SUZUKI

GSX1300R

SERVICE MANUAL

Version 1.0.0

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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 and exhaust system until they have cooled.**

NOTICE

- **Never use gasoline as a cleaning solvent.**
- **After servicing the fuel, oil, 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 from 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 and other fluids: batteries, and tires.**
- **To protect Earth's natural resources, properly dispose of used motorcycle and parts.**

Precautions for Catalytic Converter

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As this vehicle is equipped with a catalytic converter, use only unleaded fuel and be careful not to let a large amount of unburned fuel enter the converter, or it can be damaged.

- Conduct a spark jump test only when necessary to the shortest possible time without opening the throttle.
- Conduct engine compression checks within the shortest possible time.
- Avoid any situations which can result in engine misfire. (e.g. starting the engine when the fuel tank is nearly empty.)

Precautions for Electrical Circuit Service

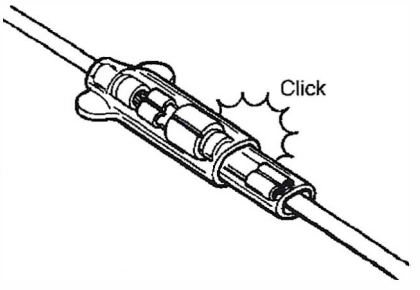
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When handling the electrical parts or servicing the electric system, observe the following points for the safety of the system.

Electrical Parts

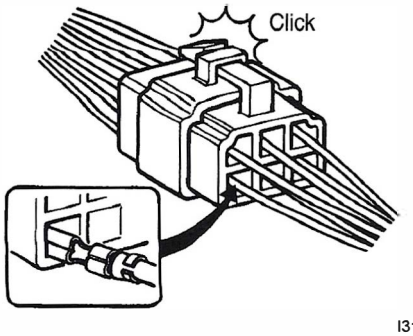
Connector / Coupler

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



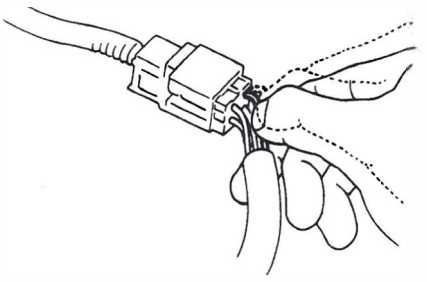
I310G1000001-01

- 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.



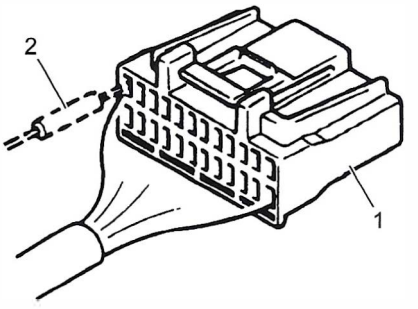
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- Inspect each lead wire circuit for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.



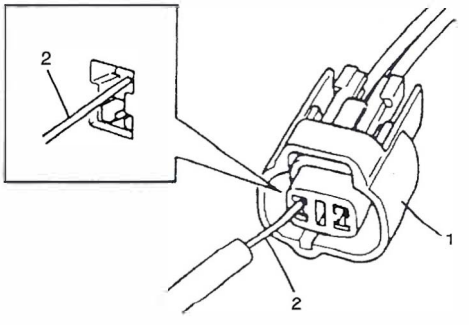
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- When taking measurements at electrical coupler (1) using a tester probe (2), be sure to insert the probe from the wire harness side (rear) of the coupler.



IF04K1000002-02

- When connecting meter probe (2) from the terminal side of the coupler (1) because it cannot be connected from harness side, use extra care not to bend the male terminal of coupler of force its female terminal open for connection.
  In case of such coupler as shown connect probe as shown to avoid opening female terminal.
  Never connect probe where male terminal is supposed to fit.

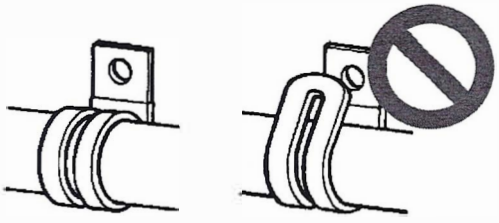


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- Avoid applying grease or other similar material to connector/coupler terminals to prevent electric trouble.

Clamp

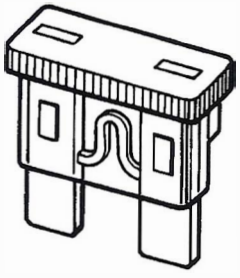
- Clamp the wire harness at such positions as indicated in "Wiring Harness Routing Diagram" in Section 9A (Page 9A-13).
- Bend the clamp properly so that the wire harness is clamped securely.
- In clamping the wire harness, use care not to allow it to hang down.
- Do not use wire or any other substitute 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.



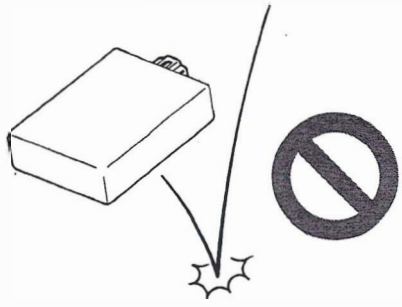
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Switch

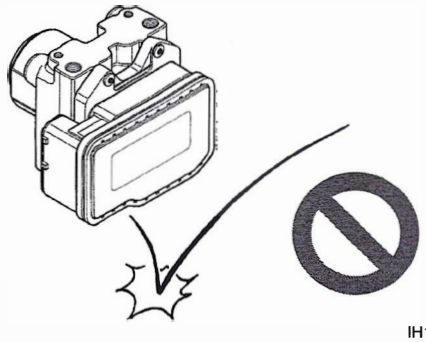
Never apply grease material to switch contact points to prevent damage.

ECM / CDI UNIT / ABS control unit / HU / 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.

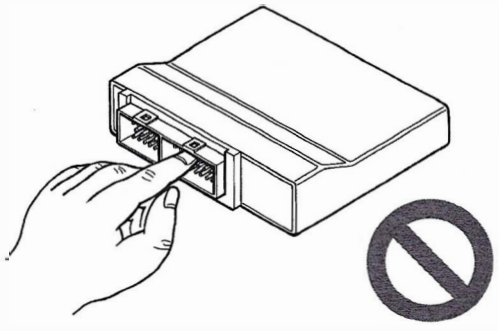


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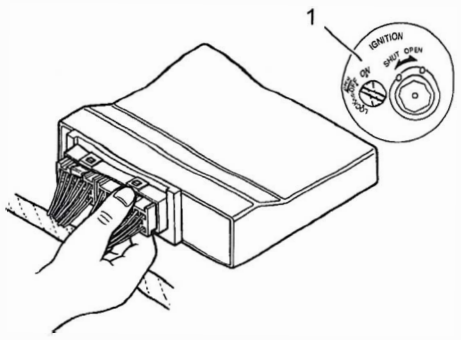
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- Be careful not to touch the electrical terminals of the electrical parts (ECM / CDI UNIT, etc.). The static electricity from your body may damage them.



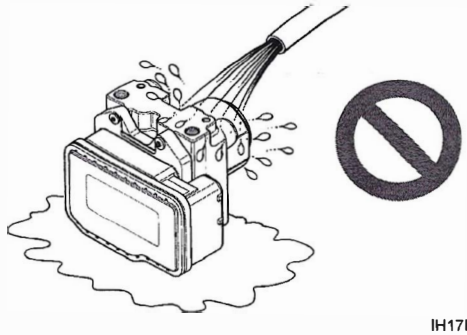
IH17K1000004-01

- When disconnecting and connecting the coupler, make sure to turn OFF the ignition switch (1), or electrical parts may get damaged.



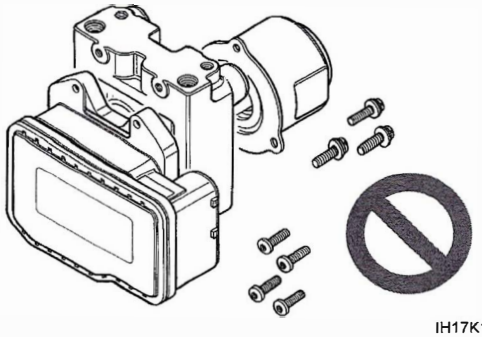
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- Never allow dust or water to contact the ABS control unit / HU.



IH17K1000005-01

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

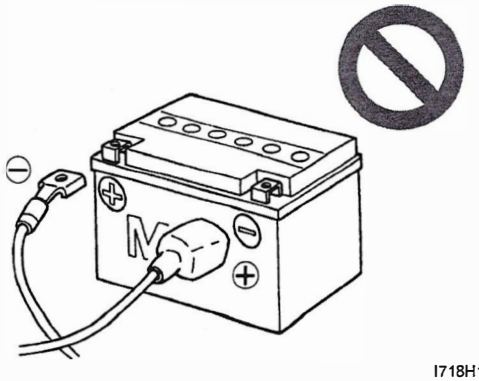


IH17K1000006-01

- 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 / CDI UNIT / ABS control unit / HU or sensor may result.
- Be sure to use a specified voltmeter/ohmmeter. Otherwise, accurate measurements may not be obtained and personal injury may result.

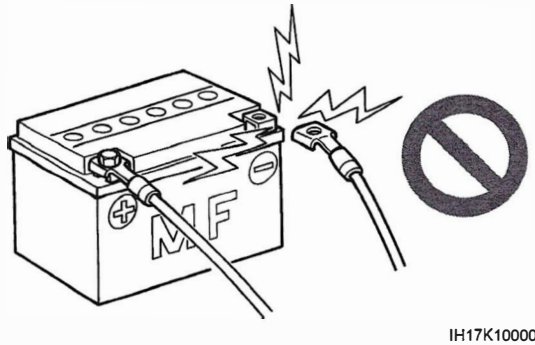
Battery

- Select the same type MF battery when replacing the battery.
- Battery connection in reverse polarity is strictly prohibited. Such a wrong connection will damage the components of the FI system and ABS instantly when reverse power is applied.



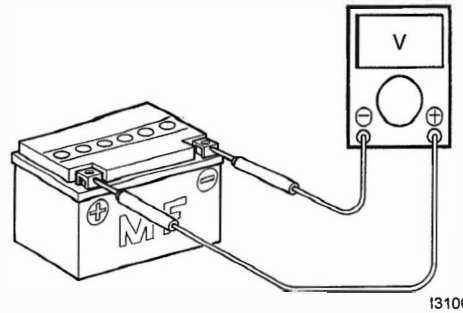
I718H1000004-01

- 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.



IH17K1000007-01

- 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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Electrical Circuit Inspection Procedure

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

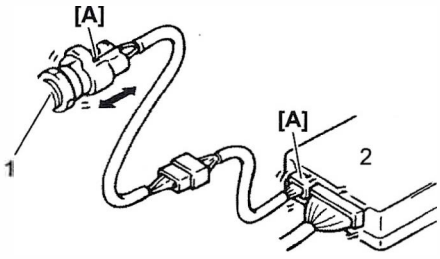
Open circuit check

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

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

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

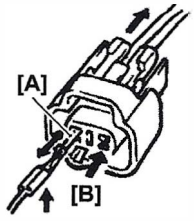
1) Disconnect the negative (–) cable from the battery.
2) Check each connector/coupler at both ends of the circuit being checked for loose connection. Also check for condition of the coupler lock if equipped.



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[A]:	Check for loose connection
1.	Sensor
2.	Electrical part

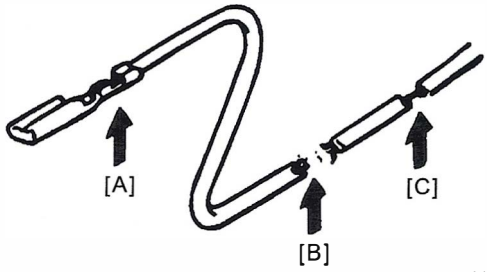
3) Using a test male terminal, check the female terminals of the circuit being checked for contact tension.
Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted 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.



IE02K1000005-01

[A]:	Check contact tension by inserting and removing.
[B]:	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.

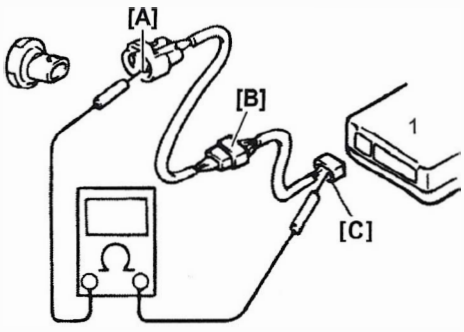


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[A]:	Looseness of crimping
[B]:	Open
[C]:	Thin wire (A few strands left)

Continuity check

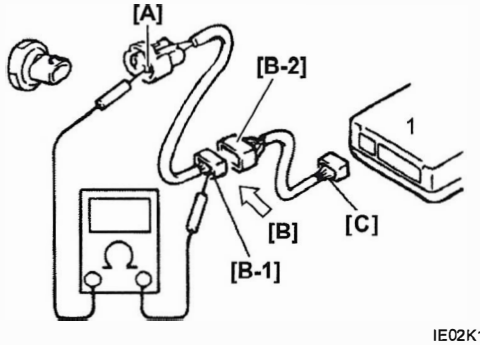
1) Measure resistance across coupler [B] (between [A] and [C] in the figure).
   If no continuity is indicated (infinity or over limit), the circuit is open between terminals [A] and [C].



IE02K1000007-01

1. Electrical part

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].



IE02K1000008-01

1. Electrical part

Voltage check

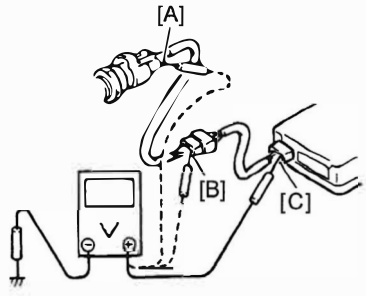
If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

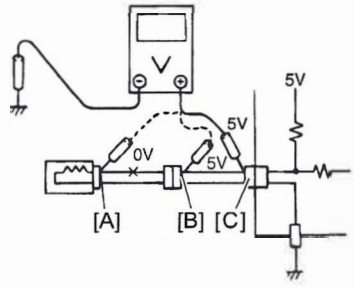
1) With all connectors/couplers connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.
2) If measurements were taken as shown in the figure and results were listed in the following, it means that the circuit is open between terminals [A] and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

Voltage between
[A] and body ground: 0 V
[B] and body ground: Approx. 5 V
[C] and body ground: Approx. 5 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: 3 V – 2 V voltage drop
[B] and body ground: Approx. 5 V
[C] and body ground: Approx. 5 V





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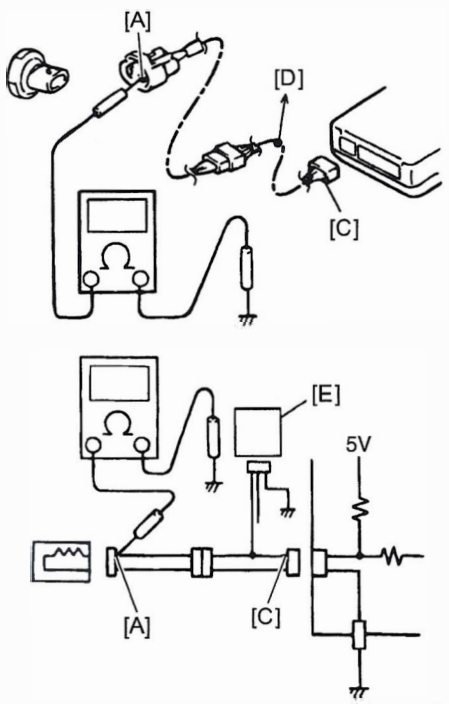
Short circuit check (Wire harness to ground)

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.

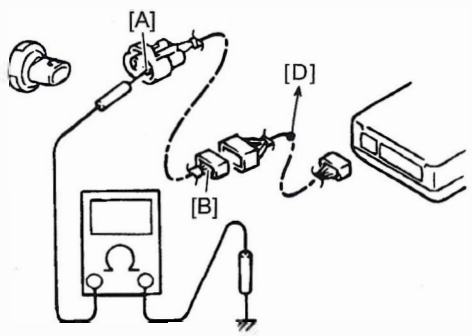
3) Measure resistance between terminal at one end of circuit ([A] terminal in the figure) and body ground. If continuity is indicated, there is a short circuit to ground between terminals [A] and [C].



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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 the ground between terminals [A] and [B].



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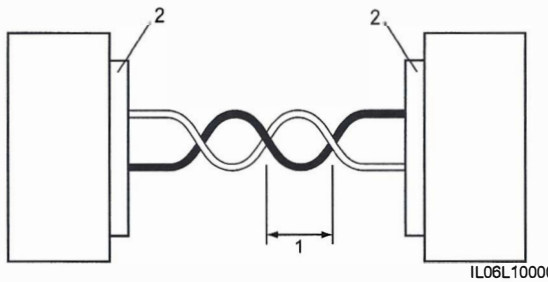
[D]: To other parts

Twist Pair Wire Harness

NOTE

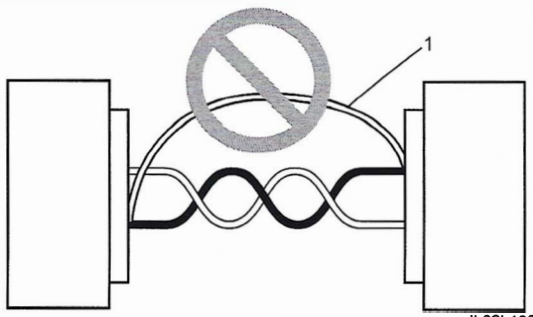
For locations where twist pair wire harness are used, refer to "How to Read Terminal Nos." in Section 9A (Page 9A-1).

- A twist (1) in the twist pair wire harnesses except around the connectors (2) should be within 100 mm (3.9 in.). Excessively-loose lines can be affected by electric noise.



IL06L1000002-01

- Do not connect twist pair line terminals using a bypass wire (1). Doing so makes the twist pair line receive electric noise interference.



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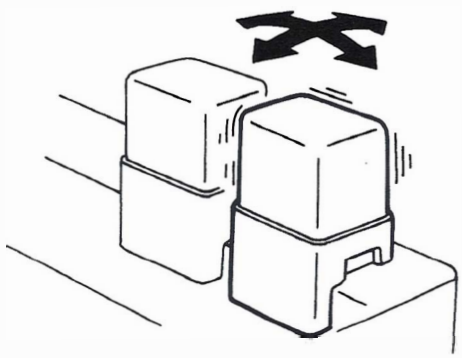
Intermittent Malfunction Inspection

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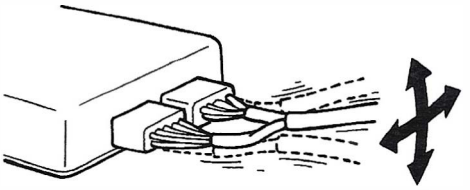
Since most intermittent failures are caused by faulty electrical connections or wiring, it is necessary to check the wiring part suspected of failure. Perform the following inspections depending on the suspected cause.

Failure Caused by Vibration

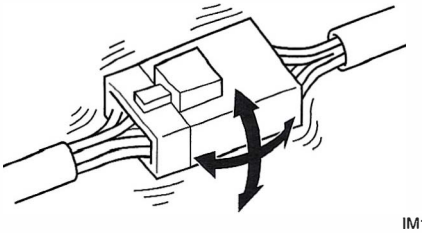
Lightly vibrate the electrical part, sensor, connector or lead wire with fingers to check if the failure is reproduced.



IM10L1000001-01



IM10L1000003-02



IM10L1000002-02

Failure Caused by Temperature Fluctuation
If a failure is suspected at low or high temperatures, perform the following inspections.

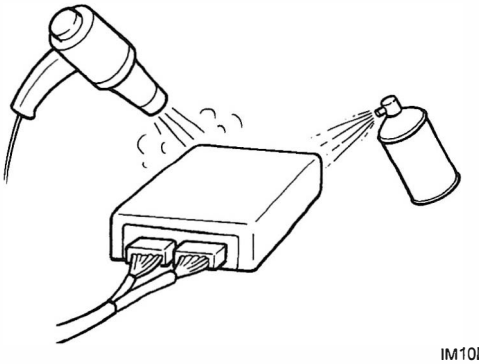
⚠ WARNING

To avoid the risk of being burned, do not touch the heated part.
Do not heat electrical components above 60 °C (140 °F).

⚠ CAUTION

Do not heat or cool electrical components in disassembled form, as this may damage them.

- Heat an electrical component with a hair dryer to check if the failure is reproduced.
- Cool an electrical component with a cold spray to check if the failure is reproduced.



IM10L1000004-01

Failure Caused by Rain or High Humidity

⚠ CAUTION

Do not splash water directly on electrical parts, as this may damage them.

Splash water on the vehicle to check if the failure is reproduced.

Failure Caused by High Electrical Load
Turn on all electrical equipment to check if the failure is reproduced.

Precautions for Circuit Tester

BENM10L30000005

Read the instruction manual to use the tester correctly.

Symbols

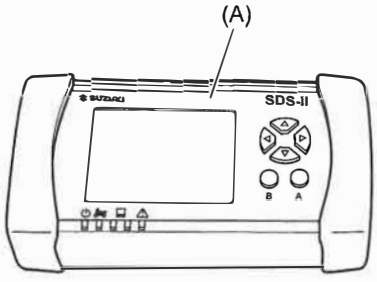
Symbol	Definition
⎓	DC
~	AC
Ω	Resistance
•))	Continuity
⊣◀	Diode

Precautions for SDS-II

BENM10L30000006

- In some models of the SUZUKI motorcycles, the DTC can be confirmed by using SDS-II.
- Read the instruction manual when using SDS-II and operate it properly.

Special tool
(A): 09904–41031
09904–41041

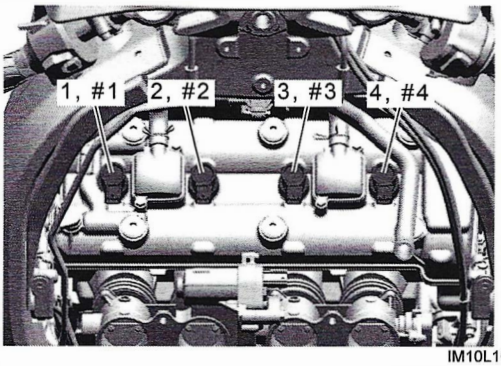


IH18K1000002-01

Precautions for Identification

BENM10L30000007

When viewed from the state in sitting on the seat, the cylinders of this engine are identified as No. 1 (1), No. 2 (2), No. 3 (3) and No. 4 (4), counting from left to right. The sensor, actuator, etc. in No. 1 cylinder are identified as #1 and the ones in No. 2, No. 3 and No. 4 cylinder are as #2, #3 and #4 respectively.



IM10L1000005-01

Section 0

General Information

0

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General Information

Service Manual Information

General Description

Abbreviations

BENM10L30111001

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
ATDC: After Top Dead Center
A/F: Air Fuel Ratio
B:
BBDC: Before Bottom Dead Center
BTDC: Before Top Dead Center
B+: Battery Positive Voltage
C:
CAN: Controller Area Network
CDI: Capacitive Discharge Ignition
CKP: Crankshaft Position
CKT: Circuit
CLP: Clutch Lever Position
CMP: Camshaft Position
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
ECU: Electronic Control Unit
EEPROM: Electrically Erasable Programmable Read Only Memory
ESS: Emergency Stop Signal
ET: Engine Temperature
ETV: Electric Throttle Valve
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
HI: High
HO2: Heated Oxygen
HU: Hydraulic Unit
I:
IAP: Intake Air Pressure
IAT: Intake Air Temperature
I.D.: Inside Diameter
IG: Ignition
IMU: Inertial Measurement Unit
IN.: Intake
ISC: Idle Speed Control
J:
JASO: Japanese Automobile Standards Organization
J/C: Junction Coupler
L:
LCD: Liquid Crystal Display
LED: Light Emitting Diode
LH: Left Hand
LO: Low
M:
Max: Maximum
MIL: Malfunction Indicator Light
Min.: Minimum
N:
NOx: Nitrogen Oxides
O:
O2: Oxygen
OBD: On-Board Diagnostic System
OHC: Over Head Camshaft
O.D.: Outside Diameter
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
RPM: Engine Speed
S:
SAE: Society of Automotive Engineers
SDMS: Suzuki Drive Mode Selector
SDS: Suzuki Diagnosis System
SRAD: Suzuki Ram Air Direct
STCS: Secondary Throttle Control System
STD: Standard
STP: Secondary Throttle Position

STV: Secondary Throttle Valve
STVA: Secondary Throttle Valve Actuator
T:
TC: Traction Control
TDC: Top Dead Center
TO: Tip-over
TP: Throttle Position
TPS: Throttle Position Sensor
V:
VVT: Variable Valve Timing

SAE-to-Former SUZUKI Term

BENM10L30111010

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 Light, Malfunction Indicator Light (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

BENM10L30111002

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.

NOTE

The table below shows generally used symbols, and includes some symbols not used in this manual.

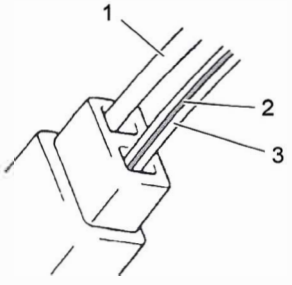
Symbol	Definition
	Torque control required. Data beside it indicate specified torque.
	Apply oil. Use engine oil unless otherwise specified.
	Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 5 : 1).
	Apply SUZUKI SUPER GREASE A. 99000-25011
	Apply SUZUKI SUPER GREASE C. 99000-25030
	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 SUZUKI BOND 1216B. 99000-31230
	Apply THREAD LOCK CEMENT 1303B. 99000-32030
	Apply THREAD LOCK CEMENT 1322D. 99000-32150
	Apply THREAD LOCK CEMENT 1342H. 99000-32160
	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
	Apply or use fork oil.
	Apply or use brake fluid.
	Use special tool.
	Do not reuse.
	Note on reassembly.
	Inserting position of resin remover
	Holding position with hands

Wire Color Symbols

BENM10L30111003

Symbol	Wire Color	Symbol	Wire Color
B	Black	Lbl	Light blue
Be	Beige	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

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.



ID26J1010224-02

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

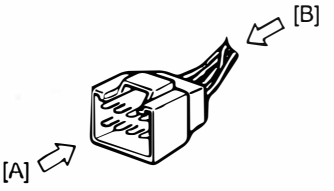
How to Read Terminal Numbers

BENM10L30111004

- The coupler section is described in an illustration viewed from terminal side. However, when using illustration viewed from harness side, the coupler illustration is described together with the symbol mark (1).
- For the visual direction of coupler such as ECM and ABS CONTROL UNIT / HU with many terminals, symbol mark (1) is also described together.
- The coupler information is expressed in terminal layout, lock position (2) and terminal numbers (3).
- The terminal numbers in this manual are described using "T".

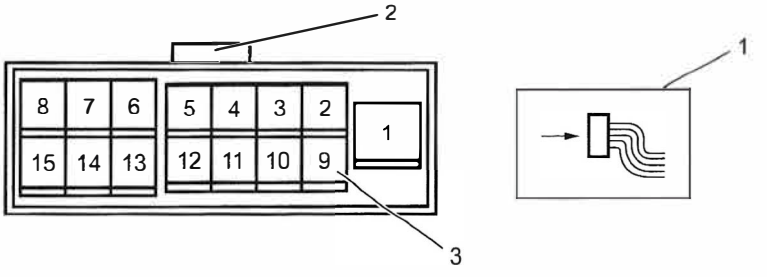
NOTE

Molded terminal numbers that are different from the above can be found on some connectors in rare cases. These molded numbers are not applied in this manual.



IJ27K1010012-01

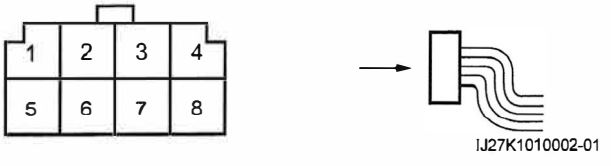
[A]: View terminal side	[B]: View harness side



IJ27K1010001-02

Female Terminal

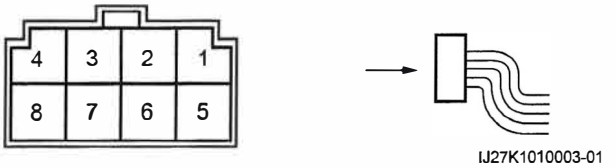
Bounds of the coupler shape are expressed in a single line. The terminal numbers are described with an integer from 1 sequentially from the top left corner.



IJ27K1010002-01

Male Terminal

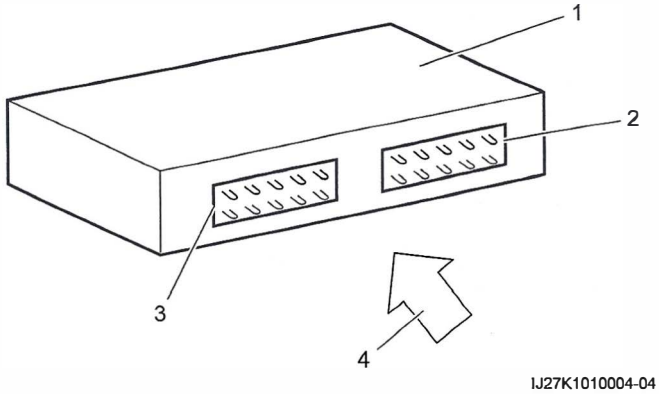
Bounds of the coupler shape are expressed in a double line. The terminal numbers are described with an integer from 1 sequentially from the top right corner.



IJ27K1010003-01

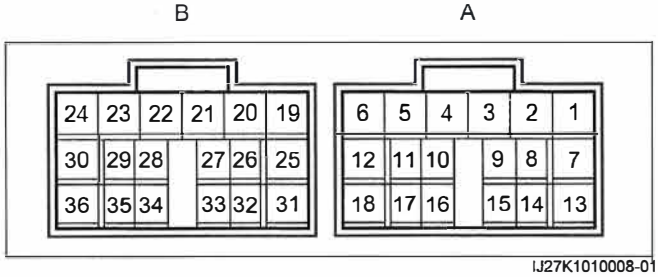
Controller / Sensor

In the case of simple substance of sensors without wiring harness, they are described as shown in the illustration below.



IJ27K1010004-04

1. Controller/sensor	3. Coupler "B"
2. Coupler "A"	4. View



IJ27K1010008-01

SDS-II

BENM10L30111005

SDS-II Function

NOTE

For details of each SDS-II function, referring to the SDS-II operation manual.

Function	Description
Data monitor	ECU data can be displayed and the displayed data can be saved.
DTC inspection	Current DTC, past DTC and pending DTC can be displayed.
Show failure data	"Show failure data" can be displayed.
Active control	• Various actuators can be operated. • The learned value of various systems can be reset.
Utility	• Vehicle information can be displayed. • The status of "System Readiness Test" can be displayed.
Reprogramming	The ECM and ABS control unit / HU can be programmed.

Corresponding ECU

NOTE

The item of the available "Active control" and "Utility" varies according to the type of the vehicle.

ECU	Data monitor	DTC inspection	Show failure data	Active control	Utility	Reprogramming
ECM	Available	Available	Available	Available *1	Available *2	Available
ABS control unit / HU	Available	Available	Not available	Available *1	Available *2	Available
Combination meter	Not available	Not available	Not available	Not available	Available *2	Available

*1: Active control

ECM	• PAIR control solenoid drive control	• Cooling fan relay control
	• Steering damper solenoid operating control	• EVAP purge valve operating control
	• STV / ETV drive control	• Long term fuel trim reset
	• TP fully closed learned value reset	• MIL
	• Exhaust valve drive control	• Reset closed accel position
	• ISC rpm control	• Reset IMU learning value
	• ISC aperture learned value reset	• Reset gear position learned value
	• ISC air volume control	
ABS control unit / HU	• ABS HU operating 2	

*2: Utility

ECM	• Vehicle information	• Readiness test results
ABS	• Vehicle information	
Combination meter	• Vehicle information	

Applicable Model / VIN

BENM10L30111006

Applicable Model

GSX1300R

Applicable VIN

NOTE

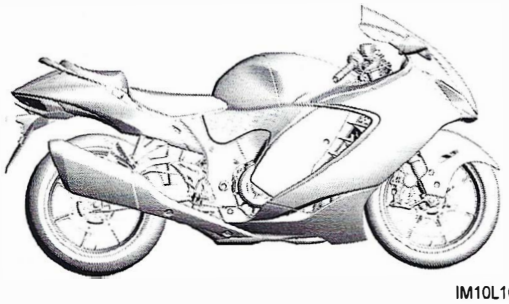
- **"#" indicates any check digit from 0 to 9 and X.**
- **"@" indicates the year of manufacture or the month and year of manufacture.**

Applicable Model	VIN Number	Country or Area
GSX1300RM2	JS1EJ11B#M7100001 –	U.S.A. except for California State
	JS1EJ11D#M7100001 –	California State

Vehicle Side View

BENM10L30111007

SUZUKI GSX1300R

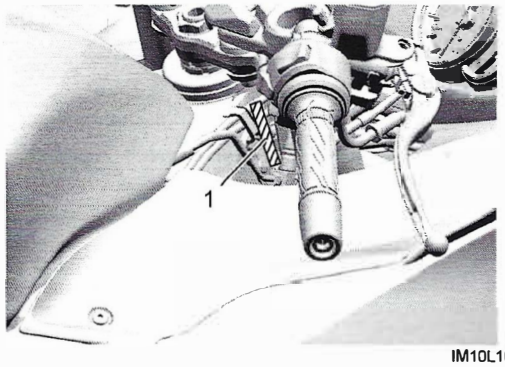


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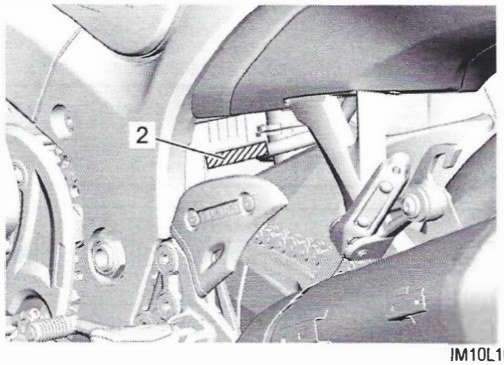
Vehicle Identification Number

BENM10L30111008

The frame serial number or V.I.N. (Vehicle Identification Number) (1) is stamped on the steering head tube. The engine serial number (2) is located on the crankcase assembly.



IM10L1011007-01

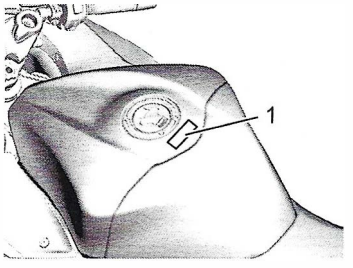


IM10L1011003-01

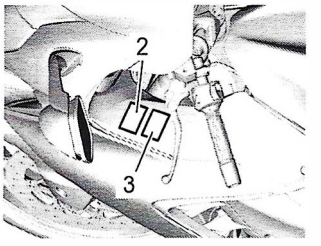
Warning, Caution and Information Labels Location

BENM10L30111009

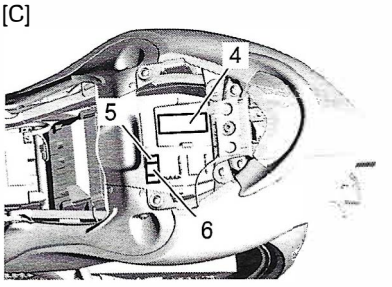
[A]



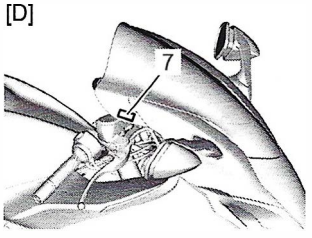
[B]



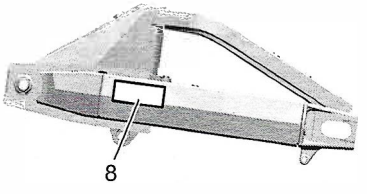
[C]



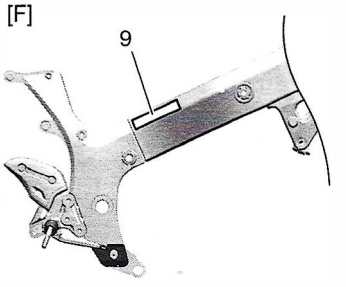
[D]



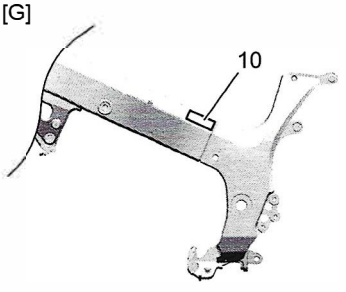
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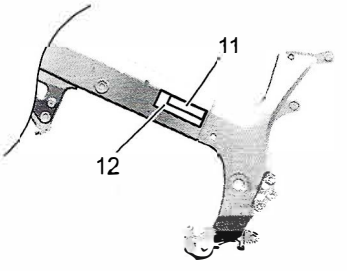
[F]



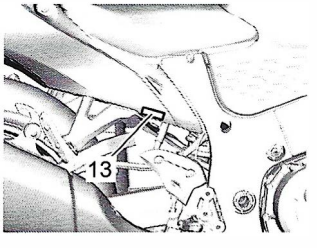
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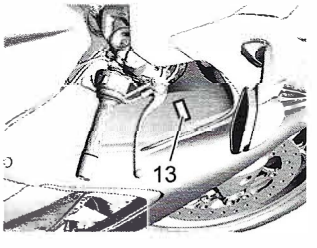
[G]



[H]



[I]



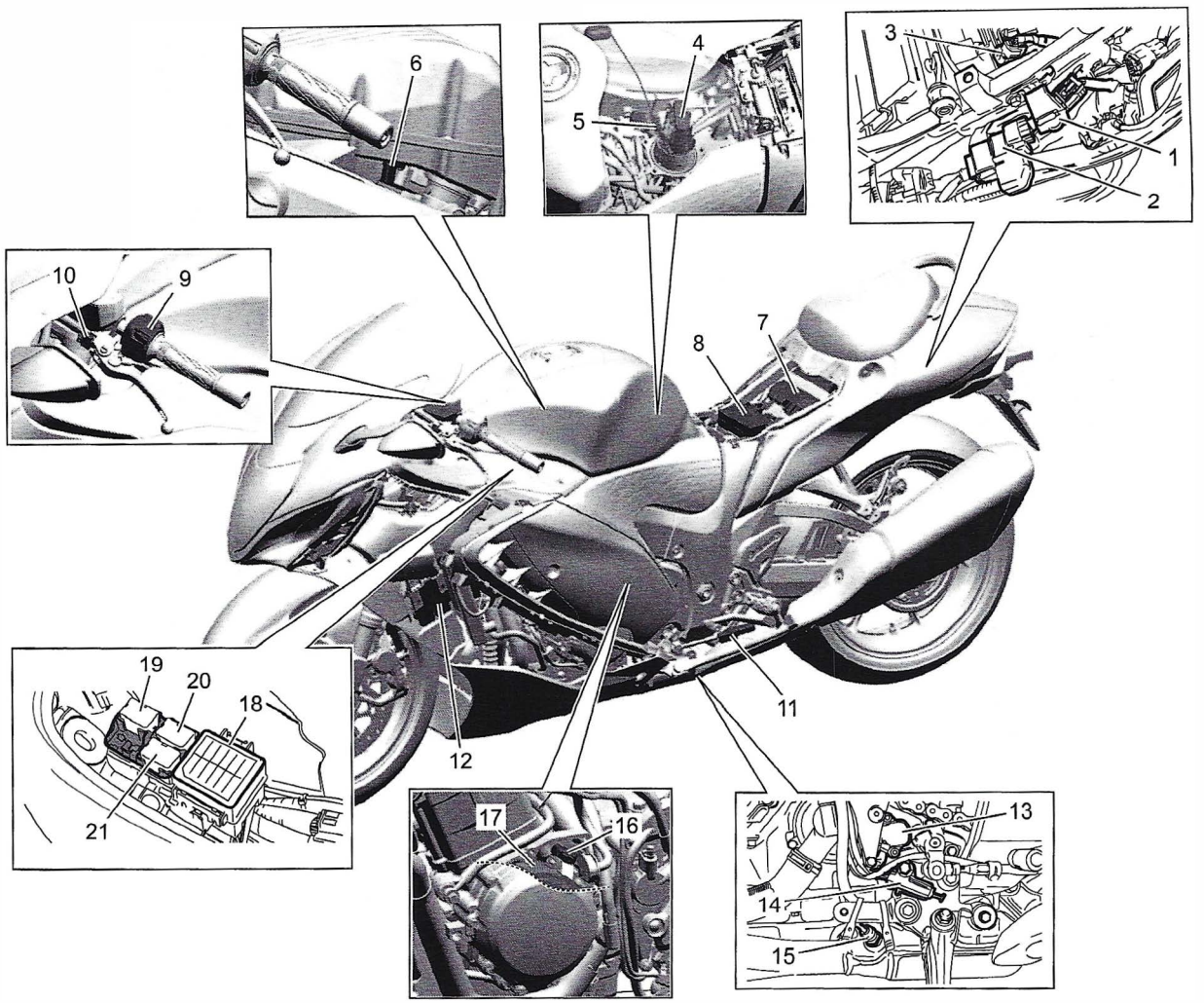
IM10L1011004-02

[A]: Fuel tank cover	[I]: Meter panel (right side)	8. Tire information label
[B]: Meter panel (left side)	1. Gasoline label	9. Information label (If equipped)
[C]: Rear fender (front)	2. General warning label	10. EPA noise label or Un noise label (If equipped)
[D]: Windscreen	3. General warning label or Helmet label or Clutch fluid label	11. Manufacturer label (If equipped)
[E]: Swing arm	4. Vacuum hose routing label (If equipped)	12. Safety plate or I.D. plate (If equipped)
[F]: Frame (right side)	5. Manual notice label (If equipped)	13. Brake fluid label (If equipped)
[G]: Frame (left side)	6. Recycle label (if equipped)	
[H]: Frame cover (left side)	7. Cowling label (if equipped)	

Component Location

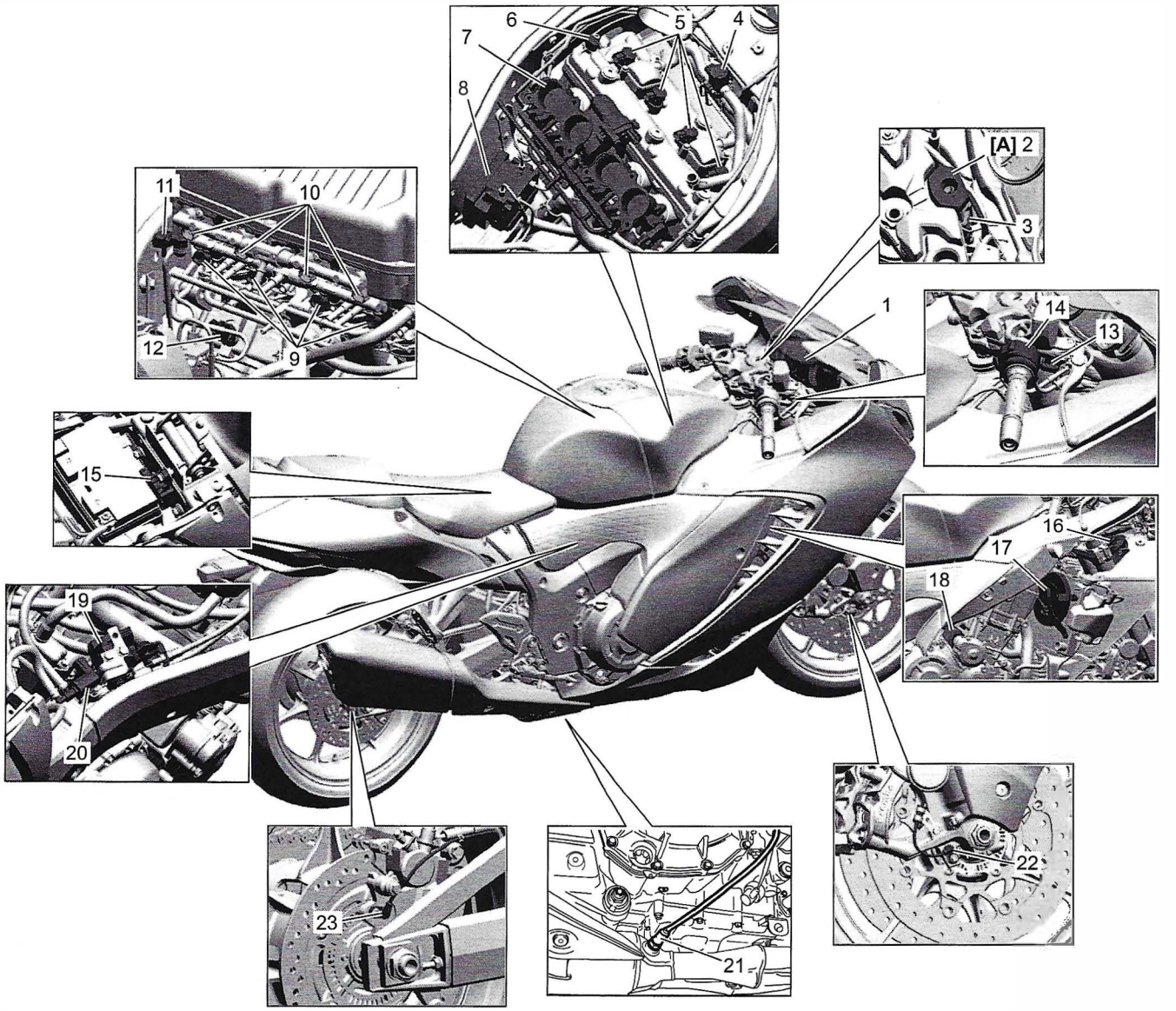
Electrical Components Location

BENM10L30113001



IM10L1011008-02

1. AP sensor	8. Battery	15. HO2 sensor #1
2. Starter relay / Main fuse	9. Left handle switch	16. CKP sensor
3. Mode select coupler (6P)	10. Clutch lever position switch	17. Generator rotor
4. Fuel pump	11. Gearshift sensor	18. Fuse box
5. Fuel level gauge	12. Rectifier	19. FP relay
6. IAT sensor	13. GP sensor	20. Cooling fan relay
7. ECM	14. Side-stand switch	21. Starter sub relay



IM10L1011006-02

[A]: With immobilizer control system	8. ABS control unit / HU	16. Horn
1. Combination meter	9. Primary fuel injector	17. Cooling fan
2. Immobilizer antenna (If equipped)	10. Secondary fuel injector	18. Starter motor
3. Ignition switch	11. IAP sensor	19. Accelerator body assembly (incorporating accelerator position sensor (main and sub) and cruise control cancel switch)
4. PAIR control solenoid valve	12. ECT sensor	20. EVAP system purge control solenoid valve (If equipped)
5. Ignition coil	13. Front brake switch	21. HO2 sensor #2
6. CMP sensor	14. Right handle switch	22. Front wheel speed sensor
7. Throttle body (incorporating TP sensor (main and sub) and throttle valve motor)	15. IMU	23. Rear wheel speed sensor

Technical Features

General Description

Engine Control System Description

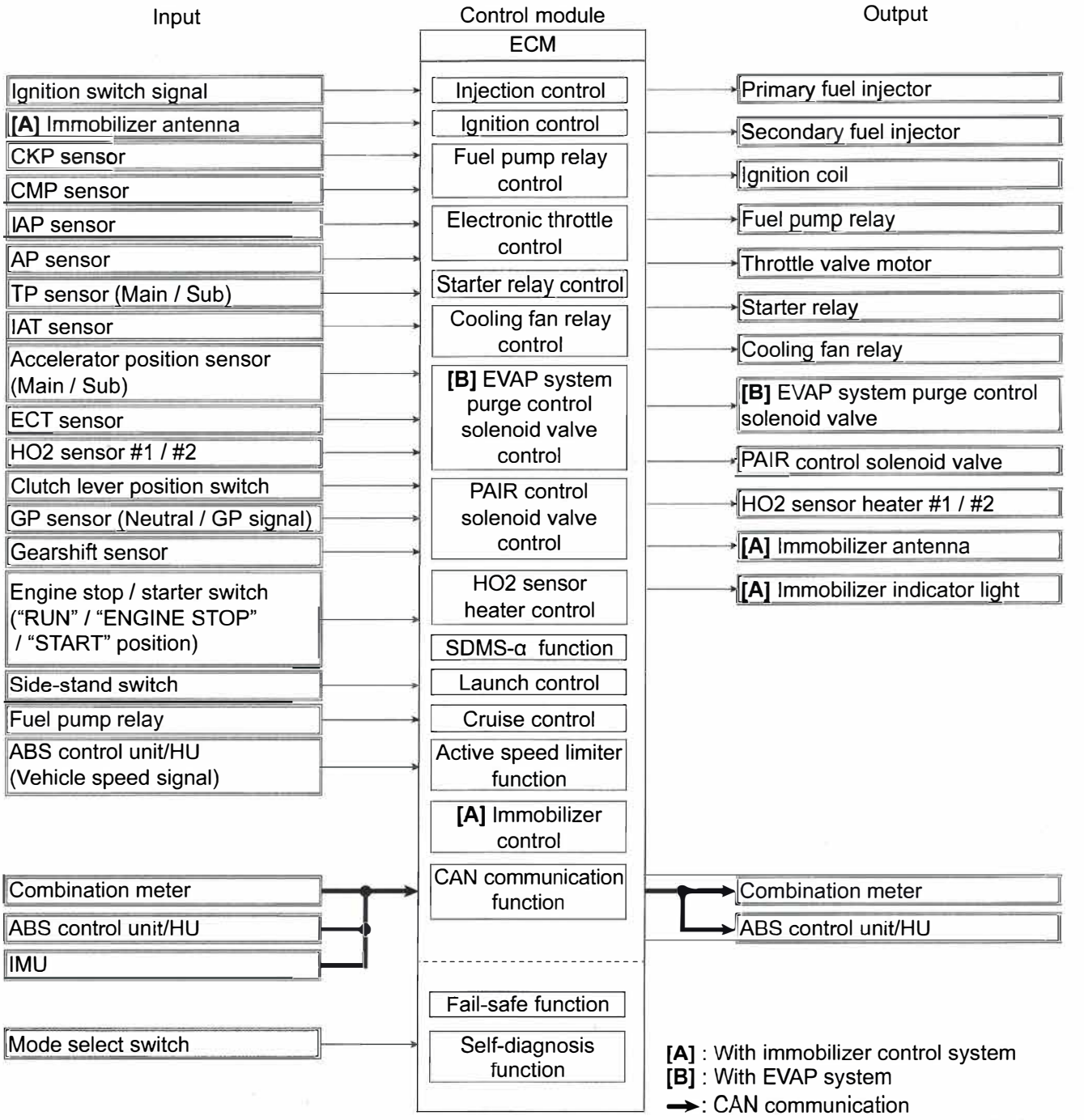
BENM10L30121001

- The engine control in this motorcycle is controlled by ECM.

Item	Description
Injection control	ECM controls fuel injector and injects fuel of the most suitable quantity in the most suitable timing. Also, ECM stops the fuel injector control based on the engine and driving conditions.
Ignition control	ECM controls ignition coil and ignition of the spark plug in the most suitable ignition timing based on the engine and driving conditions. (e.g. engine cranking, idle speed, normal driving, accelerating, decelerating, etc.)
Fuel pump relay control	ECM controls ON or OFF of the fuel pump relay to operate the fuel pump based on the ignition switch position and engine operating conditions.
Electronic throttle control	Refer to "Electric Throttle Control System Description": Technical Features (Page 0A-13).
Starter relay control	• ECM controls ON or OFF of the starter relay to operate the starter motor corresponding to the state of the ignition switch and actuation of the engine stop / starter switch ("START" position). • ECM controls easy start system. Refer to "Easy Start System Description": Technical Features (Page 0A-17).
Cooling fan relay control	ECM controls ON or OFF of the cooling fan relay to operate the cooling fan based on the engine coolant temperature condition.
EVAP system purge control solenoid valve control (if equipped)	ECM performs the EVAP system purge control solenoid valve ON / OFF control based on the engine and driving conditions.
PAIR control solenoid valve control	ECM performs the PAIR control solenoid valve ON / OFF control based on the engine and driving conditions.
HO2 sensor heater control	ECM controls the heater in the HO2 sensor and performs the early activation of the HO2 sensor.
SDMS-α function	Refer to "Suzuki Drive Mode Selector Alpha (SDMS-α) Description": Technical Features (Page 0A-15).
Launch control	Refer to "Launch Control System Description": Technical Features (Page 0A-17).
Cruise control	Refer to "Cruise Control System Description": Technical Features (Page 0A-33).
Active speed limiter function	Refer to "Active Speed Limiter Description": Technical Features (Page 0A-35).
Immobilizer control (if equipped)	Refer to "Immobilizer Control System Description (If Equipped)": Technical Features (Page 0A-37).
CAN communication function	ECM uses CAN communication to communicate with combination meter, ABS control unit / HU (with motion track brake system), IMU (with motion track brake system) and SDS-II tool. Refer to "CAN Communication System Description": Technical Features (Page 0A-38).

- ECM has a self-diagnosis function which detects a malfunction in this system. When detecting any malfunction, ECM performs fail-safe function based on the level of the malfunction.
  - Self-diagnosis function: ☞(Page 1A-1)
  - Fail-safe function: ☞(Page 1A-19)
- ECM receives vehicle speed signal using front and rear wheel speed sensor signal from ABS control unit / HU.

Engine Control System Input / Output Diagram



IM10L1012001-04

Electric Throttle Control System Description

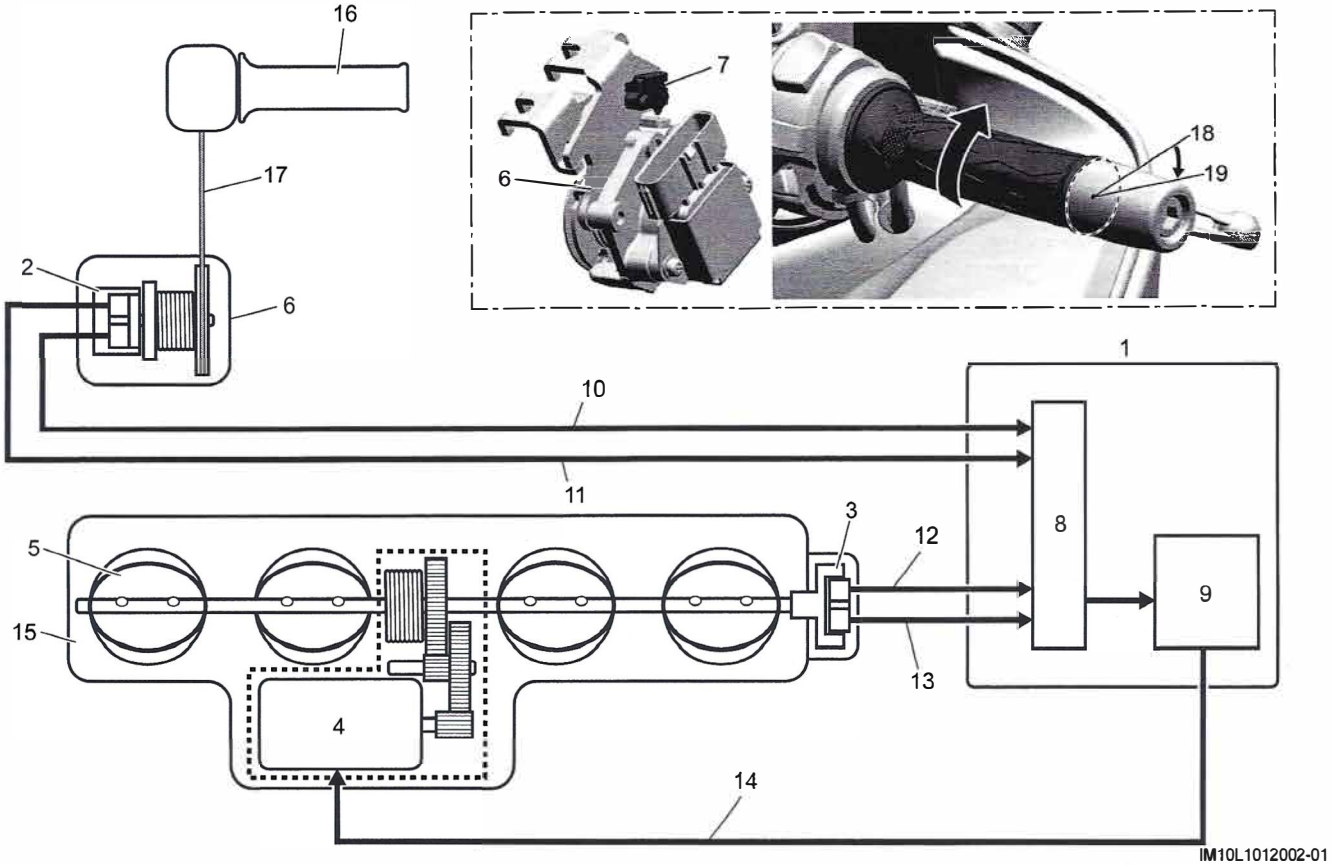
BENM10L30121002

The electric throttle control system consists of the following:

- Throttle body incorporating the throttle valve, throttle valve motor and TP sensors (main and sub)
- Accelerator body assembly incorporating accelerator position sensors (main and sub)
- ECM

Operation Description

- ECM (1) detects opening angle of the throttle grip based on the signal voltage of the accelerator position sensor (2). Using that data and engine operation condition, ECM calculates the optimum throttle valve opening. On the other hand, it detects the throttle valve opening based on the signal voltage of the TP sensor (3) and compares this value with the above calculated optimum throttle valve opening. When there is a difference between them, ECM changes the duty ratio of throttle valve motor according to this difference to drive the throttle valve motor (4). When there is no difference, ECM fixes the duty ratio of throttle valve motor to maintain the throttle valve opening. In this way, the throttle valve (5) is opened and closed to achieve the optimum throttle valve opening.
- In this system, TP sensor and accelerator position sensor have 2 sensors (main and sub) each to assure highly accurate and reliable control and abnormality detection. When ECM detects an abnormality in the system, it stops controlling the throttle valve motor.
- This throttle body is not equipped with ISC valve for idle speed control. Idle speed control is performed by the throttle valve motor by adjusting the throttle valve opening.
- Accelerator body (6) assembly has a cruise control cancel switch (7). ECM performs cancel of the cruise control, when turning the throttle grip beyond the fully closed position.



IM10L1012002-01

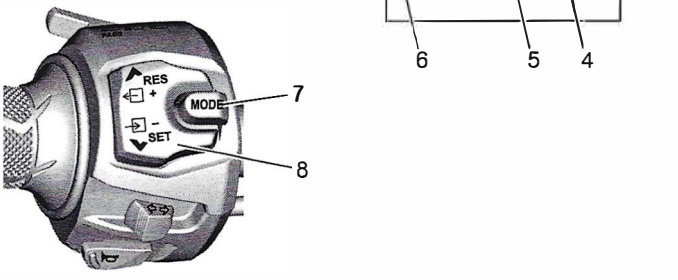
8. CPU	12. TP sensor (main) signal circuit	16. Throttle grip
9. Throttle valve motor driver	13. TP sensor (sub) signal circuit	17. Throttle cable
10. Accelerator position sensor (main) signal circuit	14. Drive circuit of throttle valve motor	18. Fully closed position
11. Accelerator position sensor (sub) signal circuit	15. Throttle body	19. Cruise control cancel switch position

Suzuki Drive Mode Selector Alpha (SDMS-α) Description

BENM10L30121003

- SDMS-α (1) is the function that can change the modes of "power mode" (2), "motion track traction control system" (3), "engine brake control" (4), "anti-lift control" (5) and "bi-directional quick shift system" (6) at once.
- The 6 modes can be selected by the mode switch (7) and select switch (8).
  - [A]: Mode A, B and C cannot change the mode of each system.
  - [B]: Mode U1, U2 and U3 can change the mode of each system optionally and can save.

SDMS-α (1)	PW (2)	TC (3)	EB (4)	LF (5)	QS (6)
A	[A]	[A]	[A]	[A]	[A]
B	[A]	[A]	[A]	[A]	[A]
C	[A]	[A]	[A]	[A]	[A]
U1	[B]	[B]	[B]	[B]	[B]
U2	[B]	[B]	[B]	[B]	[B]
U3	[B]	[B]	[B]	[B]	[B]



IM10L1012003-02

Power Mode

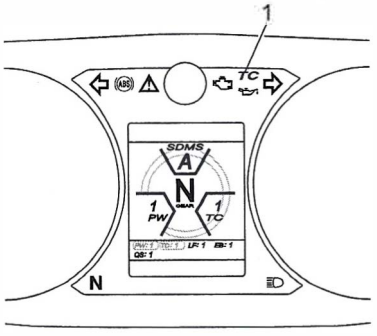
- Power mode is the function that can change engine power characteristics optionally.
- The 3 driving modes (from mode 1 to mode 3) can be selected by the mode switch and select switch.

Motion Track Traction Control System

- When the motion track traction control system senses rear wheel spin (revolution difference between the front wheel and rear wheel) during start up or acceleration, the system regulates the engine torque to restore gripping power of the rear wheel and insure the running stability. An IMU adopted in the motion track traction control system senses inclination of the motorcycle and the system has realized the traction control at cornering in high accuracy.
- The system senses the condition of rear wheel rotation by the signals sent from front and rear wheel speed sensors, accelerator position sensor, CKP sensor, GP sensor and IMU. When the rear wheel spin has been detected, ECM reduces engine power output to prevent its spin by controlling ignition timing and throttle valve motor.
- The motion track traction control status (ON / OFF) and levels can be selected by the mode switch and select switch.
- There are 10 steps of motion track traction control levels (from mode 1 to mode 10) and the higher figure has higher effect of the control. If "OFF" is selected, the engine output is not regulated even when the rear wheel spins freely.

Traction control indicator:

- The traction control indicator (1) comes on when the ignition switch is turned "ON" and goes off after the vehicle speed exceeds 10 km/h (6 mile/h). After that the indicator light does not come on after the vehicle speed decreases to less than 10 km/h (6 mile/h).
- The traction control indicator blinks when controlling the engine torque by the motion track traction control system.
- The traction control indicator comes on and remains on when the motion track traction control system is not working due to a system malfunction.



IM10L1012004-01

Engine Brake Control

- Engine brake control is a function to control effect of the engine brake in the deceleration.
- The engine brake control status (ON / OFF) and levels can be selected by the mode switch and select switch.
- There are 3 steps of engine brake control levels (from mode 1 to mode 3) and the higher figure has lower effect of the engine brake. If "OFF" is selected, the effect of engine brake is not regulated.
- The effect of the engine brake is regulated by control of the following.
  - Fuel cut of 1 or 2 cylinder is stopped.
  - Throttle valve opening control depending on the mode.

Anti-Lift Control

- Anti-lift control is a function to prevent the lift of the front wheel in the acceleration.
- During anti-lift control, the ECM regulates the engine output according to the driving conditions (e.g. vehicle speed, engine speed, gear position, etc.) and the amount of throttle grip operation. The engine output is also regulated when lifting of the front wheel is detected.
- The anti-lift control status (ON / OFF) and levels can be selected by the mode switch and select switch.
- There are 10 steps of anti-lift control levels (from mode 1 to mode 10) and the higher figure has lower effect of the control. If "OFF" is selected, the engine output is not regulated even when the front wheel lifted.

Bi-Directional Quick Shift System

- The bi-directional quick shift system allows the rider to upshift and downshift without using the clutch or throttle operation.
- The gearshift sensor on the gearshift-linkage monitors a gearshift lever motion and ECM controls the ignition timing, throttle valve opening and the fuel injection volume to be injected.
- The ECM monitors gearshift-linkage stroke and the GP sensor to adjust the engine speed.
- The bi-directional quick shift system provides OFF, mode 1 and mode 2.
  - Mode 1: The quick shift is available. The gearshift lever stroke required for the shift change is set larger and the gearshift lever operation is set heavier than those of mode 2.
  - Mode 2: The quick shift is available. The gearshift lever stroke required for the shift change is set smaller and the gearshift lever operation is set lighter than those of mode 1.

Upshift:

- When the gearshift sensor senses an upshift motion, the system automatically reduces the power in a short time by controlling the ignition timing and throttle valve opening in order to unload the transmission gear dogs and allows a smooth upshift.
- This system enables upshift at full throttle condition and realizes almost uninterrupted acceleration.

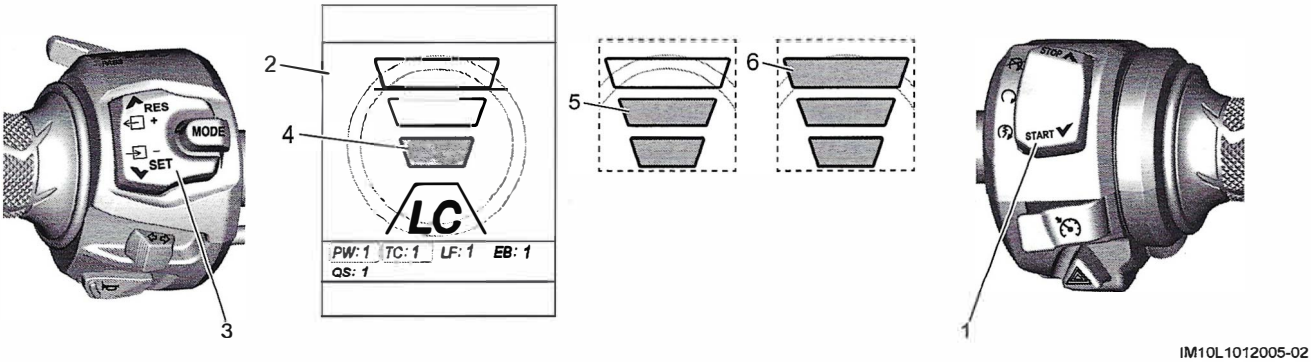
Downshift:

- When the gearshift sensor senses a downshift motion, the system automatically opens the throttle valve instantly in order to rise the engine speed properly for lower gear position.
- The system monitors gearshift-linkage stroke and GP sensor as well as engine speed.
- This system enables quicker and smoother downshift without blipping the throttle grip or using the clutch, and the system automatically opens the throttle valves just enough to increase engine speed and adapts the engine speed to the lower gear.

Launch Control System Description

BENM10L30121004

- The launch control system makes it easier for a rider to get a fast start in closed-course competition.
- Once the rider selects the launch control using the engine stop / starter switch ("START" position) on the right handlebar, the system controls the throttle valve opening and ignition timing in order to limit the engine rpm automatically and to optimize torque delivery while the rider holds the throttle grip wide open.
- Therefore, the rider can concentrate on feeling to in the clutch lever.
- The launch control system is controlled by pushing the engine stop / starter switch ("START" position) (1) for 1 second or more, after the engine starts and when the vehicle is stationary.
- When the launch control is set, ignition timing, power mode, motion track traction control and anti-lift control are shifted to dedicated mode for the launch control and the LCD indication will change to the launch control dedicated display (2).
- The launch control levels can be selected by the select switch (3).
- There are 3 steps of launch control levels (from mode 1 to mode 3) and the higher figure, the higher the engine speed limited at vehicle start.
- This control is automatically canceled under the condition that the gear is shifted up to 4th or the vehicle is decelerated by releasing the throttle grip or applying the brake.



IM10L1012005-02

4. Mode 1	5. Mode 2	6. Mode 3

Easy Start System Description

BENM10L30121005

This model has adopted easy start system which operates cranking continuously for specified time without continuous pushing of the engine stop / starter switch ("START" position).

- ECM monitors various signals and one-push of the engine stop / starter switch ("START" position) makes the starter relay to ON to operate the starter motor until the engine is started. However, if the engine cannot be started within the specified time, the ECM sets the starter relay to OFF.
- When the ignition switch is ON and, judging conditions of all of the following factors, ECM controls the starter relay to set ON. However, responding to either of the following conditions, ECM sets the starter relay to OFF.
  - Status of GP sensor or clutch lever position switch
  - Status of side-stand switch
  - Status of engine stop / starter switch ("START" position)
  - Status of engine start

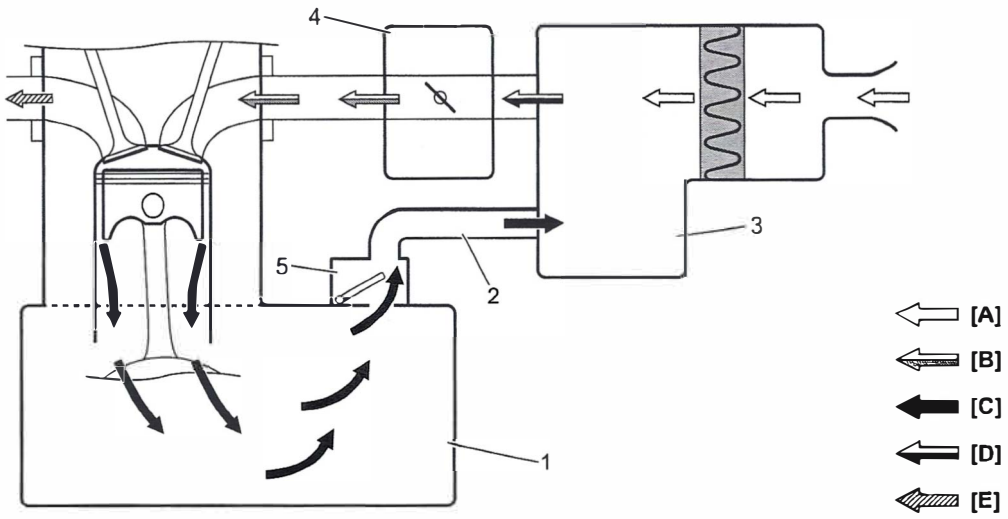
NOTE

When the engine might not start easily, grasp the clutch lever with neutral position and pushing the engine stop / starter switch ("START" position) continually enable continuous cranking.

Crankcase Emission Control System Description

BENM10L30121006

The engine is equipped with a PCV system.
Blow-by gas in the engine is constantly drawn into the crankcase (1), which is returned to the combustion chamber through the PCV hose (2), air cleaner box (3) and throttle body (4).



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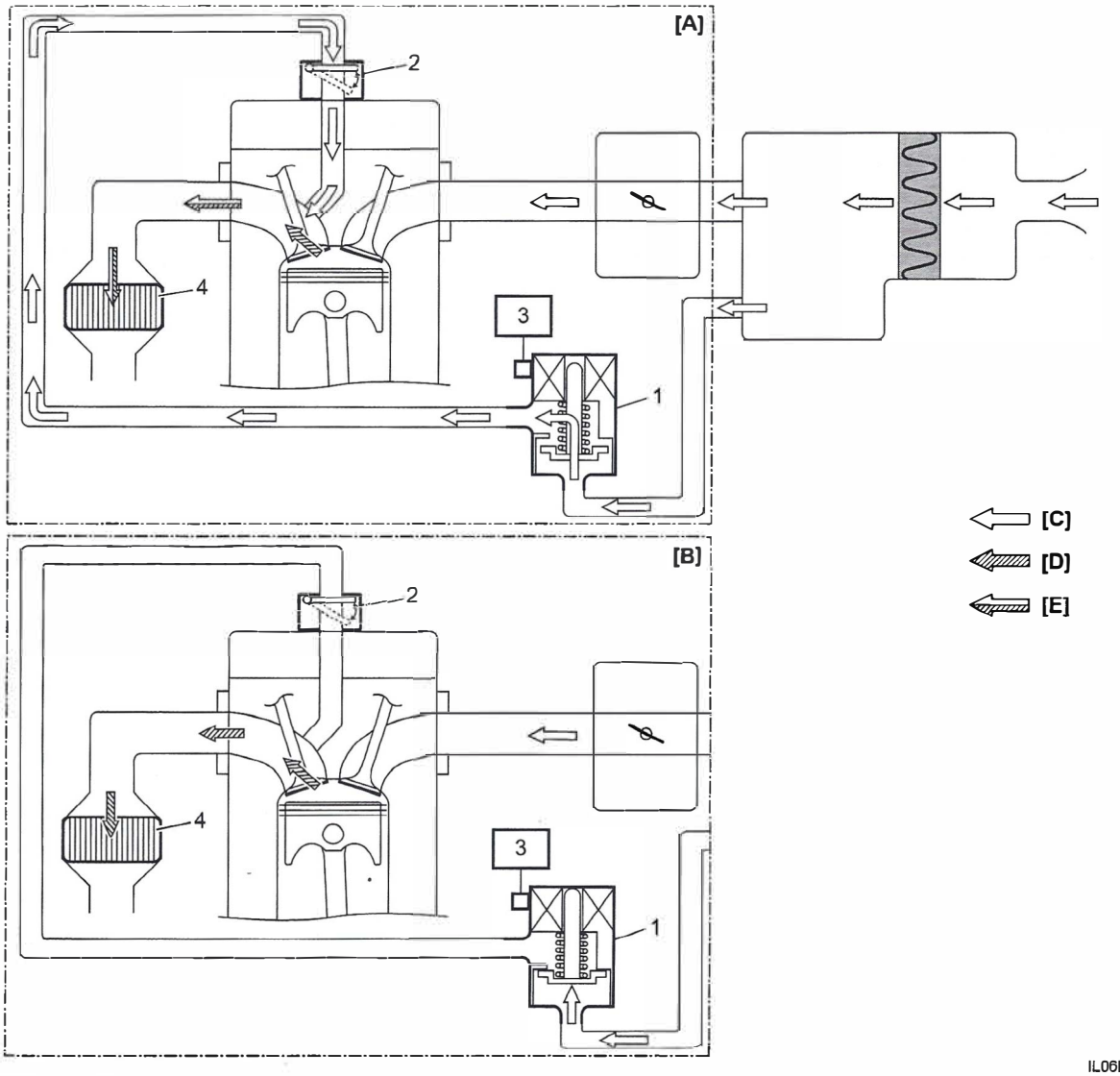
[A]: Fresh air	[C]: Blow-by gas	[E]: Exhaust gas
[B]: Fuel/Air mixture	[D]: Air/Blow-by gas mixture	5. PCV reed valve

Exhaust Emission Control System Description

BENM10L30121007

The exhaust emission control system is composed of the PAIR system and three-way catalyst system.

- The fresh air is drawn into the exhaust ports through the PAIR control solenoid valve (1) and PAIR reed valve (2). The PAIR control solenoid valve is controlled by the ECM (3), based on the engine and driving conditions. And the PAIR reed valve is operated by the exhaust-pulse.
- The three-way catalyst (4) is emission control device added to the exhaust system to lower the levels of hydrocarbon (HC), carbon monoxide (CO) and nitrogen oxides (NOx) pollutants in exhaust gases.



IL06L1012009-01

[A]: PAIR control solenoid valve is OFF (open)	[C]: Fresh air	[E]: Exhaust gas / Fresh air mixture
[B]: PAIR control solenoid valve is ON (close)	[D]: Exhaust gas	

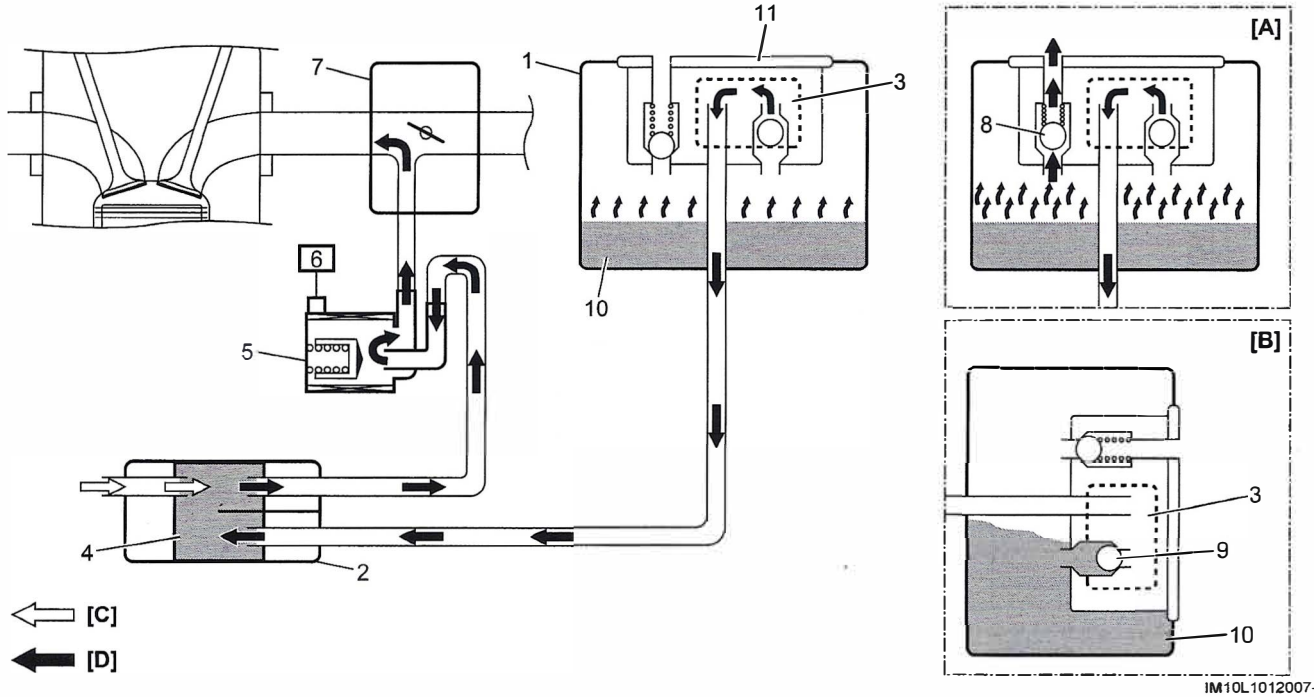
Evaporative Emission Control System Description (if equipped)

BENM10L30121008

The evaporative emission control system is composed of the EVAP system.
The EVAP system restrains hydrocarbons namely HC vapors from emitting into the atmosphere. The HC vapors' pressure in the fuel tank (1) may rise affected by change of ambient temperature, barometric pressure or refueling, and the pressurized vapors are conducted into the EVAP canister (2) through the fuel shut-off valve (3) so as to maintain the tank pressure normal. Active carbon (4) in the EVAP canister absorbs the hydrocarbons and storing them.
The active carbon stores the hydrocarbons until the engine is able to consume them. When the EVAP system purge control solenoid valve (5) is turned ON by the ECM (6), fresh air flow into the EVAP canister due to negative intake pressure, then the HC vapors are pulled apart from the active carbon and sucked into the throttle body (7).

NOTE

- **When tank pressure is excessive high, the pressurized vapors are discharged into the atmosphere through the fuel relief valve (8) so as to maintain the tank pressure normal.**
- **When motorcycle is tipping over, the fuel shut-off valve prevents the fuel that may flow out to the EVAP line because check ball (9) shuts the EVAP line.**



IM10L1012007-02

[A]: Tank pressure is excessive high.	[C]: Fresh air	10. Fuel
[B]: Motorcycle is tipping over.	[D]: Fuel vapor	11. Fuel tank cap

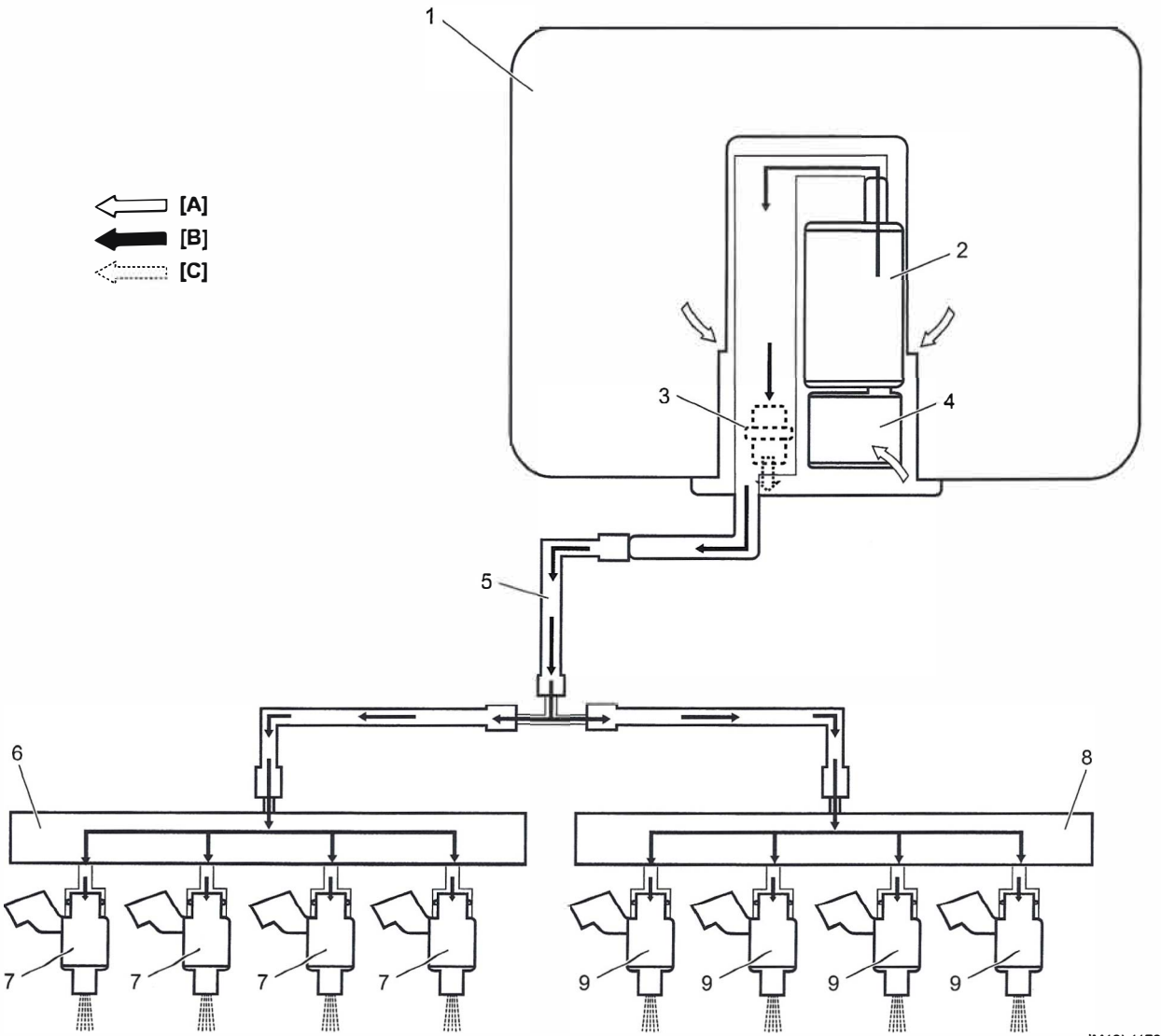
Fuel System Description

BENM10L30121009

Fuel System

The fuel delivery system consists of the fuel tank (1), fuel pump (2) (incorporating fuel pressure regulator (3) and fuel filter (4), fuel feed hose (5), primary fuel delivery pipe (6), primary fuel injectors (7), secondary fuel delivery pipe (8) and secondary fuel injectors (9). 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 pipes. Fuel pressure is regulated by the fuel pressure regulator. As the fuel pressure applied to the fuel injectors through the fuel delivery pipes is always kept at the specified level, the fuel is injected into the throttle body below the throttle valve and funnel in conic dispersion when each injector opens according to the injection signal from the ECM. Secondary fuel injectors are mounted in the air cleaner box and activated at high rpm.

The fuel relieved by the fuel pressure regulator flows back into the fuel tank.



IM10L1170051-01

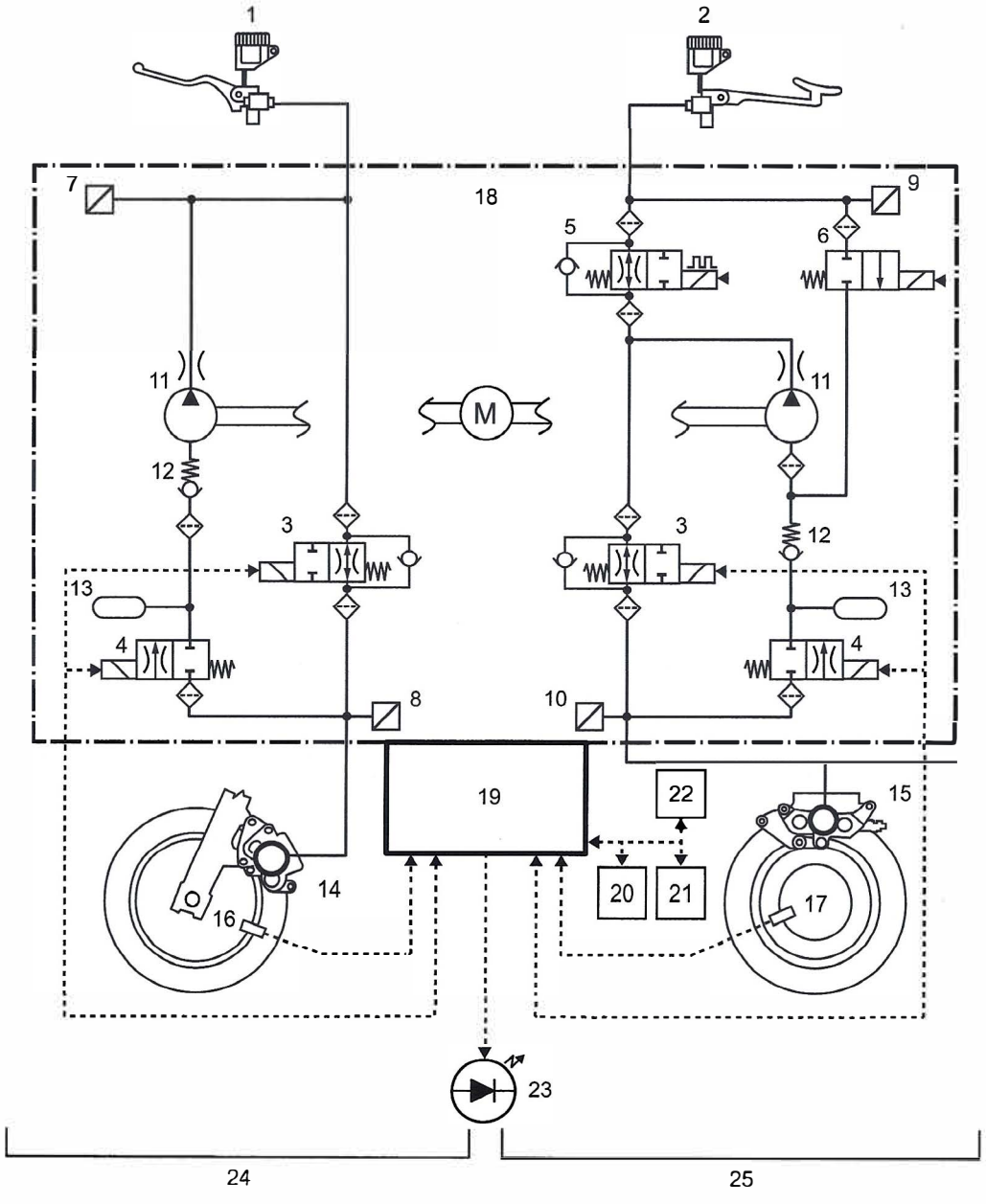
[A]: Before-pressurized fuel	[B]: Pressurized fuel	[C]: Relieved fuel

ABS

BENM10L30121010

General Description

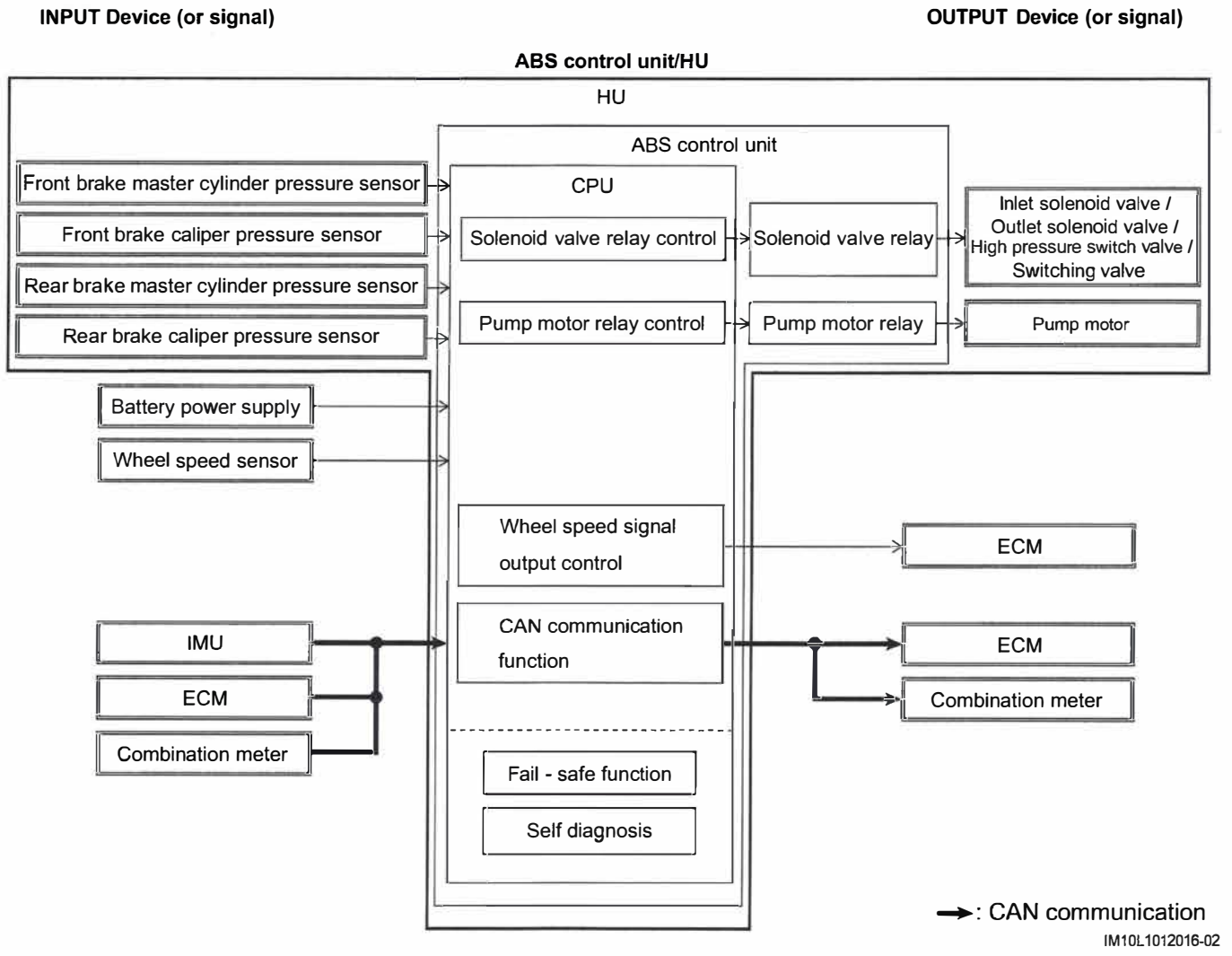
- ABS control unit calculates signals from wheel speed sensors, pressure sensors, IMU and ECM. And transmits control signals to HU. HU controls braking force based on the control signals.
- ABS control unit / HU uses CAN communication to communicate with IMU, ECM and combination meter. For details of CAN communication system, referring to the “CAN Communication System Description”: Technical Features (Page 0A-38).
- This ABS is equipped with the following function and systems.
  - Motion track brake system: ☞(Page 0A-24)
  - Hill hold control system: ☞(Page 0A-25)
  - Slope dependent control system: ☞(Page 0A-27)
  - Emergency stop signal: ☞(Page 0A-27)



IM10L1012027-01

1. Brake lever / master cylinder	10. Rear brake caliper pressure sensor	19. ABS control unit
2. Brake pedal / master cylinder	11. Suction return flow pump	20. IMU
3. Inlet valve	12. Check valve	21. ECM
4. Outlet valve	13. Accumulator	22. Combination meter
5. Switching valve	14. Front brake caliper	23. ABS indicator light
6. High pressure switch valve	15. Rear brake caliper	24. Front system
7. Front brake master cylinder pressure sensor	16. Front wheel speed sensor	25. Rear system
8. Front brake caliper pressure sensor	17. Rear wheel speed sensor	
9. Rear brake master cylinder pressure sensor	18. HU	

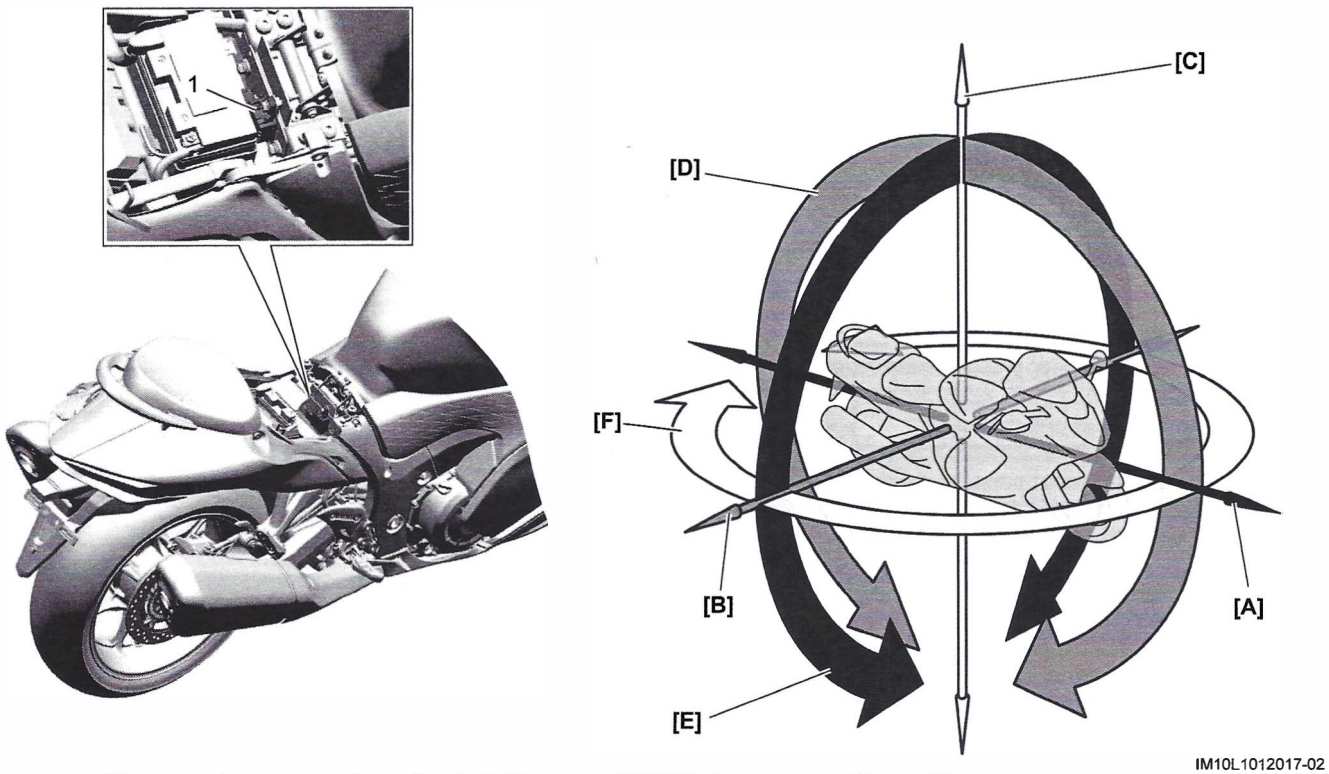
ABS Control Input / Output Table



IMU

BENM10L30121011

- IMU (1) is located under the front seat.
- IMU consists of 3-axis G sensor and 3-axis gyro sensor. These sensors detect the longitudinal acceleration, lateral acceleration, vertical acceleration, pitch rate, roll rate and yaw rate of the motorcycle, and transmit their signals to ABS control unit / HU through CAN communication.



IM10L1012017-02

[A]: Longitudinal acceleration	[C]: Vertical acceleration	[E]: Roll rate
[B]: Lateral acceleration	[D]: Pitch rate	[F]: Yaw rate

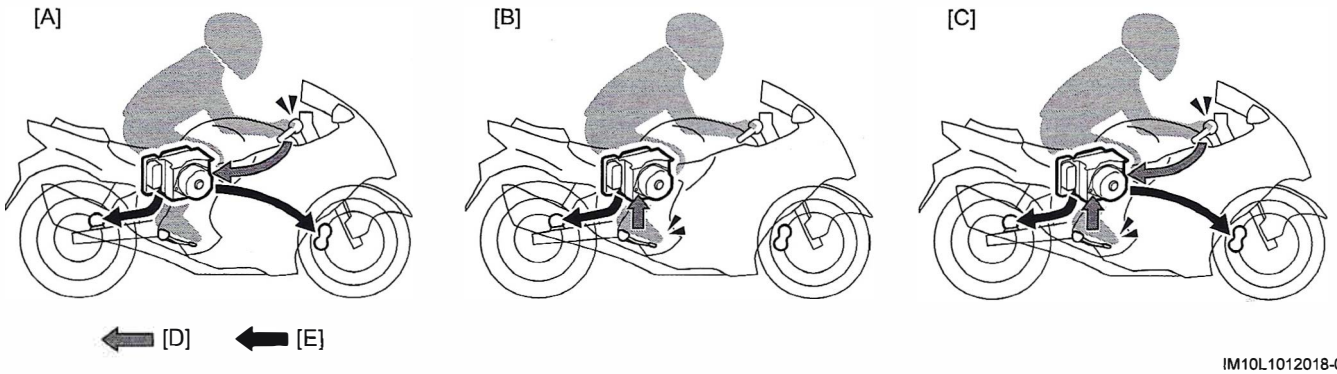
Motion Track Brake System

BENM10L30121012

This system has a following control.

Combined brake control:

Combined Brake Control is linked control of the brakes on the front and rear wheels.
Even when the rider operates the brake lever and not the brake pedal, the ABS control unit / HU activates the pump motor and boosts the rear brake caliper pressure automatically. This improves deceleration of the motorcycle even when only the brake lever is operated. The ABS control unit / HU alters the braking distribution between the front and rear brakes according to the lean angle, with the proportion allocated to the rear braking decreasing as the lean angle increases.



IM10L1012018-04

[A]: When only the front brake lever is operated	[D]: Brake input
[B]: When only the rear brake pedal is operated	[E]: Brake output
[C]: When the front brake lever and rear brake pedal is operated	

Cornering Brake Control:
Cornering Brake Control is control of the front and rear caliper pressure based on the amount of lean angle. The ABS control unit / HU utilizes internal solenoid valves, with the ABS beginning to operate as the lean angle increases and the wheel slip rate is small. This prevents wheel lock within defined parameters when the rider applies excessive braking during cornering.

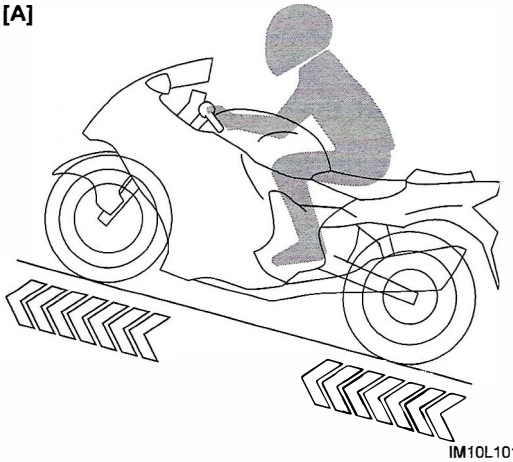
Hill Hold Control System

BENM10L30121013

System Description

- This system is a function that prevents the motorcycle from moving backwards when starting after stopping on an uphill slope [A] and assists with pulling away smoothly.
- When the system operates, it controls the rear brake for about 30 seconds to prevent the motorcycle from moving backward without any operation of the brake lever or the brake pedal.
  About 3 seconds before the system is deactivated, the hill hold indicator starts blinking and the rear caliper pressure is gradually reduced accordingly until the system is fully deactivated.

[A]



IM10L1012019-03

Effective Conditions for Control

If all of the following conditions are met, hill hold control system is in on-standby. And when brake lever and brake pedal are released, ABS control unit / HU controls the rear caliper pressure of rear brake for about 30 seconds.

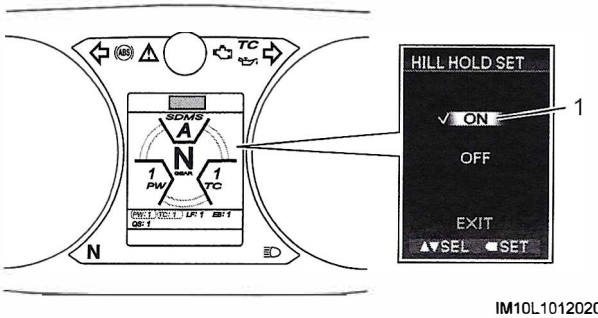
NOTE

When hill hold control system is available, hill hold indicator is OFF, and when its system is operating, hill hold indicator is ON or blinks. For details of hill hold indicator, referring to "Hill Hold Indicator": Technical Features (Page 0A-26)

- "HILL HOLD SET" is "ON".

NOTE

The selected item is highlighted (1).



IM10L1012020-01

- Motorcycle stopped on an uphill slope.
- Brake lever and/or pedal are operated.
- Gear position is other than neutral.
- Side stand is retracted.
- No DTC related to the control is detected.

System Cancel Conditions

Hill hold control is canceled under one of the following conditions.

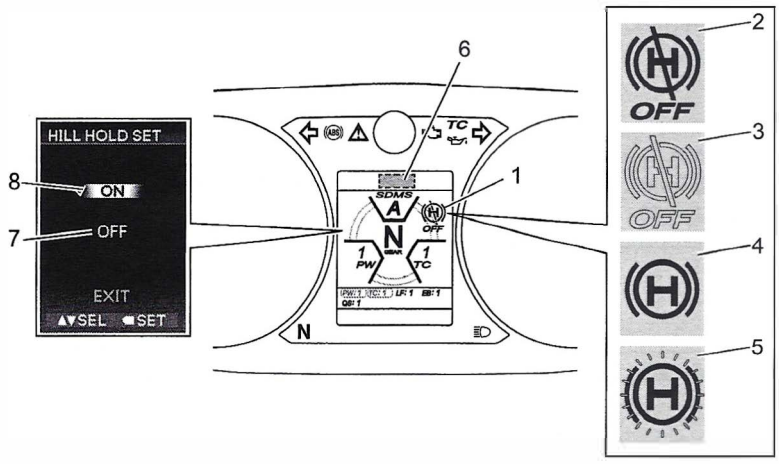
- Motorcycle is started.
- About 30 seconds elapses after the brake lever and brake pedal are released.
- Brake lever is grasped 2 times quickly.
- Gear position is neutral.
- Side stand on the ground.

Hill Hold Indicator

NOTE

When DTC related to the control is detected, the "HILL!" (6) is indicated by the display of the LCD.

Hill Hold Control System Conditions		Hill Hold Indicator (1)
"HILL HOLD SET" is "OFF" (7).		ON (2) ("OFF" display)
DTC related to the control is detected.		
"HILL HOLD SET" is "ON" (8).		OFF (3)
Hill hold control system is in on-standby.		
Hill hold control system is operating.	After the brake lever and brake pedal are released.	ON for about 27 seconds (4)
	Before rear caliper pressure reduces.	Blinks for about 3 seconds (5)

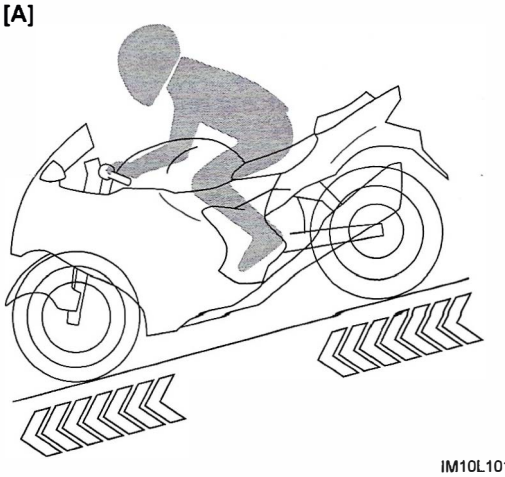


IM10L1012021-02

Slope Dependent Control System

BENM10L30121014

This system controls front and rear caliper pressure to restrain rear wheel lift up, when operating the brake lever and/or brake pedal in a downhill slope [A].



IM10L1012022-03

Emergency Stop Signal (ESS) Description

BENM10L30121015

When the execution condition is satisfied, the ABS controller transmits an emergency stop signal request to the combination meter by CAN communication. The combination meter drives the turn signal circuit to blink the hazard lights at twice the normal rate.

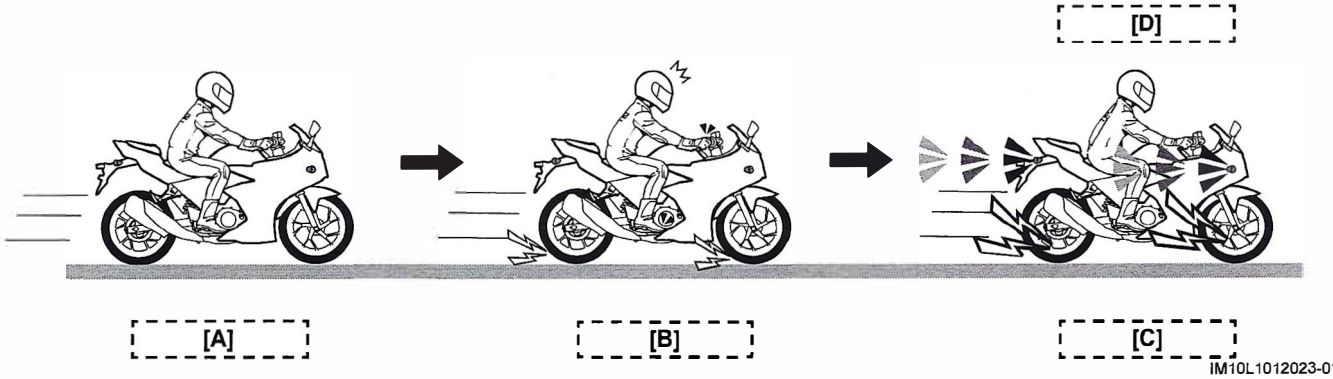
NOTE

- **The operation of the hazard lamp SW (hazard lamp control) has priority over the ESS control.**
- **ESS control cannot be turned OFF.**

Execution condition

The ABS controller executes control when all of the following conditions are satisfied.

- Brake lever or brake pedal is operated forcefully when the speed of the motorcycle is at least 55 km/h
- ABS is activated or brake is operated forcefully such that ABS would activate



IM10L1012023-01

[A]: Running at or above the specified speed.	[B]: The rider operated the brakes.	[C]: Detects excessive deceleration or activates ABS.	[D]: Hazard lamp blinks at high speed.

Release condition

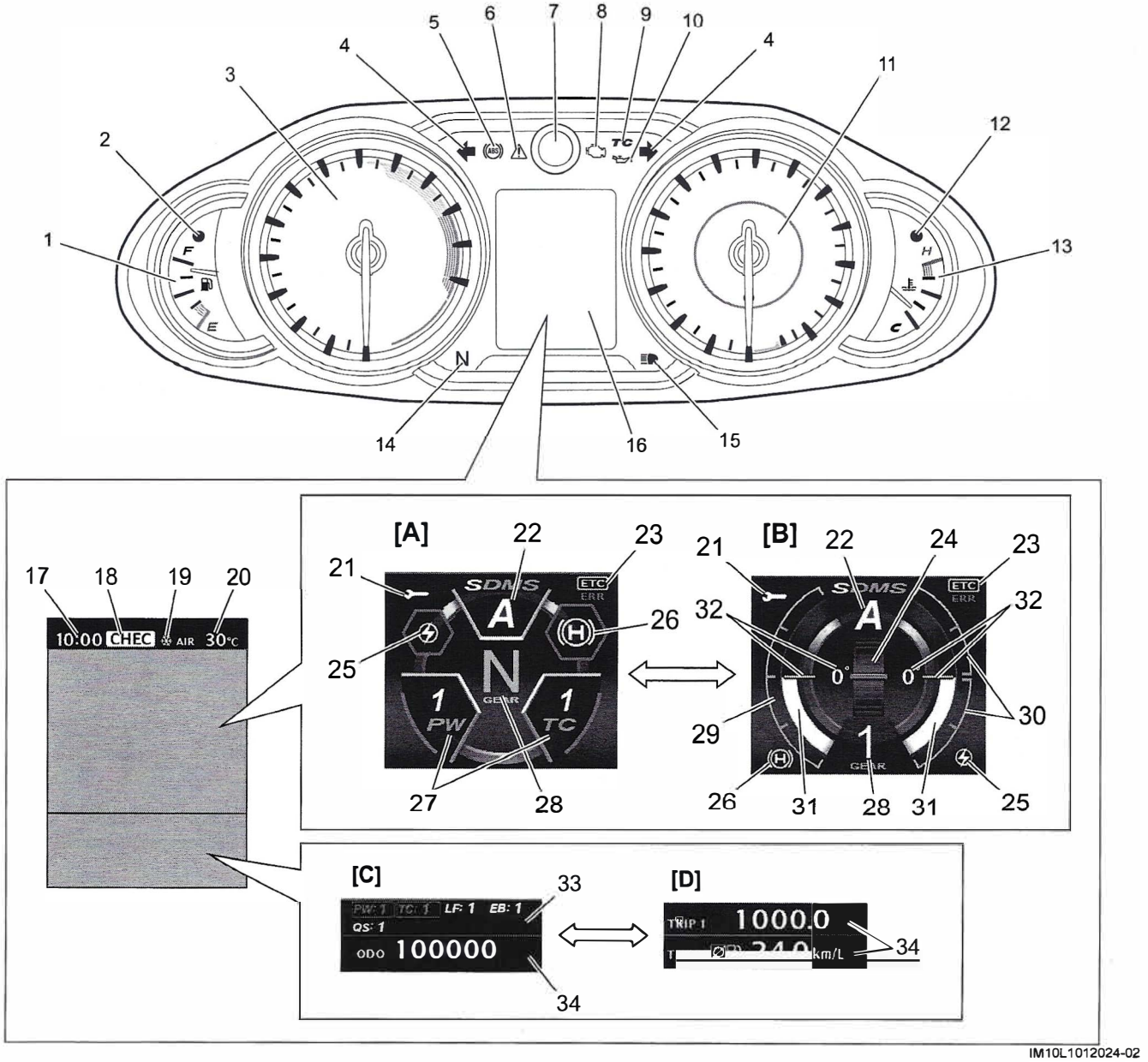
The ABS controller releases control when any of the following conditions is satisfied.

- Speed significantly decreases
- Brake pedal or brake lever is released
- ABS activation stops
- Hazard switch is turned on

Combination Meter System Description

BENM10L30121016

- This combination meter mainly consists of the stepping motor, TFT LCD (Thin Film Transistor Liquid Crystal Display) and LED (Light Emitting Diode).
- Combination meter uses signals (information) sent from each control module by CAN communication to ECM and ABS control unit. For more information on CAN communication data received by combination meter, refer to "CAN Communication System Description": Technical Features (Page 0A-38).
- The combination meter drives the turn signal light according to the state of the turn signal swtich and the hazard switch.
  The turn signal light is driven in response to an ESS signal by CAN communication from the ABS controller.
  In response to the "P" (parking) position of the ignition switch, the combination meter illuminates the position light, tail light and the license plate light.



IM10L1012024-02

[A]: "SDMS-α" screen	10. Oil pressure indicator light	23. ETC indicator and ERR indicator (If equipped)
[B]: "Active data" screen	11. Speedometer	24. Forward acceleration
[C]: Riding assistance system indicator list and Information window (one-row display)	12. Engine coolant temperature indicator light	25. Engine rpm indicator
[D]: Information window (two-row display)	13. Engine coolant temperature meter	26. Hill hold indicator
1. Fuel meter	14. Neutral indicator light	27. Riding assistance system indicator
2. Fuel indicator light	15. High beam indicator light	28. Gear position indicator
3. Tachometer	16. Multifunction display	29. Throttle opening
4. Turn signal indicator light	17. Clock	30. Brake pressure (Front and Rear)
5. ABS indicator light	18. Diagnosis display	31. Bank angle
6. Master warning indicator light	19. Freeze indicator	32. Maximum bank angle and Bank angle Peak hold bar
7. Engine rpm indicator light	20. Thermometer	33. Riding assistance system indicator list
8. Malfunction indicator light	21. Service reminder indicator	34. Information window
9. Traction control indicator light	22. SDMS (Suzuki Drive Mode Selector)-α indicator	

Combination Meter Display Table

Display	Display indication	Function
Fuel meter	Analog meter	The fuel level indicator indicates the amount of fuel remaining in the fuel tank.
Fuel indicator light	LED	This indicator comes on when the fuel level drops below approx. 5.0 L (5.3/4.4 US/Imp qt).
Tachometer	Analog meter	The tachometer indicates the engine speed in revolutions per minute (r/min).
Turn signal indicator light	LED	Operating the right or left turn signal causes the turn signal indicator to blink.
ABS indicator light	LED	• This indicator normally comes on when the ignition switch is turned "ON" and goes off after the motorcycle speed exceeds 5 km/h (3 mph). • If there is a problem with the ABS (Antilock Brake System), this indicator light comes on. The ABS does not operate when the ABS indicator light is on.
Master warning indicator light	LED	The indicators come on when the following malfunctions occur. • Low battery voltage (Red) • ECM malfunction (Yellow) • ABS control unit malfunction (Yellow) • Handle switch malfunction (Yellow) • Ambient air temperature sensor malfunction (Yellow)
Engine rpm indicator light	LED	• It works when the setting is on. • As the engine speed approaches the set value, the engine rpm indicator light comes on or blinks in conjunction with the rpm indicator to indicate when to change gears up.
Malfunction indicator light	LED	The indicator light comes on or blink when the fuel injection system malfunction.
Traction control indicator light	LED	The traction control indicator light "TC" blinks when the traction control system is controlling engine power output.
Oil pressure indicator light	LED	When the ignition switch is turned on, this indicator come on, and normally, will turn off when the engine starts. The indicator comes on when the following malfunctions occur. • Engine oil pressure drops
Speedometer	Analog meter	The speedometer indicates the road speed in miles per hour or kilometers per hour
Engine coolant temperature indicator light	LED	This indicator comes on when the engine coolant temperature exceeds 123 °C (253 °F) and turn off once the temperature falls to 120 °C (248 °F).
Engine coolant temperature meter	Analog meter	This meter indicates coolant temperature meter.

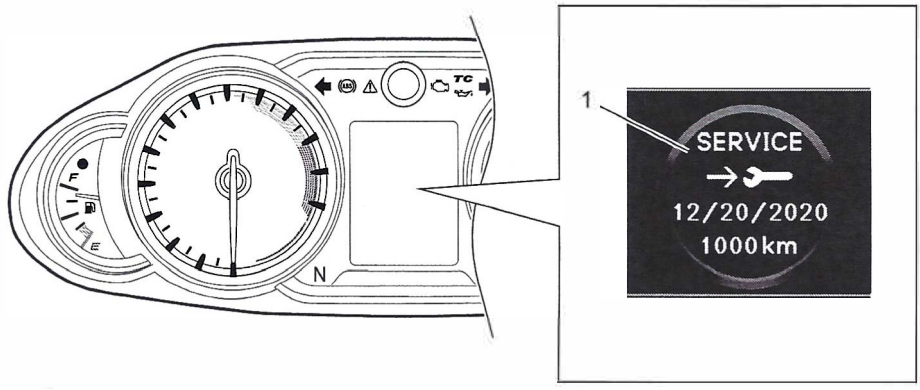
Display		Display indication	Function
Neutral indicator light		LED	The green indicator light will come on when the transmission is in neutral.
High beam indicator light		LED	This indicator light will be lit when the headlight high beam is turned on.
Multifunction display	Clock	LCD (TFT)	The time is displayed using a 12-hour, AM/PM system.
	Diagnosis display	LCD (TFT)	This display shows the current failure information as the following. • "CHEC": When the malfunction of communication system, this indication is displayed. • "TO!": If the motorcycle tips over or the ECM detects a TO sensor circuit malfunction, this indication is displayed. • Figure of key mark: This mark is displayed when the ECM detects a malfunction of the ignition switch (without immobilizer control system) or when the key IDs do not match (With Immobilizer control system). • "FI": When the ECM detects a malfunction of engine control system, "FI" is displayed. • "HILL!": When the ABS control unit / HU detects a malfunction of hill hold control function, "HILL" is displayed. • "AIR!": When the combination meter detects a malfunction of ambient air temp sensor, this indication is displayed. • "SW!": When the combination meter detects a malfunction of handle switch, this indication is displayed. • Figure of battery mark: When the battery voltage is low, this indication appears. • DTC: DTC is displayed by using a special tool. The DTC that can be displayed are P-codes (ECM), C-codes (ABS) and U-codes (CAN).
	Freeze indicator	LCD (TFT)	The freeze mark appears on the main screen whenever the ambient temperature falls below 3°C (38°F). If you press the MODE/SET switch or the select switches (Up and Down) while freeze mark is displayed, this indicator appears.
	Thermometer	LCD (TFT)	The thermometer shows the ambient temperature. The temperature display range is from -10 °C to 50 °C (14 °F to 122 °F). The meter displays "Lo" when the ambient air temperature is below - 10 °C (14 °F). The thermometer displays "HI" when the ambient air temperature is above 50 °C (122 °F).
	Service reminder indicator	LCD (TFT)	"Service Reminder" is a function that tells you when the next service is due by a date and distance indication and an service reminder indicator light. The service reminder indicator are indicated when the set date or distance has been reached. Refer to "Service Reminder Indicator Description": Technical Features (Page 0A-32).
	SDMS (Suzuki Drive Mode Selector)-α indicator	LCD (TFT)	"SDMS-α" is a feature that offers the rider a selection of 6 riding assistance system modes with 5 different control levels. Use these modes in accordance with riding conditions and desired use, such as weather, speed, road conditions, and level of traffic. The available modes include A, B, C, U1, U2, and U3. This indicator displays the currently selected mode. Refer to "Suzuki Drive Mode Selector Alpha (SDMS-α) Description": Technical Features (Page 0A-15).
	ETC and ERR indicator (If equipped)	LCD (TFT)	The ETC indicator is displayed on vehicles equipped with ETC. An error mark "ERR" is displayed when there is an error in ETC related parts.

Display		Display indication	Function
Multifunction display	Forward acceleration	LCD (TFT)	The information displayed here changes in accordance with the rate of acceleration during acceleration and deceleration operations.
	Engine rpm indicator	LCD (TFT)	This indicator appears when the engine rpm indicator light (LED) is set to blinking or on.
	Hill hold indicator	LCD (TFT)	The hill hold indicator in the LCD display indicates the hill hold operation status, as follows. • Hill Hold ON indicator: System controlling brakes • Hill Hold ON indicator brinking: Advance notification of brake control release • Hill Hold OFF indicator: System off, System failure
	Riding assistance system indicator	LCD (TFT)	You can set one riding assistance system mode each on the L side and R side.
	Gear position indicator	LCD (TFT)	The gear position indicator indicates gear position. This indicator displays "N" when the transmission is in neutral.
	Throttle opening	LCD (TFT)	The throttle opening is highlighted in accordance with throttle operation.
	Brake pressure (Front and Rear)	LCD (TFT)	The brake pressure for the front brake and rear brake is highlighted in accordance with the operation of the front brake and rear brake.
	Bank angle	LCD (TFT)	The bank angles are highlighted in accordance with the bank angle of the motorcycle as you are riding.
	Maximum bank angle and Bank angle Peak hold bar	LCD (TFT)	The maximum bank angles are displayed in numeric format while riding. The deepest bank angle is displayed by the peak hold bars.
	Riding assistance system indicator list	LCD (TFT)	This area displays the configured state of all control systems configurable as riding assistance system indicators.
	Information window	LCD (TFT)	This window displays the following items. • Odometer • Trip meter • Average fuel consumption meter (km/L, L/100km or MPG US, MPG IMP) • Cumulative time • Voltmeter • Instantaneous fuel consumption meter • Driving range meter

Service Reminder Indicator Description

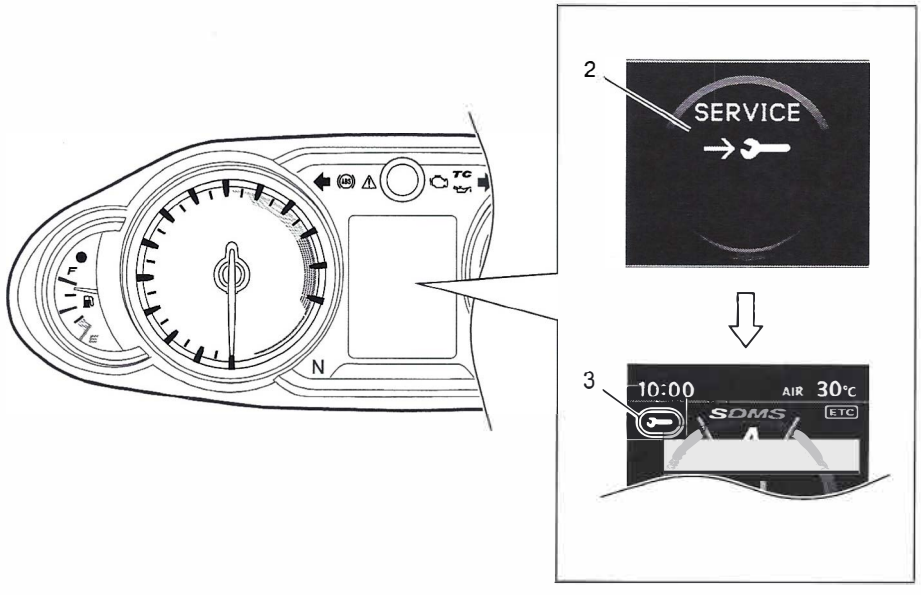
BENM10L30121017

When 1 month or 1000 km (600 mile) remains before the set date or distance, advance notice of the service interval (inspection date, remaining distance) (1) is indicated for 2 seconds when the ignition switch is turned ON.



IM10L1012025-01

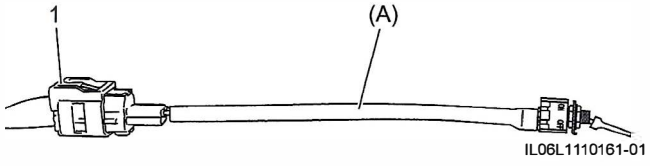
When the set date or distance for the service maintenance has been reached, an alarm screen (2) is indicated for 2 seconds when the ignition switch is turned ON. And on the main display, service reminder indicator (3) appears.



IM10L1012026-01

Once this service reminder indicator is displayed, it remains displayed until you reset the service reminder. The service reminder is set using the mode select switch (special tool). Refer to "Service Reminder Reset" in Section 9C (Page 9C-9).

Special tool
(A): 09930–83130



IL06L1110161-01

Cruise Control System Description

BENM10L30121018

System Description

- Cruise control system is a device which maintains a preset vehicle speed while driving at a high speed, e.g. on a highway. It allows the driver to drive at a constant speed of approximately 30 km/h (19 mile/h)* to 200 km/h (124 mile/h) without opening the throttle grip. (*: Vehicle speed varies depending on gear position. Refer to "Effective Conditions for Control": Technical Features (Page 0A-33).
- The system mainly consists of ECM, throttle body, cruise control switch, select switch ("RES / UP" and "SET / DOWN"), mode switch, accelerator body assembly (incorporating cruise control cancel switch) and combination meter.
- ECM performs control of the cruise control system. ECM controls throttle valve opening to keep actual vehicle speed at set (target) speed.

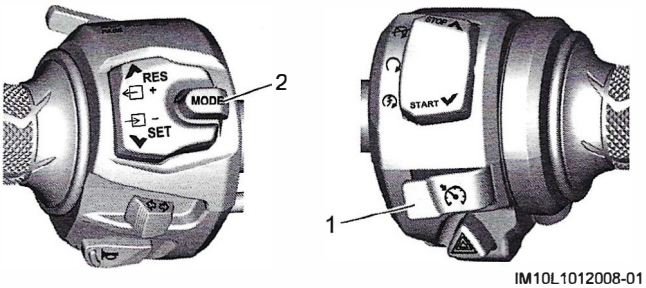
Effective Conditions for Control

If all of the following conditions are met, it is possible to set the cruise control system.

- Cruise control switch (1) is ON state. (Cruise control system is in on-standby. Refer to "Cruise Control Indicator": Technical Features (Page 0A-35).

NOTE

- **Cruise control switch has a momentary contact type button. When ignition switch is turned "ON" again, the system comes OFF.**
- **When the cruise control system enters the on-standby state by pushing the cruise control switch, the LCD switches to the cruise control system dedicated display.**
- **The active speed limiter is switched to the on-standby state by pressing the "MODE" switch (2) for a long time, when the cruise control system is in the on-standby state.**



IM10L1012008-01

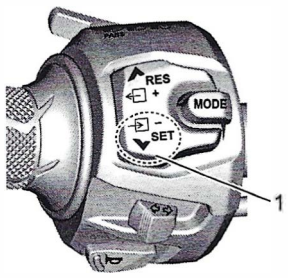
- Motorcycle is running at approximately 30 km/h (19 mile/h)* to 200 km/h (124 mile/h).
  *: Vehicle speed varies depending on gear position, referring to the following table.

Gear position	2nd	3rd	4th	5th	6th
Vehicle speed	Approx. 30 km/h (19 mile/h)	Approx. 40 km/h (25 mile/h)	Approx. 50 km/h (31 mile/h)	Approx. 55 km/h (34 mile/h)	Approx. 60 km/h (37 mile/h)

- Gear position is 2nd, 3rd, 4th, 5th or 6th.
- Clutch lever is released.
- Brake lever and pedal are released.
- Rear wheel does not wheel spin.
- No DTC related to the control is detected.

Speed Set Function

When "SET / DOWN" switch (1) is pressed in execution state of the control, the speed obtained when the switch is pressed is stored as a set speed and the cruise control system starts control.



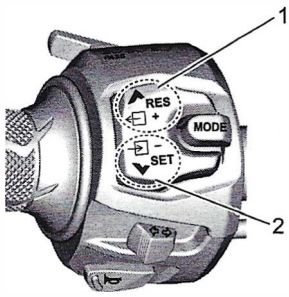
IM10L1012009-01

Acceleration / Deceleration Function

- When "RES / UP" switch (1) is pushed momentarily, the vehicle speed is set to approximately 1km/h (0.6 mile/h) high.
  When the switch is pushed for a long time, acceleration continues for pushing the switch. And when the switch is released, the vehicle speed is set.
- When "SET / DOWN" switch (2) is pushed momentarily, the vehicle speed is set to approximately 1km/h (0.6 mile/h) low.
  When the switch is pushed for a long time, deceleration continues for pushing the switch. And when the switch is released, the vehicle speed is set.

NOTE

When control of the cruise control system, the vehicle speed can be accelerated by opening the throttle grip. And when the throttle grip released, decelerate and keep the vehicle speed according to the set speed by ECM.



IM10L1012010-01

Cancel / Resume Function

NOTE

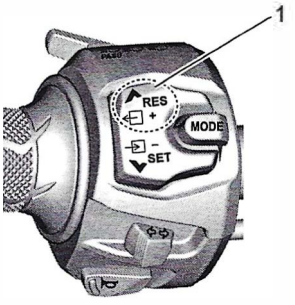
***: Vehicle speed varies depending on gear position. Refer to "Effective Conditions for Control": Technical Features (Page 0A-33).**

- When throttle grip is turned adversely under the control of the cruise control system, the control is canceled and the system becomes in a state of on-standby.

NOTE

Accelerator body assembly has a cruise control cancel switch. Refer to "Electric Throttle Control System Description": Technical Features (Page 0A-13).

- When the cruise control is in on-standby state by cancel operation while the motorcycle is running at approximately 30 km/h (19 mile/h)* or higher speed, pressing "RES / UP" switch (1) allows the system to resume motorcycle running at the speed set before the control is canceled.



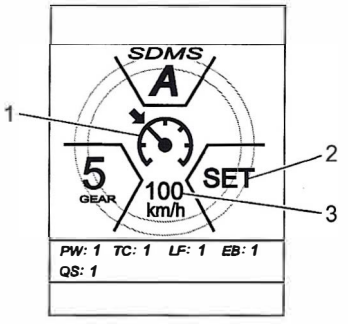
IM10L1012011-01

- Cruise control is canceled under one of the following conditions.

Conditions	Resume Function
Throttle grip is turned adversely.	Available
Gear position is 1st and neutral.	Available
Clutch lever is grasped.	Available
Brake lever is grasped or brake pedal is depressed.	Available
Cruise control switch is turned OFF.	Not available
Motorcycle is running at lower than approximately 30 km/h (19 mile/h)*	Not available
Rear wheel is wheel spin.	Available
The actual vehicle speed does not reach target vehicle speed for specified time.	Available
DTC related to the control of the cruise control system is detected.	Not available

Cruise Control Indicator

- When the cruise control is in on-standby, cruise control indicator (1) is ON.
- When the cruise control is in set, "SET" indicator (2) is ON.
- When the resume function is available, a preset vehicle speed indicator (3) is displayed on the LCD.



IM10L1012012-01

Active Speed Limiter Description

BENM10L30121019

- Active speed limiter is a function to prevent the vehicle speed from exceeding a preset vehicle speed even when a throttle grip is fully opened.
- Active speed limiter is in on-standby by pushing the cruise control switch (1).

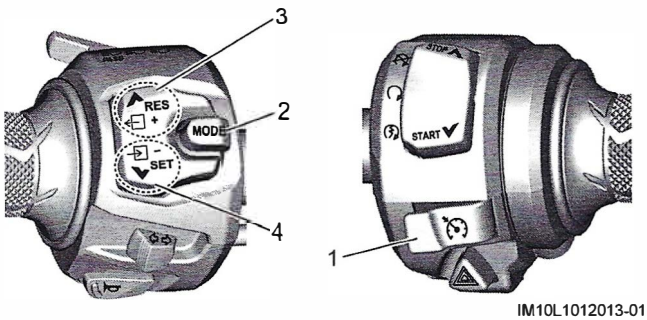
NOTE

- **Cruise control switch has a momentary contact type button. When ignition switch is turned "ON" again, the system comes OFF.**
- **When the active speed limiter enters the on-standby state by pushing the cruise control switch, the LCD switches to the active speed limiter dedicated display.**
- **The cruise control system is switched to the on-standby state by pushing the "MODE" switch (2) for a long time, when the active speed limiter is in the on-standby state.**

- The active speed limiter can be set once the ECM detects the vehicle speed after the ignition switch is turned ON.
- The method of changing the set vehicle speed is as follows. And the vehicle speed range that can be set is from 40 (25 mile/h) km/h to 200 km/h (124 mile/h).
  - When "RES / UP" switch (3) is pushed momentarily, the vehicle speed is set to 1km/h (0.6 mile/h) high.

When this switch is pushed for a long time, the set speed increases in increments of 5 km/h (3 mile/h) while the switch is pushed. And when the switch is released, the vehicle speed is set.

– When "SET / DOWN" switch (4) is pushed momentarily, the vehicle speed is set to 1km/h (0.6 mile/h) low. When this switch is pushed for a long time, the set speed decrease in increments of 5 km/h (3 mile/h) while the switch is pushed. And when the switch is released, the vehicle speed is set.



IM10L1012013-01

- When "MODE" switch is pushed under the control of the active speed limiter, the control is canceled and the active speed limiter becomes in a state of on-standby. And when the active speed limiter is in on-standby state by cancel operation, the set vehicle speed before cancellation becomes valid again by pushing the "MODE" switch.
- When cruise control switch is pushed under the control of the active speed limiter, the active speed limiter is OFF.

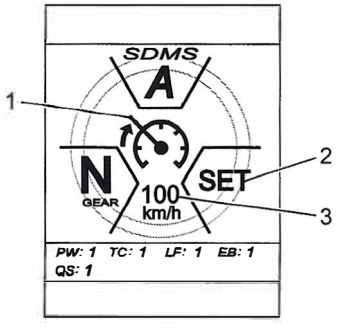
NOTE

When the throttle grip is open, the active speed limiter cannot be canceled or turned OFF by operating the "MODE" switch or cruise control switch.

- Active speed limiter can be temporarily cancelled by quickly opening the throttle grip during the active speed limiter set.

Active speed limiter Indicator

- When the active speed limiter is in on-standby, active speed limiter indicator (1) is ON.
- When the active speed limiter is in set, "SET" indicator (2) is ON.
- When ECM detects a malfunction in this system, active speed limiter indicator is blinks.
- When the active speed limiter is temporarily cancelled state, a preset vehicle speed indicator (3) is blinks.



IM10L1012014-01

Immobilizer Control System Description (If Equipped)

BENM10L30121020

System Description

- The immobilizer control system verifies that the key ID of transponder agrees with key ID already registered in ECM by means of radio communication through the immobilizer antenna. When the ID agreement is verified, the system makes the engine ready to start.
- The ignition key incorporates the transponder which stored key ID.

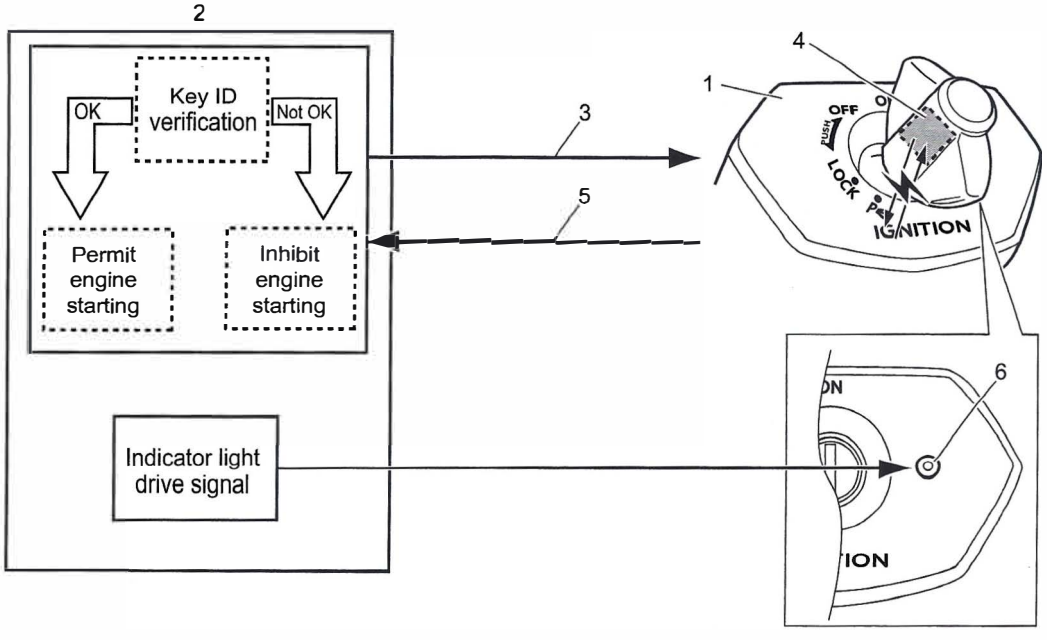
Operation Description

Operation procedure of immobilizer control system is as follows.

1) When the ignition switch is turned ON, the immobilizer antenna (1) and ECM (2) are powered ON.
2) The ECM transmits a signal (3) to the transponder (4) through the immobilizer antenna.
3) With the signal received, the transponder transmits the key ID signal (5) to the ECM through the immobilizer antenna.
4) ECM compares this key ID with the key ID that has already been registered in ECM.
   - If both key IDs agree, the ECM makes the engine ready to start. At the same time, ECM activates the indicator light (6) of immobilizer antenna.
   - If both key IDs do not agree, ECM causes fuel pump, fuel injector and ignition coil to be suspended. At the same time, ECM activates the indicator light of immobilizer antenna.

NOTE

For details of indicator light, referring to "Indicator Light Description": Technical Features (Page 0A-38).

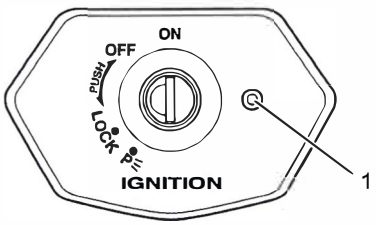


IL06L1012017-01

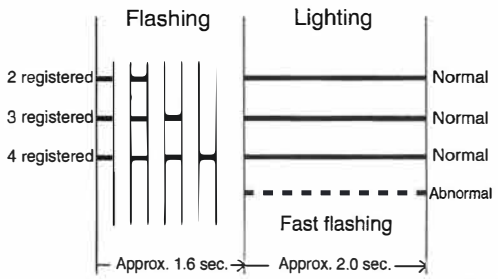
Indicator Light Description

When the ignition switch is turned ON, the indicator light (1) flashes as many as the number of key IDs registered in ECM. Thereafter, if the key IDs are in agreement, the indicator light turns on for two seconds to notify of completion in successful communication.

If the indicator light flashes fast, it notifies of communication error or disagreement of key ID.



IE31J1180004-01



I705H1180006-01

CAN Communication System Description

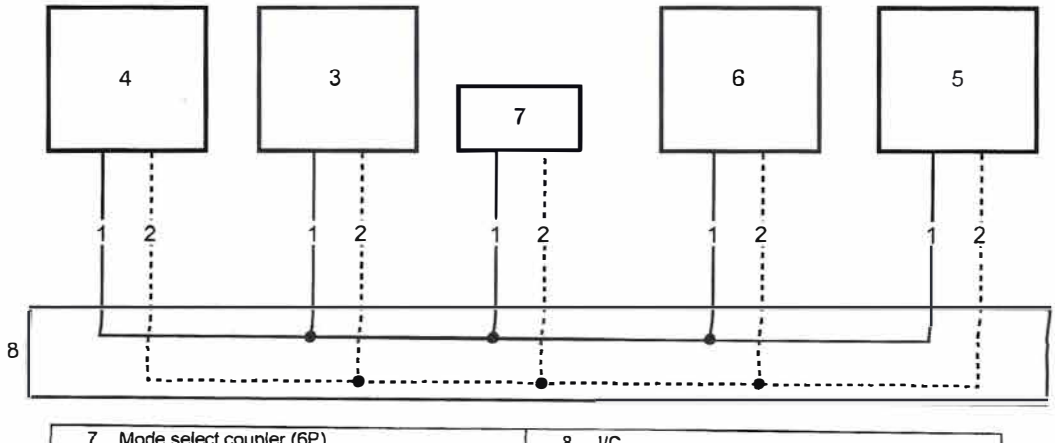
BENM10L30121021

System Description

- Communication between each control module and device is established through continuous input / output of ON/ OFF digital signals to exchange various data items. Transmitting / receiving these data is called as serial communication interface. Types of serial communication interface with protocols (communication standards) such as UART, CAN and LIN have been adopted for in-vehicle communication system.
- In this motorcycle, the following control devices transmit / receive data through a twist pair of two communication lines (CAN High (1) and CAN Low (2)) connected through CAN communication. Data obtained by a specific control module can be shared with every control module. Communication speed of CAN system is fast and the system is suitable for high-speed control data processing by ECM etc.
  - ECM (3)
  - Combination meter (4)
  - ABS control unit / HU (5)
  - IMU (6)

NOTE

The SDS-II communicates with ECM and ABS control unit / HU by CAN communication.

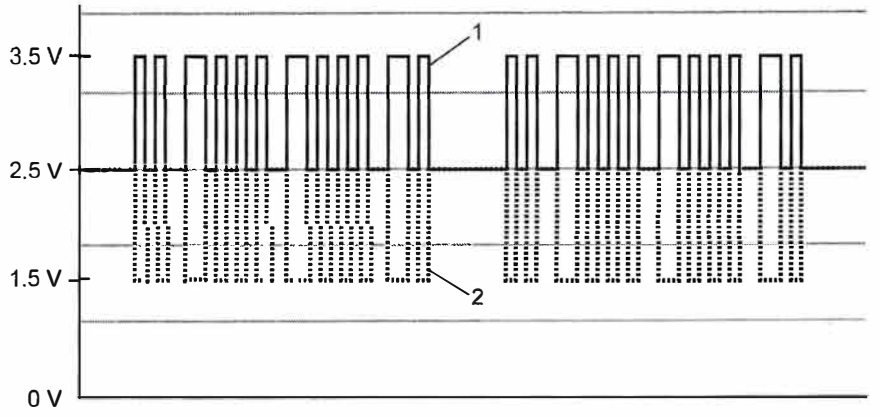


IM10L1012015-01

7. Mode select coupler (6P)
8. J/C

CAN Communication Signal

CAN communication is established as shown below with 2.5 V as the reference level for both CAN High signal (1) and CAN Low signal (2). The range of CAN High signal is from 2.5 V to about 3.5 V and that of CAN Low signal is from 2.5 V to about 1.5 V. When both are at 2.5 V, signal is judged as OFF. When CAN High signal is 3.5 V and CAN Low signal is 1.5 V (that is, when the difference between High voltage and Low voltage is more than about 2 V), signal is judged as ON. For this reason, a feature of CAN communication signal is that the signal waveform between CAN High and CAN Low signals is symmetrical with respect to 2.5 V level. CAN communication fails when the symmetrical signal form collapses.



IL06L1012019-01

Maintenance and Lubrication

Precautions

Precautions for Maintenance

BENM10L30200001

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

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

BENM10L30205001

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	3750	7500	11250	15000
Air cleaner element ☞(Page 0B-3)		—	I	I	R	I
Exhaust pipe bolts and muffler bolts ☞(Page 0B-3)		T	—	T	—	T
Valve clearance ☞(Page 0B-4)		—	—	—	—	I
Spark plugs ☞(Page 0B-7)		—	I	R	I	R
Fuel hose ☞(Page 0B-8)		—	I	I	I	I
Evaporative emission control system (california model only) ☞(Page 0B-8)		—	—	I	—	I
Engine oil ☞(Page 0B-11)		R	R	R	R	R
Engine oil filter ☞(Page 0B-12)		R	—	—	R	—
Throttle cable play ☞(Page 0B-12)		I	I	I	I	I
PAIR (air supply) system ☞(Page 0B-13)		—	—	I	—	I
Throttle bore cleaning ☞(Page 0B-14)		—	—	I	—	I
Throttle valve synchronization ☞(Page 0B-15)		I	—	I	—	I
Engine coolant ☞(Page 0B-16)	"SUZUKI SUPER LONG LIFE COOLANT" (Blue)	Replace every 4 years or 48000 km (30000 miles)				
	"SUZUKI LONG LIFE COOLANT" (Green) or an engine coolant other than "SUZUKI SUPER LONG LIFE COOLANT" (Blue)	—	—	R	—	R
Radiator hose ☞(Page 0B-17)		—	I	I	I	I
Clutch fluid ☞(Page 0B-17)		—	I	I	I	I
		Replace every 2 years				
Clutch hose ☞(Page 0B-18)		—	I	I	I	I
		Replace every 4 years				
Drive chain ☞(Page 0B-18)		I	I	I	I	I
		Clean and lubricate every 1000 km (600 miles)				

Item	Interval					
	months	2	12	24	36	48
	km	1000	6000	12000	18000	24000
	miles	600	3750	7500	11250	15000
Brakes ☞(Page 0B-20)		I	I	I	I	I
Brake fluid ☞(Page 0B-22)		—	I	I	I	I
		Replace every 2 years				
Brake hose ☞(Page 0B-25)		—	I	I	I	I
		Replace every 4 years				
Tires ☞(Page 0B-26)		—	I	I	I	I
Steering ☞(Page 0B-26)		I	—	I	—	I
Front forks ☞(Page 0B-27)		—	—	I	—	I
Rear suspension ☞(Page 0B-28)		—	—	I	—	I
Chassis bolts and nuts ☞(Page 0B-29)		T	T	T	T	T
Lubrication ☞(Page 0B-32)		Lubricate every 1000 km (600 miles)				

Repair Instructions

Air Cleaner Element

BENM10L30206001

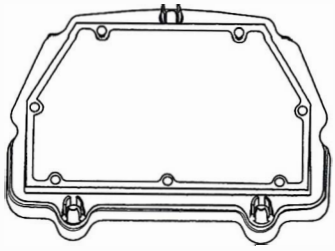
Inspection

Refer to "Replacement" (Page 0B-3).

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

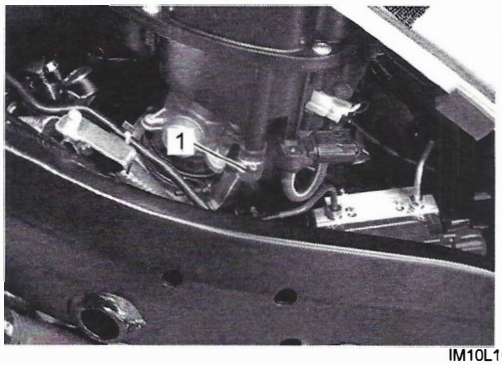
NOTICE

- **Do not blow the air cleaner element with compressed air.**
- **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. Life of the engine depends largely on this component.**



IM10L1020001-03

2) Remove the drain plug (1) and drain water from the air cleaner box.

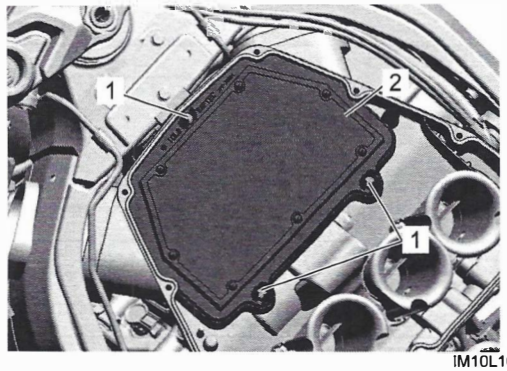


IM10L1020002-01

3) Install the drain plug to the air cleaner box.

Replacement

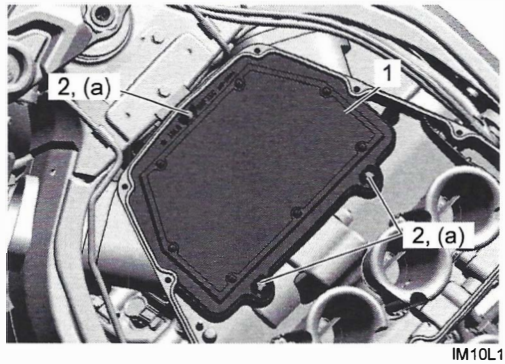
1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Remove the air cleaner cover. ☞(Page 1D-6)
3) Remove the air cleaner element screws (1) and air cleaner element (2) from the air cleaner box.



IM10L1020004-02

4) Install the new air cleaner element (1) to the air cleaner box.
5) Tighten the air cleaner element screws (2) to the specified torque.

Tightening torque
Air cleaner element screw (a): 1.2 N·m (0.12 kgf-m, 0.90 lbf-ft)



IM10L1020078-01

6) Install the air cleaner cover. ☞(Page 1D-6)
7) Install the fuel tank. ☞(Page 1G-12)

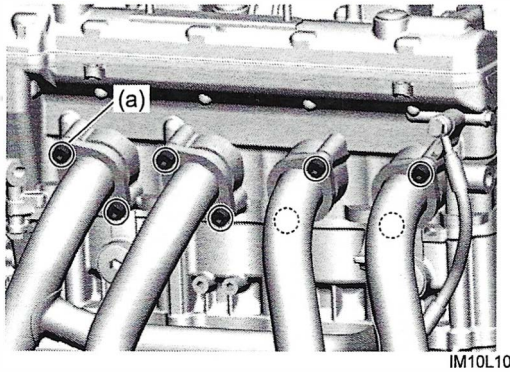
Exhaust Pipe Bolt and Muffler Mounting Bolts

BENM10L30206002

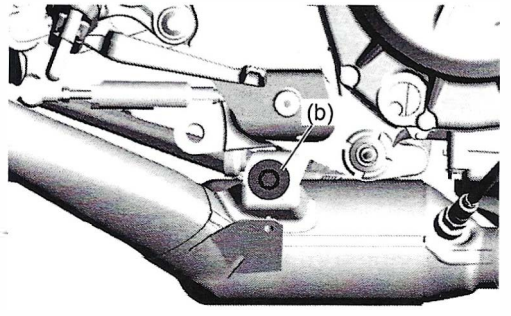
Tighten

Check the exhaust pipe bolts, muffler connector bolt and muffler support bolt are tightened to their specified torque.

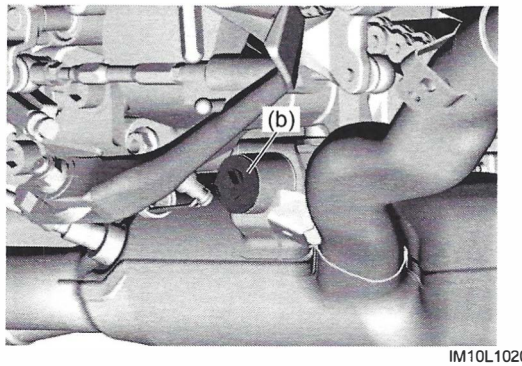
Tightening torque
Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
Exhaust pipe support bolt (b): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
Muffler connector bolt (c): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
Muffler support bolt (d): 30 N·m (3.1 kgf-m, 22.5 lbf-ft)



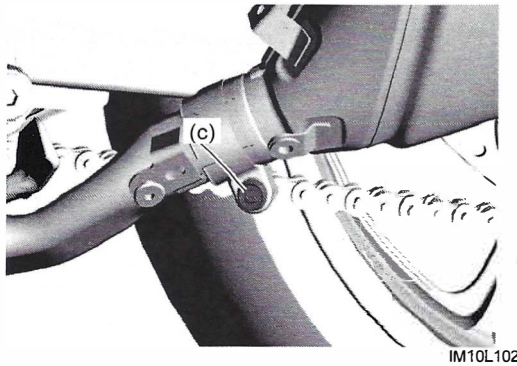
IM10L1020006-01



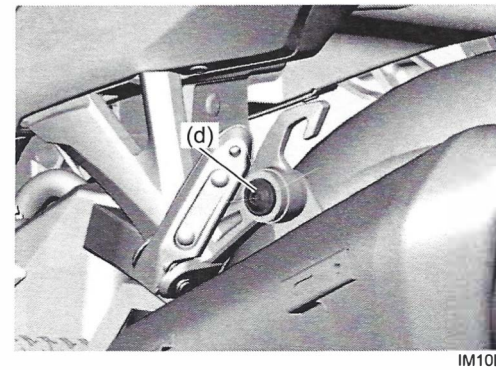
IM10L1020007-01



IM10L1020008-01



IM10L1020096-01



IM10L1020010-01

Valve Clearance

BENM10L30206003

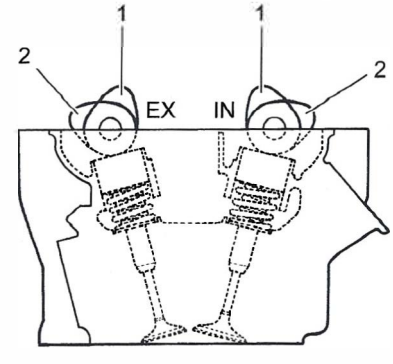
Refer to "Cylinder Head Cover Removal and Installation" in Section 1D (Page 1D-15) and "Spark Plug Removal and Installation" in Section 1H (Page 1H-5).

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.

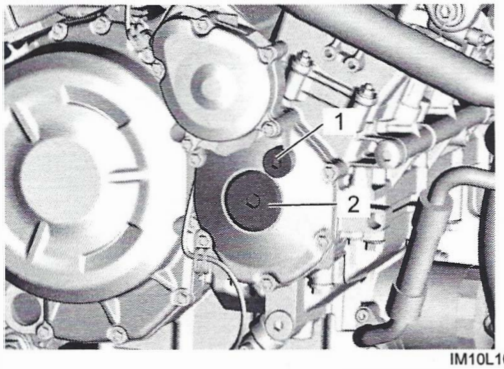
NOTE

- **The cam must be at positions, (1) or (2), 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.**



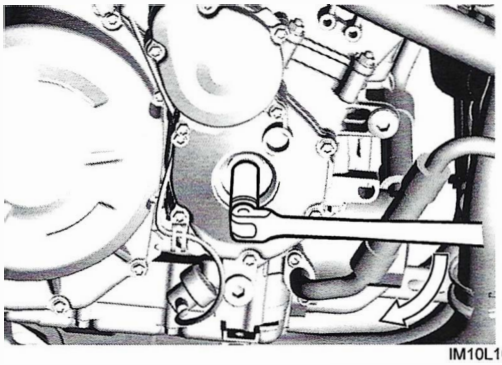
IF04K1140093-01

1) Remove the valve timing inspection cap (1) and starter clutch cover cap (2) from the starter clutch cover.

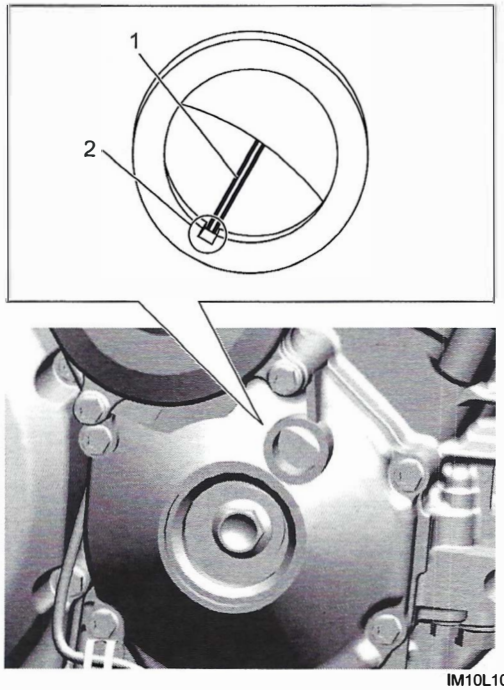


IM10L1020011-01

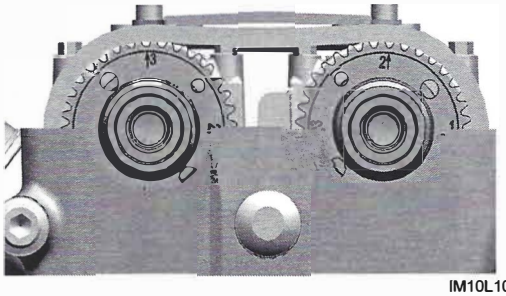
2) Turn the crankshaft clockwise to bring the line (1) on the starter clutch to the slit (2) of valve timing inspection hole and also to bring the cams to the position as shown in the figure.



IM10L1020012-01



IM10L1020013-04

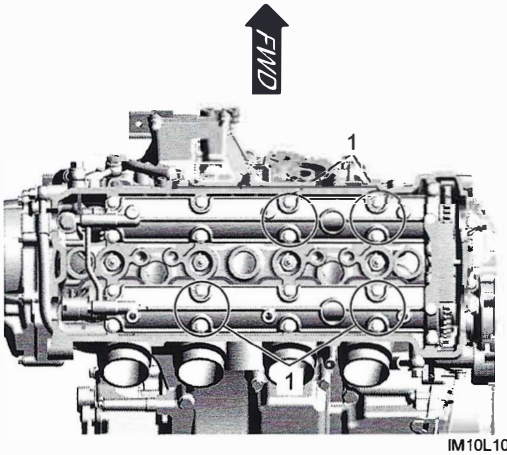


IM10L1020014-02

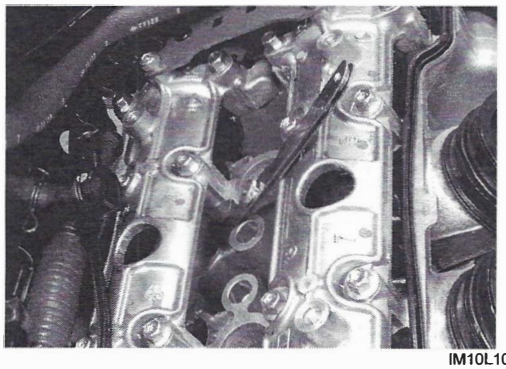
3) In this condition, read the valve clearance at the valves (1) (IN and EX of #4 cylinder, EX of #3 and IN of #2). If the clearance is out of specification, adjust the clearance.

Valve clearance
When engine cold
Intake [Standard]: 0.08 – 0.18 mm (0.0031 – 0.0070 in)
Exhaust [Standard]: 0.18 – 0.28 mm (0.0070 – 0.0110 in)

Special tool
09900–20803

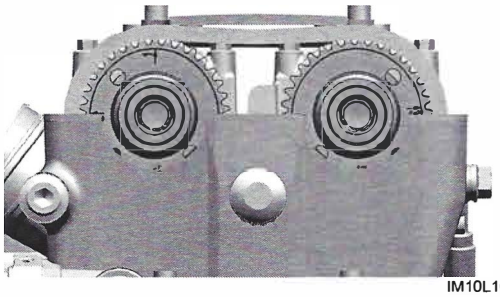


IM10L1020015-01

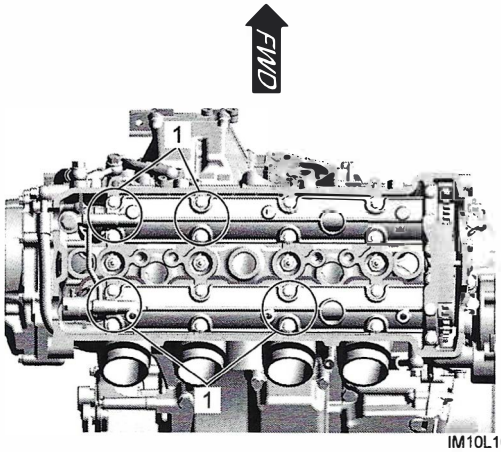


IM10L1020016-01

4) Turn the crankshaft 360° degrees (one rotation) to bring the line on the starter clutch to the slit of cap hole thread and also to bring the cams to the position as shown in the figure.


IM10L1020017-02

5) Read the clearance at the rest of the valves (1) and adjust the clearance if necessary.

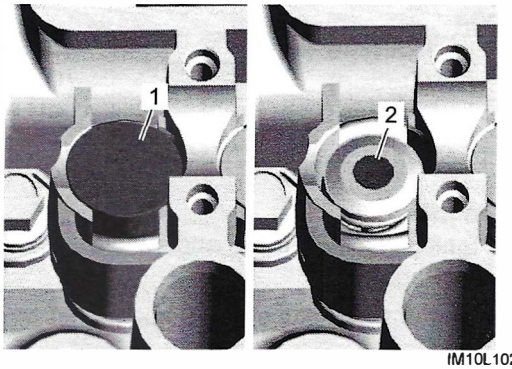


IM10L1020018-01

Adjustment

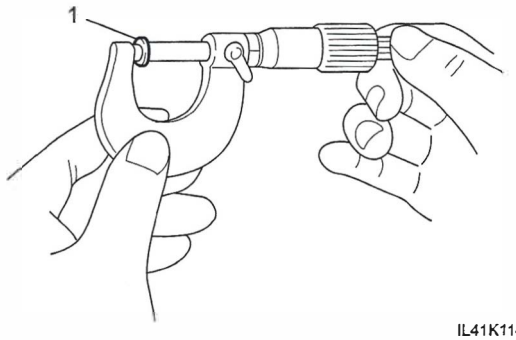
The clearance is adjusted by replacing the existing tappet shim with a thicker or thinner shim.

1) Remove the intake camshaft or exhaust camshaft. ☞(Page 1D-18)
2) Remove the tappet (1) and shim (2) by fingers or magnetic hand.



IM10L1020019-01

3) Select proper size of tappet as follows to adjust valve clearance to specification.
   a) Using a micrometer, measure the thickness of the removed shim (1).

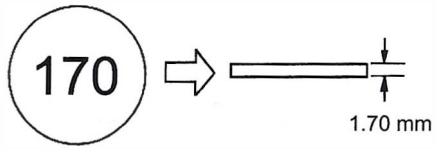


IL41K1140050-01

   b) Calculate the thickness of new shim by the following formula.
      - Intake:
        A = B + C - 0.15 mm (0.0059 in.)
      - Exhaust:
        A = B + C - 0.25 mm (0.0098 in.)
      - A: Thickness of new shim
      - B: Thickness of removed shim
      - C: Measured valve clearance

NOTE

The figures indicate the thickness of the shim, as illustrated, a total of 25 sizes of shim are available ranging from 2.300 to 3.500 mm in steps of 0.050 mm.



I837H1020014-01

   c) Select new shim closest to calculated value from available size.

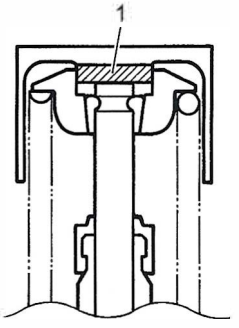
Indicated figure	Thickness
230	2.300 mm
235	2.350 mm
240	2.400 mm
245	2.450 mm
250	2.500 mm
255	2.550 mm
260	2.600 mm
265	2.650 mm
270	2.700 mm
275	2.750 mm
280	2.800 mm
285	2.850 mm
290	2.900 mm
295	2.950 mm
300	3.000 mm
305	3.050 mm
310	3.100 mm
315	3.150 mm
320	3.200 mm
325	3.250 mm
330	3.300 mm

Indicated figure	Thickness
335	3.350 mm
340	3.400 mm
345	3.450 mm
350	3.500 mm

4) Fit the selected shim (1) to the valve stem end.

NOTE

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



IE31J1140061-01

5) Install the intake camshaft or exhaust camshaft. ☞(Page 1D-18)
6) 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.
7) After finishing the valve clearance adjustment, check the engine for smooth starting and free from any abnormal noise.

Spark Plugs

BENM10L30206004

Inspection

Refer to "Replacement" (Page 0B-7).

Spark Plug Inspection

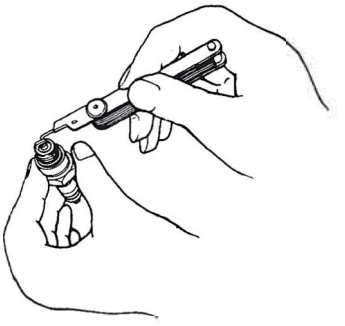
Check spark plug for:

- Electrode wear
- Carbon deposits
- Insulator damage
- Spark plug gap "a"

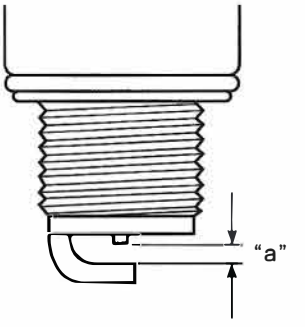
If any abnormality is found, replace the spark plug with a new one.

Spark plug

Type [Standard]: NGK: CR9EIA-9 / DENSO: IU27D
Gap [Standard]: 0.8 – 0.9 mm (0.032 – 0.035 in)



I823H1020005-01



ID26J1180010-03

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.

Heat Range

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

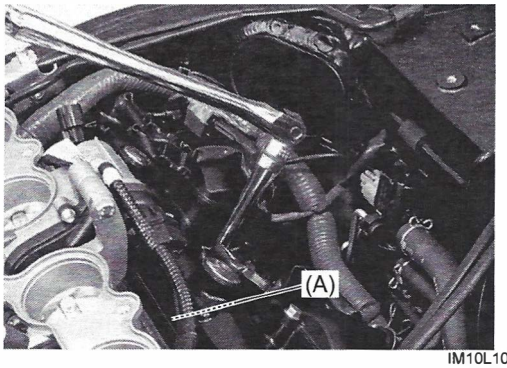
	Hot type (Option)	Standard	Cold type (Option)
NGK	CR8EIA-9	CR9EIA-9	CR10EIA-9
DENSO	IU24D	IU27D	IU31D

Replacement

Refer to "Ignition Coil Removal and Installation" in Section 1H (Page 1H-4).

1) Remove the spark plugs with a spark plug wrench.

Special tool
(A): 09930–10121



IM10L1020020-01

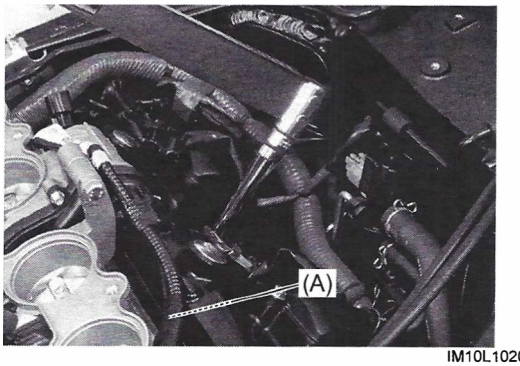
2) Screw the new spark plugs into the cylinder head with fingers, and then tighten them to the specified torque.

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
(A): 09930–10121

Tightening torque
Spark plug: 11 N·m (1.1 kgf-m, 8.5 lbf-ft)



IM10L1020021-01

Fuel Hose

BENM10L30206005

Inspection

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Inspect the fuel feed hose (1) for damage and fuel leakage. If any defects are found, the fuel feed hose (1) must be replaced.

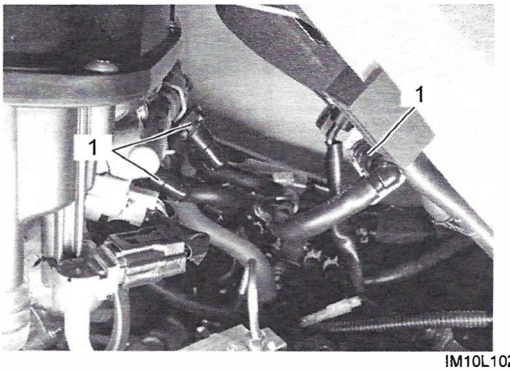


IM10L1020022-01

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

Replacement

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Disconnect the fuel feed hose joints (1) from the fuel pump, primary fuel delivery pipe and secondary fuel delivery pipe. ☞(Page 1G-7)



IM10L1020023-01

3) Install the new fuel feed hose in the reverse order of removal.

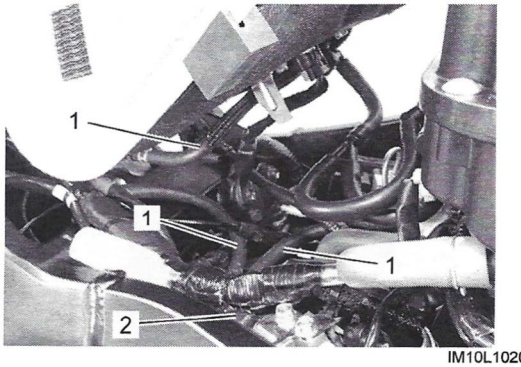
Evaporative emission control system

BENM10L30206006

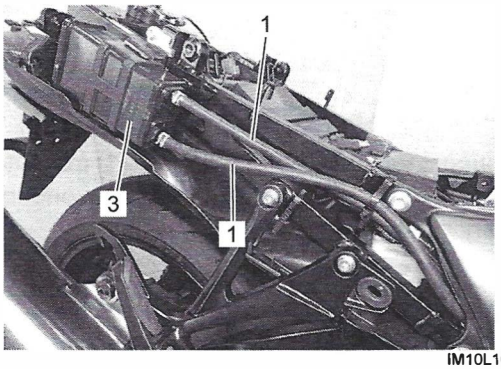
Refer to "EVAP System Removal and Installation" in Section 1B (Page 1B-8).

Hose

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Remove the Frame cover assembly: ☞(Page 9D-51)
3) Inspect the EVAP hoses (1) for wear or damage. If it is worn or damage, replace the EVAP hose with a new one. ☞(Page 1B-8)



IM10L1020071-01



IM10L1020072-01

2.	EVAP system purge control solenoid valve
3.	EVAP canister

4) Check that the EVAP hoses are securely connected. ☞(Page 1B-2)

EVAP Canister

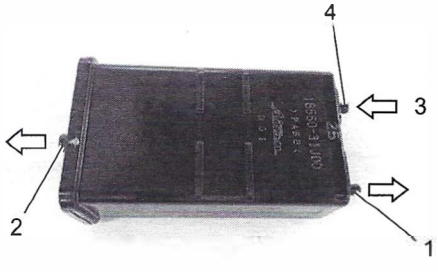
⚠ WARNING

Gasoline and gasoline vapor is toxic. A small amount of fuel remains in the EVAP canister when checking it.
Do not swallow the fuel when blowing the EVAP canister.

Check EVAP canister as follows.
If faulty condition is found, replace EVAP canister.

1) Remove the EVAP canister. ☞(Page 1B-8)
2) Check EVAP canister body for damage to the body.
3) Check that there is no restriction of flow through purge port (1) and air port (2) when specified air pressure (3) is blown into tank port (4).

EVAP canister blowing air pressure
[Standard]: 2.0 kPa (0.02 kgf/cm², 0.29 psi)



IM10L1020073-01

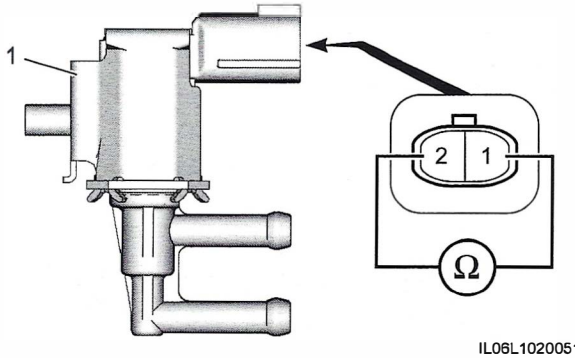
EVAP System Purge Control Solenoid Valve

⚠ WARNING

Gasoline and gasoline vapor is toxic. A small amount of fuel remains in the EVAP system purge control solenoid valve when checking it.
Do not swallow the fuel when blowing the EVAP system purge control solenoid valve.

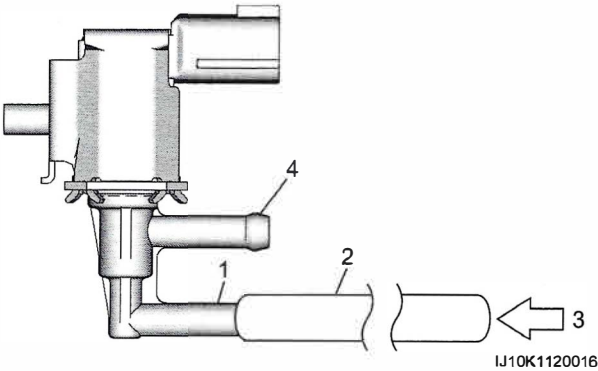
1) Check the resistance between the terminals of the EVAP system purge control solenoid valve (1). If the resistance is not within the standard range, replace the EVAP system purge control solenoid valve with a new one.

EVAP system purge control solenoid valve resistance
20 °C (68 °F) [Standard]: 22 – 26 Ω



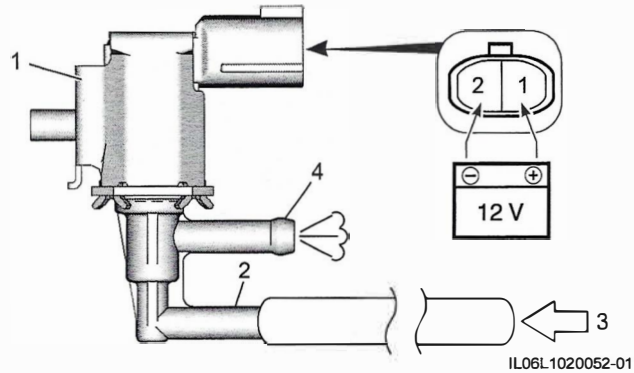
IL06L1020051-01

2) Check the EVAP system purge control solenoid valve as follows. If faulty condition is found, replace the EVAP system purge control solenoid valve with a new one.
   a) Connect clean hose (2) to air inlet port (1).
   b) Check that there is no air flow to air outlet port (4) when air (3) is blown into air inlet port.



IJ10K1120016-01

   c) Connect the 12 V battery to the terminals of the EVAP system purge control solenoid valve (1).
   d) Check that there is no restriction of flow through air outlet port (4) when air (3) is blown into air inlet port (2).

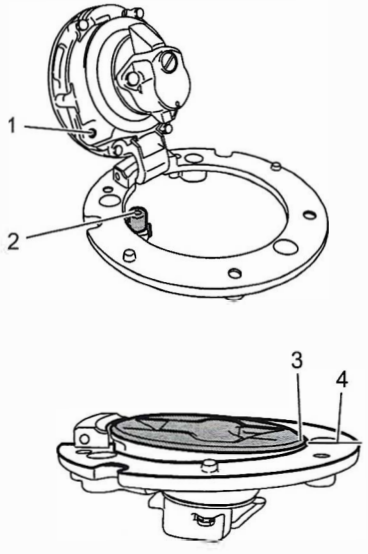


IL06L1020052-01

Fuel Shut-off Valve

Check fuel shut-off valve as follows.
If faulty condition is found, replace fuel tank cap.
☞(Page 1G-12)

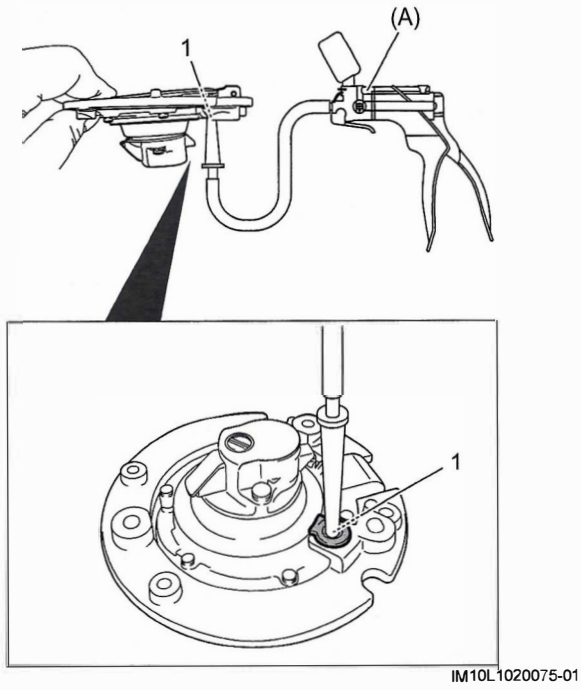
1) Hold the fuel tank cap so that the fuel tank cap breather hole (1) is aligned with and closely contacts the packing breather port (2) and align the fuel tank cap tip (3) at the same height as the fuel tank cap outer upper surface (4).



IM10L1020074-01

2) Keep the step 1), connect the vacuum pump gauge to the breather port (1) with the fuel tank cap turned upright, and give positive pressure to check that air can pass through.

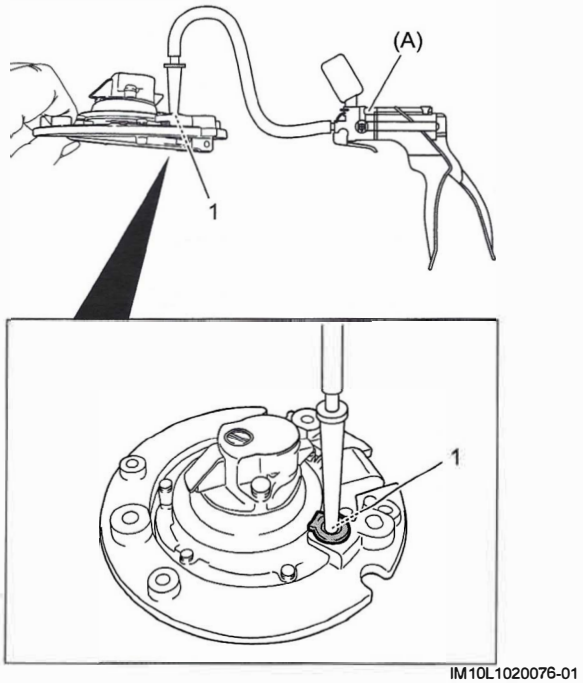
Special tool
(A): 09917–47020



IM10L1020075-01

3) Keep the step 1), connect the vacuum pump gauge to the breather port (1) with the fuel tank cap turned upside down, and give negative pressure to check that air cannot pass through.

Special tool
(A): 09917–47020



IM10L1020076-01

Engine Oil

BENM10L30206007

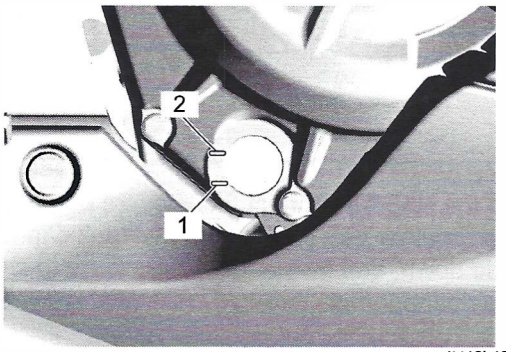
Inspection

Engine Oil Leakage Inspection

Visually check the cylinder, crankcase, etc. for oil leakage.

Engine Oil Level Inspection

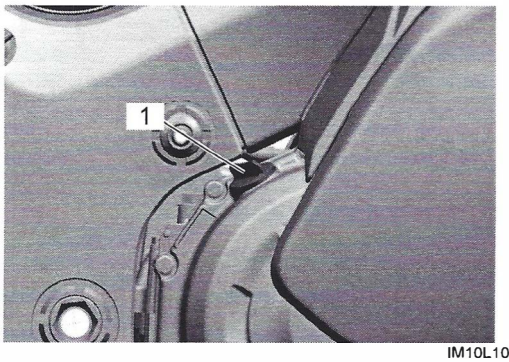
1) Keep the motorcycle upright on a level surface.
2) Start the engine at idle speed for a few minutes. Turn off the engine and wait for about three minutes.
3) Check the oil level and deterioration through the inspection window. If the oil level is below lower line (1), add new oil up to upper line (2). However, if the oil is deteriorated or discoloration, replace it.



IM10L1020024-01

Replacement

1) Keep the motorcycle upright on a level surface.
2) Start the engine at idle speed for a few minutes and then turn off the engine.
3) Place an oil pan under the engine and remove the oil filler cap (1).

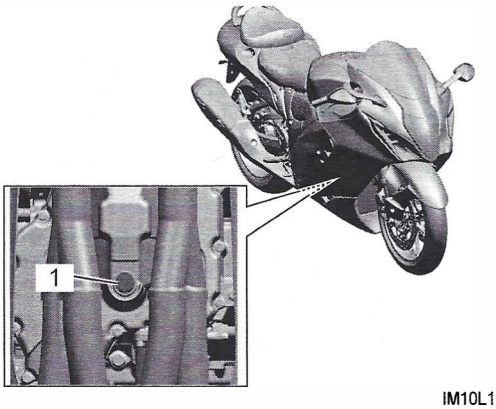


IM10L1020025-01

4) Drain engine oil by removing the oil drain plug (1).

⚠ CAUTION

To avoid getting burned, do not touch the engine, engine oil and exhaust system.



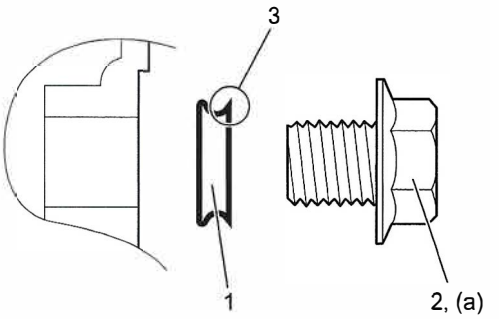
IM10L1020026-01

5) Install the new gasket washer (1) to the oil drain plug (2) and tighten the oil drain plug to the specified torque.

NOTE

The sharp edge (3) of gasket must face the oil drain plug side.

Tightening torque
Oil drain plug (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IH13K1150048-01

6) Pour new oil through the oil filler hole.

Necessary amount of engine oil
Oil change [Standard]: 3200 ml (3.38 US qt, 2.82 Imp qt)
Oil and filter change [Standard]: 3400 ml (3.59 US qt, 2.99 Imp qt)
Engine overhaul [Standard]: 4100 ml (4.33 US qt, 3.61 Imp qt)

7) Install the oil filer cap
8) Start the engine and check for oil leakage.
9) Stop the engine and check the engine oil level again. Refer to "Inspection" under "Engine Oil" (Page 0B-11).

Engine Oil Filter

BENM10L30206008

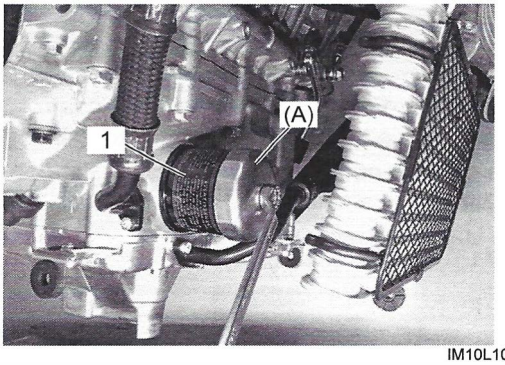
Replacement

1) Drain the engine oil. Refer to "Replacement" under "Engine Oil" (Page 0B-11).
2) Remove the right under cowling. ☞(Page 9D-42)
3) Remove the oil filter (1) using the special tool.

NOTICE

Detach the special tool once the oil filter has come loose, and then remove the filter by hand.

Special tool
(A): 09915–40620



IM10L1020028-01

4) Apply engine oil lightly to the O-ring of new oil filter (1) 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.

