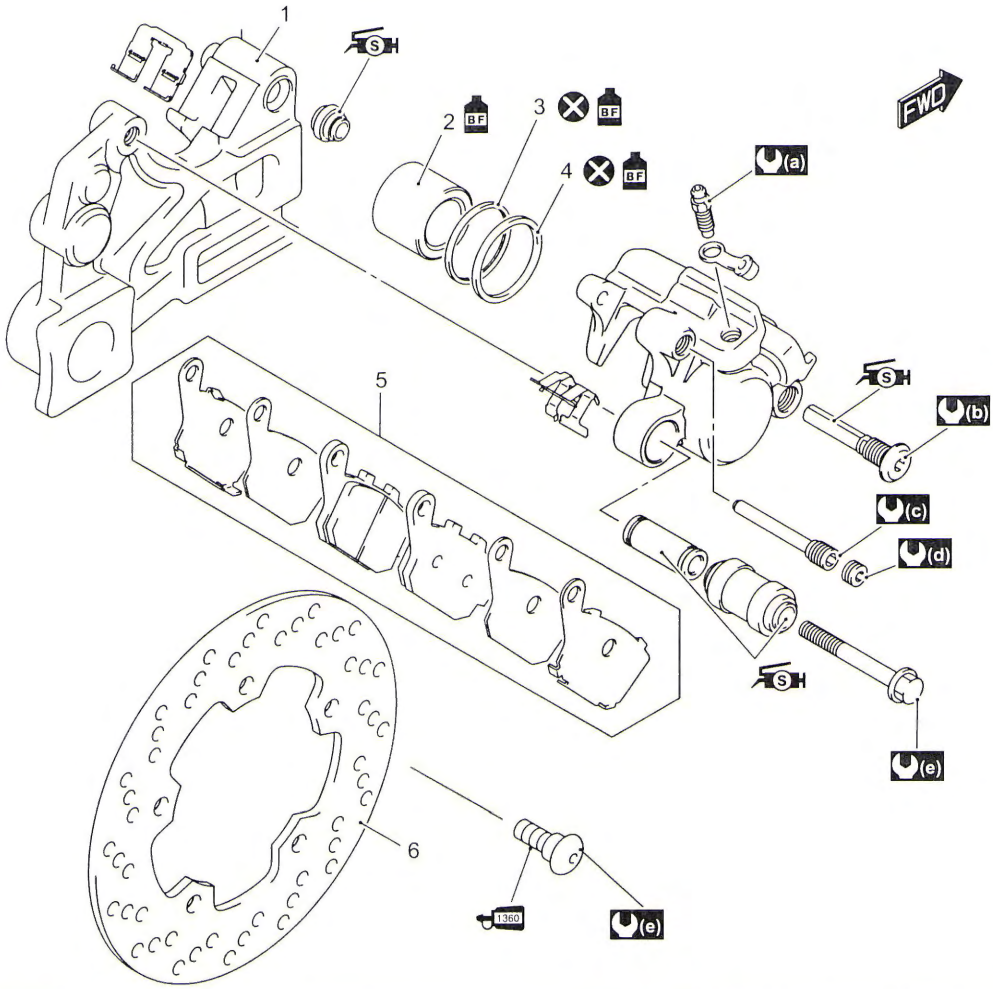
09900–20205 Micrometer (0 - 25 mm) ☞(Page 4B-7) 	09900–20607 Dial gauge (10 x 0.01 mm) ☞(Page 4B-7) 
09900–20701 Dial gauge chuck ☞(Page 4B-7) 	

Rear Brakes

Repair Instructions

Rear Brake Components

BENF08J14306001



IB08J1430020-02

1. Rear caliper bracket	6. Rear brake disc	(e) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
2. Piston	(a) : 6 N·m (0.6 kgf-m, 4.3 lbf-ft)	: Apply silicone grease to sliding surface.
3. Dust seal	(b) : 27 N·m (2.7 kgf-m, 19.5 lbf-ft)	1360 : Apply thread lock to thread part.
4. Piston seal	(c) : 17 N·m (1.7 kgf-m, 12.5 lbf-ft)	BF : Apply brake fluid.
5. Rear brake pad set	(d) : 2.5 N·m (0.25 kgf-m, 1.8 lbf-ft)	: Do not reuse.

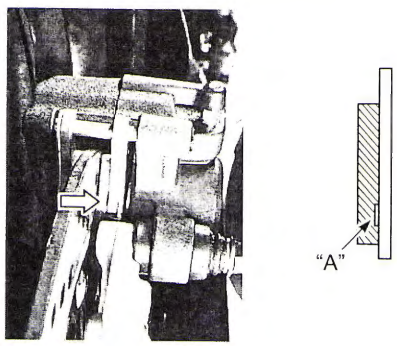
Rear Brake Pad Inspection

BENF08J14306002

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).

NOTE

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

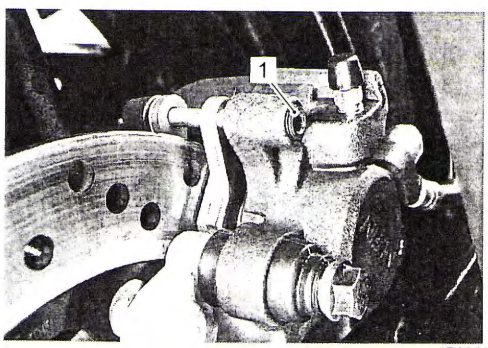


IB08J1430001-05

Rear Brake Pad Replacement

BENF08J14306003

1) Remove the plug (1).

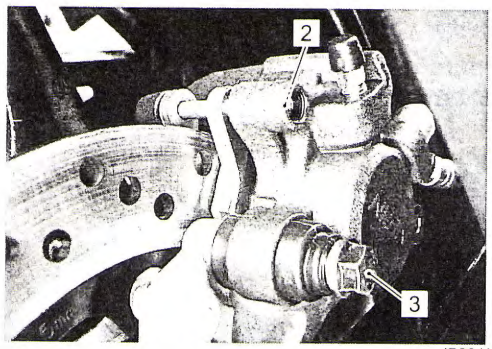


IB08J1430002-02

2) Remove the pad mounting pin (2).
3) Remove the caliper mounting bolt (3).

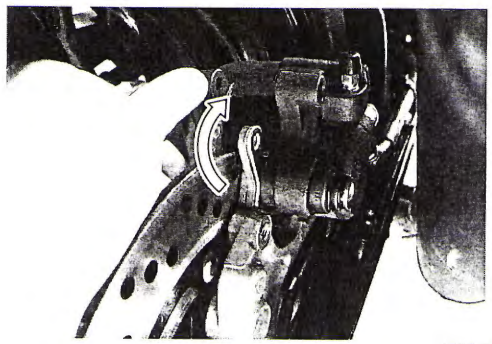
NOTICE

Do not operate the brake pedal while dismounting the pads.



IB08J1430003-02

4) Remove the brake pads with the rear caliper pivoted up.

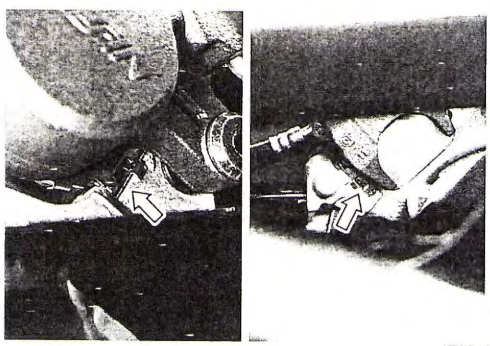


IB08J1430004-02

5) Clean up the caliper especially around the caliper piston.
6) Push the piston all the way into brake caliper.
7) Install the new brake pads.

NOTE

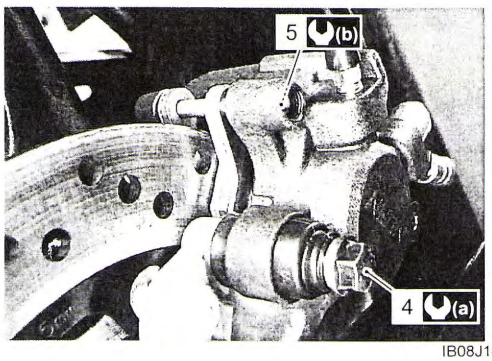
- **Replace the brake pads as a set, otherwise braking performance will be adversely affected.**
- **Make sure that the detente of the pad is seated onto the retainer on the caliper bracket.**



IB08J1430005-02

8) Tighten the caliper mounting bolt (4) and pad mounting pin (5) to the specified torque.

Tightening torque
Rear brake caliper mounting bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Rear brake pad mounting pin (b): 17 N·m (1.7 kgf-m, 12.5 lbf-ft)

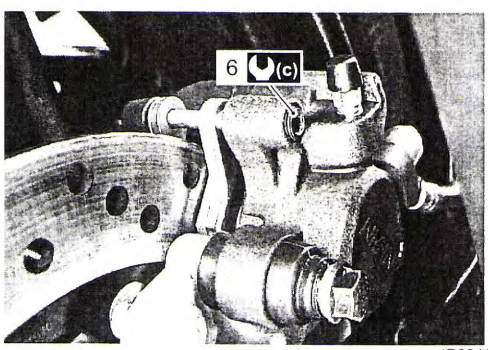


IB08J1430006-02

9) Install the plug (6) to the specified torque.

Tightening torque
Pad pin plug (c): 2.5 N·m (0.25 kgf-m, 1.8 lbf-ft)

10) After replacing the brake pads, pump the brake pedal few times to check for proper brake operation and then check the brake fluid level.



IB08J1430007-02

Rear Brake Caliper Removal and Installation

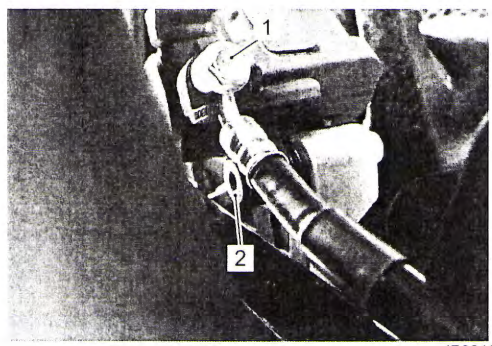
BENF08J14306004

Removal

1) Drain brake fluid. Refer to "Brake Fluid Replacement" in Section 4A (Page 4A-8).
2) Place a clean rag underneath the union bolt on the brake caliper to catch any spilt brake fluid.
3) Remove the brake hose from the caliper by removing the union bolt (1) and catch the brake fluid in a suitable receptacle.

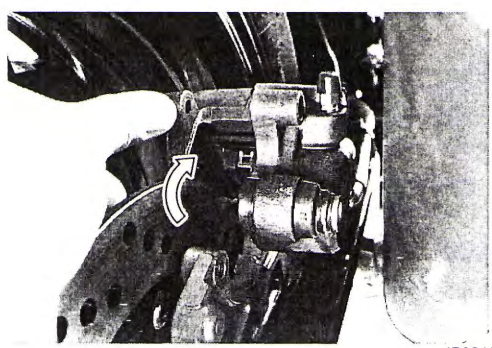
NOTE

Slightly loosen the sliding pin (2) to facilitate later disassembly, if necessary.



IB08J1430008-02

4) Remove the brake pads. Refer to "Rear Brake Pad Replacement" (Page 4C-2).
5) Pivot the caliper up and remove the caliper from the caliper bracket.


IB08J1430009-02

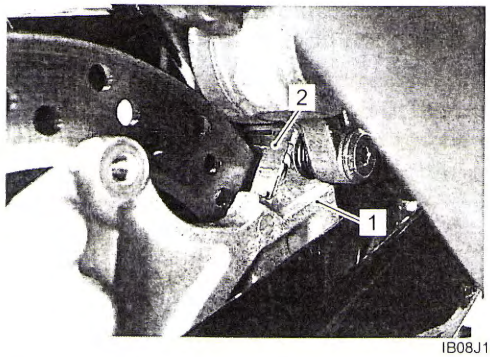
Installation

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

- Install the caliper to the caliper bracket (1).
- Set the boot onto the sliding pin securely.
- Install the brake pads. Refer to "Rear Brake Pad Replacement" (Page 4C-2).

NOTE

Confirm that there is a retainer (2) when installing the brake pads.



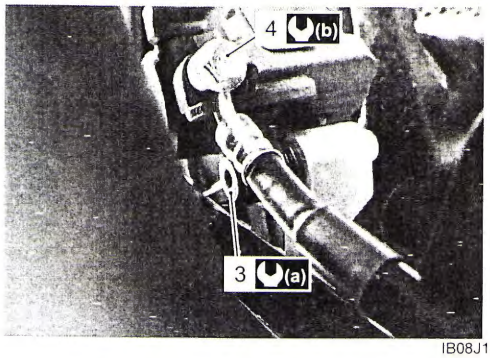
IB08J1430010-02

- Tighten the sliding pin (3) to the specified torque.

Tightening torque
Rear brake caliper sliding pin (a): 27 N·m (2.7 kgf-m, 19.5 lbf-ft)

- After setting the brake hose union to the stopper, install the new seal washers and tighten the union bolt (4) to the specified torque.

Tightening torque
Brake hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IB08J1430011-02

- Bleed air from the brake system after installing the caliper. Refer to "Brake System Inspection" 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.

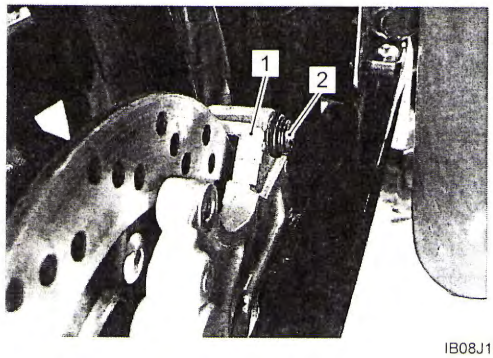
Rear Brake Caliper Disassembly and Assembly

BENF08J14306005

Refer to "Rear Brake Caliper Removal and Installation" (Page 4C-3).

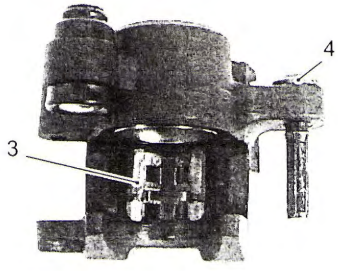
Disassembly

1) Remove the pad spring (1) and rubber boot (2).



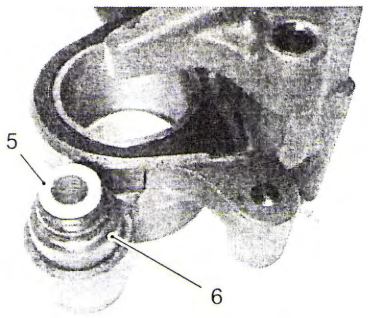
IB08J1430012-02

2) Remove the pad spring (3).
3) Remove the slide pin (4).



IB08J1430015-02

4) Remove the spacer (5) and rubber boot (6) from the caliper.



IB08J1430016-02

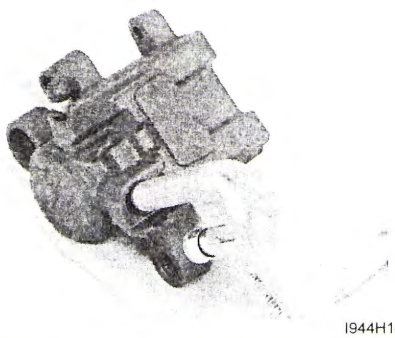
5) Place a clean rag over the piston to prevent it from popping out and then force out the piston using compressed air.

⚠ WARNING

Fingers can get caught between piston and caliper body when removing the piston. Do not place your fingers on the piston when removing the piston.

NOTICE

Do not use high pressure air to prevent piston damage.



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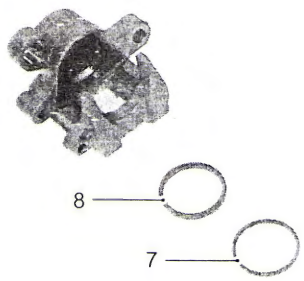
6) Remove the dust seal (7) and piston seal (8).



I944H1430017-01

Assembly

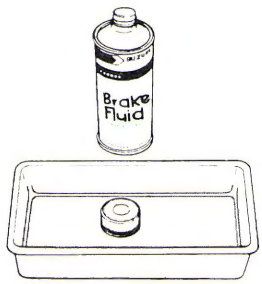
Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

- 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)

NOTICE

- **Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.**

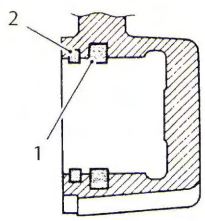


I649G1430018-02

- Apply the brake fluid to new piston seal (1) and new dust seal (2).

  BF: Brake fluid (DOT 4)

- Install the piston seals as shown.



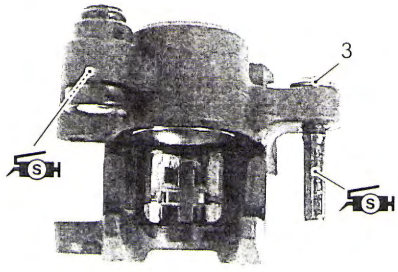
IB08J1430019-01

- Apply grease to the inside of the boot.

  : Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)

- Temporarily tighten the sliding pin (3) and apply grease to the sliding pin.

  : Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



IB08J1430017-02

Rear Brake Caliper Parts Inspection

BENF08J14306006

Refer to "Rear Brake Caliper Disassembly and Assembly" (Page 4C-4).

Brake Caliper Cylinder

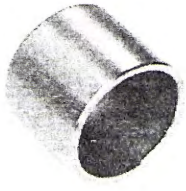
Inspect the brake caliper cylinder wall for nicks, scratches or other damage. If any damage is found, replace the caliper with a new one.



I944H1430019-01

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.



I944H1430020-01

Brake Caliper Sliding Pin

Inspect the brake caliper sliding pin for wear and other damage. If any damage is found, replace the sliding pin with a new one.



IB08J1430018-01

Boot and Spacer

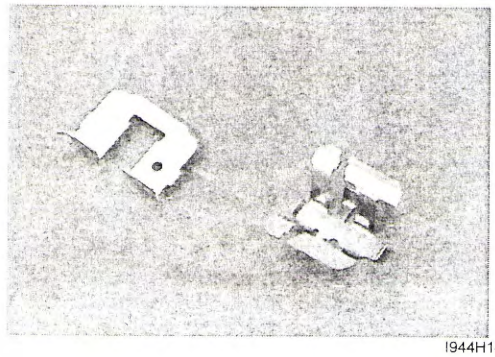
Inspect the boots and spacer for damage and wear. If any defects are found, replace them with new ones.



I944H1430022-01

Brake Pad Spring

Inspect the brake pad springs for damage and excessive bend. If any defects are found, replace them with new ones.



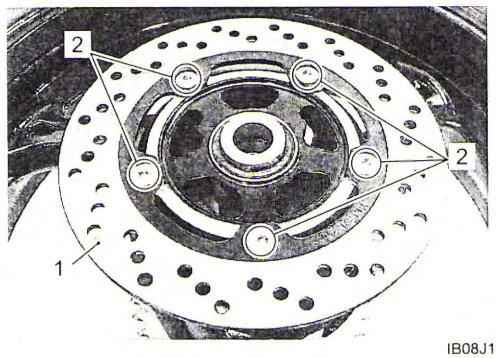
I944H1430023-02

Rear Brake Disc Removal and Installation

BENF08J14306007

Removal

1) Remove the rear wheel assembly. Refer to "Front Wheel Assembly Removal and Installation" in Section 2D (Page 2D-4).
2) Remove the rear brake disc (1) by removing its bolts (2).



IB08J1430013-02

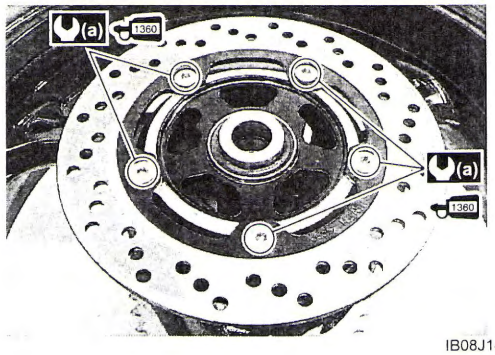
Installation

Install the rear brake disc in the reverse order of removal. Pay attention to the following points:

- Make sure that the brake discs are clean and free of any grease.
- Apply thread lock to the brake disc bolts and tighten them to the specified torque.

1360 : Thread lock cement 99000–32130 (THREAD LOCK CEMENT SUPER "1360" or equivalent)

Tightening torque
Brake disc bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IB08J1430014-02

Rear Brake Disc Inspection

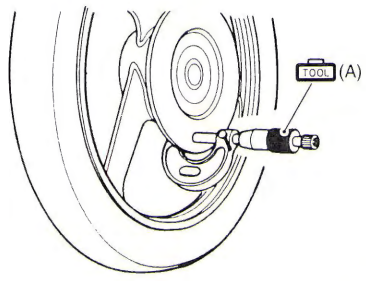
BENF08J14306008

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)



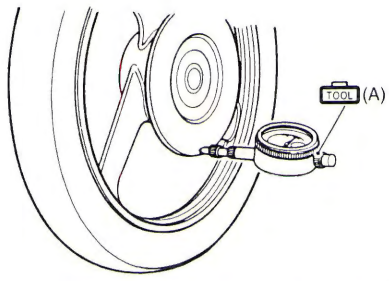
I649G1430027-03

Brake Disc Runout

1) Remove 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 (1/100 mm, 10 mm))
TOOL : 09900–20701 (Magnetic stand)

Brake disc runout
Service limit: 0.30 mm (0.012 in)



I649G1430028-03

3) Install the rear brake caliper. Refer to "Rear Brake Caliper Removal and Installation" (Page 4C-3).

Specifications

Service Data

BENF08J14307001

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	Approx. 38.2 (1.50)	—
Brake caliper piston diameter	Rear	Approx. 38.2 (1.50)	—

Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Tightening Torque Specifications

BENF08J14307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear brake caliper mounting bolt	23	2.3	16.5	☞(Page 4C-3)
Rear brake pad mounting pin	17	1.7	12.5	☞(Page 4C-3)
Pad pin plug	2.5	0.25	1.8	☞(Page 4C-3)
Rear brake caliper sliding pin	27	2.7	19.5	☞(Page 4C-4)
Brake hose union bolt	23	2.3	16.5	☞(Page 4C-4)
Brake disc bolt	23	2.3	16.5	☞(Page 4C-7)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Rear Brake Components" (Page 4C-1)

"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J14308001

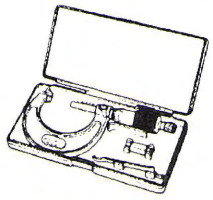
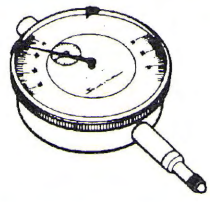
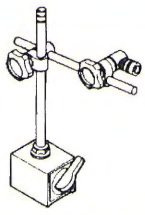
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4C-5) / ☞(Page 4C-5)
Grease	SUZUKI Silicone Grease or equivalent	P/No.: 99000–25100	☞(Page 4C-6) / ☞(Page 4C-6)
Thread lock cement	THREAD LOCK CEMENT SUPER "1360" or equivalent	P/No.: 99000–32130	☞(Page 4C-7)

NOTE

Required service material(s) is also described in:
"Rear Brake Components" (Page 4C-1)

Special Tool

BENF08J14308002

09900–20205 Micrometer (0 - 25 mm) ☞(Page 4C-7) 	09900–20607 Dial gauge (10 x 0.01 mm) ☞(Page 4C-7) 
09900–20701 Dial gauge chuck ☞(Page 4C-7) 	

Section 5

Transmission / Transaxle

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Precautions

Precautions

Precautions for Transmission / Transaxle

BENF08J15000001

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

Manual Transmission

Diagnostic Information and Procedures

Manual Transmission Symptom Diagnosis

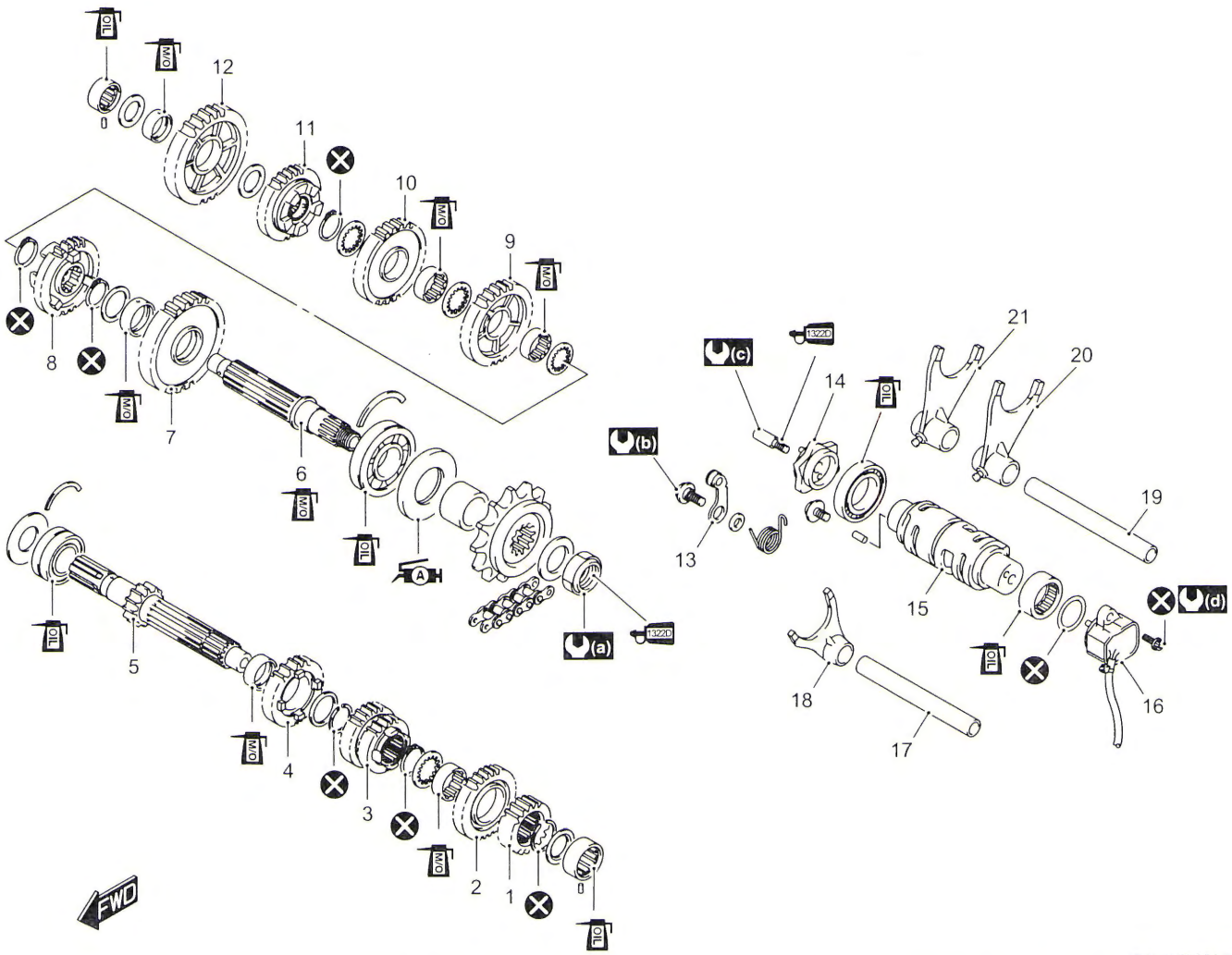
BENF08J15204001

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 gearshift shaft return spring.	*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

BENF08J15206001



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1. 2nd drive gear	11. 5th driven gear	21. Gearshift fork (For 5th driven gear)
2. 6th drive gear	12. 1st driven gear	(a) : 115 N·m (11.5 kgf-m, 83.0 lbf-ft)
3. 3rd/4th drive gears	13. Gearshift cam stopper	(b) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
4. 5th drive gear	14. Gearshift cam plate	(c) : 13 N·m (1.3 kgf-m, 9.5 lbf-ft)
5. Countershaft/1st drive gear	15. Gearshift cam	(d) : 6.5 N·m (0.65 kgf-m, 4.7 lbf-ft)
6. Driveshaft	16. GP switch	OIL : Apply engine oil.
7. 2nd driven gear	17. Gearshift fork shaft	M/O : Apply molybdenum oil solution.
8. 6th driven gear	18. Gearshift fork (For 3rd/4th drive gears)	A : Apply grease to the oil seal lip.
9. 3rd driven gear	19. Gearshift fork shaft	1322D : Apply thread lock to the thread part.
10. 4th driven gear	20. Gearshift fork (For 6th driven gear)	: Do not reuse.

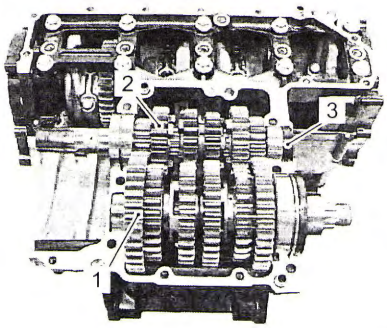
Transmission Removal

BENF08J15206002

1) Remove the engine assembly from the frame. Refer to "Engine Assembly Removal" in Section 1D (Page 1D-25).
2) Separate the middle and lower crankcases. Refer to "Engine Bottom Side Disassembly" in Section 1D (Page 1D-50).

Driveshaft Assembly / Countershaft Assembly

1) Remove the driveshaft assembly (1) and countershaft assembly (2).
2) Remove the oil seal (3).



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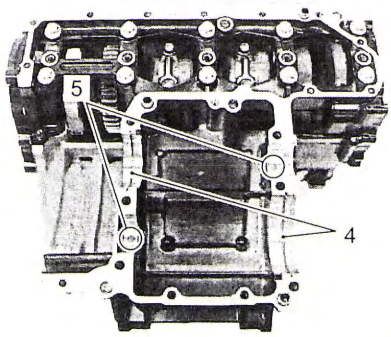
3) Remove the bearing pins (4) and C-rings (5).



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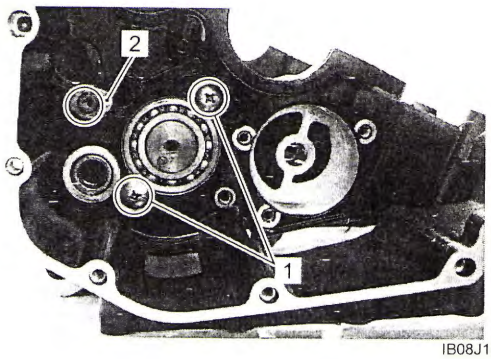
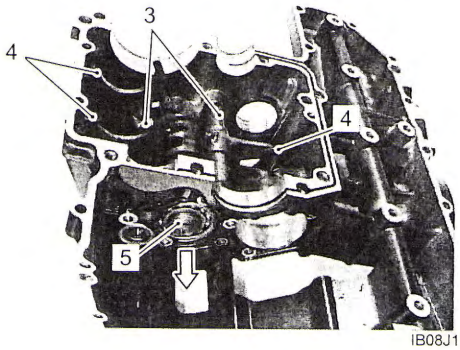
Gearshift Fork and Gearshift Cam

1) Remove the gearshift cam bearing retainer screws (1) and gearshift fork shaft retainer (2) from the lower crankcase.



IB08J1520003-02

2) Remove the gearshift fork shafts (3) and gearshift forks (4) from the lower crankcase.
3) Remove the gearshift cam (5) and its bearing.

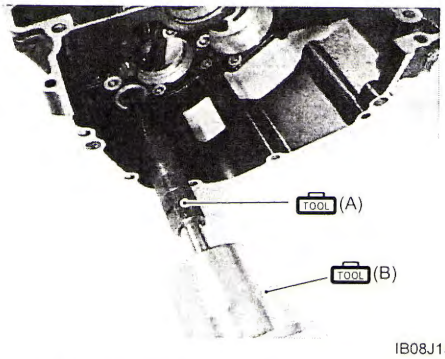


IB08J1520004-02

Bearing

1) Remove the gearshift shaft bearing using the special tool.

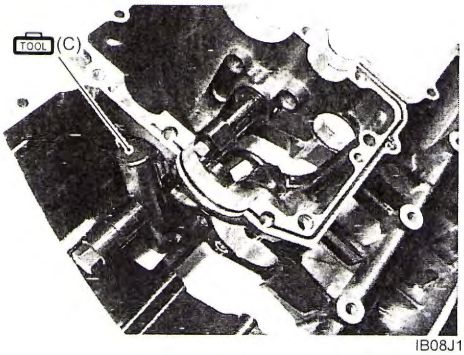
Special tool
TOOL (A): 09921–20210 (Bearing remover (12 mm))
TOOL (B): 09930–30104 (Rotor remover sliding shaft)



IB08J1520005-03

2) Remove the gearshift cam bearing using the special tools.

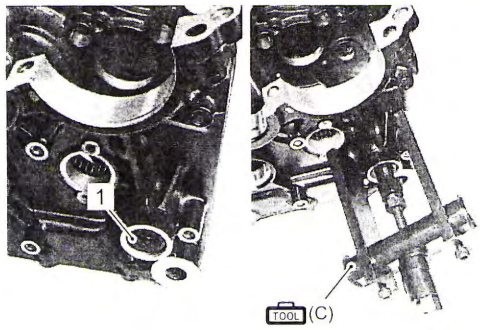
Special tool
TOOL (C): 09921–20240 (Bearing remover set)



IB08J1520006-04

3) Remove the oil seal (1).
4) Remove the gearshift bearing using the special tool.

Special tool
TOOL (C): 09921–20240 (Bearing remover set)



IB08J1520007-03

Transmission Installation

BENF08J15206003

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

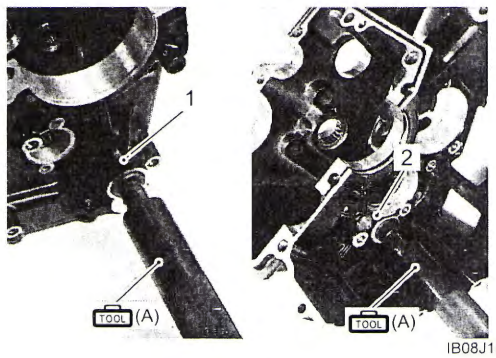
Bearing

- Install the new gearshift shaft bearings (1) and (2) using the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

NOTE

The stamped mark side of the gearshift shaft bearing faces outside.



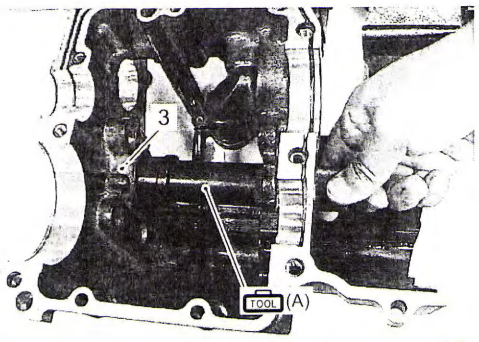
IB08J1520008-02

- Install the new gearshift cam bearing (3) using the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

NOTE

The stamped mark side of gearshift cam bearing faces the gearshift cam.



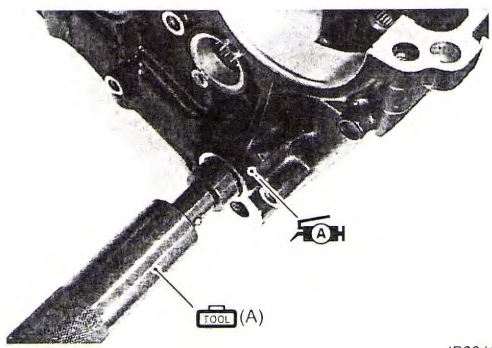
IB08J1520009-02

- Install the new oil seal using the special tool.

Special tool
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)

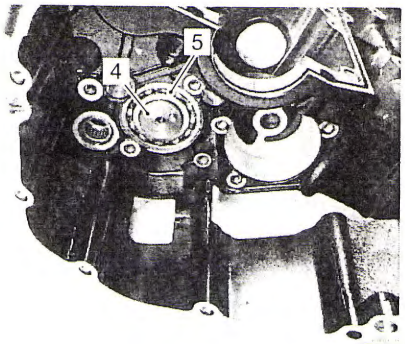


IB08J1520010-02

- Install the gearshift cam (4) along with the bearing (5).

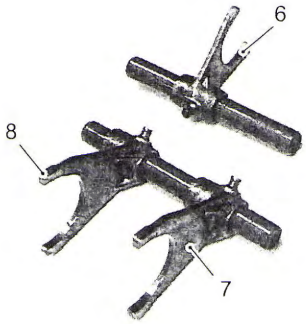
NOTE

The stamped mark side of the gearshift cam bearing faces outside.

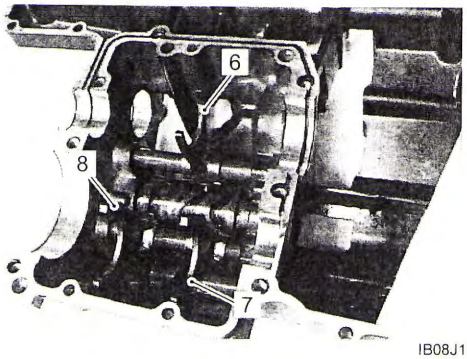


IB08J1520011-02

- Install the gearshift forks and their shafts in position.



IB08J1520012-02



IB08J1520013-02

6. For 3rd/ 4th drive gears	8. For 6th driven gear
7. For 5th driven gear	

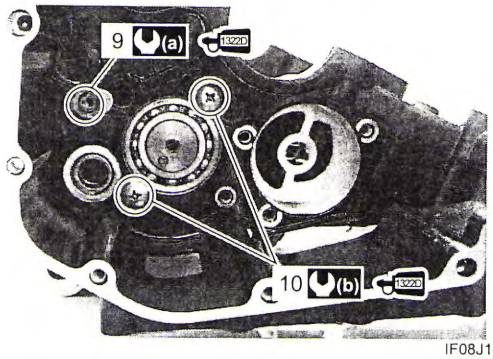
- Install the gearshift fork shaft retainer bolt (9) and the bearing retainer screws (10).