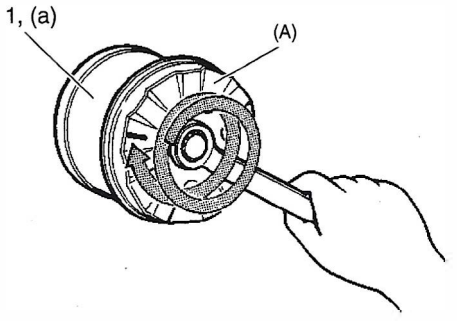
5) Install a new oil filter. Turn it by hand until you feel that the oil filter O-ring contacts the oil filter mounting surface. Then, tighten the oil filter two full turns (or to specified torque) with the special tool.

NOTICE

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

Special tool
(A): 09915–40620

Tightening torque
Oil filter (a): 20 N·m (2.0 kgf-m, 15.0 lbf-ft)



ID26J1150014-03

6) Add new engine oil. Refer to "Replacement" under "Engine Oil" (Page 0B-11).
7) Check the engine oil level. Refer to "Inspection" under "Engine Oil" (Page 0B-11).

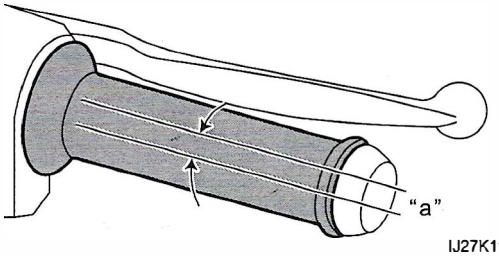
Throttle Cable Play

BENM10L30206009

Inspection

Turn the throttle grip slowly and inspect the throttle cable play "a" at the periphery of the grip.

Throttle cable play
[Standard]: 2.0 – 4.0 mm (0.08 – 0.16 in)



IJ27K1140010-01

Adjustment

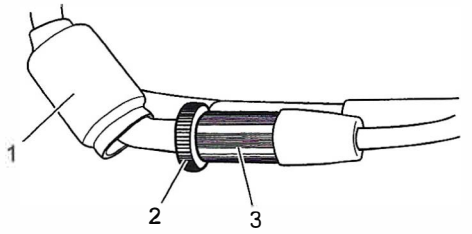
1) Slid the rubber boots (1).
2) Loosen the lock-nut (2) of the throttle cable No.1.
3) Turn the adjuster (3) in or out until the throttle cable play (at the throttle grip) is within the specification.

Throttle cable play
[Standard]: 2.0 – 4.0 mm (0.079 – 0.16 in)

4) Tighten the lock-nut (2) 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.



IE31J1130081-01

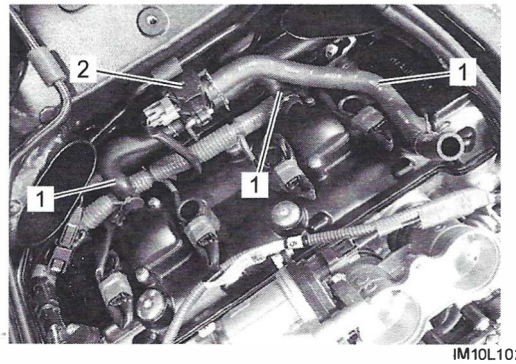
5) Reinstall the rubber boot.

PAIR (air supply) System

BENM10L30206010

PAIR Hose

1) Remove the air cleaner box. ☞(Page 1D-6)
2) Inspect the PAIR hoses (1) for wear or damage. If it is worn or damaged, replace the PAIR hose with a new one. ☞(Page 1B-5)



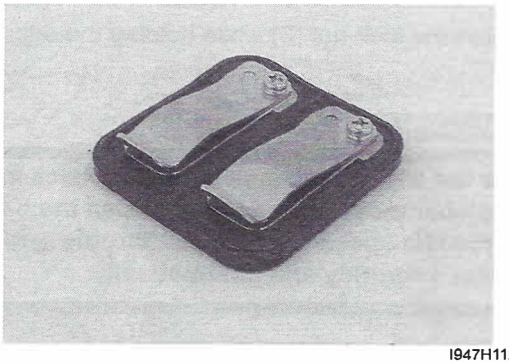
IM10L1020077-01

2. PAIR control solenoid valve

3) Check that the PAIR hoses are securely connected. ☞(Page 1B-1)

PAIR Reed Valve

1) Remove the PAIR reed valve. ☞(Page 1B-4)
2) Inspect the reed valves for carbon deposit. If carbon deposit is found on the reed valve, replace the PAIR reed valve with a new one.

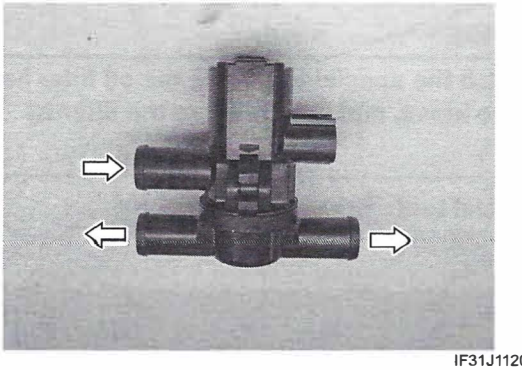


I947H1120018-01

3) Install the PAIR reed valve. ☞(Page 1B-4)

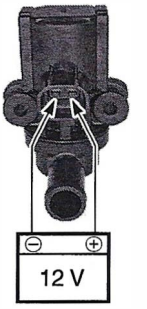
PAIR Control Solenoid Valve

1) Remove the PAIR control solenoid valve, if necessary. ☞(Page 1B-5)
2) Check that air flows through the air inlet port to the air outlet ports. If air does not flow out, replace the PAIR control solenoid valve with a new one.



IF31J1120011-01

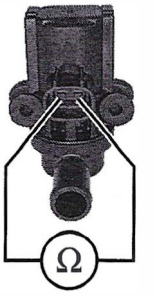
3) Connect the 12 V battery to the PAIR control solenoid valve terminals and check the air flow. If air does not flow out, the solenoid valve is in normal condition.



IF31J1120012-01

4) Check the resistance between the terminals of the PAIR control solenoid valve. If the resistance is out of the specified valve, replace the PAIR control solenoid valve with a new one.

PAIR control solenoid valve resistance
20 – 30 °C (68 – 86 °F) [Standard]: 20 – 24 Ω



IF31J1120013-01

5) Reinstall the PAIR control solenoid valve. ☞(Page 1B-5)

Throttle Bore Cleaning

BENM10L30206011

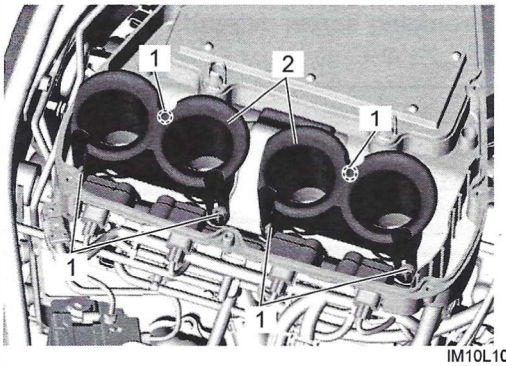
Refer to "Air Cleaner Box Removal and Installation" in Section 1D (Page 1D-6).

Inspection

1) Remove the funnel bolts (1) and remove the funnel (2).

NOTE

When removing funnels, be careful that the injector gets caught.



IM10L1020097-01

2) Shift the transmission into neutral.
3) Turn the ignition switch ON.
4) Set the anti-lift control "OFF".

NOTE

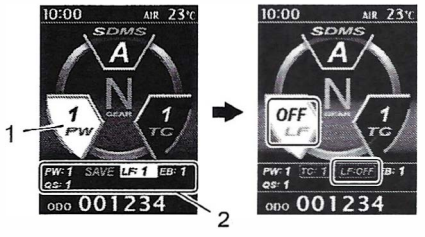
If the anti-lift control is not turned off, the throttle valve will not fully open.

Operation Procedure

Make sure either the riding assistance system indicator (1) is highlighted. Then, press and hold the MODE/SET switch for 2 seconds to display the riding assistance system indicator list (2).
After making a selection, use the select switches (Up and Down) to set the anti-lift control "OFF".

NOTE

Set the SDMS to either A, B, or C, then turn lift control "OFF". When the finished, reset the lift control setting by turning the ignition switch OFF.



IM10L1020090-01

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

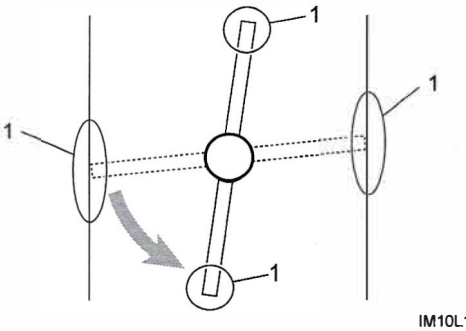
NOTICE

Do not snap the throttle valve from the open to full close. It may cause damage to the gear inside the throttle body.

6) Inspect the main bore and throttle valve for carbon deposit. If carbon deposit is found, clean the main bore and throttle valve.

Cleaning

1) Clean the location (1) shown in the figure with a cotton swab moistened with carbon cleaner.



IM10L1020091-01

NOTICE

- **Some cleaning chemicals are very corrosive. Always follow the chemical manufacturer's instructions for proper use, handling and storage.**
- **Do not dip the throttle body in a cleaning chemical or do not splay the cleaning chemical directly to the throttle valve.**
- **Cleaning chemical will penetrate into electronic parts resulting in cause of malfunction.**
- **Do not use wire to clean passages. Wire may damage them.**
- **Do not apply any cleaning chemical to parts made of rubber and plastic materials. Cleaning chemical may damage these parts.**

2) Install the removed parts.
3) Restore SDMS to its original setting.
4) After finishing the throttle bore cleaning, reset the ISC aperture learned value.

NOTE

If you do not reset the ISC aperture learned value, the idle speed may increase.

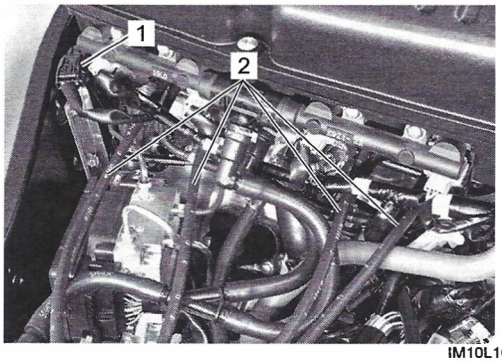
Throttle Valve Synchronization

BENM10L30206012

Check and adjust the throttle valve synchronization among four cylinders.

Inspection

1) Start the engine and run it in idling condition for warming up.
2) Stop the warmed-up engine.
3) Lift and support the fuel tank. ☞(Page 1G-12)
4) Disconnect the respective vacuum hoses from vacuum nipples on the throttle body.
5) Disconnect the IAP sensor coupler (1) from the IAP sensor.
6) Connect the respective vacuum tester hoses (2) to the vacuum nipples.



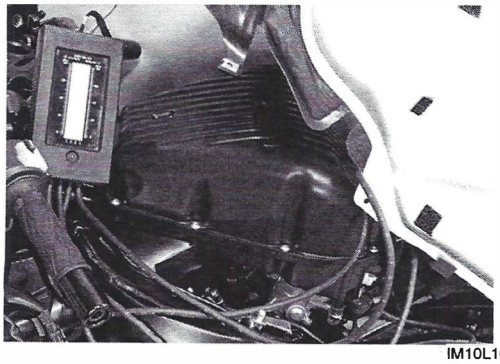
IM10L1020030-02

7) Set up the SDS-II tool referring to the SDS-II operation manual for further details.
8) Start the engine.
9) Click "Data monitor".
10) Warm up the engine enough.
11) Click "Active control".
12) Click "ISC air volume control".
13) Click "ON" to fix the ISC air volume of four cylinders.

NOTE

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

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



IM10L1020031-02

Adjustment

1) Equalize the vacuum of the cylinders as follows:
   a) Check that the engine idle speed is within the specified value.

NOTICE

A cylinder with the white painted synchronizing screw is fixed to the specified vacuum (default setting). Do not turn the synchronizing screw with the white paint.

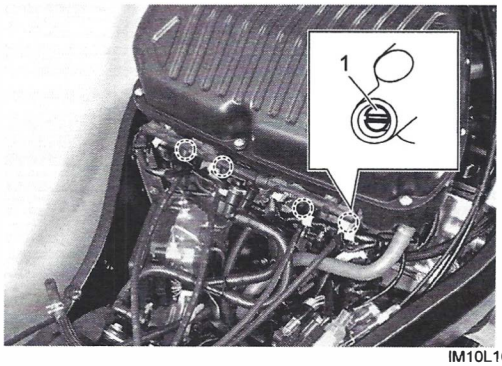
NOTE

Cylinder position with the white painted synchronizing screw depends on the throttle body.

   b) Equalize the vacuum of the cylinders by turning each synchronizing screw (1) except the one with the white paint.

NOTE

Always set the engine rpm at idle rpm.



IM10L1020032-01

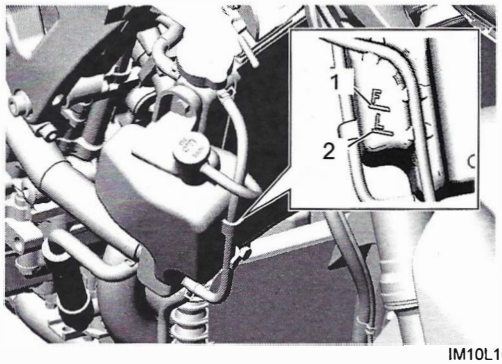
2) If the adjustment is not yet correct, inspect and clean the throttle body. ☞(Page 0B-14)
3) Repeat the procedures from 1) to 2).
4) Close the SDS-II tool and turn the ignition switch OFF.
5) Disconnect the vacuum tester and install the removed parts.
6) After completing the throttle valve synchronization, clear the DTC and reset the ISC aperture learned value. ☞(Page 1C-3)

Engine Coolant

BENM10L30206013

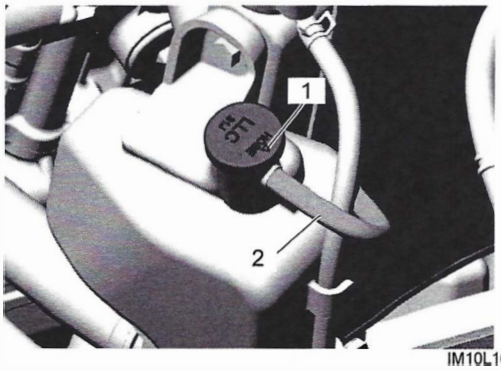
Inspection

1) Keep the motorcycle upright.
2) Remove the side cowling assembly. ☞(Page 9D-37)
3) Check the engine coolant level by observing the full (1) and lower (2) lines on the engine coolant reservoir tank. If the level is below the lower line, add engine coolant to the bottom of full line from the engine coolant reservoir tank filler.



IM10L1020033-01

4) Install the reservoir tank cap by aligning the match mark (1) and reservoir tank overflow hose (2).



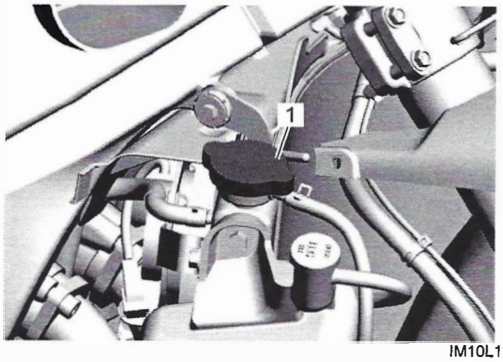
IM10L1020034-01

5) Install the removed parts.

Replacement

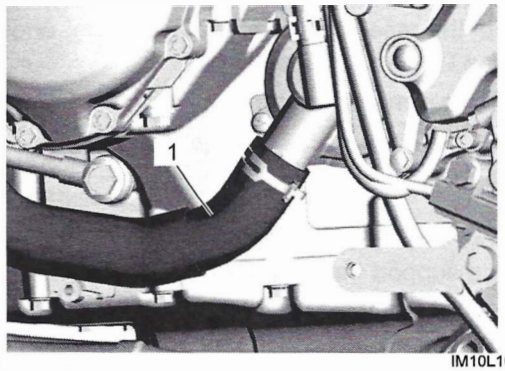
Refer to "Engine Coolant Description" in Section 1F (Page 1F-1).

1) Support the motorcycle upright.
2) Remove the side cowling assembly. ☞(Page 9D-37)
3) Lift and support the fuel tank. ☞(Page 1G-12)
4) Remove the radiator cap (1).



IM10L1160020-02

5) Disconnect the water pump inlet hose (1) and drain engine coolant.

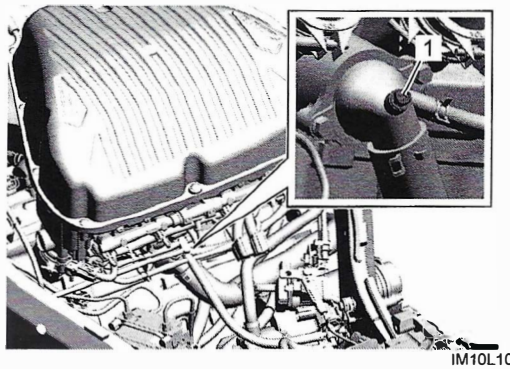


IM10L1020036-01

6) Flush the radiator with fresh water if necessary.
7) Connect the water pump inlet hose. ☞(Page 1F-2)
8) Pour the specified engine coolant up to the radiator inlet.

Engine coolant
Engine side [Standard]: Approx. 2700 ml (2.9 US qt, 2.4 Imp qt)
Reservoir tank side [Standard]: Approx. 200 ml (0.21 US qt, 0.17 Imp qt)

9) Slowly swing the motorcycle, right and left, to bleed the air trapped in the cooling circuit.
10) Add engine coolant up to the radiator inlet.
11) Close the radiator cap securely.
12) Start up the engine at idle speed for few minutes.
13) Stop the engine and wait until the engine cools down fully.
14) Open the radiator cap and add engine coolant up to the radiator inlet.
15) Repeat the 9) – 14) procedures until no air bleeds from the radiator inlet.
16) Loosen the thermostat cover air bolt (1) and check the engine coolant flows out.



IM10L1020037-01

17) Install the new gasket to the thermostat cover air bolt.
18) Tighten the thermostat cover air bolt to the specified torque.

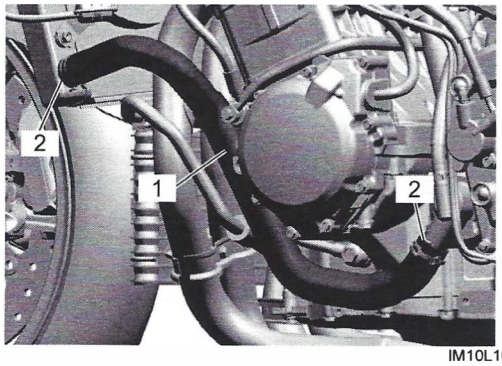
Tightening torque
Thermostat cover air bolt: 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)

19) Install the radiator cap.
20) After warming up and cooling down the engine several times, add the engine coolant up to the full level of the reservoir. Refer to "Inspection" under the "Engine Coolant" (Page 0B-16).
21) Install the removed parts.

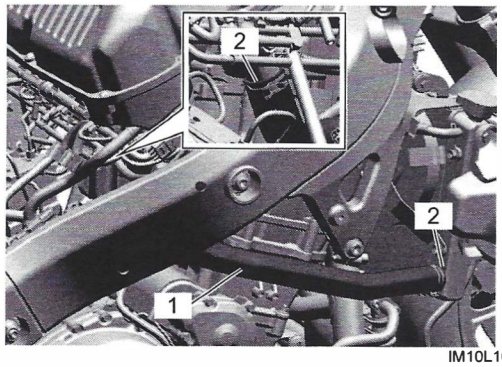
Radiator Hose

BENM10L30206014

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Lift and support the fuel tank. ☞(Page 1G-12)
3) Check the radiator hoses (1) for crack, damage or engine coolant leakage. If any defect is found, replace the radiator hose with a new one.
4) Any leakage from the connecting section (2) should be corrected by proper tightening. ☞(Page 1F-2)



IM10L1020038-01



IM10L1020039-01

5) After finishing the radiator hose inspection, install the removed parts.

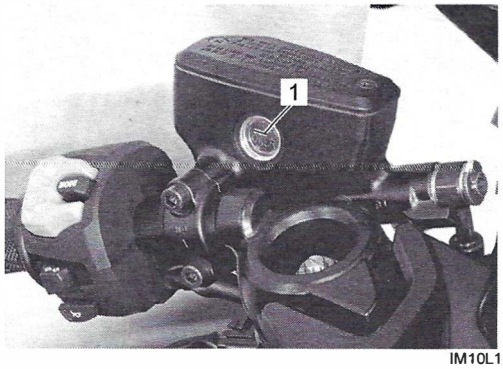
Clutch Fluid

BENM10L30206015

Inspection

1) Keep the motorcycle upright and place the handlebar straight.
2) Check the clutch fluid level by observing the lower limit line (1). When the clutch fluid level is below the lower limit line, replenish with clutch fluid that meets the following specification.

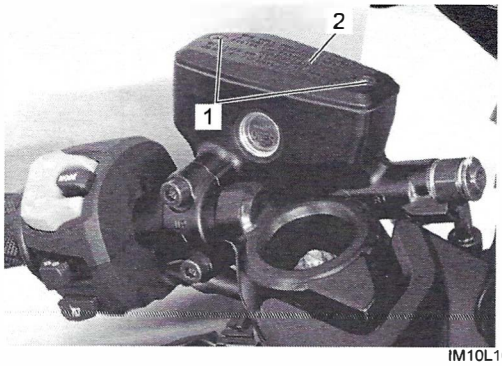
Brake fluid (DOT 4)



IM10L1020042-01

Replacement

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Place the motorcycle on a level surface and keep the handlebar straight.
3) Remove the clutch fluid reservoir cap screws (1), clutch fluid reservoir cap (2) and diaphragm from the clutch master cylinder.



IM10L1020043-01

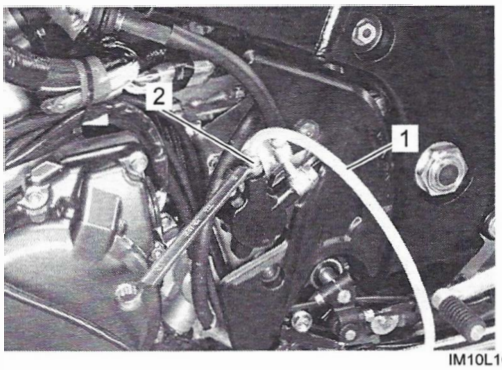
4) Suck up the old clutch fluid as much as possible.


IM10L1020044-01

5) Fill the reservoir with new clutch fluid.

Brake fluid (DOT 4)

6) Attach a clear hose (1) to the air bleeder valve (2) and insert the free end of the hose into a receptacle.

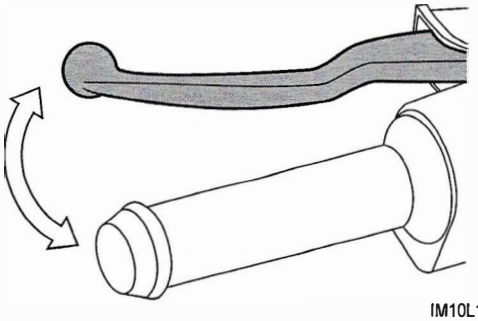


IM10L1020045-01

7) Loosen the air bleeder valve, squeeze and release the clutch lever and drain the old clutch fluid out of the clutch system.

NOTE

While bleeding the clutch system, replenish the reservoir with the clutch fluid as necessary to keep the fluid above the lower level.


IM10L1020046-01

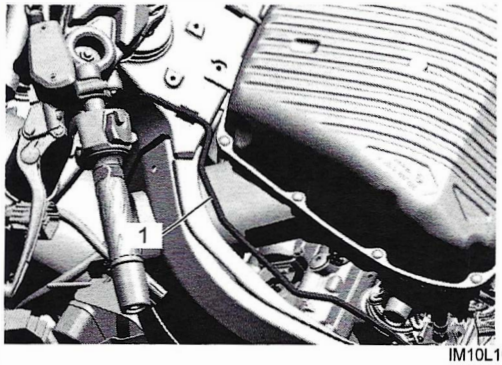
8) Bleed the air from the clutch system. ☞(Page 5C-6)

Clutch Hose

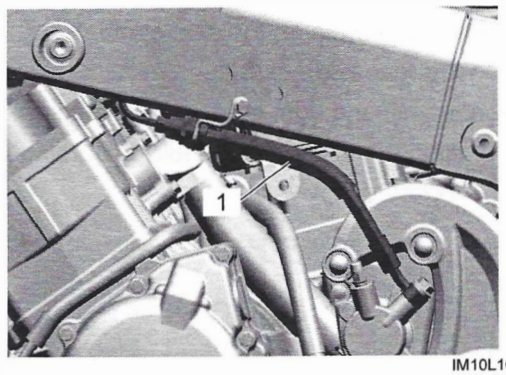
BENM10L30206016

Inspection

1) Remove the fuel tank. ☞(Page 1G-12)
2) Inspect the clutch hose (1) for clacks, damage and clutch fluid leakage. If defects are found, replace clutch hose with a new one.



IM10L1020040-01



IM10L1020041-01

Replacement

1) Remove the fuel tank. ☞(Page 1G-12)
2) Drain the clutch fluid. Refer to "Replacement" under "Clutch Fluid" (Page 0B-17).
3) Remove the clutch hose as shown in the clutch hose routing diagram. Refer to "Clutch Hose Routing Diagram" in Section 5C (Page 5C-3).
4) Install the new clutch hose and clamps. Refer to "Clutch Hose Routing Diagram" in Section 5C (Page 5C-3).
5) Bleed air from the clutch system. ☞(Page 5C-6)

Drive Chain

BENM10L30206017

Inspection

Drive chain

1) With the transmission in neutral, support the motorcycle with 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. ☞(Page 3A-8)

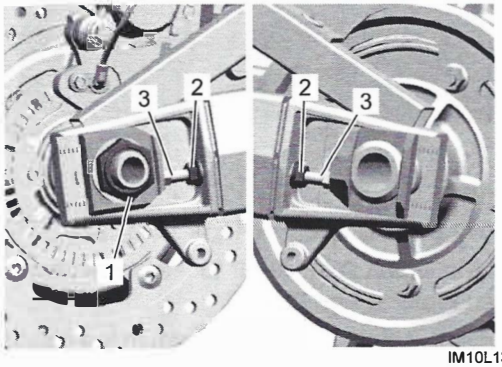
NOTE

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

- Loose pins
- Damaged rollers
- Dry or rusted links
- Kinked or binding links
- Excessive wear
- Improper chain adjustment
- Missing seal rings

Drive chain Length

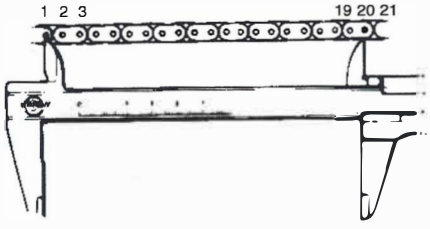
1) Place the motorcycle on the side-stand.
2) Loosen the rear axle nut (1).
3) Loosen the left and right chain adjuster lock-nuts (2).
4) Give tension to the drive chain fully by turning both chain adjuster bolts (3).



IM10L1310002-02

5) 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. ☞(Page 3A-8)

Drive chain 20-pitch length
[Limit]: 319.4 mm (12.57 in)



I649G1020034-02

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

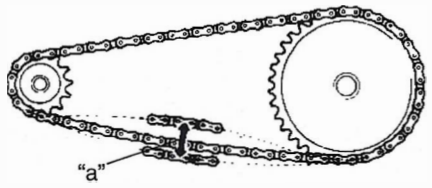
Drive chain slack

Inspect the drive chain slack "a" at the middle of the chain between the engine and rear sprockets. Adjust the drive chain slack if necessary.

NOTICE

If you ride the motorcycle while the chain slack is outside the range of the specified values, damage to the parts around the chain may results.

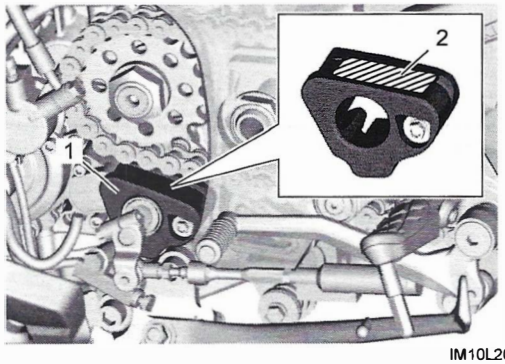
Drive chain slack
On side-stand
Standard: 20 – 30 mm (0.79 – 1.18 in)



I649G1020036-02

Gear shift cover protector

Check the gear shift cover protector (1) for wear or damage. If contacting surface (2) is worn or damaged, replace the gear shift cover protector with a new one. ☞(Page 3A-5)



IM10L2020021-01

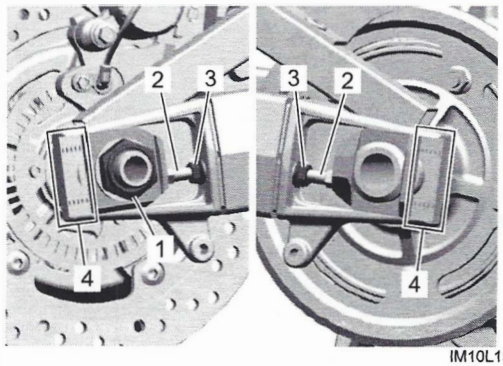
Adjustment

1) Place the motorcycle on the side-stand.
2) Loosen the rear axle nut (1).
3) Loosen the left and right chain adjuster lock-nuts (2).
4) Loosen or tighten both chain adjuster bolts (3) until there is a slack "a" at the middle of the chain between the engine and rear sprockets.

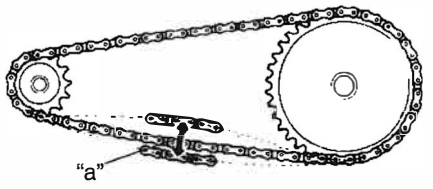
NOTICE

The reference marks (4) 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
On side-stand
[Standard]: 20 – 30 mm (0.79 – 1.18 in)



IM10L1310003-01



I649G1020036-02

5) After adjusting the drive chain, tighten the rear axle nut to the specified torque.

Tightening torque
Rear axle nut: 100 N·m (10.2 kgf-m, 74.0 lbf-ft)

6) Recheck the drive chain slack after tightening the axle nut.

7) Tighten both chain adjuster lock-nuts to the specified torque.

Tightening torque
Chain adjuster lock-nut: 22 N·m (2.2 kgf-m, 16.5 lbf-ft)

Cleaning and Lubrication

1) Place the motorcycle on the side-stand.

2) Remove dirt and dust from the drive chain (1). Be careful not to damage the seal ring.

3) Clean the drive chain (1) with a sealed drive chain cleaner, or water and neutral detergent.

NOTICE

Cleaning the drive chain improperly can damage seal rings and ruin the drive chain.

- **Do not use a volatile solvent such as paint thinner, kerosene and gasoline.**
- **Do not use high pressure cleaner to clean the drive chain.**
- **Do not use wire brush to clean the drive chain.**

4) Use a soft brush to clean the drive chain (1). Be careful not to damage the seal ring even through using a soft brush.

5) Wipe off water and neutral detergent.

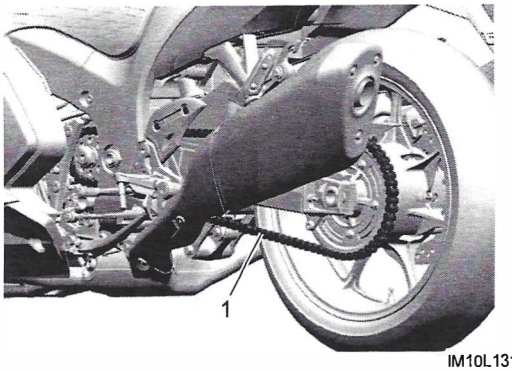
6) Lubricate with a motorcycle sealed drive chain lubricant or high viscosity oil.

NOTICE

Some drive chain lubricant contains solvents and additives which could damage the seal rings in the drive chain.
Use sealed drive chain lubricant which is specifically intended for use with sealed drive chains.

7) Lubricate both front and back plates of the drive chain (1).

8) Wipe off excess lubricant after lubricating all around of the drive chain (1).



IM10L1310004-01

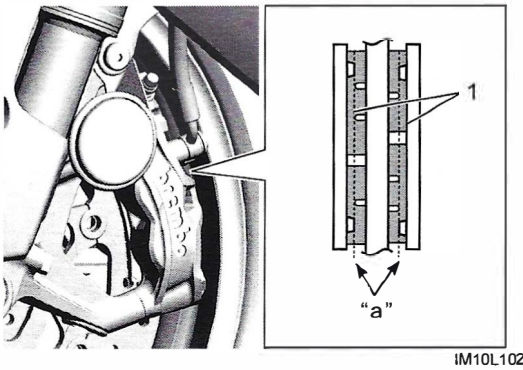
Brakes

BENM10L30206018

Brake Pad

Front Brake Pad Inspection

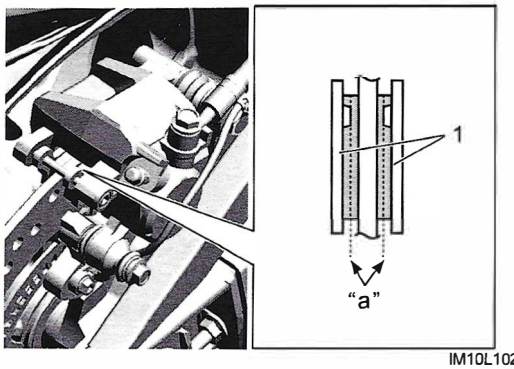
The extent of brake pads (1) wear can be checked by observing the grooved limit line "a" on the pads. When the wear exceeds the grooved limit line, replace the pads with new ones. ☞(Page 4B-2)



IM10L1020047-03

Rear Brake Pad Inspection

The extent of brake pads (1) 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.

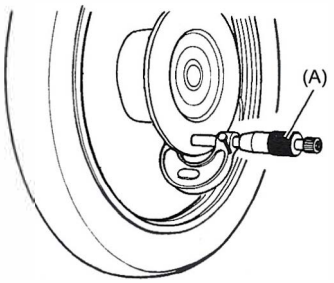


IM10L1020048-02

Brake Disc
Front Brake Disc Inspection
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.

Front brake disc thickness
[Limit]: 5.0 mm (0.197 in)

Special tool
(A): 09912–66310



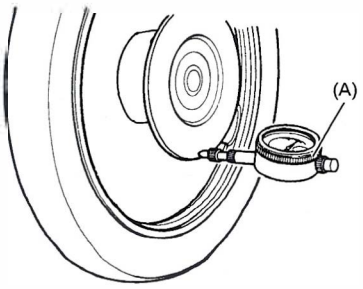
ID26J1420029-01

Brake Disc Runout

1) Dismount the front brake pads. Refer to "Front Brake Pad Replacement" in Section 4B (Page 4B-2).
2) Measure the runout using the dial gauge. Replace the disc if the runout exceeds the service limit.

Front brake disc runout
[Limit]: 0.30 mm (0.012 in)

Special tool
(A): 09900–20607
09900–20701



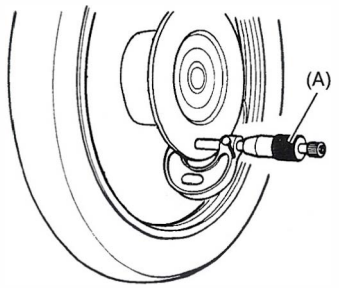
ID26J1420030-04

3) Remount the front brake pads. Refer to "Front Brake Pad Replacement" in Section 4B (Page 4B-2).

Rear Brake Disc Inspection
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.

Rear brake disc thickness
[Limit]: 5.0 mm (0.197 in)

Special tool
(A): 09912–66310



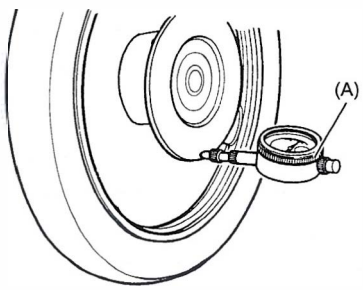
ID26J1420029-01

Brake Disc Runout

1) Dismount the rear brake pads. Refer to "Rear Brake Pad Inspection" in Section 4C (Page 4C-2).
2) Measure the runout using the dial gauge. Replace the disc if the runout exceeds the service limit.

Rear brake disc runout
[Limit]: 0.30 mm (0.012 in)

Special tool
(A): 09900–20607
(A): 09900–20701

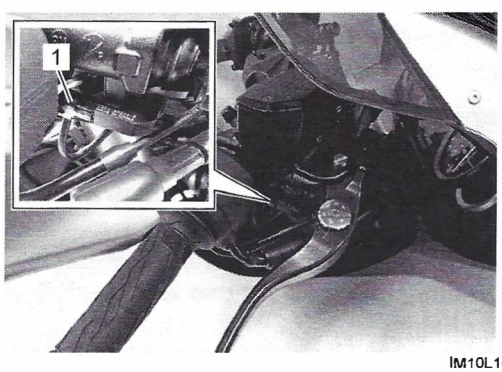


ID26J1420030-04

3) Remount the rear brake pads. Refer to "Rear Brake Pad Replacement" in Section 4C (Page 4C-2).

Brake Light Switch
Front Brake Light Switch Inspection

1) Disconnect the front brake light switch coupler (1) from the front brake light switch.



IM10L1020049-02

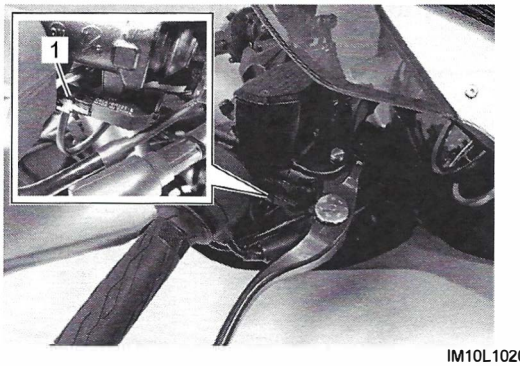
2) Inspect the front brake light switch for continuity with a circuit tester. If any abnormality is found, replace the switch with a new one. Refer to "Front Brake

Master Cylinder Assembly / Brake Lever Disassembly and Reassembly" in Section 4A (Page 4A-16).

Terminal / Position	T1	T2
Free		
Grasped	○	○

IM10L1020050-01

3) Connect the front brake light switch coupler (1) to the front brake light switch.



IM10L1020049-02

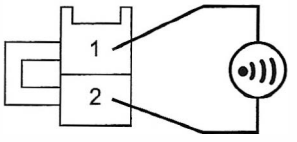
Rear Brake Light Switch Inspection

1) Lift up the fuel tank. ☞(Page 1G-12)
2) Disconnect the rear brake light switch coupler (1).



IM10L1020051-02

3) Inspect the rear brake light switch for continuity with a tester. If any abnormality is found, replace the switch with a new one. Refer to "Rear Brake Light Switch Removal and Installation" in Section 4A (Page 4A-9).



IM10L1020052-01

Terminal / Position	T1	T2
Free		
Depressed	○	○

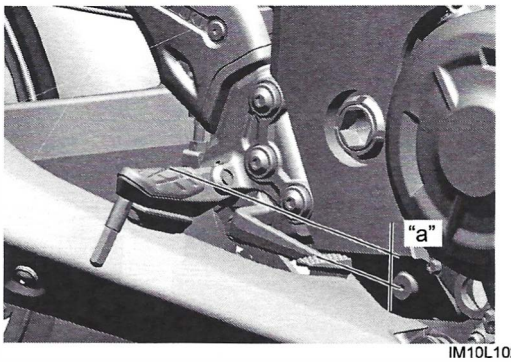
IM10L1020053-01

4) Connect the rear brake light switch coupler.
5) Install the removed parts.

Brake Pedal Height

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

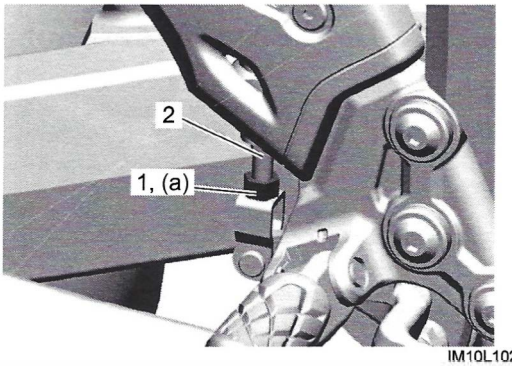
Brake pedal height
[Standard]: 50 – 60 mm (2.0 – 2.4 in)



IM10L1020054-01

2) Loosen the lock-nut (1).
3) Turn the push rod (2) in or out until the brake pedal height is within the specification.
4) Tighten the lock-nut (1) to the specified torque.

Tightening torque
Rear brake master cylinder rod lock-nut (a): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)



IM10L1020055-01

5) After finishing the brake pedal height inspection and adjustment, check the rear brake light switch. Refer to "Brake light switch" under "Brakes" (Page 0B-20).

Brake Fluid

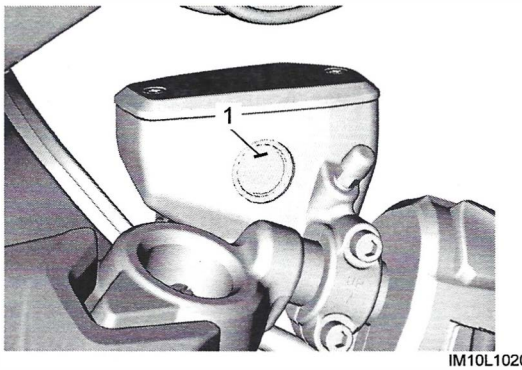
BENM10L30206019

Inspection

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

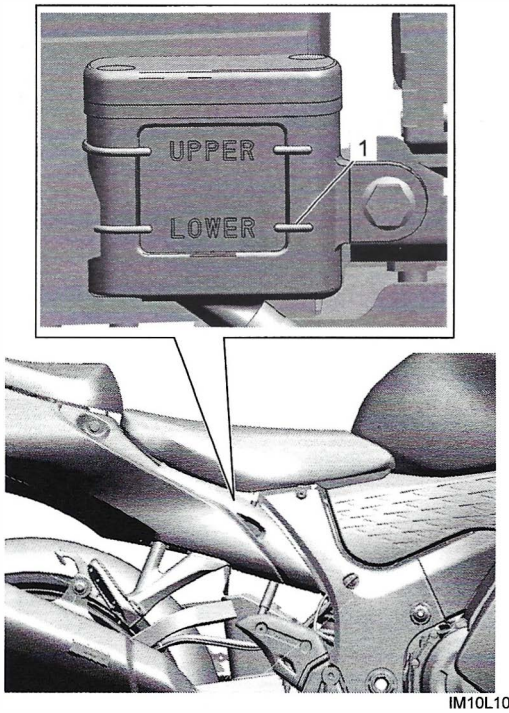
Brake fluid (DOT 4)

Front brake



IM10L1020062-01

Rear brake



IM10L1020063-02

Replacement
Front Brake

1) Place the motorcycle on a level surface and keep the handlebars straight.
2) Remove the reservoir cap and diaphragm.
3) Suck up the old brake fluid as much as possible.



IM10L1020064-01

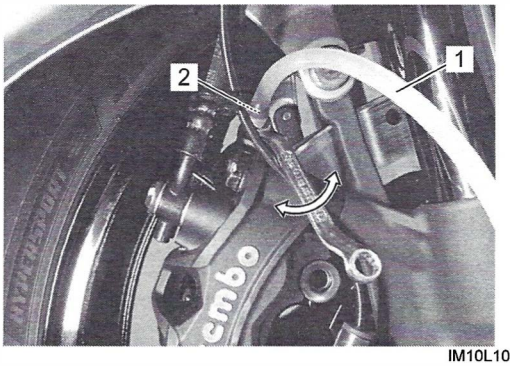
4) Fill the reservoir with new brake fluid.

Brake fluid (DOT 4)

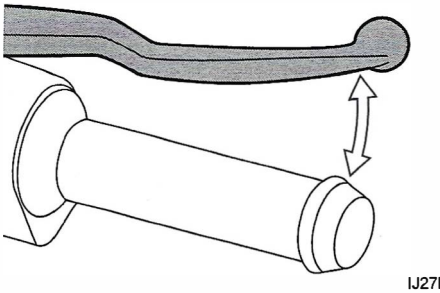
5) Attach a clear hose (1) to the front brake caliper air bleeder valve (2) and insert the free end of the hose into a receptacle.
6) Loosen the front brake caliper air bleeder valve, squeeze and release the brake lever and drain the old brake fluid out of the brake system.

NOTE

While replacing the brake system, replenish the reservoir with the brake fluid as necessary to keep the fluid above the lower level.



IM10L1020065-01

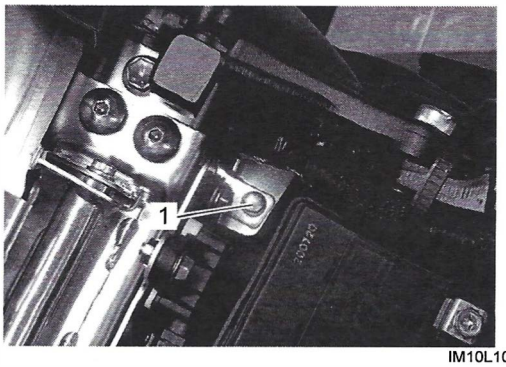


IJ27K1410061-01

7) Bleed the air from the front brake system. ☞(Page 4A-11)

Rear Brake

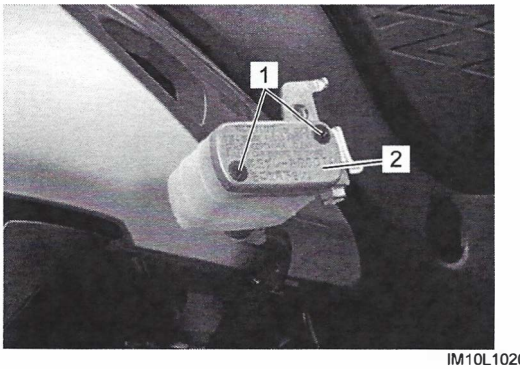
1) Place the motorcycle on a level surface.
2) Remove the front seat. ☞(Page 9D-34)
3) Remove the reservoir tank bracket bolt (1).



IM10L1020092-02

4) Move the reservoir tank with reservoir tank bracket to outside of the frame.

5) Remove the reservoir cap screws (1), reservoir cap (2) and diaphragm from the rear brake master cylinder reservoir.



IM10L1020067-02

6) Suck up the old brake fluid as much as possible.



IM10L1020068-02

7) Fill the reservoir with new brake fluid.

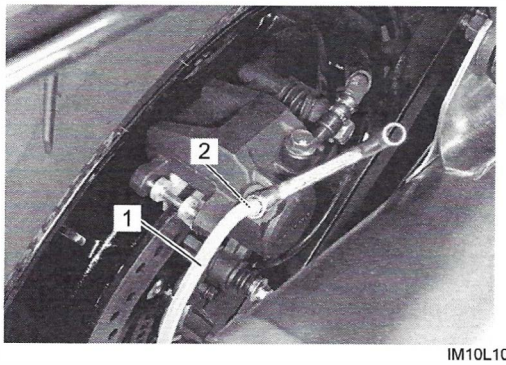
Brake fluid (DOT 4)

8) Attach a clear hose (1) to the rear brake caliper air bleeder valve (2) and insert the free end of the hose into a receptacle.

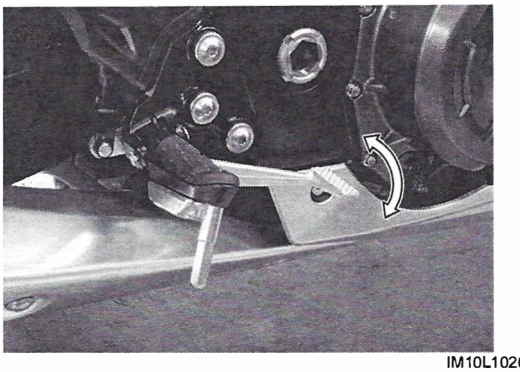
9) Loosen the rear brake caliper air bleeder valve (1) and pump the brake pedal until the old brake fluid flows out of the brake system.

NOTE

While replacing the brake system, replenish the reservoir with the brake fluid as necessary to keep the fluid above the lower level.



IM10L1020069-01



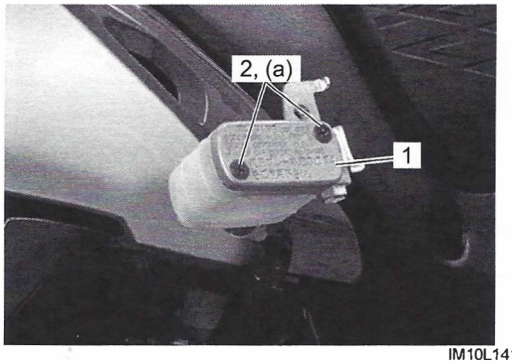
IM10L1020070-01

10) Bleed the air from the rear brake system. ☞(Page 4A-11)

11) Install the diaphragm and reservoir cap (1).

12) Tighten the reservoir cap screws (2) to the specified torque.

Tightening torque
Rear master cylinder reservoir cap screw (a): 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)

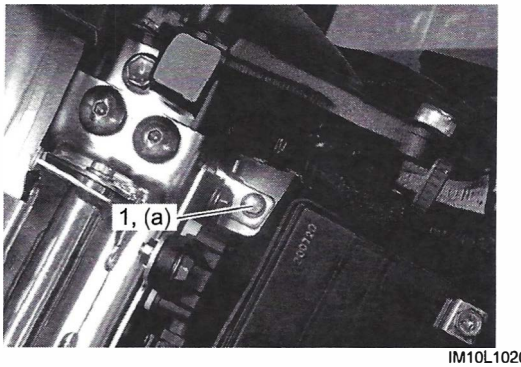


IM10L1410024-03

13) Install the reservoir tank inside of the frame.

14) Tighten the reservoir tank bracket bolt (1) to the specified torque.

Tightening torque
Rear brake master cylinder reservoir tank bracket bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



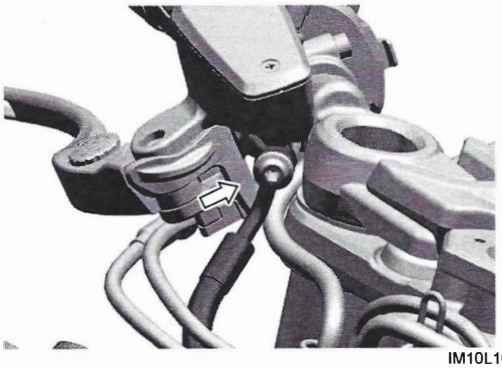
IM10L1020093-01

Brake Hose

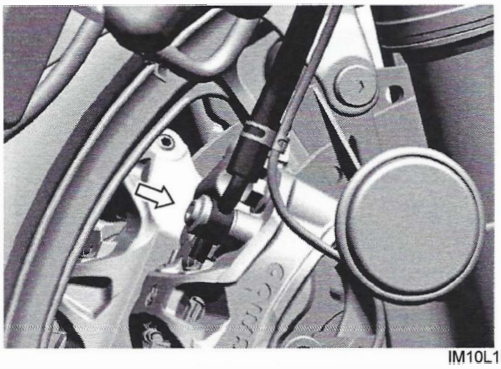
BENM10L30206020

Inspection

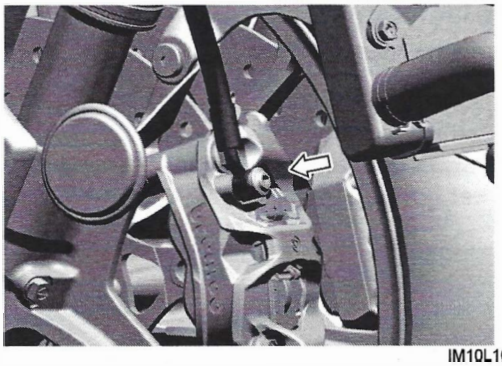
1) Remove the fuel tank. ☞(Page 1G-12)
2) Inspect the brake hoses and hose joints for crack, damage or brake fluid leakage. If any defects are found, replace the brake hose with a new one. Refer to "Replacement" (Page 0B-25).



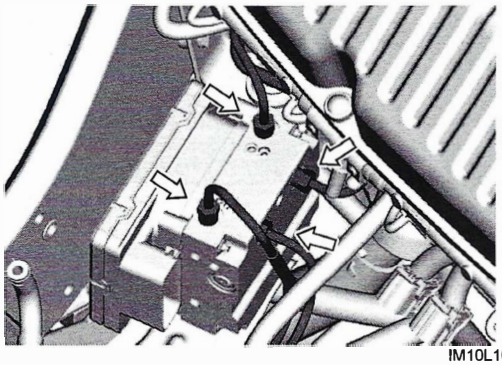
IM10L1020056-01



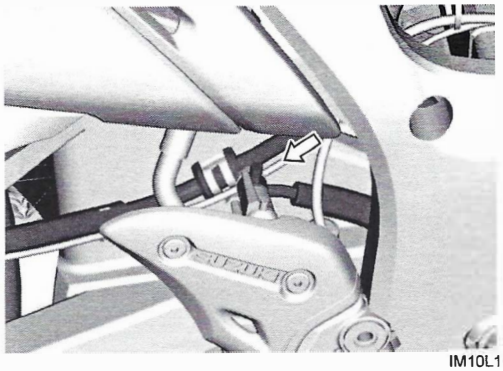
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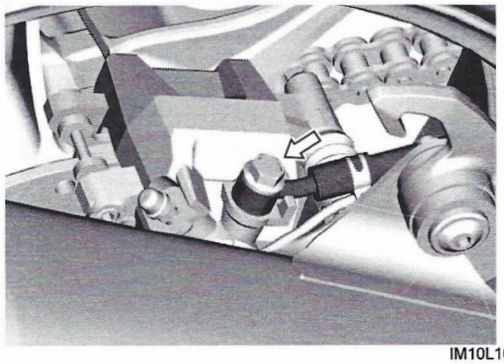
IM10L1020058-01



IM10L1020059-01



IM10L1020060-01



IM10L1020061-01

Replacement

Front Brake Hose

Refer to "Front Brake Hose Routing Diagram" in Section 4A (Page 4A-2).

1) Drain the brake fluid. ☞(Page 0B-22)
2) Remove the fuel tank. ☞(Page 1G-12)
3) Remove the front brake hoses.
4) Install the new front brake hose.
5) Install the fuel tank. ☞(Page 1G-12)
6) Bleed air from the front brake system. ☞(Page 0B-22)

Rear Brake Hose

1) Drain the brake fluid. ☞(Page 0B-22)
2) Remove the fuel tank. ☞(Page 1G-12)
3) Remove the rear brake hose.
4) Install the new brake hose.
5) Install the fuel tank. ☞(Page 1G-12)
6) Bleed air from the front brake system.

Front Brake Hose Removal and Installation

BENM10L30206021

Refer to "Replacement" under the "Brake Hose" (Page 0B-25).

Rear Brake Hose Removal and Installation

BENM10L30206022

Refer to "Replacement" under the "Brake Hose" (Page 0B-25).

Tires

BENM10L30206023

Wipe the tire clean and check for the following points:

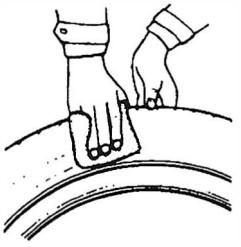
- Nick and rupture on side wall
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner

Tire size

Front [Standard]: 120/70ZR17M/C (58W), tubeless
Rear [Standard]: 190/50ZR17M/C (73W), tubeless

Tire type

Front [Standard]: BRIDGESTONE / S22F L
Rear [Standard]: BRIDGESTONE / S22R L



I649G1240042-02

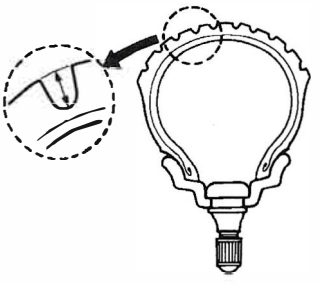
Tire tread condition

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.

Tire tread depth

Recommend depth
Front [Limit]: 1.6 mm (0.06 in)
Rear [Limit]: 2.0 mm (0.08 in)

Special tool
09900–20805



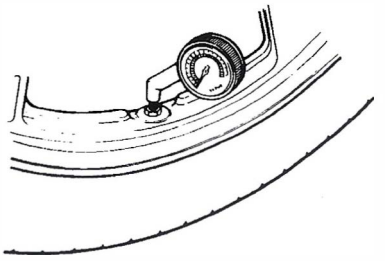
I310G1020068-02

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

	Front [Standard]	Rear [Standard]
Solo riding	290 kPa (2.90 kgf/cm^2, 42 psi)	290 kPa (2.90 kgf/cm^2, 42 psi)
Dual riding	290 kPa (2.90 kgf/cm^2, 42 psi)	290 kPa (2.90 kgf/cm^2, 42 psi)



I310G1020069-02

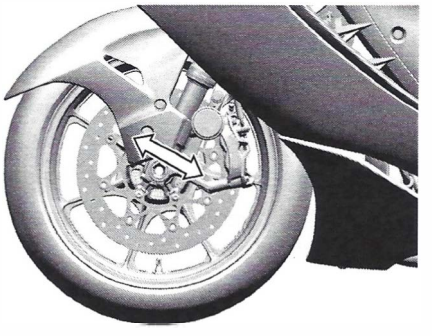
Steering

BENM10L30206024

Inspection

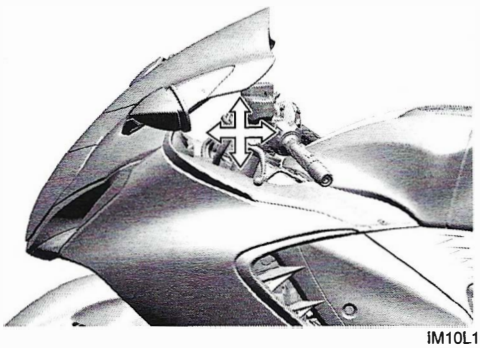
Steering should be adjusted properly for smooth turning of handlebars and safe running. Overtighten steering prevents smooth turning of the handlebars and too loose steering will cause poor stability.

1) Check that there is no play in the steering stem.
   a) Support the motorcycle with its front wheel off the ground, grasp the bottoms of the front forks and move the forks back-and-forth to check there is no play in the stem bearings.



IM10L1020080-01

   b) With the front wheel on the ground and applying the front brake(s), move the handlebar backand-forth and up-and-down to check there is no play in the stem bearings.



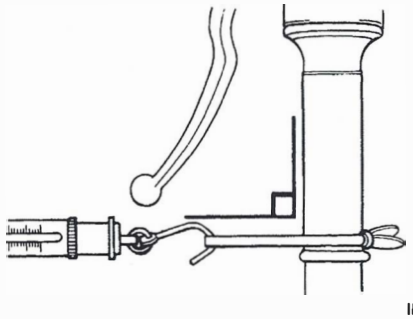
IM10L1020094-01

2) If play is found, adjust the steering tension.

Adjustment

1) By supporting the motorcycle with a jack, lift the front wheel until it is off the floor 20 – 30 mm (0.8 – 1.2 in).
2) Remove the steering damper. ☞(Page 6B-11)
3) Check to make sure that the cables and wire harnesses are properly routed.
4) With the front wheel in the straight ahead state, hitch the spring scale on one handlebar grip end as shown in the figure and read the graduation when the handlebar start moving.

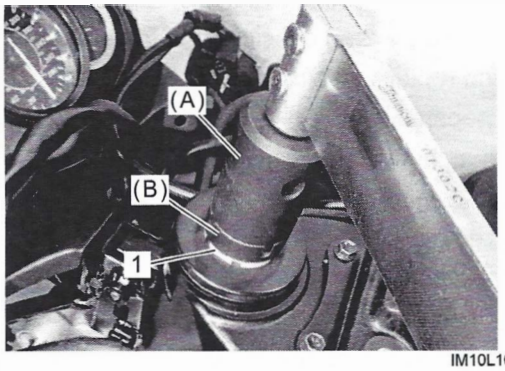
Steering tension initial force
[Standard]: 2 – 5 N (0.21 – 0.50 kgf, 0.45 – 1.12 lbf)



IF04K1620033-01

5) Do the same on the other grip end.
6) If the initial force reading on the scale when the handlebar starts turning is either too heavy or too light, adjust the tension until it satisfies the specification as follows.
   a) Remove the body cowling. ☞(Page 9D-43)
   b) Remove the handlebars and steering upper bracket. ☞(Page 6B-3)
   c) Remove the steering stem lock-nut, and then adjust the steering stem adjust-nut (1) by loosening or tightening it.

   Special tool
   (A): 09940–14911
   (B): 09940–14960



IM10L1020095-01

   d) Tighten the steering stem lock-nut to the specified torque and install the removed parts. ☞(Page 6B-3)

   Tightening torque
   Steering stem lock-nut: 80 N·m (8.2 kgf-m, 59.0 lbf-ft)
   Steering stem top nut: 90 N·m (9.2 kgf-m, 66.5 lbf-ft)

   e) Make sure that the initial force is within the specified range and the steering is not loose.

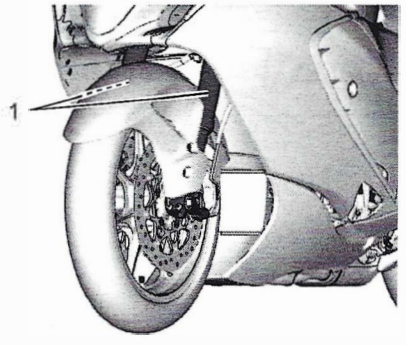


IM10L1020081-01

Front Forks

BENM10L30206025

Inspect the front forks for oil leakage, scoring or scratches on the outer surface of the inner tubes (1). Replace any defective parts, if necessary. ☞(Page 2B-5)



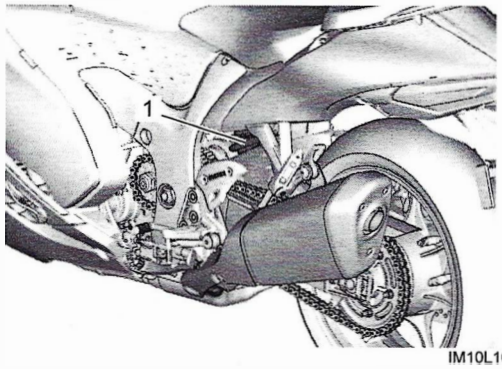
IM10L1020082-01

Rear Suspension

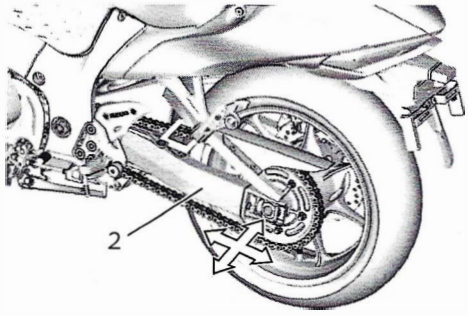
BENM10L30206026

Inspect the rear shock absorber (1) for oil leakage and check that there is no play in the swingarm (2).
Replace any defective parts, if necessary.

- Rear shock absorber replace: ☞(Page 2C-4)
- Swingarm pivot shaft and bearing inspection: ☞(Page 2C-11)
- Cushion lever inspection: ☞(Page 2C-6)
- Cushion rod inspection: ☞(Page 2C-8)
- Swingarm inspection: ☞(Page 2C-11)



IM10L1020083-01

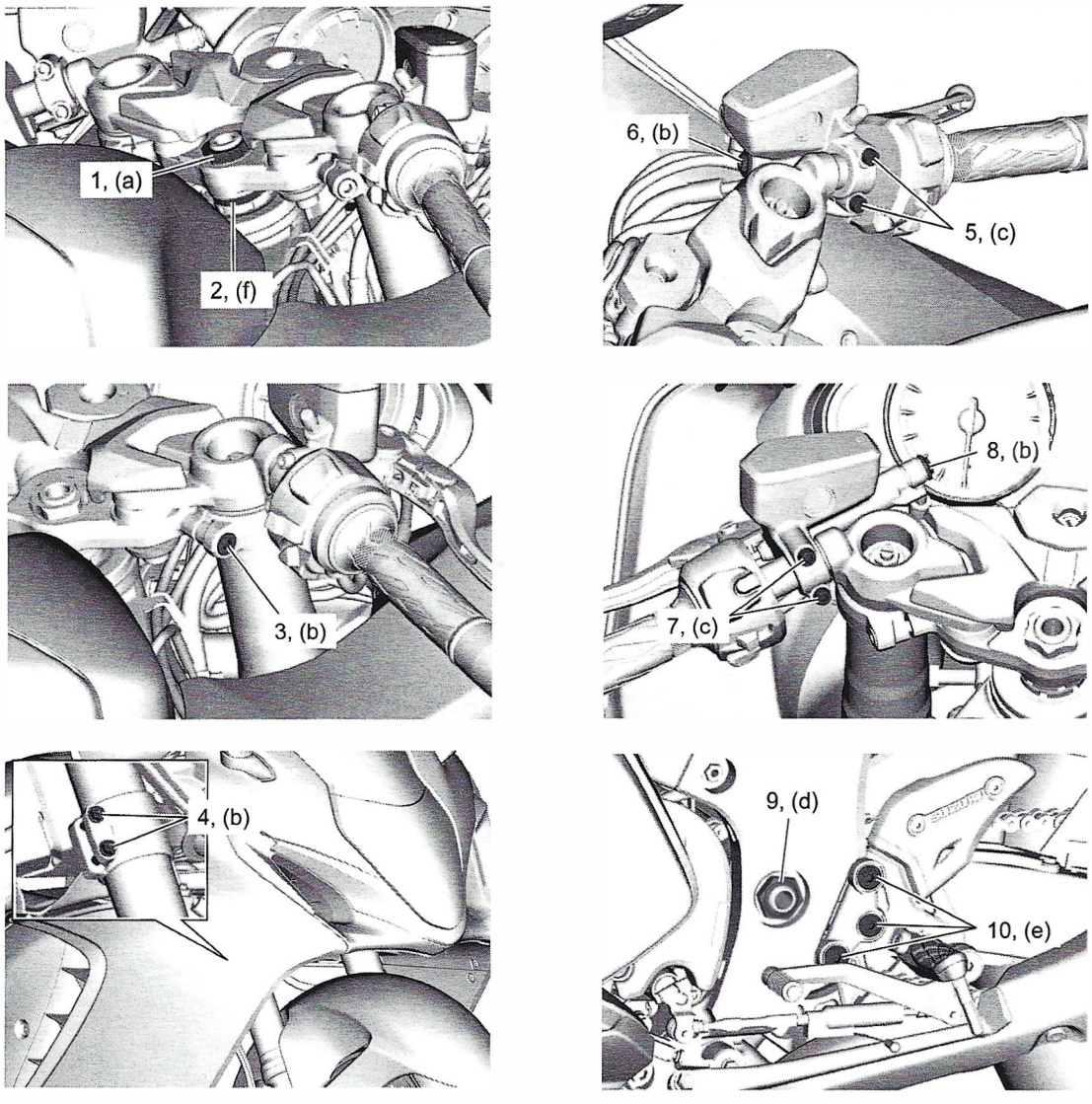


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Chassis Bolts and Nuts

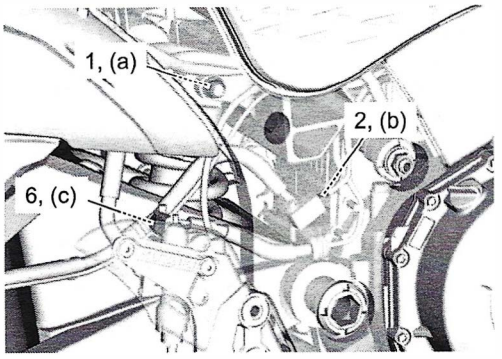
BENM10L30206027

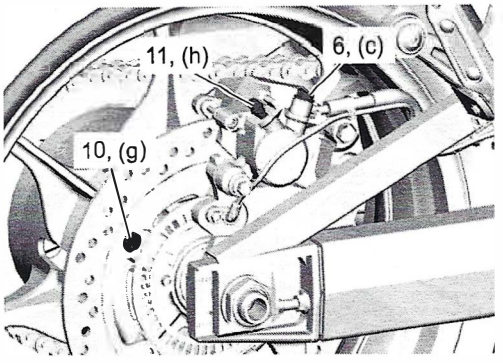
Check that all chassis bolts and nuts are tightened to their specified torque.

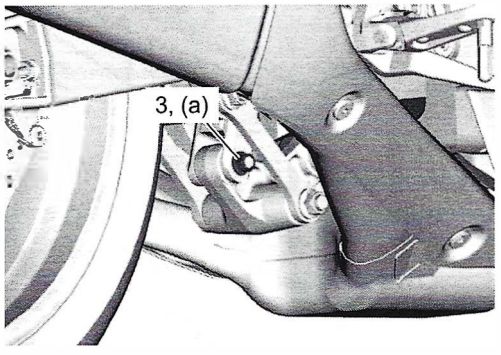


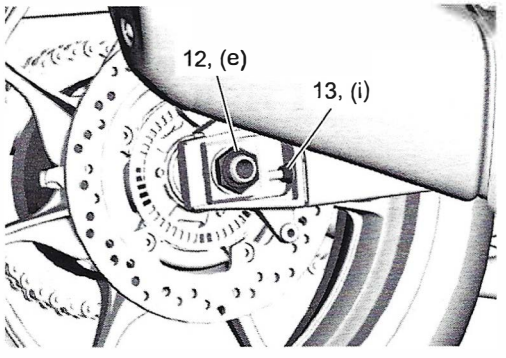
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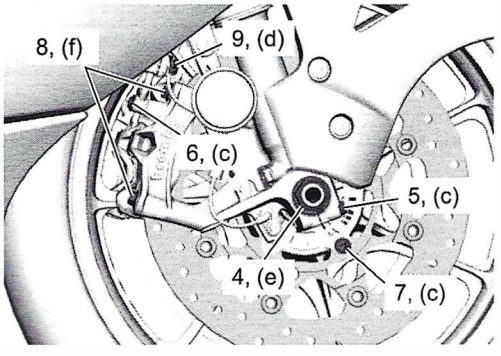
1. Steering stem top nut	5. Front brake master cylinder mounting bolt	9. Swingarm pivot nut	(c): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
2. Steering stem lock-nut	6. Brake hose union bolt	10. Front footrest bracket bolt	(d): 100 N·m (10.2 kgf-m, 74.0 lbf-ft)
3. Front fork upper clamp bolt	7. Clutch master cylinder mounting bolt	(a): 90 N·m (9.2 kgf-m, 66.5 lbf-ft)	(e): 26 N·m (2.7 kgf-m, 19.5 lbf-ft)
4. Front fork lower clamp bolt	8. Clutch hose union bolt	(b): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)	(f): 80 N·m (8.2 kgf-m, 59.0 lbf-ft)

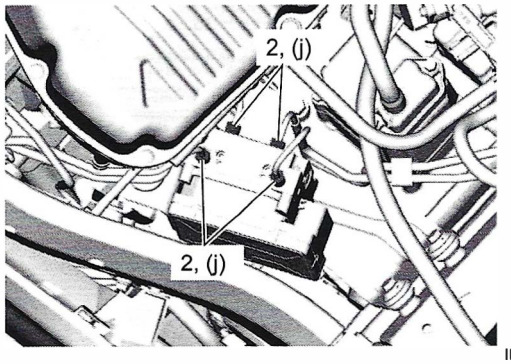






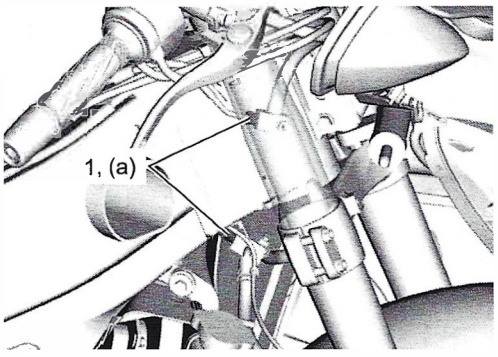


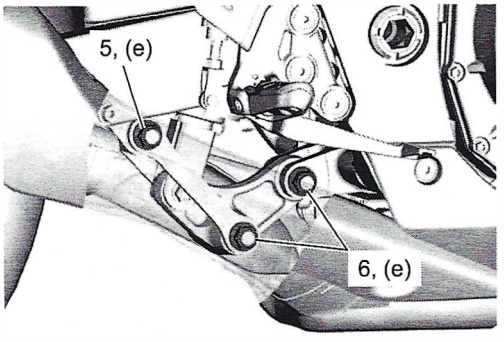


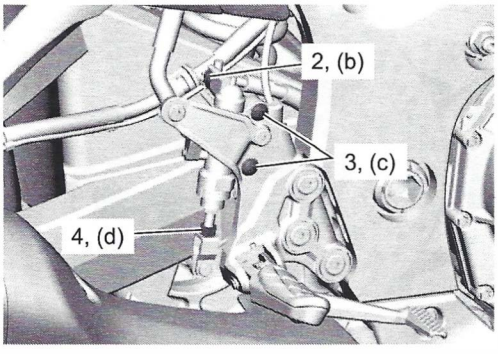


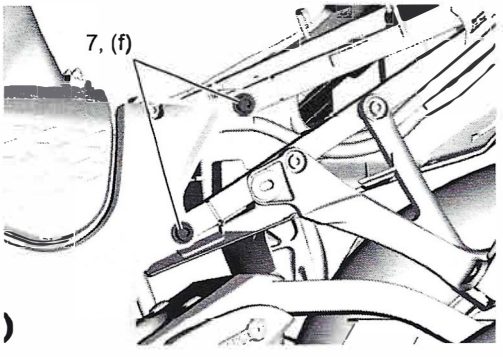
IM10L1020086-03

1. Rear shock absorber upper mounting nut	9. Front brake caliper air bleeder valve	(d): 8.5 N·m (0.87 kgf-m, 6.30 lbf-ft)
2. Brake pipe flare nut	10. Rear brake disc bolt	(e): 100 N·m (10.2 kgf-m, 74.0 lbf-ft)
3. Rear shock absorber lower mounting nut	11. Rear brake caliper air bleeder valve	(f): 39 N·m (4.0 kgf-m, 29.0 lbf-ft)
4. Front axle nut	12. Rear axle nut	(g): 35 N·m (3.6 kgf-m, 26.0 lbf-ft)
5. Front axle stopper bolt	13. Chain adjuster lock-nut	(h): 8.0 N·m (0.82 kgf-m, 5.90 lbf-ft)
6. Brake hose union bolt	(a): 50 N·m (5.1 kgf-m, 37.0 lbf-ft)	(i): 22 N·m (2.2 kgf-m, 16.5 lbf-ft)
7. Front brake disc bolt	(b): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)	(j): 16 N·m (1.6 kgf-m, 12.0 lbf-ft)
8. Front brake caliper mounting bolt	(c): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)	









IM10L1020087-01

1. Brake pipe flare nut	6. Cushion rod mounting nut	(d): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
2. Brake hose union bolt	7. Seat rail mounting bolt	(e): 78 N·m (8.0 kgf-m, 57.5 lbf-ft)
3. Rear brake master cylinder mounting bolt	(a): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)	(f): 50 N·m (5.1 kgf-m, 37.0 lbf-ft)
4. Rear brake master cylinder rod lock-nut	(b): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)	
5. Cushion lever mounting bolt	(c): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)	

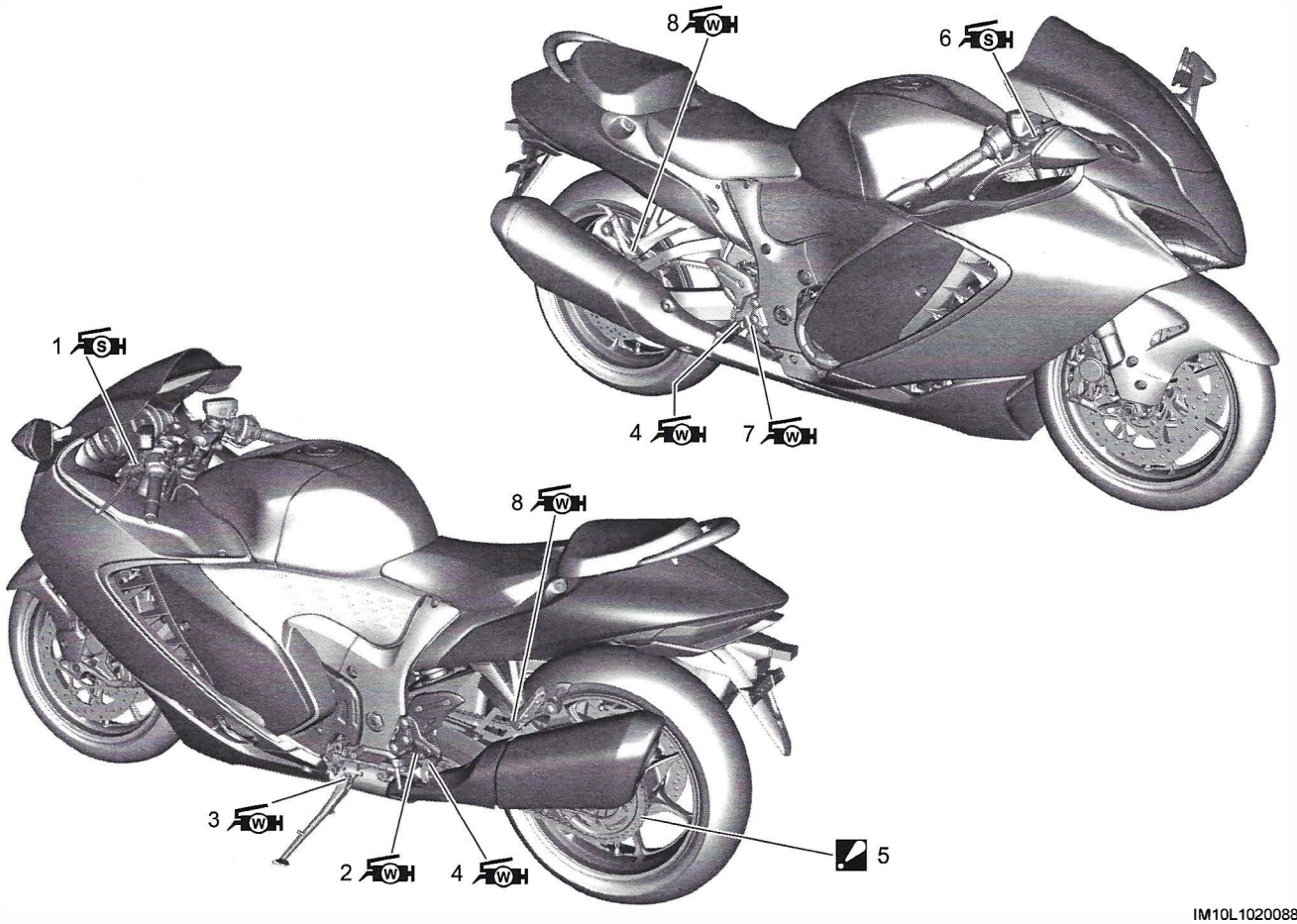
Lubrication

BENM10L30206028

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.**



IM10L1020088-07

1. Clutch lever holder	5. Drive chain : Lubricate with a motorcycle sealed drive chain lubricant or high viscosity oil.	: Apply grease.
2. Gearshift lever pivot	6. Brake lever holder	: Apply silicone grease.
3. Side-stand pivot and spring hook	7. Brake pedal pivot	
4. Footrest pivot	8. Pillion footrest	

Specifications

Tightening Torque Specifications

BENM10L30207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Air cleaner element screw	1.2	0.12	0.90	☞(Page 0B-3)
Exhaust pipe bolt	23	2.3	17.0	☞(Page 0B-3)
Exhaust pipe support bolt	23	2.3	17.0	☞(Page 0B-3)
Muffler connector bolt	18	1.8	13.5	☞(Page 0B-3)
Muffler support bolt	30	3.1	22.5	☞(Page 0B-3)
Spark plug	11	1.1	8.5	☞(Page 0B-8)
Oil drain plug	23	2.3	17.0	☞(Page 0B-11)
Oil filter	20	2.0	15.0	☞(Page 0B-12)
Thermostat cover air bolt	6.0	0.61	4.45	☞(Page 0B-16)
Rear axle nut	100	10.2	74.0	☞(Page 0B-20)
Chain adjuster lock-nut	22	2.2	16.5	☞(Page 0B-20)
Rear brake master cylinder rod lock-nut	18	1.8	13.5	☞(Page 0B-22)
Rear master cylinder reservoir cap screw	1.5	0.15	1.10	☞(Page 0B-24)
Rear brake master cylinder reservoir tank bracket bolt	10	1.0	7.5	☞(Page 0B-24)
Steering stem lock-nut	80	8.2	59.0	☞(Page 0B-27)
Steering stem top nut	90	9.2	66.5	☞(Page 0B-27)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Fasteners Information" in Section 0C (Page 0C-6)

Special Tools and Equipment

Recommended Service Material

BENM10L30208001

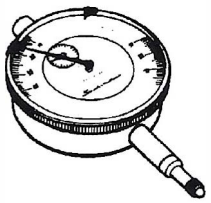
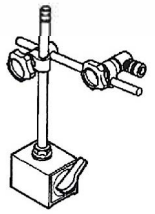
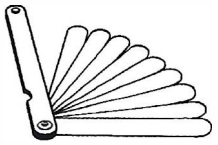
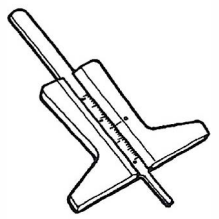
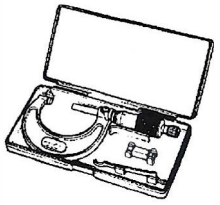
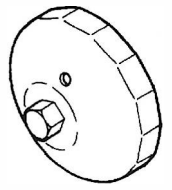
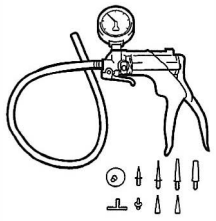
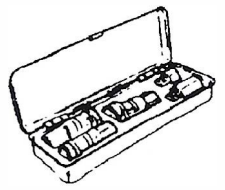
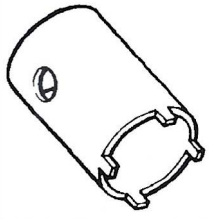
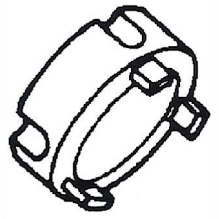
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 0B-17) / ☞(Page 0B-17) / ☞(Page 0B-22) / ☞(Page 0B-23) / ☞(Page 0B-24)

NOTE

Required service material(s) is also described in:
"Lubrication" (Page 0B-32)

Special Tool

BENM10L30208002

09900–20607 Dial gauge (10 x 0.01 mm) ☞(Page 0B-21) / ☞(Page 0B-21)		09900–20701 Dial gauge chuck ☞(Page 0B-21) / ☞(Page 0B-21)	
09900–20803 Thickness gauge ☞(Page 0B-5)		09900–20805 Tire depth gauge ☞(Page 0B-26)	
09912–66310 Micrometer (0 - 25 mm) ☞(Page 0B-21) / ☞(Page 0B-21)		09915–40620 Oil filter wrench ☞(Page 0B-12) / ☞(Page 0B-12)	
09917–47020 Vacuum pump gauge set ☞(Page 0B-10) / ☞(Page 0B-10)		09930–10121 Spark plug socket set ☞(Page 0B-7) / ☞(Page 0B-8)	
09940–14911 Steering stem nut socket ☞(Page 0B-27)		09940–14960 Steering stem nut socket wrench ☞(Page 0B-27)	

Service Data

Precautions

Precautions for Service Data

BENM10L30300001

NOTE

Specifications and service data are subject to change without notice.

Specifications

Specifications

BENM10L30307001

Dimensions and curb mass

Item	Specification	Remark
Overall length	2180mm (85.8 in)	—
Overall width	735mm (28.9 in)	—
Overall height	1165mm (45.9 in)	—
	1205 mm (47.4 in)	With option
Wheelbase	1480mm (58.3 in)	—
Ground clearance	125 mm (4.9 in)	—
Seat height	800 mm (31.5 in)	—
Curb mass	264 kg (582 lbs)	—

Engine

Item	Specification	Remark
Type	4-stroke, liquid-cooled	—
Number of cylinders	4	—
Bore	81.0 mm (3.189 in)	—
Stroke	65.0 mm (2.559 in)	—
Displacement	1340 cm^3 (81.8 cu. in)	—
Compression ratio	12.5 : 1	—
Fuel system	Fuel injection system	—
Air cleaner	Paper element	—
Starter system	Electric	—
Idle speed	1050 – 1250 r/min	—

Drive train

Item		Specification	Remark
Clutch		Wet multi-plate	—
Transmission		6-speed constant mesh	—
Gearshift pattern		1-down, 5-up	—
Primary reduction ratio		1.596 (83/52)	—
Gear ratios	Low	2.615 (34/13)	—
	2nd	1.937(31/16)	—
	3rd	1.526 (29/19)	—
	4th	1.285 (27/21)	—
	5th	1.136 (25/22)	—
	Top	1.043 (24/23)	—
Final reduction ratio		2.388 (43/18)	—
Drive chain		RKGB50GSVZ5, 114 links	—

Chassis

Item	Specification	Remark
Front suspension	Telescopic, coil spring, oil damped	—
Rear suspension	Link type, coil spring, oil damped	—
Front fork stroke	120mm (4.7 in)	—

Item	Specification	Remark
Rear wheel travel	140mm (5.5 in)	—
Steering angle	30° (right & left)	—
Caster	23° 00'	—
Trail	90mm (3.54 in)	—
Turning radius	3.3 m (10.8 ft)	—
Front brake	Disc brake, twin	—
Rear brake	Disc brake	—
Front tire	120/70ZR17M/C (58W), tubeless	—
Rear tire	190/50ZR17M/C (73W), tubeless	—

Electrical

Item	Specification	Remark
Ignition type	Electronic ignition (Transistorized)	—
Spark plug	DENSO: IU27D NGK: CR9EIA-9	—
Battery	12V 40.3 kC (11.2 Ah)/10 HR	—

Capacities

Item	Specification	Remark
Fuel tank	20.0 L (5.3 US gal, 4.4 Imp gal)	—

Service Data

BENM10L30307002

Emission Control Devices

Item	Specification	Standard	Limit / Note
PAIR control solenoid valve resistance	20 – 30 °C (68 – 86 °F)	20 – 24 Ω	

Engine Electrical Devices

Item	Specification	Standard	Limit / Note
Idle speed (When engine is warmed)		1050 – 1250 r/min	—
Fast idle speed		2100 – 2300 r/min	—
IAT sensor resistance	0 °C (32 °F)	5400 – 6600 Ω	—
	80 °C (176 °F)	290 – 390 Ω	—
ECT sensor resistance	–20 °C (–4 °F)	13840 – 16330 Ω	—
	20 °C (68 °F)	2320 – 2590 Ω	—
	80 °C (176 °F)	310 – 326 Ω	—
HO2 sensor heater resistance	23 °C (73.4 °F)	11.5 – 17.5 Ω	—
Throttle body I.D. No.		10L1	—
Throttle body bore size		43 mm (1.69 in)	—

Engine Mechanical

Item	Specification	Standard	Limit / Note
Compression pressure		1400 – 1900 kPa (14 – 19 kgf/cm², 203 – 276 psi)	Limit: 1000 kPa (10 kgf/cm², 145 psi)
Cam height	IN.	36.58 – 36.62 mm (1.440 – 1.442 in)	36.28 mm (1.429 in)
	EX.	36.83 – 36.87 mm (1.450 – 1.452 in)	36.53 mm (1.439 in)
Camshaft journal oil clearance	IN. & EX.	0.032 – 0.066 mm (0.0013 – 0.0026 in)	0.150 mm (0.0059 in)
Camshaft runout	IN. & EX.	—	0.10 mm (0.004 in)
Valve clearance (When engine is cold)	IN.	0.08 – 0.18 mm (0.0031 – 0.0070 in)	—
	EX.	0.18 – 0.28 mm (0.0070 – 0.0110 in)	—
Valve stem O.D.	IN.	4.975 – 4.990 mm (0.1959 – 0.1965 in)	—
	EX.	4.955 – 4.970 mm (0.1951 – 0.1957 in)	—
Valve seat width	IN.	0.9 – 1.1 mm (0.036 – 0.043 in)	—
	EX.	0.9 – 1.1 mm (0.036 – 0.043 in)	—
Valve guide I.D.	IN. & EX.	5.000 – 5.012 (0.1969 – 0.1973)	—
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0015)	—
	EX.	0.030 – 0.057 (0.0012 – 0.0022)	—
Valve spring free length	IN. & EX.	—	42.0 mm (1.653 in)

Item	Specification	Standard	Limit / Note
Cylinder head distortion		—	0.20 mm (0.0078 in)
Cylinder distortion		—	0.20 mm (0.0078 in)
Cylinder bore		81.000 – 81.015 mm (3.1890 – 3.1896 in)	No nicks or Scratches
Piston diameter		80.970 – 80.985 mm (3.1878 – 3.1884 in) Measure at 8.5 mm (0.33 in) from the skirt end.	80.850 mm (3.1831 in)
Piston ring to groove clearance	1st	—	0.180 mm (0.0070 in)
	2nd	—	0.150 mm (0.0059 in)
Piston ring end gap	1st	0.06 – 0.18 mm (0.002 – 0.007 in)	0.50 mm (0.019 in)
	2nd	0.06 – 0.18 mm (0.002 – 0.007 in)	0.50 mm (0.019 in)
Piston pin bore I.D.		18.002 – 18.008 mm (0.7087 – 0.7090 in)	18.030 mm (0.7098 in)
Piston pin O.D.		17.995 – 18.000 mm (0.7085 – 0.7087 in)	17.98 mm (0.7079 in)
Conrod big end side clearance		0.10 – 0.20 mm (0.004 – 0.008 in)	0.30 mm (0.011 in)
Conrod big end oil clearance		0.032 – 0.056 mm (0.0013 – 0.0022 in)	0.080 mm (0.0031 in)
Crankshaft journal O.D.		39.982 – 40.000 mm (1.5741 – 1.5748 in)	—
Crankshaft journal oil clearance		0.010 – 0.028 mm (0.0004 – 0.0011 in)	0.080 mm (0.0031 in)
Crankshaft runout		—	0.05 mm (0.002 in)

Engine Lubrication System

Item	Specification	Standard	Limit / Note
Oil pressure (at 60 °C, 140 °F)	3000 r/min	200 – 500 kPa (2.0 – 5.1 kgf/cm², 29.0 – 72.5 psi)	—
Necessary amount of engine oil	Oil change	3200 ml (3.4 US qt, 2.8 Imp qt)	—
	Oil and filter change	3400 ml (3.6 US qt, 3.0 Imp qt)	—
	Engine overhaul	4100 ml (4.3 US qt, 3.6 Imp qt)	—

Cooling System

Item	Specification	Standard	Limit / Note
Engine coolant	Reservoir tank side	Approx. 200 ml (0.21 US qt, 0.17 Imp qt)	—
	Engine side	Approx. 2700 ml (2.9 US qt, 2.4 Imp qt)	—
Radiator cap valve opening pressure		108.0 – 137.4 kPa (1.1 – 1.4 kgf/cm², 15.7 – 19.9 psi)	—
Cooling fan operating temperature	ON→OFF	Approx. 100 °C (212 °F)	—
	OFF→ON	Approx. 105 °C (221 °F)	—
Thermostat valve opening temperature		Approx. 82 °C (179.6 °F)	—
Thermostat valve lift		8 mm (0.3 in) or more at At 95 °C (203 °F)	—

Fuel System

Item	Specification	Standard	Limit / Note
Fuel pressure		289 – 299 kPa (2.95 – 3.04 kgf/cm², 42.0 – 43.3 psi)	—

Ignition System

Item	Specification	Standard	Limit / Note
Firing order		1•2•4•3	—
Spark plug	Type	DENSO: IU27D NGK: CR9EIA-9	—
	Gap	0.8 – 0.9 mm (0.031 – 0.035 in)	—

Charging System

Item	Specification	Standard	Limit / Note
Battery leakage current		3 mA or less	—
Regulated voltage (charging output)	5000 r/min	13.5 – 15.0 V	—
Generator coil resistance		0.2 – 0.7 Ω	—
Generator no-load voltage (When engine is cold)	5000 r/min	70 V (AC) or more	—
Generator maximum output	5000 r/min	Approx. 375 W	—
Battery	Type designation	FTZ14S	—
			—
	Capacity	12 V 40.3 kC (11.2 Ah)/10 HR	—
			—

Front Suspension

Item	Specification	Standard	Limit / Note
Front fork inner tube O.D.		43 mm (1.7 in)	—
Front fork oil level (Without spring, inner tube fully compressed)		88 mm (3.5 in)	—
Front fork spring free length		264 mm (10.4 in)	258 mm (10.2 in)
Front fork oil capacity (Each leg)		521 ml (17.62 US oz, 18.34 Imp oz)	—
Front fork spring adjuster		10 mm (0.39 in)	Adjustable range: 4 – 14 mm (0.16 – 0.55 in)
Front fork damping force adjuster	Rebound	8 clicks counterclockwise from stiffest position	Adjustable range: 0 – 11 clicks
	Compression	2 turns counterclockwise from stiffest position	Adjustable range: 0 – 3 turns

Rear Suspension

Item	Specification	Standard	Limit / Note
Rear shock absorber spring pre-set length		195 mm (7.68 in)	Adjustable range: 190 – 200 mm (7.48 – 7.87 in)
Rear shock absorber damping force adjuster	Rebound	8 clicks counterclockwise from stiffest position	Adjustable range: 0 – 18 clicks
	Compression	1.5 turns counterclockwise from stiffest position	Adjustable range: 0 – 1.8 turns

Wheels and Tires

Item	Specification		Standard	Limit / Note
Wheel rim runout	Front	Axial & Radial	—	2.0 mm (0.08 in)
	Rear	Axial & Radial	—	2.0 mm (0.08 in)
Tire size	Front		120/70ZR17M/C (58W)	—
	Rear		190/50ZR17M/C (73W)	—
Tire type	Front		BRIDGESTONE: S22F L	—
	Rear		BRIDGESTONE: S22R L	—
Tire tread depth (Recommended depth)	Front		—	1.6 mm (0.06 in)
	Rear		—	2.0 mm (0.08 in)
Cold inflation tire pressure (Solo riding)	Front		290 kPa (2.90 kgf/cm^2, 42 psi)	—
	Rear		290 kPa (2.90 kgf/cm^2, 42 psi)	—
Cold inflation tire pressure (Dual riding)	Front		290 kPa (2.90 kgf/cm^2, 42 psi)	—
	Rear		290 kPa (2.90 kgf/cm^2, 42 psi)	—
Wheel rim size	Front		17 M/C x MT 3.50	—
	Rear		17 M/C x MT 6.00	—

Drive Chain / Drive Train / Drive Shaft

Item	Specification	Standard	Limit / Note
Drive chain	Type	RKGB50GSVZ5	—
	Links	114 links	—
	20-pitch length	—	319.4 mm (12.57 in)
Drive chain slack (on side-stand)		20 – 30 mm (0.8 – 1.2 in)	—

Brake Control System and Diagnosis

Item	Specification	Standard	Limit / Note
Rear brake pedal height		50 – 60 mm (2.0 – 2.4 in)	—
Master cylinder bore / piston diameter	Front	Approx. 17.5 mm (0.69 in)	—
	Rear	Approx. 14.0 mm (0.55 in)	—

Front Brakes

Item	Specification	Standard	Limit / Note
Brake disc thickness		5.3 – 5.7 mm (0.21 – 0.22 in)	5.0 mm (0.20 in)
Brake disc runout		—	0.30 mm (0.012 in)
Brake caliper cylinder bore / piston diameter		Approx. 30.0 mm (1.18 in)	—

Rear Brakes

Item	Specification	Standard	Limit / Note
Brake disc thickness		5.3 – 5.7 mm (0.21 – 0.22 in)	5.0 mm (0.20 in)
Brake disc runout		—	0.30 mm (0.012 in)
Brake caliper cylinder bore / piston diameter		Approx. 38.2 mm (1.50 in)	—

Manual Transmission

Item	Specification	Standard	Limit / Note
Gearshift fork thickness	No.1, 2	4.8 – 4.9 mm (0.189 – 0.193 in)	—

Clutch

Item	Specification	Standard	Limit / Note
Drive plate thickness	No.1	2.92 – 3.08 mm (0.115 – 0.121 in)	2.62 mm (0.103 in)
	No. 2	3.72 – 3.88 mm (0.146 – 0.153 in)	3.42 mm (0.135 in)
Driven plate distortion	No.1, 2, 3, 4	—	0.10 mm (0.004 in)
Clutch spring free length		46.52 mm (1.831 in)	44.2 mm (1.74 in)
Master cylinder bore / piston diameter		Approx. 12.7 mm (0.500 in)	—
Release cylinder bore / piston diameter		Approx. 33.6 mm (1.32 in)	—

Steering / Handlebar

Item	Specification	Standard	Limit / Note
Steering tension initial force		2 – 5 N (0.2 – 0.5 kgf, 0.4 – 1.1 lbf)	—

Wiring Systems

Item	Specification		Standard	Limit / Note
Fuse size	Headlight	Hi	7.5 A	—
		Lo	7.5 A	—
	Fuel		10 A	—
	Ignition		10 A	—
	Signal		10 A	—
	Fan		15 A	—
	Main		30 A	—
	Park		10A	—
	ABS motor		30 A	—
	ABS valve		15 A	—

Lighting Systems

Item	Specification	Standard	Limit / Note
Headlight	Hi	LED	—
	Lo	LED	—
Position light		LED	—
Turn signal light		LED	—
Brake light/Tail light		LED	—
License plate light		LED	—

Combination Meter / Fuel Meter / Horn

Item	Specification	Standard	Limit / Note
Fuel indicator light		LED	—
Turn signal indicator light		LED	—
Traction control indicator light		LED	—
Engine coolant temperature indicator light		LED	—
Oil pressure indicator light		LED	—
Hi beam indicator light		LED	—
Master warning indicator light		LED	—
Malfunction indicator light		LED	—
Neutral indicator light		LED	—
ABS indicator light		LED	—
Ambient air temperature sensor resistance	–20 °C (–4 °F)	13779 – 19083 Ω	—
	–10 °C (14 °F)	8100 – 10609 Ω	—
	0 °C (32 °F)	4928 – 6125 Ω	—
	10 °C (50 °F)	3089 – 3656 Ω	—
	20 °C (68 °F)	1992 – 2251 Ω	—
	25 °C (77 °F)	1615 – 1785 Ω	—
	30 °C (86 °F)	1290 – 1456 Ω	—
	40 °C (104 °F)	838 – 986 Ω	—

Fasteners Information

BENM10L30307003

Metric Fasteners

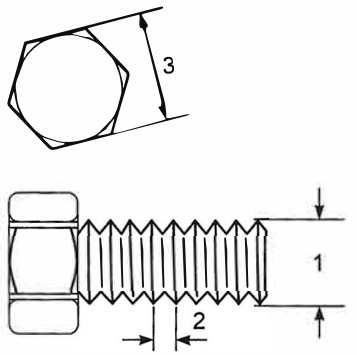
Most of the fasteners used for this vehicle are JIS-defined and ISO-defined metric fasteners. When replacing any fasteners, it is most important that replacement fasteners are of the correct diameter, thread pitch and strength.

NOTICE

Combining male and female fasteners with different thread pitches will damage both fasteners.
It is important to note that, even when the nominal diameter (1) of the threads is the same, JIS-defined and ISO-defined fasteners may be different in thread pitch (2) or width across flats (3). Refer to the following table for these differences.
Before installing a fastener, check it for correct thread pitch and then, screw it in or on the mating fastener by hand. If the fastener is too tight to turn by hand, its thread pitch may be different from that of the mating fastener.

JIS-TO-ISO main fasteners comparison table

		Nominal diameter				
		M6	M8	M10	M12	M14
JIS	Thread pitch	1.0	1.25	1.25	1.25	1.5
	Width across flats	10	12	14	17	19
ISO	Thread pitch	1.0	1.25	1.5	1.5	1.5
	Width across flats	10	13	16	18	21



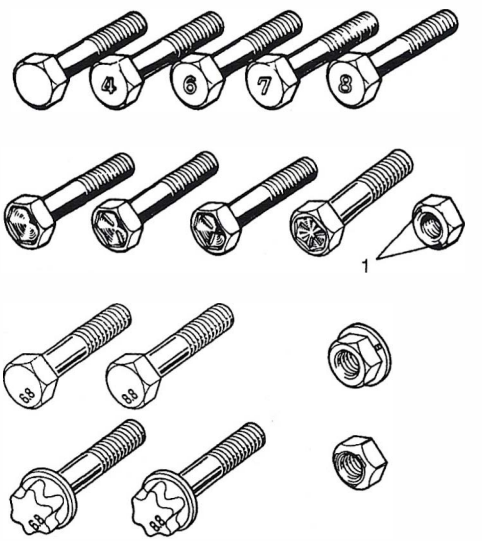
IE31J1030001-02

Fastener Strength Identification

Most commonly used strength classes of metric fasteners are 4T, 6.8, 7T and 8.8. Strength class is indicated by a number or radial line(s) embossed on the head of each bolt. Some metric nuts have a punched number, 6 or 8 on their end surfaces. Figure shows different strength markings.

When replacing metric fasteners, use bolts and nuts of the same strength class as or higher class than the original bolts and nuts. It is also important to select replacement fasteners of the correct diameter and thread pitch. Correct replacement bolts and nuts are available as SUZUKI spare parts.

Metric bolts and nuts: Strength class numbers or marks (The larger the number, the greater the strength).



IE31J1030002-01

1. Nut strength identification

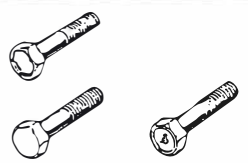
Standard Tightening Torques

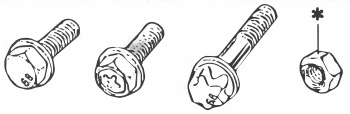
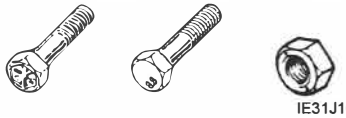
Each fastener should be tightened to the torque specified in each section. If no torque description or specification is provided in the relevant section, refer to the following tightening torque chart for the applicable torque for each fastener. When a fastener of greater strength than the original one is used, use the torque specified for the original fastener.

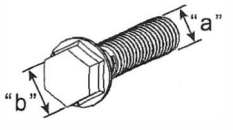
NOTE

- **For flanged bolts, flanged nuts and self-locking nuts of the 4T and 7T strength classes, add 10% to the applicable tightening torques given in the following chart.**
- **The following chart is applicable only where the fastened parts are made of steel or light alloy.**

Tightening torque chart

Strength	Unit	Thread diameter (Nominal diameter) (mm)								
		4	5	6	8	10	12	14	16	18
Fastener of strength class equivalent to 4T	N·m	1.5	3.0	5.5	13	29	45	65	105	160
	kgf-m	0.15	0.30	0.55	1.3	2.9	4.5	6.5	10.5	16
 IE31J1030003-01	lbf-ft	1.0	2.5	4.0	9.5	21.0	32.5	47.0	76.0	116.0
Fastener of strength class equivalent to 6.8	N·m	2.4	4.7	8.4	20	42	80	125	193	280
	kgf-m	0.24	0.47	0.84	2.0	4.2	8.0	12.5	19.3	28
 IE31J1030004-01	lbf-ft	2.0	3.5	6.0	14.5	30.5	58.0	90.5	139.5	202.5

Strength	Unit	Thread diameter (Nominal diameter) (mm)								
		4	5	6	8	10	12	14	16	18
Flanged fastener of strength class equivalent to 6.8 *: Self-locking nut (6 strength)	N·m	2.4	4.9	8.8	21	44	84	133	203	298
	kgf-m	0.24	0.49	0.88	2.1	4.4	8.4	13.3	20.3	29.8
	lbf-ft	2.0	3.5	6.5	15.5	32.0	61.0	96.5	147.0	215.5
 IE31J1030005-01										
Fastener of strength class equivalent to 7T	N·m	2.3	4.5	10	23	50	85	135	210	240
	kgf-m	0.23	0.45	1.0	2.3	5.0	8.5	13.5	21	24
	lbf-ft	2.0	3.5	7.5	17.0	36.5	61.5	98.0	152.0	174.0
 IE31J1030006-01										
Fastener of strength class equivalent to 8.8 (bolt) or 8 (nut)	N·m	3.1	6.3	11	27	56	105	168	258	373
	kgf-m	0.31	0.63	1.1	2.7	5.6	10.5	16.8	25.8	37.3
	lbf-ft	2.5	4.5	8.0	19.5	40.5	76.0	121.5	187.0	270.0
 IE31J1030007-01										
Flanged fastener of strength class equivalent to 8.8 (bolt) or 8 (nut)	N·m	3.2	6.5	12	29	59	113	175	270	395
	kgf-m	0.32	0.65	1.2	2.9	5.9	11.3	17.5	27	39.5
	lbf-ft	2.5	5.0	9.0	21.0	43.0	82.0	126.5	195.5	286.0
 IE31J1030008-01										

Small crown shape bolt	Width across flats "b" [mm]	Thread diameter "a" [mm]	Unit		
			N·m	kgf-m	lbf-ft
 ID26J1030004-01	7	5	4.5	0.45	3.5
	8	6	10	1.0	7.5

*: Self-locking nut

Tightening Torque List

BENM10L30307004

Maintenance and Lubrication

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Air cleaner element screw	1.2	0.12	0.90	☞(Page 0B-3)
Exhaust pipe bolt	23	2.3	17.0	☞(Page 0B-3)
Exhaust pipe support bolt	23	2.3	17.0	☞(Page 0B-3)
Muffler connector bolt	18	1.8	13.5	☞(Page 0B-3)
Muffler support bolt	30	3.1	22.5	☞(Page 0B-3)
Spark plug	11	1.1	8.5	☞(Page 0B-8)
Oil drain plug	23	2.3	17.0	☞(Page 0B-11)
Oil filter	20	2.0	15.0	☞(Page 0B-12)
Thermostat cover air bolt	6.0	0.61	4.45	☞(Page 0B-16)
Rear axle nut	100	10.2	74.0	☞(Page 0B-20)
Chain adjuster lock-nut	22	2.2	16.5	☞(Page 0B-20)
Rear brake master cylinder rod lock-nut	18	1.8	13.5	☞(Page 0B-22)
Rear master cylinder reservoir cap screw	1.5	0.15	1.10	☞(Page 0B-24)
Rear brake master cylinder reservoir tank bracket bolt	10	1.0	7.5	☞(Page 0B-24)
Steering stem lock-nut	80	8.2	59.0	☞(Page 0B-27)
Steering stem top nut	90	9.2	66.5	☞(Page 0B-27)

Emission Control Devices

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
PAIR reed valve cover bolt	10	1.0	7.5	☞(Page 1B-4)
PAIR control solenoid valve bracket bolt	5.5	0.56	4.05	☞(Page 1B-5)
PCV cover bolt	10	1.0	7.5	☞(Page 1B-7)
PCV reed valve cover bolt	10	1.0	7.5	☞(Page 1B-7)
EVAP system purge control solenoid valve nut	6.7	0.68	4.95	☞(Page 1B-9)
Accelerator body assembly bracket bolt	10	1.0	7.5	☞(Page 1B-10)

Engine Electrical Devices

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
IAP sensor screw	1.3	0.13	0.95	☞(Page 1C-5)
IAT sensor screw	1.3	0.13	0.95	☞(Page 1C-6)
ECT sensor	18	1.8	13.5	☞(Page 1C-7)
HO2 sensor	25	2.5	18.5	☞(Page 1C-10)
CMP sensor bolt	10	1.0	7.5	☞(Page 1C-11)
Accelerator body assembly bolt	10	1.0	7.5	☞(Page 1C-14)

Engine Mechanical

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Fuel tank bracket bolt (front side)	10	1.0	7.5	☞(Page 1D-7)
Fuel tank bracket bolt (rear side)	5.5	0.56	4.05	☞(Page 1D-7)
Funnel bolt	4.3	0.44	3.20	☞(Page 1D-7)
Air cleaner cover bolt	1.8	0.18	1.35	☞(Page 1D-7)
Intake pipe clamp screw	1.5	0.15	1.10	☞(Page 1D-10) / ☞(Page 1D-13)
Delivery pipe screw	3.5	0.36	2.60	☞(Page 1D-12)
Cylinder head cover bolt	12	1.2	9.0	☞(Page 1D-15)
CMP sensor bolt	10	1.0	7.5	☞(Page 1D-16)
Cam chain guide No.2 bolts	10	1.0	7.5	☞(Page 1D-21)
Camshaft journal holder bolt	10	1.0	7.5	☞(Page 1D-22) / ☞(Page 1D-25)
Cam chain tension adjuster bolt	10	1.0	7.5	☞(Page 1D-23)

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Valve timing inspection cap	23	2.3	17.0	☞(Page 1D-24)
Starter clutch cover cap	11	1.1	8.5	☞(Page 1D-24)
Engine mounting thrust adjuster	10	1.0	7.5	☞(Page 1D-30)
Engine mounting thrust adjuster lock-nut	45	4.6	33.5	☞(Page 1D-30)
Side-stand bracket bolt	95	9.7	70.0	☞(Page 1D-33)
Oil pressure switch lead wire bolt	1.5	0.15	1.10	☞(Page 1D-33)
Gearshift link arm bolt	10	1.0	7.5	☞(Page 1D-33)
Cylinder head bolt (L180)	28 N·m → turn counterclockwise 270° → 10 N·m → 25 N·m → 51 N·m (2.9 kgf-m → turn counterclockwise 270° → 1.0 kgf-m → 2.5 kgf-m → 5.2 kgf-m, 21.0 lbf-ft → turn counterclockwise 270° → 7.5 lbf-ft → 18.5 lbf-ft → 38.0 lbf-ft)			☞(Page 1D-36)
Cylinder head bolt (L55)	10	1.0	7.5	☞(Page 1D-37)
Cylinder head bolt (L30)	10	1.0	7.5	☞(Page 1D-37)
Cylinder nut	10	1.0	7.5	☞(Page 1D-37)
Cylinder head side bolt	14	1.4	10.5	☞(Page 1D-37)
Oil hose union bolt (cam chain tension adjuster)	18	1.8	13.5	☞(Page 1D-38)
Oil hose union bolt (cylinder head)	20	2.0	15.0	☞(Page 1D-38)
Cylinder head plug	23	2.3	17.0	☞(Page 1D-45)
Oil gallery bolt (Cylinder head)	10	1.0	7.5	☞(Page 1D-45)
Water bypass union	12	1.2	9.0	☞(Page 1D-46)
Clamp screw	1.5	0.15	1.10	☞(Page 1D-46)
Thermostat cover bolt	10	1.0	7.5	☞(Page 1D-46)
ECT sensor	18	1.8	13.5	☞(Page 1D-47)
Water inlet connector bolt	10	1.0	7.5	☞(Page 1D-54)
Balancer shaft arm bolt	10	1.0	7.5	☞(Page 1D-62)
Balancer shaft mounting bolt	10	1.0	7.5	☞(Page 1D-63)
Oil separator cover bolt	10	1.0	7.5	☞(Page 1D-63)
Oil pipe bolt	10	1.0	7.5	☞(Page 1D-63)
Oil pipe union bolt	24	2.4	18.0	☞(Page 1D-63)
Oil filter stand	15	1.5	11.0	☞(Page 1D-64)
Gearshift cam stopper bolt	10	1.0	7.5	☞(Page 1D-64)
Gearshift cam plate stopper bolt	13	1.3	9.5	☞(Page 1D-64)
Gearshift cover bolt	10	1.0	7.5	☞(Page 1D-65)
Cam chain tensioner bolt	23	2.3	17.0	☞(Page 1D-65)
Oil hose union plug	25	2.5	18.5	☞(Page 1D-74)
Piston cooling oil gallery plug	10	1.0	7.5	☞(Page 1D-74)
Upper crankcase plug	23	2.3	17.0	☞(Page 1D-74)
Transmission cooling oil gallery plug	10	1.0	7.5	☞(Page 1D-74)
Oil gallery plug (M10)	18	1.8	13.5	☞(Page 1D-75)
Oil gallery plug (M6)	10	1.0	7.5	☞(Page 1D-75)
Oil gallery plug (M8)	10	1.0	7.5	☞(Page 1D-75)
Crankcase bolt (M9)	22 N·m → turn clockwise 30° (2.2 kgf-m → turn clockwise 30°, 16.5 lbf-ft → turn clockwise 30°)			☞(Page 1D-77) / ☞(Page 1D-84)
Crankcase bolt (M10)	50	5.1	37.0	☞(Page 1D-77)
Crankcase bolt (M8)	26	2.7	19.5	☞(Page 1D-77)
Crankcase bolt (M6)	11	1.1	8.5	☞(Page 1D-78)
Conrod cap bolt	25 N·m → turn clockwise 90° (2.5 kgf-m → turn clockwise 90°, 18.5 lbf-ft → turn clockwise 90°)			☞(Page 1D-80) / ☞(Page 1D-82)

Engine Lubrication System

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Oil gallery plug (M16)	35	3.6	26.0	☞(Page 1E-4)
Oil strainer bolt	10	1.0	7.5	☞(Page 1E-7)
Breather pipe bolt	10	1.0	7.5	☞(Page 1E-7)
Oil pan bolt	10	1.0	7.5	☞(Page 1E-7)
Oil cooler outlet hose bolt	10	1.0	7.5	☞(Page 1E-7)
Oil cooler bolt	5.5	0.56	4.05	☞(Page 1E-9)
Oil cooler hose bolt	10	1.0	7.5	☞(Page 1E-9)
Oil pressure switch	13	1.3	9.5	☞(Page 1E-11)
Oil pressure switch lead wire connecting screw	1.5	0.15	1.10	☞(Page 1E-11)
Piston cooling oil jet bolt	10	1.0	7.5	☞(Page 1E-12)
Oil jet	1.0	0.10	0.75	☞(Page 1E-12)
Oil gallery jet	35	3.6	26.0	☞(Page 1E-13)
Oil pump bolt	10	1.0	7.5	☞(Page 1E-15)

Engine Cooling System

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Radiator assembly bolt	10	1.0	7.5	☞(Page 1F-10)
Oil cooler bolt	5.5	0.56	4.05	☞(Page 1F-10)
Radiator reservoir tank bolt	5.5	0.56	4.05	☞(Page 1F-10)
Thermostat cover bolt	10	1.0	7.5	☞(Page 1F-14)
Water pump bolt	10	1.0	7.5	☞(Page 1F-16)
Impeller securing bolt	8.0	0.82	5.90	☞(Page 1F-19)
Water pump case screw	6.0	0.61	4.45	☞(Page 1F-19)

Fuel System

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Fuel tank cap bolt	3.0	0.31	2.25	☞(Page 1G-12)
Fuel tank rear bolt	10	1.0	7.5	☞(Page 1G-13)
Fuel tank rear bracket bolt	10	1.0	7.5	☞(Page 1G-13)
Rear brake master cylinder reservoir tank bracket bolt	10	1.0	7.5	☞(Page 1G-13)
Fuel tank front bolt	5.5	0.56	4.05	☞(Page 1G-13)
Fuel pump mounting bolt	10	1.0	7.5	☞(Page 1G-18)
Fuel delivery pipe mounting screw	3.5	0.36	2.60	☞(Page 1G-22) / ☞(Page 1G-23)

Ignition System

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Ignition switch mounting bolt	23	2.3	17.0	☞(Page 1H-8)

Starting System

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Starter motor housing bolt	4.7	0.48	3.50	☞(Page 1I-6)
Starter relay terminal bolt	4.5	0.46	3.35	☞(Page 1I-8)
Starter clutch bolt	54	5.5	40.0	☞(Page 1I-11)
Starter clutch cover bolt	10	1.0	7.5	☞(Page 1I-12)
Starter torque limiter cover bolt	10	1.0	7.5	☞(Page 1I-12)

Charging System

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Generator stator bolt	11	1.1	8.5	☞(Page 1J-6)
CKP sensor bolt	6.5	0.66	4.80	☞(Page 1J-6)
Generator rotor bolt	120	12.2	88.5	☞(Page 1J-6)
Generator cover bolt	10	1.0	7.5	☞(Page 1J-6)
Regulator/rectifier bolt	8.8	0.90	6.50	☞(Page 1J-7)
Regulator/rectifier bracket bolt	10	1.0	7.5	☞(Page 1J-7)

Exhaust System

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Exhaust pipe bolt	23	2.3	17.0	☞(Page 1K-5)
Exhaust pipe support bolt	23	2.3	17.0	☞(Page 1K-5)
Muffler rear cover bolt	6.5	0.66	4.80	☞(Page 1K-6)
Muffler cover bolt	5.5	0.56	4.05	☞(Page 1K-6)
Muffler support bolt (except for India)	30	3.1	22.5	☞(Page 1K-7)
Muffler support bolt (for India)	25	2.5	18.5	☞(Page 1K-7)
Exhaust pipe cover bolt	5.5	0.56	4.05	☞(Page 1K-7)
Muffler connector bolt	18	1.8	13.5	☞(Page 1K-7)

Front Suspension

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front fork cap bolt	23	2.3	17.0	☞(Page 2B-3)
Front fork lower clamp bolt	23	2.3	17.0	☞(Page 2B-3)
Front fork upper clamp bolt	23	2.3	17.0	☞(Page 2B-3)
Front fork damper rod bolt	23	2.3	17.0	☞(Page 2B-8)
Front fork inner rod lock-nut	15	1.5	11.0	☞(Page 2B-10)

Rear Suspension

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Adjuster lock nut	30	3.1	22.5	☞(Page 2C-3)
Rear shock absorber mounting nut	50	5.0	36.0	☞(Page 2C-4) / ☞(Page 2C-6)
Cushion lever mounting nut	78	8.0	57.5	☞(Page 2C-4) / ☞(Page 2C-6)
Cushion rod mounting nut	78	8.0	57.5	☞(Page 2C-6) / ☞(Page 2C-8)
Plate bolt	5.5	0.56	4.05	☞(Page 2C-9)
Chain case bolt	5.5	0.56	4.05	☞(Page 2C-9)
Chain buffer bolt	5.5	0.56	4.05	☞(Page 2C-9)
Swingarm pivot shaft	15	1.5	11.0	☞(Page 2C-10)
Swingarm pivot nut	100	10.2	74.0	☞(Page 2C-10)
Swingarm pivot lock-nut	90	9.2	66.5	☞(Page 2C-10)

Wheels and Tires

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front axle nut	100	10.2	74.0	☞(Page 2D-4)
Front axle pinch bolt	23	2.3	17.0	☞(Page 2D-4) / ☞(Page 2D-4)

Drive Chain / Drive Train / Drive Shaft

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Engine sprocket nut	150	15.3	111.0	☞(Page 3A-4)
Engine sprocket cover bolt	10	1.0	7.5	☞(Page 3A-4)
Engine sprocket cover bolt	5.5	0.56	4.05	☞(Page 3A-4)
Gear shift cover protector bolt	10	1.0	7.5	☞(Page 3A-5)
Rear sprocket nut	60	6.1	44.5	☞(Page 3A-5)

Brake Control System and Diagnosis

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear brake master cylinder rod lock-nut	18	1.8	13.5	☞(Page 4A-10)
Front footrest bolt	26	2.7	19.5	☞(Page 4A-10) / ☞(Page 4A-22)
Rear brake master cylinder mounting bolt	10	1.0	7.5	☞(Page 4A-10) / ☞(Page 4A-21)
Front footrest guard bolt	5.0	0.51	3.70	☞(Page 4A-10) / ☞(Page 4A-22)
Front brake master cylinder air bleeder valve	6.0	0.61	4.45	☞(Page 4A-11) / ☞(Page 4A-17)
Front brake caliper air bleeder valve	8.5	0.87	6.30	☞(Page 4A-12)
Front reservoir cap screw	1.5	0.15	1.10	☞(Page 4A-12)
Rear brake caliper air bleeder valve	8.0	0.82	5.90	☞(Page 4A-13)
Rear master cylinder reservoir cap screw	1.5	0.15	1.10	☞(Page 4A-13)
Rear brake master cylinder reservoir tank bracket bolt	10	1.0	7.5	☞(Page 4A-13)
Front brake master cylinder holder bolt	10	1.0	7.5	☞(Page 4A-15)
Brake hose union bolt	23	2.3	17.0	☞(Page 4A-16) / ☞(Page 4A-21)
Front brake light switch screw	1.2	0.12	0.90	☞(Page 4A-18)
Brake lever pivot bolt	1.0	0.10	0.75	☞(Page 4A-18)
Brake lever pivot bolt lock-nut	5.9	0.60	4.35	☞(Page 4A-18)
Brake hose connector screw	1.5	0.15	1.10	☞(Page 4A-23)

Front Brakes

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front brake caliper mounting bolt	39	4.0	29.0	☞(Page 4B-2) / ☞(Page 4B-3)
Brake hose union bolt	23	2.3	17.0	☞(Page 4B-3)
Brake air bleed valve	8.5	0.87	6.30	☞(Page 4B-5)
Brake disc bolt	23	2.3	17.0	☞(Page 4B-6)

Rear Brakes

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear brake caliper mounting bolt	17	1.7	12.5	☞(Page 4C-2)
Rear brake pad mounting pin	15	1.5	11.0	☞(Page 4C-2)
Brake hose union bolt	23	2.3	16.5	☞(Page 4C-3)
Rear brake caliper sliding pin bolt	32	3.3	24.0	☞(Page 4C-4)
Brake disc bolt	35	3.6	26.0	☞(Page 4C-6)

ABS

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
ABS control unit / HU mounting bolt	8.0	0.82	5.90	☞(Page 4E-51)
Tightening torque ABS control unit / HU mounting bolt	12	1.2	9.0	☞(Page 4E-51)
Brake pipe flare nut	16	1.6	11.5	☞(Page 4E-51)
IMU holder nut	6.5	0.66	4.80	☞(Page 4E-52)
IMU bolt	6.5	0.66	4.80	☞(Page 4E-52)
Wheel speed sensor bolt	10	1.0	7.5	☞(Page 4E-53) / ☞(Page 4E-54)
Front brake disc bolt	23	2.3	17.0	☞(Page 4E-54)
Wheel speed sensor rotor bolt	6.5	0.66	4.80	☞(Page 4E-55)

Manual Transmission

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Gearshift cam bearing retainer screw	8.4	0.86	6.20	☞(Page 5B-5)
GP sensor nut	6.0	0.61	4.45	☞(Page 5B-15)
Gearshift link rod nut	10	1.0	7.5	☞(Page 5B-18)
Gear shift sensor lock-nut	10	1.0	7.5	☞(Page 5B-19)
Gearshift link arm bolt	10	1.0	7.5	☞(Page 5B-20)

Clutch

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Clutch air bleeder valve	5.4	0.55	4.00	☞(Page 5C-7)
Reservoir cap screw	1.5	0.15	1.10	☞(Page 5C-7)
Clutch master cylinder mounting bolt	10	1.0	7.5	☞(Page 5C-9)
Clutch hose union bolt	23	2.3	17.0	☞(Page 5C-10) / ☞(Page 5C-14)
Clutch lever position switch screw	1.2	0.12	0.90	☞(Page 5C-12)
Clutch lever pivot bolt	1.0	0.10	0.75	☞(Page 5C-12)
Clutch lever pivot bolt lock-nut	5.9	0.60	4.35	☞(Page 5C-12)
Clutch release cylinder mounting bolt	10	1.0	7.5	☞(Page 5C-14)
Clutch sleeve hub nut	150	15.3	111.0	☞(Page 5C-20)
Clutch spring set bolt	10	1.0	7.5	☞(Page 5C-22)
Clutch cover bolt	10	1.0	7.5	☞(Page 5C-22)

Steering / Handlebar

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
handlebar bolt	23	2.3	17.0	☞(Page 6B-5)
Handlebar holder bolt	23	2.3	17.0	☞(Page 6B-5)
Front fork upper clamp bolt	23	2.3	17.0	☞(Page 6B-5)
Steering stem top nut	90	9.2	66.5	☞(Page 6B-5) / ☞(Page 6B-15)
Handlebar balancer screw	23	2.3	17.0	☞(Page 6B-6) / ☞(Page 6B-6)
Throttle grip screw	3.0	0.31	2.25	☞(Page 6B-8)
Left handle switch screw	3.0	0.31	2.25	☞(Page 6B-10)
Steering damper mounting bolt	23	2.3	17.0	☞(Page 6B-12)
Steering damper rod end nut	23	2.3	17.0	☞(Page 6B-12)
Steering stem adjust-nut	20 N·m (2.0 kgf-m, 15.0 lbf-ft) → turn counterclockwise 0 – 1/4			☞(Page 6B-14)
Steering stem lock-nut	80	8.2	59.0	☞(Page 6B-15)

Exterior Parts

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear view mirror nut	12	1.2	9.0	☞(Page 9D-34)
Striker support bracket bolt	8.8	0.90	6.50	☞(Page 9D-36)
Front fender bolt	10	1.0	7.5	☞(Page 9D-36)
Horn bolt	5.5	0.56	4.05	☞(Page 9D-37)
Lower bracket cover bolt	10	1.0	7.5	☞(Page 9D-37)
Side cowling assembly bolt	10	1.0	7.5	☞(Page 9D-39) / ☞(Page 9D-50)
Side cowling assembly screw	1.8	0.18	1.35	☞(Page 9D-39) / ☞(Page 9D-50)
Side front cowling No.1 screw	1.8	0.18	1.35	☞(Page 9D-41)
Side rear cover screw	1.8	0.18	1.35	☞(Page 9D-41)
Side cover screw	1.8	0.18	1.35	☞(Page 9D-41)
Side front cowling No.2 screw	1.8	0.18	1.35	☞(Page 9D-42)
Under cowling bolt	10	1.0	7.5	☞(Page 9D-43) / ☞(Page 9D-50)
Under cowling screw	1.8	0.18	1.35	☞(Page 9D-43)
Cowling brace bolt	23	2.3	17.0	☞(Page 9D-46)
Regulator / rectifier bracket bolt	10	1.0	7.5	☞(Page 9D-46)
Combination meter bolt	5.5	0.56	4.05	☞(Page 9D-46)
Meter panel (center) screw	1.8	0.18	1.35	☞(Page 9D-46)
Windscreen bolt	0.4	0.04	0.30	☞(Page 9D-47)
Body center cowling screw	1.8	0.18	1.35	☞(Page 9D-48)
Meter front panel screw	1.8	0.18	1.35	☞(Page 9D-48)
Headlight screw	1.8	0.18	1.35	☞(Page 9D-48)
Cowling brace screw	1.8	0.18	1.35	☞(Page 9D-48)
Front turn signal light screw	1.8	0.18	1.35	☞(Page 9D-48)
Fuel tank front cover bolt	4.0	0.41	2.95	☞(Page 9D-50)
Side cowling assembly screw No.2	4.5	0.46	3.35	☞(Page 9D-50)
Fuel tank cap cover bolt	5.5	0.56	4.05	☞(Page 9D-50)
Frame cover assembly screw	5.5	0.56	4.05	☞(Page 9D-52)
Frame cover assembly bolt	10	1.0	7.5	☞(Page 9D-52)
Frame center cover screw	2.0	0.20	1.50	☞(Page 9D-52)
Frame cover screw	2.0	0.20	1.50	☞(Page 9D-53)
Rear fender (rear) upper bolt	12	1.2	9.0	☞(Page 9D-54)
Rear fender (rear) under bolt	12	1.2	9.0	☞(Page 9D-54)
Frame under cover screw	0.8	0.08	0.60	☞(Page 9D-54)

Cruise Control System

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Cruise control cancel switch screw	0.28	0.03	0.20	☞(Page 10A-7)

Immobilizer Control System

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Immobilizer antenna bolt	4.5	0.46	3.35	☞(Page 10C-6)

Special Tools and Equipment

Fuel / Oil / Fluid / Coolant Recommendation

BENM10L30308002

Fuel

NOTICE

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

Use unleaded gasoline with an octane rating of 95 RON (90 AKI) or higher.
Unleaded gasoline containing up to 5% or 10% ethanol by volume may be used. Use the recommended gasoline according to a gasoline label (if equipped).

Engine Oil

Suzuki recommends the use of SUZUKI Genuine Oil or Equivalent Engine Oil.

SUZUKI Genuine Oil

Oil	Standard	
	SAE	JASO
ECSTAR R9000	10W-40	MA
ECSTAR R7000	10W-40	MA
ECSTAR R5000	10W-40	MA

Equivalent Engine Oil

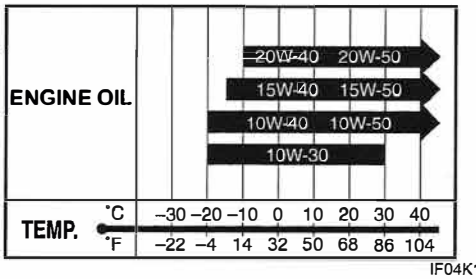
Equivalent Engine Oil means engine oil that meets the following standards.

	Engine oil
API service classification	SJ, SL, SM or SN
JASO T903 standard	MA (MA1, MA2)
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.

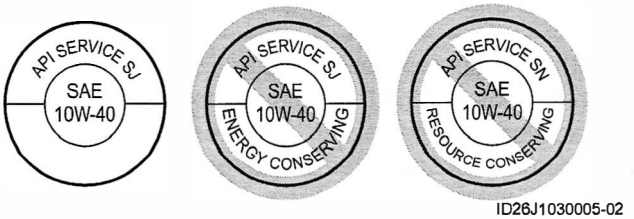
NOTICE

When 10W-30 engine oil is used, use only SJ, SL API classification. If there are not used API classification engine oils, the engine will be damaged.



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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.



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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

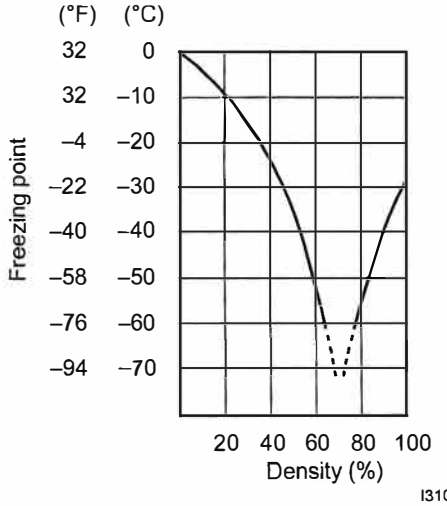
- **Use a high quality ethylene glycol base anti-freeze, mixed with distilled water. Do not mix an alcohol base anti-freeze and different brands of anti-freeze.**
- **Do not put in more than 60% anti-freeze or less than 50%. (Refer to Fig. 1 and 2.)**

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

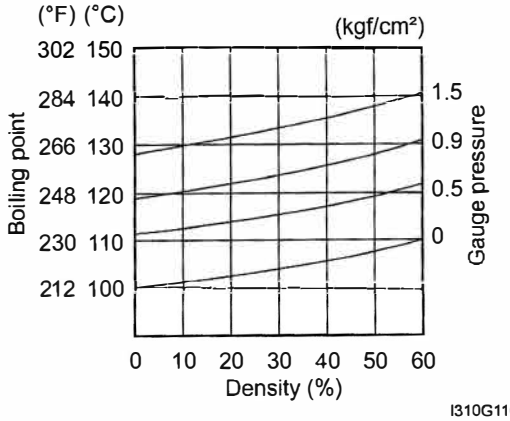
Anti-freeze density	Freezing point
50%	–31 °C (–24 °F)
55%	–40 °C (–40 °F)
60%	–55 °C (–67 °F)

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-16).

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.

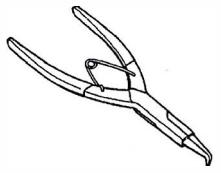
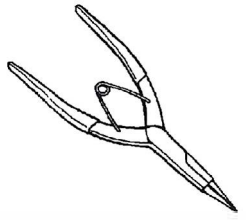
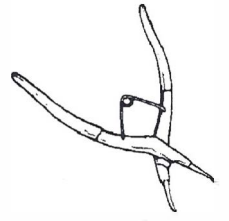
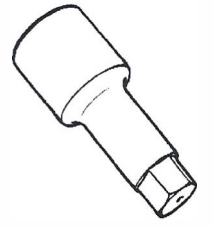
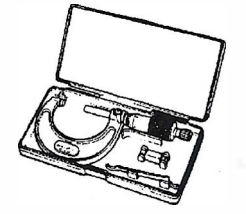
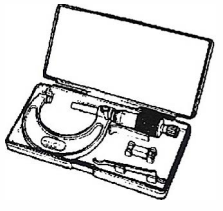
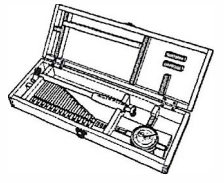
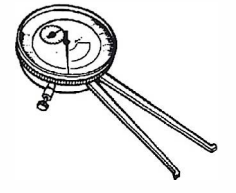
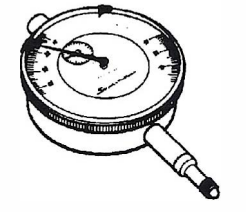
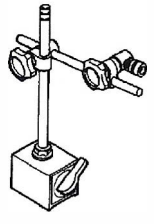
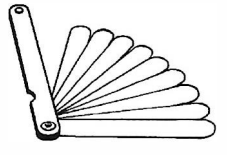
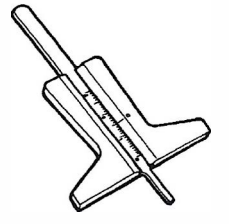
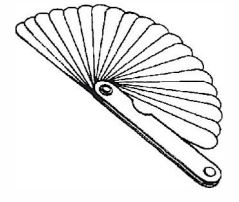
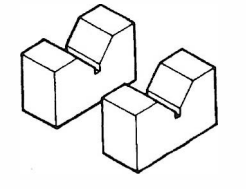
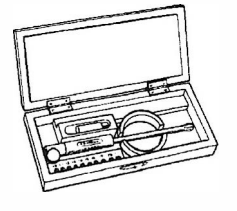
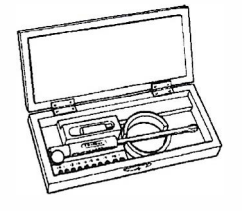
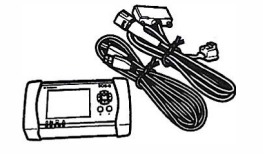
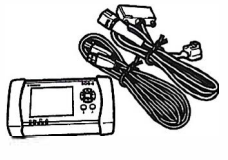
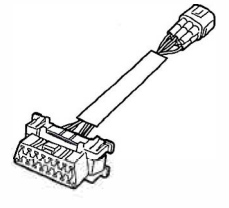
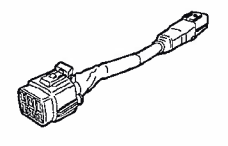
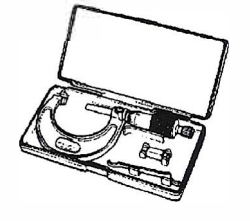
Fork oil 99000–99044–L01 (SUZUKI FORK OIL L-01)

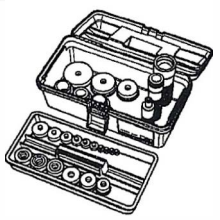
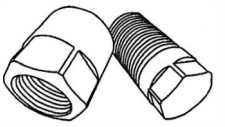
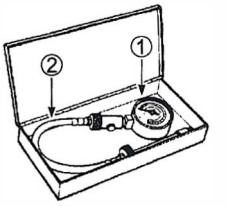
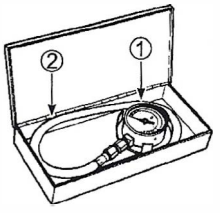
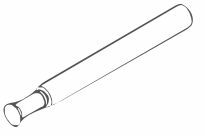
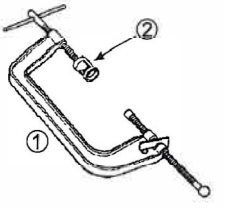
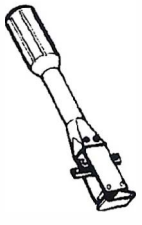
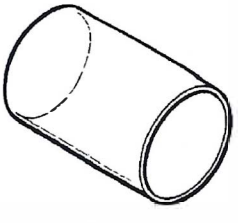
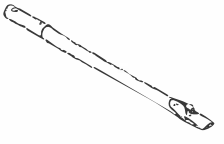
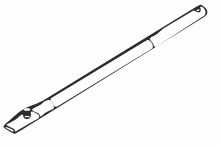
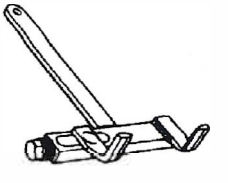
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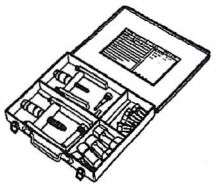
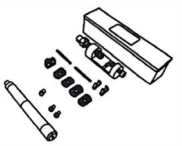
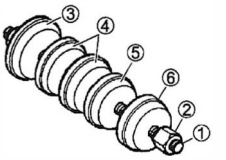
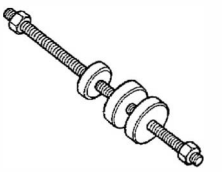
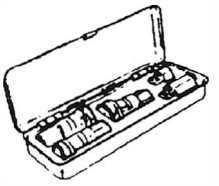
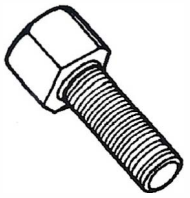
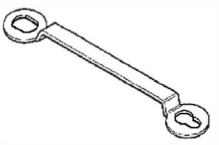
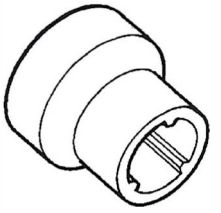
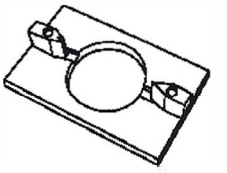
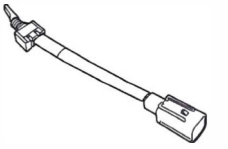
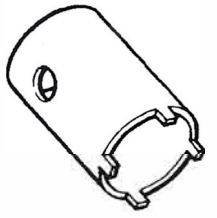
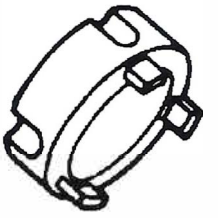
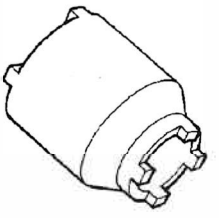
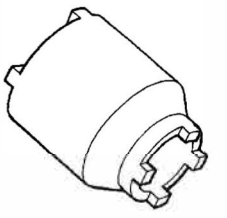
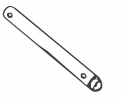
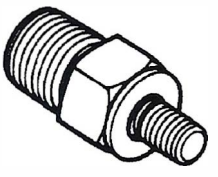
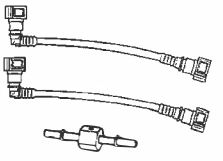
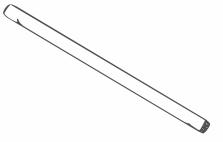
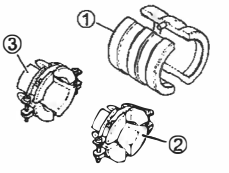
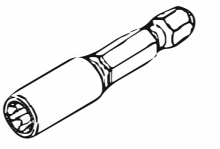
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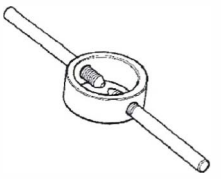
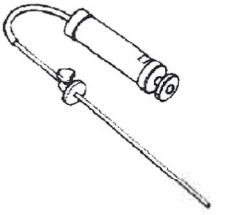
NOTE

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 **09900–06104** Snap ring pliers (External: Bent nose)	 **09900–06107** Snap ring pliers (External)	 **09900–06108** Snap ring pliers (Internal)	 **09900–18740** Hexagon bit socket (24 mm: 1/2 sq.)	 **09900–20202** Micrometer (25 - 50 mm)
 **09900–20203** Micrometer (50 - 75 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	 **09900–20806** Thickness gauge	 **09900–21304** V blocks
 **09900–22303** Plastigage (0.025 - 0.076 mm)	 **09900–22304** Plastigage (0.051 - 0.152 mm)	 **09900–22401** Small bore gauge (10 - 18 mm)	 **09900–22403** Small bore gauge (18 - 35 mm)	 **09904–41031** SDS-II set
 **09904–41041** SDS-II (oscilloscope) set	 **09904–41051** Conversion cable	 **09904–41071** Conversion cable (ISO)	 **09912–66310** Micrometer (0 - 25 mm)	 **09913–50121** Oil seal remover

 **09913–70210** Bearing installer set	 **09915–40620** Oil filter wrench	 **09915–41510** Oil filter stand remover	 **09915–63311** Compression gauge adapter	 **09915–64512** Compression gauge set (2500 kPa)
 **09915–74511** Oil pressure gauge set (600 kPa)	 **09915–74540** Oil pressure gauge attachment	 **09916–10912** Valve lapper	 **09916–14510** Valve lifter	 **09916–14522** Valve lifter attachment
 **09916–34542** Reamer handle	 **09916–34570** Valve guide reamer (ø5.0)	 **09916–34580** Valve guide reamer (ø10.8)	 **09916–44310** Valve guide installer / remover	 **09916–53350** Valve guide installer attachment
 **09916–74521** Piston ring holder handle	 **09916–74550** Piston ring holder band (ø73 - 85)	 **09916–84511** Tweezers	 **09917–47020** Vacuum pump gauge set	 **09918–78211** Radiator cap tester kit
 **09919–28620** Sleeve protector	 **09920–31020** Extension handle	 **09920–31021** Extension handle	 **09920–34830** Starter clutch rotor holder	 **09920–53740** Clutch sleeve hub holder

 **09921–20240** Bearing remover set	 **09922–22712** Drive chain cut / rivet tool set	 **09923–74511** Bearing remover (ø20 - 35)	 **09924–84510** Bearing installer set	 **09924–84521** Bearing installer set
 **09925–18011** Bearing installer	 **09930–10121** Spark plug socket set	 **09930–11920** Torx® bit (JT40H)	 **09930–11940** Torx® bit holder (3/8 sq.)	 **09930–30104** Rotor remover sliding shaft
 **09930–30450** Rotor remover bolt	 **09930–44530** Rotor holder	 **09930–73140** Starter torque limiter socket	 **09930–73170** Starter torque limiter holder	 **09930–83130** Mode selection switch (ISO)
 **09940–14911** Steering stem nut socket	 **09940–14960** Steering stem nut socket wrench	 **09940–14970** Swingarm pivot adjuster wrench	 **09940–14990** Engine mounting adjuster wrench	 **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	 **09940–63110** Torx® bit (E8)

				
09940–93110 Fork spring compressor	**09940–94922** Front fork spring stopper plate	**09940–94930** Front fork spacer holder	**09941–34513** Bearing installer set	**09943–74111** Front fork oil level gauge

Section 1

Engine

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Precautions

Precautions

Precautions for Engine

BENM10L31000001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Catalytic Converter" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2), "Precautions for Circuit Tester" in Section 00 (Page 00-8) and "Precautions for SDS-II" in Section 00 (Page 00-9).

Engine General Information and Diagnosis

Precautions

Precautions for DTC Trouble Shooting

BENM10L31100001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2), "Precautions for Circuit Tester" in Section 00 (Page 00-8) and "Precautions for SDS-II" in Section 00 (Page 00-9).

NOTE

After repairing the trouble, clear the DTC using the special tool. ☞(Page 1A-12)

General Description

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".

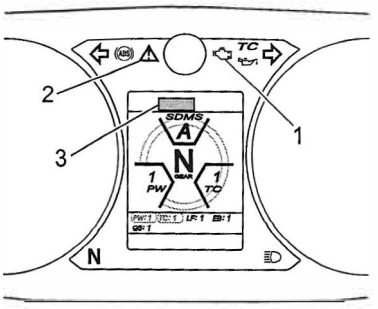
User Mode

- The ECM warns riders to turn the MIL (1) on or blink it depending on the failure place or its content. And the ECM turns the MIL off when detecting 3 D/C-correct continuously after detecting the first abnormality.
- For some malfunctions, ECM adopts the 3 driving cycle detection logic to prevent erroneous detection. With this logic, MIL is turned on when the same malfunction is detected for 3 consecutive driving cycles.

NOTE

- **The MIL blinking only when detecting a misfire which can cause damage to the catalyst.**
- **When some DTCs are detected, the ECM turns the master warning indicator (2) on. And the ECM turns the master warning indicator off when detecting 1 D/C-correct after detecting the first abnormality.**
- **The combination meter controls the each indicator based on the CAN communication signal received from ECM.**
- **When lowering of the battery is detected, the master warning indicator is turned red ON.**
- **For LCD indication (3), referring to "Combination Meter System Description": Technical Features in Section 0A (Page 0A-28).**

Malfunction part	MIL (1)	Master warning indicator (2)
Other than following malfunction parts	ON or blink	—
FP relay	—	ON
Cooling fan relay	—	ON
Ignition switch (without Immobilizer control system)	—	ON
Key is not registered. (with Immobilizer control system)	—	ON
Gearshift sensor	—	ON
IMU	—	ON
ECM (Data programming error / ROM error)	—	ON
CAN communication system	—	ON



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Supplementation

- In the case that the engine control system is in normal condition, the combination meter lights up the MIL and the master warning indicator when the ignition switch is turned ON, and then, about 3 seconds after the ignition switch is turned ON, it turns the MIL and the master warning indicator OFF.

NOTE

If master warning indicator is on continuously after turning the ignition switch ON although the battery voltage is normal, a malfunction may be detected except for engine control system.

- The driving cycle (D/C) means the cycle beginning from turning the ignition switch ON through starting the engine until turning the ignition switch OFF. The 3 driving cycles are the term repeating 3 times of the above mentioned cycle.
- The ECM erases the registered failure data when not detecting the same one during 40 times of warm up cycle. And the warm up cycle means the cycle of engine warm up operation that the engine coolant temperature reaches more than approximately 70 °C (158 °F) and also rises more than approximately 20 °C (36 °F) from the one at engine starting.
- **3 driving cycle detection logic:**
  The malfunction detected in the first driving cycle is stored in ECM memory (in the form of pending DTC) but MIL or master warning indicator does not light at this time. ECM causes the MIL or master warning indicator to light up when it detects third time the same malfunction in the next two driving cycle.
- **Pending DTC:**
  "Pending DTC" is relevant to those DTCs to which the 3 driving cycle detection logic is applied. If such a DTC is detected and stored temporarily during the first of three consecutive driving cycles, the DTC is called pending DTC.

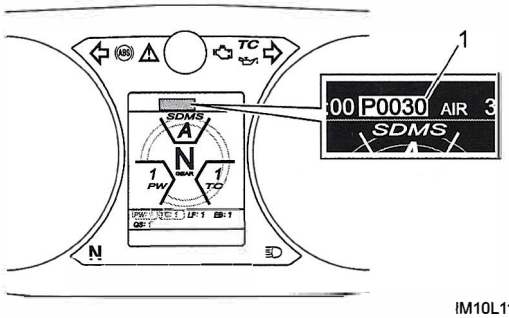
Dealer Mode

To check the function of the individual engine control system devices, the dealer mode is provided. In this check, the special tool is necessary to read the code of the malfunction items.

- The defective function is memorized in the ECM. Use the special tool's coupler to connect to the mode select coupler (6P).

Special tool
09930–83130

- The memorized malfunction code (1) is indicated by the display of the LCD.



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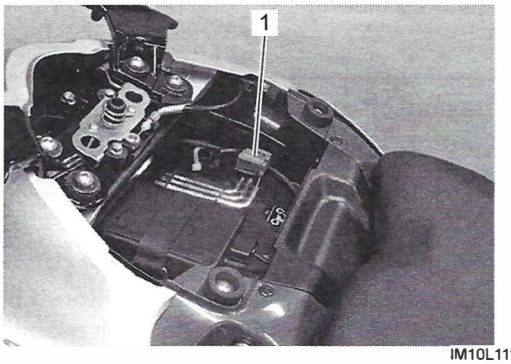
- Malfunction means that the ECM does not receive normal signal from the devices. These affected devices are indicated in the code form.

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.**
- **Some DTCs do not display malfunction code on the LCD.**
- **Pending DTC can be checked only by using the SDS-II.**

Diagnostic coupler location
Mode select coupler (6P) (1) is located under the rear seat. This coupler can use SDS-II tool and OBD conversion cable.

Special tool
09904–41051
09904–41071



IM10L1110126-02

Show Failure Data
ECM stores the engine and driving conditions at the moment of the detection of a malfunction in its memory. This data is called "Show failure data".
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 failure data". This "Show failure data" function can record the maximum of two Diagnostic Trouble Codes in the ECM.
Also, ECM has a function to store each "Show failure data" 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.
For details of "Show failure data" that can be read from ECM, refer to the table below.

DTC
Calculated LOAD value
Engine coolant temperature
Short term fuel trim (Bank1)
Long term fuel trim (Bank1)
Manifold absolute pressure "A"
Engine speed
Vehicle speed sensor
Intake air temperature
Absolute throttle position angle bank1
Battery voltage
Gear position

Show failure data clearance
When a DTC is cleared, the "Show failure data" for the malfunction represented by this DTC is also cleared.

System Readiness Test (If Equipped)

The system readiness test is performed for the purpose of checking that each of the exhaust-emission-related systems fulfills the conditions that allow ECM to detect a malfunction if it occurs and to set the corresponding DTC. The test is carried out by monitoring the specific items (components) using a SDS-II. When the test shows that the conditions pre-established for the tested system are met, ECM performs an on-board diagnosis of the system, changes the status of the system readiness test from "Not Complete" to "Completed", and causes the "Completed" status to be displayed on the scan tool.

The "Completed" status is maintained until DTC clearance operation is performed using the scan tool.

NOTE

- **The system readiness test status may change from "Completed" to "Not Complete" if any of the following service operations is performed.**
  - **Disconnection of battery (–) lead wire**
  - **Disconnection of ECM couplers**
  - **Removal of ECM power supply fuse**
- **The items (components) indicated in the table below are monitored in the system readiness test to check the readiness for detecting the DTCs listed beside each monitoring item.**
- **The "Completed" or "Not Complete" status identified through the system readiness test does not mean the "Normal" or "Abnormal" result of on-board diagnosis.**

Monitoring item of system readiness test

NOTE

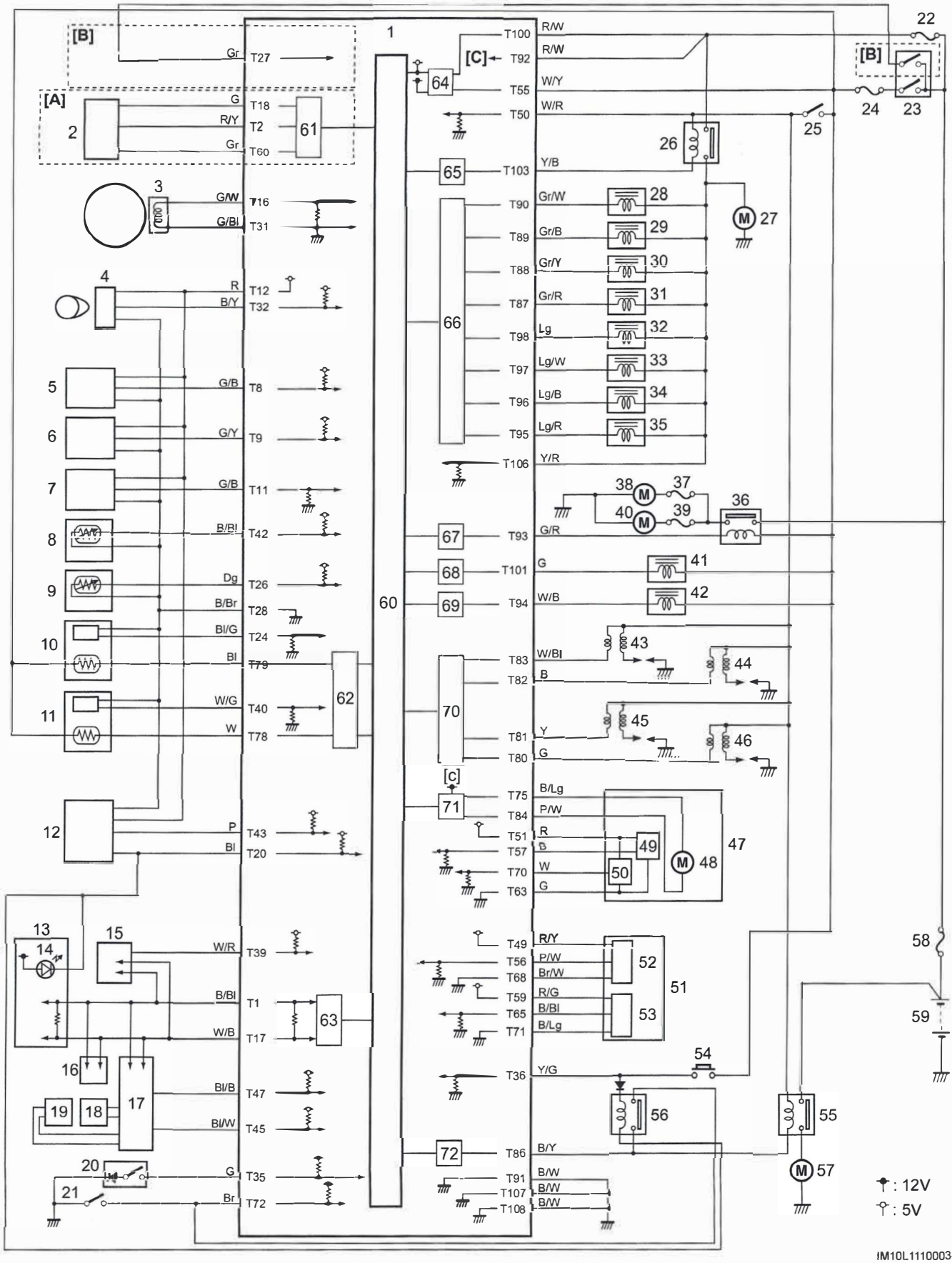
SDS-II displays "monitoring item" except the following table. And statuses of those "monitoring item" are always displayed with "Completed".

Monitoring item	DTC related to monitoring item
HO2 Sensor	P0133
	P0153
PAIR system	P0410

Schematic and Routing Diagram

Engine Control System Wiring Diagram

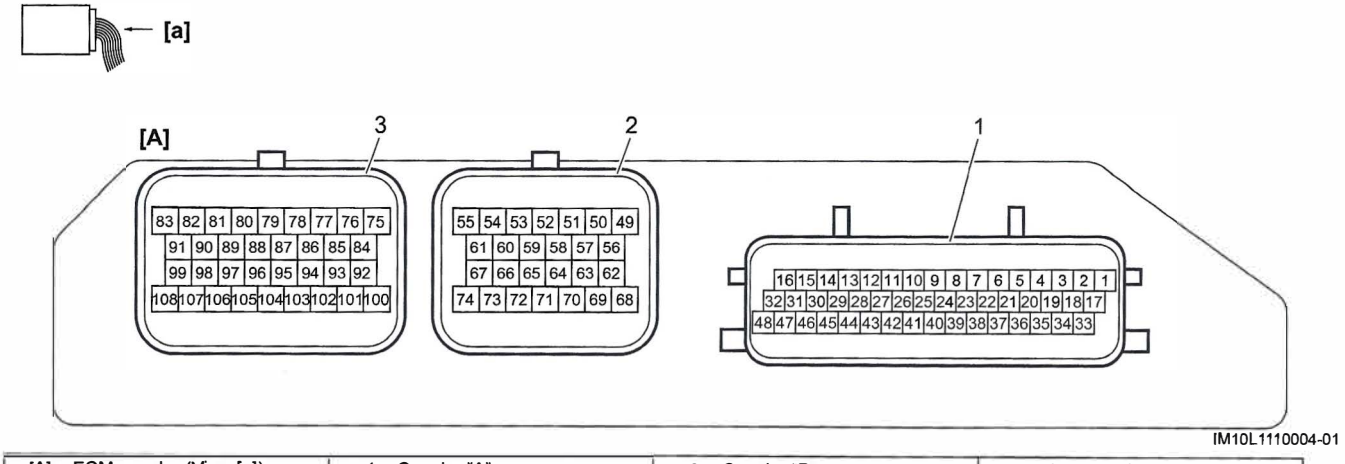
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[A]: With immobilizer control system	17. ABS control unit / HU	36. Cooling fan relay	55. Starter relay
[B]: Without immobilizer control system	18. Front wheel speed sensor	37. Fan (RH) fuse (15 A)	56. Starter sub relay
[C]: To [c]	19. Rear wheel speed sensor	38. Cooling fan motor (RH)	57. Starter motor
1. ECM	20. Side-stand switch	39. Fan (LH) fuse (15 A)	58. Main fuse (30 A)
2. Immobilizer antenna	21. Clutch lever position switch	40. Cooling fan motor (LH)	59. Battery
3. CKP sensor	22. Fuel fuse (10 A)	41. EVAP system purge control solenoid valve (If equipped)	60. CPU
4. CMP sensor	23. Ignition switch	42. PAIR control solenoid valve	61. Immobilizer antenna communication and indicator light drive circuit
5. IAP sensor	24. Ignition fuse (10 A)	43. Ignition coil #1	62. HO2 sensor heater drive circuit
6. AP sensor	25. Engine stop / starter switch ("RUN / STOP" position)	44. Ignition coil #2	63. CAN driver
7. Gearshift sensor	26. FP relay	45. Ignition coil #3	64. Power supply circuit
8. ECT sensor	27. Fuel pump	46. Ignition coil #4	65. Fuel pump relay drive circuit
9. IAT sensor	28. Primary fuel injector #1	47. Throttle body	66. Fuel injector drive circuit
10. HO2 sensor #1	29. Primary fuel injector #2	48. Throttle valve motor	67. Cooling fan relay drive circuit
11. HO2 sensor #2	30. Primary fuel injector #3	49. TP sensor (main)	68. EVAP system purge control solenoid valve drive circuit (If equipped)
12. GP sensor	31. Primary fuel injector #4	50. TP sensor (sub)	69. PAIR control solenoid valve drive circuit
13. Combination meter	32. Secondary fuel injector #1	51. Accelerator body assembly	70. Ignition coil drive circuit
14. Neutral indicator light	33. Secondary fuel injector #2	52. Accelerator position sensor (main)	71. Throttle valve motor drive circuit
15. Mode select coupler (6P)	34. Secondary fuel injector #3	53. Accelerator position sensor (sub)	72. Starter relay drive circuit
16. IMU	35. Secondary fuel injector #4	54. Engine stop / starter switch ("START" position)	

Terminal Arrangement of ECM Coupler

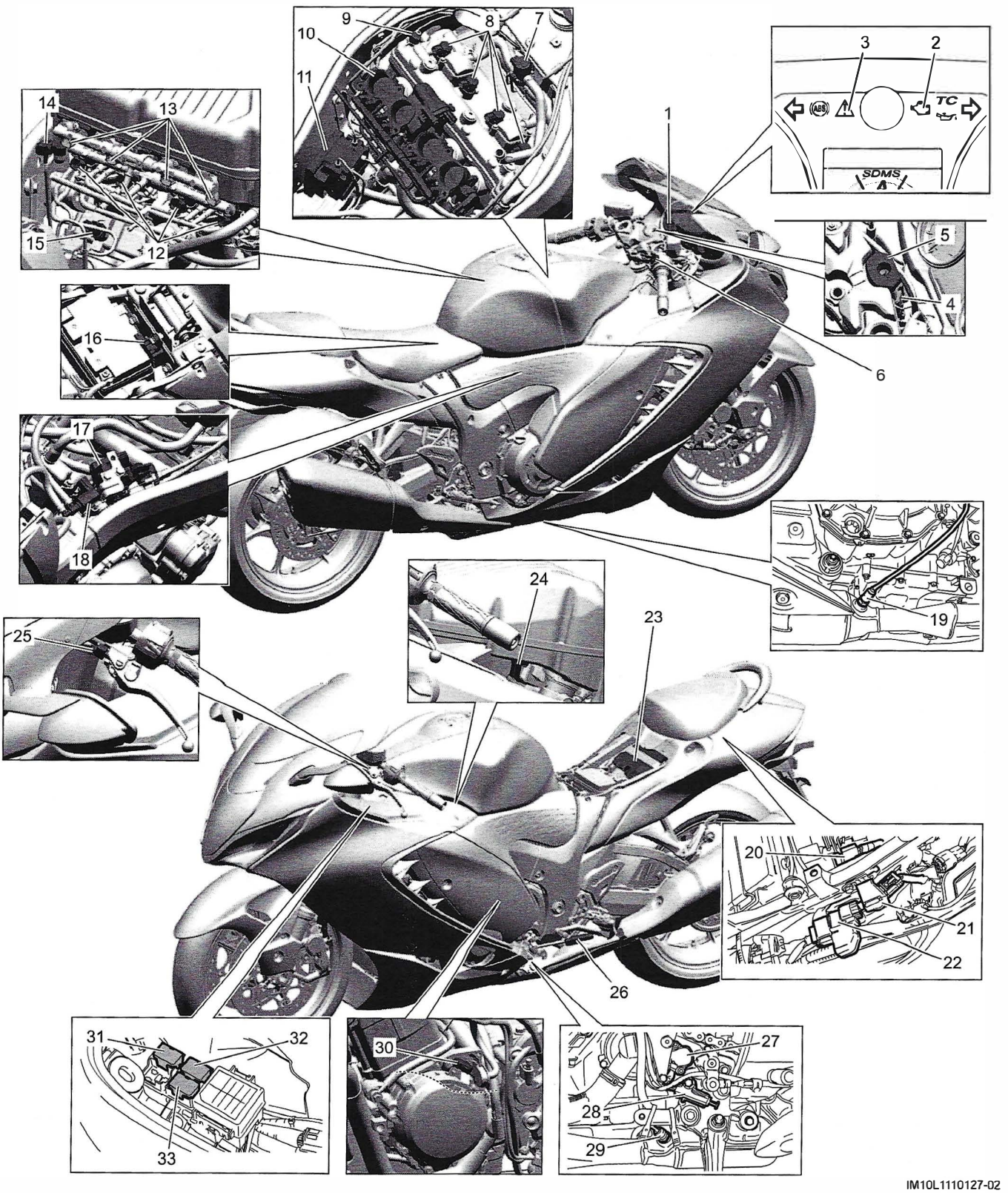


[A]: ECM coupler (View [a])	1. Coupler "A"	2. Coupler "B"	3. Coupler "C"

Component Location

Engine Control System Component Location

BENM10L31103001



IM10L1110127-02

1. Combination meter	12. Primary fuel injector	23. ECM
2. MIL	13. Secondary fuel injector	24. IAT sensor
3. Master warning indicator	14. IAP sensor	25. Clutch lever position switch
4. Ignition switch	15. ECT sensor	26. Gearshift sensor
5. Immobilizer antenna (If equipped)	16. IMU	27. GP sensor
6. Engine stop / starter switch	17. Accelerator body assembly (incorporating accelerator position sensor (main and sub) and cruise control cancel switch)	28. Side-stand switch
7. PAIR control solenoid valve	18. EVAP system purge control solenoid valve (If equipped)	29. HO2 sensor #1
8. Ignition coil	19. HO2 sensor #2	30. CKP sensor
9. CMP sensor	20. Mode select coupler (6P)	31. FP relay
10. Throttle body (incorporating TP sensor (main and sub) and throttle valve motor)	21. AP sensor	32. Cooling fan relay
11. ABS control unit / HU	22. Starter relay	33. Starter sub relay

Diagnostic Information and Procedures

Engine Control System Check

BENM10L31104001

Refer to the following items for the details of each step.

Step 1

Customer complaint analysis

1) Perform customer complaint analysis. ☞(Page 1A-9)

Was customer complaint analysis performed?

Yes — Go to Step 2.

No — Perform customer complaint analysis.

Step 2

DTC check

1) Check for DTCs (including pending DTCs). ☞(Page 1A-11)

Is there any DTC(s)?

Yes — Check and repair according to applicable DTC troubleshooting, and go to Step 5.

No — Go to Step 3.

Step 3

Visual inspection

1) Perform visual inspection. ☞(Page 1A-11)

Is there any faulty condition?

Yes — Repair or replace defective part, and go to Step 5.

No — Go to Step 4.

Step 4

Trouble symptom confirmation

1) Check trouble symptom. ☞(Page 1A-11)

Is trouble symptom identified?

Yes — Perform "Engine Symptom Diagnosis" (Page 1A-25), and go to Step 5.

No — Perform "Intermittent Malfunction Inspection" in Section 00 (Page 00-7), and go to Step 5.

Step 5

Final confirmation test

1) Perform final confirmation test. ☞(Page 1A-11)

Does the trouble recur?

Yes — Go to Step 2.

No — End.

Step 1: 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:

MIL condition	□ Always ON / □ Sometimes ON / □ Always OFF / □ Good condition
Master warning indicator condition	□ Always ON / □ Sometimes ON / □ Always OFF / □ Good condition
Malfunction display/code	User mode: □ No display / □ Malfunction display ( )
	Dealer mode: □ No code / □ Malfunction code ( )

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

MOTORCYCLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental condition	
Weather 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:

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Step 2: DTC Check
First, check DTC (including pending DTCs). ☞(Page 1A-11)

Step 3: Visual Inspection
As a preliminary step, perform visual check of the items that support proper function of the engine. ☞(Page 1A-24)

Step 4: Trouble Symptom Confirmation
Based on information obtained in "Step 1: Customer Complaint Analysis" (Page 1A-9), check trouble symptoms.

Step 5: Final Confirmation Test
Check that the problem symptom has gone and engine is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC referring to "DTC Clearance" (Page 1A-12) and confirm that the DTC is not indicated, based on information obtained in "Step 1: Customer Complaint Analysis" (Page 1A-9).

DTC Check

BENM10L31104002

NOTE

- **Do not disconnect the coupler from ECM, battery cable from battery, ECM ground wire from engine or fuse before confirming DTC stored in memory. Such disconnection will erase memorized information in ECM memory.**
- **Before checking DTC, read "User Mode and Dealer Mode" under "Self-Diagnosis Function" (Page 1A-1) carefully to have good understanding as to what functions are available and how to use it.**

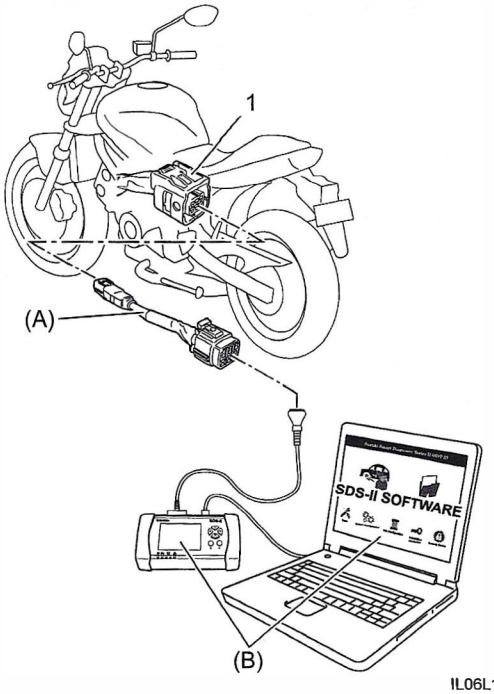
Use of SDS-II

1) Turn the ignition switch OFF.
2) Remove the rear seat. ☞(Page 9D-34)
3) Connect the conversion cable (ISO) to mode select coupler (6P) (1).

   Special tool
   (A): 09904–41071

4) Connect the SDS-II to conversion cable (ISO).

   Special tool
   (B): 09904–41031
   09904–41041



IL06L1110160-02

5) Turn the ignition switch ON.
6) Read DTC according to instructions displayed on SDS-II and print it or write it down. Refer to SDS-II operation manual for further details.

NOTE

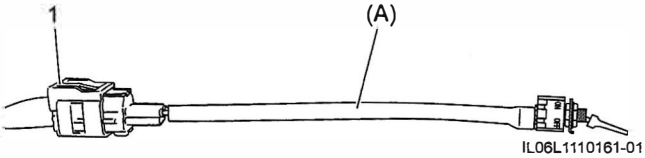
- **If communication between SDS-II and ECM is not possible, perform the following checks.**
  - **Check wire harness between mode select coupler (6P) and ECM coupler.**
  - **Check DIG-cable between mode select coupler (6P) and SDS-II. If necessary, check DIG-cable and conversion cable (ISO) by substituting a known-good cable.**
  - **Check CAN communication system. ☞(Page 10H-4)**
  - **Check ECM power circuit and ground circuit. ☞(Page 1A-113)**
- **Not only SDS-II used for detecting DTCs but also for reproducing and checking on screen the failure condition as described by customers using the trigger. How to use trigger referring to the SDS-II operation manual for further details.**

7) Close the SDS-II and turn the ignition switch OFF.
8) Disconnect the SDS-II from conversion cable (ISO).
9) Disconnect the conversion cable (ISO) from mode select coupler (6P).
10) Install the removed parts.

Use of Mode Select Switch

1) Remove the rear seat. ☞(Page 9D-34)
2) Connect the special tool to the mode select coupler (6P) (1) at the wiring harness.

Special tool
(A): 09930–83130



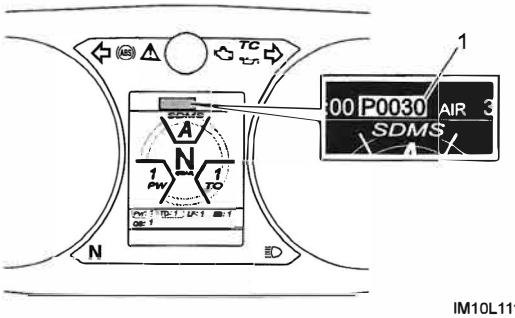
IL06L1110161-01

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



IJ10K1110012-01

5) Check the DTC (1) to determine the malfunction part. ☞(Page 1A-13)



IM10L1110125-02

DTC Clearance

BENM10L31104003

NOTE

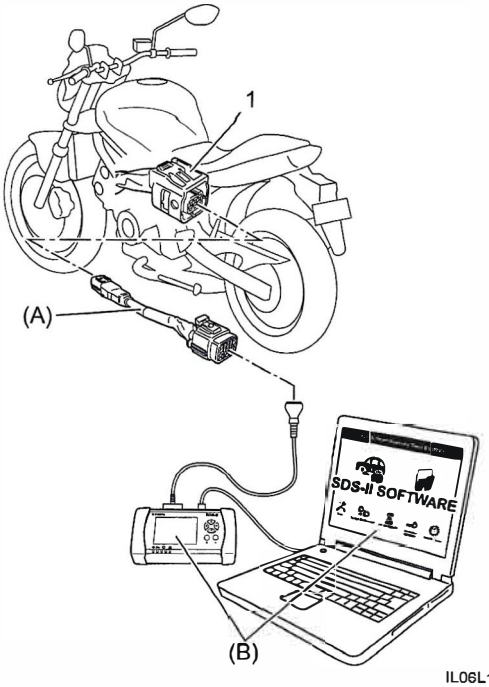
The malfunction code is memorized in the ECM also when the lead wire coupler of any sensor is disconnected. Therefore, when a lead wire coupler has been disconnected in the diagnosis, erase the stored past DTC.

1) Turn the ignition switch OFF.
2) Remove the rear seat. ☞(Page 9D-34)
3) Connect the conversion cable (ISO) to mode select coupler (6P) (1).

Special tool
(A): 09904–41071

4) Connect the SDS-II to conversion cable (ISO).

Special tool
(B): 09904–41031
09904–41041



IL06L1110160-02

5) Turn the ignition switch ON.
6) Clear DTC according to instructions displayed on SDS-II. Refer to SDS-II operation manual for further details.

NOTE

If communication between SDS-II and ECM is not possible, perform the following checks.

- **Check wire harness between mode select coupler (6P) and ECM coupler.**
- **Check DIG-cable between mode select coupler (6P) and SDS-II. If necessary, check DIG-cable and conversion cable (ISO) by substituting a known-good cable.**
- **Check CAN communication system. ☞(Page 10H-4)**
- **Check ECM power circuit and ground circuit. ☞(Page 1A-113)**

7) Close the SDS-II and turn the ignition switch OFF.
8) Disconnect the SDS-II from conversion cable (ISO).
9) Disconnect the conversion cable (ISO) from mode select coupler (6P).
10) Install the removed parts.

DTC Table

BENM10L31104004

NOTE

- **When DTC P0300 / P0301 / P0302 / P0303 / P0304 is detected, MIL blinks or lights up according to detecting condition.**
- **"1 D/C / 3 D/C" in "DTC detection logic" column of table below means DTC detecting logic varies depending on DTC.**
- ***1: Display on the LCD only. (If the ECM is normal but the ABS detects DTC, ABS-related DTC(s) is displayed.)**
- **Some DTCs do not display malfunction code on the LCD.**

DTC	DTC name	DTC detecting condition	DTC detection logic	MIL	Master warning indicator
00000 *1	None	—	—	OFF	OFF
P0030	HO2 Sensor Heater Control Circuit Bank 1 Sensor 1 ☞(Page 1A-32)	HO2 sensor #1 heater circuit is shorted to ground or open.	3 D/C	ON	OFF
P0050	HO2 Sensor Heater Control Circuit Bank 2 Sensor 1 ☞(Page 1A-34)	HO2 sensor #2 heater circuit is shorted to ground or open.	3 D/C	ON	OFF
P0069	Manifold Absolute Pressure - Barometric Pressure Correlation ☞(Page 1A-36)	Difference between measured value by AP sensor and measured value by IAP sensor is higher than specified value although the engine is stopped.	3 D/C	ON	OFF
P0110	IAT Sensor 1 Circuit ☞(Page 1A-38)	IAT sensor output voltage is higher than 4.90 V.	3 D/C	ON	OFF
P0111	IAT Sensor 1 Circuit Response Malfunction ☞(Page 1A-38)	IAT sensor output voltage does not change, under the specified condition.	3 D/C	ON	OFF
P0112	IAT Sensor 1 Circuit Low ☞(Page 1A-38)	IAT sensor output voltage is lower than 0.10 V.	3 D/C	ON	OFF
P0115	ECT Sensor Circuit ☞(Page 1A-40)	ECT sensor output voltage is higher than 4.90 V.	1 D/C	ON	OFF
P0116	ECT Sensor Circuit Response Malfunction ☞(Page 1A-40)	ECT sensor output voltage does not change, under the specified condition.	3 D/C	ON	OFF
P0117	ECT Sensor Circuit Low ☞(Page 1A-40)	ECT sensor output voltage is lower than 0.10 V.	3 D/C	ON	OFF
P0120	TP Sensor / Switch "A" Circuit ☞(Page 1A-42)	TP sensor (main) output voltage is lower than 0.20 V.	1 D/C	ON	OFF
P0123	TP Sensor / Switch "A" Circuit High ☞(Page 1A-42)	TP sensor (main) output voltage is higher than 4.80 V.	1 D/C	ON	OFF

DTC	DTC name	DTC detecting condition	DTC detection logic	MIL	Master warning indicator
P0130	O2 Sensor Circuit Bank 1 Sensor 1 ☞(Page 1A-44)	HO2 sensor #1 is not activated.	3 D/C	ON	OFF
P0132	O2 Sensor Circuit High Voltage Bank 1 Sensor 1 ☞(Page 1A-44)	HO2 sensor #1 output voltage is higher than 4.90 V.	3 D/C	ON	OFF
P0133	O2 Sensor Circuit Slow Response (Bank1 Sensor1) ☞(Page 1A-44)	Shifting time between rich and lean of HO2 sensor #1 is longer than specified time.	3 D/C	ON	OFF
P0150	O2 Sensor Circuit Bank 2 Sensor 1 ☞(Page 1A-46)	HO2 sensor #2 is not activated	3 D/C	ON	OFF
P0152	O2 Sensor Circuit High Voltage Bank 2 Sensor 1 ☞(Page 1A-46)	HO2 sensor #2 output voltage is higher than 4.90 V.	3 D/C	ON	OFF
P0153	O2 Sensor Circuit Slow Response (Bank2 Sensor1) ☞(Page 1A-46)	Shifting time between rich and lean of HO2 sensor #2 is longer than specified time.	3 D/C	ON	OFF
P0171	System Too Lean Bank 1 ☞(Page 1A-48)	Fuel trim correction is higher than specified value for specified time under the specified condition.	3 D/C	ON	OFF
P0172	System Too Rich Bank 1 ☞(Page 1A-48)	Fuel trim correction is lower than specified value for specified time under the specified condition.	3 D/C	ON	OFF
P0174	System Too Lean Bank 2 ☞(Page 1A-48)	Fuel trim correction is higher than specified value for specified time under the specified condition.	3 D/C	ON	OFF
P0175	System Too Rich Bank 2 ☞(Page 1A-48)	Fuel trim correction is lower than specified value for specified time under the specified condition.	3 D/C	ON	OFF
P0201	Injector Circuit / Open – Cylinder 1 ☞(Page 1A-50)	Primary fuel injector #1 signal is interrupted by 20 times or more continuity although CKP signal is detected.	1 D/C	ON	OFF
P0202	Injector Circuit / Open – Cylinder 2 ☞(Page 1A-50)	Primary fuel injector #2 signal is interrupted by 20 times or more continuity although CKP signal is detected.	1 D/C	ON	OFF
P0203	Injector Circuit / Open – Cylinder 3 ☞(Page 1A-50)	Primary fuel injector #3 signal is interrupted by 20 times or more continuity although CKP signal is detected.	1 D/C	ON	OFF
P0204	Injector Circuit / Open – Cylinder 4 ☞(Page 1A-50)	Primary fuel injector #4 signal is interrupted by 20 times or more continuity although CKP signal is detected.	1 D/C	ON	OFF
P0220	TP Sensor / Switch "B" Circuit ☞(Page 1A-52)	TP sensor (sub) output voltage is lower than 0.20 V.	1 D/C	ON	OFF
P0223	TP Sensor / Switch "B" Circuit High ☞(Page 1A-52)	TP sensor (sub) output voltage is higher than 4.80 V.	1 D/C	ON	OFF
P0232	FP Secondary Circuit High ☞(Page 1A-55)	Voltage is input to ECM although the FP relay is OFF.	1 D/C	OFF	ON
P023F	FP Secondary Circuit / Open ☞(Page 1A-55)	No voltage is input to ECM although the FP relay is ON.	1 D/C	OFF	ON

DTC	DTC name	DTC detecting condition	DTC detection logic	MIL	Master warning indicator
P0300	Random / Multiple Cylinder Misfire Detected ☞(Page 1A-57)	Any of the following conditions is met. • Misfire, which causes damage to the catalyst, is detected at 2 or more cylinders, under the specified condition. (The MIL blinks) • Misfire, which affects exhaust emission adversely, is detected at 2 or more cylinders, under the specified condition.	3 D/C	ON	OFF
P0301	Cylinder 1 Misfire Detected ☞(Page 1A-57)	Any of the following conditions is met. • Misfire, which causes damage to the catalyst, is detected at cylinder #1, under the specified condition. (The MIL blinks) • Misfire, which affects exhaust emission adversely, is detected at cylinder #1, under the specified condition.	3 D/C	ON	OFF
P0302	Cylinder 2 Misfire Detected ☞(Page 1A-57)	Any of the following conditions is met. • Misfire, which causes damage to the catalyst, is detected at cylinder #2, under the specified condition. (The MIL blinks) • Misfire, which affects exhaust emission adversely, is detected at cylinder #2, under the specified condition.	3 D/C	ON	OFF
P0303	Cylinder 3 Misfire Detected ☞(Page 1A-57)	Any of the following conditions is met. • Misfire, which causes damage to the catalyst, is detected at cylinder #3, under the specified condition. (The MIL blinks) • Misfire, which affects exhaust emission adversely, is detected at cylinder #3, under the specified condition.	3 D/C	ON	OFF
P0304	Cylinder 4 Misfire Detected ☞(Page 1A-57)	Any of the following conditions is met. • Misfire, which causes damage to the catalyst, is detected at cylinder #4, under the specified condition. (The MIL blinks) • Misfire, which affects exhaust emission adversely, is detected at cylinder #4, under the specified condition.	3 D/C	ON	OFF

DTC	DTC name	DTC detecting condition	DTC detection logic	MIL	Master warning indicator
P0335	CKP Sensor "A" Circuit ☞(Page 1A-59)	CKP sensor signal is not input to ECM for a few seconds or more, after receiving the starter relay ON signal.	1 D/C	ON	OFF
P0340	CMP Sensor "A" Circuit Bank 1 or Single Sensor ☞(Page 1A-61)	No CMP signal is detected, although the CKP signal is input to ECM.	1 D/C	ON	OFF
P0351	Ignition Coil "A" Primary / Secondary Circuit ☞(Page 1A-63)	Ignition coil #1 signal is interrupted by 20 times or more continuity although CKP signal is detected.	1 D/C	ON	OFF
P0352	Ignition Coil "B" Primary / Secondary Circuit ☞(Page 1A-63)	Ignition coil #2 signal is interrupted by 20 times or more continuity although CKP signal is detected.	1 D/C	ON	OFF
P0353	Ignition Coil "C" Primary / Secondary Circuit ☞(Page 1A-63)	Ignition coil #3 signal is interrupted by 20 times or more continuity although CKP signal is detected.	1 D/C	ON	OFF
P0354	Ignition Coil "D" Primary / Secondary Circuit ☞(Page 1A-63)	Ignition coil #4 signal is interrupted by 20 times or more continuity although CKP signal is detected.	1 D/C	ON	OFF
P0410	PAIR System ☞(Page 1A-64)	PAIR air flow volume is out of the specified range, under the specified condition.	3 D/C	ON	OFF
P0412	PAIR System Switching Valve "A" Circuit ☞(Page 1A-65)	PAIR control solenoid valve drive circuit is shorted to ground or open.	3 D/C	ON	OFF
P0444	EVAP System Purge Control Valve Circuit Open ☞(Page 1A-67)	EVAP system control solenoid valve circuit is shorted to ground or open.	3 D/C	ON	OFF
P0480	Fan 1 Control Circuit ☞(Page 1A-69)	Cooling fan relay drive circuit is shorted to ground or open.	3 D/C	OFF	ON
P0500	Vehicle Speed Sensor "A" ☞(Page 1A-71)	Any of the following conditions is met. • Front wheel speed is 0 km/h (0 mile/h) for a few seconds at motorcycle deceleration. • Front wheel speed is 0 km/h (0 mile/h) for a few seconds or more although the rear wheel speed is higher than 10km/h (6 mile/h). • Front wheel speed signal does not become stable	3 D/C	ON	OFF
P050B	Cold Start Ignition Timing Performance ☞(Page 1A-73)	Ignition timing for catalyst warming up is out of the specified range.	3 D/C	ON	OFF
P0602	Control Module Programming Error ☞(Page 1A-73)	ECM internal failure (data programming error).	1 D/C	OFF	ON
P0607	Control Module Performance ☞(Page 1A-73)	ECM internal processor failure.	1 D/C	ON	OFF
P0826	Up and Down Shift Switch Circuit ☞(Page 1A-74)	Gearshift sensor output voltage is lower than 0.10 V.	3 D/C	OFF	ON
P0828	Up and Down Shift Switch Circuit High ☞(Page 1A-74)	Gearshift sensor output voltage is higher than 4.90 V.	3 D/C	OFF	ON
P0830	Clutch Switch "A" Circuit ☞(Page 1A-76)	Clutch lever position switch is continuity ON for more than specified time with motorcycle running.	3 D/C	ON	OFF
P0850	Park / Neutral Switch Input Circuit ☞(Page 1A-78)	Neutral switch is continuity ON for more than specified time with motorcycle running.	3 D/C	ON	OFF

DTC	DTC name	DTC detecting condition	DTC detection logic	MIL	Master warning indicator
P0914	GP Sensor Circuit ☞(Page 1A-80)	GP sensor output voltage is higher than 4.90 V for 3 sec. or more continuity.	3 D/C	ON	OFF
P0915	GP Sensor Circuit Range/ Performance ☞(Page 1A-80)	Any of the following conditions is met. • GP sensor output voltage is out of the specified range. • Difference between measured gear position and estimated gear position is out of the specified range.	3 D/C	ON	OFF
P0916	GP Sensor Circuit Low ☞(Page 1A-80)	GP sensor output voltage is lower than 0.10 V for 3 sec. or more continuity.	3 D/C	ON	OFF
P1105	IAP Sensor Circuit Bank 2 ☞(Page 1A-82)	IAP sensor output voltage is higher than 4.80 V.	3 D/C	ON	OFF
P1106	IAP Sensor Circuit Range / Performance Bank2 ☞(Page 1A-82)	Any of the following conditions is met. • IAP sensor vacuum hose has come off. • IAP sensor output voltage does not change, under the specified condition.	3 D/C	ON	OFF
P1107	IAP Sensor Circuit Low Bank2 ☞(Page 1A-82)	IAP sensor output voltage is lower than 0.10 V.	3 D/C	ON	OFF
P1201	Secondary Injector Circuit / Open – Cylinder 1 ☞(Page 1A-84)	Secondary fuel injector #1 signal is interrupted by 20 times or more continuity although CKP signal is detected.	3 D/C	ON	OFF
P1202	Secondary Injector Circuit / Open – Cylinder 2 ☞(Page 1A-84)	Secondary fuel injector #2 signal is interrupted by 20 times or more continuity although CKP signal is detected.	3 D/C	ON	OFF
P1203	Secondary Injector Circuit / Open – Cylinder 3 ☞(Page 1A-84)	Secondary fuel injector #3 signal is interrupted by 20 times or more continuity although CKP signal is detected.	3 D/C	ON	OFF
P1204	Secondary Injector Circuit / Open – Cylinder 4 ☞(Page 1A-84)	Secondary fuel injector #4 signal is interrupted by 20 times or more continuity although CKP signal is detected.	3 D/C	ON	OFF
P1610	Ignition Switch Signal Circuit	**Without immobilizer control system** Ignition switch signal is not input to the ECM. ☞(Page 1A-86) **With immobilizer control system** Refer to "DTC Table" in Section 10C (Page 10C-3).	1 D/C	OFF	ON
P1622	Control Module ROM Error ☞(Page 1A-88)	EEPROM in ECM is corrupted.	1 D/C	ON	OFF
P1650	Inertial Measurement Unit ☞(Page 1A-88)	ECM receives abnormal signal from IMU.	3 D/C	OFF	ON

DTC	DTC name	DTC detecting condition	DTC detection logic	MIL	Master warning indicator
P2101	Throttle Actuator "A" Control Motor Circuit Range / Performance ☞(Page 1A-89)	Any of the following conditions is met. • Throttle valve motor and/or its circuit malfunction is detected. • Throttle valve sticking is detected • Difference between measured throttle valve position and targeted throttle valve position is out of the specified range. • The target value of throttle valve position does not become stable. • Throttle valve motor power supply circuit malfunction is detected. • Throttle valve does not become fully closed position. • TP sensor malfunction is detected.	1 D/C	ON	OFF
P2102	Throttle Actuator "A" Control Motor Circuit Low ☞(Page 1A-91)	Difference between power supply voltage to throttle valve motor and battery voltage is out of the specified range.	1 D/C	ON	OFF
P2120	TP Sensor / Switch "D" Circuit ☞(Page 1A-92)	Accelerator position sensor (main) output voltage is lower than 0.10 V.	1 D/C	ON	OFF
P2123	TP Sensor / Switch "D" Circuit High ☞(Page 1A-92)	Accelerator position sensor (main) output voltage is higher than 4.90 V.	1 D/C	ON	OFF
P2125	TP Sensor / Switch "E" Circuit ☞(Page 1A-94)	Accelerator position sensor (sub) output voltage is lower than 0.10 V.	1 D/C	ON	OFF
P2128	TP Sensor / Switch "E" Circuit High ☞(Page 1A-94)	Accelerator position sensor (sub) output voltage is higher than 4.90 V.	1 D/C	ON	OFF
P2135	TP Sensor / Switch "A" / "B" Voltage Correlation ☞(Page 1A-96)	Difference between TP sensor (main) value and TP sensor (sub) value is out of the specified range.	1 D/C	ON	OFF
P2138	TP Sensor / Switch "D" / "E" Voltage Correlation ☞(Page 1A-97)	Difference between accelerator position sensor (main) value and accelerator position sensor (sub) value is out of the specified range.	1 D/C	ON	OFF
P2158	Vehicle Speed Sensor "B" ☞(Page 1A-98)	Any of the following conditions is met, at motorcycle deceleration. • Rear wheel speed is 0 km/h (0 mile/h) for a few seconds or more, at motorcycle deceleration. • Rear wheel speed is 0 km/h (0 mile/h) for a few seconds or more although the front wheel speed is higher than 10km/h (6 mile/h). • Rear wheel speed signal does not become stable.	3 D/C	ON	OFF
P2226	AP Sensor Circuit ☞(Page 1A-100)	AP sensor output voltage is higher than 4.80 V.	3 D/C	ON	OFF
P2228	AP Sensor Circuit Low ☞(Page 1A-100)	AP sensor output voltage is lower than 0.10 V.	3 D/C	ON	OFF
P2505	ECM Power Input Signal ☞(Page 1A-102)	Power source for ECM is not supplied.	1 D/C	ON	OFF

DTC	DTC name	DTC detecting condition	DTC detection logic	MIL	Master warning indicator
P2A00	O2 Sensor Circuit Range / Performance Bank 1 Sensor 1 ☞(Page 1A-103)	HO2 sensor #1 output voltage is stayed for specified time or more.	3 D/C	ON	OFF
P2A03	O2 Sensor Circuit Range / Performance Bank 2 Sensor 1 ☞(Page 1A-104)	HO2 sensor #2 output voltage is stayed for specified time or more.	3 D/C	ON	OFF
U0073	Control Module Communication Bus Off	Refer to "CAN DTC (Lost Communication and Communication Bus Off) Table" in Section 10H (Page 10H-5).	1 D/C	OFF	ON
U0121	Lost Communication With ABS Control Module		1 D/C	OFF	ON
U0123	Lost Communication With IMU		1 D/C	OFF	ON
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module		1 D/C	OFF	ON

Fail-Safe Table

BENM10L31104005

Engine control 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.

NOTE

- ***1: When the clutch lever is grasped, starting ability is "YES".**
- ***2: Depending on the timing of DTC detection, the starting ability may become "NO".**

Item	Fail-safe mode	Starting ability	Running ability
HO2 sensor heater	• ECM stops controlling HO2 sensor heater. • Feedback compensation is inhibited. (Air / fuel ratio is fixed to normal.)	"YES"	"YES"
IAP sensor	Intake air pressure value is fixed to 101.3 kPa (760 mmHg).	"YES"	"YES"
AP sensor	Atmospheric pressure value is fixed to 101.3 kPa (760 mmHg).	"YES"	"YES"
IAT sensor	Intake air temperature value is fixed 25.0 °C (77 °F).	"YES"	"YES"
ECT sensor	• Engine coolant temperature value is fixed to 80 °C (176 °F). • Cooling fan is fixed to on state.	"YES"	"YES"
TP sensor	**One of the TP sensor (main) or TP sensor (sub) is normal:** ECM uses normal sensor side signal.	"YES"	"YES"
HO2 sensor	• ECM stops controlling HO2 sensor heater. • Feedback compensation is inhibited. (Air / fuel ratio is fixed to normal.)	"YES"	"YES"
Ignition coil #1	Cylinder #1 fuel-cut	"YES"	"YES"
		Cylinder #2, #3 & #4 can run	
Ignition coil #2	Cylinder #2 fuel-cut	"YES"	"YES"
		Cylinder #1, #3 & #4 can run	
Ignition coil #3	Cylinder #3 fuel-cut	"YES"	"YES"
		Cylinder #1, #2 & #4 can run	
Ignition coil #4	Cylinder #4 fuel-cut	"YES"	"YES"
		Cylinder #1, #2 & #3 can run	
PAIR control solenoid valve	ECM stops controlling PAIR control solenoid valve.	"YES"	"YES"
EVAP system purge control solenoid valve	ECM stops controlling EVAP system purge control solenoid valve.	"YES"	"YES"

Item	Fail-safe mode	Starting ability	Running ability
Cooling fan relay	ECM stops controlling cooling fan relay.	"YES"	"YES"
Clutch lever position switch	Clutch lever position switch is fixed to OFF.	"YES"	"YES"
GP sensor	It is either following depending on a failed state. • Gear position signal is fixed to specified gear position. • Gear position signal is fixed to the position before occurrence of failure.	"NO" *1	"YES"
Accelerator position sensor	Throttle grip opening value is fixed to fully closed position.	"YES"	"NO"
Throttle valve motor	ECM stops controlling throttle valve motor.	"YES" *2	"YES"
Front wheel speed sensor	Front vehicle speed is fixed to 0 km/h (0 mile/h).	"YES"	"YES"
Rear wheel speed sensor	Rear vehicle speed is fixed to 0 km/h (0 mile/h).	"YES"	"YES"

Scan Tool Data

BENM10L31104006

As the data values are standard values estimated on the basis of values obtained from the normally operating motorcycles using a SDS-II, use them as reference values.
Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made depending on these data alone.

NOTE

- **If communication between SDS-II and ECM is not possible, perform the following checks.**
  - **Check wire harness between mode select coupler (6P) and ECM coupler.**
  - **Check DIG-cable between mode select coupler (6P) and SDS-II. If necessary, check DIG-cable and conversion cable (ISO) by substituting a known-good cable.**
  - **Check CAN communication system. ☞(Page 10H-4)**
  - **Check ECM power circuit and ground circuit. ☞(Page 1A-113)**
- ***1: The value of throttle position displayed on SDS-II is different from value of mechanical throttle valve opening.**
  - **Mechanical throttle valve opening (Ignition switch: ON):**
    - **Throttle grip is fully close position: Approx. 6.1 – 8.5°**
    - **Throttle grip is fully open position: Approx. 90.0°**

Scan tool data	Normal condition / Reference value	Motorcycle condition
Short term fuel trim (Bank1)	Approx. -25 – 50%	Engine: Idle speed after warming up
Long term fuel trim (Bank1)	Approx. -25 – 50%	Engine: Idle speed after warming up
Short term fuel trim (Bank2)	Approx. -25 – 50%	Engine: Idle speed after warming up
Long term fuel trim (Bank2)	Approx. -25 – 50%	Engine: Idle speed after warming up
Vehicle speed sensor front	Almost the same as combination meter reading.	Riding condition: While running
Vehicle speed sensor rear	Almost the same as combination meter reading.	Riding condition: While running
Engine speed	Approx. 1150 r/min	Engine: Idle speed after warming up
Manifold absolute pressure "A"	Approx. 100 kPa	Engine: Stopped
	Approx. 60 kPa	Engine: Idle speed after warming up
Barometric pressure	Almost the same as measured value.	The barometric pressure is measured and compared with scan tool data reading.
Intake air temperature	Almost the same as measured value.	The intake air temperature is measured and compared with scan tool data reading.
Ambient air temperature	Almost the same as measured value.	The ambient air temperature is measured and compared with scan tool data reading.
Engine coolant temperature	Approx. 80 – 105 °C	Engine: Idle speed after warming up
Learned IAC actuator position (ETV)	Approx. 1.8°	Engine: Idle speed after warming up

Scan tool data	Normal condition / Reference value	Motorcycle condition	
Shift sensor output voltage	Approx. 4.48 – 4.65 V	Gearshift lever: Fully upped	
	Approx. 2.38 – 2.62 V	Gearshift lever: Neutral position	
	Approx. 0.35 – 0.52 V	Gearshift lever: Fully downed	
Gear position	N	Gear position: Neutral	
	1	Gear position: 1st	
	2	Gear position: 2nd	
	3	Gear position: 3rd	
	4	Gear position: 4th	
	5	Gear position: 5th	
	6	Gear position: 6th	
Throttle position sensor A output voltage	Approx. 3.6 – 3.8 V	Throttle grip: Fully close position	
	Approx. 0.7 V	Throttle grip: Fully open position	
Throttle position sensor B output voltage	Approx. 4.2 – 4.4 V	Throttle grip: Fully close position	
	Approx. 1.3 V	Throttle grip: Fully open position	
Accelerator position sensor D output voltage	Approx. 0.5 – 0.7 V	Throttle grip: Fully close position	
	Approx. 3.5 V	Throttle grip: Fully open position	
Accelerator position sensor E output voltage	Approx. 0.8 – 1.0 V	Throttle grip: Fully close position	
	Approx. 4.6 V	Throttle grip: Fully open position	
Absolute throttle position angle bank1	Approx. 40.5° *1	Throttle grip: Fully close position	
	Approx. 118.0° *1	Throttle grip: Fully open position	
Absolute accelerator position angle	Approx. 15.5°	Throttle grip: Fully close position	
	Approx. 100.5°	Throttle grip: Fully open position	
Throttle motor voltage (Bank1)	Battery voltage	—	
Battery voltage	Approx. 12 – 15 V	Engine: Running	
Oxygen sensor1 (Bank1)	Approx. 0 – 1.0 V	Engine: Idle speed after warming up	
Oxygen sensor2 (Bank2)	Approx. 0 – 1.0 V	Engine: Idle speed after warming up	
Inertial sensor output Ox	3.12 to -3.12 deg/s	Static	Side-stand position with steering fully turned to left side.
	Numerical value increases to the positive or negative side.	Dynamic	Raise to upright position from side-stand position. (While raising)
Inertial sensor output Oy	3.12 to -3.12 deg/s	Static	Side-stand position with steering fully turned to left side.
	Numerical value increases to the positive or negative side.	Dynamic	Raise to upright position from side-stand position. (While raising)
Inertial sensor output Oz	3.12 to -3.12 deg/s	Static	Side-stand position with steering fully turned to left side.
	Numerical value increases to the negative side.	Dynamic	Raise to upright position from side-stand position. (While raising)
Engine stop / starter switch	Stop	Engine stop / starter switch ("STOP" position): ON	
	Run	Engine stop / starter switch ("STOP" position): OFF	
Radiator fan	On	Cooling fan: Running	
	Off	Cooling fan: Stopped	
EVAP canister	On	EVAP system purge control solenoid valve: ON	
	Off	EVAP system purge control solenoid valve: OFF	
PAIR control solenoid valve	On	PAIR control solenoid valve: ON	
	Off	PAIR control solenoid valve: OFF	
Neutral switch	GND	Gear position: Neutral	
	Open	Gear position: Other than neutral	
Test switch	On	Special Tool (Mode selection switch): Connected to the mode select coupler (6P), and ON	
	Off	Special Tool (Mode selection switch): Not connected to the mode select coupler (6P)	
Anti-theft type	Normal	DTC P1610: Not detected	
	Abnormal	DTC P1610: Detected	

Scan tool data	Normal condition / Reference value	Motorcycle condition
Tip over sensor	On	Motorcycle condition: Leaning 45° or more
	Off	Motorcycle condition: Normal
Clutch switch	On	Clutch lever: Grasped
	Off	Clutch lever: Released
Starter switch	On	Engine stop / starter switch ("START" position): Pushed
	Off	Engine stop / starter switch ("START" position): Released
Oxygen sensor heater1	On	ECM sends HO2 sensor heater drive signal to HO2 sensor.
	Off	ECM does not send HO2 sensor heater drive signal to HO2 sensor.
Set switch (Short)	On	"MODE" switch: Pushed (For a short time)
	Off	"MODE" switch: Released
Set switch (Long)	On	"MODE" switch: Pushed (For a long time)
	Off	"MODE" switch: Released
Up switch (Short)	On	"RES / UP" switch: Pushed (For a short time)
	Off	"RES / UP" switch: Released
Up switch (Long)	On	"RES / UP" switch: Pushed (For a long time)
	Off	"RES / UP" switch: Released
Down switch (Short)	On	"SET / DOWN" switch: Pushed (For a short time)
	Off	"SET / DOWN" switch: Released
Down switch (Long)	On	"SET / DOWN" switch: Pushed (For a long time)
	Off	"SET / DOWN" switch: Released
Speed control switch (Raw value)	On	Cruise control switch: Pushed
	Off	Cruise control switch: Released
Cruise cancel switch	On	Throttle grip: Cruise control cancel switch position
	Off	Throttle grip: Other than cruise control cancel switch position
Set switch (Raw value)	On	"MODE" switch: Pushed
	Off	"MODE" switch: Released
Up switch (Raw value)	On	"RES / UP" switch: Pushed
	Off	"RES / UP" switch: Released
Down switch (Raw value)	On	"SET / DOWN" switch: Pushed
	Off	"SET / DOWN" switch: Released
Fuel cut flag1	On	Engine: Decelerating
	Off	Engine: Idle speed
Fuel cut flag2	On	Engine: Decelerating
	Off	Engine: Idle speed
Fuel cut flag3	On	Engine: Decelerating
	Off	Engine: Idle speed
Fuel cut flag4	On	Engine: Decelerating
	Off	Engine: Idle speed
Cruise resume switch (Short)	On	"RES / UP" switch: Pushed (For a short time)
	Off	"RES / UP" switch: Released
Cruise resume switch (Long)	On	"RES / UP" switch: Pushed (For a long time)
	Off	"RES / UP" switch: Released
Cruise resume switch (Raw value)	On	"RES / UP" switch: Pushed
	Off	"RES / UP" switch: Released
Cruise set switch (Short)	On	"SET / DOWN" switch: Pushed (For a short time)
	Off	"SET / DOWN" switch: Released
Cruise set switch (Long)	On	"SET / DOWN" switch: Pushed (For a long time)
	Off	"SET / DOWN" switch: Released
Cruise set switch (Raw value)	On	"SET / DOWN" switch: Pushed
	Off	"SET / DOWN" switch: Released

Scan tool data	Normal condition / Reference value	Motorcycle condition
Gear position voltage	Approx. 1.0 – 1.3 V	Gear position: Neutral
	Approx. 0.5 – 0.8 V	Gear position: 1st
	Approx. 1.6 – 1.8 V	Gear position: 2nd
	Approx. 2.2 – 2.5 V	Gear position: 3rd
	Approx. 2.9 – 3.2 V	Gear position: 4th
	Approx. 3.6– 3.8 V	Gear position: 5th
	Approx. 4.2 – 4.5 V	Gear position: 6th
CAN status (ABS)	1	Any condition
CAN status (IPC)	1	Any condition
CAN status (IMU)	1	Any condition
Traction control mode	0	Motion track traction control system: OFF
DMS mode	1	SDMS-α: Mode A
	2	SDMS-α: Mode B
	3	SDMS-α: Mode C
	4	SDMS-α: Mode U1
	5	SDMS-α: Mode U2
	6	SDMS-α: Mode U3
Power mode	1	Power mode: Mode 1
	2	Power mode: Mode 2
	3	Power mode: Mode 3
Traction control mode	0	Motion track traction control system: OFF
	1	Motion track traction control system: Mode 1
	2	Motion track traction control system: Mode 2
	3	Motion track traction control system: Mode 3
	4	Motion track traction control system: Mode 4
	5	Motion track traction control system: Mode 5
	6	Motion track traction control system: Mode 6
	7	Motion track traction control system: Mode 7
	8	Motion track traction control system: Mode 8
	9	Motion track traction control system: Mode 9
	10	Motion track traction control system: Mode 10
Quick shift mode	0	Bi-directional quick shift system: Mode 0
	1	Bi-directional quick shift system: Mode 1
	2	Bi-directional quick shift system: Mode 2
Lift control mode	0	Anti-lift control: Mode 0
	1	Anti-lift control: Mode 1
	2	Anti-lift control: Mode 2
	3	Anti-lift control: Mode 3
	4	Anti-lift control: Mode 4
	5	Anti-lift control: Mode 5
	6	Anti-lift control: Mode 6
	7	Anti-lift control: Mode 7
	8	Anti-lift control: Mode 8
	9	Anti-lift control: Mode 9
	10	Anti-lift control: Mode 10
Engine-brake control mode	0	Engine brake control: Mode 0
	1	Engine brake control: Mode 1
	2	Engine brake control: Mode 2
	3	Engine brake control: Mode 3
Launch mode	1	Launch control: Mode 1
	2	Launch control: Mode 2
	3	Launch control: Mode 3
Desired speed (Cruise Controller)	Approx. 30 – 200 km/h	Cruise control system: ON
Desired speed (Speed Limiter)	Approx. 40 – 200 km/h	Active speed limiter: ON
Spin rate (Traction Control)	0%	Riding condition: While stopped
	Approx. 0 – 100%	Riding condition: While running
Number of reprogramming	0 – 255	According to number of times the "Reprogramming" is performed.

Scan tool data	Normal condition / Reference value	Motorcycle condition
Inertial sensor output Ax axis	3.78 to 0.73 m/s^2	Side-stand position with steering fully turned to left side.
	Numerical value increases to the negative side.	Upright position.
Inertial sensor output Ay axis	10.96 to 8.71 m/s^2	Side-stand position with steering fully turned to left side.
	Numerical value increases to the positive side.	Upright position.
Inertial sensor output Az axis	1.47 to -1.61 m/s^2	Side-stand position with steering fully turned to left side.
	Numerical value does not change.	Upright position.

Visual Inspection

BENM10L31104007

Prior to diagnosis using the SDS-II or mode select switch, 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 SDS-II or mode select switch.

Inspection item		Referring section
Engine oil	Level	"Engine Oil Inspection" in Section 1E (Page 1E-5)
	Leakage	
Engine coolant	Level	"Engine Coolant Level Inspection" in Section 1F (Page 1F-6)
	Leakage	"Engine Cooling System Inspection" in Section 1F (Page 1F-7)
Fuel	Level	—
	Leakage	"Fuel Hose Inspection" in Section 1G (Page 1G-7)
Air cleaner element	Dirt	"Air Cleaner Element Removal and Installation" in Section 1D (Page 1D-6)
	Clogging	
Battery	Corrosion of terminal	"Battery Visual Inspection" in Section 1J (Page 1J-9)
Fuse	Burning	"Precautions for Electrical Circuit Service" in Section 00 (Page 00-2)
MIL	Operation	"Self-Diagnosis Function" (Page 1A-1)
Master warning indicator		
Each indicator light	Operation	"Combination Meter On-Vehicle Inspection" in Section 9C (Page 9C-9)
Combination meter	Operation	"Combination Meter On-Vehicle Inspection" in Section 9C (Page 9C-9)
Exhaust system	Leakage of exhaust gas	"Exhaust System Inspection" in Section 1K (Page 1K-7)
	Noise	
Harness coupler	Disconnection	"Precautions for Electrical Circuit Service" in Section 00 (Page 00-2)
	Poor contact	

Engine Symptom Diagnosis

BENM10L31104008

Condition	Possible cause	Correction / Reference Item
Engine will not start or is hard to start (Compression too low)	Valve clearance out of adjustment.	*Adjust. ☞(Page 1D-26)*
	Worn valve guides or poor seating of valves.	*Repair or replace. ☞(Page 1D-44)*
	Mistimed valves.	*Adjust. ☞(Page 1D-26)*
	Excessively worn piston rings.	*Replace.* • *Removal: ☞(Page 1D-50)* • *Installation: ☞(Page 1D-51)*
	Worn-down cylinder bores.	*Replace.* • *Removal: ☞(Page 1D-50)* • *Installation: ☞(Page 1D-51)*
	Too slow starter motor cranking.	*Repair or replace.* • *Repair: ☞(Page 1I-7)* • *Replace: ☞(Page 1I-6)*
	Poor seating of spark plugs.	*Retighten. ☞(Page 1H-5)*
Engine will not start or is hard to start (Plug not sparking)	Defective spark plugs.	*Replace. ☞(Page 1H-5)*
	Too wide spark plug gap.	*Replace. ☞(Page 1H-5)*
	Fouled spark plugs.	*Replace. ☞(Page 1H-5)*
	Wet spark plugs.	*Dry or replace. ☞(Page 1H-5)*
	Defective ignition coils.	*Replace. ☞(Page 1H-4)*
	Defective CKP sensor.	*Replace.* • *Removal: ☞(Page 1J-4)* • *Installation: ☞(Page 1J-6)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Open-circuited wiring connections.	*Repair or replace. ☞(Page 9A-5)*
Engine will not start or is hard to start (No fuel reaching the intake port)	Clogged fuel filter or fuel hose.	*Clean or replace.* • *Fuel filter: ☞(Page 1G-20)* • *Fuel hose: ☞(Page 1G-8)*
	Defective fuel pump.	*Replace. ☞(Page 1G-16)*
	Defective fuel pump relay.	*Replace. ☞(Page 1G-20)*
	Defective fuel pressure regulator.	*Replace. ☞(Page 1G-18)*
	Defective fuel injectors.	*Replace. ☞(Page 1G-21)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Defective engine stop switch signal circuit.	• *Repair or replace: Engine stop switch signal wire. ☞(Page 9A-5)* • *Replace: ECM. ☞(Page 1C-2)*
	Open-circuited wiring connections.	*Repair and replace. ☞(Page 9A-5)*
Engine will not start or is hard to start (Incorrect fuel/air mixture)	Defective fuel pump.	*Replace. ☞(Page 1G-16)*
	Defective fuel pressure regulator.	*Replace. ☞(Page 1G-18)*
	Defective TP sensor.	*Replace. ☞(Page 1D-9)*
	Defective CKP sensor.	*Replace.* • *Removal: ☞(Page 1J-4)* • *Installation: ☞(Page 1J-6)*
	Defective IAP sensor.	*Replace. ☞(Page 1C-5)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Defective ECT sensor.	*Replace. ☞(Page 1C-6)*
	Defective IAT sensor.	*Replace. ☞(Page 1C-5)*
	Defective throttle valve motor.	*Replace. ☞(Page 1D-9)*

Condition	Possible cause	Correction / Reference Item
Engine idles poorly	Valve clearance out of adjustment.	*Adjust. ☞(Page 1D-26)*
	Poor seating of valves.	*Repair. ☞(Page 1D-44)*
	Defective valve guides.	*Replace. ☞(Page 1D-44)*
	Worn down camshafts and/or cam surfaces.	*Replace.* • *Removal: ☞(Page 1D-18)* • *Installation: ☞(Page 1D-19)*
	Too wide spark plug gap.	*Replace. ☞(Page 1H-5)*
	Defective ignition coil.	*Replace. ☞(Page 1H-4)*
	Defective CKP sensor.	*Replace.* • *Removal: ☞(Page 1J-4)* • *Installation: ☞(Page 1J-6)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Defective TP sensor.	*Replace. ☞(Page 1D-9)*
	Defective fuel pump.	*Replace. ☞(Page 1G-16)*
	Imbalanced throttle valve.	*Adjust. ☞(Page 0B-15)*
	Damaged or cracked vacuum hose.	*Replace.*
	Defective throttle valve motor.	*Replace. ☞(Page 1D-9)*
	Dirty throttle body.	*Clean. ☞(Page 1D-12)*
	Throttle valve system incorrect leaning.	*Reset learned value. ☞(Page 1C-3)*
Engine stalls often (Incorrect fuel/air mixture)	Defective IAP sensor or circuit.	*Repair or replace. ☞(Page 1C-5)*
	Clogged fuel filter.	*Replace. ☞(Page 1G-20)*
	Defective fuel pump.	*Replace. ☞(Page 1G-16)*
	Defective fuel pressure regulator.	*Replace. ☞(Page 1G-18)*
	Defective ECT sensor.	*Replace. ☞(Page 1C-6)*
	Defective thermostat.	*Replace. ☞(Page 1F-13)*
	Defective IAT sensor.	*Replace. ☞(Page 1C-5)*
	Damaged or cracked vacuum hose.	*Replace.*
	Defective throttle valve motor.	*Replace. ☞(Page 1D-9)*
Engine stalls often (Fuel injector improperly operating)	Defective fuel injectors.	*Replace. ☞(Page 1G-21)*
	No injection signal from ECM.	*Repair or replace. ☞(Page 1A-50)*
	Open or short circuited wiring connections.	*Repair or replace. ☞(Page 9A-5)*
	Defective battery or low battery voltage.	*Replace or recharge. ☞(Page 1J-8)*
Engine stalls often (Control circuit or sensor improperly operating)	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Defective fuel pressure regulator.	*Replace. ☞(Page 1G-18)*
	Defective TP sensor.	*Replace. ☞(Page 1D-9)*
	Defective IAT sensor.	*Replace. ☞(Page 1C-5)*
	Defective CKP sensor.	*Replace.* • *Removal: ☞(Page 1J-4)* • *Installation: ☞(Page 1J-6)*
	Defective CMP sensor.	*Replace. ☞(Page 1C-11)*
	Defective ECT sensor.	*Replace. ☞(Page 1C-6)*
	Defective fuel pump relay.	*Replace. ☞(Page 1G-20)*
	Defective throttle valve motor.	*Replace. ☞(Page 1D-9)*
	Throttle valve system incorrect leaning.	*Reset learned value. ☞(Page 1C-3)*
Engine stalls often (Engine internal parts improperly operating)	Fouled spark plug.	*Replace. ☞(Page 1H-5)*
	Defective CKP sensor.	*Replace.* • *Removal: ☞(Page 1J-4)* • *Installation: ☞(Page 1J-6)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Clogged fuel hose.	*Clean or replace. ☞(Page 1G-8)*
	Valve clearance out of adjustment.	*Adjust. ☞(Page 1D-26)*
	Dirty throttle body.	*Clean. ☞(Page 1D-12)*

Condition	Possible cause	Correction / Reference Item
Noisy engine (Excessive valve chatter)	Too large valve clearance.	*Adjust. ☞(Page 1D-26)*
	Weakened or broken valve springs.	*Replace. ☞(Page 1D-40)*
	Worn tappets and/or cam surfaces.	*Replace.* • *Removal: ☞(Page 1D-18)* • *Installation: ☞(Page 1D-19)*
	Worn or burnt camshaft journals.	*Replace.* • *Removal: ☞(Page 1D-18)* • *Installation: ☞(Page 1D-19)*
Noisy engine (Noise seems to come from piston)	Worn down pistons or cylinders.	*Replace.* • *Piston:* – *Removal: ☞(Page 1D-50)* – *Installation: ☞(Page 1D-51)* • *Cylinder* – *Removal: ☞(Page 1D-50)* – *Installation: ☞(Page 1D-51)*
	Combustion chamber fouled with carbon.	*Clean. ☞(Page 1D-47)*
	Worn piston pins or piston pin bores.	*Replace.* • *Removal: ☞(Page 1D-50)* • *Installation: ☞(Page 1D-51)*
	Worn piston rings or ring grooves.	*Replace.* • *Removal: ☞(Page 1D-50)* • *Installation: ☞(Page 1D-51)*
Noisy engine (Noise seems to come from cam chain)	Stretched cam chain.	*Replace.* • *Removal: ☞(Page 1D-58)* • *Installation: ☞(Page 1D-61)*
	Worn sprockets.	*Replace.* • *Removal: ☞(Page 1D-58)* • *Installation: ☞(Page 1D-61)*
	Cam chain tension adjuster not working.	*Repair or replace.* • *Removal: ☞(Page 1D-58)* • *Installation: ☞(Page 1D-61)*
Noisy engine (Noise seems to come from crankshaft)	Rattling bearing due to wear.	*Replace.* • *Removal: ☞(Page 1D-71)* • *Installation: ☞(Page 1D-74)*
	Worn or burnt crank pin bearings.	*Replace.* • *Removal: ☞(Page 1D-71)* • *Installation: ☞(Page 1D-74)*
	Worn or burnt journal bearings.	*Replace.* • *Removal: ☞(Page 1D-71)* • *Installation: ☞(Page 1D-74)*
Noisy engine (Noise seems to come from water pump)	Too much play on pump shaft bearing.	*Replace. ☞(Page 1F-17)*
	Worn or damaged impeller shaft.	*Replace. ☞(Page 1F-17)*
	Worn or damaged mechanical seal.	*Replace. ☞(Page 1F-17)*
	Contact between pump case and impeller.	*Replace. ☞(Page 1F-17)*

Condition	Possible cause	Correction / Reference Item
Engine runs poorly in high speed range (Defective engine internal/ electrical parts)	Weakened valve springs.	*Replace. ☞(Page 1D-40)*
	Worn camshafts.	*Replace.* • *Removal: ☞(Page 1D-18)* • *Installation: ☞(Page 1D-19)*
	Valve clearance out of adjustment.	*Adjust. ☞(Page 1D-26)*
	Too narrow spark plug gaps.	*Replace. ☞(Page 1H-5)*
	Ignition not advanced sufficiently due to poorly working timing advance circuit.	*Replace ECM. ☞(Page 1C-2)*
	Defective ignition coils.	*Replace. ☞(Page 1H-4)*
	Defective CKP sensor.	*Replace.* • *Removal: ☞(Page 1J-4)* • *Installation: ☞(Page 1J-6)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Clogged air cleaner element.	*Replace. ☞(Page 1D-6)*
	Clogged fuel hose, resulting in inadequate fuel supply to injector.	*Clean and prime.*
	Defective fuel pump.	*Replace. ☞(Page 1G-16)*
	Defective TP sensor.	*Replace. ☞(Page 1D-9)*
	Defective accelerator position sensor.	*Replace. ☞(Page 1C-14)*
	Defective throttle valve motor.	*Replace. ☞(Page 1D-9)*
Engine runs poorly in high speed range (Defective air flow system)	Clogged air cleaner element.	*Replace. ☞(Page 1D-6)*
	Sucking air from throttle body joint or intake pipe joint.	*Repair or replace.* • *Throttle body joint: ☞(Page 1D-9)* • *Intake pipe joint: ☞(Page 1D-12)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Defective throttle valve motor.	*Replace. ☞(Page 1D-9)*
	Unbalancing throttle valve synchronization.	*Adjust. ☞(Page 0B-15)*
	Defective accelerator position sensor.	*Replace. ☞(Page 1D-9)*
Engine runs poorly in high speed range (Defective control circuit or sensor)	Low fuel pressure.	*Clean or replace.*
	Defective TP sensor.	*Replace. ☞(Page 1D-9)*
	Defective IAT sensor.	*Replace. ☞(Page 1C-5)*
	Defective IAP sensor.	*Replace. ☞(Page 1C-5)*
	Defective CKP sensor.	*Replace.* • *Removal: ☞(Page 1J-4)* • *Installation: ☞(Page 1J-6)*
	Defective CMP sensor.	*Replace. ☞(Page 1C-11)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Defective accelerator position sensor.	*Replace. ☞(Page 1C-14)*
	Defective throttle valve motor.	*Replace. ☞(Page 1D-9)*

Condition	Possible cause	Correction / Reference Item
Engine lacks power (Defective engine internal/ electrical parts)	Weakened valve springs.	*Replace. ☞(Page 1D-40)*
	Valve clearance out of adjustment.	*Adjust. ☞(Page 1D-26)*
	Worn piston rings or cylinders.	*Replace.* • *Piston ring:* – *Removal: ☞(Page 1D-50)* – *Installation: ☞(Page 1D-51)* • *Cylinder* – *Removal: ☞(Page 1D-50)* – *Installation: ☞(Page 1D-51)*
	Poor seating of valves.	*Repair. ☞(Page 1D-44)*
	Fouled spark plugs.	*Replace. ☞(Page 1H-5)*
	Incorrect spark plugs.	*Replace. ☞(Page 1H-5)*
	Clogged fuel injector.	*Clean or replace. ☞(Page 1G-23)*
	Clogged air cleaner element.	*Replace. ☞(Page 1D-6)*
	Sucking air from throttle body joint or intake pipe joint.	*Repair or replace.* • *Throttle body joint: ☞(Page 1D-9)* • *Intake pipe joint: ☞(Page 1D-12)*
	Too much engine oil.	*Drain out excess oil.*
	Defective fuel pump.	*Replace. ☞(Page 1G-16)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Defective CKP sensor.	*Replace.* • *Removal: ☞(Page 1J-4)* • *Installation: ☞(Page 1J-6)*
	Defective ignition coils.	*Replace. ☞(Page 1H-4)*
	Defective accelerator position sensor.	*Replace. ☞(Page 1C-14)*
	Defective throttle valve motor.	*Replace. ☞(Page 1D-9)*
Engine lacks power (Defective control circuit or sensor)	Low fuel pressure.	*Repair or replace.* • *Fuel feed hose: ☞(Page 1G-8)* • *Fuel pump: ☞(Page 1G-16)*
	Defective TP sensor.	*Replace. ☞(Page 1D-9)*
	Defective IAT sensor.	*Replace. ☞(Page 1C-5)*
	Defective CKP sensor.	*Replace.* • *Removal: ☞(Page 1J-4)* • *Installation: ☞(Page 1J-6)*
	Defective IAP sensor.	*Replace. ☞(Page 1C-5)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Defective accelerator position sensor.	*Replace. ☞(Page 1C-14)*
	Defective throttle valve motor.	*Replace. ☞(Page 1D-9)*
Engine overheats (Defective engine internal parts)	Heavy carbon deposit on piston crown.	*Clean.*
	Not enough oil in the engine.	*Add oil. ☞(Page 1E-5)*
	Defective oil pump or clogged oil circuit.	*Replace or clean. ☞(Page 1E-14)*
	Use of incorrect engine oil.	*Replace. ☞(Page 1E-5)*
	Sucking air from throttle body joint or intake pipe joint.	*Repair or replace.* • *Throttle body joint: ☞(Page 1D-9)* • *Intake pipe joint: ☞(Page 1D-12)*
	Defective cooling system	• *Engine cooling system: ☞(Page 1F-5)* • *Engine oil cooling system: ☞(Page 1E-3)*
Engine overheats (Lean fuel/air mixture)	Short-circuited IAP sensor/lead wire.	*Repair or replace. ☞(Page 1C-5)*
	Short-circuited IAT sensor/lead wire.	*Repair or replace. ☞(Page 1C-5)*
	Sucking air from throttle body joint or intake pipe joint.	*Repair or replace.* • *Throttle body joint: ☞(Page 1D-9)* • *Intake pipe joint: ☞(Page 1D-12)*
	Defective fuel injectors.	*Replace. ☞(Page 1G-21)*
	Defective ECT sensor.	*Replace. ☞(Page 1C-6)*

Condition	Possible cause	Correction / Reference Item
Engine overheats (Other factors)	Ignition timing is too advanced due to defective timing advance system (ECT sensor, CKP sensor or ECM).	*Replace.*
Dirty or heavy exhaust smoke	Too much engine oil.	*Drain out excess oil.*
	Worn piston rings or cylinders.	*Replace.* • *Piston ring:* – *Removal: ☞(Page 1D-50)* – *Installation: ☞(Page 1D-51)* • *Cylinder* – *Removal: ☞(Page 1D-50)* – *Installation: ☞(Page 1D-51)*
	Worn valve guides.	*Replace. ☞(Page 1D-47)*
	Scored or scuffed cylinder walls.	*Replace.* • *Removal: ☞(Page 1D-50)* • *Installation: ☞(Page 1D-51)*
	Worn valve stems.	*Replace. ☞(Page 1D-40)*
	Defective valve stem oil seal.	*Replace. ☞(Page 1D-40)*
	Worn oil ring side rails.	*Replace.* • *Removal: ☞(Page 1D-50)* • *Installation: ☞(Page 1D-51)*

MIL Inspection

BENM10L31104009

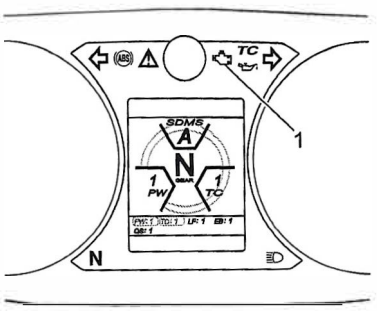
Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).

Troubleshooting

Step 1

1) Check if the MIL (1) lights up when turning the ignition switch ON.



IM10L1110005-01

Does the MIL light up?

Yes — Go to Step 3.

No — Go to Step 2.

Step 2

(The MIL dose not lights up)

1) Check the other indicator light. ☞(Page 9C-9)

Is check result OK?

Yes — Replace the combination meter. ☞(Page 9C-13)

No — Check the combination meter power supply and ground circuit.

If combination meter power supply and ground circuit is in good condition, replace the combination meter. ☞(Page 9C-13)

Step 3

(The MIL lights up)

1) Check if the MIL go off about 3 seconds later of ignition switch ON.

Does the MIL go off?

Yes — Go to Step 4.

No —
- DTC output. ☞(Page 1A-11)
- If DTC can not be output, check the combination meter. ☞(Page 9C-9)

  If combination meter is in good condition, replace the ECM and inspect it again. ☞(Page 1C-2)

Step 4

Is "– – – – –" or "CHEC" displayed to LCD?

Yes — Perform the "CAN Communication Check" in Section 10H (Page 10H-4).

No — Normal. (No DTC exists)

Master Warning Indicator Inspection

BENM10L31104010

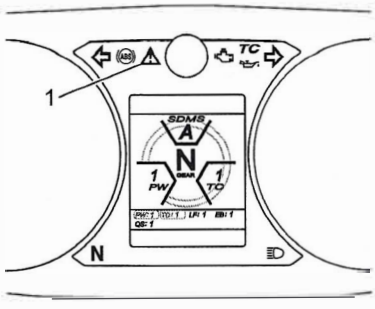
Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).

Troubleshooting

Step 1

1) Check if the master warning indicator (1) lights up when turning the ignition switch ON.



IM10L1110006-01

Does the master warning indicator light up?

Yes — Go to Step 3.

No — Go to Step 2.

Step 2

(The master warning indicator dose not lights up)

1) Check the other indicator light. ☞(Page 9C-9)

Is check result OK?

Yes — Replace the combination meter. ☞(Page 9C-13)

No — Check the combination meter power supply and ground circuit.

If combination meter power supply and ground circuit is in good condition, replace the combination meter. ☞(Page 9C-13)

Step 3

(The master warning indicator lights up)

1) Check if the master warning indicator go off about 3 seconds later of ignition switch ON.

Does the master warning indicator go off?

Yes — Normal.

No — Go to Step 4.

Step 4

Is battery mark, "Air!" or "SW!" displayed to LCD?

Yes — Check the battery voltage or go to troubleshooting for "Multifunction Display indicates "Air!"" in Section 9C (Page 9C-4) or "Multifunction Display indicates "SW!"" in Section 9C (Page 9C-6).

No
- DTC output.
  - ECM: ☞(Page 1A-11)
  - ABS control unit / HU: ☞(Page 4E-15)
- If DTC can not be output, go to Step 5.

Step 5

Is "- - - - -" or "CHEC" displayed to LCD?

Yes — Perform the "CAN Communication Check" in Section 10H (Page 10H-4).

No — Replace the combination meter. ☞(Page 9C-13)

If the master warning indicator is abnormal even after replacing the combination meter, replace the ECM or ABS control unit / HU and inspect it again.
- ECM: ☞(Page 1C-2)
- ABS control unit / HU: ☞(Page 4E-50)

DTC P0030

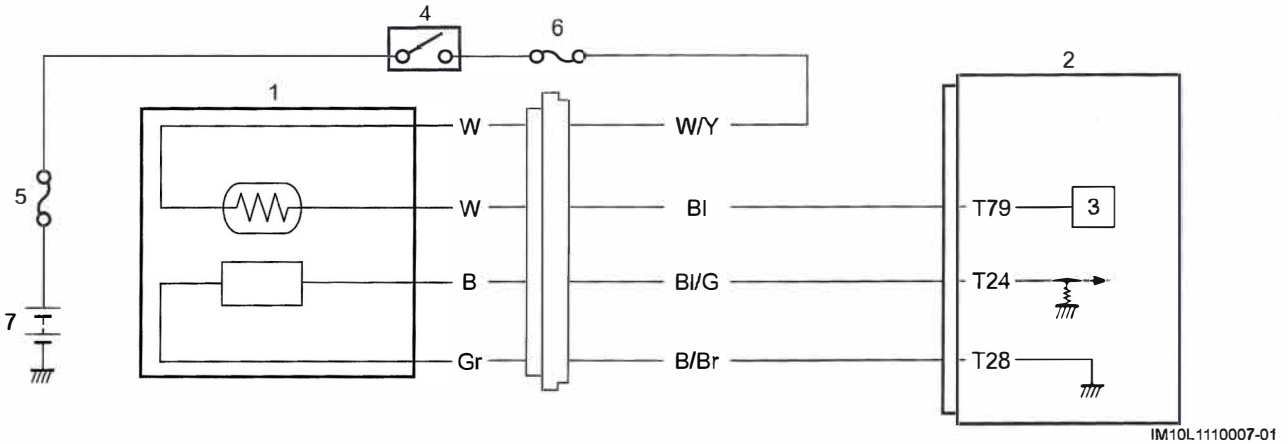
BENM10L31104011

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0030: HO2 Sensor Heater Control Circuit Bank 1 Sensor 1 HO2 sensor #1 heater circuit is shorted to ground or open. (3 D/C detection logic)	• HO2 sensor #1 heater • HO2 sensor #1 heater circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110007-01

1. HO2 sensor #1	4. Ignition switch	7. Battery
2. ECM	5. Main fuse (30 A)	
3. HO2 sensor heater drive circuit	6. Ignition fuse (10 A)	

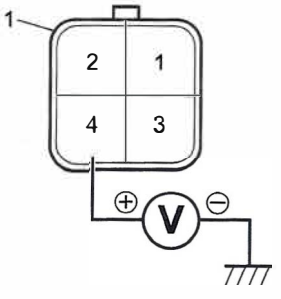
Troubleshooting

Step 1

HO2 sensor #1 heater power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the HO2 sensor #1 coupler. ☞(Page 1C-9)
3) Check for proper terminal connection to the HO2 sensor #1 coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between "T4" and ground.

HO2 sensor heater power supply voltage
[Standard]: Battery voltage



IL41K1110009-01

Is check result OK?

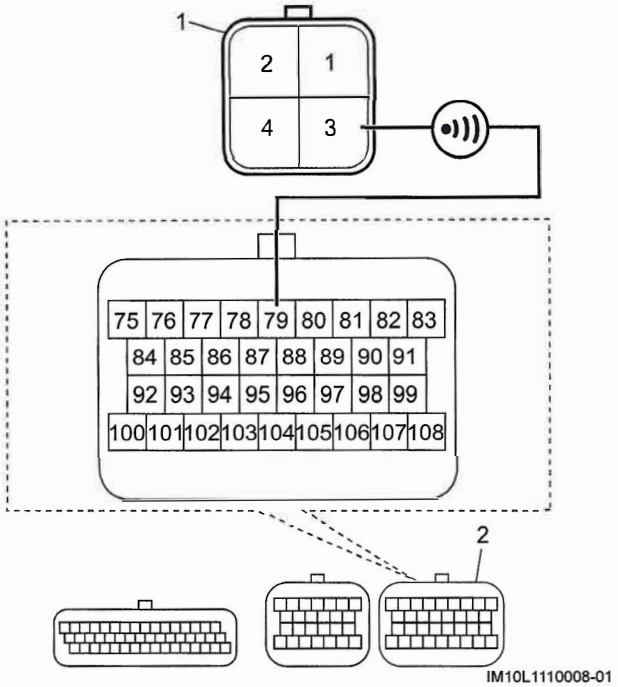
Yes Go to Step 2.

No Repair or replace the "T4" wire at the HO2 sensor #1 coupler.

Step 2

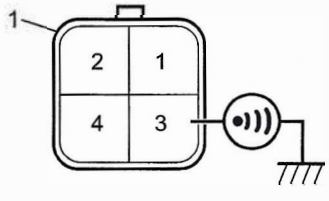
HO2 sensor #1 heater circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T3" at the HO2 sensor #1 coupler (1) and "T79" at the ECM coupler "C" (2): less than 1 Ω



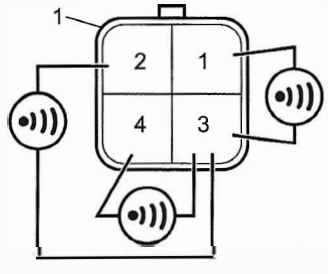
IM10L1110008-01

– Between "T3" at the HO2 sensor #1 coupler (1) and ground: infinity



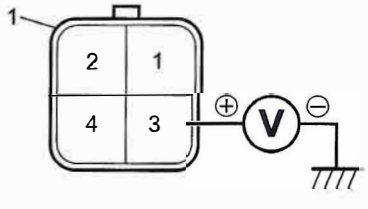
IL41K1110011-01

– Between "T3" and other terminal at HO2 sensor #1 coupler (1): infinity



IL41K1110012-01

- Voltage
  - Turn the ignition switch ON.
  - Between "T3" at the HO2 sensor #1 coupler (1) and ground: approx. 0 V



IL41K1110013-01

Is check result OK?

Yes Go to Step 3.

No Repair or replace the "T3" wire at the HO2 sensor #1 coupler.

Step 3

HO2 sensor #1 heater check

1) Measure the HO2 sensor #1 heater resistance. Refer to "HO2 Sensor Heater Resistance" under "HO2 Sensor Inspection" in Section 1C (Page 1C-8).

Is check result OK?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No Replace the HO2 sensor #1. ☞(Page 1C-9)

DTC P0050

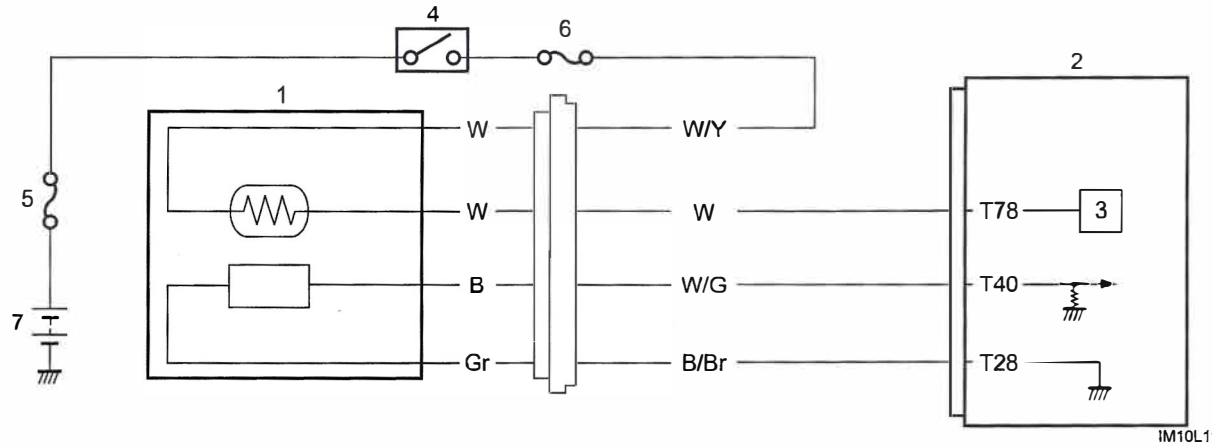
BENM10L31104012

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0050: HO2 Sensor Heater Control Circuit Bank 2 Sensor 1 HO2 sensor #2 heater circuit is shorted to ground or open. (3 D/C detection logic)	• HO2 sensor #2 heater • HO2 sensor #2 heater circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110009-01

1. HO2 sensor #2	4. Ignition switch	7. Battery
2. ECM	5. Main fuse (30 A)	
3. HO2 sensor heater drive circuit	6. Ignition fuse (10 A)	

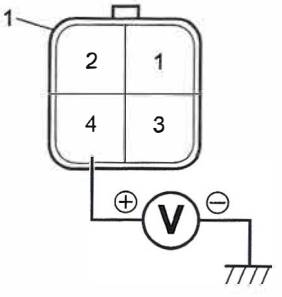
Troubleshooting

Step 1

HO2 sensor #2 heater power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the HO2 sensor #2 coupler. ☞(Page 1C-9)
3) Check for proper terminal connection to the HO2 sensor #2 coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between "T4" and ground.

HO2 sensor heater power supply voltage
[Standard]: Battery voltage



IL41K1110009-01

Is check result OK?

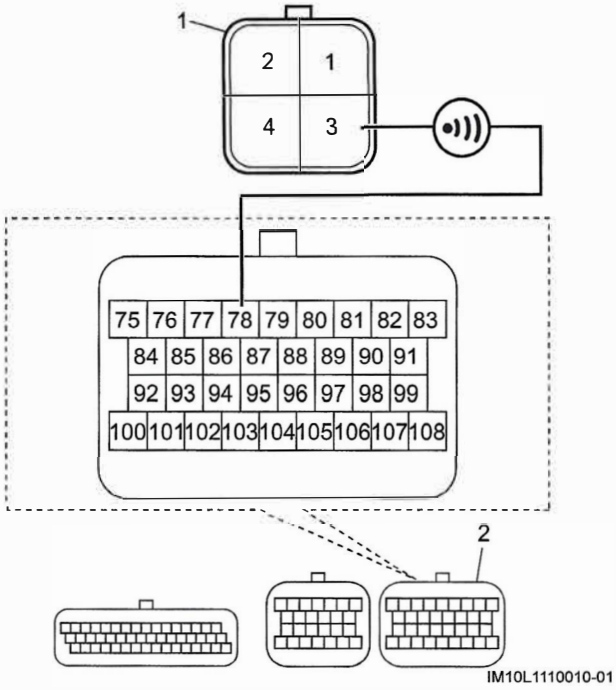
Yes Go to Step 2.

No Repair or replace the "T4" wire at the HO2 sensor #2 coupler.

Step 2

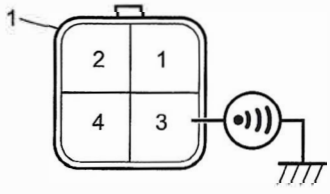
HO2 sensor #2 heater circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T3" at the HO2 sensor #2 coupler (1) and "T78" at the ECM coupler "C" (2): less than 1 Ω



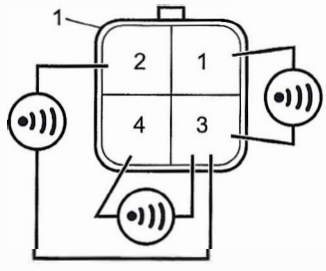
IM10L1110010-01

– Between "T3" at the HO2 sensor #2 coupler (1) and ground: infinity



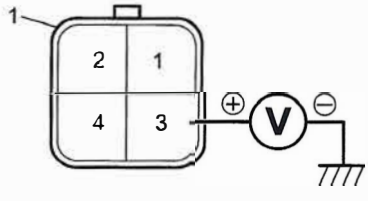
IL41K1110011-01

– Between "T3" and other terminal at HO2 sensor #2 coupler (1): infinity



IL41K1110012-01

- Voltage
  – Turn the ignition switch ON.
  – Between "T3" at the HO2 sensor #2 coupler (1) and ground: approx. 0 V



IL41K1110013-01

Is check result OK?

Yes Go to Step 3.

No Repair or replace the "T3" wire at the HO2 sensor #2 coupler.

Step 3

HO2 sensor #2 heater check

1) Measure the HO2 sensor #2 heater resistance. Refer to "HO2 Sensor Heater Resistance" under "HO2 Sensor Inspection" in Section 1C (Page 1C-8).

Is check result OK?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No Replace the HO2 sensor #2. ☞(Page 1C-9)

DTC P0069

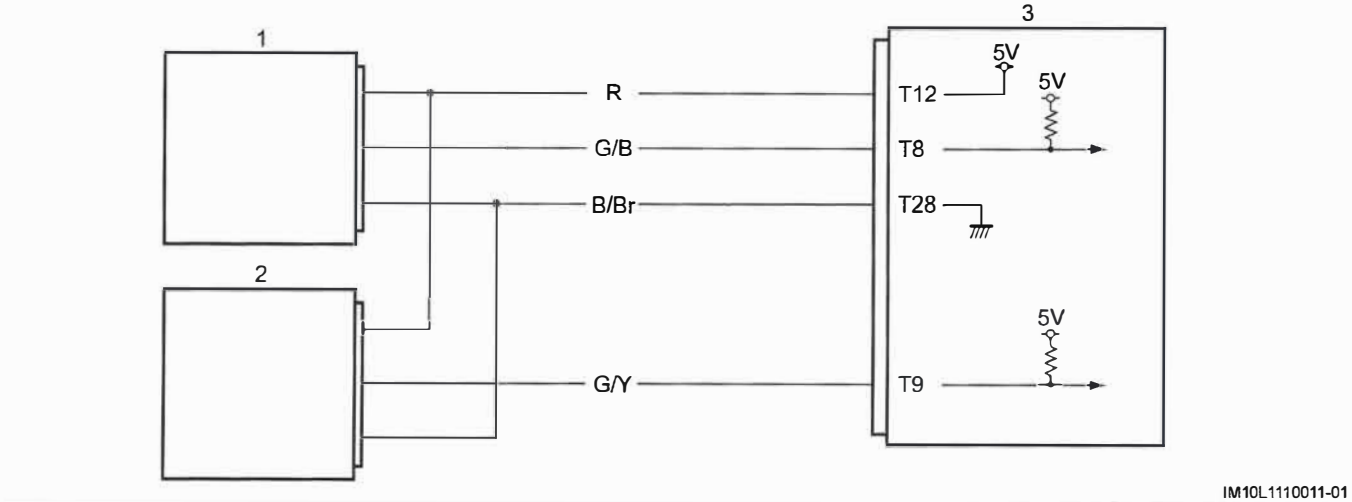
BENM10L31104013

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0069: Manifold Absolute Pressure – Barometric Pressure Correlation Difference between measured value by AP sensor and measured value by IAP sensor is higher than specified value although the engine is stopped. (3 D/C detection logic)	• IAP sensor vacuum hose or AP sensor vacuum hose • IAP sensor or AP sensor • IAP sensor or AP sensor circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110011-01

1. IAP sensor	2. AP sensor	3. ECM

Troubleshooting

Step 1

DTC check

Is DTC P1105, P1106, P1107, P2226 and/or P2228 detected?

Yes — Go to troubleshooting for applicable DTC.

No — Go to Step 2.

Step 2

IAP sensor vacuum hose and AP sensor vacuum hose check

- Check that the IAP sensor vacuum hose and AP sensor vacuum hose are connected correctly. ☞(Page 1D-5)
- Check the IAP sensor vacuum hose and AP sensor vacuum hose for wear and damage.

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the IAP sensor vacuum hose and AP sensor vacuum hose.

Step 3

IAP sensor and AP sensor circuit check

1) Check the IAP sensor and AP sensor circuit.
   - IAP sensor: Refer to "Step 2" – "Step 4" under "DTC P1105 / P1106 / P1107" (Page 1A-82)
   - AP sensor: Refer to "Step 1" – "Step 3" under "DTC P2226 / P2228" (Page 1A-100)

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace defective parts.

Step 4

IAP sensor and AP sensor check

1) Check the IAP sensor and AP sensor.
   - IAP sensor: ☞(Page 1C-4)
   - AP sensor: ☞(Page 1C-3)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Repair or replace defective parts.
   - IAP sensor: ☞(Page 1C-5)
   - AP sensor: ☞(Page 1C-3)

DTC P0110 / P0111 / P0112

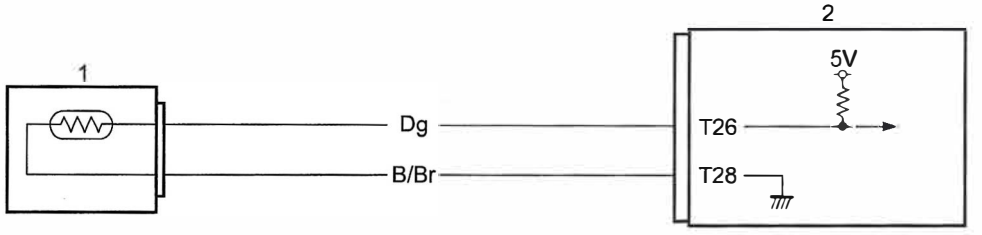
BENM10L31104014

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0110: IAT Sensor 1 Circuit The sensor output voltage is higher than 4.90 V. (3 D/C detection logic)	• IAT sensor • IAT sensor circuit • ECM
P0111: IAT Sensor 1 Circuit Response Malfunction IAT sensor output voltage does not change, under the specified condition. (3 D/C detection logic)	
P0112: IAT Sensor 1 Circuit Low The sensor output voltage is lower than 0.10 V. (3 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110012-01

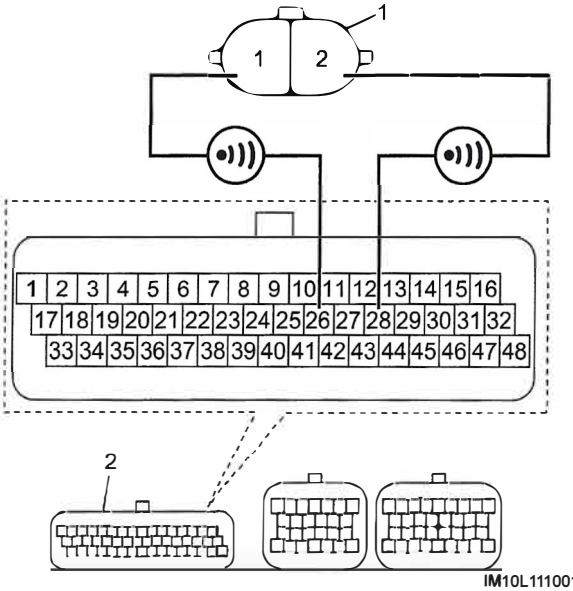
1. IAT sensor	2. ECM

Troubleshooting

Step 1

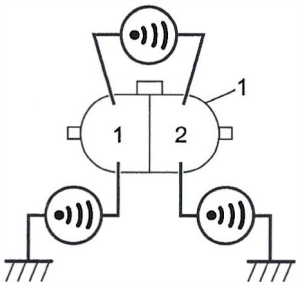
IAT sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T1" at the IAT sensor coupler (1) and "T26" at the ECM coupler "A" (2): less than 1 Ω
     - Between "T2" at the IAT sensor coupler and "T28" at the ECM coupler "A": less than 1 Ω



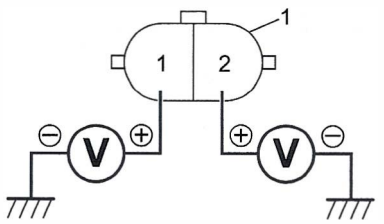
IM10L1110013-01

- Between "T1" at the IAT sensor coupler (1) and ground: infinity
- Between "T2" at the IAT sensor coupler and ground: infinity
- Between "T1" and "T2" at IAT sensor coupler: infinity



IL06L1110017-01

- Voltage
  - Turn the ignition switch ON.
  - Between "T1" at the IAT sensor coupler (1) and ground: approx. 0 V
  - Between "T2" at the IAT sensor coupler and ground: approx. 0 V



IL06L1110018-01

Is check result OK?

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

Step 2

IAT sensor resistance check

1) Turn the ignition switch OFF.
2) Measure the IAT sensor resistance. ☞(Page 1C-5)

Is check result OK?

Yes	Replace the ECM and inspect it again. ☞(Page 1C-2)
No	Replace the IAT sensor. ☞(Page 1C-5)

DTC P0115 / P0116 / P0117

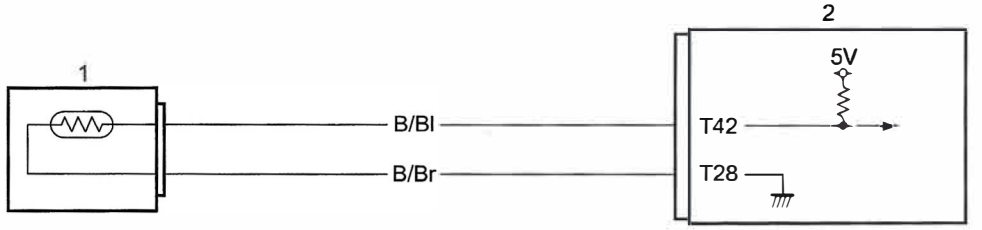
BENM10L31104015

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0115: ECT Sensor Circuit ECT sensor output voltage is higher than 4.90 V. (1 D/C detection logic)	• ECT sensor • ECT sensor circuit • ECM
P0116: ECT Sensor Circuit Response Malfunction ECT sensor output voltage does not change, under the specified condition. (3 D/C detection logic)	
P0117: ECT Sensor Circuit Low ECT sensor output voltage is lower than 0.10 V. (3 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110014-01

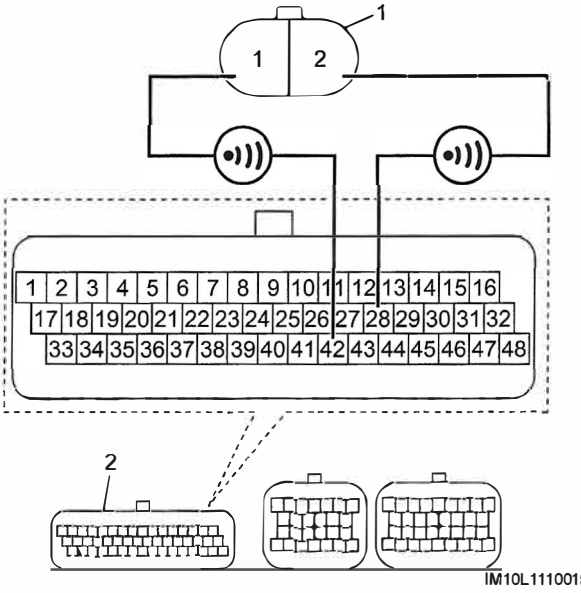
1. ECT sensor	2. ECM

Troubleshooting

Step 1

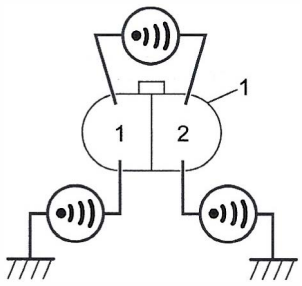
ECT sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T1" at the ECT sensor coupler (1) and "T42" at the ECM coupler "A" (2): less than 1 Ω
     – Between "T2" at the ECT sensor coupler and "T28" at the ECM coupler "A": less than 1 Ω



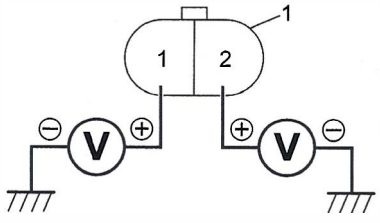
IM10L1110015-01

   – Between "T2" at the ECT sensor coupler (1) and ground: infinity
   – Between "T1" at the ECT sensor coupler and ground: infinity
   – Between "T2" and "T1" at the ECT sensor coupler: infinity



IL06L1110022-01

- Voltage
  - Turn the ignition switch ON.
  - Between "T2" at the ECT sensor coupler (1) and ground: approx. 0 V
  - Between "T1" at the ECT sensor coupler and ground: approx. 0 V



IL06L1110023-01

Is check result OK?

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

Step 2

ECT sensor resistance check

1) Turn the ignition switch OFF.
2) Measure the ECT sensor resistance. ☞(Page 1C-6)

Is check result OK?

Yes	Replace the ECM and inspect it again. ☞(Page 1C-2)
No	Replace the ECT sensor. ☞(Page 1C-6)

DTC P0120 / P0123

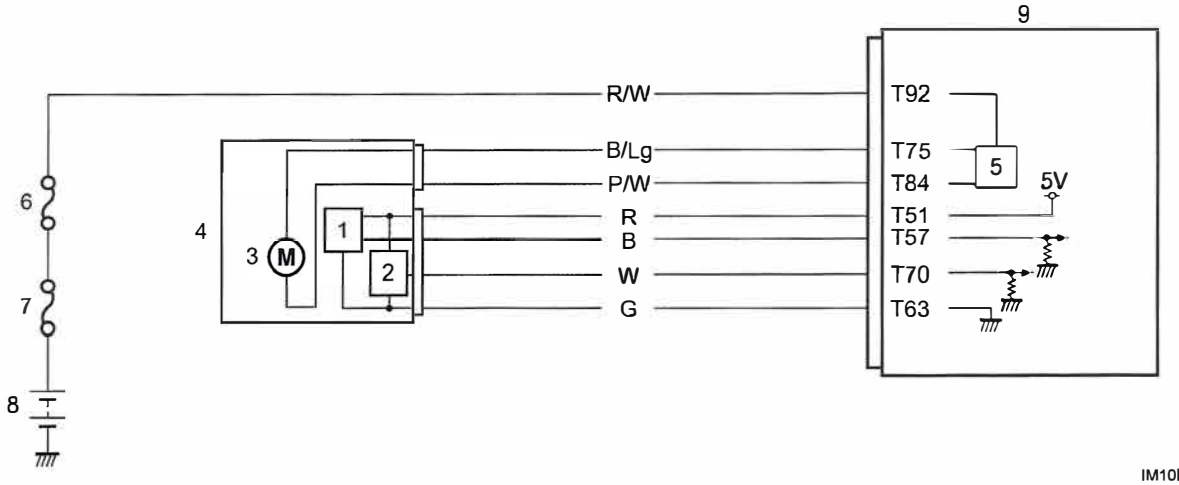
BENM10L31104016

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0120: TP Sensor / Switch "A" Circuit TP sensor (main) output voltage is lower than 0.20 V. (1 D/C detection logic)	• TP sensor (main) • TP sensor (main) circuit • ECM
P0123: TP Sensor / Switch "A" Circuit High TP sensor (main) output voltage is higher than 4.80 V. (1 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110016-01

1. TP sensor (main)	4. Throttle body	7. Main fuse (30 A)
2. TP sensor (sub)	5. Throttle valve motor drive circuit	8. Battery
3. Throttle valve motor	6. Fuel fuse (10 A)	9. ECM

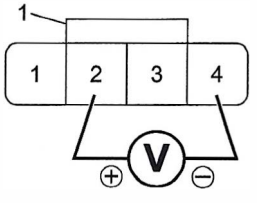
Troubleshooting

Step 1

TP sensor power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the TP sensor coupler (1). ☞(Page 1D-9)
3) Check for proper terminal connection to the TP sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T2" and "T4".

TP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110017-01

Is check result OK?

Yes Go to Step 3.

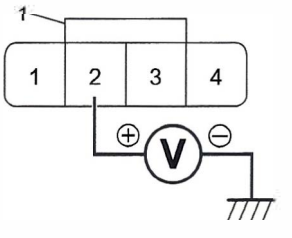
No Go to Step 2.

Step 2

TP sensor ground circuit check

1) Measure the voltage between the "T2" at the TP sensor coupler (1) and ground.

TP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110018-01

Is check result OK?

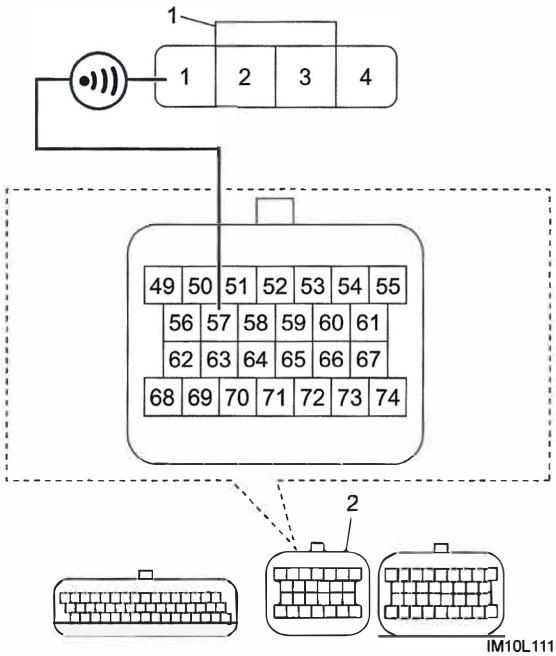
Yes Repair or replace the "T4" wire at the TP sensor coupler.

No Repair or replace the "T2" wire at the TP sensor coupler.

Step 3

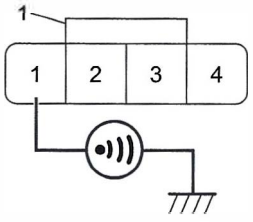
TP sensor (main) signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "B". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "B".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T1" at the TP sensor coupler (1) and "T57" at the ECM coupler "B" (2): less than 1 Ω



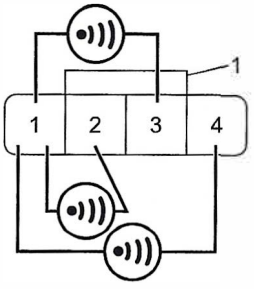
IM10L1110019-01

     – Between "T1" at the TP sensor coupler (1) and ground: infinity



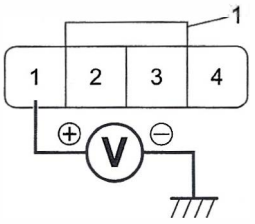
IM10L1110020-01

     – Between "T1" and other terminal at the TP sensor coupler (1): infinity



IM10L1110021-01

   - Voltage
     – Turn the ignition switch ON.
     – Between "T1" at the TP sensor coupler (1) and ground: approx. 0 V



IM10L1110022-01

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace the "T1" wire at the TP sensor coupler.

Step 4

TP sensor (main) output voltage check

1) Measure the TP sensor (main) output voltage. ☞(Page 1C-7)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the throttle body. ☞(Page 1D-9)

DTC P0130 / P0132 / P0133

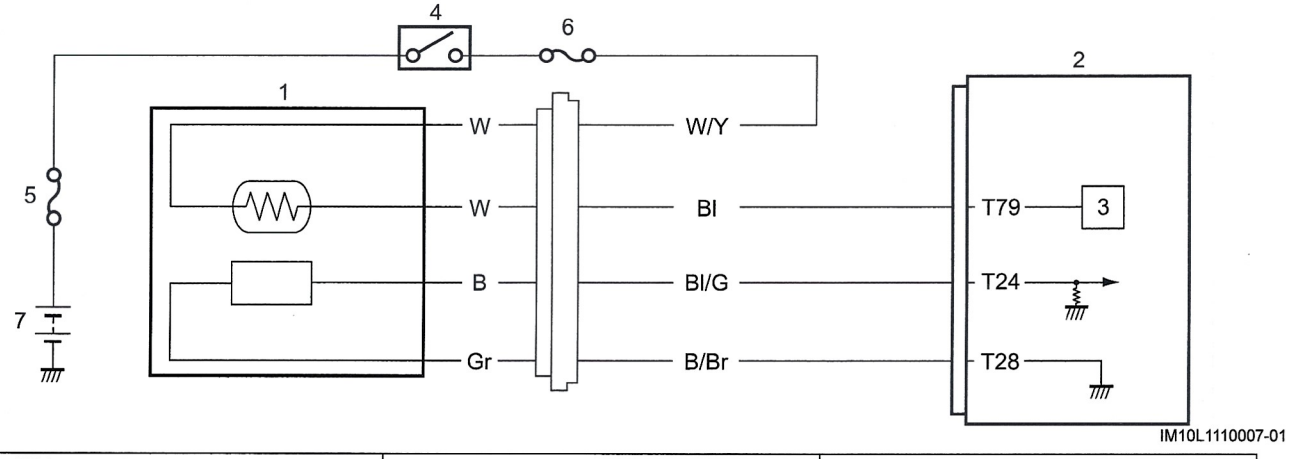
BENM10L31104017

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0130: O2 Sensor Circuit Bank 1 Sensor 1 HO2 sensor #1 is not activated. (3 D/C detection logic)	• HO2 sensor #1 • HO2 sensor #1 circuit • ECM
P0132: O2 Sensor Circuit High Voltage Bank 1 Sensor 1 HO2 sensor #1 output voltage is higher than 4.90 V. (3 D/C detection logic)	
P0133: O2 Sensor Circuit Slow Response (Bank1 Sensor1) Shifting time between rich and lean of HO2 sensor #1 is longer than specified time. (3 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110007-01

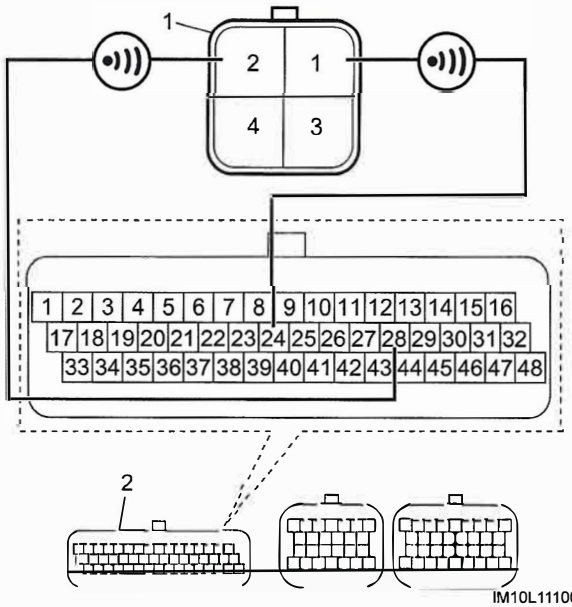
1. HO2 sensor #1	4. Ignition switch	7. Battery
2. ECM	5. Main fuse (30 A)	
3. HO2 sensor heater drive circuit	6. Ignition fuse (10 A)	

Troubleshooting

Step 1

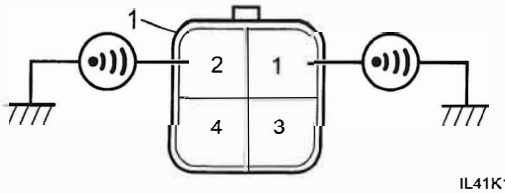
HO2 sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the HO2 sensor #1 coupler and ECM coupler.
   - HO2 sensor #1: ☞(Page 1C-9)
   - ECM: ☞(Page 1C-2)
3) Check for proper terminal connection to the HO2 sensor #1 coupler and ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T1" at the HO2 sensor #1 coupler (1) and "T24" at the ECM coupler "A" (2): less than 1 Ω
     – Between "T2" at the HO2 sensor #1 coupler and "T28" at the ECM coupler "A": less than 1 Ω



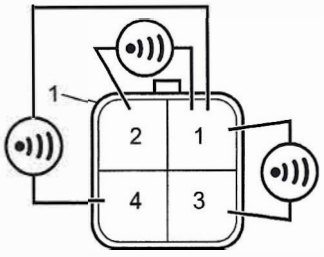
IM10L1110023-01

   – Between each of "T1" and "T2" at the HO2 sensor #1 coupler (1) and ground: infinity



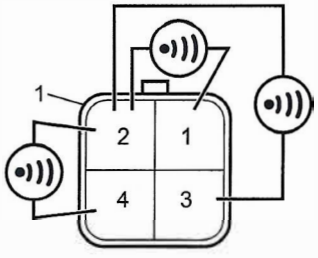
IL41K1110020-01

   – Between "T1" and other terminal at HO2 sensor #1 coupler (1): infinity



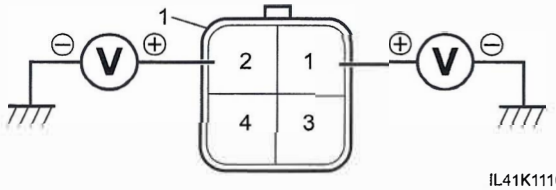
IL41K1110021-01

   – Between "T2" and other terminal at HO2 sensor #1 coupler (1): infinity



IL41K1110022-01

   - Voltage
     – Turn the ignition switch ON.
     – Between each of "T1" and "T2" at the HO2 sensor #1 coupler (1) and ground: approx. 0 V



IL41K1110023-01

Is check result OK?

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

Step 2

HO2 sensor #1 output voltage check

1) Turn the ignition switch OFF.
2) Connect the ECM coupler "A" and HO2 sensor #1 coupler.
3) Warm up the engine enough.
4) Measure the HO2 sensor #1 output voltage. Refer to "HO2 Sensor Output Voltage" under "HO2 Sensor Inspection" in Section 1C (Page 1C-8).

Is check result OK?

Yes	Replace the ECM and inspect it again. ☞(Page 1C-2)
No	Replace the HO2 sensor #1. ☞(Page 1C-9)

DTC P0150 / P0152 / P0153

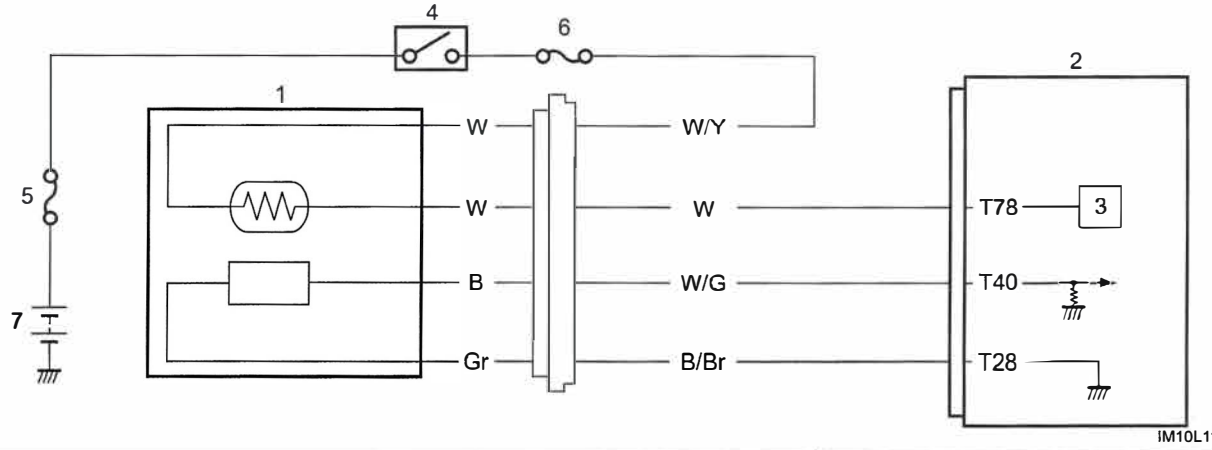
BENM10L31104018

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0150: O2 Sensor Circuit Bank 2 Sensor 1 HO2 sensor #2 is not activated. (3 D/C detection logic)	• HO2 sensor #2 • HO2 sensor #2 circuit • ECM
P0152: O2 Sensor Circuit High Voltage Bank 2 Sensor 1 HO2 sensor #2 output voltage is higher than 4.90 V. (3 D/C detection logic)	
P0153: O2 Sensor Circuit Slow Response (Bank2 Sensor1) Shifting time between rich and lean of HO2 sensor #2 is longer than specified time. (3 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110009-01

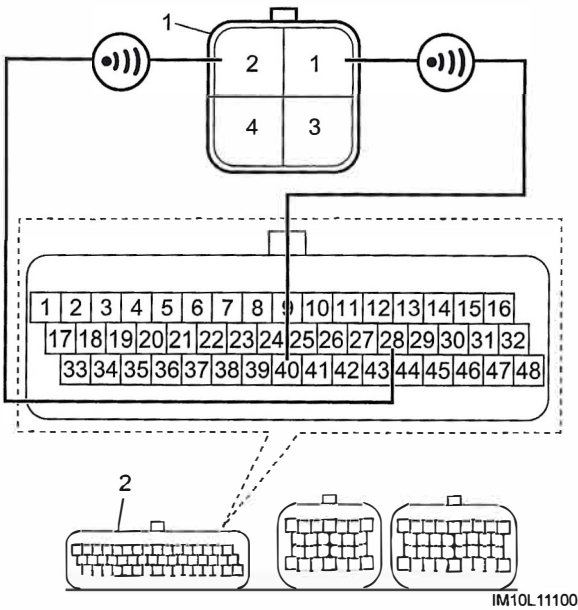
1. HO2 sensor #2	4. Ignition switch	7. Battery
2. ECM	5. Main fuse (30 A)	
3. HO2 sensor heater drive circuit	6. Ignition fuse (10 A)	

Troubleshooting

Step 1

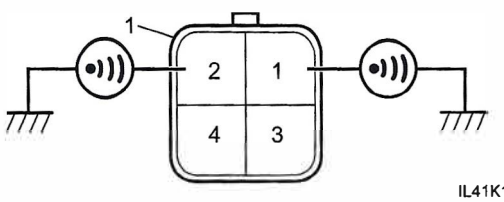
HO2 sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the HO2 sensor #2 coupler and ECM coupler.
   - HO2 sensor #2: ☞(Page 1C-9)
   - ECM: ☞(Page 1C-2)
3) Check for proper terminal connection to the HO2 sensor #2 coupler and ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T1" at the HO2 sensor #2 coupler (1) and "T40" at the ECM coupler "A" (2): less than 1 Ω
     - Between "T2" at the HO2 sensor #2 coupler and "T28" at the ECM coupler "A": less than 1 Ω



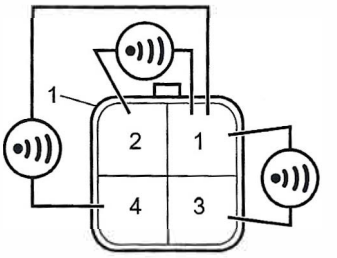
IM10L1110024-01

   - Between each of "T1" and "T2" at the HO2 sensor #2 coupler (1) and ground: infinity



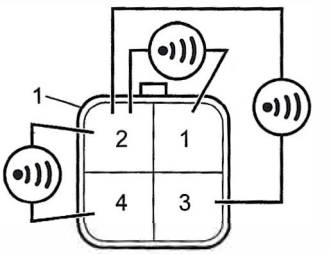
IL41K1110020-01

   - Between "T1" and other terminal at HO2 sensor #2 coupler (1): infinity



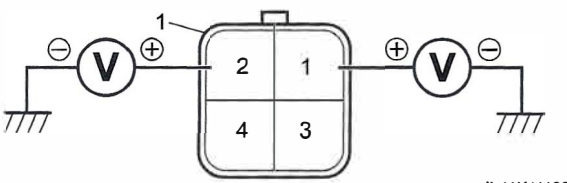
IL41K1110021-01

   - Between "T2" and other terminal at HO2 sensor #2 coupler (1): infinity



IL41K1110022-01

   - Voltage
     - Turn the ignition switch ON.
     - Between each of "T1" and "T2" at the HO2 sensor #2 coupler (1) and ground: approx. 0 V



IL41K1110023-01

Is check result OK?

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

Step 2

HO2 sensor #2 output voltage check

1) Turn the ignition switch OFF.
2) Connect the ECM coupler "A" and HO2 sensor #2 coupler.
3) Warm up the engine enough.
4) Measure the HO2 sensor #2 output voltage. Refer to "HO2 Sensor Output Voltage" under "HO2 Sensor Inspection" in Section 1C (Page 1C-8).

Is check result OK?

Yes	Replace the ECM and inspect it again. ☞(Page 1C-2)
No	Replace the HO2 sensor #2. ☞(Page 1C-9)

DTC P0171 / P0172 / P0174 / P0175

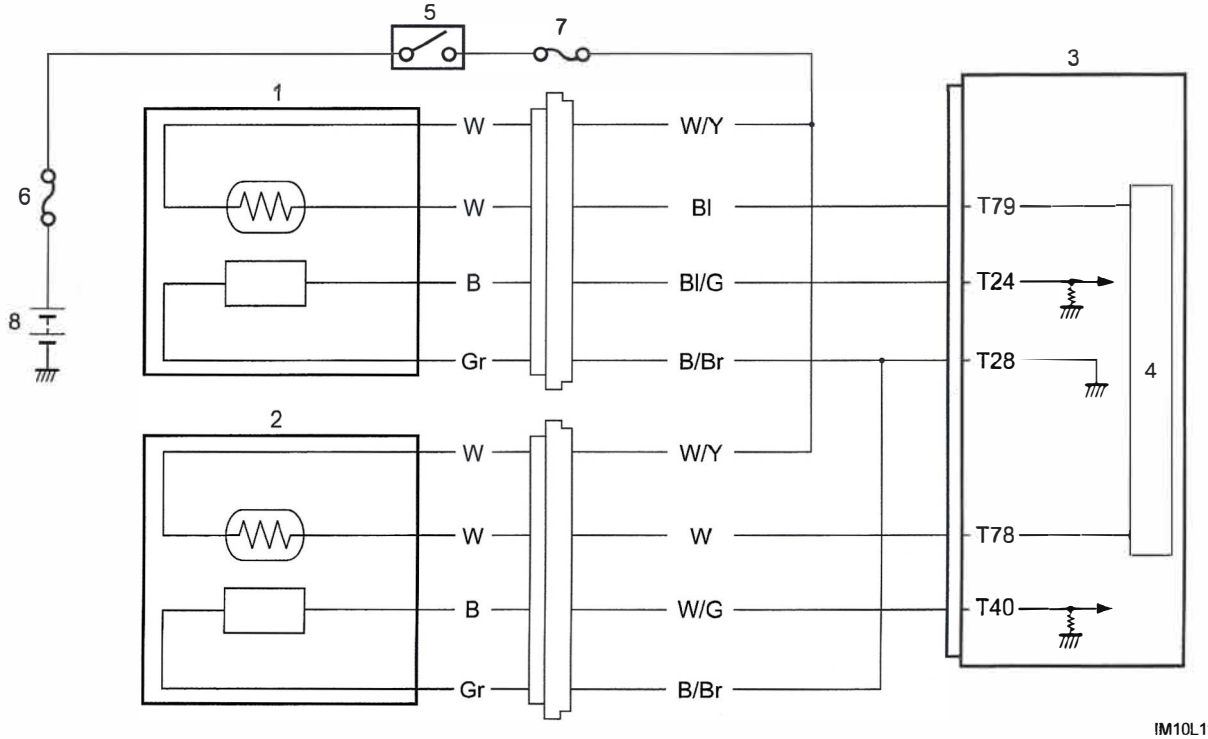
BENM10L31104019

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0171: System Too Lean Bank 1 Fuel trim correction is higher than specified value for specified time under the specified condition. (3 D/C detection logic)	• Fuel system • Air intake system • Exhaust system • Emission control system • HO2 sensor #1 • HO2 sensor #1 circuit • ECM
P0172: System Too Rich Bank 1 Fuel trim correction is lower than specified value for specified time under the specified condition. (3 D/C detection logic)	
P0174: System Too Lean Bank 2 Fuel trim correction is higher than specified value for specified time under the specified condition. (3 D/C detection logic)	• Fuel system • Air intake system • Exhaust system • Emission control system • HO2 sensor #2 • HO2 sensor #2 circuit • ECM
P0175: System Too Rich Bank 2 Fuel trim correction is lower than specified value for specified time under the specified condition. (3 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110025-01

1. HO2 sensor #1	4. HO2 sensor heater drive circuit	7. Ignition fuse (10 A)
2. HO2 sensor #2	5. Ignition switch	8. Battery
3. ECM	6. Main fuse (30 A)	

Troubleshooting

Step 1

DTC check

Is there any DTC(s) other than P0171 P0172, P0174 and P0175?

Yes Go to troubleshooting for applicable DTC.

No Go to Step 2.

Step 2

Fuel system and emission control system check

1) Check the following points related to fuel and emission control systems.
   - Fuel pressure: ☞(Page 1G-6)
   - Fuel injector circuit: Refer to "DTC P0201 / P0202 / P0203 / P0204" (Page 1A-50) and "DTC P1201 / P1202 / P1203 / P1204" (Page 1A-84).
   - Fuel injector: ☞(Page 1G-23)
   - IAP sensor: ☞(Page 1C-4)
   - PCV hose: ☞(Page 1B-6)
   - PAIR system: ☞(Page 1B-5)
   - EVAP system (If equipped): ☞(Page 1B-10)

Is check result OK?

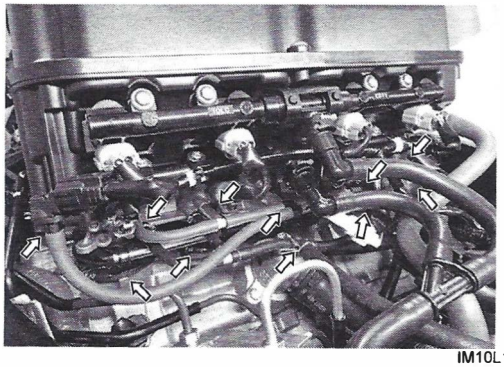
Yes Go to Step 3.

No Repair or replace defective parts.

Step 3

Exhaust system and air intake system check

1) Check exhaust system and air intake system for clogging and leakage.
   - Exhaust system: ☞(Page 1K-7)
   - Check air intake system for clogging and leakage.



IM10L1110128-04

Is check result OK?

Yes Go to Step 4.

No Repair or replace defective parts.

Step 4

HO2 sensor circuit signal check

1) Check HO2 sensor signal circuit.
   - HO2 sensor #1: "Step 1" under "DTC P0130 / P0132 / P0133" (Page 1A-44)
   - HO2 sensor #2: "Step 1" under "DTC P0150 / P0152 / P0153" (Page 1A-46)

Is check result OK?

Yes Go to Step 5.

No Repair or replace the defective wire harness.

Step 5

DTC recheck

1) Replace the HO2 sensor #1 and HO2 sensor #2. ☞(Page 1C-9)
2) Perform "DTC Check" (Page 1A-11) and recheck DTC.

Is DTC P0171 P0172, P0174 and/or P0175 still detected?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No End.

DTC P0201 / P0202 / P0203 / P0204

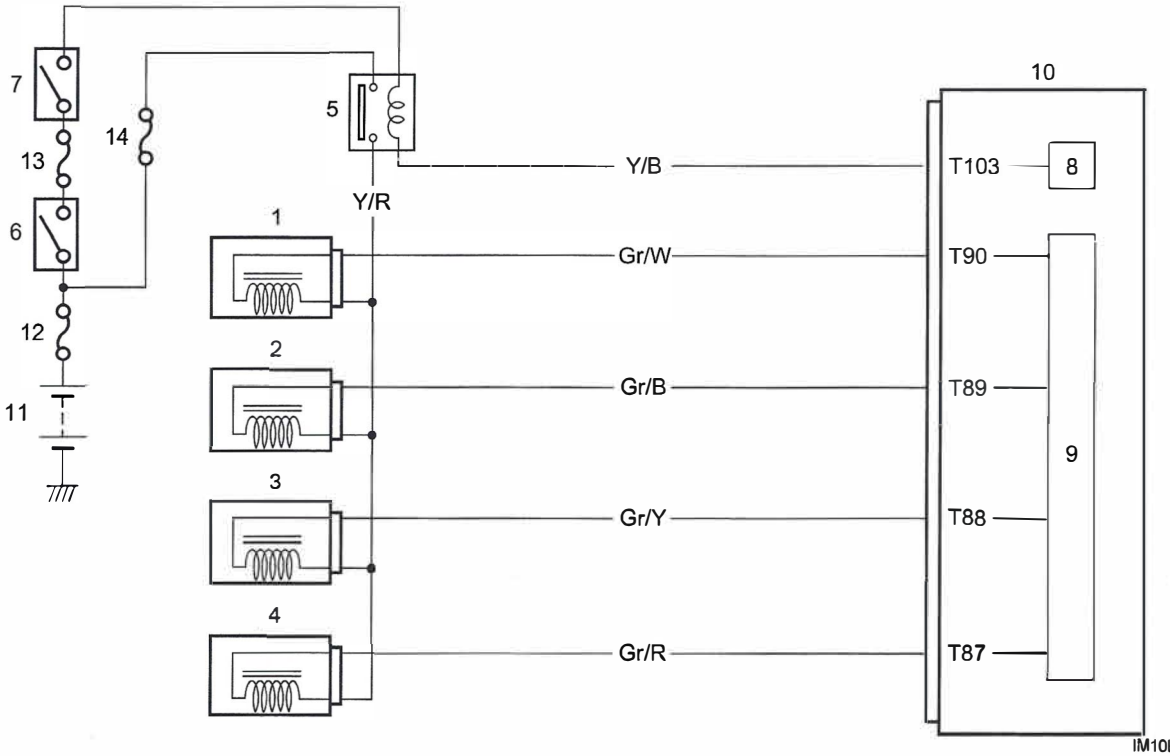
BENM10L31104020

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0201: Injector Circuit / Open – Cylinder 1 Primary fuel injector #1 signal is interrupted by 20 times or more continuity although CKP signal is detected. (1 D/C detection logic)	• Primary fuel injector #1 • Primary fuel injector #1 circuit • ECM
P0202: Injector Circuit / Open – Cylinder 2 Primary fuel injector #2 signal is interrupted by 20 times or more continuity although CKP signal is detected. (1 D/C detection logic)	• Primary fuel injector #2 • Primary fuel injector #2 circuit • ECM
P0203: Injector Circuit / Open – Cylinder 3 Primary fuel injector #3 signal is interrupted by 20 times or more continuity although CKP signal is detected. (1 D/C detection logic)	• Primary fuel injector #3 • Primary fuel injector #3 circuit • ECM
P0204: Injector Circuit / Open – Cylinder 4 Primary fuel injector #4 signal is interrupted by 20 times or more continuity although CKP signal is detected. (1 D/C detection logic)	• Primary fuel injector #4 • Primary fuel injector #4 circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110026-01

1. Primary fuel injector #1	6. Ignition switch	11. Battery
2. Primary fuel injector #2	7. Engine stop / starter switch ("RUN / STOP" position)	12. Main fuse (30 A)
3. Primary fuel injector #3	8. Fuel pump relay drive circuit	13. Ignition fuse (10 A)
4. Primary fuel injector #4	9. Fuel injector drive circuit	14. Fuel fuse (10 A)
5. FP relay	10. ECM	

Troubleshooting

Step 1

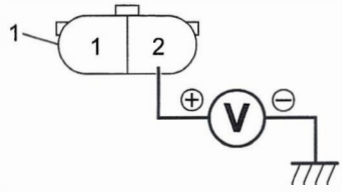
Primary fuel injector power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the primary fuel injector coupler. ☞(Page 1G-21)
3) Check for proper terminal connection to the primary fuel injector coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between "T2" and ground.

NOTE

Primary fuel injector power supply voltage can be detected only for a few seconds after ignition switch is turned ON.

Primary fuel injector power supply voltage
[Standard]: Battery voltage



IL41K1110025-01

Is check result OK?

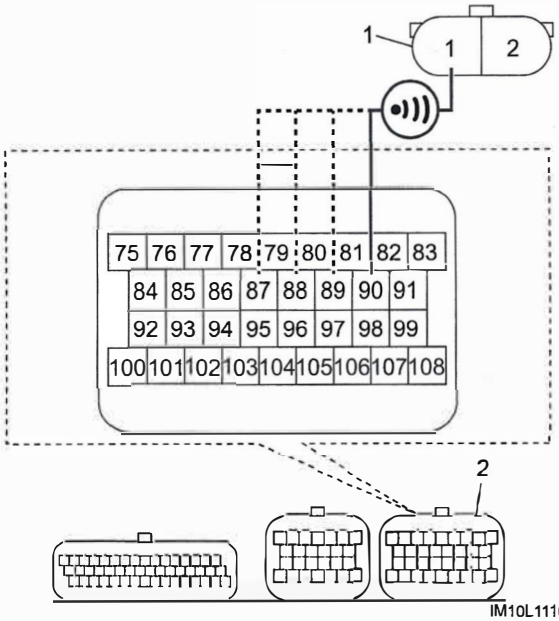
Yes — Go to Step 2.

No — Repair or replace the "T2" wire at the primary fuel injector #1 coupler.

Step 2

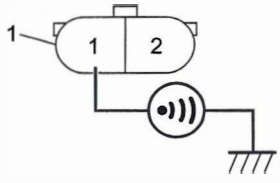
Primary fuel injector drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, check the following points.
   - Resistance
     - **Primary fuel injector #1:** Between "T1" at the primary fuel injector coupler (1) and "T90" at the ECM coupler "C" (2): less than 1 Ω
     - **Primary fuel injector #2:** Between "T1" at the primary fuel injector coupler and "T89" at the ECM coupler "C": less than 1 Ω
     - **Primary fuel injector #3:** Between "T1" at the primary fuel injector coupler and "T88" at the ECM coupler "C": less than 1 Ω
     - **Primary fuel injector #4:** Between "T1" at the primary fuel injector coupler and "T87" at the ECM coupler "C": less than 1 Ω



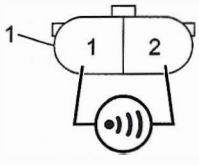
IM10L1110027-01

   - Between "T1" at the primary fuel injector coupler (1) and ground: infinity



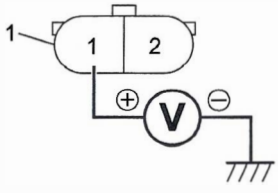
IL41K1110027-01

   - Between "T1" and "T2" at the primary fuel injector coupler (1): infinity



IL41K1110028-01

   - Voltage
     - Turn the ignition switch ON.
     - Between "T1" at the primary fuel injector coupler (1) and ground: approx. 0 V



IL41K1110029-01

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the "T1" wire at the primary fuel injector coupler.

Step 3

Primary fuel injector resistance check

1) Turn the ignition switch OFF.
2) Measure the primary fuel injector resistance. ☞(Page 1G-21)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the primary fuel injector. ☞(Page 1G-21)

DTC P0220 / P0223

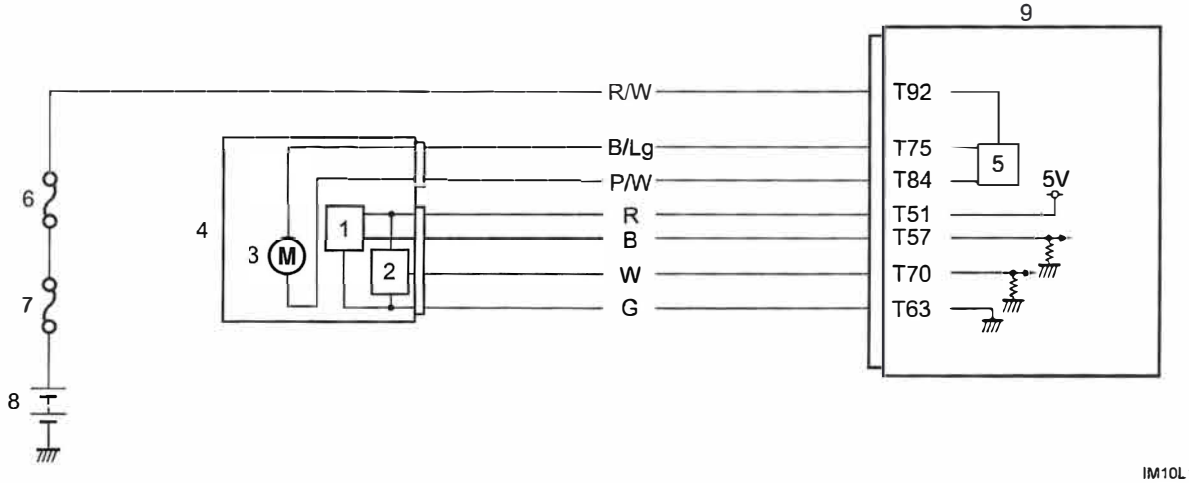
BENM10L31104021

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0220: TP Sensor / Switch "B" Circuit TP sensor (sub) output voltage is lower than 0.20 V. (1 D/C detection logic)	• TP sensor (sub) • TP sensor (sub) circuit • ECM
P0223: TP Sensor / Switch "B" Circuit High TP sensor (sub) output voltage is higher than 4.80 V. (1 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110016-01

1. TP sensor (main)	4. Throttle body	7. Main fuse (30 A)
2. TP sensor (sub)	5. Throttle valve motor #1 drive circuit	8. Battery
3. Throttle valve motor	6. Fuel fuse (10 A)	9. ECM

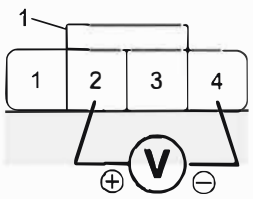
Troubleshooting

Step 1

TP sensor #1 power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the TP sensor coupler (1). ☞(Page 1D-9)
3) Check for proper terminal connection to the TP sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T2" and "T4".

TP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110017-01

Is check result OK?

Yes Go to Step 3.

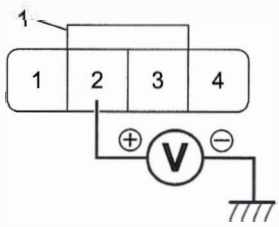
No Go to Step 2.

Step 2

TP sensor ground circuit check

1) Measure the voltage between the "T2" at the TP sensor coupler (1) and ground.

TP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110018-01

Is check result OK?

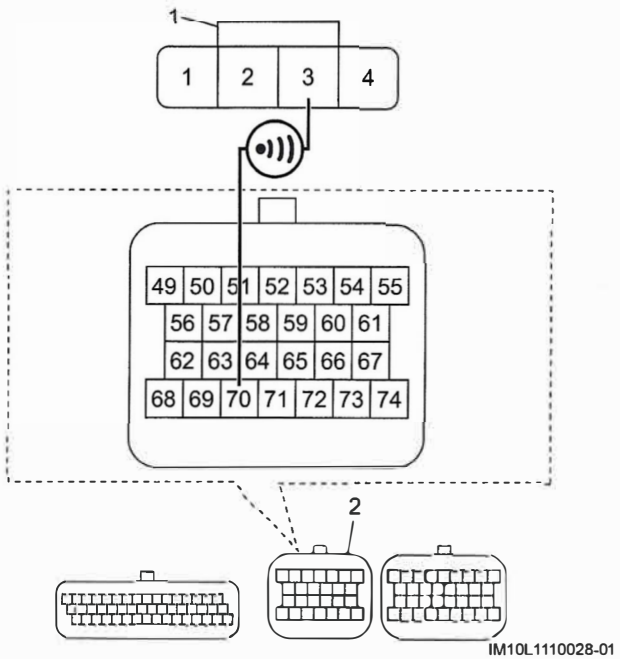
Yes Repair or replace the "T4" wire at the TP sensor coupler.

No Repair or replace the "T2" wire at the TP sensor coupler.

Step 3

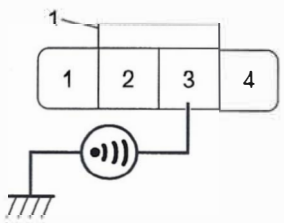
TP sensor #1 (sub) signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "B". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "B".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T3" at the throttle body #1 coupler (1) and "T70" at the ECM coupler "B" (2): less than 1 Ω



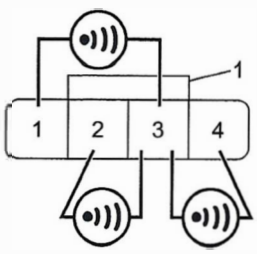
IM10L1110028-01

     – Between "T3" at the TP sensor coupler (1) and ground: infinity



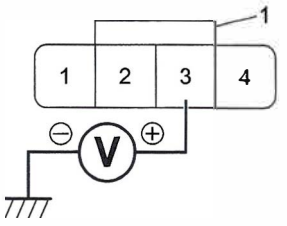
IM10L1110029-01

     – Between "T3" and other terminal at the TP sensor coupler (1): infinity



IM10L1110030-01

- Voltage
  - Turn the ignition switch ON.
  - Between "T3" at the TP sensor coupler (1) and ground: approx. 0 V



IM10L1110031-01

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace the "T3" wire at the TP sensor coupler.

Step 4

TP sensor (sub) output voltage check

1) Measure the TP sensor (sub) output voltage. ☞(Page 1C-7)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the throttle body. ☞(Page 1D-9)

DTC P0232 / P023F

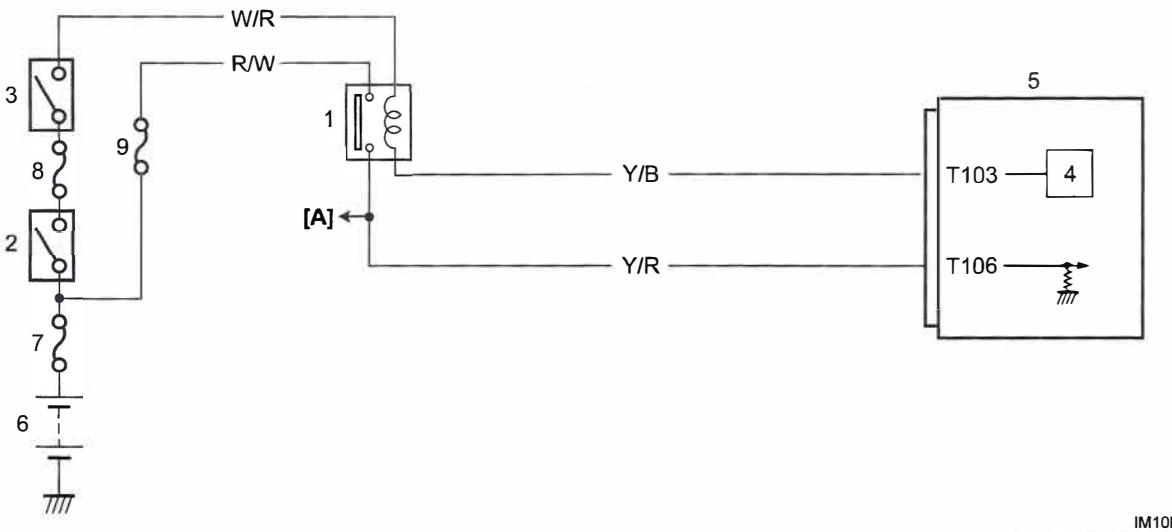
BENM10L31104022

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0232: FP Secondary Circuit High Voltage is input to ECM although the FP relay is OFF. (1 D/C detection logic)	• Fuel pump relay • FP relay circuit • ECM
P023F: FP Secondary Circuit / Open No voltage is input to ECM although the FP relay is ON. (1 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110032-01

[A]: To fuel pump, primary fuel injectors and secondary fuel injectors	4. Fuel pump relay drive circuit	8. Ignition fuse (10 A)
1. FP relay	5. ECM	9. Fuel fuse (10 A)
2. Ignition switch	6. Battery	
3. Engine stop / starter switch ("RUN / STOP" position)	7. Main fuse (30 A)	

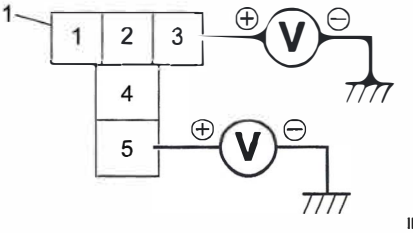
Troubleshooting

Step 1

FP relay power supply circuit check

1) Turn the ignition switch OFF.
2) Remove the fuel pump relay. ☞(Page 1G-21)
3) Check for proper terminal connection to the FP relay couplers.
4) If connections are OK measure the voltage between "T5" at the FP relay coupler (1) and ground.
5) If OK, turn the ignition switch ON.
6) Measure the voltage between "T3" at the FP relay coupler and ground.

FP relay power supply voltage
[Standard]: Battery voltage



IM10L1110033-01

Is check result OK?

Yes — Go to Step 2.

No — Repair or replace the defective wire harness.

Step 2

FP relay check

1) Check the FP relay. ☞(Page 1G-21)

Is check result OK?

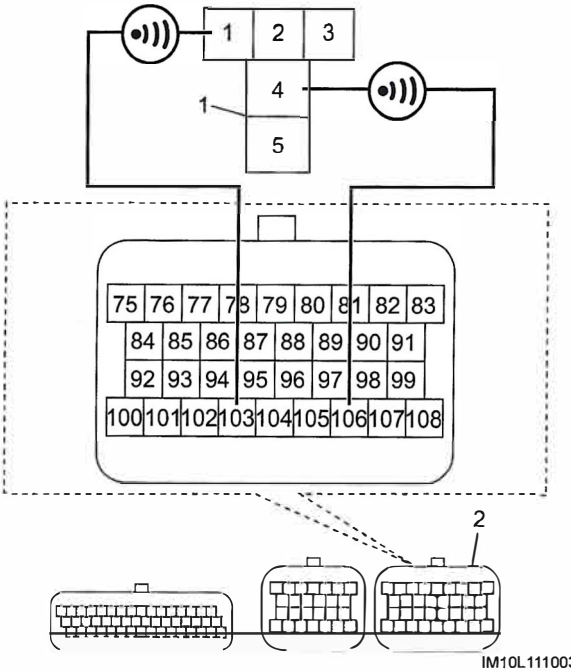
Yes — Go to Step 3.

No Replace the FP relay.

Step 3

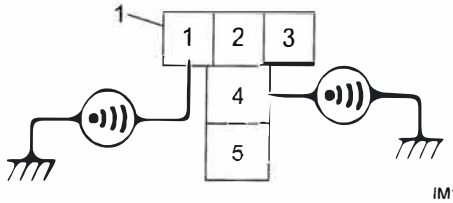
FP relay drive circuit and signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T1" at the FP relay coupler (1) and "T103" at the ECM coupler "C" (2): less than 1 Ω
     - Between "T4" at the FP relay coupler and "T106" at the ECM coupler "C": less than 1 Ω



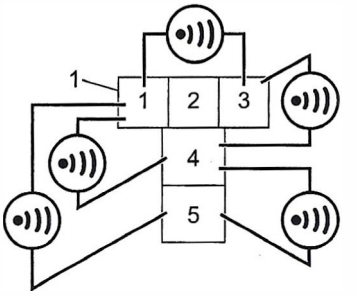
IM10L1110034-01

- Between "T1" at the FP relay coupler (1) and ground: infinity
- Between "T4" at the FP relay coupler and ground: infinity



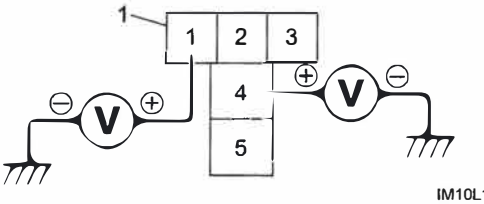
IM10L1110035-01

- Between "T1" and other terminal at FP relay coupler (1): Infinity
- Between "T4" and other terminal at FP relay coupler: Infinity



IM10L1110036-01

- Voltage
  - Turn the ignition switch ON.
  - Between "T1" at the FP relay coupler (1) and ground: approx. 0 V
  - Between "T4" at the FP relay coupler and ground: approx. 0 V



IM10L1110037-01

Is check result OK?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No Repair or replace the defective wire harness.

DTC P0300 / P0301 / P0302 / P0303 / P0304

BENM10L31104023

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0300: Random / Multiple Cylinder Misfire Detected Any of the following conditions is met. • Misfire, which causes damage to the catalyst, is detected at 2 or more cylinders, under the specified condition. (The MIL blinks) • Misfire, which affects exhaust emission adversely, is detected at 2 or more cylinders, under the specified condition. (3 D/C detection logic)	• Fuel system • Air intake system • Exhaust system • Emission control system • Ignition system • Engine compression • Valve clearance • Valve timing • Drive chain • ECM
P0301: Cylinder 1 Misfire Detected Any of the following conditions is met. • Misfire, which causes damage to the catalyst, is detected at cylinder #1, under the specified condition. (The MIL blinks) • Misfire, which affects exhaust emission adversely, is detected at cylinder #1, under the specified condition. (3 D/C detection logic)	
P0302: Cylinder 2 Misfire Detected Any of the following conditions is met. • Misfire, which causes damage to the catalyst, is detected at cylinder #2, under the specified condition. (The MIL blinks) • Misfire, which affects exhaust emission adversely, is detected at cylinder #2, under the specified condition. (3 D/C detection logic)	
P0303: Cylinder 3 Misfire Detected Any of the following conditions is met. Misfire, which causes damage to the catalyst, is detected at cylinder #3, under the specified condition. (The MIL blinks) Misfire, which affects exhaust emission adversely, is detected at cylinder #3, under the specified condition. (3 D/C detection logic)	
P0304: Cylinder 4 Misfire Detected Any of the following conditions is met. Misfire, which causes damage to the catalyst, is detected at cylinder #4, under the specified condition. (The MIL blinks) Misfire, which affects exhaust emission adversely, is detected at cylinder #4, under the specified condition. (3 D/C detection logic)	

Troubleshooting

Step 1

Fuel level check

1) Check fuel level by fuel level indicator.

Does it indicate "E" level (empty)?

Yes — Add fuel, and perform the "Step 5: Final Confirmation Test" of "Engine Control System Check" (Page 1A-9) and recheck DTC.

No — Go to Step 2.

Step 2

Fuel quality check

1) Check fuel in fuel tank for smell, color and quality.

Is check result OK?

Yes — Go to Step 3.

No — Replace fuel with correct type fuel, and perform the "Step 5: Final Confirmation Test" of "Engine Control System Check" (Page 1A-9) and recheck DTC.

Step 3

Drive chain check

1) Check the drive chain slack. ☞(Page 3A-3)

Is check result OK?

Yes — Go to Step 4.

No — Adjust the drive chain slack or replace the drive chain, and perform the "Step 5: Final Confirmation Test" of "Engine Control System Check" (Page 1A-9) and recheck DTC.

Step 4

Fuel system and emission control system check

1) Check the following points related to fuel and emission control systems.
   - Fuel pressure: ☞(Page 1G-6)
   - Fuel injector circuit: Refer to "DTC P0201 / P0202 / P0203 / P0204" (Page 1A-50) and/or "DTC P1201 / P1202 / P1203 / P1204" (Page 1A-84).
   - Fuel injector: ☞(Page 1G-23)
   - PCV hose: ☞(Page 1B-6)
   - PAIR system: ☞(Page 1B-5)
   - EVAP system (If equipped): ☞(Page 1B-10)

Is check result OK?

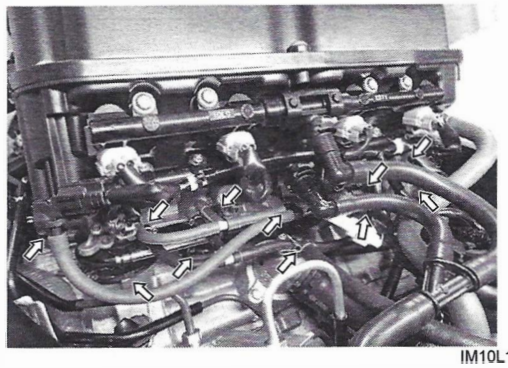
Yes — Go to Step 5.

No — Repair or replace defective parts.

Step 5

Exhaust system and air intake system check

1) Check exhaust system and air intake system for clogging and leakage.
   - Exhaust system: ☞(Page 1K-7)
   - Check air intake system for clogging and leakage.



IM10L1110128-04

Is check result OK?

Yes — Go to Step 6.

No — Repair or replace defective parts.

Step 6

Engine mechanical system check

1) Check the following points.
   - Engine compression: ☞(Page 1D-3)
   - Valve clearance: ☞(Page 1D-26)
   - Valve timing: ☞(Page 1D-51)

Is check result OK?

Yes — Check ECM power supply and ground circuits. ☞(Page 1A-113)
If circuit is OK, replace the ECM and inspect it again. ☞(Page 1C-2)

No — Repair or replace defective parts.

DTC P0335

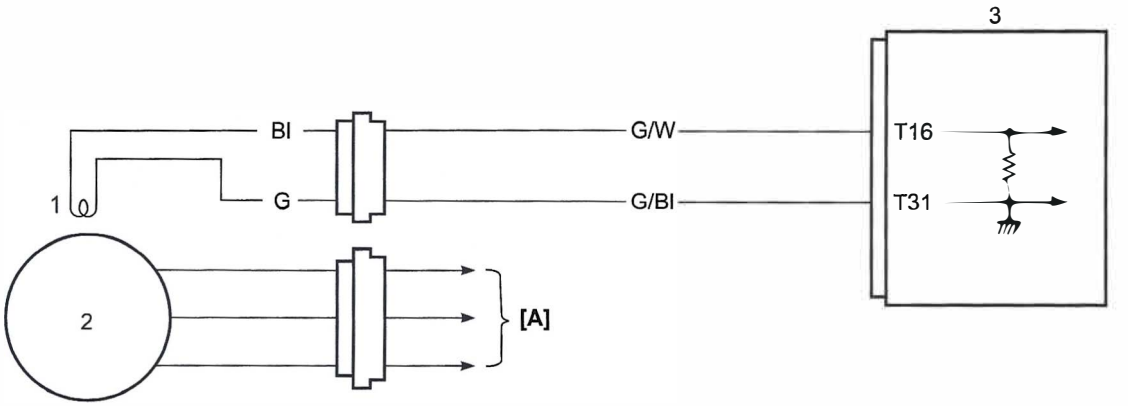
BENM10L31104024

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0335: CKP Sensor "A" Circuit CKP sensor signal is not input to ECM for a few seconds or more, after receiving the starter relay ON signal. (1 D/C detection logic)	• Metal particles or foreign material being stuck on the CKP sensor and rotor tip • CKP sensor • CKP sensor circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110038-01

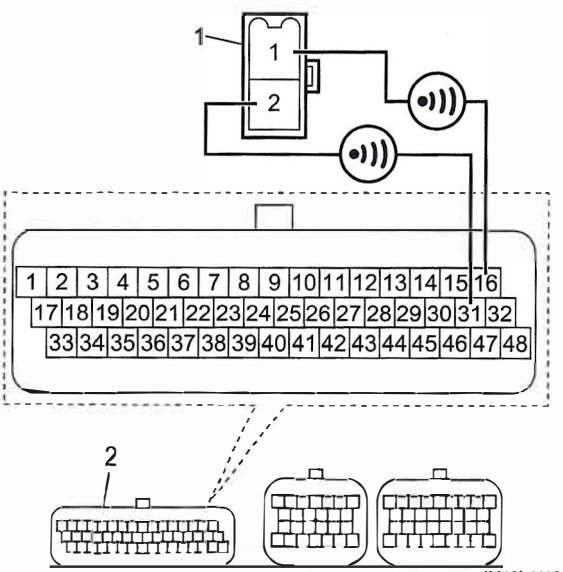
[A]: To regulator/rectifier	2. Generator
1. CKP sensor	3. ECM

Troubleshooting

Step 1

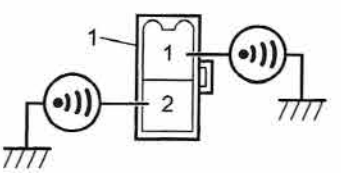
CKP sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the CKP sensor lead wire coupler and ECM coupler "A".
   - CKP sensor: ☞(Page 1C-12)
   - ECM: ☞(Page 1C-2)
3) Check for proper terminal connection to the CKP sensor lead wire coupler and ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T1" at the CKP sensor lead wire coupler (1) and "T16" at the ECM coupler "A" (2): less than 1 Ω
     - Between "T2" at the CKP sensor lead wire coupler and "T31" at the ECM coupler "A": less than 1 Ω



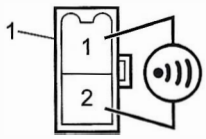
IM10L1110039-01

   - Between "T1" at the CKP sensor lead wire coupler (1) and ground: infinity
   - Between "T2" at the CKP sensor lead wire coupler and ground: infinity



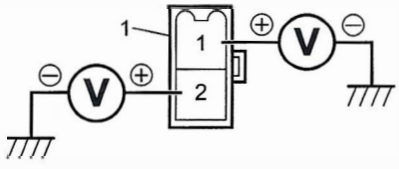
IM10L1110040-01

– Between "T1" and "T2" at the CKP sensor lead wire coupler (1): infinity



IM10L1110041-01

- Voltage
  – Turn the ignition switch ON.
  – Between "T1" at the CKP sensor lead wire coupler (1) and ground: approx. 0 V
  – Between "T2" at the CKP sensor lead wire coupler and ground: approx. 0 V



IM10L1110042-01

Is check result OK?

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

Step 2

CKP sensor resistance check

1) Turn the ignition switch OFF.
2) Measure the CKP sensor resistance. Refer to "CKP Sensor Resistance" under "CKP Sensor Inspection" in Section 1C (Page 1C-12).

Is check result OK?

Yes	Go to Step 3.
No	Replace the CKP sensor. ☞(Page 1C-13)

Step 3

CKP sensor peak voltage check

1) Connect the ECM coupler.
2) Crank the engine several seconds with the starter motor, and measure the CKP sensor peak voltage with the peak volt adapter. Refer to "CKP Sensor Peak Voltage" under "CKP Sensor Inspection" in Section 1C (Page 1C-12).

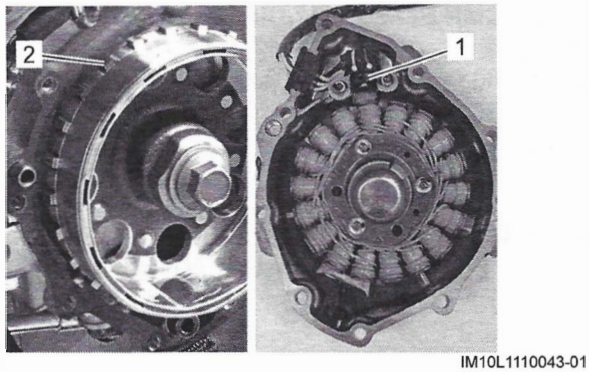
Is check result OK?

Yes	Replace the ECM and inspect it again. ☞(Page 1C-2)
No	Go to Step 4.

Step 4

CKP sensor and generator rotor check

1) Turn the ignition switch OFF.
2) Remove the generator cover. ☞(Page 1J-4)
3) Check that end face of the CKP sensor (1) and generator rotor teeth (2) are free from any metal particles and damage.



IM10L1110043-01

Is check result OK?

Yes	Replace the ECM and inspect it again. ☞(Page 1C-2)
No	Clean or replace defective parts.

DTC P0340

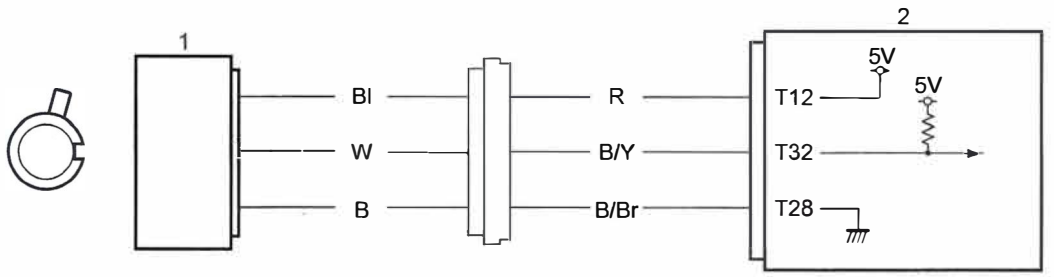
BENM10L31104025

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0340: CMP Sensor "A" Circuit Bank 1 or Single Sensor No CMP signal is detected, although the CKP signal is input to ECM. (1 D/C detection logic)	• Metal particles or foreign material being stuck on the CMP sensor and intake camshaft dent • CMP sensor • CMP sensor circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110044-01

1. CMP sensor	2. ECM

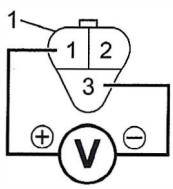
Troubleshooting

Step 1

CMP sensor power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the CMP sensor coupler. ☞(Page 1C-11)
3) Check for proper terminal connection to the CMP sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T1" and "T3".

CMP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110045-01

Is check result OK?

Yes — Go to Step 3.

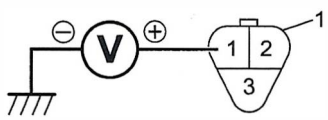
No — Go to Step 2.

Step 2

CMP sensor ground circuit check

1) Measure the voltage between the "T1" at the CMP sensor coupler (1) and ground.

CMP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110046-01

Is check result OK?

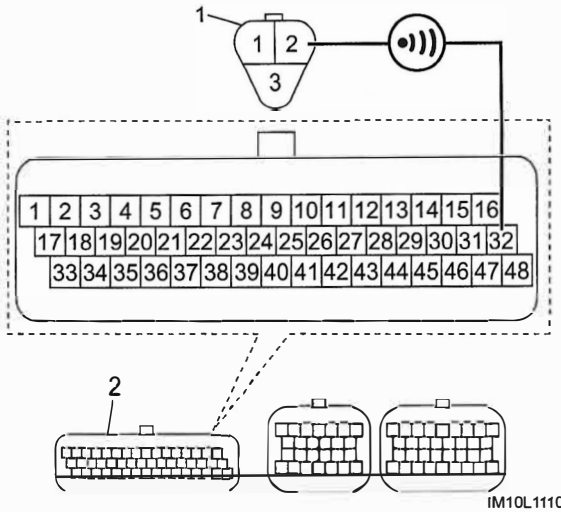
Yes — Repair or replace the "T3" wire at the CMP sensor coupler.

No — Repair or replace the "T1" wire at the CMP sensor coupler.

Step 3

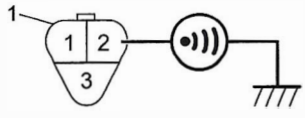
CMP sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T2" at the CMP sensor coupler (1) and "T32" at the ECM coupler "A" (2): less than 1 Ω



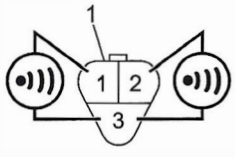
IM10L1110047-01

– Between "T2" at the CMP sensor coupler (1) and ground: infinity



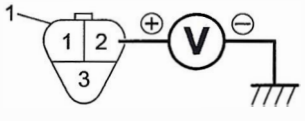
IM10L1110048-01

– Between "T2" and other terminal at the CMP sensor coupler (1): infinity



IM10L1110049-01

- Voltage
  - Turn the ignition switch ON.
  - Between "T2" at the CMP sensor coupler (1) and ground: approx. 0 V



IM10L1110050-01

Is check result OK?

Yes	Go to Step 4.
No	Repair or replace the "T2" wire at the CMP sensor coupler.

Step 4

CMP sensor check

1) Check the CMP sensor. ☞(Page 1C-11)

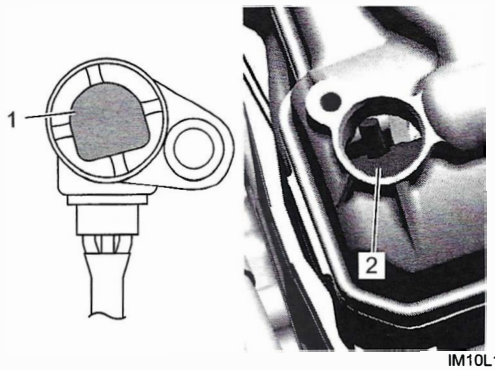
Is check result OK?

Yes	Go to Step 5.
No	Replace the CMP sensor with a new one. ☞(Page 1C-11)

Step 5

CMP sensor and camshaft check

1) Turn the ignition switch OFF.
2) Check that end face of the CMP sensor (1) and intake camshaft (2) are free from any metal particles and damage.



IM10L1110051-01

Is check result OK?

Yes	Replace the ECM with a known good one, and inspect it again. ☞(Page 1C-2)
No	Clean or replace defective parts.

DTC P0351 / P0352 / P0353 / P0354

BENM10L31104026

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0351: Ignition Coil "A" Primary / Secondary Circuit Ignition coil #1 signal is interrupted by 20 times or more continuity although CKP signal is detected. (1 D/C detection logic)	Refer to "No Spark or Poor Spark" in Section 1H (Page 1H-3).
P0352: Ignition Coil "B" Primary / Secondary Circuit Ignition coil #2 signal is interrupted by 20 times or more continuity although CKP signal is detected. (1 D/C detection logic)	
P0353: Ignition Coil "C" Primary / Secondary Circuit Ignition coil #3 signal is interrupted by 20 times or more continuity although CKP signal is detected. (1 D/C detection logic)	
P0354: Ignition Coil "D" Primary / Secondary Circuit Ignition coil #4 signal is interrupted by 20 times or more continuity although CKP signal is detected. (1 D/C detection logic)	

DTC P0410

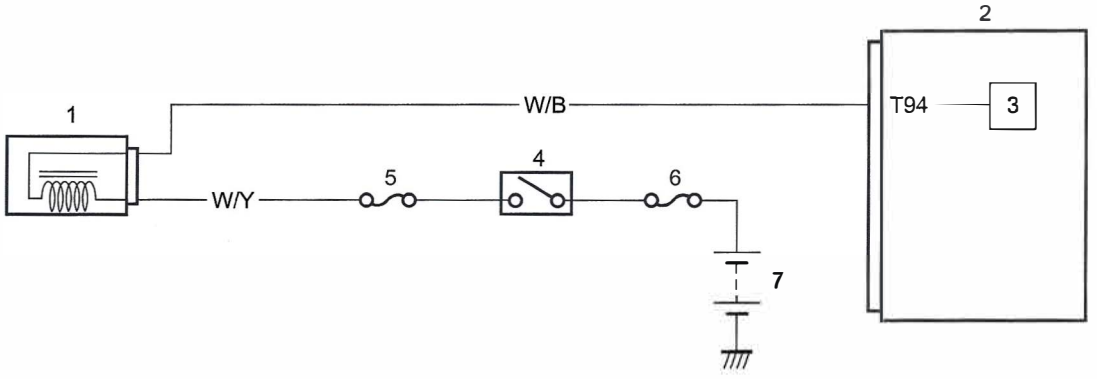
BENM10L31104027

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0410: PAIR System PAIR air flow volume is out of the specified range, under the specified condition. (3 D/C detection logic)	• PAIR system • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110052-02

1. PAIR control solenoid valve	4. Ignition switch	7. Battery
2. ECM	5. Ignition fuse (10 A)	
3. PAIR control solenoid valve drive circuit	6. Main fuse (30 A)	

Troubleshooting

Step 1

DTC check

1) Perform "DTC Check" (Page 1A-11).

Is DTC P0412 detected?

Yes — Go to troubleshooting for applicable DTC.

No — Go to Step 2.

Step 2

PAIR system check

1) Check the PAIR system. ☞(Page 0B-13)

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace defective parts.

Step 3

PAIR control solenoid valve circuit check

1) Check the PAIR control solenoid valve power supply and drive circuits. Refer to step "Step 1" – "Step 2" in "Troubleshooting" under "DTC P0412" (Page 1A-65).

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Repair or replace defective wire harness.

DTC P0412

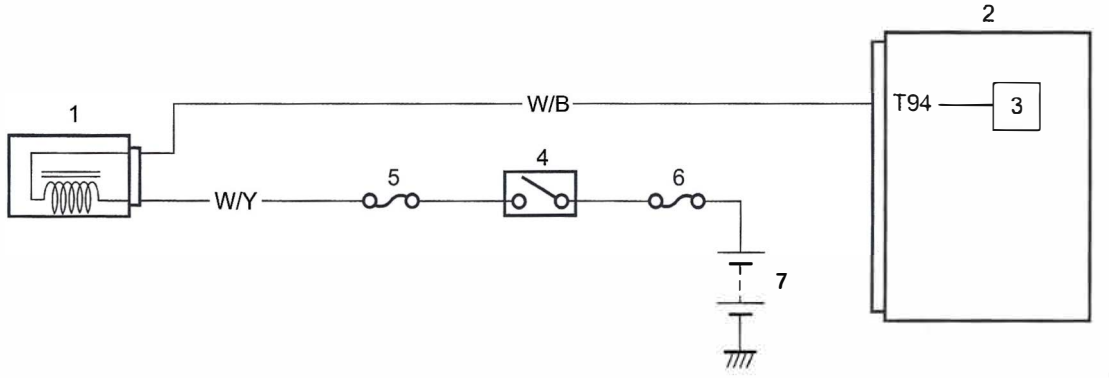
BENM10L31104028

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0412: PAIR System Switching Valve "A" Circuit PAIR control solenoid valve drive circuit is shorted to ground or open. (3 D/C detection logic)	• PAIR control solenoid valve • PAIR control solenoid valve circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110052-02

1. PAIR control solenoid valve	4. Ignition switch	7. Battery
2. ECM	5. Ignition fuse (10 A)	
3. PAIR control solenoid valve drive circuit	6. Main fuse (30 A)	

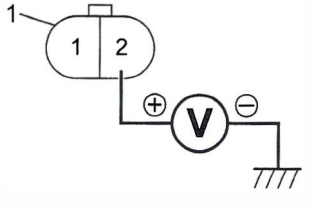
Troubleshooting

Step 1

PAIR control solenoid valve power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the PAIR control solenoid valve coupler. ☞(Page 1B-5)
3) Check for proper terminal connection to the PAIR control solenoid valve coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between "T2" and ground.

PAIR control solenoid valve power supply voltage
[Standard]: Battery voltage



IL06L1110052-01

Is check result OK?

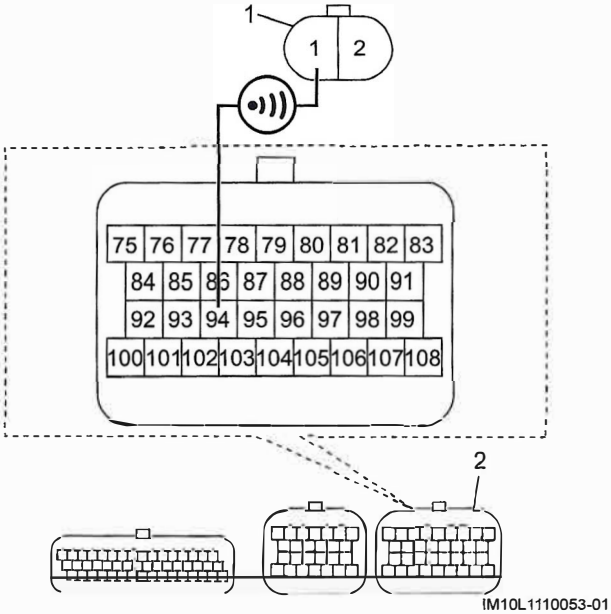
Yes — Go to Step 2.

No — Repair or replace the "T2" wire at the PAIR control solenoid valve coupler.

Step 2

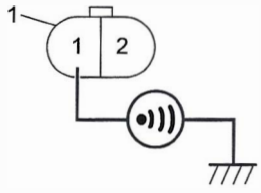
PAIR control solenoid valve drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T1" at the PAIR control solenoid valve coupler (1) and "T94" at the ECM coupler "C" (2): less than 1 Ω



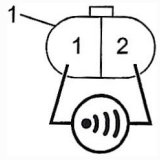
IM10L1110053-01

– Between "T1" at the PAIR control solenoid valve coupler (1) and ground: infinity



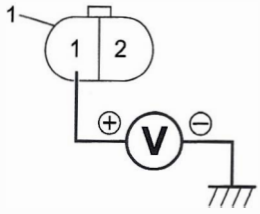
IL06L1110054-01

– Between "T1" and "T2" at the PAIR control solenoid valve coupler (1): infinity



IL06L1110055-02

- Voltage
  – Turn the ignition switch ON.
  – Between "T1" at the PAIR control solenoid valve coupler (1) and ground: approx. 0 V



IL06L1110056-01

Is check result OK?

Yes Go to Step 3.

No Repair or replace the "T1" wire at the PAIR control solenoid valve coupler.

Step 3

PAIR solenoid valve resistance check

1) Turn the ignition switch OFF.
2) Measure the PAIR control solenoid valve resistance. Refer to step 4) in "PAIR Control Solenoid Valve" under "PAIR (air supply) System" in Section 0B (Page 0B-13).

Is check result OK?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No Replace the PAIR control solenoid valve. ☞(Page 1B-5)

DTC P0444

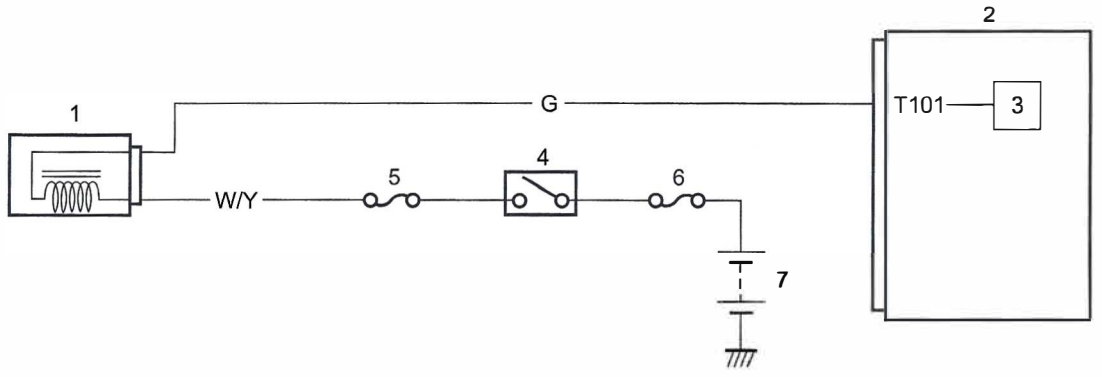
BENM10L31104029

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0444: EVAP System Purge Control Valve Circuit Open EVAP system purge control solenoid valve circuit is shorted to ground or open. (3 D/C detection logic)	• EVAP system purge control solenoid valve • EVAP system purge control solenoid valve circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110054-02

1. EVAP system purge control solenoid valve	4. Ignition switch	7. Battery
2. ECM	5. Ignition fuse (10 A)	
3. EVAP system purge control solenoid valve drive circuit	6. Main fuse (30 A)	

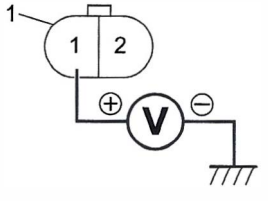
Troubleshooting

Step 1

EVAP system purge control solenoid valve power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the EVAP system purge control solenoid valve coupler. ☞(Page 1B-8)
3) Check for proper terminal connection to the EVAP system purge control solenoid valve coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between "T1" and ground.

EVAP system purge control solenoid valve power supply voltage
[Standard]: Battery voltage



IL06L1110057-01

Is check result OK?

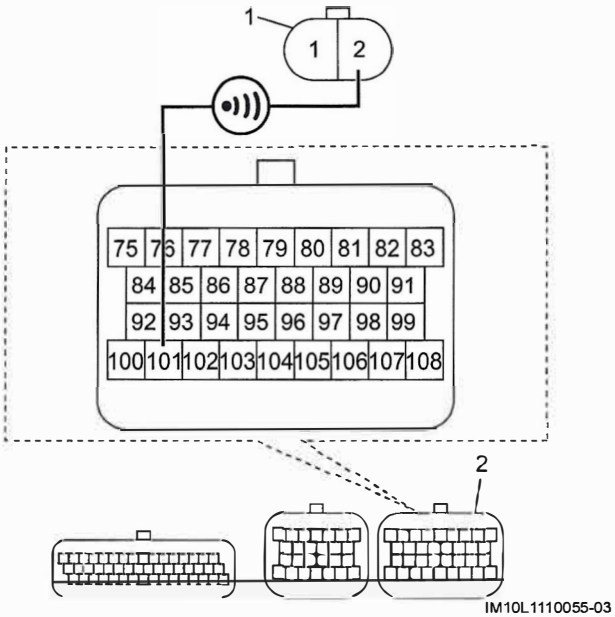
Yes Go to Step 2.

No Repair or replace the "T1" wire at the EVAP system purge control solenoid valve coupler.

Step 2

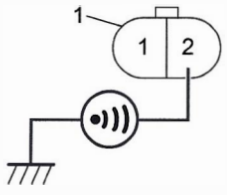
EVAP system purge control solenoid valve drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T2" at the EVAP system purge control solenoid valve coupler (1) and "T101" at the ECM coupler "C" (2): less than 1 Ω



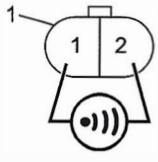
IM10L1110055-03

– Between "T2" at the EVAP system purge control solenoid valve coupler (1) and ground: infinity



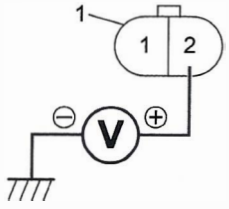
IL06L1110061-01

– Between "T2" and "T1" at the EVAP system purge control solenoid valve coupler (1): infinity



IL06L1110055-02

- Voltage
  – Turn the ignition switch ON.
  – Between "T2" at the EVAP system purge control solenoid valve coupler (1) and ground: approx. 0 V



IL06L1110062-01

Is check result OK?

Yes Go to Step 3.

No Repair or replace the "T2" wire at the EVAP system purge control solenoid valve coupler.

Step 3

EVAP system purge control solenoid valve resistance check

1) Turn the ignition switch OFF.
2) Measure the EVAP system purge control solenoid valve resistance. Refer to step 1) in "EVAP System Purge Control Solenoid Valve" under "Evaporative emission control system" in Section 0B (Page 0B-8).

Is check result OK?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No Replace the EVAP system purge control solenoid valve. ☞(Page 1B-8)

DTC P0480

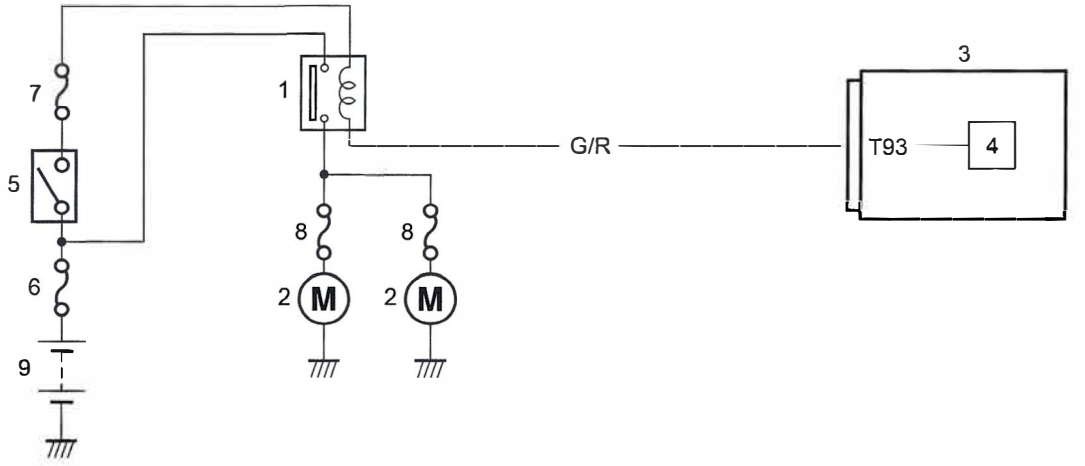
BENM10L31104030

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0480: Fan 1 Control Circuit Cooling fan relay drive circuit is shorted to ground or open. (3 D/C detection logic)	• Cooling fan relay • Cooling fan relay circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110056-02

1. Cooling fan relay	4. Cooling fan relay drive circuit	7. Ignition fuse (10 A)
2. Cooling fan	5. Ignition switch	8. Cooling fan fuse (15 A)
3. ECM	6. Main fuse (30 A)	9. Battery

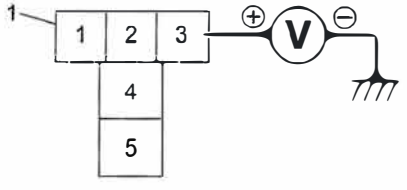
Troubleshooting

Step 1

Cooling fan relay power supply circuit check

1) Turn the ignition switch OFF.
2) Remove the cooling fan relay. ☞(Page 1F-13).
3) Check for proper terminal connection to the cooling fan relay coupler.
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between "T3" at the cooling fan relay coupler (1) and ground.

Cooling fan relay power supply voltage
[Standard]: Battery voltage



IM10L1110057-01

Is check result OK?

Yes — Go to Step 2.

No — Repair or replace the "T3" wire at the cooling fan relay coupler.

Step 2

Cooling fan relay check

1) Check the cooling fan relay. ☞(Page 1F-13)

Is check result OK?

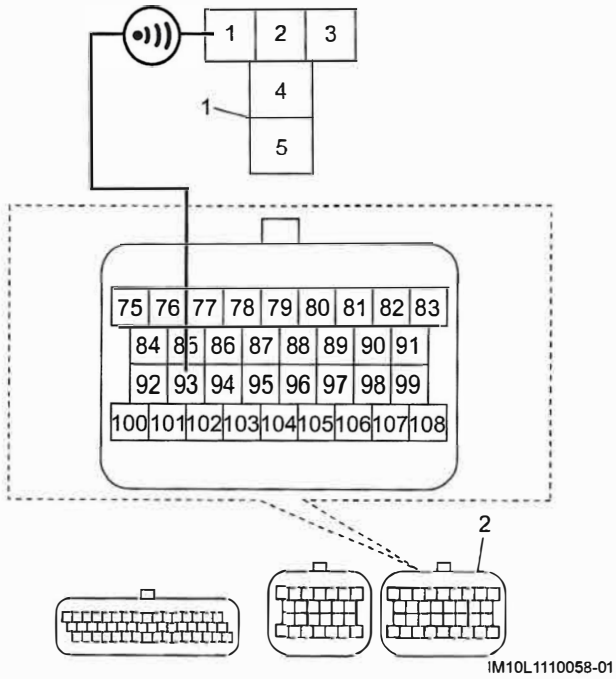
Yes — Go to Step 3.

No — Replace the cooling fan relay.

Step 3

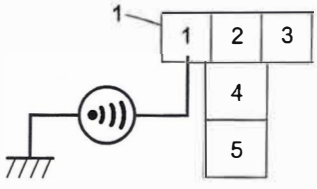
Cooling fan relay drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T1" at the cooling fan relay coupler (1) and "T93" at the ECM coupler "C" (2): less than 1 Ω



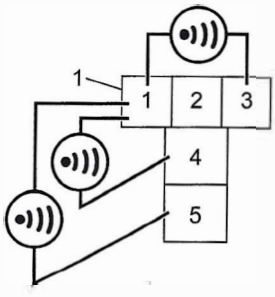
IM10L1110058-01

– Between "T1" at the cooling fan relay coupler (1) and ground: infinity



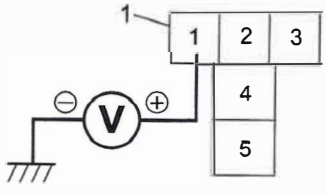
IM10L1110059-01

– Between "T1" and other terminal (2) at cooling fan relay coupler (1): Infinity



IM10L1110060-01

- Voltage
  - Turn the ignition switch ON.
  - Between "T1" at the cooling fan relay coupler (1) and ground: approx. 0 V



IM10L1110061-01

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Repair or replace the "T1" wire at the cooling fan relay coupler.

DTC P0500

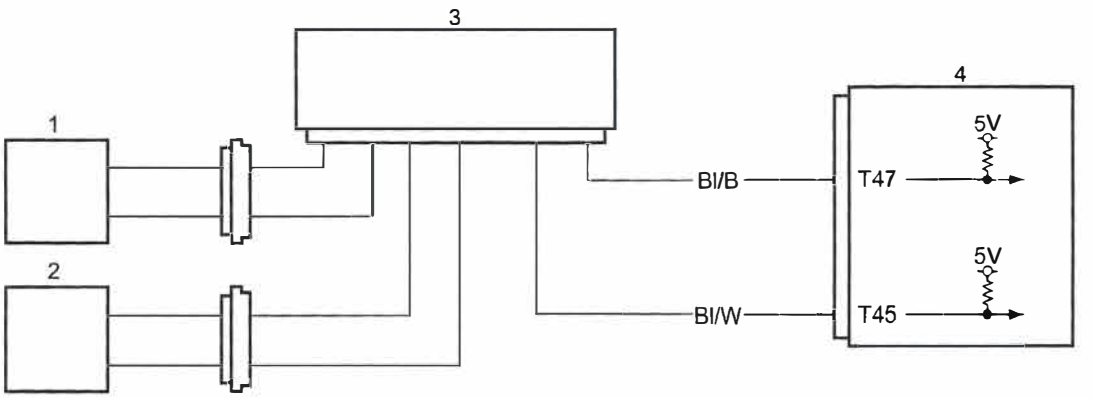
BENM10L31104031

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0500: Vehicle Speed Sensor "A" Any of the following conditions is met. • Front wheel speed is 0 km/h (0 mile/h) for a few seconds or more, at motorcycle deceleration. • Front wheel speed is 0 km/h (0 mile/h) for a few seconds or more although the rear wheel speed is higher than 10km/h (6 mile/h). • Front wheel speed signal does not become stable (3 D/C detection logic)	• Front wheel speed sensor • Front wheel speed sensor circuit • ABS control unit / HU • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110062-01

1. Front wheel speed sensor	3. ABS control unit / HU
2. Rear wheel speed sensor	4. ECM

Troubleshooting

Step 1

ABS DTC check.

1) Check that DTC is detected in ABS. ☞(Page 4E-15)

Is the DTC detected?

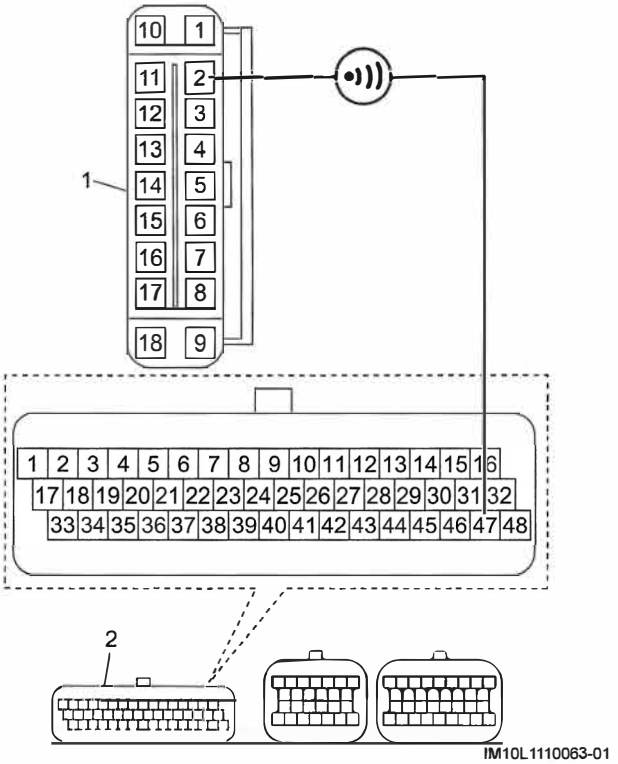
Yes — Go to troubleshooting for DTCs. Refer to "DTC Table" in Section 4E (Page 4E-18).

No — Go to Step 2.

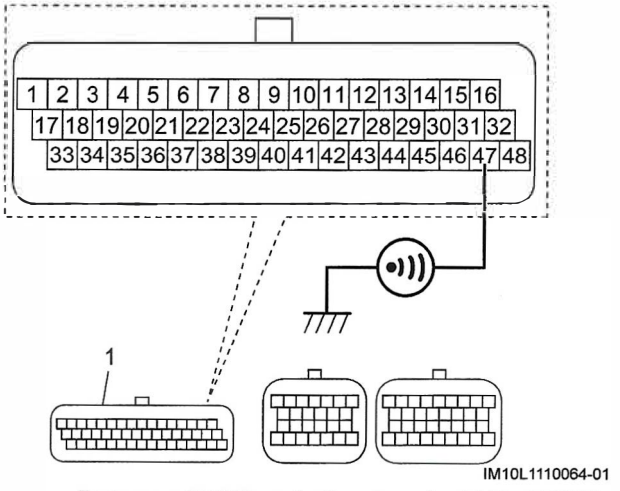
Step 2

Speed sensor signal circuit check (From ABS control unit to ECM)

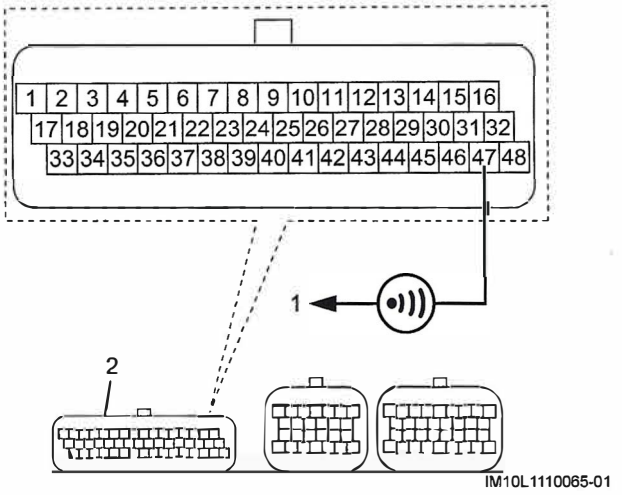
1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A" and ABS control unit / HU coupler.
   - ECM coupler "A": ☞(Page 1C-2)
   - ABS control unit / HU coupler: ☞(Page 4E-50)
3) Check for proper terminal connection to the ECM coupler "A" and ABS control unit / HU coupler.
4) If connections are OK, check the following points.
   - Resistance
     – Between "T12" at the ABS control unit / HU coupler (1) and "T47" at the ECM coupler "A" (2): less than 1 Ω



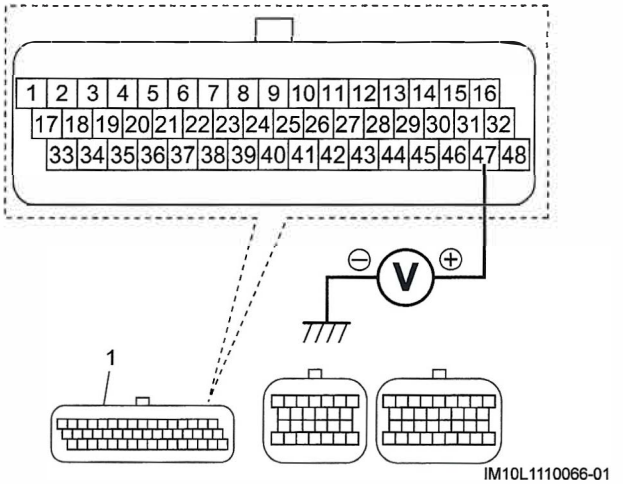
– Between "T47" at the ECM coupler "A" (1) and ground: infinity



– Between "T47" and other terminal (1) at ECM coupler "A" (2): infinity



- Voltage
  - Turn the ignition switch ON.
  - Between "T47" at the ECM coupler "A" (1) and ground: approx. 0 V



Is check result OK?

Yes	Replace the ECM and inspect it again. ☞(Page 1C-2) If this DTC is detected again, replace the ABS control unit / HU and recheck DTC.
No	Repair or replace the "T47" wire at the ECM coupler "A".

DTC P050B

BENM10L31104032

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P050B: Cold Start Ignition Timing Performance Ignition timing for catalyst warming up is out of the specified range. (3 D/C detection logic)	• ECM

Troubleshooting

Step 1

DTC recheck

1) Perform "DTC Clearance" (Page 1A-12).
2) Perform "DTC Check" (Page 1A-11) and recheck DTC.

Is DTC P050B still detected?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — End.

DTC P0602

BENM10L31104033

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0602: Control Module Programming Error ECM internal failure (data programming error). (1 D/C detection logic)	• Reprogramming failure of ECM • ECM

Troubleshooting

Step 1

ECM reprogramming check

Was reprogramming of ECM executed?

Yes — Execute reprogramming of ECM correctly once again.
If this DTC is detected again, replace the ECM. ☞(Page 1C-2)

No — Execute reprogramming of ECM.

DTC P0607

BENM10L31104034

NOTE

When DTC P0607 is detected, perform the Troubleshooting of DTC P0607 first even if other DTC is detected.

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0607: Control Module Performance ECM internal processor failure. (1 D/C detection logic)	• ECM coupler connection • ECM

Troubleshooting

Step 1

ECM coupler connection check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers. ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, reconnect the ECM couplers.
5) Perform "DTC Check" (Page 1A-11) and check DTC

Is DTC P0607 still detected?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — End.

DTC P0826 / P0828

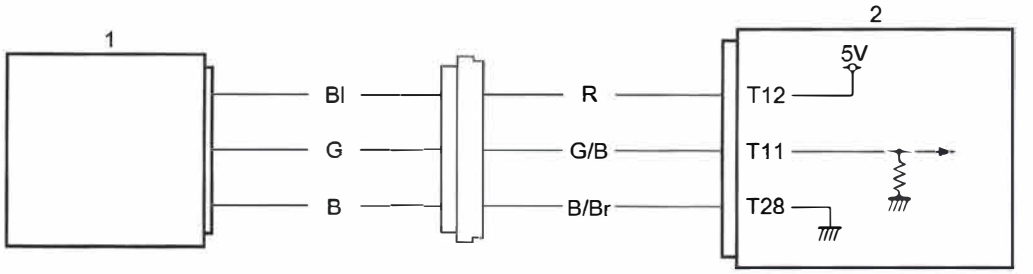
BENM10L31104035

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0826: Up and Down Shift Switch Circuit Gearshift sensor output voltage is lower than 0.10 V. (3 D/C detection logic)	• Gearshift sensor • Gearshift sensor circuit • ECM
P0828: Up and Down Shift Switch Circuit High Gearshift sensor output voltage is higher than 4.90 V. (3 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110067-01

1. Gearshift sensor
2. ECM

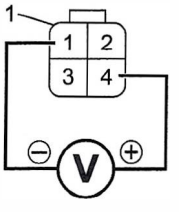
Troubleshooting

Step 1

Gearshift sensor power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the gearshift sensor coupler. ☞(Page 5B-19)
3) Check for proper terminal connection to the gearshift sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T4" and "T1".

Gearshift sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110068-01

Is check result OK?

Yes — Go to Step 3.

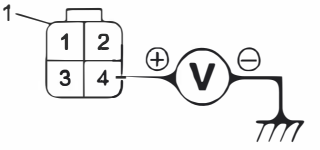
No — Go to Step 2.

Step 2

Gearshift sensor ground circuit check

1) Measure the voltage between the "T4" at the gearshift sensor coupler (1) and ground.

Gearshift sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110069-01

Is check result OK?

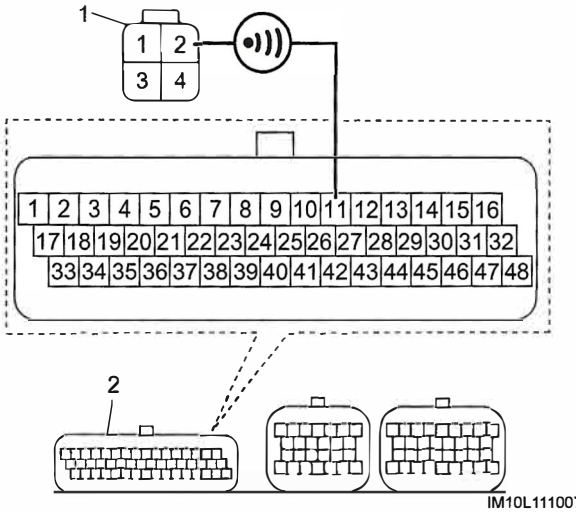
Yes — Repair or replace the "T1" wire at the gearshift sensor coupler.

No — Repair or replace the "T4" wire at the gearshift sensor coupler.

Step 3

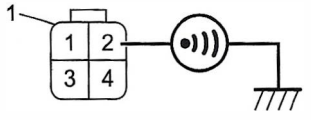
Gearshift sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T2" at the gearshift sensor coupler (1) and "T11" at the ECM coupler "A" (2): less than 1 Ω



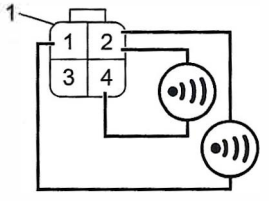
IM10L1110070-01

– Between "T2" at the gearshift sensor coupler (1) and ground: infinity



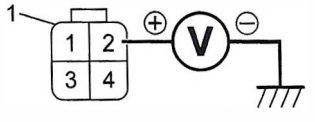
IM10L1110071-01

– Between "T2" and other terminal at the gearshift sensor coupler (1): infinity



IM10L1110072-01

- Voltage
  – Turn the ignition switch ON.
  – Between "T2" at the gearshift sensor coupler (1) and ground: approx. 0 V



IM10L1110073-01

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace the "T2" wire at the gearshift sensor coupler.

Step 4

Gearshift sensor check

1) Check the gearshift sensor. ☞(Page 5B-20)

Is check result OK?

Yes — Replace the ECM with a known good one, and inspect it again. ☞(Page 1C-2)

No — Replace the gearshift sensor with a new one. ☞(Page 5B-19)

DTC P0830

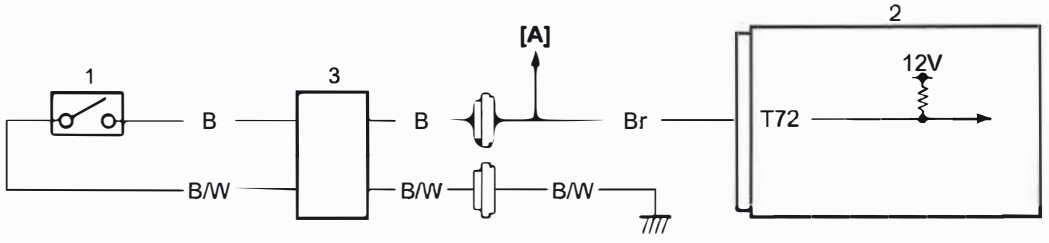
BENM10L31104036

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0830: Clutch Switch "A" Circuit Clutch lever position switch is continuity ON for more than specified time with motorcycle running. (3 D/C detection logic)	• Clutch lever position switch • Clutch lever position switch circuit • Left handle switch • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110074-02

[A]: To starter sub relay	2. ECM
1. Clutch lever position switch	3. Left handle switch

Troubleshooting

Step 1

Clutch lever position switch check

1) Turn the ignition switch OFF.
2) Check the clutch lever position switch. ☞(Page 5C-6)

Is check result OK?

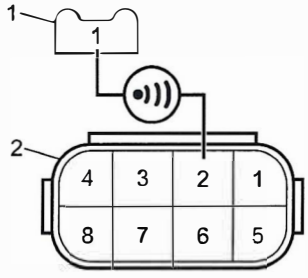
Yes — Go to Step 2.

No — Replace the clutch lever position switch. ☞(Page 5C-10)

Step 2

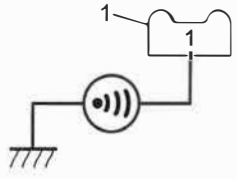
Clutch lever position switch signal circuit check (left handle switch)

1) Check for proper terminal connection to the clutch lever position switch connectors or coupler.
2) If connections are OK, disconnect the left handle switch couplers. ☞(Page 6B-9)
3) Check for proper terminal connection to the left handle switch couplers.
4) If connections are OK, check the resistance.
   - Between "T1" (B wire) at the clutch lever position switch connector (1) and "T2" at the left handle switch coupler (8P) (2): less than 1 Ω



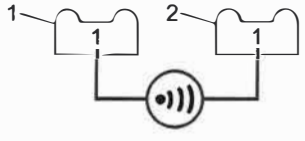
IL06L3110028-01

- Between "T1" (B wire) at the clutch lever position switch connector (1) and ground: infinity



IL06L1110076-01

- Between "T1" (B wire) at the clutch lever position switch connector (1) and "T1" (B/W wire) at the clutch lever position switch connector (2): infinity



IL06L1110077-01

Is check result OK?

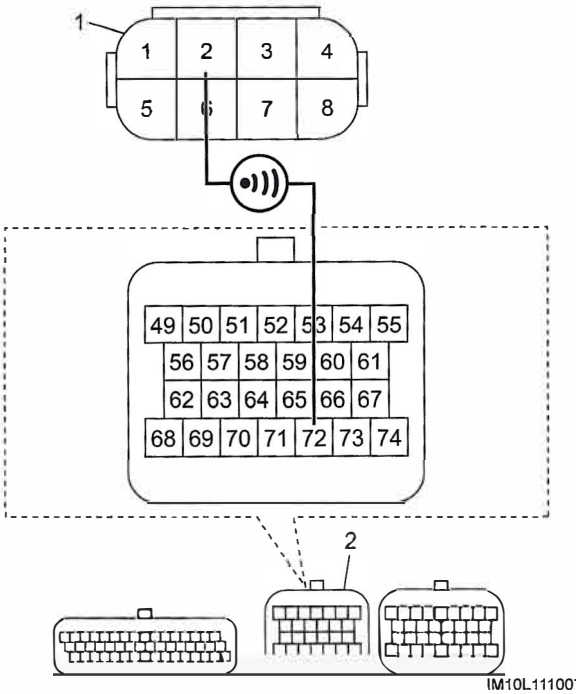
Yes — Go to Step 3.

No Repair the left handle switch lead wire or replace the left handle switch. ☞(Page 6B-9)

Step 3

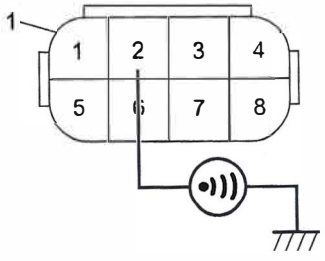
Clutch lever position switch signal circuit check (main harness)

1) Disconnect the ECM coupler "B". ☞(Page 1C-2)
2) Check for proper terminal connection to the ECM coupler "B".
3) If connections are OK, check the resistance.
   - Between "T2" at the left handle switch coupler (8P) (1) and "T72" at the ECM coupler "B" (2): less than 1 Ω



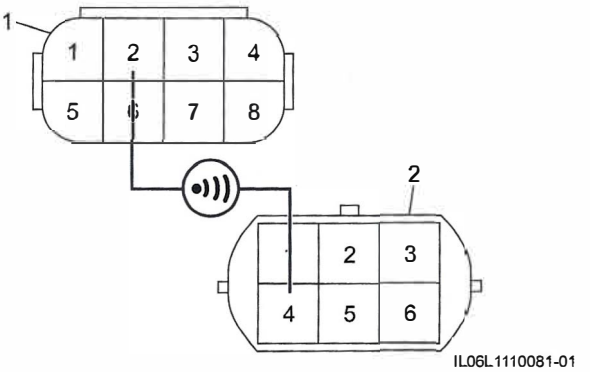
IM10L1110075-01

   - Between "T2" at the left handle switch coupler (8P) (1) and ground: infinity



IL06L1110080-01

   - Between "T2" at the left handle switch coupler (8P) (1) and "T4" at the left handle switch coupler (6P) (2): infinity



IL06L1110081-01

Is check result OK?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No Repair or replace the "T2" wire at the left handle switch coupler (8P).

DTC P0850

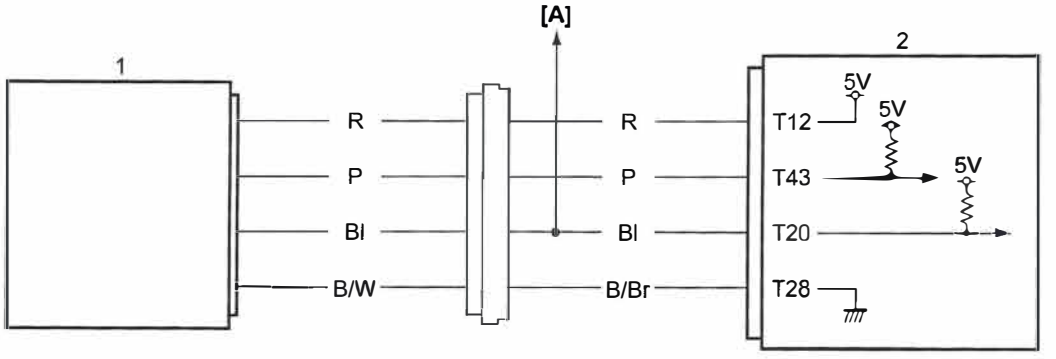
BENM10L31104037

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0850: Park / Neutral Switch Input Circuit Neutral switch is continuity ON for more than specified time with motorcycle running. (3 D/C detection logic)	• GP sensor • GP sensor circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110076-02

[A]: To combination meter and starter sub relay	1. GP sensor	2. ECM

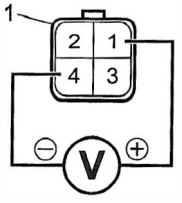
Troubleshooting

Step 1

GP sensor power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the GP sensor coupler. ☞(Page 5B-14)
3) Check for proper terminal connection to the GP sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T1" and "T4".

GP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110077-02

Is check result OK?

Yes Go to Step 3.

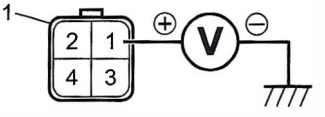
No Go to Step 2.

Step 2

GP sensor ground circuit check

1) Measure the voltage between the "T1" at the GP sensor coupler (1) and ground.

GP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110078-02

Is check result OK?

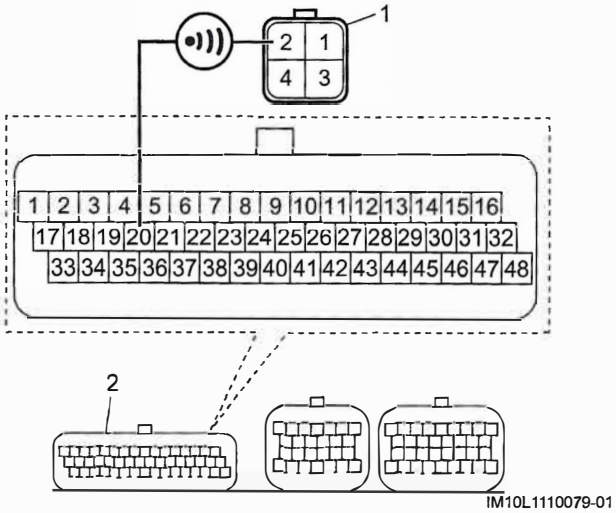
Yes Repair or replace the "T4" wire at the gearshift sensor coupler.

No Repair or replace the "T1" wire at the gearshift sensor coupler.

Step 3

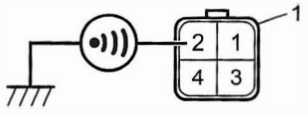
GP sensor (neutral) signal circuit check

1) Disconnect the GP sensor coupler, ECM coupler "A", combination meter coupler and starter sub relay.
   - GP sensor coupler: ☞(Page 5B-14)
   - ECM coupler: ☞(Page 1C-2)
   - Combination meter coupler: ☞(Page 9C-13)
   - Remove the starter sub relay. ☞(Page 1I-9)
2) Check for proper terminal connection to the GP sensor coupler and ECM coupler "A".
3) If connections are OK, check the resistance.
   - Resistance
     – Between "T2" at the GP sensor coupler (1) and "T20" at the ECM coupler "A" (2): less than 1 Ω



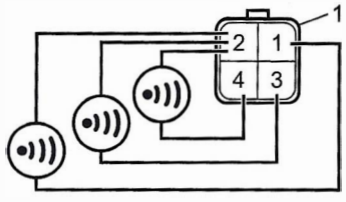
IM10L1110079-01

– Between "T2" at the GP sensor coupler (1) and ground: infinity



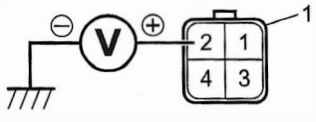
IM10L1110080-01

– Between "T2" and other terminal at the GP sensor coupler (1): infinity



IM10L1110081-01

- Voltage
  – Turn the ignition switch ON.
  – Between "T2" at the GP sensor coupler (1) and ground: approx. 0 V



IM10L1110082-01

Is check result OK?

Yes Go to Step 4.

No Repair or replace the "T2" wire at the GP sensor coupler.

Step 4

GP sensor check

1) Turn the ignition switch OFF.
2) Check the neutral switch of GP sensor. Refer to ☞(Page 5B-13)

Is check result OK?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No Replace the GP sensor. ☞(Page 5B-14)

DTC P0914 / P0915 / P0916

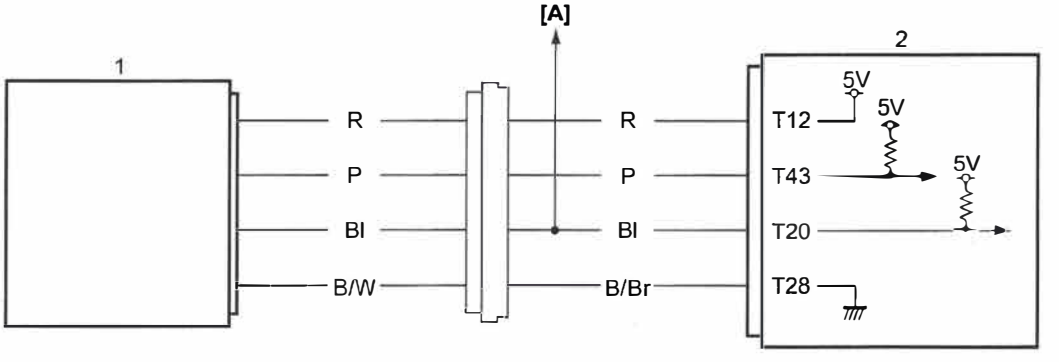
BENM10L31104038

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P0914: GP Sensor Circuit GP sensor output voltage is higher than 4.90 V for 3 sec. or more continuity. (3 D/C detection logic)	• GP sensor • GP sensor circuit • ECM
P0915: GP Sensor Circuit Range/Performance Any of the following conditions is met. • GP sensor output voltage is out of the specified range. • Difference between measured gear position and estimated gear position is out of the specified range. (3 D/C detection logic)	
P0916: GP Sensor Circuit Low GP sensor output voltage is lower than 0.10 V for 3 sec. or more continuity. (3 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110076-02

[A]: To combination meter and starter sub relay	1. GP sensor	2. ECM

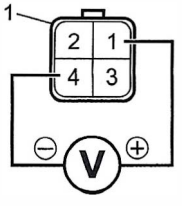
Troubleshooting

Step 1

GP sensor power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the GP sensor coupler. ☞(Page 5B-14)
3) Check for proper terminal connection to the GP sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T1" and "T4".

GP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110077-02

Is check result OK?

Yes Go to Step 3.

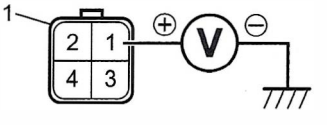
No Go to Step 2.

Step 2

GP sensor ground circuit check

1) Measure the voltage between the "T1" at the GP sensor coupler (1) and ground.

GP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110078-02

Is check result OK?

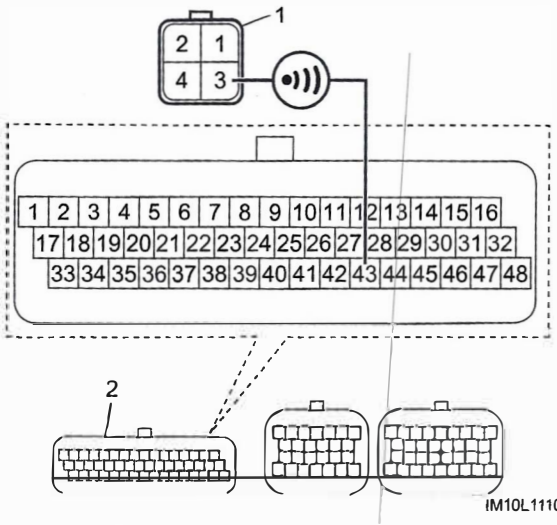
Yes Repair or replace the "T4" wire at the gearshift sensor coupler.

No Repair or replace the "T1" wire at the gearshift sensor coupler.

Step 3

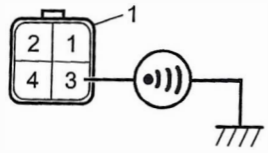
GP sensor (gear position) signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T3" at the GP sensor coupler (1) and "T43" at the ECM coupler "A" (2): less than 1 Ω



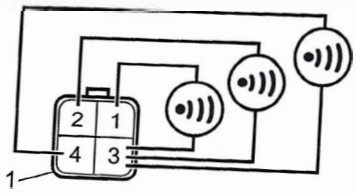
IM10L1110083-01

     – Between "T3" at the GP sensor coupler (1) and ground: infinity



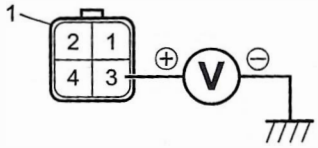
IM10L1110084-01

     – Between "T3" and other terminal at the GP sensor coupler (1): infinity



IM10L1110085-01

   - Voltage
     – Turn the ignition switch ON.
     – Between "T3" at the GP sensor coupler (1) and ground: approx. 0 V



IM10L1110086-01

Is check result OK?