NOTE

Apply a small quantity of thread lock to the bearing retainer screws and tighten them to the specified torque.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
Gearshift fork shaft retainer bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
Bearing retainer screw (b): 8 N·m (0.8 kgf-m, 6.0 lbf-ft)



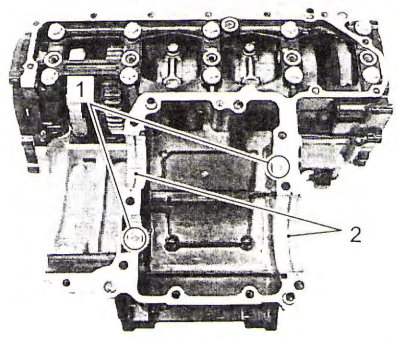
IF08J1520002-01

Driveshaft / Countershaft Assembly

- Install the bearing pins (1) and C-rings (2) on the middle crankcase.

NOTE

Before installing the transmission assembly, use a nonflammable cleaning solvent to wipe off oily or greasy matter from the crankcase mating surfaces and outside of the oil seal fitting surfaces.

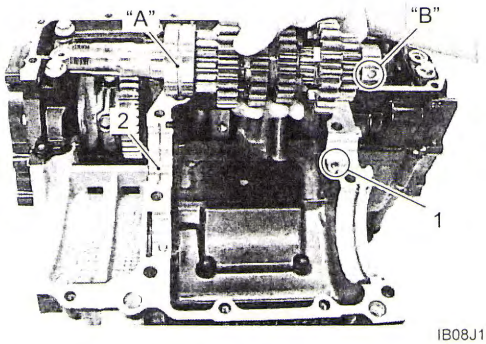


IB08J1520015-02

- Install the driveshaft assembly on the middle crankcase.

NOTE

Align the C-ring (2) with the groove of bearing "A" and the bearing pin (1) with the indent "B" on the bearing.

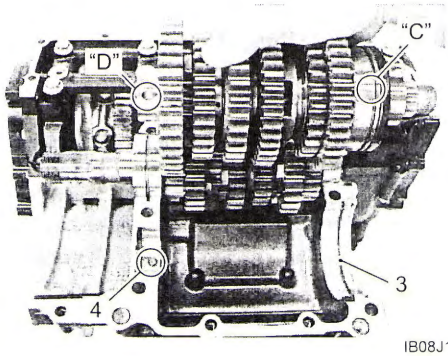


IB08J1520016-03

- Install the countershaft assembly on the middle crankcase.

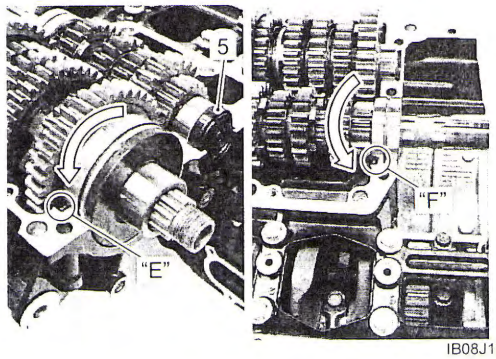
NOTE

Align the C-ring (3) with the groove of bearing "C" and the bearing pin (4) with the indent "D" on the bearing.



IB08J1520017-02

- Install the new oil seal (5).
- Turn the bearings to install the bearing dowel pins "E" and "F" in the respective positions.

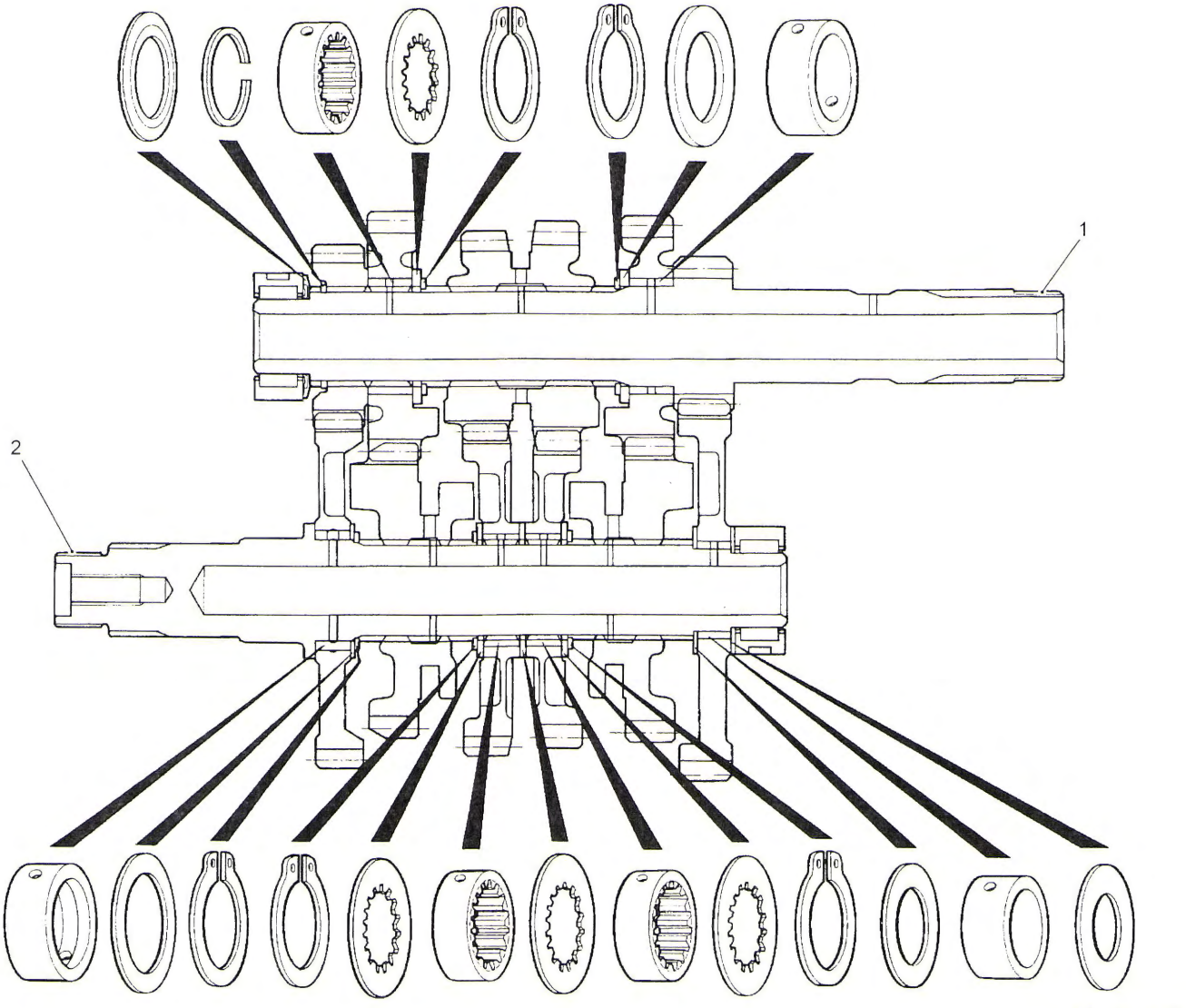


IB08J1520018-02

- Assemble the engine. Refer to "Engine Bottom Side Assembly" in Section 1D (Page 1D-57).
- Remount the engine assembly. Refer to "Engine Assembly Installation" in Section 1D (Page 1D-28).

Transmission Construction

BENF08J15206004



IB08J1520019-02

1. Countershaft	2. Driveshaft

Countershaft Gear / Driveshaft Gear Disassembly and Assembly

BENF08J15206005

Refer to "Transmission Removal" (Page 5B-3) and "Transmission Installation" (Page 5B-4).

Disassembly

NOTE

Identify the position of each removed part. Organize the parts in their respective groups (i.e., drive or driven) so that they can be reinstalled in their original positions.

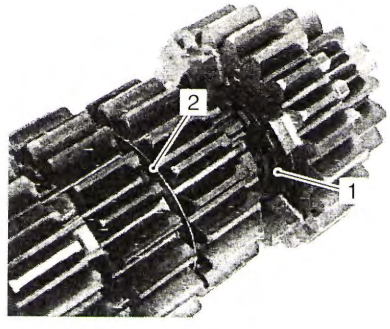
Disassemble the countershaft and driveshaft as shown in the transmission construction. Refer to "Transmission Construction" (Page 5B-7).
Pay attention to the following points:

Countershaft

- Remove the 6th drive gear snap ring (1) from its groove and slide it towards the 3rd/4th drive gears (2).

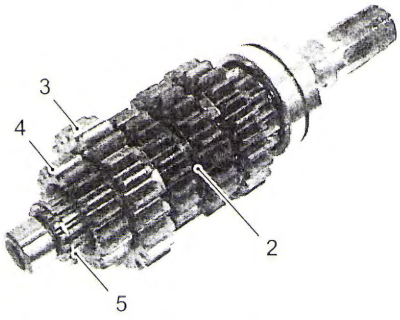
Special tool

TOOL : 09900–06104 (Snap ring pliers)



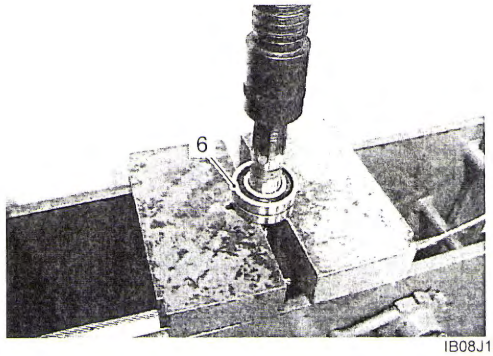
I823H1520018-01

- 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).



IB08J1520020-02

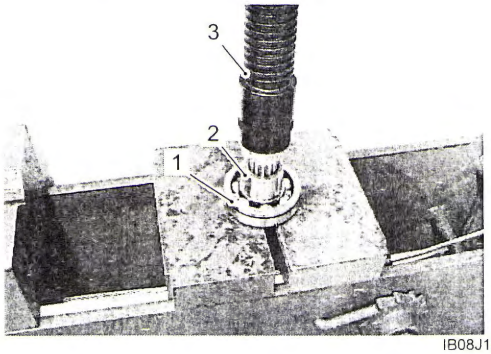
- Remove the countershaft bearing (6) using a hydraulic press.



IB08J1520021-02

Driveshaft

- Remove the driveshaft bearing (1) along with the spacer (2) using a hydraulic press (3).



IB08J1520022-02

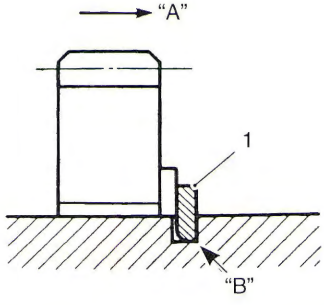
Assembly

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-7).**
- **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.**
- **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 molybdenum oil to the driveshaft and countershaft.**
- **Before installing the oil seal, apply grease to the oil seal lip.**

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)
: 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.



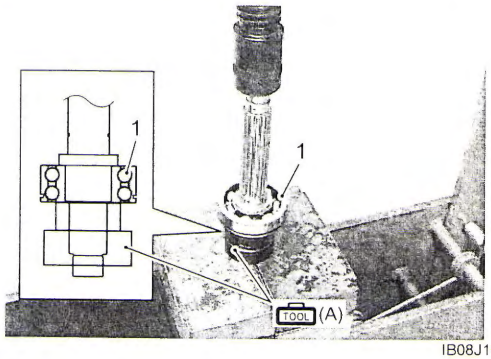
I649G1520049-02

"A": Thrust	"B": Sharp edge

Driveshaft

- Install the new driveshaft bearing (1) using a hydraulic press and special tool.

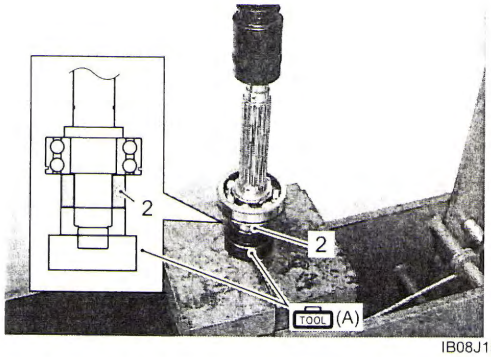
Special tool
TOOL (A): 09913–70210 (Bearing installer set)



1B08J1520023-02

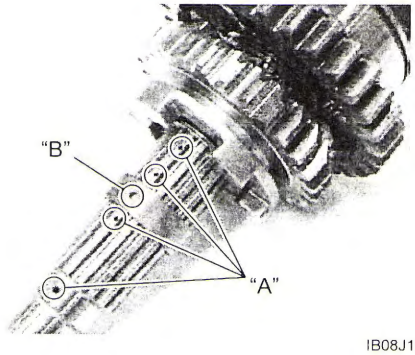
- Install the spacer (2) using a hydraulic press and special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

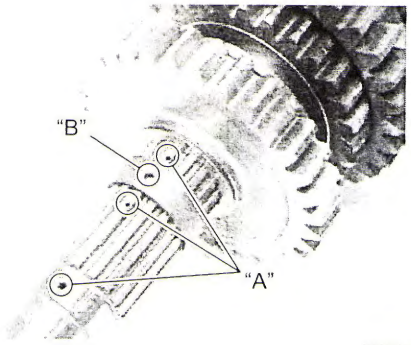


1B08J1520024-02

- When installing the gear bushings onto the driveshaft, align the shaft oil holes "A" with the bushing oil hole "B".



1B08J1520025-03

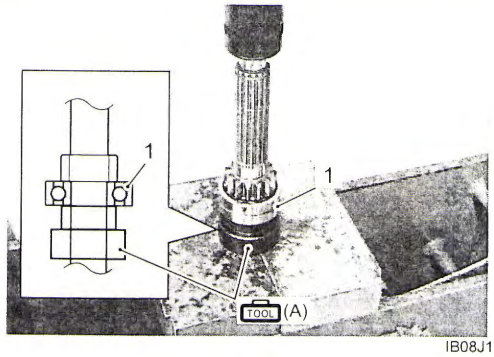


1B08J1520026-03

Countershaft

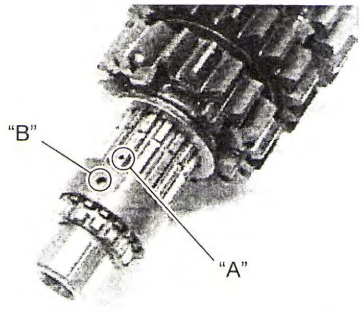
- Install the new countershaft bearing (1) using a hydraulic press and special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)



1B08J1520027-02

- When installing the gear bushing onto the countershaft, align the shaft oil hole "A" with the bushing oil hole "B".



1B08J1520028-03

Transmission Related Parts Inspection

BENF08J15206006

Refer to "Transmission Removal" (Page 5B-3), "Transmission Installation" (Page 5B-4) and "Countershaft Gear / Driveshaft Gear Disassembly and Assembly" (Page 5B-7).

Gearshift Fork to Groove Clearance

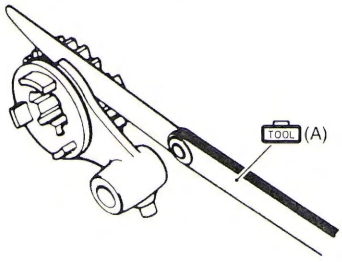
NOTE

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)



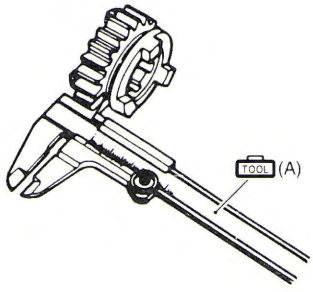
I649G1520056-03

Gearshift Fork Groove Width

Measure the gearshift fork groove width using the vernier calipers.

Special tool
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Gearshift fork groove width
Standard: 5.0 – 5.1 mm (0.197 – 0.201 in)



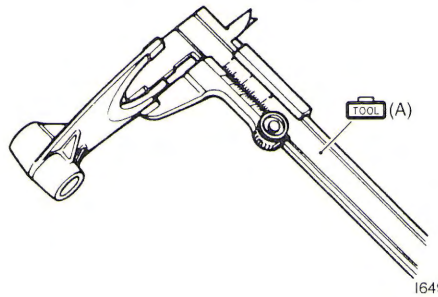
I649G1520057-03

Gearshift Fork Thickness

Measure the gearshift fork thickness using the vernier calipers.

Special tool
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

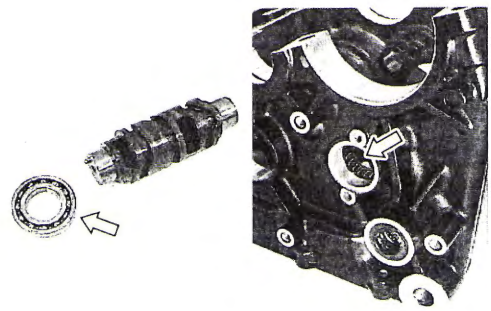
Gearshift fork thickness
Standard: 4.8 – 4.9 mm (0.189 – 0.193 in)



I649G1520058-03

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-4).



IB08J1520029-02

Gear Position (GP) Switch Inspection

BENF08J15206007

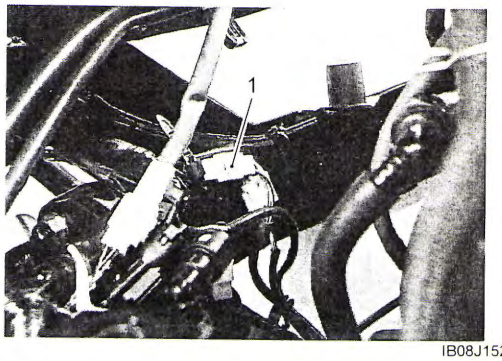
Refer to "Side-stand / Ignition Interlock System Parts Inspection" in Section 1I (Page 1I-8).

Gear Position (GP) Switch Removal and Installation

BENF08J15206008

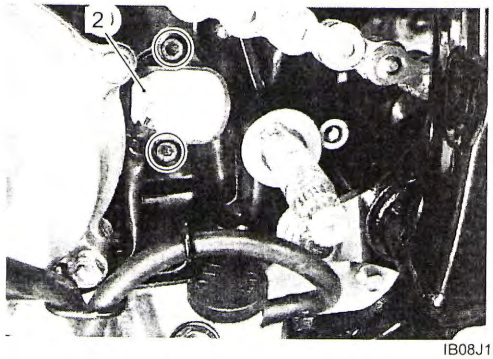
Removal

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) Remove the engine sprocket cover. Refer to "Engine Sprocket Removal and Installation" in Section 3A (Page 3A-2).
4) Disconnect the GP switch coupler (1).



IB08J1520030-02

5) Remove the GP switch (2).



IB08J1520031-02

Installation

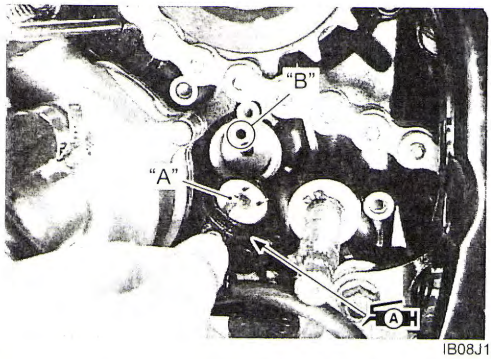
Install the GP switch in the reverse order of removal. Pay attention to the following points:

- Apply grease to the new O-ring.

NOTE

Align the GP switch pin "A" with the gearshift cam hole "B".

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

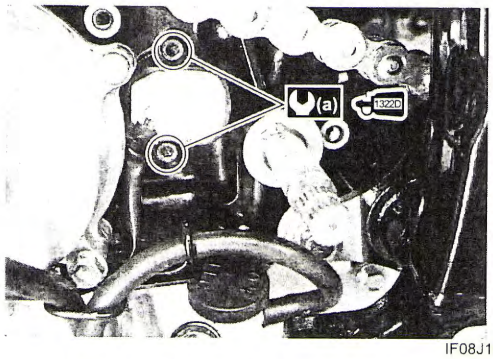


IB08J1520032-03

- Apply thread lock to the GP switch mounting bolts.
- Tighten new GP switch mounting bolts to the specified torque.

: Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
GP switch mounting bolt (a): 6.5 N·m (0.65 kgf-m, 4.7 lbf-ft)

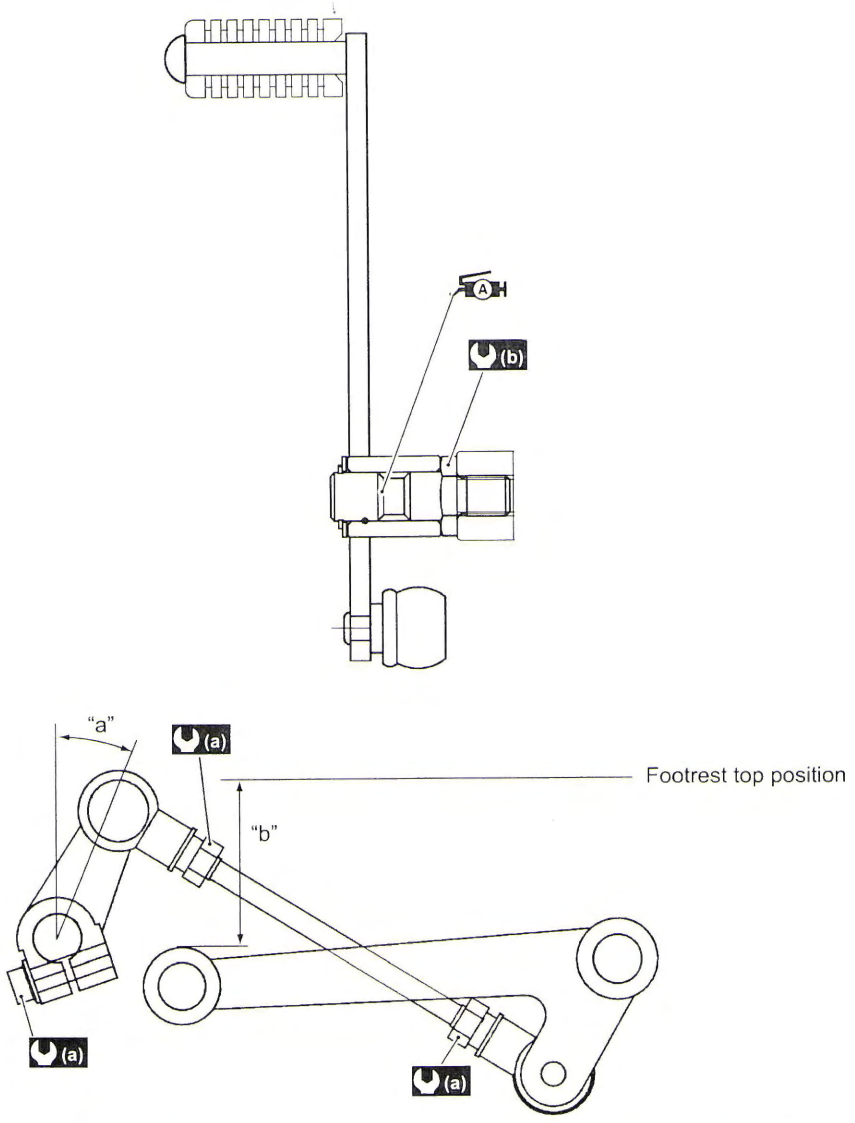


IF08J1520005-01

- Route the GP switch lead wire. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-3).

Gearshift Lever Construction

BENF08J15206009



IB08J1520034-02

(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	"a": Approx. 22° 30'	(A)H : Apply grease.
(b) : 40 N·m (4.0 kgf-m, 29.0 lbf-ft)	"b": 40 – 50 mm (1.6 – 2.0 in)	

Gearshift Lever Removal and Installation

BENF08J15206010

Removal

Remove the gearshift lever as shown in the gearshift lever construction. Refer to "Gearshift Lever Construction" (Page 5B-12).

Installation

1) Install the gearshift lever as shown in the gearshift lever construction. Refer to "Gearshift Lever Construction" (Page 5B-12).
2) After installing the gearshift lever, check the gearshift lever height. Refer to "Gearshift Lever Height Inspection and Adjustment" (Page 5B-13).

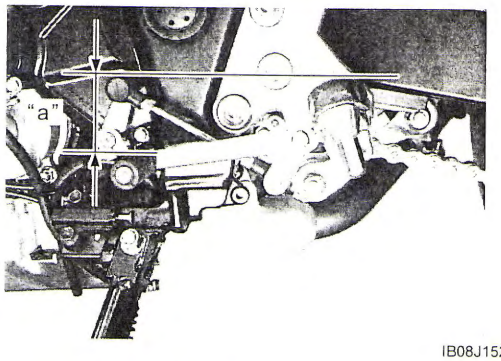
Gearshift Lever Height Inspection and Adjustment

BENF08J15206011

Inspect and adjust the gearshift lever height in the following procedures:

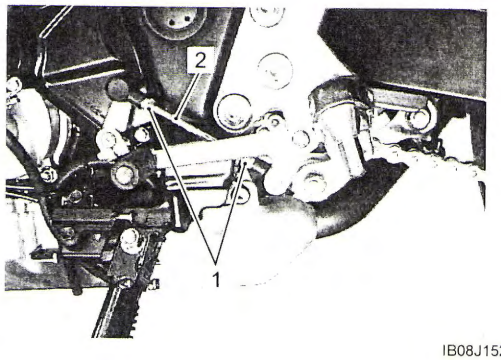
1) Inspect the gearshift lever height "a" between the lever top and footrest.
   Adjust the gearshift lever height if necessary.

   Gearshift lever height "a"
   Standard: 40 – 50 mm (1.6 – 2.0 in)



IB08J1520035-02

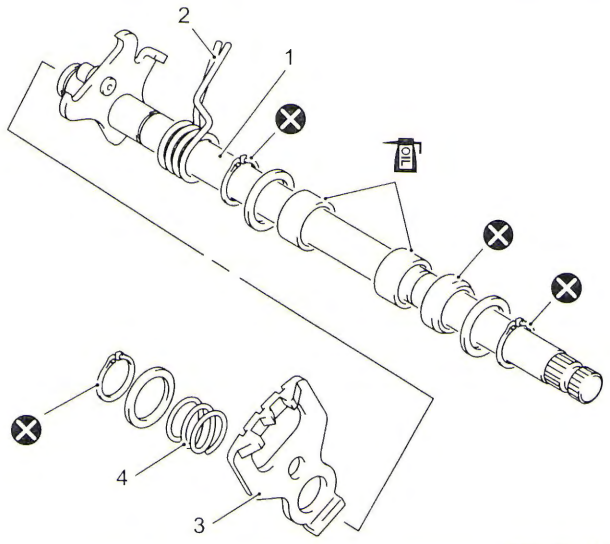
2) Loosen the lock-nuts (1).
3) Turn the gearshift link rod (2) until the gearshift lever is 40 – 50 mm (1.6 – 2.0 in) below the top of the footrest.
4) Tighten the lock-nuts securely.



IB08J1520036-02

Gearshift Shaft / Gearshift Cam Plate Components

BENF08J15206012

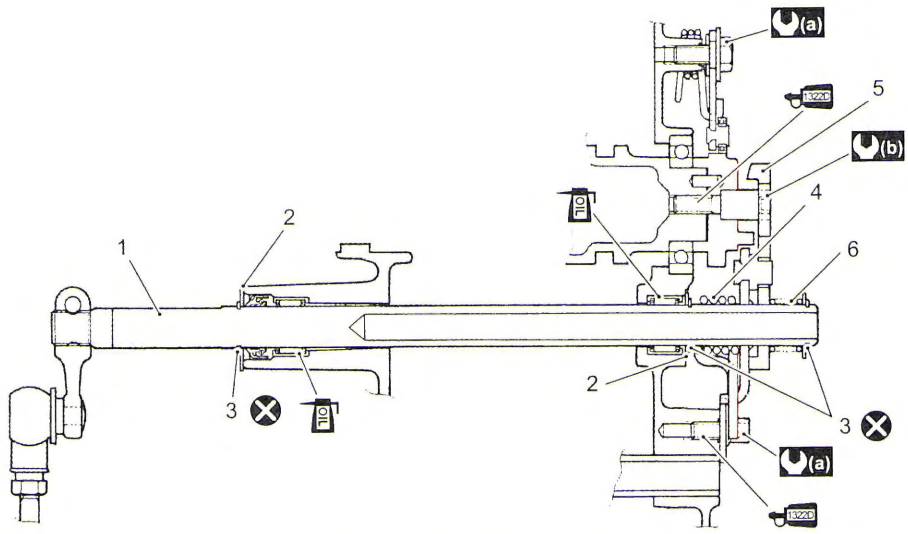


IB08J1520056-01

1.	Gearshift shaft
2.	Gearshift shaft return spring
3.	Gearshift cam drive plate
4.	Gearshift plate return spring
:	Apply engine oil to bearing.
:	Do not reuse.

Gearshift Shaft Construction

BENF08J15206013



IF08J1520003-01

1. Gearshift shaft	5. Gearshift cam drive plate	: Apply grease.
2. Washer	6. Gearshift plate return spring	1322D : Apply thread lock to the thread part.
3. Snap ring	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	OIL : Apply engine oil to bearing.
4. Gearshift shaft return spring	(b) : 13 N·m (1.3 kgf-m, 9.5 lbf-ft)	: Do not reuse.

Gearshift Shaft / Gearshift Cam Plate Removal and Installation

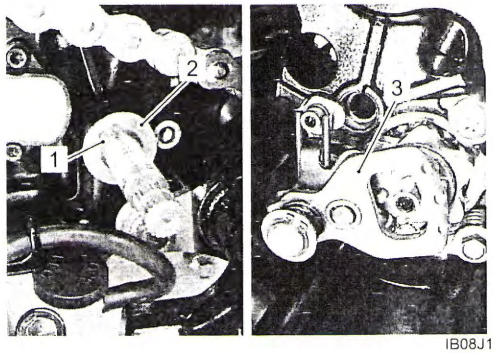
BENF08J15206014

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-8).
3) Remove the oil pump assembly. Refer to "Oil Pump Removal and Installation" in Section 1E (Page 1E-13).
4) Remove the snap ring (1) and washer (2) from the gearshift shaft.

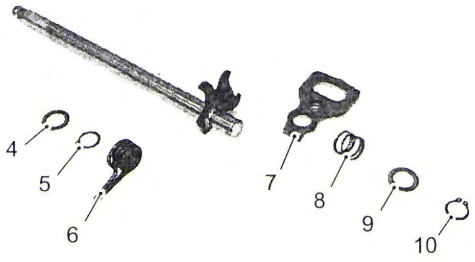
Special tool
TOOL : 09900–06107 (Snap ring pliers)

5) Remove the gearshift shaft assembly (3).



IB08J1520038-02

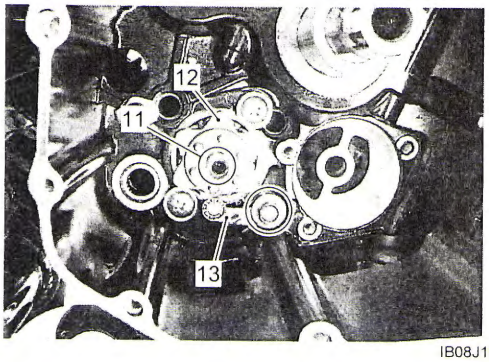
6) Remove the following parts in the figure from the gearshift shaft.



IB08J1520039-02

4. Washer	
5. Snap ring	
6. Gearshift shaft return spring	
7. Gearshift cam drive plate	
8. Gearshift plate return spring	
9. Washer	
10. Snap ring	

7) Remove the gearshift cam plate bolt (11) and gearshift cam plate (12).
8) Remove the gearshift cam stopper (13).



IB08J1520040-02

Installation

Install the gearshift shaft and gearshift cam plate in the reverse order of removal. Pay attention to the following points:

NOTE

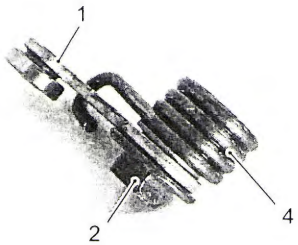
The removed snap rings must be replaced with new ones.

- Install the gearshift cam stopper (1), bolt (2), collar (3) and return spring (4).
- Tighten the gearshift cam stopper bolt (2) to the specified torque.

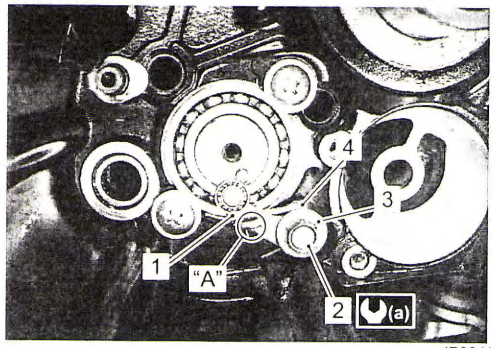
NOTE

Hook the return spring end "A" to the stopper (1).

Tightening torque
Gearshift cam stopper bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1520041-02

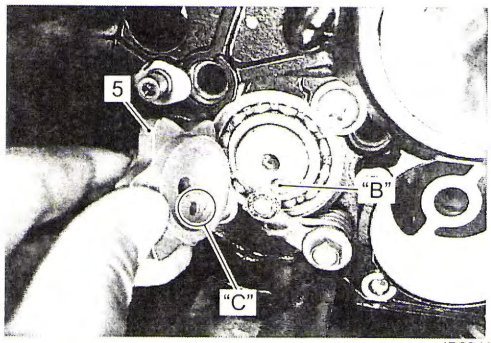


IB08J1520042-02

- Check the gearshift cam stopper moves smoothly.
- Locate the gearshift cam in the neutral position.
- Install the gearshift cam stopper plate (5).

NOTE

Align the gearshift cam pin "B" with the gearshift cam stopper plate hole "C".

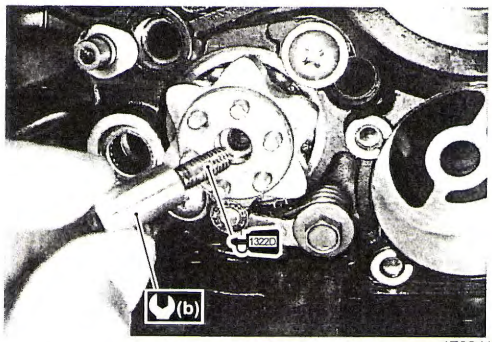


IB08J1520043-02

- Apply a small quantity of thread lock to the gearshift cam stopper plate bolt and tighten it to the specified torque.

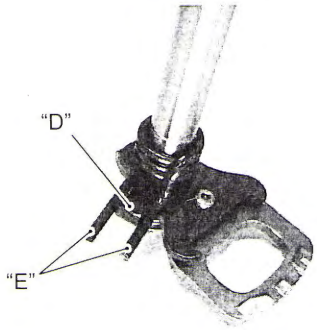
1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Tightening torque
Gearshift cam stopper plate bolt (b): 13 N·m (1.3 kgf-m, 9.5 lbf-ft)



IF08J1520004-01

- When installing the gearshift shaft return spring, position the stopper "D" of gearshift arm between the shaft return spring ends "E".



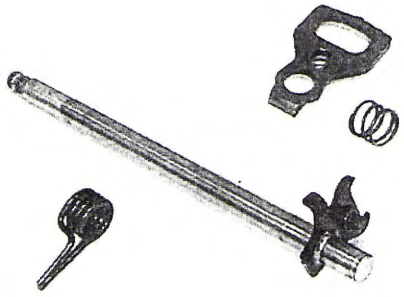
IB08J1520045-02

Gearshift Linkage Inspection

BENF08J15206015

Gearshift Shaft

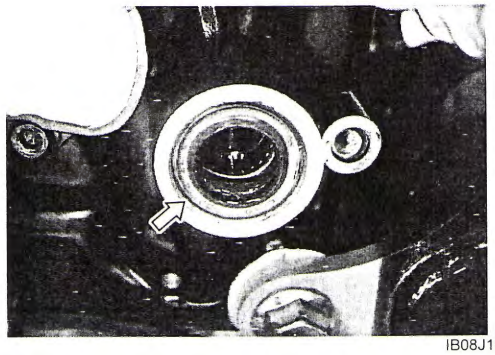
Check the gearshift shaft for bend or wear.
Check the return spring for damage or fatigue.
If any defects are found, replace the defective part(-s).



IB08J1520046-02

Gearshift Shaft Oil Seal

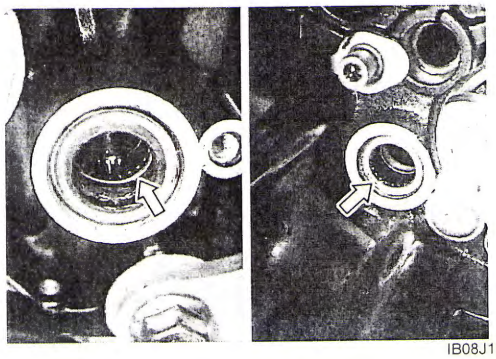
Inspect the gearshift shaft oil seal lip for damage or wear. If any defect is found, replace the oil seal with a new one.



IB08J1520047-02

Gearshift Shaft Bearing

Inspect the gearshift shaft bearings for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



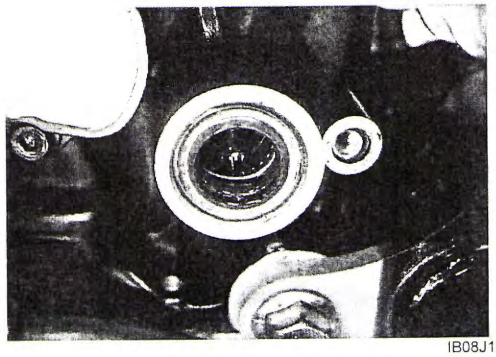
IB08J1520048-02

Gearshift Shaft Oil Seal / Bearing Removal and Installation

BENF08J15206016

Removal

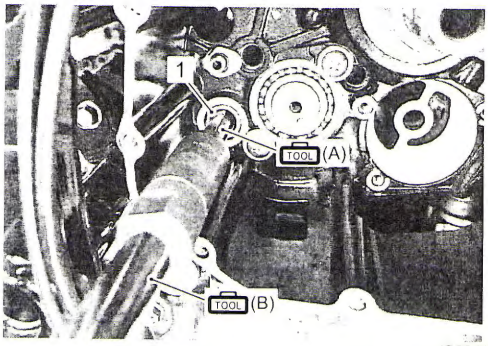
1) Remove the gearshift shaft. Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation" (Page 5B-14).
2) Remove the gearshift shaft oil seal.



IB08J1520049-02

3) Remove the bearings (1) and (2) with the special tools.

Special tool
TOOL (A): 09921–20210 (Bearing remover (12 mm))
TOOL (B): 09930–30104 (Rotor remover sliding shaft)



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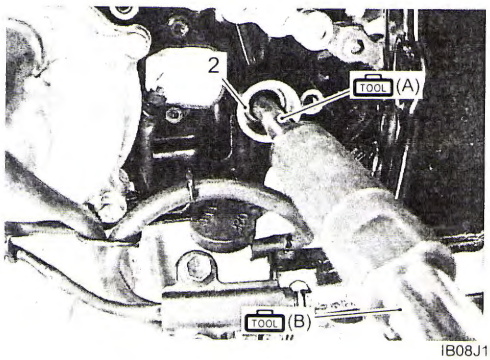


IB08J1520051-02

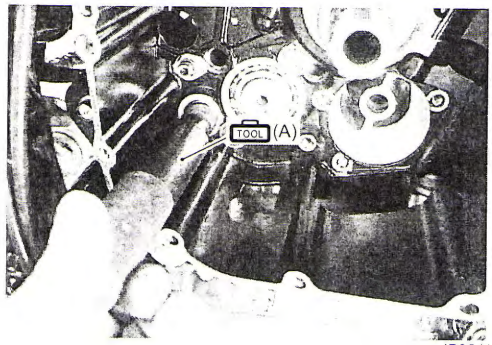
Installation
Install the oil seal and bearings in the reverse order of removal. Pay attention to the following points:

- Install the new bearings with the special tool.

NOTE

The stamped mark side of gearshift shaft bearing faces outside.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)



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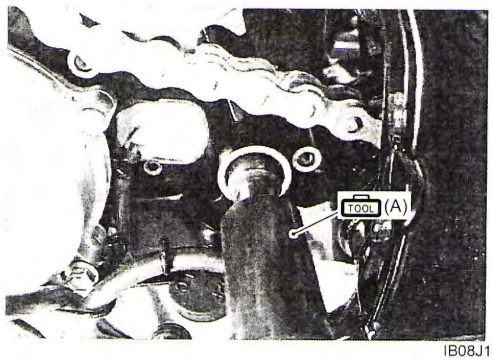


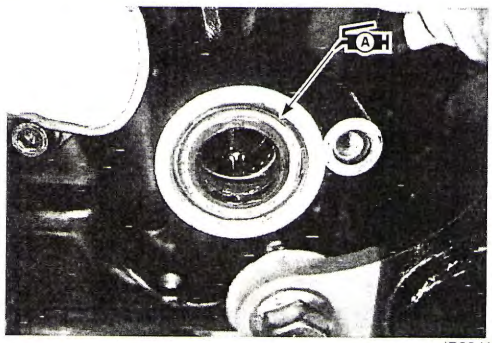
IB08J1520053-02

- Install the new oil seal with the special tool.

Special tool
TOOL : 09913–70210 (Bearing installer set)

- Apply grease to the oil seal lip.

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



IB08J1520054-02

Specifications

Service Data

BENF08J15207001

Drive Train

Unit: mm (in) Except ratio

Item		Standard		Limit
Primary reduction ratio		1.857 (78/42)		—
Final reduction ratio		2.470 (42/17)		—
Gear ratios	Low	2.785 (39/14)		—
	2nd	2.052 (39/19)		—
	3rd	1.681 (37/22)		—
	4th	1.450 (29/20)		—
	5th	1.304 (30/23)		—
	Top	1.181 (26/22)		—
Shift fork to groove clearance		0.1 – 0.3 (0.004 – 0.012)		0.5 (0.02)
Shift fork groove width		5.0 – 5.1 (0.197 – 0.201)		—
Shift fork thickness		4.8 – 4.9 (0.189 – 0.193)		—
Drive chain		Type	RK 525SMOZ8	—
		Links	112 links	—
		20-pitch length	—	319.4 (12.57)
Drive chain slack (on side-stand)		20 – 30 (0.8 – 1.2)		—
Gearshift lever height		40 – 50 (1.6 – 2.0)		—

Tightening Torque Specifications

BENF08J15207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Gearshift fork shaft retainer bolt	10	1.0	7.0	☞(Page 5B-5)
Bearing retainer screw	8	0.8	6.0	☞(Page 5B-5)
GP switch mounting bolt	6.5	0.65	4.7	☞(Page 5B-11)
Gearshift cam stopper bolt	10	1.0	7.0	☞(Page 5B-15)
Gearshift cam stopper plate bolt	13	1.3	9.5	☞(Page 5B-15)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Transmission Components" (Page 5B-2)

"Gearshift Lever Construction" (Page 5B-12)

"Gearshift Shaft Construction" (Page 5B-14)

"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J15208001

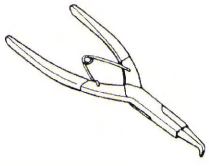
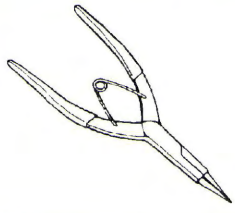
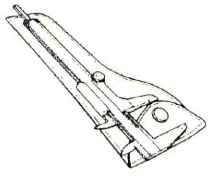
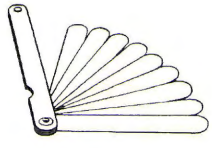
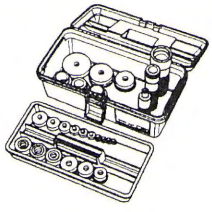
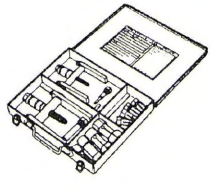
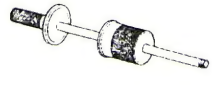
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 5B-4) / ☞(Page 5B-8) / ☞(Page 5B-11) / ☞(Page 5B-17)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 5B-8)
Thread lock cement	THREAD LOCK CEMENT 1322D	P/No.: 99000–32150	☞(Page 5B-5) / ☞(Page 5B-11) / ☞(Page 5B-15)

NOTE

Required service material(s) is also described in:
"Transmission Components" (Page 5B-2)
"Gearshift Lever Construction" (Page 5B-12)
"Gearshift Shaft / Gearshift Cam Plate Components" (Page 5B-13)
"Gearshift Shaft Construction" (Page 5B-14)

Special Tool

BENF08J15208002

09900–06104 Snap ring pliers (External: Bent nose) ☞(Page 5B-7)		09900–06107 Snap ring pliers (External) ☞(Page 5B-14)	
09900–20102 Vernier calipers (200 mm) ☞(Page 5B-10) / ☞(Page 5B-10)		09900–20803 Thickness gauge ☞(Page 5B-10)	
09913–70210 Bearing installer set ☞(Page 5B-4) / ☞(Page 5B-4) / ☞(Page 5B-4) / ☞(Page 5B-9) / ☞(Page 5B-9) / ☞(Page 5B-9) / ☞(Page 5B-17) / ☞(Page 5B-17)		09921–20210 Bearing remover (ø12) ☞(Page 5B-3) / ☞(Page 5B-17)	
09921–20240 Bearing remover set ☞(Page 5B-3) / ☞(Page 5B-4)		09930–30104 Rotor remover sliding shaft This tool is included in Rotor remover set (09930-30135). ☞(Page 5B-3) / ☞(Page 5B-17)	

Clutch

Precautions

Precautions for Clutch System

BENF08J15300001

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

Schematic and Routing Diagram

Clutch Cable Routing Diagram

BENF08J15302001

Refer to "Throttle Cable Routing Diagram" in Section 1D (Page 1D-2).

Diagnostic Information and Procedures

Clutch System Symptom Diagnosis

BENF08J15304001

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, driven and drive.	*Replace.*
	Worn clutch release bearing.	*Replace.*
	Weakened clutch dampers.	*Replace primary driven gear.*
Clutch slips	Weakened clutch springs.	*Replace.*
	Worn or distorted clutch pressure plate.	*Replace.*
	Distorted clutch plates.	*Replace.*
	Clutch cable play out of adjustment.	*Adjust.*
Clutch drags	Clutch cable play out of adjustment.	*Adjust.*
	Some clutch springs are weak, while others are not.	*Replace.*
	Worn or distorted clutch pressure plates.	*Replace.*
	Distorted clutch plates.	*Replace.*

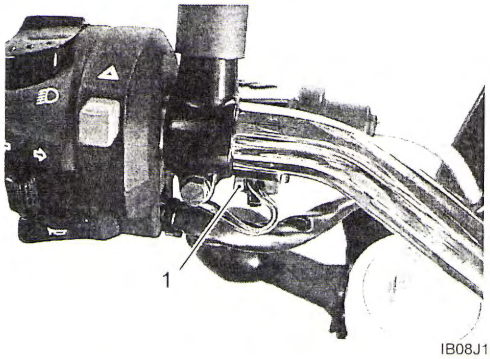
Repair Instructions

Clutch Lever Position Switch Inspection

BENF08J15306001

Inspect the clutch lever position switch in the following procedures:

1) Disconnect the clutch lever switch coupler (1).



IB08J1530001-02

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 (•)))

Color / Position	B/W	B/Y
OFF		
ON	○	○

I944H1530002-01

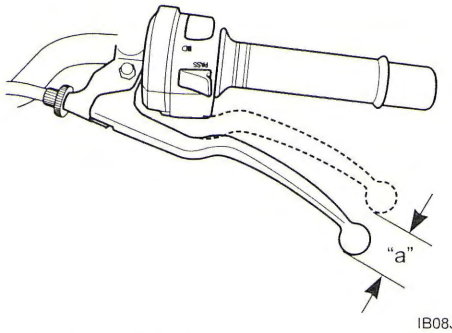
3) Connect the clutch lever position switch coupler.

Clutch Cable Inspection and Adjustment

BENF08J15306002

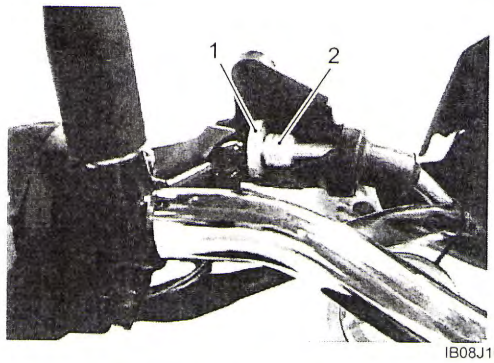
Inspect and adjust the clutch cable play "a" as follows.

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



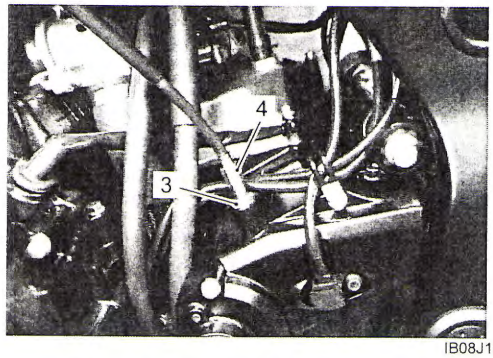
IB08J1020057-01

1) Loosen the lock nut (1).
2) Turn the clutch lever adjuster (2) clockwise as far as it will go.



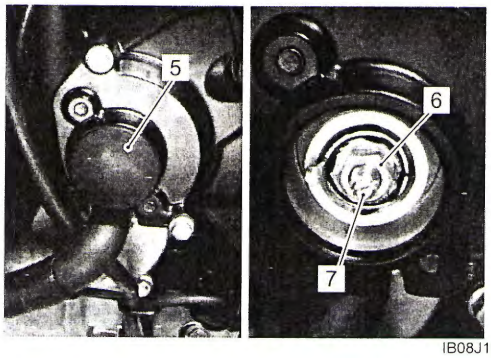
IB08J1020058-01

3) Loosen the lock nut (3) and turn the cable adjuster (4) clockwise as far as it will go.



IB08J1020059-01

4) Remove the cap from the left side sprocket cover (5).
5) Loosen the lock nut (6) and turn out the adjuster screw (7) two or three rotations.
6) From that position, slowly turn the adjuster screw (7) in until it stops. Turn the adjuster screw (7) out 1/4 rotation, and tighten the lock nut (6).



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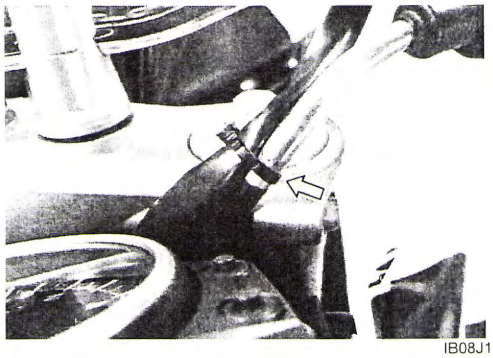
7) Turn out the clutch lever adjuster (2) three to five rotations.
8) Turn the cable adjuster (4) to obtain approximately 10 – 15 mm (0.4 – 0.6 in) of free play at the clutch lever end as indicated.
9) Minor adjustment can now be made with the adjuster (2).
10) Tighten the lock nuts, (1) and (3), after finishing adjustment.

Clutch Cable Removal and Installation

BENF08J15306003

Removal

1) Remove the engine sprocket cover. Refer to "Engine Sprocket Removal and Installation" in Section 3A (Page 3A-2).
2) Disconnect the clamp.



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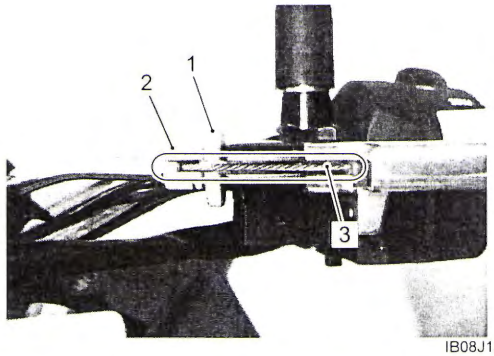
3) Loosen the cable lock-nut (1) and adjuster (2).

NOTE

Align the clutch lever, cable lock-nut (1) and adjuster (2) with the cutaway.

4) Disconnect the clutch cable (3) (clutch lever side).



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5) Remove the left frame body cover. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
6) Remove the clutch cable as shown in the cable routing diagram. Refer to "Throttle Cable Routing Diagram" in Section 1D (Page 1D-2).

Installation

Install the clutch cable in the reverse order of removal. Pay attention to the following point:

- Install the clutch cable as shown in the cable routing diagram. Refer to "Throttle Cable Routing Diagram" in Section 1D (Page 1D-2).
- After install the removed parts, adjust the clutch cable play. Refer to "Clutch Cable Inspection and Adjustment" (Page 5C-2).

Clutch Lever Components

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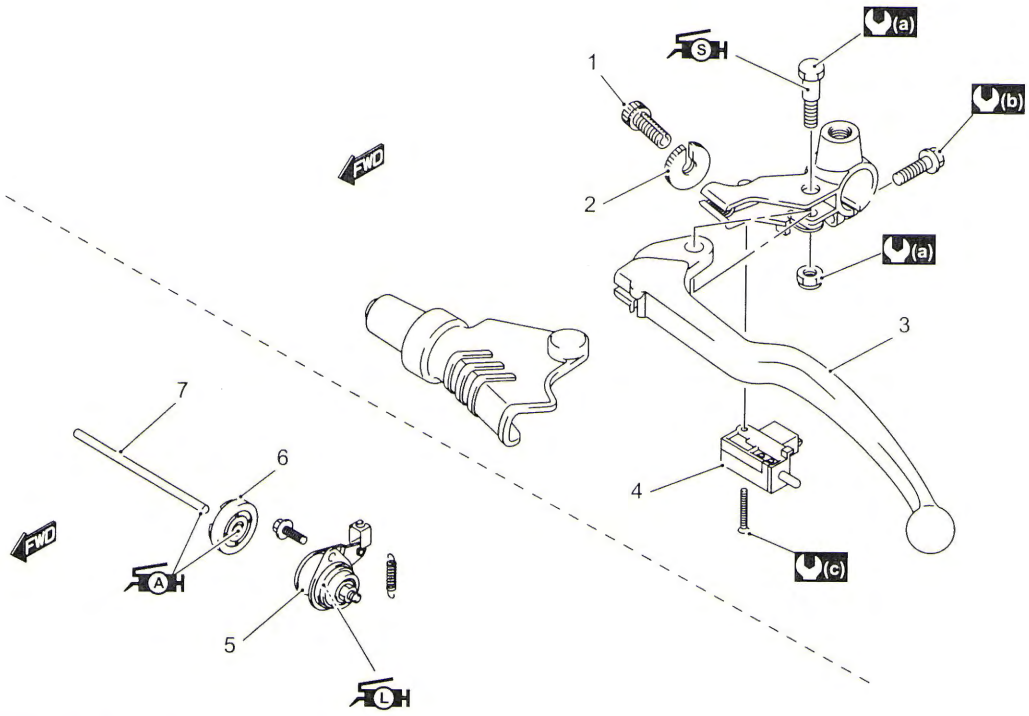

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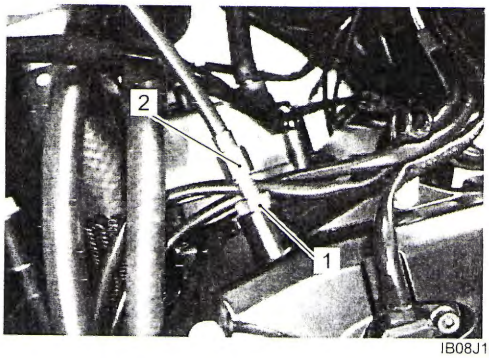
1. Adjuster	6. Oil seal	A : Apply grease.
2. Lock-nut	7. Clutch push rod (left)	S : Apply silicone grease.
3. Clutch lever	(a) : 6.5 N·m (0.65 kgf-m, 4.7 lbf-ft)	L : Apply molybdenum grease L.
4. Clutch lever position switch	(b) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	⊗ : Do not reuse.
5. Clutch release screw	(c) : 0.6 N·m (0.06 kgf-m, 0.43 lbf-ft)	

Clutch Lever Removal and Installation

BENF08J15306005

Removal

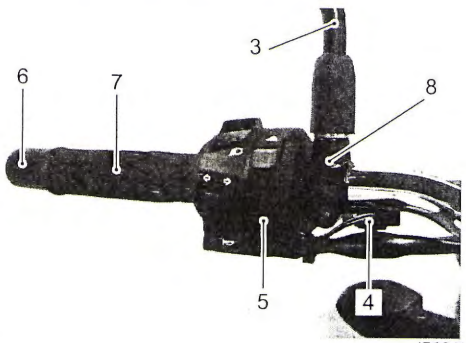
1) Full loosen the cable adjuster lock nut (1) and adjuster (2) (engine side).



IB08J1530038-03

2) Disconnect the clutch cable (clutch lever side). Refer to "Clutch Cable Removal and Installation" (Page 5C-3).

3) Remove the following parts from the left handle bar.
   a) Rear view mirror (3)
   b) Clutch lever position switch coupler (4)
   c) Left handlebar switch box (5)
   d) Handlebar balancer (6)
   e) Grip rubber (7)
   f) Clutch lever assembly (8)



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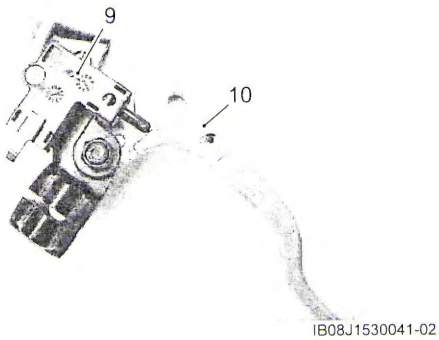
4) Remove the clutch lever position switch (9) and clutch lever (10).



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Installation

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

- Apply grease to the clutch lever pivot bolt.

: Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)



I944H1530009-01

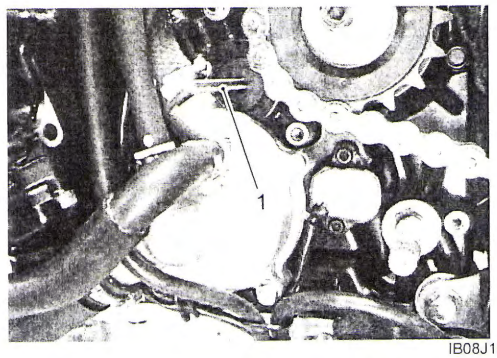
- Install the left handlebar components. Refer to "Handlebars Removal and Installation" in Section 6B (Page 6B-3).
- After install the removed parts, adjust the clutch cable play. Refer to "Clutch Cable Inspection and Adjustment" (Page 5C-2).

Clutch Push Rod (Left) / Clutch Release Screw Removal and Installation

BENF08J15306006

Removal

1) Remove the engine sprocket cover. Refer to "Engine Sprocket Removal and Installation" in Section 3A (Page 3A-2).
2) Remove the clutch push rod (1).



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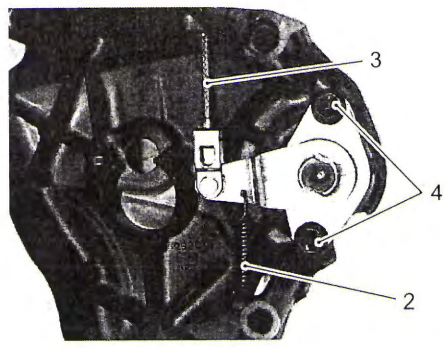
3) Remove the return spring (2) and clutch cable (3).
4) Remove the clutch release screw (4).



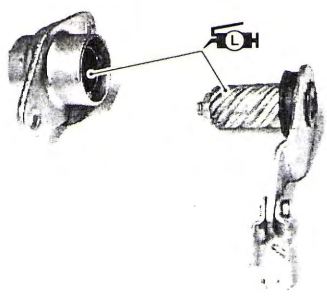
IB08J1530003-03

Installation

Install the clutch release screw in the reverse order of removal. Pay attention to the following points:

- Apply SUZUKI MOLYBDENUM GREASE L to the clutch release screw.

: Grease 99000–25280 (SUZUKI MOLYBDENUM GREASE L or equivalent)



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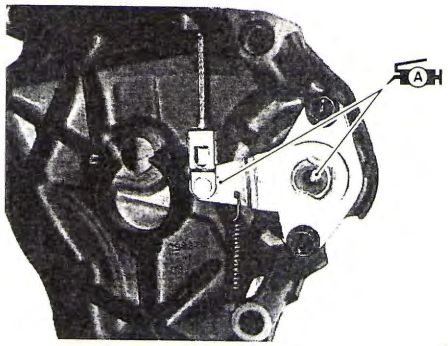
- Apply grease to the sliding surface and the clutch push rod.

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



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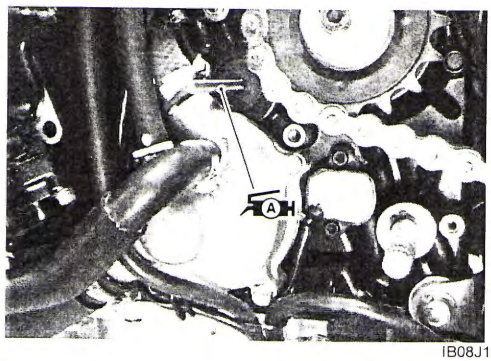

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Clutch Push Rod (Left) Inspection

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Inspect the push rod in the following procedures:

1) Remove the clutch push rod. Refer to "Clutch Push Rod (Left) / Clutch Release Screw Removal and Installation" (Page 5C-5).
2) Inspect the push rod for wear or bend. If any defects are found, replace it with a new one.



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3) Reinstall the removed parts. Refer to "Clutch Push Rod (Left) / Clutch Release Screw Removal and Installation" (Page 5C-5).

Clutch Components

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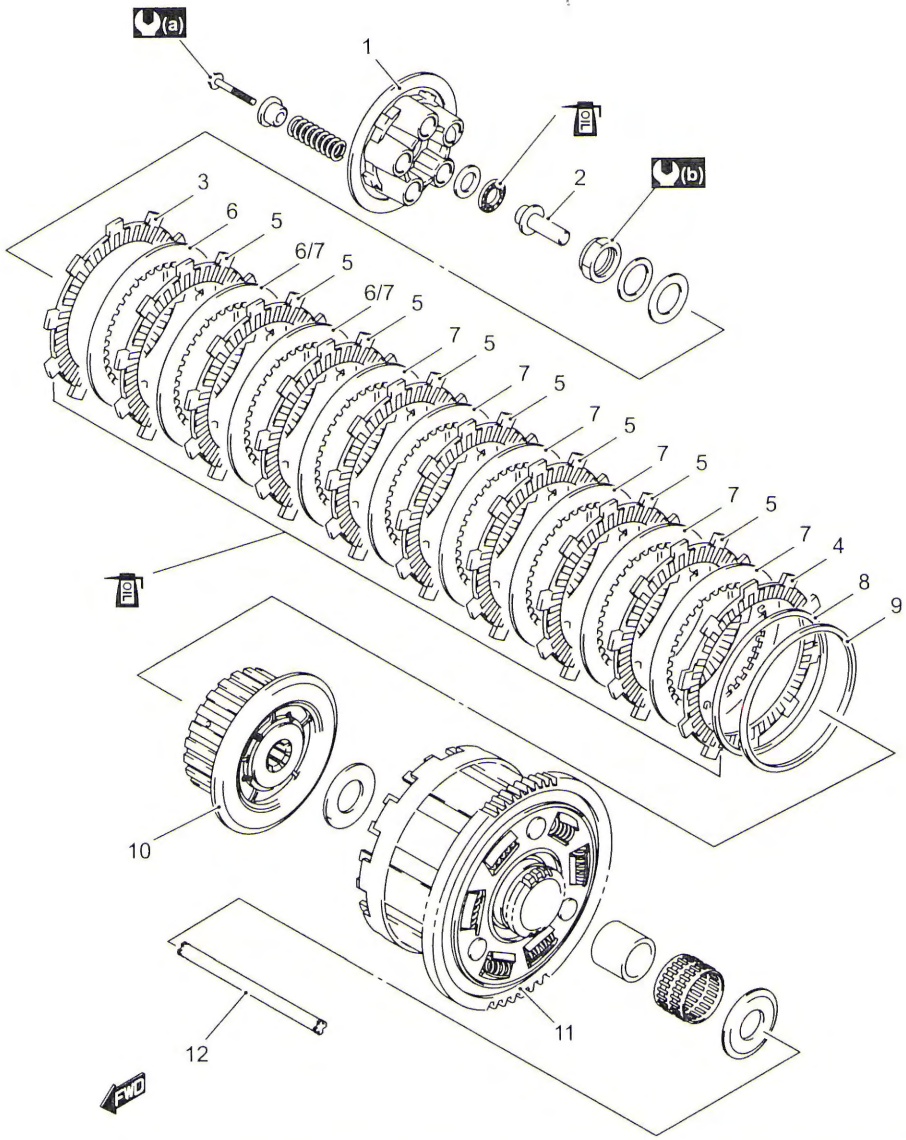


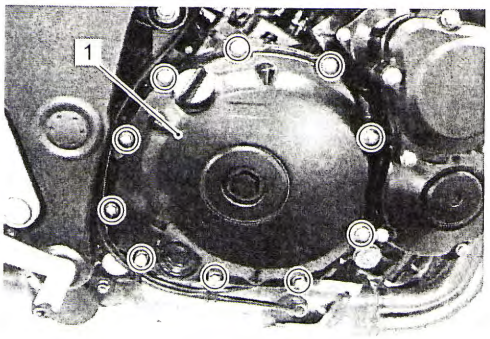
IB08J1530045-05

1. Clutch pressure plate	7. No. 2 driven plate (6 – 8 pcs.)	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
2. Clutch push piece	8. Spring washer	(b) : 150 N·m (15.0 kgf-m, 108.5 lbf-ft)
3. No. 2 drive plate	9. Spring washer seat	: Apply engine oil.
4. No. 3 drive plate	10. Clutch sleeve hub	: Do not reuse.
5. No. 1 drive plate	11. Primary driven gear assembly	
6. No. 1 driven plate (1 – 3 pc(-s).)	12. Clutch push rod (right)	

Clutch Removal

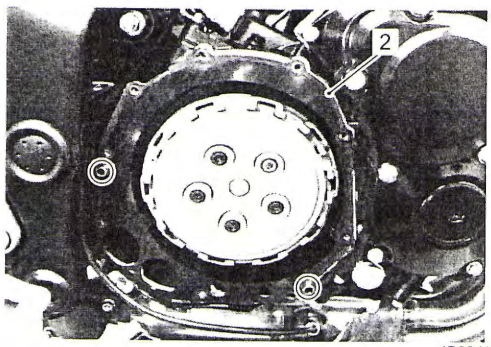
BENF08J15306009

1) Drain engine oil. Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).
2) Remove the clutch cover (1).



IB08J1530007-02

3) Remove the gasket (2) and dowel pins.



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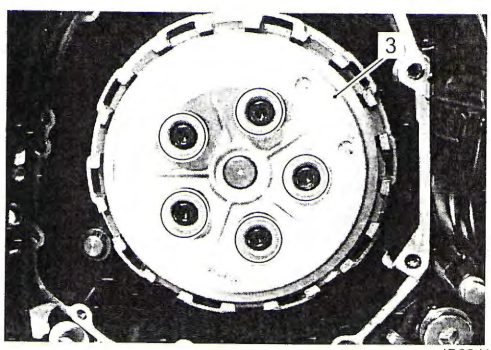
4) Remove the clutch springs and clutch pressure plate (3).

NOTE

Loosen the clutch spring set bolts little by little and diagonally.



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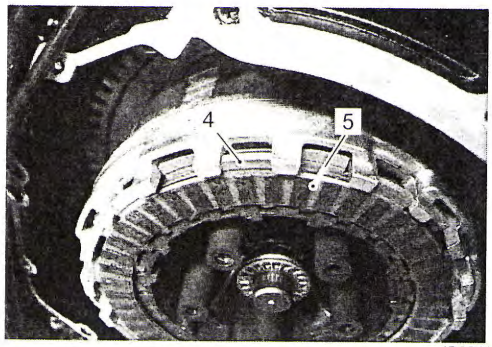
5) Remove the clutch drive plates (4) and driven plates (5).



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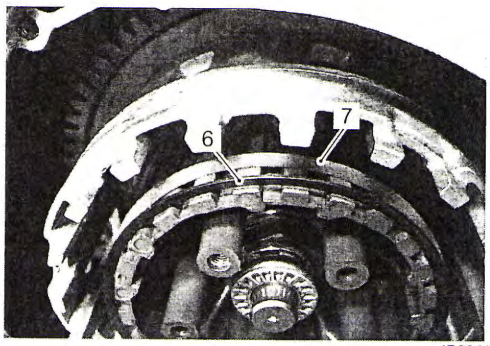
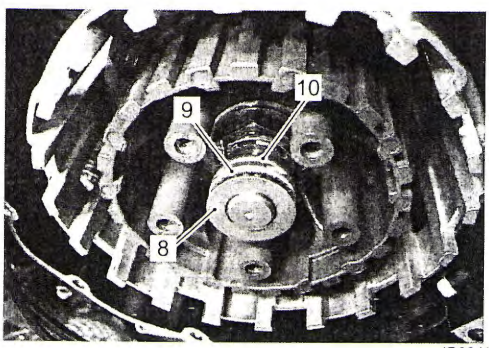
6) Remove the spring washer (6) and spring washer seat (7).



IB08J1530010-02

7) Remove the thrust washer (8), bearing (9) and clutch push piece (10).

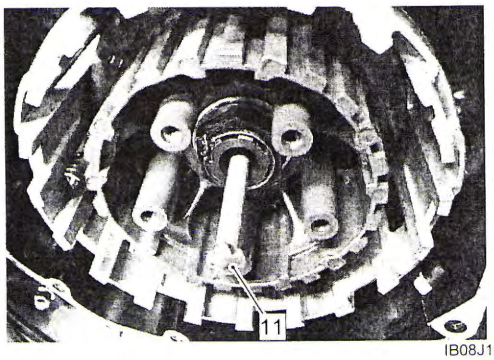


IB08J1530011-02

8) Remove the clutch push rod (11).

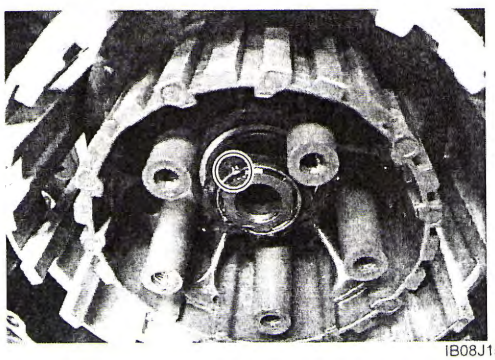
NOTE

If it is difficult to pull out the push rod (11), use a magnetic hand or a wire.



IB08J1530012-02

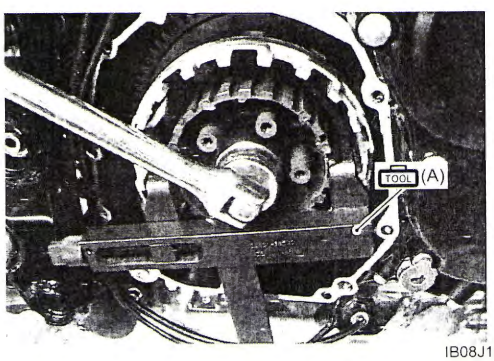
9) Unlock the clutch sleeve hub nut.



IB08J1530013-02

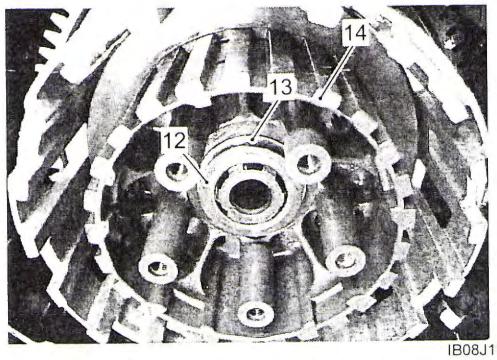
10) Hold the clutch sleeve hub using the special tool and remove the clutch sleeve hub nut.

Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)



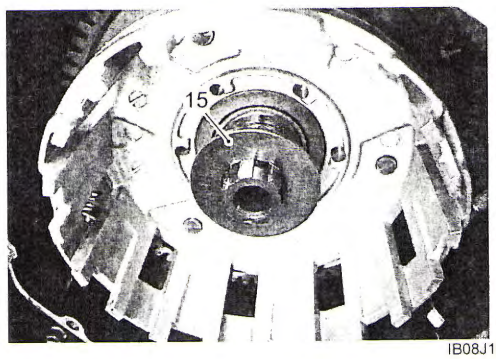
IB08J1530014-02

11) Remove the conical spring washer (12), washer (13) and clutch sleeve hub (14).



IB08J1530015-02

12) Remove the thrust washer (15).



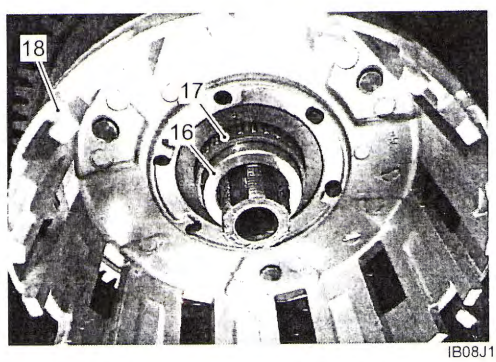
IB08J1530016-02

13) Remove the spacer (16) and bearing (17).

14) Remove the primary driven gear assembly (18).

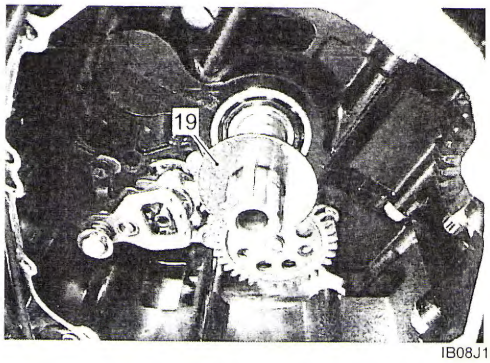
NOTE

If it is difficult to remove the primary driven gear, rotate the crankshaft.



IB08J1530017-03

15) Remove the thrust washer (19).



IB08J1530018-03

Clutch Installation

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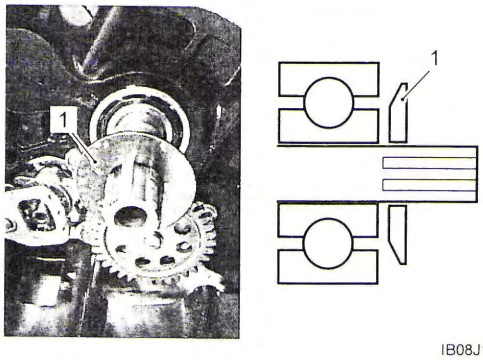
1) Install the thrust washer (1) onto the countershaft.