Yes Go to Step 4.

No Repair or replace the "T3" wire at the GP sensor coupler.

Step 4

GP sensor check

1) Turn the ignition switch OFF.
2) Check the neutral switch of GP sensor. ☞(Page 5B-13)

Is check result OK?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No Replace the GP sensor. ☞(Page 5B-14)

DTC P1105 / P1106 / P1107

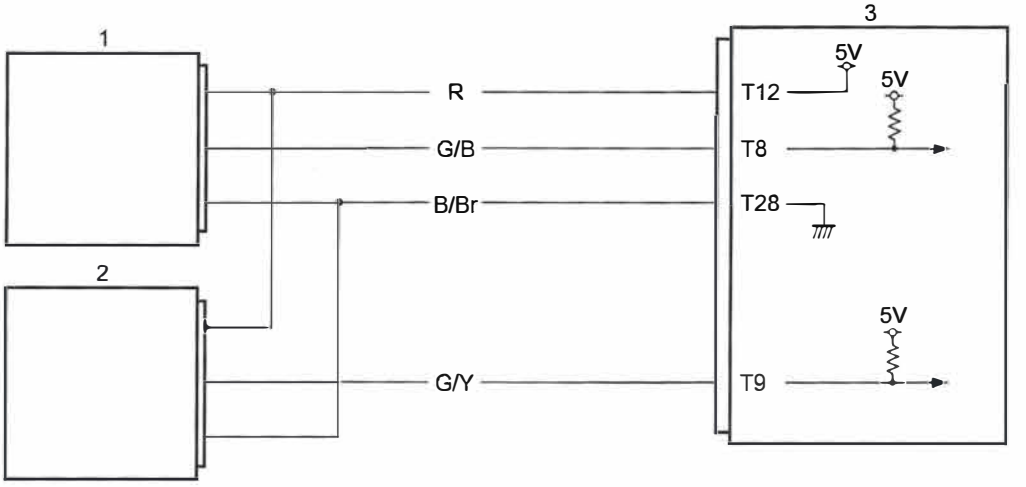
BENM10L31104039

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P1105: IAP Sensor Circuit Bank 2 IAP sensor output voltage is higher than 4.80 V. (3 D/C detection logic)	• Vacuum passage between throttle body and IAP sensor • IAP sensor • IAP sensor circuit • ECM
P1106: IAP Sensor Circuit Range / Performance Bank2 Any of the following conditions is met. • IAP sensor vacuum hose has come off. • IAP sensor output voltage does not change, under the specified condition. (3 D/C detection logic)	
P1107: IAP Sensor Circuit Low Bank2 IAP sensor output voltage is lower than 0.10 V. (3 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110011-01

1. IAP sensor	2. AP sensor	3. ECM

Troubleshooting

NOTE

When DTC P1106 is not detected, start with Step 2.

Step 1

IAP sensor vacuum hose check

- Check that the IAP sensor vacuum hose is connected correctly. ☞(Page 1D-5)
- Check the IAP sensor vacuum hose for wear and damage.

Is check result OK?

Yes — Go to Step 2.

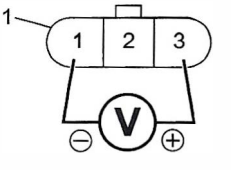
No — Repair or replace the IAP sensor vacuum hose.

Step 2

IAP sensor power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the IAP sensor coupler. ☞(Page 1C-5)
3) Check for proper terminal connection to the IAP sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T3" and "T1".

IAP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM06L1110001-01

Is check result OK?

Yes Go to Step 3.

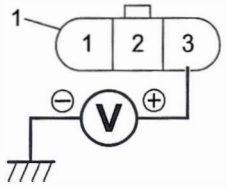
No Go to Step 2.

Step 3

IAP sensor ground circuit check

1) Measure the voltage between the "T3" at the IAP sensor coupler (1) and ground.

IAP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM06L1110002-01

Is check result OK?

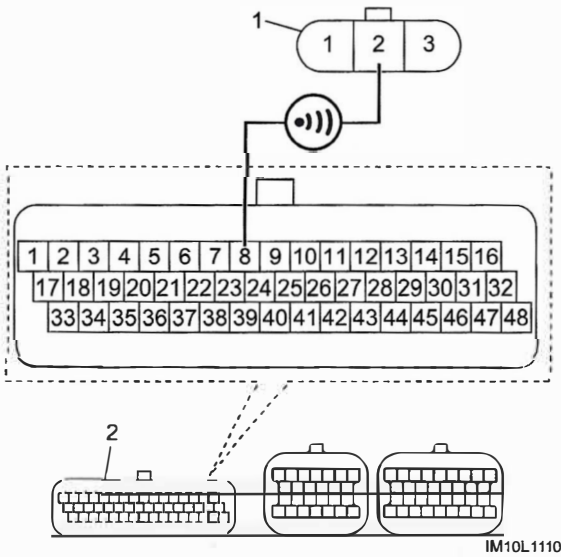
Yes Repair or replace the "T1" wire at the IAP sensor coupler.

No Repair or replace the "T3" wire at the IAP sensor coupler.

Step 4

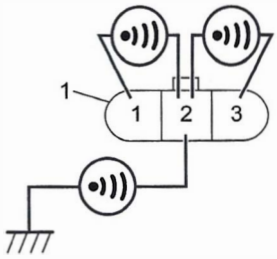
IAP sensor signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T2" at the IAP sensor coupler (1) and "T8" at the ECM coupler "A" (2): less than 1 Ω



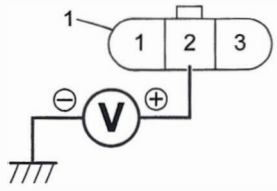
IM10L1110087-01

     – Between "T2" at the IAP sensor coupler (1) and ground: infinity
     – Between "T2" and other terminal at IAP sensor coupler (1): infinity



IM06L1110004-01

   - Voltage
     – Turn the ignition switch ON.
     – Between "T2" at the IAP sensor coupler (1) and ground: approx. 0 V



IM06L1110005-01

Is check result OK?

Yes Go to Step 5.

No Repair or replace the "T2" wire at the IAP sensor coupler.

Step 5

IAP sensor output voltage at idle speed check

1) Turn the ignition switch OFF.
2) Measure the IAP sensor voltage. Refer to "IAP Sensor Output Voltage" under "IAP Sensor Inspection" in Section 1C (Page 1C-4).

Is check result OK?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No Replace the IAP sensor. ☞(Page 1C-5)

DTC P1201 / P1202 / P1203 / P1204

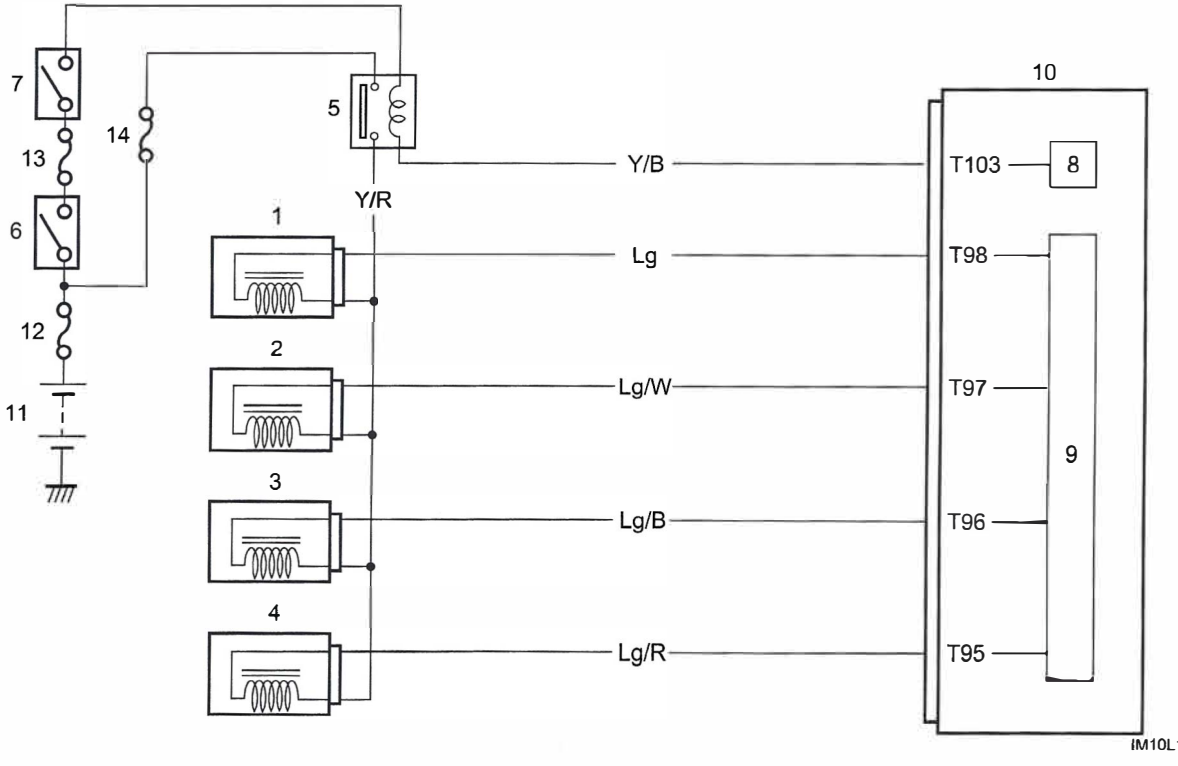
BENM10L31104040

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P1201: Secondary Injector Circuit / Open - Cylinder 1 Secondary fuel injector #1 signal is interrupted by 20 times or more continuity although CKP signal is detected. (3 D/C detection logic)	• Secondary fuel injector #1 • Secondary fuel injector #1 circuit • ECM
P1202: Secondary Injector Circuit / Open - Cylinder 2 Secondary fuel injector #2 signal is interrupted by 20 times or more continuity although CKP signal is detected. (3 D/C detection logic)	• Secondary fuel injector #2 • Secondary fuel injector #2 circuit • ECM
P1203: Secondary Injector Circuit / Open - Cylinder 3 Secondary fuel injector #3 signal is interrupted by 20 times or more continuity although CKP signal is detected. (3 D/C detection logic)	• Secondary fuel injector #3 • Secondary fuel injector #3 circuit • ECM
P1204: Secondary Injector Circuit / Open - Cylinder 4 Secondary fuel injector #4 signal is interrupted by 20 times or more continuity although CKP signal is detected. (3 D/C detection logic)	• Secondary fuel injector #4 • Secondary fuel injector #4 circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



1. Secondary fuel injector #1	6. Ignition switch	11. Battery
2. Secondary fuel injector #2	7. Engine stop / starter switch ("RUN / STOP" position)	12. Main fuse (30 A)
3. Secondary fuel injector #3	8. Fuel pump relay drive circuit	13. Ignition fuse (10 A)
4. Secondary fuel injector #4	9. Fuel injector drive circuit	14. Fuel fuse (10 A)
5. FP relay	10. ECM	

Troubleshooting

Step 1

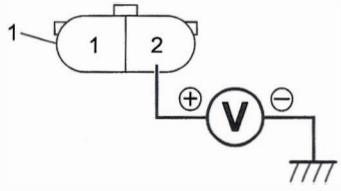
Secondary fuel injector power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the secondary fuel injector coupler. ☞(Page 1G-21)
3) Check for proper terminal connection to the secondary fuel injector coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between "T2" and ground.

NOTE

Secondary fuel injector power supply voltage can be detected only for a few seconds after ignition switch is turned ON.

Secondary fuel injector power supply voltage [Standard]: Battery voltage



IL41K1110025-01

Is check result OK?

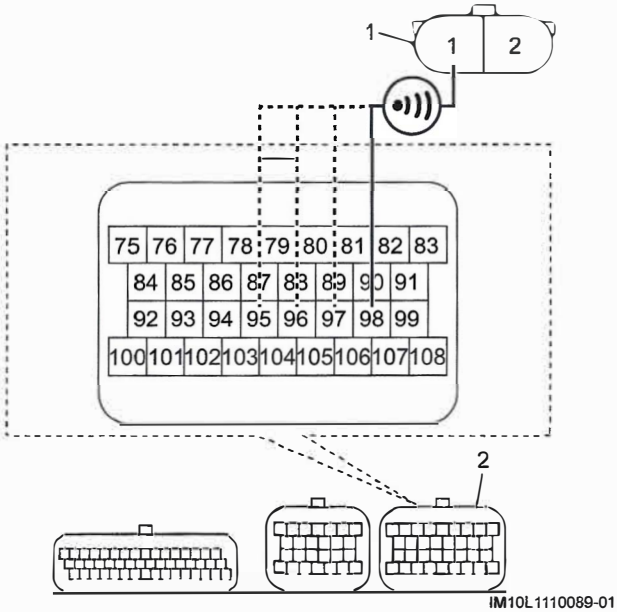
Yes — Go to Step 2.

No — Repair or replace the "T2" wire at the secondary fuel injector coupler.

Step 2

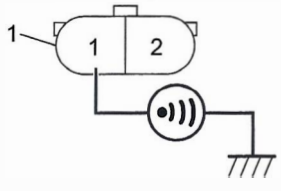
Secondary fuel injector drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, check the following points.
   - Resistance
     - **Secondary fuel injector #1:** Between "T1" at the secondary fuel injector coupler (1) and "T98" at the ECM coupler "C" (2): less than 1 Ω
     - **Secondary fuel injector #2:** Between "T1" at the secondary fuel injector coupler and "T97" at the ECM coupler "C": less than 1 Ω
     - **Secondary fuel injector #3:** Between "T1" at the secondary fuel injector coupler and "T96" at the ECM coupler "C": less than 1 Ω
     - **Secondary fuel injector #4:** Between "T1" at the secondary fuel injector coupler and "T95" at the ECM coupler "C": less than 1 Ω



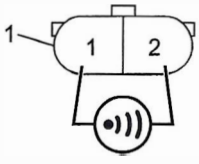
IM10L1110089-01

- Between "T1" at the secondary fuel injector coupler (1) and ground: infinity



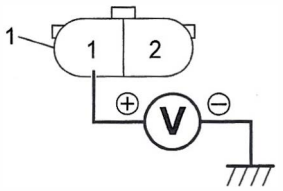
IL41K1110027-01

- Between "T1" and "T2" at the secondary fuel injector coupler (1): infinity



IL41K1110028-01

- Voltage
  - Turn the ignition switch ON.
  - Between "T1" at the secondary fuel injector coupler (1) and ground: approx. 0 V



IL41K1110029-01

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the "T1" wire at the secondary fuel injector coupler.

Step 3

Secondary fuel injector resistance check

1) Turn the ignition switch OFF.
2) Measure the secondary fuel injector resistance. ☞(Page 1G-21)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the secondary fuel injector. ☞(Page 1G-21)

DTC P1610

BENM10L31104041

NOTE

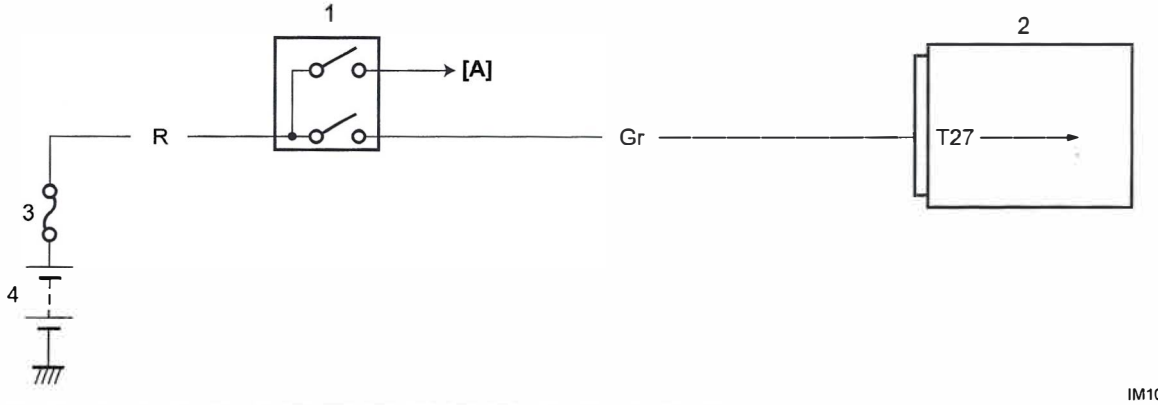
For model with immobilizer control system, refer to "DTC P1610" in Section 10C (Page 10C-4).

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P1610: Ignition Switch Signal Circuit Ignition switch signal is not input to the ECM. (1 D/C detection logic)	• Ignition switch • Ignition switch circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110090-01

[A]: To ignition fuse (10 A)	2. ECM	4. Battery
1. Ignition switch	3. Main fuse (30 A)	

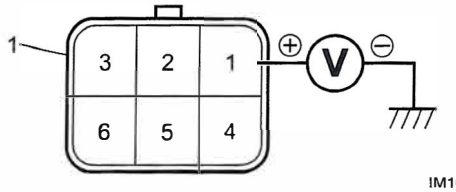
Troubleshooting

Step 1

Ignition switch power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ignition switch coupler. ☞(Page 1H-7)
3) Check for proper terminal connection to the ignition switch coupler (1).
4) If connections are OK, measure the voltage between the "T1" and ground.

Ignition switch power supply voltage
[Standard]: Battery voltage



IM10L1110091-01

Is check result OK?

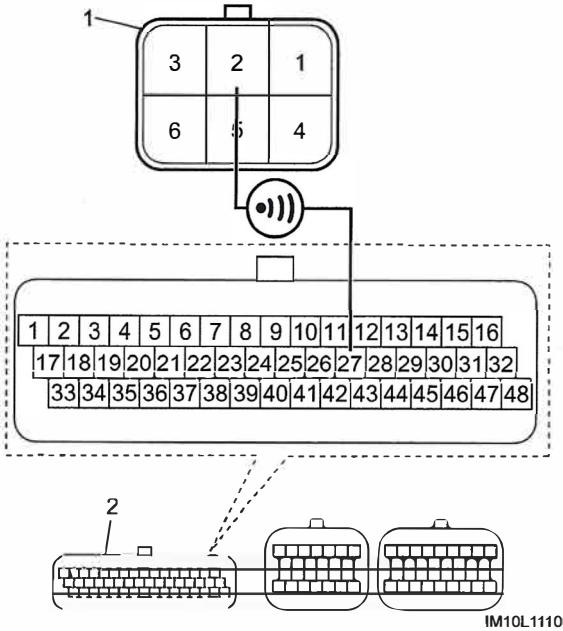
Yes — Go to Step 2.

No — Repair or replace the "T1" wire at the ignition switch coupler.

Step 2

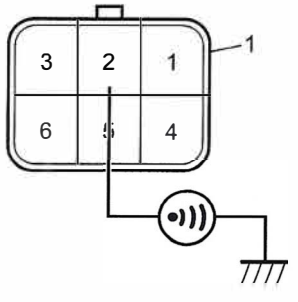
Ignition switch signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T2" at the ignition switch coupler (1) and "T27" at the ECM coupler "A" (2): less than 1 Ω



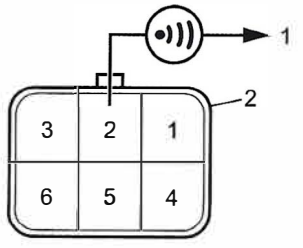
IM10L1110092-01

     – Between "T2" at the ignition switch coupler (1) and ground: infinity



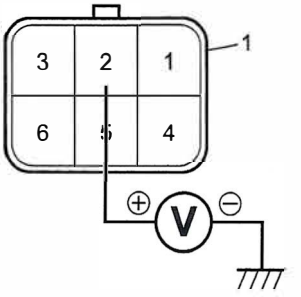
IM10L1110093-01

     – Between "T2" and other terminal (1) at the ignition switch coupler (2): infinity



IM10L1110094-01

   - Voltage
     – Between "T2" at the ignition switch coupler (1) and ground: approx. 0 V



IM10L1110095-01

Is check result OK?

Yes	Go to Step 3.
No	Repair or replace the "T2" wire at the ignition switch coupler.

Step 3

Ignition switch check

1) Replace the ignition switch. ☞(Page 1H-7)
2) Connect the ECM coupler "A". ☞(Page 1C-2)
3) Perform "DTC Check" (Page 1A-11) and check DTC.

Is DTC P1610 still detected?

Yes	Replace the ECM with a known good one, and inspect it again. ☞(Page 1C-2)
No	End.

DTC P1622

BENM10L31104042

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P1622: Control Module ROM Error EEPROM in ECM is corrupted. (1 D/C detection logic)	• ECM coupler connection • ECM

Troubleshooting

Step 1

ECM coupler connection check

1) Turn the ignition switch OFF.
2) Disconnect the ECM couplers. ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM couplers.
4) If connections are OK, reconnect the ECM couplers.
5) Perform "DTC Check" (Page 1A-11) and check DTC.

Is DTC P1622 still detected?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — End.

DTC P1650

BENM10L31104043

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P1650: Inertial Measurement Unit ECM receives abnormal signal from IMU. (3 D/C detection logic)	• IMU • IMU circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).

Troubleshooting

Step 1

ABS DTC check

1) Check that DTC is detected in ABS. ☞(Page 4E-15)

Is the DTC detected?

Yes — Go to troubleshooting for DTCs. Refer to "DTC Table" in Section 4E (Page 4E-18).

No — Perform troubleshooting of "DTC C1762 / C1763 / C1764 / C1765 / C1766 / C1767" in Section 4E (Page 4E-41).

If check result is OK, replace the ECM and inspect it again. ☞(Page 1C-2)

DTC P2101

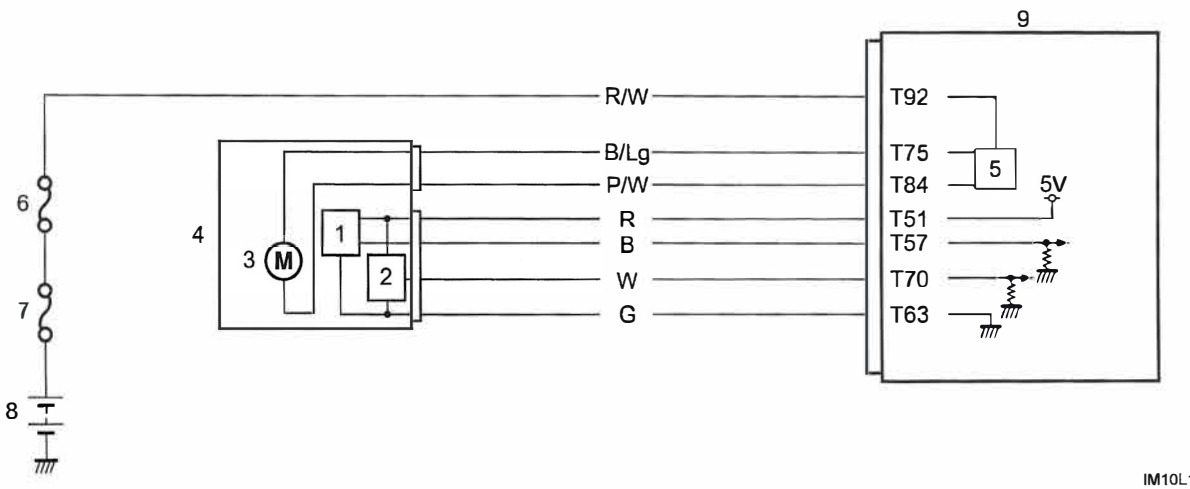
BENM10L31104044

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2101: Throttle Actuator "A" Control Motor Circuit Range / Performance Any of the following conditions is met. • Throttle valve motor and/or its circuit malfunction is detected. • Throttle valve sticking is detected • Difference between measured throttle valve position and targeted throttle valve position is out of the specified range. • The target value of throttle valve position does not become stable. • Throttle valve motor power supply circuit malfunction is detected. • Throttle valve does not become fully closed position. • TP sensor malfunction is detected. (1 D/C detection logic)	• Throttle valve motor • Throttle valve motor circuit • Throttle valve sticking • Throttle valve motor power supply circuit • TP sensor • TP sensor circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110016-01

1. TP sensor (main)	4. Throttle body	7. Main fuse (30 A)
2. TP sensor (sub)	5. Throttle valve motor drive circuit	8. Battery
3. Throttle valve motor	6. Fuel fuse (10 A)	9. ECM

Troubleshooting

Step 1

DTC check

Is there any DTC(s) other than P2101?

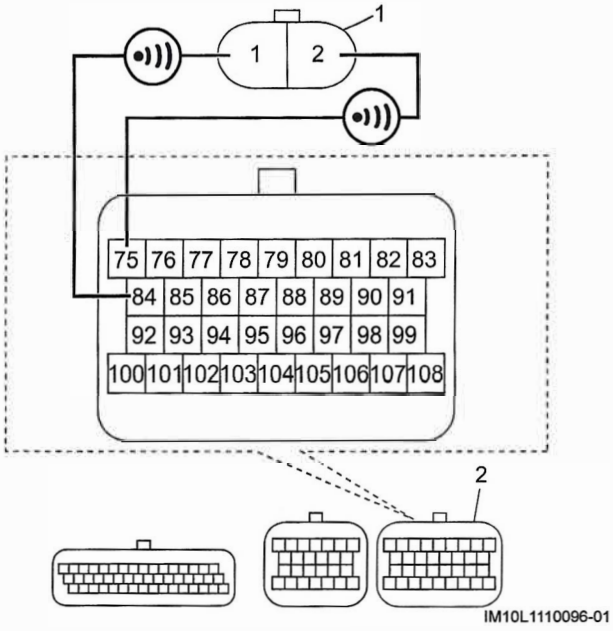
Yes — Go to troubleshooting for applicable DTC.

No — Go to Step 2.

Step 2

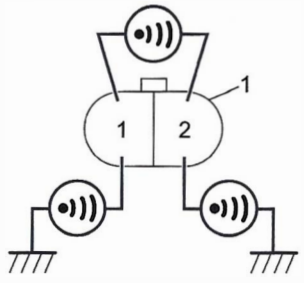
Throttle valve motor drive circuit check

1) Turn the ignition switch OFF.
2) Disconnect the throttle valve motor coupler and ECM coupler "C".
   - Throttle valve motor coupler: ☞(Page 1D-9)
   - ECM coupler "C": ☞(Page 1C-2)
3) Check for proper terminal connection to the throttle valve motor coupler and ECM coupler "C".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T1" at the throttle valve motor coupler (1) and "T84" at the ECM coupler "C" (2): less then 1 Ω
     - Between "T2" at the throttle valve motor coupler and "T75" at the ECM coupler "C": less then 1 Ω



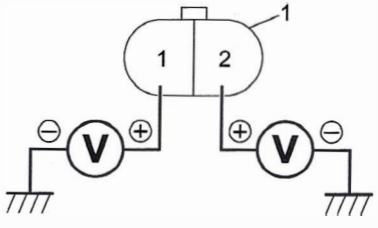
IM10L1110096-01

– Between "T1" at the throttle valve motor coupler (1) and ground: infinity
– Between "T2" at the throttle valve motor coupler and ground: infinity
– Between "T1" and T2 at the throttle valve motor coupler: infinity



IL06L1110022-01

- Voltage
  – Turn the ignition switch ON.
  – Between "T1" at the throttle valve motor coupler (1) and ground: approx. 0 V
  – Between "T2" at the throttle valve motor coupler and ground: approx. 0 V



IL06L1110023-01

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the defective wire harness.

Step 3

Throttle valve and throttle valve motor check

1) Check the following points. ☞(Page 1C-15)
   - Throttle valve operation:
   - Throttle valve motor resistance:

Is check result OK?

Yes — Go to Step 4.

No — Replace the throttle body. ☞(Page 1D-9)

Step 4

Throttle valve motor power supply circuit check

1) Check the throttle valve motor #1 power supply circuit. Refer to "Step 1" under "DTC P2102" (Page 1A-91).

Is check result OK?

Yes — Go to Step 5.

No — Repair or replace the defective wire harness.

Step 5

TP sensor circuit check

1) Check the TP sensor circuit.
   - TP sensor (main) circuit: Refer to "Step 1" – "Step 3" under "DTC P0120 / P0123" (Page 1A-42)
   - TP sensor (sub) circuit: Refer to "Step 1" – "Step 3" under "DTC P0220 / P0223" (Page 1A-52)

Is check result OK?

Yes — Go to Step 6.

No — Repair or replace the defective wire harness.

Step 6

TP sensor output voltage check

1) Measure the TP sensor output voltage. ☞(Page 1C-7)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the throttle body. ☞(Page 1D-9)

DTC P2102

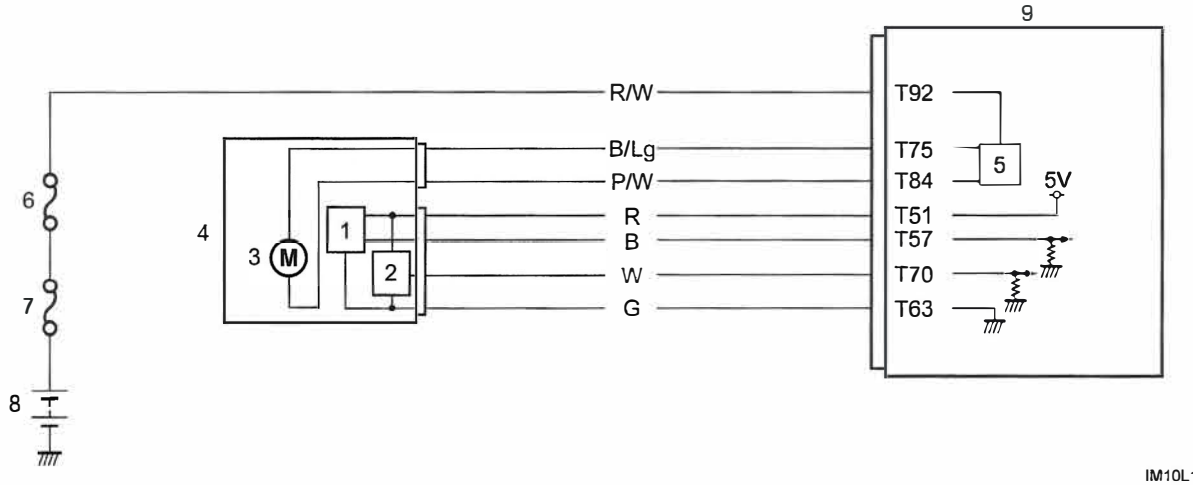
BENM10L31104045

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2102: Throttle Actuator "A" Control Motor Circuit Low Difference between power supply voltage to throttle valve motor and battery voltage is out of the specified range. (1 D/C detection logic)	• Throttle valve motor power supply circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110016-01

1. TP sensor (main)	4. Throttle body	7. Main fuse (30 A)
2. TP sensor (sub)	5. Throttle valve motor drive circuit	8. Battery
3. Throttle valve motor	6. Fuel fuse (10 A)	9. ECM

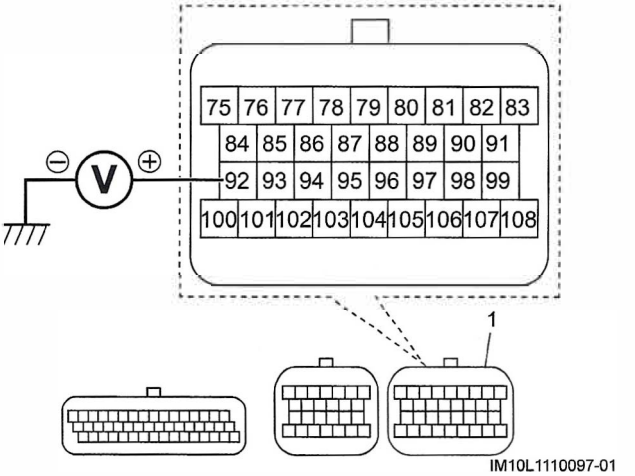
Troubleshooting

Step 1

Throttle valve motor power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, measure the voltage between "T92" at the ECM coupler "C" (1) and ground.

Throttle valve motor power supply voltage
[Standard]: Battery voltage



IM10L1110097-01

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Repair or replace the "T92" wire at the ECM coupler "C".

DTC P2120 / P2123

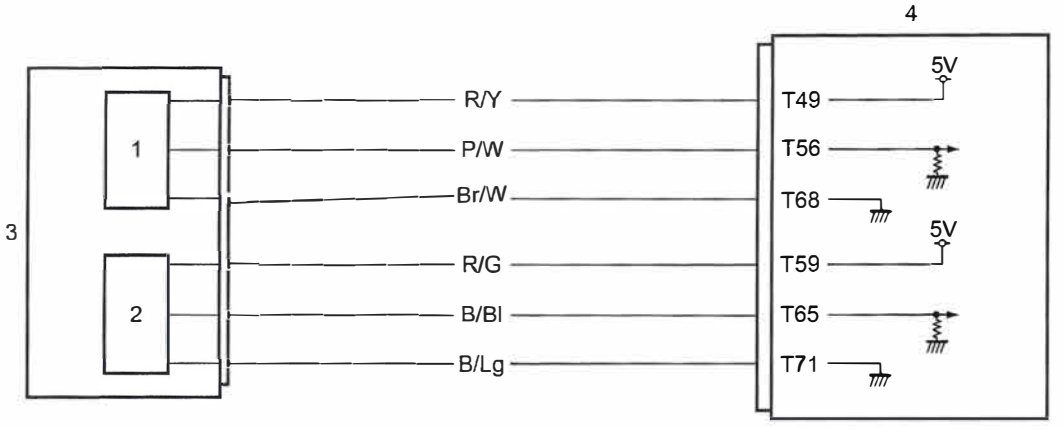
BENM10L31104046

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2120: TP Sensor / Switch "D" Circuit Accelerator position sensor (main) output voltage is lower than 0.10 V. (1 D/C detection logic)	• Accelerator position sensor (main) • Accelerator position sensor (main) circuit • ECM
P2123: TP Sensor / Switch "D" Circuit High Accelerator position sensor (main) output voltage is higher than 4.90 V. (1 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110098-03

1. Accelerator position sensor (main)	3. Accelerator body assembly
2. Accelerator position sensor (sub)	4. ECM

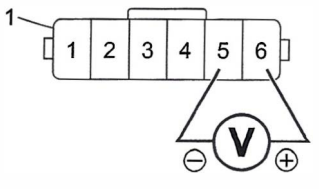
Troubleshooting

Step 1

Accelerator position sensor (main) power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the accelerator position sensor coupler (1). ☞(Page 1C-13)
3) Check for proper terminal connection to the accelerator position sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T6" and "T5".

Accelerator position sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110099-01

Is check result OK?

Yes Go to Step 3.

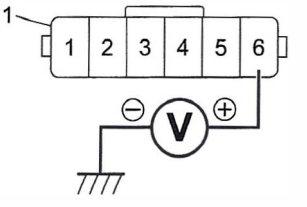
No Go to Step 2.

Step 2

Accelerator position sensor (main) ground circuit check

1) Measure the voltage between the "T6" at the accelerator position sensor coupler (1) and ground.

Accelerator position sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110100-01

Is check result OK?

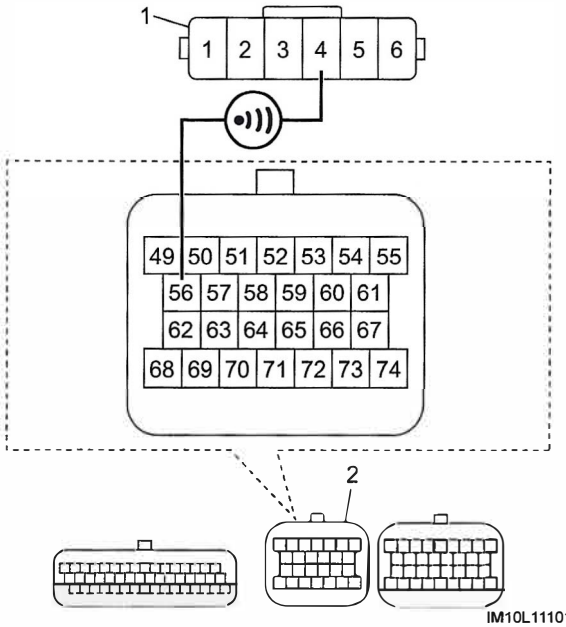
Yes Repair or replace the "T5" wire at the accelerator position sensor coupler.

No Repair or replace the "T6" wire at the accelerator position sensor coupler.

Step 3

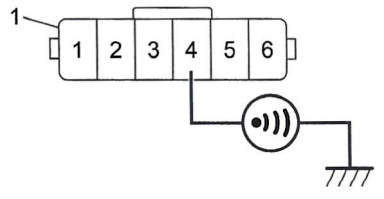
Accelerator position sensor (main) signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "B". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "B".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T4" at the accelerator position sensor coupler (1) and "T56" at the ECM coupler "B" (2): less than 1 Ω



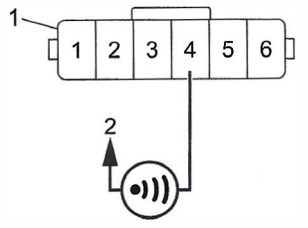
IM10L1110101-01

     – Between "T4" at the accelerator position sensor coupler (1) and ground: infinity



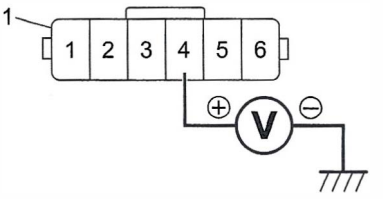
IM10L1110102-01

     – Between "T4" and other terminal (2) at the accelerator position sensor coupler (1): infinity



IM10L1110103-01

   - Voltage
     – Turn the ignition switch ON.
     – Between "T4" at the accelerator position sensor coupler (1) and ground: approx. 0 V



IM10L1110104-01

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace the "T4" wire at the accelerator position sensor coupler.

Step 4

Accelerator position sensor (main) output voltage check

1) Measure the accelerator position sensor (main) output voltage. ☞(Page 1C-13)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the accelerator body assembly. ☞(Page 1C-14)

DTC P2125 / P2128

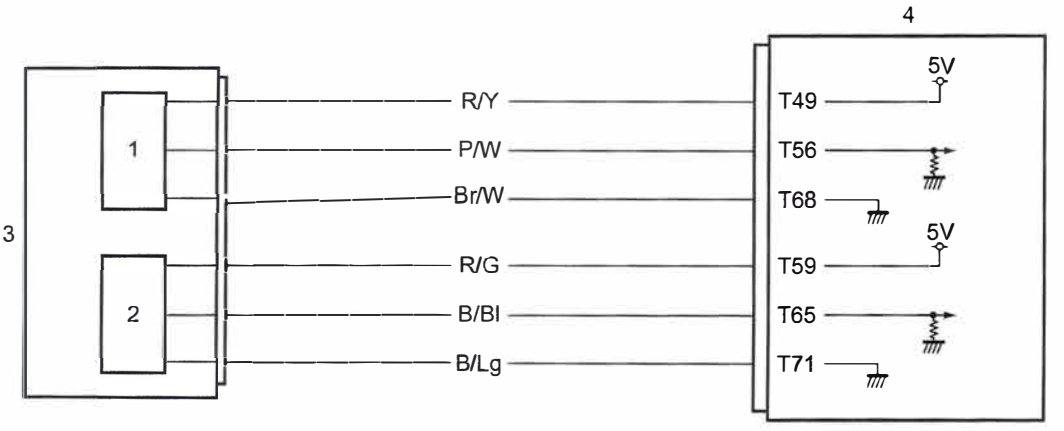
BENM10L31104047

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2125: TP Sensor / Switch "E" Circuit Accelerator position sensor (sub) output voltage is lower than 0.10 V. (1 D/C detection logic)	• Accelerator position sensor (sub) • Accelerator position sensor (sub) circuit • ECM
P2128: TP Sensor / Switch "E" Circuit High Accelerator position sensor (sub) output voltage is higher than 4.90 V. (1 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110098-03

1. Accelerator position sensor (main)	3. Accelerator body assembly
2. Accelerator position sensor (sub)	4. ECM

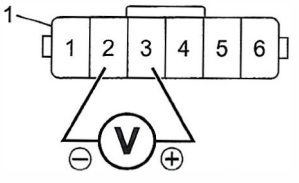
Troubleshooting

Step 1

Accelerator position sensor (sub) power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the accelerator position sensor coupler (1). ☞(Page 1C-13)
3) Check for proper terminal connection to the accelerator position sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T3" and "T2".

Accelerator position sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110106-01

Is check result OK?

Yes Go to Step 3.

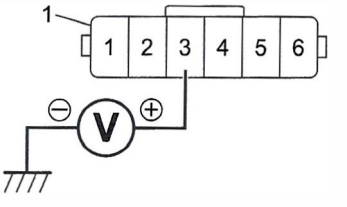
No Go to Step 2.

Step 2

Accelerator position sensor (sub) ground circuit check

1) Measure the voltage between the "T3" at the accelerator position sensor coupler (1) and ground.

Accelerator position sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM10L1110107-01

Is check result OK?

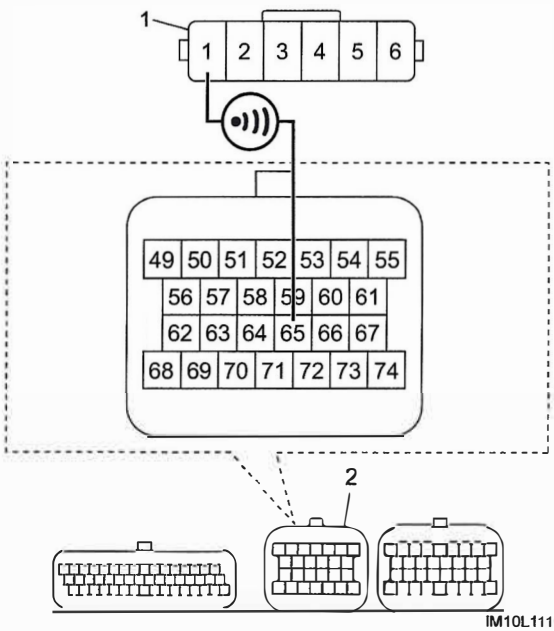
Yes Repair or replace the "T2" wire at the accelerator position sensor coupler.

No Repair or replace the "T3" wire at the accelerator position sensor coupler.

Step 3

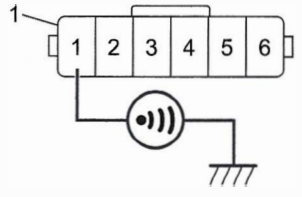
Accelerator position sensor (sub) signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "B". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "B".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T1" at the accelerator position sensor coupler (1) and "T65" at the ECM coupler "B" (2): less than 1 Ω



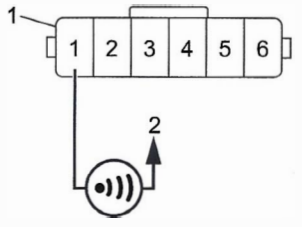
IM10L1110108-01

     – Between "T1" at the accelerator position sensor coupler (1) and ground: infinity



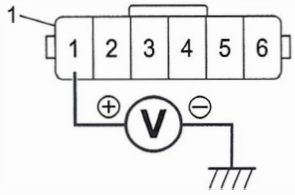
IM10L1110109-01

     – Between "T1" and other terminal (2) at the accelerator position sensor coupler (1): infinity



IM10L1110110-01

   - Voltage
     – Turn the ignition switch ON.
     – Between "T1" at the accelerator position sensor coupler (1) and ground: approx. 0 V



IM10L1110111-01

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace the "T1" wire at the accelerator position sensor coupler.

Step 4

Accelerator position sensor (sub) output voltage check

1) Measure the accelerator position sensor (sub) output voltage. ☞(Page 1C-13)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the accelerator body assembly. ☞(Page 1C-14)

DTC P2135

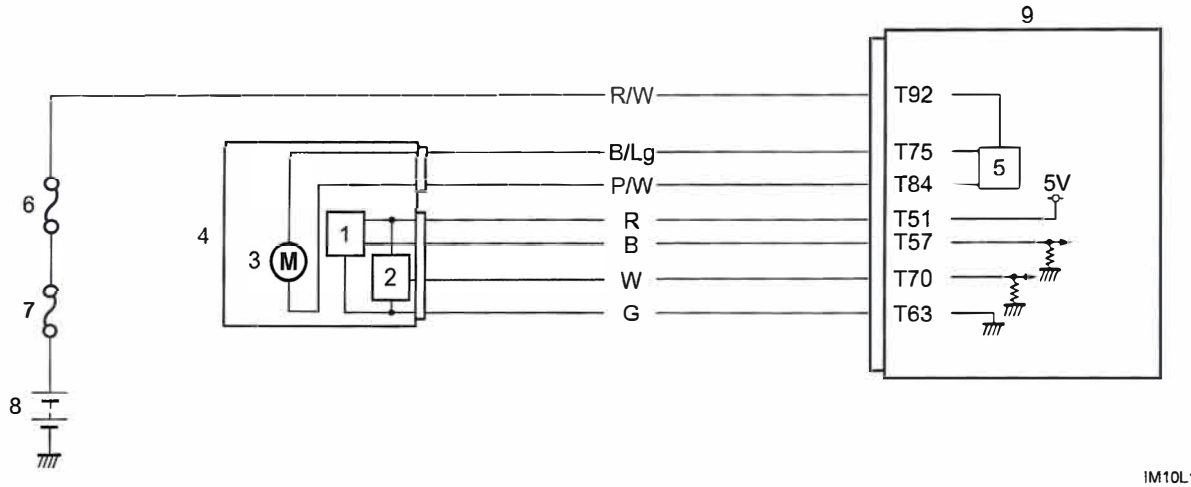
BENM10L31104048

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2135: TP Sensor / Switch "A" / "B" Voltage Correlation Difference between TP sensor (main) value and TP sensor (sub) value is out of the specified range. (1 D/C detection logic)	• TP sensor • TP sensor circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110016-01

1. TP sensor (main)	4. Throttle body	7. Main fuse (30 A)
2. TP sensor (sub)	5. Throttle valve motor drive circuit	8. Battery
3. Throttle valve motor	6. Fuel fuse (10 A)	9. ECM

Troubleshooting

Step 1

DTC check

Is there any DTC(s) other than P2135?

Yes — Go to troubleshooting for applicable DTC.

No — Go to Step 2.

Step 2

TP sensor circuit check

1) Check the TP sensor circuit.
   - TP sensor (main) circuit: Refer to "Step 1" – "Step 3" under "DTC P0120 / P0123" (Page 1A-42).
   - TP sensor (sub) circuit: Refer to "Step 1" – "Step 3" under "DTC P0220 / P0223" (Page 1A-52).

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the defective wire harness.

Step 3

TP sensor output voltage check

1) Measure the TP sensor output voltage. ☞(Page 1C-7)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the throttle body. ☞(Page 1D-9)

DTC P2138

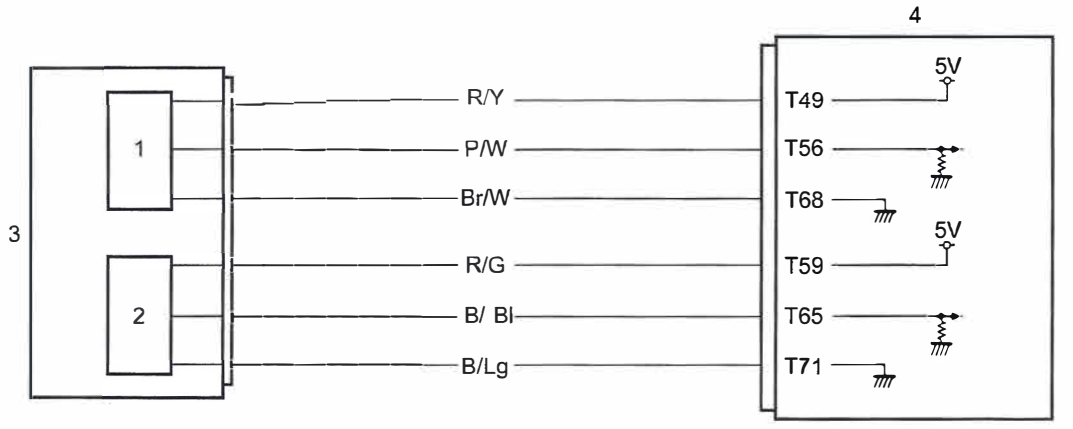
BENM10L31104049

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2138: TP Sensor / Switch "D" / "E" Voltage Correlation Difference between accelerator position sensor (main) value and accelerator position sensor (sub) value is out of the specified range. (1 D/C detection logic)	• Accelerator position sensor • Accelerator position sensor circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110098-03

1. Accelerator position sensor (main)	3. Accelerator body assembly
2. Accelerator position sensor (sub)	4. ECM

Troubleshooting

Step 1

DTC check

Is there any DTC(s) other than P2138?

Yes — Go to troubleshooting for applicable DTC.

No — Go to Step 2.

Step 2

Accelerator position sensor circuit check

1) Check the accelerator position sensor circuit.
   - Accelerator position sensor (main) circuit: Refer to "Step 1" – "Step 3" under "DTC P2120 / P2123" (Page 1A-92).
   - Accelerator position sensor (sub) circuit: Refer to "Step 1" – "Step 3" under "DTC P2125 / P2128" (Page 1A-94).

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the defective wire harness.

Step 3

Accelerator position sensor output voltage check

1) Measure the accelerator position sensor output voltage. ☞(Page 1C-13)

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the accelerator body assembly. ☞(Page 1C-14)

DTC P2158

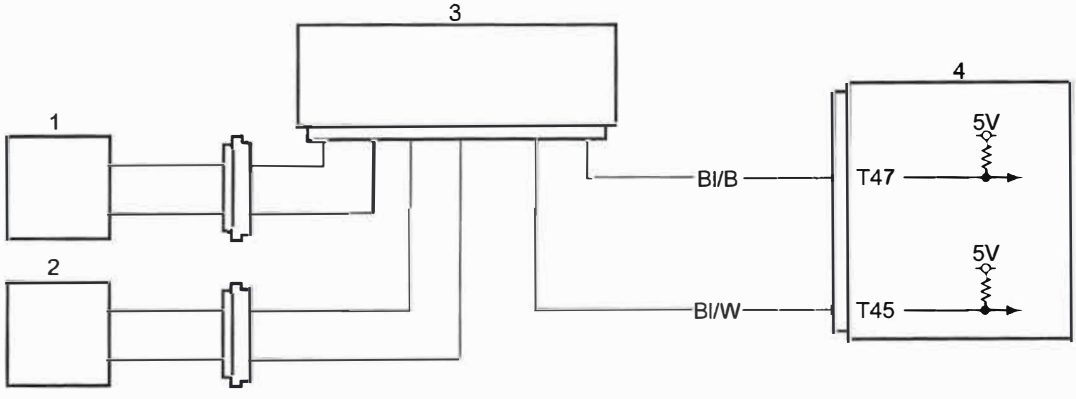
BENM10L31104050

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2158: Vehicle Speed Sensor "B" Any of the following conditions is met, at motorcycle deceleration. • Rear wheel speed is 0 km/h (0 mile/h) for a few seconds or more, at motorcycle deceleration. • Rear wheel speed is 0 km/h (0 mile/h) for a few seconds or more although the front wheel speed is higher than 10km/h (6 mile/h). • Rear wheel speed signal does not become stable. (3 D/C detection logic)	• Rear wheel speed sensor • Rear wheel speed sensor circuit • ABS control unit / HU • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110062-01

1. Front wheel speed sensor	3. ABS control unit / HU
2. Rear wheel speed sensor	4. ECM

Troubleshooting

Step 1

ABS DTC check.

1) Check that DTC is detected in ABS. ☞(Page 4E-15)

Is the DTC detected?

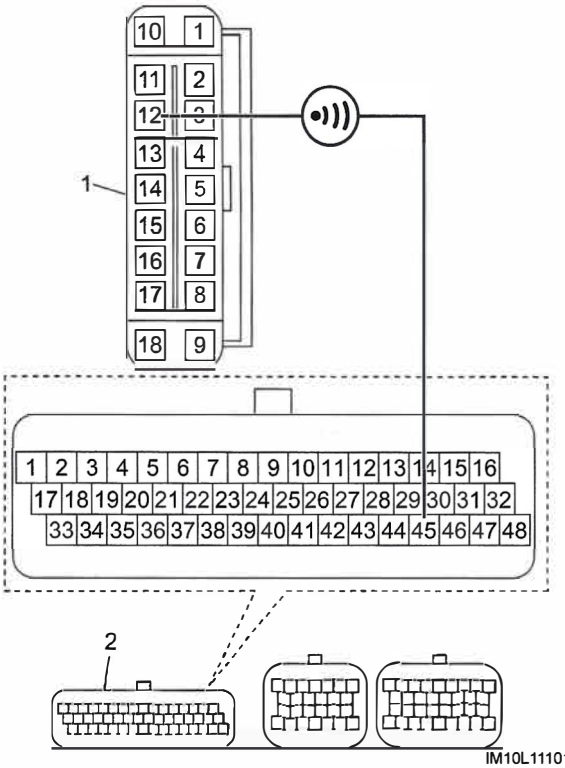
Yes — Go to troubleshooting for DTCs. Refer to "DTC Table" in Section 4E (Page 4E-18).

No — Go to Step 2.

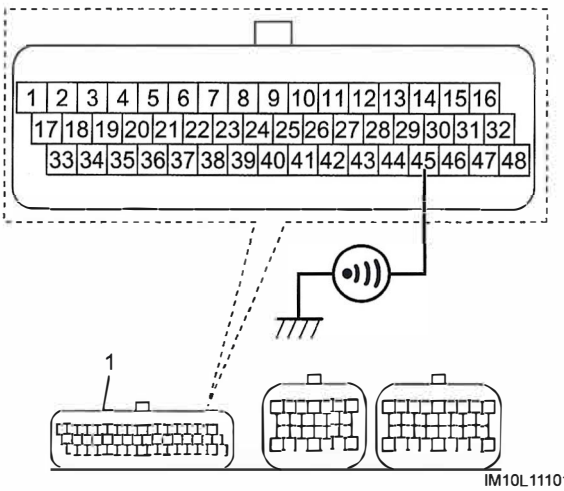
Step 2

Speed sensor signal circuit check (From ABS control unit to ECM)

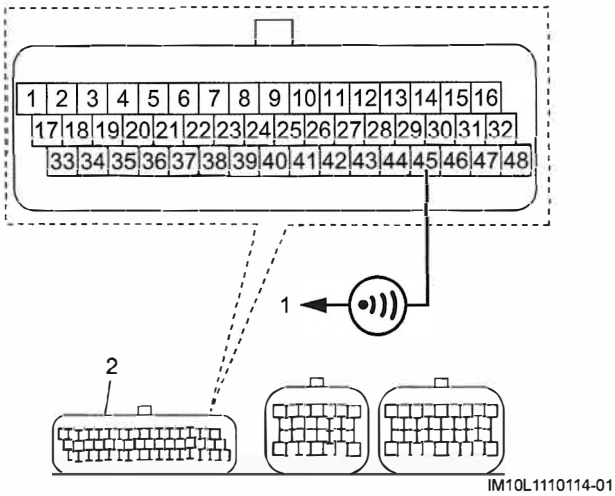
1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A" and ABS control unit / HU coupler.
   - ECM coupler "A": ☞(Page 1C-2)
   - ABS control unit / HU coupler: ☞(Page 4E-50)
3) Check for proper terminal connection to the ECM coupler "A" and ABS control unit / HU coupler.
4) If connections are OK, check the following points.
   - Resistance
     – Between "T12" at the ABS control unit / HU coupler (1) and "T45" at the ECM coupler "A" (2): less than 1 Ω



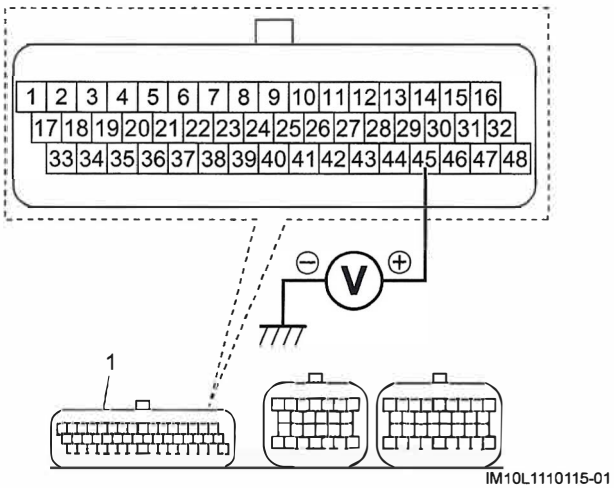
– Between "T45" at the ECM coupler "A" (1) and ground: infinity



– Between "T45" and other terminal (1) at ECM coupler "A" (2): infinity



- Voltage
  - Turn the ignition switch ON.
  - Between "T45" at the ECM coupler "A" (1) and ground: approx. 0 V



Is check result OK?

Yes	Replace the ECM and inspect it again. ☞(Page 1C-2) If this DTC is detected again, replace the ABS control unit / HU and recheck DTC.
No	Repair or replace the "T45" wire at the ECM coupler "A".

DTC P2226 / P2228

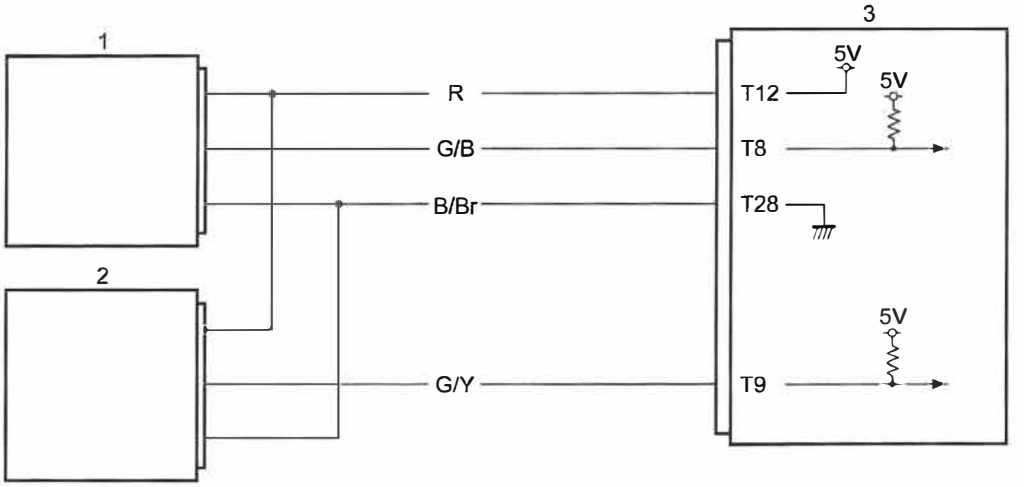
BENM10L31104051

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2226: AP Sensor Circuit AP sensor output voltage is higher than 4.80 V. (3 D/C detection logic)	• AP sensor • AP sensor circuit • ECM
P2228: AP Sensor Circuit Low AP sensor output voltage is lower than 0.10 V. (3 D/C detection logic)	

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110011-01

1. IAP sensor	2. AP sensor	3. ECM

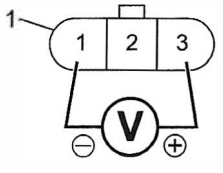
Troubleshooting

Step 1

AP sensor power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the AP sensor coupler. ☞(Page 1C-3)
3) Check for proper terminal connection to the AP sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T3" and "T1".

AP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM06L1110001-01

Is check result OK?

Yes — Go to Step 3.

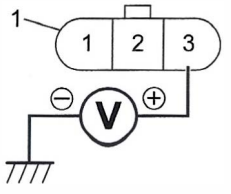
No — Go to Step 2.

Step 2

AP sensor ground circuit check

1) Measure the voltage between the "T3" at the AP sensor coupler (1) and ground.

AP sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IM06L1110002-01

Is check result OK?

Yes — Repair or replace the "T1" wire at the AP sensor coupler.

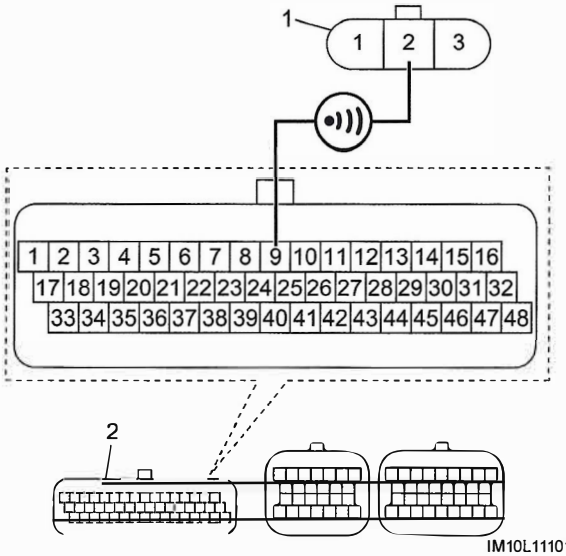
No — Repair or replace the "T3" wire at the AP sensor coupler.

Step 3

AP sensor signal circuit check

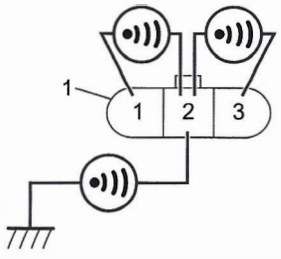
1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)

3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     – Between "T2" at the AP sensor coupler (1) and "T9" at the ECM coupler "A" (2): less than 1 Ω



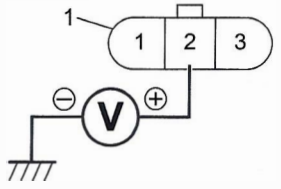
IM10L1110116-01

     – Between "T2" at the AP sensor coupler (1) and ground: infinity
     – Between "T2" and other terminal at AP/ sensor coupler (1): infinity



IM06L1110004-01

   - Voltage
     – Turn the ignition switch ON.
     – Between "T2" at the AP sensor coupler (1) and ground: approx. 0 V



IM06L1110005-01

Is check result OK?

Yes — Go to Step 5.

No — Repair or replace the "T2" wire at the AP sensor coupler.

Step 4

AP sensor output voltage at idle speed check

1) Turn the ignition switch OFF.
2) Measure the AP sensor voltage. Refer to "AP Sensor Output Voltage" under ☞(Page 1C-3).

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Replace the AP sensor. ☞(Page 1C-3)

DTC P2505

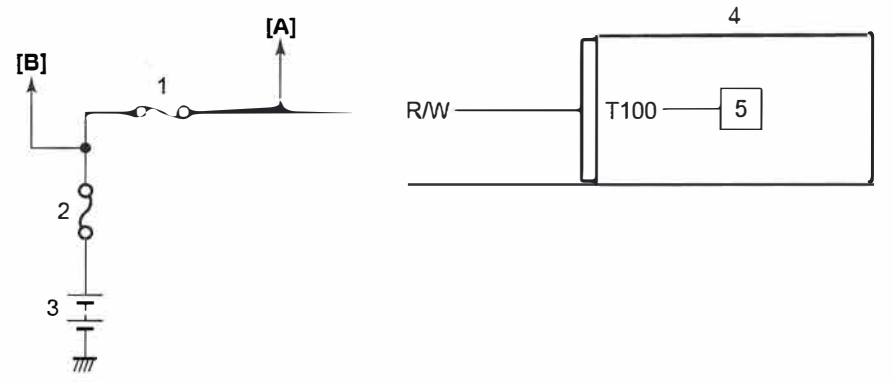
BENM10L31104052

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2505: ECM Power Input Signal Power source for ECM is not supplied. (1 D/C detection logic)	• ECM back-up power supply circuit • Fuel fuse (10 A) • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110117-01

[A]: To FP relay	2. Main fuse (30 A)	5. Power supply circuit
[B]: To ignition switch and cooling fan relay	3. Battery	
1. Fuel fuse (10 A)	4. ECM	

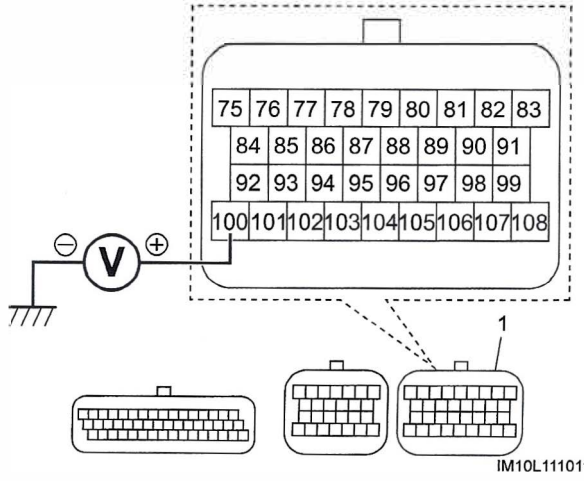
Troubleshooting

Step 1

ECM power supply voltage check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "C".
4) If connections are OK, measure the voltage between "T100" at the ECM coupler "C" (1) and ground.

ECM power supply voltage
[Standard]: Battery voltage



IM10L1110118-01

Is check result OK?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — Check fuel fuse (10 A) for blowout.

- If fuel fuse (10 A) is not blown, check "T100" wire at the ECM coupler "C" for open.
- If fuel fuse (10 A) is blown, check "T100" wire at the ECM coupler "C" for open and short circuit to ground.

DTC P2A00

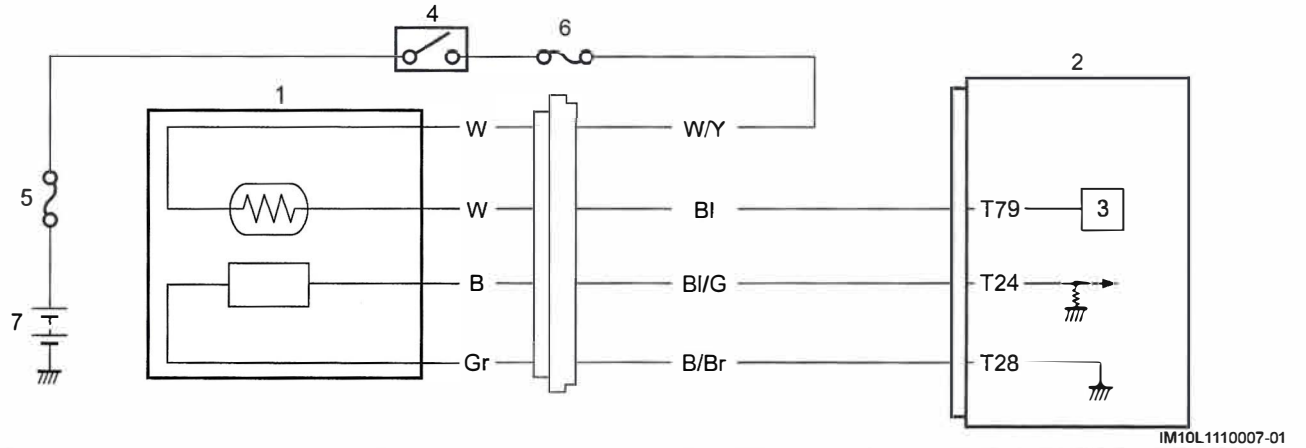
BENM10L31104053

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2A00: O2 Sensor Circuit Range / Performance Bank 1 Sensor 1 HO2 sensor #1 output voltage is stayed for specified time or more. (3 D/C detection logic)	• Air intake system • Exhaust system • HO2 sensor #1 • HO2 sensor #1 circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110007-01

1. HO2 sensor #1	4. Ignition switch	7. Battery
2. ECM	5. Main fuse (30 A)	
3. HO2 sensor heater drive circuit	6. Ignition fuse (10 A)	

Troubleshooting

Step 1

DTC check

Is there any DTC(s) other than P2A00?

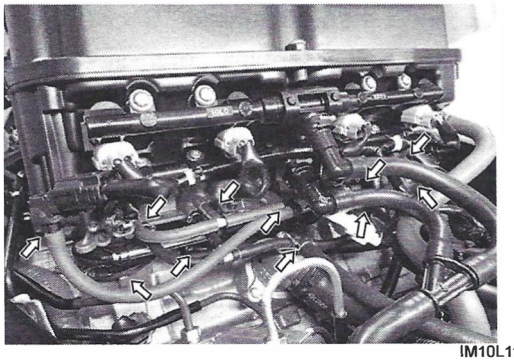
Yes — Go to troubleshooting for applicable DTC.

No — Go to Step 2.

Step 2

Exhaust system and air intake system check

1) Check exhaust system and air intake system for clogging and leakage.
   - Exhaust system: ☞(Page 1K-7)
   - Check air intake system for clogging and leakage.



IM10L1110128-04

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace defective parts.

Step 3

HO2 sensor #1 signal circuit check

1) Check HO2 sensor #1 signal circuit. Refer to "Step 1" under "DTC P0130 / P0132 / P0133" (Page 1A-44).

Is check result OK?

Yes — Go to Step 4.

No Repair or replace the defective wire harness.

Step 4

HO2 sensor #1 heater circuit check

1) Check HO2 sensor #1 heater circuit. Refer to "Step 1" – "Step 2" under "DTC P0030" (Page 1A-32).

Is check result OK?

Yes Go to Step 5.

No Repair or replace the defective wire harness.

Step 5

DTC recheck

1) Replace the HO2 sensor #1. ☞(Page 1C-9)
2) Perform "DTC Check" (Page 1A-11) and recheck DTC.

Is DTC P2A00 still detected?

Yes Replace the ECM and inspect it again. ☞(Page 1C-2)

No End.

DTC P2A03

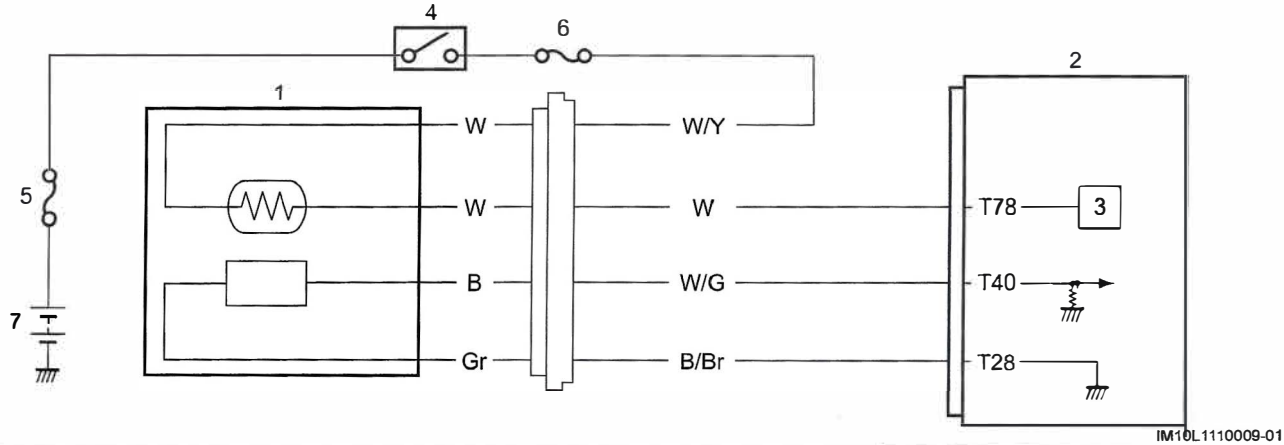
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DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P2A03: O2 Sensor Circuit Range / Performance Bank 2 Sensor 1 HO2 sensor #2 output voltage is stayed for specified time or more. (3 D/C detection logic)	• Air intake system • Exhaust system • HO2 sensor #2 • HO2 sensor #2 circuit • ECM

Wiring Diagram

Refer to "Engine Control System Wiring Diagram" (Page 1A-6).



IM10L1110009-01

1. HO2 sensor #2	4. Ignition switch	7. Battery
2. ECM	5. Main fuse (30 A)	
3. HO2 sensor heater drive circuit	6. Ignition fuse (10 A)	

Troubleshooting

Step 1

DTC check

Is there any DTC(s) other than P2A03?

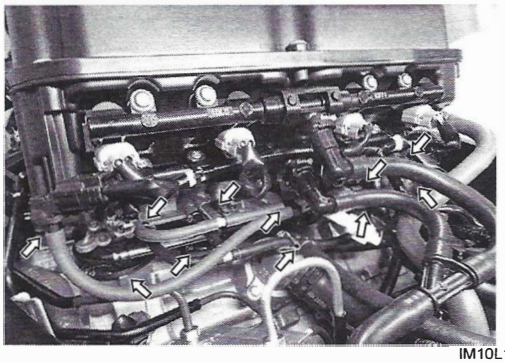
Yes — Go to troubleshooting for applicable DTC.

No — Go to Step 2.

Step 2

Exhaust system and air intake system check

1) Check exhaust system and air intake system for clogging and leakage.
   - Exhaust system: ☞(Page 1K-7)
   - Check air intake system for clogging and leakage.



IM10L1110128-04

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace defective parts.

Step 3

HO2 sensor #2 signal circuit check

1) Check HO2 sensor #2 signal circuit. Refer to "Step 1" under "DTC P0150 / P0152 / P0153" (Page 1A-46).

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace the defective wire harness.

Step 4

HO2 sensor #2 heater circuit check

1) Check HO2 sensor #2 heater circuit. Refer to "Step 1" – "Step 2" under "DTC P0050" (Page 1A-34).

Is check result OK?

Yes — Go to Step 5.

No — Repair or replace the defective wire harness.

Step 5

DTC recheck

1) Replace the HO2 sensor #2. ☞(Page 1C-9)
2) Perform "DTC Check" (Page 1A-11) and recheck DTC.

Is DTC P2A03 still detected?

Yes — Replace the ECM and inspect it again. ☞(Page 1C-2)

No — End.

DTC U0073

BENM10L31104055

Refer to "Troubleshooting for Communication Bus Off" in Section 10H (Page 10H-13).

DTC U0121

BENM10L31104056

Refer to "Troubleshooting for Lost Communication" in Section 10H (Page 10H-9).

DTC U0123

BENM10L31104057

Refer to "Troubleshooting for Lost Communication" in Section 10H (Page 10H-9).

DTC U0155

BENM10L31104058

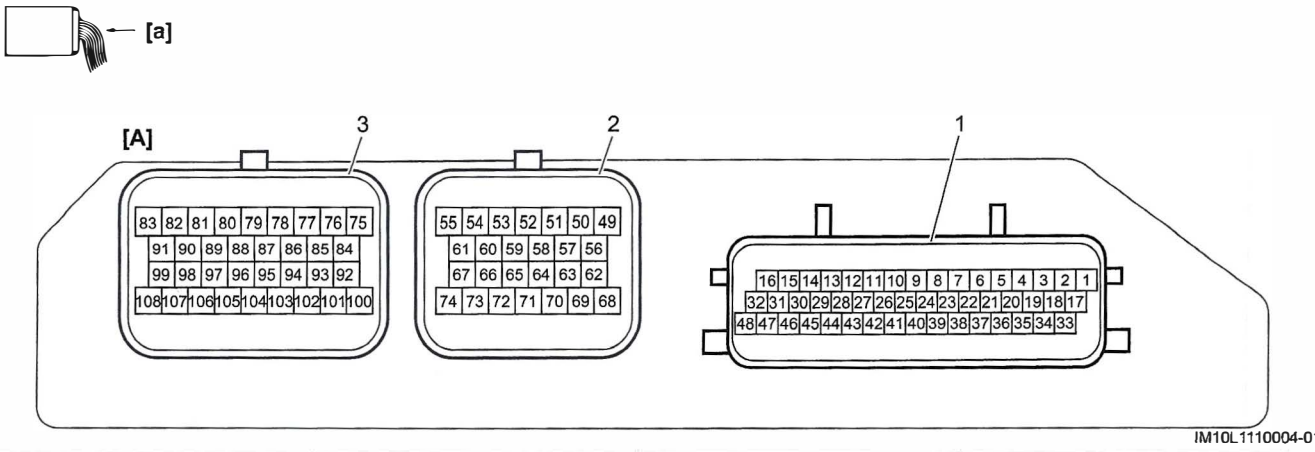
Refer to "Troubleshooting for Lost Communication" in Section 10H (Page 10H-9).

Engine Control System Circuits Inspection

BENM10L31104059

Refer to "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2).
Refer to "Precautions for Circuit Tester" in Section 00 (Page 00-8).

Voltage and Signal Check



[A]: ECM coupler (View [a])	1. Coupler "A"	2. Coupler "B"	3. Coupler "C"

ECM terminal standard voltage table (reference)

NOTICE

Failure to observe "Precautions for Electrical Circuit Service" and "Precautions for Circuit Tester" may cause damage to motorcycle or parts when measuring voltage.
Read "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2) and "Precautions for Circuit Tester" in Section 00 (Page 00-8) before starting the operations described below and follow all of the instructions provided.

NOTE

- **As each terminal voltage is affected by battery voltage, check that battery voltage is 12 V or more when ignition switch is "ON".**
- **Voltage with asterisk (*) cannot be measured with voltmeter because it is pulse signal. Use oscilloscope for its check.**

Terminal No.	Wire color	Circuit	Normal voltage	Condition
T1*	B/Bl	CAN signal (Low)	Approx. 2.5 V ↑↓ Approx. 1.5 V	Ignition switch: ON
T2	R/Y	Immobilizer communication (If equipped)	—	—
T3	—	—	—	—
T4	—	—	—	—
T5	—	—	—	—
T6	—	—	—	—
T7	—	—	—	—
T8	G/B	IAP sensor signal	Approx. 3.4 – 4.0 V	• Ignition switch: ON • Engine: Stopped • Barometric pressure: 100 kPa, 760 mmHg
			Approx. 0.79 – 4.0 V	• Engine: Idle speed after warming up • Barometric pressure: 100 kPa, 760 mmHg
T9	G/Y	AP sensor signal	Approx. 3.4 – 4.0 V	• Ignition switch: ON • Barometric pressure: 100 kPa, 760 mmHg
			Approx. 0 V	Ignition switch: OFF
T10	—	—	—	—

Terminal No.	Wire color	Circuit	Normal voltage	Condition
T11	G/B	Gearshift sensor signal	Approx. 4.48 – 4.65 V	• Ignition switch: ON • Gearshift lever: Fully upped
			Approx. 0.35 – 0.52 V	• Ignition switch: ON • Gearshift lever: Fully downed
			Approx. 2.38 – 2.62 V	• Ignition switch: ON • Gearshift lever: Neutral position
T12	R	Power source for sensors	Approx. 5 V	Ignition switch: ON
			Approx. 0 V	Ignition switch: OFF
T13	—	—	—	—
T14	—	—	—	—
T15	—	—	—	—
T16*	G/W	CKP sensor signal (+)	Approx. 6 V ↑↓ Approx. -6 V	Engine: Idle speed after warming up
T17*	W/B	CAN signal (High)	Approx. 3.5 V ↑↓ Approx. 2.5 V	Ignition switch: ON
T18	G	Immobilizer communication (If equipped)	—	—
T19	—	—	—	—
T20	Bl	Neutral signal	Approx. 12 V	• Ignition switch: ON • Gear position: Other than neutral
			Approx. 0 V	• Ignition switch: ON • Gear position: Neutral
T21	—	—	—	—
T22	—	—	—	—
T23	—	—	—	—
T24*	Bl/G	HO2 sensor #1 signal	Approx. 0 V ↑↓ Approx. 1 V	Engine: Idle speed after warming up
T25	—	—	—	—
T26	Dg	IAT sensor signal	Approx. 3.3 V	• Ignition switch: ON • IAT: 0 °C (32 °F)
			Approx. 2.3 V	• Ignition switch: ON • IAT: 20 °C (68 °F)
			Approx. 0.5 V	• Ignition switch: ON • IAT: 80 °C (176 °F)
T27	Gr	Ignition switch signal (If equipped)	Approx. 1 – 12 V	Ignition switch: ON
			Approx. 0 V	Ignition switch: OFF
T28	B/Br	Sensor ground (E2)	Approx. 0 V	Any condition
T29	—	—	—	—
T30	—	—	—	—
T31	G/Bl	CKP sensor signal (–)	Approx. 0 V	Any condition
T32*	B/Y	CMP sensor signal	Approx. 5 V ↑↓ Approx. 0 V	Engine: Running
T33	—	—	—	—
T34	—	—	—	—
T35	G	Side-stand switch signal	Approx. 12 V	• Ignition switch: ON • Side-stand: On the ground
			Approx. 0 V	• Ignition switch: ON • Side-stand: Retracted

Terminal No.	Wire color	Circuit	Normal voltage	Condition
T36	Y/G	Starter switch signal	Approx. 12 V	• Ignition switch: ON • Engine stop / starter switch ("START" position): Pushed
			Approx. 0 V	Engine stop / starter switch: Other than "START" position
T37	—	—	—	—
T38	—	—	—	—
T39	W/R	Mode select coupler (6P)	Approx. 5 V	• Ignition switch: ON • Mode select switch: OFF
			Approx. 0 V	• Ignition switch: ON • Mode select switch: ON
T40*	W/G	HO2 sensor #2 signal	Approx. 0 V ↑↓ Approx. 1 V	Engine: Idle speed after warming up
T41	—	—	—	—
T42	B/Bl	ECT sensor signal	Approx. 3.3 V	• Ignition switch: ON • ECT: 0 °C (32 °F)
			Approx. 2.3 V	• Ignition switch: ON • ECT: 20 °C (68 °F)
			Approx. 0.5 V	• Ignition switch: ON • ECT: 80 °C (176 °F)
T43	P	GP sensor signal	Approx. 0.6 V	• Ignition switch: ON • Gear position: 1st
			Approx. 1.2 V	• Ignition switch: ON • Gear position: Neutral
			Approx. 1.7 V	• Ignition switch: ON • Gear position: 2nd
			Approx. 2.4 V	• Ignition switch: ON • Gear position: 3rd
			Approx. 3.0 V	• Ignition switch: ON • Gear position: 4th
			Approx. 3.7 V	• Ignition switch: ON • Gear position: 5th
			Approx. 4.4 V	• Ignition switch: ON • Gear position: 6th
T44	—	—	—	—
T45*	Bl/W	Rear wheel speed sensor signal	Approx. 5 V ↑↓ Approx. 0 V	Riding condition: While running
T46	—	—	—	—
T47*	Bl/B	Front wheel speed sensor signal	Approx. 5 V ↑↓ Approx. 0 V	Riding condition: While running
T48	—	—	—	—
T49	R/Y	Power source for accelerator position sensor (main)	Approx. 5 V	Ignition switch: ON
			Approx. 0 V	Ignition switch: OFF
T50	W/R	Engine stop switch signal	Approx. 12 V	• Ignition switch: ON • Engine stop / starter switch: "RUN" position
			Approx. 0 V	• Ignition switch: ON • Engine stop / starter switch: "STOP" position
T51	R	Power source for TP sensor	Approx. 5 V	Ignition switch: ON
			Approx. 0 V	Ignition switch: OFF

Terminal No.	Wire color	Circuit	Normal voltage	Condition
T52	—	—	—	—
T53	—	—	—	—
T54	—	—	—	—
T55	W/Y	Power source	Battery voltage	Ignition switch: ON
			Approx. 0 V	Ignition switch: OFF
T56	P/W	Accelerator position sensor (main) signal	Approx. 0.485 – 0.635 V	• Ignition switch: ON • Throttle grip: Released
			Approx. 3.51 V	• Ignition switch: ON • Throttle grip: Fully open position
T57	B	TP sensor (main) signal	Approx. 3.635 – 3.785 V	• Ignition switch: ON • Throttle grip: Released
			Approx. 0.70 V	• Ignition switch: ON • Throttle grip: Fully open position
T58	—	—	—	—
T59	R/G	Power source for accelerator position sensor (sub)	Approx. 5 V	Ignition switch: ON
			Approx. 0 V	Ignition switch: OFF
T60	Gr	Immobilizer indicator (If equipped)	Approx. 12 V	• Ignition switch: ON • Immobilizer indicator: OFF
			Approx. 0 V	• Ignition switch: ON • Immobilizer indicator: ON
T61	—	—	—	—
T62	—	—	—	—
T63	G	TP sensor ground	Approx. 0 V	Any condition
T64	—	—	—	—
T65	B/Bl	Accelerator position sensor (sub) signal	Approx. 0.825 – 0.975 V	• Ignition switch: ON • Throttle grip: Released
			Approx. 4.59 V	• Ignition switch: ON • Throttle grip: Fully open position
T66	—	—	—	—
T67	—	—	—	—
T68	Br/W	Accelerator position sensor (main) ground	Approx. 0 V	Any condition
T69	—	—	—	—
T70	W	TP sensor (sub) signal	Approx. 4.235 – 4.385 V	• Ignition switch: ON • Throttle grip: Released
			Approx. 1.30 V	• Ignition switch: ON • Throttle grip: Fully open position
T71	B/Lg	Accelerator position sensor (sub) ground	Approx. 0 V	Any condition
T72	Br	Clutch lever position switch signal	Approx. 12 V	• Ignition switch: ON • Clutch lever position switch: OFF (Clutch lever is released)
			Approx. 0 V	• Ignition switch: ON • Clutch lever position switch: ON (Clutch lever is grasped)
T73	—	—	—	—
T74	—	—	—	—
T75*	B/Lg	Throttle valve motor (open)	Approx. 0 V	• Ignition switch: ON • Throttle grip: Fully closed position
			Approx. 12 V ↑↓ Approx. 0 V	• Ignition switch: ON • Throttle grip: Fully opened position
T76	—	—	—	—
T77	—	—	—	—

Terminal No.	Wire color	Circuit	Normal voltage	Condition
T78	W	HO2 sensor heater #2	Approx. 12 V	Ignition switch: ON
			Approx. 0 V	Ignition switch: OFF
T79	Bl	HO2 sensor heater #1	Approx. 12 V	Ignition switch: ON
			Approx. 0 V	Ignition switch: OFF
T80*	G	Ignition coil #41	Approx. 0 V ↑↓ Approx. 12 – 14 V	Engine: Running
T81*	Y	Ignition coil #31	Approx. 0 V ↑↓ Approx. 12 – 14 V	Engine: Running
T82*	B	Ignition coil #21	Approx. 0 V ↑↓ Approx. 12 – 14 V	Engine: Running
T83*	W/Bl	Ignition coil #11	Approx. 0 V ↑↓ Approx. 12 – 14 V	Engine: Running
T84*	P/W	Throttle valve motor (close)	Approx. 12 V ↑↓ Approx. 0 V	• Ignition switch: ON • Throttle grip: Fully closed position
			Approx. 0 V	• Ignition switch: ON • Throttle grip: Fully opened position
T85	—	—	—	—
T86	B/Y	Starter relay	Approx. 12 V	Ignition switch: ON
			Approx. 0 V	Starter motor: Running
T87*	Gr/R	Primary fuel injector #4	Approx. 12 V	• Engine stop / starter switch: "RUN" position • Ignition switch: For a few seconds after turned ON • Engine: Stopped
			Approx. 12 V ↑↓ Approx. 0 V	Engine: Running
T88*	Gr/Y	Primary fuel injector #3	Approx. 12 V	• Engine stop / starter switch: "RUN" position • Ignition switch: For a few seconds after turned ON • Engine: Stopped
			Approx. 12 V ↑↓ Approx. 0 V	Engine: Running
T89*	Gr/B	Primary fuel injector #2	Approx. 12 V	• Engine stop / starter switch: "RUN" position • Ignition switch: For a few seconds after turned ON • Engine: Stopped
			Approx. 12 V ↑↓ Approx. 0 V	Engine: Running
T90*	Gr/W	Primary fuel injector #1	Approx. 12 V	• Engine stop / starter switch: "RUN" position • Ignition switch: For a few seconds after turned ON • Engine: Stopped
			Approx. 12 V ↑↓ Approx. 0 V	Engine: Running

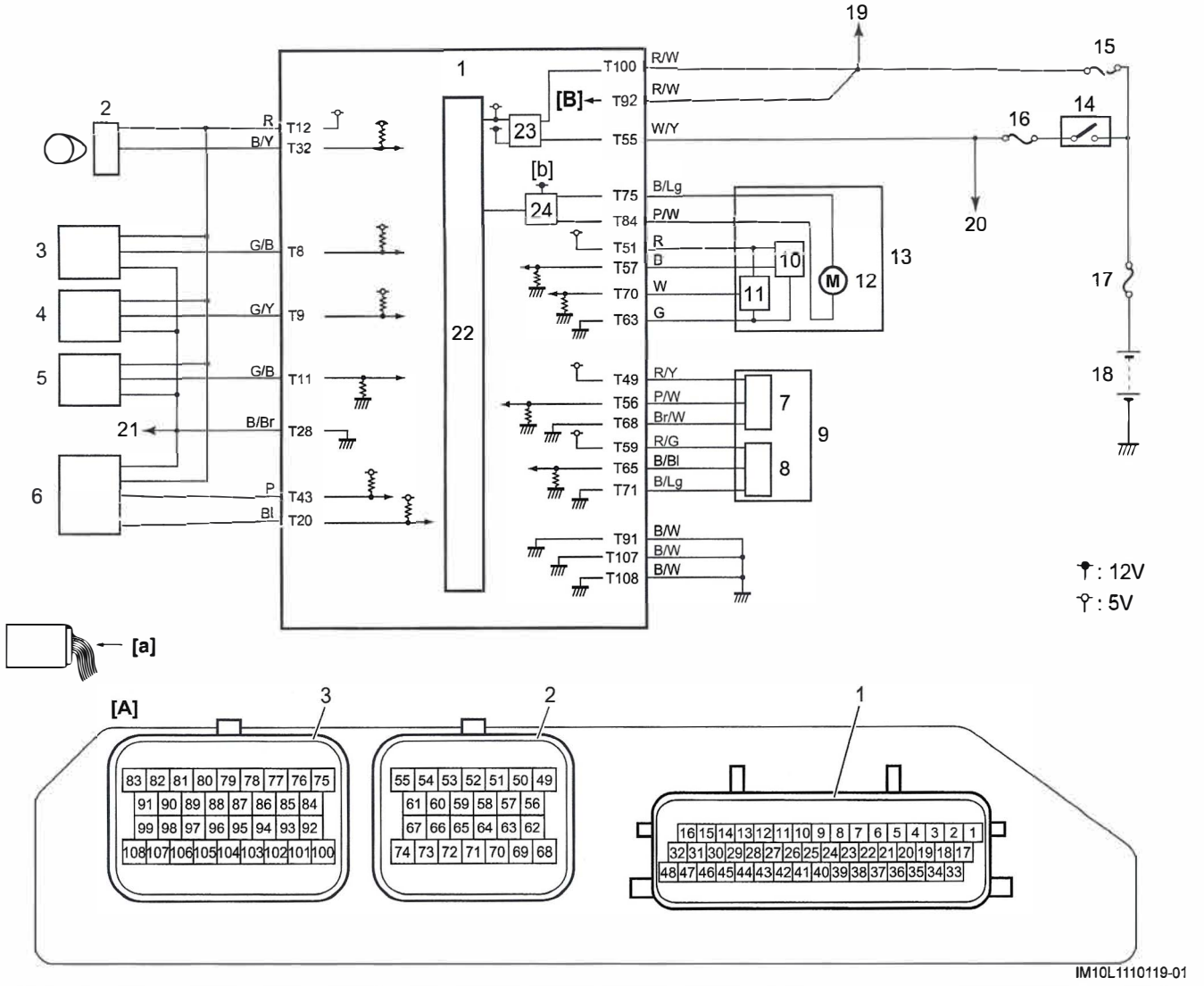
Terminal No.	Wire color	Circuit	Normal voltage	Condition
T91	B/W	Ignition system ground (E03)	Approx. 0 V	Any condition
T92	R/W	Power source for throttle body	Battery voltage	Any condition
T93	G/R	Cooling fan relay	Approx. 12 V	Ignition switch: ON
			Approx. 0 V	• Ignition switch: ON • Cooling fan: Running
T94	W/B	PAIR control solenoid valve	Approx. 12 V	Ignition switch: ON
			Approx. 0 V	• Ignition switch: ON • PAIR control solenoid valve: ON (PAIR control solenoid valve is operated using "PAIR control solenoid drive control" on "Active control" of SDS-II.)
T95*	Lg/R	Secondary fuel injector #4	Approx. 12 V	• Engine stop / starter switch: "RUN" position • Ignition switch: For a few seconds after turned ON • Engine: Stopped
			Approx. 12 V ↑↓ Approx. 0 V	• Engine: 4800 r/min or more • Throttle position angle: 38% or more (The throttle position angle (Absolute throttle position angle bank1) can be checked with the "Data monitor" function of SDS-II.) • Gear position: Other than neutral position
T96*	Lg/B	Secondary fuel injector #3	Approx. 12 V	• Engine stop / starter switch: "RUN" position • Ignition switch: For a few seconds after turned ON • Engine: Stopped
			Approx. 12 V ↑↓ Approx. 0 V	• Engine: 4800 r/min or more • Throttle position angle: 38% or more (The throttle position angle (Absolute throttle position angle bank1) can be checked with the "Data monitor" function of SDS-II.) • Gear position: Other than neutral position
T97*	Lg/W	Secondary fuel injector #2	Approx. 12 V	• Engine stop / starter switch: "RUN" position • Ignition switch: For a few seconds after turned ON • Engine: Stopped
			Approx. 12 V ↑↓ Approx. 0 V	• Engine: 4800 r/min or more • Throttle position angle: 38% or more (The throttle position angle (Absolute throttle position angle bank1) can be checked with the "Data monitor" function of SDS-II.) • Gear position: Other than neutral position

Terminal No.	Wire color	Circuit	Normal voltage	Condition
T98*	Lg	Secondary fuel injector #1	Approx. 12 V	• Engine stop / starter switch: "RUN" position • Ignition switch: For a few seconds after turned ON • Engine: Stopped
			Approx. 12 V ↑↓ Approx. 0 V	• Engine: 4800 r/min or more • Throttle position angle: 38% or more (The throttle position angle (Absolute throttle position angle bank1) can be checked with the "Data monitor" function of SDS-II.) • Gear position: Other than neutral position
T99	—	—	—	—
T100	R/W	Power source for back-up	Battery voltage	Any condition
T101	G	EVAP system purge control solenoid valve	Approx. 12 V	Ignition switch: ON
			Approx. 0 V	• Ignition switch: ON • EVAP system purge control solenoid valve: ON (EVAP system purge control solenoid valve is operated using "EVAP purge valve operating control" on "Active control" of SDS-II.)
T102	—	—	—	—
T103	Y/B	FP relay	Approx. 12 V	• Engine stop / starter switch: "RUN" position • Ignition switch: A few seconds after turning ON • Engine: Stopped
			Approx. 0 V	Engine: Running
T104	—	—	—	—
T105	—	—	—	—
T106	Y/R	Power source for fuel injectors and fuel pump	Approx. 0 V	• Engine stop / starter switch: "RUN" position • Ignition switch: A few seconds after turning ON • Engine: Stopped
			Approx. 12 V	Engine: Running
T107	B/W	General power ground (E01)	Approx. 0 V	Any condition
T108	B/W	Control circuit ground (E1)	Approx. 0 V	Any condition

ECM Power Supply and Ground Circuit Check

BENM10L31104060

Circuit Diagram



IM10L1110119-01

[A]: ECM coupler (View [a])	8. Accelerator position sensor (sub)	17. Main fuse (30 A)
[B]: To [b]	9. Accelerator body assembly	18. Battery
1. ECM	10. TP sensor (main)	19. To FP relay
2. CMP sensor	11. TP sensor (sub)	20. To HO2 sensor, Engine stop / starter switch ("RUN / STOP" position), cooling fan relay, EVAP system purge control solenoid valve (If equipped) and PAIR control solenoid valve
3. IAP sensor	12. Throttle valve motor	21. To each sensor
4. AP sensor	13. Throttle body	22. CPU
5. Gearshift sensor	14. Ignition switch	23. Power supply circuit
6. GP sensor	15. Fuel fuse (10 A)	24. Throttle valve motor drive circuit
7. Accelerator position sensor (main)	16. Ignition fuse (10 A)	

Troubleshooting

NOTE

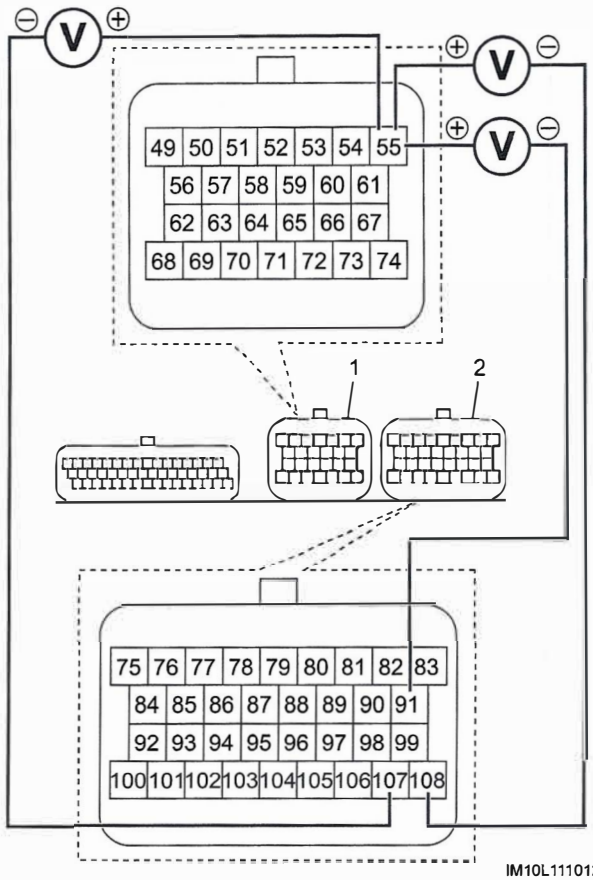
- **As each terminal voltage is affected by battery voltage, check that battery voltage is 12 V or more when ignition switch is "ON".**
- **Before performing, check that related fuses of ECM power circuit have not blown out.**
  If any fuse has blown out, replace the fuse and check circuits connected to the blown fuse for short circuit to ground.

Step 1

ECM power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "B" and ECM coupler "C". ☞(Page 1C-2)
3) Check for proper terminal connection to ECM coupler "B" and ECM coupler "C".
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the following terminal at the ECM coupler "B" (1) and ECM coupler "C" (2).
   - Between the "T55" and "T91".
   - Between the "T55" and "T107".
   - Between the "T55" and "T108".

ECM power supply voltage
[Standard]: Battery voltage



Is check result OK?

Yes Go to Step 3.

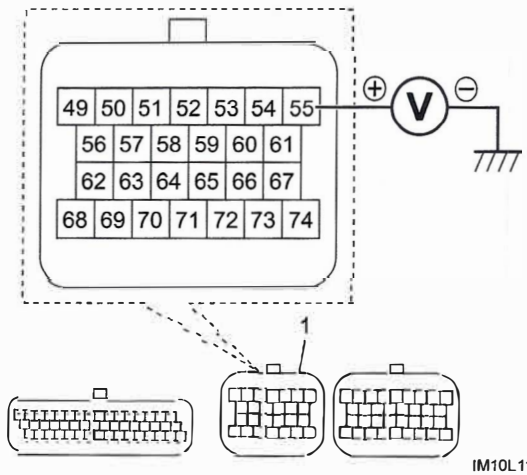
No Go to Step 2.

Step 2

ECM ground circuit check

1) Measure the voltage between "T55" at the ECM coupler "B" (1) and ground.

ECM power supply voltage
[Standard]: Battery voltage



Is check result OK?

Yes Repair or replace defective ground wire harness.

No Check "T55" wire for open, short circuit to battery and short circuit to ground. If "T55" wire is in good condition, check the following parts.

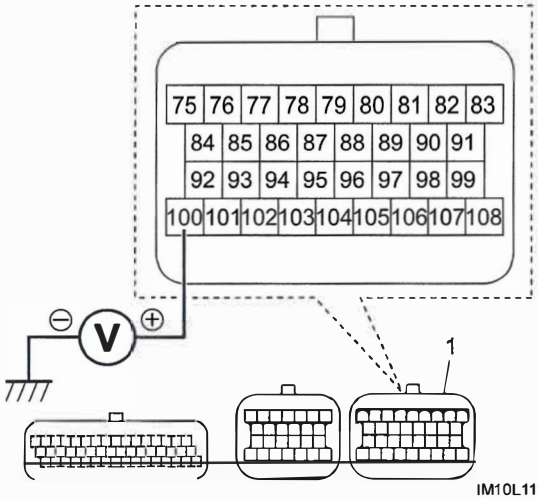
- Wire for open, short circuit to battery and short circuit to ground of the wire harness between battery and ignition switch.
- Fuses
- Ignition switch

Step 3

ECM back-up power supply circuit check

1) Turn the ignition switch OFF.
2) Measure the voltage between "T100" at the ECM coupler "C" (1) and ground.

ECM power supply voltage
[Standard]: Battery voltage



IM10L1110122-01

Is check result OK?

Yes Go to Step 4.

No Check "T100" wire for open and short circuit to ground. If "T100" wire is in good condition, check the fuse.

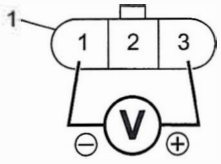
Step 4

Sensor power supply circuit check

1) Turn the ignition switch OFF.
2) Connect the ECM coupler "B" and ECM coupler "C". ☞(Page 1C-2)
3) Disconnect the following sensor couplers.
   - IAP sensor: ☞(Page 1C-4)
   - AP sensor: ☞(Page 1C-3)
   - Accelerator position sensor: ☞(Page 1C-13)
   - TP sensor: ☞(Page 1C-7)
   - CMP sensor: ☞(Page 1C-11)
   - GP sensor: ☞(Page 1C-15)
   - Gearshift sensor: ☞(Page 1C-15)
4) Check for proper terminal connection to each sensor couplers.
5) If connections are OK, turn the ignition switch ON.
6) Measure the sensor power supply voltage.

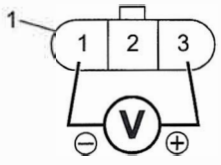
Sensor power supply voltage
[Standard]: 4.5 – 5.5 V

- IAP sensor coupler (1): Between the "T3" and "T1".



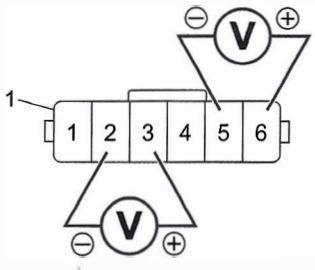
IM06L1110001-01

- AP sensor coupler (1): Between the "T3" and "T1".



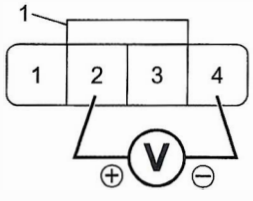
IM06L1110001-01

- Accelerator position sensor coupler (1)
  - Accelerator position sensor (main): Between the "T6" and "T5".
  - Accelerator position sensor (sub): Between the "T3" and "T2".



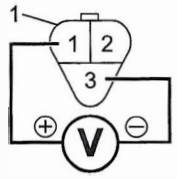
IM10L1110123-01

- TP sensor coupler (1): Between the "T2" and "T4".



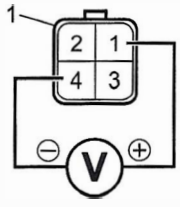
IM10L1110017-01

- CMP sensor coupler (1): Between the "T1" and "T3".



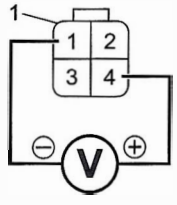
IM10L1110045-01

- GP sensor coupler (1): Between the "T1" and "T4".



IM10L1110077-02

- Gearshift sensor coupler (1): Between the "T4" and "T1".



IM10L1110068-01

Is check result OK?

Yes — ECM power supply and ground circuits are in good condition.

No — Go to Step 5.

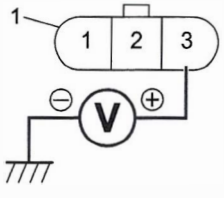
Step 5

Sensor ground circuit check

1) Measure the sensor power supply voltage.

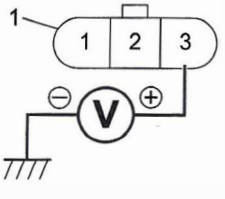
Sensor power supply voltage
[Standard]: 4.5 – 5.5 V

- IAP sensor coupler (1): Between the "T3" and ground.



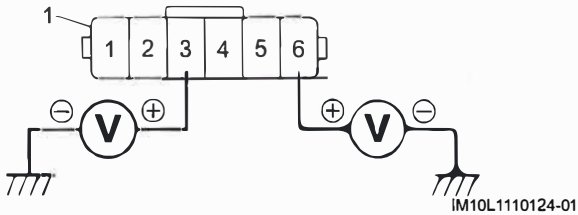
IM06L1110002-01

- AP sensor coupler (1): Between the "T3" and ground.



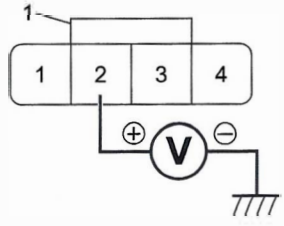
IM06L1110002-01

- Accelerator position sensor coupler (1)
  - Accelerator position sensor (main): Between the "T6" and ground.
  - Accelerator position sensor (sub): Between the "T3" and ground.



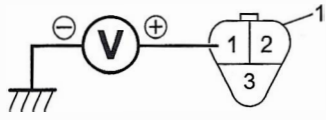
IM10L1110124-01

- TP sensor coupler (1): Between the "T2" and ground.



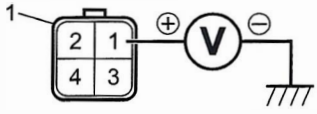
IM10L1110018-01

- CMP sensor coupler (1): Between the "T1" and ground.



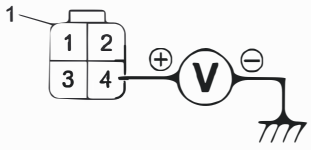
IM10L1110046-01

- GP sensor coupler (1): Between the "T1" and ground.



IM10L1110078-02

- Gearshift sensor coupler (1): Between the "T4" and ground.



IM10L1110069-01

Is check result OK?

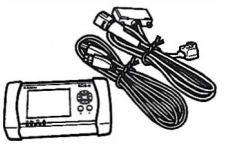
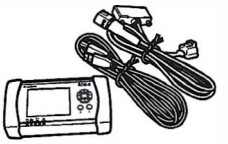
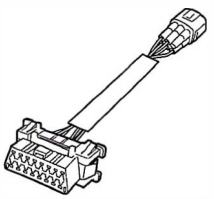
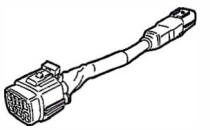
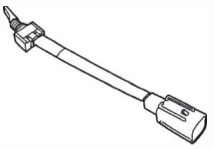
Yes — Repair or replace the defective ground wire harness.

No — Check defective sensor power supply circuit wire for open, short circuit to battery and short circuit to ground. If sensor power supply circuit wire is in good condition, replace the ECM and recheck ECM power supply and ground circuits.
☞(Page 1C-2)

Special Tools and Equipment

Special Tool

BENM10L31108001

09904–41031 SDS-II set ☞(Page 1A-11) / ☞(Page 1A-12) 	09904–41041 SDS-II (oscilloscope) set ☞(Page 1A-11) / ☞(Page 1A-12) 
09904–41051 Conversion cable ☞(Page 1A-4) 	09904–41071 Conversion cable (ISO) ☞(Page 1A-4) / ☞(Page 1A-11) / ☞(Page 1A-12) 
09930–83130 Mode selection switch (ISO) ☞(Page 1A-3) / ☞(Page 1A-12) 	

Emission Control Devices

Precautions

Precautions for Emission Control Devices

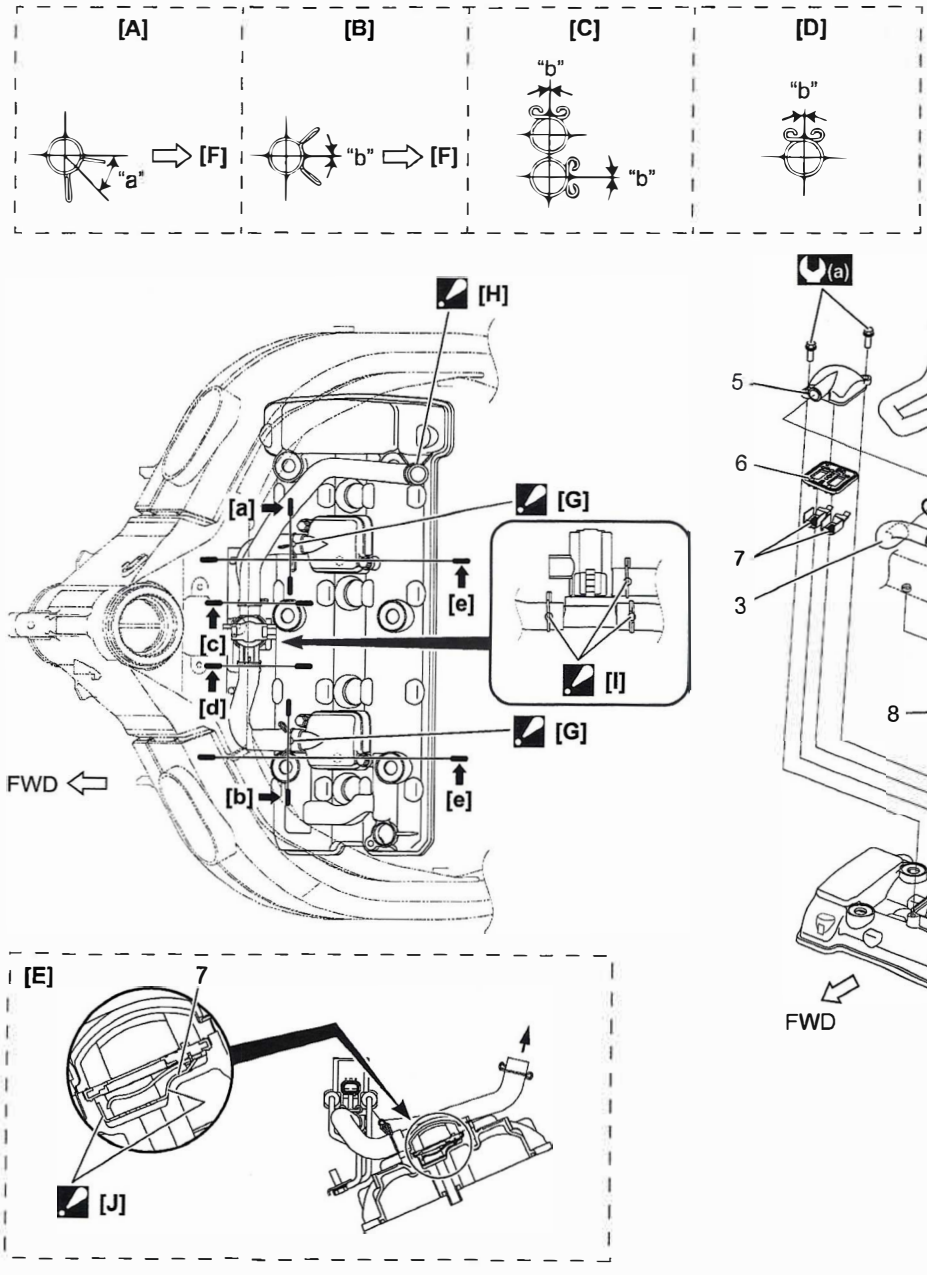
BENM10L31200001

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

Schematic and Routing Diagram

PAIR System Hose Routing Diagram

BENM10L31202001



IM10L1120003-01

[A]: View [a]	[I]: Face the yellow mark to backward of the PAIR control solenoid valve.	7. PAIR reed valve plate
[B]: View [b]	[J]: Push in the PAIR reed valve plate until the two points contact the cylinder head cover.	8. PAIR control solenoid valve bracket
[C]: View [c]	1. PAIR hose (to air cleaner box)	"a": Approx. 45°
[D]: View [d]	2. PAIR hose (to left PAIR reed valve cover)	"b": Approx. 0°
[E]: View [e]	3. PAIR hose (to right PAIR reed valve cover)	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[F]: Upper side	4. PAIR control solenoid valve	(b) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
[G]: Face the white mark upward.	5. PAIR reed valve cover	
[H]: Face the white mark to right side.	6. PAIR reed valve	

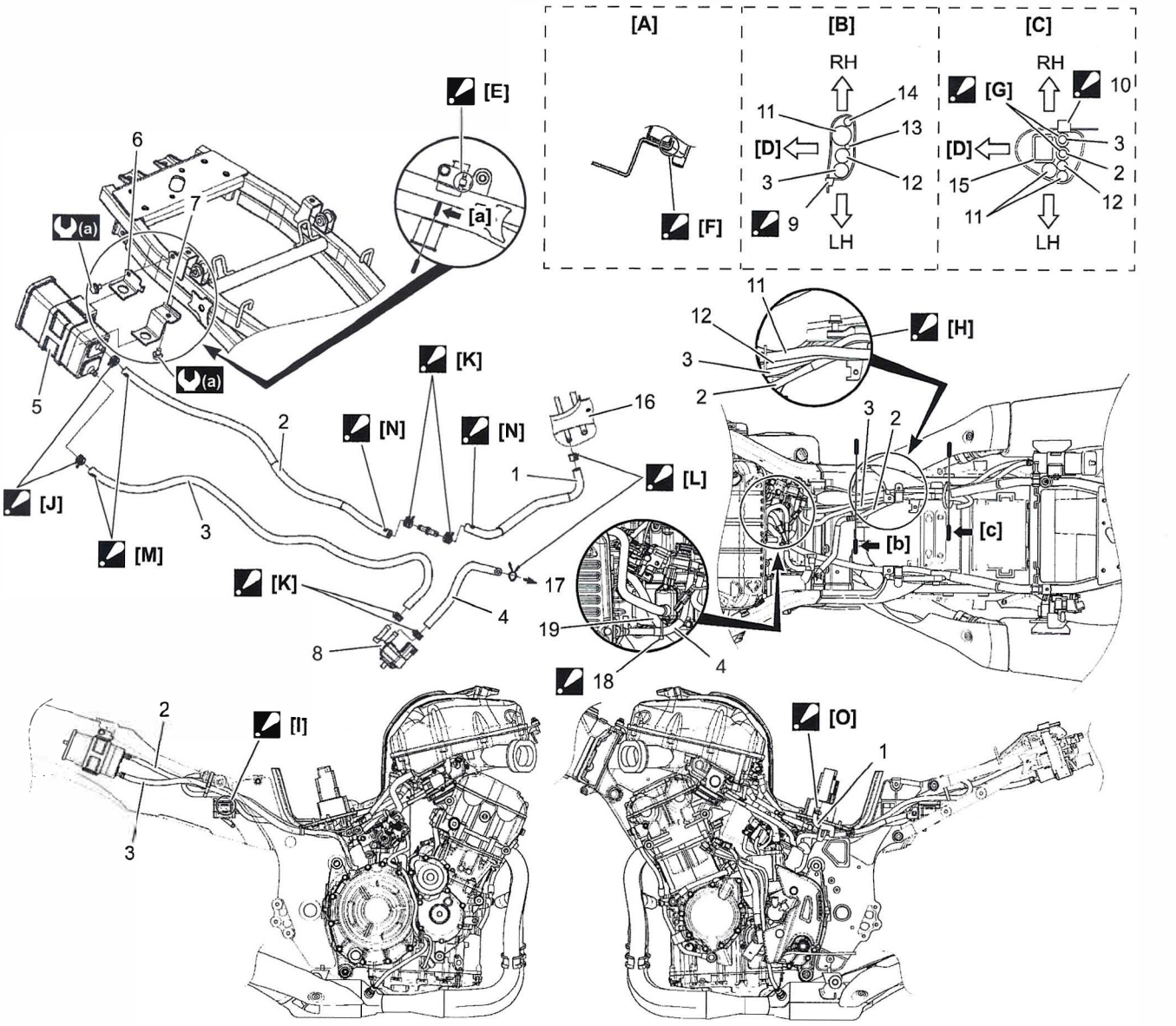
PCV Hose Routing Diagram

BENM10L31202002

Refer to "Intake System Construction" in Section 1D (Page 1D-5).

EVAP Canister Hose Routing Diagram

BENM10L31202003



IM10L2120001-01

[A]: View [a]	[M]: Face the white mark to right side.	10. Clamp : Face the locked part of clamp to right side. Face the tip of clamp downward.
[B]: View [b]	[N]: Face the yellow mark upward.	11. Main harness
[C]: View [c]	[O]: Face the white mark to left side.	12. Battery minus lead wire
[D]: Upper side	1. EVAP surge No.1 hose	13. Rear wheel speed sensor lead wire
[E]: Align the EVAP canister No.1 bracket with the edge of the rear seat cushion plate.	2. EVAP surge No.2 hose	14. Rear brake light switch lead wire
[F]: Align the EVAP canister No.2 bracket with the seat rail tube.	3. EVAP purge No.1 hose	15. Seat rail tube
[G]: Do not intersect the EVAP surge No.2 hose with the EVAP purge No.1 hose.	4. EVAP purge No.2 hose	16. Fuel tank
[H]: Pass the EVAP surge No.2 hose and EVAP purge No.1 hose under the battery minus lead wire and main harness.	5. EVAP canister	17. To throttle body
[I]: The EVAP hose must not be visible in hole of the frame cover.	6. EVAP canister No.1 bracket	18. Clamp : Clamp the starter motor lead wire and protector part of the EVAP purge No.2 hose.
[J]: Face the clamp end to right side.	7. EVAP canister No.2 bracket	19. Starter motor lead wire
[K]: Face the clamp end upward.	8. EVAP system purge control solenoid valve	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[L]: Face the clamp end to left side.	9. Clamp : Face the locked part of clamp to left side. Face the tip of clamp to left side.	

Repair Instructions

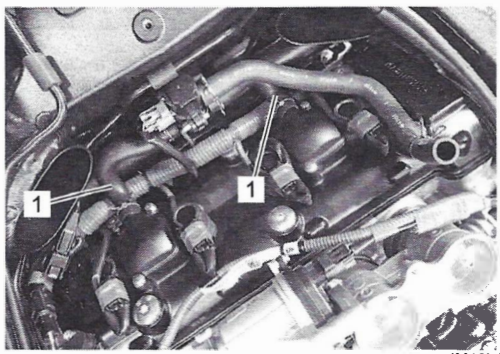
PAIR Reed Valve Removal and Installation

BENM10L31206001

Refer to "PAIR System Hose Routing Diagram" (Page 1B-1).

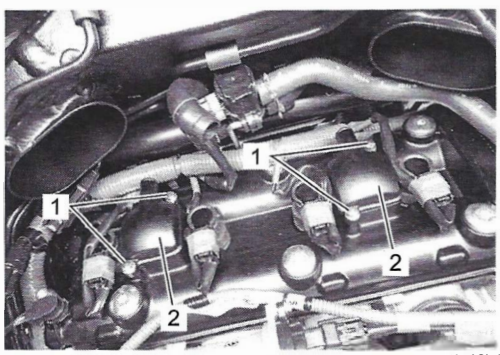
Removal

1) Remove the air cleaner box. ☞(Page 1D-6)
2) Disconnect the PAIR hoses (1) from the PAIR reed valve covers.



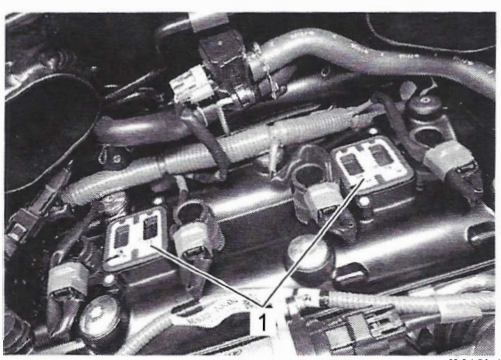
IM10L1120005-01

3) Remove the bolts (1) and PAIR reed valve covers (2).



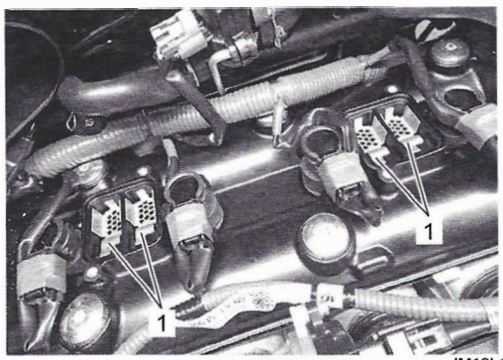
IM10L1120009-01

4) Remove the PAIR reed valves (1).



IM10L1120010-01

5) Remove the PAIR reed valve plates (1).

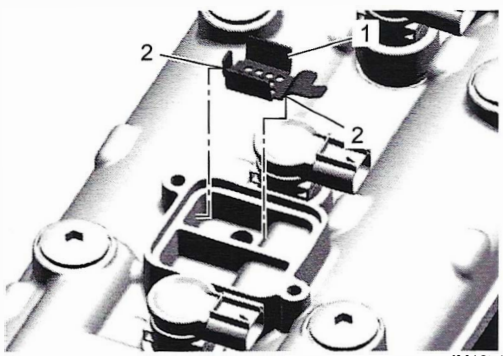


IM10L1120011-01

Installation

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

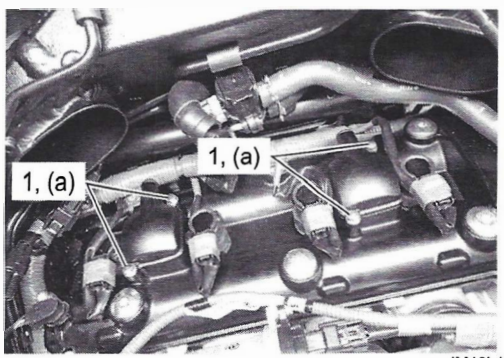
- Push in the PAIR reed valve plate (1) until the two points (2) contact the cylinder head cover.



IM10L1120012-01

- Tighten PAIR reed valve cover bolts (1) to the specified torque.

Tightening torque
PAIR reed valve cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1120013-01

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

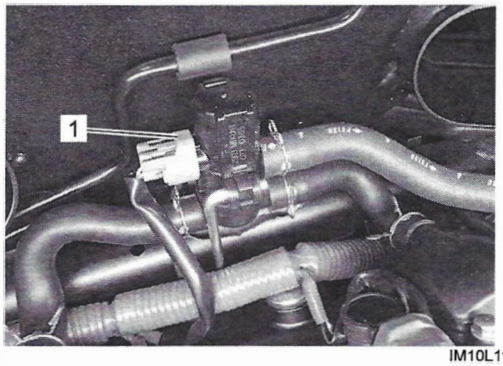
PAIR Control Solenoid Valve Removal and Installation

BENM10L31206002

Refer to "PAIR System Hose Routing Diagram" (Page 1B-1).

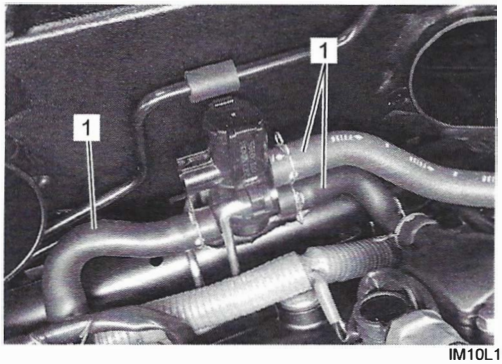
Removal

1) Remove the air cleaner box. ☞(Page 1D-6)
2) Disconnect the PAIR control solenoid valve coupler (1).



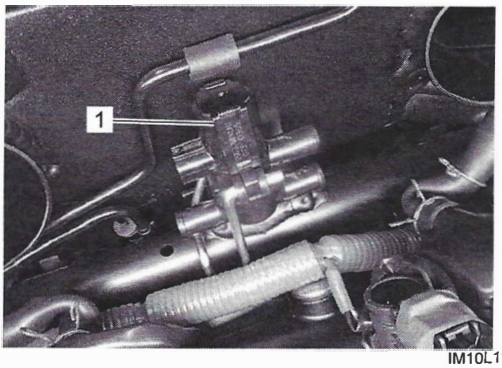
IM10L1120014-01

3) Disconnect the PAIR hoses (1) from PAIR control solenoid valve.



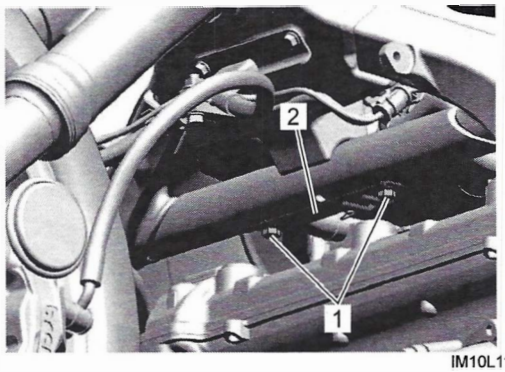
IM10L1120015-01

4) Remove the PAIR control solenoid valve (1) from its bracket.



IM10L1120016-01

5) Remove the PAIR control solenoid valve bracket as follows, if necessary.
   a) Remove the radiator heat shield. ☞(Page 1F-8)
   b) Remove the bolts (1) and PAIR control solenoid valve bracket (2).



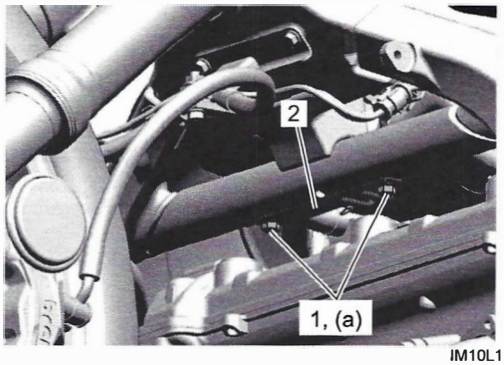
IM10L1120017-01

Installation

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

- Tighten the PAIR control solenoid valve bracket bolts (1) to the specified torque.

Tightening torque
PAIR control solenoid valve bracket bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



IM10L1120018-01

2. PAIR control solenoid valve bracket

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

PAIR System Inspection

BENM10L31206003

Refer to "PAIR (air supply) System" in Section 0B (Page 0B-13).

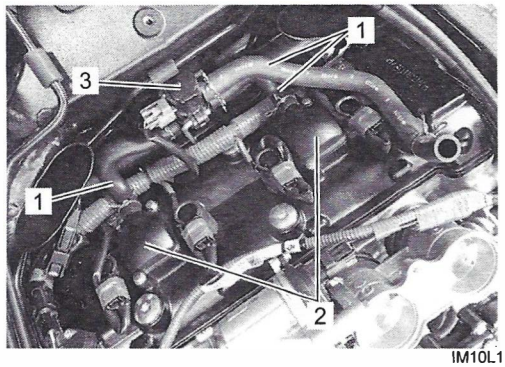
PAIR Hose Removal and Installation

BENM10L31206004

Refer to "PAIR System Hose Routing Diagram" (Page 1B-1).

Removal

1) Remove the air cleaner box. ☞(Page 1D-6)
2) Disconnect the PAIR hoses (1) from the PAIR reed valve covers (2).
3) Disconnect the PAIR hoses from PAIR control solenoid valve (3).



IM10L1120019-01

4) Remove the PAIR hoses.

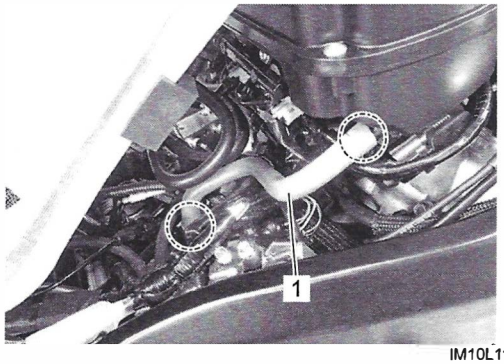
Installation
Install the PAIR hoses in the reverse order of removal. Pay attention to the following points:

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

PCV Hose Inspection

BENM10L31206005

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Inspect the PCV hose (1) for wear and damage. If it is worn or damaged, replace the PCV hose with a new one.
3) Check that the PCV hose is securely connected.



IM10L1120020-01

4) After finishing the PCV hose inspection, install the removed parts.

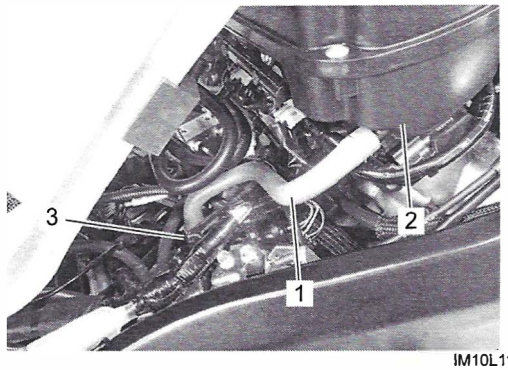
PCV Hose Removal and Installation

BENM10L31206006

Refer to "Intake System Construction" in Section 1D (Page 1D-5).

Removal

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Disconnect the PCV hose (1) from air cleaner box (2).
3) Disconnect the PCV hose from PCV reed valve cover (3).



IM10L1120021-01

4) Remove the PCV hose.

Installation
Install the PCV hose in the reverse order of removal. Pay attention to the following points:

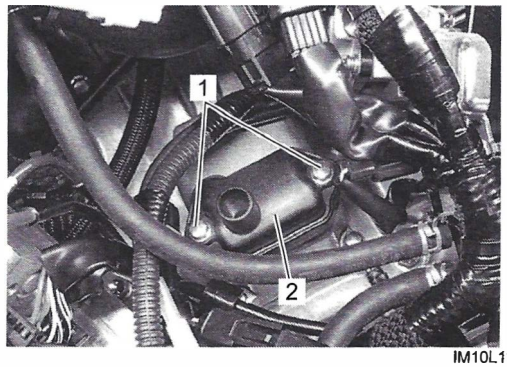
- Connect the PCV hose properly. Refer to "Intake System Construction" in Section 1D (Page 1D-5).

PCV Reed Valve / PCV Cover Removal and Installation

BENM10L31206007

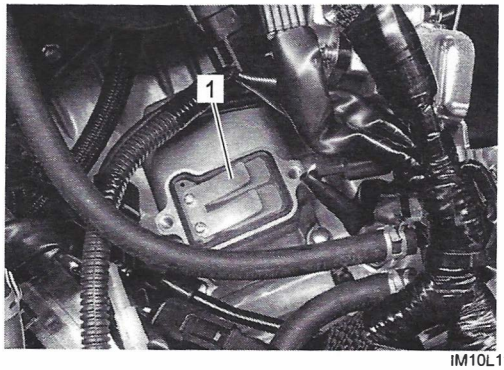
Removal

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Disconnect the PCV hose from PCV reed valve cover. ☞(Page 1B-6)
3) Remove the bolts (1) and PCV reed valve cover (2).



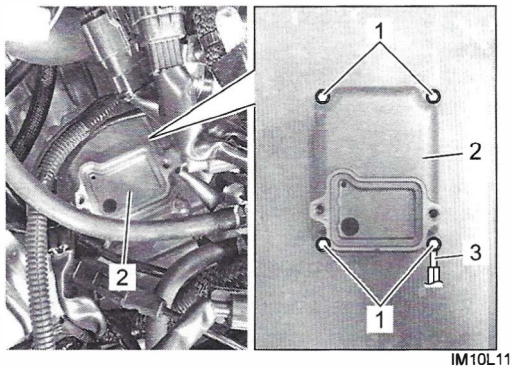
IM10L1120022-01

4) Remove the PCV reed valve (1).



IM10L1120023-01

5) Remove the bolts (1) and PCV cover (2).



IM10L1120024-01

3. Ground wire harness	

Installation

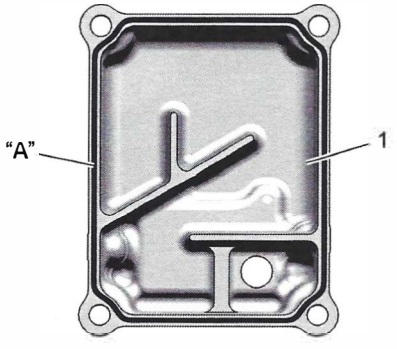
Installation is in the reverse order of removal.
Pay attention to the following points:

- Apply sealant to the mating surface of the PCV cover (1).

NOTE

- **Make surfaces free from moisture, oil dust and other foreign materials.**
- **Spread on surface thinly to form an even layer and assemble the PCV cover within a few minutes.**

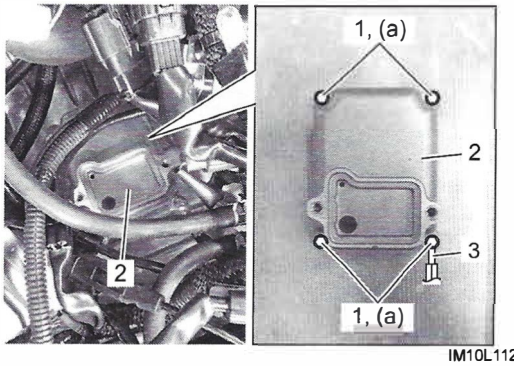
Sealant 99000–31140 (SUZUKI BOND 1207B)



IM10L1120025-01

- Tighten the PCV cover bolts (1) to the specified torque.

Tightening torque
PCV cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

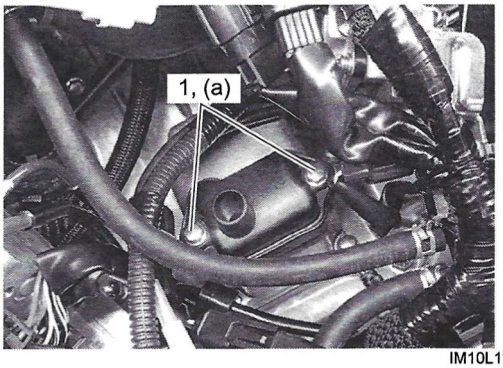


IM10L1120026-01

2. PCV cover	3. Ground wire harness

- Tighten the PCV reed valve cover bolts (1) to the specified torque.

Tightening torque
PCV reed valve cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1120027-01

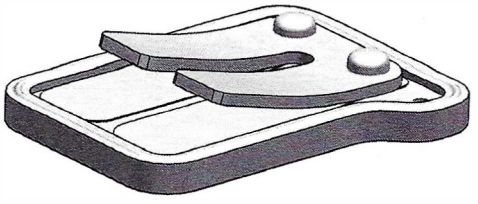
- Connect the PCV hose properly. Refer to "Intake System Construction" in Section 1D (Page 1D-5).

PCV Reed Valve / PCV Cover Inspection

BENM10L31206008

PCV Reed Valve

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



IM10L1120028-01

PCV Cover

1) Remove the PCV cover. Refer to "PCV Reed Valve / PCV Cover Removal and Installation" (Page 1B-6).
2) Inspect the PCV cover for carbon deposit. If carbon deposit is found in the PCV cover, remove the carbon.



IM10L1120029-01

EVAP System Removal and Installation

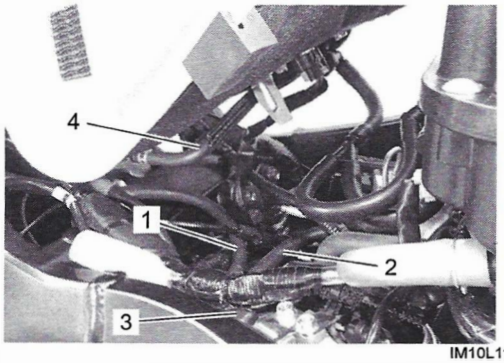
BENM10L31206009

Refer to "EVAP Canister Hose Routing Diagram" (Page 1B-2).

Hose

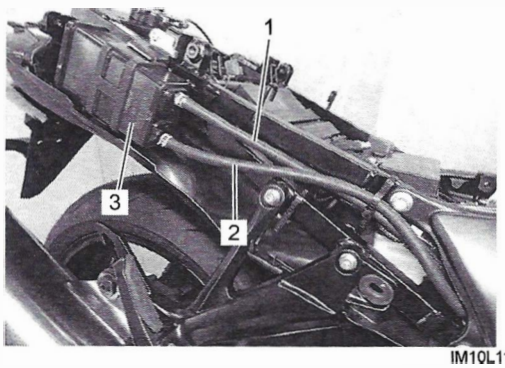
Removal

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Remove the frame cover assembly: ☞(Page 9D-51)
3) Disconnect the EVAP purge No.1 hose (1) and EVAP purge No.2 hose (2) from EVAP system purge control solenoid valve (3).
4) Disconnect the EVAP purge No.2 hose from vacuum line of throttle body.
5) Disconnect the EVAP surge No.1 hose (4) from fuel tank.



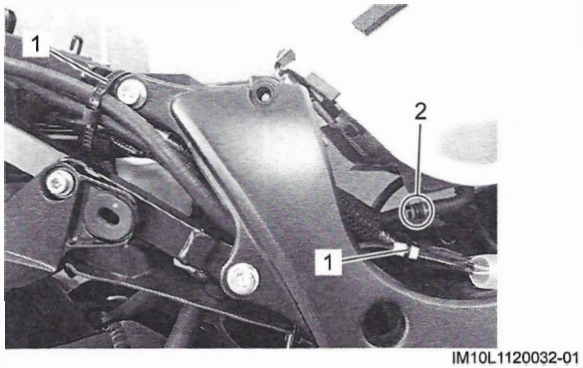
IM10L1120030-01

6) Disconnect the EVAP surge No.2 hose (1) and EVAP purge No.1 hose (2) from EVAP canister (3).



IM10L1120031-02

7) Release the clamps (1).
8) Disconnect the EVAP surge No.1 hose and EVAP surge No.2 hose from EVAP hose joint (2), if necessary.



IM10L1120032-01

9) Remove the EVAP hoses.

Installation

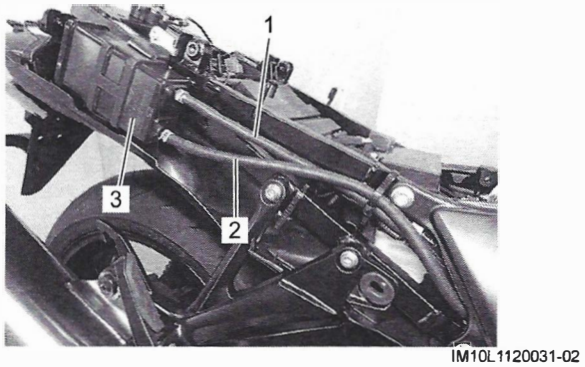
Install the EVAP hoses in the reverse order of removal. Pay attention to the following points:

- Connect the EVAP hoses properly. Refer to "EVAP Canister Hose Routing Diagram" (Page 1B-2).

EVAP Canister

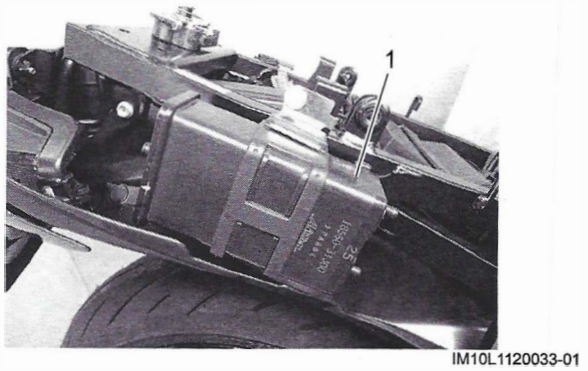
Removal

1) Remove the frame cover assembly. ☞(Page 9D-51)
2) Disconnect the EVAP surge No.2 hose (1) and EVAP purge No.1 hose (2) from EVAP canister (3).



IM10L1120031-02

3) Remove the EVAP canister (1) from its bracket.



IM10L1120033-01

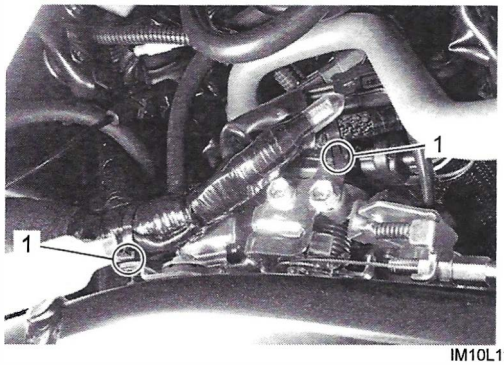
Installation

Install the EVAP canister in the reverse order of removal. Pay attention to the following point:

- Connect the EVAP surge No.2 hose and EVAP purge No.1 hose to EVAP canister as shown in the "EVAP Canister Hose Routing Diagram" (Page 1B-2).

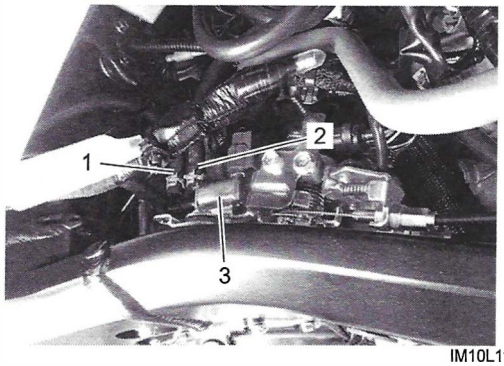
EVAP System Purge Control Solenoid Valve Removal

1) Lift and support the fuel Tank. ☞(Page 1G-12)
2) Remove the clamps (1) from accelerator body assembly bracket.



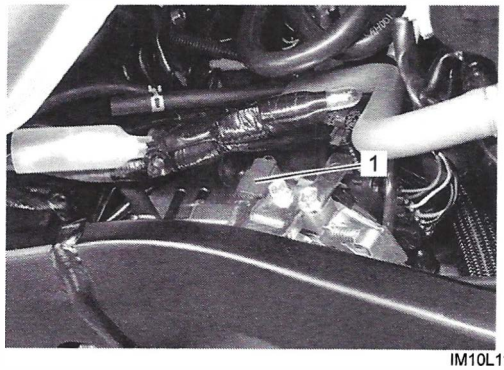
IM10L1120034-01

3) Disconnect the EVAP purge No.1 hose (1) and EVAP purge No.2 hose (2) from EVAP system purge control solenoid valve (3).



IM10L1120035-01

4) Disconnect the EVAP system purge control solenoid valve coupler (1).

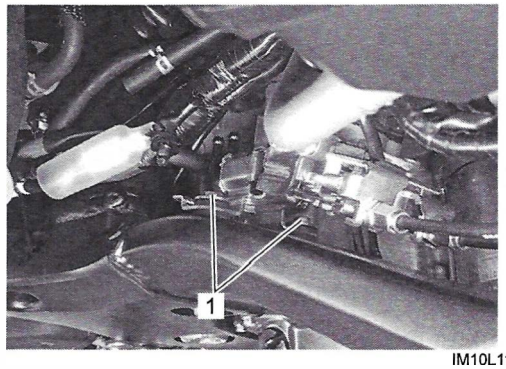


IM10L1120036-01

5) Remove the accelerator body assembly bracket bolts (1).

NOTE

Do not drop the accelerator body assembly bracket spacers.

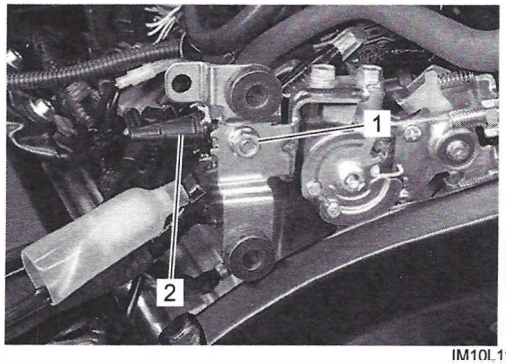


IM10L1120037-01

6) Move the accelerator body assembly bracket outside of the motorcycle.
7) Remove the nut (1) and remove the EVAP system purge control solenoid valve (2) from its bracket.

NOTE

Be careful not to expose the accelerator body assembly to an excessive shock.



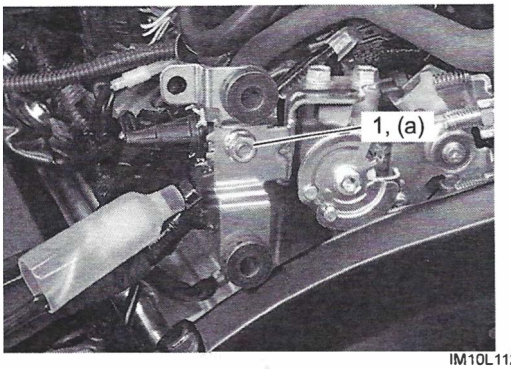
IM10L1120038-01

Installation

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

- Tighten the EVAP system purge control solenoid valve nut (1) to the specified torque.

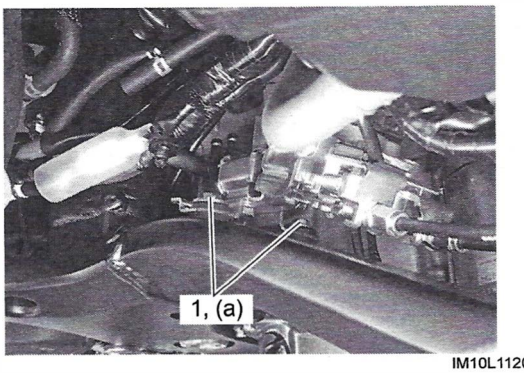
Tightening torque
EVAP system purge control solenoid valve nut (a): 6.7 N·m (0.68 kgf-m, 4.95 lbf-ft)



IM10L1120039-01

- Tighten the accelerator body assembly bracket bolts (1) to the specified torque.

Tightening torque
Accelerator body assembly bracket bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1120040-01

- Connect the EVAP purge No.1 hose and EVAP purge No.2 hose as shown in the "EVAP Canister Hose Routing Diagram" (Page 1B-2).

Fuel Shut-off Valve

For fuel tank cap removal and installation, refer to ☞(Page 1G-12).

EVAP System Inspection

BENM10L31206010

Refer to "Evaporative emission control system" in Section 0B (Page 0B-8).

Specifications

Tightening Torque Specifications

BENM10L31207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
PAIR reed valve cover bolt	10	1.0	7.5	☞(Page 1B-4)
PAIR control solenoid valve bracket bolt	5.5	0.56	4.05	☞(Page 1B-5)
PCV cover bolt	10	1.0	7.5	☞(Page 1B-7)
PCV reed valve cover bolt	10	1.0	7.5	☞(Page 1B-7)
EVAP system purge control solenoid valve nut	6.7	0.68	4.95	☞(Page 1B-9)
Accelerator body assembly bracket bolt	10	1.0	7.5	☞(Page 1B-10)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"PAIR System Hose Routing Diagram" (Page 1B-1)
"EVAP Canister Hose Routing Diagram" (Page 1B-2)
"Fasteners Information" in Section 0C (Page 0C-6)

Special Tools and Equipment

Recommended Service Material

BENM10L31208001

Material	SUZUKI recommended product or Specification		Note
Sealant	SUZUKI BOND 1207B	P/No.: 99000–31140	☞(Page 1B-7)

Engine Electrical Devices

Precautions

Precautions for Engine Electrical Device

BENM10L31300001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2), "Precautions for Circuit Tester" in Section 00 (Page 00-8) and "Precautions for SDS-II" in Section 00 (Page 00-9).

Precautions for Electric Throttle Control System

BENM10L31300002

⚠ CAUTION

If you touch the throttle valve with your finger when the ignition switch is "ON" and the throttle grip is opened, your finger may be pinched in the gap between the throttle valve and throttle body housing when the throttle grip is released.
Never touch the throttle valve with your finger when the ignition switch is "ON" and the throttle grip is opened.

NOTICE

- **Failure to take proper precautions when handling the throttle body may lead to malfunction of the throttle body or damage to its components.**
  - **Do not disassemble the throttle body.**
  - **Do not drop or otherwise expose the throttle body to large shock.**
  - **Keep the throttle body housing and/or throttle valve free of dust, metallic particles or other foreign materials.**
  - **Do not apply undue forces to the throttle valve when checking operation of the throttle valve or performance of the TP sensor.**
- **Failure to take proper precautions when handling the accelerator body assembly may lead to malfunction of the accelerator body assembly or damage to its components.**
  - **Do not remove the accelerator position sensor from the accelerator body assembly.**
  - **Do not drop or otherwise expose the accelerator body assembly to large shock.**

Component Location

Engine Electrical Components Location

BENM10L31303001

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

Diagnostic Information and Procedures

Engine Symptom Diagnosis

BENM10L31304001

Refer to "Engine Symptom Diagnosis" in Section 1A (Page 1A-25).

Repair Instructions

ECM Removal and Installation

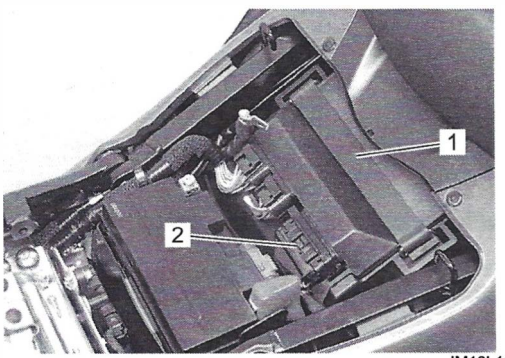
BENM10L31306001

Removal

NOTICE

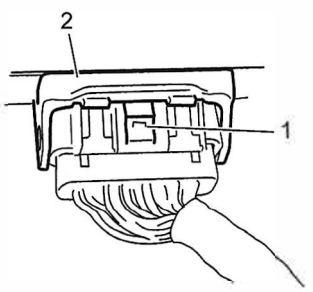
Be careful not to disconnect the ECM coupler at least 5 seconds after ignition switch is turned to OFF. If the ECM coupler is disconnected within 5 seconds after ignition switch is turned to OFF, there is a possibility of an unusual valve position being written in ECM and causing an error of throttle valve operation.

1) Remove the front seat. ☞(Page 9D-34)
2) Disconnect the battery (–) lead wire. ☞(Page 1J-8)
3) Detach the band (1).
4) Disconnect the ECM couplers from the ECM. At this time, disconnect the ECM coupler "A" (2) as follows.



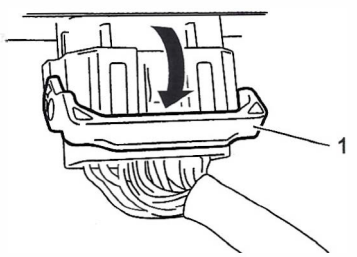
IM10L1130001-01

a) Push the lock (1) to release locking of the lock lever (2).



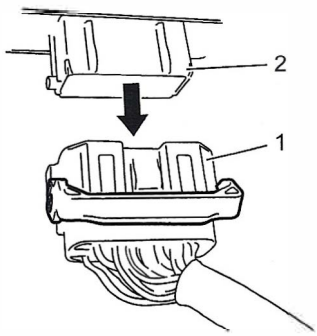
IM10L1130002-01

b) Turn the lock lever (1) in arrow direction until it stops.



IM10L1130003-01

c) Disconnect the ECM coupler "A" (1) from ECM (2).



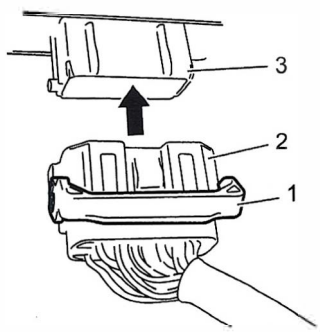
IM10L1130004-01

5) Remove the ECM.

Installation

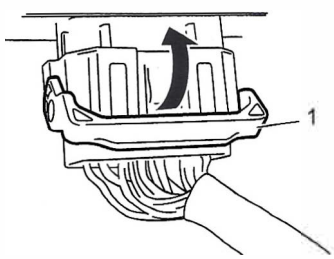
Install the ECM in the reverse order of removal. Pay attention to the following point:

- Connect the ECM coupler "A" as follows.
  a. Make sure that lock lever (1) are in unlock position.
  b. Insert ECM coupler "A" (2) to ECM (3) until they stop with lock lever in unlocked position.



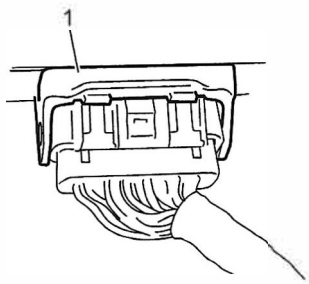
IM10L1130005-01

c. Turn the lock lever (1) in direction of arrow to lock the ECM coupler "A" securely.



IM10L1130006-01

d. Make sure that lock lever (1) are in lock position.



IM10L1130007-01

- After ECM is replaced with new one, perform the following procedure.
  a. Perform the "Reprogramming" to ECM. Referring to the Suzuki SDS-II reprogramming software operator's manual for further details.
  b. Perform the key registration. (if equipped)

ECM Learned Value Reset

BENM10L31306002

Perform ECM learned value reset whenever one of the following operations has been performed.

Operation	Item to reset
Throttle body is replaced	TP fully closed learned value reset
	ISC aperture learned value reset
Accelerator body assembly is replaced	Reset closed accel position
HO2 sensor is replaced	Long term fuel trim reset (HO2 sensor feedback learned value)
IMU is replaced	Reset IMU learning value
GP sensor is replaced	Reset gear position learned value

1) Turn the ignition switch OFF.
2) Remove the rear seat. ☞(Page 9D-34)
3) Set up the SDS-II referring to the SDS-II operation manual for further details.

Special tool
09904–41031
09904–41041
09904–41071

4) Turn the ignition switch ON.
5) Click the "Active control".
6) Click the item depending on operation and follow instructions displayed on SDS-II.
7) Close the SDS-II and turn the ignition switch OFF.

NOTE

The ECM learned value initialization is automatically started after the ignition switch is turned OFF position.

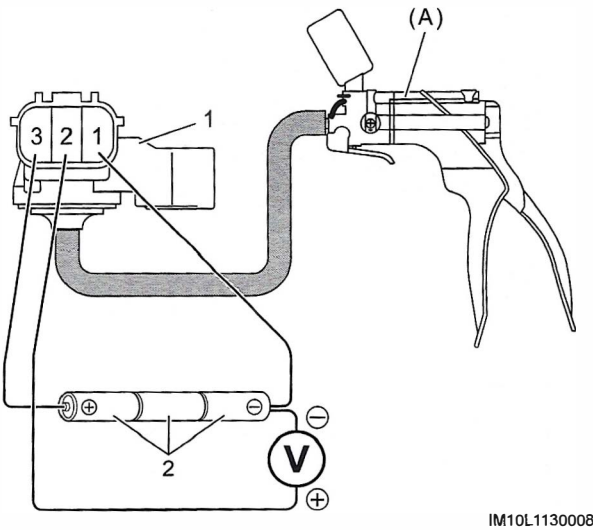
AP Sensor Inspection

BENM10L31306003

1) Turn the ignition switch OFF.
2) Remove the AP sensor. ☞(Page 1C-3)
3) Connect the vacuum pump gauge to the vacuum port of the AP sensor (1).
4) Arrange 3 new 1.5 V batteries (2) in series (check that total voltage is 4.5 – 5.0 V) and connect (–) terminal to the "T1" and (+) terminal to the "T3".
5) Measure the voltage between "T2" and "T1". Also, check if voltage reduces when vacuum is applied using the vacuum pump gauge.

If the voltage is not within the specified value, replace the AP sensor. ☞(Page 1C-3)

Special tool
(A): 09917–47020



IM10L1130008-02

ALTITUDE (Reference)		ATOMOSPHERIC PRESSURE		OUTPUT VOLTAGE
m	ft	kPa	mmHg	V
0 – 610	0 – 2001	100 – 94	760 – 705	3.4 – 4.0
611 – 1524	2005 – 5000	94 – 85	705 – 638	3.0 – 3.7
1525 – 2438	5003 – 7999	85 – 76	638 – 570	2.6 – 3.4
2439 – 3048	8002 – 10000	76 – 70	570 – 525	2.4 – 3.1

IF04K1130058-02

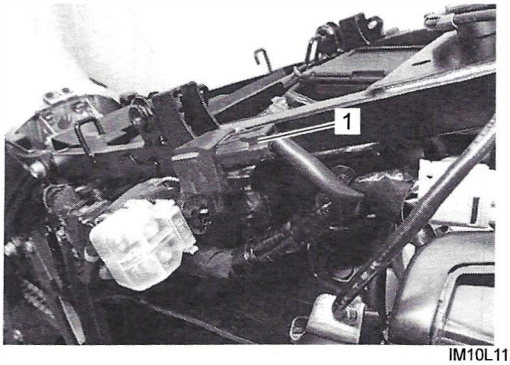
6) After finishing the AP sensor inspection, install the removed parts.

AP Sensor Removal and Installation

BENM10L31306004

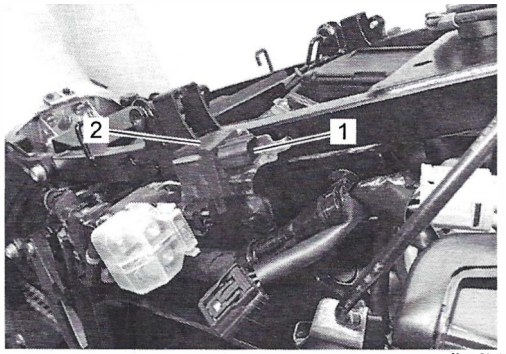
Removal

1) Remove the frame cover assembly. ☞(Page 9D-51)
2) Disconnect the AP sensor coupler (1).



IM10L1130009-01

3) Remove the AP sensor (1) from sensor holder (2).



IM10L1130010-01

Installation
Install the AP sensor in the reverse order of removal.

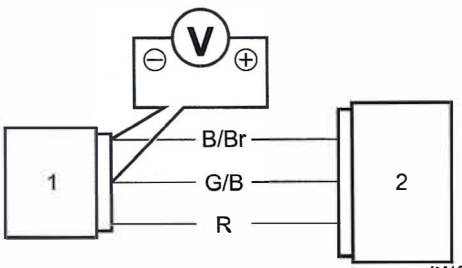
IAP Sensor Inspection

BENM10L31306005

IAP Sensor Output Voltage at Idle Speed

1) Check the IAP sensor power supply voltage. ☞(Page 1A-82)
2) Turn the ignition switch OFF.
3) Connect the IAP sensor coupler and ECM couplers.
4) Connect the circuit tester to the wire harness as shown in the figure.
5) Start the engine and at idle speed, measure the IAP sensor output voltage between the G/B wire and B/Br wire. If the voltage is not within the specified value, replace the IAP sensor. ☞(Page 1C-5)

IAP sensor output voltage
Idle speed at 1 atm.
[Standard]: Approx. 0.789 – 4.0 V



IM10L1130011-01

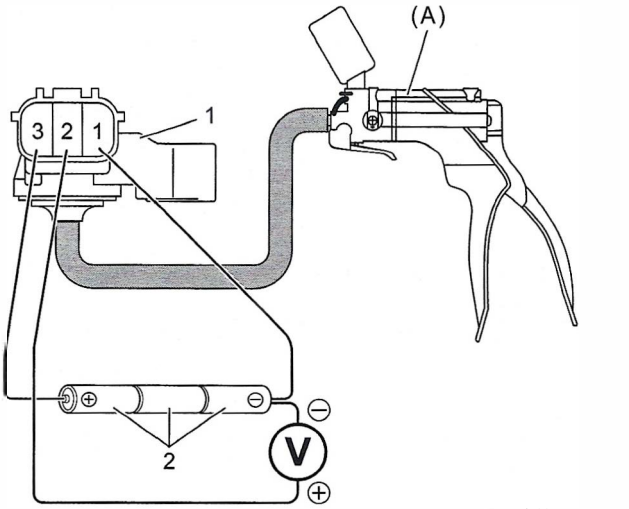
1. IAP sensor	2. ECM

6) After finishing the IAP sensor inspection, install the removed parts.

IAP Sensor Output Voltage

1) Turn the ignition switch OFF.
2) Remove the IAP sensor. ☞(Page 1C-5)
3) Connect the vacuum pump gauge to the vacuum port of the IAP sensor (1).
4) Arrange 3 new 1.5 V batteries (2) in series (check that total voltage is 4.5 – 5.0 V) and connect (–) terminal to the "T1" and (+) terminal to the "T3".
5) Measure the voltage between "T2" and "T1". Also, check if voltage reduces when vacuum is applied using the vacuum pump gauge.
If the voltage is not within the specified value, replace the IAP sensor. ☞(Page 1C-5)

Special tool
(A): 09917–47020



IM10L1130008-02

ALTITUDE (Reference)		ATOMOSPHERIC PRESSURE		OUTPUT VOLTAGE
m	ft	kPa	mmHg	V
0 – 610	0 – 2001	100 – 94	760 – 705	3.4 – 4.0
611 – 1524	2005 – 5000	94 – 85	705 – 638	3.0 – 3.7
1525 – 2438	5003 – 7999	85 – 76	638 – 570	2.6 – 3.4
2439 – 3048	8002 – 10000	76 – 70	570 – 525	2.4 – 3.1

IF04K1130058-02

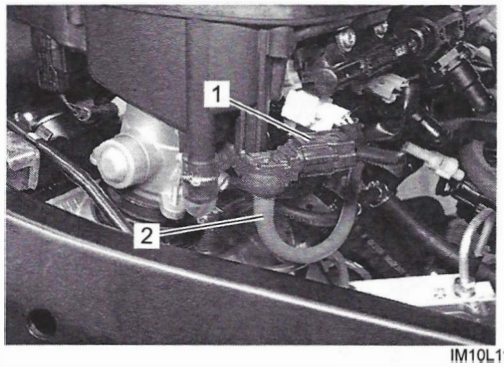
6) After finishing the IAP sensor inspection, install the removed parts.

IAP Sensor Removal and Installation

BENM10L31306006

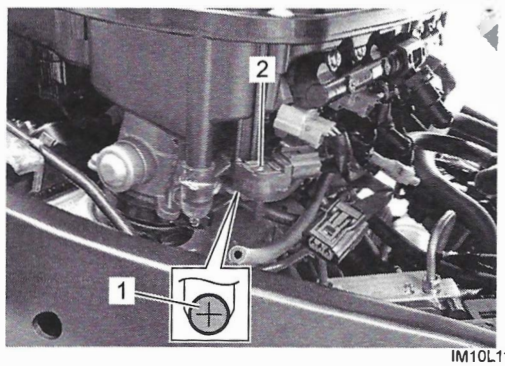
Removal

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Disconnect the IAP sensor coupler (1) and vacuum hose (2).



IM10L1130012-01

3) Remove the IAP sensor screw (1) and IAP sensor (2) from the air cleaner box.



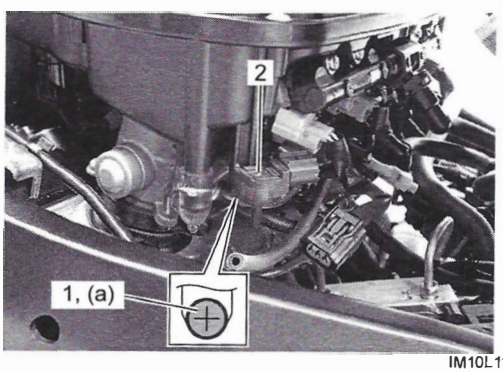
IM10L1130013-01

Installation

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

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

Tightening torque
IAP sensor screw (a): 1.3 N·m (0.13 kgf-m, 0.95 lbf-ft)



IM10L1130014-01

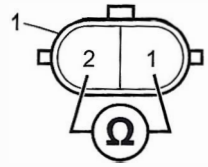
2. IAP sensor

IAT Sensor Inspection

BENM10L31306007

1) Turn the ignition switch OFF.
2) Remove the IAT sensor. ☞(Page 1C-5)
3) Measure the IAT sensor (1) resistance between the terminals of the IAT sensor. If the resistance is out of the specified value, replace the IAT sensor. ☞(Page 1C-5)

IAT sensor resistance
0 °C (32 °F) [Standard]: 5400 – 6600 Ω
80 °C (176 °F) [Standard]: 290– 390 Ω



IL06L1130003-01

4) After finishing the IAT sensor inspection, install the removed parts.

IAT Sensor Removal and Installation

BENM10L31306008

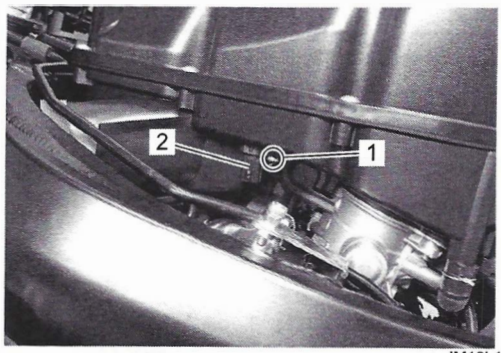
Removal

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Disconnect the IAT sensor coupler (1).



IM10L1130015-01

3) Remove the IAT sensor screw (1) and IAT sensor (2) from the air cleaner box.

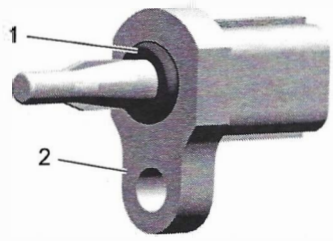


IM10L1130016-01

Installation

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

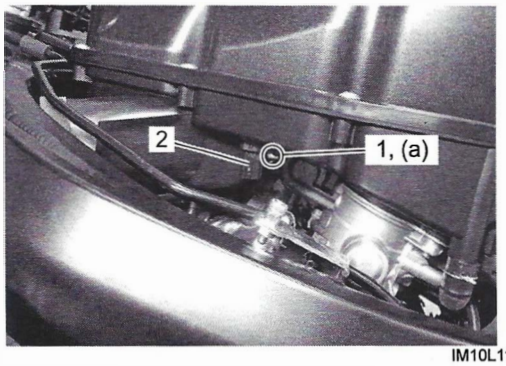
- Install the new O-ring (1) to the IAT sensor (2).



IL06L1130005-01

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

Tightening torque
IAT sensor screw (a): 1.3 N·m (0.13 kgf-m, 0.95 lbf-ft)



IM10L1130017-01

2. IAT sensor

ECT Sensor Inspection

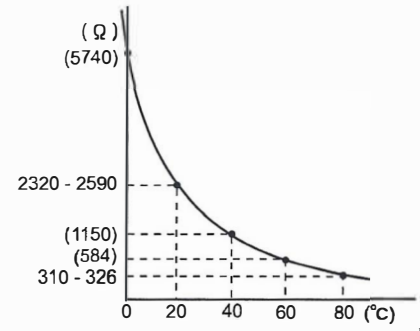
BENM10L31306009

Refer to "ECT Sensor Removal and Installation" (Page 1C-6).
Measure the resistance between terminals of the ECT sensor (1). Make sure that the resistance value decreases as temperature increase. If measured resistance does not change as specified, replace ECT sensor with a new one.

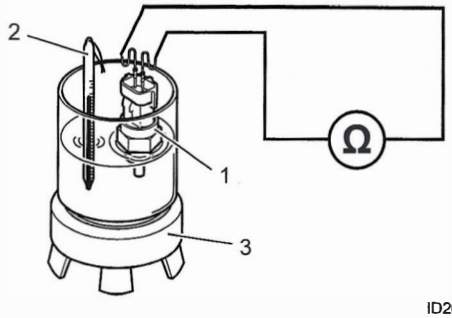
NOTICE

- **Handle the ECT sensor carefully as it will easily be broken if it receives excessively large shocks or forces.**
- **Keep the ECT sensor and thermometer (2) not in contact with the heater's water container.**

ECT sensor resistance
–20 °C (–4 °F) [Standard]: 13840 – 16330 Ω
20 °C (68 °F) [Standard]: 2320 – 2590 Ω
80 °C (176 °F) [Standard]: 310 – 326 Ω



ID26J1130061-02



ID26J1130060-01

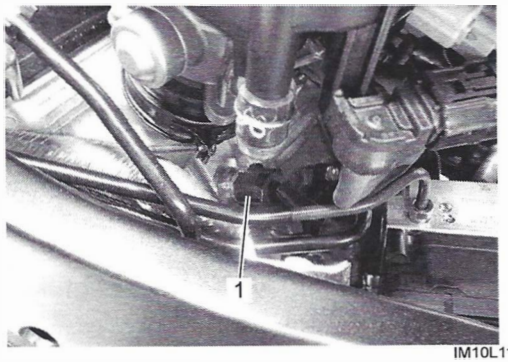
3. Heater

ECT Sensor Removal and Installation

BENM10L31306010

Removal

1) Drain engine coolant. ☞(Page 1F-6)
2) Lift and support the fuel tank. ☞(Page 1G-12)
3) Disconnect the ECT sensor coupler (1).

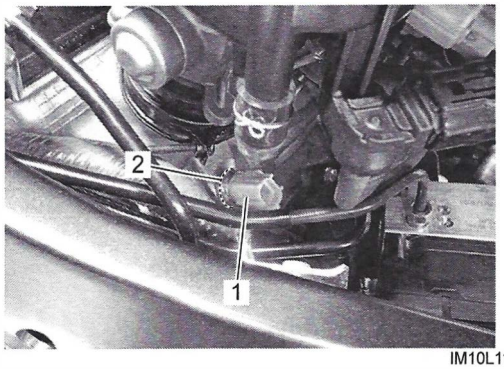


IM10L1130018-01

4) Remove the ECT sensor (1) and its gasket (2) from the cylinder head.

NOTICE

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



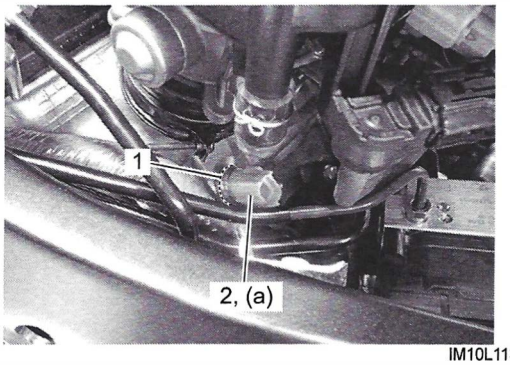
IM10L1130019-01

Installation

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

- Install the new gasket (1).
- Install the ECT sensor (2) and tighten it to the specified torque.

Tightening torque
ECT sensor (a): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)



IM10L1130020-01

TP Sensor Inspection

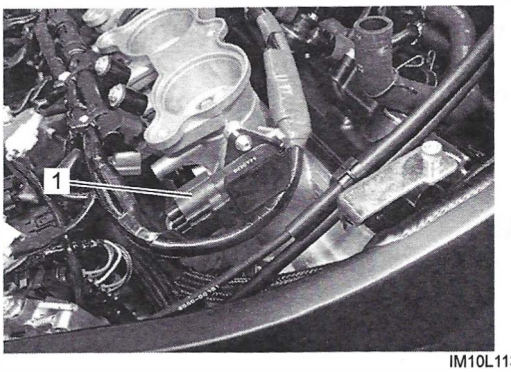
BENM10L31306011

Refer to "Precautions for Electric Throttle Control System" (Page 1C-1).

NOTICE

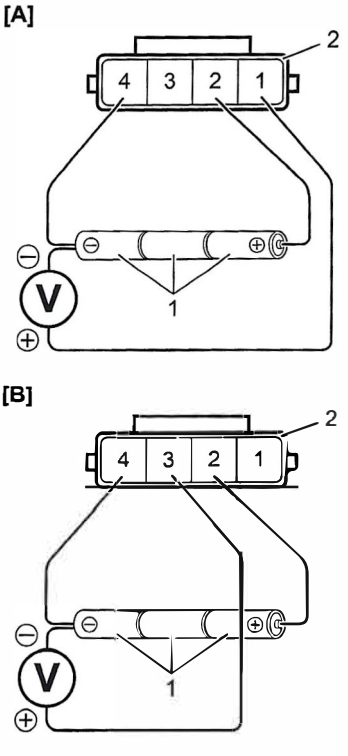
Do not snap the throttle valve from the open to full close. It may cause damage to the gear inside the throttle body.

1) Turn the ignition switch OFF.
2) Remove the air cleaner box. ☞(Page 1D-6)
3) Disconnect the TP sensor coupler (1).



IM10L1130021-01

4) Measure the output voltage of TP sensor main and sub signals as follows.
   If faulty condition is found, replace the throttle body with a new one. ☞(Page 1D-9)
   a) 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 "T4" and (+) terminal to the "T2".
   b) Connect the voltmeter between the following terminal.
      - TP sensor (main): between the "T1" and "T4"
      - TP sensor (sub): between the "T3" and "T4"



IM10L1130022-01

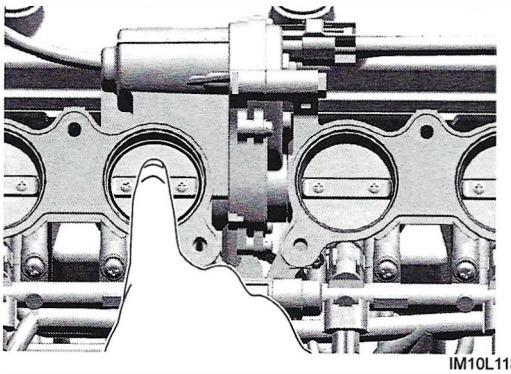
[A]: TP sensor (main)	2. TP sensor
[B]: TP sensor (sub)	

   c) Check that voltage varies depending on throttle opening angle as shown in the following graph while throttle valve is opened and closed manually.

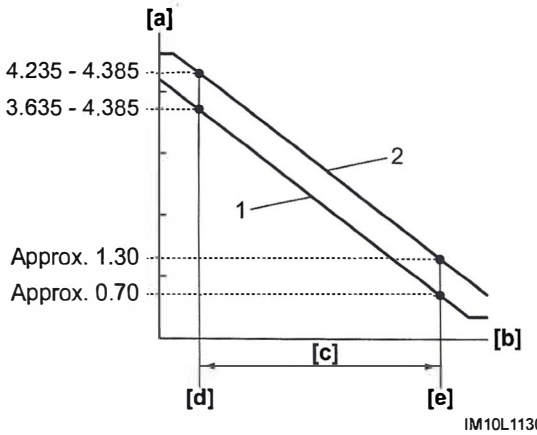
TP sensor (main) output voltage
Closed [Standard]: 3.635 – 3.785 V

Opened [Standard]: Approx. 0.70 V

TP sensor (sub) output voltage
Closed [Standard]: 4.235 – 4.385 V
Opened [Standard]: Approx. 1.30 V



IM10L1130057-01



IM10L1130024-02

[a]:	Voltage (V)
[b]:	Throttle valve opening
[c]:	Angle obtained when throttle valve is fully opened manually
[d]:	Fully closed position
[e]:	Fully opened position
1.	TP sensor (main) output voltage
2.	TP sensor (sub) output voltage

5) After finishing the TP sensor inspection, install the removed parts.

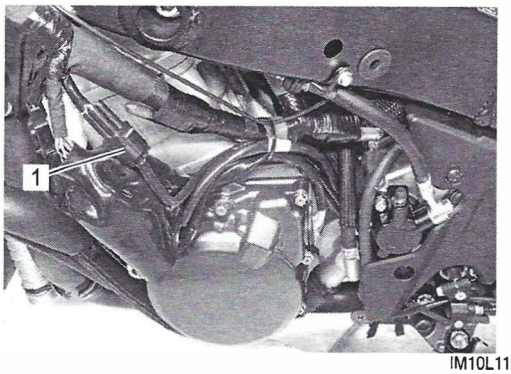
HO2 Sensor Inspection

BENM10L31306012

HO2 Sensor Output Voltage

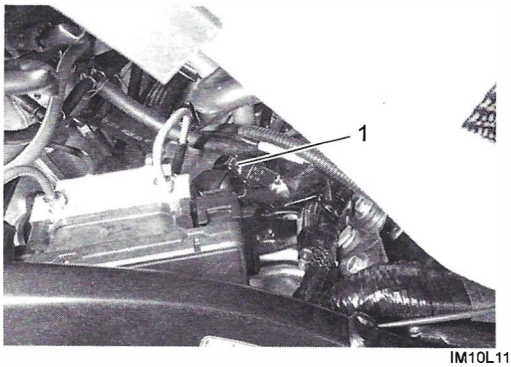
1) Remove the following parts.
   - For HO2 sensor #1, remove the side cowling assembly (LH). ☞(Page 9D-37)
   - For HO2 sensor #2, lift and support the fuel tank. ☞(Page 1G-12)
2) Start the engine and warm up the engine enough.
3) Disconnect the HO2 sensor coupler (1).

HO2 sensor #1



IM10L1130025-03

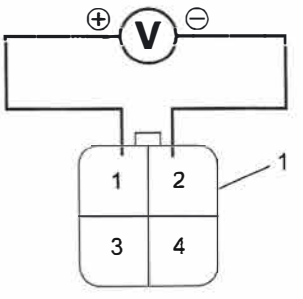
HO2 sensor #2



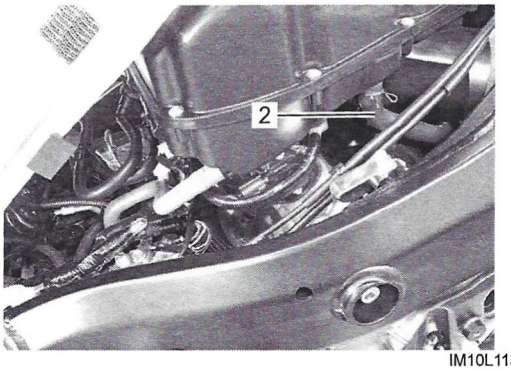
IM10L1130026-03

4) Measure the HO2 sensor (1) output voltage between the "T1" and "T2", in idling condition.
5) If OK, then pinch the PAIR hose (2) with a proper hose clamp.
6) Measure the HO2 sensor output voltage while holding the engine speed at 6000 r/min.

HO2 sensor output voltage
Idle speed [Standard]: Approx. 0 V
6000 r/min [Standard]: Approx. 1 V



IL41K1130014-01



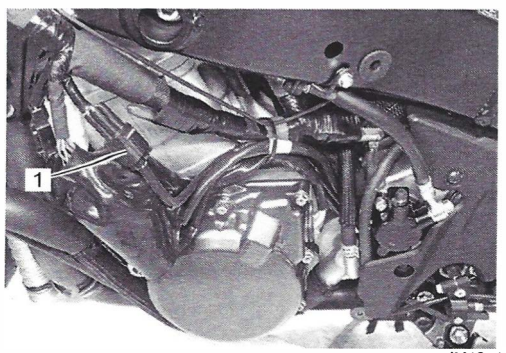
IM10L1130027-01

7) If the HO2 sensor output voltage is not within the standard range, replace the HO2 sensor with a new one. ☞(Page 1C-9)
8) After finishing the HO2 sensor inspection, install the removed parts.

HO2 Sensor Heater Resistance

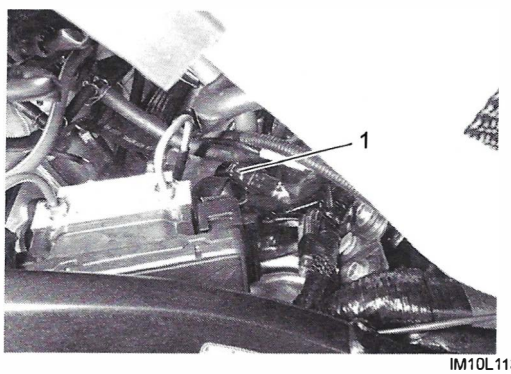
1) Remove the following parts.
   - For HO2 sensor #1, remove the side cowling assembly (LH). ☞(Page 9D-37)
   - For HO2 sensor #2, lift and support the fuel tank. ☞(Page 1G-12)
2) Disconnect the HO2 sensor coupler (1).

HO2 sensor #1



IM10L1130025-03

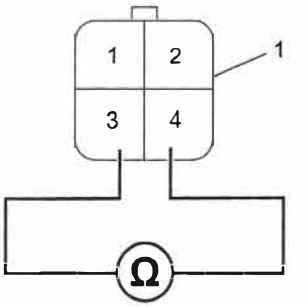
HO2 sensor #2



IM10L1130026-03

3) Measure the HO2 sensor heater resistance between the "T3" and "T4" of the HO2 sensor. If the resistance is out of the specified value, replace the HO2 sensor (1) with a new one. ☞(Page 1C-9)

HO2 sensor heater resistance
23 °C (73.4 °F) [Standard]: 11.5 – 17.5 Ω



IL41K1130015-01

4) After finishing the HO2 sensor inspection, install the removed parts.

HO2 Sensor Removal and Installation

BENM10L31306013

⚠ WARNING

Do not remove the HO2 sensor while it is hot.

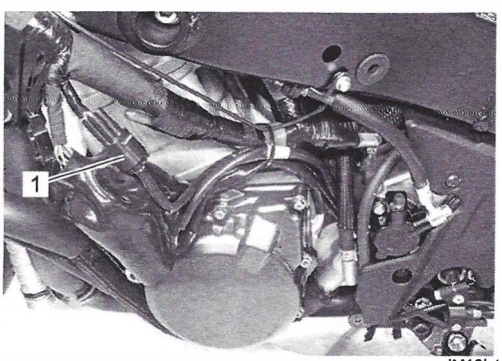
NOTICE

- **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 wire.**

Removal

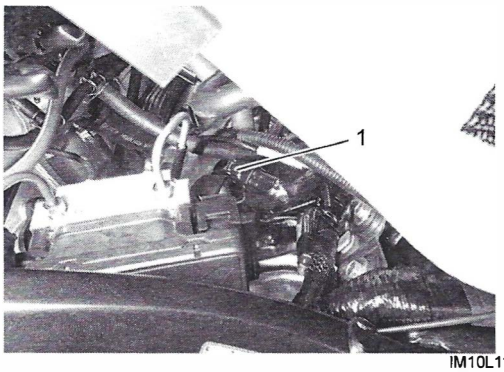
1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Lift and support the fuel tank. ☞(Page 1G-12)
3) Disconnect the HO2 sensor coupler (1).