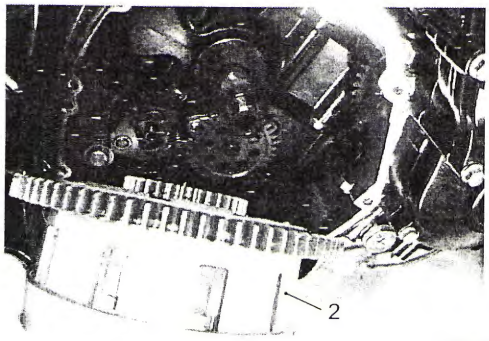


IB08J1530019-02

2) Install the primary driven gear assembly (2) onto the countershaft.

NOTE

- **If it is difficult to install the primary driven gear, rotate the crankshaft.**
- **Be sure to engage the oil pump drive and driven gears, primary drive and driven gears.**



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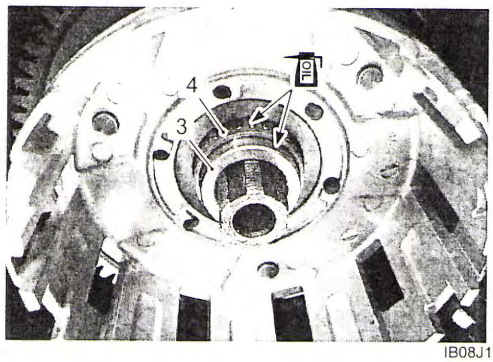
3) Install the spacer (3) and bearing (4), and apply engine oil to them.



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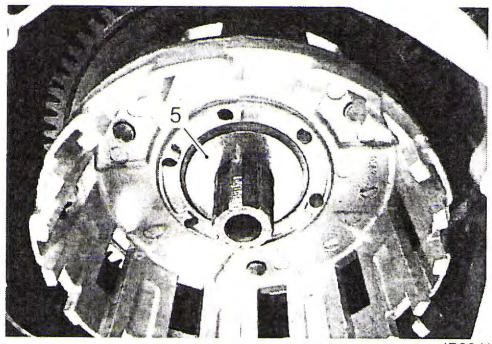
4) Install the thrust washer (5).

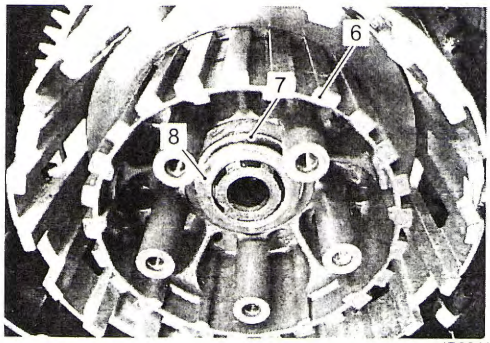


IB08J1530022-02

5) Install the clutch sleeve hub (6), washer (7) and spring washer (8).

NOTE

The conical curve side of spring washer (8) faces outside.



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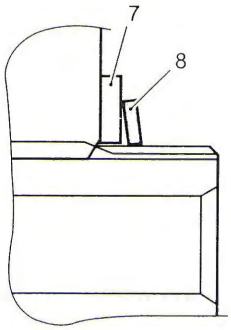
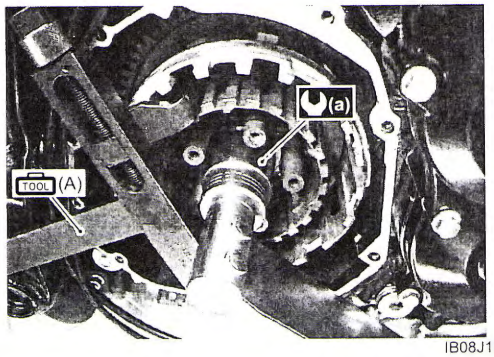


IB08J1530024-01

6) Hold the clutch sleeve hub with the special tool and tighten the clutch sleeve hub nut to the specified torque.

Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)

Tightening torque
Clutch sleeve hub nut (a): 150 N·m (15.0 kgf-m, 108.5 lbf-ft)



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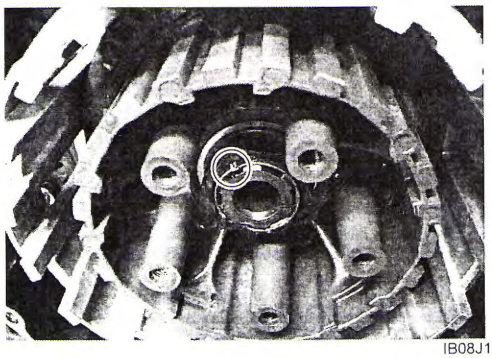
7) Lock the clutch sleeve hub nut with a center punch.



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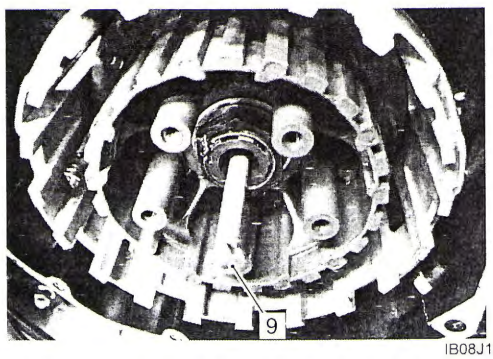
8) Install the clutch push rod (9) into the countershaft.

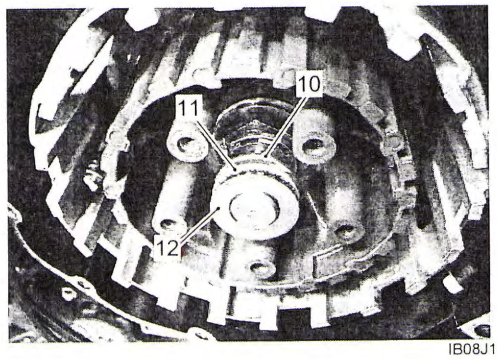


IB08J1530026-02

9) Install the clutch push piece (10), the bearing (11) and thrust washer (12) to the countershaft.

NOTE

Thrust washer (12) is located between the pressure plate and bearing (11).



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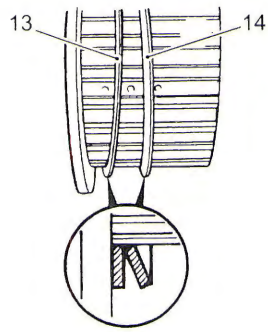
10) Install the spring washer seat (13) and spring washer (14) onto the clutch sleeve hub correctly.

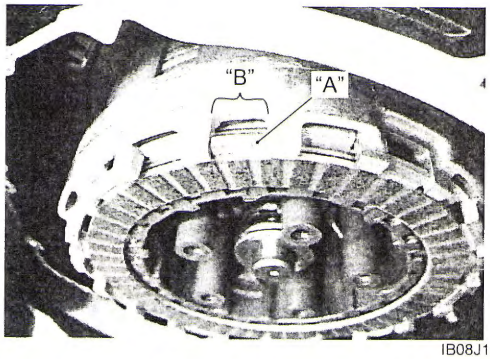


IB08J1530047-01

11) Apply engine oil to the clutch drive plates and driven plates.
12) Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order.

NOTE

Insert the outermost No. 2 drive plate claws "A" to the other slits "B" of clutch housing as shown in the figure.



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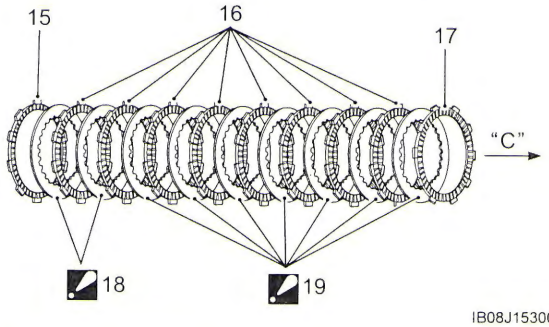
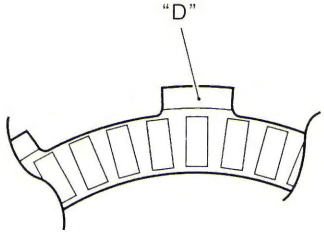


IB08J1530029-01

15.	No. 3 drive plate
16.	No. 1 drive plate
17.	No. 2 drive plate
◪ 18.	No. 1 driven plate (1 – 3 pc(-s).) : The No. 1 and No. 2 driven plates are 9 in total.
◪ 19.	No. 2 driven plate (6 – 8 pcs.) : The No. 1 and No. 2 driven plates are 9 in total.
"C":	Direction of outside

NOTE

For drive plate
Three kinds of the drive plate (No. 1, No. 2 and No. 3) are equipped in the clutch system, they can be distinguished by the inside diameter and paint "D".



IB08J1530030-01

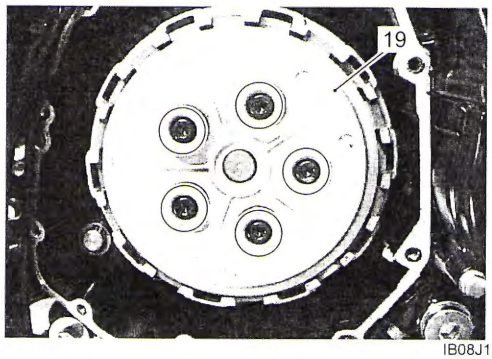
Drive plate	I.D.	Paint
No. 1	101 mm (4.0 in)	○
No. 2	101 mm (4.0 in)	—
No. 3	108 mm (4.3 in)	—

NOTE

Two kinds of the driven plate (No. 1 and No. 2) are equipped in the clutch system, they can be distinguished by the thickness. The No. 1 and No. 2 driven plates are 9 pcs. in total.
1 – 3 pc(-s). of No. 1 driven plate(-s) are used with 6 – 8 pcs. of No. 2 driven plates as a set.
The driven plate No. 2 should be installed pressure plate side.

Driven plate	Thickness
No. 1	1.6 mm (0.06 in)
No. 2	2.0 mm (0.08 in)

13) Install the clutch pressure plate (19) and clutch springs.



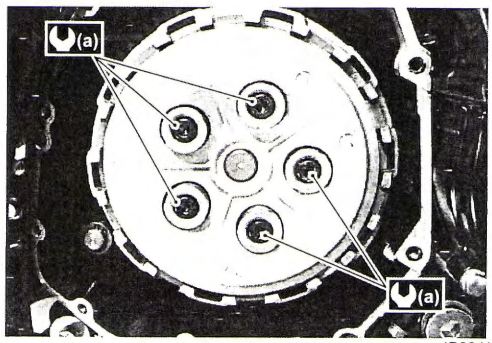
IB08J1530031-02

14) Tighten the clutch spring set bolts to the specified torque.

NOTE

Tighten the clutch spring set bolts diagonally.

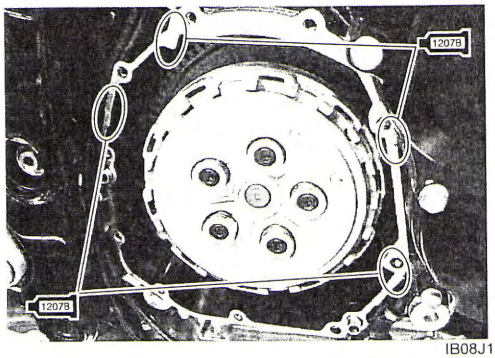
Tightening torque
Clutch spring set bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



IB08J1530032-02

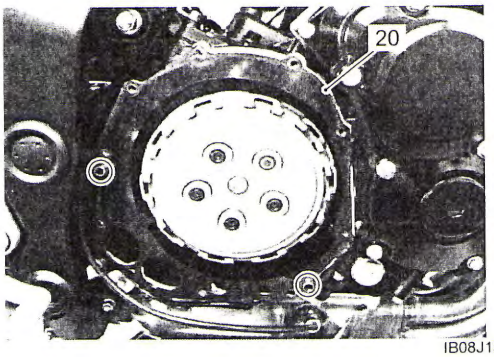
15) Apply a bond lightly to the mating surfaces at the parting line between the upper and middle, middle and lower crankcase as shown in the figure.

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



IB08J1530033-03

16) Install the new gasket (20) and the dowel pins.

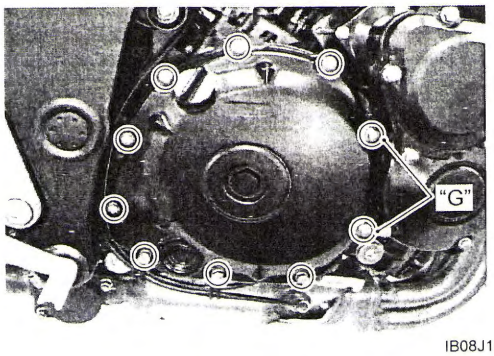


IB08J1530043-02

17) Tighten the clutch cover and tighten the clutch cover bolts.

NOTE

Fit the new gasket washer to the bolt "G".



IB08J1530034-02

18) Pour engine oil. Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).

Clutch Parts Inspection

BENF08J15306011

Refer to "Clutch Removal" (Page 5C-8) and "Clutch Installation" (Page 5C-10).

Clutch Drive and Driven Plate

NOTE

Wipe off the engine oil from the drive and driven plates with a clean rag.

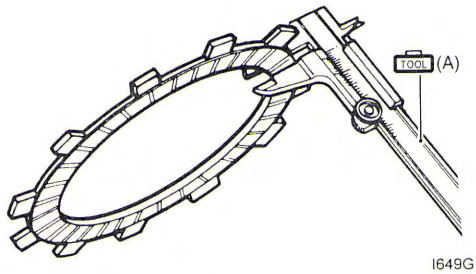
Measure the thickness of drive plates with a vernier calipers. If the drive plate thickness is found to have reached the limit, replace it with a new one.

Special tool

TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Clutch drive plate thickness

Service limit (No. 1, No. 2 and No. 3): 2.62 mm (0.103 in)



I649G1530056-03

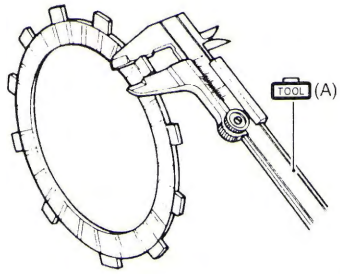
Measure the claw width of drive plates with a vernier calipers. Replace the drive plates found to have worn down to the limit.

Special tool

TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Clutch drive plate claw width

Service limit (No. 1, No. 2 and No. 3): 12.9 mm (0.508 in)

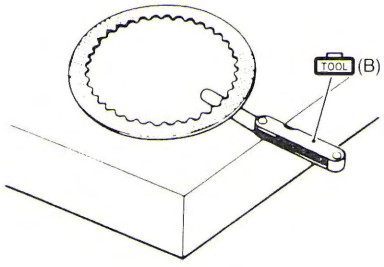


I649G1530057-03

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: 0.10 mm (0.004 in)

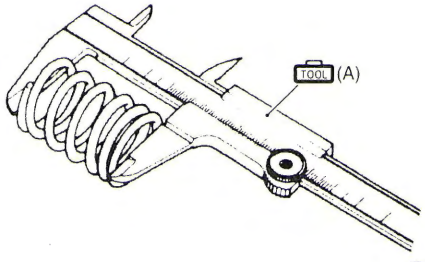


I649G1530058-03

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.

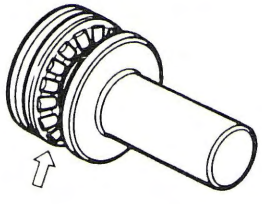
Special tool
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Clutch spring free length
Service limit: 69.8 mm (2.75 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.



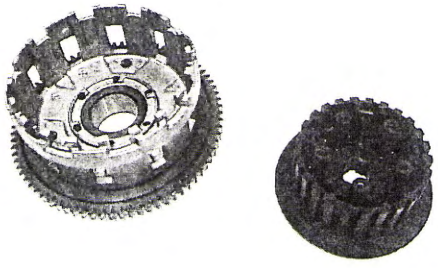
I649G1530059-02

Push Rod (Right)
Inspect the push rod for bend and damage.
If any defects are found, replace the push rod with a new one.



I944H1530050-01

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.



IB08J1530035-02

Specifications

Service Data

BENF08J15307001

Clutch

Unit: mm (in)

Item	Standard		Limit
Clutch cable play	10 – 15 (0.4 – 0.6)		—
Clutch release screw	1/4 turn back		—
Clutch drive plate thickness	No. 1, 2 & 3	2.92 – 3.08 (0.115 – 0.121)	2.62 (0.103)
Clutch drive plate claw width	No. 1, 2 & 3	13.7 – 13.8 (0.539 – 0.543)	12.9 (0.508)
Clutch driven plate distortion	—		0.10 (0.004)
Clutch spring free length	73.47 (2.893)		69.8 (2.75)

Tightening Torque Specifications

BENF08J15307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Clutch sleeve hub nut	150	15.0	108.5	☞(Page 5C-11)
Clutch spring set bolt	10	1.0	7.0	☞(Page 5C-12)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Clutch Lever Components" (Page 5C-4)

"Clutch Components" (Page 5C-7)

"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J15308001

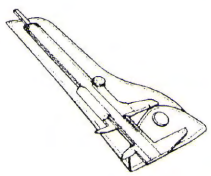
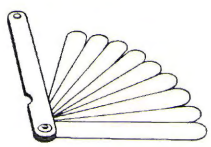
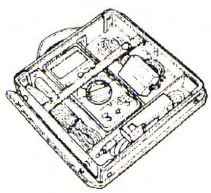
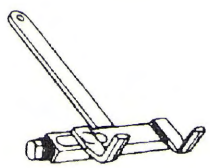
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 5C-6)
	SUZUKI SILICONE GREASE or equivalent	P/No.: 99000–25100	☞(Page 5C-5)
	SUZUKI MOLYBDENUM GREASE L or equivalent	P/No.: 99000–25280	☞(Page 5C-5)
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 5C-13)

NOTE

Required service material(s) is also described in:
"Clutch Lever Components" (Page 5C-4)
"Clutch Components" (Page 5C-7)

Special Tool

BENF08J15308002

09900–20102 Vernier calipers (200 mm) ☞(Page 5C-13) / ☞(Page 5C-13) / ☞(Page 5C-14) 	09900–20803 Thickness gauge ☞(Page 5C-14) 
09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 5C-2) 	09920–53740 Clutch sleeve hub holder ☞(Page 5C-9) / ☞(Page 5C-11) 

Section 6

Steering

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Precautions

Precautions

Precautions for Steering

BENF08J16000001

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

Steering General Diagnosis

Diagnostic Information and Procedures

Steering Symptom Diagnosis

BENF08J16104001

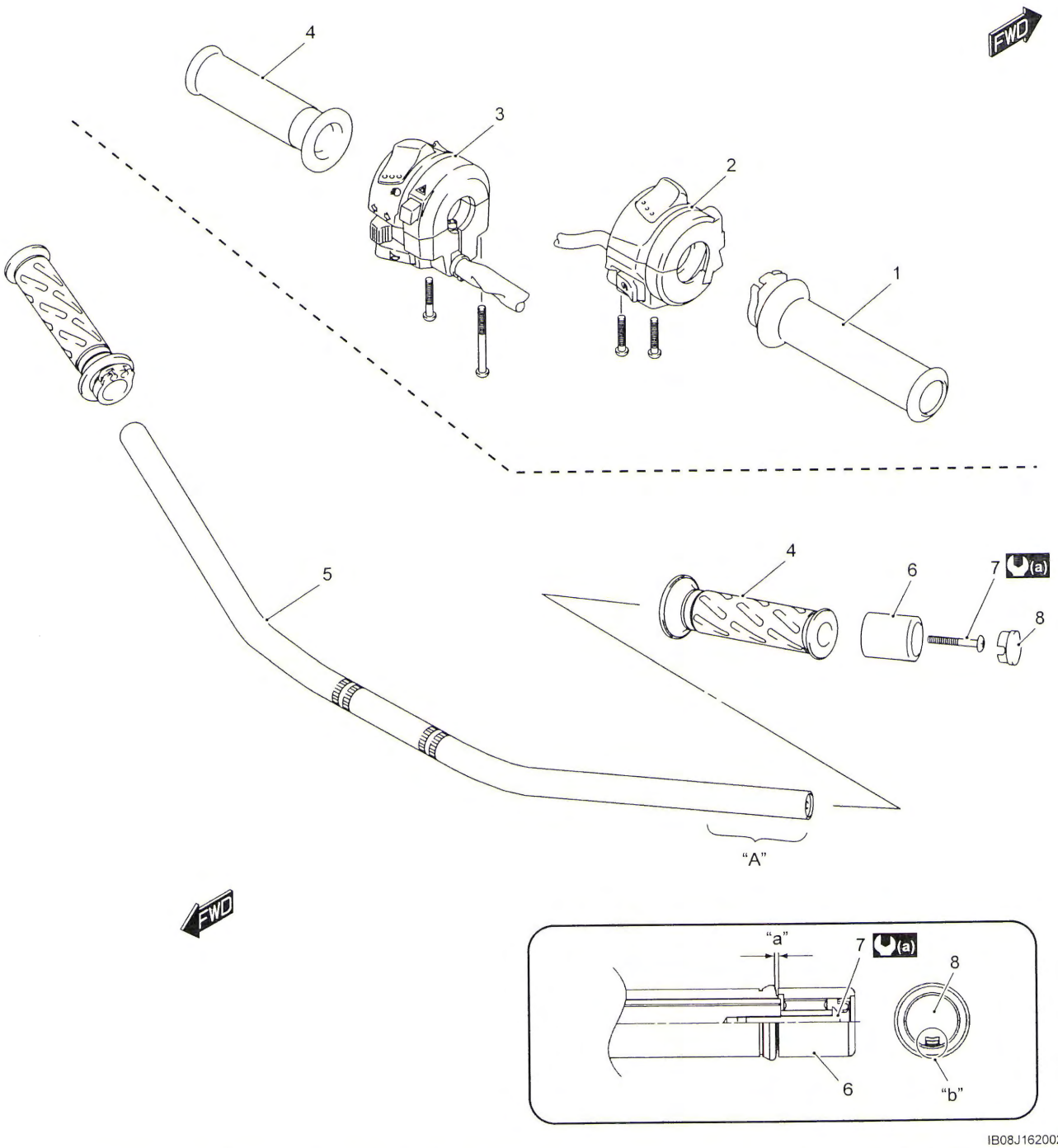
Condition	Possible cause	Correction / Reference Item
Heavy Steering	Over tightened steering stem nut.	*Adjust.*
	Broken bearing in steering stem.	*Replace.*
	Distorted steering stem.	*Replace.*
	Not enough pressure in tires.	*Adjust.*
Wobbly Handlebars	Loss of balance between right and left front forks.	*Replace fork or 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

Handlebars Components

BENF08J16206001

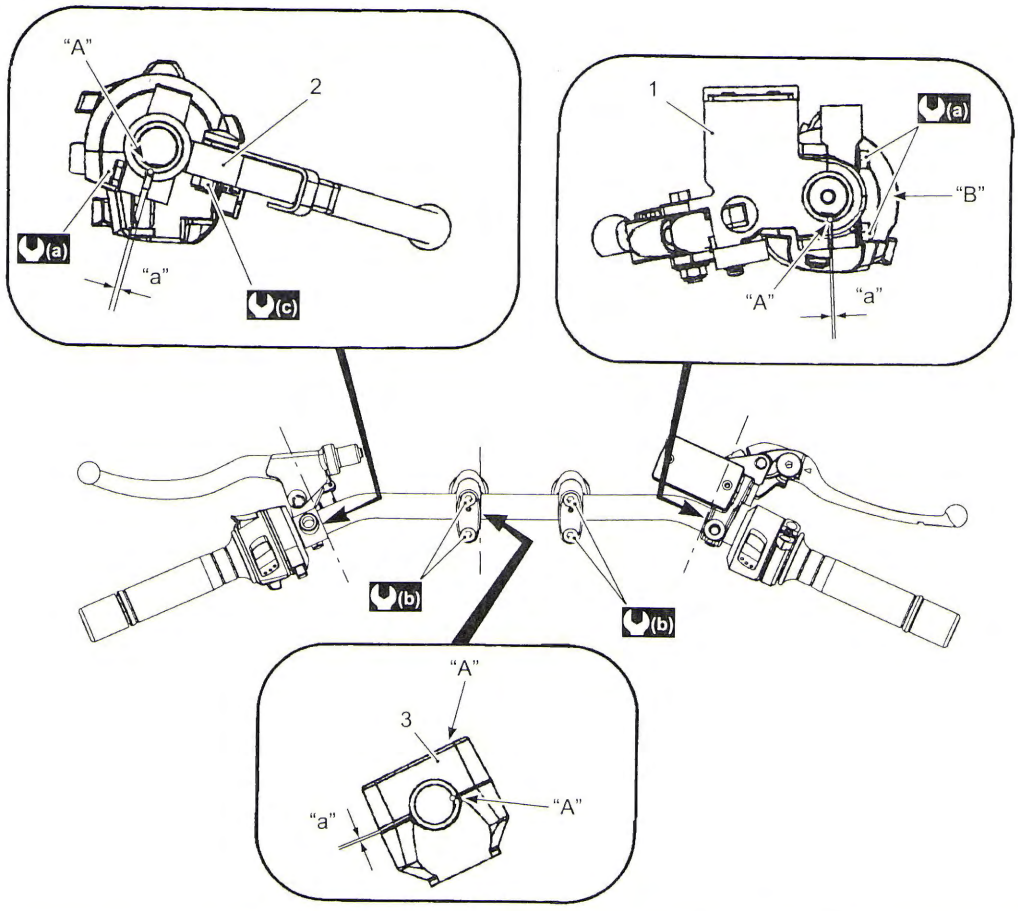


IB08J1620022-01

1. Throttle grip	5. Handlebars	"A": Apply handle grip bond.
2. Right handlebar switch box	6. Handlebar balancer	"a": 0.5 – 1.5 mm (0.02 – 0.06 in)
3. Left handlebar switch box	7. Handle balancer screw	"b": Downward
4. Grip rubber	8. Cap	(a): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)

Handlebar Construction

BENF08J16206002



IB08J1620001-03

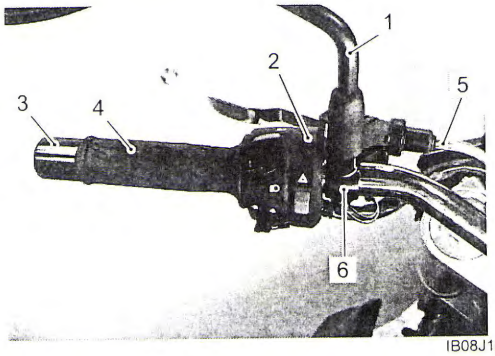
1. Front brake master cylinder	"A": Punch mark	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
2. Clutch lever holder	"B": UP mark	(b) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
3. Handlebar clamp	"a": Clearance	(c) : 6.5 N·m (0.65 kgf-m, 4.7 lbf-ft)

Handlebars Removal and Installation

BENF08J16206003

Removal

1) Remove the following parts from the left handlebar.
   a) Rear view mirror (1)
   b) Left handlebar switch box (2)
   c) Handlebar balancer (3)
   d) Grip rubber (4)
   e) Disconnect the clutch cable (5)
   f) Clutch lever (6)

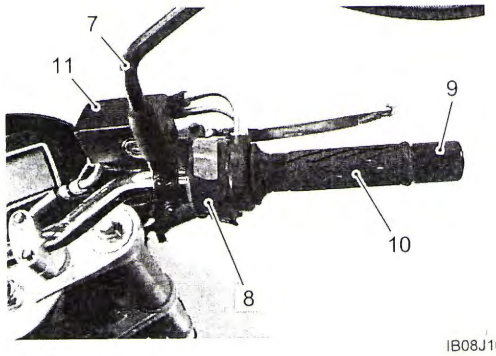


IB08J1620002-02

2) Remove the following parts from the right handlebar.
   a) Rear view mirror (7)
   b) Right handlebar switch box (8)
   c) Handlebar balancer (9)
   d) Throttle grip (10)
   e) Front brake master cylinder/Front brake lever (11)

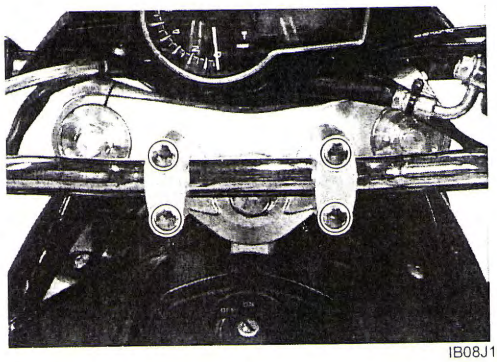
NOTE

Do not turn the front brake master cylinder upside down.



IB08J1620003-02

3) Remove the caps and handlebar clamp bolts.



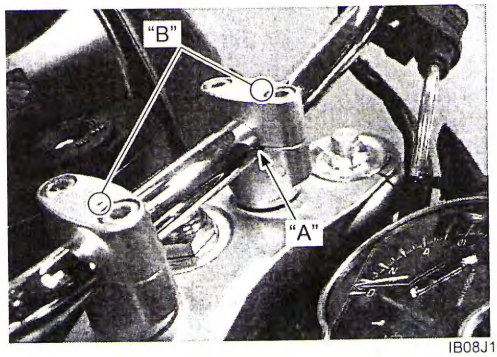
IB08J1620004-01

4) Remove the handlebars.

Installation

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

- Set the handlebars so that its punch mark "A" aligns with the mating surface of the left handlebar clamp.
- Set the handlebar clamps with their punch marks "B" forward.



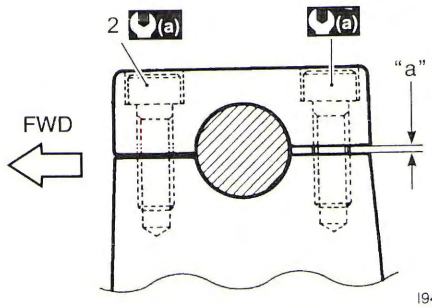
IB08J1620005-01

- Tighten the handlebar clamp bolts.

NOTE

First tighten the handlebar clamp bolts (2) (front ones) to the specified torque.

Tightening torque
Handlebar clamp bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



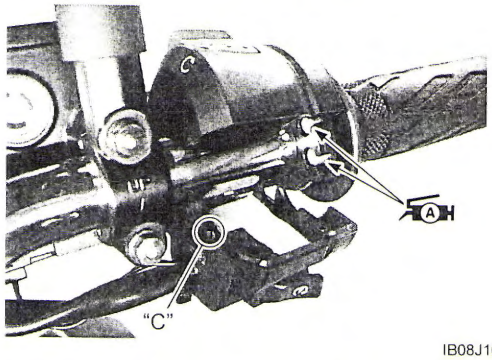
I944H1620007-01

"a": Clearance

- Install the front brake master cylinder. Refer to "Front Brake Master Cylinder Assembly Removal and Installation" in Section 4A (Page 4A-12).
- Apply grease to the end of the throttle cables and cable pulley.

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

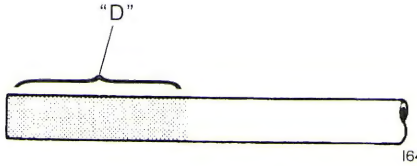
- Insert the projection "C" of the right handlebar switch box into the hole of the handlebars.



IB08J1620006-02

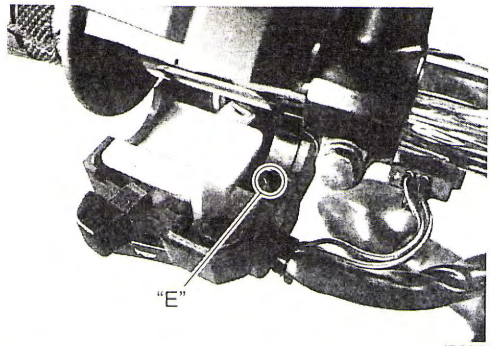
- Install the clutch lever assembly. Refer to "Clutch Lever Removal and Installation" in Section 5C (Page 5C-4).
- Apply a handle grip bond "D" onto the left handlebar before installing the handlebar grip.

BOND : Handle grip bond (Handle Grip Bond (commercially available))



I649G1620008-04

- Insert the projection "E" of the left handlebar switch box into the hole of the handlebars.



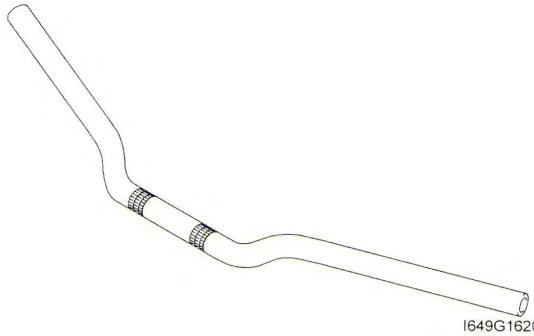
IB08J1620007-02

- Route the wiring harness and cable routing. Refer to "Throttle Cable Routing Diagram" in Section 1D (Page 1D-2) and "Wiring Harness Routing Diagram" in Section 9A (Page 9A-3).
- After installing the steering, the following adjustments are required before driving.
  - Clutch cable play (Refer to "Throttle Cable Play Inspection and Adjustment" in Section 1D (Page 1D-8))
  - Throttle cable play (Refer to "Throttle Cable Play Inspection and Adjustment" in Section 1D (Page 1D-8))

Handlebars Inspection

BENF08J16206004

Refer to "Handlebars Removal and Installation" (Page 6B-3).
Inspect the handlebars for distortion and damage.
If any defect is found, replace the handlebars with a new one.



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Steering Components

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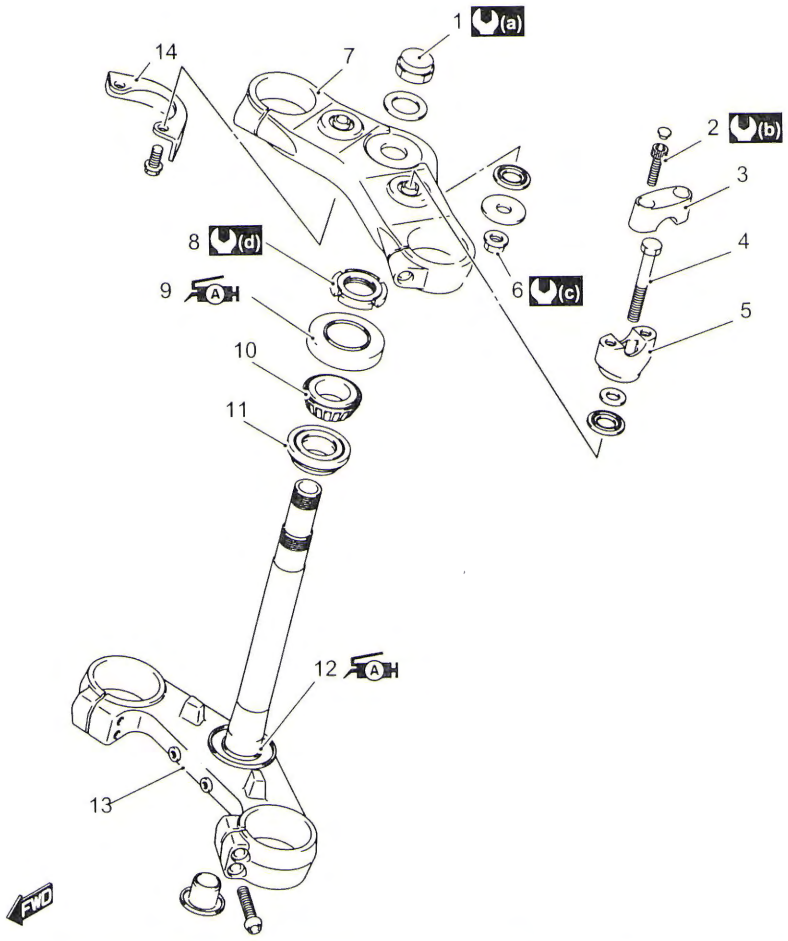


IB08J1620023-02

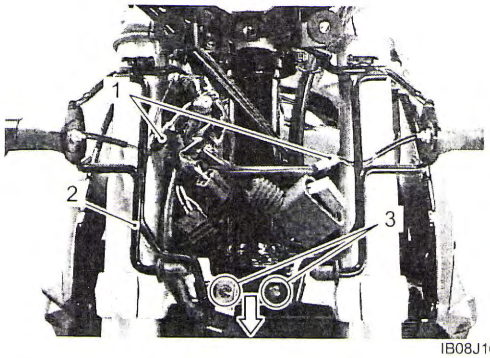
1. Steering stem head nut	8. Steering stem nut	(a) : 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
2. Handlebar clamp bolt	9. Dust seal	(b) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
3. Handlebar clamp	10. Steering stem upper bearing	(c) : 45 N·m (4.5 kgf-m, 32.5 lbf-ft)
4. Handlebar holder bolt	11. Steering stem lower bearing	(d) : 45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/2 – 1/4
5. Handlebar holder	12. Lower seal	A H : Apply grease to bearing.
6. Handlebar holder nut	13. Steering stem lower bracket	
7. Steering stem upper bracket	14. Steering lock plate	

Steering Removal and Installation

BENF08J16206006

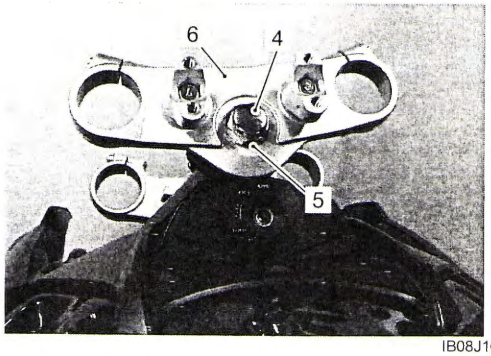
Removal

1) Remove the headlight. Refer to "Headlight Removal and Installation" in Section 9B (Page 9B-3).
2) Remove the combination meter. Refer to "Combination Meter Removal and Installation" in Section 9C (Page 9C-2).
3) Disconnect the turn signal light lead wire couplers (1).
4) Demount the headlight bracket (2) downward by removing the bracket mounting bolts (3).



IB08J1620008-02

5) Remove the front forks. Refer to "Front Fork Removal and Installation" in Section 2B (Page 2B-2).
6) Remove the handlebars. Refer to "Handlebars Removal and Installation" (Page 6B-3).
7) Remove the steering stem head nut (4) and washer (5).
8) Remove the steering stem upper bracket (6).



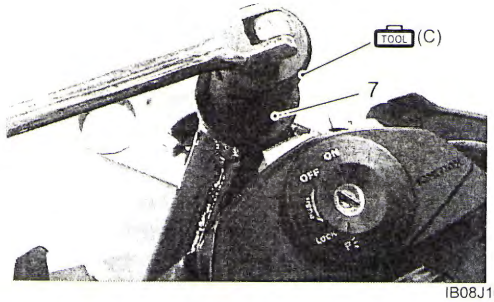
IB08J1620010-01

9) Remove the steering stem nut (7) using the special tool.

NOTE

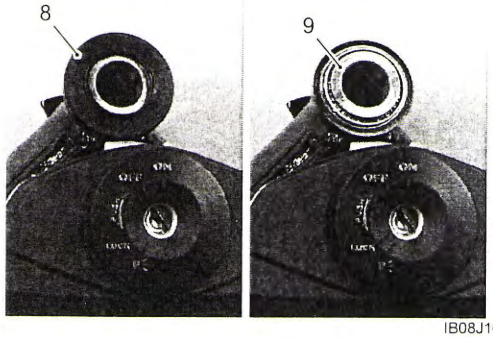
When loosening the stem nuts, hold the steering stem lower bracket to prevent it from falling.

Special tool
TOOL (C): 09940–14911 (Steering stem nut wrench)



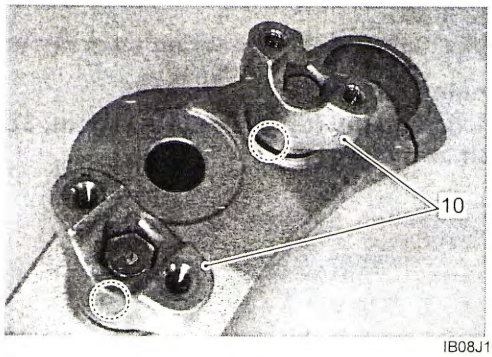
IB08J1620011-02

10) Remove the steering stem lower bracket.
11) Remove the dust seal (8) and steering stem upper bearing (9).



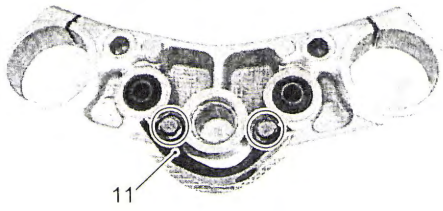
IB08J1620012-02

12) Remove the handlebar holders (10), if necessary.



IB08J1620009-01

13) Remove the steering lock plate (11), if necessary.



IB08J1620013-02

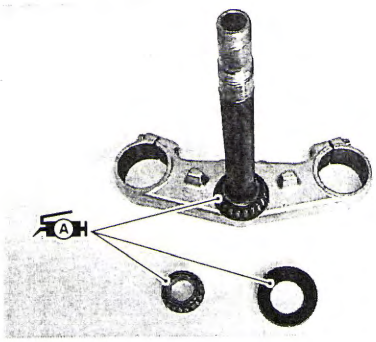
Installation

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

Bearing

- Apply grease to the bearings, races and dust seals before remounting the steering stem.

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



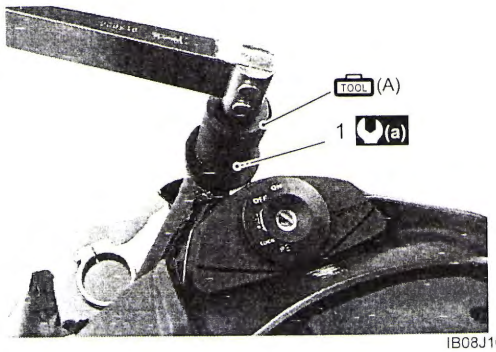
IB08J1620014-02

Steering stem nut

- Tighten the steering stem nut (1) to the specified torque using the special tool.

Special tool
TOOL (A): 09940–14911 (Steering stem nut wrench)

Tightening torque
Steering stem nut (a): 45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/2 – 1/4

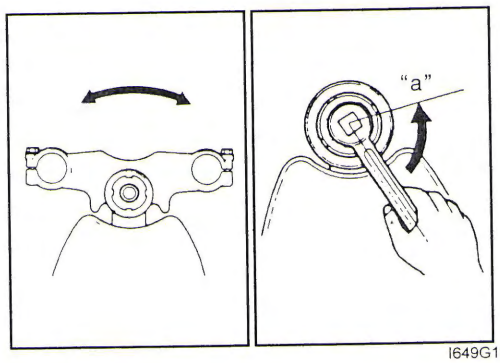


IB08J1620015-02

- 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.



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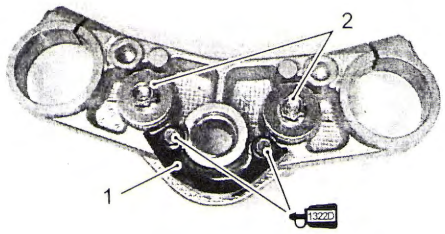
Steering stem upper bracket

Install the front forks and steering stem upper bracket in the following steps:

1) Apply thread lock to the bolts and install the steering lock plate (1), if removed.

1322D : Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

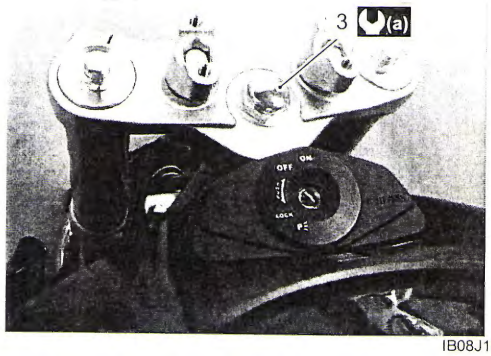
2) Temporarily tighten the handlebar holder nuts (2).



IF08J1620001-01

3) Temporarily install the upper bracket, washer and steering stem head nut (3).
4) Temporarily install the front forks.
5) Tighten the steering stem head nut (3).

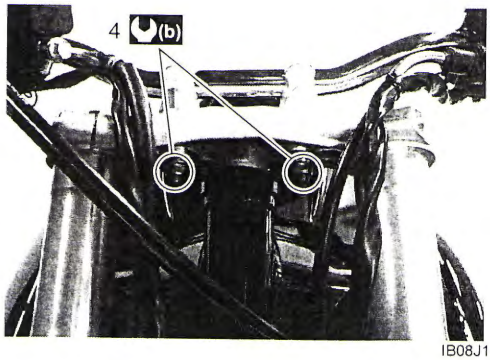
Tightening torque
Steering stem head nut (a): 90 N·m (9.0 kgf-m, 65.0 lbf-ft)



IB08J1620017-02

6) Tighten the front fork upper and lower clamp bolts. Refer to "Front Fork Removal and Installation" in Section 2B (Page 2B-2).
7) Temporary install the handlebars and tighten the handlebar holder nuts (4) to the specified torque.

Tightening torque
Handlebar holder nut (b): 45 N·m (4.5 kgf-m, 32.5 lbf-ft)



IB08J1620018-02

Handlebars

- Install the handlebars. Refer to "Handlebars Removal and Installation" (Page 6B-3).

Inspection After Installation

- Check the steering tension. Refer to "Steering Tension Adjustment" (Page 6B-10).

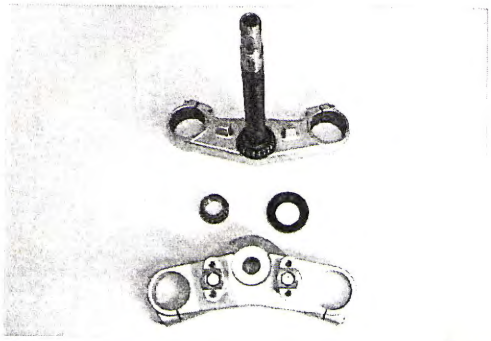
Steering Related Parts Inspection

BENF08J16206007

Refer to "Steering Removal and Installation" (Page 6B-6).
Inspect the removed parts for the following abnormalities.

- Distortion of the steering stem
- Bearing wear or damage
- Abnormal bearing noise
- Race wear or damage
- Bearing lower seal damage
- Rubber dust seal wear or damage

If any abnormal points are found, replace defective parts with new ones. Refer to "Steering Removal and Installation" (Page 6B-6).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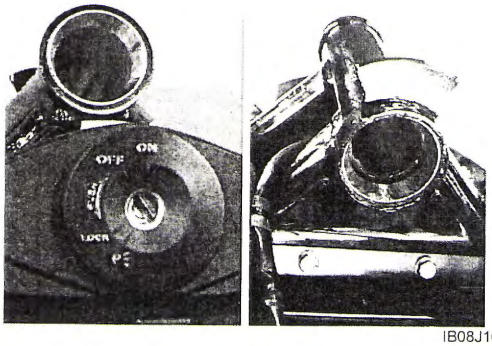
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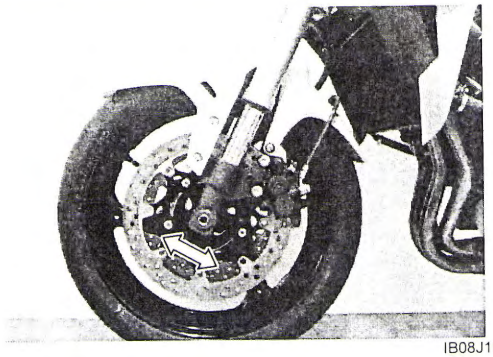
Steering System Inspection

BENF08J16206008

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" (Page 6B-10).



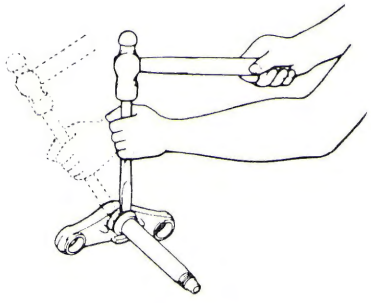
IB08J1020038-02

Steering Stem Bearing Removal and Installation

BENF08J16206009

Removal

1) Remove the dust seal and steering stem upper bearing. Refer to "Steering Removal and Installation" (Page 6B-6).
2) Remove the steering stem lower bearing and inner race using a chisel.



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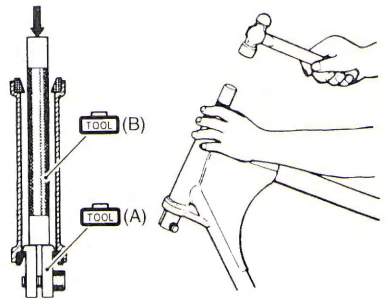
3) Remove the steering stem upper and lower outer races using the special tools.

Special tool
TOOL (A): 09941–54911 (Bearing outer race remover)
TOOL (B): 09941–74911 (Steering bearing installer)



I649G1620034-03

Installation

Install the steering stem bearings in the reverse order of removal. Pay attention to the following points:

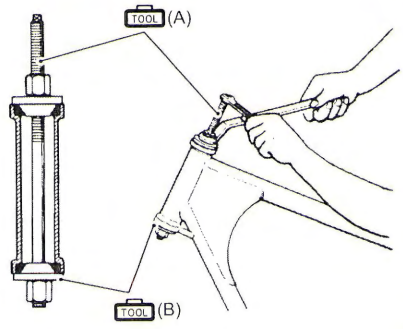
NOTE

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 (Steering race installer)
TOOL (B): 09924–84510 (Bearing installer set)



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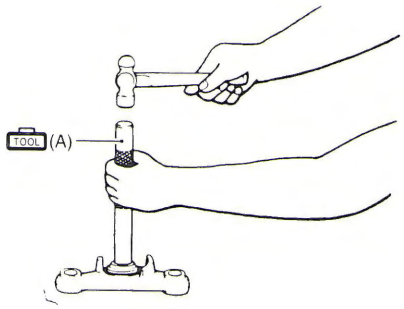
Inner race

- Press in the lower inner race and bearing using the special tool.

Special tool
TOOL (A): 09941–74911 (Steering bearing installer)



I649G1620036-03

- Install the steering. Refer to "Steering Removal and Installation" (Page 6B-6).

Steering Tension Adjustment

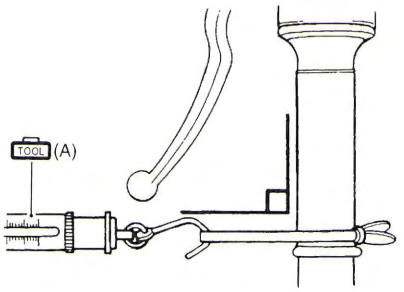
BENF08J16206010

Check the steering movement in the following procedures:

1) By supporting the motorcycle with a jack, lift the front wheel unit is off the floor 20 – 30 mm (0.8 – 1.2 in).
2) Check to make sure that the cables and wire harnesses are properly routed.
3) With the front wheel in the straight ahead state, hitch the spring scale (special tool) on one handlebar grip end as shown in the figure and read the graduation when the handlebar starts moving.

Initial force
200 – 500 grams

Special tool
TOOL (A): 09940–92720 (Spring scale)



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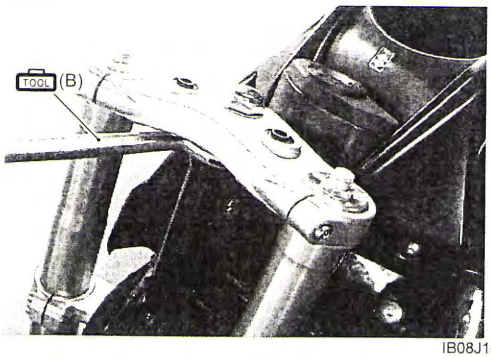
4) Do the same on the other grip end.
5) If the initial force read on the scale when the handlebar starts turning is either to heavy or too light, adjust it till it satisfies the specification.
   a) Remove the combination meter and headlight bracket. Refer to "Combination Meter Removal and Installation" in Section 9C (Page 9C-2).
   b) Remove the handlebar holders (lower). Refer to "Steering Components" (Page 6B-5).
   c) Loosen the front fork upper clamp bolts and steering stem head nut, and then adjust the steering stem nut by loosening or tightening it.

Special tool
TOOL (B): 09910–60611 (Universal clamp wrench)



IB08J1620021-02

   d) Tighten the steering stem head nut and front fork upper clamp bolts to the specified torque.
   e) Reinstall the removed parts and recheck the initial force with the spring scale according to the previously described procedure.
   f) 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.

Specifications

Tightening Torque Specifications

BENF08J16207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Handlebar clamp bolt	23	2.3	16.5	☞(Page 6B-3)
Steering stem nut	45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/2 – 1/4			☞(Page 6B-7)
Steering stem head nut	90	9.0	65.0	☞(Page 6B-8)
Handlebar holder nut	45	4.5	32.5	☞(Page 6B-8)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Handlebars Components" (Page 6B-1)
"Handlebar Construction" (Page 6B-2)
"Steering Components" (Page 6B-5)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J16208001

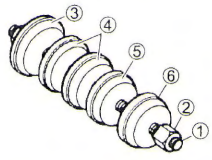
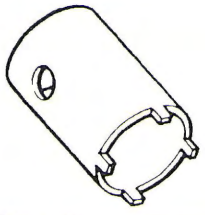
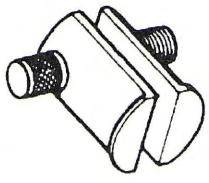
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 6B-4) / ☞(Page 6B-7)
Handle grip bond	Handle Grip Bond (commercially available)	—	☞(Page 6B-4)
Thread lock cement	THREAD LOCK CEMENT 1322D	P/No.: 99000–32150	☞(Page 6B-7)

NOTE

Required service material(s) is also described in:
"Steering Components" (Page 6B-5)

Special Tool

BENF08J16208002

09910–60611 Adjustable hook wrench ☞(Page 6B-10) 	09924–84510 Bearing installer set ☞(Page 6B-9) 
09940–14911 Steering stem nut socket ☞(Page 6B-6) / ☞(Page 6B-7) 	09940–92720 Spring scale (400 - 1000 g) ☞(Page 6B-10) 
09941–34513 Bearing installer set ☞(Page 6B-9) 	09941–54911 Bearing outer race remover ☞(Page 6B-9) 
09941–74911 Steering stem bearing installer ☞(Page 6B-9) / ☞(Page 6B-10) 	

Section 9

Body and Accessories

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Precautions

Precautions

Precautions for Electrical System

BENF08J19000001

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

BENF08J19003001

Refer to "Electrical Components Location" in Section 0A (Page 0A-6).

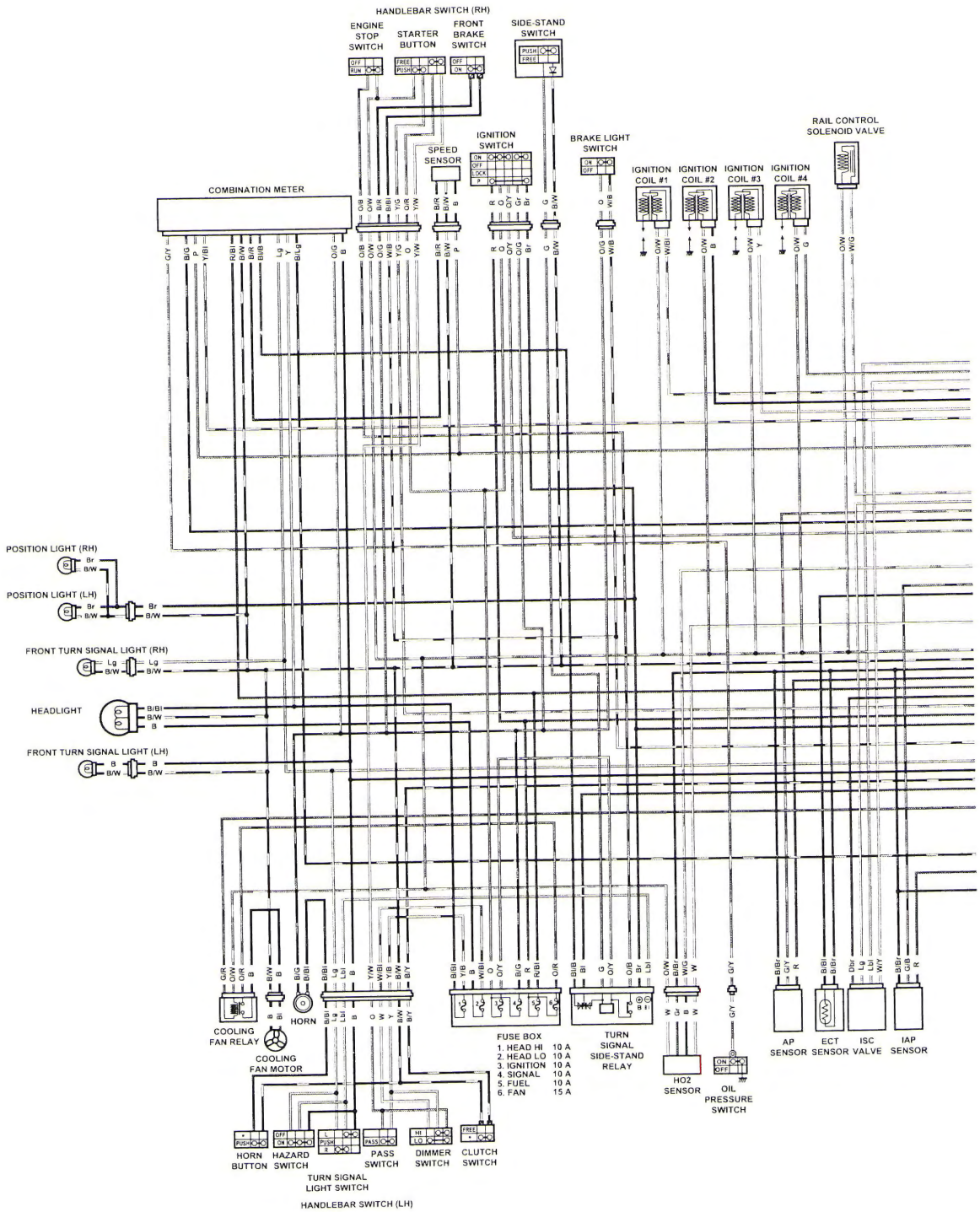
Wiring Systems

Schematic and Routing Diagram

Wiring Diagram

BENF08J19102001

Refer to "Wire Color Symbols" in Section 0A (Page 0A-3).



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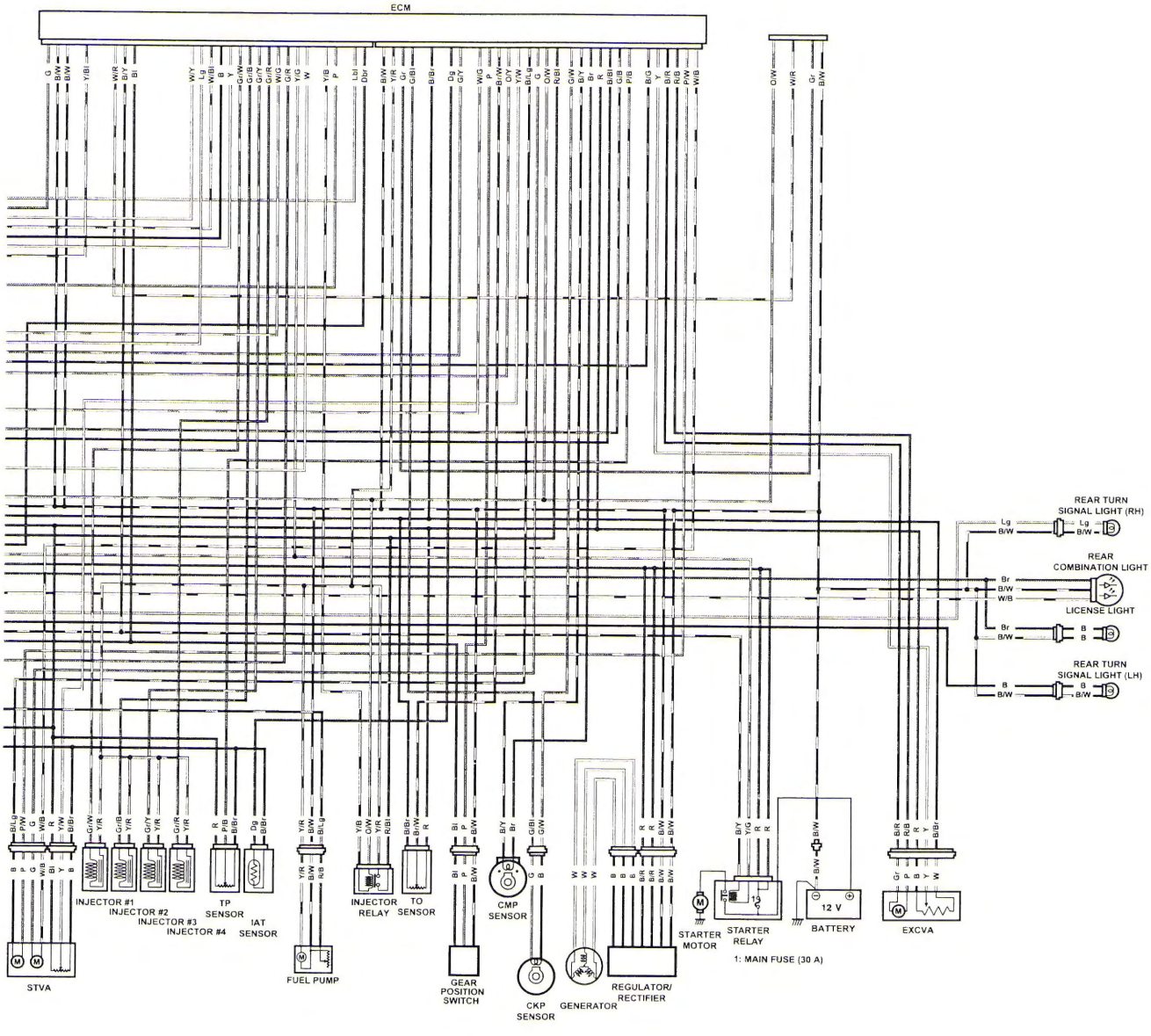

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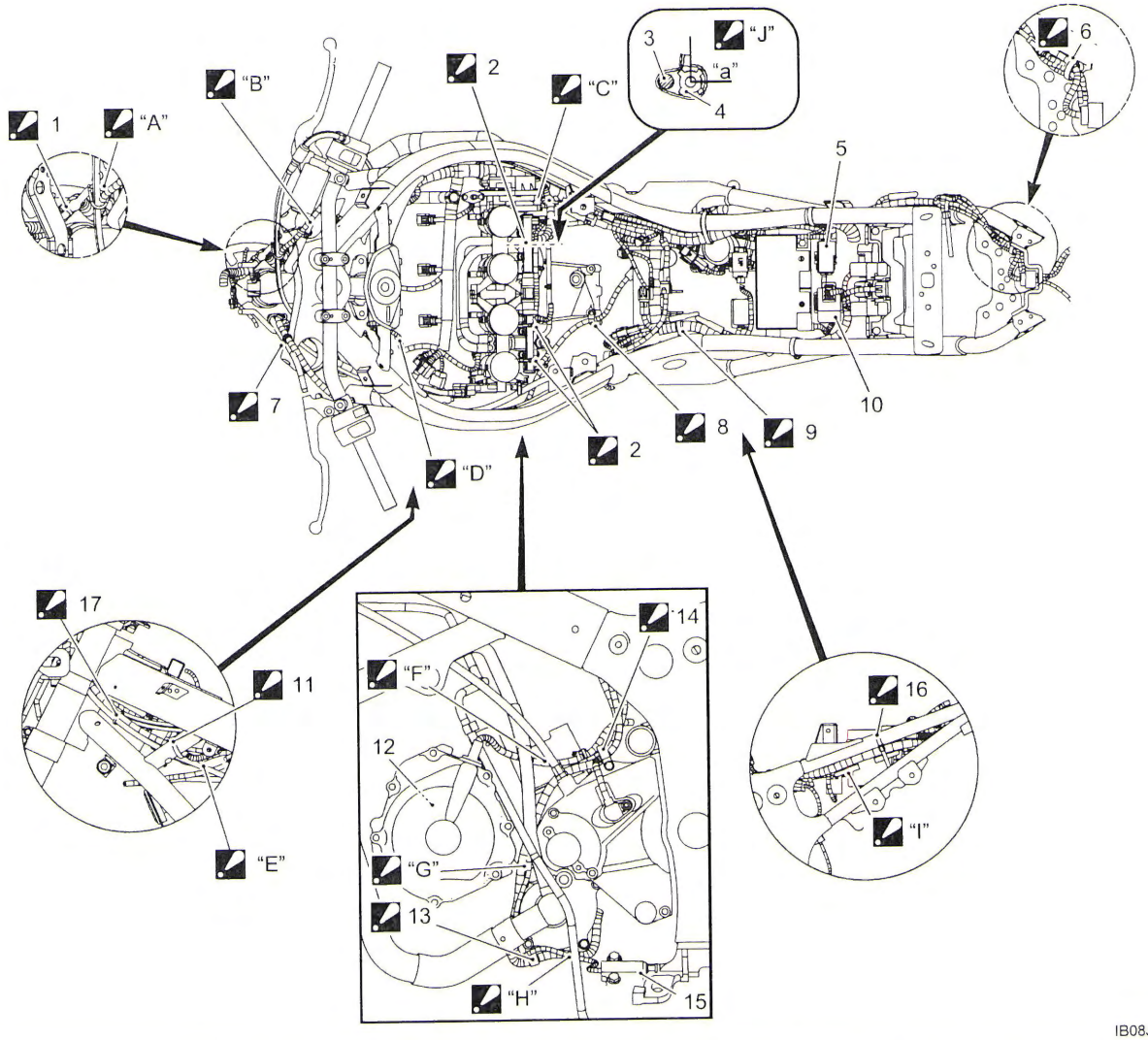
Wiring Harness Routing Diagram

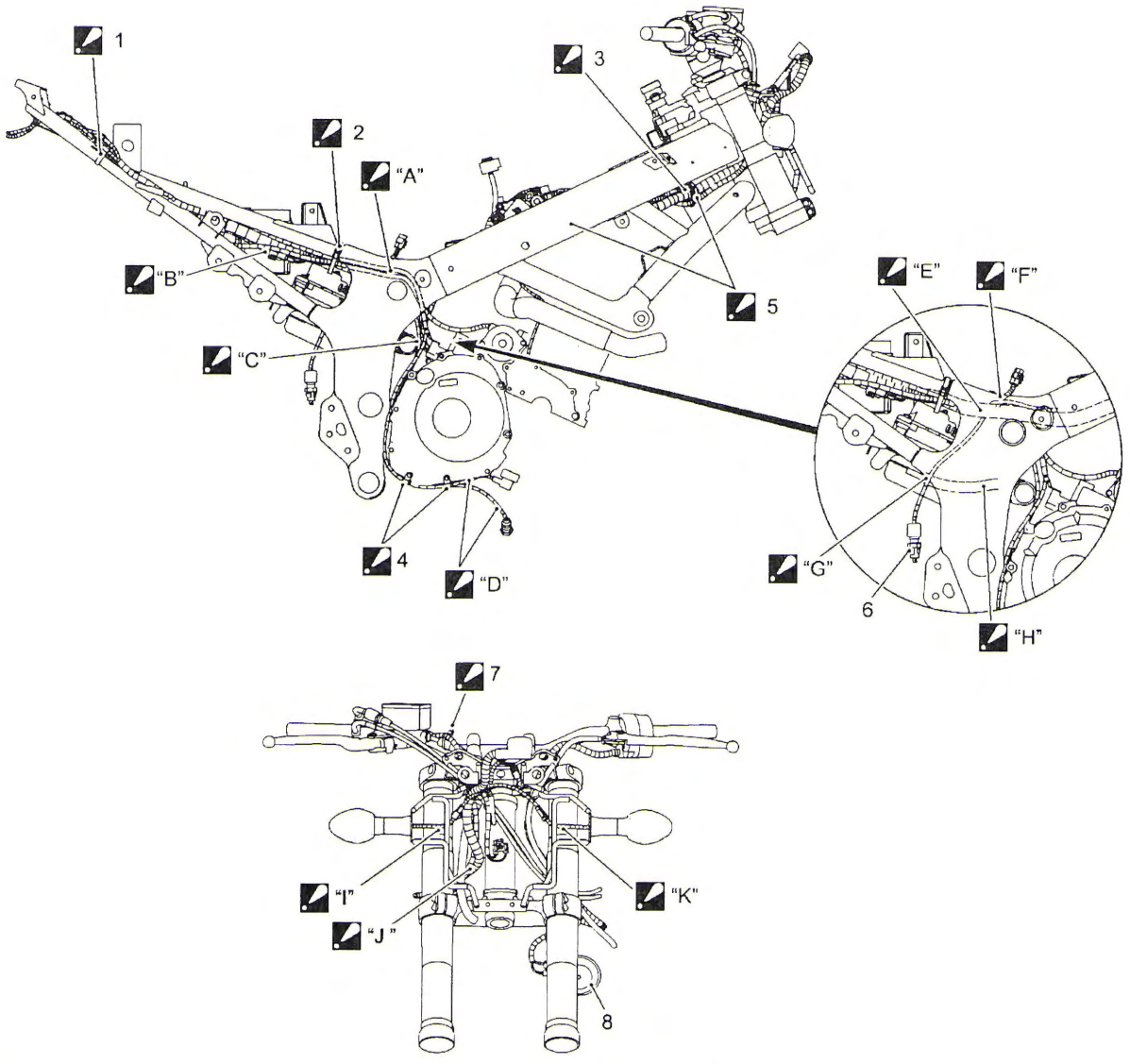
BENF08J19102003



IB08J1910903-03

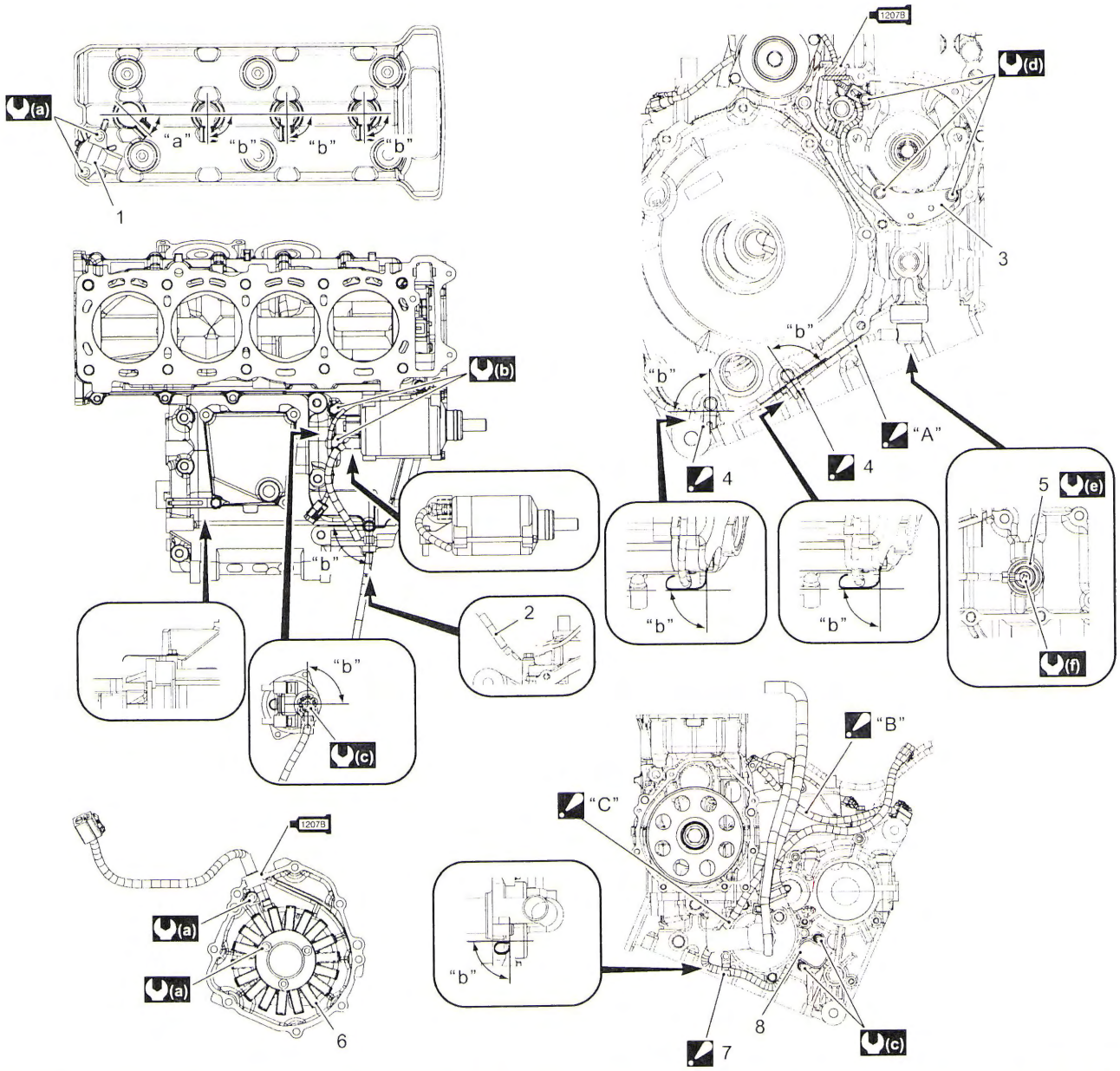
1. Clamp : Clamp in front of the squeezed side.	15. Side-stand switch
2. Clamp : Bind the wire harness at the violet taping point and cut off the excess tip of the clamp.	16. Clamp : Bind the wire harness at the bonder.
3. Wire harness	17. Clamp : Bind the left handlebar switch lead wire and clutch cable.
4. Fuel delivery pipe	"A": Pass the right handlebar switch lead wire through the hose guide.
5. Fuse box	"B": Pass the right handlebar switch lead wire over the brake hose.
6. Clamp : Bind the rear combination light lead wire, the turn signal light lead wires and the license plate light lead wire and face the clamp end inside.	"C": Pass the CKP sensor lead wire over the wire harness.
7. Clamp : Face the lock of the clamp forward. : Clamp between the clutch hose round cap and headlight bracket, accessing from the underside of the clutch hose round cap.	"D": Pass the immobilizer antenna lead wire under the fuel tank center cover bracket. (if equipped)
8. Clamp : Fasten the clamp after the generator lead wire coupler has been connected.	"E": Do not clamp the clutch cable.
9. Clamp : Install the clamp to the frame after binding the wire harness.	"F": Pass the generator lead wire, GP switch lead wire and side-stand switch lead wire inside of the clutch cable.
10. Starter relay	"G": Pass the GP switch lead wire and the side-stand switch lead wire between the cylinder inlet hose and the by-pass hose.
11. Clamp : Face the lock of the clamp inward and the tip of the clamp downward.	"H": Pass the side-stand switch lead wire inside of the reservoir tank inlet hose.
12. Generator	"I": Pass the TO sensor lead wire backward of the turn signal/side-stand relay.
13. Clamp : Bind the GP switch lead wire and the side-stand switch lead wire.	"J": Be sure to position the lock of the clamp within the range "a".