HO2 sensor #1



IM10L1130025-03

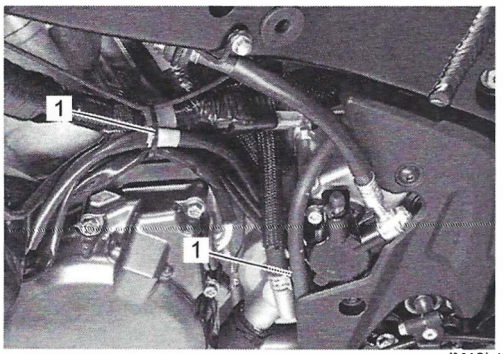
HO2 sensor #2



IM10L1130026-03

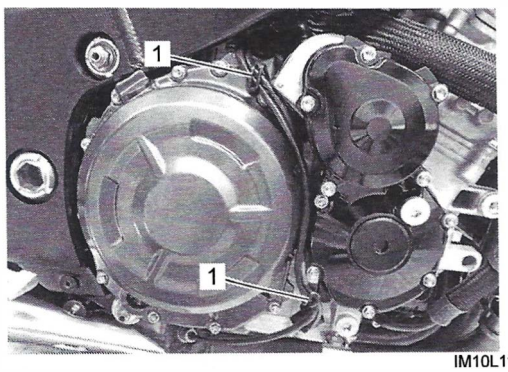
4) Release the clamps (1).

HO2 sensor #1



IM10L1130056-01

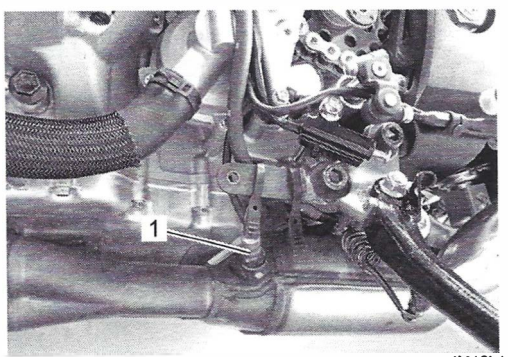
HO2 sensor #2



IM10L1130029-01

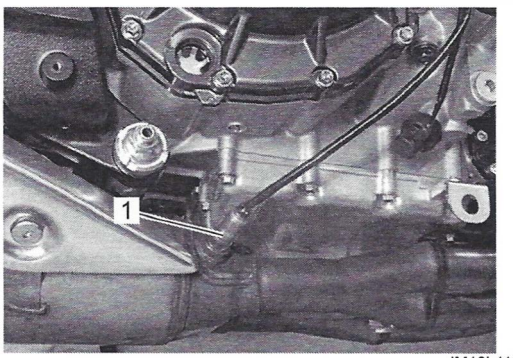
5) Remove the HO2 sensor (1) from exhaust pipe.

HO2 sensor #1



IM10L1130031-01

HO2 sensor #2



IM10L1130030-01

Installation

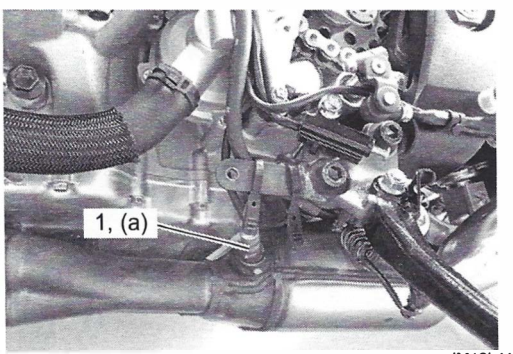
Install the HO2 sensor in the reverse order of removal. Pay attention to the following points:

- Apply nickel based anti seize to the thread part of HO2 sensor.
- Tighten the HO2 sensor (1) to the specified torque.

Tightening torque

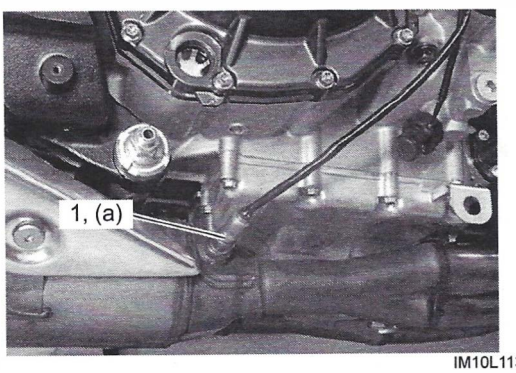
HO2 sensor (a): 25 N·m (2.5 kgf-m, 18.5 lbf-ft)

HO2 sensor #1



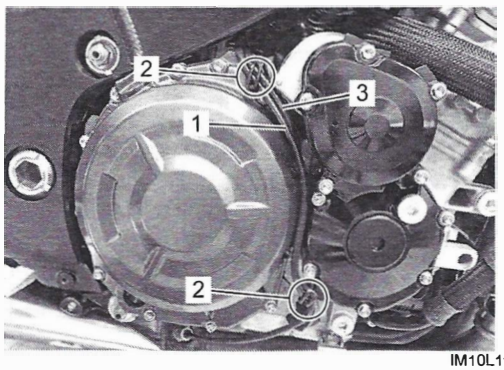
IM10L1130032-01

HO2 sensor #2



IM10L1130033-01

- Clamp the HO2 sensor #1 lead wire, referring to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-13).
- Pass the HO2 sensor #2 lead wire (1) under (2) the oil pressure switch lead wire (3).
- Do not twist HO2 sensor #2 lead wire and oil pressure switch lead wire.



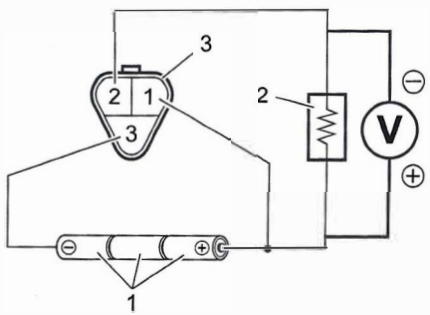
IM10L1130034-01

- Reset the long term fuel trim when replacing the HO2 sensor. ☞(Page 1C-3)

CMP Sensor Inspection

BENM10L31306014

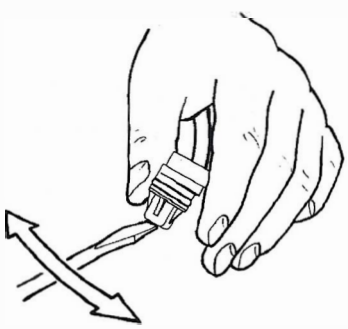
1) Turn the ignition switch OFF.
2) Remove the CMP sensor. ☞(Page 1C-11)
3) Arrange 3 new 1.5 V batteries (1) in series (check that total voltage is 4.5 – 5.0 V), 1000 Ω resistor (2) and connect (–) terminal to the "T3" and (+) terminal to the "T1".



IM10L1130035-01

3. CMP sensor

4) Under this condition, if a suitable screwdriver touching the pick-up surface of the CMP sensor is moved, the tester reading voltage changes (0.8 V and less ↔ 4.3 V and more).
If the voltage reading does not change, replace the CMP sensor with a new one. ☞(Page 1C-11)



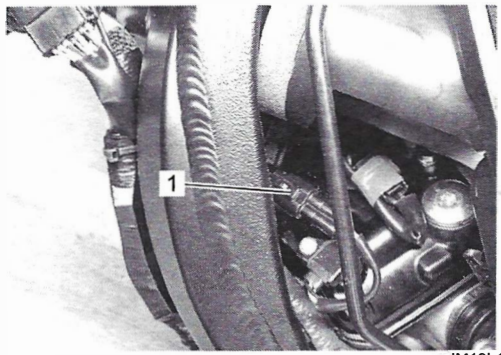
I823H1110007-01

CMP Sensor Removal and Installation

BENM10L31306015

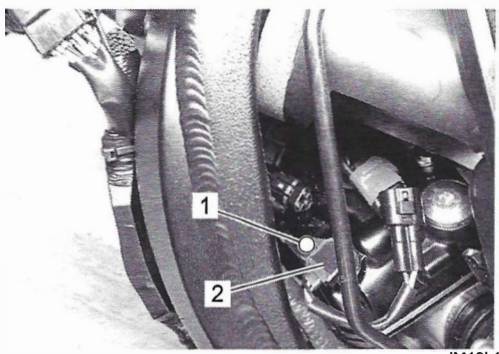
Removal

1) Remove the fuel tank front cover. ☞(Page 9D-49)
2) Disconnect the CMP sensor coupler (1).



IM10L1130036-01

3) Remove the bolt (1).
4) Remove the CMP sensor (2) from cylinder head cover.

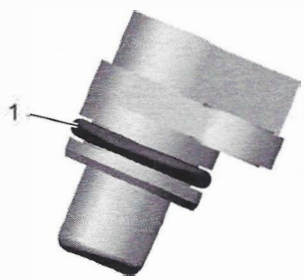


IM10L1130037-01

Installation

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

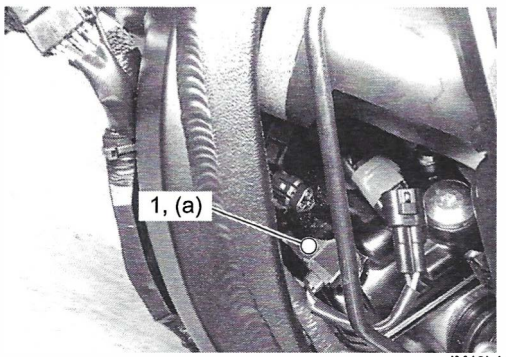
- Check the O-ring (1) for damage.
If check result is not OK, replace the CMP sensor with a new one.



IM10L1130038-01

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

Tightening torque
CMP sensor bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1130039-01

CKP Sensor Inspection

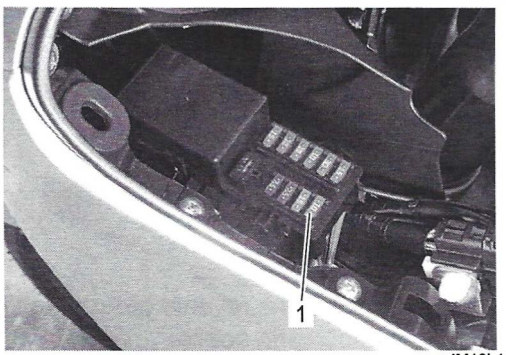
BENM10L31306016

CKP Sensor Peak Voltage

NOTE

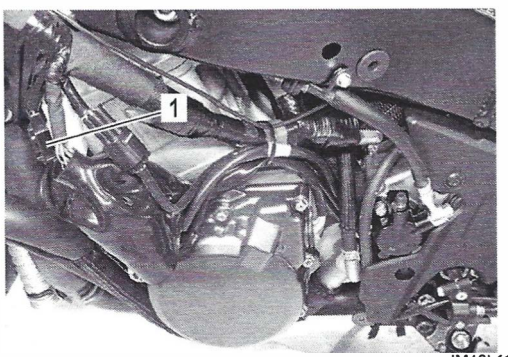
Be sure that all the couplers are connected properly and the battery used is in fully-charged condition.

1) Remove the meter panel (LH). ☞(Page 9D-37)
2) Remove the fuel fuse (10 A) (1) to stop the fuel injection.



IM10L1130040-01

3) Remove the side cowling assembly (LH). ☞(Page 9D-37)
4) Disconnect the CKP sensor coupler (1).

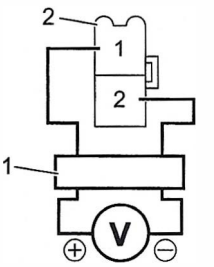


IM10L1130041-02

5) Connect the multi circuit tester with the peak voltage adapter (1) as follows.

CKP sensor – circuit tester connection

	(+) Probe	(–) Probe
CKP sensor (2)	T1	T2



IM10L1130042-01

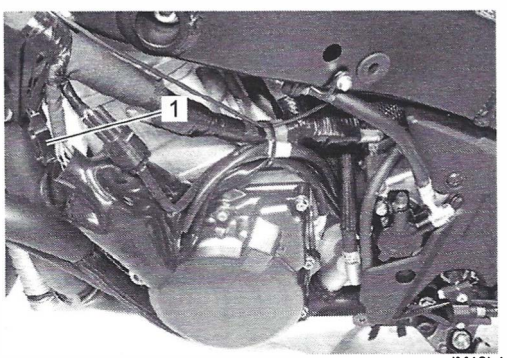
6) Measure the CKP sensor peak voltage in the following procedures:
   a) Shift the transmission to the neutral and turn the ignition switch ON.
   b) Grasp the clutch lever.
   c) Push the engine stop / starter switch to the "START" position and allow the engine to crank for a few seconds, and then measure the CKP sensor peak voltage.
7) Repeat the c) procedure several times and measure the highest peak voltage.
   If the voltage is lower than standard range, inspect for coupler connection and metal particles or foreign material being stuck on the CKP sensor and generator rotor.
   If the peak voltage is within the standard range, check the continuity between the CKP sensor coupler and ECM coupler.

   CKP sensor peak voltage
   When cranking [Standard]: 2 V or more

8) After finishing the CKP sensor inspection, install the removed parts.

CKP Sensor Resistance

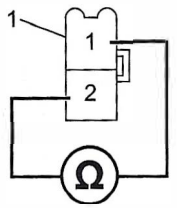
1) Remove the side cowling assembly (LH). ☞(Page 9D-37)
2) Disconnect the CKP sensor coupler (1).



IM10L1130041-02

3) Measure the resistance between the terminals of the CKP sensor (1).
   If the resistance is not within the standard range, replace the CKP sensor with a new one. ☞(Page 1C-13)

   CKP sensor resistance
   20 °C (68 °F) [Standard]: 180 – 280 Ω



IM10L1130043-01

4) After finishing the CKP sensor inspection, install the removed parts.

CKP Sensor Removal and Installation

BENM10L31306017

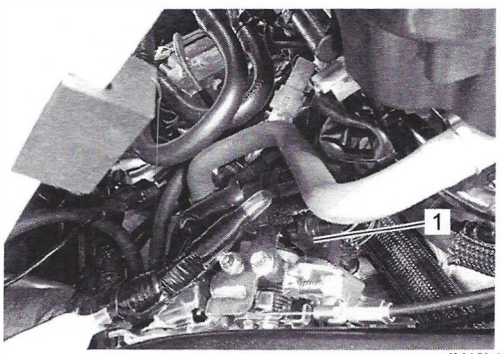
Refer to "Generator Removal" in Section 1J (Page 1J-4) and "Generator Installation" in Section 1J (Page 1J-6).

Accelerator Position Sensor Inspection

BENM10L31306018

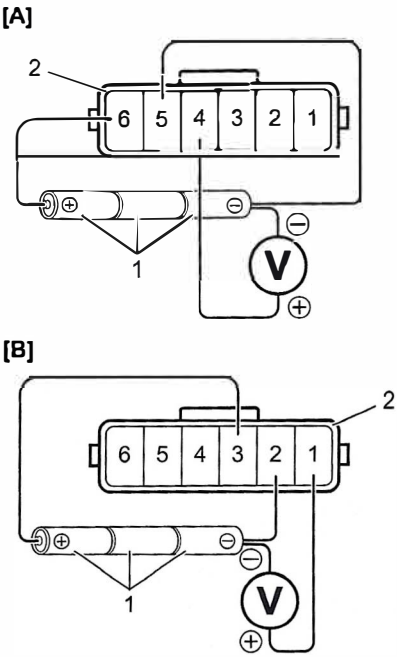
Refer to "Precautions for Electric Throttle Control System" (Page 1C-1).

1) Check that the throttle cable play is within the specification. ☞(Page 1D-9)
2) Lift and support the fuel tank. ☞(Page 9D-49)
3) Remove the air cleaner box. ☞(Page 1D-6)
4) Disconnect the accelerator position sensor coupler (1).



IM10L1130044-01

5) Measure the output voltage of accelerator position sensor main and sub signals as follows.
   If faulty condition is found, replace the accelerator body assembly with a new one. ☞(Page 1C-14)
   a) Arrange 3 new 1.5 V batteries (1) in series, and check that total voltage is 4.5 – 5.0 V.
   b) Connect 3 new 1.5 V batteries terminal to the accelerator position sensor terminal as follows.
      - Accelerator position sensor (main): connect (–) terminal to the "T5" and (+) terminal to the "T6"
      - Accelerator position sensor (sub): connect (–) terminal to the "T2" and (+) terminal to the "T3"
   c) Connect the voltmeter between the following terminal.
      - Accelerator position sensor (main): between the "T4" and "T5"
      - Accelerator position sensor (sub): between the "T1" and "T2"



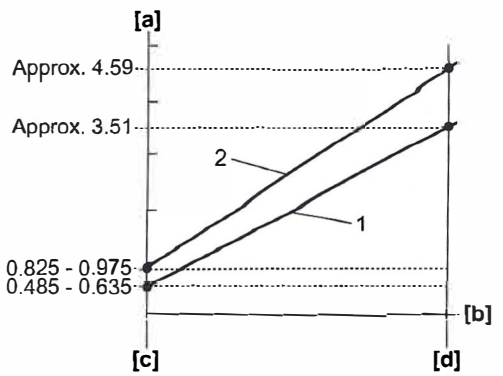
IM10L1130045-01

[A]: Accelerator position sensor (main)	2. Accelerator position sensor
[B]: Accelerator position sensor (sub)	

d) Check that voltage varies depending on throttle grip opening angle as shown in the following graph.

Accelerator position sensor (main) output voltage
Closed [Standard]: 0.485 – 0.635 V
Opened [Standard]: Approx. 3.51 V

Accelerator position sensor (sub) output voltage
Closed [Standard]: 0.825 – 0.975 V
Opened [Standard]: Approx. 4.59 V



IM10L1130046-02

[a]: Voltage (V)	
[b]: Throttle grip opening angle	
[c]: Throttle grip: Fully closed position	
[d]: Throttle grip: Fully opened position	
1. Accelerator position sensor (main) output voltage	
2. Accelerator position sensor (sub) output voltage	

6) After finishing the accelerator position sensor inspection, install the removed parts.

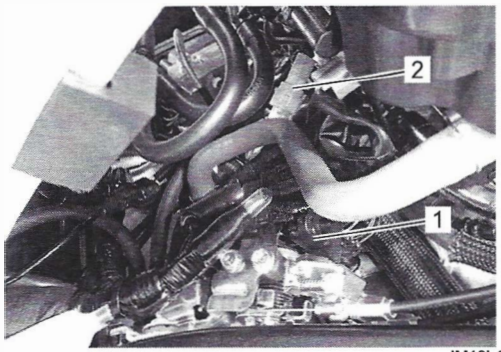
Accelerator Position Sensor Removal and Installation

BENM10L31306019

Refer to "Precautions for Electric Throttle Control System" (Page 1C-1).

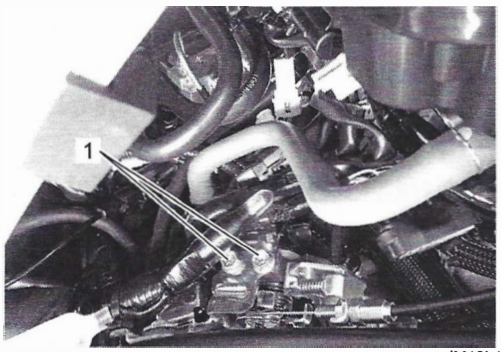
Removal

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Disconnect the accelerator position sensor coupler (1) and cruise control cancel switch coupler (2).



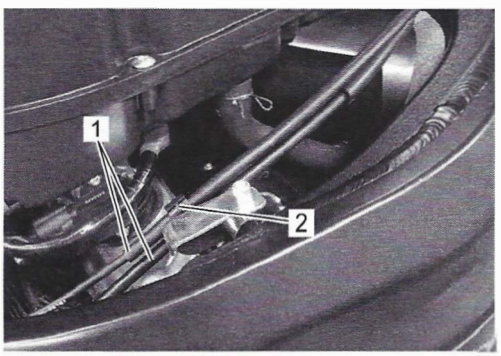
IM10L1130051-01

3) Remove the accelerator body assembly bolts (1).



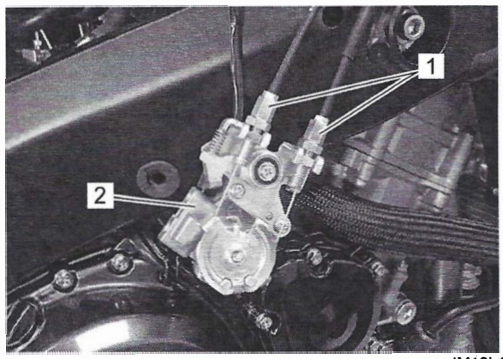
IM10L1130052-01

4) Disconnect the throttle cables (1) from the clamp (2).



IM10L1130053-01

5) Move the accelerator body assembly outside of the motorcycle.
6) Disconnect the throttle cables (1) from the accelerator body assembly (2).



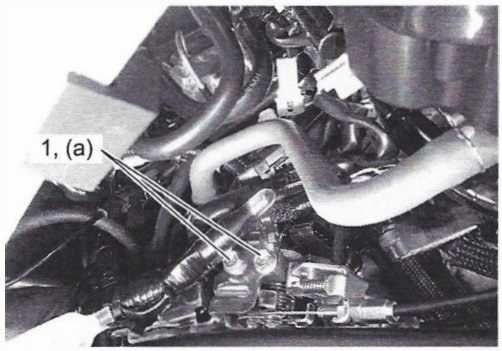
IM10L1130054-01

Installation

Install the accelerator body assembly in the reverse order of removal.
Pay attention to the following point:

- Connect the throttle cables to the accelerator body assembly and clamp. Refer to "Throttle Cable Routing Diagram" in Section 1D (Page 1D-2).
- Tighten the accelerator body assembly bolts (1) to the specified torque.

Tightening torque
Accelerator body assembly bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1130055-01

- Check the throttle cable play and proper operation. ☞(Page 1D-9)
- Reset the accelerator position sensor fully closed learned value when replacing the accelerator body assembly. ☞(Page 1C-3)

Throttle Valve Motor Inspection

BENM10L31306020

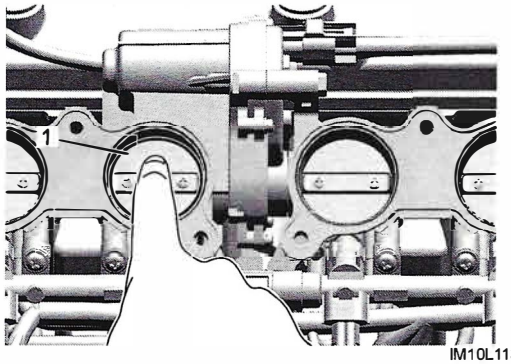
Refer to "Precautions for Electric Throttle Control System" (Page 1C-1).

Throttle Valve Operation Check

NOTICE

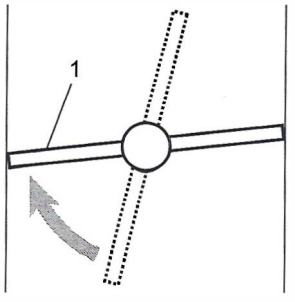
Do not snap the throttle valve from the open to full close. It may cause damage to the gear inside the throttle body.

1) Turn the ignition switch OFF.
2) Remove the air cleaner box. ☞(Page 1D-6)
3) Check throttle valve operation as follows.
   If faulty condition is found, replace throttle body with a new one. ☞(Page 1D-9)
   a) Check that throttle valve (1) moves smoothly to both fully closed position and fully open position when pressed manually.



IM10L1130023-02

   b) Check throttle valve (1) returns to fully closed position when finger pressure on throttle valve is released slowly at fully open position.

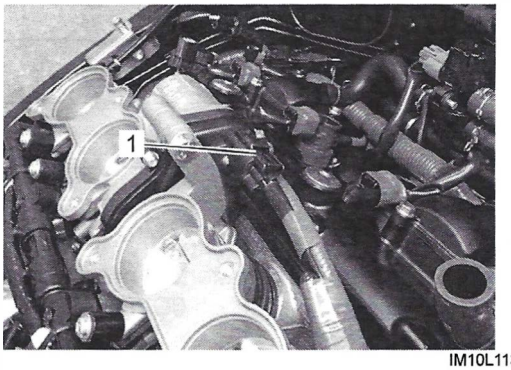


IL06L1130015-01

4) After finishing the throttle valve motor inspection, install the removed parts.

Throttle Valve Motor Check

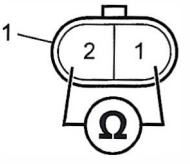
1) Turn the ignition switch OFF.
2) Remove the air cleaner box. ☞(Page 1D-6)
3) Disconnect the throttle valve motor coupler (1).



IM10L1130049-01

4) Measure the throttle valve motor resistance between the "T1" and "T2" of the throttle valve motor (1).
   If faulty condition is found, replace throttle body with a new one. ☞(Page 1D-9)

Throttle valve motor resistance
20 °C (68 °F) [Standard]: 0.3 – 100 Ω



IM10L1130050-01

5) After finishing the throttle valve motor inspection, install the removed parts.

GP Sensor Inspection

BENM10L31306021

Refer to "GP Sensor Inspection" in Section 5B (Page 5B-13).

GP Sensor Removal and Installation

BENM10L31306022

Refer to "GP Sensor Removal and Installation" in Section 5B (Page 5B-14).

Gearshift Sensor Inspection

BENM10L31306023

Refer to "Gearshift Sensor Inspection" in Section 5B (Page 5B-13).

Gearshift Sensor Removal and Installation

BENM10L31306024

Refer to "GP Sensor Removal and Installation" in Section 5B (Page 5B-14).

Specifications

Tightening Torque Specifications

BENM10L31307001

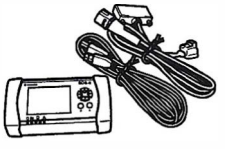
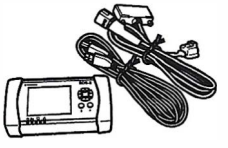
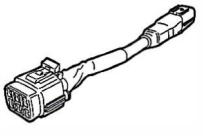
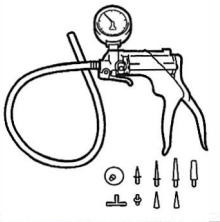
Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
IAP sensor screw	1.3	0.13	0.95	☞(Page 1C-5)
IAT sensor screw	1.3	0.13	0.95	☞(Page 1C-6)
ECT sensor	18	1.8	13.5	☞(Page 1C-7)
HO2 sensor	25	2.5	18.5	☞(Page 1C-10)
CMP sensor bolt	10	1.0	7.5	☞(Page 1C-11)
Accelerator body assembly bolt	10	1.0	7.5	☞(Page 1C-14)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Fasteners Information" in Section 0C (Page 0C-6)

Special Tools and Equipment

Special Tool

BENM10L31308001

09904–41031 SDS-II set ☞(Page 1C-3) 	09904–41041 SDS-II (oscilloscope) set ☞(Page 1C-3) 
09904–41071 Conversion cable (ISO) ☞(Page 1C-3) 	09917–47020 Vacuum pump gauge set ☞(Page 1C-3) / ☞(Page 1C-4) 

Engine Mechanical

Precautions

Precautions for Engine Mechanical

BENM10L31400001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2) and "Precautions for SDS-II" in Section 00 (Page 00-9).

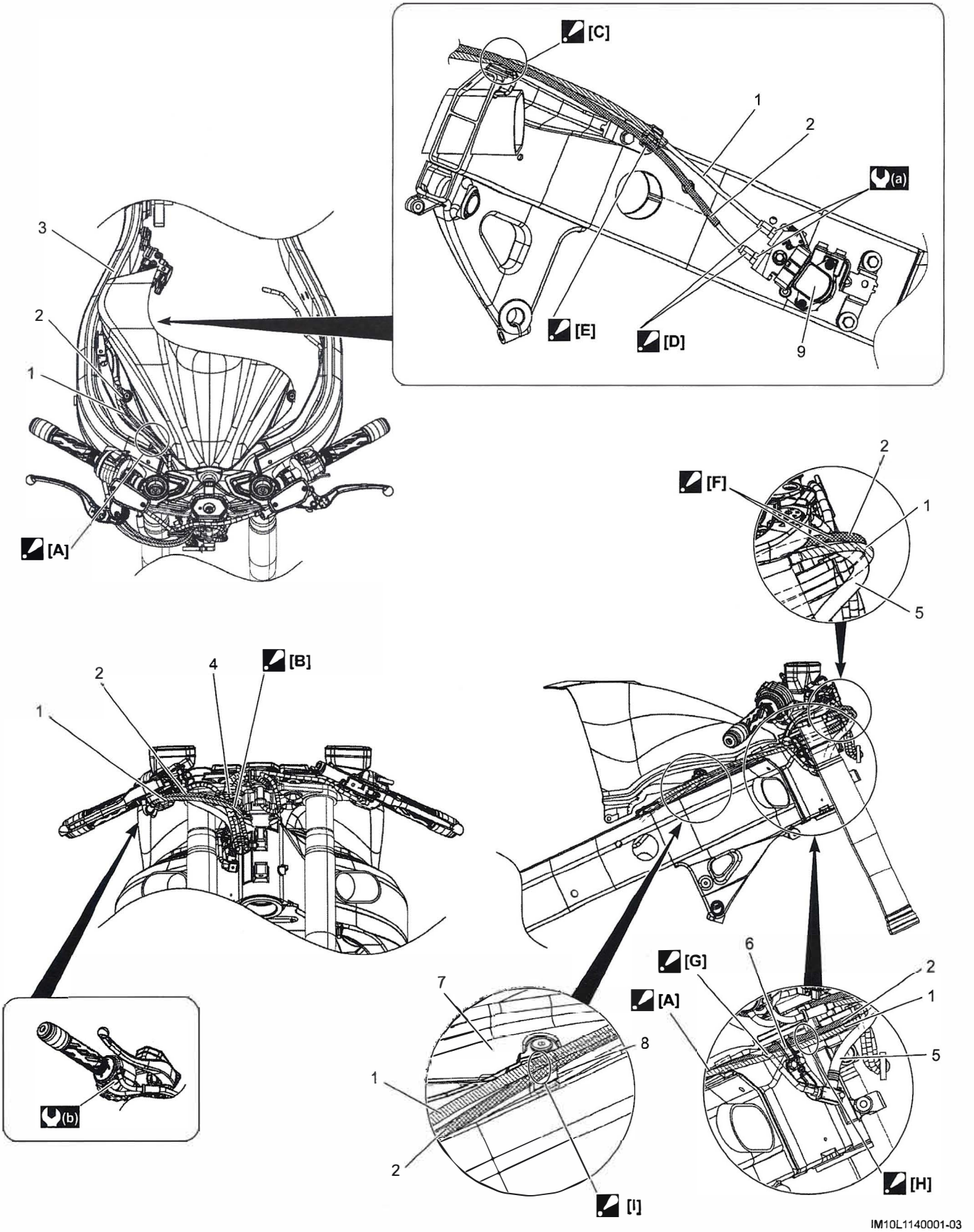
NOTE

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.

Schematic and Routing Diagram

Throttle Cable Routing Diagram

BENM10L31402001



IM10L1140001-03

[A]: Pass the throttle cable No. 1 to the outside of throttle cable No. 2 at the upper side of the frame.	[H]: Pass the throttle cable No.1 to the lower side of the throttle cable No.2.	6. Cable guide
[B]: Pass the throttle cables to the lower side of wire harness guide.	[I]: Pass the throttle cables to under the fuel tank cover and outside the fuel tank bracket.	7. Fuel tank front cover
[C]: Pass the throttle cable No.2 to the inside of throttle cable No.1.	1. Throttle cable No.1	8. Fuel tank bracket
[D]: The distance between the adjustment nut and the lock nut shall not exceed one rotation back.	2. Throttle cable No.2	9. Accelerator body assembly
[E]: The throttle cables is clamped to prevent tension or looseness. Fasten throttle cable No.1 to the upper side and throttle cable No.2 to the lower side.	3. Frame	(a): 4.5 N·m (0.46 kgf-m, 3.35 lbf-ft)
[F]: Pass the throttle cables to the front side of the front brake hose.	4. Wire harness guide	(b): 2.5 N·m (0.25 kgf-m, 1.85 lbf-ft)
[G]: Pass the throttle cables to the inside of the front brake pipe.	5. Front brake hose	

Diagnostic Information and Procedures

Engine Mechanical Symptom Diagnosis

BENM10L31404001

Refer to "Engine Symptom Diagnosis" in Section 1A (Page 1A-25).

Compression Pressure Check

BENM10L31404002

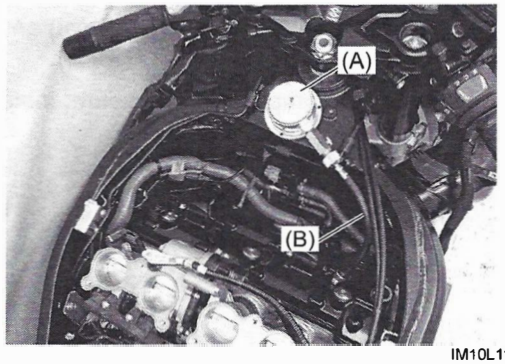
The compression pressure reading of a cylinder is a good indicator of its internal condition.
The decision to overhaul the cylinder is often based on the results of a compression test. Periodic maintenance records kept at your dealership should include compression readings for each maintenance service.

NOTE

- **Before checking the engine for compression pressure, make sure that the cylinder head bolts are tightened to the specified torque values and the valves are properly adjusted.**
- **Make sure that the battery is in fully-charged condition.**

1) Warm up the engine.
2) Remove the air cleaner box. ☞(Page 1D-6)
3) Remove the spark plugs. ☞(Page 1H-5)
4) Disconnect the primary and secondary fuel injector couplers. Refer to "Fuel Injector / Fuel Delivery Pipe Removal and Installation" in Section 1G (Page 1G-21).
5) Install the compression gauge and adapter in the spark plug hole. Make sure that the connection is tight.

Special tool
(A): 09915–64512
(B): 09915–63311



IM10L1140002-01

6) Set the anti-lift control "OFF". ☞(Page 0B-14)
7) Keep the throttle grip in the fully-opened position.



IM10L1140003-01

8) Grasp the clutch lever.
9) Push the engine stop / starter switch to the "START" position and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.
10) Repeat this procedure with the other cylinders.

Compression pressure
[Standard]: 1400 – 1900 kPa (14 – 19 kgf/cm², 203 – 276 psi)
[Limit]: 1000 kPa (10 kgf/cm², 145 psi)

Compression pressure difference
[Limit]: 200 kPa (2 kgf/cm², 29 psi)

If compression pressure is less than the service limit, it is considered any of the following reasons:

- 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:

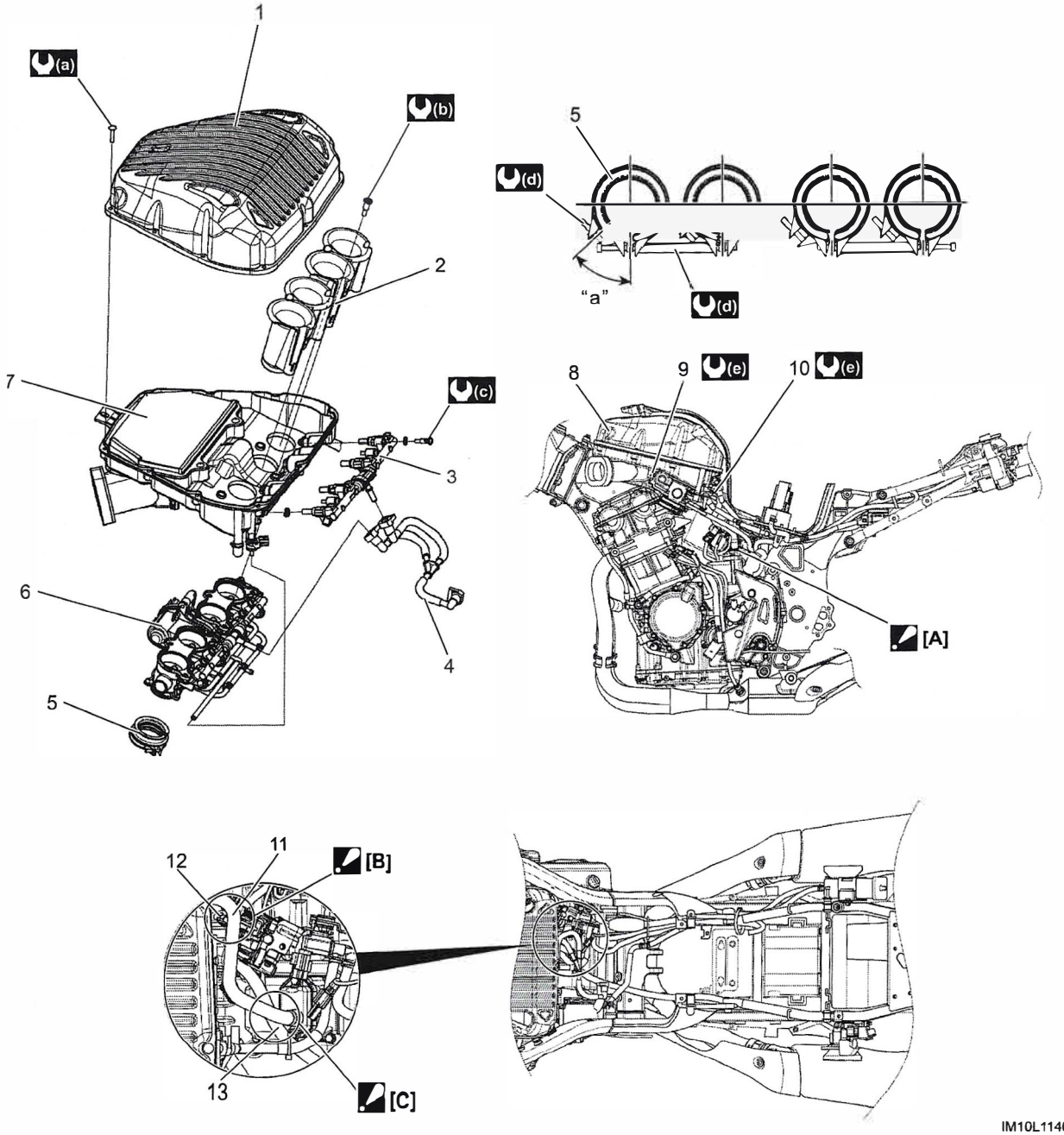
- Compression pressure in one of the cylinders is 1000 kPa (10 kgf/cm^2, 145 psi) and less.
- The difference in compression pressure between any two cylinders is 200 kPa (2 kgf/cm^2, 29 psi) and more.
- All compression pressure readings are below 1400 kPa (14 kgf/cm^2, 203 psi) even when they measure 1000 kPa (10 kgf/cm^2, 145 psi) and more.

11) After checking the compression pressure, install the removed parts.

Repair Instructions

Intake System Construction

BENM10L31406001



IM10L1140297-01

[A]: Face the clamp end to the left side.	6. Throttle body assembly	(a) : 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)
[B]: Pass the breather hose to upper side of the cruise control cancel switch coupler.	7. Air cleaner element	(b) : 4.3 N·m (0.44 kgf-m, 3.20 lbf-ft)
[C]: Pass the breather hose to right side of the starter motor lead wire.	8. Air cleaner box	(c) : 3.5 N·m (0.36 kgf-m, 2.60 lbf-ft)
1. Air cleaner cover	9. IAT sensor	(d) : 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)
2. Funnel	10. IAP sensor	(e) : 1.3 N·m (0.13 kgf-m, 0.95 lbf-ft)
3. Secondary fuel injector	11. Breather hose	"a": 35° – 55°
4. Fuel feed hose	12. Cruise control cancel switch coupler	
5. Intake pipe	13. Starter motor lead wire	

Air Cleaner Element Removal and Installation

BENM10L31406002

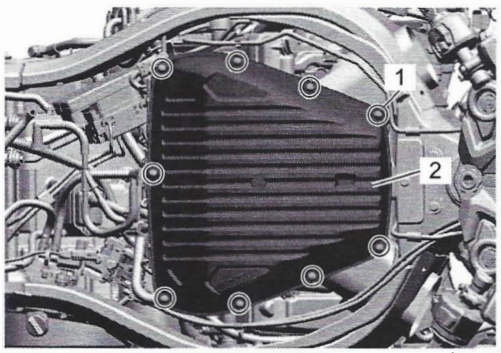
For removal and installation procedure, refer to "Air Cleaner Element" in Section 0B (Page 0B-3). And if necessary, replace the air cleaner element with a new one.

Air Cleaner Box Removal and Installation

BENM10L31406003

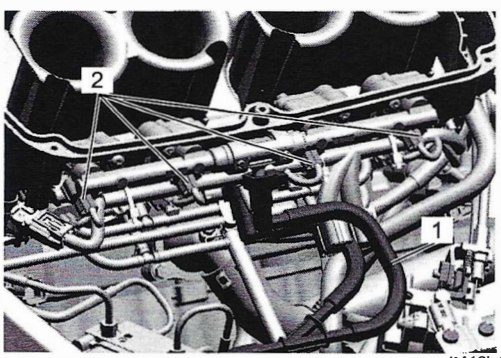
Removal

1) Remove the fuel tank. ☞(Page 1G-12)
2) Remove the air cleaner cover screws (1) and air cleaner cover (2) from the air cleaner box.



IM10L1140005-01

3) Remove the fuel feed hose (1) and secondary fuel injector couplers (2).

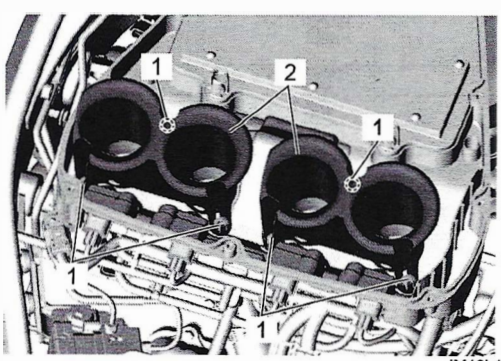


IM10L1140006-01

4) Remove the funnel bolts (1) and funnels (2) from the air cleaner box.

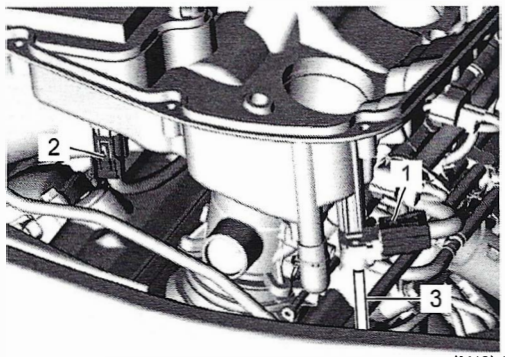
NOTE

When removing funnels, be careful that the injector gets caught.



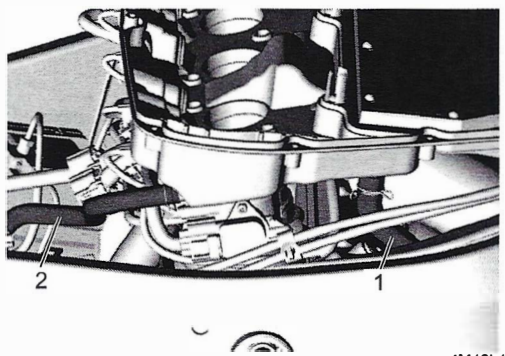
IM10L1140007-02

5) Disconnect the IAP sensor coupler (1), IAT sensor coupler (2) and hoses (3).



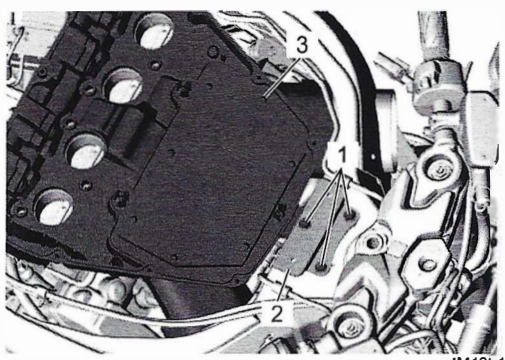
IM10L1140008-01

6) Disconnect PAIR hose (1) and crankcase breather (PCV) hose (2) from the air cleaner case.



IM10L1140009-01

7) Remove the fuel tank bracket bolts (1), fuel tank bracket (2) and air cleaner box (3).



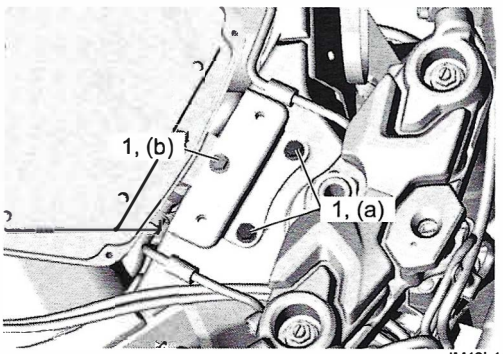
IM10L1140010-01

Installation

Install the air cleaner box in the reverse order of removal. Pay attention to the following points:

- Route the hoses properly. Refer to "Intake System Construction" (Page 1D-5).
- Tighten the fuel tank bracket bolts (1) to the specified torque.

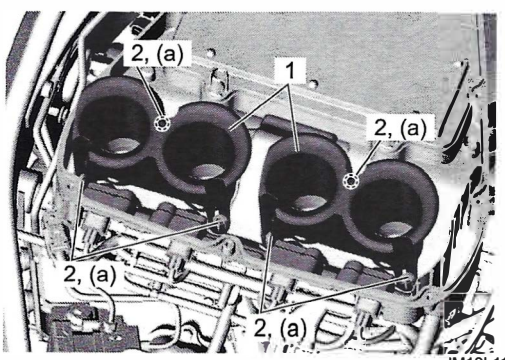
Tightening torque
Fuel tank bracket bolt (front side) (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
Fuel tank bracket bolt (rear side) (b): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



IM10L1140011-01

- Install the funnel (1), and then tighten the funnel bolts (2) to the specified torque.

Tightening torque
Funnel bolt (a): 4.3 N·m (0.44 kgf-m, 3.20 lbf-ft)



IM10L1140012-02

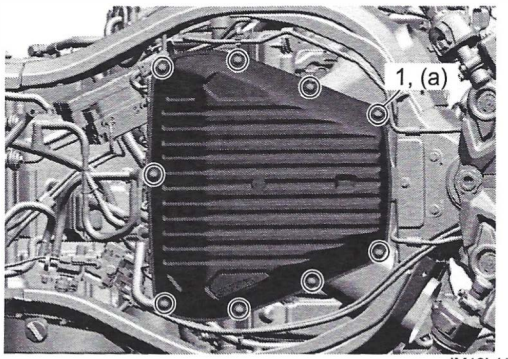
- Before installing the air cleaner cover, inspect the air cleaner cover gasket (1) for damage or cracks. If any defect is found, replace the air cleaner gasket with a new one.



IM10L1140292-01

- Tighten the air cleaner cover bolts (1) to the specified torque.

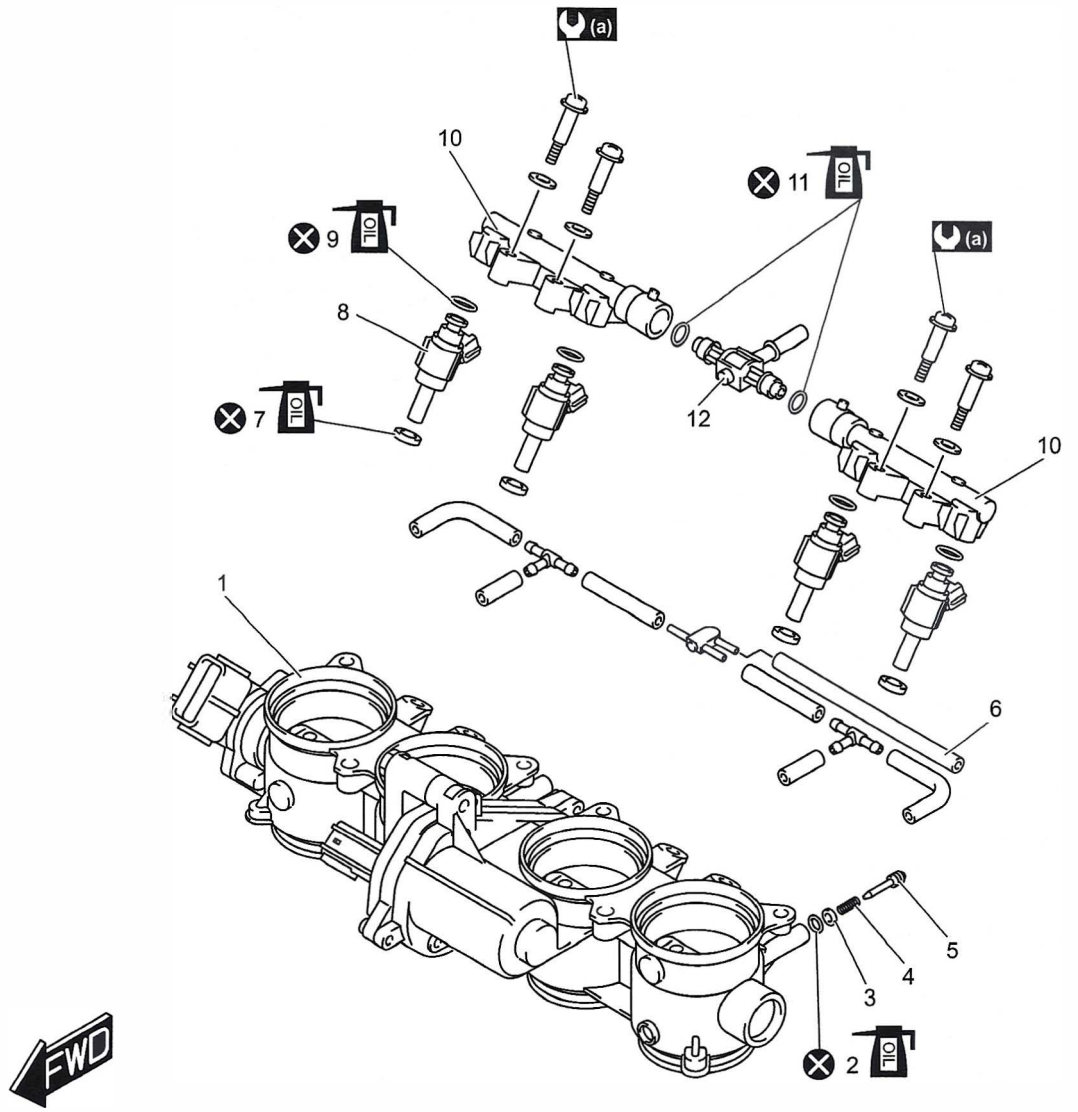
Tightening torque
Air cleaner cover bolt (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)

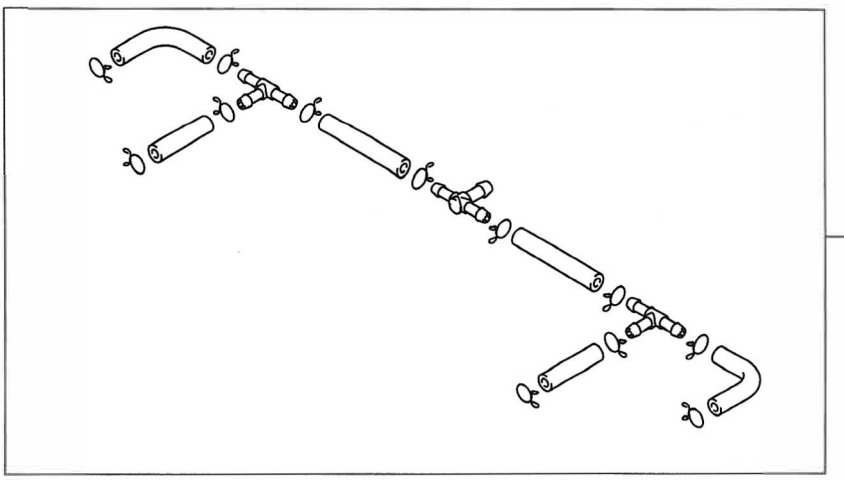


IM10L1140295-01

Throttle Body Components

BENM10L31406004





IM10L1140294-01

1. Throttle body	7. Cushion seal	13. Purge hose (if equipped)
2. O-ring	8. Fuel injector	(a) : 3.5 N·m (0.36 kgf-m, 2.60 lbf-ft)
3. Washer	9. O-ring	: Apply engine oil.
4. Spring	10. Fuel delivery pipe	: Do not reuse.
5. Synchronizing screw	11. O-ring	
6. Vacuum hoses	12. Nipple joint	

Throttle Cable Play On-Vehicle Inspection and Adjustment

BENM10L31406005

Refer to "Throttle Cable Play" in Section 0B (Page 0B-12).

Engine Idle Speed Inspection

BENM10L31406006

1) Turn the ignition switch OFF.
2) Remove the rear seat. ☞(Page 9D-34)
3) Set up the SDS-II referring to the SDS-II operation.
4) Start the engine.
5) Click "Data monitor".
6) Check the engine idle speed. If the engine idle speed is out of the specified range, check the air suction, throttle valve etc.

NOTE

The engine idle speed is automatically adjusted by the throttle valve. Therefore, no adjuster is provided.

Engine idle speed
When engine warmed
[Standard]: 1150 ± 100 r/min

7) Close the SDS-II tool and turn the ignition switch OFF.
8) Install the removed parts.

Throttle Cable Removal and Installation

BENM10L31406007

Removal

1) Remove the fuel tank. ☞(Page 9D-49)
2) Remove the right handle switch. ☞(Page 6B-3)
3) Disconnect the throttle cables from the accelerator body assembly. ☞(Page 1C-14)
4) 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:

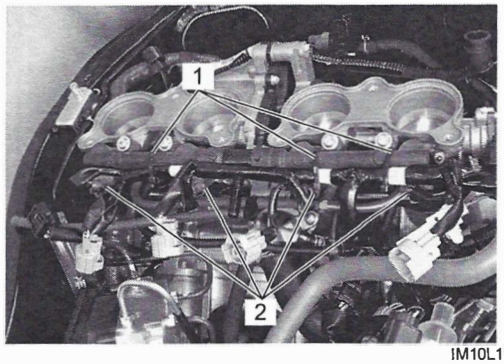
- Install the throttle cables as shown in the cable routing diagram. Refer to "Throttle Cable Routing Diagram" (Page 1D-2).
- Check the throttle cable play and proper operation. ☞(Page 1D-9)

Throttle Body Removal and Installation

BENM10L31406008

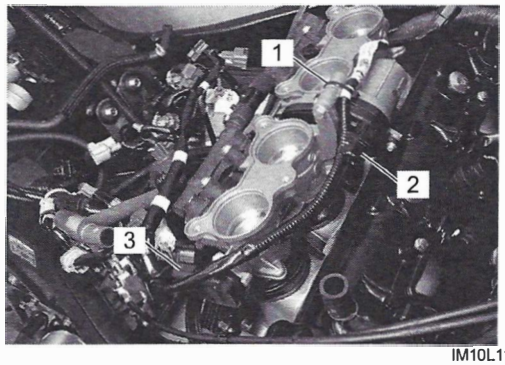
Removal

1) Remove the air cleaner box. ☞(Page 1D-6)
2) Remove the clamps (1), and then disconnect the primary fuel injector couplers (2).



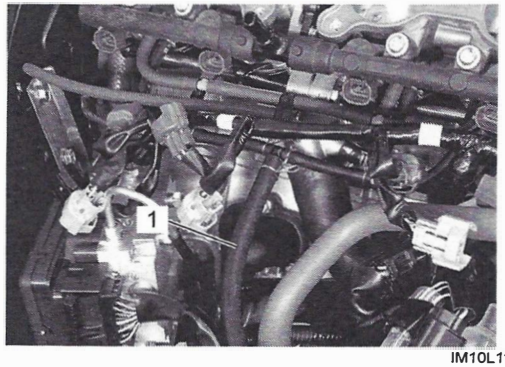
IM10L1140016-01

3) Remove the clamp (1), and then disconnect the throttle valve motor coupler (2) and TP sensor coupler (3).



IM10L1140017-01

4) Disconnect the purge hose No.2 (1) (if equipped).

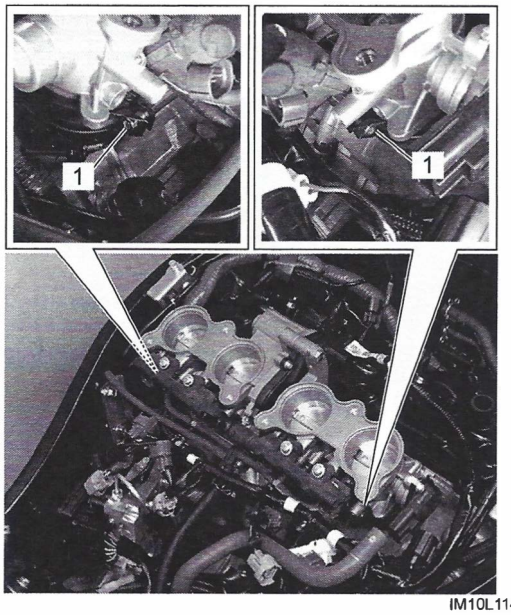


IM10L1140018-02

5) Loosen the intake pipe clamp screws (1), and then remove the throttle body.

NOTICE

- **Do not snap the throttle valve from the open to full close. It may cause damage to the gear inside the throttle body.**
- **If foreign materials like mud and sand are adhered to the intake pipe or the throttle body, they are likely to get into the intake port. When foreign materials like mud or sand are adhered, remove them before starting the work.**

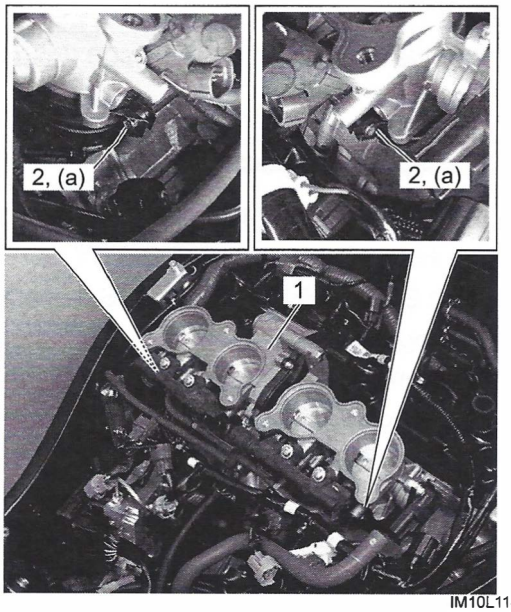


IM10L1140019-01

Installation

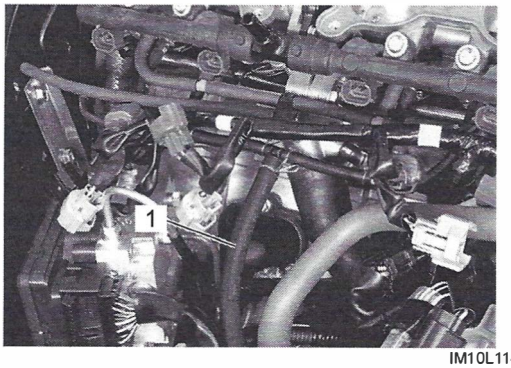
1) Install the throttle body (1) to the intake pipe.
2) Tighten the intake pipe clamp screws (2) to the specified torque.

Tightening torque
Intake pipe clamp screw (a): 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)



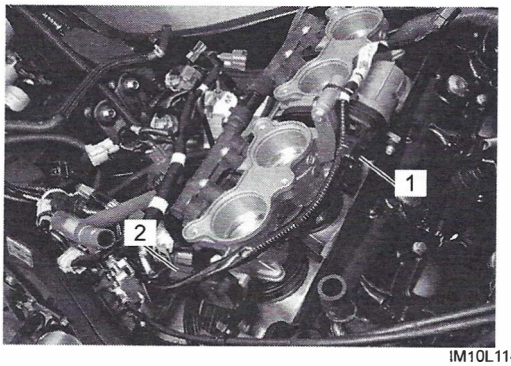
IM10L1140020-02

3) Connect the purge hose No.2 (1) (if equipped).

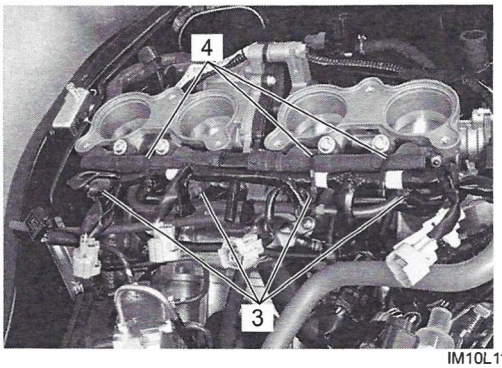


IM10L1140018-02

4) Connect the throttle valve motor coupler (1), TP sensor coupler (2) and primary fuel injector couplers (3).
5) Install the clamps (4).



IM10L1140021-01



IM10L1140284-01

6) Install the air cleaner box. ☞(Page 1D-6)

Throttle Body Disassembly and Reassembly

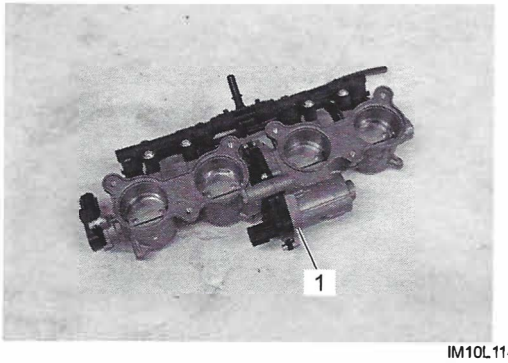
BENM10L31406009

Refer to "Throttle Body Removal and Installation" (Page 1D-9).

Disassembly

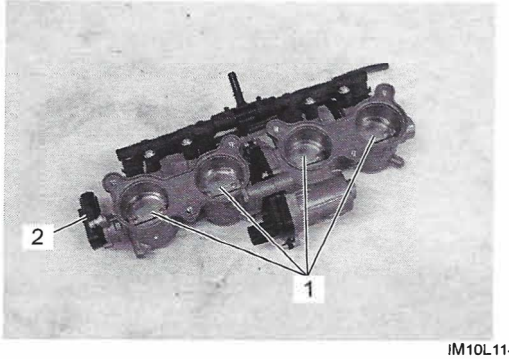
NOTE

- **Identify the position of each removed part. Organize the parts in their respective groups so that they can be reinstalled in their original positions.**
- **Do not apply the battery voltage to the throttle valve motor (1) directly. Otherwise the gear inside the throttle body may get damaged.**
- **Never remove the throttle valve motor (1).**



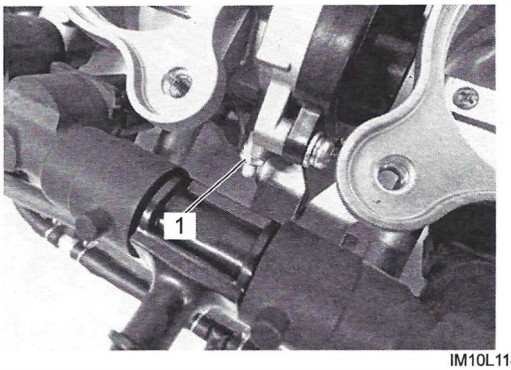
IM10L1140023-01

- **Never remove the throttle valves (1) and TP sensor (2).**



IM10L1140024-01

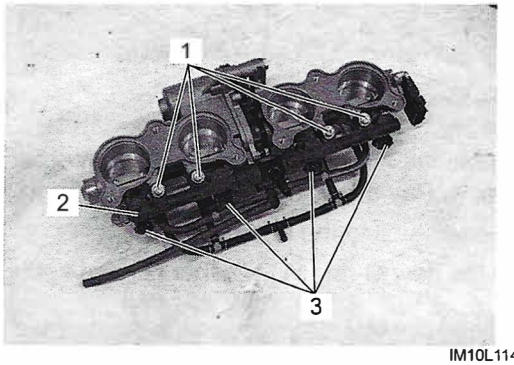
- **The screw (1) is factory-adjusted at the time of delivery and therefore avoid removing of turning it unless otherwise necessary.**



IM10L1140025-01

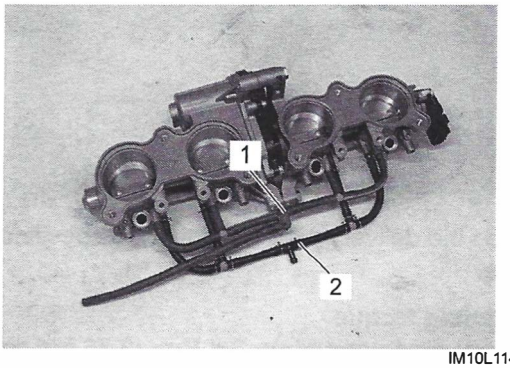
- **Do not turn or remove the synchronizing screw with white paint (one in four). The white painted screw is fixed in the factory default setting.**

1) Remove the delivery pipe screws (1), delivery pipe (2) and primary fuel injectors (3) from the throttle body.



IM10L1140026-01

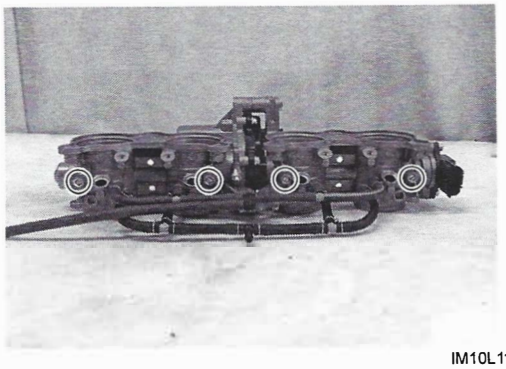
2) Disconnect the vacuum hoses (1).
3) Disconnect the purge hoses (2). (If equipped)



IM10L1140027-01

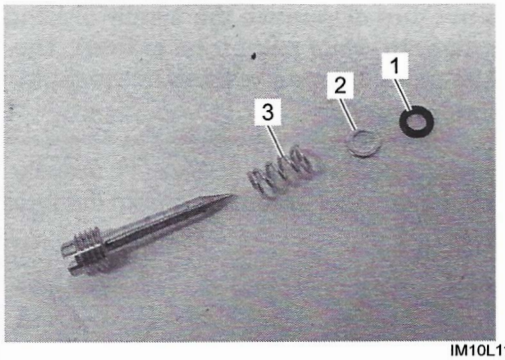
4) Before removing the synchronizing screws without white paint, make sure the setting by turning each one clockwise slowly and count the number of turns until the screw is lightly seated.
This counted number is important when reassembling synchronizing screw to the original position.

5) Remove the synchronizing screws without white paint.



IM10L1140028-01

6) Remove the O-ring (1), washer (2) and spring (3).

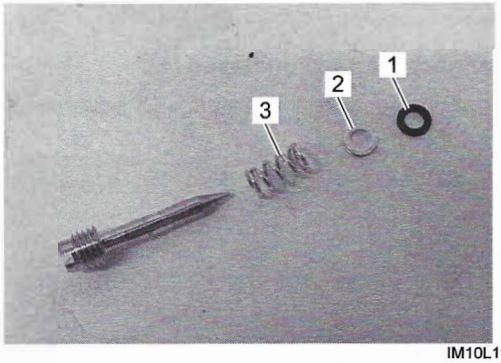


IM10L1140029-01

Reassembly

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

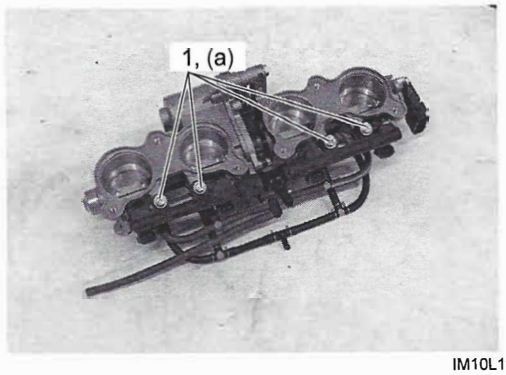
- Apply engine oil to the new O-ring (1).
- Install the new O-ring (1), washer (2) and spring (3).



IM10L1140029-01

- Tighten the delivery pipe screws (1) to specified torque.

Tightening torque
Delivery pipe screw (a): 3.5 N·m (0.36 kgf-m, 2.60 lbf-ft)



IM10L1140030-01

Throttle Body Inspection and Cleaning

BENM10L31406010

Refer to "Throttle Bore Cleaning" in Section 0B (Page 0B-14).

Throttle Valve Synchronization

BENM10L31406011

Refer to "Throttle Valve Synchronization" in Section 0B (Page 0B-15).

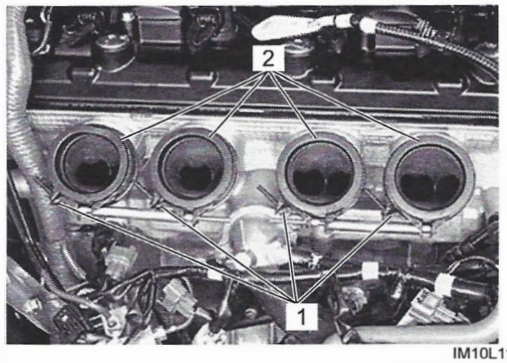
Intake Pipe Removal and Installation

BENM10L31406012

Refer to "Throttle Body Removal and Installation" (Page 1D-9).

Removal

1) Loosen the intake pipe clamp screw (1).
2) Remove the intake pipes (2).

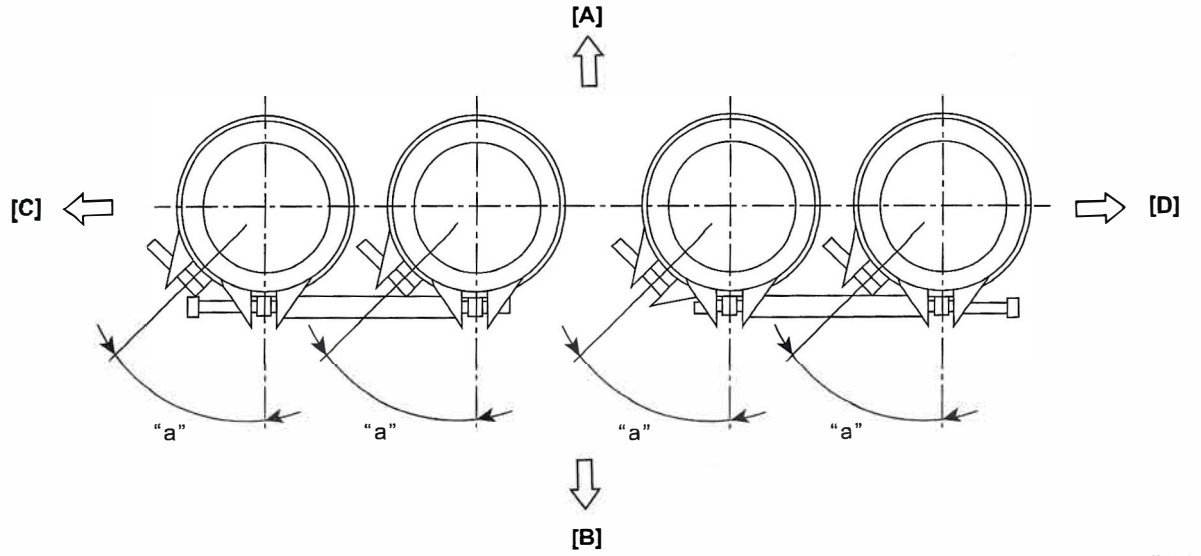


IM10L1140031-02

Installation

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

- Face the up mark (1) on the intake pipe to upper.
- Set the clamp screws as shown in the figure.



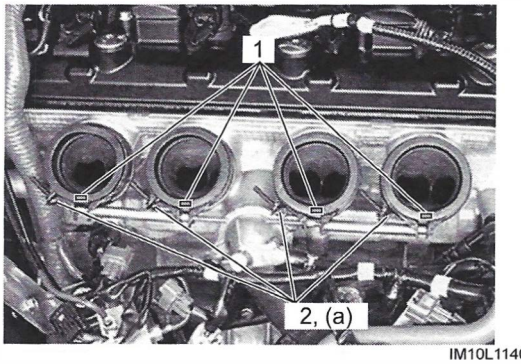
IM10L1140141-01

[A]: Front	[B]: Rear	[C]: Left	[D]: Right	"a": 35° – 55°

- Tighten the intake pipe clamp screws (2) to the specified torque.

Tightening torque

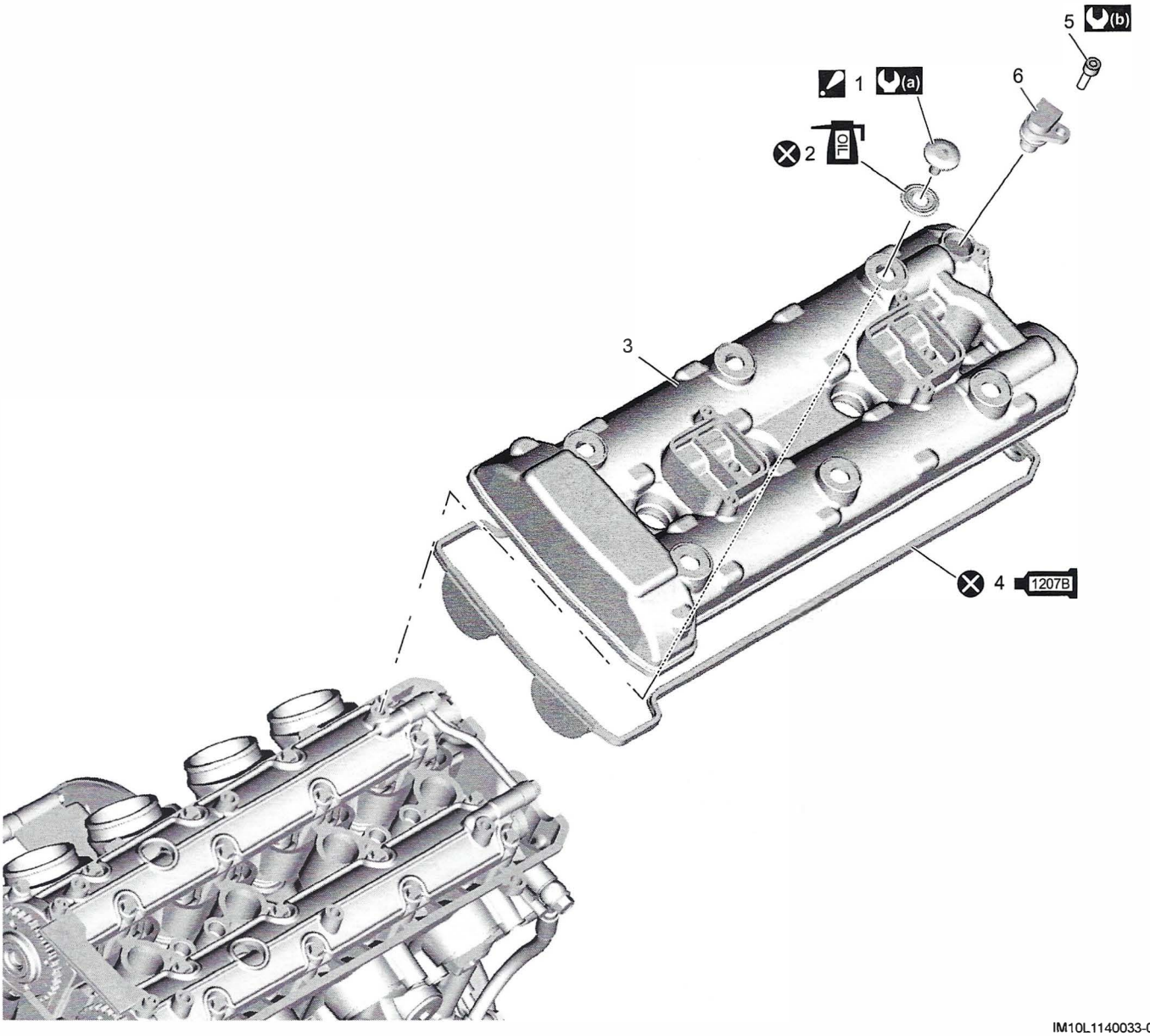
Intake pipe clamp screw (a): 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)



IM10L1140032-02

Cylinder Head Cover Components

BENM10L31406013



IM10L1140033-03

1. Cylinder head cover bolt : When install the cylinder head bolt, clean the cylinder head bolt threads and matching surface.	5. CMP sensor bolt	1207B : Apply SUZUKI BOND 1207B
2. Washer	6. CMP sensor	: Apply engine oil.
3. Cylinder head cover	(a) : 12 N·m (1.2 kgf-m, 9.0 lbf-ft)	: Do not reuse.
4. Cylinder head cover gasket	(b) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)	

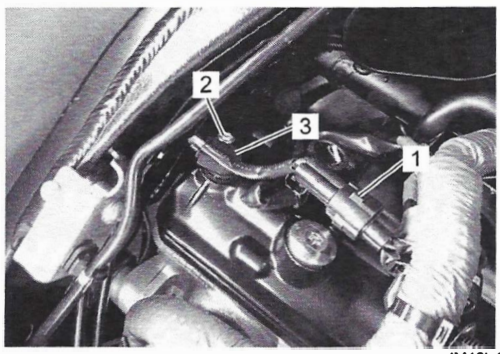
Cylinder Head Cover Removal and Installation

BENM10L31406014

Refer to "Throttle Body Removal and Installation" (Page 1D-9).

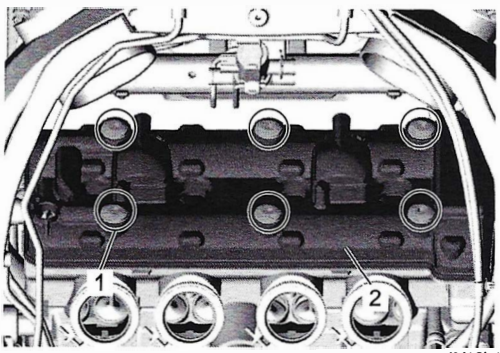
Removal

1) Remove the ignition coils. ☞(Page 1H-4)
2) Disconnect the PAIR hose. ☞(Page 1B-4)
3) Disconnect the CMP sensor coupler (1), and then remove the CMP sensor bolt (2) and CMP sensor (3) from the cylinder head cover.



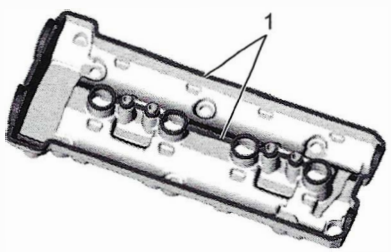
IM10L1140034-01

4) Remove the cylinder head cover bolts (1) and cylinder head cover (2) from the cylinder head.



IM10L1140035-01

5) Remove the gaskets (1) from the cylinder head covers.

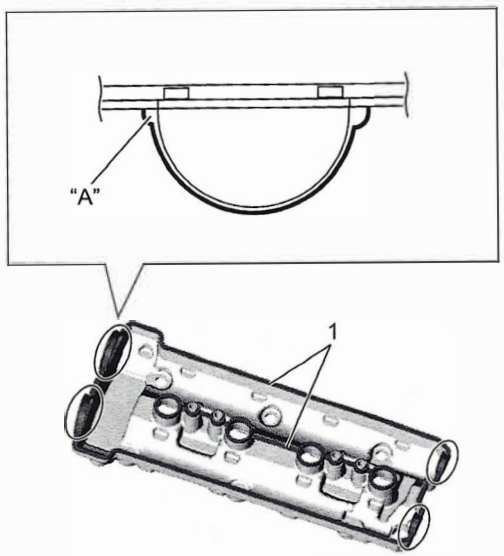


IM10L1140291-01

Installation

1) Install new gaskets (1) to the cylinder head cover.
2) Apply sealant to the cam end cap points of the gasket and cylinder head as shown.

"A": Sealant 99000–31140 (SUZUKI BOND 1207B)



IM10L1140036-03

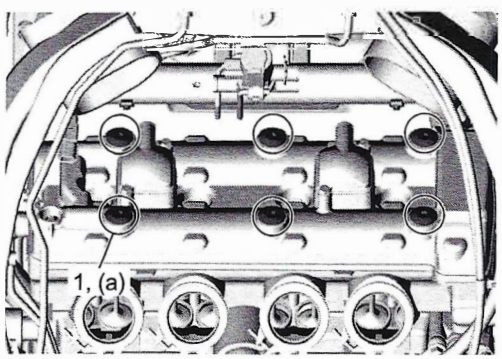
3) Place the cylinder head cover on the cylinder head.
4) Clean the cylinder head bolt threads and matching surface.
5) Set the new gaskets (1) to each cylinder head cover bolt and coat the both sides of the gasket with engine oil.



IM10L1140037-01

6) Tighten the cylinder head cover bolts (1) to the specified torque.

Tightening torque
Cylinder head cover bolt (a): 12 N·m (1.2 kgf-m, 9.0 lbf-ft)

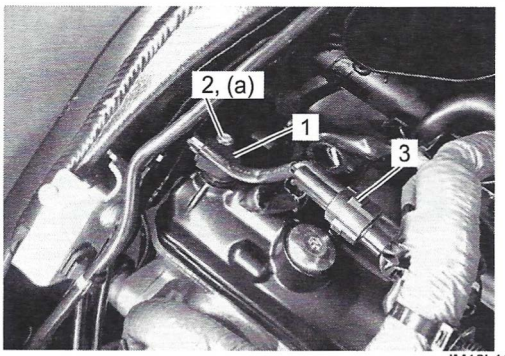


IM10L1140038-01

7) Install the CMP sensor (1) to the cylinder head, and then tighten the CMP sensor bolt (2) to the specified torque.

Tightening torque
CMP sensor bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

8) Connect the CMP sensor coupler (3) to the CMP sensor.



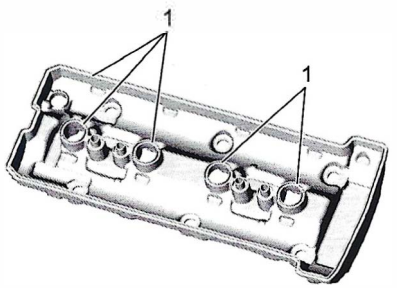
IM10L1140039-01

9) Install the ignition coil. ☞(Page 1H-4)

Cylinder Head Cover Inspection

BENM10L31406015

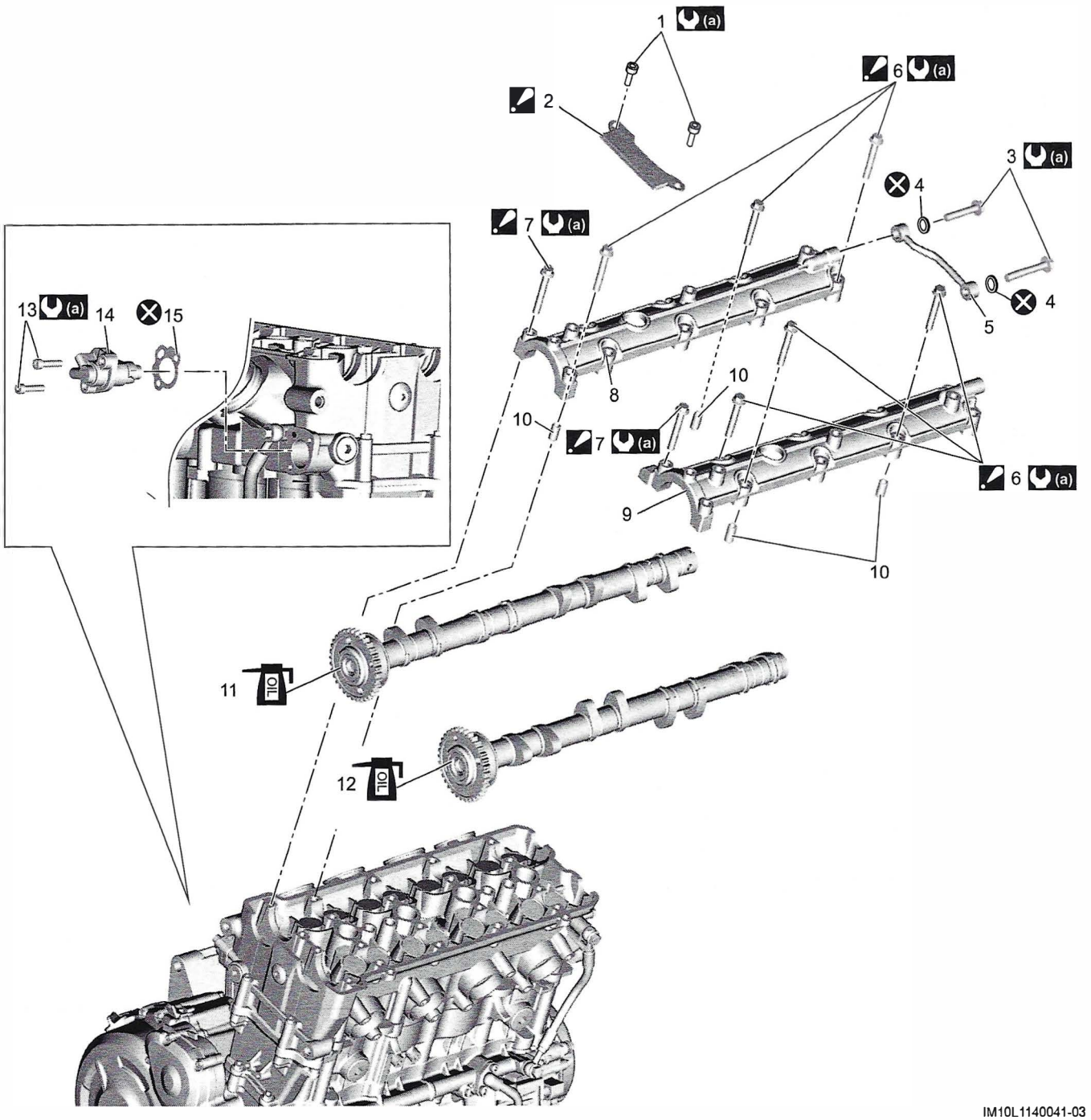
Refer to "Cylinder Head Cover Removal and Installation" (Page 1D-15).
Clean and check the gasket grooves (1).
If there is anything unusual, replace the cylinder head cover with a new one.



IM10L1140040-01

Cam Chain Tension Adjuster / Camshaft Components

BENM10L31406016



IM10L1140041-03

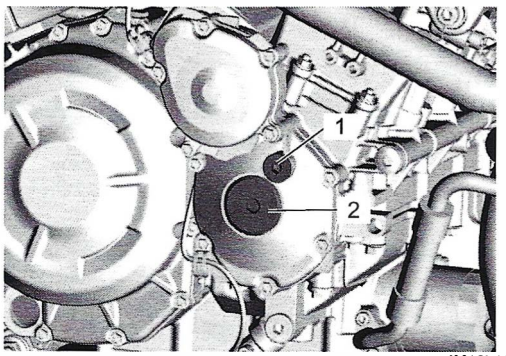
1. Cam chain guide bolt	7. Camshaft journal holder bolt (L45) : For tightening order, refer to "Cam Chain Tension Adjuster / Camshaft Installation" (Page 1D-19).	13. Cam chain tensioner adjuster bolt
2. Cam chain guide : Stamped mark facing up side.	8. Intake camshaft journal holder	14. Cam chain tensioner adjuster
3. Cylinder head oil pipe bolt	9. Exhaust camshaft journal holder	15. Cam chain tensioner adjuster gasket
4. Gasket washer	10. Dowel pin	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
5. Cylinder head oil pipe	11. Intake camshaft	OIL : Apply engine oil.
6. Camshaft journal holder bolt (L39) : For tightening order, refer to "Cam Chain Tension Adjuster / Camshaft Installation" (Page 1D-19).	12. Exhaust camshaft	: Do not reuse.

Cam Chain Tension Adjuster / Camshaft Removal

BENM10L31406017

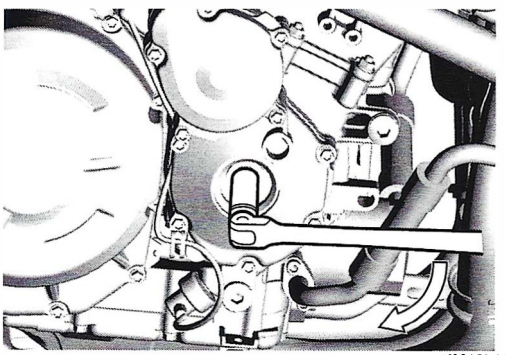
Refer to "Cylinder Head Cover Removal and Installation" (Page 1D-15).

1) Remove the spark plugs. ☞(Page 1H-5)
2) Remove the valve timing inspection cap (1) and starter clutch cover cap (2) from the starter clutch cover.

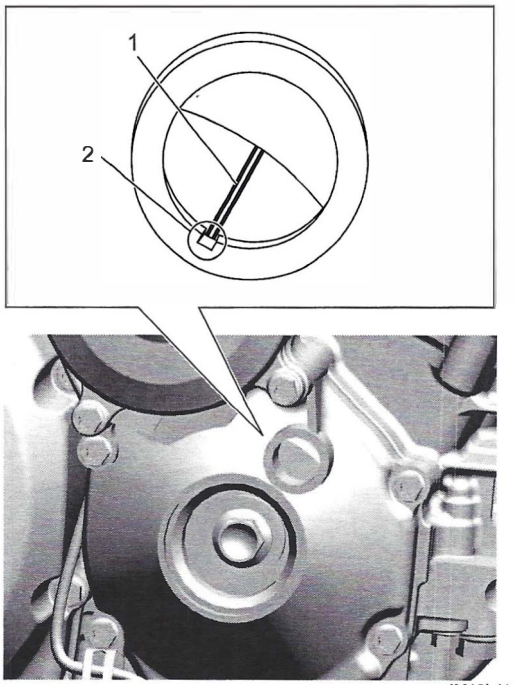


IM10L1140042-01

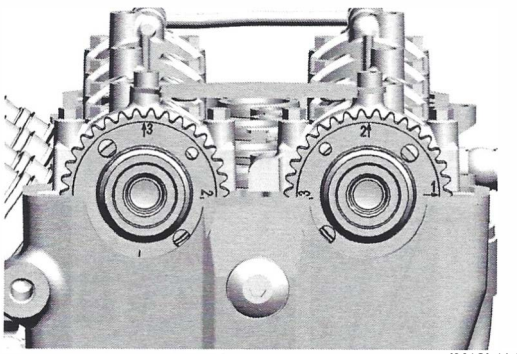
3) Turn the crankshaft clockwise to bring the line (1) on the starter clutch to the slit (2) of the valve timing inspection hole and also to bring the cams to the position as shown in the figure.



IM10L1140043-01



IM10L1140285-02

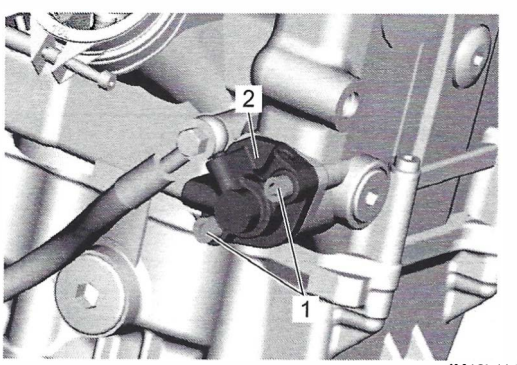


IM10L1140045-01

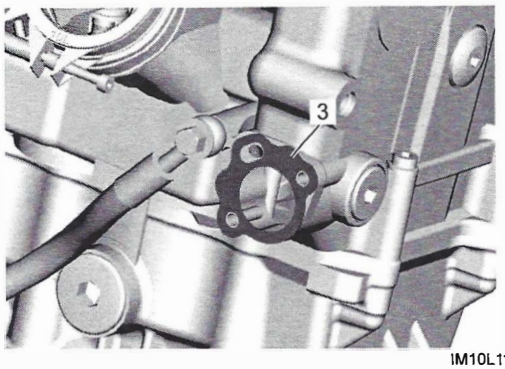
4) Remove the cam chain tension adjuster bolts (1), cam chain tension adjuster (2) and gasket (3).

NOTE

Do not disassemble the cam chain tension adjuster.

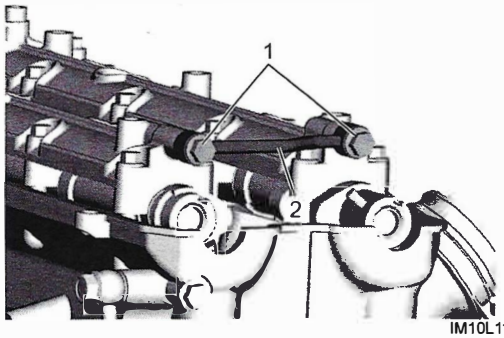


IM10L1140046-01



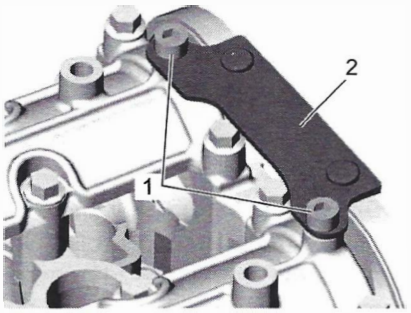
IM10L1140286-01

5) Remove the cylinder head oil pipe bolts (1), washers and cylinder head oil pipe (2) from the camshaft housing.



IM10L1140048-01

6) Remove the cam chain guide bolts (1) and cam chain guide (2) from the camshaft housing.

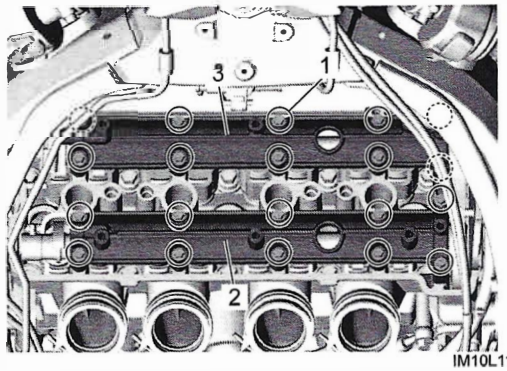


IM10L1140049-02

7) Remove the camshaft journal holder bolts (1) intake camshaft journal holder (2) and exhaust camshaft journal holder (3) from the cylinder head.

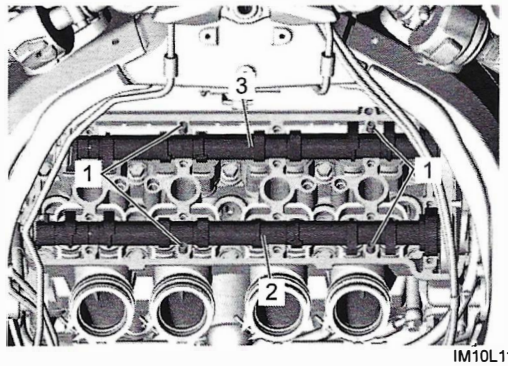
NOTICE

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



IM10L1140050-01

8) Remove the dowel pins (1) from the cylinder head.
9) Remove the intake camshaft (2) and exhaust camshaft (3).



IM10L1140051-01

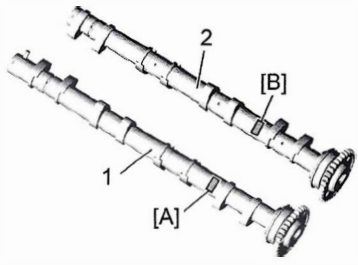
Cam Chain Tension Adjuster / Camshaft Installation

BENM10L31406018

1) Apply engine oil to the camshaft journals and cam faces.

NOTICE

Identify the camshafts according to the following embosses letters.
Intake camshaft (1): [A]
Exhaust camshaft (2): [B]



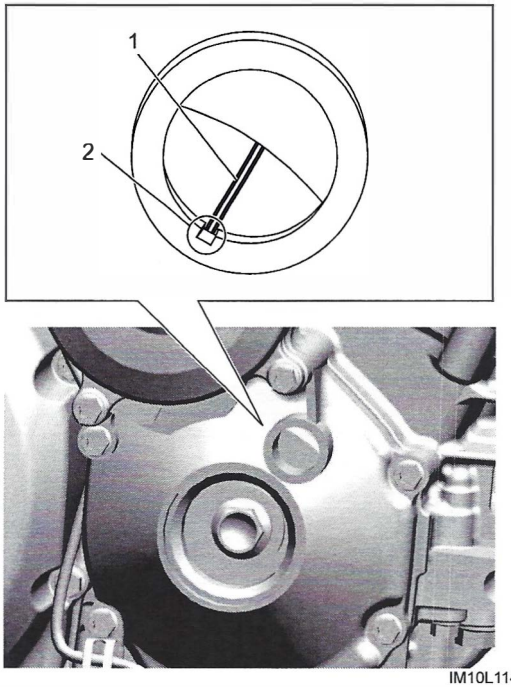
IM10L1140052-01

[A]: IN	[B]: EX

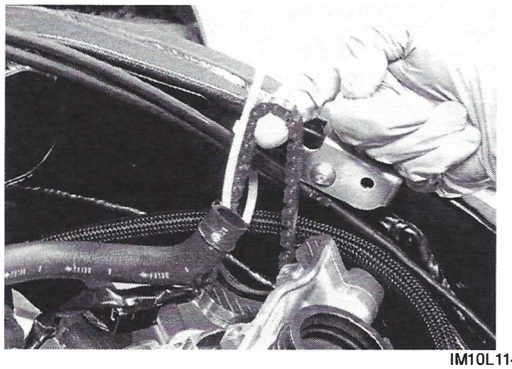
2) Turn the crankshaft clockwise and align the line (1) on the starter clutch to the slit (2) of cap hole thread while keeping the cam chain pulled upward.

NOTICE

- **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 (1) with slit (2) and hold this position when installing the camshafts.**



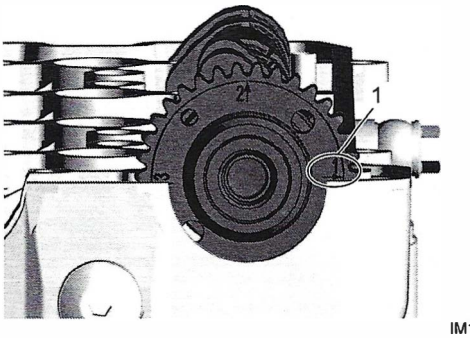
IM10L1140053-02



IM10L1140054-01

3) Pull the cam chain lightly.

4) 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" (1).)



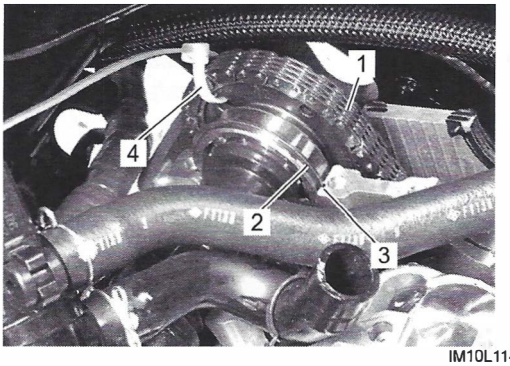
IM10L1140055-01

5) Engage the cam chain (1) with the exhaust camshaft sprocket.

NOTICE

- **Before installing the camshaft, check that the tappets are installed correctly.**
- **Align the C-ring (2) of the exhaust camshaft bearing with the groove (3) in the cylinder head.**

6) Bind the cam chain and the sprocket with a proper clamp (4) to prevent the cam chain disengagement while installing the camshaft journal holders.



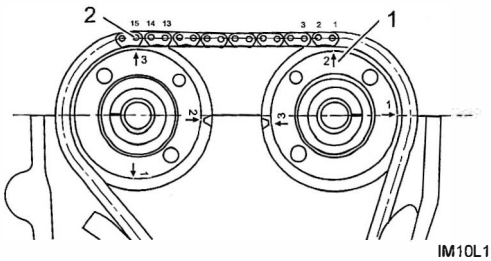
IM10L1140056-01

7) The other arrow marked "2" (1) should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked "2" (1), count out 15 roller pins (from the exhaust camshaft side going towards the intake camshaft side).

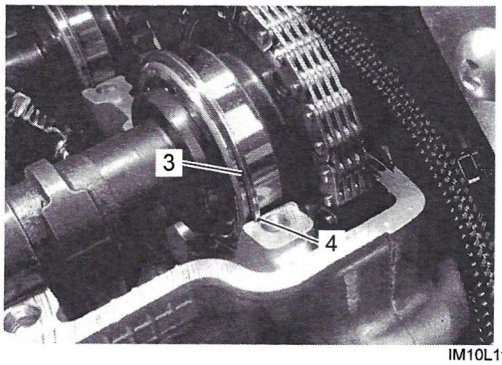
8) Engage the 15th roller pin (2) on the cam chain with the arrow marked "3" on the intake sprocket.

NOTE

- **Before installing the camshaft, check that the tappets are installed correctly. Align the C-ring (3) of the intake camshaft bearing with the groove (4) in the cylinder head.**



IM10L1140057-02

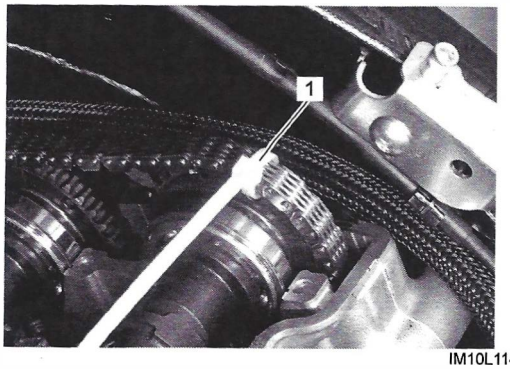


IM10L1140058-01

9) Bind the cam chain and the sprocket with a proper clamp (1) to prevent the cam chain disengagement while installing the camshaft journal holders.

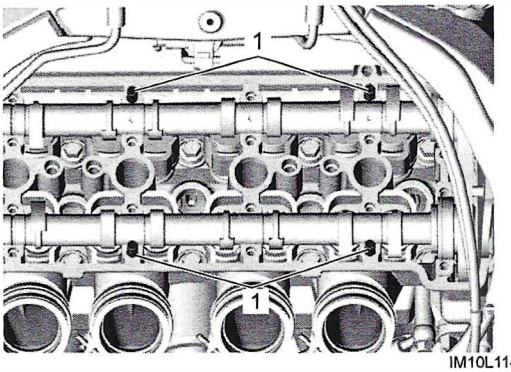
NOTE

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.



IM10L1140059-01

10) Install the dowel pins (1) to the cylinder head.



IM10L1140060-01

11) Install the camshaft journal holders (1) and camshaft journal holder bolts (2).

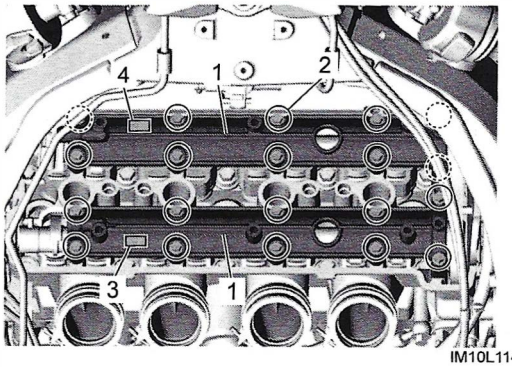
12) Have the camshaft journal holders seated evenly by tightening the camshaft journal holder bolts lightly, in the ascending order of numbers.

NOTICE

Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders (1) are not drawn down evenly.

NOTE

- **Each camshaft journal holder is identified with a cast-on letters.**
- **The ascending order of numbers are indicated on the camshaft journal holders.**



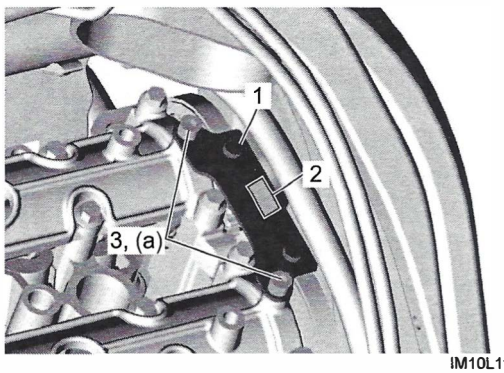
IM10L1140061-02

3. IN	4. EX

13) Install the cam chain guide No.2 (1) with the stamped mark (2) facing up side.

14) Tighten the cam chain guide bolts (3) to the specified torque.

Tightening torque
Cam chain guide No.2 bolts (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1140062-01

15) Tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque.

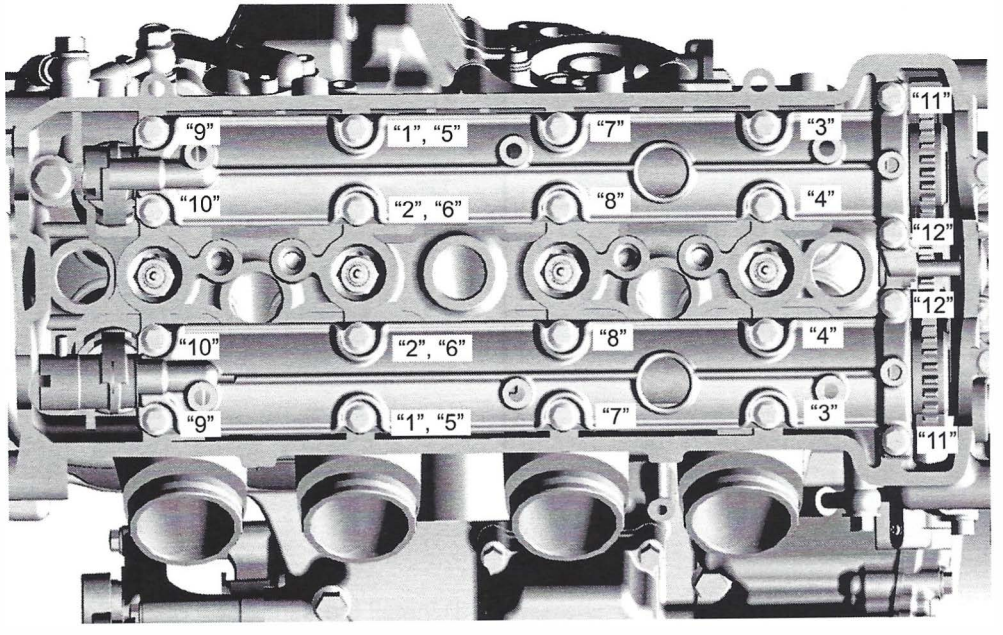
Tightening torque
Camshaft journal holder bolt: 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

NOTICE

Temporary tighten in order the camshaft journal holder bolt "1 – 2", and then tighten in order the bolt "3 – 12" to the specified torque.

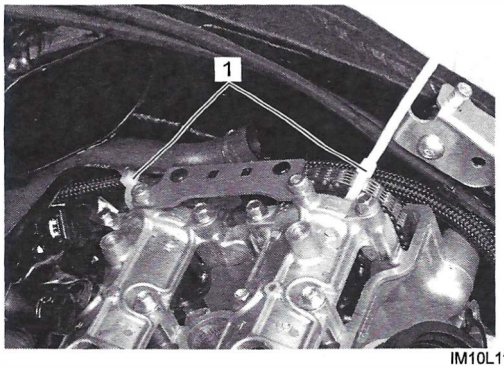
NOTE

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.



IM10L1140063-02

16) Remove the clamps (1).

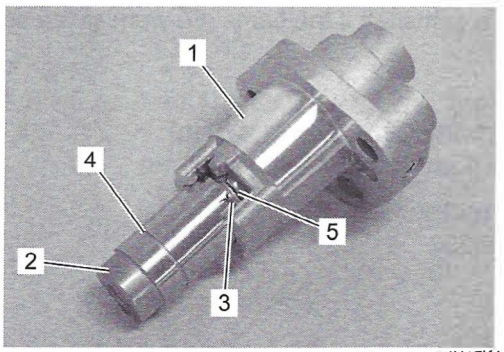


IM10L1140064-01

17) Holding the cam chain tension adjuster (1), compress the plunger (2) by turning the adjuster body until the groove (4) reaches the outer circlip (3).

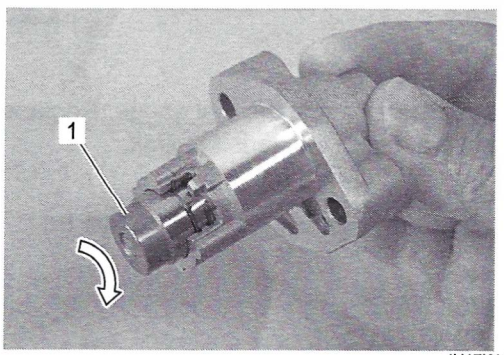
NOTICE

When turning the adjuster body, do not make the groove (4) to cross the outer circlip (3). If the inner circlip (5) is caught in the groove (4), plunger may not come out automatically from the adjuster body even if pushing force is applied on the head. In such a case, it needs to be replace.



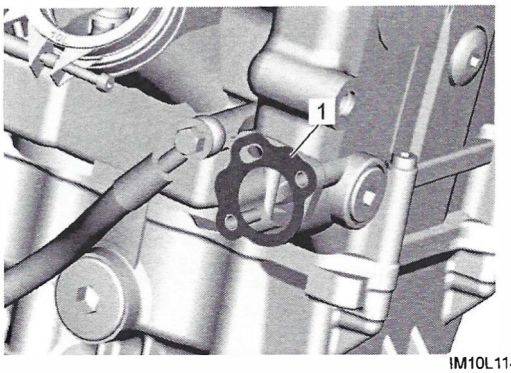
IH17K1140067-01

18) Turn the plunger head (1) clockwise more than 90° to make a little play in the inner thread mechanism.



IH17K1140069-01

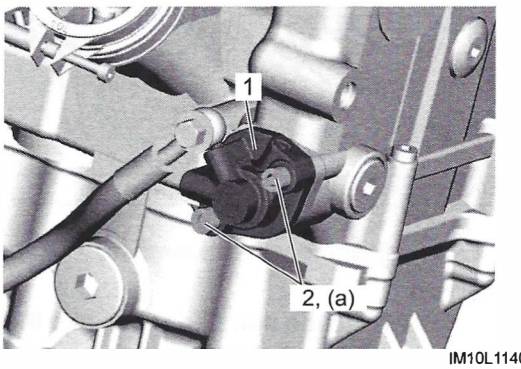
19) Fit a new gasket (1).



IM10L1140047-02

20) Install the cam chain tension adjuster (1), and then tighten the bolts (2) to the specified torque.

Tightening torque
Cam chain tension adjuster bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

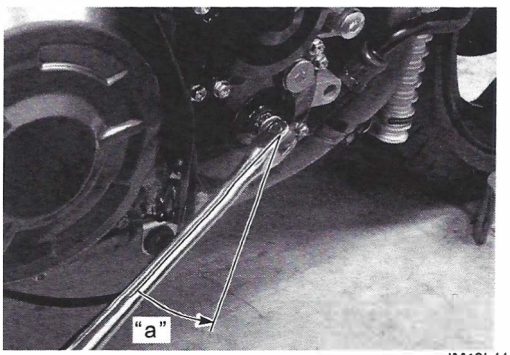


IM10L1140065-01

21) Release the lock of the cam chain tensioner adjuster by turning the crankshaft 30 degrees "a" counterclockwise.

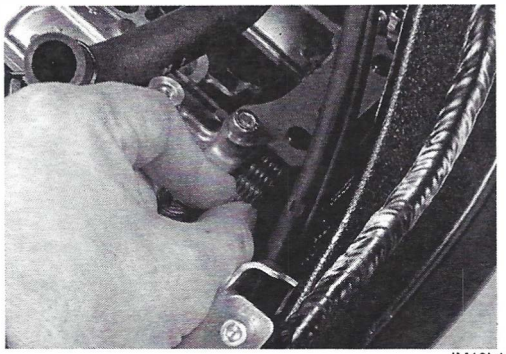
NOTE

Before turning the crankshaft, confirm the spark plugs has been removed.



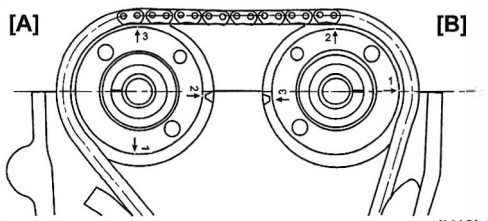
IM10L1140066-02

22) Confirm the cam chain tensioner adjuster for proper operation by checking the cam chain slack.



IM10L1140067-01

23) Check that the crankshaft rotates smoothly by rotating the crankshaft (some turns) and recheck the valve timing.



IM10L1140068-01

[A]: Intake side	[B]: Exhaust side

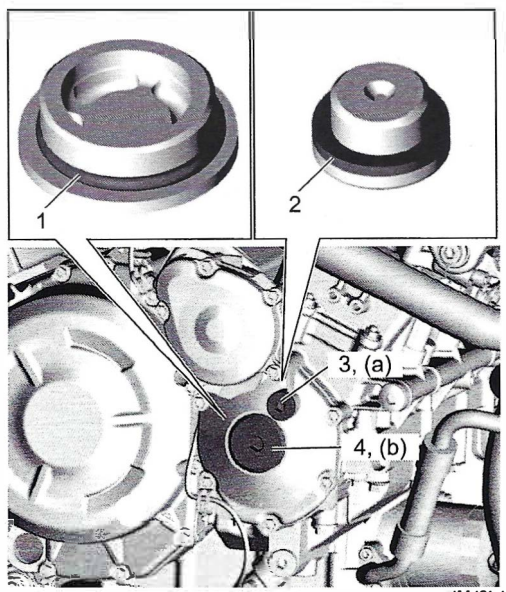
24) Check and adjust the valve clearance. ☞(Page 1D-26)

25) Apply engine oil to the new O-ring (1), and then install the new O-ring to the starter clutch cover cap.

26) Install the new gasket (2) to the valve timing inspection cap.

27) Tighten the valve timing inspection cap (3) and starter clutch cover cap (4) to the specified torque.

Tightening torque
Valve timing inspection cap (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
Starter clutch cover cap (b): 11 N·m (1.1 kgf-m, 8.5 lbf-ft)



IM10L1140069-01

28) Install the removed parts.

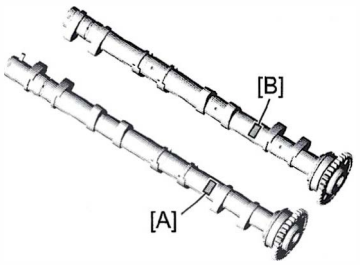
Camshaft Inspection

BENM10L31406019

Refer to "Cam Chain Tension Adjuster / Camshaft Removal" (Page 1D-18) and "Cam Chain Tension Adjuster / Camshaft Installation" (Page 1D-19).

Camshaft Identification

The camshafts can be identified by the embossed letter.



IM10L1140070-01

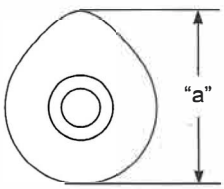
[A]: IN (Intake camshaft)	[B]: EX (Exhaust camshaft)

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.

Cam height
Intake [Limit]: 36.28 mm (1.429 in)
Exhaust [Limit]: 36.53 mm (1.439 in)

Special tool
09900–20202



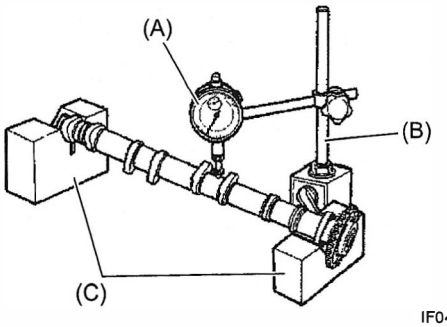
I649G1140199-03

Camshaft Runout

Measure the runout using the dial gauge. Replace the camshaft if the runout exceeds the limit.

Camshaft runout
Intake & Exhaust [Limit]: 0.10 mm (0.004 in)

Special tool
(A): 09900–20607
(B): 09900–20701
(C): 09900–21304



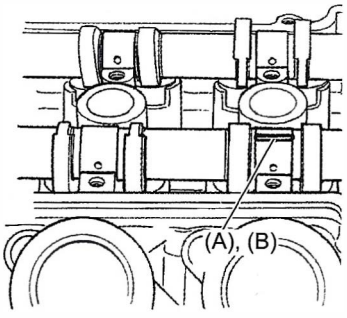
IF04K1140086-01

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 plastigage to read the clearance at the widest portion, which is specified as follows.

Special tool
(A): 09900–22303
(B): 09900–22304



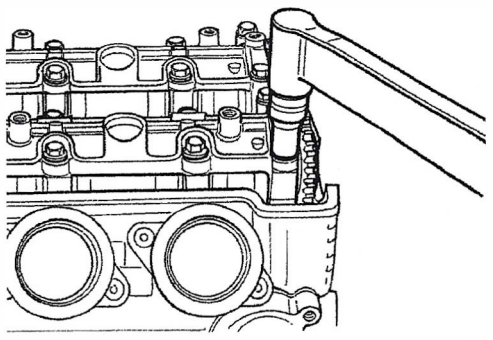
IF04K1140087-01

3) Install each camshaft journal holder to its original position. Refer to "Cam Chain Tension Adjuster / Camshaft Installation" (Page 1D-19).
4) Tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque. Refer to "Cam Chain Tension Adjuster / Camshaft Installation" (Page 1D-19).

NOTE

Do not rotate the camshafts with the plastigage in place.

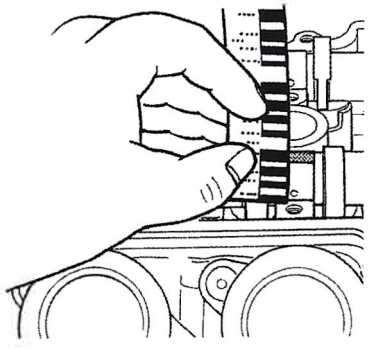
Tightening torque
Camshaft journal holder bolt: 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



I947H1140066-01

5) Remove the camshaft journal holders and measure the width of the compressed plastigage using the envelope scale.
6) This measurement should be taken at the widest part of the compressed plastigage.

Camshaft journal oil clearance
Intake [Limit]: 0.150 mm (0.0059 in)
Exhaust [Limit]: 0.150 mm (0.0059 in)



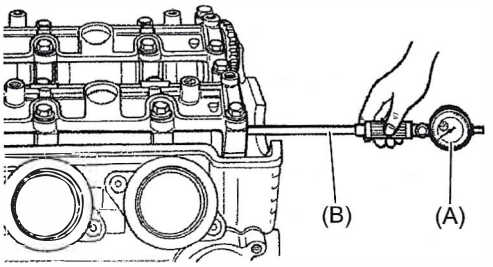
I947H1140067-01

7) If the camshaft journal oil clearance exceeds the limit, measure the inside diameter of the camshaft journal holder and the outside diameter of the camshaft journal. Replace the camshaft or the cylinder head depending upon which one exceeds the specification.

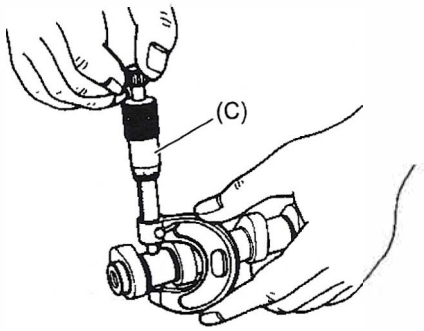
Camshaft journal holder I.D.
Intake [Standard]: 24.012 – 24.025 mm (0.9454 – 0.9459 in)
Exhaust [Standard]: 24.012 – 24.025 mm (0.9454 – 0.9459 in)

Camshaft journal O.D.
Intake [Standard]: 23.959 – 23.980 mm (0.9433 – 0.9441 in)
Exhaust [Standard]: 23.959 – 23.980 mm (0.9433 – 0.9441 in)

Special tool
(A): 09900–20602
(B): 09900–22403
(C): 09912–66310



IF04K1140088-01

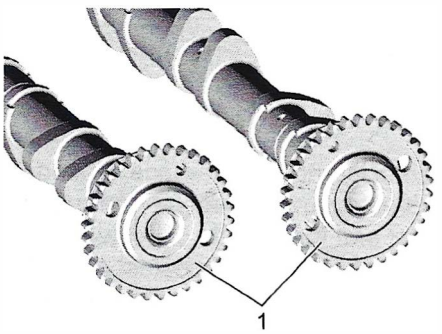


IF04K1140089-01

Camshaft Sprocket

Inspect the teeth of each camshaft sprocket (1) for wear or damage.

If they are worn or damaged, replace the sprocket/ camshaft assembly and cam chain as a set.



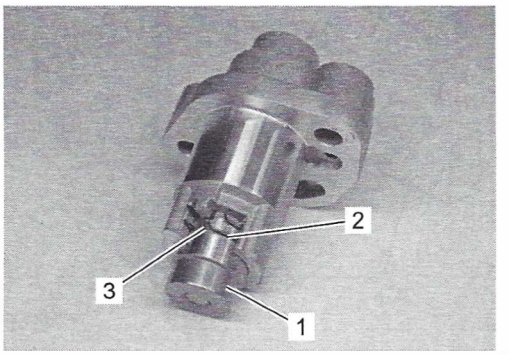
IM10L1140071-01

Cam Chain Tension Adjuster Inspection

BENM10L31406020

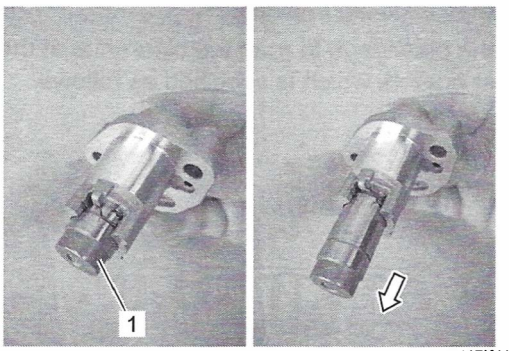
Refer to "Cam Chain Tension Adjuster / Camshaft Removal" (Page 1D-18) and "Cam Chain Tension Adjuster / Camshaft Installation" (Page 1D-19).

1) Turn the plunger (1) into the adjuster body until the groove (3) reaches the outer circlip (2). Refer to "Cam Chain Tension Adjuster / Camshaft Installation" (Page 1D-19).



IH17K1140081-02

2) Check that the plunger goes out automatically when its head (1) is tapped. If it does not work smoothly, replace the cam chain tension adjuster with a new one.



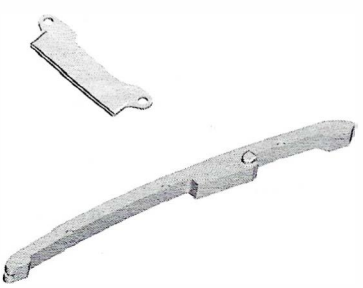
IH17K1140082-01

Cam Chain Guide Inspection

BENM10L31406021

Refer to "Cam Chain Tension Adjuster / Camshaft Removal" (Page 1D-18), "Cam Chain Tension Adjuster / Camshaft Installation" (Page 1D-19), "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand / Oil Pipe Removal" (Page 1D-58) and "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand Installation" (Page 1D-61).

Check the contacting surface of the cam chain guides. If it is worn or damaged, replace it with a new one.



IM10L1140287-01

Valve Clearance Inspection and Adjustment

BENM10L31406022

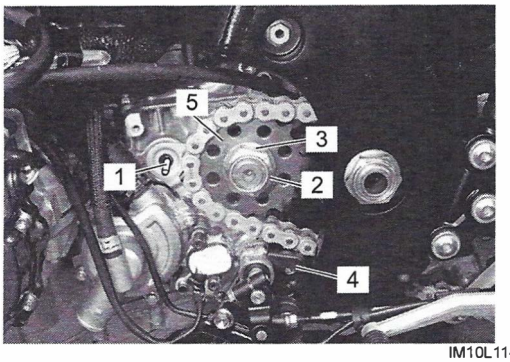
Refer to "Valve Clearance" in Section 0B (Page 0B-4).

Engine Assembly Removal

BENM10L31406023

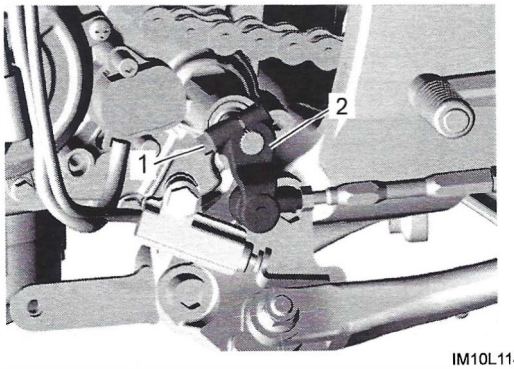
Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps:

1) Remove the seat. ☞(Page 9D-34)
2) Disconnect the battery (–) lead wire. ☞(Page 1J-8)
3) Jack up the motorcycle and fix it for safety.
4) Drain engine oil. ☞(Page 0B-11)
5) Drain engine coolant. ☞(Page 0B-16)
6) Remove the throttle body assembly. ☞(Page 1D-9)
7) Remove the radiator and radiator heat shield. ☞(Page 1F-8)
8) Remove the oil cooler. ☞(Page 1E-9)
9) Remove the exhaust system components. ☞(Page 1K-2)
10) Remove the clutch release cylinder holder, push rod (1), engine sprocket nut (2), washer (3), sprocket cover protector (4) and engine sprocket (5). ☞(Page 3A-3)



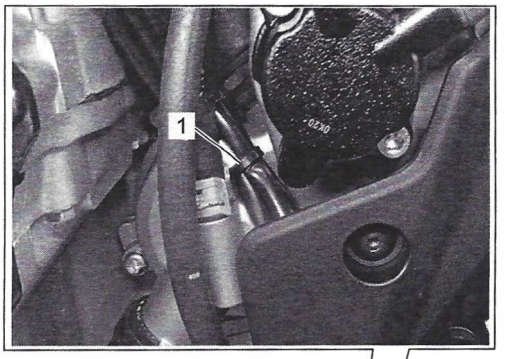
IM10L1140073-01

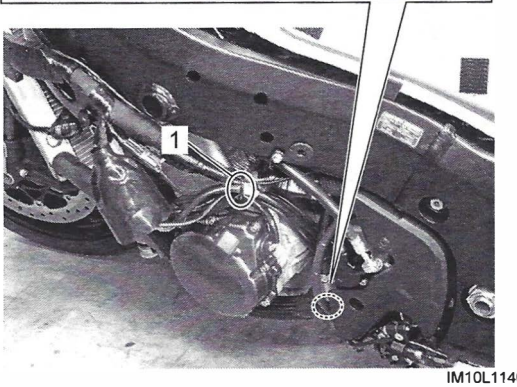
11) Mark the gearshift shaft head at which the gearshift link arm slit is set for correct reinstall.
12) Remove the gear shift link arm bolt (1) and gearshift link arm (2) from the gear shift shaft.



IM10L1140074-01

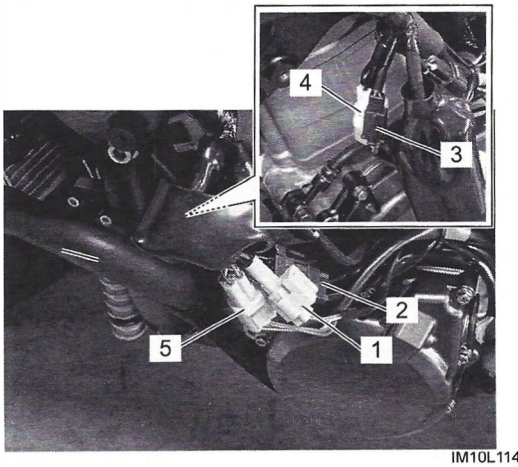
13) Release the clamps (1).





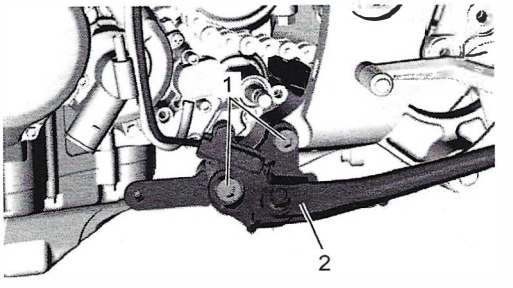
IM10L1140288-01

14) Disconnect the side-stand switch lead wire coupler (1), gear shift sensor lead wire coupler (2), CKP sensor lead wire coupler (3), generator lead wire coupler (4), and GP sensor lead wire coupler (5).



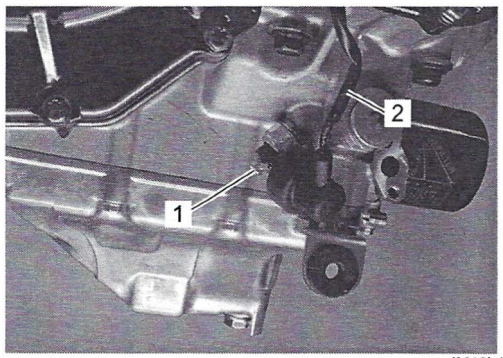
IM10L1140075-02

15) Remove the side-stand bracket bolt (1) and side-stand (2) with its bracket from the frame.



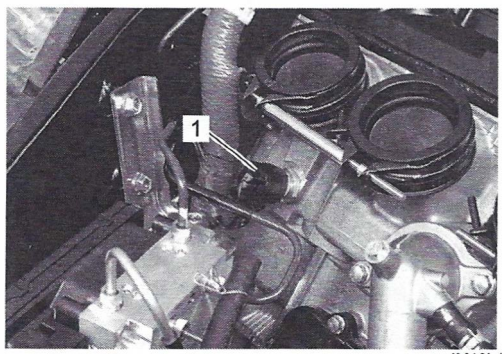
IM10L1140076-01

16) Remove the oil pressure switch lead wire bolt (1), and then disconnect the oil pressure switch lead wire (2) from the oil pressure switch.



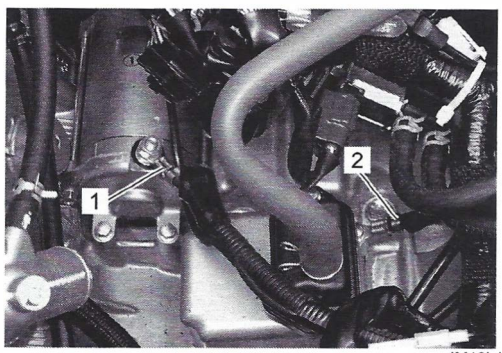
IM10L1140077-01

17) Disconnect the ECT sensor lead wire coupler (1) from the ECT sensor.



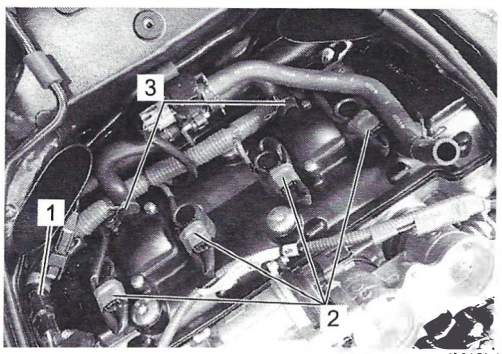
IM10L1140078-01

18) Disconnect the starter motor lead wire (1) and engine ground lead wire (2).



IM10L1140080-01

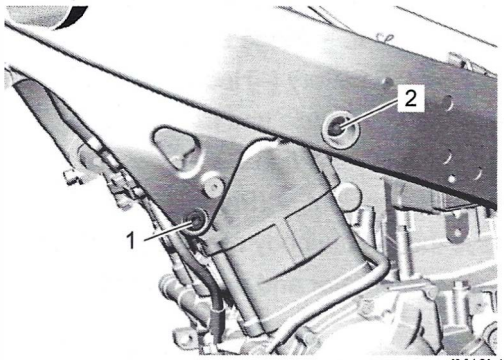
19) Disconnect the CMP sensor lead wire coupler (1), ignition coil / plug cap lead wire couplers (2) and PAIR hoses (3).



IM10L1140081-02

20) Support the engine with a proper jack.

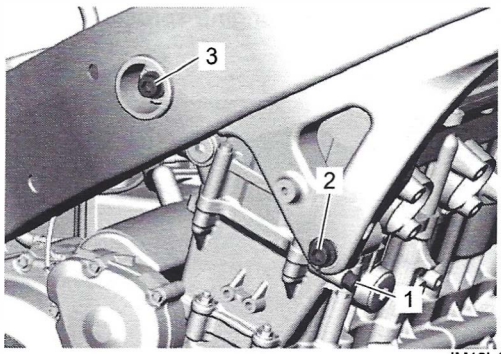
21) Remove the engine mounting bolts (1) and (2) from the cylinder head.



IM10L1140083-01

22) Loosen the engine mounting pinch bolt (1).

23) Remove the engine mounting bolts (2) and (3) from the cylinder head.

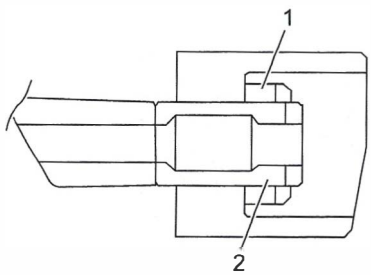


IM10L1140084-01

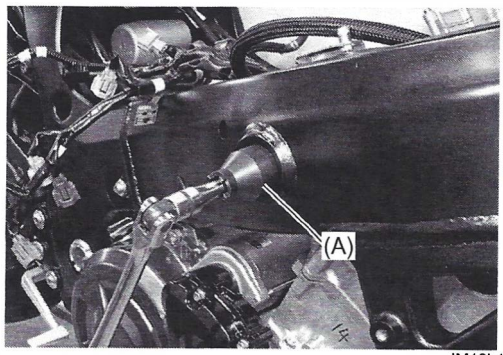
24) Loosen the engine mounting thrust adjuster lock-nut (1) with the special tool.

25) Loosen the engine mounting thrust adjuster (2) fully.

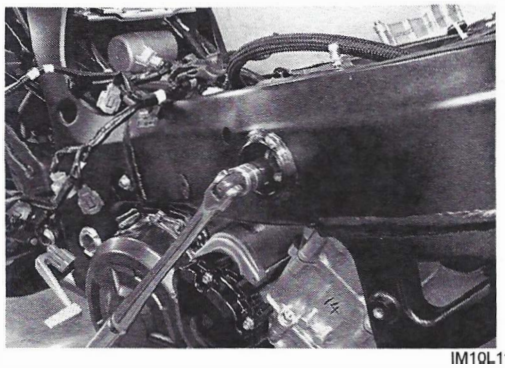
Special tool
(A): 09940–14990



IM10L1140088-01

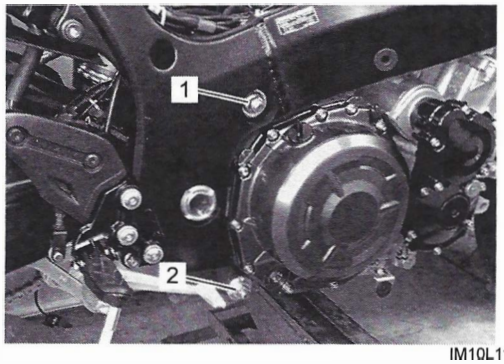


IM10L1140085-01



IM10L1140086-01

26) Remove the engine mounting nuts (1) and (2).



IM10L1140087-01

27) Loosen the engine mounting thrust adjuster locknuts (1) and (2) with the special tool.

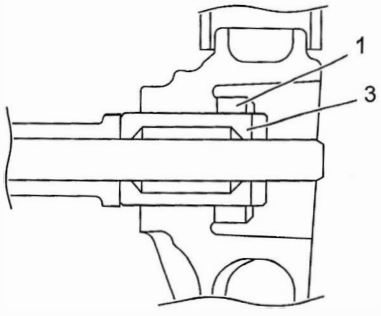
28) Loosen the engine mounting thrust adjusters (3) and (4) fully.

Special tool
(A): 09940–14990

NOTE

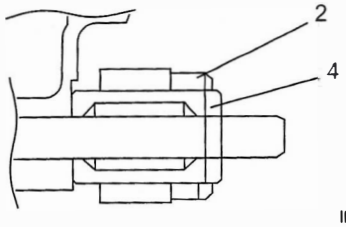
Do not remove the engine mounting bolts at this stage.

[A]



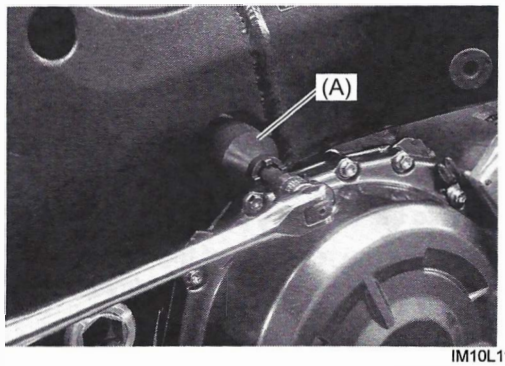
IM10L1140093-02

[B]

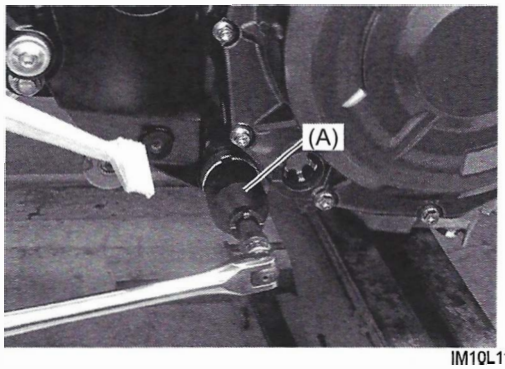


IM10L1140095-02

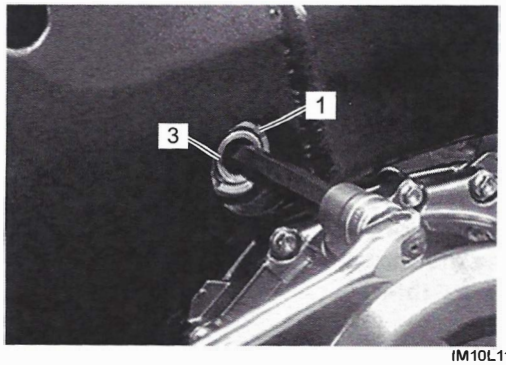
[A]: Rear upper side	[B]: Rear lower side



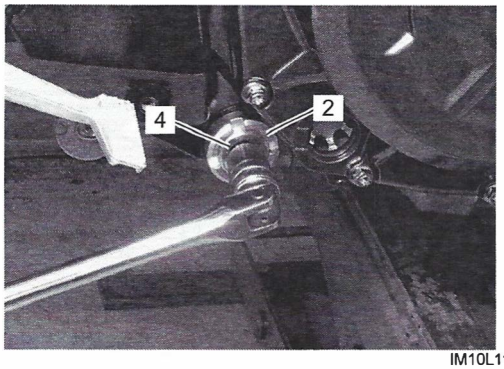
IM10L1140089-01



IM10L1140090-01



IM10L1140092-01



IM10L1140091-01

29) Remove the engine mounting bolts and gradually lower the front side of the engine.
Then, take off the driven chain from the drive shaft.
30) Remove the engine assembly.

Engine Assembly Installation

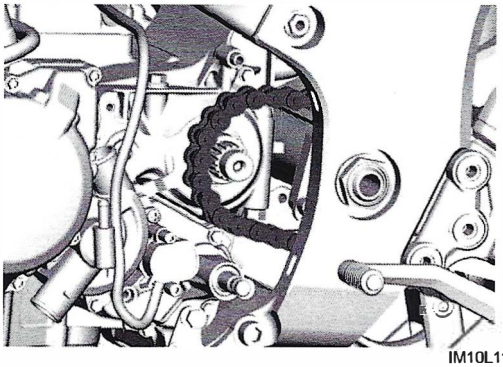
BENM10L31406024

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.

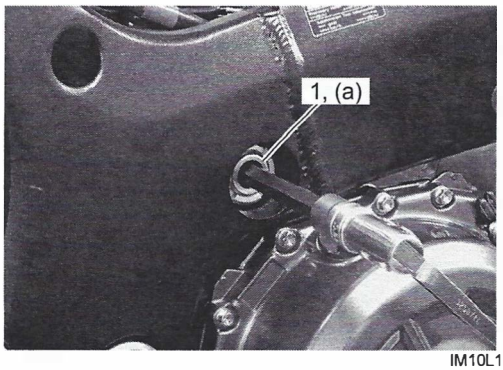
NOTICE

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

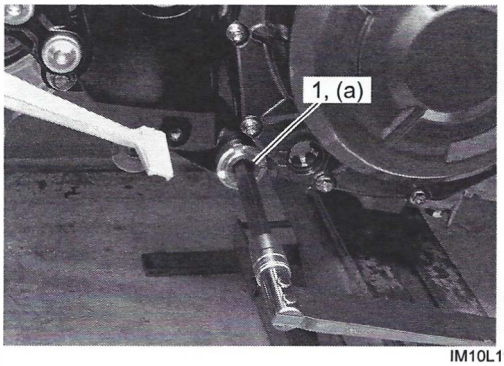

IM10L1140096-01

- Install all engine mounting bolts and spacers, then tighten them temporarily.
- Tighten the engine mounting thrust adjusters (1) to the specified torque.

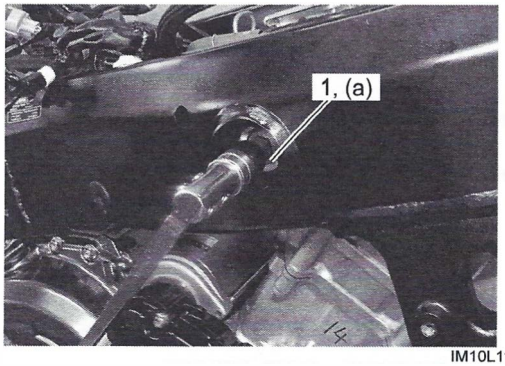
Tightening torque
Engine mounting thrust adjuster (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1140097-01



IM10L1140098-01

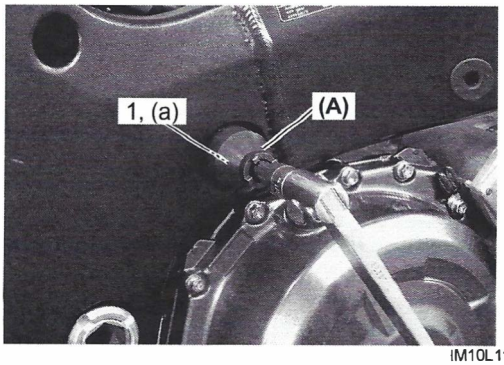


IM10L1140099-01

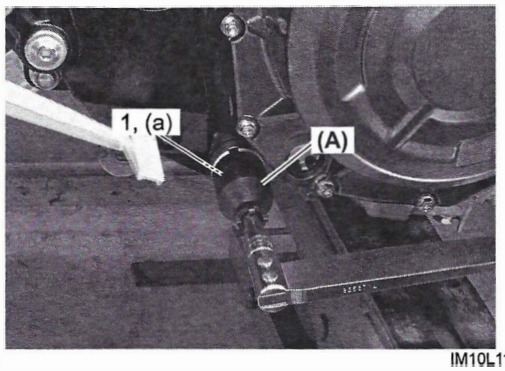
- Tighten the engine mounting thrust adjuster lock-nuts (1) to the specified torque with the special tool.

Special tool
(A): 09940–14990

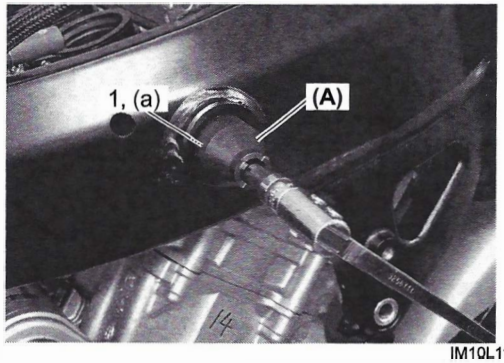
Tightening torque
Engine mounting thrust adjuster lock-nut (a): 45 N·m (4.6 kgf-m, 33.5 lbf-ft)



IM10L1140100-02



IM10L1140101-02



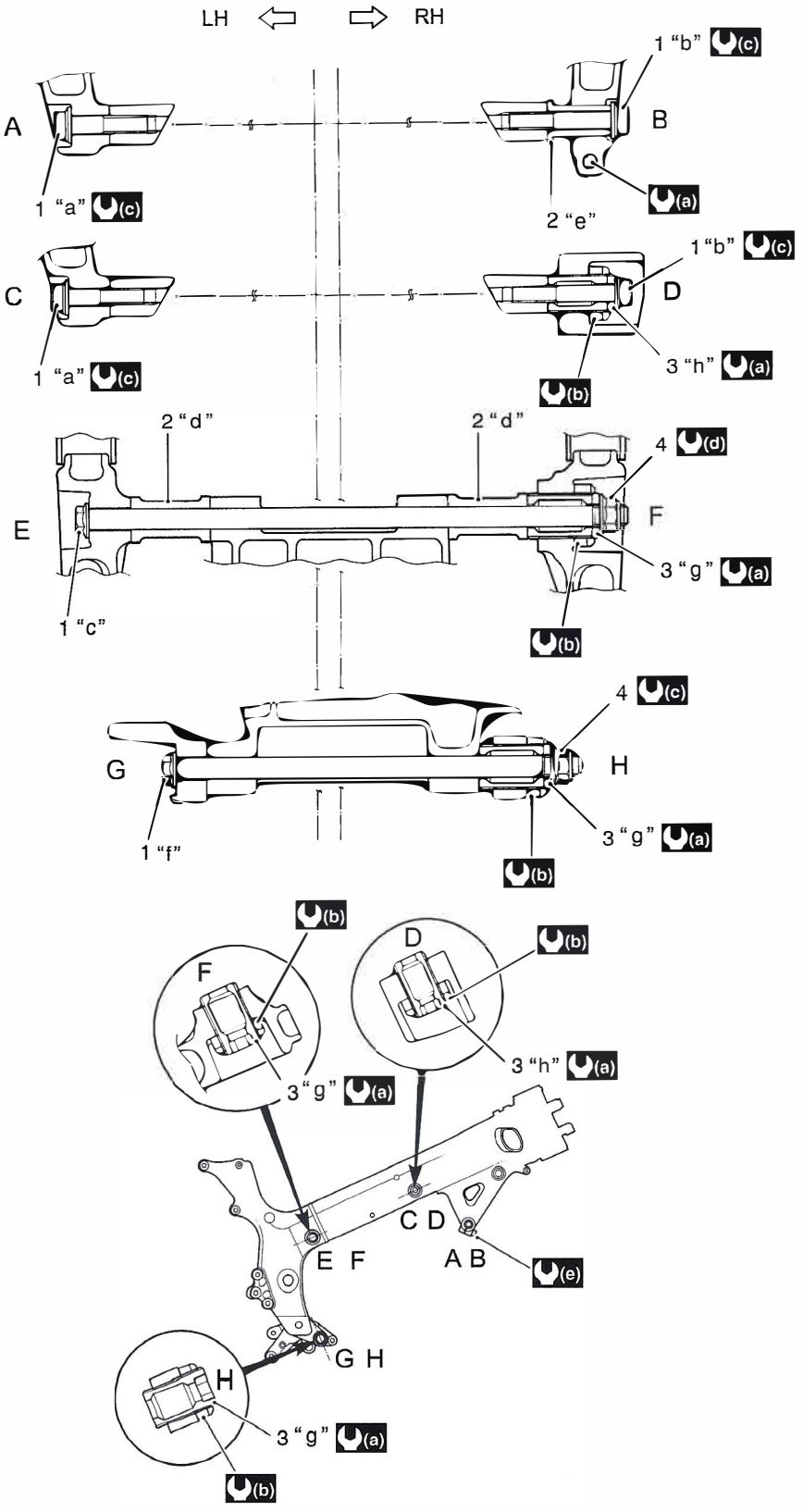
IM10L1140102-02

- Tighten all engine mounting bolts and nuts to the specified torque.

NOTE

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

- Tighten the engine mounting pinch bolt to the specified torque.

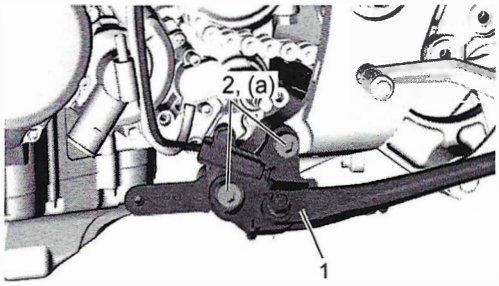


I815H1140131-02

1. Bolt	"c": 320 mm (12.60 in)	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
2. Spacer	"d": 47 mm (1.85 in)	(b) : 45 N·m (4.6 kgf-m, 33.5 lbf-ft)
3. Adjuster	"e": 37.5 mm (1.48 in)	(c) : 55 N·m (5.6 kgf-m, 40.5 lbf-ft)
4. Nut	"f": 243 mm (9.56 in)	(d) : 75 N·m (7.6 kgf-m, 55.5 lbf-ft)
"a": 45 mm (1.77 in)	"g": 43 mm (1.69 in)	(e) : 35 N·m (3.6 kgf-m, 26.0 lbf-ft)
"b": 60 mm (2.36 in)	"h": 39 mm (1.54 in)	

- Install the side-stand (1), and then tighten the new side-stand bracket bolt (2) to the specified torque.

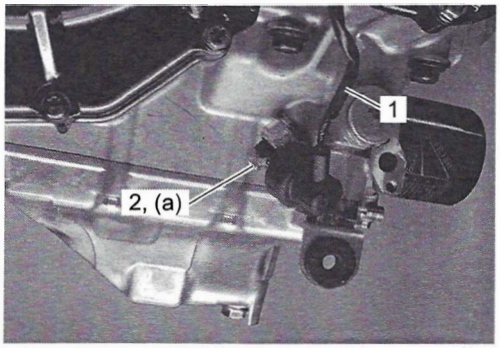
Tightening torque
Side-stand bracket bolt (a): 95 N·m (9.7 kgf-m, 70.0 lbf-ft)



IM10L1140103-01

- Connect the oil pressure switch lead wire (1), and then tighten the oil pressure switch lead wire bolt (2) to the specified torque.

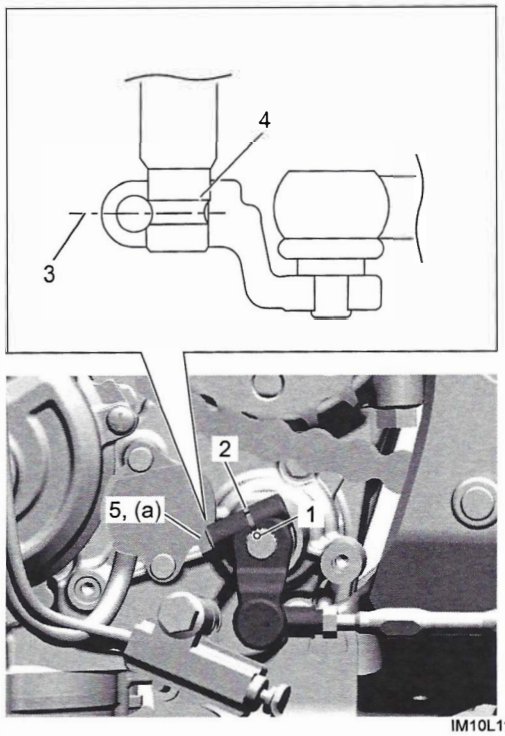
Tightening torque
Oil pressure switch lead wire bolt (a): 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)



IM10L1140289-01

- Align the mark (1) on the gear shift shaft with the slit (2) of the gearshift link arm.
- Align the center of hole (3) of the gearshift link arm with the groove (4) of the gearshift shaft.
- Tighten the gearshift link arm bolt (5) to the specified torque.

Tightening torque
Gearshift link arm bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

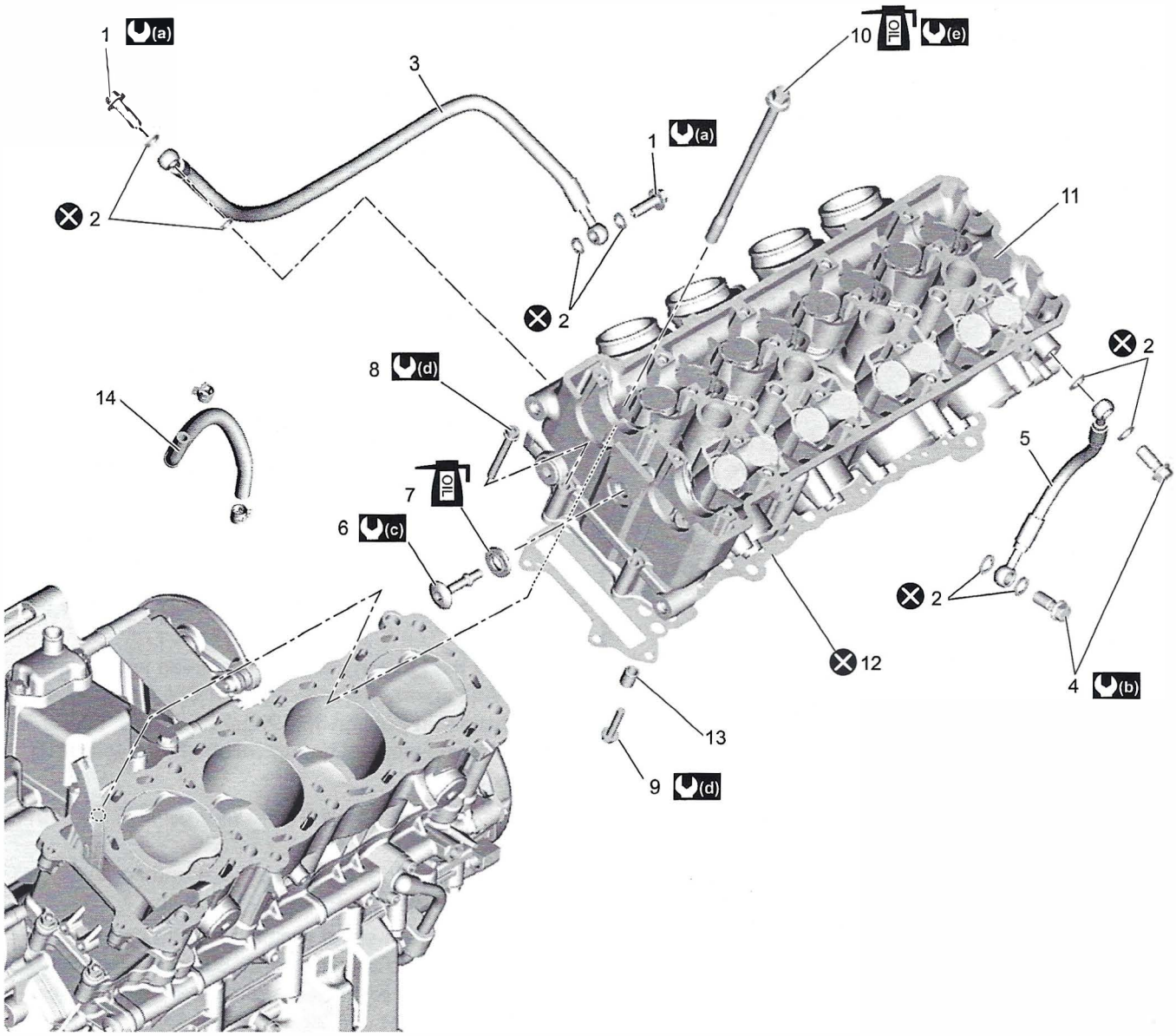


IM10L1140104-02

- Install the clutch release cylinder holder. ☞(Page 3A-3)
- Connect the ignition coil / plug cap lead wire couplers and PAIR hoses. Refer to "Ignition Coil Removal and Installation" in Section 1H (Page 1H-4) and "PAIR Reed Valve Removal and Installation" in Section 1B (Page 1B-4).
- Connect the CMP sensor lead wire coupler. ☞(Page 1C-11)
- Connect the starter motor lead wire and engine ground lead wire. ☞(Page 9A-13)
- Connect the side-stand switch lead wire coupler, CKP sensor lead wire coupler, generator lead wire coupler, GP sensor lead wire coupler and gearshift sensor lead wire coupler. ☞(Page 9A-13)
- Connect the ETC sensor lead wire coupler.
- Fill the engine oil. ☞(Page 0B-11)
- Fill the engine coolant. ☞(Page 0B-16)
- Install the radiator heat shield and radiator. ☞(Page 1F-8)
- Install the oil cooler. ☞(Page 1E-9)
- Install the exhaust system components. ☞(Page 1K-2)
- After finishing the engine installation, check the following items.
  - Throttle valve synchronization ☞(Page 0B-15)
  - Drive chain slack ☞(Page 0B-18)
  - Engine oil and coolant leakage "Engine Oil" in Section 0B (Page 0B-11) and "Radiator Hose" in Section 0B (Page 0B-17).
- Connect the battery (-) lead wire. ☞(Page 1J-8)
- Install the seat. ☞(Page 9D-34)

Cylinder head Components

BENM10L31406025



IM10L1140106-02

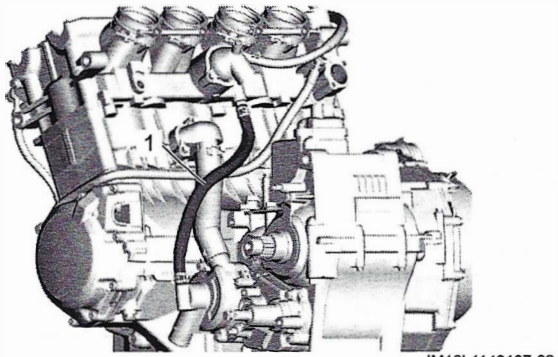
1. Oil hose union bolt (cam chain tension adjuster)	8. Cylinder head bolt (L55)	(a) : 18 N·m (1.8 kgf-m, 18.5 lbf-ft)
2. Gasket	9. Cylinder head bolt (L30)	(b) : 20 N·m (2.0 kgf-m, 15.0 lbf-ft)
3. Oil hose (cam chain tension adjuster)	10. Cylinder head bolt (L180) : For tightening order, refer to "Cylinder Head Installation" (Page 1D-36).	(c) : 14 N·m (1.4 kgf-m, 10.5 lbf-ft)
4. Oil hose union bolt (Cylinder head)	11. Cylinder head	(d) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
5. Oil hose (cylinder head)	12. Cylinder head gasket	(e) : Cylinder head bolt (L180) (a): 28 N·m → turn counterclockwise 270° → 10 N·m → 25 N·m → 51 N·m (2.9 kgf-m → turn counterclockwise 270° → 1.0 kgf-m → 2.5 kgf-m → 5.2 kgf-m, 21.0 lbf-ft → turn counterclockwise 270° → 7.5 lbf-ft → 18.5 lbf-ft → 38.0 lbf-ft)
6. Cylinder head side bolt	13. Dowel pin	OIL : Apply engine oil to bolt thread and seat.
7. Gasket	14. Water bypass hose	: Do not reuse.

Cylinder Head Removal

BENM10L31406026

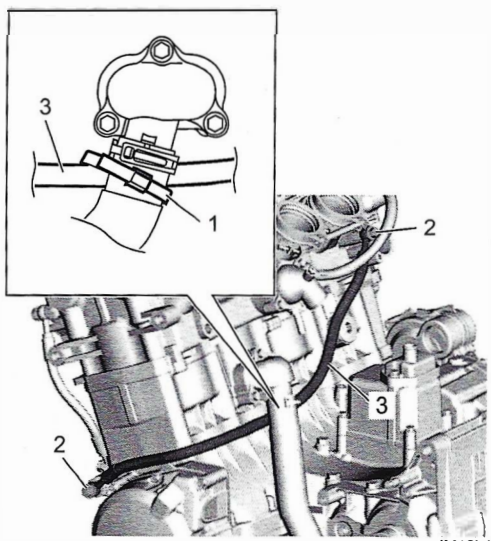
Refer to "Engine Assembly Removal" (Page 1D-27) and "Cam Chain Tension Adjuster / Camshaft Removal" (Page 1D-18).

1) Remove the water bypass hose (1) from the cylinder head.

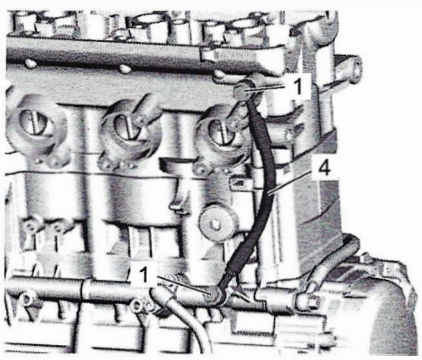


IM10L1140107-02

2) Release the clamp (1).
3) Remove the oil hose bolts (2), oil hose (cam chain tension adjuster) (3) and oil hose (cylinder head) (4) from the cylinder head and upper crankcase.

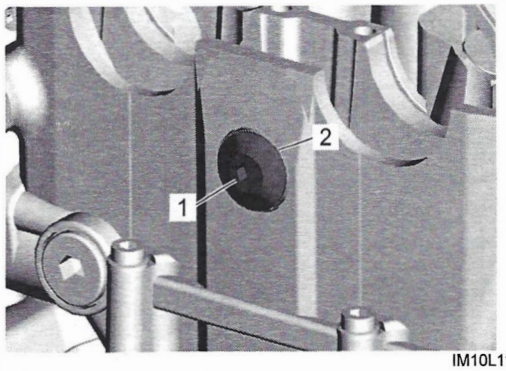


IM10L1140108-02



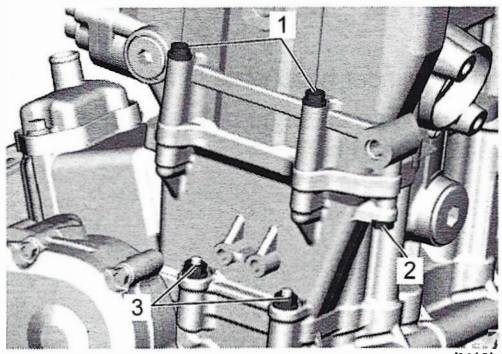
IM10L1140109-03

4) Remove the cylinder head side bolt (1) and gasket (2) from the cylinder head.



IM10L1140110-01

5) Remove the cylinder head bolts (L55) (1) and cylinder head bolt (L30) (2) from the cylinder.
6) Loosen the cylinder nuts (3).



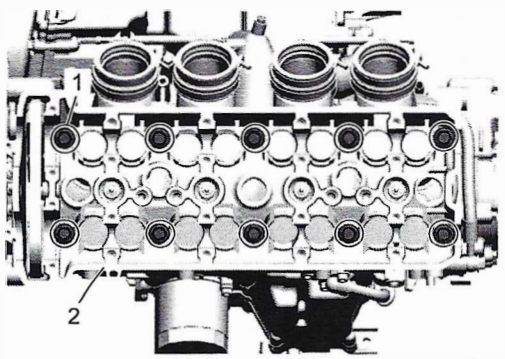
IM10L1140111-02

7) Remove cylinder head bolts (1).

NOTE

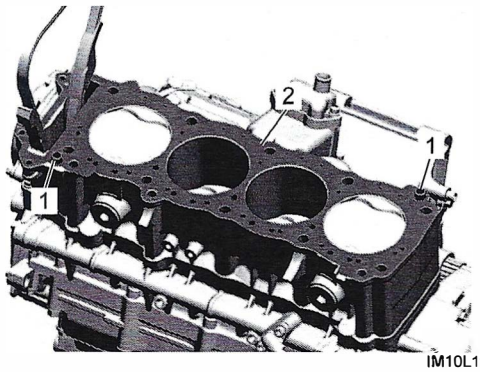
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

8) Remove the cylinder head (2) from the cylinder.



IM10L1140112-01

9) Remove the dowel pins (1) and cylinder head gasket (2) from the cylinder.

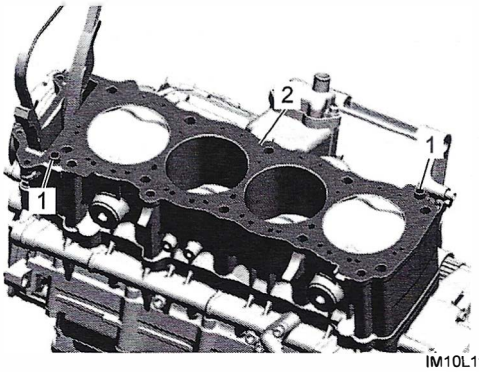


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Cylinder Head Installation

BENM10L31406027

1) Install the dowel pins (1) and a new cylinder head gasket (2) to the cylinder.



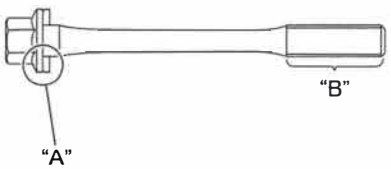
IM10L1140113-02

2) Place the cylinder head on the cylinder.

NOTE

When installing the cylinder head, keep the cam chain taut.

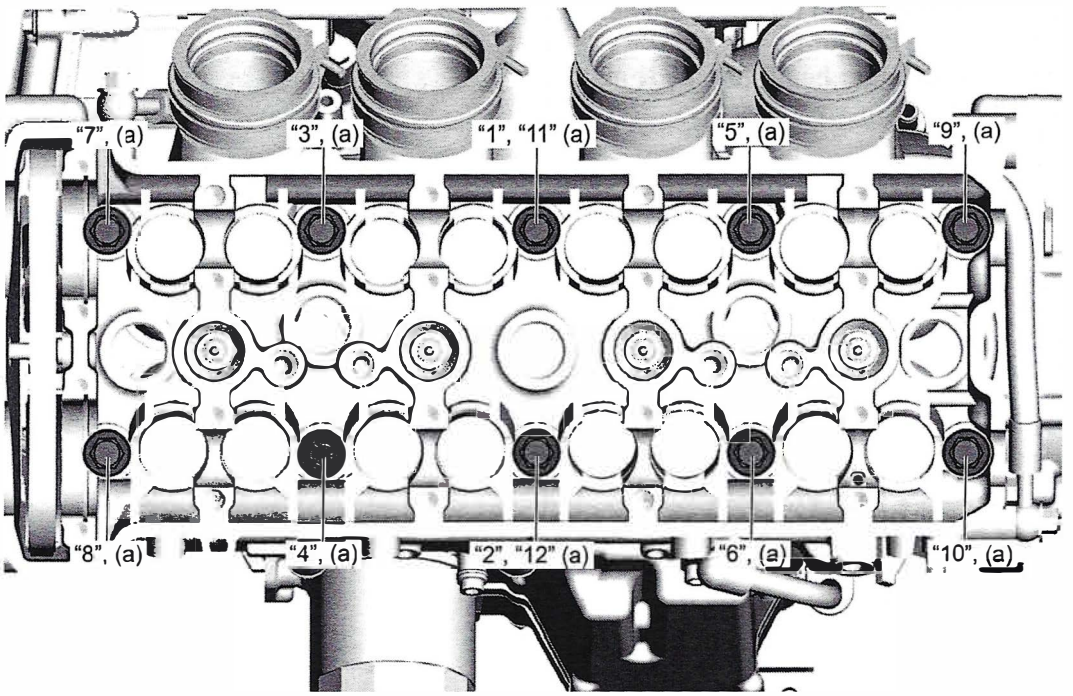
3) Install the cylinder head bolts (L180) to the cylinder according to the following procedure.
   a) Apply engine oil to the both side of the washers "A" and thread portion "B" of the bolts before installing the cylinder head bolts.



IF04K1140331-03

   b) Tighten the cylinder head bolt to 28 N·m (2.9 kgf-m, 21.0 lbf-ft) in numerical order "1" – "12".
   c) In the same manner as in Step b), turn counterclockwise them to 270°.
   d) In the same manner as in Step b), tighten them to 10 N·m (1.0 kgf-m, 7.5 lbf-ft).
   e) In the same manner as in Step b), tighten them to 25 N·m (2.5 kgf-m, 18.5 lbf-ft), and then tighten to 51 N·m (5.2 kgf-m, 38.0 lbf-ft).

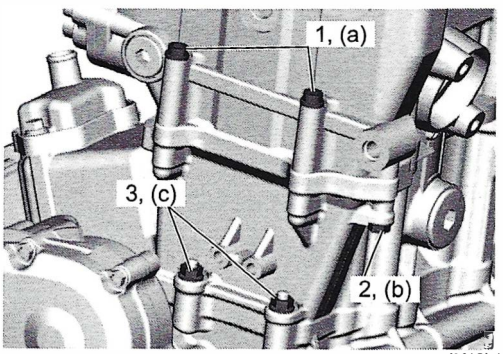
Tightening torque
Cylinder head bolt (L180) (a): 28 N·m → turn counterclockwise 270° → 10 N·m → 25 N·m → 51 N·m (2.9 kgf-m → turn counterclockwise 270° → 1.0 kgf-m → 2.5 kgf-m → 5.2 kgf-m, 21.0 lbf-ft → turn counterclockwise 270° → 7.5 lbf-ft → 18.5 lbf-ft → 38.0 lbf-ft)



IM10L1140114-02

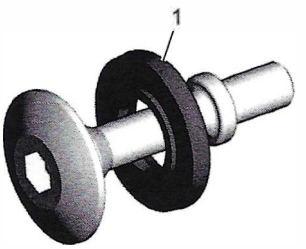
4) Tighten the cylinder head bolt (1), (2) and cylinder nuts (3) to specified torque.

Tightening torque
Cylinder head bolt (L55) (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
Cylinder head bolt (L30) (b): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
Cylinder nut (c): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1140115-02

5) Apply engine oil to the both side of the new gasket (1).



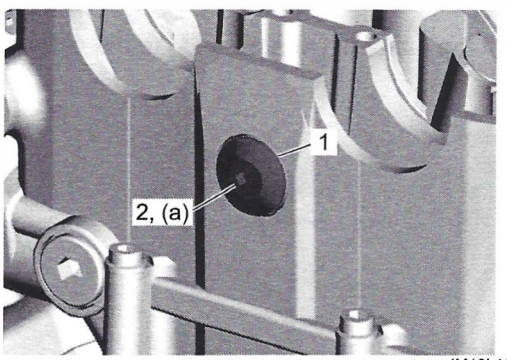
IM10L1140116-01

6) Install the new gasket (1) and cylinder head side bolt (2) to the cylinder head, and then tighten the bolt to the specified torque.

Tightening torque
Cylinder head side bolt (a): 14 N·m (1.4 kgf-m, 10.5 lbf-ft)

NOTE

Install the cylinder head side bolt between the cam chain.



IM10L1140117-01

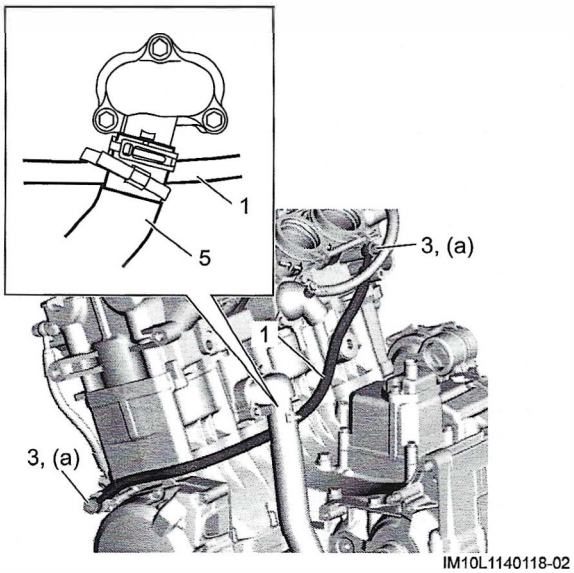
7) Install the oil hoses (1) and (2) with new gaskets and oil hose union bolts (3) and (4), and then tighten the oil hose union bolts to specified torque.

NOTE

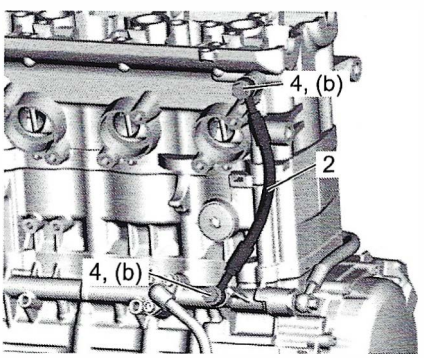
Pass the oil hose (1) between the water hose (5) and cylinder.

8) Clamp the oil hose (1) and water hose (5).

Tightening torque
Oil hose union bolt (cam chain tension adjuster) (a): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
Oil hose union bolt (cylinder head) (b): 20 N·m (2.0 kgf-m, 15.0 lbf-ft)

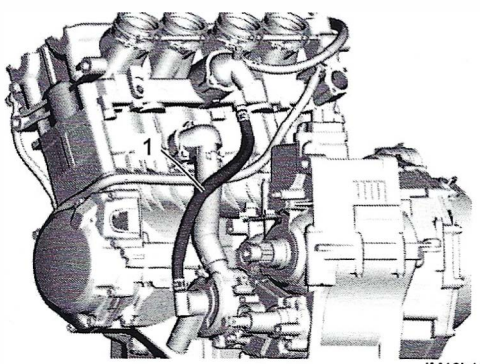


IM10L1140118-02



IM10L1140119-01

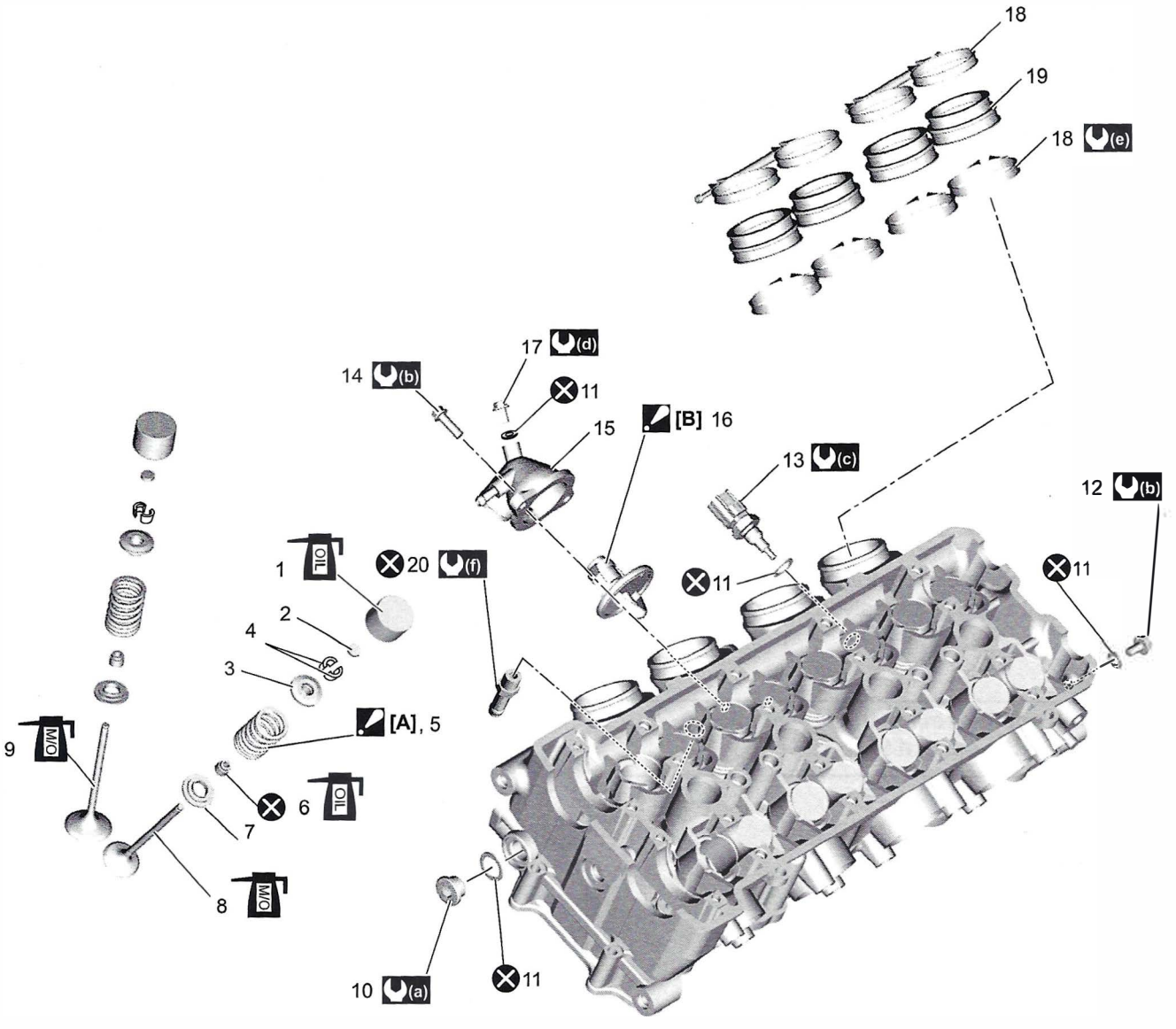
9) Install the water bypass hose (1) to the cylinder head.



IM10L1140107-02

Valve and Cylinder Head Components

BENM10L31406028



IM10L1140120-02

[A]: Face the small-pitch portion to the cylinder head.	10. Cylinder head plug	(a) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
[B]: The air bleeder hole of the thermostat faces upside.	11. Gasket	(b) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
1. Tappet	12. Oil gallery bolt	(c) : 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
2. Shim	13. ECT sensor	(d) : 6 N·m (0.61 kgf-m, 4.45 lbf-ft)
3. Valve spring retainer	14. Thermostat cover bolt	(e) : 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)
4. Valve cotter	15. Thermostat cover	(f) : 12 N·m (1.2 kgf-m, 9.0 lbf-ft)
5. Valve spring	16. Thermostat	OIL : Apply engine oil.
6. Oil seal	17. Thermostat cover air bolt	MO : Apply molybdenum oil.
7. Valve spring seat	18. Intake pipe clamp	: Do not reuse.
8. Exhaust valve	19. Intake pipe	
9. Intake valve	20. Water bypass union	

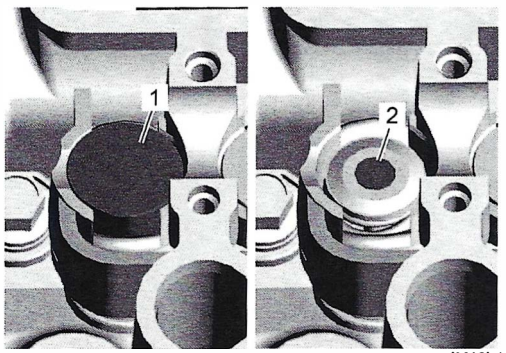
Valve / Valve Spring Removal and Installation

BENM10L31406029

Refer to "Cylinder Head Removal" (Page 1D-35) and "Cylinder Head Installation" (Page 1D-36).

Removal

1) Remove the tappet (1) and shim (2) by fingers or magnetic hand.



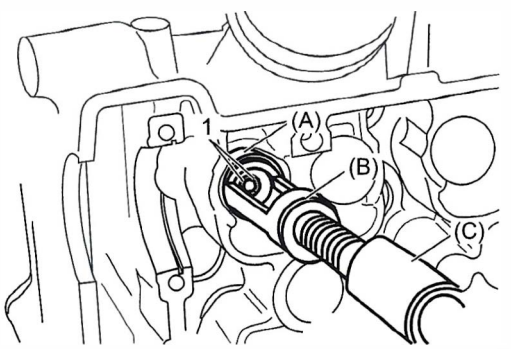
IM10L1140121-01

2) Insert the special tool between the valve springs and cylinder head.
3) Using the special tools, compress the valve springs and remove the two cotter halves (1) from the valve stem.

NOTICE

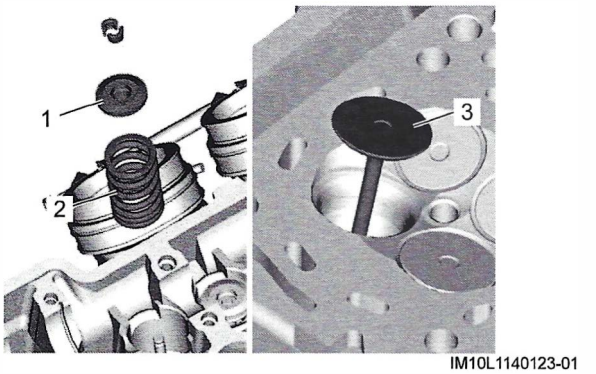
Be careful not to damage the tappet sliding surface with the special tool.

Special tool
(A): 09919–28620
(B): 09916–14522
(C): 09916–14510
09916–84511



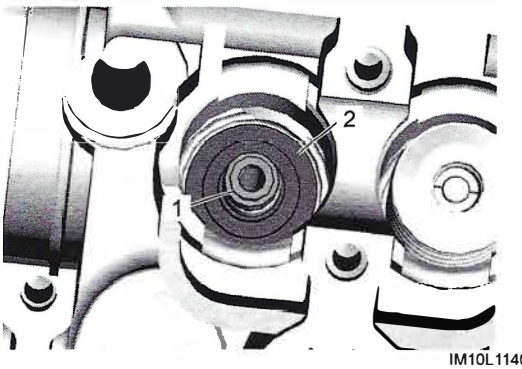
IM10L1140122-03

4) Remove the valve spring retainer (1) and valve spring (2).
5) Pull out the valve (3) from the combustion chamber side.