14. Clamp : Bind the GP switch lead wire, the side-stand switch lead wire and the speed sensor lead wire.	"a": 90°



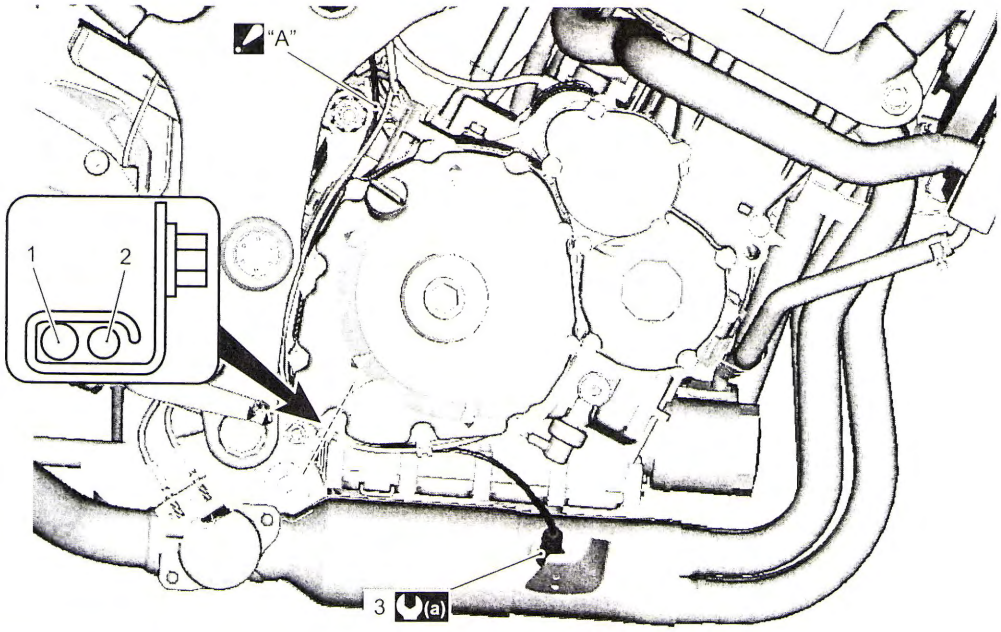
IF08J1910903-01

1. Clamp : Bind the wire harness and face the clamp end to the inside.	"C": Pass the oil pressure switch lead wire and the HO2 sensor lead wire inside of the starter motor lead wire and the engine ground lead wire.
2. Clamp : Bind the wire harness, the starter motor lead wire and the engine ground lead wire.	"D": Be sure not to slacken the oil pressure switch lead wire and the HO2 sensor lead wire.
3. Clamp : Clamp at the rear of the harness incorporated clamp.	"E": Pass the rear brake light switch lead wire inside of the wire harness.
4. Clamp : Bind the oil pressure switch lead wire and the HO2 sensor lead wire.	"F": Pass the rear brake light switch lead wire outside of the fuel pump lead wire.
5. Clamp : Install the clamp to the frame.	"G": Pass the rear brake light switch lead wire between the regulator/rectifier and the frame.
6. Rear brake light switch	"H": Pass the regulator/rectifier lead wire under the bridge.
7. Clamp : Bind the right handlebar switch lead wire and the brake hose and cut off the excess tip of the clamp.	"I": Pass the front right turn signal light lead wire backward of the headlight bracket.
8. Horn	"J": Pass the wire harness and right handlebar switch lead wire inside of the brake hose.
"A": Pass the starter motor lead wire and the battery negative lead wire over the bridge. Pass the starter motor lead wire and the battery negative lead wire outside of the wire harness.	"K": Pass the front left turn signal light lead wire backward of the headlight bracket.
"B": Pass the starter motor lead wire under the wire harness.	



IB08J1910905-02

1. CMP sensor	"C": Pass the GP switch lead wire between the lower crankcase and the water pump. Pass the GP switch lead wire between the radiator inlet hose and the water by-pass hose.
2. Battery (–) lead wire	"a": 45°
3. CKP sensor	"b": 90°
4. Clamp : Bind the oil pressure switch lead wire and the HO2 sensor lead wire.	(a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
5. Oil pressure switch	(b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
6. Generator stator	(c): 6 N·m (0.60 kgf-m, 4.3 lbf-ft)
7. Clamp : Bind the GP switch lead wire.	(d): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)
8. GP switch	(e): 14 N·m (1.4 kgf-m, 10.0 lbf-ft)
"A": Be sure not to slacken the oil pressure switch lead wire.	(f): 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)
"B": Pass the generator lead wire between the radiator inlet hose and the radiator bypass hose.	1207B: Apply bond.



IB08J1910908-02

1. HO2 sensor lead wire	"A": Pass the HO2 sensor lead wire between the frame and engine.
2. Oil pressure switch lead wire	(a) : 25 N·m (2.5 kgf-m, 18.0 lbf-ft)
3. HO2 sensor	

Specifications

Service Data

BENF08J1910S001

Electrical

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

Tightening Torque Specifications

BENF08J1910S002

Reference:

For the tightening torques of fasteners not specified in this page, refer to:
"Wiring Harness Routing Diagram" (Page 9A-3)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J1910T001

NOTE

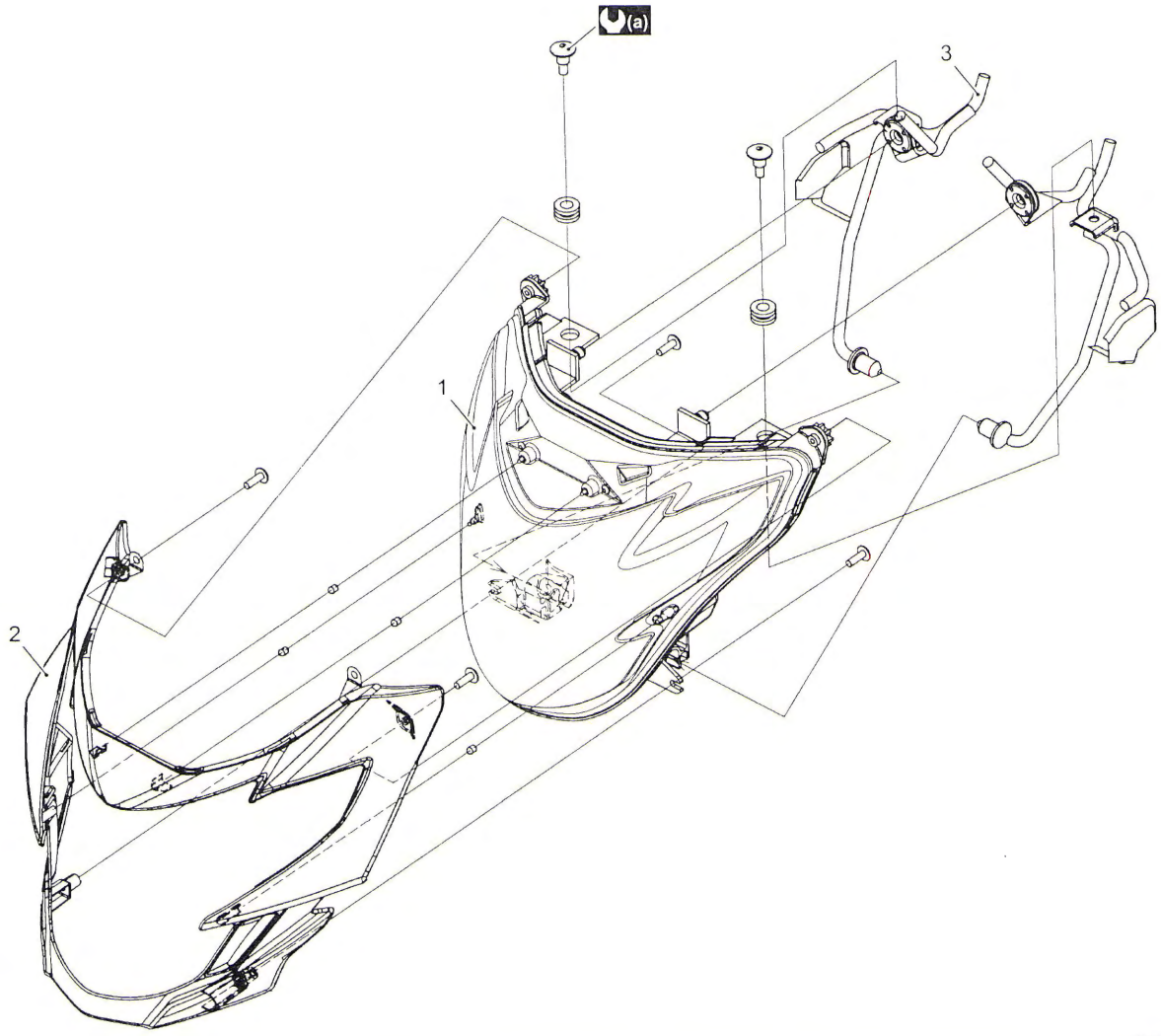
Required service material(s) is also described in:
"Wiring Harness Routing Diagram" (Page 9A-3)

Lighting Systems

Repair Instructions

Headlight Construction

BENF08J19206001

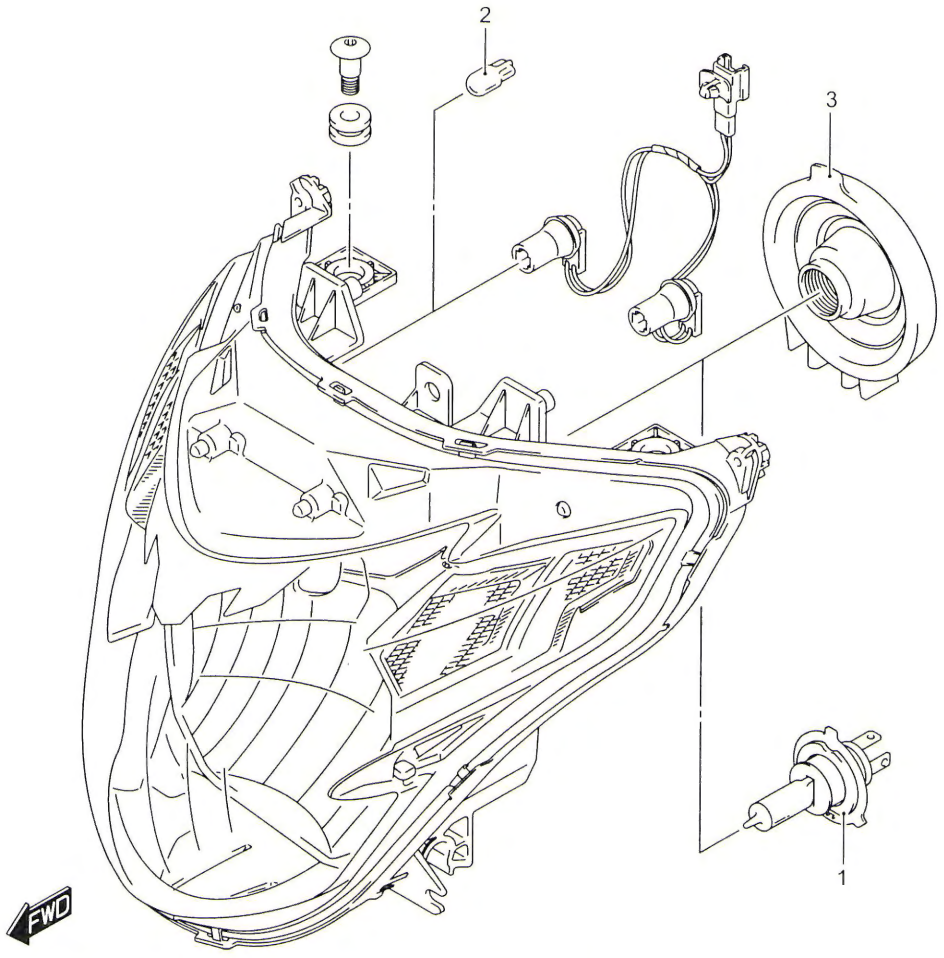


IB08J1920001-01

1. Headlight	3. Headlight bracket
2. Headlight cover	(a) : 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)

Headlight Components

BENF08J19206002



IB08J1920032-01

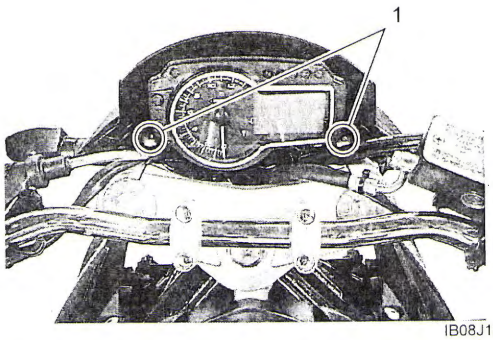
1. Headlight bulb (12 V 60/55 W, H4)	3. Bulb socket rubber cap
2. Position light bulb (12 V 5 W)	

Headlight Removal and Installation

BENF08J19206003

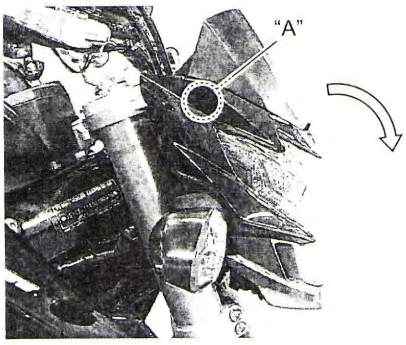
Removal

1) Remove the headlight mounting bolts (1).



IB08J1920002-02

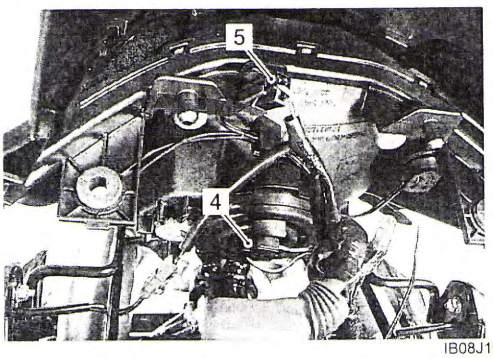
2) Move the headlight assembly arrow direction.



IB08J1920003-02

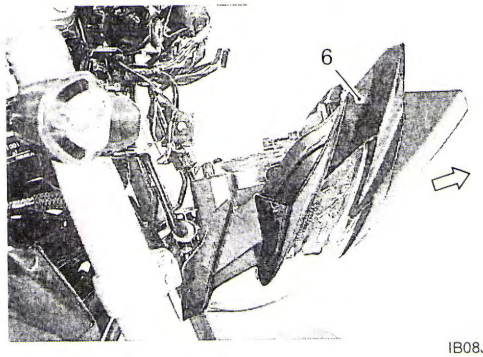
"A": Hooked point

3) Disconnect the headlight coupler (4) and position light coupler (5).



IB08J1920004-02

4) Remove the headlight assembly (6).



IB08J1920005-03

Installation

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

- After installing, be sure to inspect the headlight beam. Refer to "Headlight Beam Adjustment" (Page 9B-4).

Headlight Bulb and Position Light Bulb Replacement

BENF08J19206004

⚠ CAUTION

Remove the bulb when it gets cool, since it may be heated to an extremely high temperature when the headlight is turned ON.

NOTICE

When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

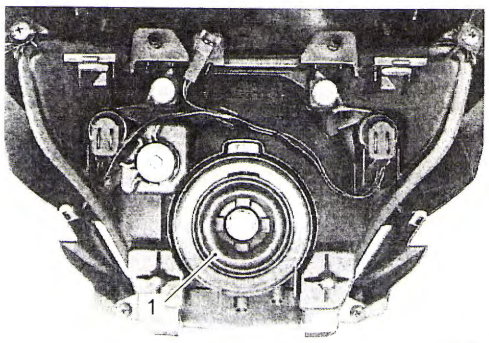
NOTE

Do not use bulb other than those with predetermined wattage.

Headlight Bulb

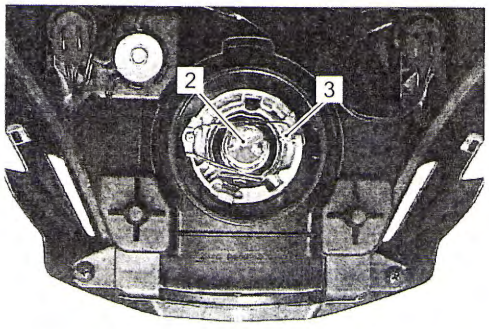
Replace the headlight bulb in the following procedures:

1) Remove the headlight assembly. Refer to "Headlight Removal and Installation" (Page 9B-3).
2) Remove the bulb socket rubber cap (1).



IB08J1920006-02

3) Replace the headlight bulb (2) by unhooking the bulb holder spring (3).



IB08J1920007-02

4) Reinstall the removed parts.

NOTE

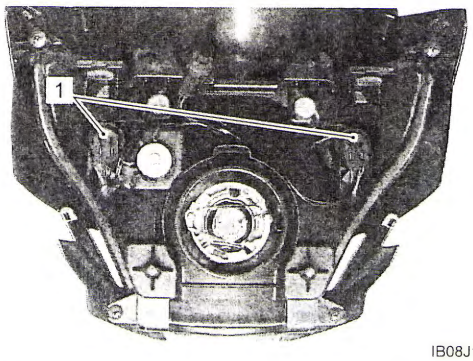
Properly fit the bulb socket rubber cap (1).

5) After installing be sure to inspect the headlight beam. Refer to "Headlight Beam Adjustment" (Page 9B-4).

Position Light Bulb

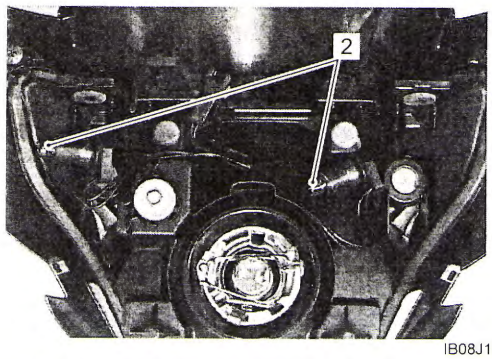
Replace the position light bulb in the following procedures:

1) Remove the headlight assembly. Refer to "Headlight Removal and Installation" (Page 9B-3).
2) Remove the position light sockets (1).



IB08J1920008-02

3) Replace the position light bulbs (2).



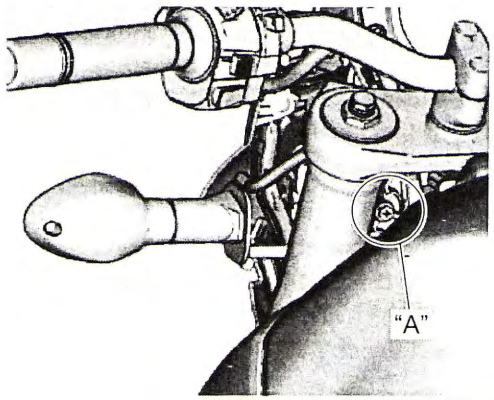
IB08J1920009-02

4) Reinstall the removed parts.

Headlight Beam Adjustment

BENF08J19206005

Adjust the headlight beam in the following procedures:
Insert a plus screw driver and adjust the headlight beam vertically.

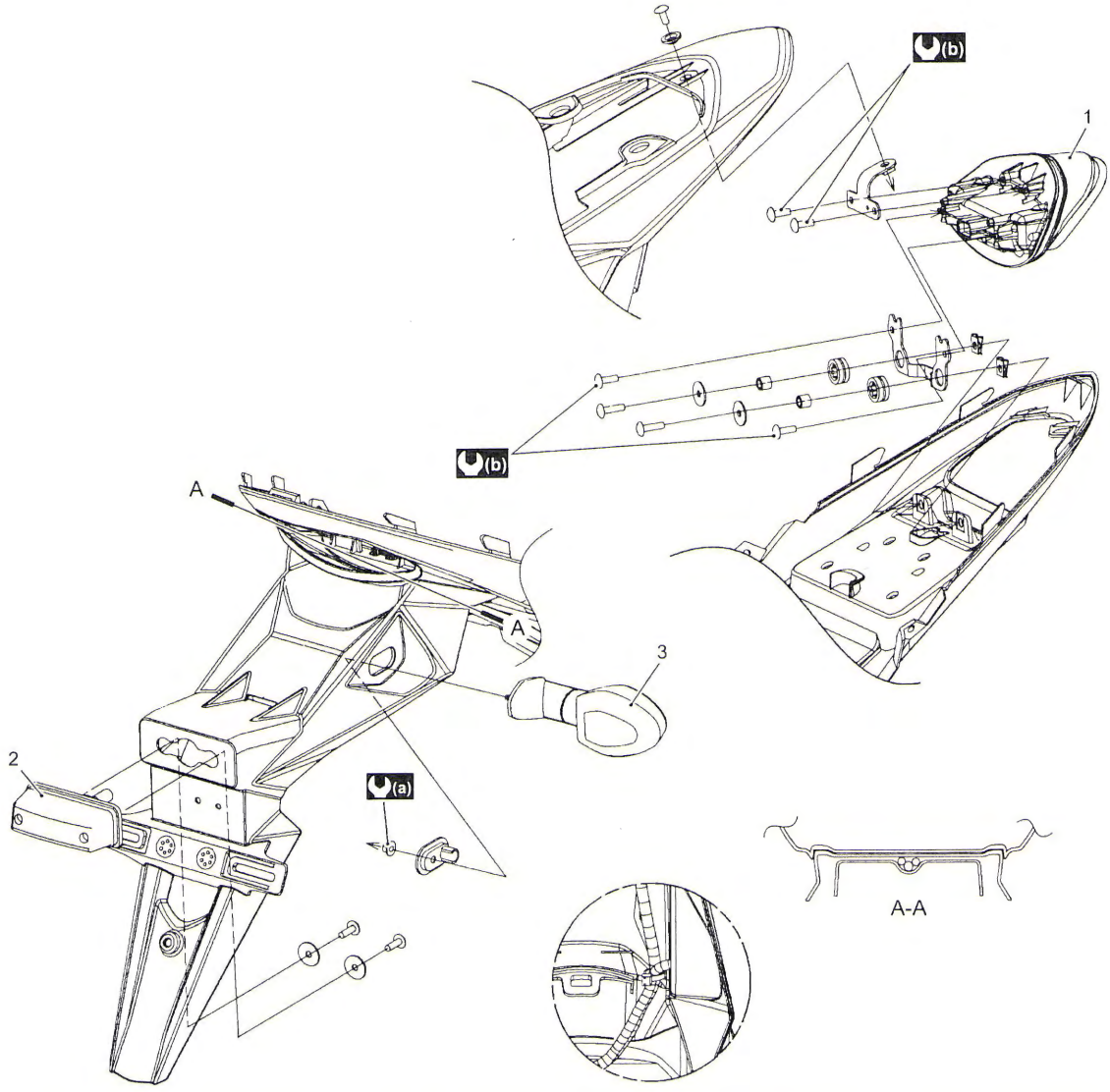


IF08J1920001-02

"A": Vertical adjuster

Rear Lighting System Construction

BENF08J19206006



IF08J1920002-01

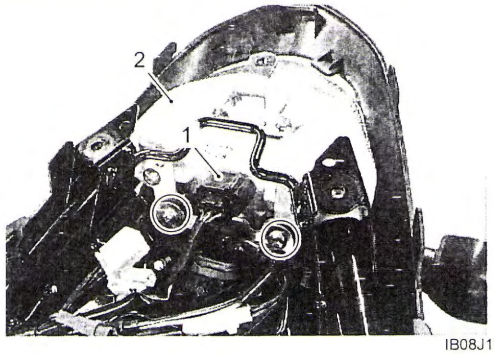
1. Rear combination light	3. Rear turn signal light	(b) : 5 N·m (0.5 kgf-m, 3.7 lbf-ft)
2. License plate light	(a) : 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)	

Rear Combination Light Removal and Installation

BENF08J19206007

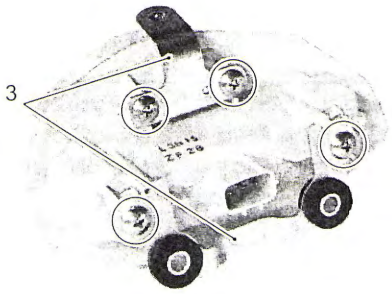
Removal

1) Remove the frame cover assembly. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Disconnect the combination light coupler (1).
3) Remove the rear combination light (2).



IB08J1920012-02

4) Remove the combination light brackets (3).



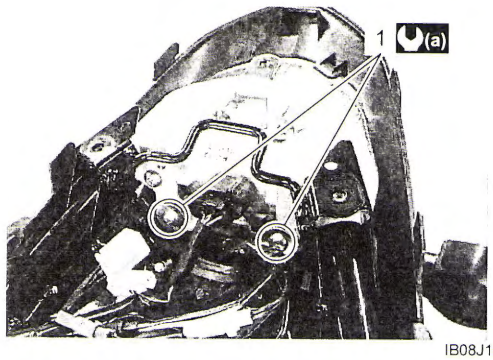
IB08J1920013-04

Installation

Install the rear combination right in the reverse order of removal. Pay attention to the following point:

- Tighten the rear combination light screws (1) to the specified torque.

Tightening torque
Rear combination light screw (a): 3.0 N·m (0.30 kgf-m, 2.0 lbf-ft)



IB08J1920014-03

Rear Combination Light Replacement

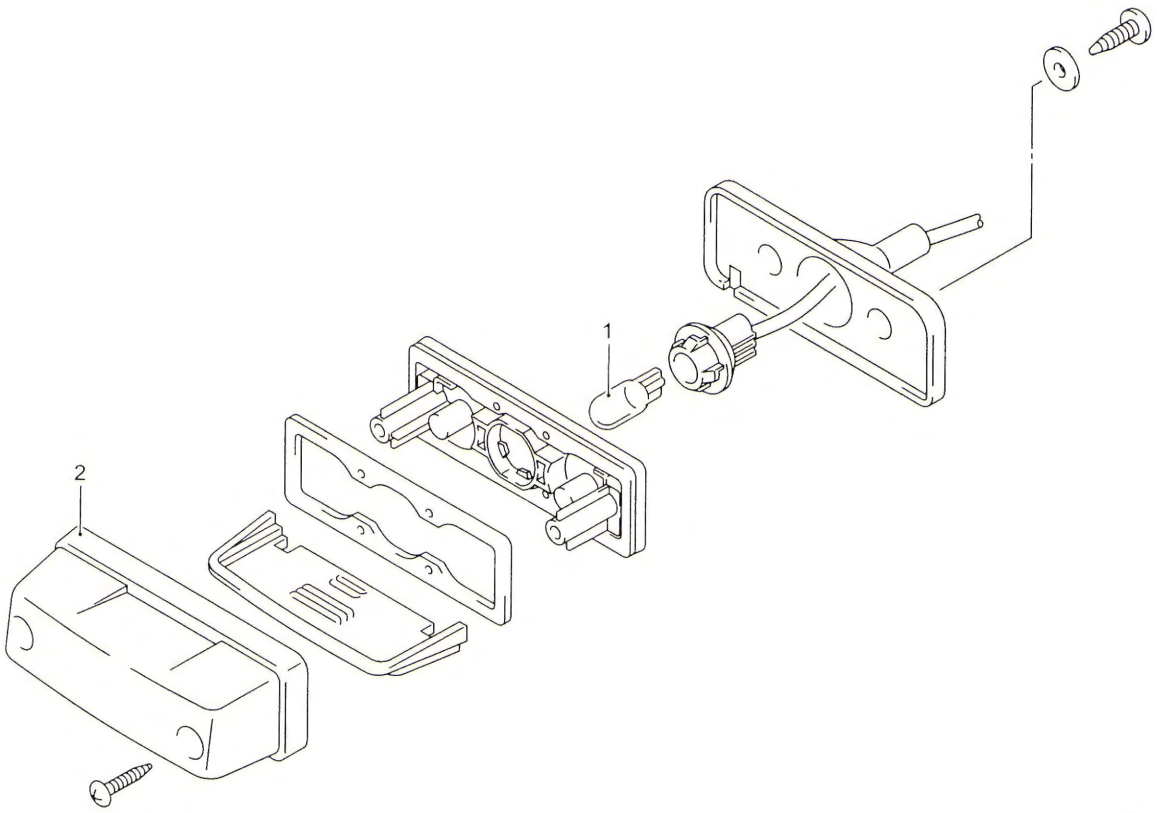
BENF08J19206008

NOTE

If LED operation is abnormal, replace the rear combination light with a new one.

License Plate Light Components

BENF08J19206009



IB08J1920033-01

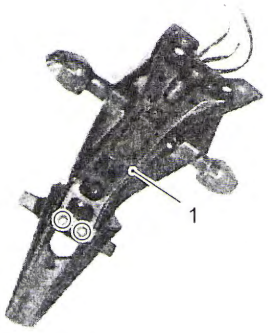
1. License plate light bulb (12 V 5 W)	2. Lens

License Plate Light Removal and Installation

BENF08J19206010

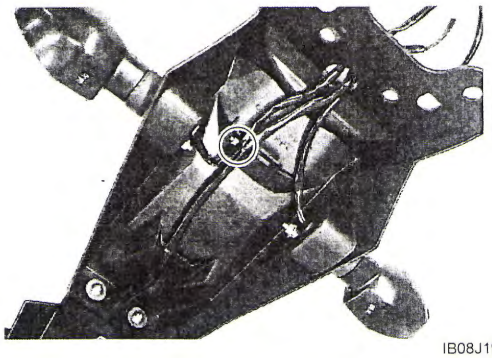
Removal

1) Remove the rear fender assembly. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Remove the rear fender bracket (1).



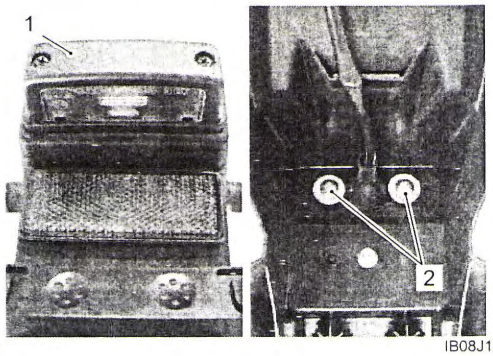
IB08J1920015-02

3) Remove the clip.



IB08J1920016-02

4) Remove the license plate light assembly (1) by removing the screws (2).



IB08J1920017-02

Installation

Install the license plate light in the reverse order of removal.

License Plate Light Bulb Replacement

BENF08J19206011

Replace the license plate light bulb in the following procedures:

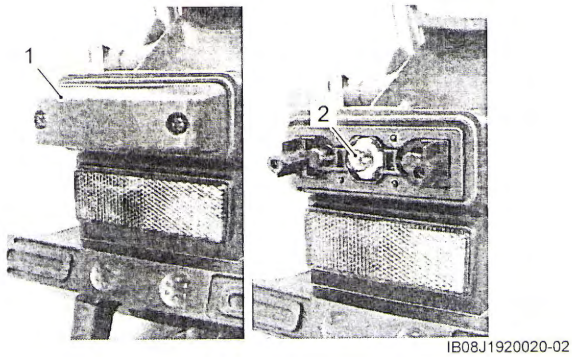
NOTICE

When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

NOTE

Do not use bulb other than those with predetermined wattage.

1) Remove the license plate light cover (1).
2) Replace the bulb (2).



IB08J1920020-02

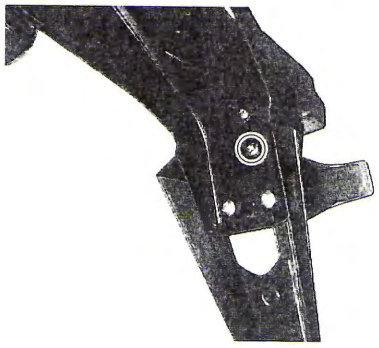
3) Reinstall the removed parts.

Rear Reflex Reflector Removal and Installation

BENF08J19206012

Removal

1) Remove the rear reflex reflector by removing the nut.



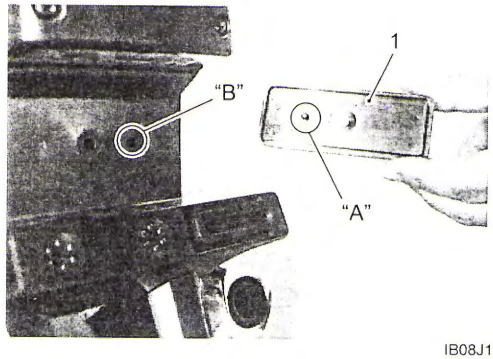
IB08J1920018-02

Installation

1) Install the rear reflex reflector (1).

NOTE

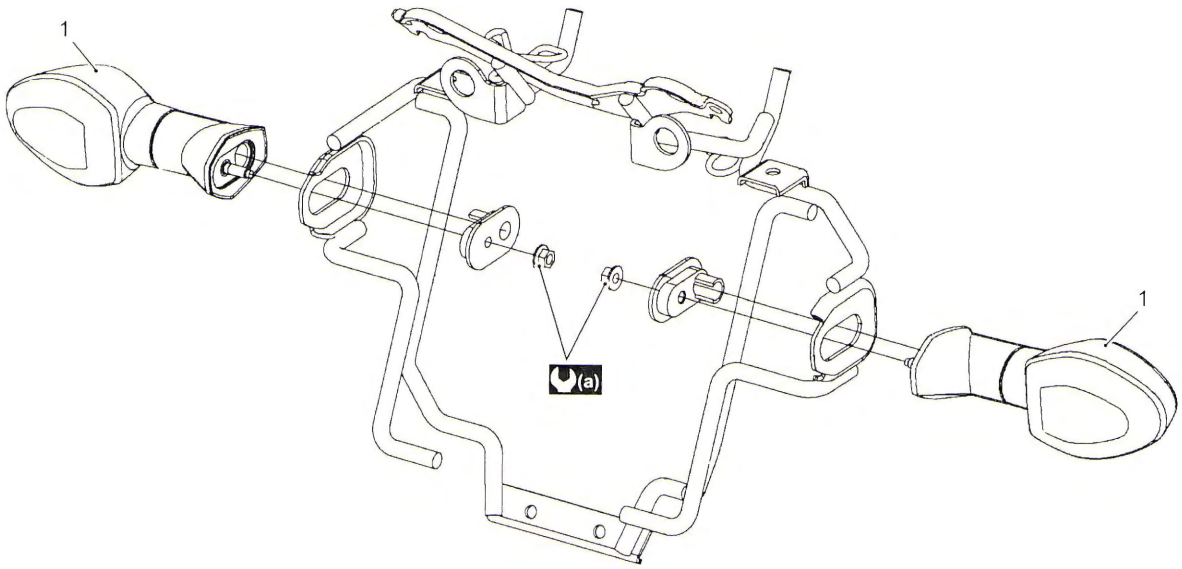
When installing the rear reflex reflector, fit the protrusion "A" to the hole "B".



IB08J1920019-02

Front Turn Signal Light Construction

BENF08J19206013

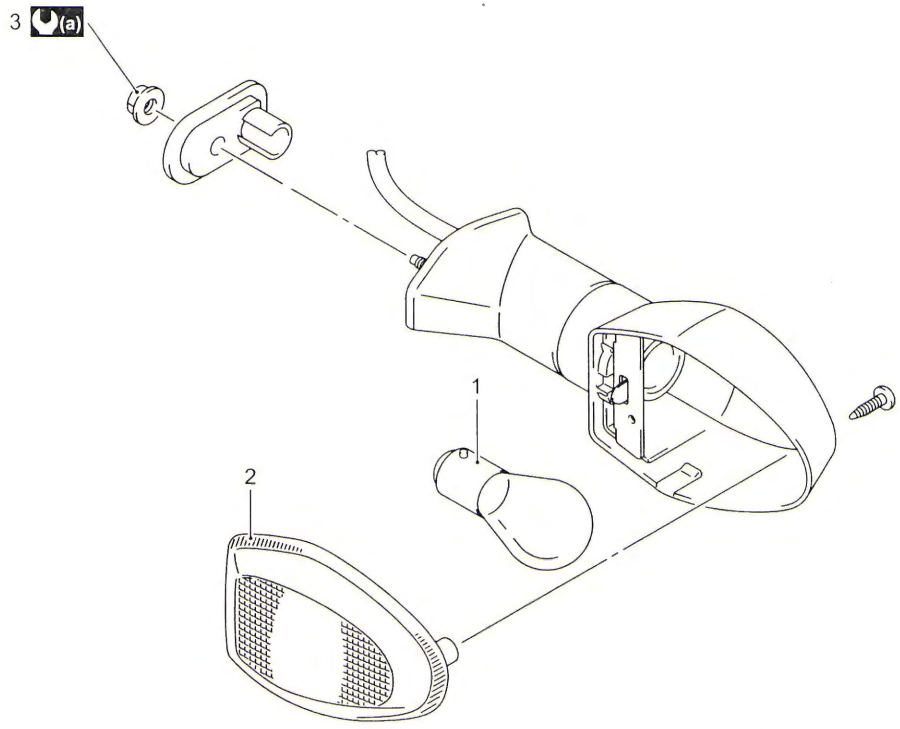


IB08J1920021-01

1. Front turn signal light	(a) : 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)

Turn Signal Light Components

BENF08J19206014



IB08J1920034-01

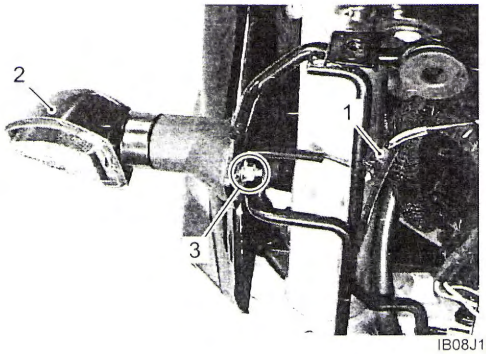
1. Turn signal light bulb (12 V 21 W x 4)	3. Turn signal light mounting nut
2. Lens	(a) : 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)

Front Turn Signal Light Removal and Installation

BENF08J19206015

Removal

1) Remove the headlight assembly. Refer to "Headlight Removal and Installation" (Page 9B-3).
2) Disconnect the front turn signal light coupler (1).
3) Remove the front turn signal light (2) by removing the nut (3).



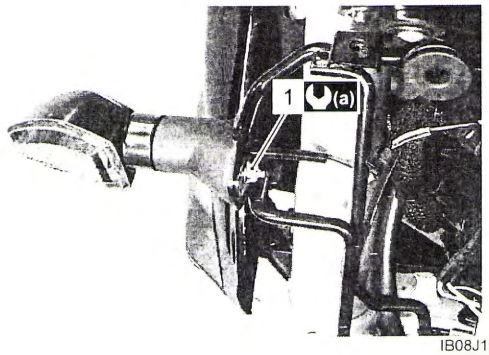
IB08J1920022-02

Installation

Install the front turn signal light in the reverse order of removal. Pay attention to the following point:

- Tighten the front turn signal light mounting nut (1) to the specified torque.

Tightening torque
Front turn signal light mounting nut (a): 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)



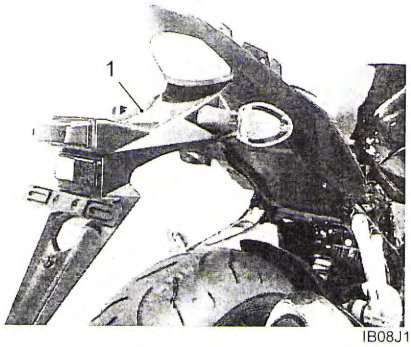
IB08J1920023-02

Rear Turn Signal Light Removal and Installation

BENF08J19206016

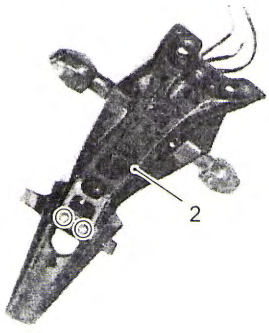
Removal

1) Remove the rear fender assembly (1). Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).



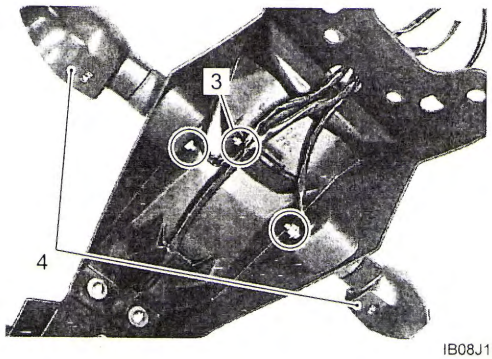
IB08J1920024-02

2) Remove the rear fender bracket (2).



IB08J1920025-02

3) For right side, remove the clamp (3).
4) Remove the rear turn signal lights (4) by removing the nut.



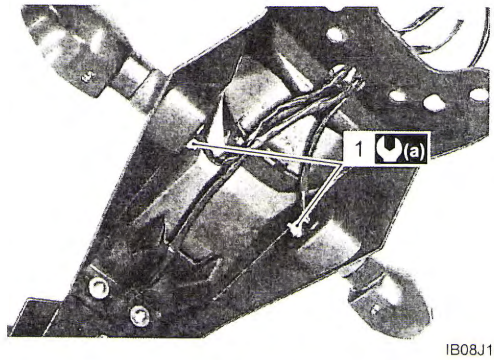
IB08J1920026-02

Installation

Install the rear turn signal light in the reverse order of removal. Pay attention to the following point:

- Tighten the rear turn signal light mounting nut (1) to the specified torque.

Tightening torque
Rear turn signal light mounting nut (a): 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)



IB08J1920027-02

- Rout the turn signal light lead wire. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-3).

Turn Signal Light Bulb Replacement

BENF08J19206017

NOTICE

- **When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.**
- **Do not use bulb other than those with predetermined wattage.**

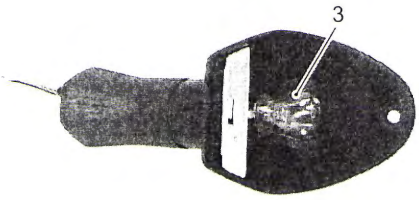
Replace the turn signal light bulb in the following procedures:

1) Remove the lens assembly (1) by removing the screw (2).



IB08J1920028-02

2) Push in on the bulb (3), turn it counterclockwise, and pull it out.
3) Replace the bulb (3).

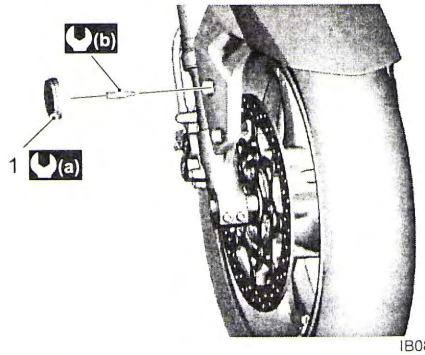


IB08J1920029-02

4) Reinstall the lens and socket.

Reflex Reflector Construction

BENF08J19206018



IB08J1920031-02

1.	Front reflex reflector x 2 pcs. (if equipped)
(a)	2.0 N·m (0.20 kgf-m, 1.5 lbf-ft)
(b)	10 N·m (1.0 kgf-m, 7.0 lbf-ft)

Turn Signal / Side-stand Relay Inspection

BENF08J19206019

Refer to "Electrical Components Location" in Section 0A (Page 0A-6).

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

BENF08J19206020

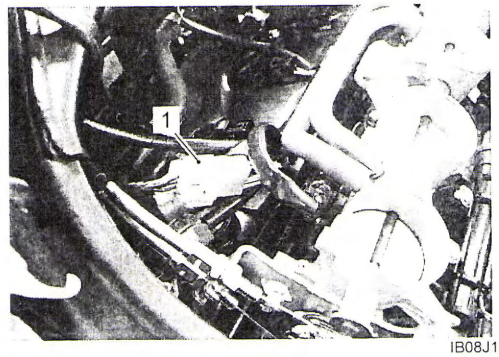
Refer to "Turn Signal / Side-stand Relay Removal and Installation" in Section 1I (Page 1I-7).

Hazard Switch Inspection

BENF08J19206021

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).



IB08J1920030-02

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 "Handlebars Removal and Installation" in Section 6B (Page 6B-3).

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

Tester knob indication
Continuity (•))))

Color / Position	Lg	Lbl	B
OFF			
ON	○	○	○

IB08J1920035-01

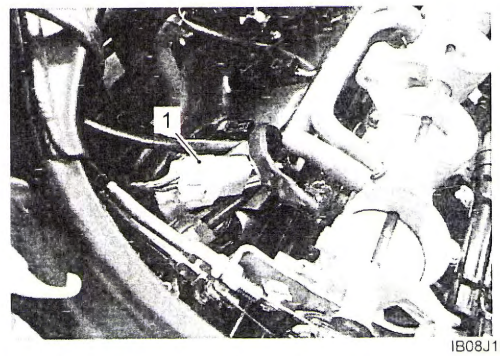
4) After finishing the hazard switch inspection, reinstall the removed parts.

Turn Signal Switch Inspection

BENF08J19206022

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).



IB08J1920030-02

3) Inspect the turn signal switch for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation" in Section 6B (Page 6B-3).

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

Tester knob indication
Continuity (•))))

Position \ Color	Lg	Lbl	B
L		○——○	
PUSH			
R	○——○		

I944H1920039-01

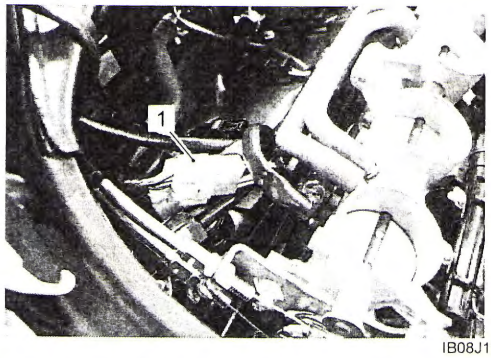
4) After finishing the turn signal switch inspection, reinstall the removed parts.

Passing Light Switch Inspection

BENF08J19206023

Inspect the passing light switch in the following procedures:

1) Remove the left frame body cover. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Disconnect the left handlebar switch coupler (1).



IB08J1920030-02

3) Inspect the passing light switch for continuity with a tester.
If any abnormality is found, replace the left handlebar switch assembly with a new one.
Refer to "Handlebars Removal and Installation" in Section 6B (Page 6B-3).

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

Tester knob indication
Continuity (•))))

Position \ Color	O	Y
•		
PUSH	○——○	

I944H1920041-01

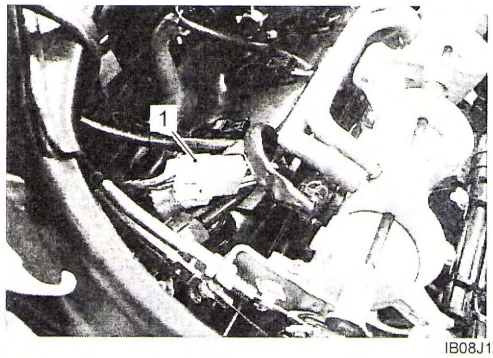
4) After finishing the passing light switch inspection, reinstall the removed parts.

Dimmer Switch Inspection

BENF08J19206024

Inspect the dimmer 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).



IB08J1920030-02

3) Inspect the dimmer switch for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation" in Section 6B (Page 6B-3).

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

Tester knob indication
Continuity (•))))

Position \ Color	W	Y	O
HI		○——○	
LO	○——○		

I944H1920043-01

4) After finishing the dimmer switch inspection, reinstall the removed parts.

Specifications

Service Data

BENF08J19207001

Wattage

Unit: W

Item	Specification
Headlight	60/55
Position light	5 x 2
Brake light/Taillight	LED
Turn signal light	21 x 4
License plate light	5
Speedometer light	LED
Tachometer light	LED
Turn signal indicator light	LED

Tightening Torque Specifications

BENF08J19207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear combination light screw	3.0	0.30	2.0	☞(Page 9B-6)
Front turn signal light mounting nut	1.5	0.15	1.0	☞(Page 9B-9)
Rear turn signal light mounting nut	1.5	0.15	1.0	☞(Page 9B-10)

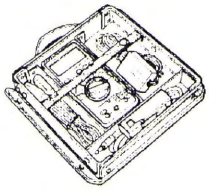
Reference:

For the tightening torques of fasteners not specified in this page, refer to:
"Headlight Construction" (Page 9B-1)
"Rear Lighting System Construction" (Page 9B-5)
"Front Turn Signal Light Construction" (Page 9B-8)
"Turn Signal Light Components" (Page 9B-9)
"Reflex Reflector Construction" (Page 9B-11)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Special Tool

BENF08J19208001

09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 9B-11) / ☞(Page 9B-12) / ☞(Page 9B-12) / ☞(Page 9B-12)		

Combination Meter / Fuel Meter / Horn

General Description

Combination Meter System Description

BENF08J19301001

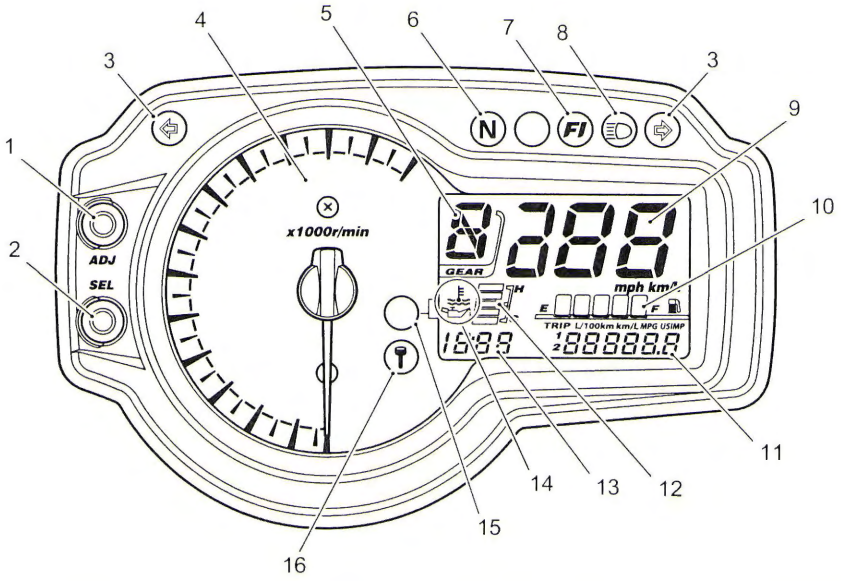
This combination meter mainly consists of the stepping motor, LCD (Liquid Crystal Display) and LED (Light Emitting Diode).
The rpm pointer is driven by the stepping motor.
The LCDs indicate Speed, Odo / Trip 1 / Trip 2 / Fuel consumption 1 / Fuel consumption 2 / Clock / FI (DTC), Gear position, Engine coolant temperature and Oil pressure indicator and Fuel level indicator respectively.

Detection of Fuel Level Sensor Failure

The speedometer has a function to detect a failure of the fuel level sensor and inform it to the driver in the following way.
When the resistance value of the fuel level sensor becomes 3 ± 2 Ω or lower (short circuit) or 2 k ± 1 kΩ or higher (disconnection), fuel level segments (10) in the speedometer light up one by one in the order of 1 (E) → 2 → 3 → 4 → 5 (F) → 1 → at 0.5 sec. intervals.

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.



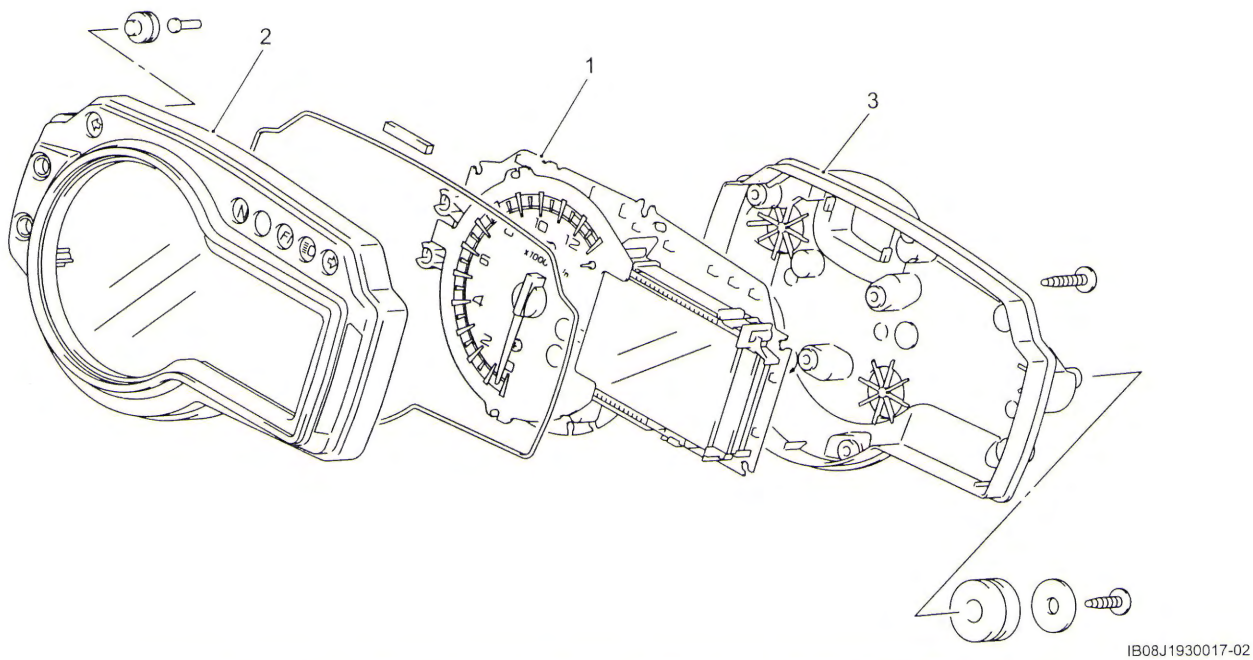
IB08J1930001-02

1. Adjust button	9. LCD (Speedometer)
2. Select button	10. LCD (Fuel level indicator)
3. LED (Turn signal indicator light)	11. LCD (Odo / Trip 1 / Fuel consumption 1 / Trip 2 / Fuel consumption 2 / Brightness of lighting / FI (DTC))
4. Tachometer	12. LCD (Engine coolant temperature indicator)
5. LCD (Gear position indicator)	13. LCD (Clock)
6. LED (Neutral indicator light)	14. LCD (Engine coolant temperature indicator / Oil pressure indicator)
7. LED (FI indicator light)	15. LED (Engine coolant temperature indicator light / Oil pressure indicator light)
8. LED (High-beam indicator light)	16. LED (Immobilizer indicator light) (if equipped)

Repair Instructions

Combination Meter Components

BENF08J19306001



IB08J1930017-02

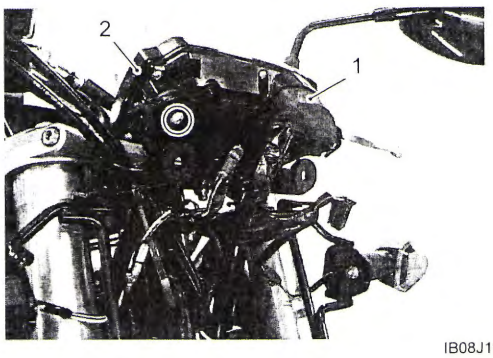
1. Combination meter unit	2. Combination meter case	3. Combination meter cover

Combination Meter Removal and Installation

BENF08J19306002

Removal

1) Remove the headlight. Refer to "Headlight Removal and Installation" in Section 9B (Page 9B-3).
2) Disconnect the coupler (1) and remove the combination meter mounting screw.
3) Remove the combination meter assembly (2).



IB08J1930002-02

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

BENF08J19306003

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

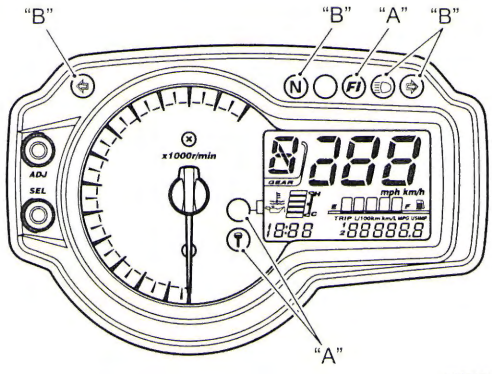
BENF08J19306004

LED Inspection

Check that the LEDs "A" (FI, indicator lights, immobilizer indicator light (if equipped) and meter panel illumination) immediately light up when the ignition switch is turned ON.

Check that other LEDs "B" (neutral, high-beam and turn signal indicator lights) light up/go off by operating each switch.

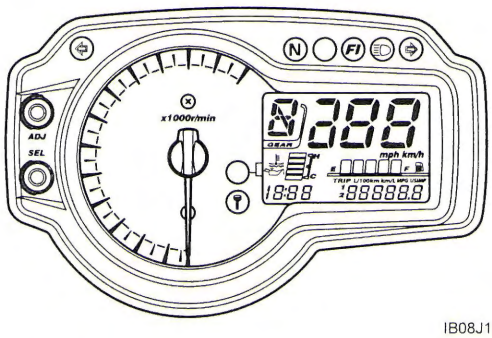
If abnormal condition is found, replace the combination meter assembly with a new one after checking its wire harness/coupler. Refer to "Combination Meter Removal and Installation" (Page 9C-2).



IB08J1930003-03

Stepping Motor Inspection

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.



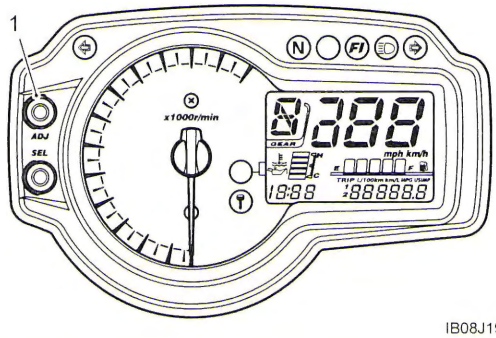
IB08J1930004-04

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.



IB08J1930005-03

Time	Ignition switch	Adjuster button (1)
	OFF	PUSH
0	ON	
•		
•		
3 sec.		
•		
5 sec.		Release
•		Push
•		
•		Push→Reset
•		
10 sec.		

I837H1930023-03

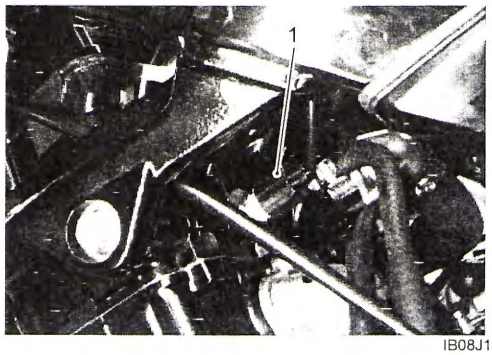
Pointers will return to the proper position right after the completion of the operation. In the case of the pointers not returning to the proper position after doing above, replace the combination meter unit. Refer to "Combination Meter Removal and Installation" (Page 9C-2).

Engine Coolant Temperature Indicator Light Inspection

BENF08J19306005

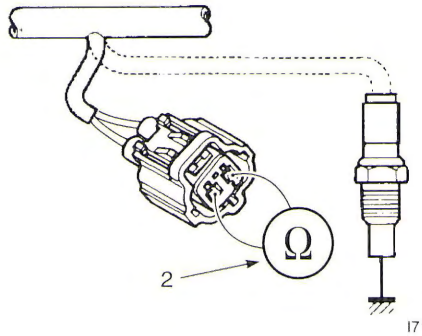
Inspect the engine coolant temperature meter and indicator light (LED) in the following procedures:

1) Disconnect the ECT sensor coupler (1).



IB08J1930006-02

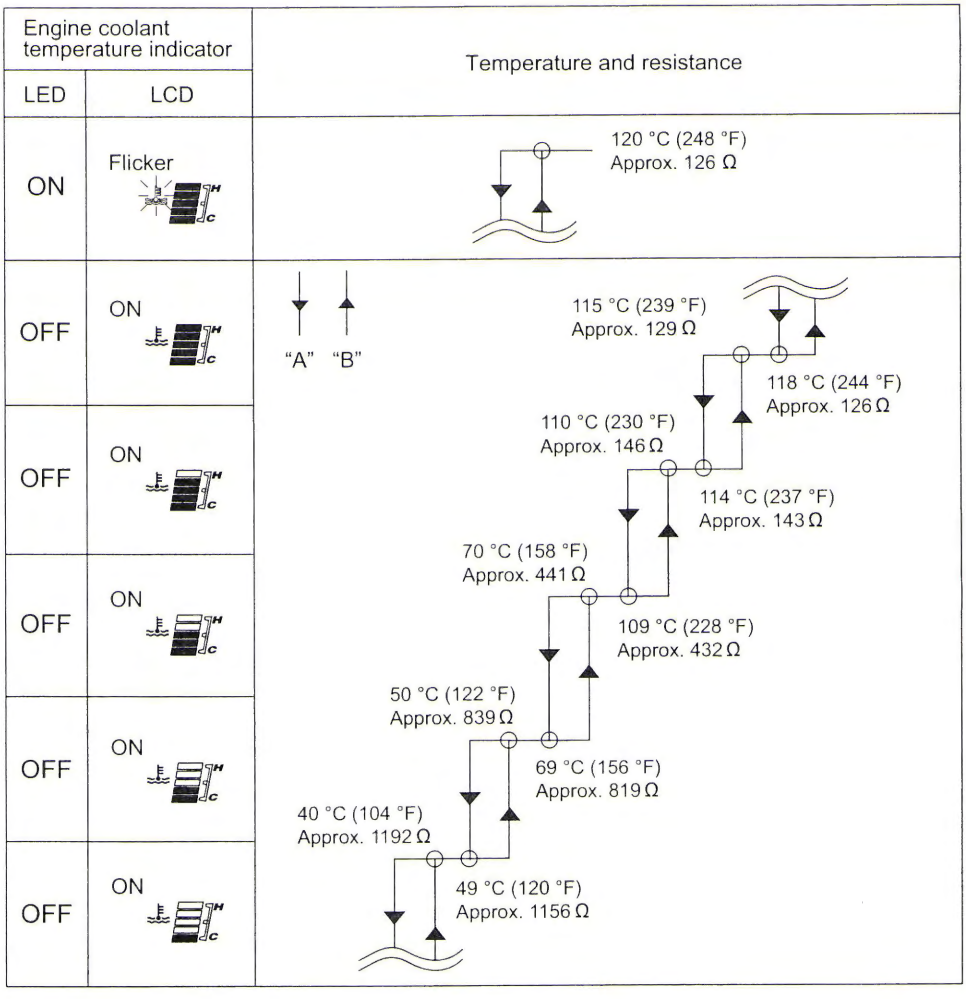
2) Connect a variable resistor (2) between the terminals.



I718H1930009-05

3) Turn the ignition switch ON.

4) 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).



IB08J1930007-02

5) Connect the ECT sensor coupler.

ECT Sensor Removal and Installation

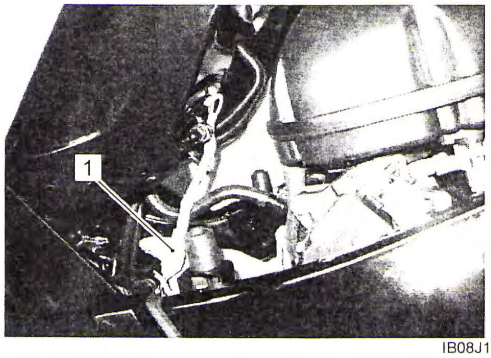
BENF08J19306006

Refer to "ECT Sensor Removal and Installation" in Section 1C (Page 1C-4).

Fuel Level Indicator Inspection

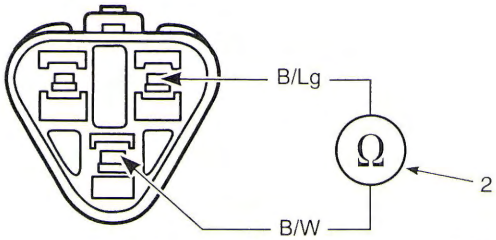
BENF08J19306007

1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
2) Disconnect the fuel pump coupler (1).



IB08J1930008-02

3) Connect a variable resistor (2) between the B/Lg and B/W lead wires of the wire harness side coupler.



I823H1930010-03

4) Turn the ignition switch ON.
5) Check the display of fuel level indicator (LCD) as shown in the figure.
If any abnormality is found, replace the combination meter with a new one. Refer to "Combination Meter Removal and Installation" (Page 9C-2).

NOTE

It takes approx. 30 seconds that the fuel level indicator indicates the detected fuel level.

Resistance	Fuel level indicator	
200.3 ± 5.0 Ω	ON	Flicker
142.2 ± 8.5 Ω	ON	ON
92.9 ± 6.0 Ω	ON	ON
54.7 ± 4.0 Ω	ON	ON
21.2 ± 2.0 Ω	ON	ON

IB08J1930009-04

6) Connect the fuel level gauge coupler and reinstall the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).

Fuel Level Gauge Inspection

BENF08J19306008

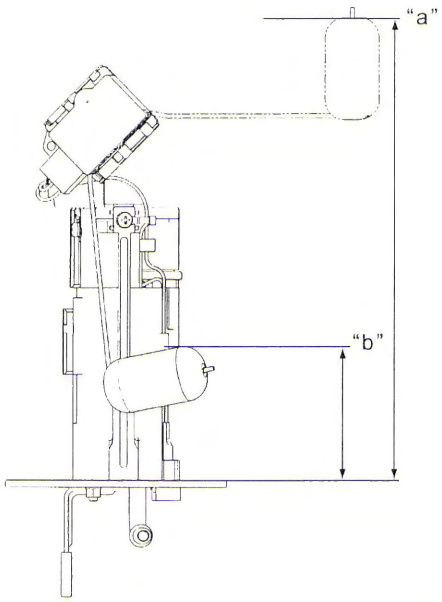
Inspect the fuel level gauge in the following procedures:

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"	9 – 11 Ω
Empty "b"	213 – 219 Ω



IB08J1930010-01

"a": 236.8 mm (9.32 in)	"b": 68.3 mm (2.69 in)

3) Install the fuel pump. Refer to "Fuel Pump Disassembly and Assembly" in Section 1G (Page 1G-11).

Speedometer Inspection

BENF08J19306009

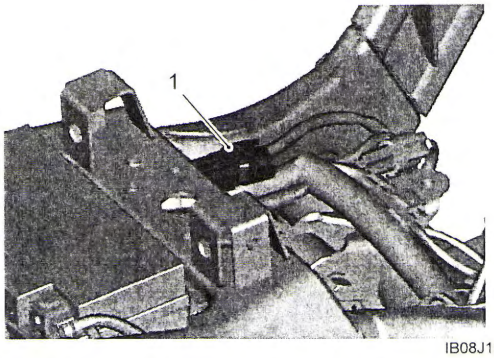
If the speedometer, odometer or tripmeter does not function properly, inspect the speed sensor and the coupler connections. If the speed sensor and coupler connections are OK, replace the combination meter unit with a new one. Refer to "Combination Meter Removal and Installation" (Page 9C-2).

Speed Sensor Removal and Installation

BENF08J19306010

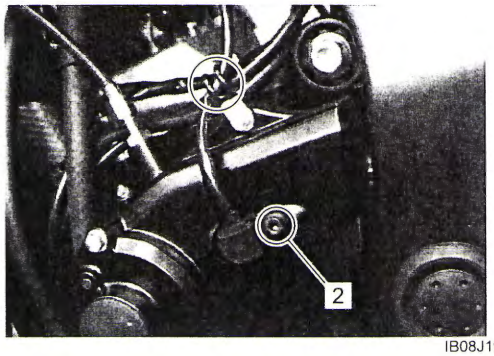
Removal

1) Lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
2) Disconnect the speed sensor lead wire coupler (1).



IB08J1930011-03

3) Remove the speed sensor (2).



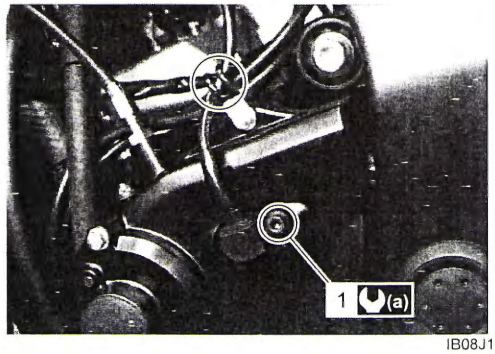
IB08J1930012-02

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): 4.5 N·m (0.45 kgf-m, 3.3 lbf-ft)



IB08J1930013-02

- Route the speed sensor lead wire. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-3).

Speed Sensor Inspection

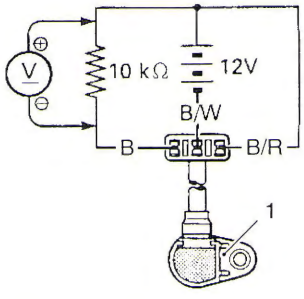
BENF08J19306011

Inspect the speed sensor in the following procedures:

1) Remove the speed sensor. Refer to "Speed Sensor Removal and Installation" (Page 9C-6).
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 (⎓)



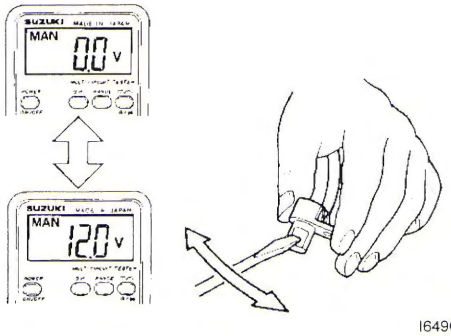
I649G1930016-02

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).



I649G1930017-03

Oil Pressure Indicator Inspection

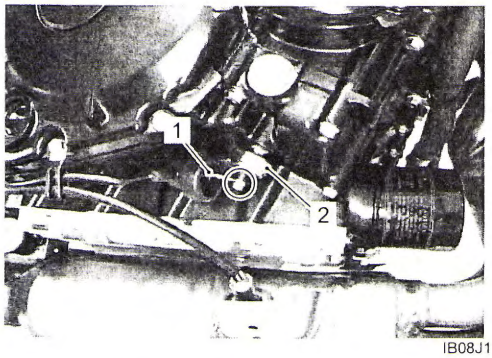
BENF08J19306012

Inspect the oil pressure indicator in the following procedures:

NOTE

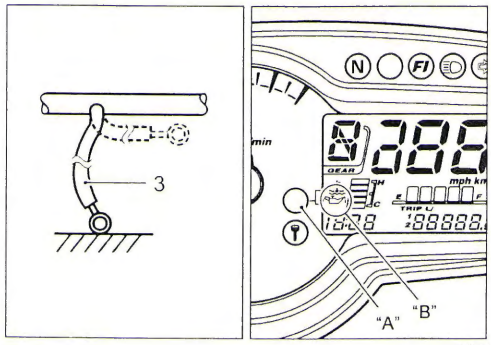
Before inspecting the oil pressure switch, check if the engine oil level is correct. Refer to "Engine Oil and Filter Replacement" in Section 1E (Page 1E-6).

1) Disconnect the oil pressure switch lead wire (1) from the oil pressure switch (2).



IB08J1150022-03

2) Turn the ignition switch ON.
3) Check if the oil pressure indicator (LED) "A" and LCD "B" will light up when grounding the lead wire (3).
   If the oil pressure indicator does not light up, replace the combination meter assembly with a new one after checking the connection of couplers.



IB08J1930014-03

Oil Pressure Switch Removal and Installation

BENF08J19306013

Refer to "Oil Pressure Switch Removal and Installation" in Section 1E (Page 1E-10).

Oil Pressure Switch Inspection

BENF08J19306014

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 1E (Page 1E-6).

1) Disconnect the oil pressure switch lead wire from the oil pressure switch.
2) 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

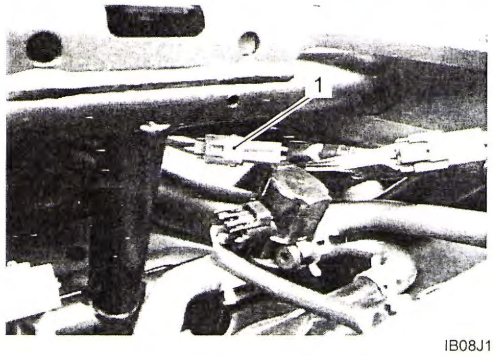
3) After finishing the oil pressure switch inspection, reinstall the removed parts.

Ignition Switch Inspection

BENF08J19306015

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).



IB08J1930018-02

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 (•))))

Color / Position	R	O	Gr	Br
ON	○	○	○	○
OFF				
LOCK				
P	○			○

I823H1930019-02

4) After finishing the ignition switch inspection, reinstall the removed parts.

Ignition Switch Removal and Installation

BENF08J19306016

Refer to "Ignition Switch Removal and Installation" in Section 1H (Page 1H-11).

Horn Inspection

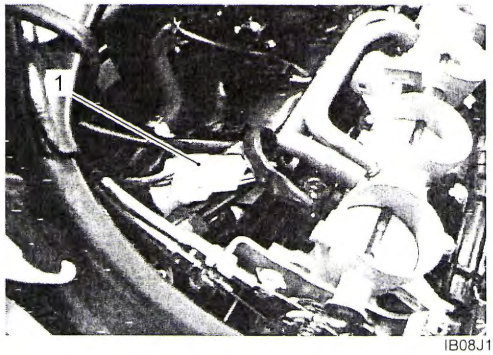
BENF08J19306017

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).



IB08J1930019-02

3) Inspect the horn button for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation" in Section 6B (Page 6B-3).

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

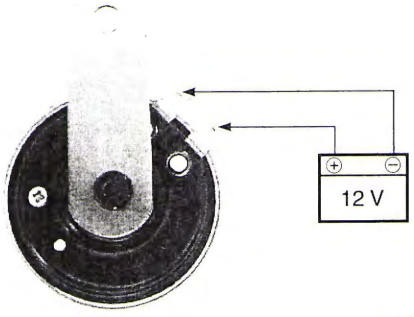
Tester knob indication
Continuity (•))))

Color / Position	B/BI	B/W
•		
PUSH	○	○

I718H1930028-03

Horn Inspection

1) Remove the horn. Refer to "Horn Removal and Installation" (Page 9C-8).
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.



IB08J1930015-02

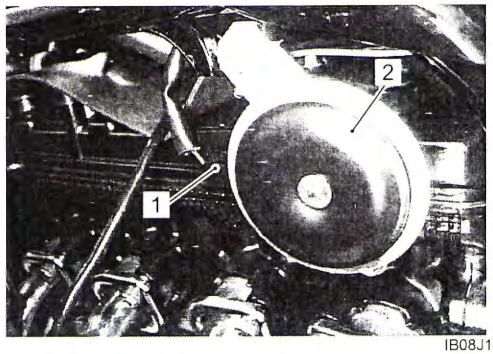
3) Connect the horn coupler.

Horn Removal and Installation

BENF08J19306018

Removal

1) Remove the left and right frame body cover. Refer to "Exterior Parts Removal and Installation" in Section 9D (Page 9D-6).
2) Move the radiator forward by removing the radiator mounting bolts.
3) Disconnect the horn coupler (1).
4) Remove the horn (2) by removing the mounting bolt.



IB08J1930016-02

Installation

Install the horn in the reverse order of removal.