IM10L1140123-01

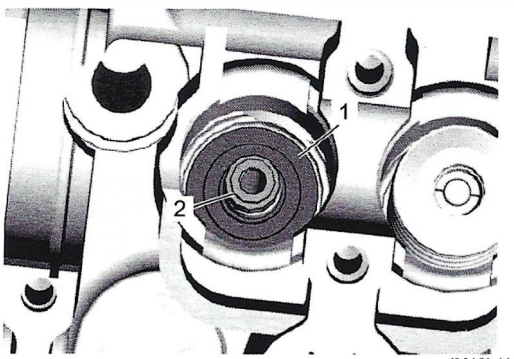
6) Remove the oil seal (1) and spring seat (2).
7) Remove the other valves in the same manner as described previously.



IM10L1140124-01

Installation

1) Install the valve spring seat (1).
2) Apply engine oil to the new oil seal (2), and press-fit it into the position.



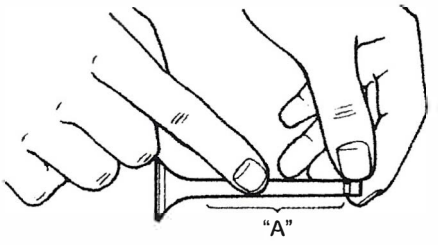
IM10L1140125-01

3) Insert the valve, with its stem coated with molybdenum oil solution all around and along the full stem length without any break.

NOTICE

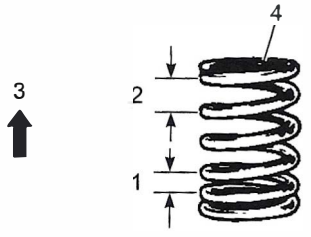
When inserting the valve, take care not to damage the lip of the oil seal.

"A": Assembly lubrication (Molybdenum oil solution)



IF04K1140149-01

4) Install each valve spring with the small-pitch portion (1) facing cylinder head.



IF04K1140150-01

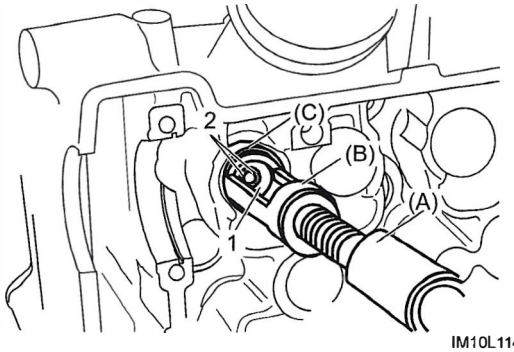
2. Large-pitch portion	4. Paint
3. Upward	

5) Put on the valve spring retainer (1), and using the special tools, press down the springs, fit the cotter halves (2) to the stem end, and release the lifter to allow the cotter halves to wedge in between retainer and stem.

NOTICE

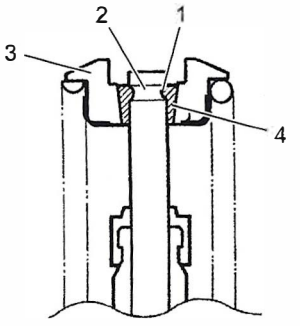
- **Be sure to restore each spring and valve to their original positions.**
- **Be careful not to damage the valve and valve stem when handling it.**
- **Compressing of the valve spring must be limited to the extent only necessary to prevent the spring from fatigue.**

Special tool
(A): 09916–14510
(B): 09916–14522
(C): 09919–28620
09916–84511



IM10L1140126-03

6) Be sure that the rounded lip (1) of the cotter fits snugly into the groove (2) in the stem end.



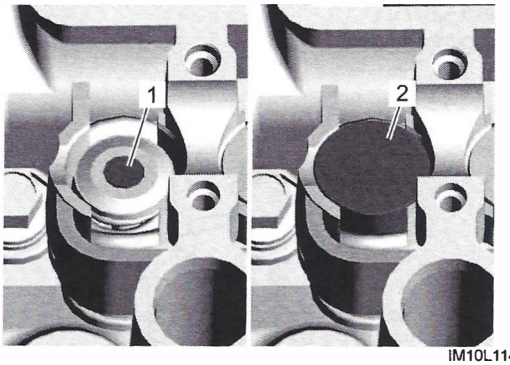
IE31J1140175-02

3. Valve spring retainer	4. Cotter

7) Apply engine oil to the tappets (2).
8) Install the tappet shims (1) and the tappets (2) to their original positions.

NOTE

When seating the tappet shim, be sure the figure printed surface faces the tappet.



IM10L1140127-01

Valve Inspection

BENM10L31406030

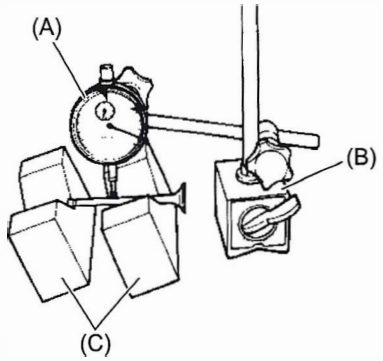
Refer to "Valve / Valve Spring Removal and Installation" (Page 1D-40).

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.

Valve stem runout
Intake & Exhaust [Limit]: 0.05 mm (0.0019 in)

Special tool
(A): 09900–20607
(B): 09900–20701
(C): 09900–21304

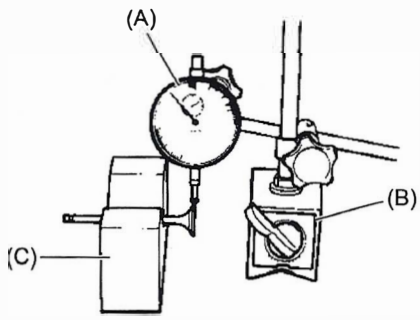


IF04K1140154-01

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.

Valve head radial runout
Intake & Exhaust [Limit]: 0.03 mm (0.0011 in)

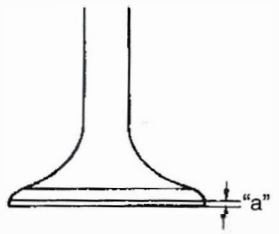
Special tool
(A): 09900–20607
(B): 09900–20701
(C): 09900–21304



IF04K1140155-01

Valve Face Wear
Visually inspect each valve face for wear. Replace any valve with an abnormally worn face. The thickness of the valve face decreases as the face wears. Measure the valve head "a". If it is out of specification replace the valve with a new one.

Valve head thickness
Intake & Exhaust [Limit]: 0.5 mm (0.019 in)

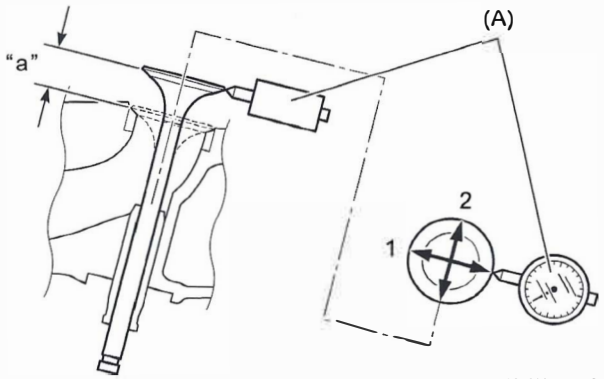


I649G1140233-02

Valve Stem Deflection
Lift the valve about 10 mm (0.39 in) "a" from the valve seat. Measure the valve stem deflection in two directions, (1) and (2), perpendicular to each other, positioning the dial gauge as shown. If the deflection measured exceeds the limit, then determine whether the valve or valve guide should be replaced with a new one.

Valve stem deflection
Intake & Exhaust
0.25 mm (0.010 in)

Special tool
(A): 09900–20607
09900–20701

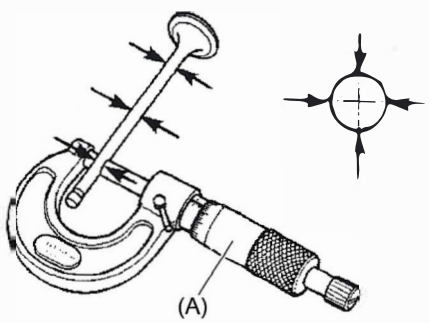


IH18K1140324-02

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.

Valve stem O.D.
Intake [Standard]: 4.975 – 4.990 mm (0.1959 – 0.1965 in)
Exhaust [Standard]: 4.955 – 4.970 mm (0.1951 – 0.1957 in)

Special tool
(A): 09912–66310

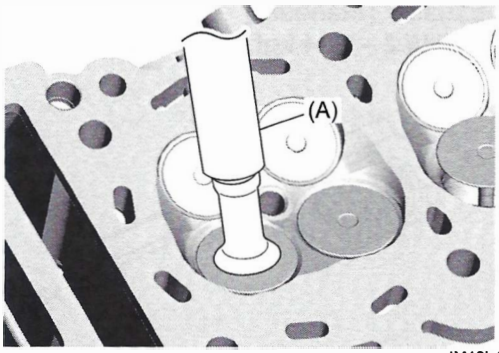


IF04K1140158-01

Valve Seat Width

1) Visually check for valve seat width on each valve face. If the valve face has worn abnormally, replace the valve.
2) Coat the valve seat with a red lead (Prussian Blue) and set the valve in place.
3) Rotate the valve with light pressure.

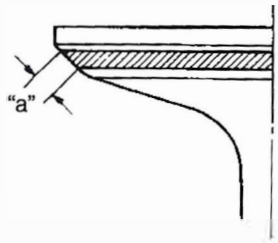
Special tool
(A): 09916–10912



IM10L1140128-01

4) Check that the transferred red lead (blue) on the valve face is uniform all around and in center of the valve face.
If the seat width "a" measured exceeds the standard value, or seat width is not uniform reface the seat using the seat cutter. ☞(Page 1D-44)

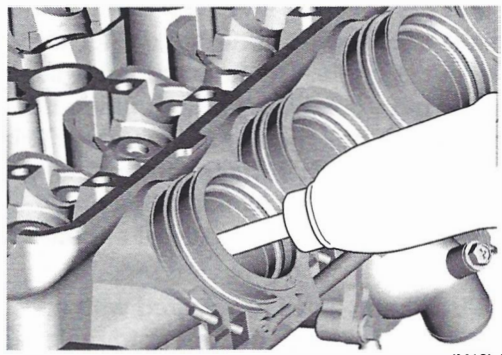
Valve seat width
Intake [Standard]: 0.9 – 1.1 mm (0.036 – 0.043 in)
Exhaust [Standard]: 0.9 – 1.1 mm (0.036 – 0.043 in)



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. ☞(Page 1D-44)



IM10L1140129-01

Valve Seat Repair

BENM10L31406031

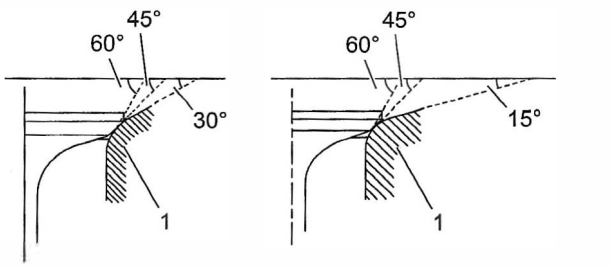
The valve seats (1) for both the intake and exhaust valves are machined to three different angles. The seat contact surface is cut at 45°.

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.**
- **The titanium valves are coated with an oxidized membrane treatment to resist wear but the membrane tend to removed if lapped after valve seat servicing.**

NOTE

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. ☞(Page 1D-26)



IF04K1140326-02

[A]: Intake valve	[B]: Exhaust valve

	Intake	Exhaust
Seat angle	30°/45°/60°	15°/45°/60°
Seat width	0.9 – 1.1 mm (0.036 – 0.043 in)	←
Valve diameter	33 mm (1.30 in)	27.5 mm (1.08 in)
Valve guide I.D.	5.000 – 5.012 mm (0.1969 – 0.1973 in)	←

Valve Spring Inspection

BENM10L31406032

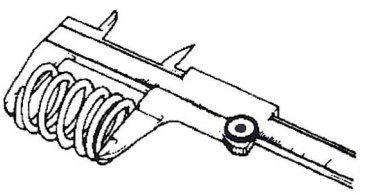
Refer to "Valve / Valve Spring Removal and Installation" (Page 1D-40).

The force of the coil spring keeps the valve seat tight. Weakened spring results in reduced engine power output and often accounts for the chattering noise coming from the valve mechanism.

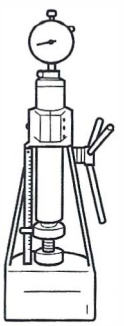
Check the valve springs for proper strength by measuring its free length and also by the force required to compress it. If the spring length is less than the service limit or if the force required to compress the spring does not fall within the range specified, replace spring as a set.

Valve spring free length
Intake & Exhaust [Limit]: 42.0 mm (1.653 in)

Valve spring pre-load
When compressed to 36.8 mm (1.449 in)
Intake & Exhaust [Standard]
149 – 171 N (15.2 – 17.4 kgf, 33.5 – 38.4 lbf)



IK34K2140017-01



ID26J1140263-01

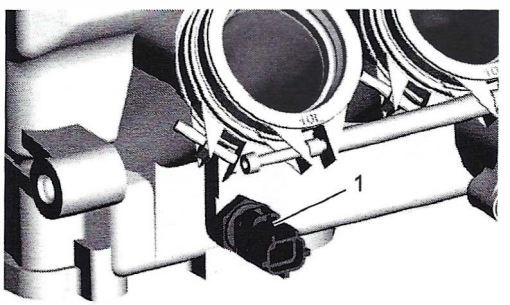
Cylinder Head Disassembly and Reassembly

BENM10L31406033

Refer to "Cylinder Head Removal" (Page 1D-35) and "Cylinder Head Installation" (Page 1D-36).

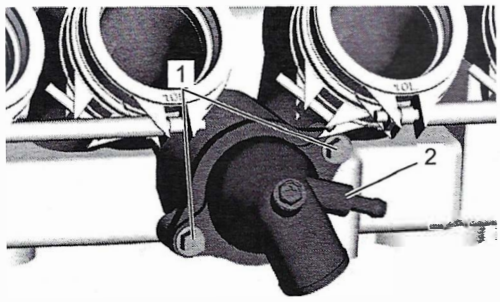
Disassembly

1) Remove the ECT sensor (1) and gasket from the cylinder head.



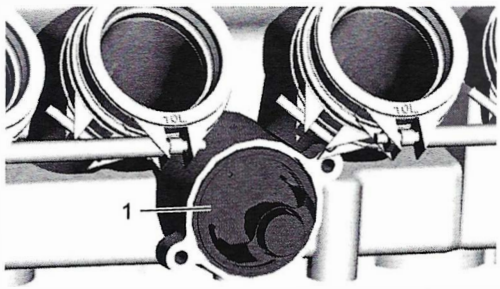
IM10L1140130-01

2) Remove the thermostat cover bolts (1) and thermostat cover (2) from the cylinder head.



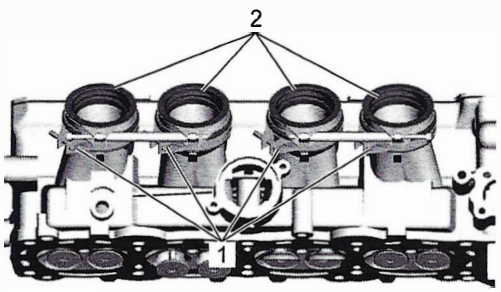
IM10L1140132-01

3) Remove the thermostat (1) from the cylinder head.



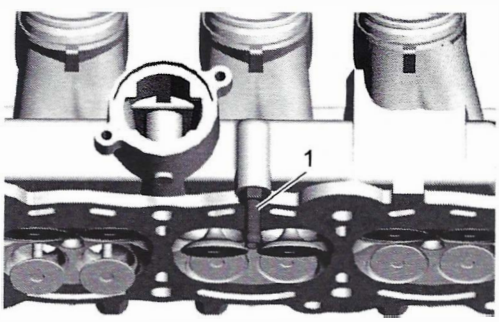
IM10L1140133-01

4) Loosen the intake pipe clamp screws (1), and then remove the intake pipes (2) from the cylinder head.



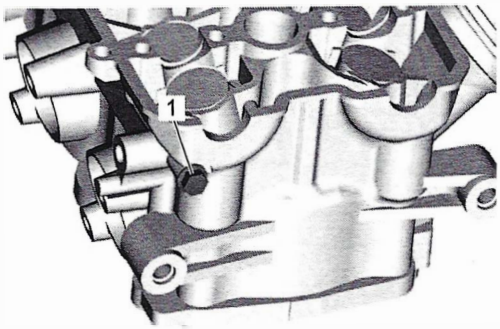
IM10L1140134-01

5) Remove the water bypass union (1) from the cylinder head.



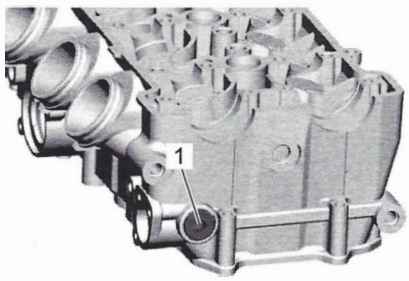
IM10L1140135-01

6) Remove the oil gallery bolt (1) and gasket from the cylinder head.



IM10L1140136-01

7) Remove the cylinder head plug (1) and gasket from the cylinder head.



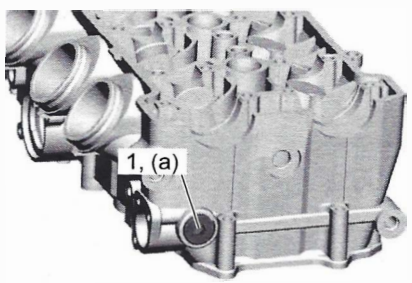
IM10L1140137-01

Assembly

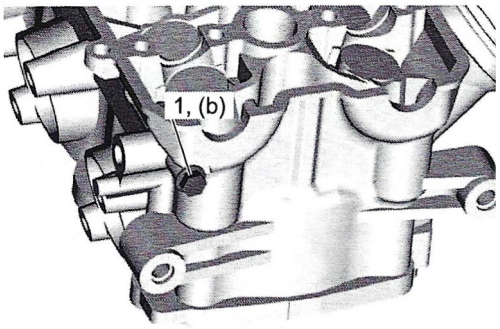
Assembly is in the reverse order of disassembly. Pay attention to the following points:

- Install the cylinder head plug (1) and oil gallery bolt (2) with the new gasket, and then tighten the oil gallery bolt and cylinder head plug.

  Tightening torque
  Cylinder head plug (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
  Oil gallery bolt (Cylinder head) (b): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



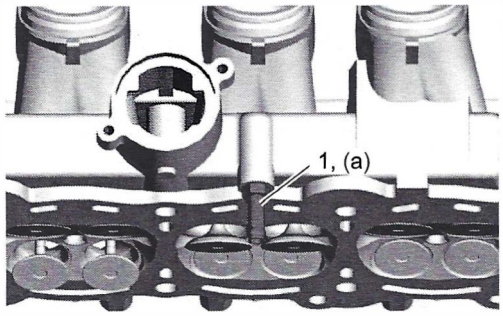
IM10L1140138-01



IM10L1140139-01

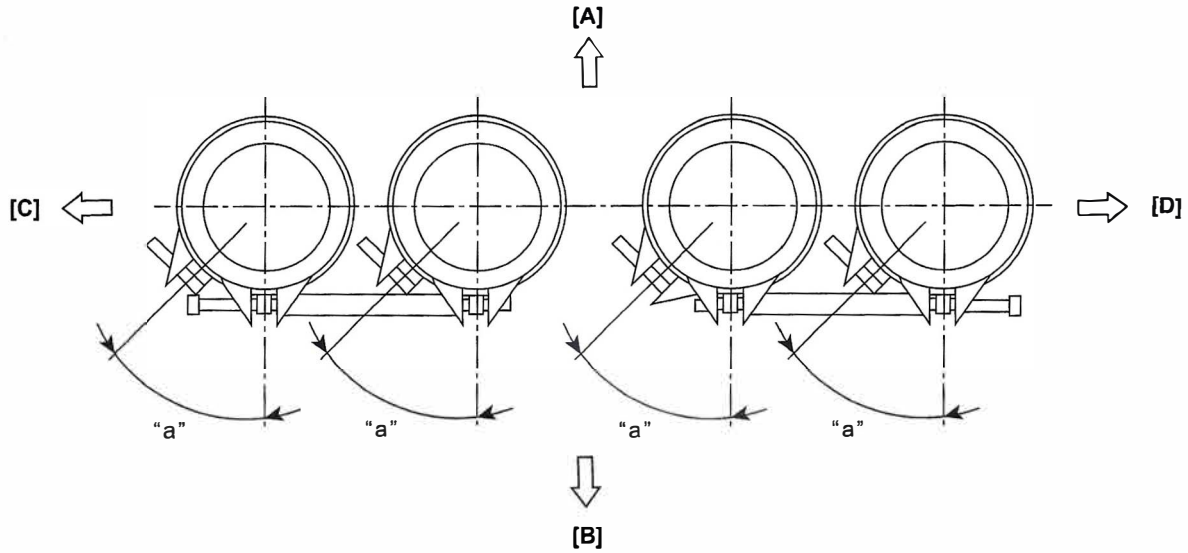
- Install the new water bypass union (1) to the cylinder head, and then tighten the specified torque.

Tightening torque
Water bypass union (a): 12 N·m (1.2 kgf-m, 9.0 lbf-ft)



IM10L1140140-01

- Set the clamp screws as shown in the figure.

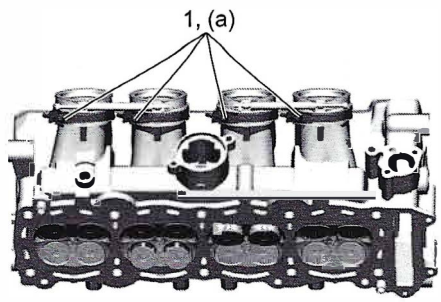


IM10L1140141-01

[A]: Front	[B]: Rear	[C]: Left	[D]: Right	"a": 35° – 55°

- Tighten the clamp screw (1) to the specified torque.

Tightening torque
Clamp screw (a): 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)

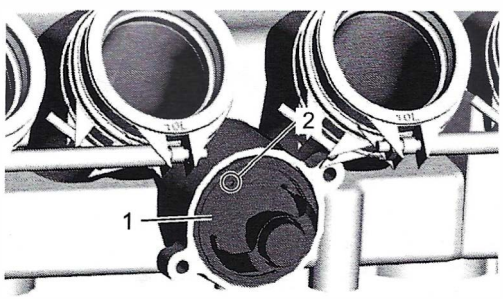


IM10L1140142-01

- Install the thermostat (1) to the cylinder head.

NOTE

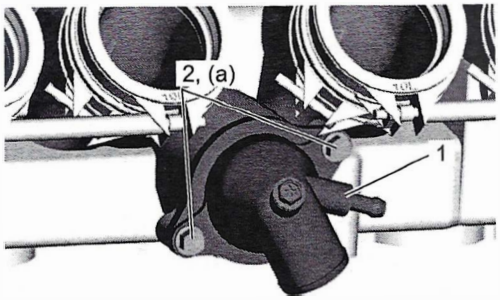
The air bleeder hole (2) of the thermostat faces upside.



IM10L1140143-01

- Install the thermostat cover (1), and then tighten the thermostat cover bolts (2) to the specified torque.

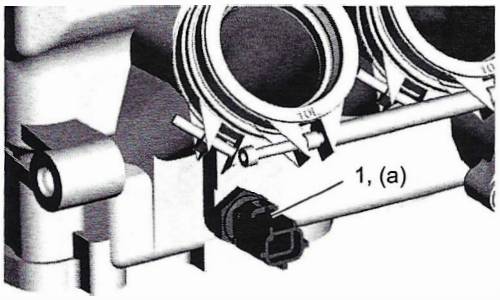
Tightening torque
Thermostat cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1140144-01

- Install the ECT sensor with new gasket to the cylinder head, and then tighten the ECT sensor (1) to the specified torque.

Tightening torque
ECT sensor (a): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)



IM10L1140145-01

Cylinder Head Inspection

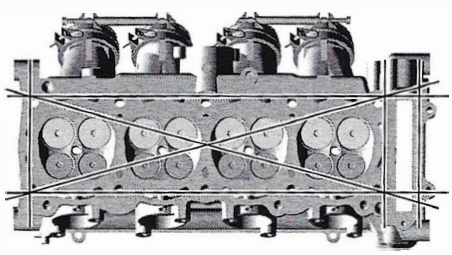
BENM10L31406034

Refer to "Cylinder Head Removal" (Page 1D-35) and "Cylinder Head Installation" (Page 1D-36).

1) Decarbonize the combustion chambers.
2) Check the gasket surface of the cylinder head for distortion with a straightedge and thickness gauge, taking a clearance reading at several places as indicated. If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder head.

Cylinder head distortion
[Limit]: 0.20 mm (0.0078 in)

Special tool
09900–20803



IM10L1140146-01

Valve Guide Replacement

BENM10L31406035

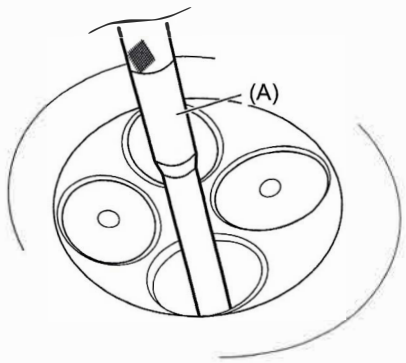
Refer to "Valve / Valve Spring Removal and Installation" (Page 1D-40).

1) Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

Special tool
(A): 09916–44310

NOTE

- **Discard the removed valve guide sub-assemblies.**
- **Only oversized valve guides are available as replacement parts. (Part No. 11115-15H70)**



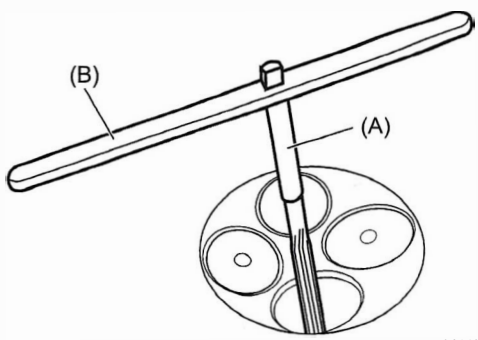
IM10L1140147-03

2) Refinish the valve guide holes in the cylinder head using the reamer and handle.
3) Remove the special tools by turning clockwise and raising them at the same time.

NOTICE

Never turn the special tools counterclockwise, as this will dull the blades.

Special tool
(A): 09916–34580
(B): 09916–34542



IM10L1140148-03

4) 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.

NOTICE

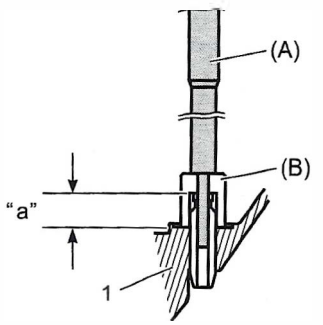
Do not use a burner to heat the valve guide hole to prevent cylinder head distortion.

5) Apply engine oil to each valve guide and valve guide hole.
6) Drive the guide into the guide hole using the valve guide installer.

NOTICE

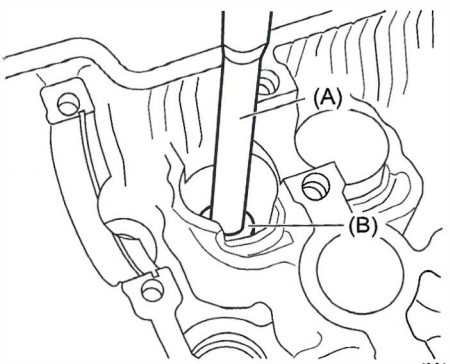
Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

Special tool
(A): 09916–44310
(B): 09916–53350



IM10L1140150-01

1. Cylinder head	"a": 18.0 mm (0.71 in)



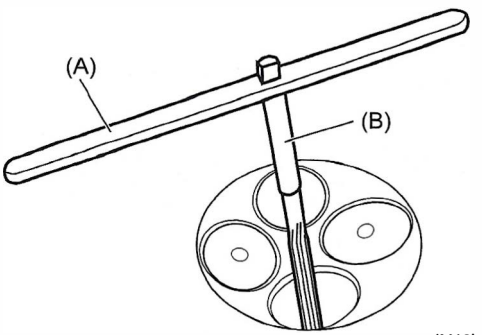
IM10L1140149-03

7) After installing the valve guides, refinish their guiding bores using the reamer. Be sure to clean and oil the guides after reaming.

NOTE

- **Be sure to cool down the cylinder head to ambient air temperature.**
- **Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.**

Special tool
(A): 09916–34542
(B): 09916–34570



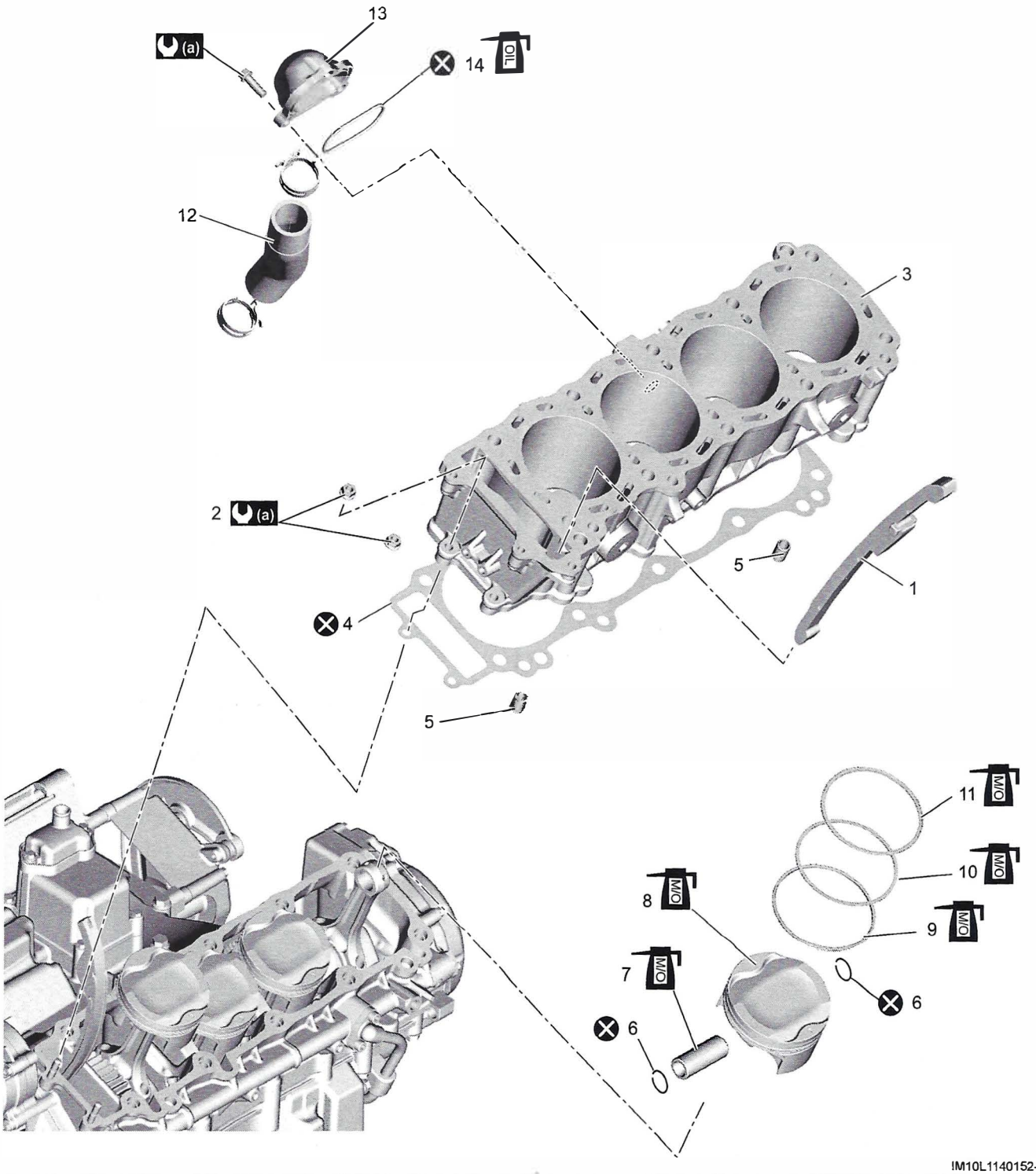
IM10L1140151-03

Cylinder / Cam Chain Guide No.1 / Piston / Piston Ring Components

BENM10L31406036

NOTE

The components of the piston are the same from # 1 to # 4.



IM10L1140152-03

1. Cam chain guide	7. Piston pin	13. Water inlet connector
2. Cylinder nut	8. Piston	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
3. Cylinder	9. Oil ring	OIL : Apply oil.
4. Cylinder gasket	10. 2nd ring	M/O : Apply molybdenum oil.
5. Dowel pin	11. 1st ring	: Do not reuse.
6. Piston pin circlip	12. Water hose	

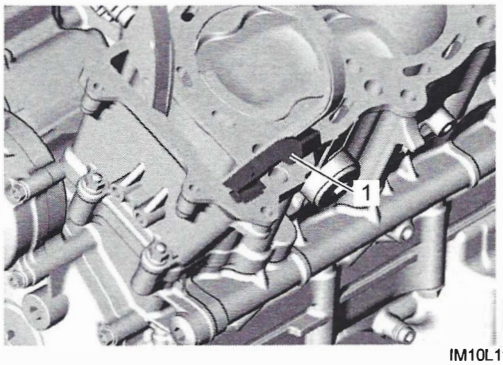
Cam Chain Guide No.1 / Cylinder / Piston Removal

BENM10L31406037

Refer to "Cylinder Head Removal" (Page 1D-35).
Refer to "Cylinder Head Installation" (Page 1D-36).

Cam Chain Guide No.1

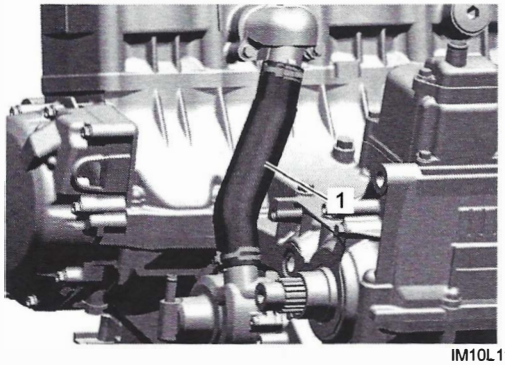
1) Remove the cam chain guide No.1 (1) from the cylinder.



IM10L1140153-02

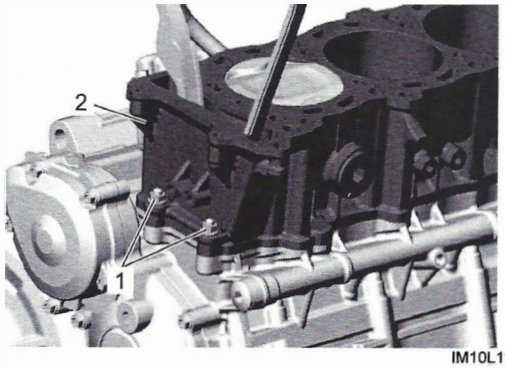
Cylinder

1) Remove the water hose (1) from the cylinder.



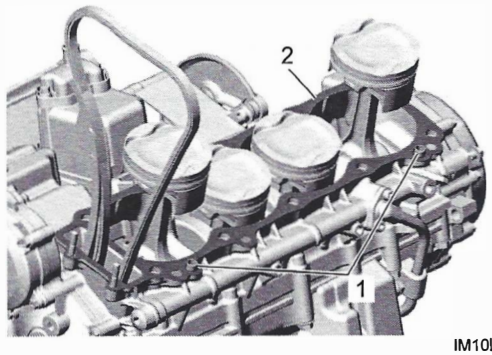
IM10L1140154-01

2) Remove the cylinder nuts (1), and then remove the cylinder (2).



IM10L1140155-01

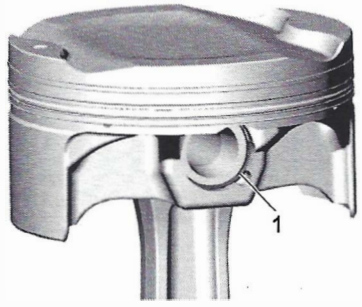
3) Remove the dowel pins (1) and cylinder gasket (2).



IM10L1140156-02

Piston

1) Place a clean rag over the cylinder base so as not to drop the piston pin circlips into the crankcase.
2) Remove the piston pin circlip (1) from the piston.

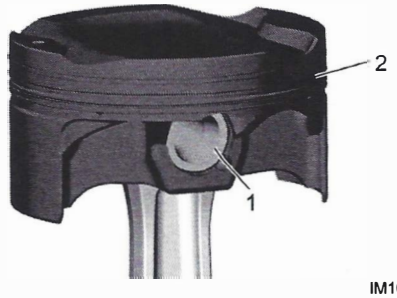


IM10L1140157-01

3) Draw out the piston pin (1) and remove the piston (2).

NOTE

Scribe the cylinder number on the piston head.



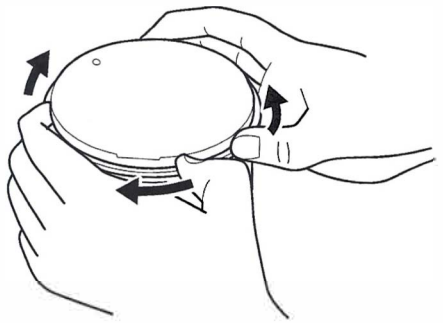
IM10L1140158-01

Piston ring

1) Carefully spread the ring opening with your thumbs and then push up the opposite side of the 1st ring to remove it.

NOTE

Do not expand the piston ring excessively since it is apt to be broken down.



I837H1140181-01

2) Remove the 2nd ring and oil ring in the same manner.

Cam Chain Guide No.1 / Cylinder / Piston Installation

BENM10L31406038

Piston ring

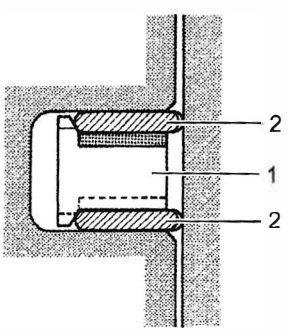
NOTE

- **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.**

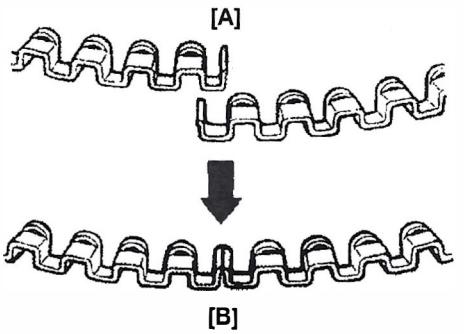
1) Install the piston rings in the order of the oil ring, 2nd ring and 1st ring.
   a) The first member to go into the oil ring groove is the spacer (1).
   After placing the spacer, fit the two side rails (2).

NOTICE

When installing the spacer, be careful not to allow its two ends to overlap in the groove.



IF04K1140328-02



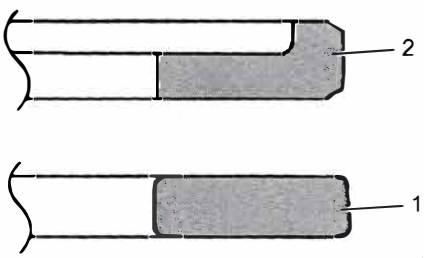
IH17K1140241-01

[A]: Incorrect	[B]: Correct

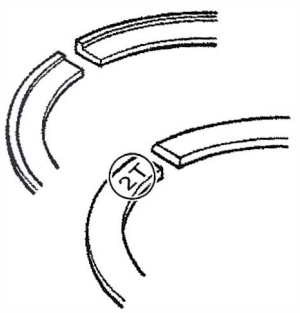
b) Install the 2nd ring (1) and 1st ring (2) to piston.

NOTE

- **1st ring (2) and 2nd ring (1) differ in shape.**
- **Face the side with the stamped mark upward when assembling.**

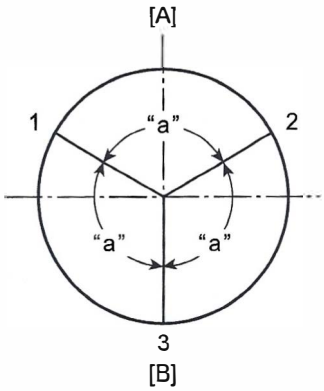


IM10L1140159-01



I823H1140148-03

2) Position the gaps of the piston rings and side rails as shown. Before inserting piston into the cylinder, check that the gaps are so located.



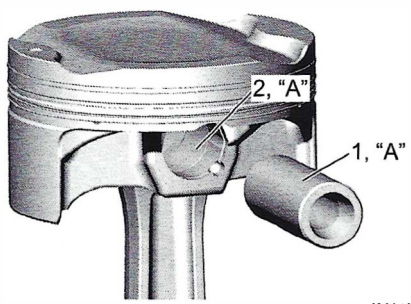
IH18K1140213-01

[A]:	EX.
[B]:	IN.
1.	2nd ring and lower side rail
2.	Upper side rail
3.	1st ring and spacer
"a":	120°

Piston

1) Apply a small quantity of molybdenum oil solution to the piston pin (1) and sliding surface of the pistons (2).

"A": Assembly lubrication (Molybdenum oil solution)

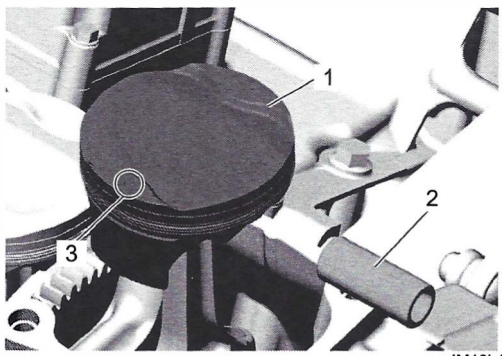


IM10L1140160-01

2) Install the piston (1), piston pin (2).

NOTE

- **Be sure to install the pistons in the cylinders from which they were removed in disassembly, refer to the cylinder numbers, #1 through #4, scribed on the piston.**
- **When installing the pistons, the indent (3) on the piston head must be faced to exhaust side.**

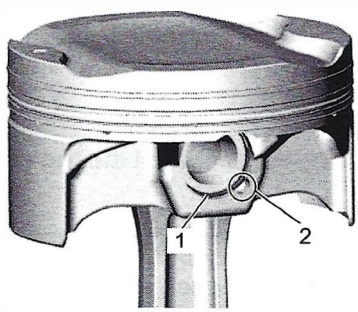


IM10L1140161-01

3) Install the new piston pin circlip (1).

NOTE

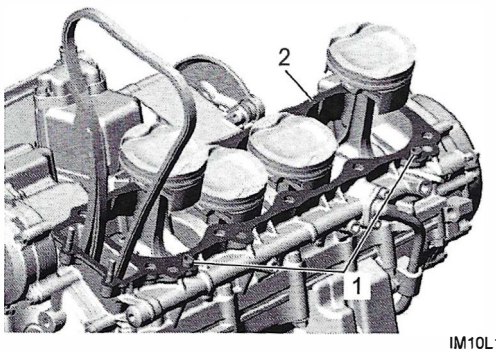
- **Place a clean rag over the cylinder base so as not to drop the piston pin circlips into the crankcase.**
- **End gap of the circlip should not be aligned with the cutaway (2) in the piston pin bore.**



IM10L1140162-01

Cylinder

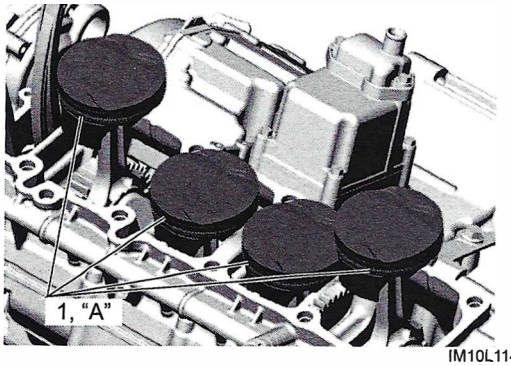
1) Fit the dowel pins (1) and a new gasket (2) to the upper crankcase.



IM10L1140156-02

2) Apply a small quantity of molybdenum oil solution to the sliding surface of the pistons (1).

"A": Assembly lubrication (Molybdenum oil solution)



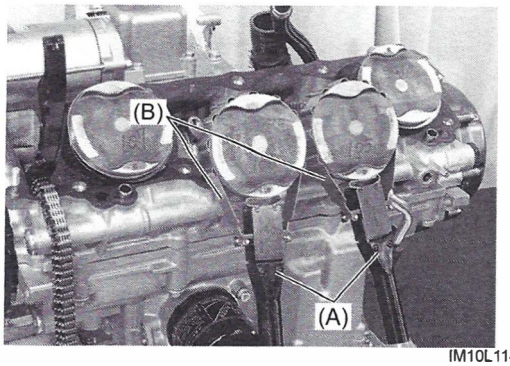
IM10L1140163-01

3) Install special tools to the No. 2 and No. 3 pistons.

Special tool
(A): 09916–74521
(B): 09916–74550

NOTE

Do not over tighten the bands, or the piston installation into the cylinders will be difficult.



IM10L1140164-01

4) Insert the No. 2 and No. 3 pistons into the cylinder.

NOTE

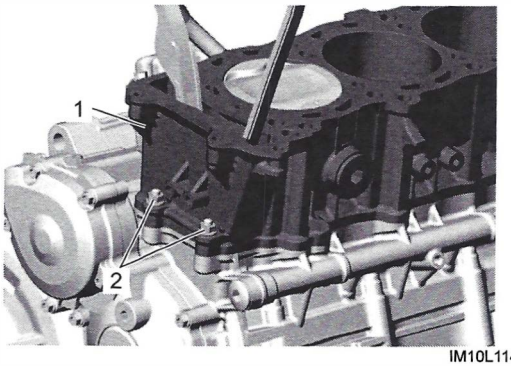
Some light resistance must be overcome to lower the cylinder.

5) After inserting the No. 2 and No. 3 pistons in place, insert the No. 1 and No. 4 pistons in the same manner of the No. 2 and No. 3 pistons.

NOTE

When installing the cylinder block, keep the cam chain taut. The cam chain must not be caught between cam drive sprocket and crankcase when turning the crankshaft.

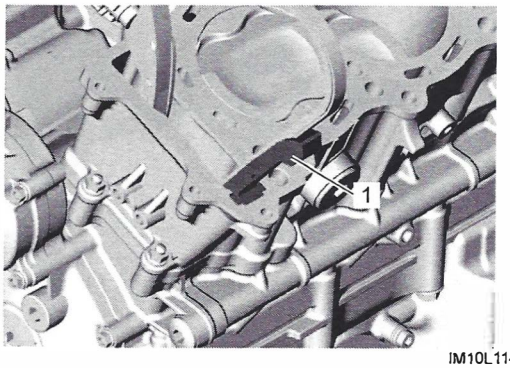
6) Install the cylinder (1), and then tighten he cylinder nuts (2) temporary.



IM10L1140165-02

Cam Chain Guide No.1

1) Install the cam chain guide No.1 (1) to the cylinder.



IM10L1140153-02

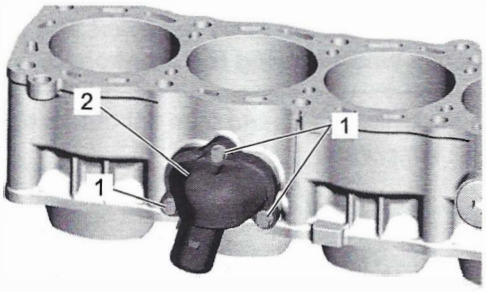
Cylinder Disassembly and Reassembly

BENM10L31406039

Refer to "Cam Chain Guide No.1 / Cylinder / Piston Removal" (Page 1D-50).
Refer to "Cam Chain Guide No.1 / Cylinder / Piston Installation" (Page 1D-51).

Disassembly

1) Remove the water inlet connector bolts (1) and water inlet connector (2).

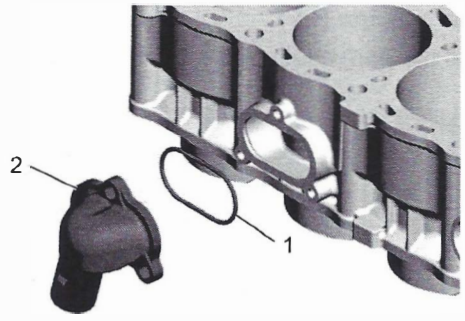


IM10L1140166-01

Reassembly

Assembly is in the reverse order of disassembly. Pay attention to the following points:

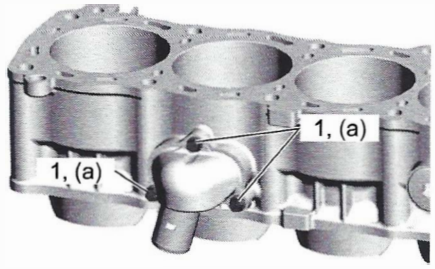
- Apply engine coolant to new O-ring (1) of water inlet connector (2).



IM10L1140169-01

- Tighten the water inlet connector bolts (1) to the specified torque.

Tightening torque
Water inlet connector bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1140170-01

Cylinder Inspection

BENM10L31406040

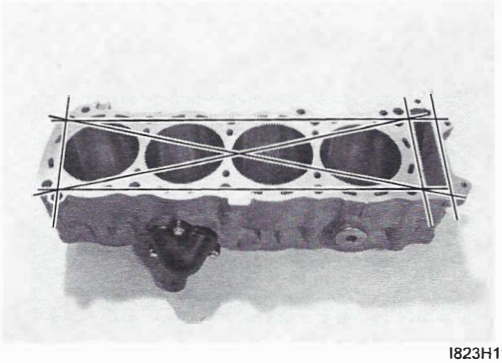
Refer to "Cam Chain Guide No.1 / Cylinder / Piston Removal" (Page 1D-50).
Refer to "Cam Chain Guide No.1 / Cylinder / Piston Installation" (Page 1D-51).

Cylinder Distortion

Check the gasket surface of the cylinder for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If any reading exceeds the service limit, replace the cylinder.

Special tool
09900–20803

Cylinder distortion
[Limit]: 0.20 mm (0.008 in)



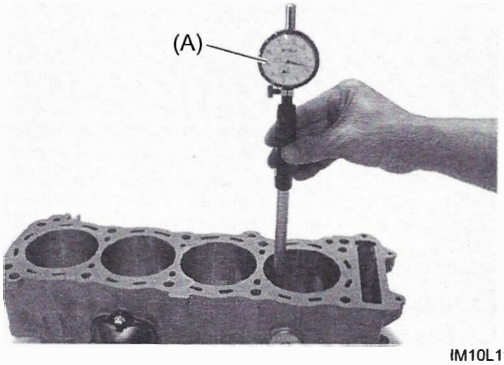
I823H1140144-01

Cylinder Bore

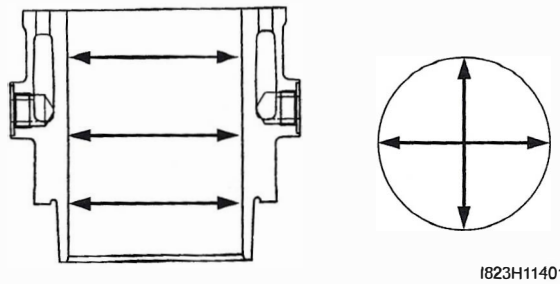
Check the cylinder wall for any scratches, nicks or other damage. Measure the cylinder bore diameter at six places.

Special tool
(A): 09900–20530

Cylinder bore
[Standard]: 81.000 – 81.015 mm (3.1890 – 3.1896 in)
[Limit]: No nicks or Scratches



IM10L1140171-01



I823H1140146-02

Piston-to-cylinder Clearance
Refer to "Piston / Piston Ring Inspection" (Page 1D-55).

Piston / Piston Ring Inspection

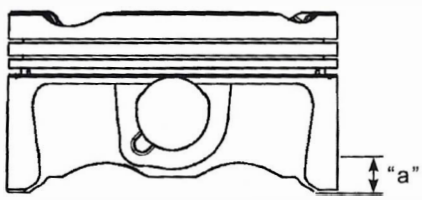
BENM10L31406041

Refer to "Cam Chain Guide No.1 / Cylinder / Piston Removal" (Page 1D-50) and "Cam Chain Guide No.1 / Cylinder / Piston Installation" (Page 1D-51).

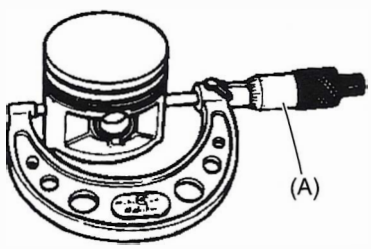
Piston Diameter
Measure the piston diameter using the micrometer at 8.5 mm (0.3 in) "a" from the skirt end. If the piston diameter is less than the service limit, replace the piston.

Piston diameter
Measure at 8.5 mm (0.3 in) from the skirt end.
[Limit]: 80.850 mm (3.1831 in)

Special tool
(A): 09900–20203



IF04K1140240-01



IF04K1140241-01

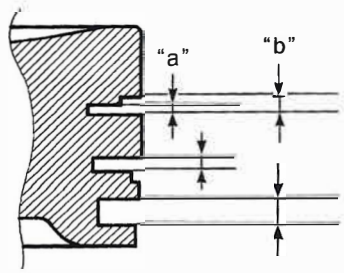
Piston to Cylinder Clearance
Subtract the piston diameter from the cylinder bore diameter. If the piston to cylinder clearance exceeds the service limit, replace both the cylinder and the piston.

Piston to cylinder clearance
[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.

Piston ring to groove clearance
1st [Limit]: 0.180 mm (0.0070 in)
2nd [Limit]: 0.150 mm (0.0059 in)

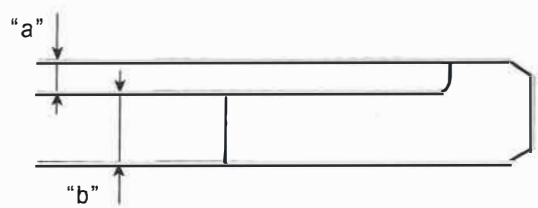
Piston ring groove width
1st [Standard] "a": 0.83 – 0.85 mm (0.0327 – 0.0335 in)
1st [Standard] "b": 1.30 – 1.32 mm (0.0512 – 0.0520 in)
2nd [Standard]: 1.01 – 1.03 mm (0.0398 – 0.0406 in)
Oil [Standard]: 2.01 – 2.03 mm (0.0791 – 0.0799 in)



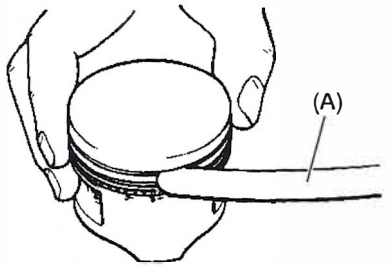
I823H1140580-02

Piston ring thickness
1st [Standard] "a": 0.76 – 0.81 mm (0.0299 – 0.0319 in)
1st [Standard] "b": 1.08 – 1.10 mm (0.0425 – 0.0433 in)
2nd [Standard]: 0.97 – 0.99 mm (0.0382 – 0.0390 in)

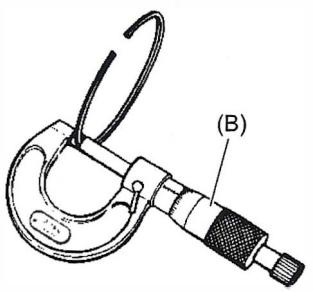
Special tool
(A): 09900–20803
(B): 09912–66310



IM10L1140173-01



IF04K1140242-01



IF04K1140243-01

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.

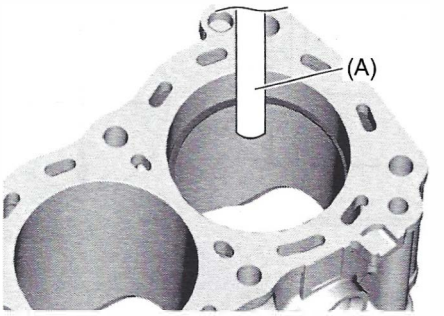
Piston ring free end gap
1st [Limit]: 5.2 mm (0.20 in)
2nd [Limit]: 7.2 mm (0.28 in)

Piston ring end gap
1st [Limit]: 0.50 mm (0.019 in)
2nd [Limit]: 0.50 mm (0.019 in)

Special tool
(A): 09900–20803



IK46K1140139-01

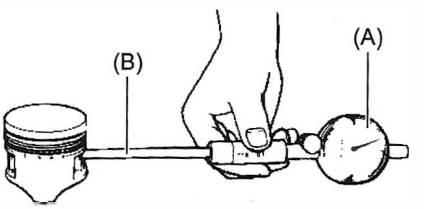


IM10L1140174-01

Piston Pin and Pin Bore
Measure the piston pin bore inside diameter using the small bore gauge. If either is out of specification or the difference between these measurements surpass limits, replace the piston.

Piston pin bore I.D.
[Limit]: 18.030 mm (0.7098 in)

Special tool
(A): 09900–20602
(B): 09900–22401

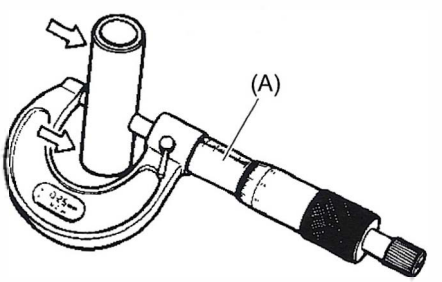


IF04K1140246-01

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.

Piston pin O.D.
[Limit]: 17.98 mm (0.7079 in)

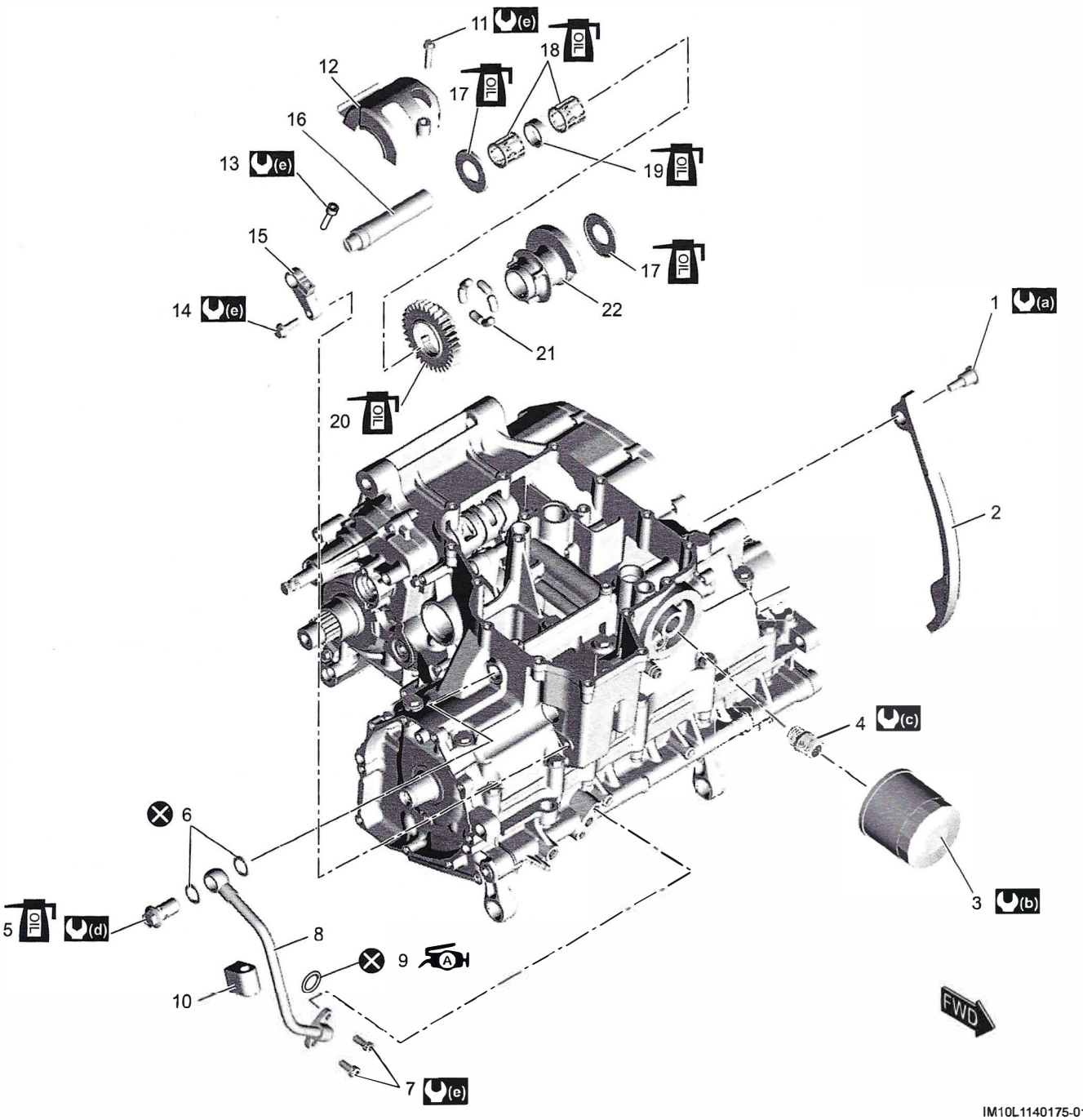
Special tool
(A): 09912–66310



IF04K1140323-02

Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand / Oil Pipe Components

BENM10L31406042



IM10L1140175-01

1. Cam chain tensioner bolt	11. Oil separator bolt	21. Damper
2. Cam chain tensioner	12. Oil separator	22. Crank balancer
3. Oil filter	13. Balancer shaft mounting bolt	(a) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
4. Oil filter stand	14. Balancer shaft arm bolt	(b) : 20 N·m (2.0 kgf-m, 15.0 lbf-ft)
5. Oil pipe union bolt	15. Balancer shaft arm	(c) : 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
6. Gasket	16. Balancer shaft	(d) : 24 N·m (2.4 kgf-m, 18.0 lbf-ft)
7. Oil pipe bolt	17. Washer	(e) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
8. Oil pipe	18. Bearing	OIL : Apply engine oil.
9. O-ring	19. Spacer	A : Apply SUZUKI SUPER GREASE A.
10. Cushion	20. Balancer gear	: Do not reuse.

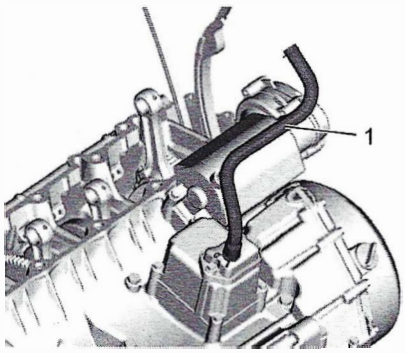
Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand / Oil Pipe Removal

BENM10L31406043

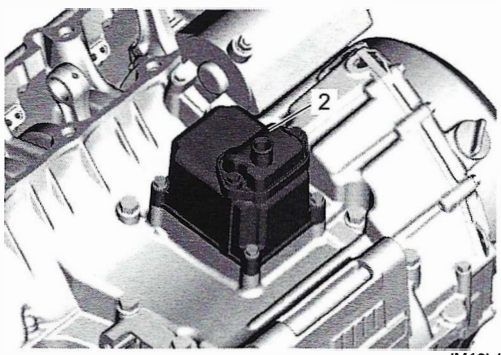
- Refer to "Engine Assembly Removal" (Page 1D-27).
- Refer to "Cam Chain Guide No.1 / Cylinder / Piston Removal" (Page 1D-50).
- Refer to "Cam Chain Guide No.1 / Cylinder / Piston Installation" (Page 1D-51).

PCV Cover

Remove the PCV hose (1) and cover (2). ☞(Page 1B-6)



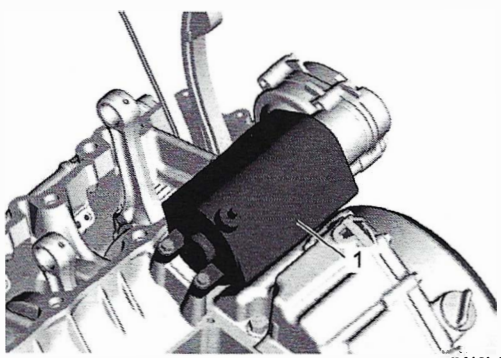
IM10L1140176-02



IM10L1140177-02

Starter Motor

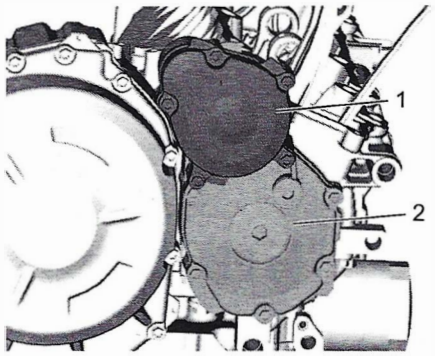
Remove the starter motor (1). ☞(Page 1I-6)



IM10L1140178-02

Starter Torque Limiter / Starter Clutch

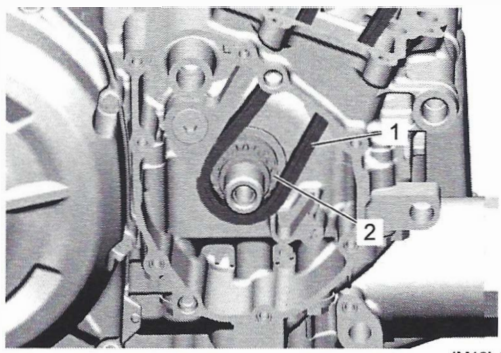
Remove the starter torque limiter (1) and starter clutch (2). ☞(Page 1I-10)



IM10L1140179-02

Cam Chain

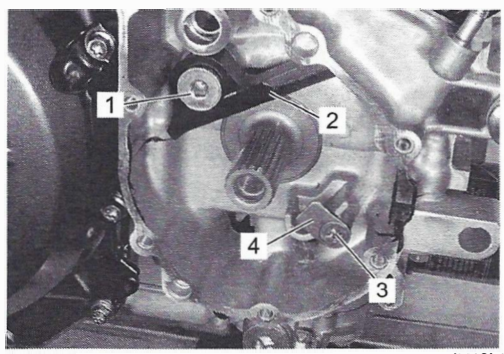
Remove the cam chain (1) and cam chain drive sprocket (2).



IM10L1140180-01

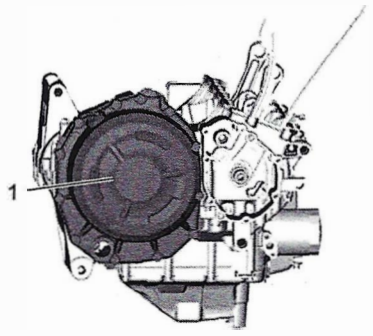
Cam Chain Tensioner

Remove the cam chain tensioner bolt (1), cam chain tensioner (2), cam chain guide retainer bolt (3) and cam chain guide retainer (4).



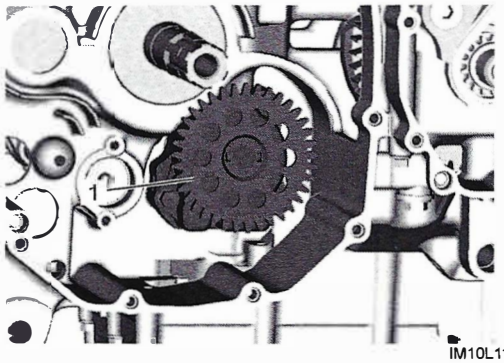
IM10L1140181-01

Clutch
Remove the clutch component parts (1). ☞(Page 5C-17)



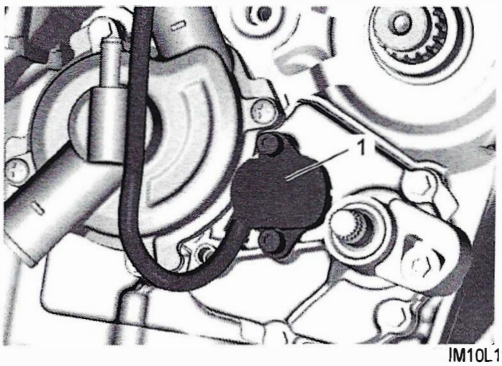
IM10L1140182-02

Oil Pump
Remove the oil pump (1). ☞(Page 1E-14)



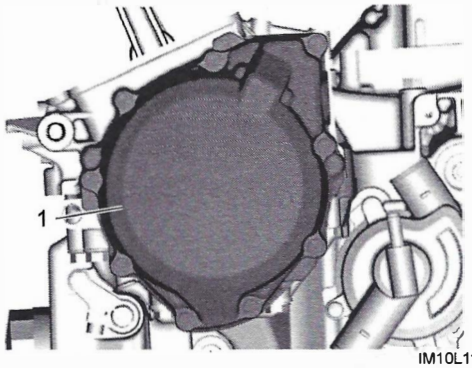
IM10L1140183-02

GP Sensor
Remove the GP sensor (1). ☞(Page 5B-14)



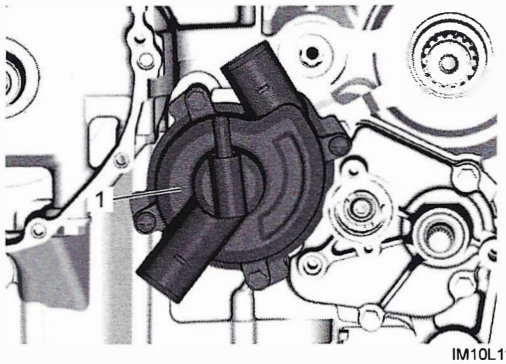
IM10L1140184-02

Generator
Remove the generator component parts (1). ☞(Page 1J-4)



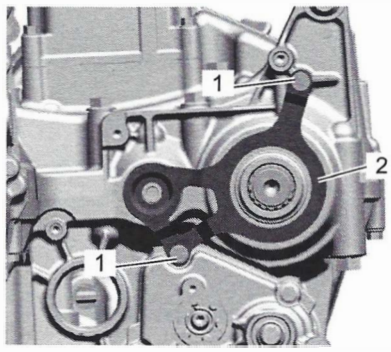
IM10L1140185-02

Water Pump
Remove the water pump (1). ☞(Page 1F-15)



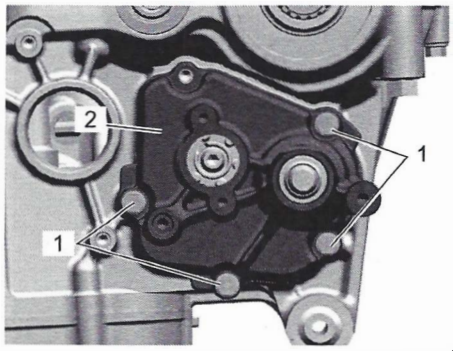
IM10L1140186-04

Gearshift System
1) Remove the oil seal retainer bolts (1) and oil seal retainer (2) from the upper crankcase and lower crankcase.



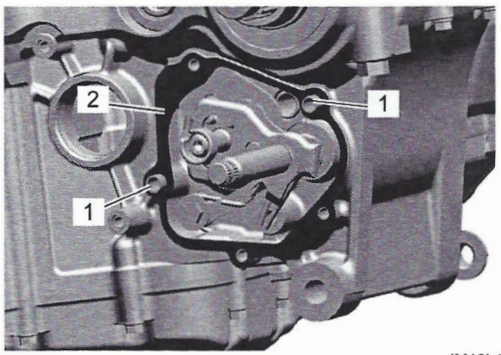
IM10L1140187-01

2) Remove the gearshift cover bolts (1) and gearshift cover (2) from the lower crankcase.



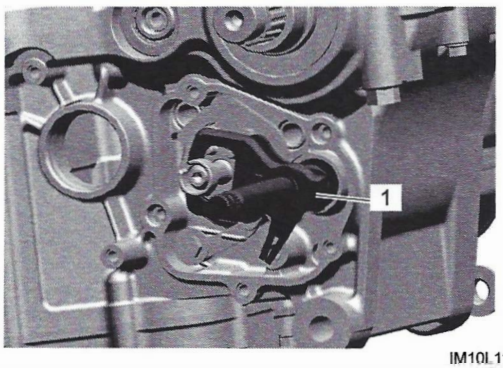
IM10L1140188-01

3) Remove the dowel pins (1) and gasket (2) from the lower crankcase.



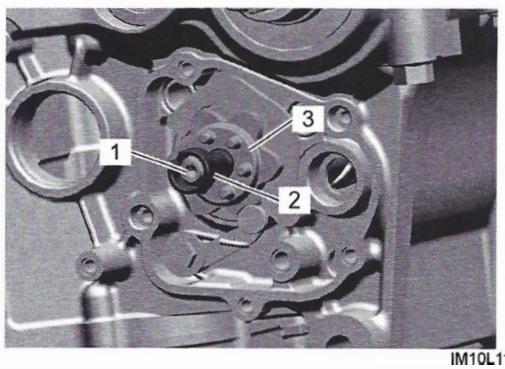
IM10L1140189-01

4) Remove the gearshift assembly (1) from the lower crankcase.



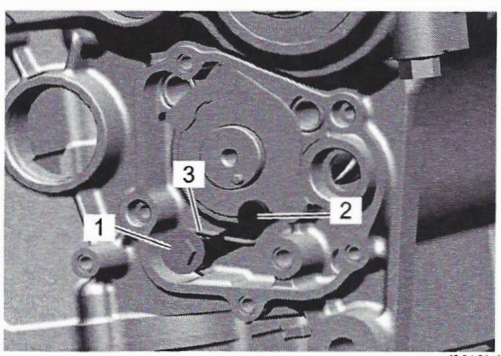
IM10L1140190-01

5) Remove the gearshift cam plate stopper bolt (1), gearshift cam plate stopper (2) and gearshift cam plate (3).



IM10L1140191-01

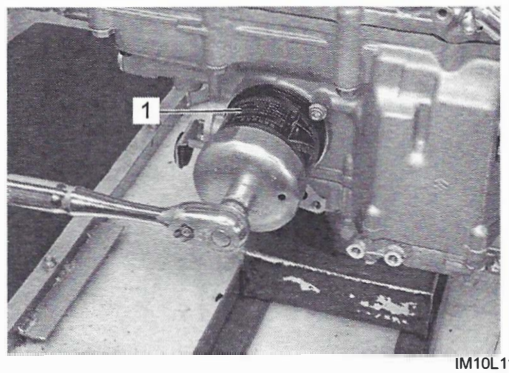
6) Remove the gearshift cam stopper bolt (1), gearshift cam stopper (2), washer and spring (3) from the lower crankcase.



IM10L1140192-01

Oil Filter / Oil Filter Stand

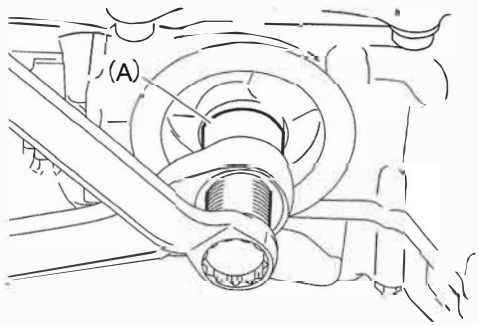
1) Remove the oil filter (1). ☞(Page 0B-12)



IM10L1140193-01

2) Remove oil filter stand from the lower crankcase using special tool and wrenches, if necessary.

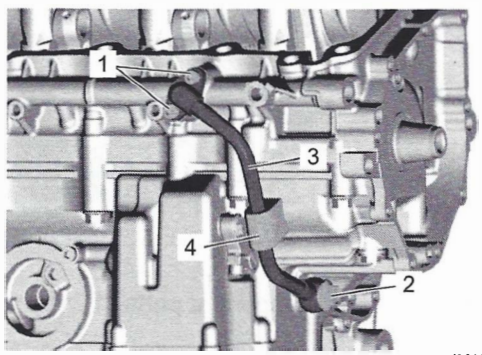
Special tool
(A): 09915–41510



IM10L1140194-03

Oil Pipe

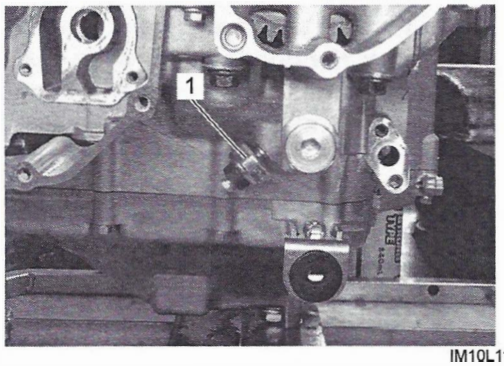
1) Remove the oil pipe bolts (1), union bolt (2), gaskets and oil pipe (3).
2) Remove the cushion (4).



IM10L1140195-01

Oil Pressure Switch

Remove the oil pressure switch (1) from the lower crankcase. ☞(Page 1E-11)



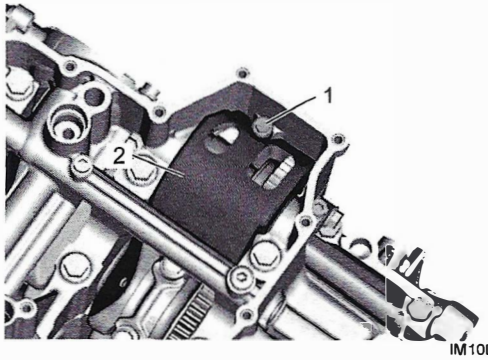
IM10L1140196-01

Oil Pan / Oil Pressure Regulator / Oil Strainer / Breather Pipe

1) Remove the following parts. ☞(Page 1E-6)
   - Oil pan
   - Oil strainer
   - Breather pipe

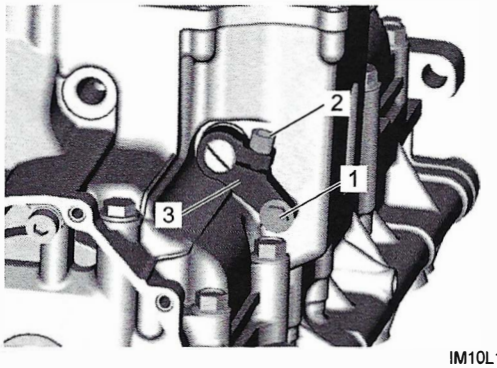
Crank Balancer

1) Remove the oil separator bolt (1) and oil separator (2) from the lower crankcase.



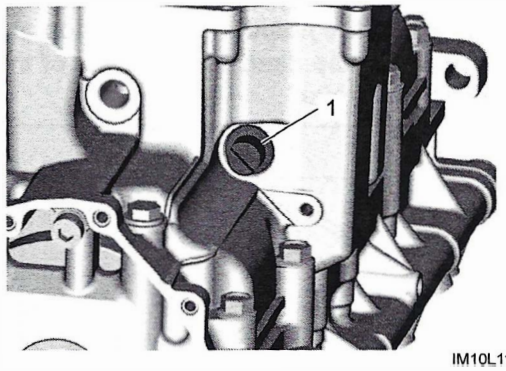
IM10L1140197-01

2) Remove the balancer shaft arm bolt (1), balancer shaft mounting bolt (2) and balancer shaft arm (3).



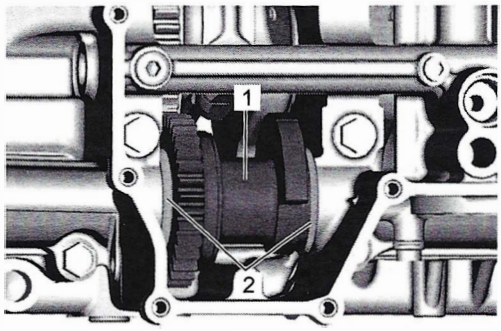
IM10L1140198-02

3) Remove the balancer shaft (1) from the crank balancer assembly.



IM10L1140199-01

4) Remove the crank balancer assembly (1) and washers (2) from the lower crankcase.



IM10L1140200-01

Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand Installation

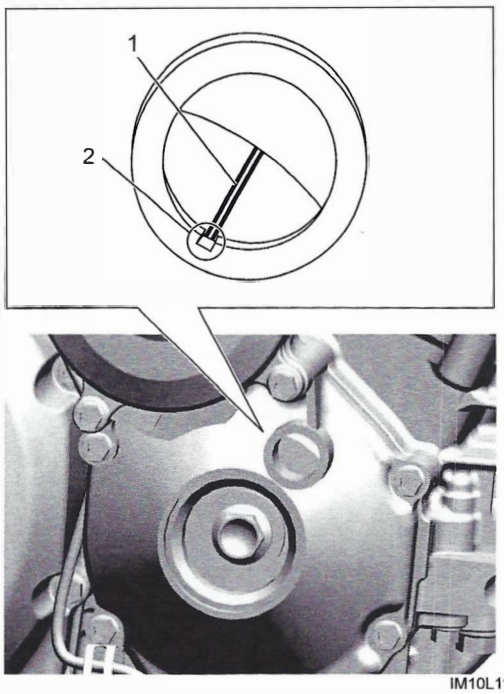
BENM10L31406044

Crank Balancer

1) Temporarily install the cam chain drive sprocket, starter clutch and starter clutch cover. ☞(Page 1I-10)
2) Turn the crankshaft to bring the line (1) on starter clutch to the slit (2) of the valve timing inspection hole.

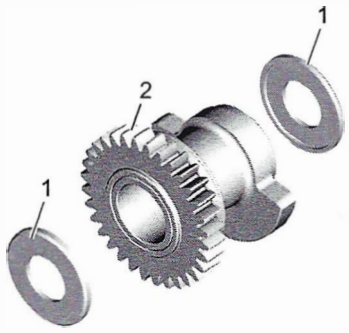
NOTE

Make sure that the positions of #1 piston and #4 piston are at top dead center (TDC) of the compression stroke.



IM10L1140296-01

3) Apply engine oil to the washers (1), and then install the washers to the crank balancer assembly (2).

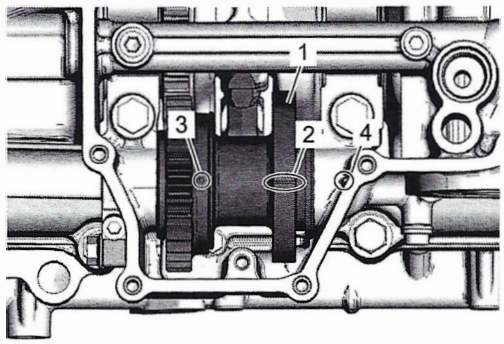


IM10L1140202-02

4) Hold the crankshaft and install the crank balancer assembly (1).

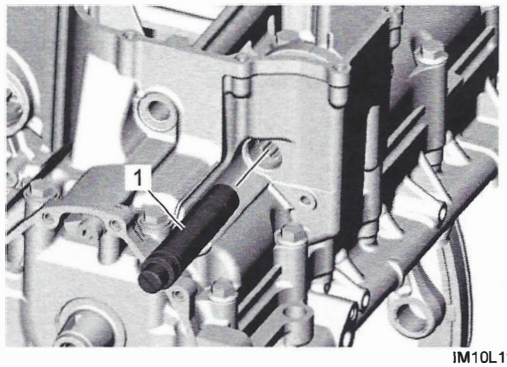
NOTE

Make sure that the engraved line (2) on the crank balancer, the punch mark (3) on the balancer gear, and the triangle mark (4) on the crankcase are aligned.



IM10L1140203-01

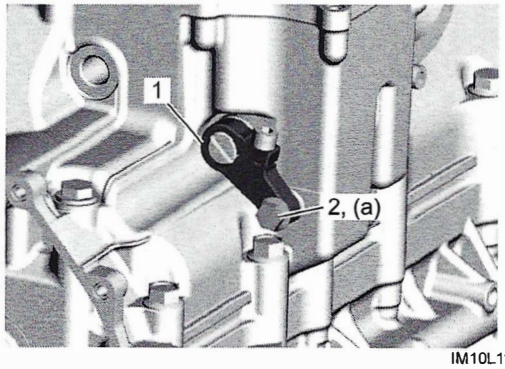
5) Install the balancer shaft (1) to the crank balancer assembly.



IM10L1140204-01

6) Install the balancer shaft arm (1) to the balancer shaft, and then tighten the new balancer shaft arm bolt (2) to the specified torque.

Tightening torque
Balancer shaft arm bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



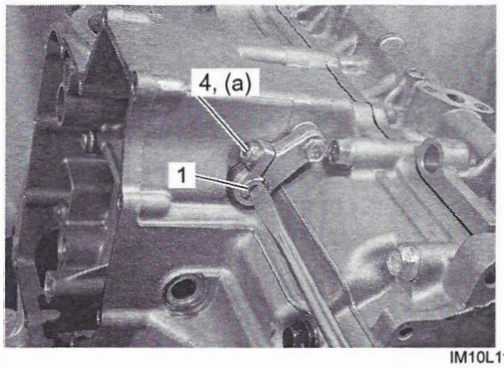
IM10L1140205-01

7) Slowly turn the balancer shaft (1) clockwise until it stops (position (2)) with a (–) screwdriver.
8) From this position, turn the balancer shaft (1) counterclockwise by 1.5 – 2 graduations (3), and then tighten the bolt (4) to the specified torque. From (2) to (3): 1.5 – 2 graduations.

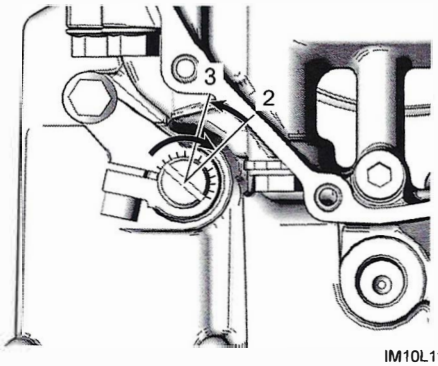
NOTE

If the balancer gear is noisy after starting the engine, turn in or out the balancer shaft within 1 graduation from standard setting to reduce the gear noise.

Tightening torque
Balancer shaft mounting bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



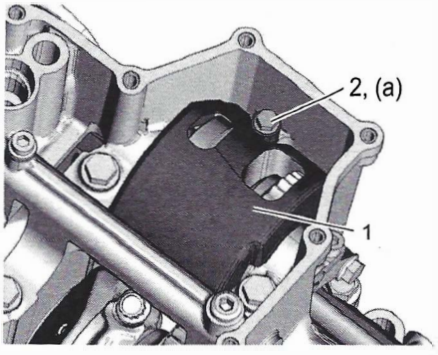
IM10L1140206-02



IM10L1140207-01

9) Install the oil separator cover (1), and then tighten the oil separator cover bolt (2) to the specified torque.

Tightening torque
Oil separator cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

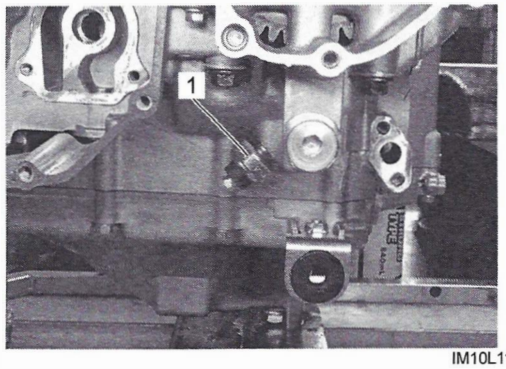


IM10L1140208-01

Oil Pan / Oil Pressure Regulator / Oil Strainer / Breather Pipe

1) Install the following parts. ☞(Page 1E-6)
   - Oil pan
   - Oil strainer
   - Breather pipe

Oil Pressure Switch
Install the oil pressure switch (1). ☞(Page 1E-11)

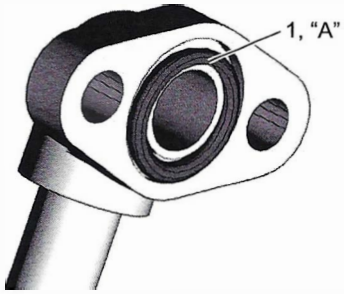


IM10L1140196-01

Oil Pipe

1) Apply grease to the new O-ring (1), and then install the new O-ring to the oil pipe.

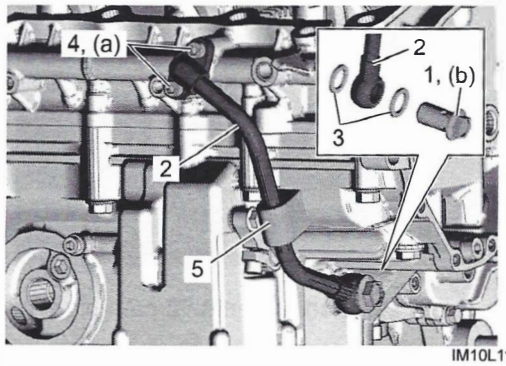
   "A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1140209-01

2) Apply engine oil to the oil pipe union bolt (1) threads.
3) Install the oil pipe (2), new gaskets (3), new oil pipe bolt (4) and oil pipe union bolt (1) to the upper crankcase and lower crankcase.
4) Install the cushion (5) to the oil pipe.
5) Tighten the oil pipe bolt (4) and oil pipe union bolt (1) to the specified torque.

Tightening torque
Oil pipe bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
Oil pipe union bolt (b): 24 N·m (2.4 kgf-m, 18.0 lbf-ft)



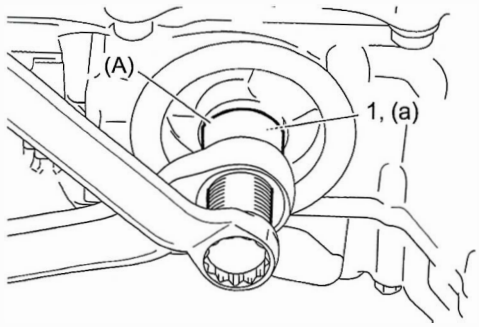
IM10L1140210-01

Oil Filter / Oil Filter Stand

1) Install the oil filter stand (1) to the lower crankcase, and then tighten the oil filter stand with special tool to the specified torque.

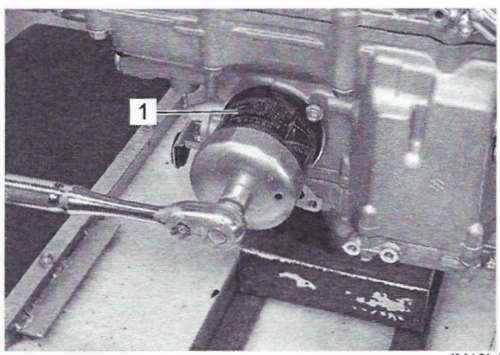
Special tool
(A): 09915–41510

Tightening torque
Oil filter stand (a): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)



IM10L1140211-03

2) Install the oil filter (1). ☞(Page 0B-12)

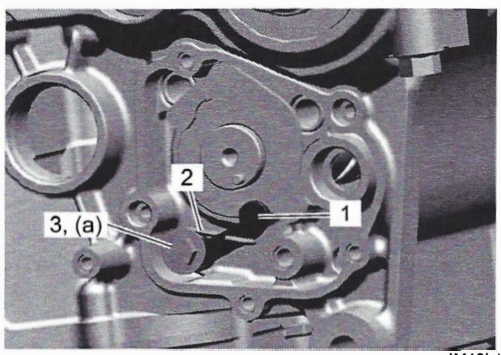


IM10L1140193-01

Gearshift System

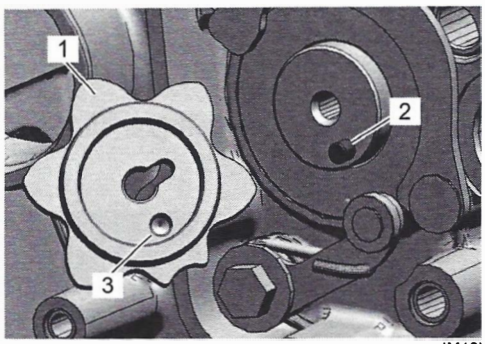
1) Install the gearshift cam stopper (1), spring (2) and gearshift cam stopper bolt (3).
2) Tighten the gearshift cam stopper bolt (3) to the specified torque.

Tightening torque
Gearshift cam stopper bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1140212-01

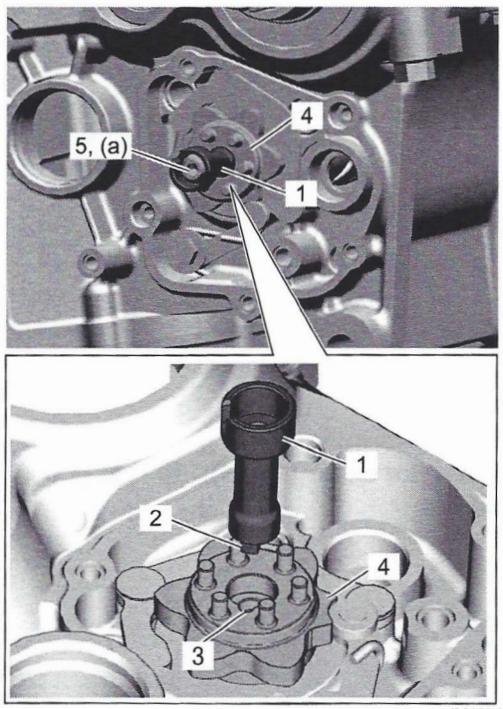
3) Degrease the thread of gearshift cam plate stopper bolt (1).
4) When installing the gearshift cam plate (1), align the gearshift cam pin (2) with the hole (3) of gearshift cam plate.



IM10L1140293-01

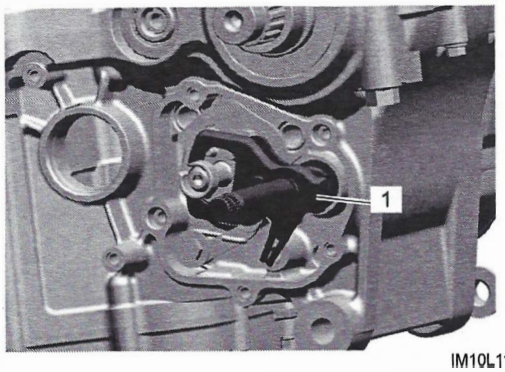
5) When installing the gearshift cam stopper (1), align the projection (2) of gearshift cam stopper with the groove (3) of gearshift cam plate (4).
6) Tighten the gearshift cam plate stopper bolt (5) to the specified torque.

Tightening torque
Gearshift cam plate stopper bolt (a): 13 N·m (1.3 kgf-m, 9.5 lbf-ft)



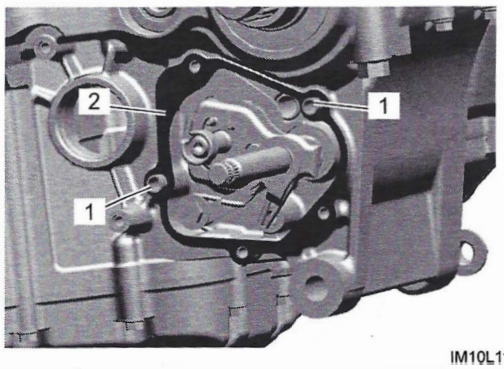
IM10L1140213-03

7) Install the gearshift assembly (1) to the lower crankcase.



IM10L1140214-01

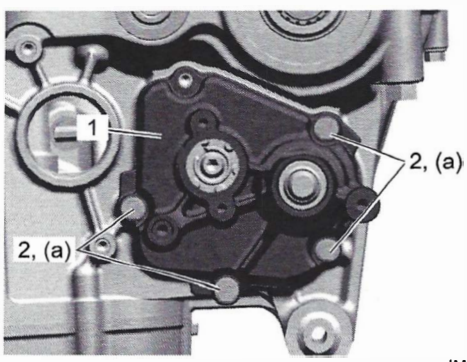
8) Install the dowel pins (1) and new gasket (2) to the lower crankcase.



IM10L1140215-01

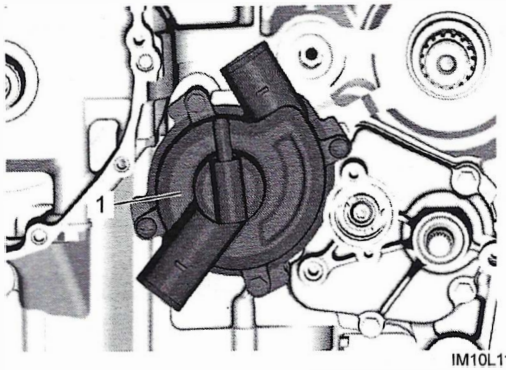
9) Install the gearshift cover (1) and gearshift cover bolts (2) to the lower crankcase, and then tighten the gearshift cover bolts to the specified torque.

Tightening torque
Gearshift cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



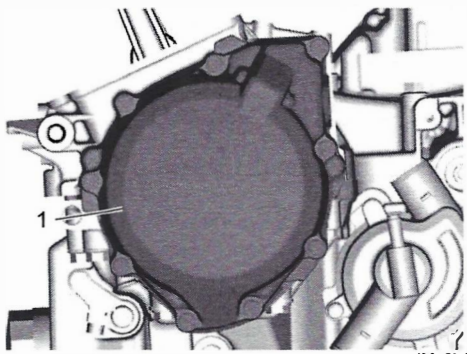
IM10L1140216-01

Water Pump
Install the water pump (1). ☞(Page 1F-15)



IM10L1140186-04

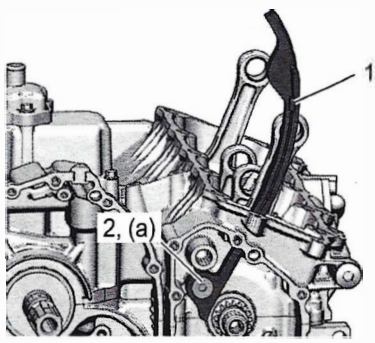
Generator
Install the generator component parts (1). ☞(Page 1J-6)



IM10L1140185-02

Cam Chain Tensioner
Install the cam chain tensioner (1) and cam chain tensioner bolt (2) to the upper crankcase, and then tighten the cam chain tensioner bolt to the specified torque.

Tightening torque
Cam chain tensioner bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



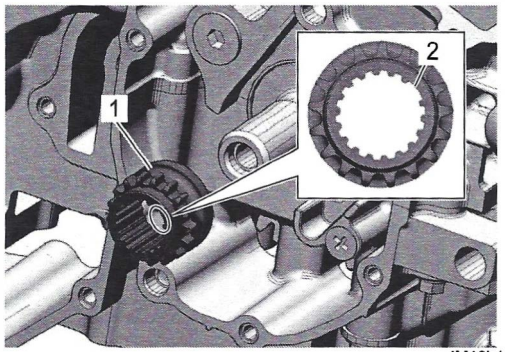
IM10L1140217-01

Cam Chain

1) Install the cam chain drive sprocket (1) to the crankshaft.

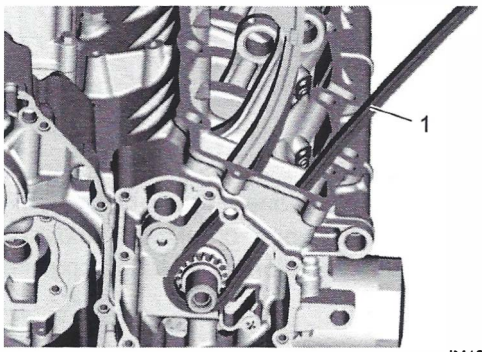
NOTE

Align the wide spline tooth (2) of cam chain drive sprocket and that of crankshaft.



IM10L1140218-01

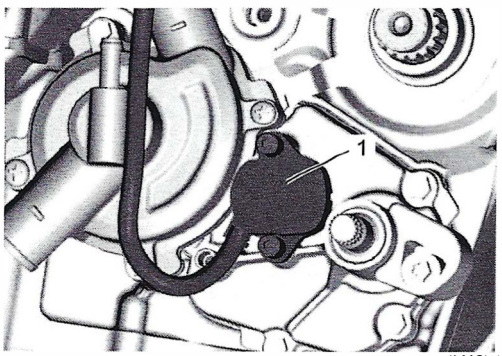
2) Install the cam chain (1) onto the cam chain drive sprocket.



IM10L1140219-01

GP Sensor

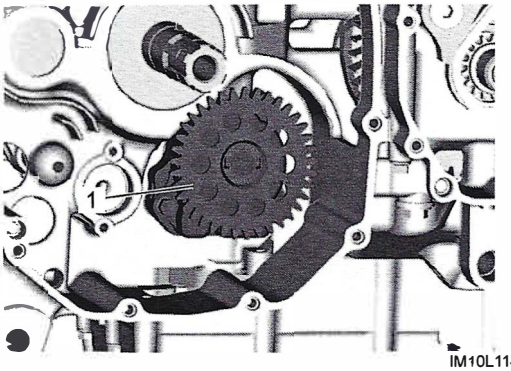
Install the GP sensor (1). ☞(Page 5B-14)



IM10L1140184-02

Oil Pump

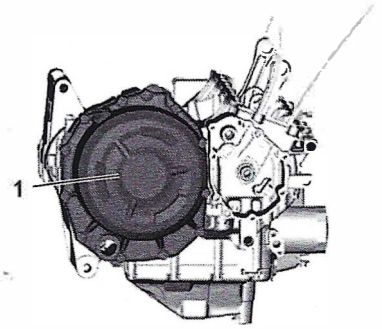
Install the oil pump (1). ☞(Page 1E-14)



IM10L1140183-02

Clutch

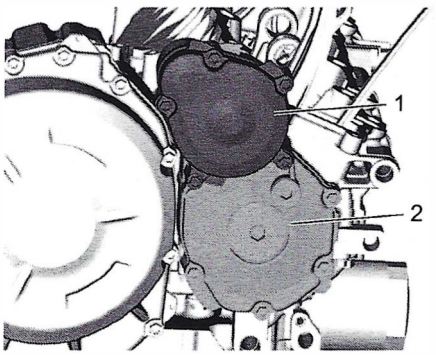
Install the clutch component parts (1). ☞(Page 5C-17)



IM10L1140182-02

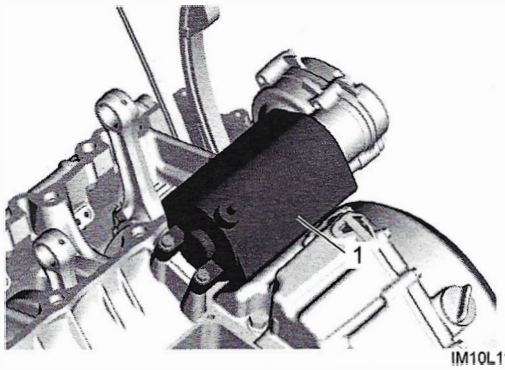
Starter Torque Limiter / Starter Clutch

Install the starter torque limiter (1) and starter clutch (2). ☞(Page 1I-10)



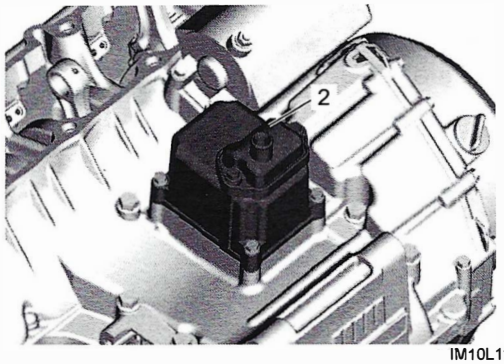
IM10L1140179-02

Starter Motor
Install the starter motor (1). ☞(Page 1I-6)

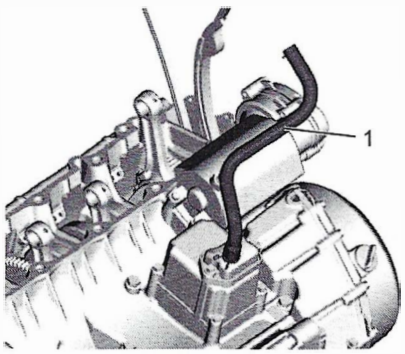


IM10L1140178-02

PCV Cover
Install the PCV cover (2) and hose (1). ☞(Page 1B-6)



IM10L1140177-02



IM10L1140176-02

- Refer to "Cam Chain Guide No.1 / Cylinder / Piston Removal" (Page 1D-50).
- Refer to "Cam Chain Guide No.1 / Cylinder / Piston Installation" (Page 1D-51).
- Refer to "Engine Assembly Installation" (Page 1D-30).

Cam Chain Tensioner Inspection

BENM10L31406045

Refer to "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand / Oil Pipe Removal" (Page 1D-58) and "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand Installation" (Page 1D-61).
Check the contacting surface of the cam chain tensioner. If it is worn or damaged, replace it with a new one.


IM10L1140290-01

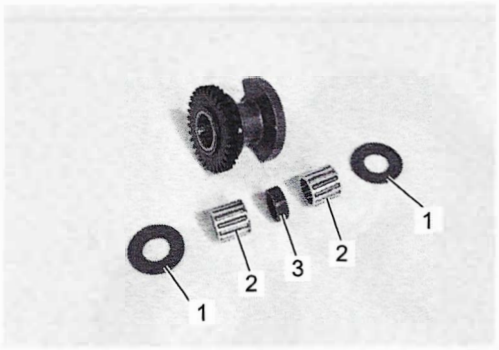
Crank Balancer Disassembly and Reassembly

BENM10L31406046

Refer to "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand / Oil Pipe Removal" (Page 1D-58) and "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand Installation" (Page 1D-61).

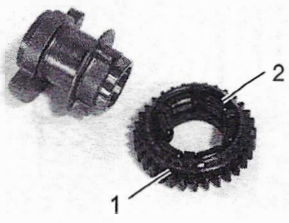
Disassembly

1) Remove the washers (1), bearings (2) and spacer (3) from the crank balancer.



IM10L1140220-02

2) Remove the balancer gear (1) along with the dampers (2) from the crank balancer.
3) Remove the dampers (2) from the balancer gear (1).



IM10L1140221-01

Assembly

1) Apply engine oil to the dampers (1).

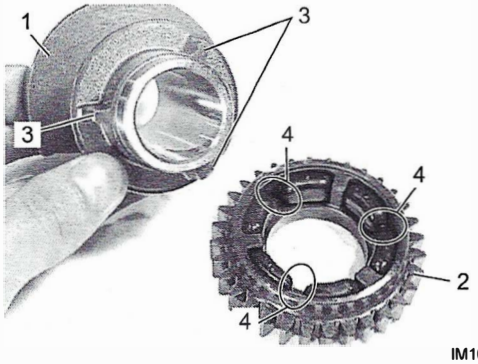


IM10L1140222-01

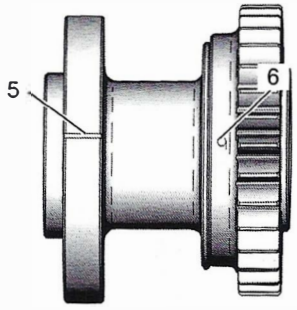
2) Install the crank balancer (1) to the balancer gear (2).

NOTE

- **Align the portion (3) of the crank balancer with between the dampers (4).**
- **Align the engraved line (5) on the crank balancer with the punched mark (6) on the balancer gear.**

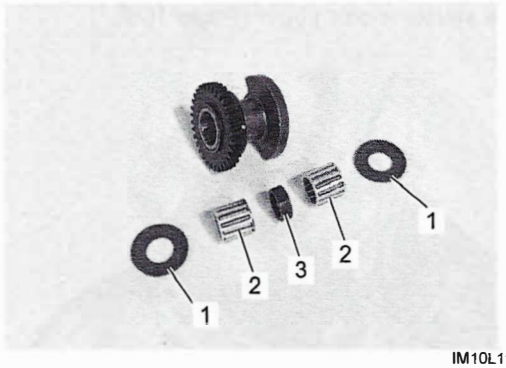


IM10L1140223-01



IM10L1140224-02

3) Apply engine oil to the washers (1), bearings (2) and spacer (3).
4) Install the washers (1), bearings (2) and spacer (3) to the crank balancer.



IM10L1140220-02

Crank Balancer Inspection

BENM10L31406047

Refer to "Crank Balancer Disassembly and Reassembly" (Page 1D-67).

Damper

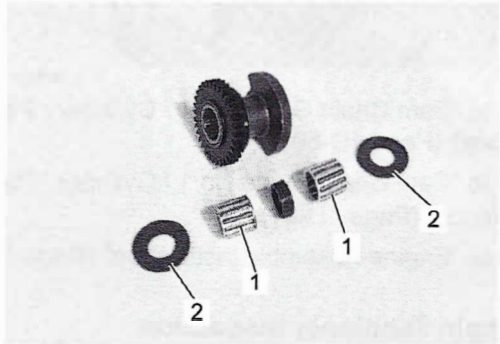
Inspect the damper for wear and damage, replace it if any defects are found.



I823H1140273-01

Bearing and Washer

Inspect the bearings (1) and the washers (2) for wear or damage. Replace the bearing or the washer if there is anything unusual.



IM10L1140225-01

Balancer Shaft

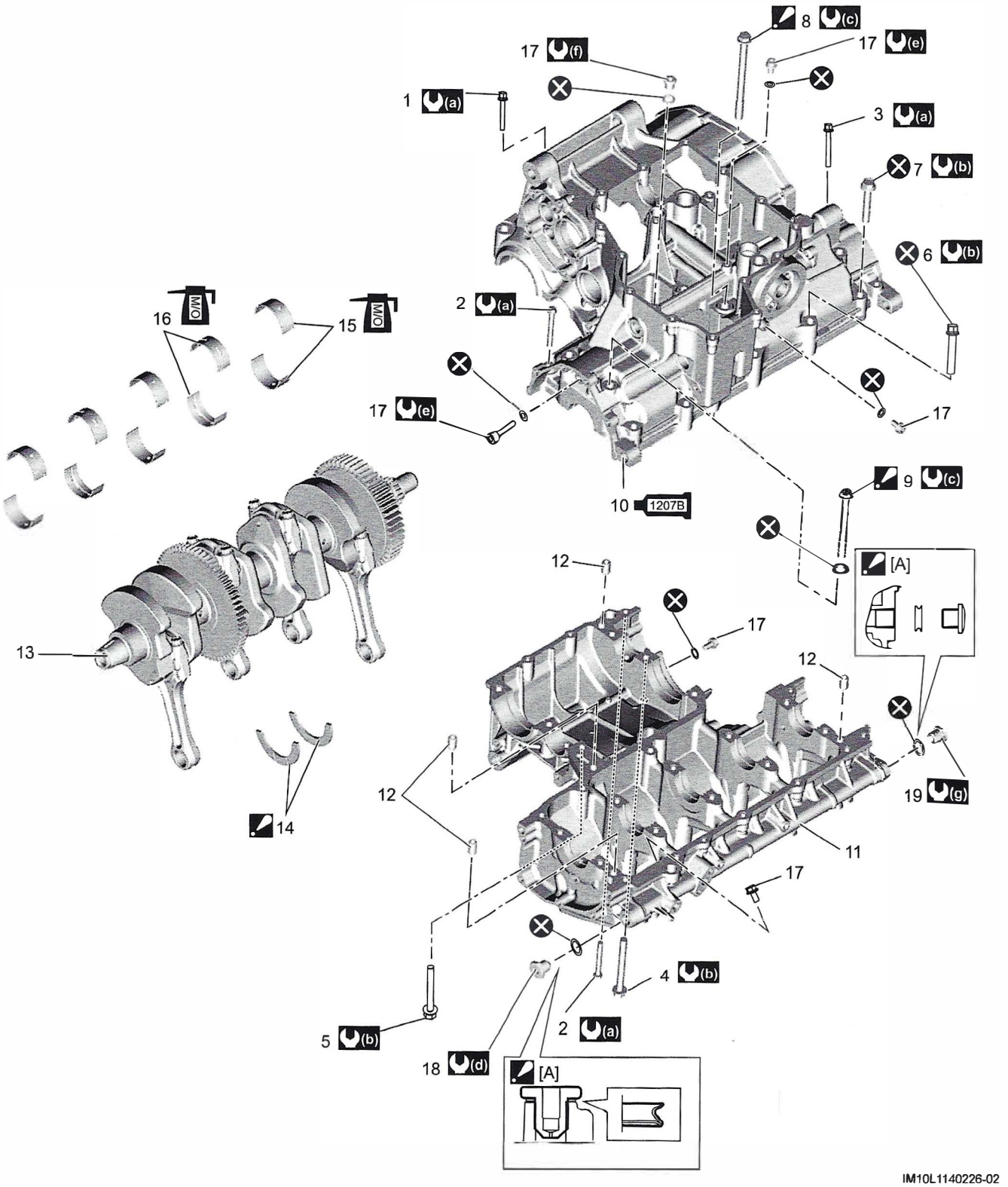
Inspect the balancer shaft for wear or damage. Replace the balancer shaft if there is anything unusual.



I823H1140275-01

Crankcase / Crankshaft / Crankshaft journal bearing / Oil Jet / Oil gallery plug Components

BENM10L31406048



IM10L1140226-02

[A]: The new gasket is installed in the direction shown in the figure.	11. Upper crankcase	(c): 22 N·m → turn clockwise 30° (2.2 kgf-m → turn clockwise 30°, 16.5 lbf-ft → turn clockwise 30°)
1. Crankcase bolt (M6 × L40)	12. Dowel pin	(d): 25 N·m (2.5 kgf-m, 18.5 lbf-ft)
2. Crankcase bolt (M6 × L50)	13. Crankshaft assembly	(e): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
3. Crankcase bolt (M6 × L60)	14. Thrust bearing : Install thrust bearing with oil grooves facing crankshaft.	(f): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
4. Crankcase bolt (M8 × L80)	15. Crankshaft journal bearing (without oil groove)	(g): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
5. Crankcase bolt (M8 × L65)	16. Crankshaft journal bearing (with oil groove)	(h): 50 N·m (5.1 kgf-m, 37.0 lbf-ft)
6. Crankcase bolt (M8 × L60)	17. Oil gallery plug (M14)	1207B: Apply sealant.
7. Crankcase bolt (M8 × L50)	18. Oil hose union plug	MO: Apply molybdenum oil.
8. Lower crankcase bolt (M9 × L115) : For tightening order, refer to "Crankcase / Crankshaft Installation" (Page 1D-74).	19. Upper crankcase plug	⊗: Do not reuse.
9. Lower crankcase bolt (M9×L95) : For tightening order, refer to "Crankcase / Crankshaft Installation" (Page 1D-74).	(a): 11 N·m (1.1 kgf-m, 8.5 lbf-ft)	
10. Lower crankcase	(b): 26 N·m (2.7 kgf-m, 19.5 lbf-ft)	

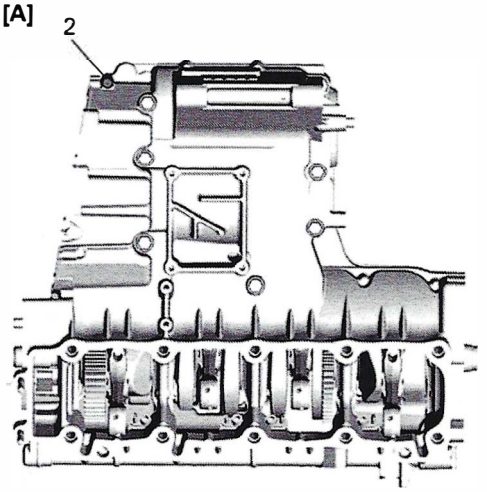
Crankcase / Crankshaft Removal

BENM10L31406049

Lower crankcase

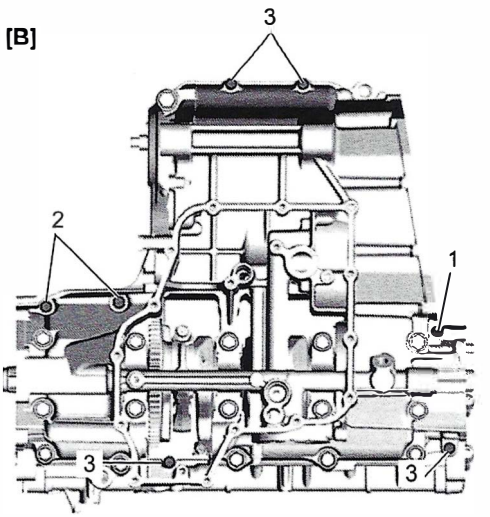
1) Remove the crankcase bolts from the upper crankcase and lower crankcase.

[A]



IM10L1140227-01

[B]

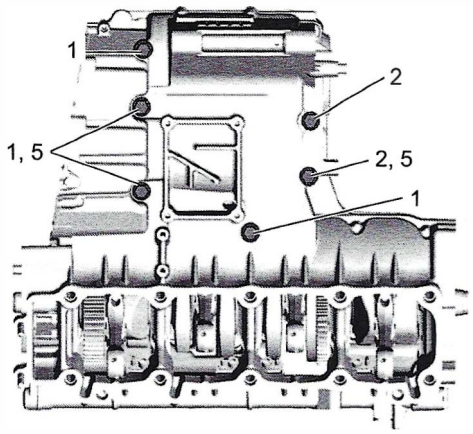


IM10L1140228-01

[A]: Upper side
[B]: Lower side
1. Crankcase bolt (M6 × L60)
2. Crankcase bolt (M6 × L50)
3. Crankcase bolt (M6 × L40)

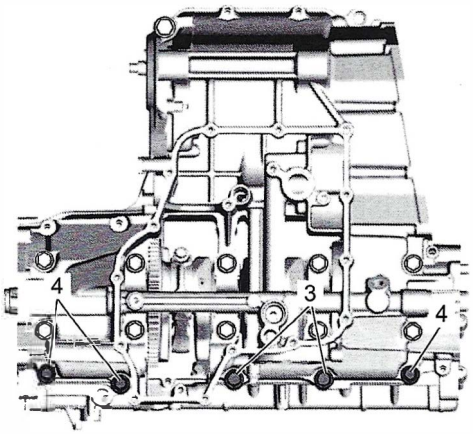
2) Remove the crankcase bolts from the upper crankcase and lower crankcase.

[A]



IM10L1140229-02

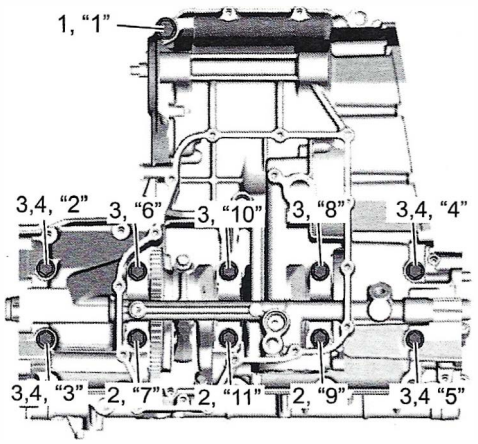
[B]



IM10L1140230-01

[A]:	Upper side
[B]:	Lower side
1.	Crankcase bolt (M8 × L80)
2.	Crankcase bolt (M8 × L65)
3.	Crankcase bolt (M8 × L60)
4.	Crankcase bolt (M8 × L50)
5.	Washer

3) Remove the crankcase bolts (M10) (1) and crankcase bolts (M9) in numerical order ("1" – "11").

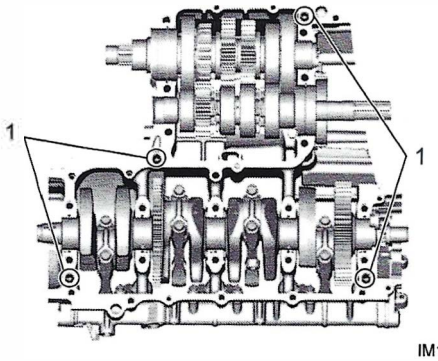


IM10L1140231-01

2.	Crankcase bolt (M9 × L115)
3.	Crankcase bolt (M9 × L95)
4.	Washer

4) Make sure that all of the bolts are removed. Then, tap the sides of the lower crankcase using a plastic hammer to separate the upper and lower crankcase halves and then lift the lower crankcase off of the upper crankcase.

5) Remove the dowel pins (1) from the upper crankcase.



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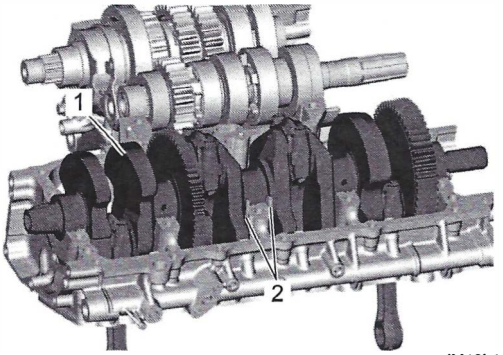
Crankshaft assembly

1) Remove the crankshaft assembly (1) from the upper crankcase.

NOTE

Remove the conrod if necessary. Refer to "Conrod / Conrod Crank Pin Bearing Removal and Installation" (Page 1D-80).

2) Remove the thrust bearings (2) from the crankcase.



IM10L1140233-01

Transmission
Remove the transmission components. ☞(Page 5B-3)

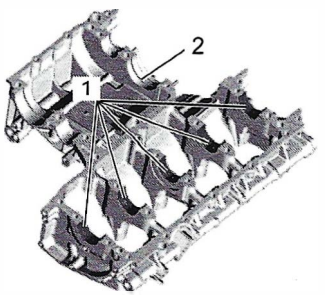
Crankshaft journal bearing
Remove the crankshaft journal bearings (1) from the upper crankcase and lower crankcase.

NOTICE

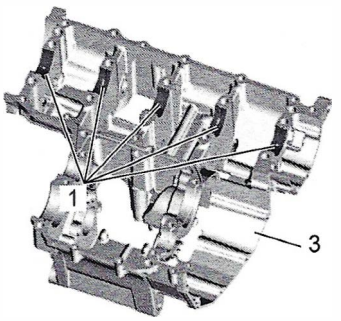
- **When removing the crankshaft journal bearings, be careful not to scratch the crankcase and the crankshaft journal bearings.**
- **Do not touch the bearing surfaces with your hands. Grasp the bearings by their edges.**

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.**



IM10L1140234-01

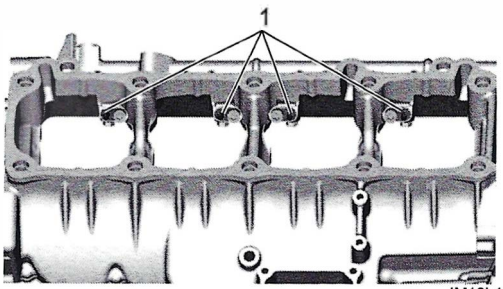


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2. Upper crankcase	3. Lower crankcase

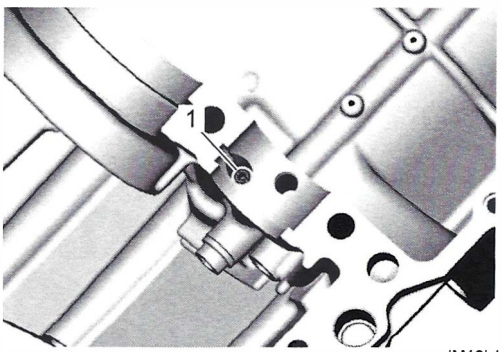
Oil Jet

1) Remove the piston cooling oil jets (1). ☞(Page 1E-12)



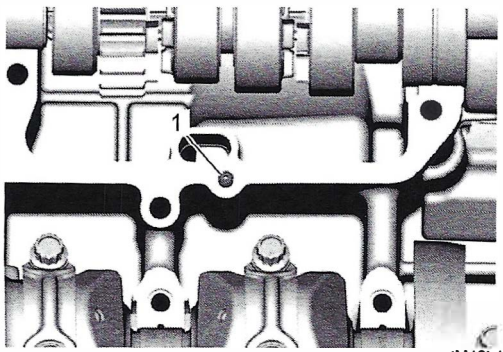
IM10L1140236-01

2) Remove the oil jet (for transmission oil spray) (1). ☞(Page 1E-12)



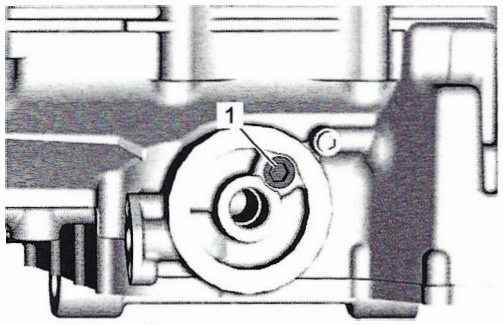
IM10L1140237-01

3) Remove the oil jet (for transmission) (1). ☞(Page 1E-12)



IM10L1140238-01

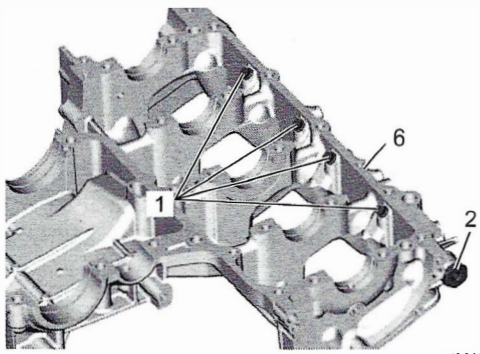
4) Remove the oil gallery jet (1). ☞(Page 1E-12)



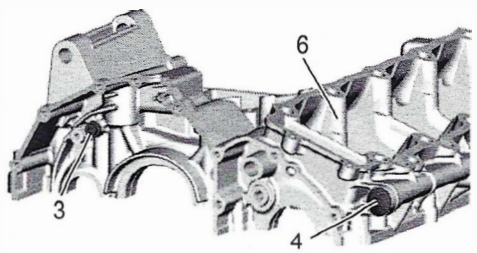
IM10L1140239-01

Oil gallery plug

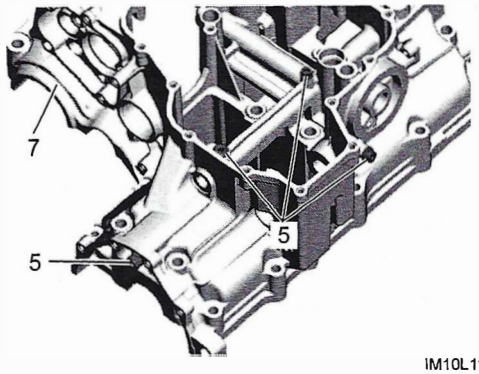
1) Remove the following parts.
   - Piston cooling oil gallery plug (1)
   - Oil hose union plug (2)
   - Transmission cooling oil gallery plug (3)
   - Upper crankcase plug (4)
   - Oil gallery plug (5)



IM10L1140240-02



IM10L1140241-02



IM10L1140242-02

6. Upper crankcase	7. Lower crankcase

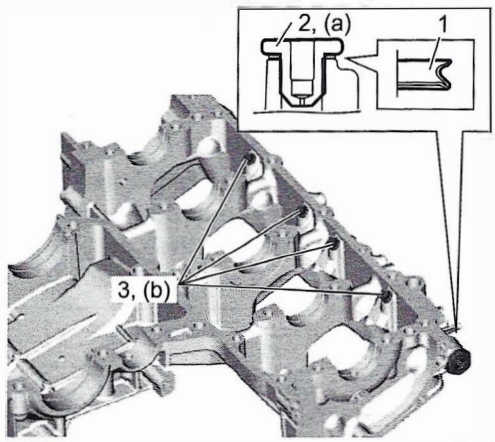
Crankcase / Crankshaft Installation

BENM10L31406050

Oil gallery plug

1) Install the new gasket (1) to the oil hose union plug (2) in correct direction as shown in the figure.
2) Install the piston cooling oil gallery plug (3).
3) Tighten the plugs to the specified torque.

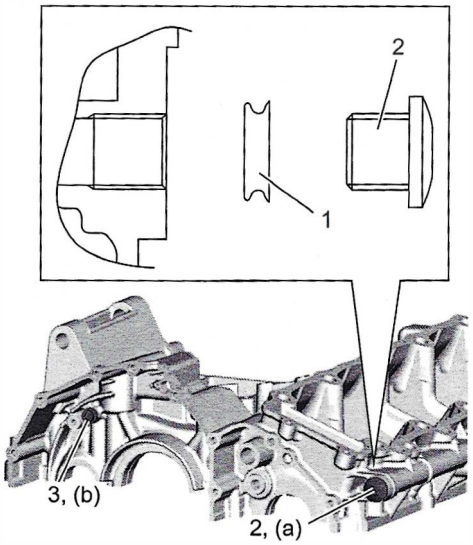
Tightening torque
Oil hose union plug (a): 25 N·m (2.5 kgf-m, 18.5 lbf-ft)
Piston cooling oil gallery plug (b): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1140243-02

4) Install the new gaskets (1) to the upper crankcase plug (2) in correct direction as shown in the figure.
5) Install the transmission cooling oil gallery plug (3).
6) Tighten the plugs to the specified torque.

Tightening torque
Upper crankcase plug (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
Transmission cooling oil gallery plug (b): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1140244-02

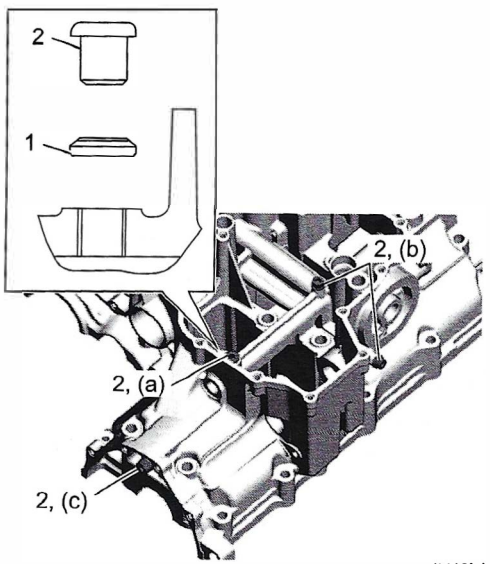
7) Install the new gaskets to the oil gallery plugs.

NOTE

Only the gasket (1) is installed in the direction shown in the figure.

8) Tighten the oil gallery plugs (2) to the specified torque.

Tightening torque
Oil gallery plug (M10) (a): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
Oil gallery plug (M6) (b): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
Oil gallery plug (M8) (c): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1140245-02

Oil Jet

Install the oil jets. ☞(Page 1E-12)

Crankshaft journal bearing

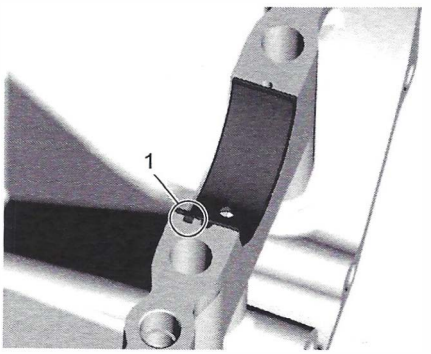
1) Apply molybdenum oil solution to the crankshaft journal bearing.

"A": Assembly lubrication (Molybdenum oil solution)

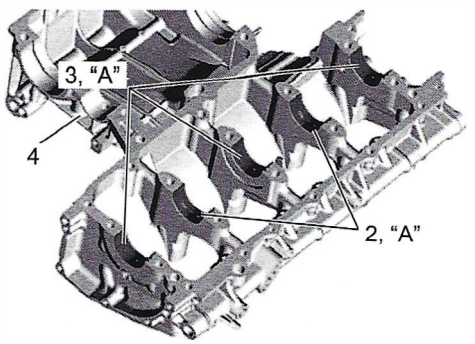
2) Install the crankshaft journal bearings to the upper and lower crankcases, be sure to fix the stopper part (1) first and press the other end.

NOTE

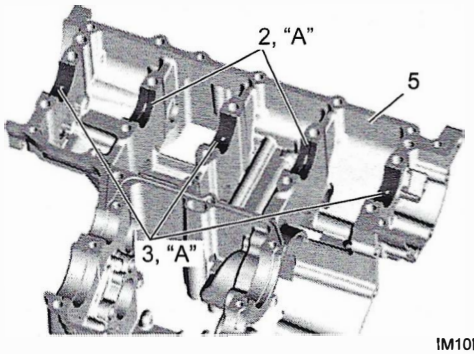
- **Do not touch the bearing surfaces with your hands. Grasp by the edge of the bearing shell.**
- **There are two types of bearing halves in the crankshaft journal bearing with oil groove (2) and without oil groove (3).**
- **Inspect and select the crankshaft journal bearing if necessary. Refer to "Crankshaft Journal Bearing Inspection and Selection" (Page 1D-84).**



IM10L1140246-01



IM10L1140247-01



IM10L1140248-01

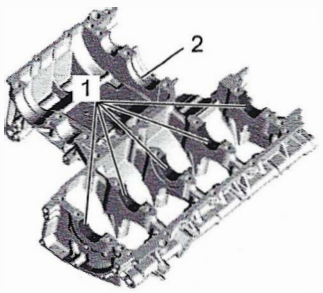
4. Upper crankcase	5. Lower crankcase

Transmission

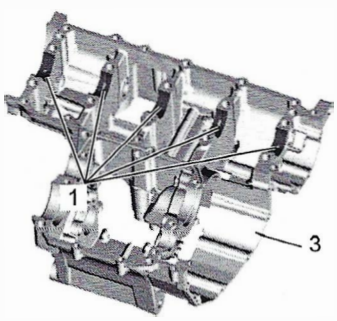
Install the transmission components. ☞(Page 5B-4)

Crankshaft assembly

1) Apply engine oil to inner surface of crankshaft journal bearings (1).



IM10L1140249-01



IM10L1140250-01

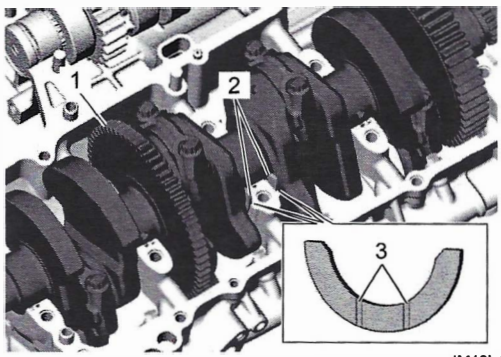
2. Upper crankcase	3. Lower crankcase

2) Install the crankshaft assembly (1) to the upper crankcase.

3) Install thrust bearings (2) with oil grooves (3) facing crankshaft assembly (1).

NOTE

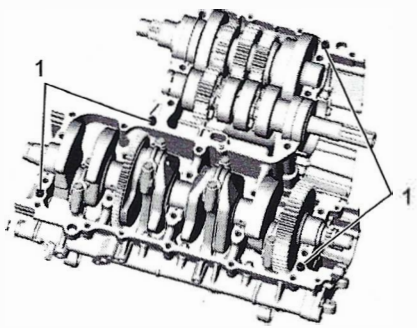
- **Right-thrust bearing has green painting.**
- **Inspect and select the crankshaft thrust clearance if necessary. Refer to "Crankshaft Thrust Clearance Inspection and Selection" (Page 1D-86).**



IM10L1140251-01

Lower crankcase

1) Install the dowel pins (1) to the upper crankcase.



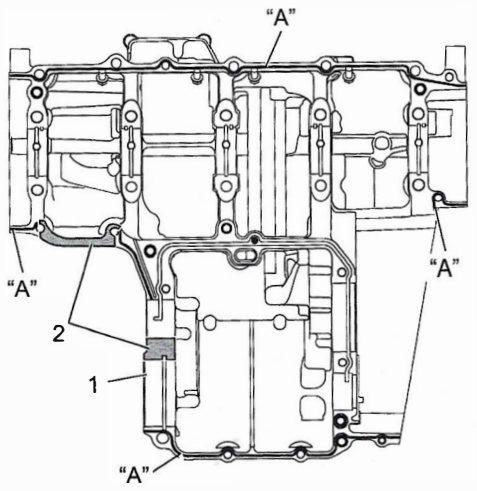
IM10L1140252-01

2) Clean the mating surfaces of upper and lower crankcase halves. Apply sealant to the mating surface of the lower crankcase (1).

NOTE

- **Apply sealant to the portion (2) of the upper and lower crankcases.**
- **Make surfaces free from moisture, oil, dust and other foreign materials.**
- **Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.**
- **Take extreme care not to apply any sealant to the oil hole, oil groove and bearing.**
- **Apply to distorted surfaces as it forms a comparatively thick film.**

"A": Sealant 99000–31140 (SUZUKI BOND 1207B)

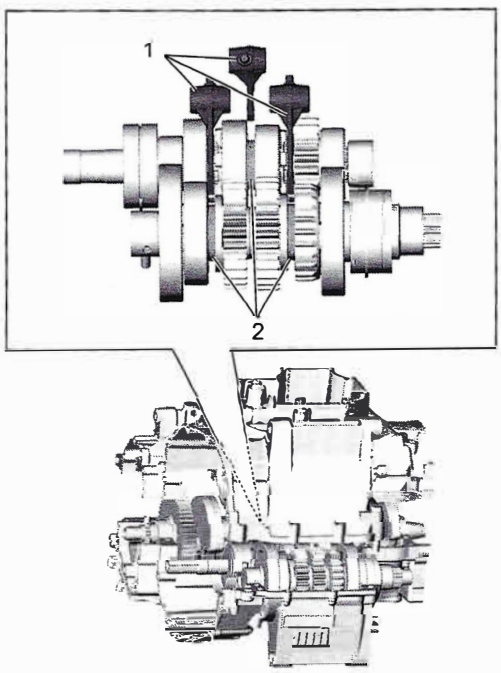


IM10L1140253-02

3) Match the upper and lower crankcase.

NOTE

Align each gearshift fork (1) with its groove (2) of the driveshaft and countershaft.



IM10L1140254-01

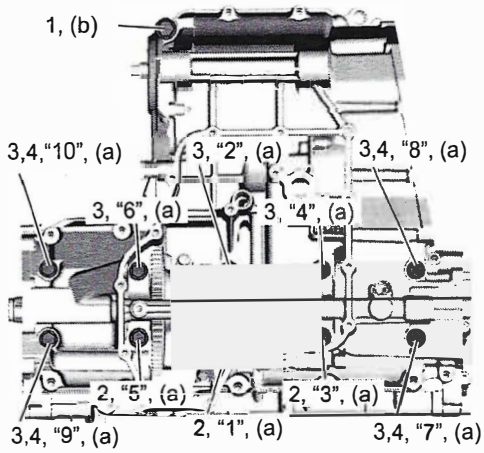
4) Tighten the crankcase bolts (M9) to the specified torque in numerical order ("1" – "10").

5) Additionally tighten the crankcase bolts (M9) with the specified angles gradually in numerical order "1" – "10" using an angular torque gauge.

Tightening torque
Crankcase bolt (M9) (a): 22 N·m → turn clockwise 30° (2.2 kgf-m → turn clockwise 30°, 16.5 lbf-ft → turn clockwise 30°)

6) Tighten the crankcase bolt (M10) (1) to the specified torque.

Tightening torque
Crankcase bolt (M10) (b): 50 N·m (5.1 kgf-m, 37.0 lbf-ft)



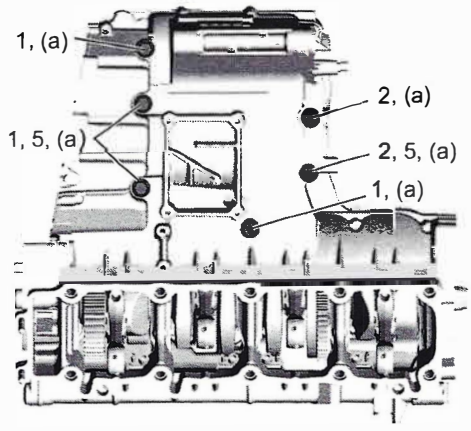
IM10L1140255-01

2.	Crankcase bolt (M9 × L115)
3.	Crankcase bolt (M9 × L95)
4.	New washer

7) Tighten the crankcase bolts (M8) (1) to the specified torque.

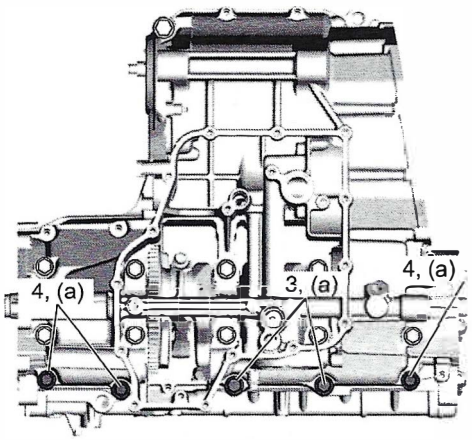
Tightening torque
Crankcase bolt (M8) (a): 26 N·m (2.7 kgf-m, 19.5 lbf-ft)

[A]



IM10L1140256-02

[B]



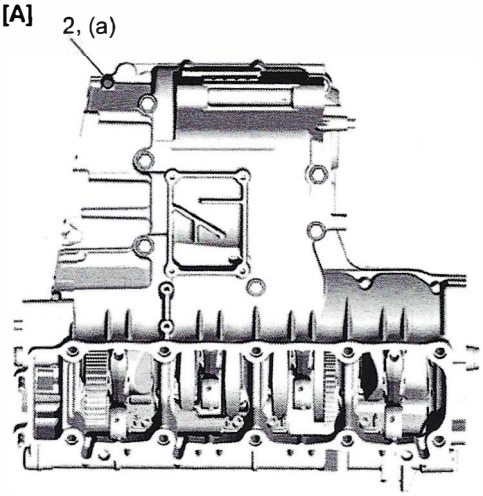
IM10L1140257-01

[A]:	Upper crankcase
[B]:	Lower crankcase
1.	Crankcase bolt (M8 × L80)
2.	Crankcase bolt (M8 × L65)
3.	Crankcase bolt (M8 × L60) (New bolt)
4.	Crankcase bolt (M8 × L50) (New bolt)
5.	New washer

8) Tighten the crankcase bolts (M6) to the specified torque.

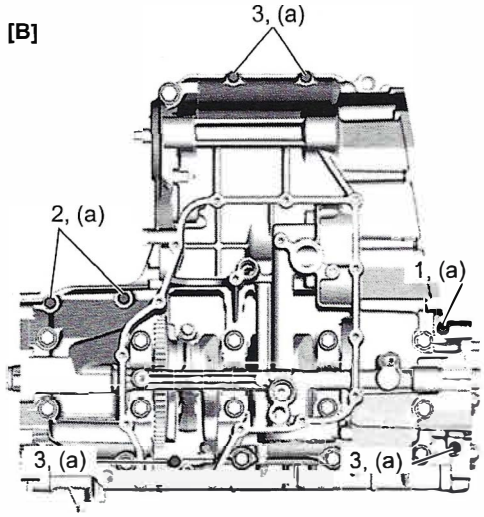
Tightening torque
Crankcase bolt (M6) (a): 11 N·m (1.1 kgf-m, 8.5 lbf-ft)

[A]



IM10L1140258-01

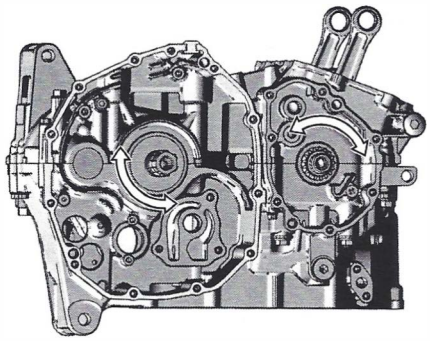
[B]



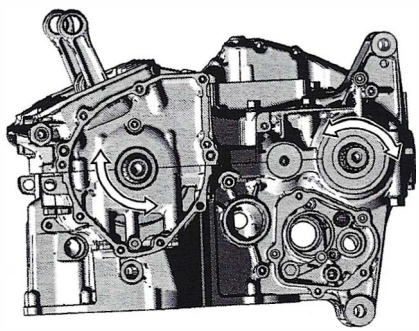
IM10L1140259-01

[A]:	Upper crankcase
[B]:	Lower crankcase
1.	Crankcase bolt (M6 × L60)
2.	Crankcase bolt (M6 × L50)
3.	Crankcase bolt (M6 × L40)

9) After crankcase bolts have been tightened, check that the crankshaft rotates smoothly.
10) Also check that the driveshaft and countershaft rotate smoothly.



IM10L1140260-01



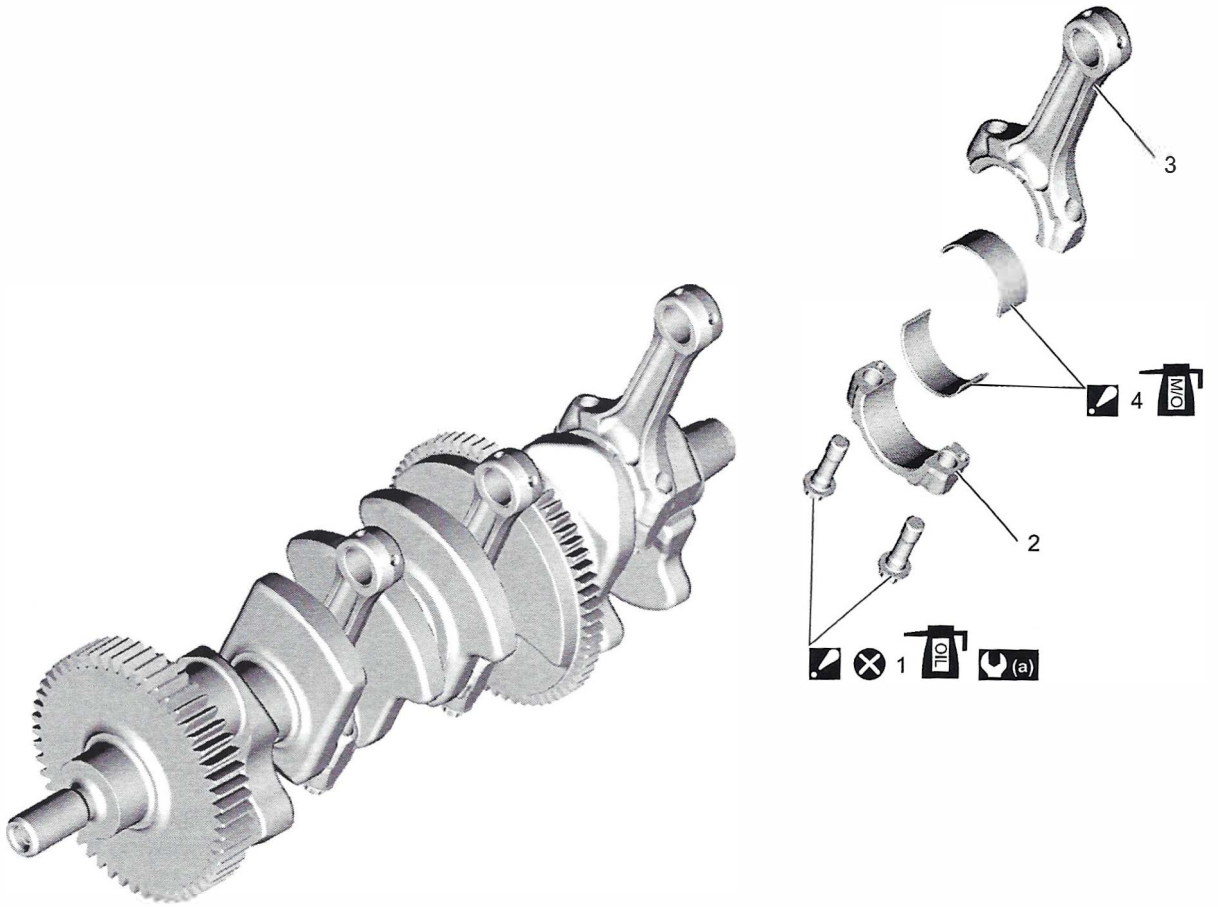
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Conrod / Conrod Crank Pin Bearing Components

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NOTE

 # 1 to # 4 conrod have the same parts composition.



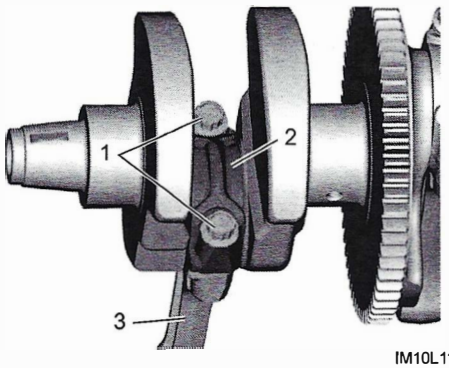
IM10L1140262-02

1. Conrod cap bolt : For tightening order, refer to "Conrod / Conrod Crank Pin Bearing Removal and Installation" (Page 1D-80).	4. Conrod crank pin bearing : Refer to "Conrod / Conrod Crank Pin Bearing Removal and Installation" (Page 1D-80).	: Apply molybdenum oil.
2. Conrod cap	(a) : 25 N·m → turn clockwise 90° (2.5 kgf-m → turn clockwise 90°, 18.5 lbf-ft → turn clockwise 90°)	: Do not reuse.
3. Conrod	: Apply engine oil.	

Conrod / Conrod Crank Pin Bearing Removal and Installation

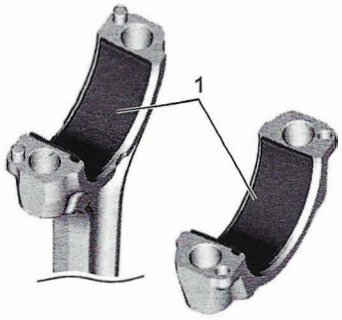
BENM10L31406052

1) Remove the crankshaft assembly from the crankcase. Refer to "Crankcase / Crankshaft Removal" (Page 1D-71).
2) Remove the conrod cap bolts (1), conrod cap (2) and conrod (3).



IM10L1140263-01

3) Remove the bearings (1) from the conrod cap and conrod.



IM10L1140264-01

Installation

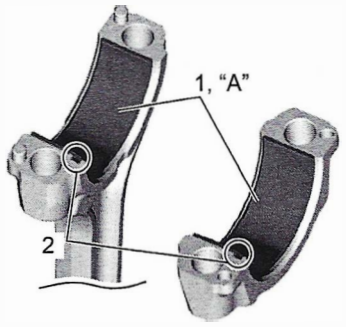
1) Install the crank pin bearings (1) to the conrod and conrod cap, be sure to fix the stopper part (2) first and press the other end.

NOTE

Inspect and select the conrod crank pin bearing if necessary. Refer to "Conrod Crank Pin Bearing Inspection and Selection" (Page 1D-82).

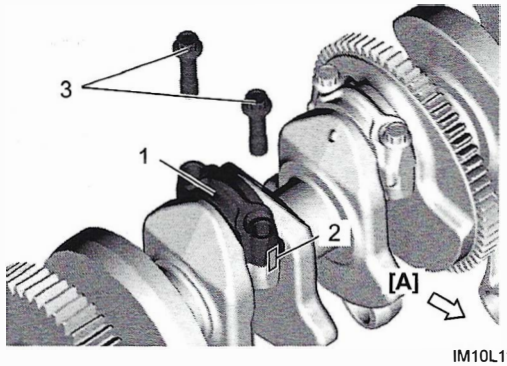
2) Apply molybdenum oil solution to the inner surface of the crank pin bearings (1).

"A": Assembly lubrication (Molybdenum oil solution)



IM10L1140265-01

3) When fitting the conrod cap (1), make sure that I.D. code (2) on each conrod faces intake side.
4) Apply engine oil to the flange and thread portion of the new conrod cap bolts (3).

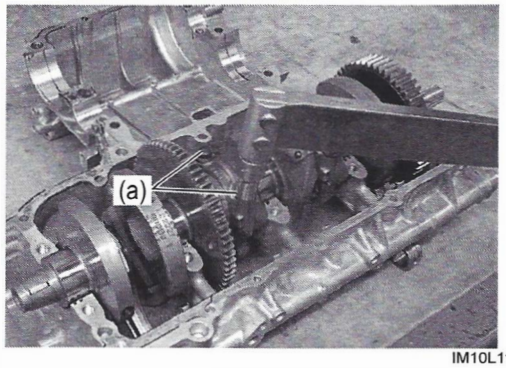


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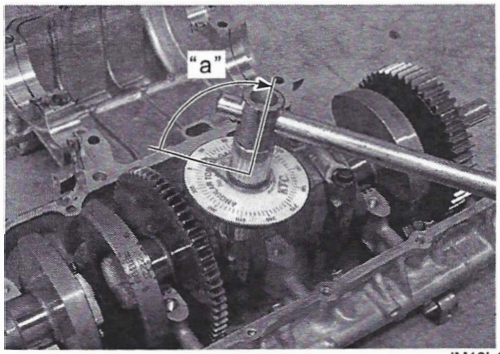
[A]: Intake side

5) Tighten the conrod cap bolt by using a 10 mm, 12 point socket wrench in the following two steps.

Tightening torque
Conrod cap bolt (a): 25 N·m → turn clockwise 90° (2.5 kgf-m → turn clockwise 90°, 18.5 lbf-ft → turn clockwise 90°)



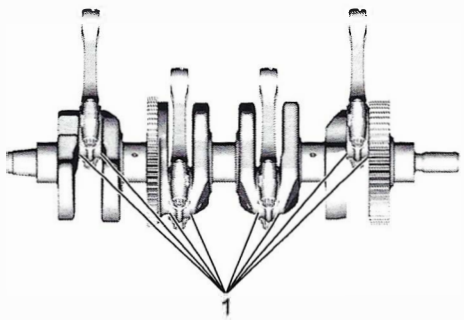
IM10L1140268-01



IM10L1140269-02

"a": 90°

6) Apply engine oil to the conrod big end side surfaces (1).



IM10L1140270-01

Conrod / Crankshaft Inspection

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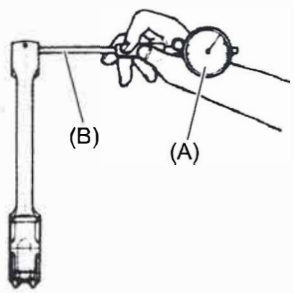
Refer to "Conrod / Conrod Crank Pin Bearing Removal and Installation" (Page 1D-80).

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.

Conrod small end I.D.
[Limit]: 18.050 mm (0.7106 in)

Special tool
(A): 09900–20602
(B): 09900–22401



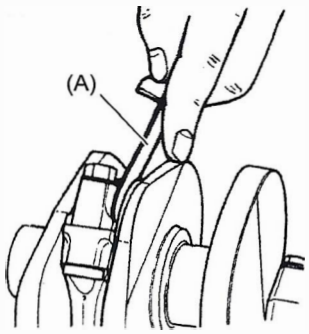
IF04K1140291-01

Conrod Big End Side Clearance

1) Check the conrod big end side clearance using the thickness gauge.

Conrod big end side clearance
[Limit]: 0.3 mm (0.011 in)

Special tool
(A): 09900–20803



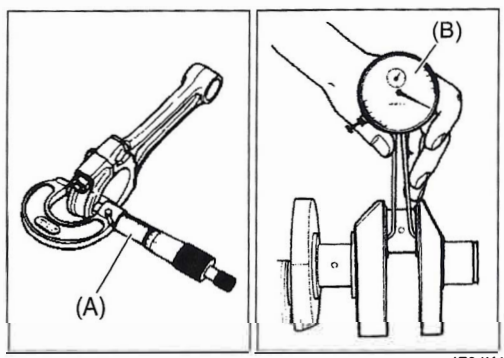
IF04K1140292-01

2) If the clearance exceeds the limit, remove the conrod and measure the conrod big end width and crank pin width. Refer to "Conrod / Conrod Crank Pin Bearing Removal and Installation" (Page 1D-80). If any of the measurements are out of specification, replace the conrod or crankshaft.

Conrod big end width
[Standard]: 20.95 – 21.00 mm (0.8248 – 0.8268 in)

Crank pin width
[Standard]: 21.10 – 21.15 mm (0.8307 – 0.8327 in)

Special tool
(A): 09912–66310
(B): 09900–20605



IF04K1140293-01

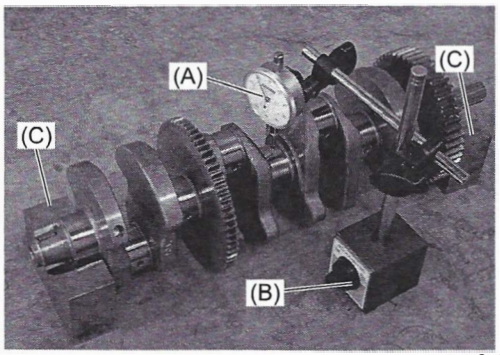
Crankshaft Runout

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.

Crankshaft runout
[Limit]: 0.05 mm (0.0019 in)

Special tool
(A): 09900–20607
(B): 09900–20701

(C): 09900–21304



IM10L1140271-01

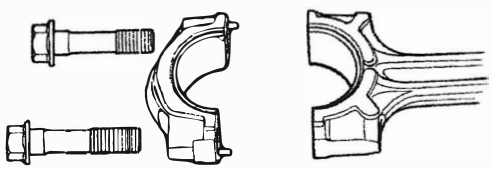
Conrod Crank Pin Bearing Inspection and Selection

BENM10L31406054

Refer to "Conrod / Conrod Crank Pin Bearing Removal and Installation" (Page 1D-80).

Inspection

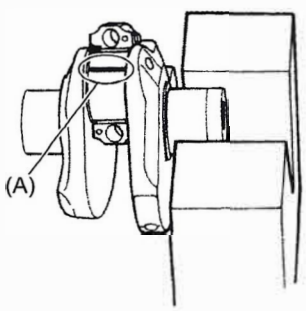
1) Inspect the bearing surfaces for any signs of fusion, pitting, burn or flaws. If any, replace them with a specified set of bearings.



I718H1140285-01

2) Place the plastigage axially along the crank pin, avoiding the oil hole, as shown in the figure.

Special tool
(A): 09900–22303



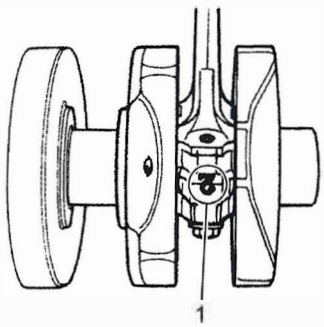
IF04K1140295-01

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 (1) on the conrod faces towards the intake side.**
- **Never rotate the crankshaft or conrod when a piece of plastigage is installed.**

Tightening torque
Conrod cap bolt (a): 25 N·m → turn clockwise 90° (2.5 kgf-m → turn clockwise 90°, 18.5 lbf-ft → turn clockwise 90°)

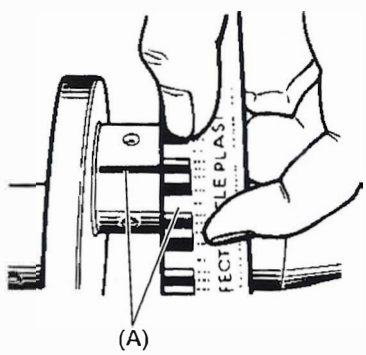


IF04K1140296-01

4) Remove the conrod cap bolts and measure the width of the compressed plastigage using the envelope scale. This measurement should be taken at the widest part of the compressed plastigage.
If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

Conrod big end oil clearance
[Standard]: 0.032 – 0.056 mm (0.0013 – 0.0022 in)
[Limit]: 0.080 mm (0.0031 in)

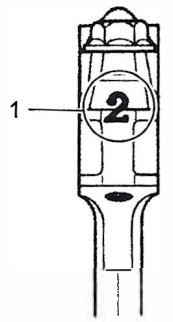
Special tool
(A): 09900–22303



IF04K1140297-01

Selection

1) Check the corresponding conrod I.D. code numbers ([1] or [2]) (1).



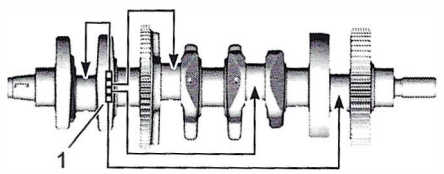
IF04K1140298-01

Conrod big end I.D.
[Standard]: 41.000 – 41.016 mm (1.6142 – 1.6148 in)

Conrod I.D. specification

Code (1)	I.D. specification
1	41.000 – 41.008 mm (1.6142 – 1.6145 in)
2	41.008 – 41.016 mm (1.6145 – 1.6148 in)

2) Check the corresponding crank pin O.D. code numbers ([1], [2] or [3]) (1).



IM10L1140272-01

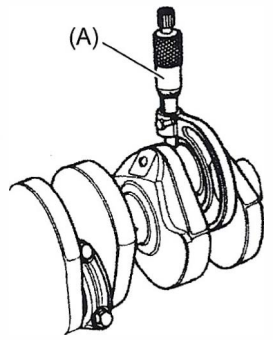
3) Measure the conrod crank pin O.D. with the special tool. If any of the measurements are out of specification, replace the crankshaft.

Crank pin O.D.
[Standard]: 37.976 – 38.000 mm (1.4951 – 1.4961 in)

Crank pin O.D. specification

Code	O.D. specification
1	37.992 – 38.000 mm (1.4957 – 1.4960 in)
2	37.984 – 37.992 mm (1.4954 – 1.4957 in)
3	37.976 – 37.984 mm (1.4951 – 1.4954 in)

Special tool
(A): 09900–20202



IF04K1140300-01

4) Select the specified bearings from the bearing selection table.

NOTICE

The bearings should be replaced as a set.

Bearing selection table

		Crank pin O.D.		
	Code	1	2	3
Conrod I.D.	1	Green	Black	Brown
	2	Black	Brown	Yellow

IF04K1140333-03

Crank pin bearing thickness
[Standard]: 1.480 – 1.496 mm (0.0583 – 0.0589 in)

Bearing thickness specification

Color (Part No.)	Thickness
Yellow (12164-10L00-0D0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)
Brown (12164-10L00-0C0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Black (12164-10L00-0B0)	1.484 – 1.488 mm (0.0584 – 0.0585 in)
Green (12164-10L00-0A0)	1.480 – 1.484 mm (0.0583 – 0.0584 in)



IF04K1140301-01

1. Color code

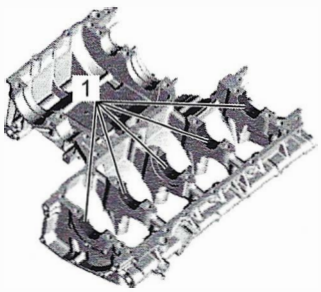
Crankshaft Journal Bearing Inspection and Selection

BENM10L31406055

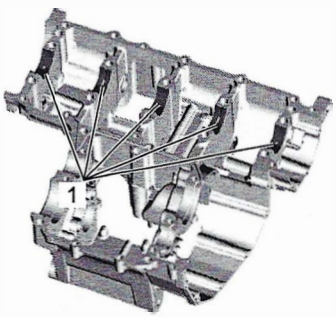
Refer to "Crankcase / Crankshaft Removal" (Page 1D-71) and "Crankcase / Crankshaft Installation" (Page 1D-74).

Inspection

1) Inspect each upper and lower crankcase bearing (1) for any damage.



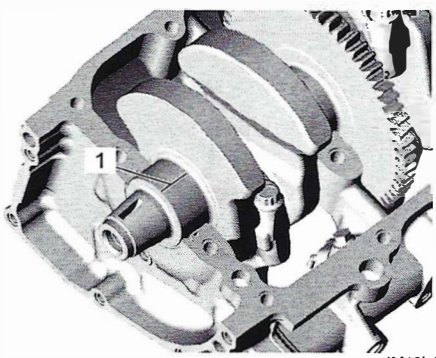
IM10L1140273-01



IM10L1140274-01

2) Set the crankshaft onto the upper crankcase.
3) Install the plastigage onto each crankshaft journal.

Special tool
09900–22303



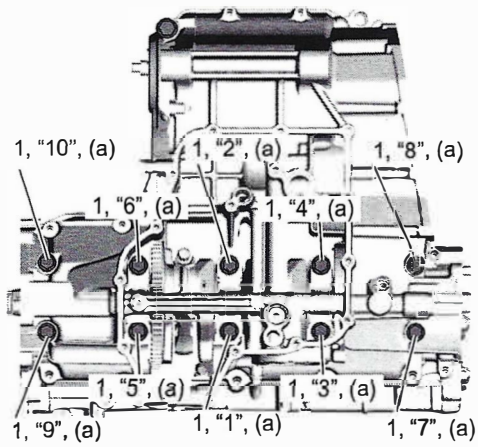
IM10L1140275-01

4) Mate the lower crankcase with the upper crankcase.
5) Tighten the crankcase bolt (M9) (1) to the specified torque in numerical order ("1" – "10").
6) Additionally tighten the crankcase bolts (M9) (1) with the specified angles gradually in numerical order "1" – "10" using an angular torque gauge.

NOTE

Do not rotate the crankshaft when a piece of plastigage is installed.

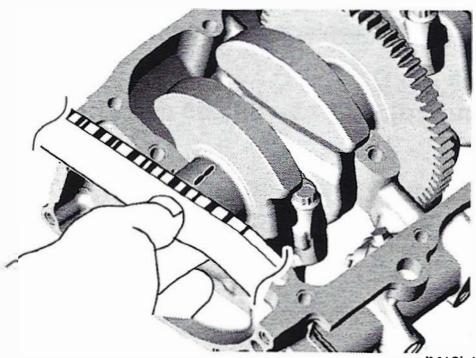
Tightening torque
Crankcase bolt (M9) (a): 22 N·m → turn clockwise 30° (2.2 kgf-m → turn clockwise 30°, 16.5 lbf-ft → turn clockwise 30°)



IM10L1140276-01

7) Remove the lower crankcase and measure the width of compressed plastigage using the envelope scale. This measurement should be taken at the widest part of the compressed plastigage. If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

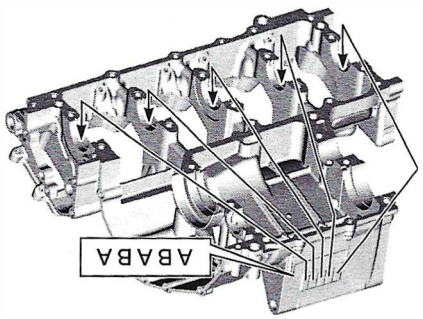
Crankshaft journal oil clearance
[Standard]: 0.010 – 0.028 mm (0.0004 – 0.0011 in)
[Limit]: 0.080 mm (0.0031 in)



IM10L1140277-01

Selection

1) Check the corresponding crankcase journal I.D. codes ([A], [B] or [C]) (1), which are stamped on the upper crankcase.



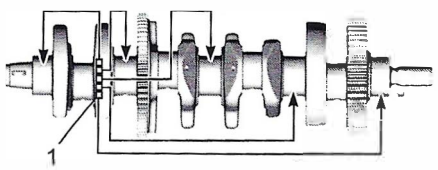
IM10L1140278-01

Crankcase journal I.D.
[Standard]: 43.000 – 43.018 mm (1.6929 – 1.6936 in)

Crankcase journal I.D. specification

Code (1)	I.D. specification
A	43.000 – 43.006 mm (1.6929 – 1.6931 in)
B	43.006 – 43.012 mm (1.6931 – 1.6933 in)
C	43.012 – 43.018 mm (1.6933 – 1.6936 in)

2) Check the corresponding crankshaft journal O.D. codes ([A], [B] or [C]) (1), which are stamped on the crankshaft.



IM10L1140279-01

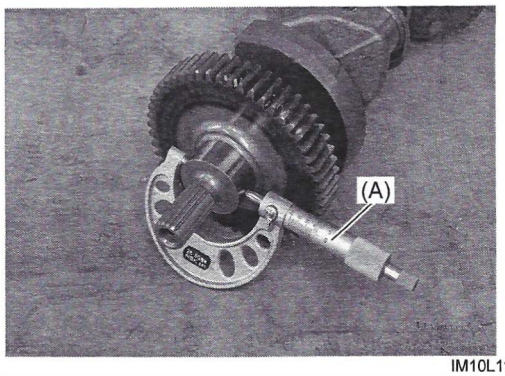
3) Measure the crankshaft O.D. with the special tool. If any of the measurements are out of specification, replace the crankshaft.

Crankshaft journal O.D.
[Standard]: 39.982 – 40.000 mm (1.5741 – 1.5748 in)

Crankshaft journal O.D. specification

Code (1)	O.D. specification
A	39.994 – 40.000 mm (1.5746 – 1.5748 in)
B	39.988 – 39.994 mm (1.5743 – 1.5746 in)
C	39.982 – 39.988 mm (1.5741 – 1.5743 in)

Special tool
(A): 09900–20202



IM10L1140280-01

4) Select the specified bearings from the bearing selection table.

Bearing selection table

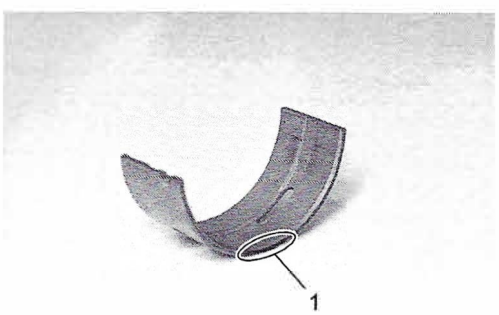
		Crankshaft O.D.		
	Code	A	B	C
Crankcase I.D.	A	Green	Black	Brown
	B	Black	Brown	Yellow
	C	Brown	Yellow	Blue

IF04K1140310-01

Crankcase journal bearing thickness
[Standard]: 1.492 – 1.507 mm (0.0588 – 0.0593 in)

Bearing thickness specification

Color (Part No.)	Thickness
Blue (12229-10L00-0E0) (12229-15H10-0E0)	1.504 – 1.507 mm (0.05922 – 0.05933 in)
Yellow (12229-10L00-0D0) (12229-15H10-0D0)	1.501 – 1.504 mm (0.0591 – 0.0592 in)
Brown (12229-10L00-0C0) (12229-15H10-0C0)	1.498 – 1.501 mm (0.05898 – 0.05909 in)
Black (12229-10L00-0B0) (12229-15H10-0B0)	1.495 – 1.498 mm (0.05886 – 0.05897 in)
Green (12229-10L00-0A0) (12229-15H10-0A0)	1.492 – 1.495 mm (0.05874 – 0.05885 in)



IF04K1140311-01

1. Color code

Crankshaft Thrust Clearance Inspection and Selection

BENM10L31406056

Refer to "Crankcase / Crankshaft Removal" (Page 1D-71) and "Crankcase / Crankshaft Installation" (Page 1D-74).

Inspection

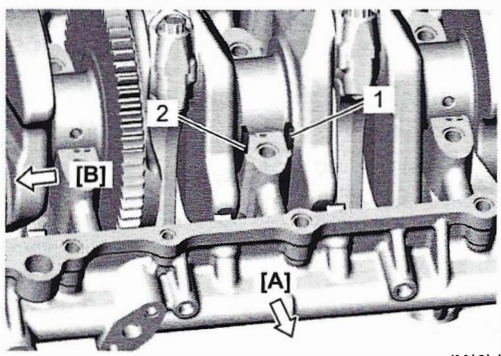
1) With the crankshaft's right-side and left-side thrust bearings inserted into the upper crankcase.
2) Measure the thrust clearance "a" between the left-side thrust bearing and crankshaft using the thickness gauge. If the thrust clearance exceeds the standard range, adjust the thrust clearance.

NOTE

Pull the crankshaft to the left (generator side) so that there is no clearance on the right-side thrust bearing.

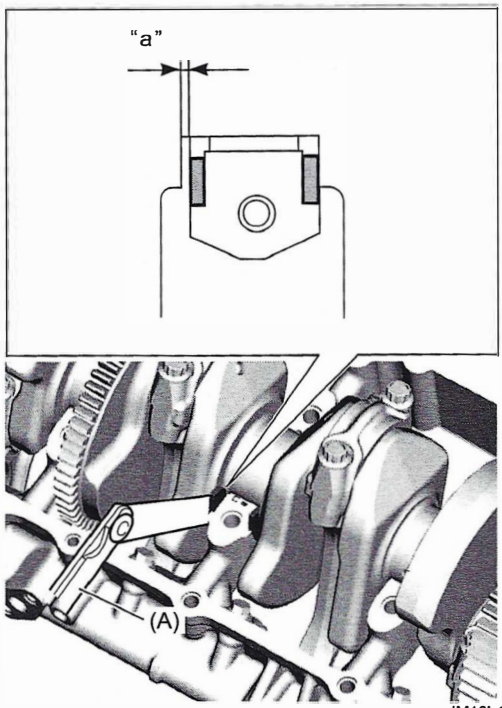
Crankshaft thrust clearance
[Standard]: 0.060 – 0.110 mm (0.0024 – 0.0043 in)

Special tool
(A): 09900–20803



IM10L1140281-01

[A]: Front side	1. Right-side thrust bearing
[B]: Left side	2. Left-side thrust bearing



IM10L1140282-01

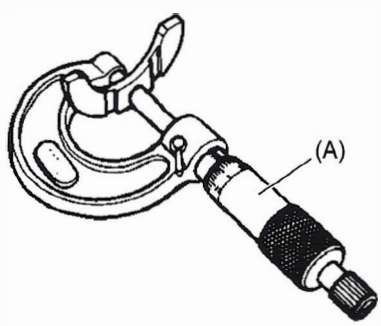
"a": Clearance

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).

Camshaft thrust bearing thickness
Right side [Standard]: 2.425 – 2.450 mm (0.0954 – 0.09646 in)
Left side [Standard]: 2.350 – 2.500 mm (0.0925 – 0.0984 in)

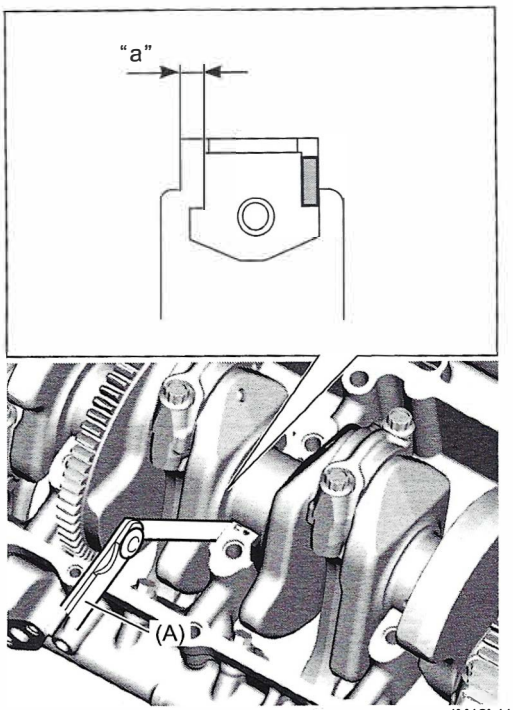
Special tool
(A): 09912–66310



IF04K1140314-01

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
(A): 09900-20803



IM10L1140283-01

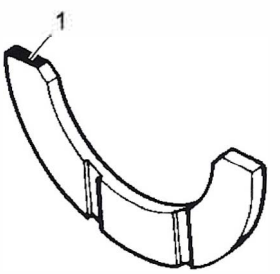
4) Select a left-side thrust bearing from the selection table.

NOTE

Right-side thrust bearing has the same specification as the GREEN (12228-24F00-0D0) 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 (12228-24F00-0F0)	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 (12228-24F00-0E0)	2.450 – 2.475 mm (0.0965 – 0.0974 in)	
2.510 – 2.535 mm (0.0988 – 0.0998 in)	Green (12228-24F00-0D0)	2.425 – 2.450 mm (0.0955 – 0.0965 in)	
2.485 – 2.510 mm (0.0978 – 0.0988 in)	Blue (12228-24F00-0C0)	2.400 – 2.425 mm (0.0945 – 0.0955 in)	
2.460 – 2.485 mm (0.0969 – 0.0978 in)	Black (12228-24F00-0B0)	2.375 – 2.400 mm (0.0935 – 0.0945 in)	
2.430 – 2.460 mm (0.0957 – 0.0969 in)	Red (12228-24F00-0A0)	2.350 – 2.375 mm (0.0925 – 0.0935 in)	0.055 – 0.110 mm (0.0022 – 0.0043 in)



IF04K1140316-01

1. Color code

5) After selecting a left-side thrust bearing, install it and then measure the thrust clearance again.

Specifications

Tightening Torque Specifications

BENM10L31407001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Fuel tank bracket bolt (front side)	10	1.0	7.5	☞(Page 1D-7)
Fuel tank bracket bolt (rear side)	5.5	0.56	4.05	☞(Page 1D-7)
Funnel bolt	4.3	0.44	3.20	☞(Page 1D-7)
Air cleaner cover bolt	1.8	0.18	1.35	☞(Page 1D-7)
Intake pipe clamp screw	1.5	0.15	1.10	☞(Page 1D-10) / ☞(Page 1D-13)
Delivery pipe screw	3.5	0.36	2.60	☞(Page 1D-12)
Cylinder head cover bolt	12	1.2	9.0	☞(Page 1D-15)
CMP sensor bolt	10	1.0	7.5	☞(Page 1D-16)
Cam chain guide No.2 bolts	10	1.0	7.5	☞(Page 1D-21)
Camshaft journal holder bolt	10	1.0	7.5	☞(Page 1D-22) / ☞(Page 1D-25)
Cam chain tension adjuster bolt	10	1.0	7.5	☞(Page 1D-23)
Valve timing inspection cap	23	2.3	17.0	☞(Page 1D-24)
Starter clutch cover cap	11	1.1	8.5	☞(Page 1D-24)
Engine mounting thrust adjuster	10	1.0	7.5	☞(Page 1D-30)
Engine mounting thrust adjuster lock-nut	45	4.6	33.5	☞(Page 1D-30)
Side-stand bracket bolt	95	9.7	70.0	☞(Page 1D-33)
Oil pressure switch lead wire bolt	1.5	0.15	1.10	☞(Page 1D-33)
Gearshift link arm bolt	10	1.0	7.5	☞(Page 1D-33)
Cylinder head bolt (L180)	28 N·m → turn counterclockwise 270° → 10 N·m → 25 N·m → 51 N·m (2.9 kgf-m → turn counterclockwise 270° → 1.0 kgf-m → 2.5 kgf-m → 5.2 kgf-m, 21.0 lbf-ft → turn counterclockwise 270° → 7.5 lbf-ft → 18.5 lbf-ft → 38.0 lbf-ft)			☞(Page 1D-36)
Cylinder head bolt (L55)	10	1.0	7.5	☞(Page 1D-37)
Cylinder head bolt (L30)	10	1.0	7.5	☞(Page 1D-37)
Cylinder nut	10	1.0	7.5	☞(Page 1D-37)
Cylinder head side bolt	14	1.4	10.5	☞(Page 1D-37)
Oil hose union bolt (cam chain tension adjuster)	18	1.8	13.5	☞(Page 1D-38)
Oil hose union bolt (cylinder head)	20	2.0	15.0	☞(Page 1D-38)
Cylinder head plug	23	2.3	17.0	☞(Page 1D-45)
Oil gallery bolt (Cylinder head)	10	1.0	7.5	☞(Page 1D-45)
Water bypass union	12	1.2	9.0	☞(Page 1D-46)
Clamp screw	1.5	0.15	1.10	☞(Page 1D-46)
Thermostat cover bolt	10	1.0	7.5	☞(Page 1D-46)
ECT sensor	18	1.8	13.5	☞(Page 1D-47)
Water inlet connector bolt	10	1.0	7.5	☞(Page 1D-54)
Balancer shaft arm bolt	10	1.0	7.5	☞(Page 1D-62)
Balancer shaft mounting bolt	10	1.0	7.5	☞(Page 1D-63)
Oil separator cover bolt	10	1.0	7.5	☞(Page 1D-63)
Oil pipe bolt	10	1.0	7.5	☞(Page 1D-63)
Oil pipe union bolt	24	2.4	18.0	☞(Page 1D-63)
Oil filter stand	15	1.5	11.0	☞(Page 1D-64)
Gearshift cam stopper bolt	10	1.0	7.5	☞(Page 1D-64)
Gearshift cam plate stopper bolt	13	1.3	9.5	☞(Page 1D-64)
Gearshift cover bolt	10	1.0	7.5	☞(Page 1D-65)
Cam chain tensioner bolt	23	2.3	17.0	☞(Page 1D-65)
Oil hose union plug	25	2.5	18.5	☞(Page 1D-74)
Piston cooling oil gallery plug	10	1.0	7.5	☞(Page 1D-74)
Upper crankcase plug	23	2.3	17.0	☞(Page 1D-74)
Transmission cooling oil gallery plug	10	1.0	7.5	☞(Page 1D-74)
Oil gallery plug (M10)	18	1.8	13.5	☞(Page 1D-75)

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Oil gallery plug (M6)	10	1.0	7.5	☞(Page 1D-75)
Oil gallery plug (M8)	10	1.0	7.5	☞(Page 1D-75)
Crankcase bolt (M9)	22 N·m → turn clockwise 30° (2.2 kgf-m → turn clockwise 30°, 16.5 lbf-ft → turn clockwise 30°)			☞(Page 1D-77) / ☞(Page 1D-84)
Crankcase bolt (M10)	50	5.1	37.0	☞(Page 1D-77)
Crankcase bolt (M8)	26	2.7	19.5	☞(Page 1D-77)
Crankcase bolt (M6)	11	1.1	8.5	☞(Page 1D-78)
Conrod cap bolt	25 N·m → turn clockwise 90° (2.5 kgf-m → turn clockwise 90°, 18.5 lbf-ft → turn clockwise 90°)			☞(Page 1D-80) / ☞(Page 1D-82)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Throttle Cable Routing Diagram" (Page 1D-2)
"Intake System Construction" (Page 1D-5)
"Throttle Body Components" (Page 1D-8)
"Cylinder Head Cover Components" (Page 1D-14)
"Cam Chain Tension Adjuster / Camshaft Components" (Page 1D-17)
"Engine Assembly Installation" (Page 1D-30)
"Cylinder head Components" (Page 1D-34)
"Valve and Cylinder Head Components" (Page 1D-39)
"Cylinder / Cam Chain Guide No.1 / Piston / Piston Ring Components" (Page 1D-49)
"Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand / Oil Pipe Components" (Page 1D-57)
"Crankcase / Crankshaft / Crankshaft journal bearing / Oil Jet / Oil gallery plug Components" (Page 1D-70)
"Conrod / Conrod Crank Pin Bearing Components" (Page 1D-79)

Special Tools and Equipment

Recommended Service Material

BENM10L31408001

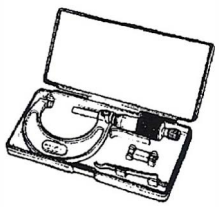
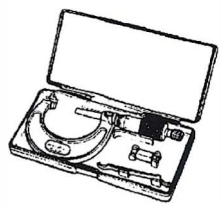
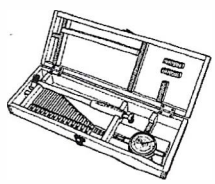
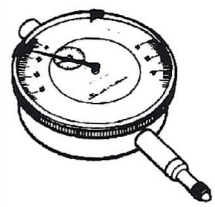
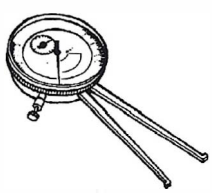
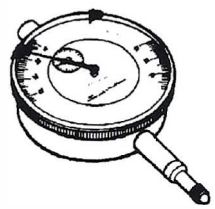
Material	SUZUKI recommended product or Specification		Note
Assembly lubrication	Molybdenum oil solution	—	☞(Page 1D-40) / ☞(Page 1D-52) / ☞(Page 1D-53) / ☞(Page 1D-75) / ☞(Page 1D-80)
Grease	SUZUKI SUPER GREASE A	P/No.: 99000–25011	☞(Page 1D-63)
Sealant	SUZUKI BOND 1207B	P/No.: 99000–31140	☞(Page 1D-15) / ☞(Page 1D-76)

NOTE

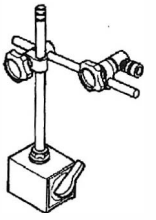
Required service material(s) is also described in:
"Throttle Body Components" (Page 1D-8)
"Cylinder Head Cover Components" (Page 1D-14)
"Cam Chain Tension Adjuster / Camshaft Components" (Page 1D-17)
"Cylinder head Components" (Page 1D-34)
"Valve and Cylinder Head Components" (Page 1D-39)
"Cylinder / Cam Chain Guide No.1 / Piston / Piston Ring Components" (Page 1D-49)
"Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand / Oil Pipe Components" (Page 1D-57)
"Crankcase / Crankshaft / Crankshaft journal bearing / Oil Jet / Oil gallery plug Components" (Page 1D-70)
"Conrod / Conrod Crank Pin Bearing Components" (Page 1D-79)

Special Tool

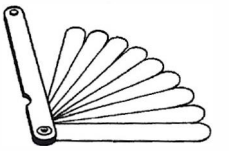
BENM10L31408002

09900–20202 Micrometer (25 - 50 mm) ☞(Page 1D-24) / ☞(Page 1D-83) / ☞(Page 1D-85)		09900–20203 Micrometer (50 - 75 mm) ☞(Page 1D-55)	
09900–20530 Cylinder gauge set ☞(Page 1D-54)		09900–20602 Dial gauge (1 x 0.001 mm) ☞(Page 1D-25) / ☞(Page 1D-56) / ☞(Page 1D-81)	
09900–20605 Dial calipers (10 - 34 mm) ☞(Page 1D-81)		09900–20607 Dial gauge (10 x 0.01 mm) ☞(Page 1D-24) / ☞(Page 1D-41) / ☞(Page 1D-42) / ☞(Page 1D-42) / ☞(Page 1D-81)	

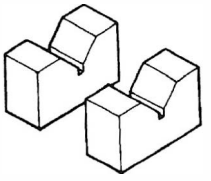
09900–20701
Dial gauge chuck
☞(Page 1D-24) /
☞(Page 1D-41) /
☞(Page 1D-42) /
☞(Page 1D-42) /
☞(Page 1D-81)



09900–20803
Thickness gauge
☞(Page 1D-47) /
☞(Page 1D-54) /
☞(Page 1D-55) /
☞(Page 1D-56) /
☞(Page 1D-81) /
☞(Page 1D-86) /
☞(Page 1D-87)



09900–21304
V blocks
☞(Page 1D-24) /
☞(Page 1D-41) /
☞(Page 1D-42) /
☞(Page 1D-82)



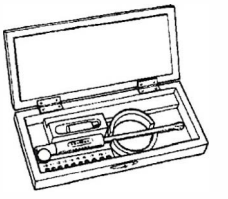
09900–22303
Plastigage (0.025 - 0.076 mm)
☞(Page 1D-25) /
☞(Page 1D-82) /
☞(Page 1D-82) /
☞(Page 1D-84)



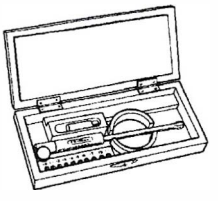
09900–22304
Plastigage (0.051 - 0.152 mm)
☞(Page 1D-25)



09900–22401
Small bore gauge (10 - 18 mm)
☞(Page 1D-56) /
☞(Page 1D-81)



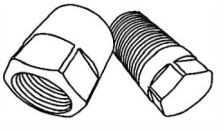
09900–22403
Small bore gauge (18 - 35 mm)
☞(Page 1D-25)



09912–66310
Micrometer (0 - 25 mm)
☞(Page 1D-25) /
☞(Page 1D-42) /
☞(Page 1D-55) /
☞(Page 1D-56) /
☞(Page 1D-81) /
☞(Page 1D-86)



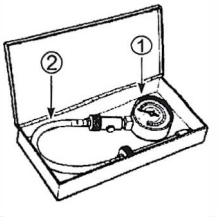
09915–41510
Oil filter stand remover
☞(Page 1D-60) /
☞(Page 1D-64)



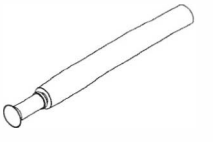
09915–63311
Compression gauge adapter
☞(Page 1D-3)



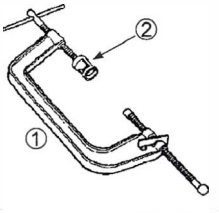
09915–64512
Compression gauge set (2500 kPa)
1. Gauge 2. Hose (Adapter)
☞(Page 1D-3)



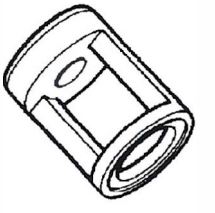
09916–10912
Valve lapper
☞(Page 1D-43)

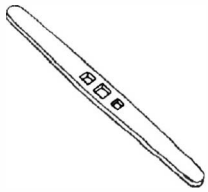
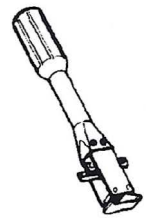
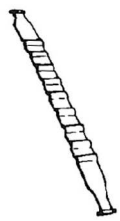
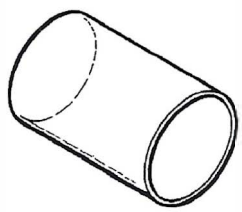
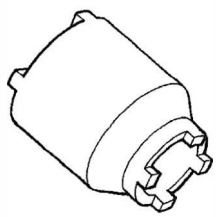


09916–14510
Valve lifter
1. Main unit 2. Attachment
☞(Page 1D-40) /
☞(Page 1D-41)



09916–14522
Valve lifter attachment
☞(Page 1D-40) /
☞(Page 1D-41)



09916–34542 Reamer handle ☞(Page 1D-47) / ☞(Page 1D-48) 	09916–34570 Valve guide reamer (ø5.0) ☞(Page 1D-48) 
09916–34580 Valve guide reamer (ø10.8) ☞(Page 1D-47) 	09916–44310 Valve guide installer / remover ☞(Page 1D-47) / ☞(Page 1D-48) 
09916–53350 Valve guide installer attachment ☞(Page 1D-48) 	09916–74521 Piston ring holder handle This tool is included in Piston ring holder set (09916-74512). ☞(Page 1D-53) 
09916–74550 Piston ring holder band (ø73 - 85) ☞(Page 1D-53) 	09916–84511 Tweezers ☞(Page 1D-40) / ☞(Page 1D-41) 
09919–28620 Sleeve protector ☞(Page 1D-40) / ☞(Page 1D-41) 	09940–14990 Engine mounting adjuster wrench ☞(Page 1D-28) / ☞(Page 1D-29) / ☞(Page 1D-30) 

Engine Lubrication System

Precautions

Precautions for Engine Oil

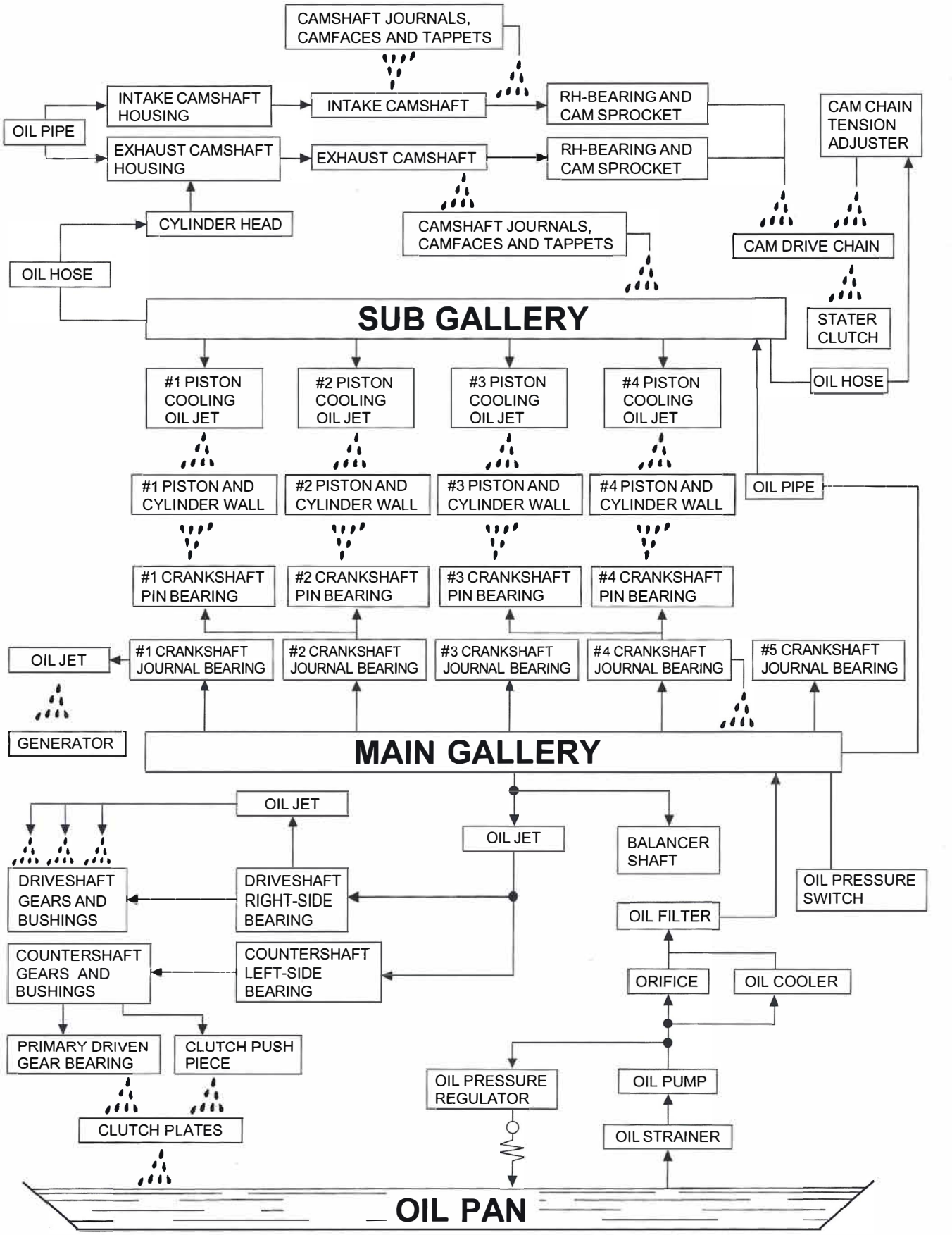
BENM10L31500001

Refer to "Fuel / Oil / Fluid / Coolant Recommendation" in Section 0C (Page 0C-16).

Schematic and Routing Diagram

Engine Lubrication System Chart Diagram

BENM10L31502001



IM10L1150051-01

Diagnostic Information and Procedures

Engine Lubrication Symptom Diagnosis

BENM10L31504001

Condition	Possible cause	Correction / Reference Item
Engine overheats	Insufficient amount of engine oil.	*Add engine oil. ☞(Page 1E-5)*
	Defective oil pump.	*Replace. ☞(Page 1E-14)*
	Clogged oil circuit.	*Clean.*
	Incorrect engine oil.	*Change. ☞(Page 1E-5)*
	Clogged oil cooler.	*Replace. ☞(Page 1E-9)*
Exhaust smoke is dirty or thick	Excessive amount of engine oil.	*Drain out excess engine oil. ☞(Page 1E-5)*
Engine lacks power	Excessive amount of engine oil.	*Drain out excess engine oil. ☞(Page 1E-5)*

Oil Pressure Check

BENM10L31504002

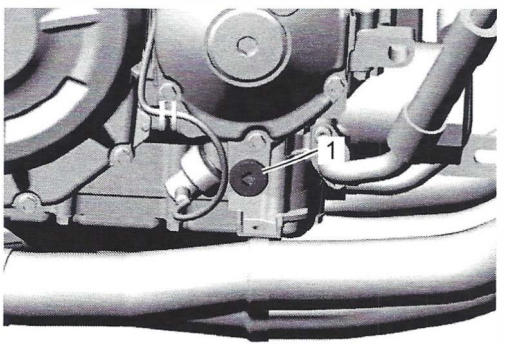
Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts.

NOTE

Before checking the oil pressure, check the following:

- **Oil level: ☞(Page 1E-5)**
- **Oil leaks (If leak is found, repair it.)**
- **Oil quality (If oil is discolored or deteriorated, replace it.)**

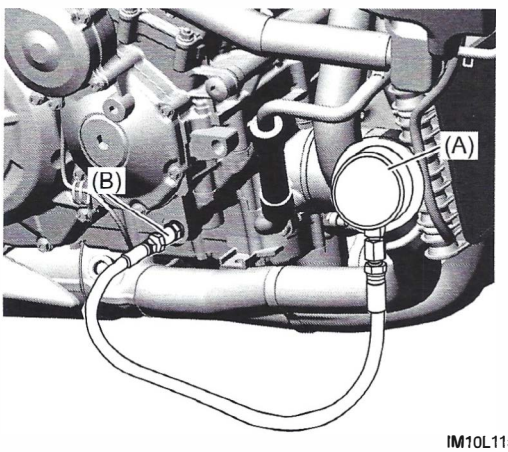
1) Remove the side cowling assembly (RH). ☞(Page 9D-37)
2) Start the engine and check if the oil pressure indicator light is turned on. If the light stays on, check the oil pressure indicator light circuit. If the circuit is OK, check the oil pressure in the following manner.
3) Remove the oil gallery plug (M16) (1) and washer.



IM10L1150003-02

4) Install the oil pressure gauge and attachment into the oil gallery.

Special tool
(A): 09915–74511
(B): 09915–74540



IM10L1150004-02

5) Warm up the engine as follows:
Summer: 10 min. at 2000 r/min
Winter: 20 min. at 2000 r/min
6) After warm up, increase the engine speed to 3000 r/min 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
At 60 °C (140 °F), 3000 r/min
[Standard]: 200 – 500 kPa (2.0 – 5.1 kgf/cm², 29.0 – 72.5 psi)

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

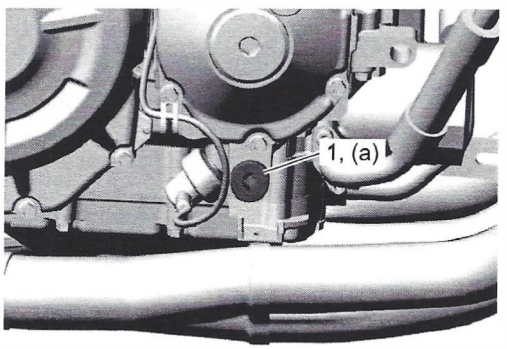
7) Stop the engine and remove the oil pressure gauge and attachment.

⚠ WARNING

To avoid the risk of being burned, remove the oil pressure gauge when the oil has cooled.

8) Install the new gasket to the oil gallery plug (M16) (1).
9) Install the oil gallery plug (M16) and tighten it to the specified torque.

Tightening torque
Oil gallery plug (M16) (a): 35 N·m (3.6 kgf-m, 26.0 lbf-ft)



IM10L1150005-02

10) Check the engine oil level. ☞(Page 1E-5)
11) Install the removed parts.

Repair Instructions

Engine Oil Inspection

BENM10L31506001

Refer to "Engine Oil" in Section 0B (Page 0B-11).

Engine Oil Replacement

BENM10L31506002

Refer to "Engine Oil" in Section 0B (Page 0B-11).

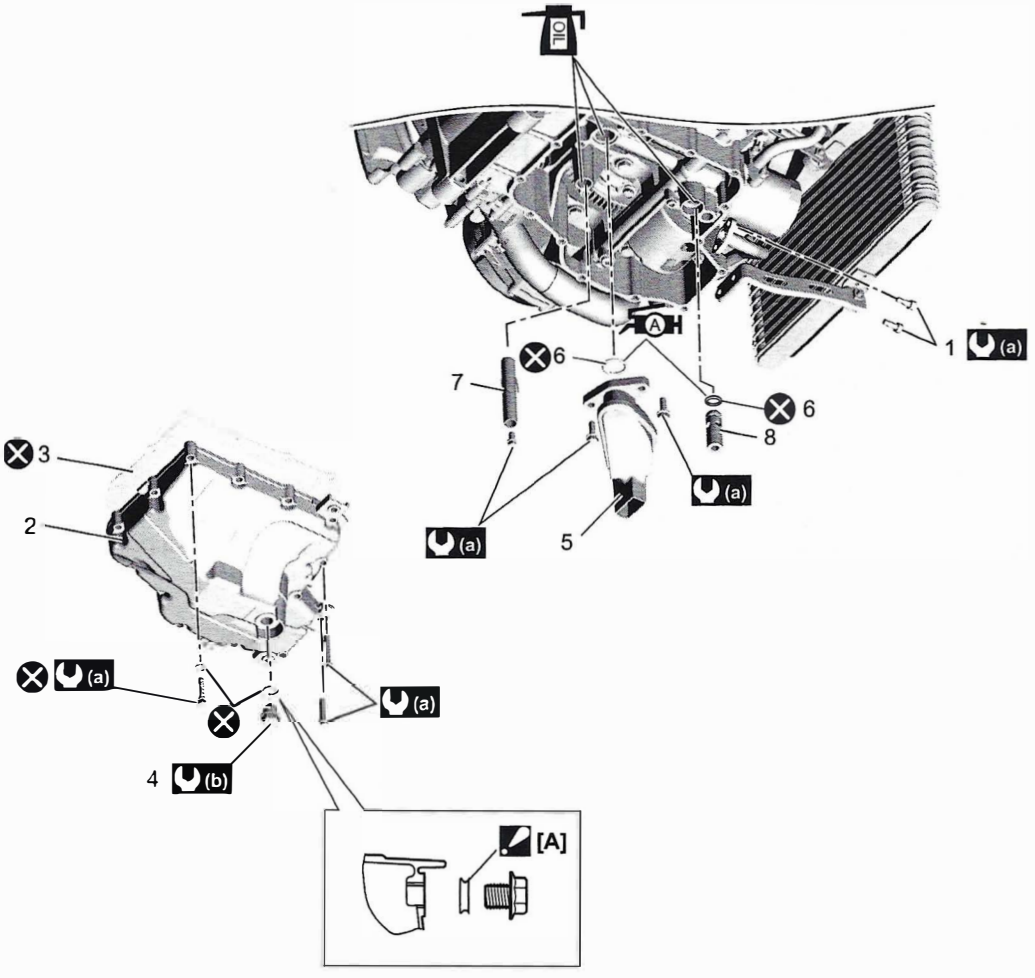
Oil Filter Replacement

BENM10L31506003

Refer to "Engine Oil Filter" in Section 0B (Page 0B-12).

Oil Pan / Oil Pressure Regulator / Breather Pipe / Oil Strainer

BENM10L31506004



IM10L1150052-04

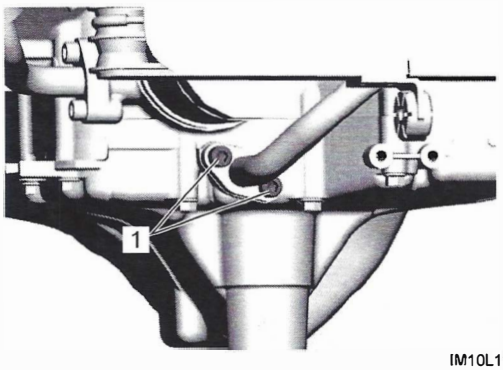
[A]: The new gasket is install in the direction shown in the figure.	5. Oil strainer	(b) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
1. Oil cooler outlet hose bolt	6. O-ring	: Do not reuse.
2. Oil pan	7. Breather pipe	: Apply engine oil.
3. Oil pan gasket	8. Oil pressure regulator	: Apply SUZUKI SUPER GREASE A.
4. Oil drain plug	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)	

Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation

BENM10L31506005

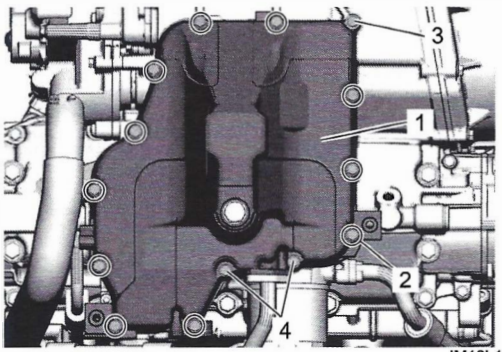
Removal

1) Drain the engine oil. ☞(Page 0B-11)
2) Remove the side cowling assembly. ☞(Page 9D-37)
3) Remove the exhaust pipe assembly. ☞(Page 1K-2)
4) Remove the oil cooler outlet hose bolts (1) from the oil pan.



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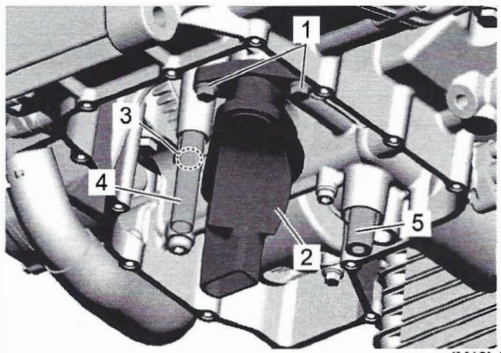
5) Remove the oil pan (1) and gasket from the lower crankcase.



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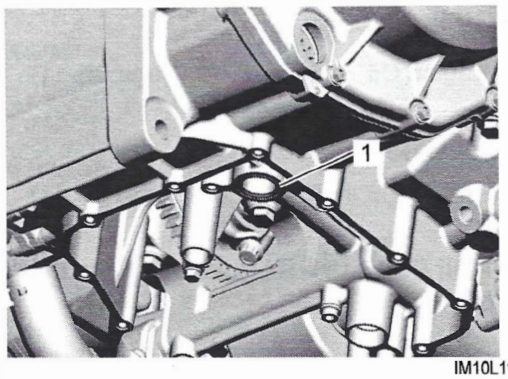
2.	Oil pan bolt (M6 × L30)
3.	Oil pan bolt (with washer) (M6 × L30)
4.	Oil pan bolt (M6 × L40)

6) Remove the following parts.
- Oil strainer bolt (1)
- Oil strainer (2)
- Breather pipe bolt (3)
- Breather pipe (4)
- Oil pressure regulator (5)



IM10L1150009-01

7) Remove the O-ring (1).

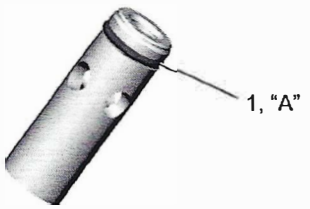


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Installation

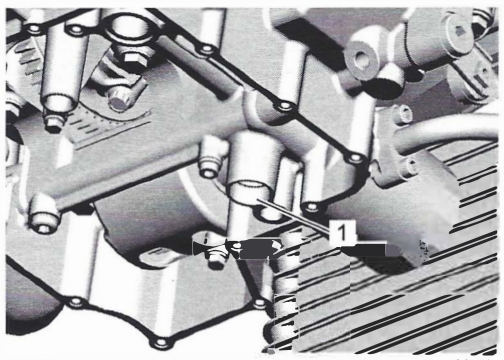
1) Apply grease to the new O-ring (1).

"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



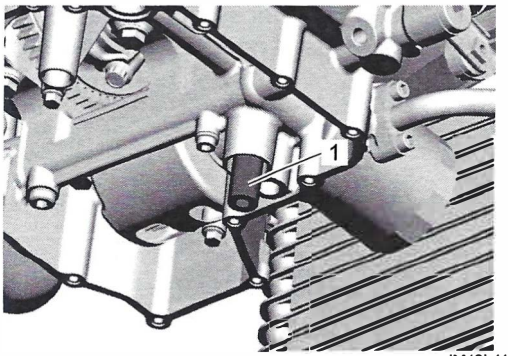
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2) Apply engine oil to the oil pressure regulator hole (1) of the lower crankcase.



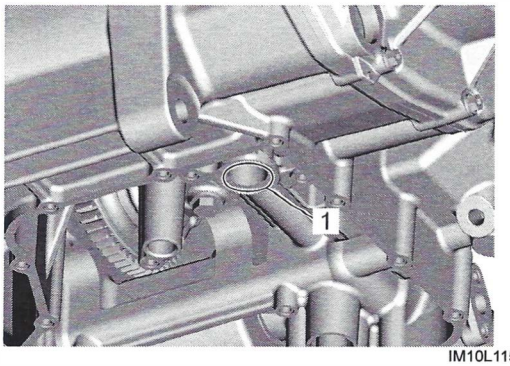
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3) Install the oil pressure regulator (1) to the lower crankcase.



IM10L1150013-01

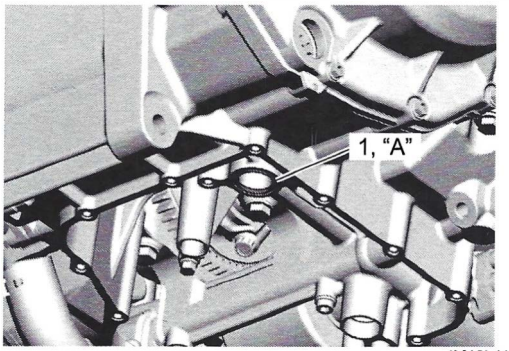
4) Apply engine oil to the oil strainer hose (1) of the lower crankcase.



IM10L1150055-01

5) Apply grease to the new O-ring (1).

"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



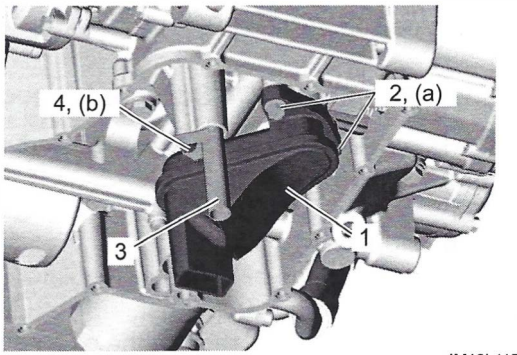
IM10L1150014-01

6) Install the oil strainer (1), and then tighten the oil strainer bolts (2) to specified torque.

Tightening torque
Oil strainer bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

7) Install the breather pipe (3) to lower crankcase, and then tighten the breather pipe bolt (4) to specified torque.

Tightening torque
Breather pipe bolt (b): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1150015-01

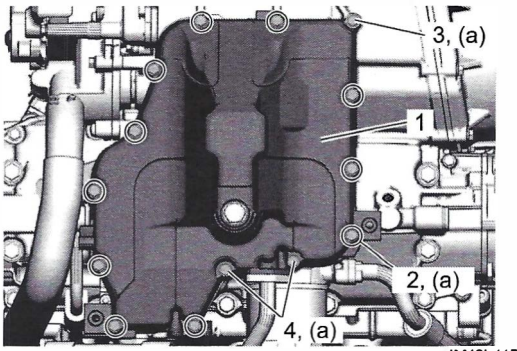
8) Install the new gasket and oil pan (1) to the lower crankcase.

9) Tighten the oil pan bolt to specified torque.

NOTE

First, after the new oil pan bolt (with washer) (3) is tightened, another bolt is tightened.

Tightening torque
Oil pan bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



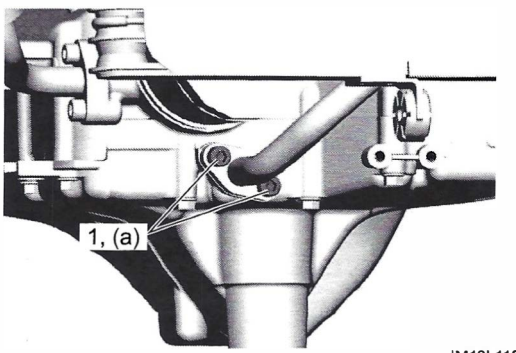
IM10L1150056-02

2.	Oil pan bolt (M6 × L30)
3.	Oil pan bolt (with washer)
4.	Oil pan bolt (M6 × L40)

10) Install the oil cooler outlet hose bolts (1) to the oil pan.

11) Tighten the oil cooler outlet hose bolts to specified torque.

Tightening torque
Oil cooler outlet hose bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1150017-01

12) Install the side cowling assembly. ☞(Page 9D-37)
13) Fill the engine oil. ☞(Page 0B-11)

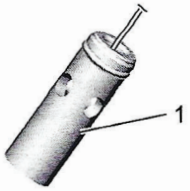
Oil Pressure Regulator / Oil Strainer Inspection

BENM10L31506006

Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation" (Page 1E-6).

Oil Pressure Regulator

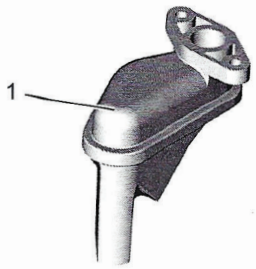
Inspect the operation of the oil pressure regulator (1) by pushing on the piston with a proper bar.
If the piston does not operate, replace the oil pressure regulator with a new one.



IM10L1150018-01

Oil Strainer

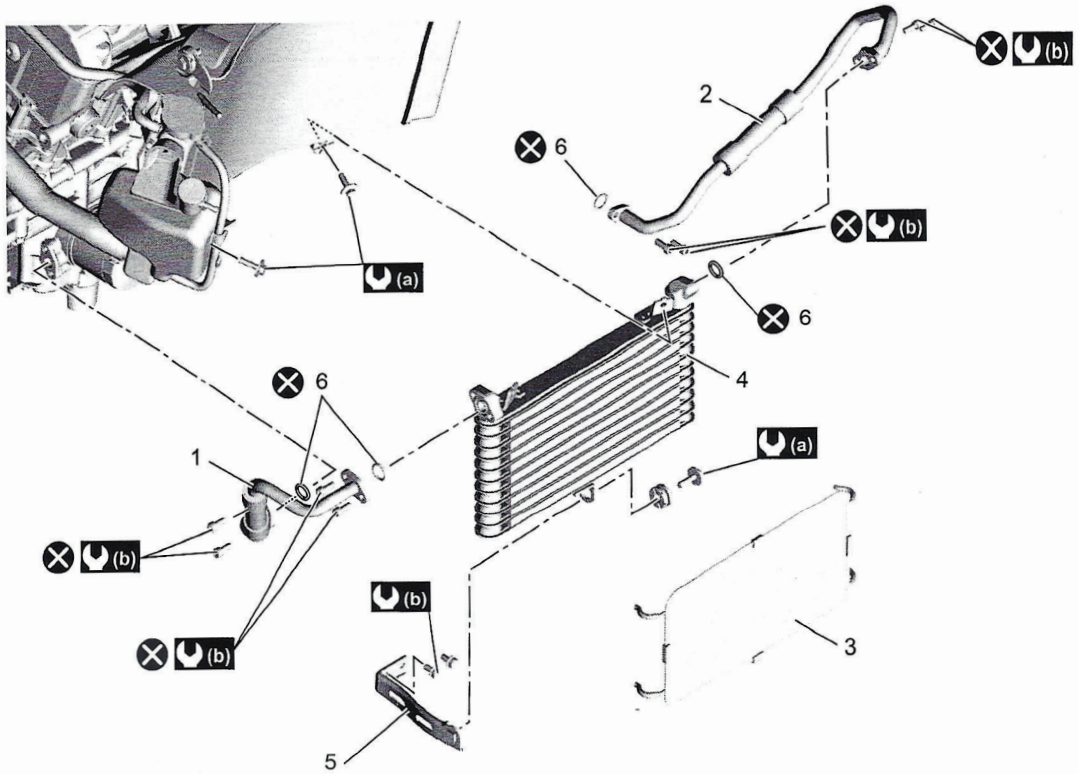
Clean the oil strainer (1) if necessary. Inspect the oil strainer body for damage. If necessary, replace it with a new one.



IM10L1150019-01

Oil Cooler Components

BENM10L31506007



IM10L1150020-02

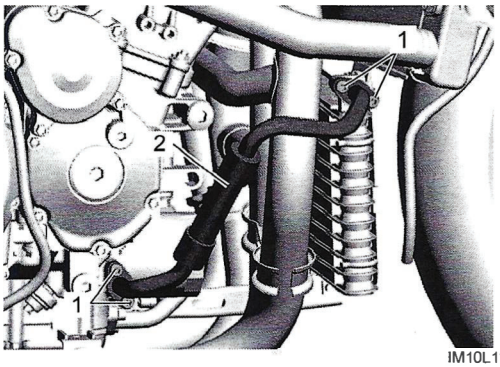
1. Oil cooler inlet hose	4. Oil cooler	(a) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
2. Oil cooler outlet hose	5. Oil cooler bracket	(b) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
3. Oil cooler guard	6. O-ring	⊗ : Do not reuse.

Oil Cooler / Oil Cooler Hose Removal and Installation

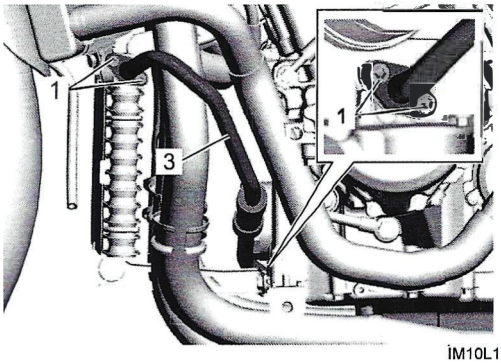
BENM10L31506008

Removal

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Drain the engine oil. ☞(Page 0B-12)
3) Remove the oil cooler hose bolts (1), oil cooler inlet hose (2) and oil cooler outlet hose (3).

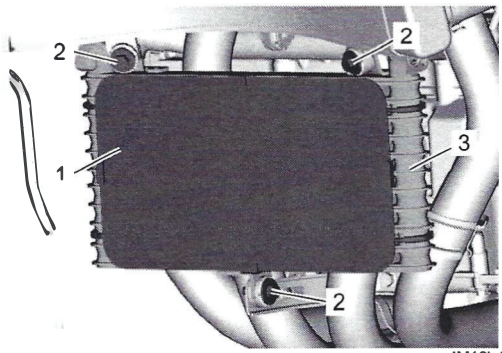


IM10L1150021-01



IM10L1150022-01

4) Remove the oil cooler guard (1) from the oil cooler.
5) Remove the oil cooler bolts (2) and oil cooler (3) from the oil cooler bracket and radiator.



IM10L1150023-01

Installation

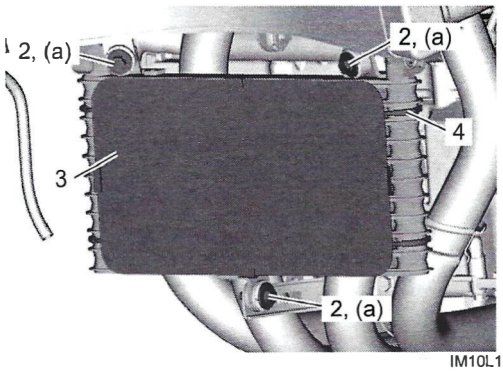
1) Install the oil cooler (1) and oil cooler bolts (2) to the oil cooler bracket and radiator.
2) Tighten the oil cooler bolts (2) to specified torque.

Tightening torque
Oil cooler bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)

3) Install the oil cooler guard (3) to the oil cooler.

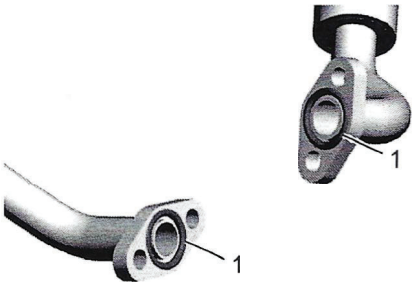
NOTE

Hook (4) of oil cooler guard position as shown in the figure.

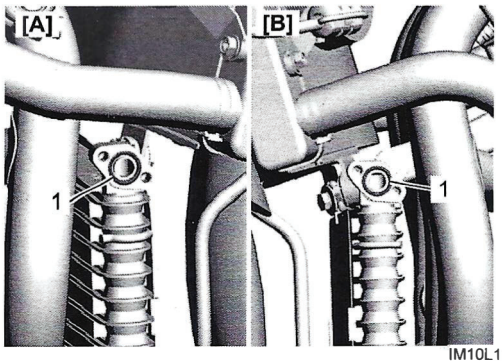


IM10L1150024-01

4) Install the new O-rings (1) to the oil cooler hoses and oil cooler.



IM10L1150025-01

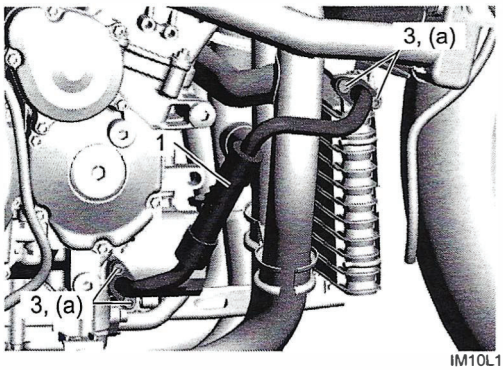


IM10L1150026-01

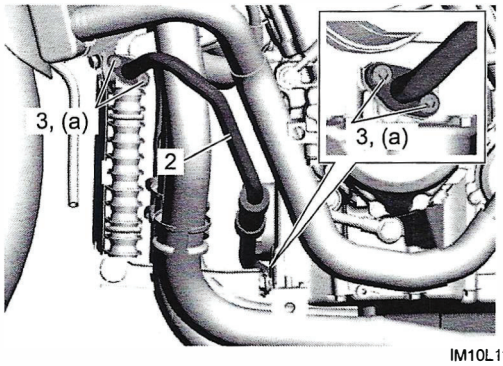
[A]:	Right side
[B]:	Left side

5) Install the oil cooler inlet hose (1) and oil cooler outlet hose (2), and then tighten the new oil cooler hose bolts (3) to specified torque.

Tightening torque
Oil cooler hose bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1150027-01



IM10L1150028-01

6) Fill the engine oil. ☞(Page 0B-11)
7) Install the side cowling assembly. ☞(Page 9D-37)

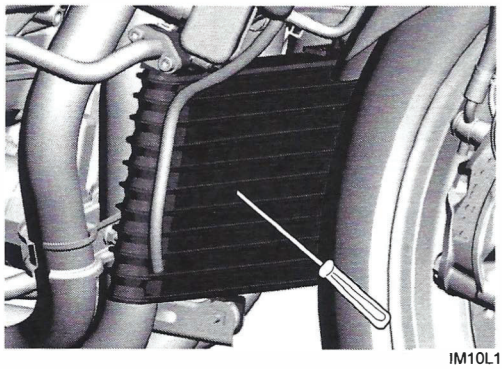
Oil Cooler / Oil Cooler Hose Inspection and Cleaning

BENM10L31506009

Inspection

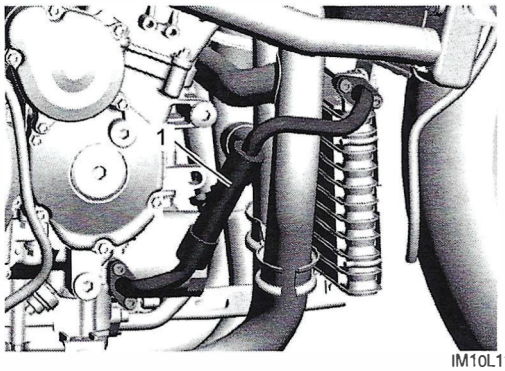
Oil cooler

1) Inspect the oil cooler for engine oil leaks. If any defects are found, replace the oil cooler with a new one. ☞(Page 1E-9)
2) Inspect the fins of oil cooler. If the fins are bent or dented, repair them by carefully straightening them with the blade of a small screwdriver.

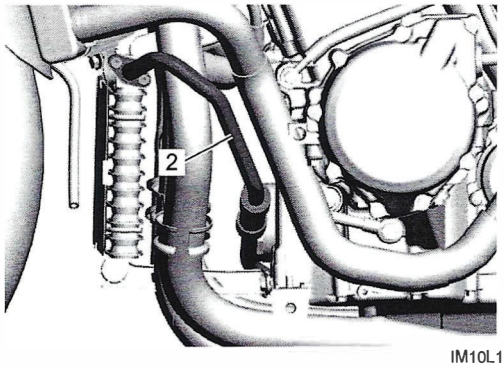

IM10L1150029-01

Oil cooler hose

Inspect the oil cooler inlet hose (1) and oil cooler outlet hose (2) for crack, damage or engine oil leakage. If any defects are found, replace the defective parts with a new one.



IM10L1150030-01



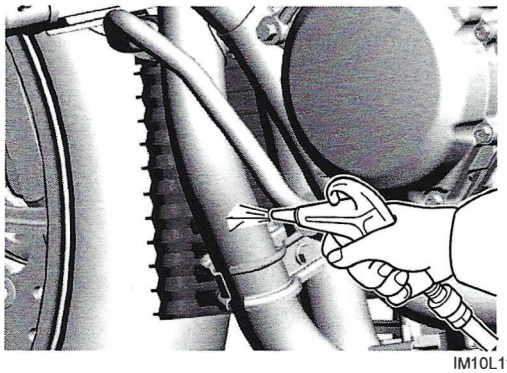
IM10L1150032-01

Cleaning

Blow out any foreign matter that is stuck in the oil cooler fins using compressed air.

NOTICE

- **Do not bend the fins when using compressed air.**
- **Apply compressed air from the engine side. If compressed air is applied from the other side, dirt will be forced into the pores of oil cooler.**

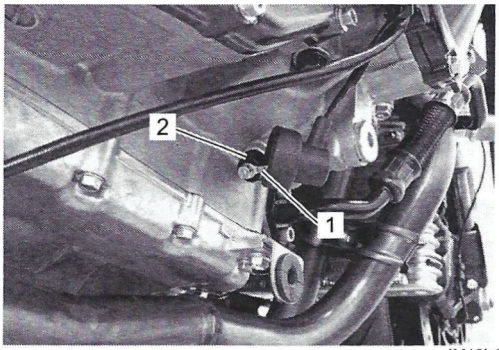

IM10L1150033-01

Oil Pressure Switch Removal and Installation

BENM10L31506010

Removal

1) Turn the ignition switch OFF.
2) Remove the side cowling assembly. ☞(Page 9D-37)
3) Drain engine oil. ☞(Page 1E-5)
4) Disconnect the oil pressure switch lead wire (1).
5) Remove the oil pressure switch (2).



IM10L1150034-01

Installation

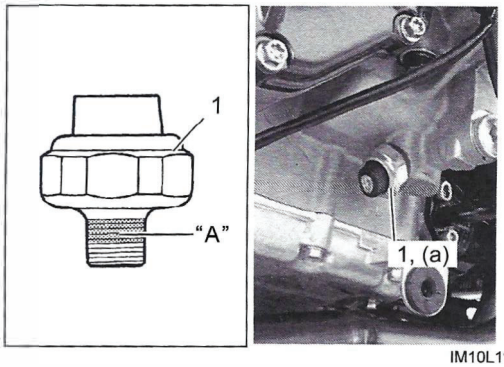
1) Apply engine oil to the oil pressure switch hole.
2) Install the oil pressure switch (1), apply the sealant to its thread part and tighten it to the specified torque.

NOTE

Do not apply sealant to oil pressure switch hole.

"A": Sealant 99000–31140 (SUZUKI BOND 1207B)

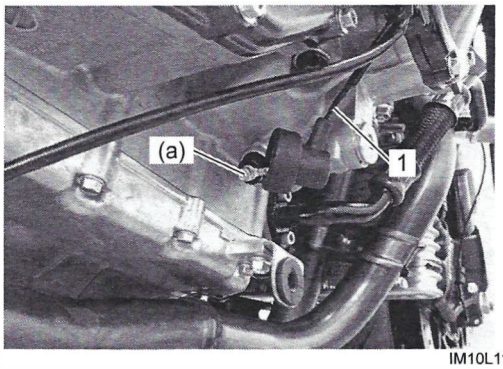
Tightening torque
Oil pressure switch (a): 13 N·m (1.3 kgf-m, 9.5 lbf-ft)



IM10L1150035-01

3) Connect the oil pressure switch lead wire (1). Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-13).

Tightening torque
Oil pressure switch lead wire connecting screw (a): 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)



IM10L1150036-01

4) Pour engine oil. ☞(Page 1E-5)
5) Install the removed parts.

Oil Pressure Switch Inspection

BENM10L31506011

Refer to "Oil Pressure Switch Removal and Installation" (Page 1E-11).

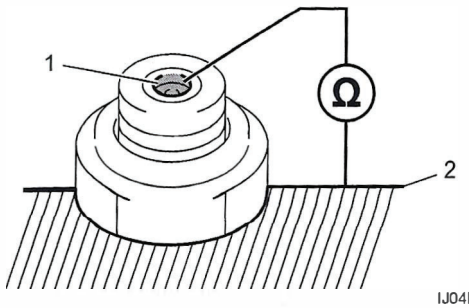
NOTE

Before inspecting the oil pressure switch, check if the engine oil level is correct. ☞(Page 1E-5)

1) Disconnect the oil pressure switch lead wire from the oil pressure switch.
2) Inspect for continuity between the oil pressure switch terminal (1) and crankcase (2) using a circuit tester. If any abnormality is found, replace the oil pressure switch with a new one.

	Oil pressure switch terminal	Crankcase
Engine is at stop	○	○
Engine is running		

IJ04K1150002-01



IJ04K1150003-01

3) After finishing the oil pressure switch inspection, install the removed parts.

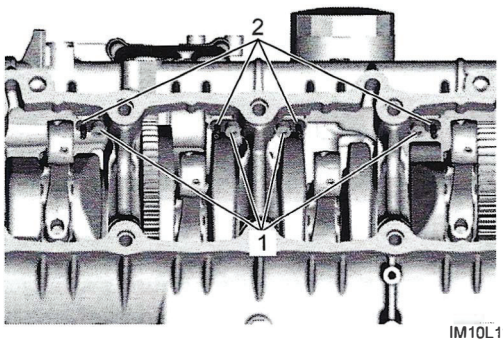
Oil Jet / Oil Gallery Jet Removal and Installation

BENM10L31506012

Oil Jet (For Pistons)

Removal

1) Remove the engine assembly. Refer to "Engine Assembly Removal" in Section 1D (Page 1D-27).
2) Remove the cylinder. Refer to "Cam Chain Guide No.1 / Cylinder / Piston Removal" in Section 1D (Page 1D-50).
3) Remove the piston cooling oil jet bolt (1) and piston cooling oil jets (2).



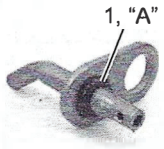
IM10L1150037-01

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 grease to the new O-ring.

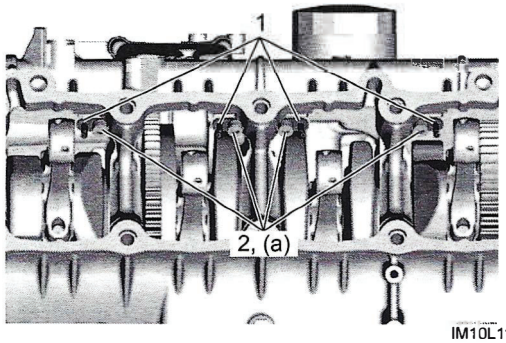
  "A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1150057-01

- Install the piston cooling oil jet (1), and then tighten the piston cooling oil jet bolts (2) to the specified torque.

  Tightening torque
  Piston cooling oil jet bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

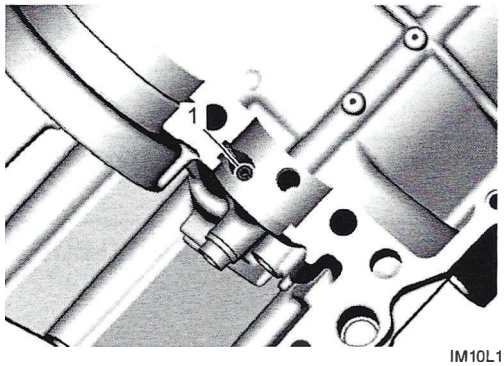


IM10L1150038-01

Oil Jet (For Transmission)

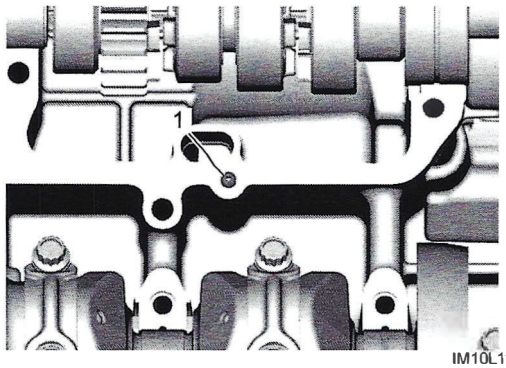
Removal

1) Remove the engine assembly. Refer to "Engine Assembly Removal" in Section 1D (Page 1D-27).
2) Separate the crankcases, upper and lower. Refer to "Crankcase / Crankshaft Removal" in Section 1D (Page 1D-71) and "Crankcase / Crankshaft Installation" in Section 1D (Page 1D-74).
3) Remove the oil jet (1) (for transmission oil spray) from the upper crankcase.



IM10L1150039-01

4) Remove the oil jet (1) (for transmission) from the lower crankcase.



IM10L1150040-01

Installation

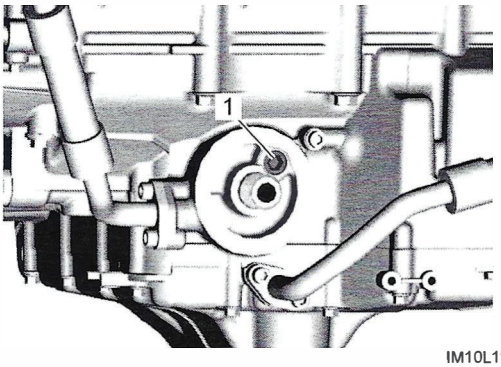
Installation is in the reverse order of removal.
Pay attention to the following points:

- Tighten the oil jets to specified torque.

  Tightening torque
  Oil jet: 1.0 N·m (0.10 kgf-m, 0.75 lbf-ft)

Oil Gallery Jet
Removal

1) Remove the oil filter. Refer to "Engine Oil Filter" in Section 0B (Page 0B-12).
2) Remove the oil gallery jet (1) from the lower crankcase.



IM10L1150041-01

Installation

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

- Tighten the oil gallery jets to specified torque.

Tightening torque
Oil gallery jet: 35 N·m (3.6 kgf-m, 26.0 lbf-ft)

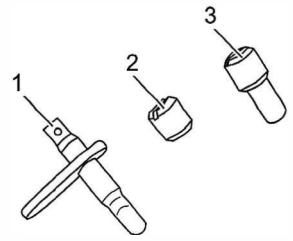
Oil Jet / Oil Gallery Jet Inspection

BENM10L31506013

Refer to "Oil Jet / Oil Gallery Jet Removal and Installation" (Page 1E-12).

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.



IM10L1150058-01

1.	Piston cooling jet
2.	Oil jet (For transmission oil spray)
3.	Oil jet (For transmission)

Oil Gallery Jet

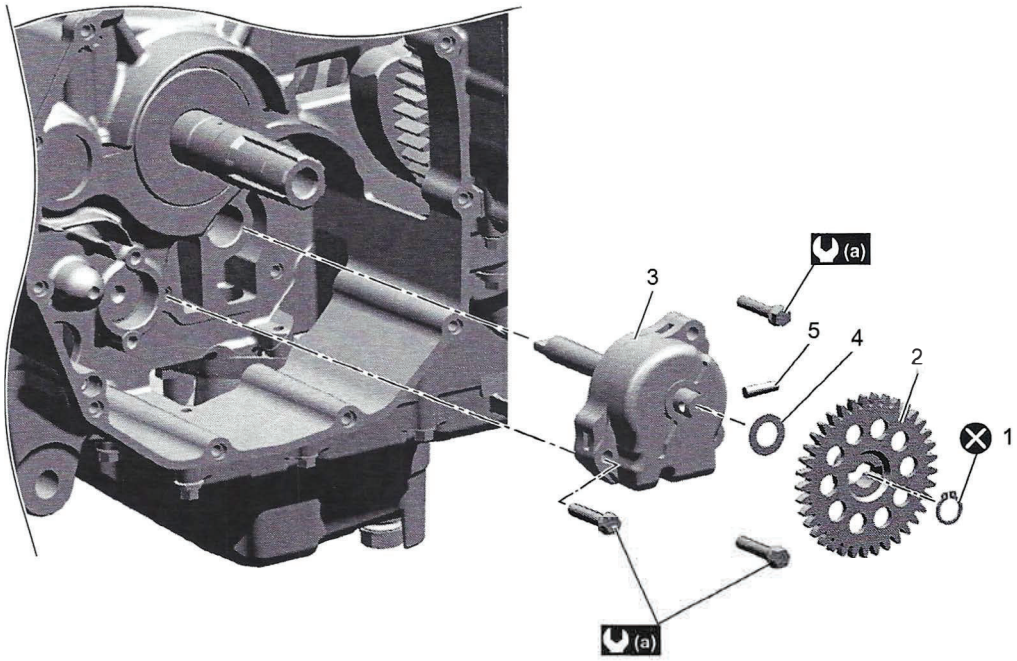
Inspect the oil gallery jet for clogging. Clean the oil gallery if necessary.



I823H1150041-01

Oil Pump Components

BENM10L31506014



IM10L1150043-01

1. Snap ring	4. Washer	⊗ : Do not reuse.
2. Oil pump driven gear	5. Pin	
3. Oil pump	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)	

Oil Pump Removal and Installation

BENM10L31506015

Refer to "Clutch Removal" in Section 5C (Page 5C-17) and "Clutch Installation" in Section 5C (Page 5C-19).

NOTE

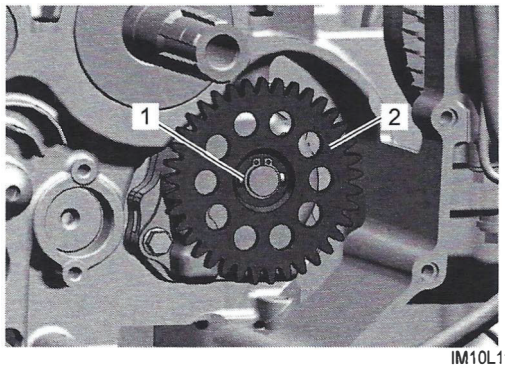
Be careful not to drop any parts into the crankcase.

Removal

1) Remove the circlip (1) from the oil pump.

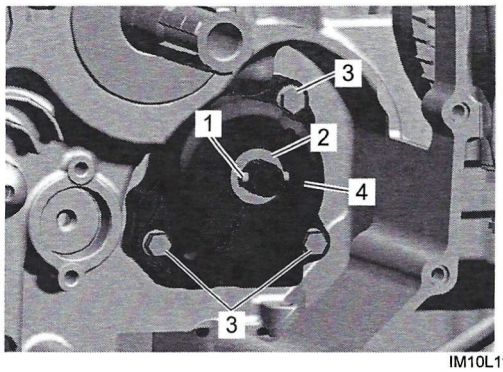
Special tool
09900–06107

2) Remove the oil pump driven gear (2) from the oil pump.



IM10L1150044-01

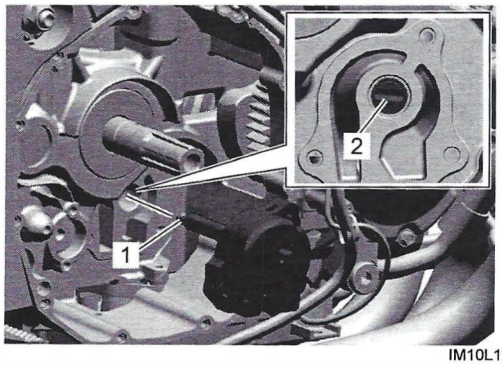
3) Remove the pin (1), washer (2), oil pump assembly bolts (3) and oil pump assembly (4) from the lower crankcase.



IM10L1150045-01

Installation
Install the oil pump in the reverse order of removal. Pay attention to the following points:

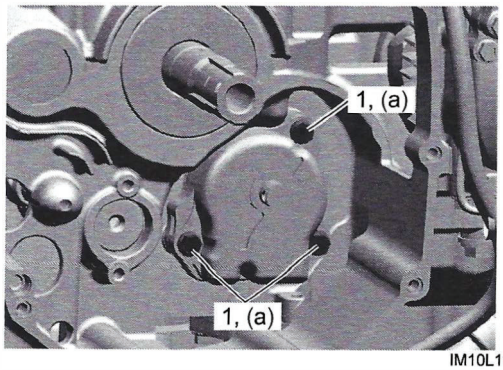
- Install the oil pump with the projection (1) on the shaft end securely engaged with the groove (2) on the water pump shaft.



IM10L1150046-01

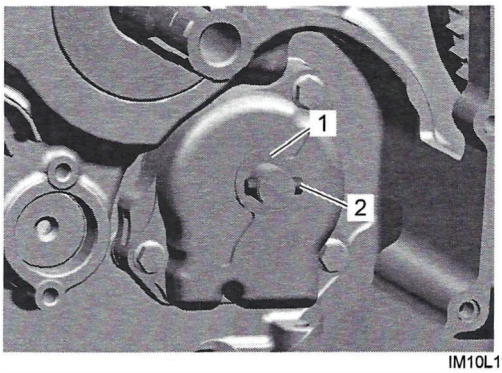
- Tighten the oil pump bolts (1) to the specified torque.

Tightening torque
Oil pump bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1150047-01

- Install the washer (1) and pin (2).



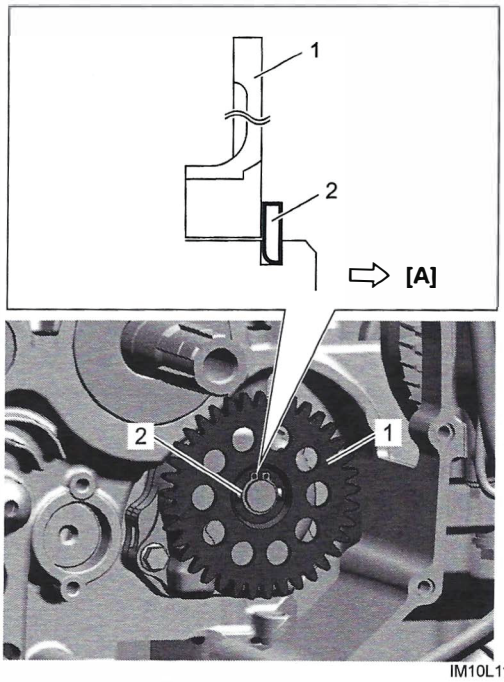
IM10L1150048-01

- Install the oil pump driven gear (1) and new circlip (2).

NOTE

When installing the new circlip, sharp edge of circlip face outside.

Special tool
09900–06107



IM10L1150049-02

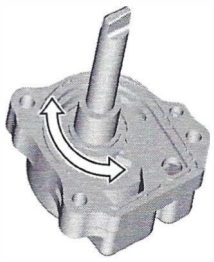
A: Outside

Oil Pump Inspection

BENM10L31506016

Refer to "Oil Pump Removal and Installation" (Page 1E-14).

Rotate the oil pump shaft by hand and check that it moves smoothly. If it does not move smoothly, replace the oil pump assembly.



IM10L1150050-01

Specifications

Tightening Torque Specifications

BENM10L31507001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Oil gallery plug (M16)	35	3.6	26.0	☞(Page 1E-4)
Oil strainer bolt	10	1.0	7.5	☞(Page 1E-7)
Breather pipe bolt	10	1.0	7.5	☞(Page 1E-7)
Oil pan bolt	10	1.0	7.5	☞(Page 1E-7)
Oil cooler outlet hose bolt	10	1.0	7.5	☞(Page 1E-7)
Oil cooler bolt	5.5	0.56	4.05	☞(Page 1E-9)
Oil cooler hose bolt	10	1.0	7.5	☞(Page 1E-9)
Oil pressure switch	13	1.3	9.5	☞(Page 1E-11)
Oil pressure switch lead wire connecting screw	1.5	0.15	1.10	☞(Page 1E-11)
Piston cooling oil jet bolt	10	1.0	7.5	☞(Page 1E-12)
Oil jet	1.0	0.10	0.75	☞(Page 1E-12)
Oil gallery jet	35	3.6	26.0	☞(Page 1E-13)
Oil pump bolt	10	1.0	7.5	☞(Page 1E-15)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Oil Pan / Oil Pressure Regulator / Breather Pipe / Oil Strainer" (Page 1E-5)

"Oil Cooler Components" (Page 1E-8)

"Oil Pump Components" (Page 1E-14)

Special Tools and Equipment

Recommended Service Material

BENM10L31508001

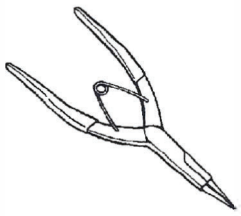
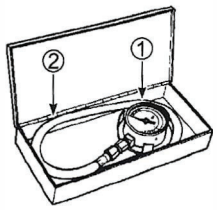
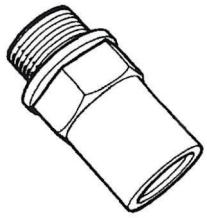
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A	P/No.: 99000–25011	☞(Page 1E-6) / ☞(Page 1E-7) / ☞(Page 1E-12)
Sealant	SUZUKI BOND 1207B	P/No.: 99000–31140	☞(Page 1E-11)

NOTE

Required service material(s) is also described in:
"Oil Pan / Oil Pressure Regulator / Breather Pipe / Oil Strainer" (Page 1E-5)

Special Tool

BENM10L31508002

09900–06107 Snap ring pliers (External) ☞(Page 1E-14) / ☞(Page 1E-15)		09915–74511 Oil pressure gauge set (600 kPa) 1. Gauge 2. Hose ☞(Page 1E-4)	
09915–74540 Oil pressure gauge attachment ☞(Page 1E-4)			

Engine Cooling System

Precautions

Precautions for Engine Cooling System

BENM10L31600001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2) and "Precautions for Circuit Tester" in Section 00 (Page 00-8).

⚠ 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, do not induce vomiting and call physician immediately.**
  - **Keep it away from children.**

Precautions for Engine Coolant

BENM10L31600002

Refer to "Fuel / Oil / Fluid / Coolant Recommendation" in Section 0C (Page 0C-16).

General Description

Engine Coolant Description

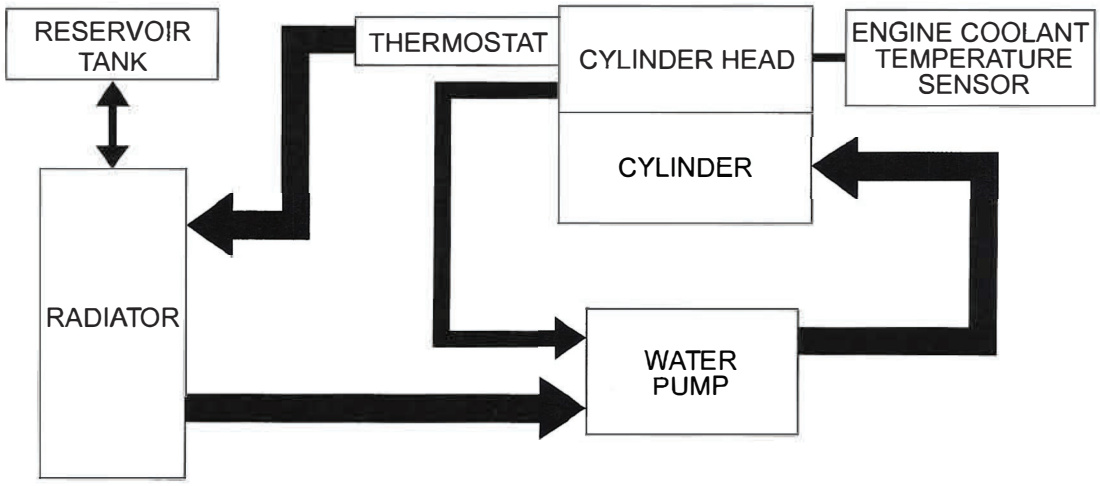
BENM10L31601001

Refer to "Fuel / Oil / Fluid / Coolant Recommendation" in Section 0C (Page 0C-16).

Schematic and Routing Diagram

Cooling Circuit Diagram

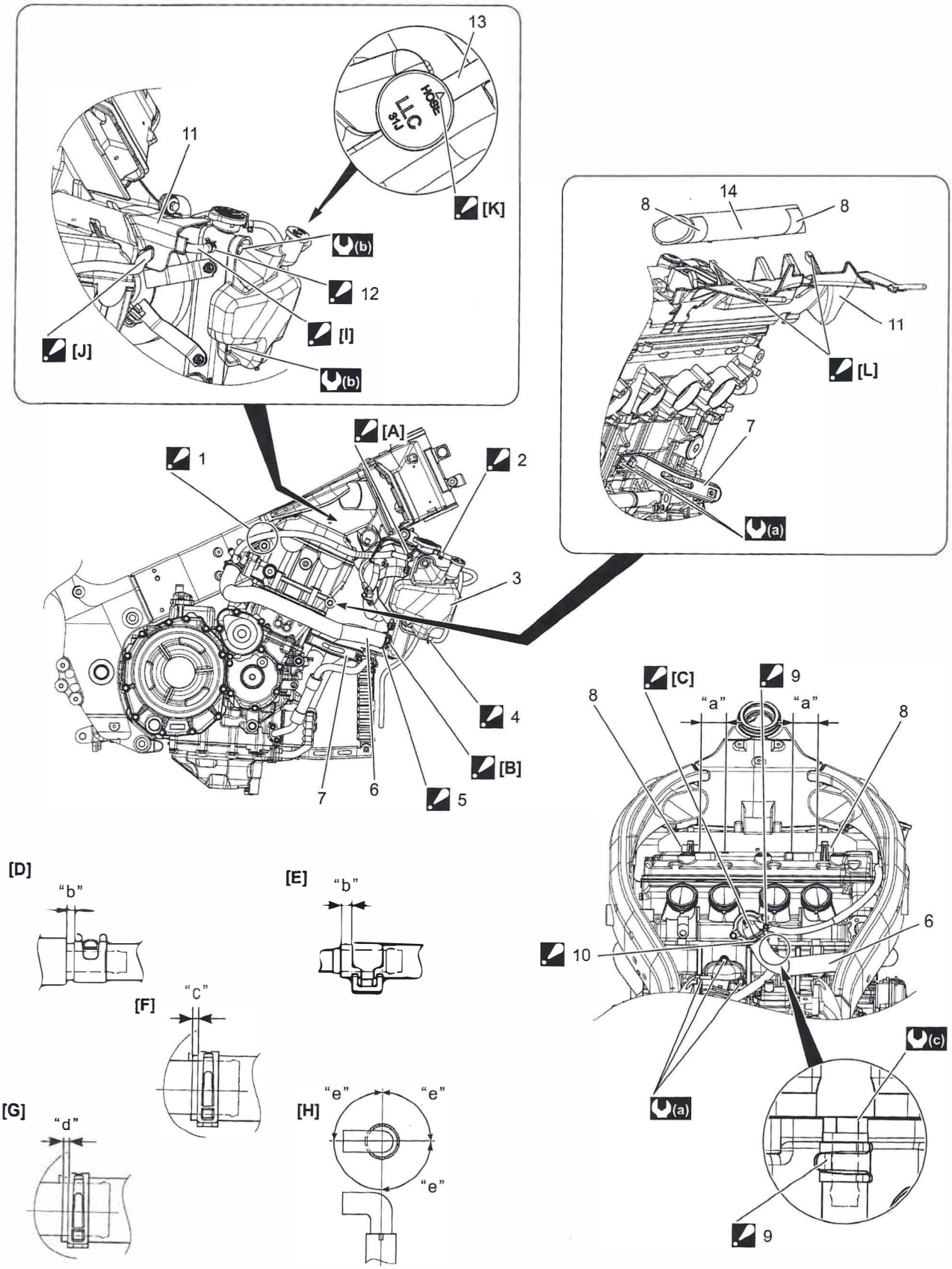
BENM10L31602001



I823H1160001-01

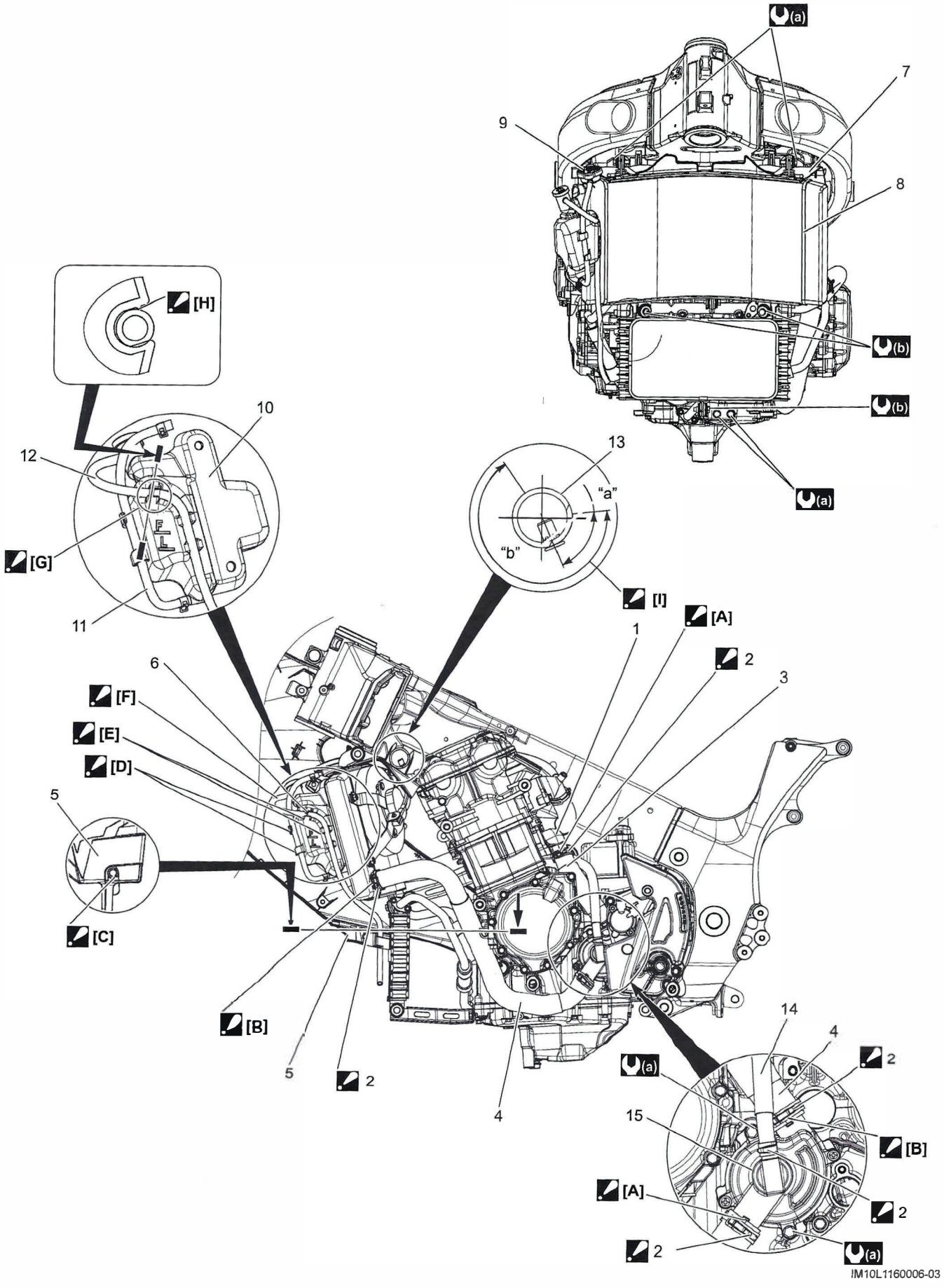
Water Hose Routing Diagram

BENM10L31602002



IM10L1160005-03

[A]: Face the yellow mark to the upward.	1. Water air bleed hose : Pass the water air bleed hose to the upper side of engine mounting.	13. Radiator reservoir tank overflow hose
[B]: Face the yellow mark to the right side.	2. Clamp : Do not touch the radiator cap. : Face the clamp end to the downward.	14. Frame
[C]: Face the white mark to the rearward.	3. Radiator reservoir tank	(a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[D]: Water air bleed hose clamp (thermostat side)/ Water bypass hose clamp (cylinder head side, water pump side)/Reservoir tank inlet hose clamp (reservoir tank side)	4. Clamp : Face the clamp end to the downward.	(b): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
[E]: Water air bleed hose clamp (reservoir tank side)/ Reservoir tank inlet hose clamp (radiator side)	5. Clamp : Face the clamp end to the right side.	(c): 12 N·m (1.2 kgf-m, 9.0 lbf-ft)
[F]: Radiator hose clamp (radiator side)	6. Cylinder head outlet hose	"a": 41.6 – 51.6 mm (1.64 – 2.03)
[G]: Radiator hose clamp (water inlet connector side, water pump side)	7. Radiator bracket	"b": 0 – 2.0 mm (0.00 – 0.08)
[H]: Marking position	8. Radiator heat shield tape	"c": 2.0 – 5.0 mm (0.08 – 1.20)
[I]: Do not pull the air bleed hose by excessive force from the radiator.	9. Clamp : Face the clamp end to the rearward.	"d": 1.0 – 3.0 mm (0.04 – 0.12)
[J]: Pass the water air bleed hose to the groove of the radiator heat shield.	10. Clamp : Face the clamp end rearward.	"e": 90°
[K]: Install the reservoir tank cap by align the match mark and reservoir tank overflow hose.	11. Radiator heat shield	
[L]: Install the projections (1) of radiator heat shield to the frame.	12. Clamp : Face the clamp end upward.	



IM10L1160006-03

[A]: Face the yellow mark to the left side.	6. White paint mark
[B]: Face the white mark to the left side.	7. Radiator heat shield
[C]: Pass the reservoir tank overflow hose to the hole of the side cowling assembly.	8. Radiator
[D]: Fasten the reservoir tank inlet hose to the projections of the reservoir tank.	9. Radiator cap
[E]: Fasten the reservoir tank overflow hose to the projections of the reservoir tank.	10. Radiator reservoir tank
[F]: Pass the reservoir tank overflow hose to the out side of the reservoir tank inlet hose.	11. Reservoir tank inlet hose
[G]: Align the white mark on the reservoir tank overflow hose and projections of reservoir tank.	12. Reservoir tank overflow hose
[H]: Install the reservoir tank overflow hose to the inside of stopper on the reservoir tank.	13. Frame
[I]: Stick tape on this range.	14. Water bypass hose
1. Water inlet connector	15. Water pump
2. Clamp : Face the clamp end to the left side.	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
3. Water inlet hose	(b) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
4. Radiator outlet hose	"a": 69° – 75°
5. Side cowling assembly	"b": 241°

Diagnostic Information and Procedures

Engine Cooling Symptom Diagnosis

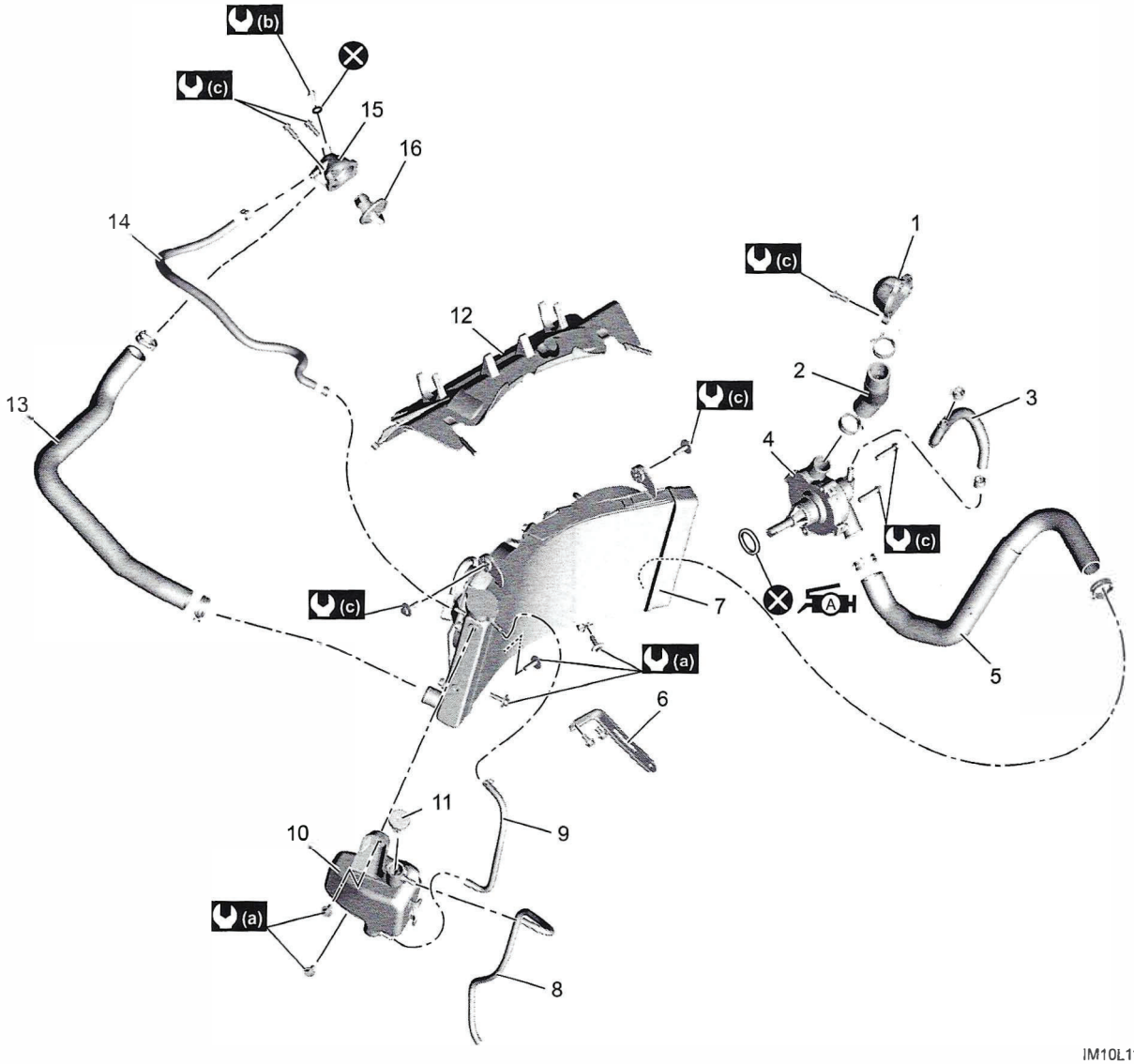
BENM10L31604001

Condition	Possible cause	Correction / Reference Item
Engine overheats	Not enough engine coolant.	*Add engine coolant. ☞(Page 1F-6)*
	Radiator core clogged with dirt or scale.	*Clean. ☞(Page 1F-11)*
	Faulty cooling fan.	*Repair or replace. ☞(Page 1F-8)*
	Defective cooling fan relay, or open-or-short circuited.	*Repair or replace. ☞(Page 1F-13)*
	Clogged water passage.	*Clean.*
	Air trapped in the cooling circuit.	*Bleed air. ☞(Page 1F-6)*
	Defective water pump.	*Replace. ☞(Page 1F-17)*
	Use of incorrect engine coolant.	*Replace. ☞(Page 1F-6)*
	Defective thermostat.	*Replace. ☞(Page 1F-13)*
	Defective ECT sensor.	*Replace. ☞(Page 1C-6)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
Engine over cools	Defective cooling fan relay, or open-or-short circuited.	*Repair or replace. ☞(Page 1F-13)*
	Extremely cold weather.	*Put on radiator cover.*
	Defective thermostat.	*Replace. ☞(Page 1F-13)*
	Defective ECT sensor.	*Replace. ☞(Page 1C-6)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*

Repair Instructions

Cooling System Components

BENM10L31606001



IM10L1160019-02

1. Cylinder inlet hose connector	8. Reservoir tank overflow hose	15. Thermostat cover
2. Cylinder inlet hose	9. Water air bleed hose	16. Thermostat
3. Water bypass hose	10. Radiator reservoir tank	(a) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
4. Water pump	11. Radiator reservoir tank cap	(b) : 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)
5. Water pump inlet hose	12. Radiator heat shield	(c) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
6. Radiator bracket	13. Radiator inlet hose	A : Apply grease.
7. Radiator	14. Water air bleed hose	: Do not reuse.

Engine Coolant Level Inspection

BENM10L31606002

Refer to "Engine Coolant" in Section 0B (Page 0B-16).

Engine Coolant Replacement

BENM10L31606003

Refer to "Engine Coolant" in Section 0B (Page 0B-16).

Engine Cooling System Inspection

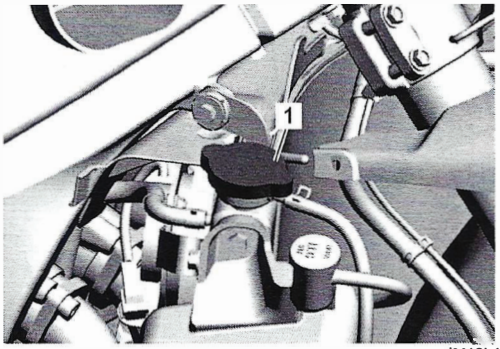
BENM10L31606004

1) Remove the intake pipe assembly (RH). ☞(Page 9D-48)
2) Remove the radiator cap (1).
3) Connect the special tool to the filler.
4) Pressurize the cooling system with approx. 107.9 – 137.3 kPa (1.1 – 1.4 kgf/cm², 15.6 – 19.9 psi) of pressure, and then check if it holds the pressure for 10 seconds.

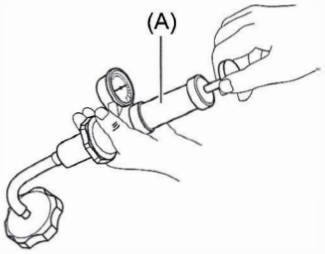
NOTICE

Do not exceed the radiator cap release pressure, or the radiator cap and subsequently the radiator, can be damaged.

Special tool
(A): 09918–78211



IM10L1160020-02



IK46K1160040-01

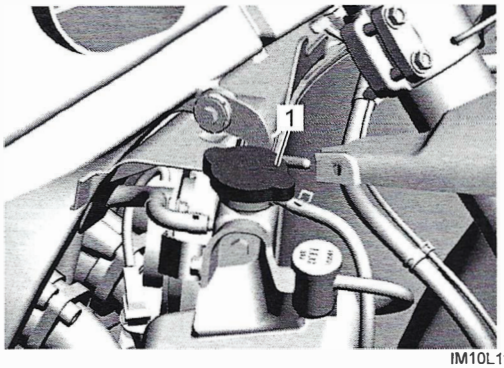
5) Install the removed parts.

Radiator Cap Inspection

BENM10L31606005

Refer to "Engine Cooling System Inspection" (Page 1F-7).

1) Remove the right side cowling assembly (RH). ☞(Page 9D-37)
2) Remove the radiator cap (1).

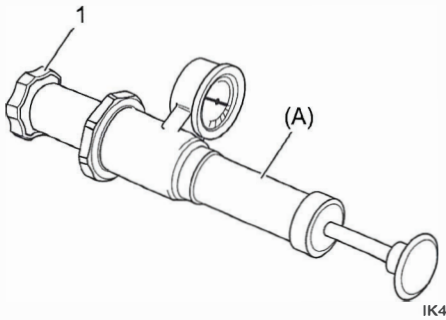


IM10L1160020-02

3) Attach the radiator cap (1) to the special tool as shown in the figure.
4) 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 valve opening pressure
[Standard]: 108.0 – 137.4 kPa (1.1 – 1.4 kgf/cm², 15.7 – 19.9 psi)

Special tool
(A): 09918–78211



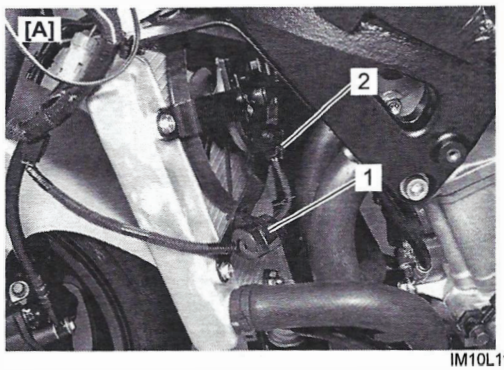
IK46K1160041-01

5) Install the removed parts.

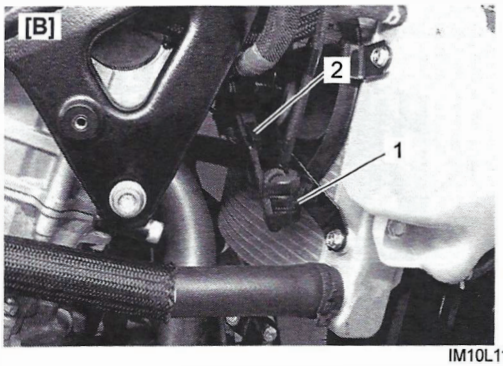
Cooling Fan On-Vehicle Inspection

BENM10L31606006

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Remove the clamps (1) and disconnect the cooling fan motor couplers (2).



IM10L1160021-02



IM10L1160022-02

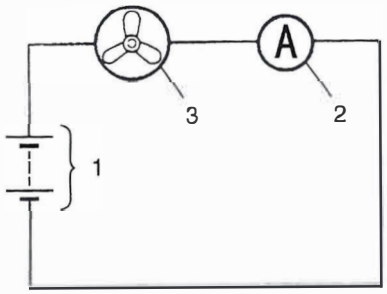
[A]:	Left side
[B]:	Right side

3) Test the cooling fan motor (3) for load current with an ammeter (2) connected as shown in the figure.
If the fan motor does not turn, replace the cooling fan assembly with a new one. ☞(Page 1F-8)

NOTE

- **When making this test, it is not necessary to remove the cooling fan.**
- **Make sure that the battery (1) 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 5.4 A.**

Cooling fan operating temperature
OFF→ON [Standard]: Approx. 105 °C (221 °F)
ON→OFF [Standard]: Approx. 100 °C (212 °F)



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4) After finishing the cooling fan inspection, install the removed parts.

Radiator Hose Inspection

BENM10L31606007

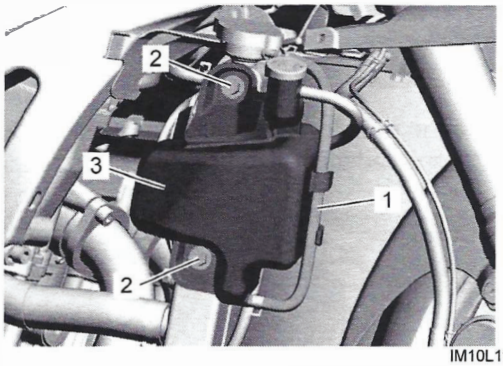
Refer to "Radiator Hose" in Section 0B (Page 0B-17).

Radiator / Cooling Fan Motor Removal and Installation

BENM10L31606008

Removal

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Drain the engine coolant. ☞(Page 1F-6)
3) Disconnect the reservoir tank inlet hose (1).
4) Remove the radiator reservoir tank bolts (2), radiator reservoir tank (3) from the radiator.

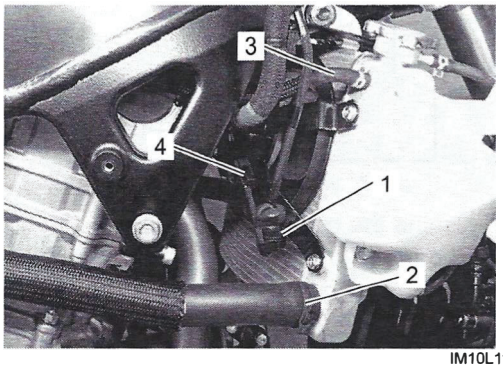


IM10L1160023-01

5) Remove the clamp (1).
6) Disconnect the radiator inlet hose (2), water air bleed hose (3) and cooling fan motor lead wire coupler (right) (4).

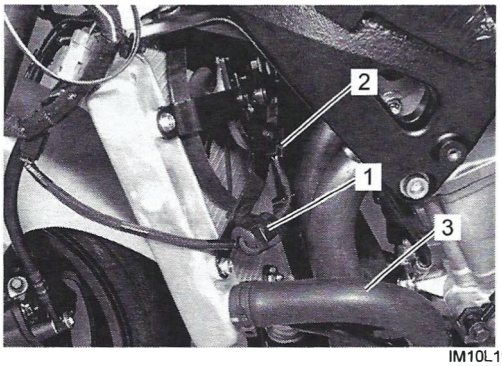
NOTE

Do not pull the water air bleed hose (3) by excessive force from the radiator.



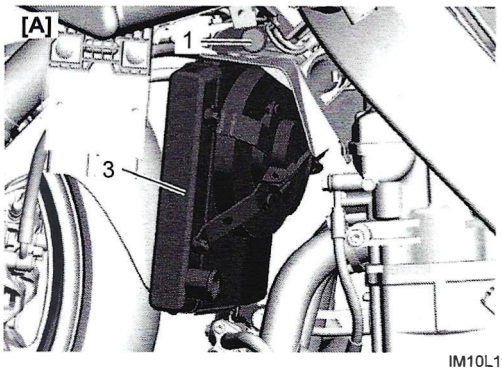
IM10L1160024-03

7) Remove the clamp (1).
8) Disconnect the cooling fan motor lead wire coupler (left) (2) and radiator outlet hose (3).

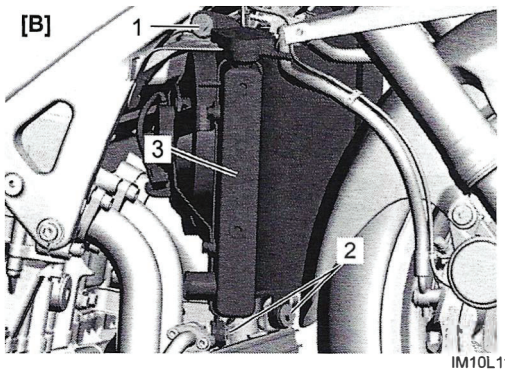


IM10L1160025-03

9) Remove the radiator assembly bolts (1), oil cooler bolts (2) and radiator assembly (3).



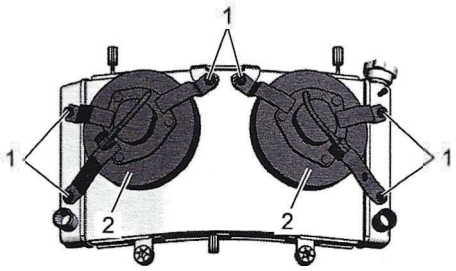
IM10L1160026-02



IM10L1160027-02

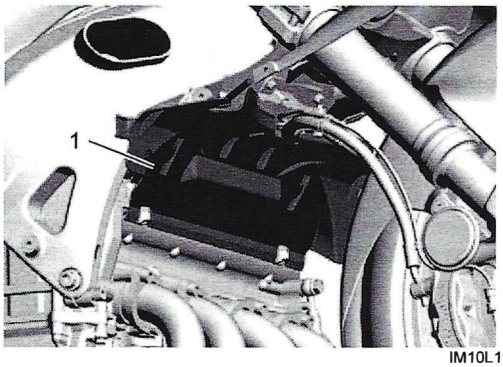
[A]:	Left side
[B]:	Right side

10) Remove the cooling fan motor bolts (1) and cooling fan motors (2) from the radiator.



IM10L1160028-01

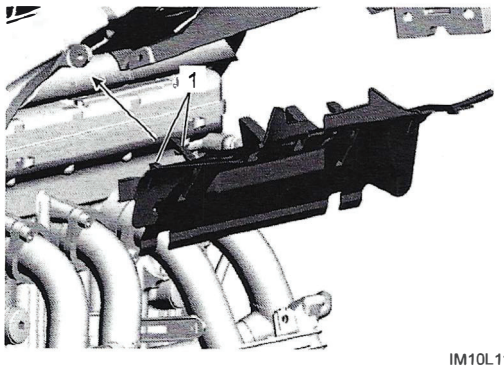
11) Remove the radiator heat shield (1) if necessary.



IM10L1160029-01

Installation

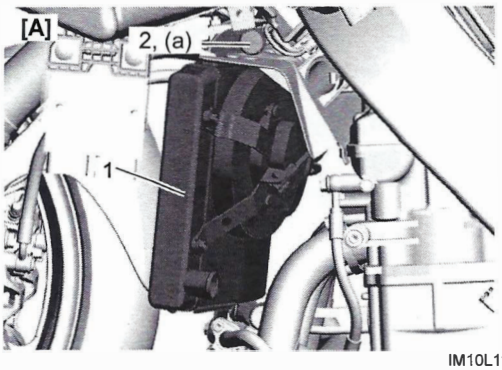
1) Install the projections (1) of radiator heat shield to the frame if removed.



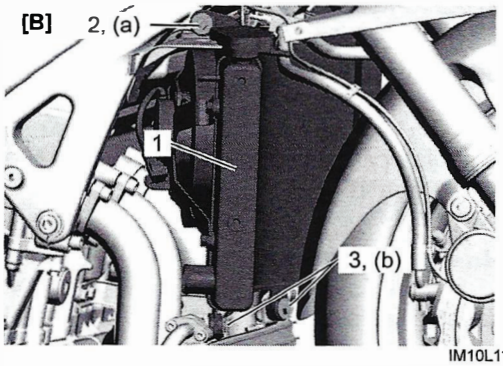
IM10L1160030-01

2) Install the radiator (1), and then tighten the radiator bolts (2) and oil cooler bolt (3) to specified torque.

Tightening torque
Radiator assembly bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
Oil cooler bolt (b): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



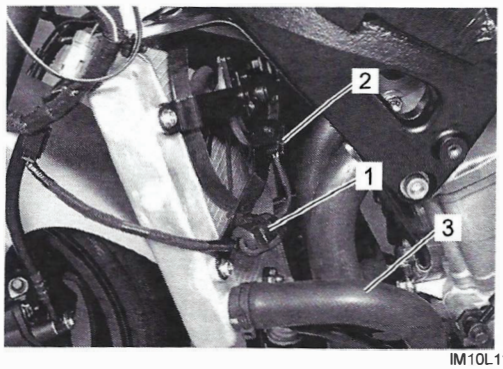
IM10L1160031-02



IM10L1160032-02

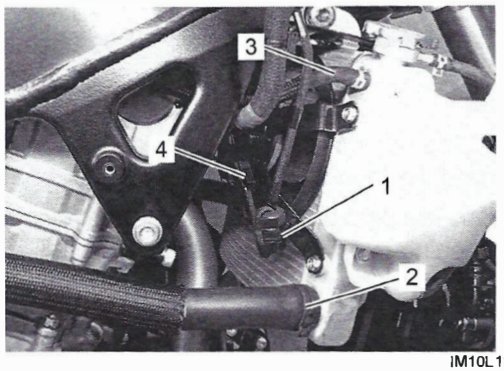
[A]:	Left side
[B]:	Right side

3) Install the clamp (1), and then connect the cooling fan motor lead wire coupler (left) (2) and radiator outlet hose (3). ☞(Page 1F-2)



IM10L1160025-03

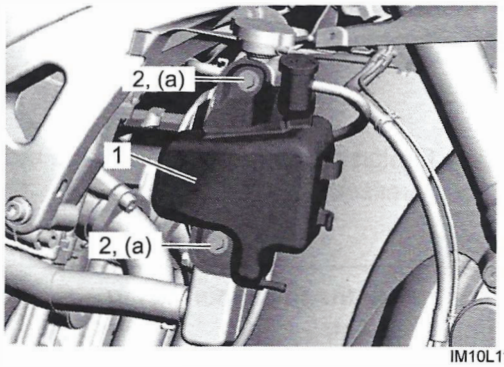
4) Install the clamp (1), and then connect the radiator inlet hose (2), water air bleed hose (3) and cooling fan motor lead wire coupler (right) (4). ☞(Page 1F-2)



IM10L1160024-03

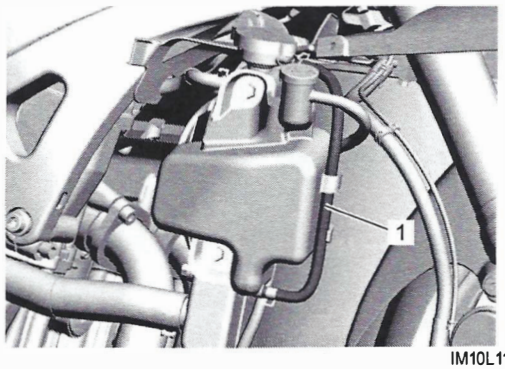
5) Install the radiator reservoir tank (1) to the radiator, and then tighten the new radiator reservoir tank bolts (2) to specified torque.

Tightening torque
Radiator reservoir tank bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



IM10L1160033-01

6) Connect the reservoir tank inlet hose (1). ☞(Page 1F-2)



IM10L1160034-01

7) Fill the engine coolant. ☞(Page 0B-16)
8) Install the side cowling assembly. ☞(Page 9D-37)

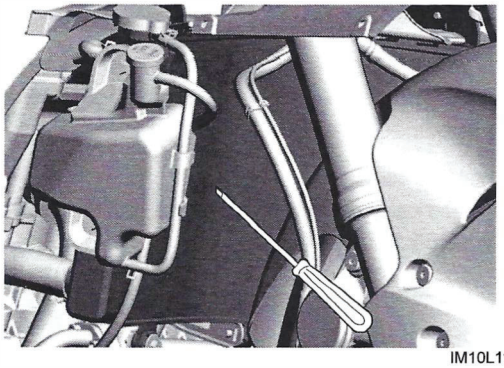
Radiator Inspection and Cleaning

BENM10L31606009

Remove the side cowling assembly. ☞(Page 9D-37)

Inspection

1) Inspect the radiator for coolant leaks. If any defects are found, replace the radiator with a new one.
2) If the fins are bent or dented, repair them by carefully straightening them with the blade of a small screwdriver.



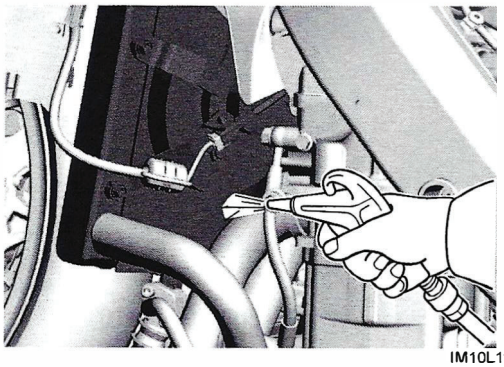
IM10L1160035-01

Cleaning

Blow out any foreign matter that is stuck in the radiator fins using compressed air.

NOTICE

- **Do not bend the fins when using compressed air.**
- **Apply compressed air from the engine side. If compressed air is applied from the other side, dirt will be forced into the pores of radiator.**

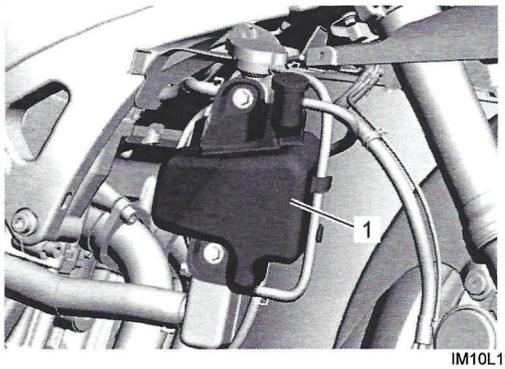


IM10L1160036-01

Radiator Reservoir Tank Inspection

BENM10L31606010

1) Remove the right side cowling assembly. ☞(Page 9D-37)
2) Inspect the radiator reservoir tank (1) coolant leaks. If any defects are found, replace the radiator reservoir tank with a new one.



IM10L1160037-01

3) Install the removed parts.

Radiator Reservoir Tank Removal and Installation

BENM10L31606011

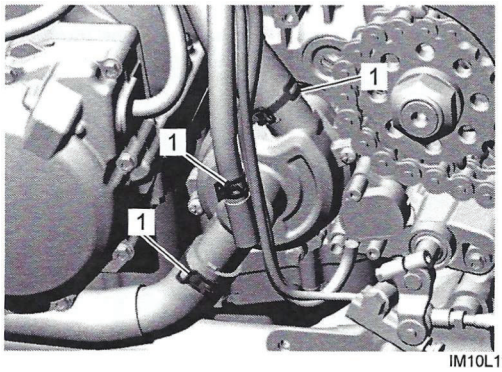
Refer to "Radiator / Cooling Fan Motor Removal and Installation" (Page 1F-8).

Water Hose Inspection

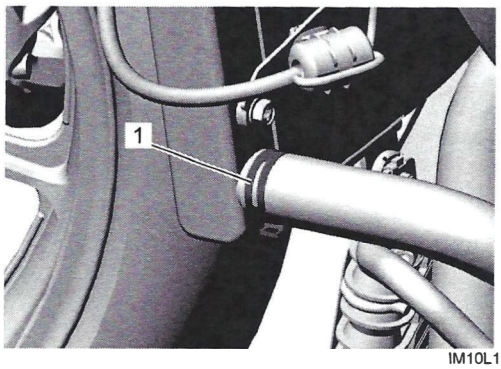
BENM10L31606012

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Lift and support the fuel tank. ☞(Page 1G-12)
3) Remove the engine sprocket cover. Refer to "Engine Sprocket Removal and Installation" in Section 3A (Page 3A-3).
4) Check the water hoses for crack, damage or engine coolant leakage. If any defect is found, replace the water hose with a new one.

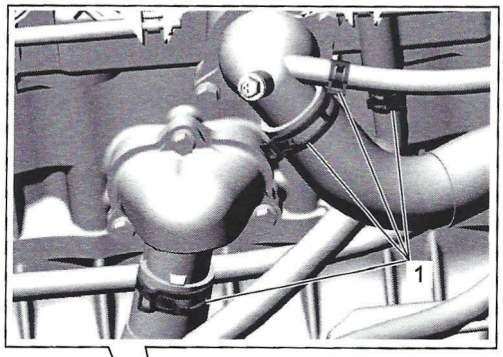
5) Any leakage from the connecting section (1) should be corrected by proper tightening. ☞(Page 1F-2)

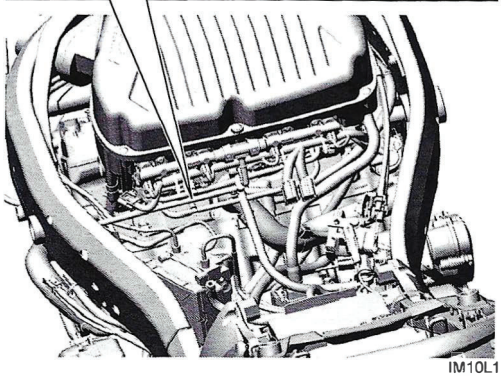


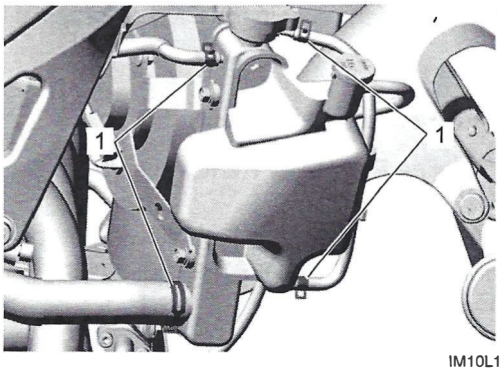
IM10L1160065-01



IM10L1160066-01




IM10L1160067-01



IM10L1160068-01

6) After finishing the water hose inspection, install the removed parts.

Water Hose Removal and Installation

BENM10L31606013

Removal

1) Drain engine coolant. ☞(Page 1F-6)
2) Remove the side cowling assembly. ☞(Page 9D-37)
3) Remove the fuel tank. ☞(Page 1G-12)
4) Remove the water hoses and water hose band. ☞(Page 1F-2)

Installation

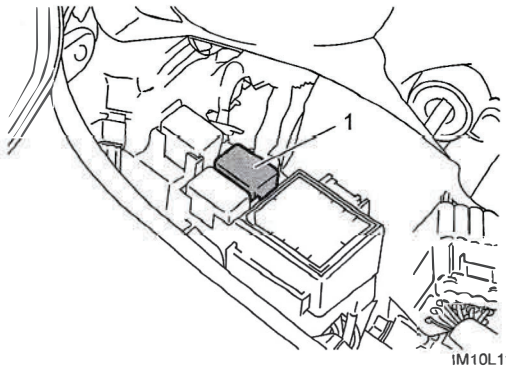
1) Install the water hose. Refer to "Water Hose Routing Diagram" (Page 1F-2).
2) Pour engine coolant and bleed air from the cooling circuit. Refer to "Engine Coolant" in Section 0B (Page 0B-16).
3) Install the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-12).
4) Install the side cowling assembly. Refer to "Side Cowling Assembly Removal and Installation" in Section 9D (Page 9D-37).

Cooling Fan Relay Removal and Installation

BENM10L31606014

Removal

1) Turn the ignition switch OFF.
2) Remove the meter panel. ☞(Page 9D-37)
3) Remove the cooling fan relay (1).



IM10L1160038-02

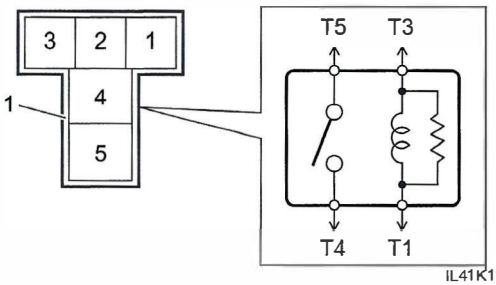
Installation
Install the cooling fan relay in the reverse order of removal.

Cooling Fan Relay Inspection

BENM10L31606015

Refer to "Cooling Fan Relay Removal and Installation" (Page 1F-12).
Check the cooling fan relay in the following procedures. If abnormality is found, replace the cooling fan relay with a new one.

1) Check that there is no continuity between terminals "T4" and "T5".
2) Check that there is continuity between terminals "T1" and "T3".
3) Connect battery positive (+) terminal and negative (–) terminal between terminals "T1" and "T3" and check for continuity between terminals "T4" and "T5". If there is no continuity when the relay is connected to the battery, replace the cooling fan relay.



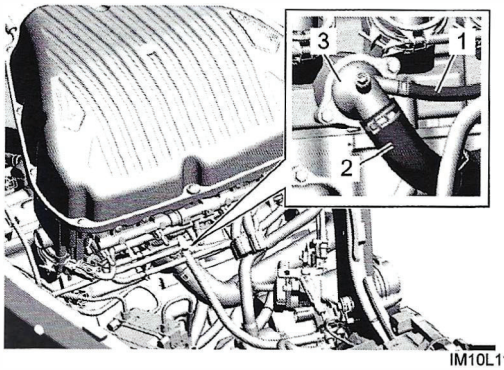
IL41K1150036-02

Thermostat Cover / Thermostat Removal and Installation

BENM10L31606016

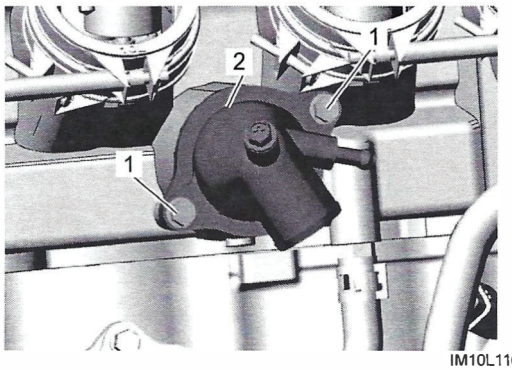
Removal

1) Drain a small amount of engine coolant. Refer to "Engine Coolant" in Section 0B (Page 0B-16).
2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation" in Section 1G (Page 1G-12).
3) Disconnect the water air bleed hose (1) and cylinder head outlet hose (2) from the thermostat cover (3).



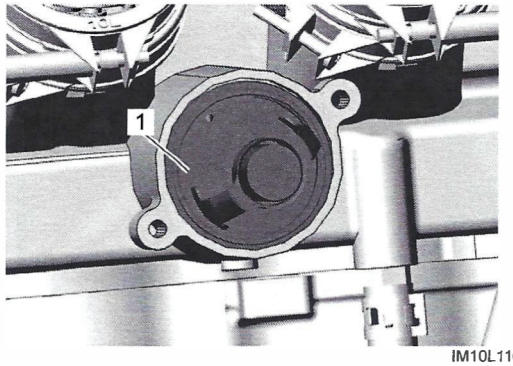
IM10L1160039-01

4) After removing of the thermostat cover bolts (1), and then remove the thermostat cover (2) from the cylinder head.



IM10L1160040-01

5) Remove the thermostat (1) from the cylinder head.



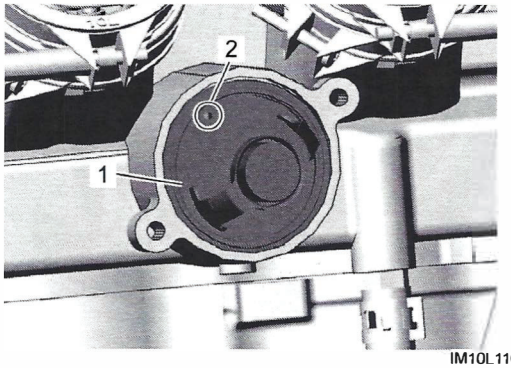
IM10L1160041-01

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

- Install the thermostat (1) to the cylinder head.

NOTE

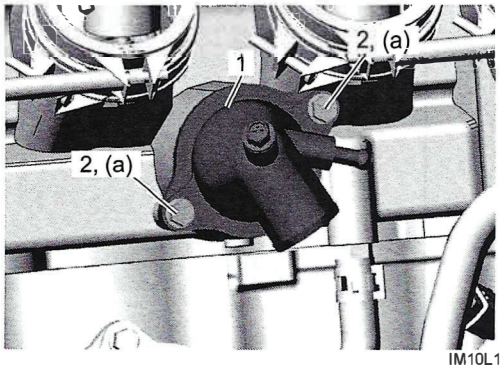
The air bleeder hole (2) of the thermostat faces upside.



IM10L1160042-01

- Install the thermostat cover (1), and then tighten the thermostat cover bolts (2) to the specified torque.

Tightening torque
Thermostat cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1160043-01

- Connect the water hoses securely. Refer to "Water Hose Routing Diagram" (Page 1F-2).
- Pour engine coolant and bleed air from the cooling circuit. Refer to "Engine Coolant" in Section 0B (Page 0B-16).
- Install the removed parts.

Thermostat Inspection

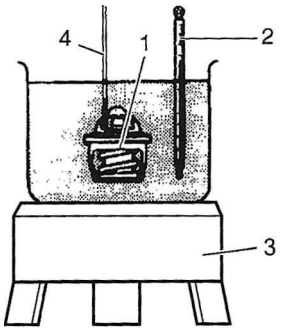
BENM10L31606017

1) Inspect the thermostat pellet for signs of cracking.
2) Test the thermostat at the bench for control action.

NOTE

- **Do not contact the thermostat (1) and the column thermometer (2) with a pan.**
- **As the thermostat operating response to water temperature change is gradual, do not raise water temperature too quickly.**
- **The thermostat with its valve open even slightly under normal temperature must be replaced.**

3) Immerse the thermostat (1) in the water contained in a beaker and note that the immersed thermostat is in suspension.
4) Heat the water by placing the beaker on a heater (3) and observe the rising temperature on a thermometer (2).



ID26J1160035-04

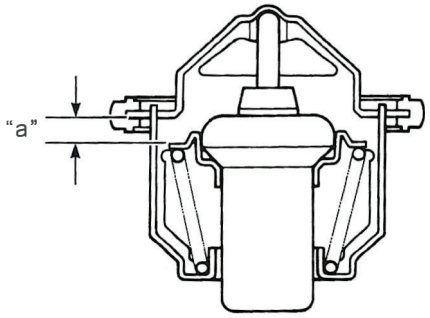
4. String

5) 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 (179.6 °F)

6) Keep on heating the water to raise its temperature.
7) Just when the water temperature reaches specified value, the thermostat valve should have been lifted by at least 8 mm (0.3 in) "a". A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.

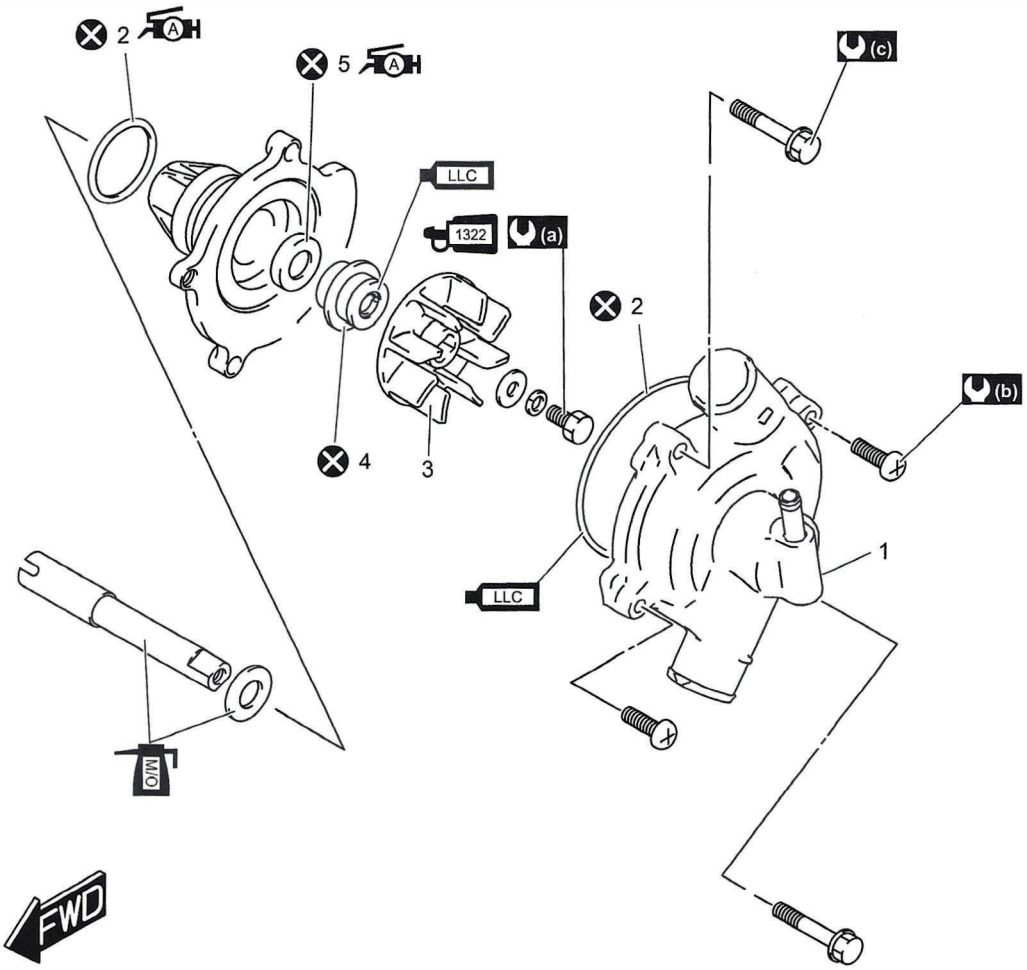
Thermostat valve lift
At 95 °C (203 °F) [Standard]: 8 mm (0.3 in) or more



I944H1160022-01

Water Pump Components

BENM10L31606018



IM10L1160072-02

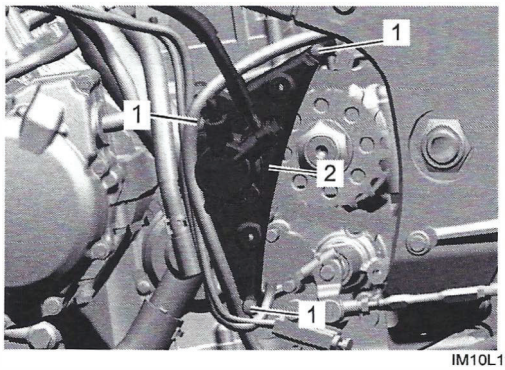
1. Water pump case	(a) : 8.0 N·m (0.82 kgf-m, 5.90 lbf-ft)	M/O : Apply molybdenum oil solution.
2. O-ring	(b) : 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)	1322 : Apply thread lock.
3. Impeller	(c) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)	: Do not reuse.
4. Mechanical seal	: Apply grease.	
5. Oil seal	LLC : Apply engine coolant.	

Water Pump Removal and Installation

BENM10L31606019

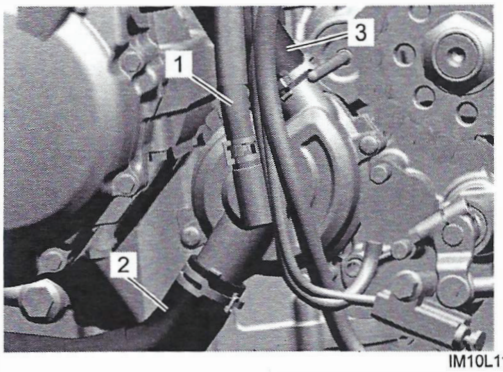
Removal

1) Drain engine oil and coolant. Refer to "Engine Oil Filter" in Section 0B (Page 0B-12) and "Engine Coolant" in Section 0B (Page 0B-16).
2) Remove the engine sprocket covers. Refer to "Engine Sprocket Removal and Installation" in Section 3A (Page 3A-3).
3) Remove the clutch release cylinder holder bolts (1) and clutch release cylinder holder (2).



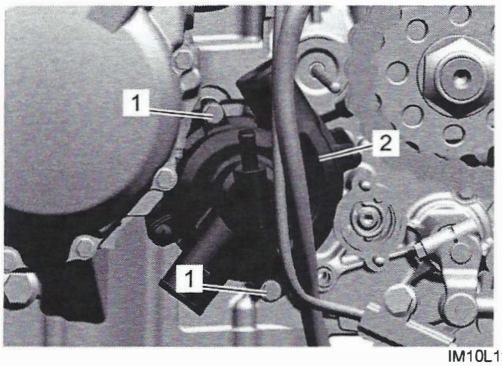
IM10L1160044-01

4) Remove the GP sensor. ☞(Page 5B-14)
5) Disconnect the water bypass hose (1), water pump inlet hose (2) and cylinder inlet hose (3) from the water pump case.



IM10L1160045-01

6) Remove the water pump bolt (1) and water pump (2) from the lower crankcase.

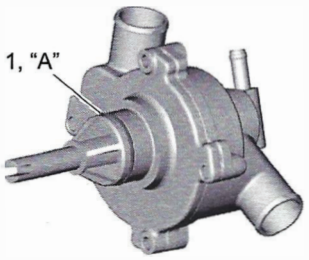


IM10L1160046-01

Installation

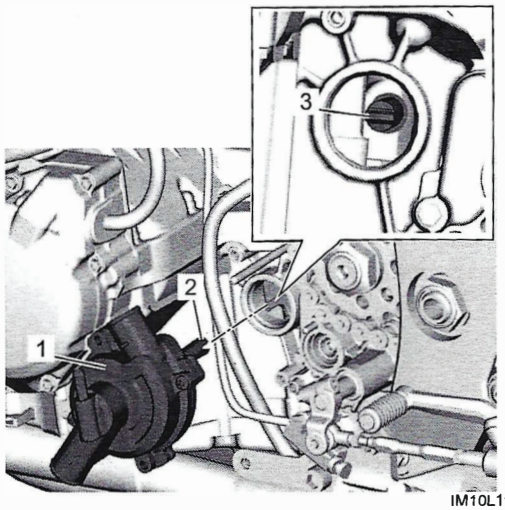
- Apply grease to the new O-ring (1).

  "A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1160071-01

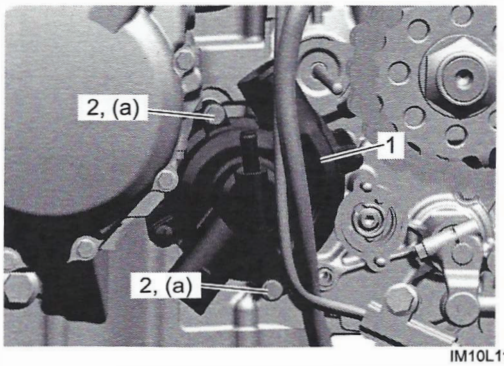
- Install the water pump assembly (1) with the slot on the pump shaft end (2) securely engaged with the flat (3) on the oil pump shaft.



IM10L1160047-01

- Install the water pump (1), and then tighten the water pump bolts (2) to the specified torque.

  Tightening torque
  Water pump bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1160048-01

- Connect the water hoses securely. Refer to "Water Hose Routing Diagram" (Page 1F-2).
- Pour engine oil and coolant. Refer to "Engine Oil Filter" in Section 0B (Page 0B-12) and "Engine Coolant" in Section 0B (Page 0B-16).
- Bleed air from the cooling circuit. Refer to "Engine Coolant" in Section 0B (Page 0B-16).
- Install the side cowling assembly. ☞(Page 9D-37)

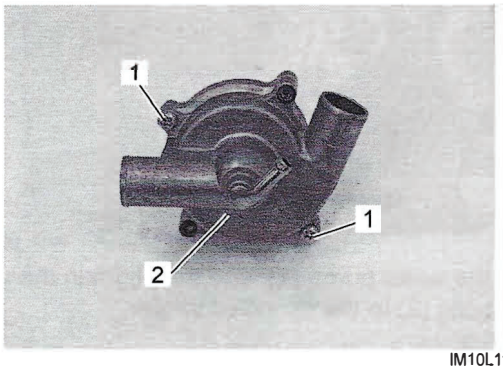
Water Pump Disassembly and Assembly

BENM10L31606020

Refer to "Water Pump Removal and Installation" (Page 1F-15).

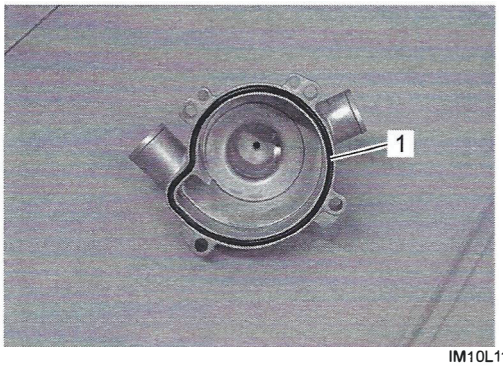
Disassembly

1) Remove the water pump case bolts (1) and water pump case (2) from the water pump body.



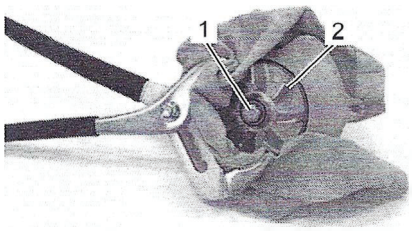
IM10L1160049-01

2) Remove the O-ring (1) from the water pump case.



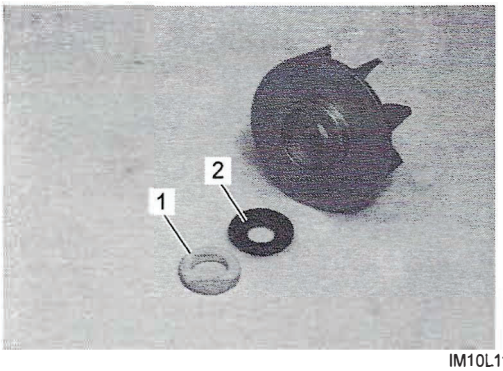
IM10L1160050-01

3) Remove the impeller securing bolt by holding the impeller (1) with a water pump pliers.



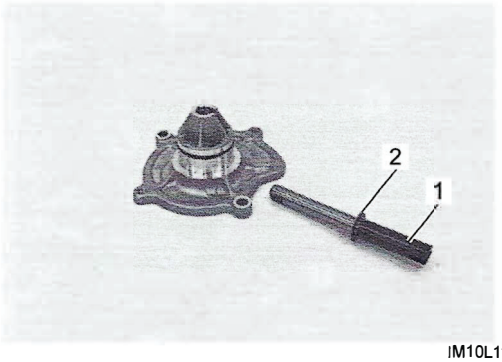
IM10L1160051-01

4) Remove the mechanical seal ring (1) and rubber seal (2) from the impeller.



IM10L1160052-01

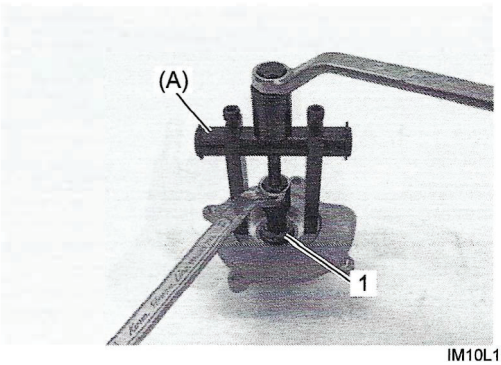
5) Remove the impeller shaft (1) and washer (2) from the water pump body.



IM10L1160053-01

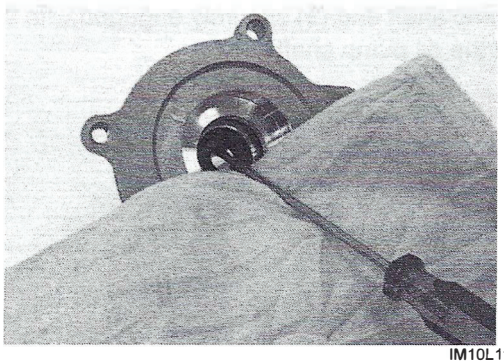
6) Remove the mechanical seal (1) with the special tool.

Special tool
(A): 09921–20240



IM10L1160054-01

7) Remove the oil seal (1).



IM10L1160055-01

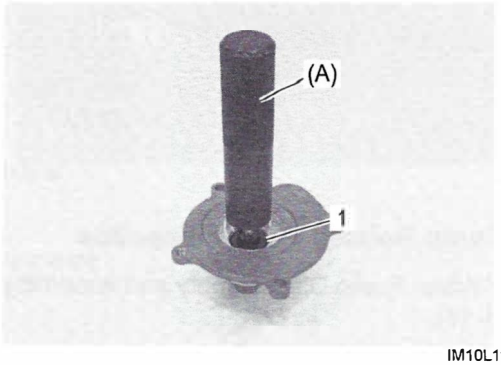
Reassembly

1) Install the new oil seal (1) with the special tool.

NOTE

The stamped mark on the oil seal should face mechanical seal side.

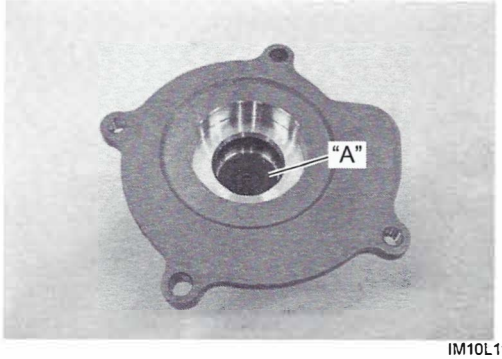
Special tool
(A): 09913–70210



IM10L1160056-01

2) Apply a small quantity of the grease to the oil seal lip.

"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)

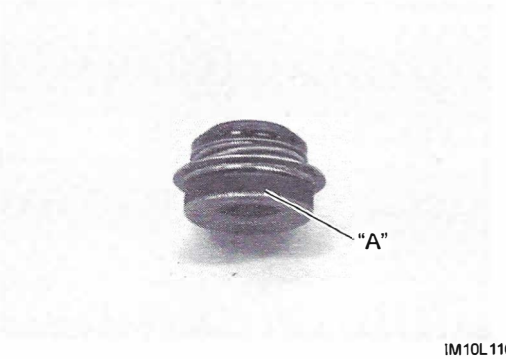


IM10L1160057-01

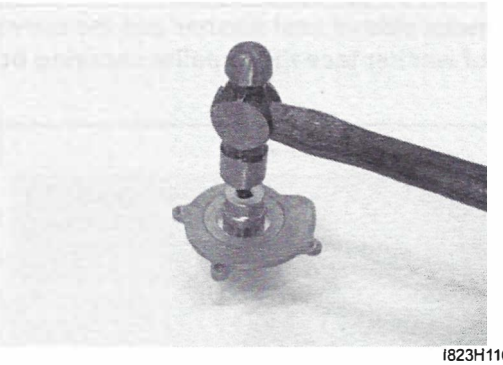
3) Install a new mechanical seal using a suitable size socket wrench.

NOTE

On new mechanical seals, the sealer "A" has been applied.



IM10L1160058-01

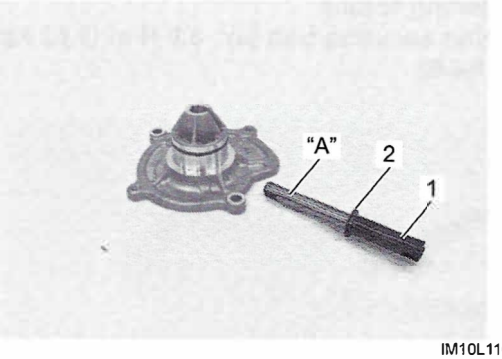


I823H1160042-01

4) Apply molybdenum solution to the impeller shaft (1) and washer (2).

"A": Assembly lubrication (Molybdenum oil solution)

5) Install the impeller shaft (1) and washer (2) to the water pump body.



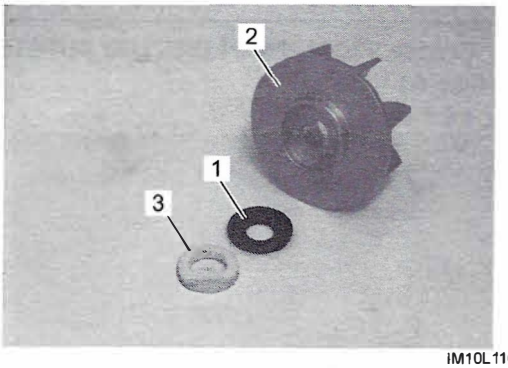
IM10L1160059-01

6) Install the rubber seal (1) into the impeller (2).

7) After wiping off the oily or greasy matter from the mechanical seal ring (3), install it into the impeller.

NOTE

The paint marked side of mechanical seal ring faces the rubber seal.

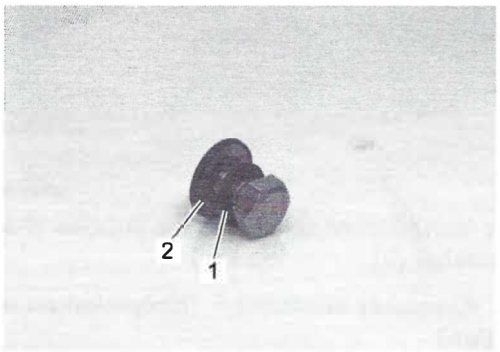


IM10L1160060-01

8) Install the washer (1) and seal washer (2) onto the impeller securing bolt.

NOTE

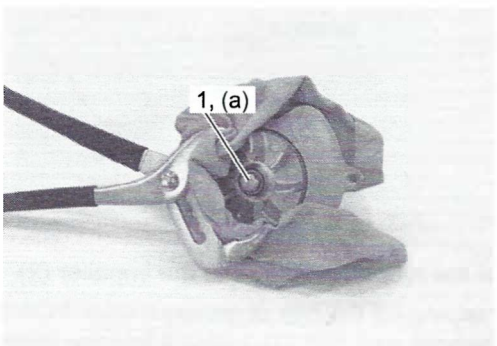
The metal side of seal washer and the curved side of washer face the impeller securing bolt head.



IM10L1160061-01

9) Install the impeller and tighten the impeller securing bolt (1) to the specified torque.

Tightening torque
Impeller securing bolt (a): 8.0 N·m (0.82 kgf-m, 5.90 lbf-ft)



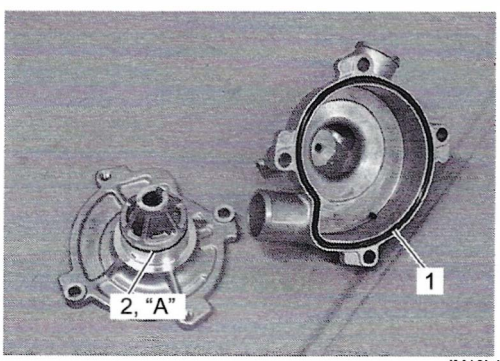
IM10L1160062-01

10) Install new O-rings.

NOTE

- **Apply engine coolant to the O-ring (1).**
- **Apply grease to the O-ring (2).**

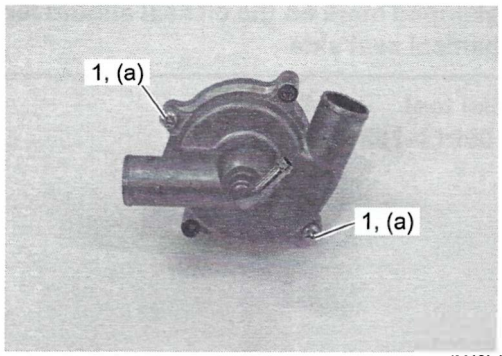
"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1160063-02

11) Fit the water pump case and tighten the water pump case screws (1) to the specified torque.

Tightening torque
Water pump case screw (a): 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)



IM10L1160064-01

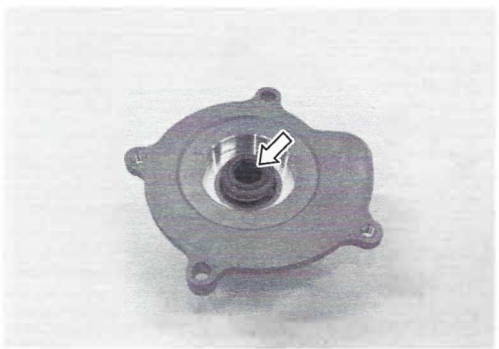
Water Pump Related Parts Inspection

BENM10L31606021

Refer to "Water Pump Disassembly and Assembly" (Page 1F-17).

Mechanical Seal

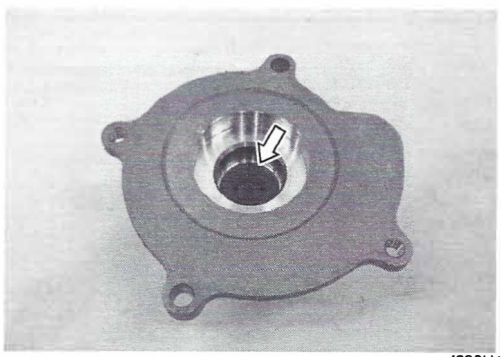
Visually inspect the mechanical seal for damage, with particular attention given to the sealing face.
Replace the mechanical seal that shows indications of leakage.



I823H1160049-01

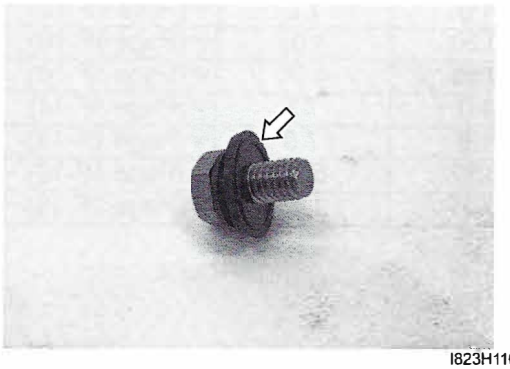
Oil Seal

Visually inspect the oil seal for damage, with particular attention given to the lip.
Replace the oil seal that shows indications of leakage.



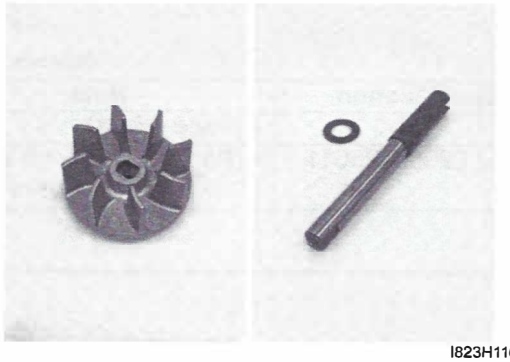
I823H1160050-01

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.



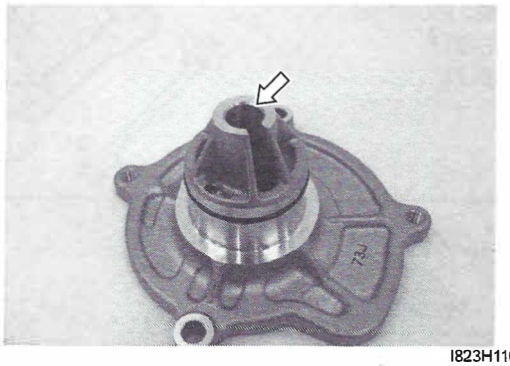
I823H1160051-01

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.



I823H1160053-01

Specifications

Tightening Torque Specifications

BENM10L31607001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Radiator assembly bolt	10	1.0	7.5	☞(Page 1F-10)
Oil cooler bolt	5.5	0.56	4.05	☞(Page 1F-10)
Radiator reservoir tank bolt	5.5	0.56	4.05	☞(Page 1F-10)
Thermostat cover bolt	10	1.0	7.5	☞(Page 1F-14)
Water pump bolt	10	1.0	7.5	☞(Page 1F-16)
Impeller securing bolt	8.0	0.82	5.90	☞(Page 1F-19)
Water pump case screw	6.0	0.61	4.45	☞(Page 1F-19)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Water Hose Routing Diagram" (Page 1F-2)
"Cooling System Components" (Page 1F-6)
"Water Pump Components" (Page 1F-15)

Special Tools and Equipment

Recommended Service Material

BENM10L31608001

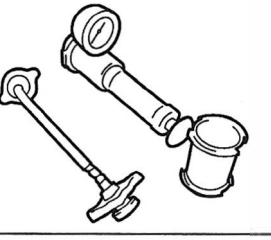
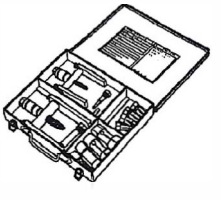
Material	SUZUKI recommended product or Specification		Note
Assembly lubrication	Molybdenum oil solution	—	☞(Page 1F-18)
Grease	SUZUKI SUPER GREASE A	P/No.: 99000–25011	☞(Page 1F-16) / ☞(Page 1F-18) / ☞(Page 1F-19)

NOTE

Required service material(s) is also described in:
"Cooling System Components" (Page 1F-6)
"Water Pump Components" (Page 1F-15)

Special Tool

BENM10L31608002

09913–70210 Bearing installer set ☞(Page 1F-18)		09918–78211 Radiator cap tester kit ☞(Page 1F-7) / ☞(Page 1F-7)	
09921–20240 Bearing remover set ☞(Page 1F-17)			

Fuel System

Precautions

Precautions for Fuel System

BENM10L31700001

⚠ 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.**
- **Before loosening or disconnecting the fuel feed line, relieve the fuel system of fuel pressure by following "Fuel Pressure Relief Procedure" (Page 1G-7).**

⚠ CAUTION

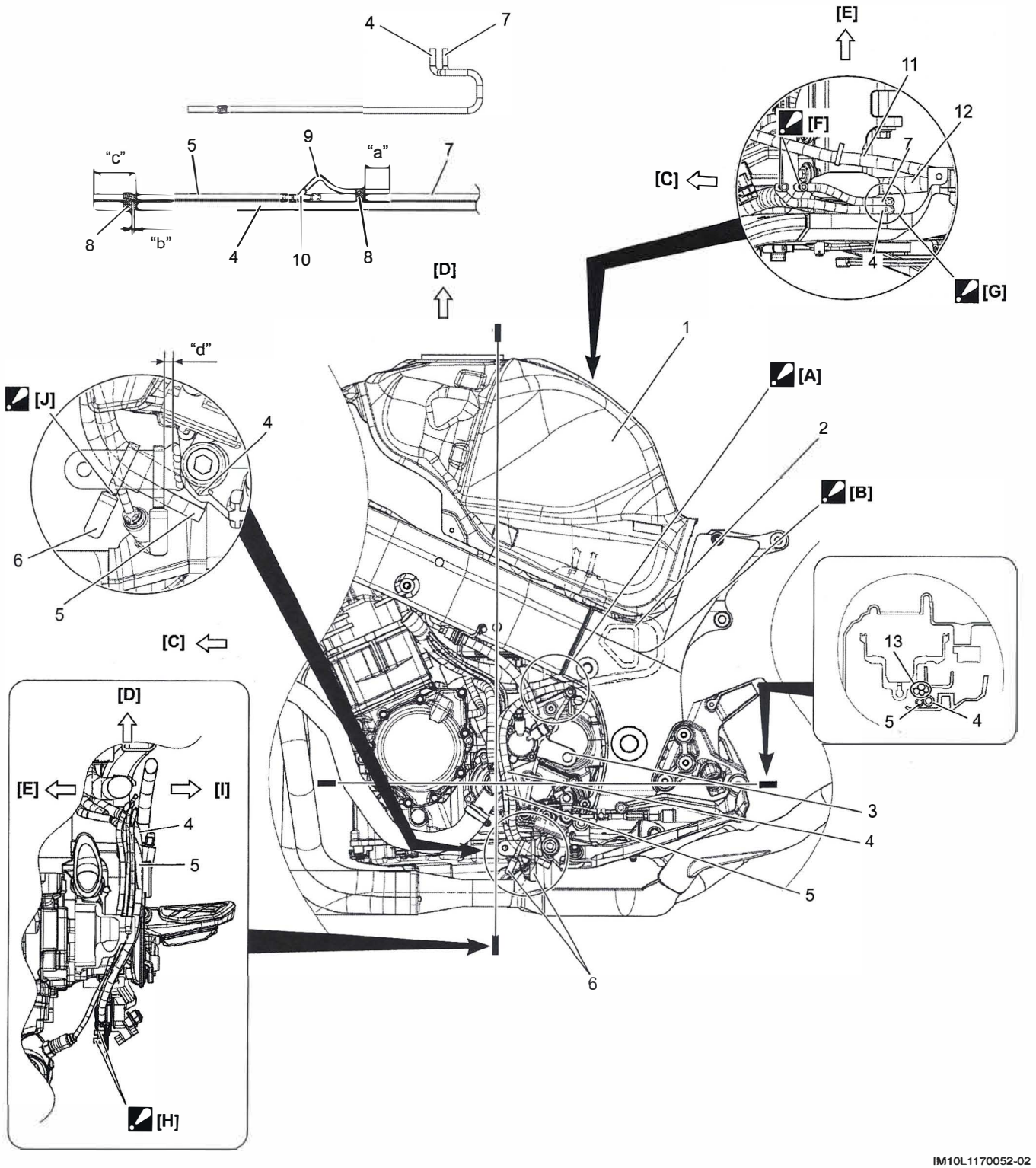
- **To prevent the fuel system (fuel tank, fuel hose, etc.) from contamination with foreign particles, blind all openings.**
- **After removing the throttle body, tape the cylinder intake section to prevent foreign particles from entering.**

Schematic and Routing Diagram

Fuel Tank Water Drain Hose and Fuel Tank Breather Hose Routing Diagram

BENM10L31702001

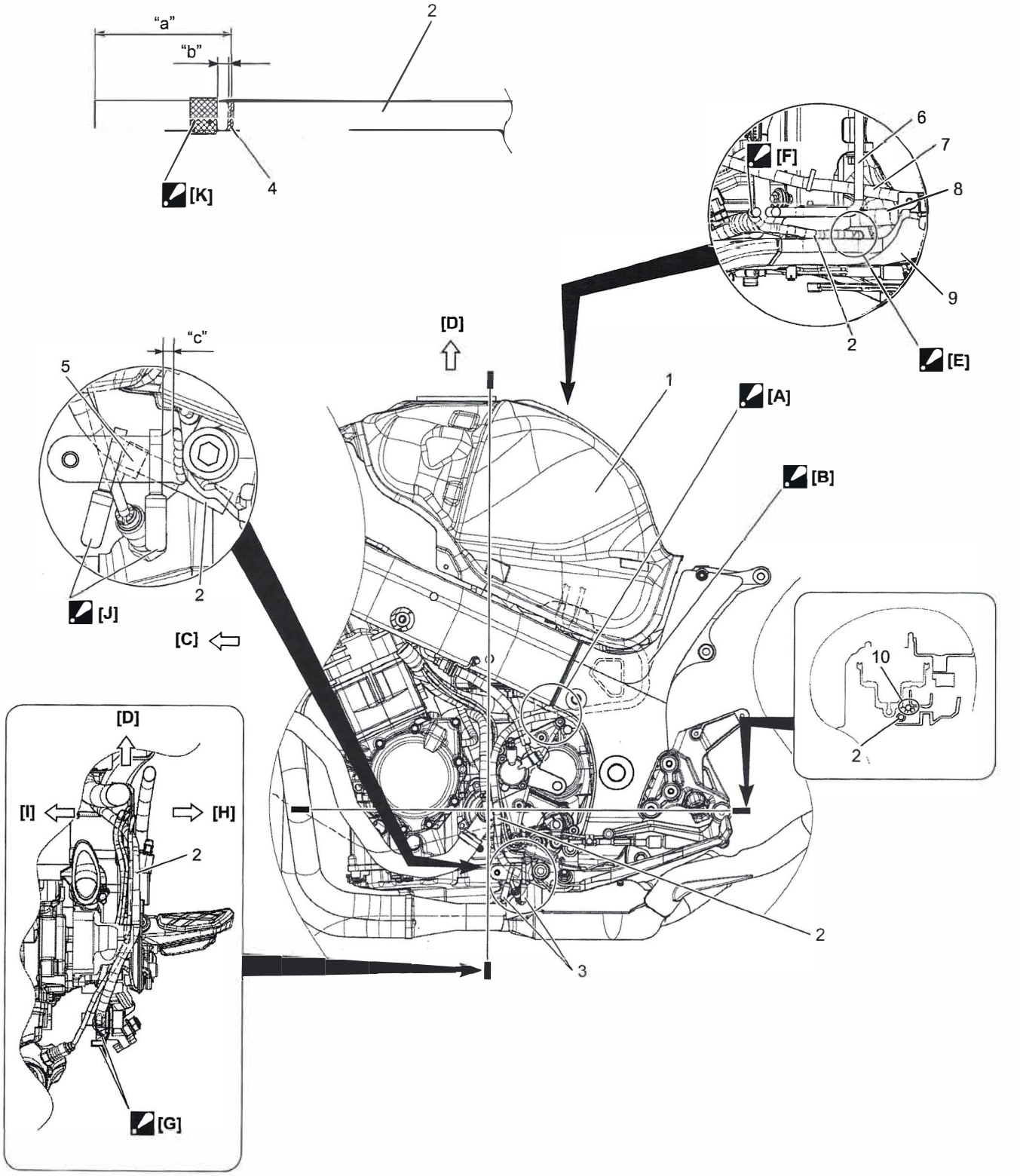
Without EVAP Control System



IM10L1170052-02

[A]: Pass the fuel tank drain hose and fuel tank breather hose No.1 to the upper side of clutch release cylinder holder.	[J]: Clamp the fuel tank drain hose and fuel tank breather hose No.2 on the both side of breather hose clamp.	9. Fuel tank breather hose No.3
[B]: Pass the fuel tank drain hose to the rear side of frame.	1. Fuel tank	10. 3-way joint
[C]: Front side	2. Frame	11. Starter motor lead wire
[D]: Upper side	3. Clutch release master cylinder holder	12. Wiring harness
[E]: Right side	4. Fuel tank drain hose	13. Side-stand switch lead wire / GP sensor lead wire / HO2 sensor lead wire / Gearshift sensor lead wire
[F]: Face the white mark of the hoses to front side.	5. Fuel tank breather hose No.2	"a": 30 – 40 mm (1.18 – 1.57 in)
[G]: Pass the fuel tank drain hose and fuel tank breather hose No.1 to between the frame and wiring harness.	6. Clamp	"b": 0 – 5 mm (0 – 0.20 in)
[H]: Face the projection of clamp to right side.	7. Fuel tank breather hose No.1	"c": 50 mm (1.97 in)
[I]: Left side	8. Breather hose clamp	"d": 0 – 10 mm (0 – 0.39 in)

With EVAP Control System



IM10L1170053-02

✓ [A]: Pass the fuel tank drain hose to the upper side of clutch release cylinder holder.	[I]: Right side	6. Surge hose No.1
✓ [B]: Pass the fuel tank drain hose to the rear side of frame.	✓ [J]: Clamp the fuel tank drain hose on the both side of breather hose clamp.	7. Starter motor lead
[C]: Front side	✓ [K]: Adhere the clamp to the fuel tank drain hose.	8. Wiring harness
[D]: Upper side	1. Fuel tank	9. Frame
✓ [E]: Pass the fuel tank drain hose to the between the wiring harness and frame.	2. Fuel tank drain hose	10. Side stand switch lead wire / GP sensor lead wire / HO2 sensor lead wire / Gear shift sensor lead wire
✓ [F]: Face the white mark of the fuel tank drain hose to front side.	3. Clamp	"a": 50 mm (1.97 in)
✓ [G]: Face the projection of clamp to right side.	4. White stripe	"b": 0 – 5 mm (0 – 0.20 in)
[H]: Left side	5. Clamp	"c": 0 – 10 mm (0 – 0.39 in)

Diagnostic Information and Procedures

Fuel System Symptom Diagnosis

BENM10L31704001

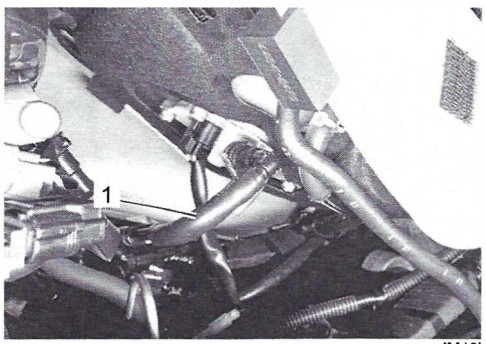
Refer to "Engine Symptom Diagnosis" in Section 1A (Page 1A-25).

Repair Instructions

Fuel Pressure Inspection

BENM10L31706001

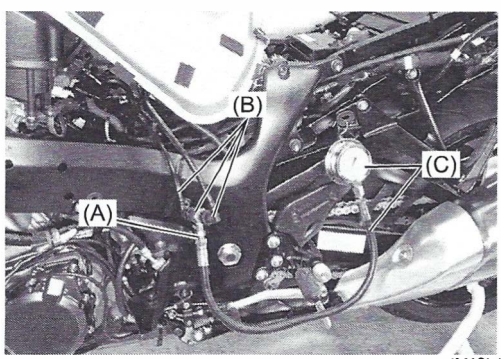
1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Place a clean rag under the fuel feed hose (1) and disconnect the fuel feed hose from the fuel pump. ☞(Page 1G-7)



IM10L1170054-03

3) Install the special tools between the fuel pump and fuel delivery pipe.

Special tool
(A): 09940–40211
(B): 09940–40220
(C): 09915–74511



IM10L1170050-02

4) Turn the ignition ON and check for fuel pressure.
If the fuel pressure is lower than the specification, check for the followings:
- Fuel hose leakage
- Clogged fuel filter
- Pressure regulator
- Fuel pump

If the fuel pressure is higher than the specification, check for the followings:
- Fuel pump
- Pressure regulator

Fuel pressure
[Standard]: 289 – 299 kPa (2.95 – 3.04 kgf/cm², 42.0 – 43.3 psi)

5) Remove the special tools.

⚠ WARNING

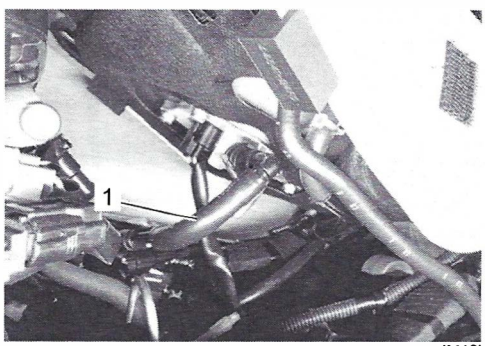
Before removing the special tools, turn the ignition switch OFF and release the fuel pressure slowly.

6) After finishing the fuel pressure inspection, install the removed parts.

Fuel Discharge Amount Inspection

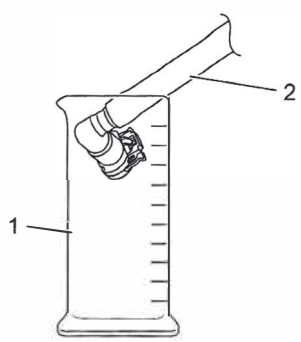
BENM10L31706002

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Place a clean rag under the fuel feed hose (1) and disconnect the fuel feed hose from the fuel delivery pipe. ☞(Page 1G-7)



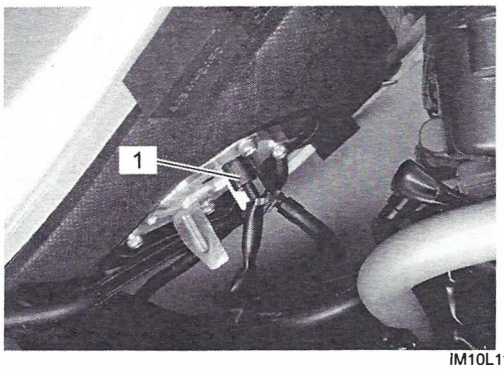
IM10L1170054-03

3) Place the measuring cylinder (1) and insert the fuel feed hose (2) into the measuring cylinder.



IK31K1170043-01

4) Disconnect the fuel pump coupler (1).



IM10L1170002-02

5) Connect proper lead wires to the fuel pump.
Apply 12 V to fuel pump (between "T1" and "T2") for 10 seconds and measure the amount of fuel discharged.
If the discharge amount is out of the specification, the following cause may be considered.

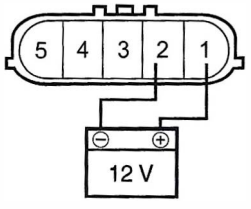
Possible cause	Correction
Clogged fuel filter	Replace
Defective fuel pump	Replace

Battery (+) terminal – "T1"
Battery (–) terminal – "T2"

NOTE

The battery must be in fully charged condition.

FP discharge amount
Per 10 seconds [Standard]: 223 ml (7.54 US oz, 7.85 Imp oz) or more



IM10L1170003-02

6) After finishing the fuel discharge inspection, reinstall the removed parts.

Fuel Pressure Relief Procedure

BENM10L31706003

NOTICE

Performing this procedure when the engine is still hot can damage the catalyst.
Wait until the engine has cooled down before performing this procedure.

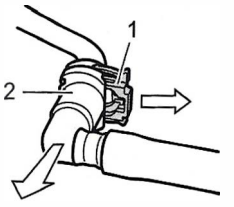
1) Check that the engine is cold.
2) Disconnect the fuel pump coupler. ☞(Page 1G-12)
3) Start the engine and run it until the engine stops for lack of the fuel. Repeat cranking the engine 2 – 3 times for about 3 seconds each time to dissipate the fuel pressure in line.
Fuel connections are now safe for servicing.
4) After servicing, install the removed parts.

Fuel Feed Hose Disconnection and Reconnection

BENM10L31706004

Disconnection

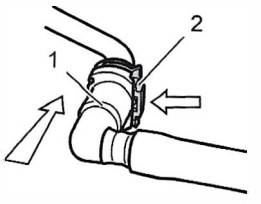
1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Place a rag over the fuel feed hose.
3) Relieve fuel pressure. ☞(Page 1G-7)
4) Pull the retainer (1).
5) Disconnect the fuel feed hose joint (2) from fuel pipe.



IE31J1170034-01

Reconnection

1) Insert the fuel feed hose joint (1) to fuel pipe.
2) Lock the retainer (2).



IE31J1170035-01

3) Confirm that fuel feed hose joint is not disconnected by hand.

Fuel Hose Inspection

BENM10L31706005

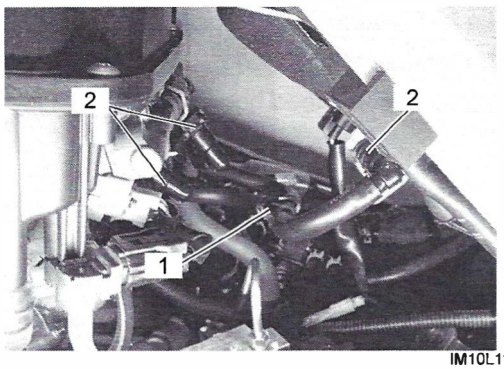
Refer to "Fuel Hose" in Section 0B (Page 0B-8).

Fuel Feed Hose Removal and Installation

BENM10L31706006

Removal

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Place a clean rag under the fuel feed hose (1).
3) Disconnect the fuel feed hose joints (2) and remove the fuel feed hose. ☞(Page 1G-7)



IM10L1170004-02

Installation

Install the fuel feed hose in the reverse order of removal.

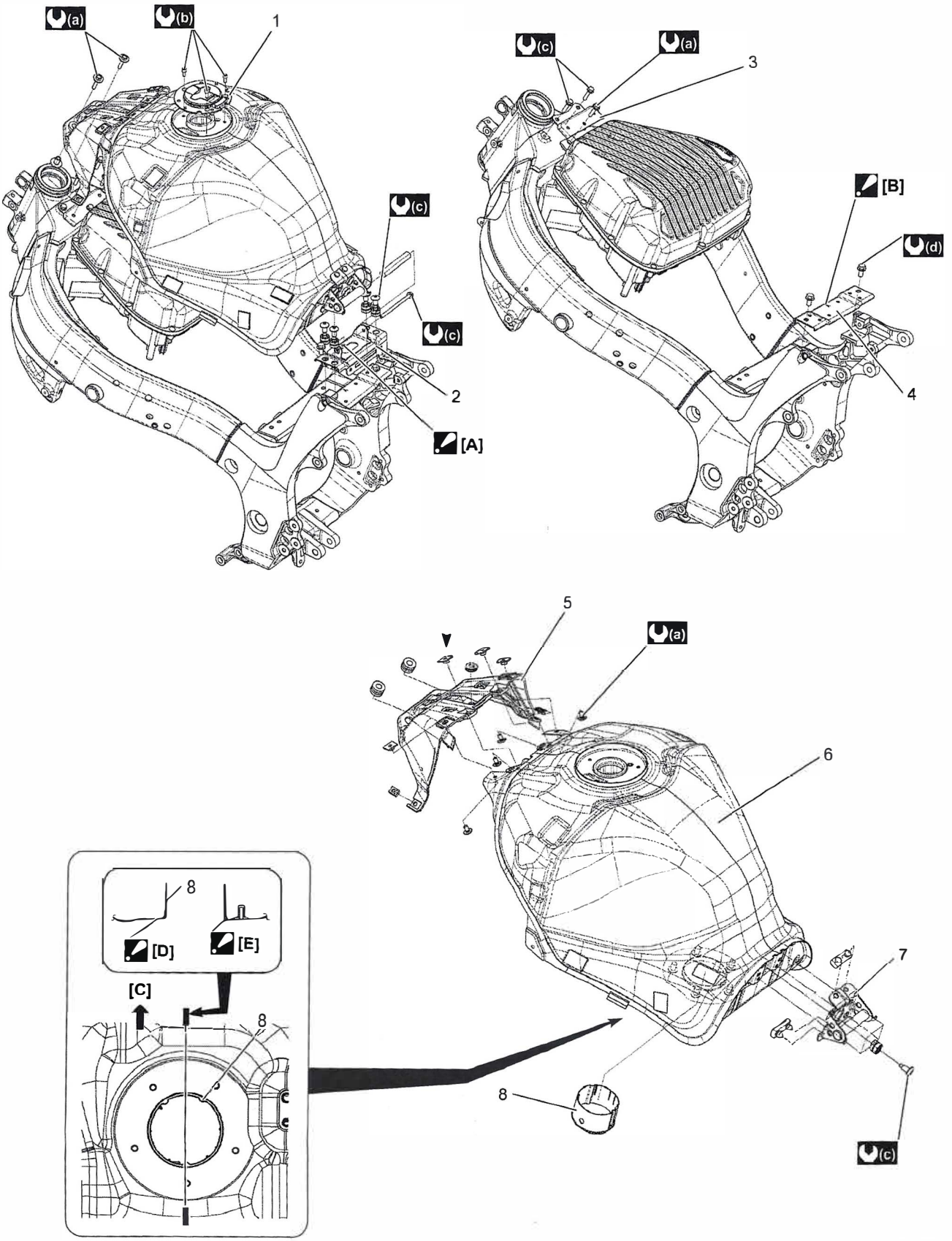
Fuel Tank Construction

BENM10L31706007

Fuel Tank Cover

Refer to "Fuel Tank Front Cover / Fuel Tank Bracket Construction" in Section 9D (Page 9D-13).

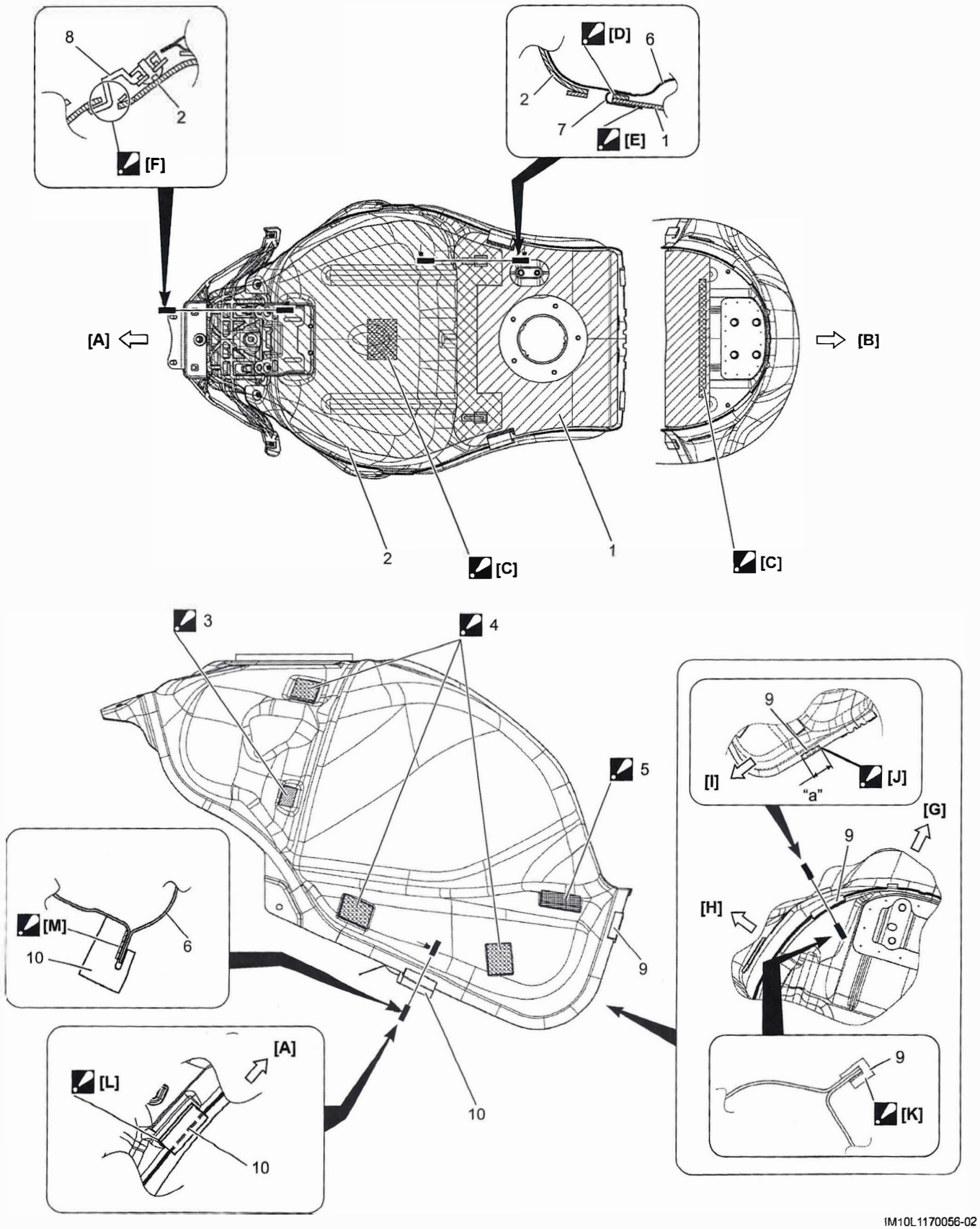
Fuel Tank



IM10L1170055-02

[A]: The arrow mark on the fuel tank rear bracket No.2 is facing forward.	2. Fuel tank rear bracket No.2	8. Fuel tank vessel
[B]: The arrow mark on the fuel tank rear bracket No.3 is facing forward.	3. Fuel tank front bracket	(a) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
[C]: Forward	4. Fuel tank rear bracket No.3	(b) : 3.0 N·m (0.31 kgf-m, 2.25 lbf-ft)
[D]: Make sure that the lower end of the fuel tank container does not protrude outside the sealing surface of the fuel tank.	5. Fuel tank front bracket	(c) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[E]: Align the groove of the fuel tank vessel with the protrusion of the fuel tank.	6. Fuel tank	(d) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
1. Fuel tank cap	7. Fuel tank rear bracket No.1	

Fuel tank cushion and heat shield



IM10L1170056-02

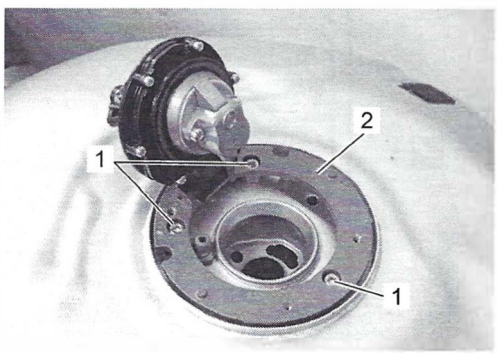
[A]: Front side	[I]: Lower side	4. Fuel tank fastener : Stick the fastener aligning with the groove of the fuel tank. Clean the adhesive surface before sticking the fastener. Press the fastener after sticking.
[B]: Rear side	[J]: Stick the fuel tank side cushion align the projection on the fuel tank.	5. Fuel tank side cushion : Stick the cushion aligning with the groove of the fuel tank. Clean the adhesive surface before sticking the cushion. Press the cushion after sticking.
[C]: Clean the adhesive surface before sticking the fuel tank heat shield. Press the fuel tank heat shield after sticking.	[K]: The thick side of the fuel tank molding faces inward.	6. Fuel tank
[D]: Stick the fuel tank heat shield No.2 under the fuel tank heat shield No.1.	[L]: Apply adhesive to the inside of fuel tank flange and fuel tank molding.	7. Clamp
[E]: Face the clamp end to rearward.	[M]: Apply adhesive to the inside of fuel tank flange and fuel tank side cushion.	8. Fuel tank front bracket nut
[F]: Hook the fuel tank front cover nut to the hole of the fuel tank heat shield No.2.	1. Fuel tank heat shield No.1	9. Fuel tank molding
[G]: Upper side	2. Fuel tank heat shield No.2	10. Fuel tank side cushion
[H]: Left side	3. Fuel tank cover fastener : Stick the fastener aligning with the groove of the fuel tank. Clean the adhesive surface before sticking the fastener. Press the fastener after sticking.	

Fuel Tank Cap Removal and Installation

BENM10L31706008

Removal

1) Remove the fuel tank front cover. ☞(Page 9D-49)
2) Open the fuel tank cap with the ignition key.
3) Remove the fuel tank cap bolts (1) and fuel tank cap (2) from the fuel tank.



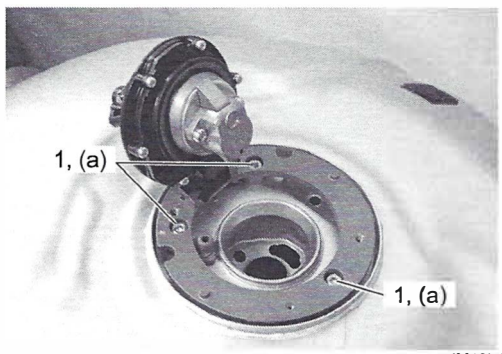
IM10L1170005-02

Installation

Install the fuel tank cap in the reverse order of removal. Pay attention to the following point:

- Tighten the fuel tank cap bolts (1) to the specified torque.

Tightening torque
Fuel tank cap bolt (a): 3.0 N·m (0.31 kgf-m, 2.25 lbf-ft)



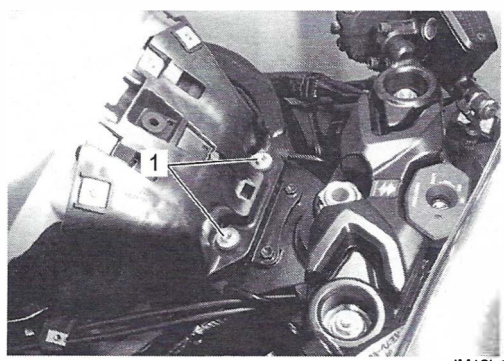
IM10L1170006-02

Fuel Tank Removal and Installation

BENM10L31706009

Removal

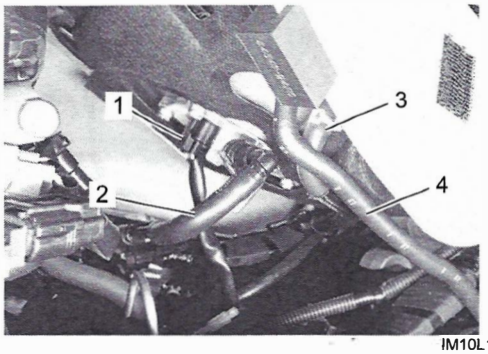
1) Remove the fuel tank front cover. ☞(Page 9D-49)
2) Remove the fuel tank front bracket bolts (1) from the frame.



IM10L1170007-02

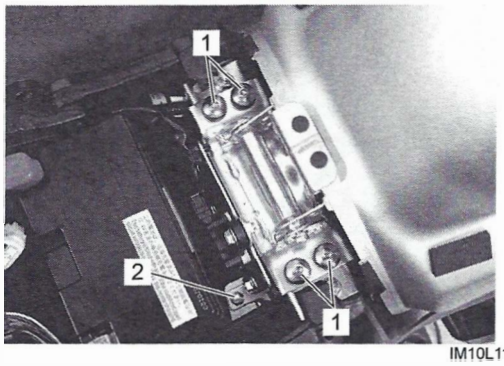
3) Lift and support the fuel tank.
4) Disconnect the fuel pump coupler (1) from the fuel pump.
5) Place a clean rag under the fuel feed hose (2) and disconnect the fuel feed hose from the fuel pump.

6) Disconnect the surge hose or fuel tank breather hose (3) and fuel tank water drain hose (4) from the fuel tank.



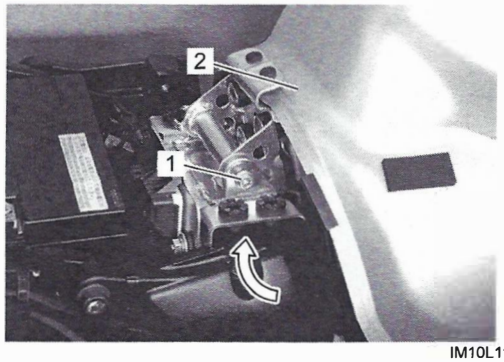
IM10L1170008-03

7) Remove the fuel tank rear bracket bolts (1) and rear brake master cylinder reservoir tank bracket bolt (2).



IM10L1170057-01

8) Lift up the rear side of fuel tank, and then remove the fuel tank rear bolt (1) and fuel tank(2).



IM10L1170058-01

Installation

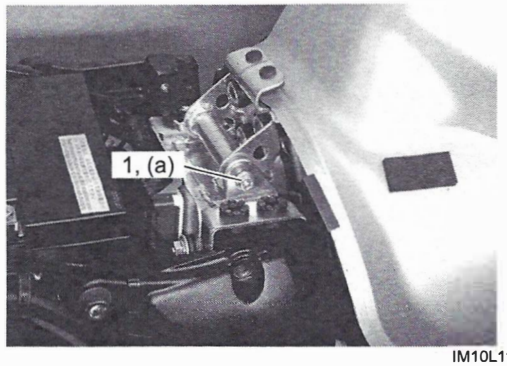
Install the fuel tank in the reverse order of removal. Pay attention to the following points:

NOTICE

Be sure not to bend or twist the hoses when installing.

- Connect the fuel tank water drain hose and surge hose or fuel tank breather hose. ☞(Page 1G-2)
- Tighten the fuel tank rear bolt (1) to the specified torque.

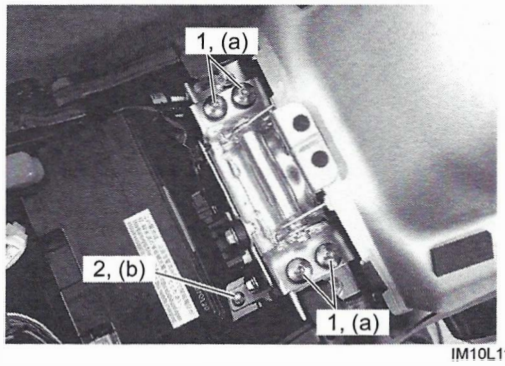
Tightening torque
Fuel tank rear bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1170011-02

- Tighten the fuel tank rear bracket bolts (1) and rear brake master cylinder reservoir tank bracket bolt (2) to the specified torque.

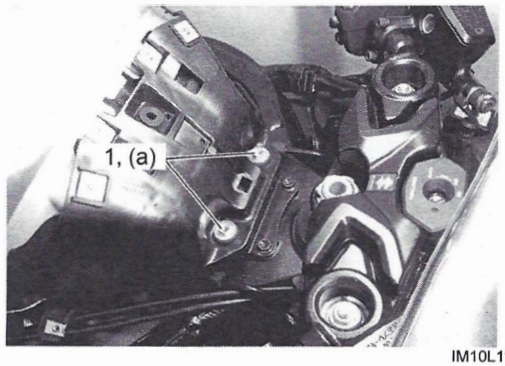
Tightening torque
Fuel tank rear bracket bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
Rear brake master cylinder reservoir tank bracket bolt (b): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1170059-01

- Tighten the fuel tank front bolts (1) to the specified torque.

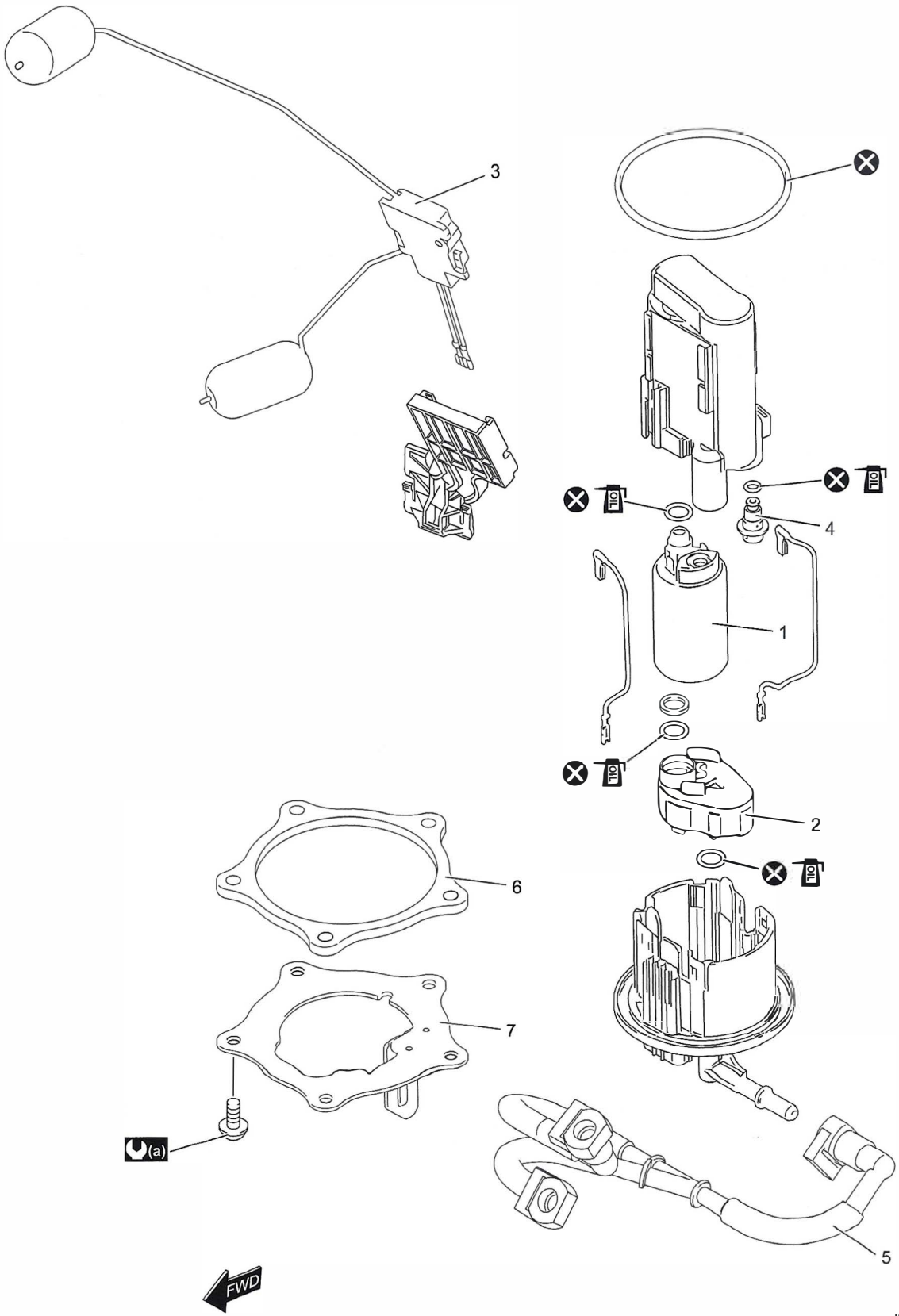
Tightening torque
Fuel tank front bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



IM10L1170013-02

Fuel Pump Assembly Components

BENM10L31706010

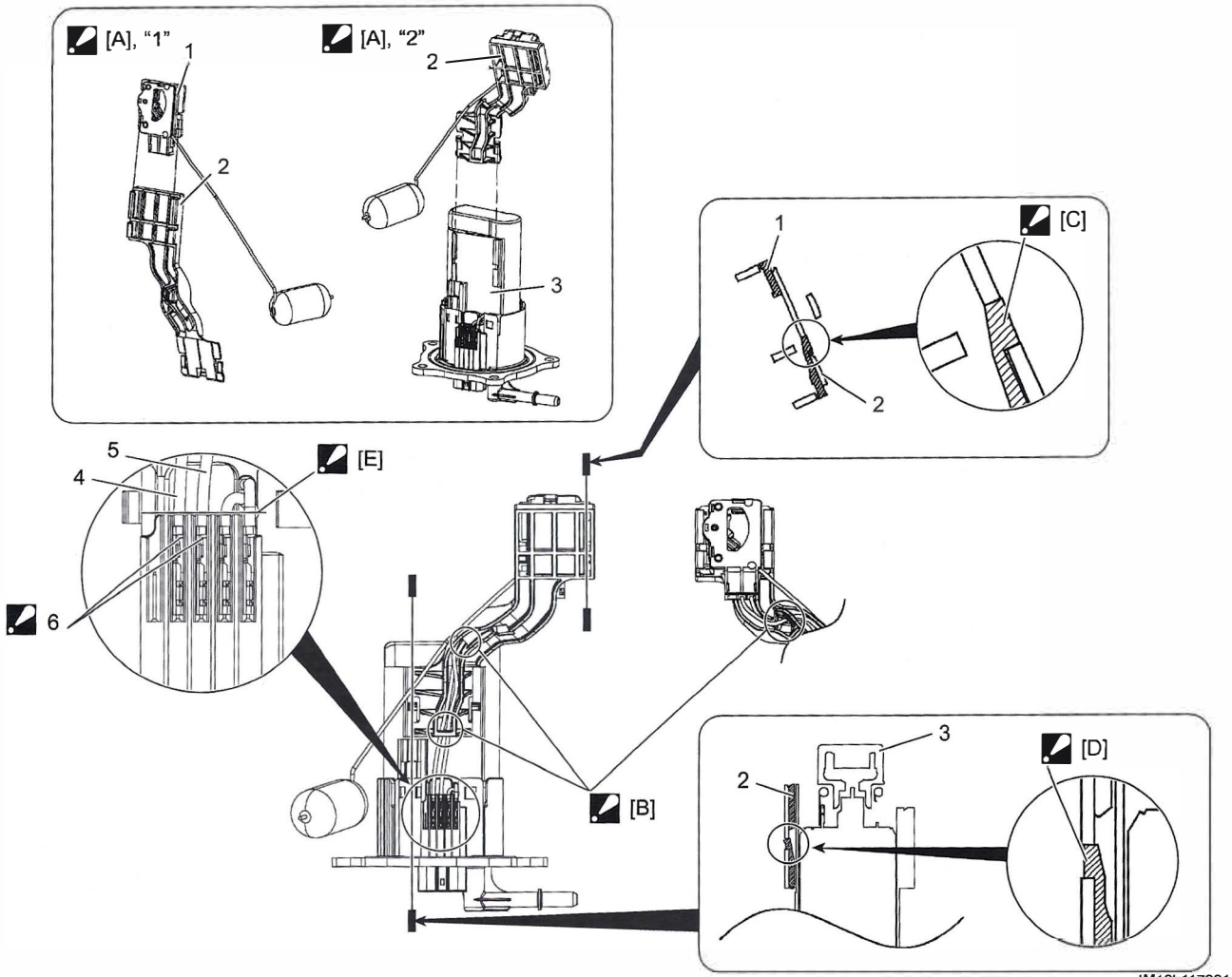


IM10L1170060-03

1. Fuel pump	5. Fuel feed hose	: Apply engine oil.
2. Fuel filter	6. Fuel pump inner plate	: Do not reuse.
3. Fuel level gauge	7. Fuel pump outer plate	
4. Fuel pressure regulator	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)	

Fuel Level Gauge Construction

BENM10L31706011



IM10L1170014-02

[A]: Install the fuel level gauge and fuel level gauge attachment to the fuel pump assembly in order of "1" → "2".	2. Fuel level gauge attachment
[B]: Pass the lead wires into the hole of fuel level gauge attachment. Route the lead wires as shown in the figure.	3. Fuel pump assembly
[C]: Set the fuel level gauge to the fuel level gauge attachment until the hook is locked firmly.	4. Fuel level gauge (+) lead wire (R)
[D]: Set the fuel level gauge attachment to the fuel pump assembly until the hook is locked firmly. The terminals must be below this line.	5. Fuel level gauge (–) lead wire (B)
1. Fuel level gauge	6. Terminal : Connect the terminal firmly.