Specifications

Service Data

BENF08J19307001

Wattage

Unit: W

Item	Specification
Combination meter light	LED
Turn signal indicator light	LED
High beam indicator light	LED
Neutral position indicator light	LED
FI indicator light/Oil pressure indicator light/Engine coolant temp. indicator light	LED
Immobilizer indicator light (if equipped)	LED

Tightening Torque Specifications

BENF08J19307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Speed sensor mounting bolt	4.5	0.45	3.3	☞(Page 9C-6)

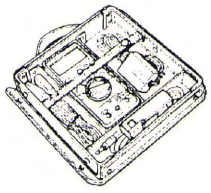
Reference:

For the tightening torques of fasteners not specified in this page, refer to:
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Special Tool

BENF08J19308001

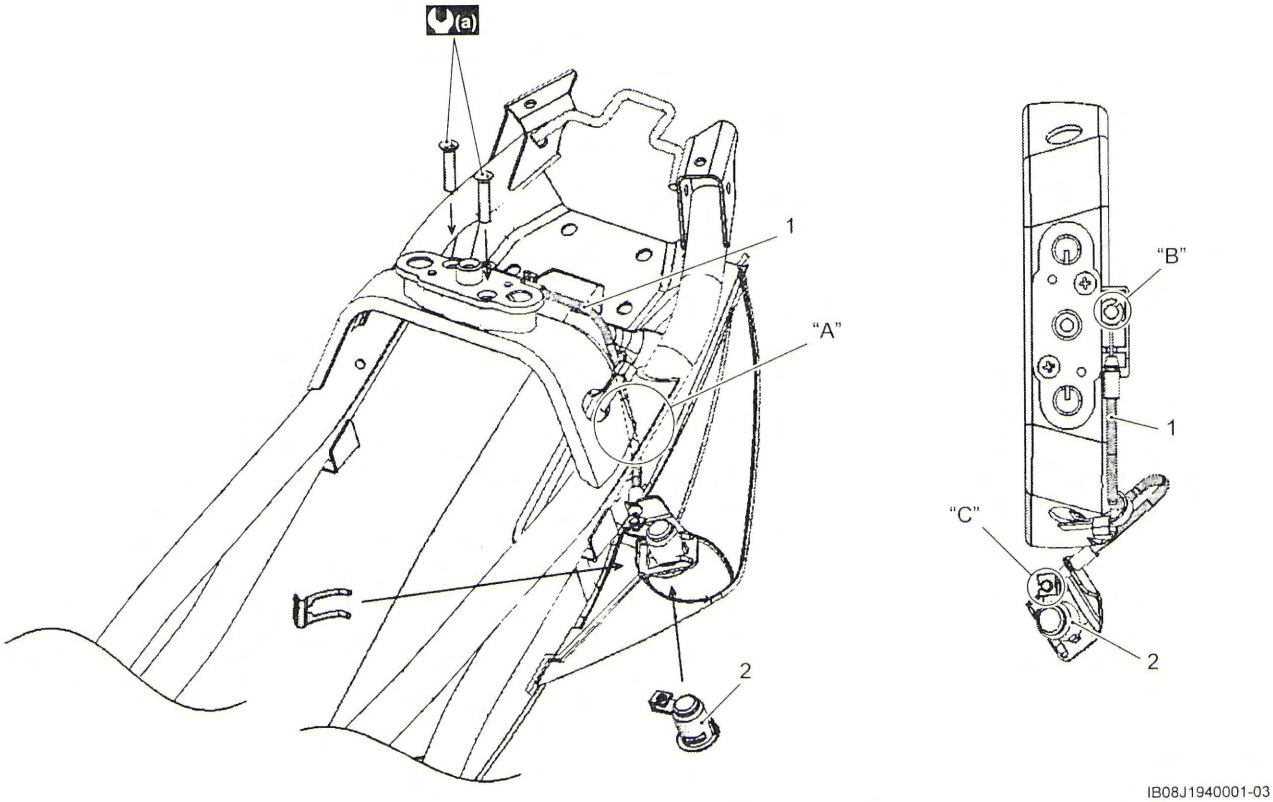
09900–25008 Multi circuit tester set 1. Multi circuit tester (09900-25004) 2. Revolution sensor (09900-25005) 3. Lead wire (09900-25006) 4. Peak volt adapter (09900-25007) ☞(Page 9C-5) / ☞(Page 9C-6) / ☞(Page 9C-7) / ☞(Page 9C-8) / ☞(Page 9C-8)		

Exterior Parts

Schematic and Routing Diagram

Seat Lock Cable Routing Diagram

BENF08J19402001



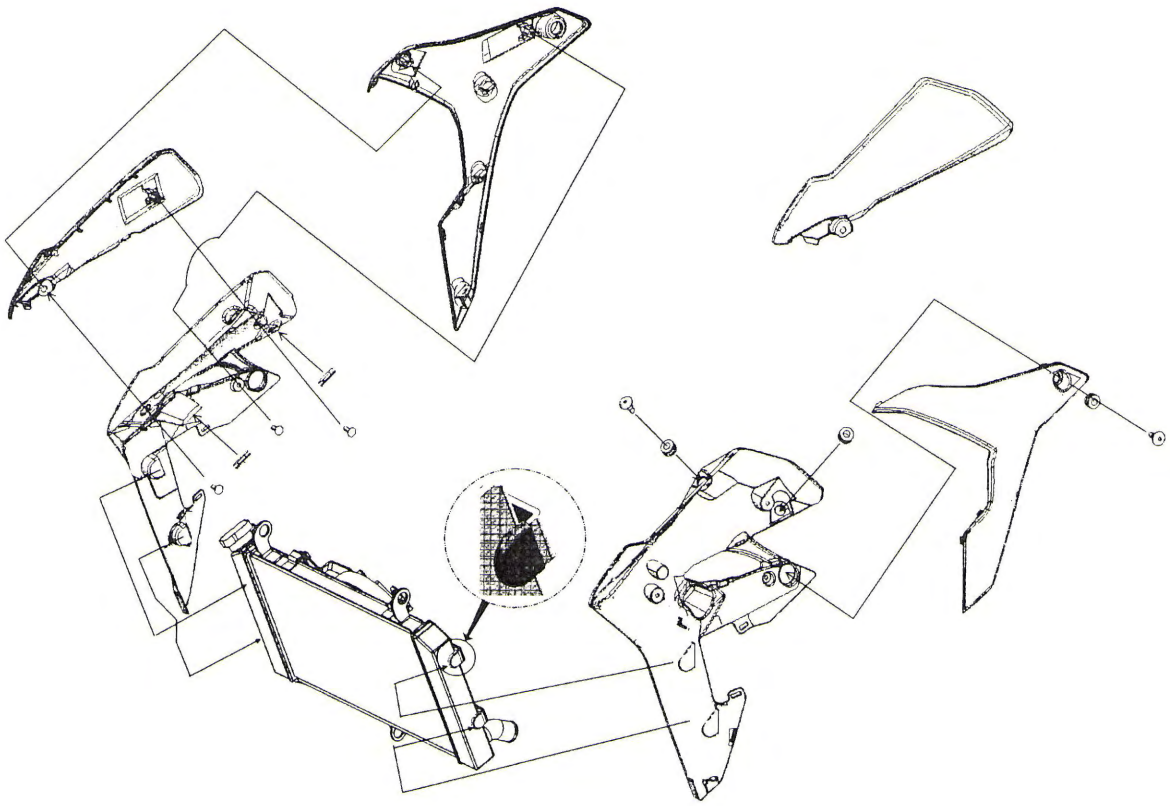
IB08J1940001-03

"A": Pass the seat lock cable under the frame pipe	"C": The tip of the cable is cylindrical shaped.	2. Seat lock
"B": The tip of the cable is spherical shaped.	1. Seat lock cable	(a) : 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)

Repair Instructions

Frame Body Cover Construction

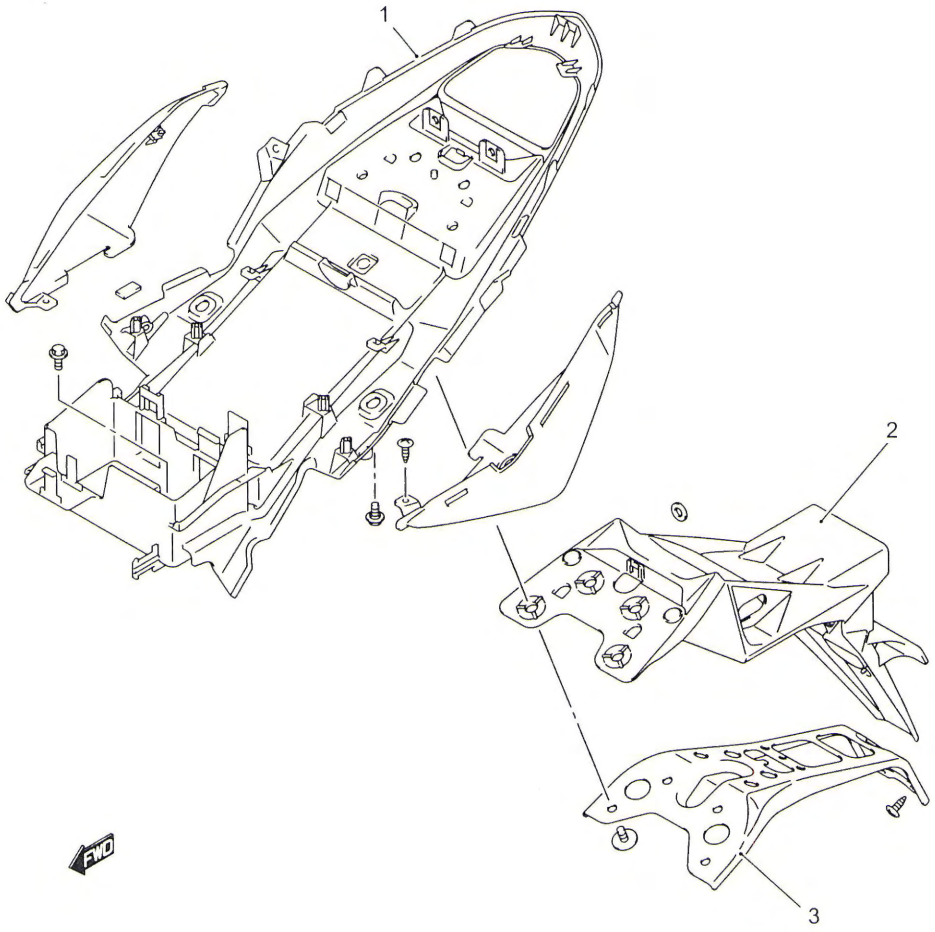
BENF08J19406001



IB08J1940002-01

Rear Fender Construction

BENF08J19406002

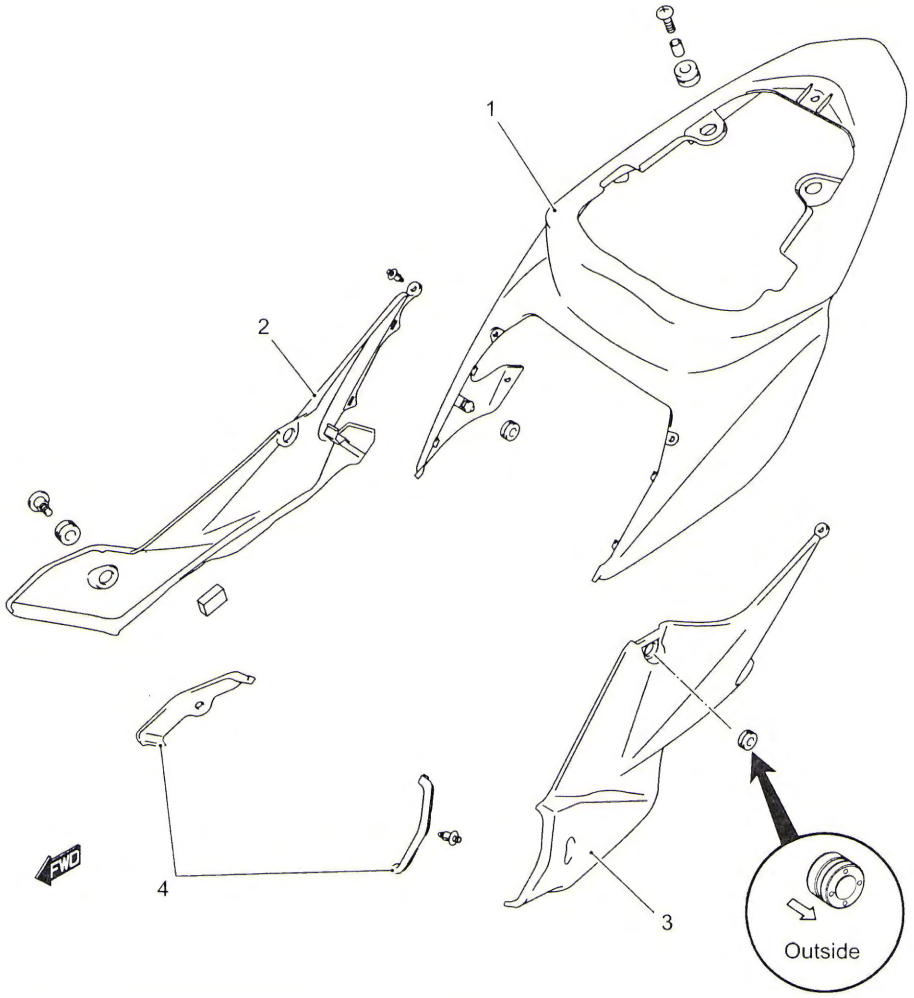


IB08J1940015-02

1. Rear fender (Front)	2. Rear fender (Rear)	3. Bracket

Frame Cover Construction

BENF08J19406003

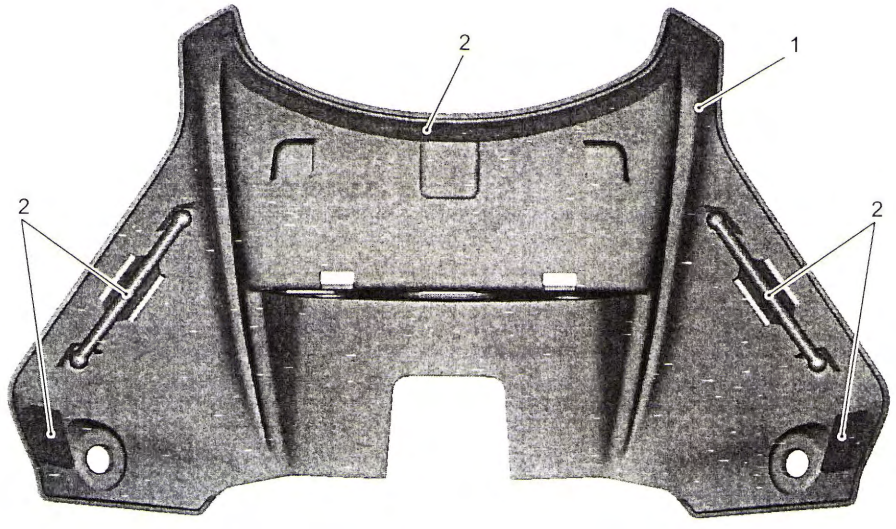


IB08J1940016-01

1. Frame center cover	2. Frame cover (RH)	3. Frame cover (LH)	4. Frame top cover

Fuel Tank Center Cover Cushion Attachment

BENF08J19406004

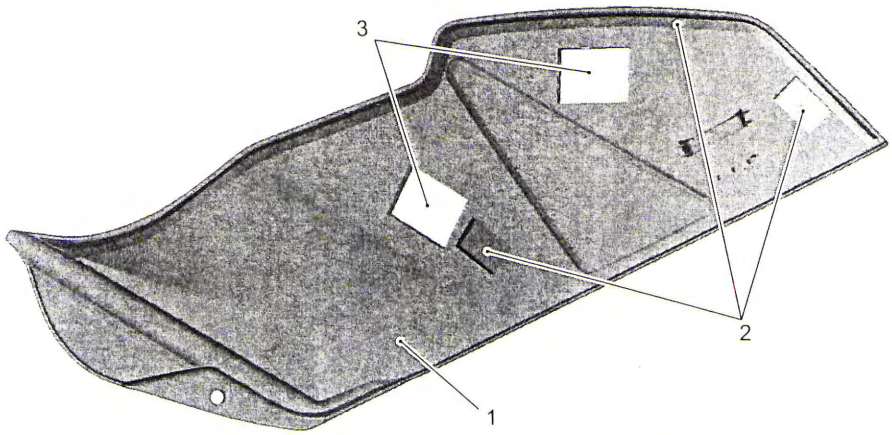


IB08J1940018-01

1. Fuel tank center cover	2. Cushion

Fuel Tank Side Cover Cushion Attachment

BENF08J19406005



IB08J1940017-02

1. Fuel tank side cover	2. Cushion	3. Velcro fastenings

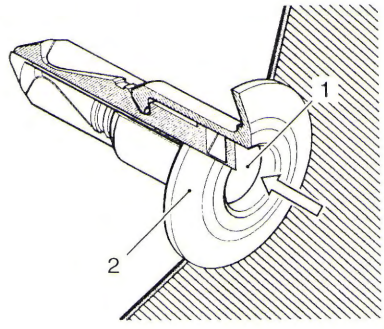
Fastener Removal and Installation

BENF08J19406006

Type A

Removal

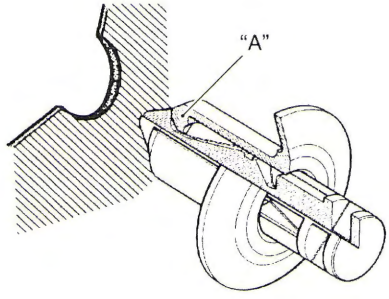
1) Depress the head of fastener center piece (1).
2) Pull out the fastener (2).



I649G1940005-02

Installation

1) Let the center piece stick out toward the head so that the pawls "A" closes.



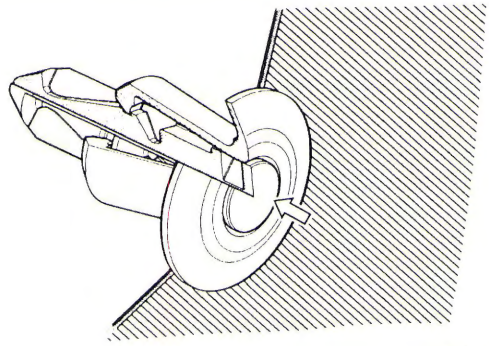
I649G1940006-02

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.

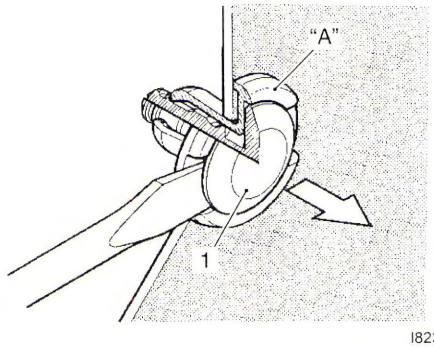


I649G1940007-02

Type B

Removal

1) Pry up the head of fastener center piece (1) with a screw driver.
2) Pull out the fastener "A".



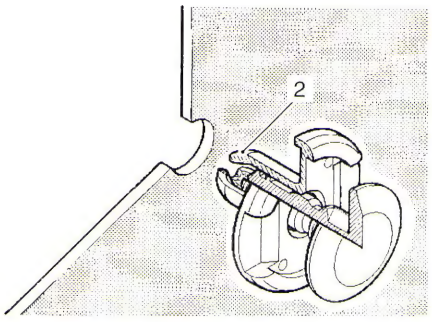
I823H1940001-01

Installation

1) Insert the fastener into the installation hole.

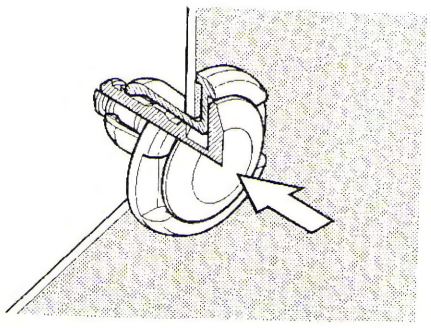
NOTE

To prevent the pawl (2) from damage, insert the fastener all the way into the installation hole.



I823H1940002-01

2) Push in the head of center piece.



I823H1940003-01

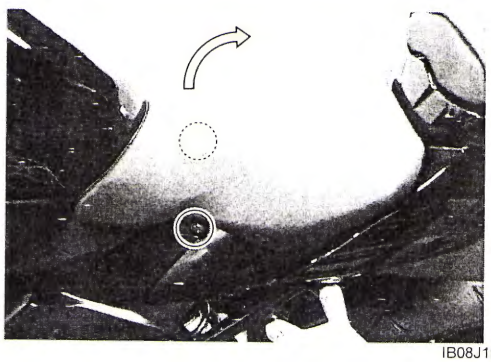
Exterior Parts Removal and Installation

BENF08J19406007

Front Seat

Removal

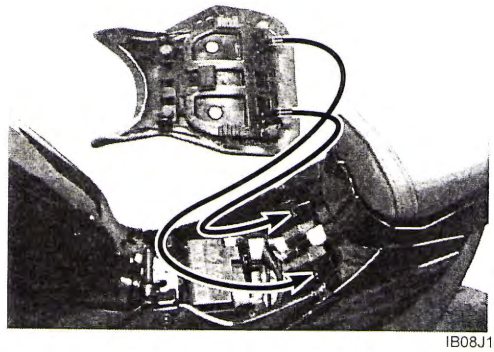
Remove the front seat by removing the bolts.



IB08J1940003-02

Installation

1) Slide the seat hooks into the seat hook retainers on the frame.
2) Insert the spacer to each side and tighten the bolts securely.

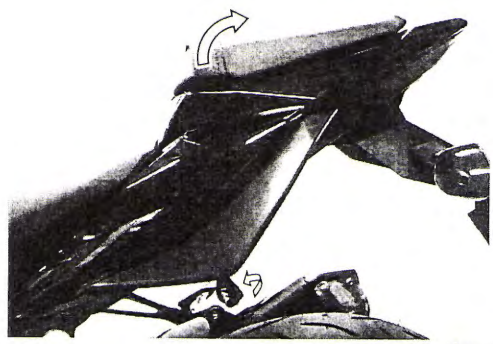


IB08J1940004-02

Rear Seat

Removal

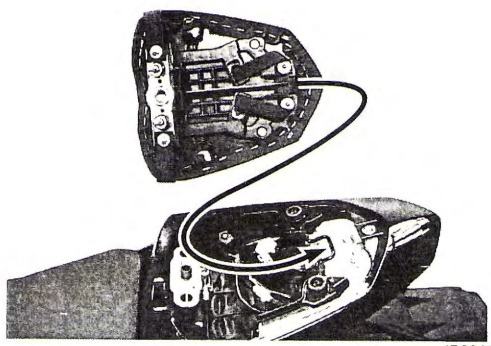
Remove the rear seat or seat tail cover with the ignition key.



IB08J1940005-02

Installation

Slide the seat hooks into the seat hook retainers and push down firmly until the seat snaps into the locked position.

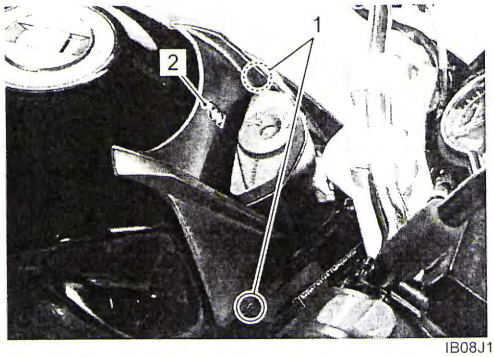


IB08J1940006-02

Fuel Tank Center Cover

Removal

1) Remove the bolts (1).
2) Disconnect the immobilizer antenna coupler. (if equipped)
3) Remove the fuel tank center cover (2).



IB08J1940007-01

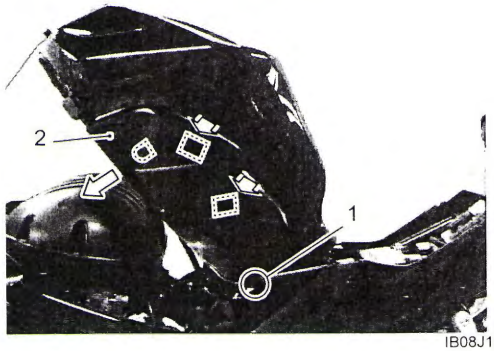
Installation

Install the fuel tank center cover in the reverse order of removal.

Fuel Tank Side Cover

Removal

1) Lift and Support the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-9).
2) Remove the fastener (1).
3) Remove the fuel tank side cover (2).



IB08J1940008-02

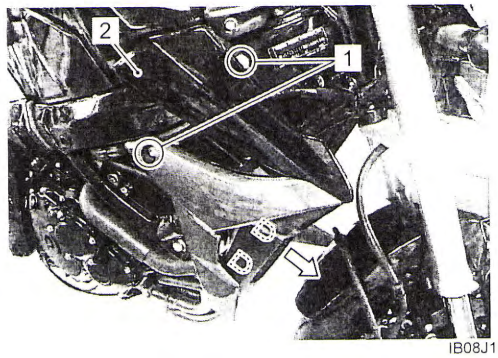
Installation

Install the fuel tank side cover in the reverse order of removal.

Frame Body Cover

Removal

1) Remove the bolts (1).
2) Remove the frame body cover(-s) (2). (LH & RH)



IB08J1940009-02

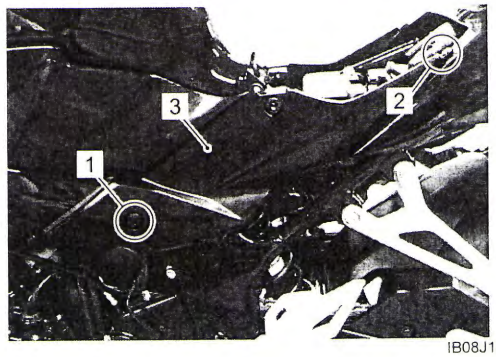
Installation

Install the frame body cover in the reverse order of removal.

Frame Front Cover

Removal

1) Remove the front seat.
2) Remove the bolt (1) and the fastener (2).
3) Remove the frame front cover (3).



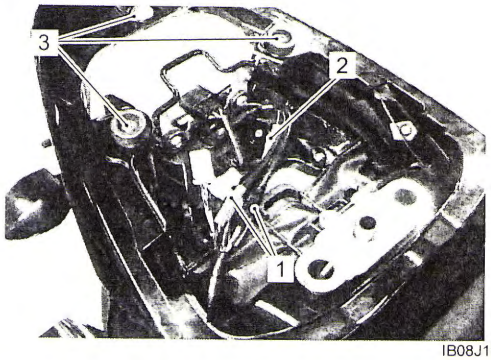
IB08J1940010-02

Installation

Install the frame front cover in the reverse order of removal.

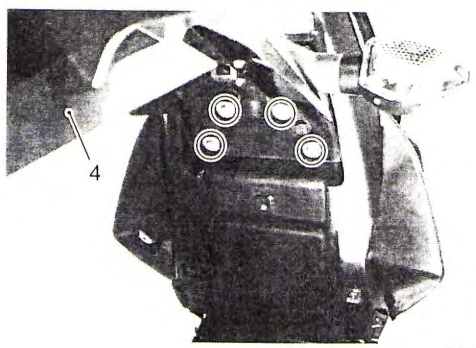
Frame Center Cover
Removal

1) Remove the front and rear seats.
2) Remove the frame covers (LH & RH).
3) Disconnect the turn signal light couplers (1) and licence plate light coupler (2).
4) Remove the screws (3).



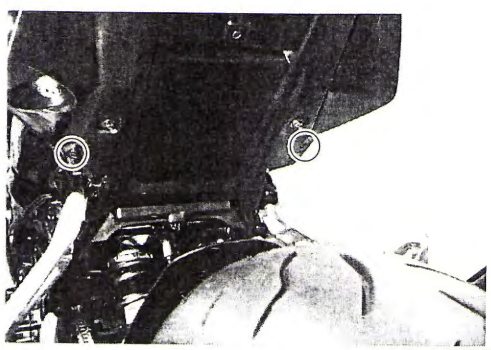
IB08J1940013-02

5) Remove the rear fender (4).



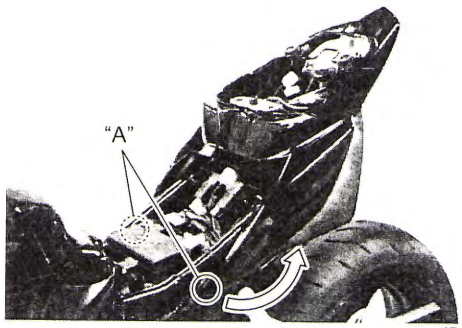
IB08J1940014-02

6) Remove the fasteners.



IB08J1940011-02

7) Remove the frame cover assembly from the frame.



IB08J1940012-03

"A": Hooked point

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-3).

Installation
Refer to "Rear Fender Construction" (Page 9D-3).

Specifications

Tightening Torque Specifications

BENF08J19407001

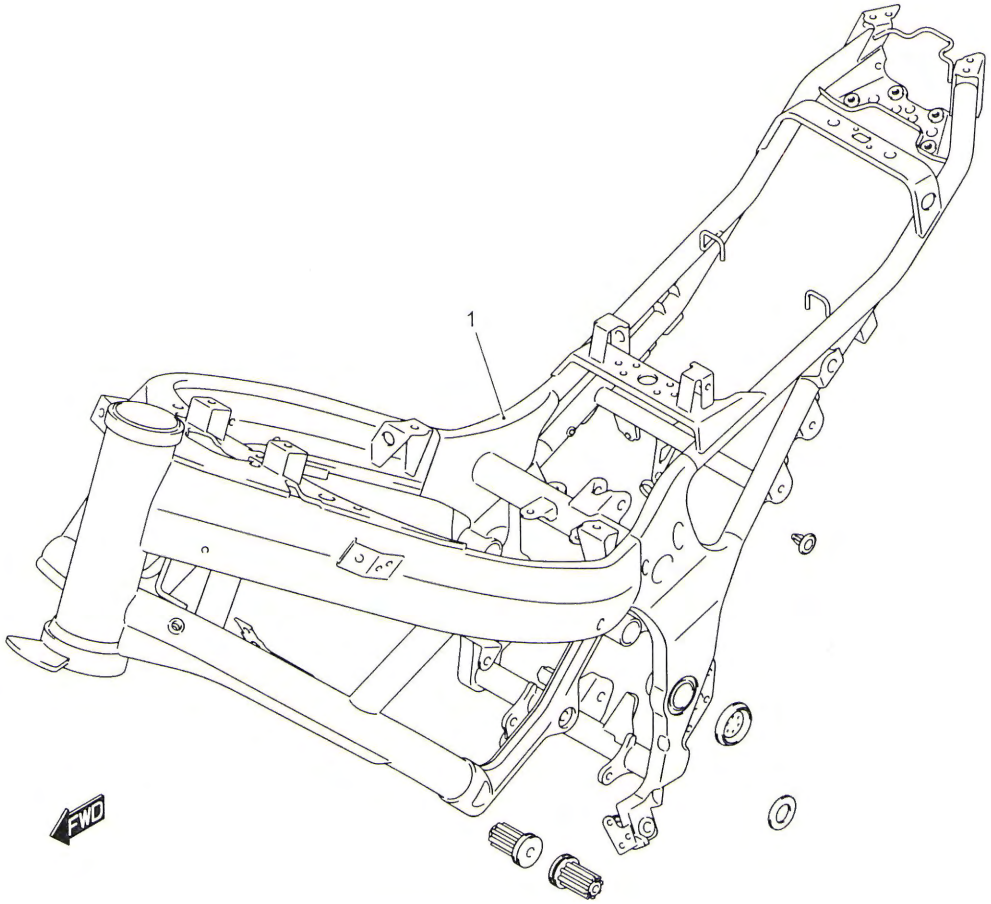
Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Seat Lock Cable Routing Diagram" (Page 9D-1)
"Tightening Torque List" in Section 0C (Page 0C-7)

Body Structure

Repair Instructions

Body Frame Construction

BENF08J19506001

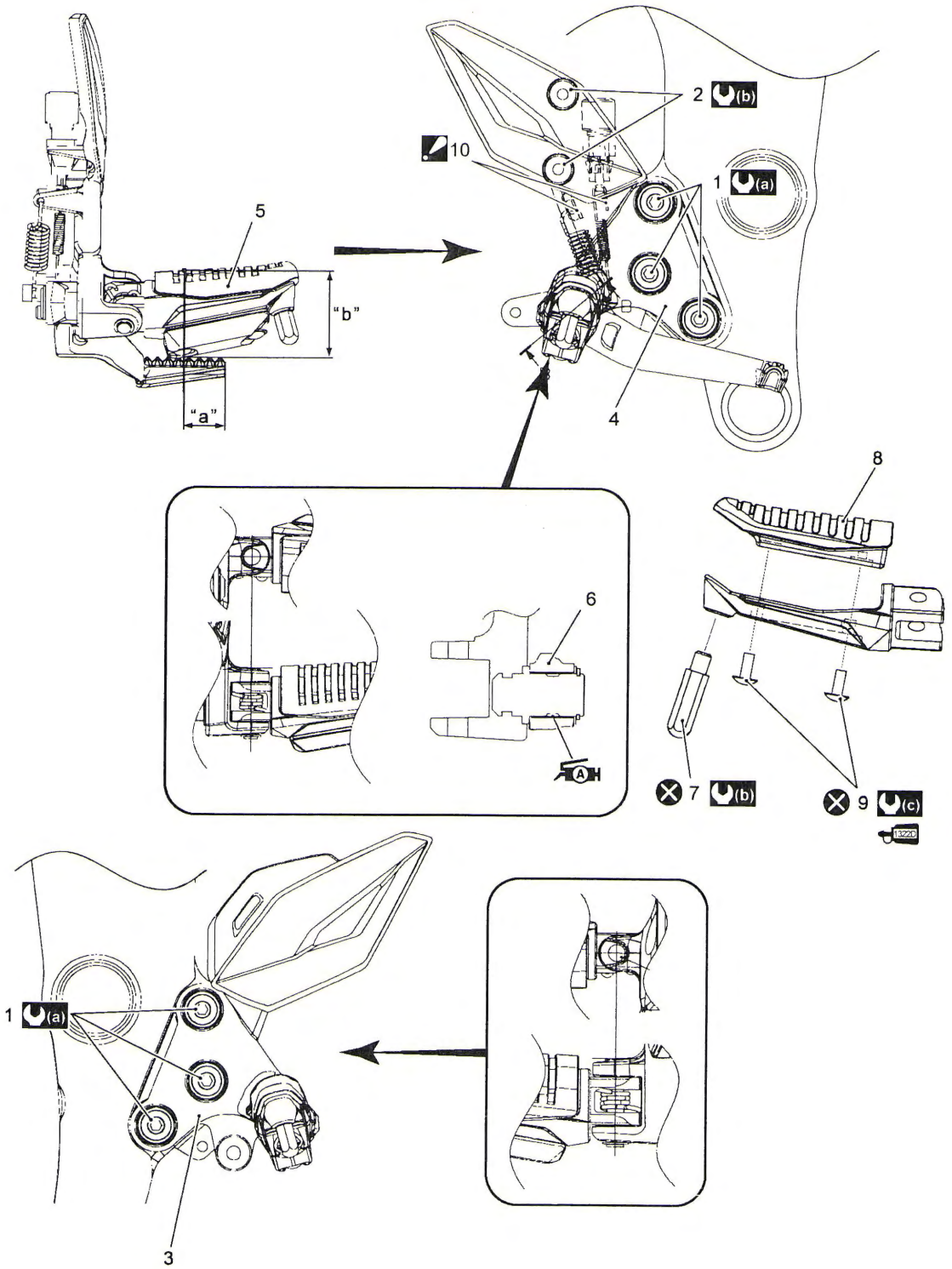


IB08J1950003-01

1. Frame

Front Footrest Bracket Construction

BENF08J19506002

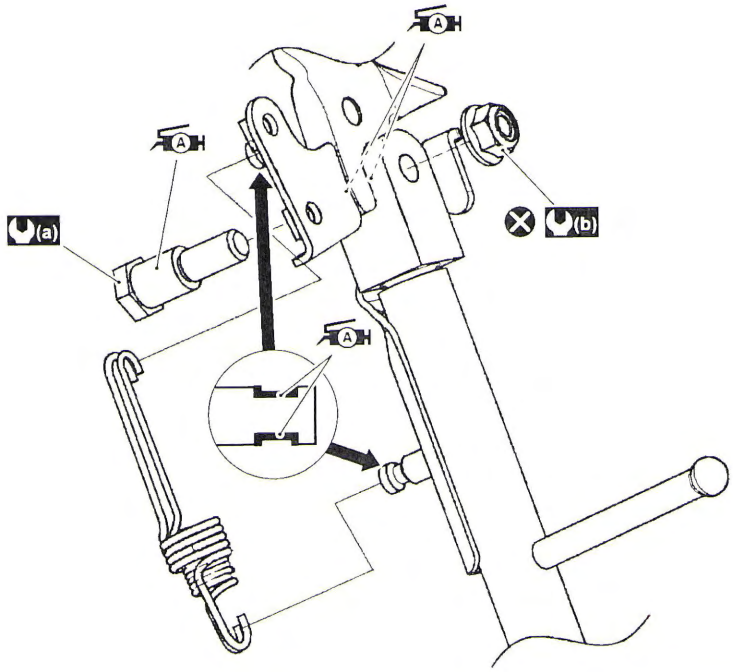


IF08J1950001-01

1. Footrest bracket bolt	7. Bank sensor bolt	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
2. Rear master cylinder bolt	8. Rubber	(b) : 18 N·m (1.8 kgf-m, 13.0 lbf-ft)
3. Footrest bracket No. 1 (Left)	9. Screw	(c) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
4. Footrest bracket No. 1 (Right)	10. Return spring Attach return springs as shown in figure.	A : Apply grease to the sliding surface.
5. Footrest	"a": 25.5 mm	1322D : Apply thread lock to the thread part.
6. Rear brake pedal	"b": 45 – 55 mm	

Side-stand Construction

BENF08J19506003



IB08J1950002-01

(a) : 40 N·m (4.0 kgf-m, 29.0 lbf-ft)	(A) : Apply grease to sliding surface.
(b) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	

Side-stand Removal and Installation

BENF08J19506004

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

BENF08J19507001

Reference:

For the tightening torques of fasteners not specified in this page, refer to:
"Front Footrest Bracket Construction" (Page 9E-2)
"Side-stand Construction" (Page 9E-3)
"Tightening Torque List" in Section 0C (Page 0C-7)

Special Tools and Equipment

Recommended Service Material

BENF08J19508001

NOTE

Required service material(s) is also described in:
"Front Footrest Bracket Construction" (Page 9E-2)
"Side-stand Construction" (Page 9E-3)