Fuel Pump On-Vehicle Inspection

BENM10L31706012

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 and fuel pump relay. ☞(Page 1G-21)
If the fuel pump circuit connections is OK, the fuel pump may be faulty, replace the fuel pump assembly with a new one. ☞(Page 1G-16)

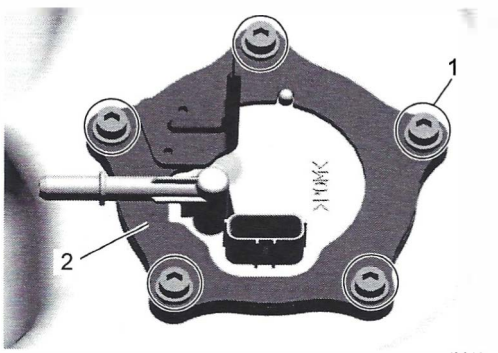
Fuel Pump Assembly / Fuel Level Gauge Removal and Installation

BENM10L31706013

Refer to "Fuel Tank Removal and Installation" (Page 1G-12).

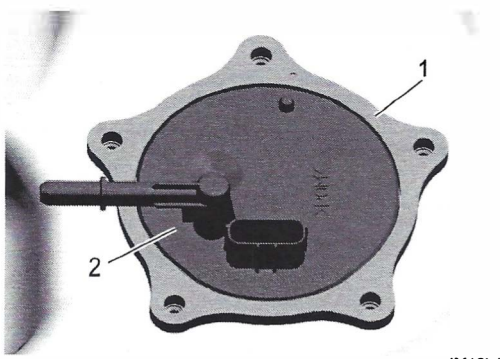
Removal

1) Remove the fuel pump mounting bolts (1) diagonally.
2) Remove the fuel pump outer plate (2) from the fuel tank.



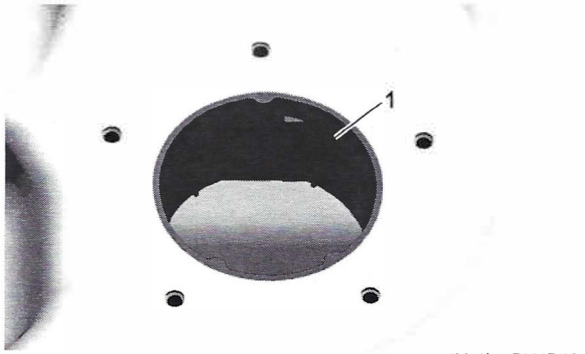
IM10L1170015-02

3) Remove the fuel pump inner plate (1) and fuel pump assembly (2) form the fuel tank.



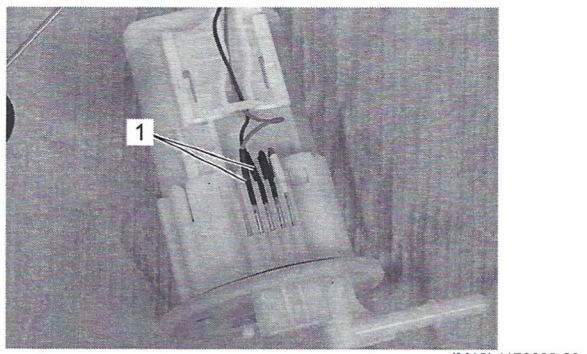
IM10L1170016-02

4) Remove the fuel tank vessel (1) from the fuel tank.



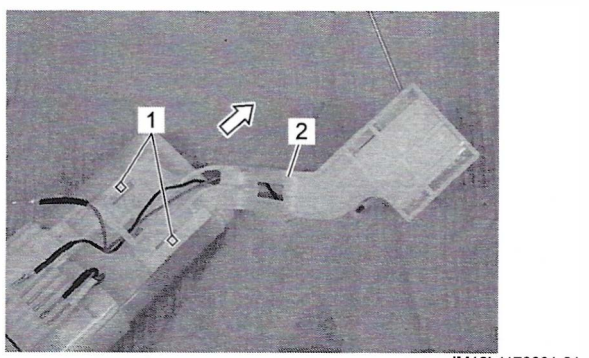
IM10L1170017-02

5) Disconnect the fuel level gauge lead wires (1) from the fuel pump.



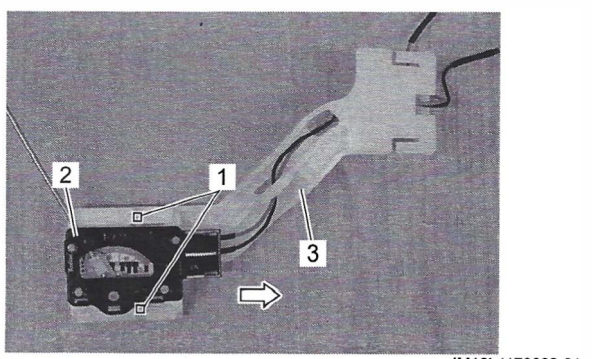
IM10L1170020-02

6) Unhook the hooks (1) and slide the fuel level sender gauge (2) arrow direction as shown in the figure.



IM10L1170061-01

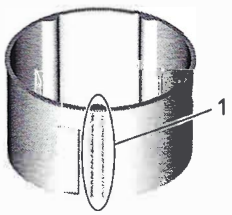
7) Unhook the hooks (1) and slide the fuel level sender gauge (2) from the fuel level sender gauge attachment (3) arrow direction as shown in the figure.



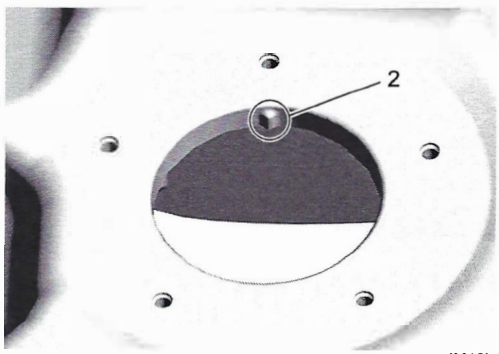
IM10L1170062-01

Installation

1) Install the fuel level gauge to the fuel level gauge attachment. Then install the fuel level gauge assembly to the fuel pump assembly. Refer to "Fuel Level Gauge Construction" (Page 1G-15).
2) Align the groove (1) of the fuel tank vessel with the protrusion (2) of the fuel tank.

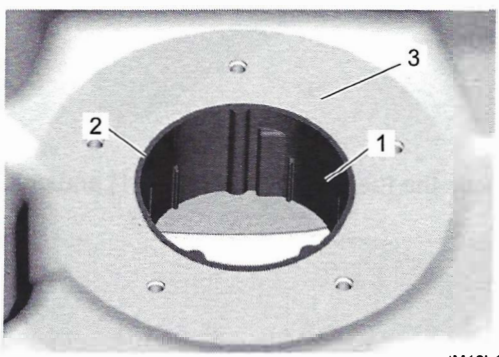


IM10L1170021-02



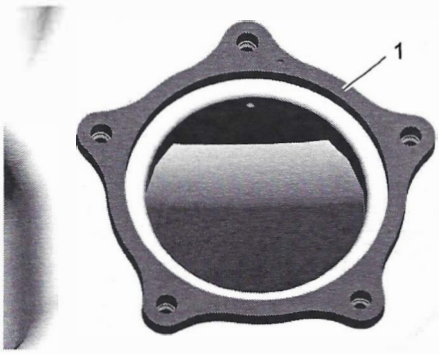
IM10L1170022-02

3) Install the fuel tank vessel (1) to the fuel tank, and then make sure that the lower end (2) of the fuel tank container does not protrude outside the sealing surface (3) of the fuel tank.



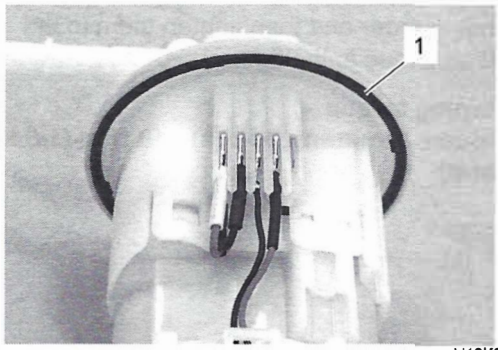
IM10L1170023-02

4) Install the fuel pump inner plate (1) to the fuel tank.



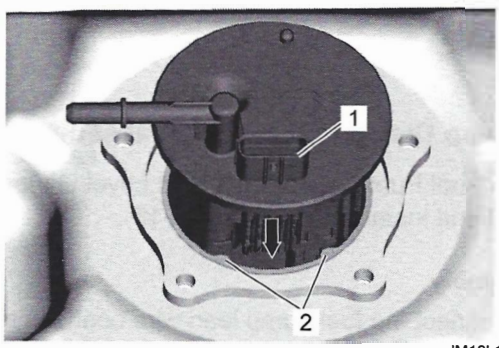
IM10L1170064-01

5) Install the new O-ring (1) to the fuel pump assembly.



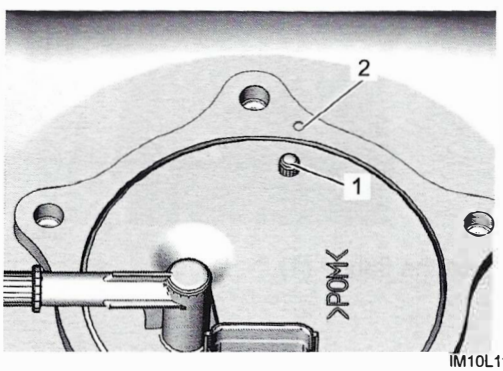
IJ13K3170003-01

6) When install the fuel pump to the fuel tank, set the fuel pump terminal (1) between the projections (2) of fuel tank vessel.



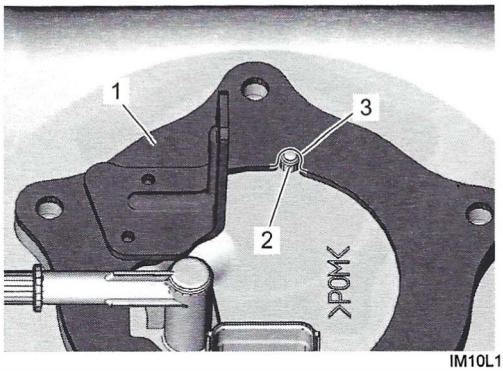
IM10L1170024-02

7) Align the boss (1) of fuel pump assembly with the punch mark (2) on fuel pump inner plate and install them.



IM10L1170025-02

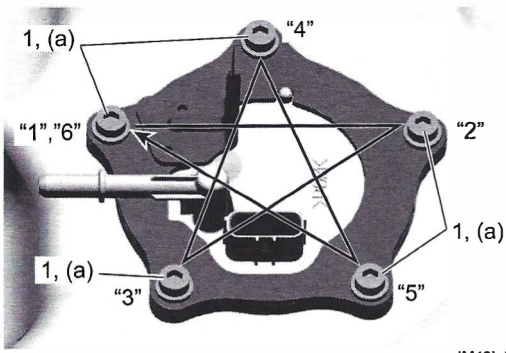
8) Install the fuel pump outer plate (1) aligning the boss (2) of fuel pump assembly with the groove (3) of fuel pump outer plate.



IM10L1170026-02

9) Install the fuel pump mounting bolt (1).
10) Tighten all the fuel pump mounting bolts lightly in the ascending order and then tighten them to the specified torque in the figure.

Tightening torque
Fuel pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1170027-02

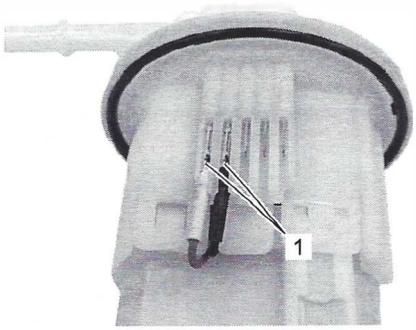
Fuel Pump Disassembly and Reassembly

BENM10L31706014

Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation" (Page 1G-16).

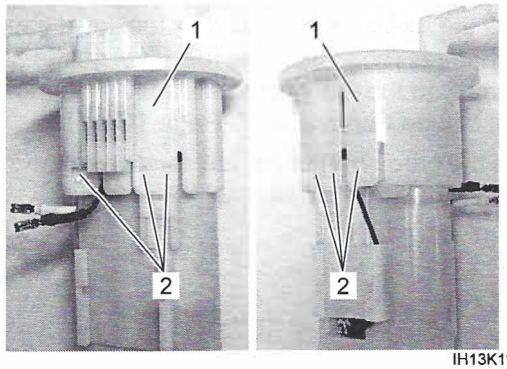
Disassembly

1) Disconnect the fuel pump lead wire connectors (1).



IH13K1170051-01

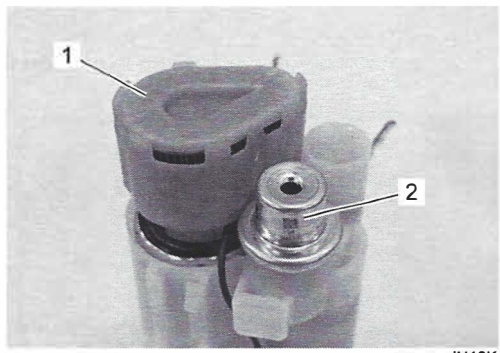
2) Remove the flange (1).



IH13K1170052-01

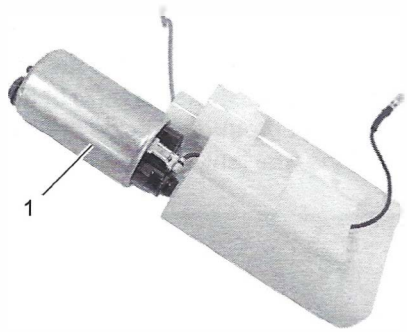
2. Hooked point

3) Remove the fuel filter (1) and fuel pressure regulator (2).



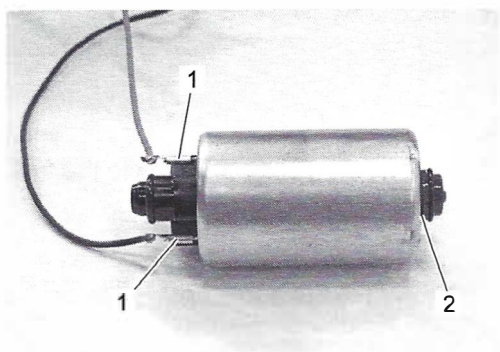
IH13K1170053-01

4) Remove the fuel pump (1).



IH13K1170054-02

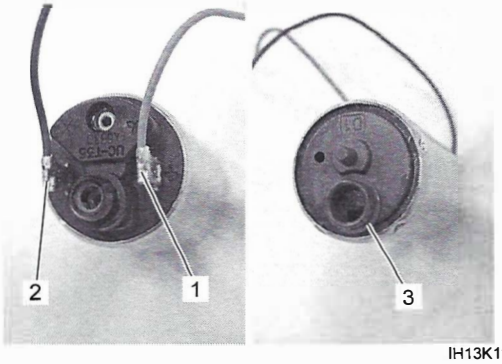
5) Remove the fuel pump lead wires (1) and collar (2).



IH13K1170055-03

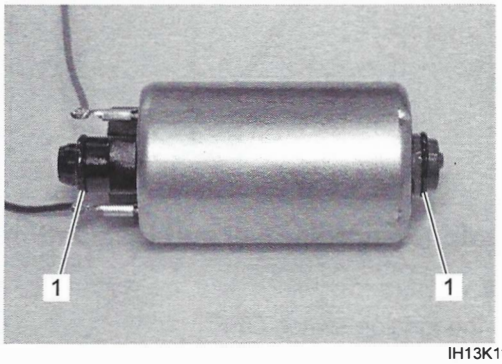
Reassembly

1) Install the fuel pump (+) lead wire (1), fuel pump (–) lead wire (2) and collar (3).



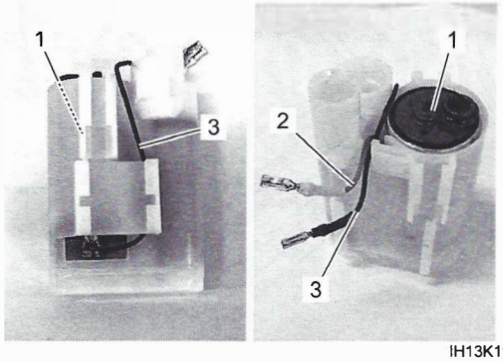
IH13K1170056-01

2) Apply engine oil lightly to the new O-rings (1) and install them.



IH13K1170057-01

3) Install the fuel pump (1) and route the fuel pump lead wires as shown in the figure.

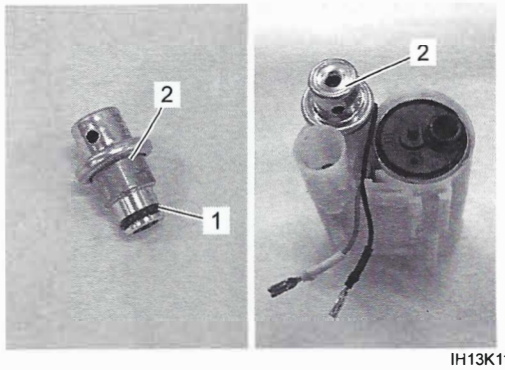


IH13K1170058-02

2.	Fuel pump (+) lead wire (Bl)
3.	Fuel pump (–) lead wire (B)

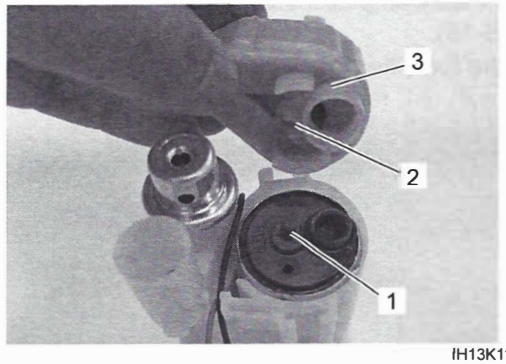
4) Apply engine oil lightly to the new O-ring (1) of the new fuel pressure regulator (2).

5) Install the fuel pressure regulator (2).



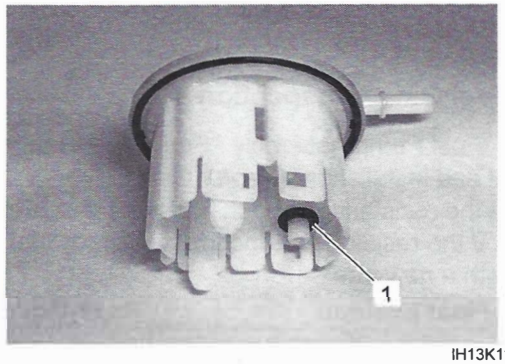
IH13K1170059-02

6) Align the boss (1) of fuel pump with the groove (2) of fuel filter and install the fuel filter (3).



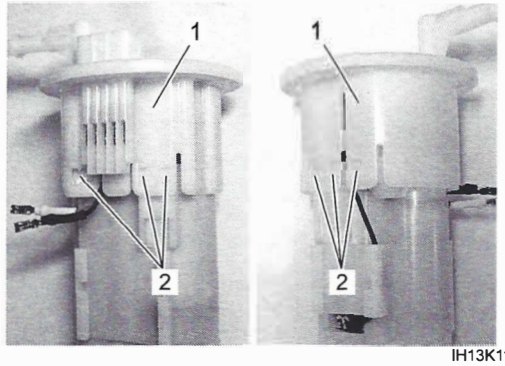
IH13K1170060-01

7) Apply engine oil lightly to the new O-ring (1) and install it.



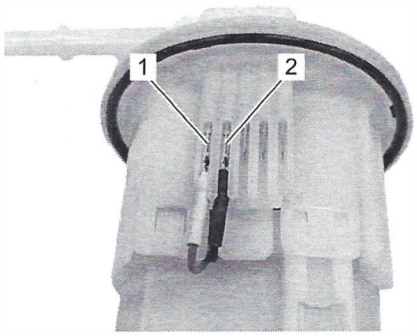
IH13K1170061-01

8) Install the flange (1) until the hooks (2) into the locked position.



IH13K1170062-01

9) Connect the fuel pump (+) lead wire (1) and fuel pump (–) lead wire (2).



IH13K1170063-01

Fuel Filter Inspection

BENM10L31706015

Refer to "Fuel Pump Disassembly and Reassembly" (Page 1G-18).
Inspect the fuel filter for clogging. If the fuel filter is clogged with dirt, replace the fuel filter with a new one.



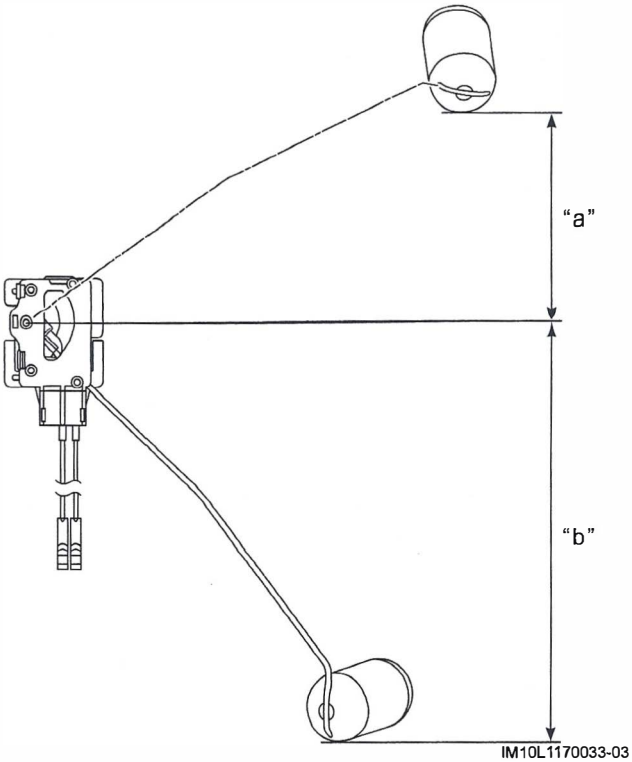
IH13K1170064-01

Fuel Level Gauge Inspection

BENM10L31706016

Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation" (Page 1G-16).
Measure the resistance at each fuel level gauge in float position. If the resistance is incorrect, replace fuel level gauge with a new one.

Float position		Resistance
"a"	76.9 – 85.9 mm (3.027 – 3.381)	8 – 12 Ω
"b"	161.9 – 170.9 mm (6.374 – 6.728 in)	337 – 343 Ω



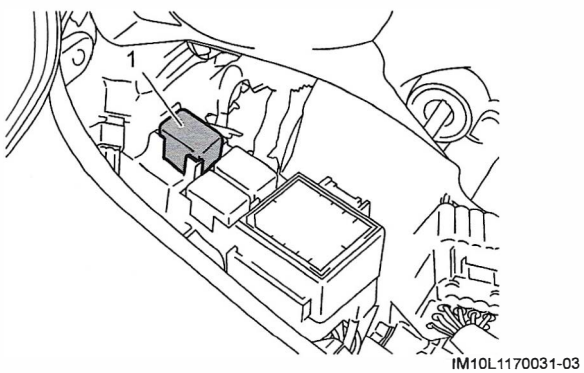
IM10L1170033-03

Fuel Pump Relay Removal and Installation

BENM10L31706017

Removal

1) Turn the ignition switch OFF.
2) Remove the meter panel. ☞(Page 9D-37)
3) Remove the fuel pump relay (1).



IM10L1170031-03

Installation

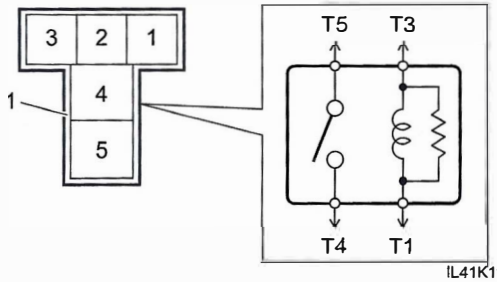
Install the fuel pump relay in the reverse order of removal.

Fuel Pump Relay Inspection

BENM10L31706018

Refer to "Fuel Pump Relay Removal and Installation" (Page 1G-20).
Check the fuel pump relay in the following procedures. If abnormality is found, replace the fuel pump relay with a new one.

1) Check that there is no continuity between terminals "T4" and "T5".
2) Check that there is continuity between terminals "T1" and "T3".
3) Connect battery positive (+) terminal and negative (–) terminal between terminals "T1" and "T3" and check for continuity between terminals "T4" and "T5". If there is no continuity when the relay is connected to the battery, replace the fuel pump relay.

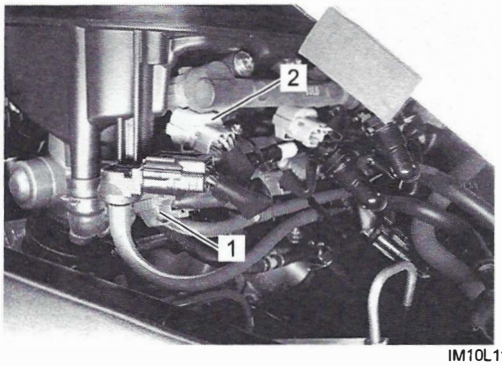


IL41K1150036-02

Fuel Injector On-Vehicle Inspection

BENM10L31706019

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Turn the ignition switch OFF.
3) Disconnect the fuel injector coupler from the fuel injector.

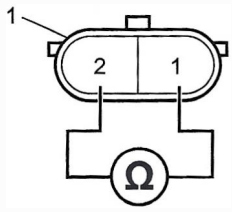


IM10L1170063-01

1.	Primary fuel injector coupler
2.	Secondary fuel injector coupler

4) Measure the fuel injector resistance between terminals using the circuit tester. If resistance is out of specification, replace the fuel injector (1) with a new one. ☞(Page 1G-21)

Fuel injector resistance
20 °C (68 °F) [Standard]: 11.5 – 12.5 Ω



IL41K1170014-01

5) After finishing the fuel injector inspection, install the removed parts.

Fuel Injector / Fuel Delivery Pipe Removal and Installation

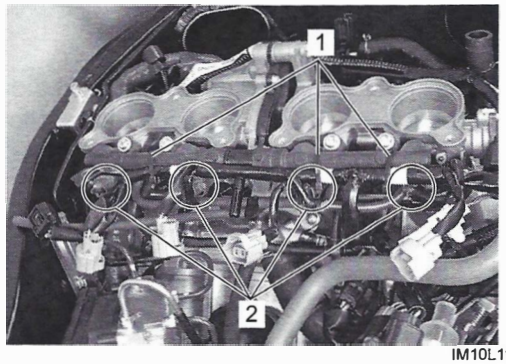
BENM10L31706020

NOTE

The fuel injector can be removed without removing the throttle body.

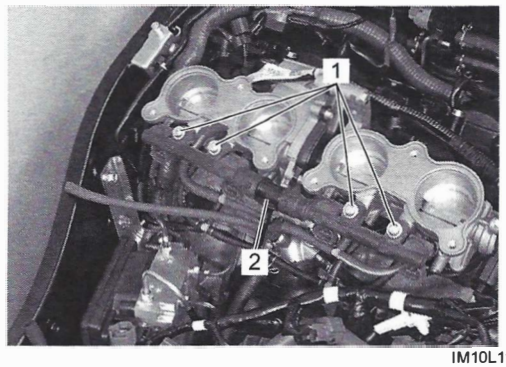
Primary side
Removal

1) Remove the air cleaner box. ☞(Page 1D-6)
2) Remove the clamps (1), and then disconnect the fuel injector couplers (2) from the fuel injectors.



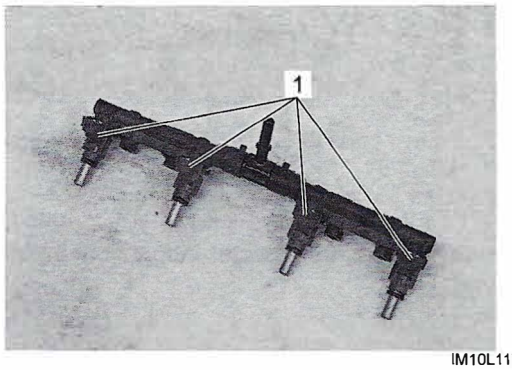
IM10L1170035-03

3) Remove the fuel delivery pipe assembly bolt (1) and fuel delivery pipe assembly (2).



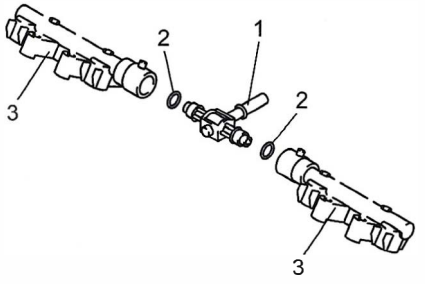
IM10L1170036-03

4) Remove the fuel injectors (1) from the fuel delivery pipes.



IM10L1170037-03

5) Remove the nipple joint (1) and O-rings (2) from the fuel delivery pipes (3).

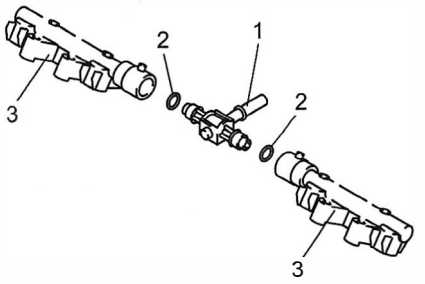


IM10L1170065-02

Installation

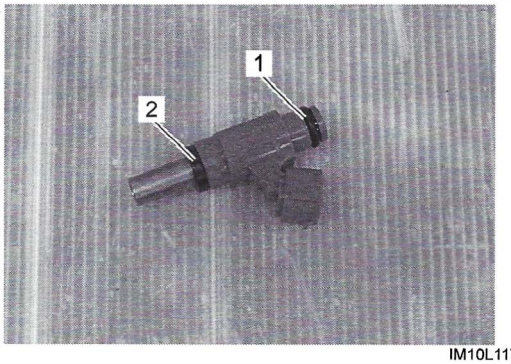
Install the fuel injector and fuel delivery pipe in the reverse order of removal. Pay attention to the following points:

- Apply engine oil to the new O-ring.
- Install the nipple joint (1) and new O-rings (2) to the fuel delivery pipes (3).



IM10L1170065-02

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



IM10L1170039-03

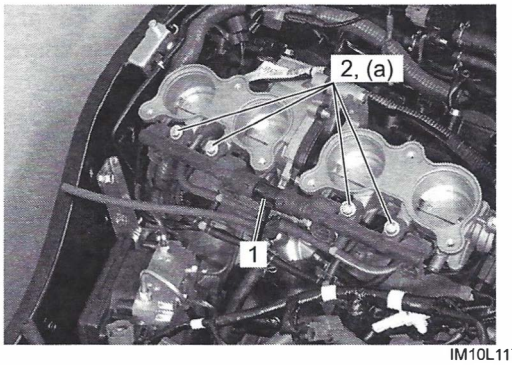
- Install the fuel delivery pipe assembly (1) to the throttle body.

NOTICE

Never turn the fuel injectors while installing them.

- Tighten the fuel delivery pipe mounting screws (2) to the specified torque.

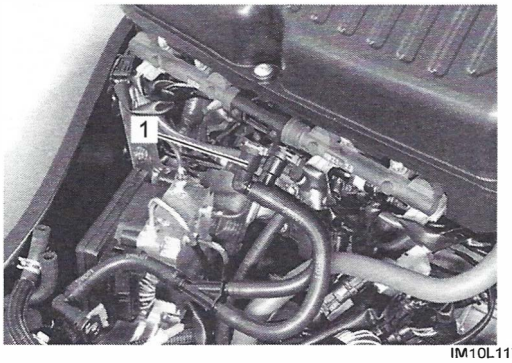
Tightening torque
Fuel delivery pipe mounting screw (a): 3.5 N·m (0.36 kgf-m, 2.60 lbf-ft)



IM10L1170041-03

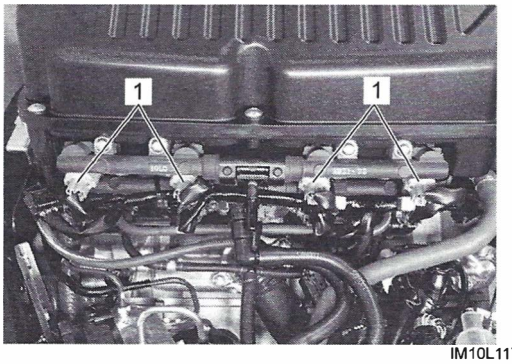
Secondary side
Removal

1) Remove the fuel tank. ☞(Page 1G-12)
2) Place a clean rag under the fuel feed hose (1) and disconnect the fuel feed hose (1). ☞(Page 1G-7)



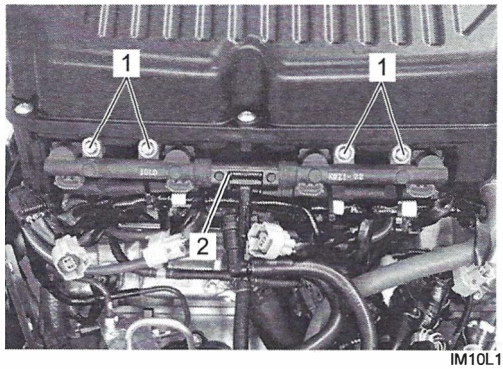
IM10L1170042-02

3) Disconnect the fuel injector couplers (1) from the fuel injectors.



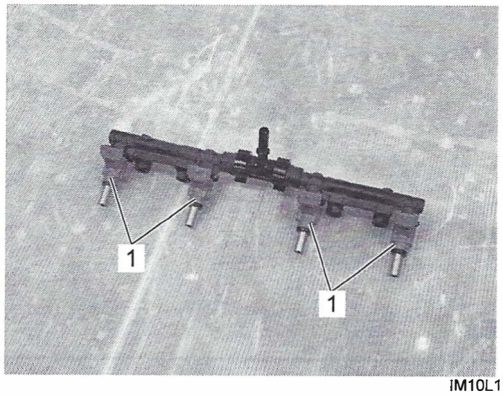
IM10L1170043-02

4) Remove the fuel delivery pipe assembly bolt (1) and fuel delivery pipe assembly (2).



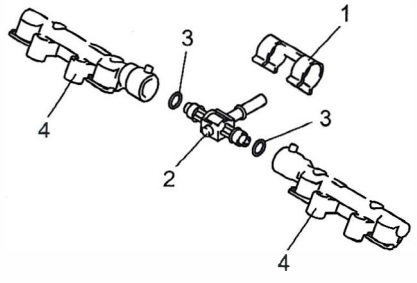
IM10L1170044-02

5) Remove the fuel injectors (1) from the fuel delivery pipes.



IM10L1170045-02

6) Remove the nipple joint cover (1), nipple joint (2) and O-rings (3) from the fuel delivery pipes (4).

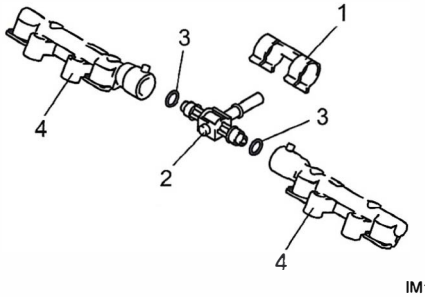


IM10L1170066-02

Installation

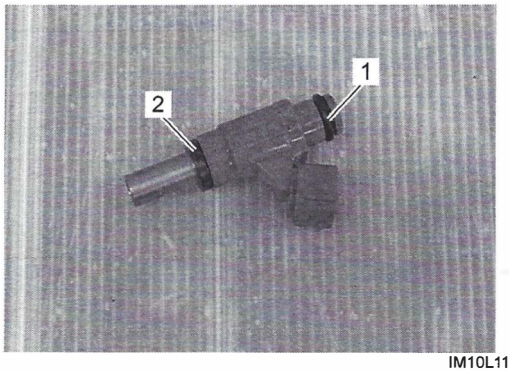
Install the fuel injector and fuel delivery pipe in the reverse order of removal. Pay attention to the following points:

- Apply engine oil to the new O-rings.
- Install the nipple joint cover (1), nipple joint (2) and new O-ring (3) to the fuel delivery pipes (4).



IM10L1170066-02

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



IM10L1170047-02

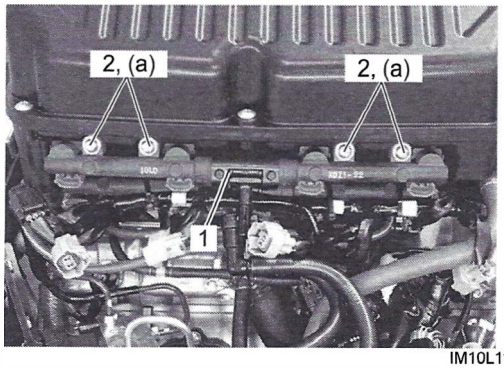
- Install the fuel delivery pipe assembly (1) to the air cleaner box.

NOTICE

Never turn the fuel injectors while installing them.

- Tighten the fuel delivery pipe mounting screws (2) to the specified torque.

Tightening torque
Fuel delivery pipe mounting screw (a): 3.5 N·m (0.36 kgf-m, 2.60 lbf-ft)



IM10L1170048-02

Fuel Injector Inspection and Cleaning

BENM10L31706021

Refer to "Fuel Injector / Fuel Delivery Pipe Removal and Installation" (Page 1G-21).

Check the fuel injector filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in the fuel line and fuel tank.


IM10L1170049-02

Specifications

Tightening Torque Specifications

BENM10L31707001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Fuel tank cap bolt	3.0	0.31	2.25	☞(Page 1G-12)
Fuel tank rear bolt	10	1.0	7.5	☞(Page 1G-13)
Fuel tank rear bracket bolt	10	1.0	7.5	☞(Page 1G-13)
Rear brake master cylinder reservoir tank bracket bolt	10	1.0	7.5	☞(Page 1G-13)
Fuel tank front bolt	5.5	0.56	4.05	☞(Page 1G-13)
Fuel pump mounting bolt	10	1.0	7.5	☞(Page 1G-18)
Fuel delivery pipe mounting screw	3.5	0.36	2.60	☞(Page 1G-22) / ☞(Page 1G-23)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Fuel Tank Construction" (Page 1G-9)
"Fuel Pump Assembly Components" (Page 1G-14)

Special Tools and Equipment

Recommended Service Material

BENM10L31708001

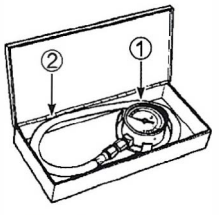
NOTE

Required service material(s) is also described in:
"Fuel Pump Assembly Components" (Page 1G-14)

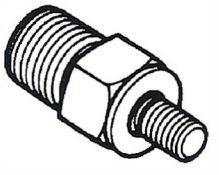
Special Tool

BENM10L31708002

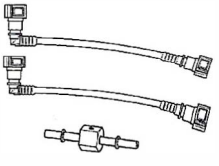
09915–74511
Oil pressure gauge set (600 kPa)
1. Gauge 2. Hose
☞(Page 1G-6)



09940–40211
Fuel pressure gauge adapter
Discontinued
☞(Page 1G-6)



09940–40220
Fuel pressure gauge attachment
☞(Page 1G-6)

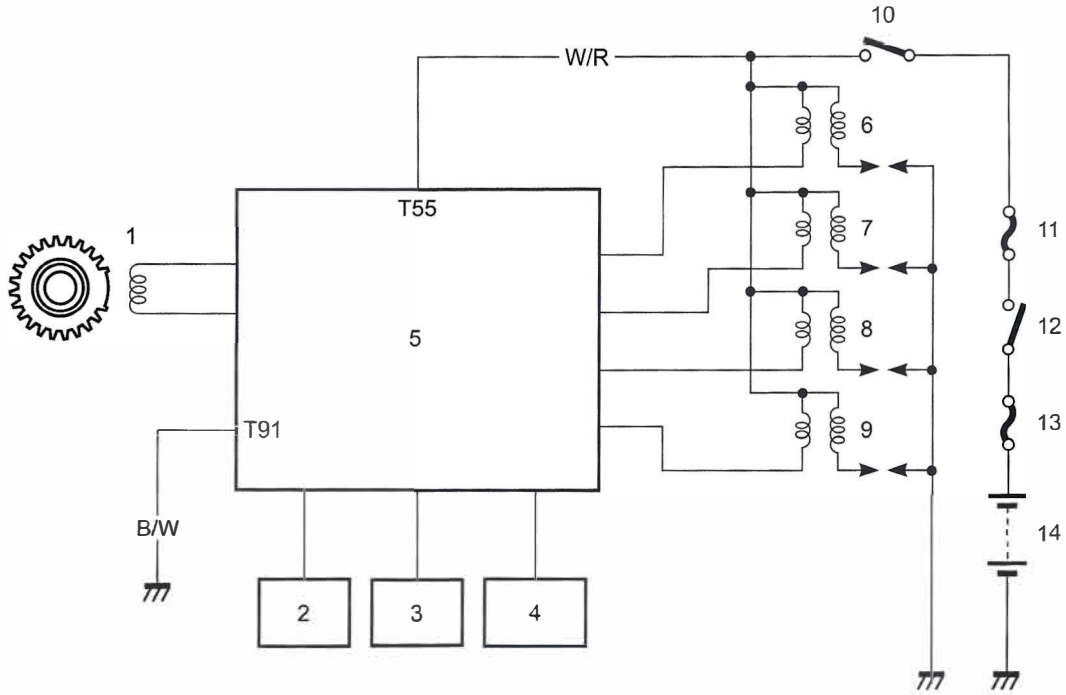


Ignition System

Schematic and Routing Diagram

Ignition System Diagram

BENM10L31802001



IM10L1180016-02

1. CKP sensor	6. Ignition coil #1	11. Ignition fuse
2. TP sensor	7. Ignition coil #2	12. Ignition switch
3. ECT sensor	8. Ignition coil #3	13. Main fuse
4. GP sensor	9. Ignition coil #4	14. Battery
5. ECM	10. Engine stop / starter switch	

Component Location

Ignition System Components Location

BENM10L31803001

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

Diagnostic Information and Procedures

Ignition System Symptom Diagnosis

BENM10L31804001

Condition	Possible cause	Correction / Reference Item
Spark plug not sparking	Damaged spark plugs.	*Replace. ☞(Page 1H-5)*
	Fouled spark plugs.	*Replace. ☞(Page 1H-5)*
	Wet spark plugs.	*Dry or replace. ☞(Page 1H-5)*
	Defective ignition coils.	*Replace. ☞(Page 1H-4)*
	Defective CKP sensor.	*Replace. ☞(Page 1C-13)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
	Open-circuited wiring connections.	*Repair or replace. ☞(Page 9A-5)*
Engine stalls easily (No spark)	Fouled spark plugs.	*Replace. ☞(Page 1H-5)*
	Defective CKP sensor.	*Replace. ☞(Page 1C-13)*
	Defective ECM.	*Replace. ☞(Page 1C-2)*
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.	*Replace. ☞(Page 0B-3)*
	Incorrect spark plugs (Cold type).	*Change to standard spark plug. ☞(Page 1H-5)*
Spark plug quickly becomes fouled with oil or carbon	Worn piston rings.	*Replace. ☞(Page 1D-50) ☞(Page 1D-51)*
	Worn pistons.	*Replace. ☞(Page 1D-50) ☞(Page 1D-51)*
	Worn cylinders.	*Replace. ☞(Page 1D-50) ☞(Page 1D-51)*
	Excessive valve-stem to valve-guide clearance.	*Replace. ☞(Page 1D-40)*
	Worn valve stem oil seals.	*Replace. ☞(Page 1D-40)*
Spark plug electrodes overheat or burn	Incorrect spark plugs (Hot type).	*Change to standard spark plug. ☞(Page 1H-5)*
	Overheated engine.	*Inspect cooling system.*
	Loose spark plugs.	*Tighten. ☞(Page 1H-5)*
	Excessively lean air / fuel mixture.	*Inspect FI system.*

No Spark or Poor Spark

BENM10L31804002

Troubleshooting

NOTE

Check that the transmission is in neutral and the engine stop / starter switch is in the "RUN / STOP" position. Check that the fuse is not blown and the battery is fully-charged before diagnosing.

Step 1

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

1) Turn the ignition switch ON.
2) Measure the battery voltage between W/R wire (+) and B/W wire (–) of ECM. Refer to "Ignition System Diagram" (Page 1H-1).

Is the voltage OK?

Yes — Go to Step 3.

No
- Faulty ignition switch.
- Faulty engine stop /starter switch.
- Broken wire harness or poor connection of related circuit couplers.

Step 3

Measure the ignition coil primary peak voltage. Refer to "Ignition Coil Inspection" (Page 1H-5).

Is the peak voltage OK?

Yes — Go to Step 4.

No — Go to Step 5.

Step 4

Inspect the spark plug(-s). ☞(Page 1H-5)

Is the spark plug(-s) OK?

Yes — Go to Step 5.

No — Faulty spark plug(-s).

Step 5

Inspect the ignition coil(-s). ☞(Page 1H-5)

Is the ignition coil(-s) OK?

Yes — Go to Step 6.

No — Faulty ignition coil(-s).

Step 6

Measure the CKP sensor peak voltage and its resistance. Refer to "CKP Sensor Inspection" in Section 1C (Page 1C-12).

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 Removal and Installation

BENM10L31806001

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. ☞(Page 1D-6)
3) Disconnect the ignition coil couplers (1) from the ignition coils / plug caps.

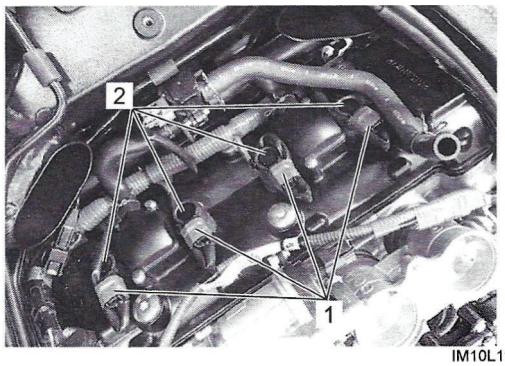
NOTICE

Disconnect the ignition coil coupler before removing the ignition coil to avoid coupler damage.

4) Remove the ignition coils / plug caps (2) from the cylinder head as follows.

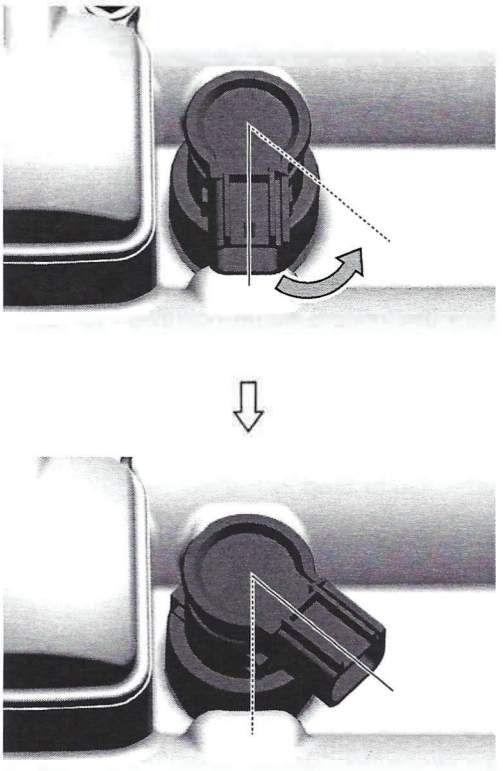
NOTICE

- **Do not pry up the ignition coil with a screw driver or a bar to avoid its damage.**
- **Be careful not to drop the ignition coil to prevent short / open circuit.**



IM10L1180020-01

a) Turn the ignition coil counterclockwise about 45°.



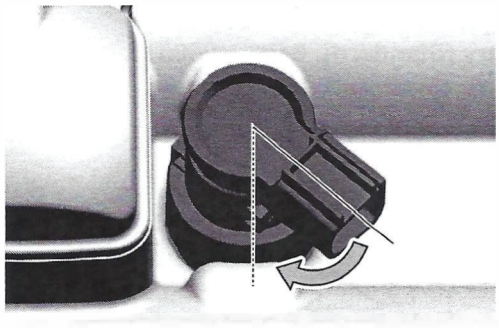
IM10L1180021-01

b) Pull out the ignition coil.

Installation

Install the ignition coil in the reverse order of removal. Pay attention to the following point:

- Turning the ignition coil about 45° from the normal position, install each ignition coil to the spark plug.

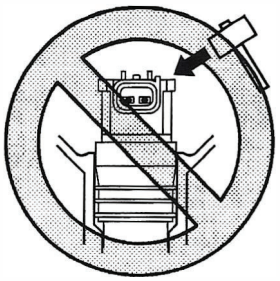


IM10L1180022-01

- Position the ignition coils and install them. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-13).

NOTICE

Do not hit the ignition coil with a plastic hammer when installing it.



ID26J1180025-02

Spark Plug Removal and Installation

BENM10L31806002

For removal and installation procedure, refer to "Spark Plugs" in Section 0B (Page 0B-7). And if necessary, replace the spark plug with a new one.

Spark Plug Inspection

BENM10L31806003

Refer to "Spark Plugs" in Section 0B (Page 0B-7).

Ignition Coil Inspection

BENM10L31806004

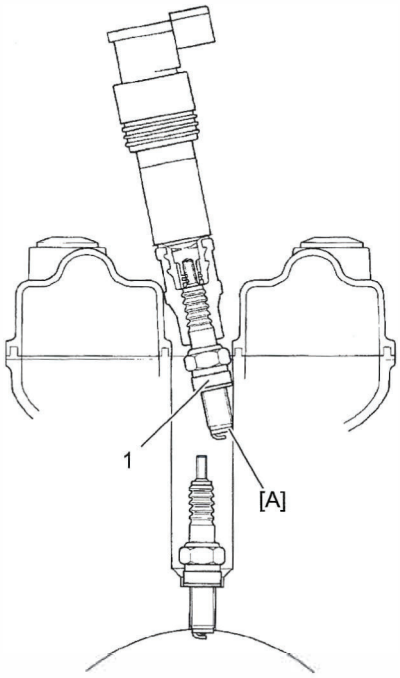
Refer to "Ignition Coil Removal and Installation" (Page 1H-4).

Ignition Coil Primary Peak Voltage

1) Disconnect the fuel injector couplers. Refer to "Fuel Injector On-Vehicle Inspection" in Section 1G (Page 1G-21).
2) Connect new spark plug (1) to each ignition coil.
3) Connect all the ignition coil couplers to the ignition coils respectively, and ground them on the cylinder head.

NOTE

Be sure that all the spark plugs are connected properly and the battery used is in fully-charged condition.



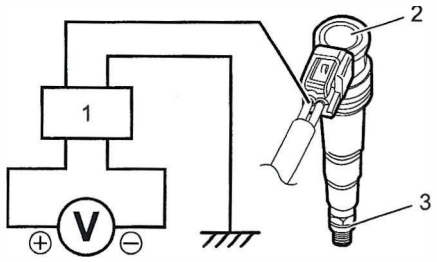
IH13K1180014-03

[A]: Contact the spark plug to the cylinder head.

4) Connect the circuit tester with the peak volt adapter (1) as follows.

Ignition coil – circuit tester connection

	(+) Probe	(–) Probe
Ignition coil #1 (2)	W/Bl wire terminal	Ground
Ignition coil #2 (2)	B wire terminal	Ground
Ignition coil #3 (2)	Y wire terminal	Ground
Ignition coil #4 (2)	G wire terminal	Ground



IK07L1180002-02

3. New spark plug

5) 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 and turn the ignition switch ON.
b) Press the engine stop / starter switch ("START" position) and allow the engine to crank for a few seconds, and then measure the ignition coil primary peak voltage.

6) Repeat the b) procedure several times and measure the highest peak voltage.
If the voltage is lower than standard range, replace the ignition coil. ☞(Page 1H-4)

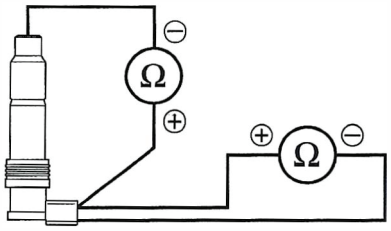
Ignition coil primary peak voltage
[Standard]: 80 V or more

7) After measuring the ignition coil primary peak voltage, install the removed parts.

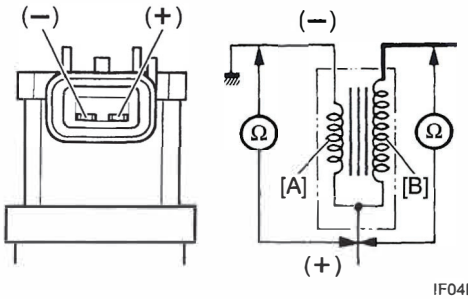
Ignition Coil Resistance

Measure the ignition coil for resistance in both primary and secondary coils. If the resistance is not within the standard range, replace the ignition coil with a new one.

Ignition coil resistance
10 – 30 °C (50 – 86 °F)
Primary [Standard]: 1.1 – 1.5 Ω
Secondary [Standard]: 6400 – 9600 Ω



IK07L1180003-02



IF04K1180012-02

[A]: Primary coil	[B]: Secondary coil

Engine Stop / Starter Switch Inspection

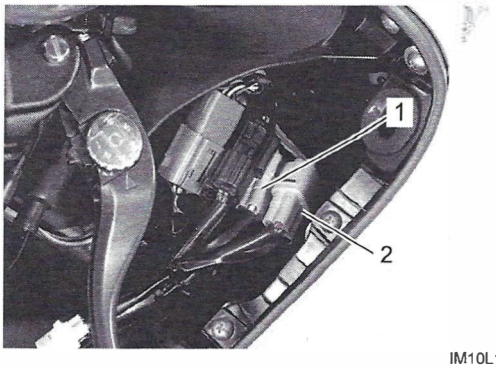
BENM10L31806005

Inspect the engine stop / starter switch for continuity. ☞(Page 6B-7)

Ignition Switch Inspection

BENM10L31806006

1) Turn the ignition switch OFF.
2) Remove the meter panel (RH). ☞(Page 9D-37)
3) Disconnect the ignition switch lead wire coupler (1).



IM10L1180003-03

2. Immobilizer antenna coupler (if equipped)

4) Inspect the ignition switch for continuity with a circuit tester. If any abnormality is found, replace the ignition switch with a new one.

With immobilizer control system

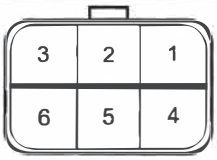
Terminal / Position	T2	T1	T3	T4
ON	○	○	○	○
OFF				
LOCK				
P	○			○



IM10L1180004-03

Without immobilizer control system

Terminal / Position	T5	T3	T1	T4	T6
ON	○	○	○	○	○
OFF					
LOCK					
P		○			○



IM10L1180005-03

5) After finishing the ignition switch inspection, reinstall the removed parts.

Ignition Switch Removal and Installation

BENM10L31806007

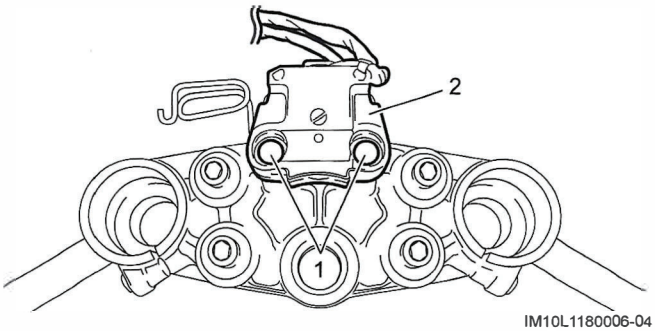
NOTE

When ignition switch is replace with new one, perform ignition key registration (with immobilizer control system). ☞(Page 10C-6)

Removal

For break head bolt

1) Remove the steering stem upper bracket. ☞(Page 6B-3)
2) Remove the ignition switch mounting bolts (1) from the ignition switch.
3) Remove the ignition switch (2) from the steering stem upper bracket.



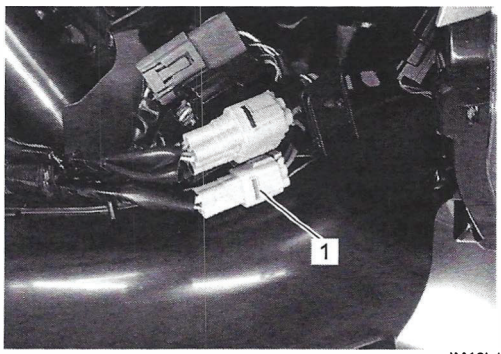
IM10L1180006-04

Except for break head bolt

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Disconnect the ignition switch lead wire coupler (1).

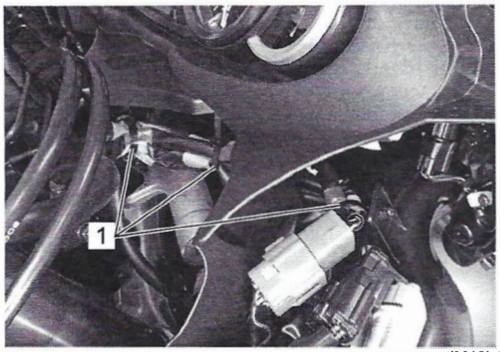
NOTE

The ignition switch couplers are divided into the following.
With immobilizer control system models: 4 terminals.
Without immobilizer control system models: 6 terminals.



IM10L1180007-02

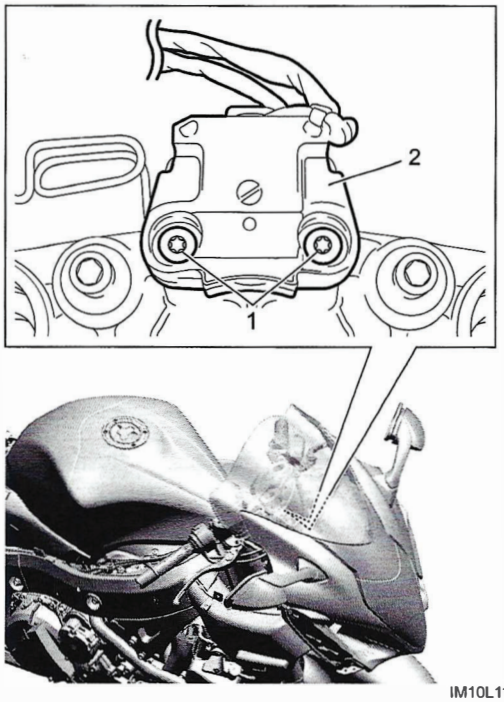
3) Release the ignition switch lead wires from its clamps (1).



IM10L1180008-02

4) Remove the ignition switch mounting bolts (1) and ignition switch (2) using the special tools.

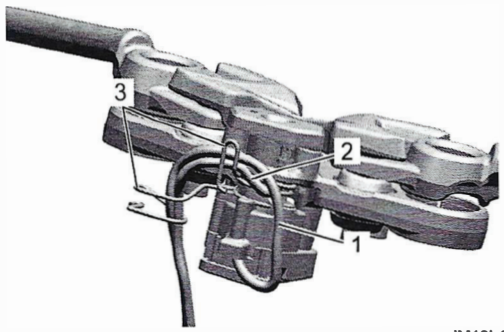
Special tool
09930–11920
09930–11940



IM10L1180009-03

Installation
Install the ignition switch in the reverse order of removal. Pay attention to the following points:

- Pass the ignition switch read wire (1) and immobilizer antenna lead (if equipped) (2) to the read wire guide (3).

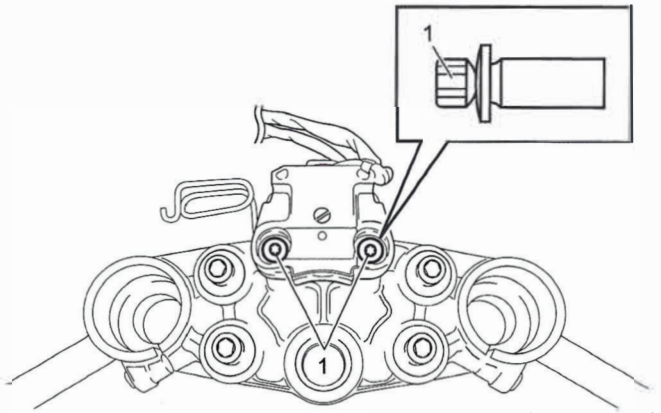


IM10L1180018-01

For break head bolt

- Tighten new ignition switch mounting bolts (1) with the special tool until head of each bolt is broken off.

Special tool
09930–11940
09940–63110



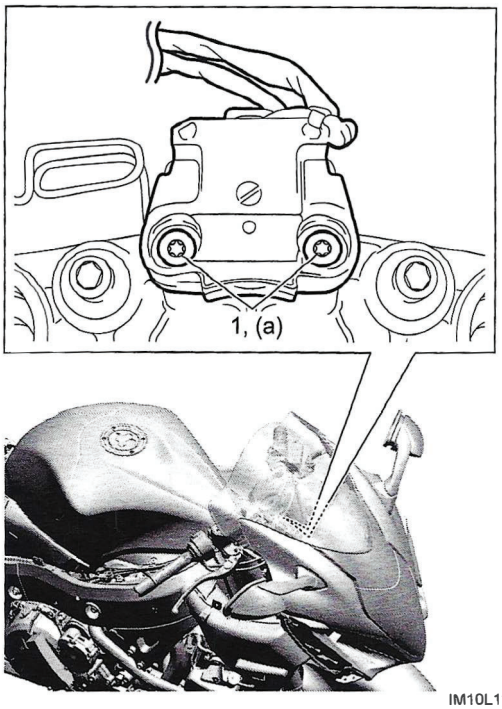
IM10L1180019-02

Except for break head bolt

- Replace the ignition switch mounting bolts new one, and then tighten the ignition switch mounting bolts (1) to the specified torque with the special tools.

Special tool
09930–11920
09930–11940

Tightening torque
Ignition switch mounting bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1180010-03

Specifications

Tightening Torque Specifications

BENM10L31807001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Ignition switch mounting bolt	23	2.3	17.0	☞(Page 1H-8)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Fasteners Information" in Section 0C (Page 0C-6)

Special Tools and Equipment

Special Tool

BENM10L31808001

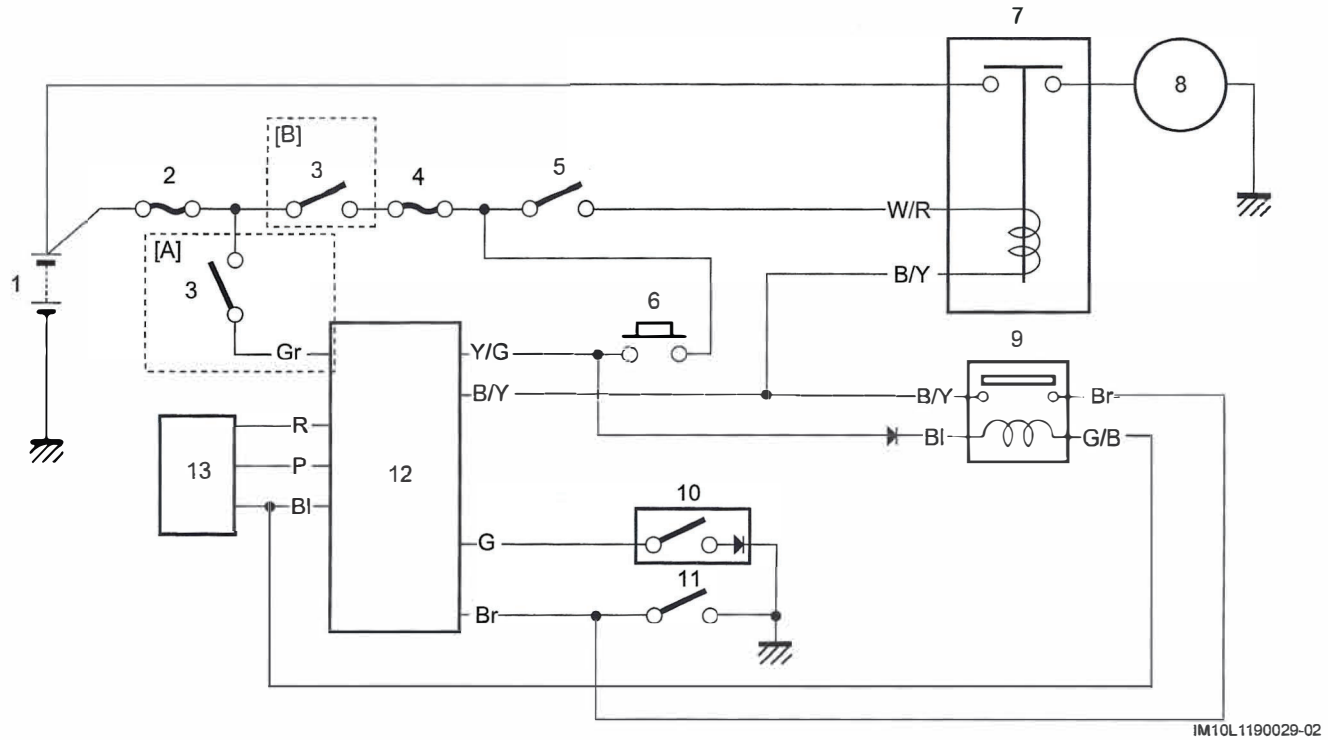
09930–11920 Torx® bit (JT40H) Torx® is the registered trademark of Camcar Division of Textron inc. U.S.A. ☞(Page 1H-8) / ☞(Page 1H-8)	09930–11940 Torx® bit holder (3/8 sq.) Torx® is the registered trademark of Camcar Division of Textron inc. U.S.A. ☞(Page 1H-8) / ☞(Page 1H-8) / ☞(Page 1H-8)
09940–63110 Torx® bit (E8) Torx® is the registered trademark of Camcar Division of Textron inc. U.S.A. ☞(Page 1H-8)	

Starting System

Schematic and Routing Diagram

Starting System Diagram

BENM10L31902001



IM10L1190029-02

[A]: Without immobilizer control system	4. Ignition fuse (10 A)	9. Starter sub relay
[B]: With immobilizer control system	5. Engine stop / starter switch ("RUN / STOP" position)	10. Side-stand switch
1. Battery	6. Engine stop / starter switch ("START" position)	11. Clutch lever position switch
2. Main fuse (30 A)	7. Starter relay	12. ECM
3. Ignition switch	8. Starter motor	13. GP sensor

Component Location

Starting System Components Location

BENM10L31903001

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

Diagnostic Information and Procedures

Starting System Symptom Diagnosis

BENM10L31904001

Condition	Possible cause	Correction / Reference Item
Engine does not turn though the starter motor runs	Faulty starter clutch.	*Replace. ☞(Page 1I-10)*
Starter button is not effective	Run down battery.	*Repair or replace. ☞(Page 1J-8)*
	Defective switch contacts.	*Replace* • *Ignition switch: ☞(Page 1H-7)* • *Right handlebar switch: ☞(Page 6B-3)* • *Side-stand switch: ☞(Page 1D-27)* • *Clutch lever position switch: ☞(Page 5C-9)*
	Brushes not seating properly on starter motor commutator.	*Repair or replace. ☞(Page 1I-7)*
	Defective sensor.	*Replace. ☞(Page 5B-14)*
	Defective relay(s).	*Replace.* • *Starter relay: ☞(Page 1I-8)* • *Starter sub relay: ☞(Page 1I-9)*
	Defective fuse(s).	*Replace.*

Starter Motor Will Not Run

BENM10L31904002

NOTE

Check the fuses and charge the battery fully before diagnosing.

Troubleshooting

Step 1

1) Shift the transmission into neutral.
2) Turn on the ignition switch listen for a click from the starter relay when the engine stop / starter switch ("START" position) is pushed.

Is a 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.

NOTICE

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

Grasp the clutch lever and push the engine stop / starter switch ("START" position).

Does the starter motor run?

Yes
- Faulty ECM.
- Faulty GP sensor.
- Poor contact of connector.
- Open circuit in wire harness.

No Go to Step 4.

Step 4

Measure the voltage between W/R wire (+) and B/Y wire (–) at the starter relay coupler when the engine stop / starter switch ("START" position) is pushed. Refer to "Starting System Diagram" (Page 1I-1).

NOTE

- **A voltage drop lowers the voltage.**
- **The amount of the voltage drop depends on the model, equipments and the battery condition.**

Is the battery voltage applied?

Yes Go to Step 4.

No
- Faulty ignition switch.
- Faulty engine stop / starter switch
- Faulty clutch lever position switch.
- Faulty ECM.
- Faulty GP sensor.
- Faulty starter sub relay.
- Faulty side-stand switch.
- Poor contact of coupler.
- Open circuit in wire harness.

Step 5

Check the starter relay. ☞(Page 1I-8)

Is the starter relay OK?

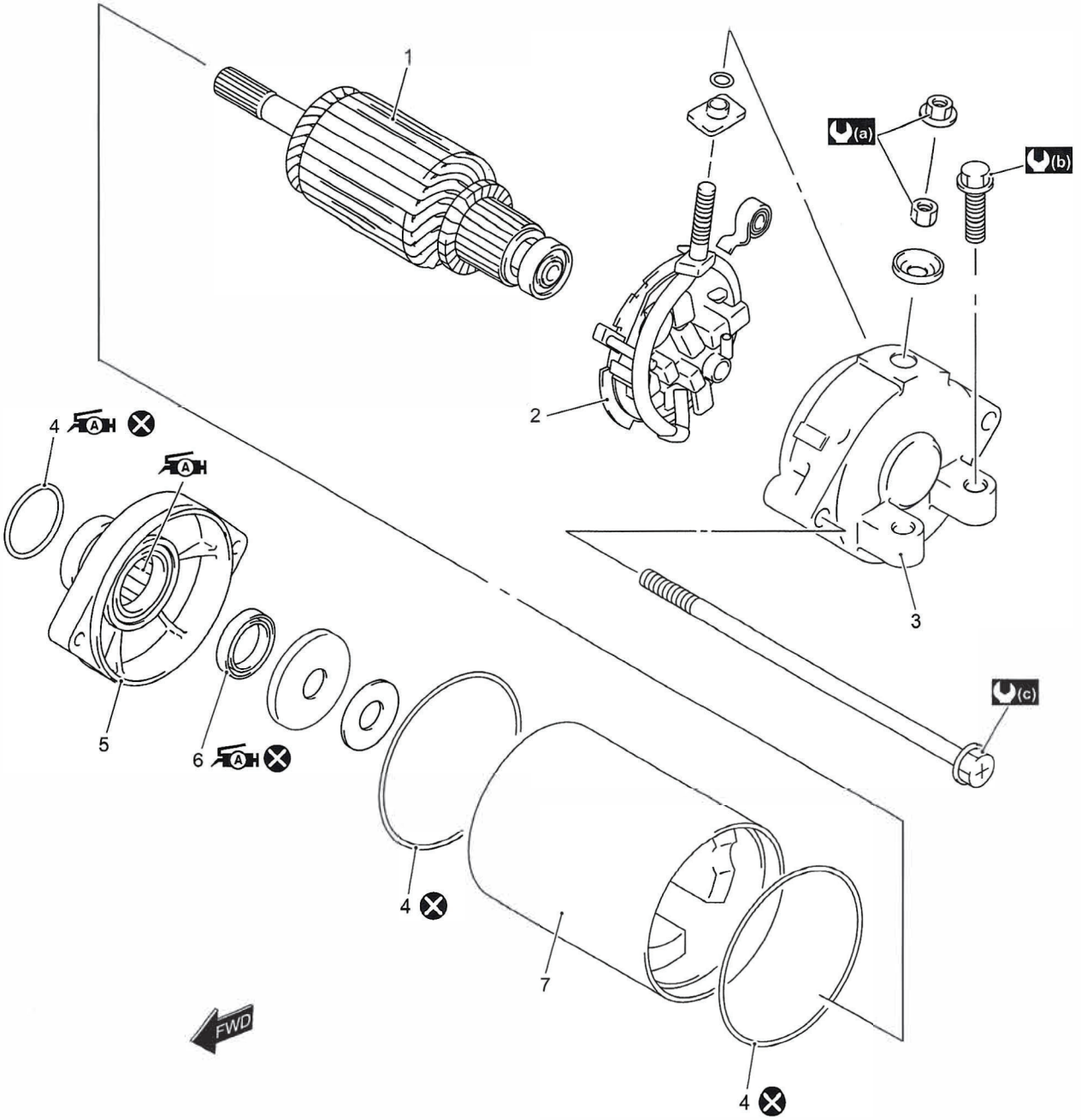
Yes Poor contact of the starter relay.

No Faulty starter relay.

Repair Instructions

Starter Motor Components

BENM10L31906001



IM10L1190030-01

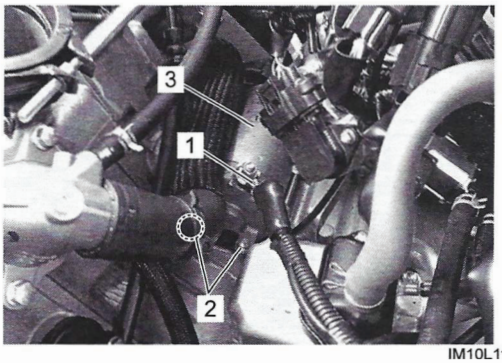
1. Armature	5. Housing end (Inside)	(b) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
2. Brush holder	6. Oil seal	(c) : 4.7 N·m (0.48 kgf-m, 3.50 lbf-ft)
3. Housing end (Outside)	7. Starter motor case	A : Apply grease.
4. O-ring	(a) : 5.0 N·m (0.51 kgf-m, 3.70 lbf-ft)	⊗ : Do not reuse.

Starter Motor Removal and Installation

BENM10L31906002

Removal

1) Turn the ignition switch OFF and disconnect the battery (–) lead wire. Refer to "Battery Removal and Installation" in Section 1J (Page 1J-8).
2) Remove the throttle body. Refer to "Throttle Body Removal and Installation" in Section 1D (Page 1D-9).
3) Disconnect the starter motor lead wire (1) from the starter motor.
4) Remove the starter motor bolts (2) and starter motor (3).



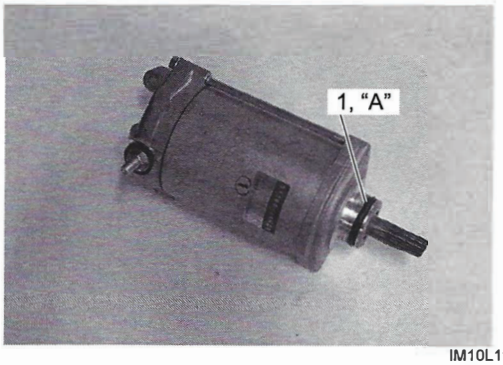
IM10L1190001-01

Installation

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

- Apply grease to the new O-ring (1).

  "A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1190002-01

- Install the starter motor. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-13).

Starter Motor Disassembly and Assembly

BENM10L31906003

Refer to "Starter Motor Removal and Installation" (Page 1I-6).

Disassembly

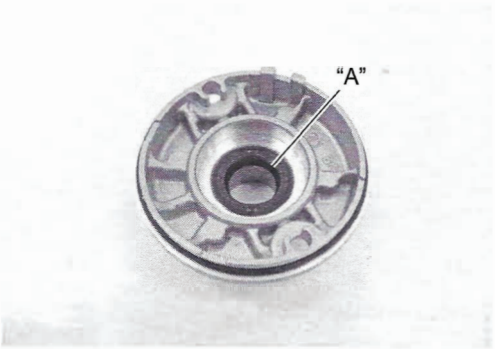
Disassemble the starter motor as shown in the starter motor components diagram. Refer to "Starter Motor Components" (Page 1I-5).

Assembly

Reassemble the starter motor in the reverse order of removal. Pay attention to the following points:

- Apply grease to the lip of the new oil seal.

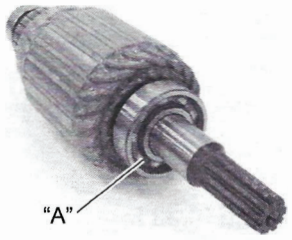
  "A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1190003-01

- Apply grease to the bearing.

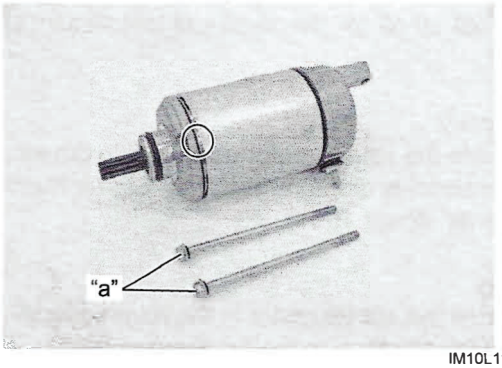
  "A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1190004-01

- Align the match marks on the starter motor case with the match mark on each housing end.
- Tighten the starter motor housing bolts to the specified torque.

  Tightening torque
  Starter motor housing bolt (a): 4.7 N·m (0.48 kgf-m, 3.50 lbf-ft)



IM10L1190005-01



I823H1190006-01

Starter Motor Inspection

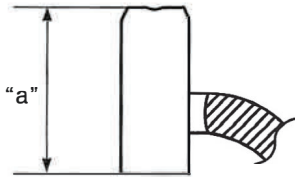
BENM10L31906004

Refer to "Starter Motor Disassembly and Assembly" (Page 1I-6).

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.

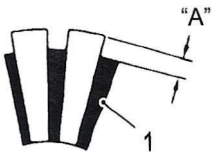
Brush length "a"
Service limit: 8.5 mm (0.33 in)



I718H1190013-01

Commutator

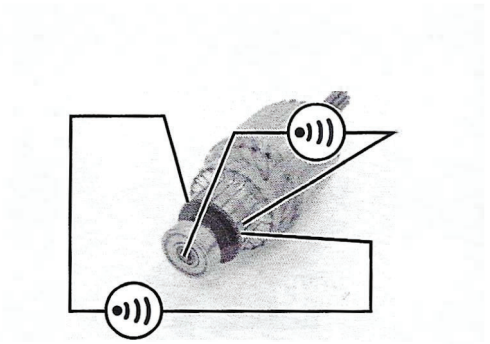
Inspect the commutator for discoloration, abnormal wear or undercut "A".
If the commutator is abnormally worn, replace the armature assembly.
If the commutator surface is discolored, polish it with #400 sandpaper and wipe it using a clean, dry cloth.
If there is no undercut, scrape out the insulator (1) with a saw blade.



I823H1190007-01

Armature Coil

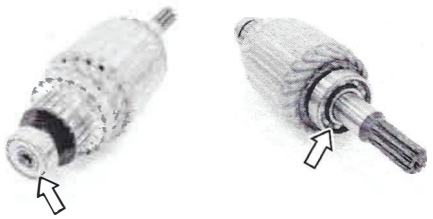
Inspect for continuity between each segment.
Inspect for continuity between each segment and the armature shaft.
If there is no continuity between the segments or there is continuity between the segments and shaft, replace the armature assembly with a new one.



IM10L1190006-01

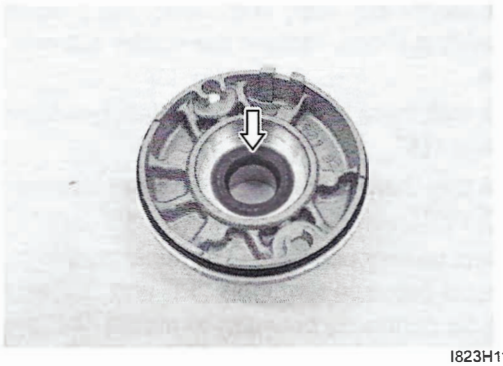
Bearing

Check the bearings for damage.
If any damage is found, replace the armature assembly with a new one.



I823H1190033-01

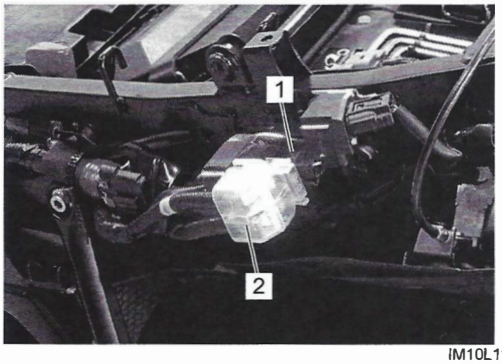
Oil Seal
Check the seal lip for damage.
If any damage is found, replace the housing end (inside).



I823H1190034-01

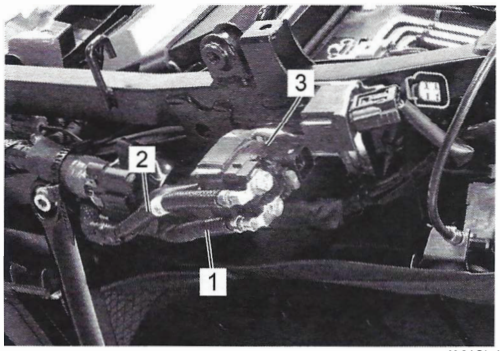
Starter Relay Removal and Installation
BENM10L31906005

Removal
1) Remove the frame cover assembly. ☞(Page 9D-51)
2) Disconnect the battery (–) lead wire from the battery. ☞(Page 1J-8)
3) Disconnect the starter relay coupler (1) and remove the starter relay cover (2).



IM10L1190007-02

4) Disconnect the starter motor lead wire (1) and battery (+) lead wire (2).
5) Remove the starter relay (3).

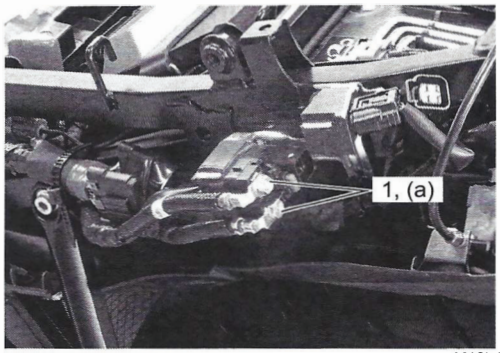


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Installation
Install the starter relay in the reverse order of removal. Pay attention to the following point:

- Tighten the starter relay terminal bolts (1) to the specified torque.

Tightening torque
Starter relay terminal bolt (a): 4.5 N·m (0.46 kgf-m, 3.35 lbf-ft)



IM10L1190009-02

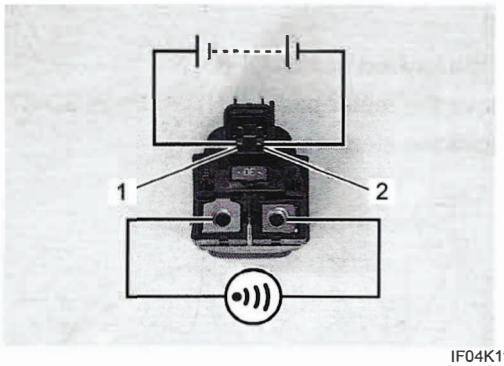
Starter Relay Inspection
BENM10L31906006

Refer to "Starter Relay Removal and Installation" (Page 1I-8).

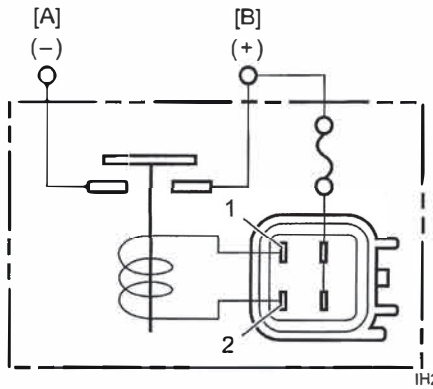
1) Apply 12 V to (1) and (2) terminals and check for continuity between the positive and negative terminals using the circuit tester. If the starter relay clicks and continuity is found, the relay is OK.

NOTICE

Do not apply battery voltage to the starter relay for five seconds or more, otherwise the relay coil may overheat and get damaged.



IF04K1190012-01

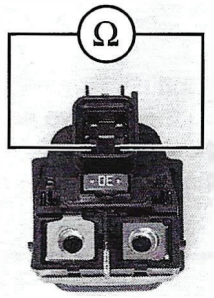


IH23K3190012-01

[A]: To starter motor	[B]: To battery

2) Measure the relay coil resistance between the terminals using the circuit tester. If the resistance is not within the specified value, replace the starter relay with a new one.

Starter relay resistance
[Standard]: 3 – 5 Ω



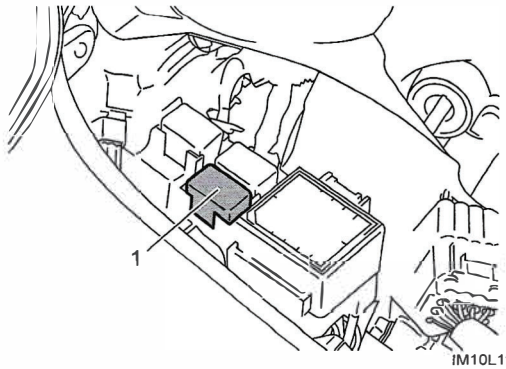
IF04K1190013-02

Starter Sub Relay Removal and Installation

BENM10L31906007

Removal

1) Turn the ignition switch OFF.
2) Remove the meter panel (LH). ☞(Page 9D-37)
3) Remove the starter sub relay (1).



IM10L1190010-02

Installation

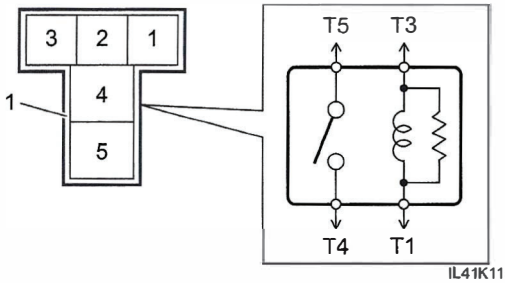
Install the starter sub relay in the reverse order of removal.

Starter Sub Relay Inspection

BENM10L31906008

Refer to "Starter Sub Relay Removal and Installation" (Page 1I-9).
Check the starter sub relay in the following procedures. If abnormality is found, replace the starter sub relay with a new one.

1) Check that there is no continuity between terminals "T4" and "T5".
2) Check that there is continuity between terminals "T1" and "T3".
3) Connect battery positive (+) terminal and negative (–) terminal between terminals "T1" and "T3" and check for continuity between terminals "T4" and "T5".



IL41K1150036-02

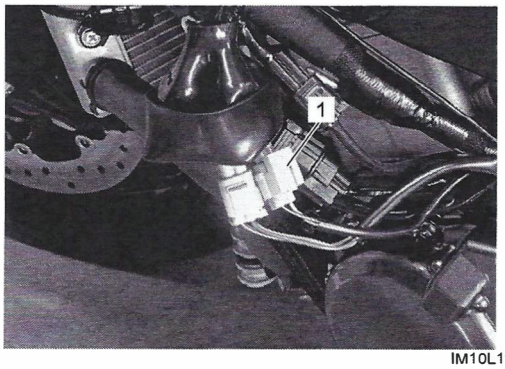
Starter Interlock System Parts Inspection

BENM10L31906009

Check the interlock system for proper operation. If the interlock system does not operate properly, check each component for damage or abnormalities. If any abnormality is found, replace the component with a new one.

Side-stand Switch

1) Turn the ignition switch OFF.
2) Remove the side cowling assembly (LH). ☞(Page 9D-37)
3) Disconnect the side-stand switch coupler (1).

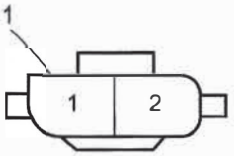


IM10L1190011-02

4) Using diode range of circuit tester, check the between each terminal of side-stand switch (1) according to the following table.
If any defect is found, replace the side-stand switch with a new one.

NOTE

For diode test, refer to the instruction manual of circuit tester.



IM10L1190031-01

	(–) probe of tester	(+) probe of tester
	T1	T2
ON (Side-stand retracted)	0.4 – 0.6 V	
OFF (Side-stand on the ground)	Tester's battery voltage or more	

GP Sensor

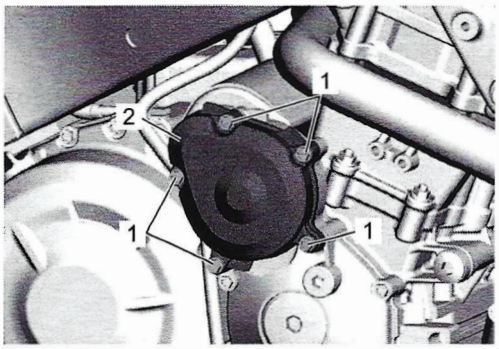
Refer to "GP Sensor Inspection" in Section 5B (Page 5B-13).

Starter Torque Limiter / Starter Clutch Removal and Installation

BENM10L31906010

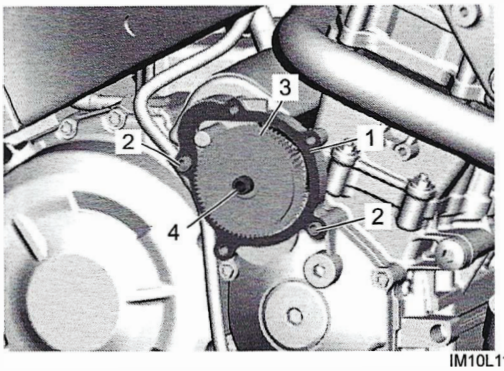
Removal

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Remove the starter torque limiter cover bolts (1) and starter torque limiter cover (2) from the starter clutch cover.



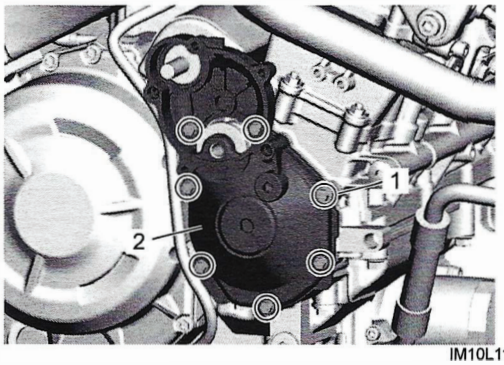
IM10L1190013-01

3) Remove the gasket (1) and dowel pins (2) from the starter clutch cover.
4) Remove the starter torque limiter (3) and its shaft (4).



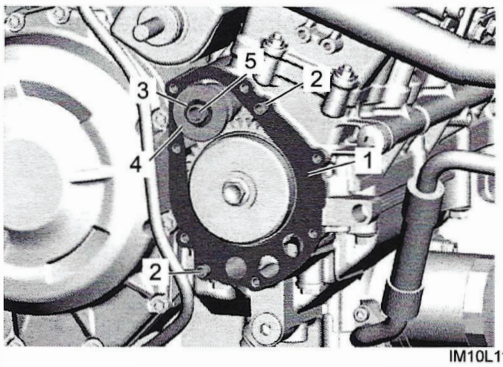
IM10L1190014-01

5) Remove the starter clutch cover bolts (1) and starter clutch cover (2) from the upper crankcase and lower crankcase.



IM10L1190015-01

6) Remove the gasket (1) and dowel pins (2).
7) Remove the wave washer (3), starter idle gear (4) and shaft (5).

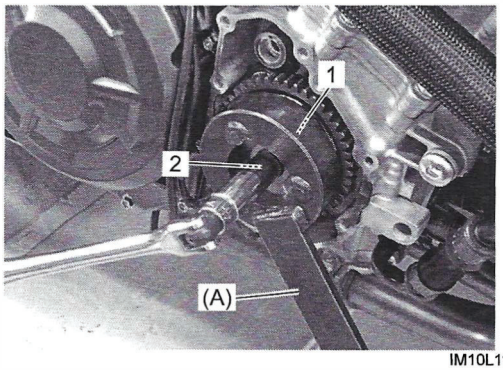


IM10L1190016-01

8) Hold the starter clutch (1) with the special tool, and then loosen the starter clutch bolt (2).

Special tool
(A): 09920–34830

9) Remove the starter clutch and washer.

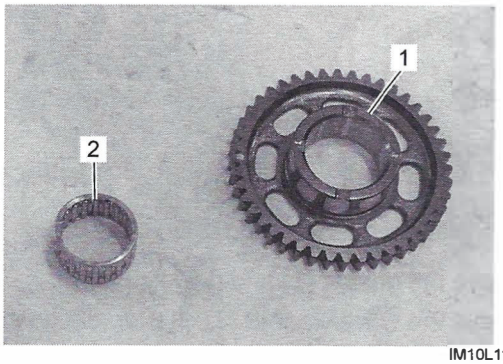


IM10L1190017-01

Installation

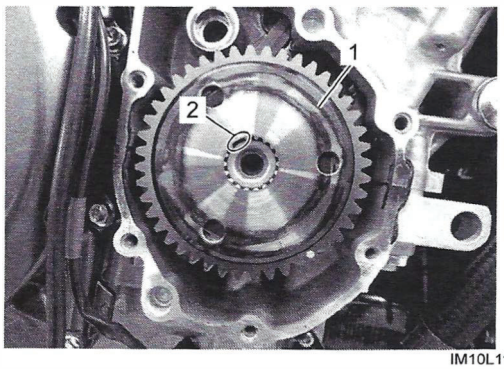
Installation is in the reverse order of removal. Pay attention to the following points:

- Apply engine oil to the starter clutch gear (1) and bearing (2).



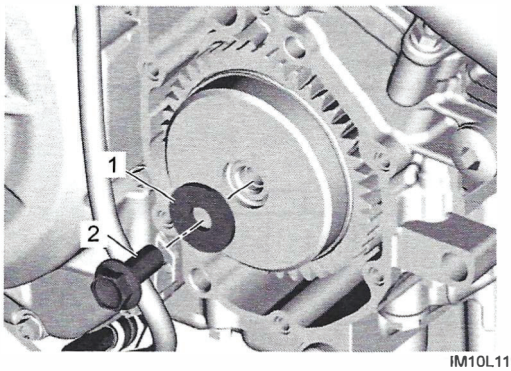
IM10L1190018-01

- When installing the starter clutch (1) to the crankshaft, align the wide spline tooth (2) of starter clutch with that of crankshaft.



IM10L1190019-01

- Apply engine oil to the both side of the washer (1) and thread portion (2) of starter clutch bolt.

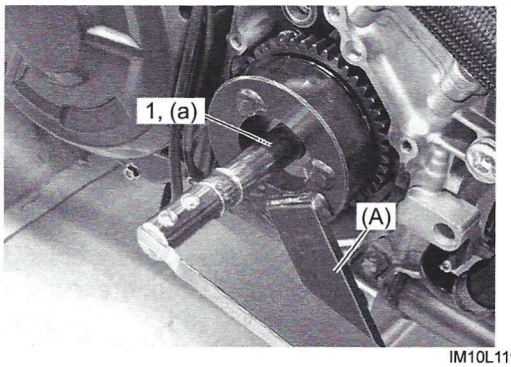


IM10L1190020-01

- With the starter clutch held immovable using the special tool, tighten the starter clutch bolt (1) to the specified torque.

Special tool
(A): 09920–34830

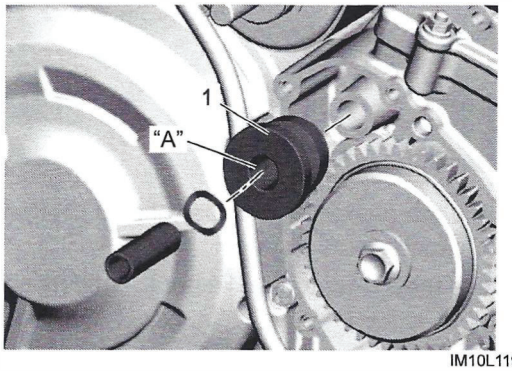
Tightening torque
Starter clutch bolt (a): 54 N·m (5.5 kgf-m, 40.0 lbf-ft)



IM10L1190021-01

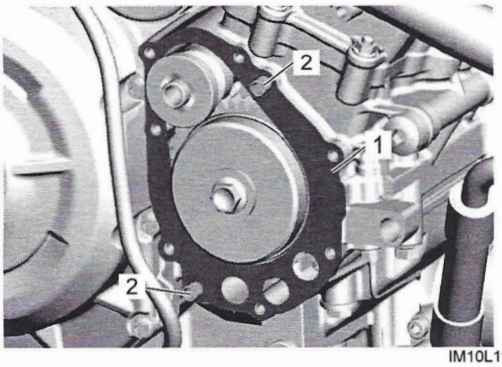
- Apply molybdenum oil solution to the inner surface of the starter clutch idle gear (1).

"A": Assembly lubrication (Molybdenum oil solution)



IM10L1190022-01

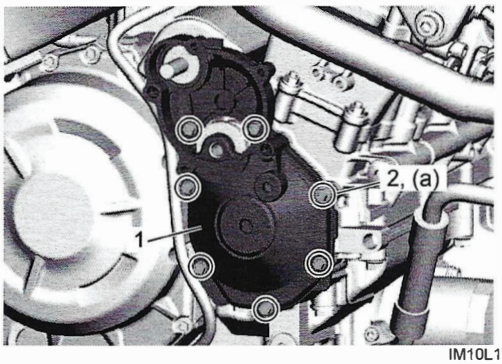
- Install the new gasket (1) and dowel pins (2) to the crankcase.



IM10L1190023-01

- Install the starter clutch cover (1), and then tighten the starter clutch cover bolts (2) to specified torque.

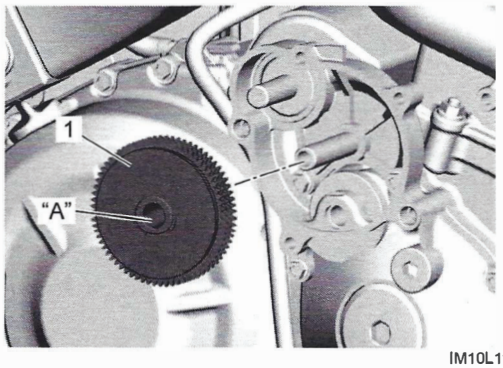
  Tightening torque
  Starter clutch cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1190024-01

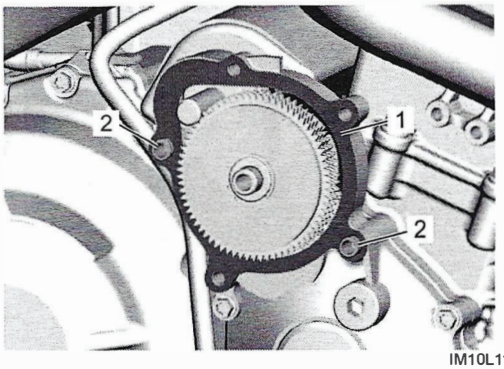
- Apply molybdenum oil solution onto the boss portion of starter torque limiter (1).

  "A": Assembly lubrication (Molybdenum oil solution)



IM10L1190025-01

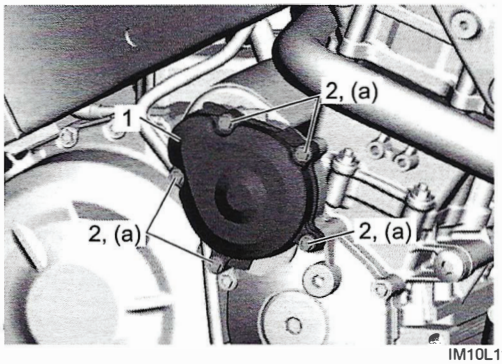
- Fit the new gasket (1) and the dowel pins (2) to the starter clutch cover.



IM10L1190026-01

- Install the starter torque limiter cover (1) to the starter clutch cover, and then tighten the starter torque limiter cover bolts (2) to the specified torque.

  Tightening torque
  Starter torque limiter cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1190027-01

Starter Torque Limiter Inspection

BENM10L31906011

NOTICE

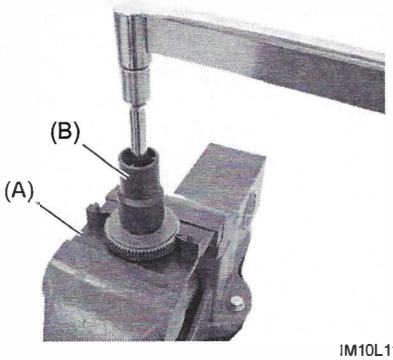
- **Do not attempt to disassemble the starter torque limiter.**
- **The starter torque limiter is available only as an assembly part.**

1) Hold the starter torque limiter with the special tools and vise.

   Special tool
   (A): 09930–73170
   (B): 09930–73140

2) Turn the starter torque limiter with a torque wrench and check the slip torque. If the slip torque is not within the specification, replace the starter torque limiter with a new one.

   Starter torque limiter slip torque
   Standard: 33.3 – 52.0 N·m (3.3 – 5.2 kgf-m, 24.0 – 37.5 lbf-ft)



IM10L1190028-01

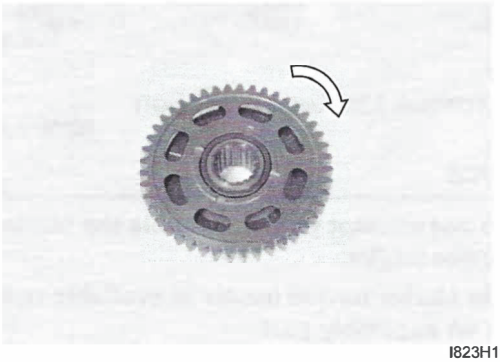
Starter Clutch Inspection

BENM10L31906012

Refer to "Starter Torque Limiter / Starter Clutch Removal and Installation" (Page 1I-10).

Starter Clutch

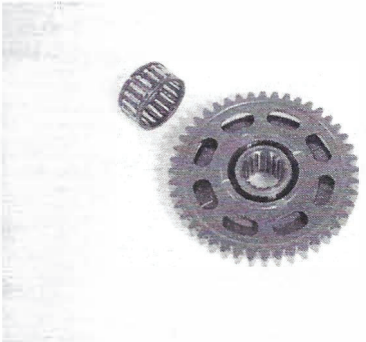
1) Install the starter driven gear onto the starter clutch.
2) Turn the starter driven gear by hand to inspect the starter clutch for a smooth movement. The gear turns in one direction only. If a large resistance is felt for rotation, inspect the starter clutch or the starter clutch contacting surface on the starter driven gear for wear or damage.
   If they are found to be damaged, replace them with new ones.



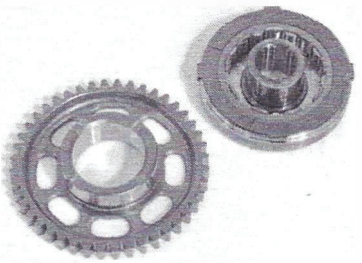
I823H1190029-01

Starter Clutch Bearing and Starter Driven Gear

Inspect the starter clutch bearing and starter clutch contacting surface on the starter driven gear for wear and damage. If they are found to be damaged, replace them with new ones.



I823H1190030-01



I823H1190031-03

Specifications

Tightening Torque Specifications

BENM10L31907001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Starter motor housing bolt	4.7	0.48	3.50	☞(Page 1I-6)
Starter relay terminal bolt	4.5	0.46	3.35	☞(Page 1I-8)
Starter clutch bolt	54	5.5	40.0	☞(Page 1I-11)
Starter clutch cover bolt	10	1.0	7.5	☞(Page 1I-12)
Starter torque limiter cover bolt	10	1.0	7.5	☞(Page 1I-12)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Starter Motor Components" (Page 1I-5)

Special Tools and Equipment

Recommended Service Material

BENM10L31908001

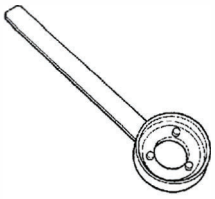
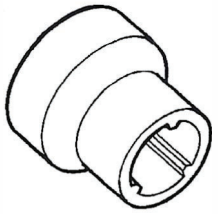
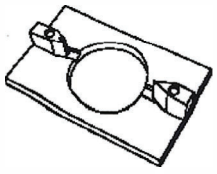
Material	SUZUKI recommended product or Specification		Note
Assembly lubrication	Molybdenum oil solution	—	☞(Page 1I-11) / ☞(Page 1I-12)
Grease	SUZUKI SUPER GREASE A	P/No.: 99000–25011	☞(Page 1I-6) / ☞(Page 1I-6) / ☞(Page 1I-6)

NOTE

Required service material(s) is also described in:
"Starter Motor Components" (Page 1I-5)

Special Tool

BENM10L31908002

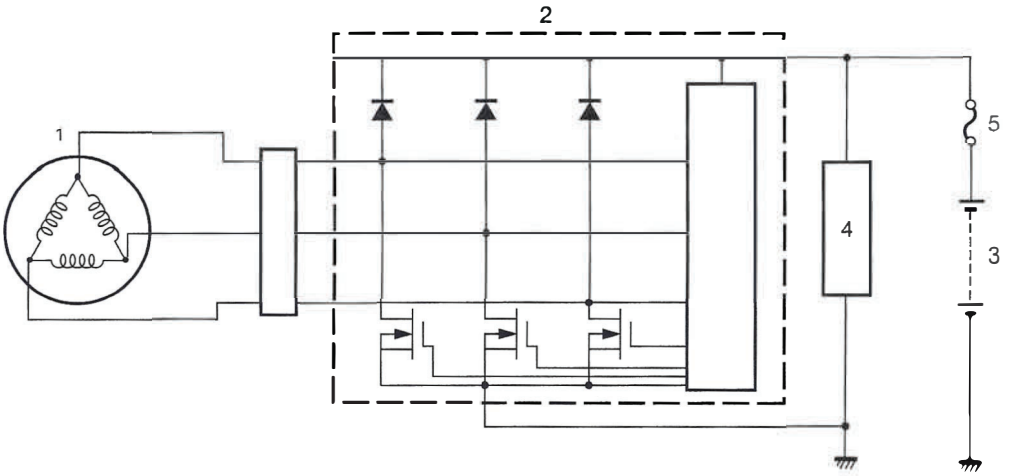
09920–34830 Starter clutch rotor holder ☞(Page 1I-10) / ☞(Page 1I-11) 	09930–73140 Starter torque limiter socket ☞(Page 1I-12) 
09930–73170 Starter torque limiter holder ☞(Page 1I-12) 	

Charging System

Schematic and Routing Diagram

Charging System Diagram

BENM10L31A02001



IM10L11A0027-01

1. Generator	3. Battery	5. Main fuse
2. Regulator/rectifier	4. Load	

Component Location

Charging System Components Location

BENM10L31A03001

Refer to “Electrical Components Location”: Service Manual Information in Section 0A (Page 0A-10).

Diagnostic Information and Procedures

Charging System Symptom Diagnosis

BENM10L31A04001

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. ☞(Page 1J-4) ☞(Page 1J-6)*
	Short-circuited or punctured regulator/ rectifier.	*Replace. ☞(Page 1J-7)*
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. ☞(Page 1J-4) ☞(Page 1J-6)*
	Defective regulator/rectifier.	*Replace. ☞(Page 1J-7)*
	Defective cell plates in the battery.	*Replace the battery. ☞(Page 1J-8)*
Generator overcharges	Internal short-circuit in the battery.	*Replace the battery. ☞(Page 1J-8)*
	Damaged or defective regulator/rectifier.	*Replace. ☞(Page 1J-7)*
	Poorly grounded regulator/rectifier.	*Clean and tighten ground connection.*

Condition	Possible cause	Correction / Reference Item
Unstable charging	Lead wire insulation frayed due to vibration, resulting in intermittent short-circuiting.	*Repair or replace.*
	Internally short-circuited generator.	*Replace. ☞(Page 1J-4) ☞(Page 1J-6)*
	Defective regulator/rectifier.	*Replace. ☞(Page 1J-7)*
Battery overcharges	Faulty regulator/rectifier.	*Replace. ☞(Page 1J-7)*
	Faulty battery.	*Replace. ☞(Page 1J-8)*
	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. ☞(Page 1J-3)*
	Cell plates have lost much of their active materials a result of overcharging.	*Replace the battery and correct the charging system. ☞(Page 1J-8)*
	Internal short-circuit in the battery.	*Replace the battery. ☞(Page 1J-8)*
	Too low battery voltage.	*Recharge the battery fully. ☞(Page 1J-8)*
	Too old battery.	*Replace the battery. ☞(Page 1J-8)*
Battery "sulfation"	Incorrect charging rate. (When not in use battery should be checked at least once a month to avoid sulfation.)	*Replace the battery. ☞(Page 1J-8)*
	The battery was left unused in a cold climate for too long.	*Replace the battery if badly sulfated. ☞(Page 1J-8)*
"Sulfation", acidic white powdery substance or spots on surface of cell plates	Cracked battery case.	*Replace the battery. ☞(Page 1J-8)*
	Battery has been left in a run-down condition for a long time.	*Replace the battery. ☞(Page 1J-8)*

Battery Runs Down Quickly

BENM10L31A04002

Troubleshooting

Step 1

Check accessories which use excessive amounts of electricity.

Are accessories installed?

Yes — Remove accessories.

No — Go to Step 2.

Step 2

Check the following points of battery.

- Tightening state of the battery lead wire mounting bolts. ☞(Page 1J-8)
- Visual of the battery. ☞(Page 1J-9)

Is check result OK?

Yes — Go to Step 3.

No
- Loose battery lead wire mounting bolts.
- Faulty battery.

Step 3

Check the battery for current leakage. ☞(Page 1J-3)

Is the battery for current leakage OK?

Yes — Go to Step 4.

No
- Short circuit of wire harness.
- Faulty electrical equipment.

Step 4

Measure the regulated voltage between the battery terminals. ☞(Page 1J-3)

Is the regulated voltage OK?

Yes
- Faulty battery.
- Abnormal driving condition.

No — Go to Step 5.

Step 5

Measure the resistance of the generator coil. ☞(Page 1J-4)

Is the resistance of generator coil OK?

Yes — Go to Step 6.

No
- Faulty generator coil.
- Poor contact of couplers.

Step 6

Measure the generator no-load performance. ☞(Page 1J-4)

Is the generator no-load performance OK?

Yes Go to Step 7.

No Faulty generator.

Step 7

1) Replace the regulator/rectifier with a new one. ☞(Page 1J-7)
2) Measure the regulated voltage between the battery terminals. ☞(Page 1J-3)

Is the regulated voltage OK?

Yes End.

No
- Faulty wire harness.
- Poor contact of couplers.

Repair Instructions

Battery Current Leakage Inspection

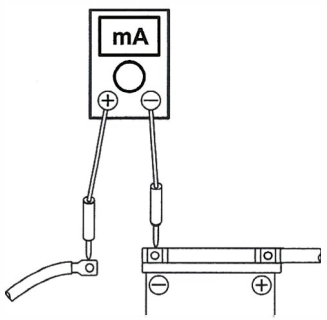
BENM10L31A06001

1) Turn the ignition switch OFF.
2) Remove the seat and disconnect the battery (–) lead wire. ☞(Page 1J-8)
3) Measure the current between battery (–) terminal and the battery (–) lead wire using the circuit tester. If the reading exceeds the specified value, leakage is evident.

NOTICE

- **In case of a large current leak, turn the tester to high range first to avoid tester damage.**
- **Do not turn the ignition switch to ON position when measuring current.**

Battery leakage current
[Standard]: 3 mA or less



I649G11A0002-03

4) Connect the battery (–) terminal and install the seat. ☞(Page 1J-8)

Regulated Voltage Inspection

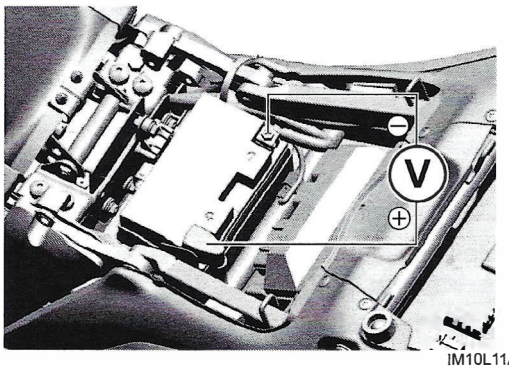
BENM10L31A06002

1) Remove the front seat. ☞(Page 9D-34)
2) Start the engine and keep it running at 5000 r/min with the dimmer switch turned HI position.
3) Measure the DC voltage between the battery (+) and (–) terminals using the circuit tester.
If the voltage is not within the specified value, inspect the generator and regulator/rectifier referring to step 5) – 7) in "Troubleshooting" under "Battery Runs Down Quickly" (Page 1J-2).

NOTE

When making this test, be sure that the battery is in fully charged condition.

Regulated voltage
Charging output
At 5000 r/min [Standard]: 13.5 – 15.5 V



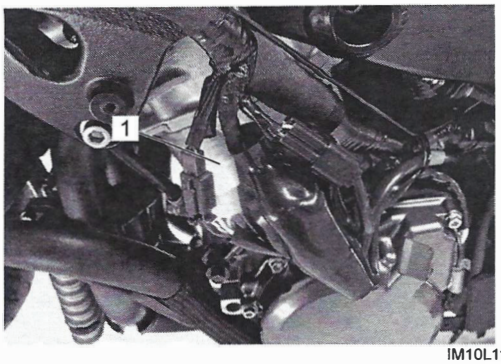
IM10L11A0028-01

Generator Inspection

BENM10L31A06003

Generator Coil Resistance

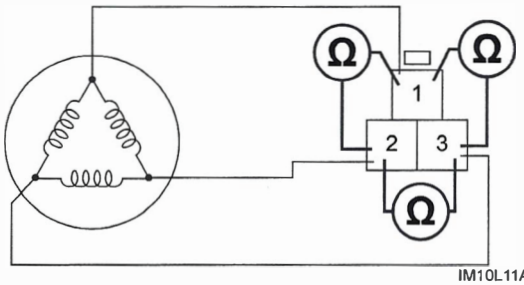
1) Remove the side cowling assembly (LH). ☞(Page 9D-37)
2) Disconnect the generator lead wire coupler (1).



IM10L11A0002-03

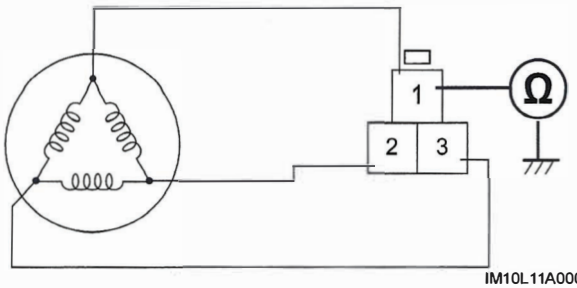
3) Check that the resistance between each lead wire and ground is infinity.
4) Measure the resistance between the terminals of the generator coil.
   If the resistance is out of specified value, replace the stator with a new one.

Generator coil resistance
[Standard]: 0.2 – 0.7 Ω



IM10L11A0003-01

5) Check that there is no continuity between "T1" and ground, "T2" and ground or "T3" and ground. If there is continuity, replace the generator stator with a new one.

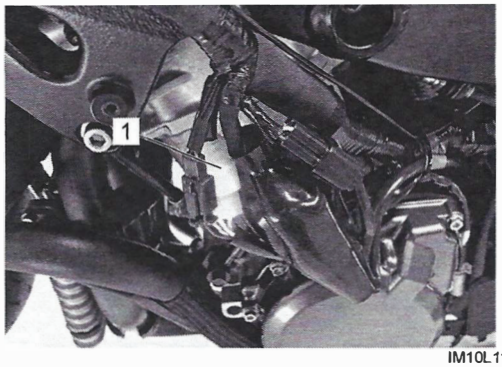


IM10L11A0004-01

6) Connect the generator lead wire coupler and install the removed parts.

No-load Performance

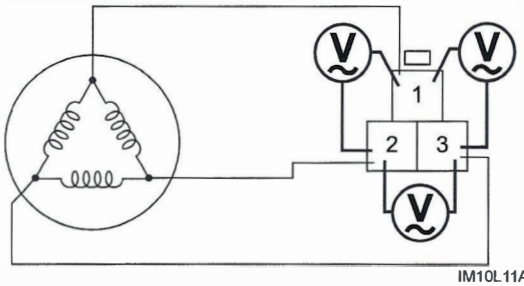
1) Remove the side cowling assembly (LH). ☞(Page 9D-37)
2) Disconnect the generator lead wire coupler (1).



IM10L11A0002-03

3) Start the engine and keep it running at 5000 r/min.
4) Using the multi circuit tester, measure the voltage of the generator coil.
   If the tester reads under the specified value, replace the generator stator with a new one.

Generator no-load voltage
When engine cold
At 5000 r/min [Standard]: 70 V (AC) or more



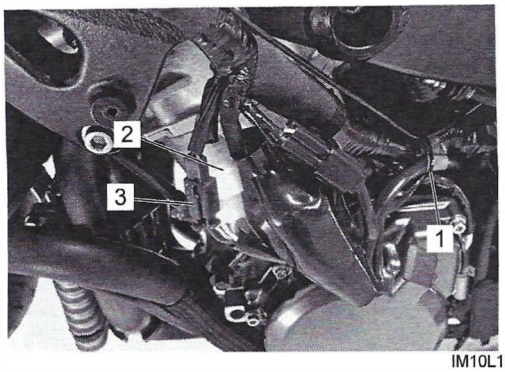
IM10L11A0005-01

5) Connect the generator lead wire coupler and install the removed parts.

Generator Removal

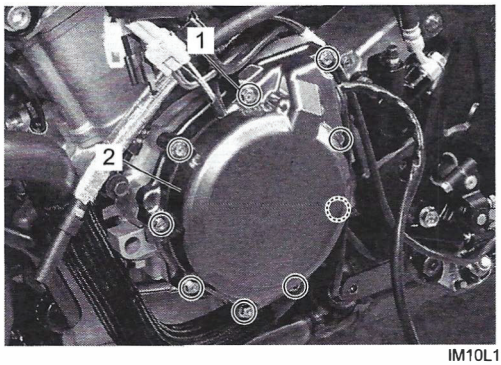
BENM10L31A06004

1) Disconnect the battery (–) lead wire. ☞(Page 1J-8)
2) Drain engine oil. ☞(Page 0B-11)
3) Remove the side cowling assembly (LH). ☞(Page 9D-37)
4) Remove the clamp (1).
5) Disconnect the generator lead wire coupler (2) and CKP sensor lead wire coupler (3).



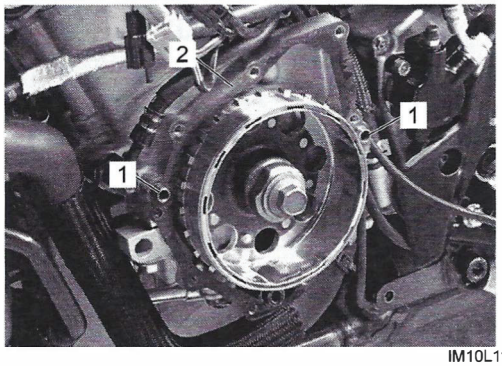
IM10L11A0006-02

6) Remove the generator cover bolts (1) and generator cover (2).



IM10L11A0007-01

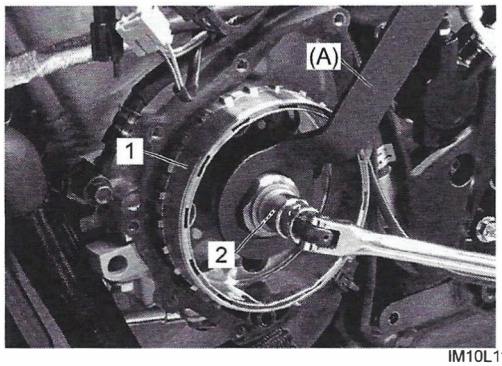
7) Remove the dowel pins (1) and gasket (2).



IM10L11A0008-01

8) Hold the generator rotor (1) using the special tool and remove the generator rotor bolt (2) and washer.

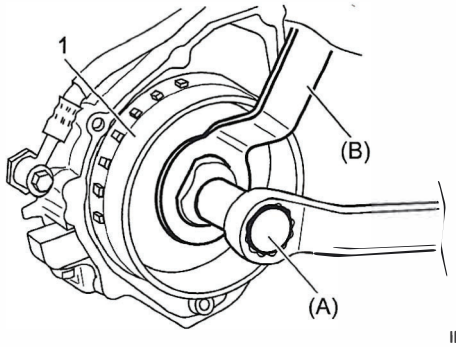
Special tool
(A): 09930–44530



IM10L11A0009-01

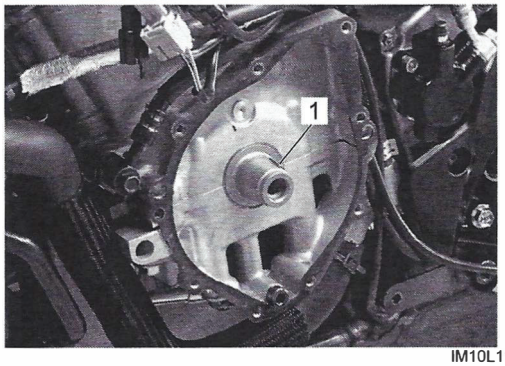
9) Remove the generator rotor (1) using the special tool.

Special tool
(A): 09930–30450
(B): 09930–44530



IM10L11A0034-01

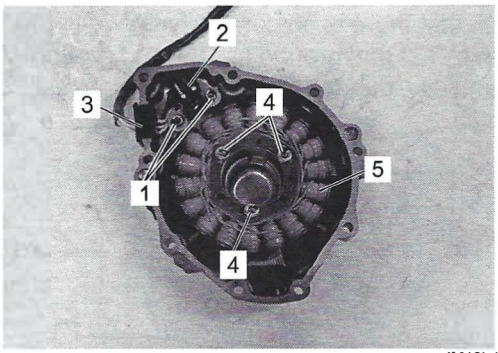
10) Remove the key (1).



IM10L11A0011-01

11) Remove the CKP sensor bolts (1), CKP sensor (2) and grommet (3).

12) Remove the generator stator bolts (4) and generator stator (5).



IM10L11A0012-01

Generator Installation

BENM10L31A06005

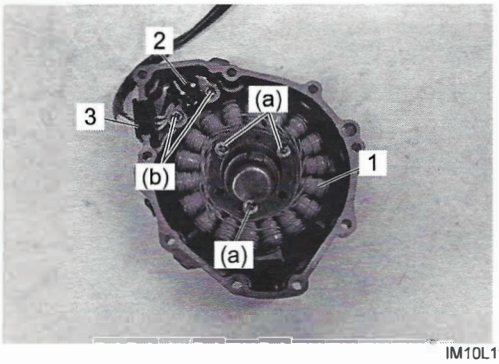
1) Install the generator stator (1) and CKP sensor (2) to the generator cover, and then tighten the bolts to the specified torque.

NOTE

Be careful not to pinch the generator lead wire between the generator cover rib and lead wire clamp.

Tightening torque
Generator stator bolt (a): 11 N·m (1.1 kgf-m, 8.5 lbf-ft)
CKP sensor bolt (b): 6.5 N·m (0.66 kgf-m, 4.80 lbf-ft)

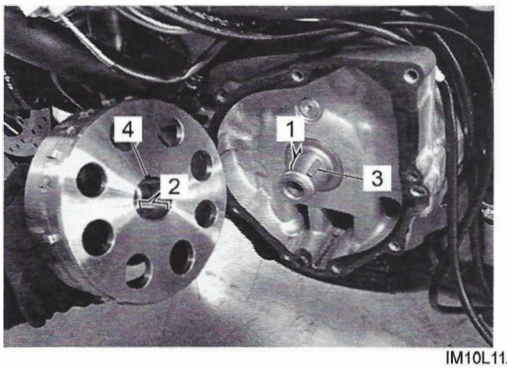
2) Install the grommet (3) to the generator cover.



IM10L11A0013-01

3) Degrease the tapered portion (1) of crankshaft and also the generator rotor (2). Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.

4) Align the key (3) and key slot (4) on the generator rotor.



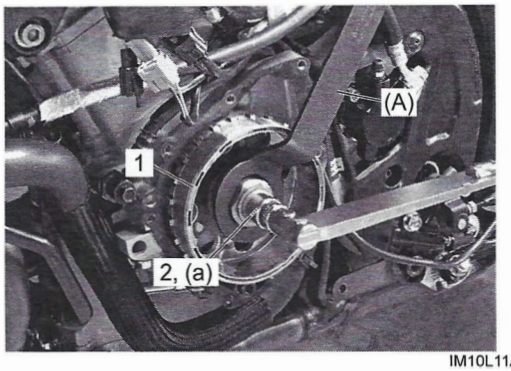
IM10L11A0014-01

5) Install the generator rotor (1) on the crankshaft.

6) Hold the generator rotor using the special tool and tighten its bolt (2) to the specified torque.

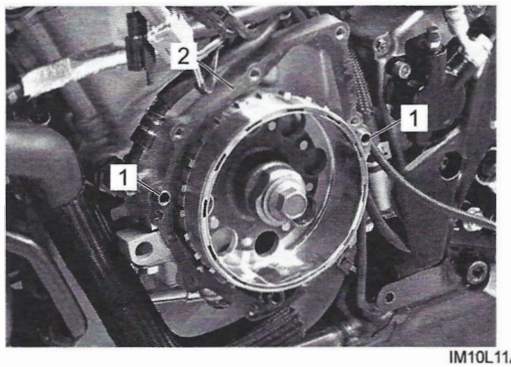
Special tool
(A): 09930–44530

Tightening torque
Generator rotor bolt (a): 120 N·m (12.2 kgf-m, 88.5 lbf-ft)



IM10L11A0015-01

7) Install the dowel pins (1) and new gasket (2).



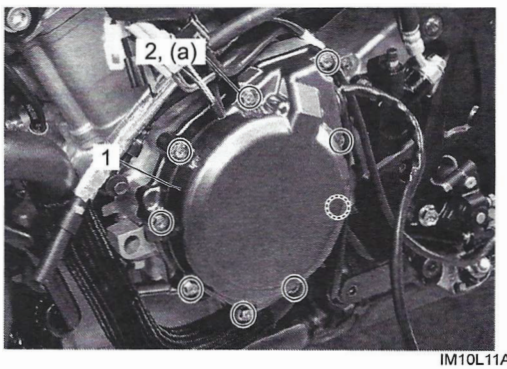
IM10L11A0016-01

8) Install the generator cover (1) and tighten the generator cover bolts (2) to the specified torque.

⚠ CAUTION

Be careful not to pinch the finger between the generator cover and the crankcase.

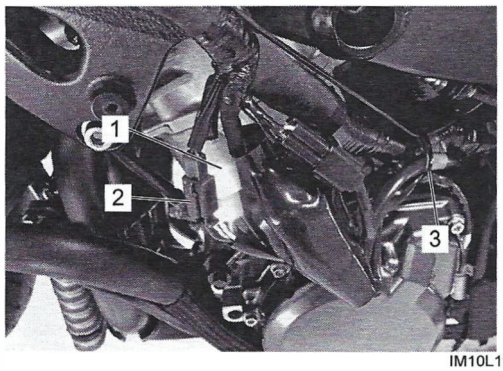
Tightening torque
Generator cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L11A0017-01

9) Connect the generator lead wire coupler (1) and CKP sensor lead wire coupler (2).

10) Install the clamp (3).

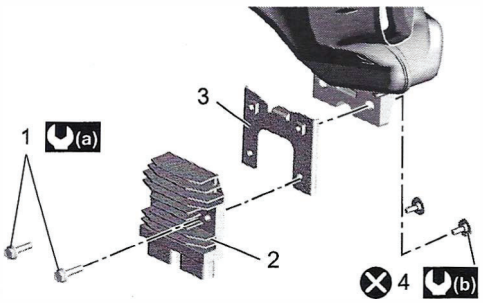


IM10L11A0018-02

11) Connect the battery (–) lead wire. ☞(Page 1J-8)
12) Install the side cowling assembly (LH). ☞(Page 9D-37)
13) Pour engine oil. ☞(Page 0B-11)

Regulator / Rectifier Construction

BENM10L31A06006



IM10L11A0019-04

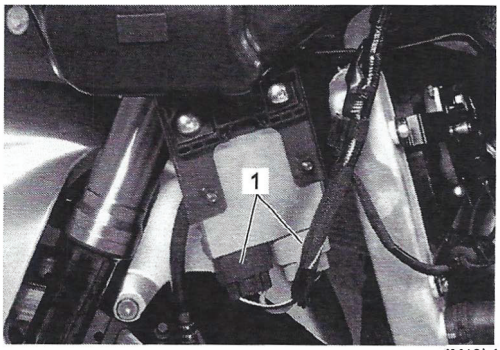
1. Regulator/rectifier bolt	(a) : 8.8 N·m (0.90 kgf-m, 6.50 lbf-ft)
2. Regulator/rectifier	(b) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
3. Regulator/rectifier bracket	⊗ : Do not reuse.
4. Regulator/rectifier bracket bolt	

Regulator / Rectifier Removal and Installation

BENM10L31A06007

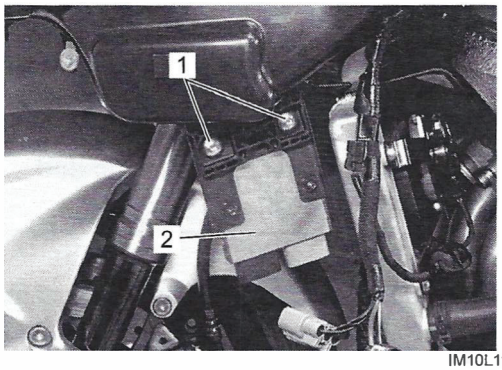
Removal

1) Remove the side cowling assembly (LH). ☞(Page 9D-37)
2) Disconnect the battery (–) lead wire. ☞(Page 1J-8)
3) Disconnect the regulator/rectifier couplers (1) from the regulator/rectifier.



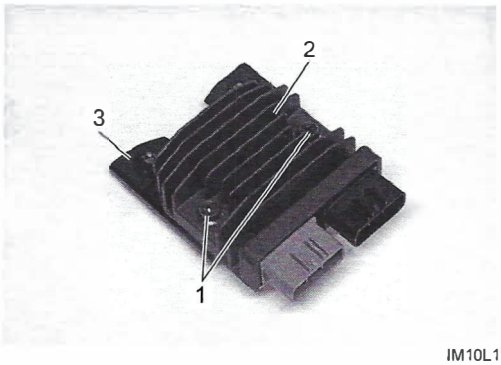
IM10L11A0029-01

4) Remove the regulator/rectifier bracket bolts (1) and regulator/rectifier assembly (2) from the intake pipe.



IM10L11A0030-01

5) Remove the regulator/rectifier bolts (1) and regulator/rectifier (2) from the regulator/rectifier bracket (3).



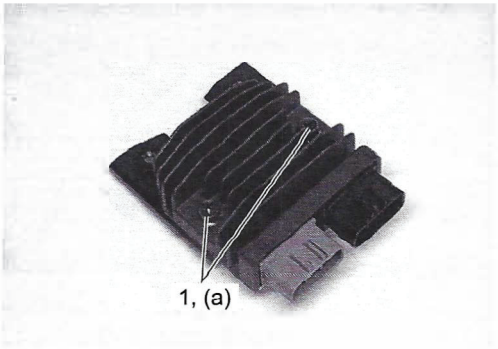
IM10L11A0031-01

Installation

Install the regulator/rectifier in the reverse order of removal. Pay attention to the following points:

1) Tighten the regulator/rectifier bolt (1) to the specified torque.

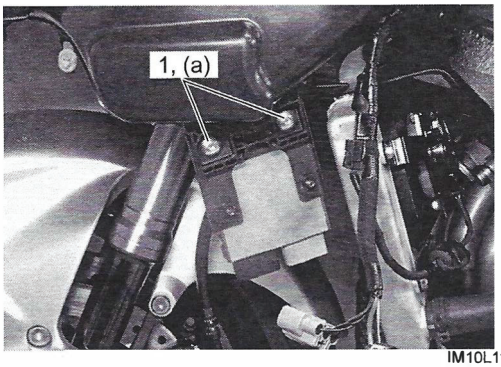
Tightening torque
Regulator/rectifier bolt (a): 8.8 N·m (0.90 kgf-m, 6.50 lbf-ft)



IM10L11A0032-01

2) Tighten the new regulator/rectifier bracket bolts (1) to the specified torque.

Tightening torque
Regulator/rectifier bracket bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L11A0033-01

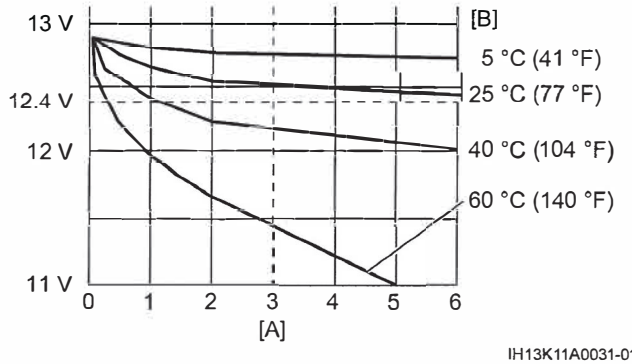
Battery Charging

BENM10L31A06008

NOTICE

- **For charging the battery, read the instruction manuals of the battery and battery charger and follow the instructions properly.**
- **For charging the battery, follow the specified charging current and time. Otherwise, the battery may be overcharged and resulted in shortened service life of the battery.**
- **If the battery is left discharged to 11.5 V or less, the battery voltage may not recover fully after recharging and the battery may be discharged quickly during use.**
- **It is recommended to recharge the battery periodically with reference to the battery self-discharge rate by ambient temperature, so as not to drop the battery voltage below 12.4 V during the motorcycle storage to avoid shortening of the battery service life.**

Self discharge rate by environment



IH13K11A0031-01

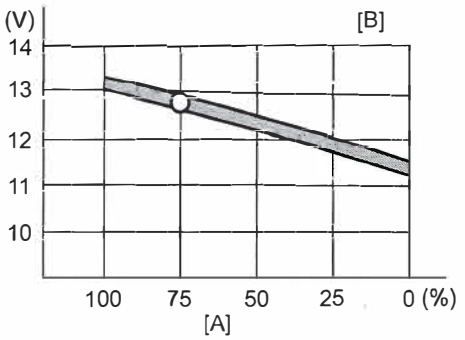
[A]: Time (Month)	[B]: Ambient temperature

NOTE

For charging MF battery, use a charger applicable to MF battery.

1) Remove the battery from the motorcycle. ☞(Page 1J-8)
2) Measure the battery voltage.
   If the voltage reading is 12.4 V or less, recharge the battery.

   Recharging time
   Standard charging [Standard]: 1.1 A for 5 to 10 hours
   Fast charging [Standard]: 5.5 A for 1 hours
3) After recharging, wait at least 30 minutes and then measure the battery voltage using the circuit tester. If the battery voltage is 12.4 V or less, recharge the battery again.
   If the battery voltage is still 12.4 V or less after recharging, replace the battery with a new one.
4) Install the battery to the motorcycle. ☞(Page 1J-8)



IH13K11A0032-02

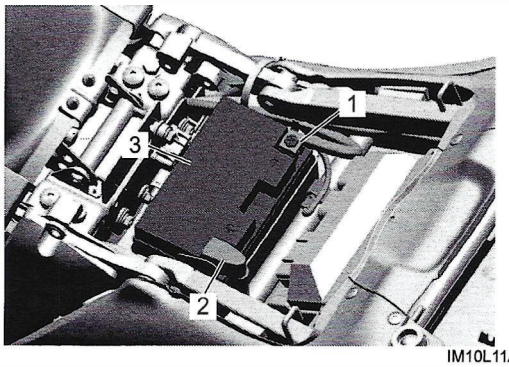
[A]: Battery charged condition
[B]: Ambient temperature 0 – 40 °C (32 – 104 °F)

Battery Removal and Installation

BENM10L31A06009

Removal

1) Remove the front seat. ☞(Page 9D-34)
2) Disconnect the battery (–) lead wire (1) first, then disconnect the battery (+) lead wire (2).
3) Remove the battery (3) from the motorcycle.



IM10L11A0025-01

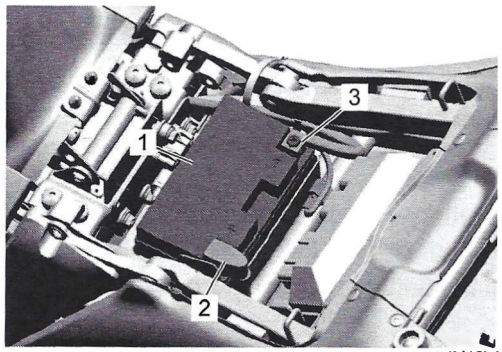
Installation

Install the tool holder and battery in the reverse order of removal. Pay attention to the following points:

NOTICE

Never use anything except the specified battery.

- Install the battery (1), and then connect the battery (+) lead wire (2) first, then connect battery (–) lead wire (3).
- Tighten the battery lead wire mounting bolts.



IM10L11A0026-01

Battery Visual Inspection

BENM10L31A06010

1) Remove the front seat. ☞(Page 9D-34)
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 seat.

Specifications

Tightening Torque Specifications

BENM10L31A07001

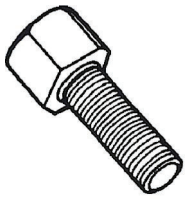
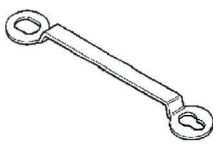
Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Generator stator bolt	11	1.1	8.5	☞(Page 1J-6)
CKP sensor bolt	6.5	0.66	4.80	☞(Page 1J-6)
Generator rotor bolt	120	12.2	88.5	☞(Page 1J-6)
Generator cover bolt	10	1.0	7.5	☞(Page 1J-6)
Regulator/rectifier bolt	8.8	0.90	6.50	☞(Page 1J-7)
Regulator/rectifier bracket bolt	10	1.0	7.5	☞(Page 1J-7)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Regulator / Rectifier Construction" (Page 1J-7)

Special Tools and Equipment

Special Tool

BENM10L31A08001

09930–30450 Rotor remover bolt ☞(Page 1J-5)		09930–44530 Rotor holder ☞(Page 1J-5) / ☞(Page 1J-5) / ☞(Page 1J-6)	

Exhaust System

Precautions

Precautions for Exhaust System

BENM10L31B00001

⚠ WARNING

To avoid the risk of being burned, do not touch the exhaust system when the system is hot.

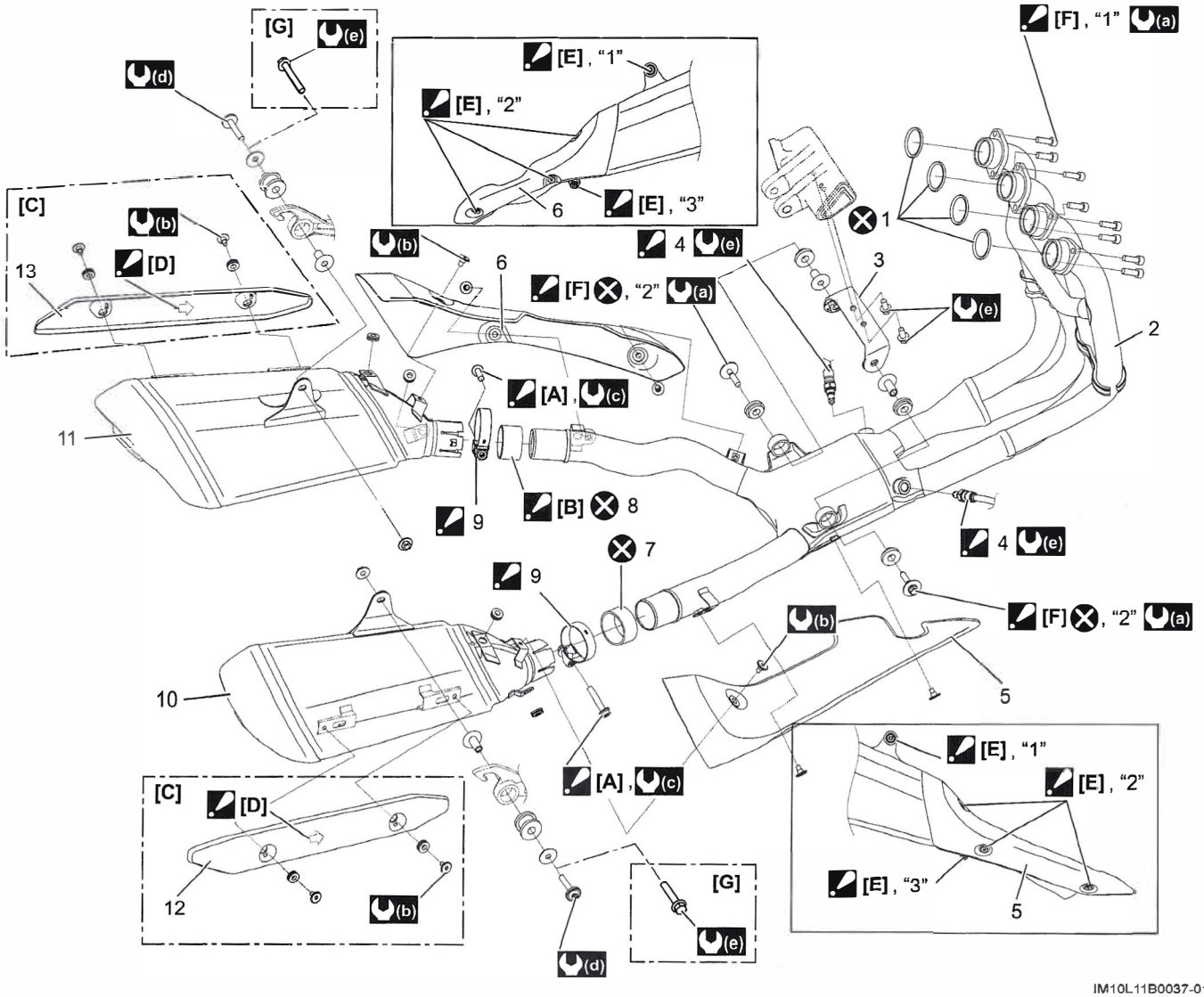
NOTICE

After installation of the muffler, make sure that there is no leakage of exhaust gas.

Repair Instructions

Exhaust System Components

BENM10L31B06001



IM10L11B0037-01

[A]: Apply nickel based anti seize to the thread part.	3. Exhaust pipe bracket	12. Muffler cover (RH)
[B]: Face the chamfer side of the connector to muffler.	4. HO2 sensor : Apply nickel based anti seize to the thread part.	13. Muffler cover (LH)
[C]: For Taiwan.	5. Exhaust pipe cover (RH)	(a) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
[D]: Face the arrow mark of the muffler cover to the forward.	6. Exhaust pipe cover (LH)	(b) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
[E]: Tighten the each bolts to the specified torque in order of "1" → "2" → "3".	7. Muffler connector (RH)	(c) : 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
[F]: Tighten the exhaust pipe bolt to the specified torque in order of "1" → "2".	8. Muffler connector (LH)	(d) : 30 N·m (3.1 kgf-m, 22.5 lbf-ft)
[G]: For India.	9. Muffler connector clamp : Fit the muffler connector clamp hole to the convex part of muffler.	(e) : 25 N·m (2.5 kgf-m, 18.5 lbf-ft)
1. Exhaust pipe gasket	10. Muffler (RH)	⊗ : Do not reuse.
2. Exhaust pipe	11. Muffler (LH)	

Exhaust Pipe / Muffler Removal

BENM10L31B06002

NOTICE

Applying a shock to the muffler may cause damage to the catalyst inside the muffler. Handle the muffler carefully. Be careful not to drop it or hit it against something.

Muffler

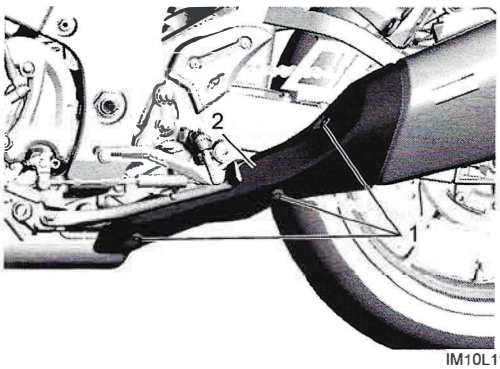
NOTE

The procedure for removing the muffler is the same for left and right.

1) Remove the exhaust pipe cover bolts (1) and exhaust pipe cover (2).

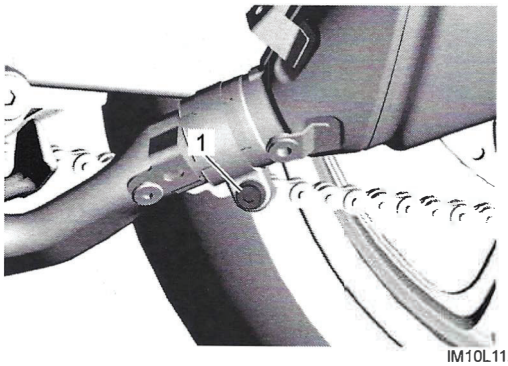
NOTE

Spray the bolt with silicon spray before removing the exhaust pipe cover bolts.



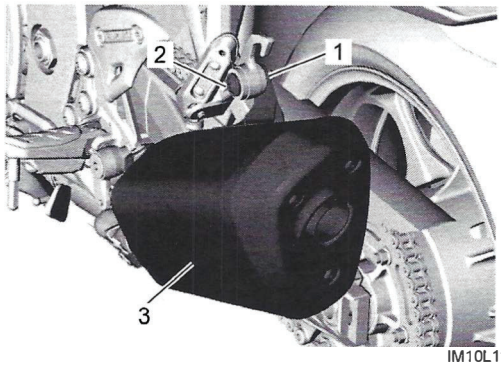
IM10L11B0002-02

2) Loosen the muffler connector clamp bolt (1).



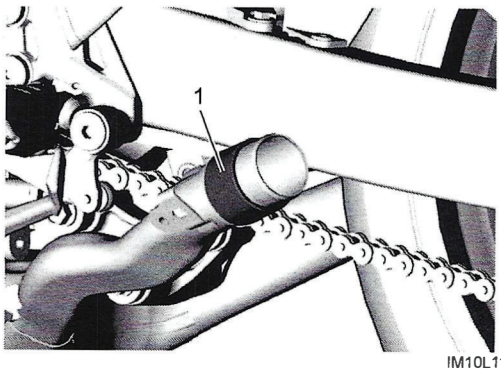
IM10L11B0003-03

3) Remove the muffler support nut (1), washer and bolt (2), and then remove the muffler (3).



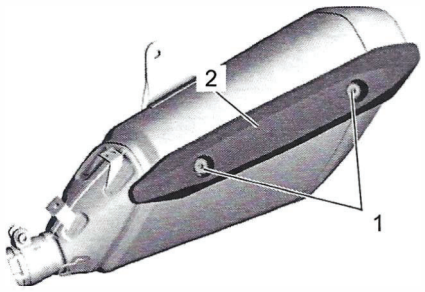
IM10L11B0004-03

4) Remove the muffler connector (1) from the exhaust pipe.



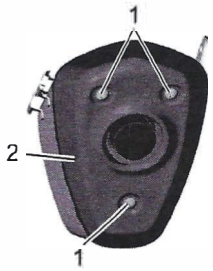
IM10L11B0005-02

5) For Taiwan models, remove the muffler cover bolts (1) and muffler cover (2).



IM10L11B0035-01

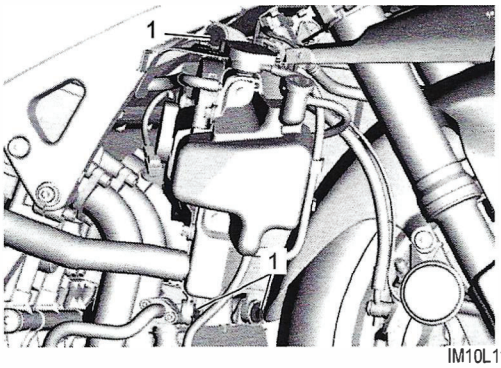
6) Remove the muffler rear cover bolts (1) and muffler rear cover (2) from the muffler.



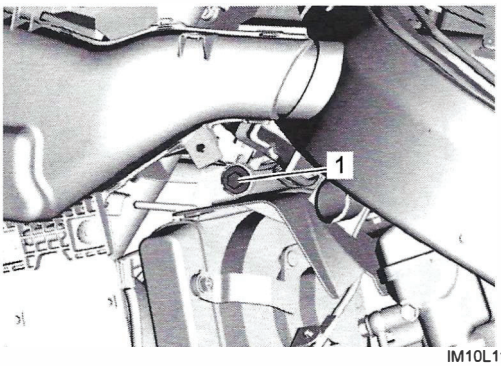
IM10L11B0006-02

Exhaust Pipe

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Lift and support the fuel tank. ☞(Page 1G-12)
3) Remove the radiator mounting bolts(1).

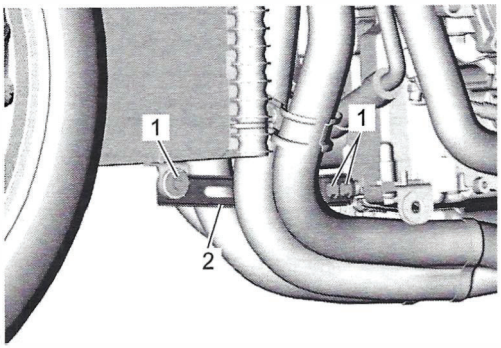


IM10L11B0007-02



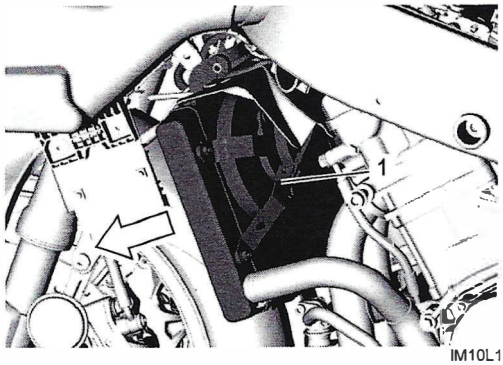
IM10L11B0008-02

4) Remove the oil cooler bracket bolts (1) and oil cooler bracket (2).



IM10L11B0009-02

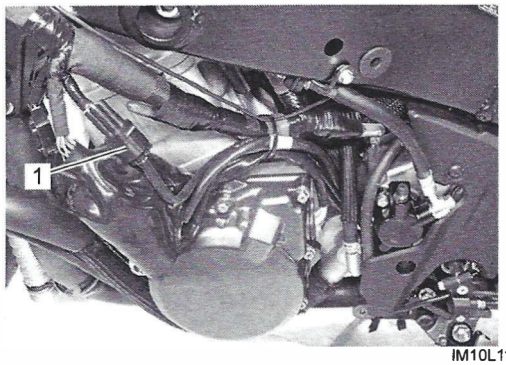
5) Move the radiator (1) forward.



IM10L11B0010-02

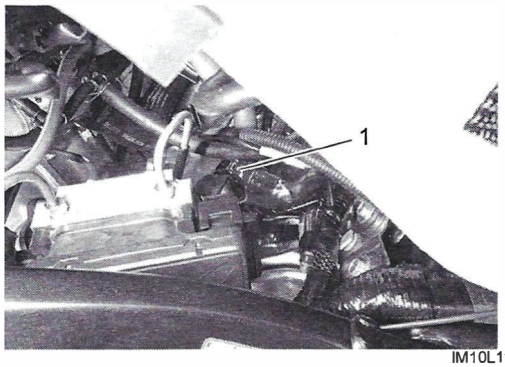
6) Disconnect the HO2 sensor couplers (1).

HO2 sensor #1



IM10L1130025-03

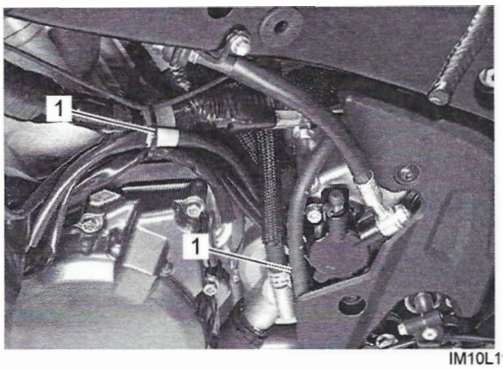
HO2 sensor #2



IM10L1130026-03

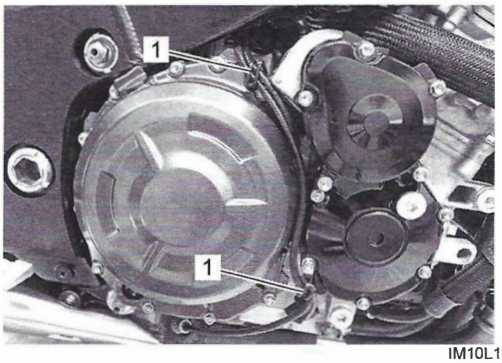
7) Release the clamps (1).

HO2 sensor #1



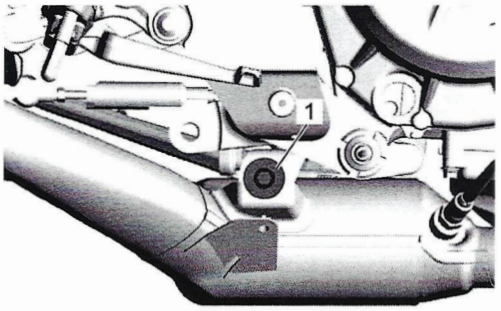
IM10L1130056-01

HO2 sensor #2

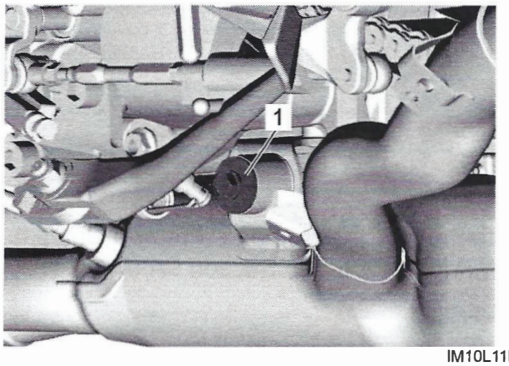


IM10L1130029-01

8) Remove the exhaust support bolts (1).

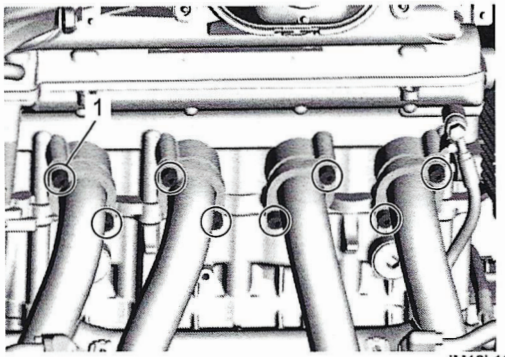


IM10L11B0014-02



IM10L11B0015-02

9) Remove the exhaust pipe bolts (1) from the cylinder head.

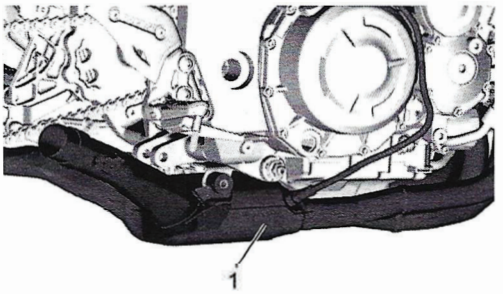


IM10L11B0013-02

10) Remove the exhaust pipe (1).

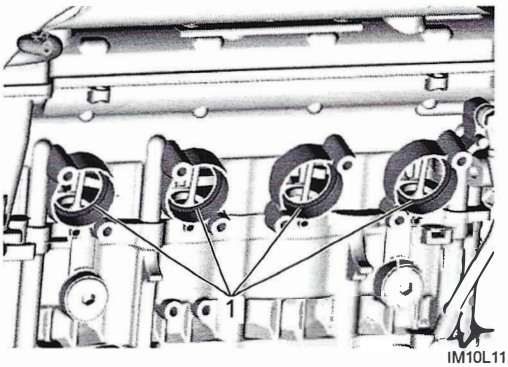
NOTE

Support the exhaust pipe assembly to prevent it from falling.



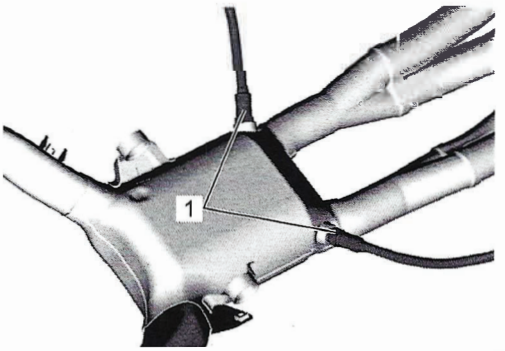
IM10L11B0016-02

11) Remove the exhaust pipe gaskets (1) from the cylinder head.



IM10L11B0017-04

12) Remove the HO2 sensors (1) if necessary. ☞(Page 1C-9)



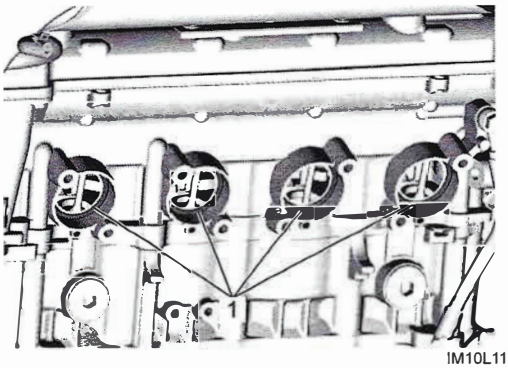
IM10L11B0018-02

Exhaust Pipe / Muffler Installation

BENM10L31B06003

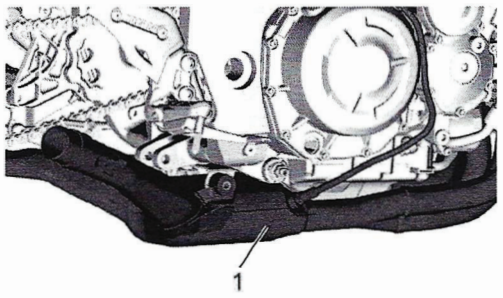
Exhaust Pipe

1) Install the HO2 sensor, if removed. ☞(Page 1C-9)
2) Install the new exhaust pipe gaskets (1).

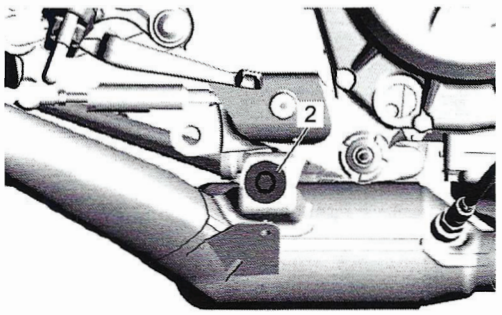


IM10L11B0017-04

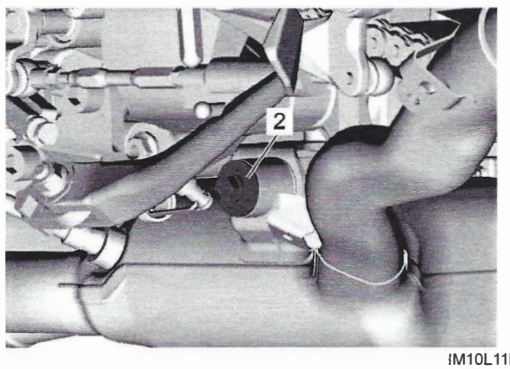
3) Temporarily install the exhaust pipe (1) and new support bolts (2).



IM10L11B0019-02



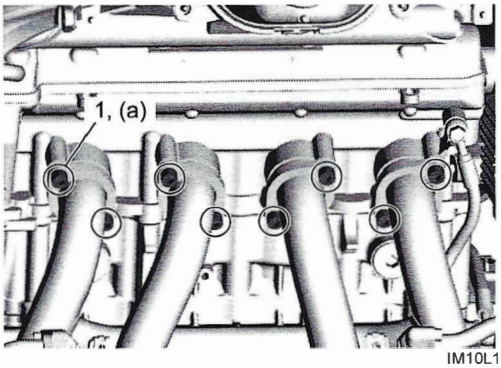
IM10L11B0020-02



IM10L11B0021-02

4) Tighten the exhaust pipe bolts (1) to the specified torque.

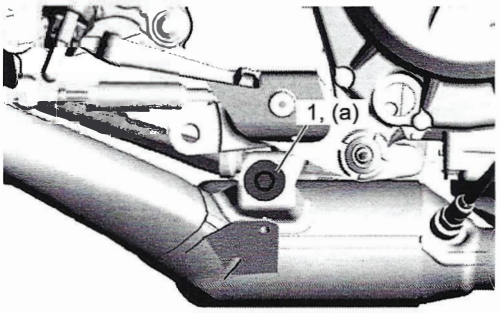
Tightening torque
Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



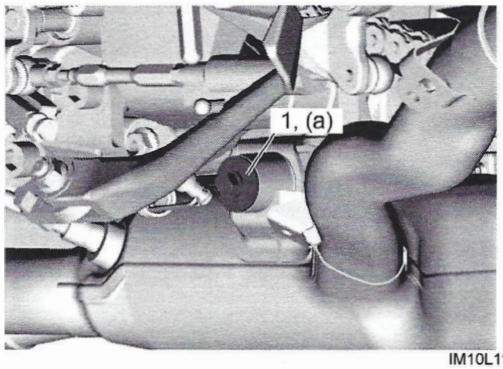
IM10L11B0022-02

5) Tightening the exhaust pipe support bolts (1) to the specified torque.

Tightening torque
Exhaust pipe support bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L11B0023-02

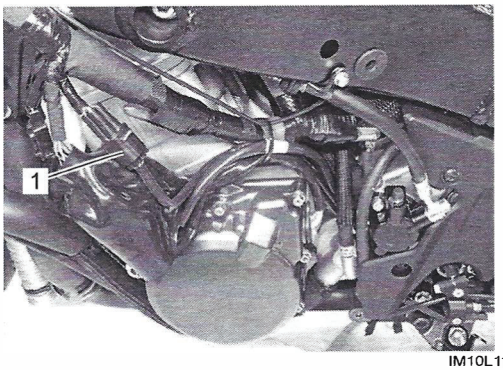


IM10L11B0024-02

6) Route the HO2 sensor lead wire and clamp it. Refer to “Wiring Diagram” in Section 9A (Page 9A-5).

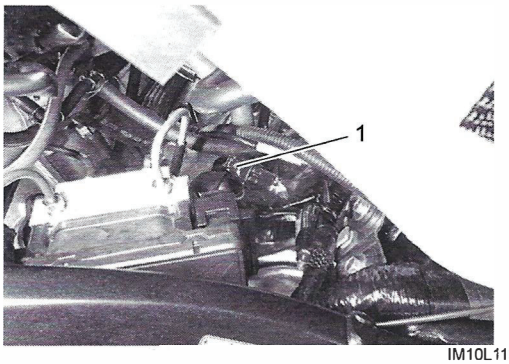
7) Connect the HO2 sensor coupler (1).

HO2 sensor #1



IM10L1130025-03

HO2 sensor #2



IM10L1130026-03

8) Install the radiator. ☞(Page 1F-8)

9) Install the removed parts.

Muffler

NOTE

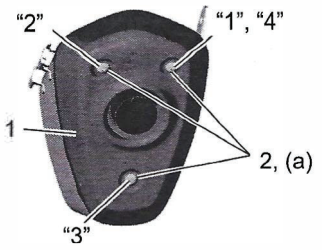
The procedure for installing the muffler is the same for left and right.

1) Install the muffler rear cover (1) and tighten the new muffler rear cover bolts (2) to the specified torque in order of "1" → "2" → "3" → "4".

NOTE

Apply nickel based anti seize to the thread part of muffler rear cover bolts.

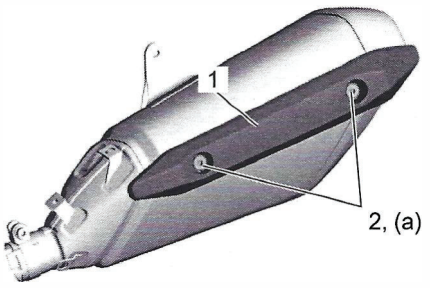
Tightening torque
Muffler rear cover bolt (a): 6.5 N·m (0.66 kgf-m, 4.80 lbf-ft)



IM10L11B0026-02

2) For Taiwan models, install the muffler cover (1) and muffler cover bolts (2), and then tighten the muffler cover bolts to the specified torque.

Tightening torque
Muffler cover bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)

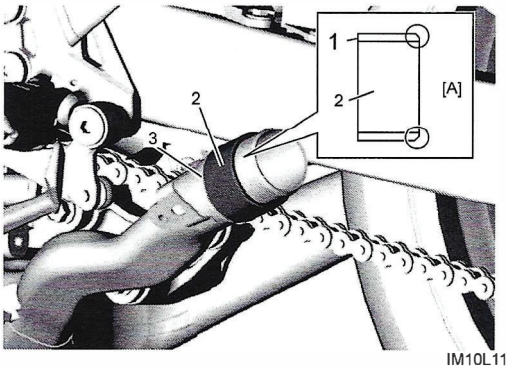


IM10L11B0036-01

3) Put the edge (1) of a new muffler connector (2) to the exhaust pipe stopper (3).

NOTE

For left side only, face the chamfer side [A] of the connector (2) to the muffler.

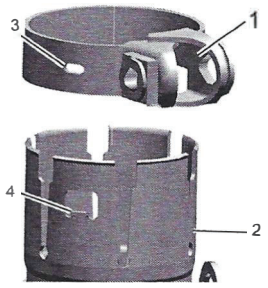


IM10L11B0034-01

4) Install the muffler connector clamp (1) to the muffler (2), if removed.

NOTE

Fit the muffler connector clamp hole (3) to the convex part (4) of muffler.

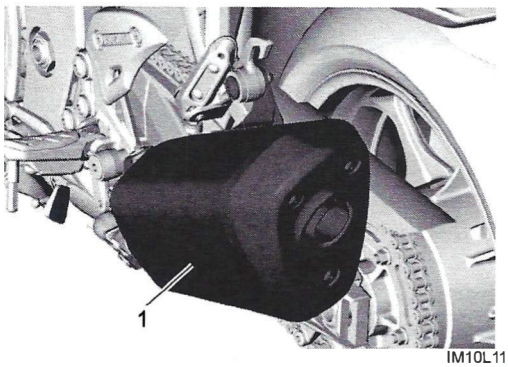


IM10L11B0028-03

5) Install the muffler (1).

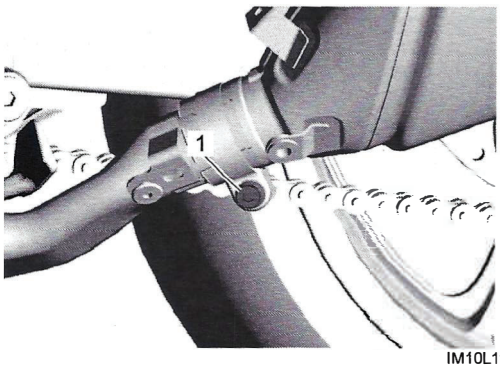
NOTE

Contact the muffler to the exhaust pipe.



IM10L11B0029-03

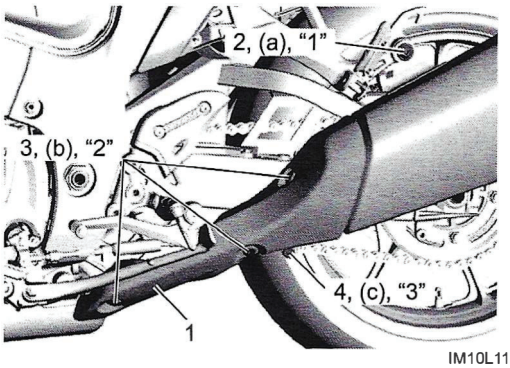
6) Apply nickel based anti seize to the thread part of muffler connector bolt (1).



IM10L11B0030-03

7) Install the exhaust pipe cover (1).
8) Tighten the each bolts (2), (3), (4) to the specified torque in order of "1" → "2" → "3".

Tightening torque
Muffler support bolt (except for India) (a): 30 N·m (3.1 kgf-m, 22.5 lbf-ft)
Muffler support bolt (for India) (a): 25 N·m (2.5 kgf-m, 18.5 lbf-ft)
Exhaust pipe cover bolt (b): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
Muffler connector bolt (c): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)



IM10L11B0031-03

Exhaust System Inspection

BENM10L31B06004

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. Refer to "Exhaust Pipe / Muffler Removal" (Page 1K-2) and "Exhaust Pipe / Muffler Installation" (Page 1K-5).
Check the exhaust pipe bolts and muffler mounting bolt to specified torque. Refer to "Exhaust Pipe Bolt and Muffler Mounting Bolts" in Section 0B (Page 0B-3).

Specifications

Tightening Torque Specifications

BENM10L31B07001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Exhaust pipe bolt	23	2.3	17.0	☞(Page 1K-5)
Exhaust pipe support bolt	23	2.3	17.0	☞(Page 1K-5)
Muffler rear cover bolt	6.5	0.66	4.80	☞(Page 1K-6)
Muffler cover bolt	5.5	0.56	4.05	☞(Page 1K-6)
Muffler support bolt (except for India)	30	3.1	22.5	☞(Page 1K-7)
Muffler support bolt (for India)	25	2.5	18.5	☞(Page 1K-7)
Exhaust pipe cover bolt	5.5	0.56	4.05	☞(Page 1K-7)
Muffler connector bolt	18	1.8	13.5	☞(Page 1K-7)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Exhaust System Components" (Page 1K-1)
"Fasteners Information" in Section 0C (Page 0C-6)

Section 2

Suspension

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Wheel Rim / Air Valve Inspection and Cleaning 2D-14
Air Valve Removal and Installation 2D-14
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Precautions

Precautions

Precautions for Suspension

BENM10L32000001

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

⚠ WARNING

- **Never attempt to heat, quench or straighten any suspension part. If any damage or deformation is found, replace the part with a new one without correct it.**
- **When removing or installing the suspension or wheel, place the motorcycle on a level surface and support it securely with a hoist or jack etc.**
- **Do not support the motorcycle with the muffler.**

Suspension General Diagnosis

Diagnostic Information and Procedures

Suspension and Wheel Symptom Diagnosis

BENM10L32104001

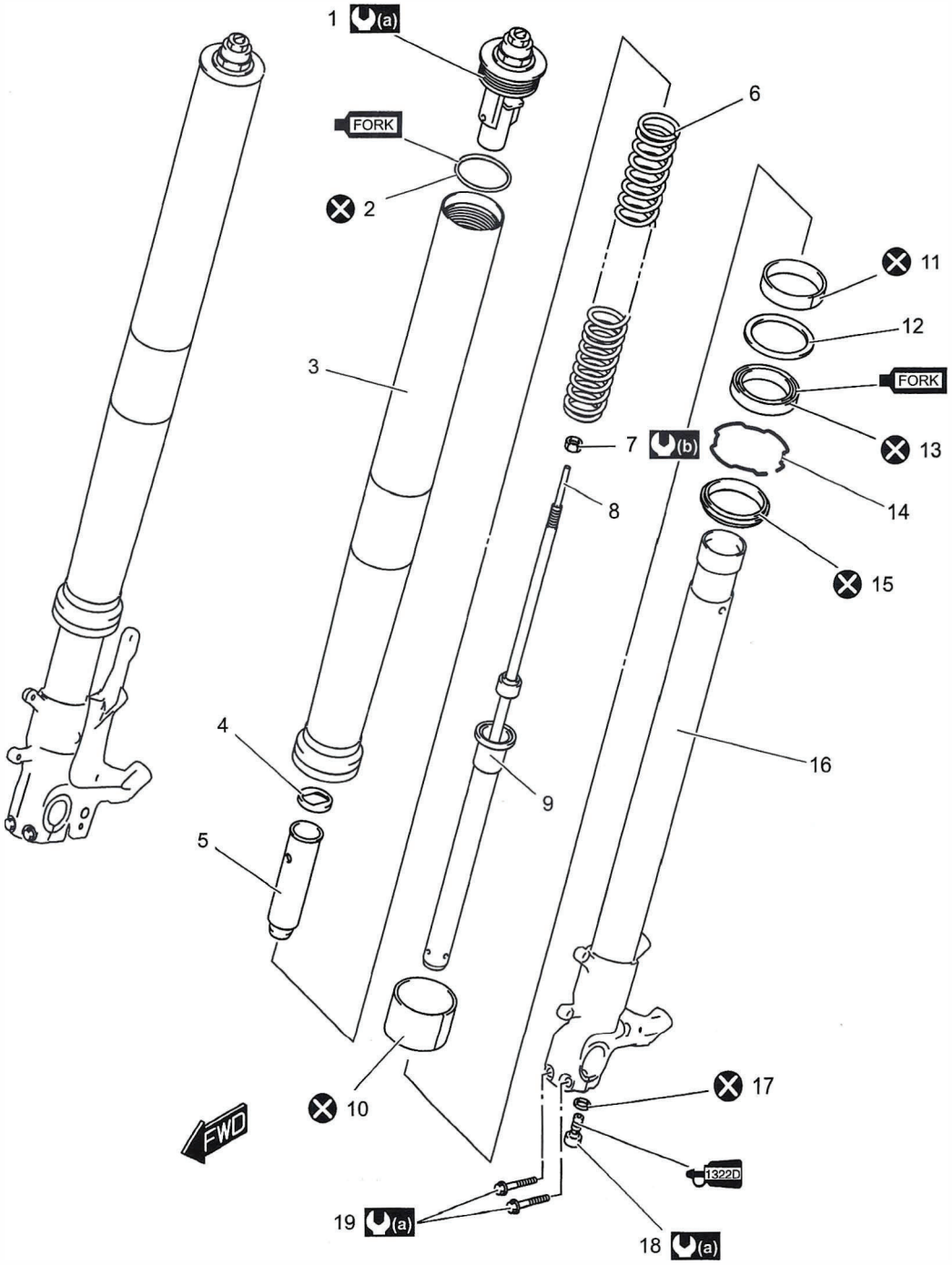
Condition	Possible cause	Correction / Reference Item
Wobbly front wheel	Distorted wheel rim.	*Replace. ☞(Page 2D-13)*
	Worn front wheel bearings.	*Replace. ☞(Page 2D-4)*
	Defective or incorrect tire.	*Replace. ☞(Page 2D-13)*
	Loose front axle nut.	*Replace. ☞(Page 2D-3)*
	Incorrect fork oil level.	*Adjust. ☞(Page 2B-5)*
	Loose front axle pinch bolts.	*Tighten. ☞(Page 2D-3)*
	Incorrect front wheel weight balance.	*Adjust. ☞(Page 2D-15)*
Front suspension too soft	Insufficient fork oil.	*Adjust. ☞(Page 2B-5)*
	Weak front fork spring.	*Replace front fork spring. ☞(Page 2B-5)*
	Improperly set front fork spring pre-load adjuster.	*Adjust. ☞(Page 2B-4)*
	Improperly set front fork damping force adjuster.	*Adjust. ☞(Page 2B-4)*
	Deteriorated fork oil.	*Replace fork oil. ☞(Page 2B-5)*
Front suspension too stiff	Excessive fork oil.	*Adjust. ☞(Page 2B-5)*
	Bent front axle.	*Replace. ☞(Page 2D-3)*
	Improperly set front fork spring pre-load adjuster.	*Adjust. ☞(Page 2B-4)*
	Improperly set front fork damping force adjuster.	*Adjust. ☞(Page 2B-4)*
	Deteriorated fork oil.	*Replace fork oil. ☞(Page 2B-5)*
Front suspension too noisy	Insufficient fork oil.	*Adjust. ☞(Page 2B-5)*
	Loose front fork clamp bolt.	*Tighten. ☞(Page 2B-2)*
	Deteriorated fork oil.	*Replace fork oil. ☞(Page 2B-5)*
Wobbly rear wheel	Distorted wheel rim.	*Replace. ☞(Page 2D-13)*
	Worn rear wheel bearings.	*Replace. ☞(Page 2D-9)*
	Defective or incorrect tire.	*Replace. ☞(Page 2D-13)*
	Worn swingarm bearings.	*Replace. ☞(Page 2C-12)*
	Loose rear suspension fastener.	*Tighten. ☞(Page 2C-4)*
	Loose rear axle nut.	*Tighten. ☞(Page 2D-8)*
	Incorrect rear wheel weight balance.	*Adjust. ☞(Page 2D-15)*
Rear suspension too soft	Rear shock absorber leaks oil.	*Replace. ☞(Page 2C-4)*
	Improperly set rear shock absorber spring pre-load adjuster.	*Adjust. ☞(Page 2C-3)*
	Improperly set rear shock absorber damping force adjuster.	*Adjust. ☞(Page 2C-3)*
Rear suspension too stiff	Worn swingarm bearings.	*Replace. ☞(Page 2C-12)*
	Worn cushion lever bearings.	*Replace. ☞(Page 2C-7)*
	Bent swingarm pivot shaft.	*Replace. ☞(Page 2C-8)*
	Bent rear shock absorber shaft.	*Replace. ☞(Page 2C-4)*
	Improperly set rear shock absorber spring pre-load adjuster.	*Adjust. ☞(Page 2C-3)*
	Improperly set rear shock absorber damping force adjuster.	*Adjust. ☞(Page 2C-3)*
Rear suspension too noisy	Loose rear suspension fastener.	*Tighten. ☞(Page 2C-4)*
	Worn swingarm bearings.	*Replace. ☞(Page 2C-12)*

Front Suspension

Repair Instructions

Front Fork Components

BENM10L32206001



IM10L1220001-05

1. Front fork cap bolt	9. Inner rod/Damper rod (cartridge)	17. Gasket
2. O-ring	10. Outer tube slide metal	18. Damper rod bolt
3. Outer tube	11. Inner tube slide metal	19. Front axle pinch bolt
4. Spring retainer	12. Oil seal retainer	(a) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
5. Spacer	13. Oil seal	(b) : 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
6. Spring	14. Oil seal stopper ring	1322D : Apply thread lock to the thread part.
7. Lock-nut	15. Dust seal	FORK : Apply fork oil.
8. Adjuster rod	16. Inner tube	: Do not reuse.

Front Fork On-Vehicle Inspection

BENM10L32206002

Refer to "Front Forks" in Section 0B (Page 0B-27).

Front Fork Assembly Removal and Installation

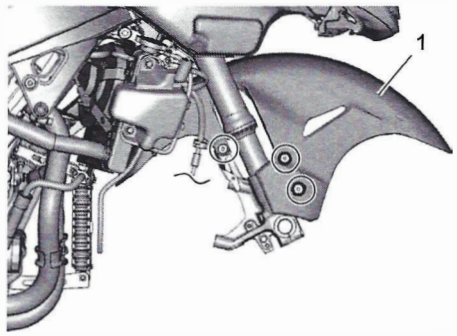
BENM10L32206003

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.

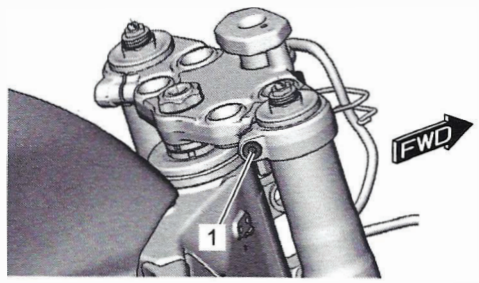
Removal

1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation" in Section 2D (Page 2D-3).
2) Remove the body cowling assembly. "Body Cowling Assembly Removal and Installation" in Section 9D (Page 9D-44).
3) Remove the handlebar holder and handlebars from the upper bracket. ☞(Page 6B-3)
4) Remove the reflex reflectors. (If equipped) Refer to "Front Fender Construction" in Section 9D (Page 9D-5).
5) Remove the front fender (1) by removing the left and right bolts.



IM10L1220002-03

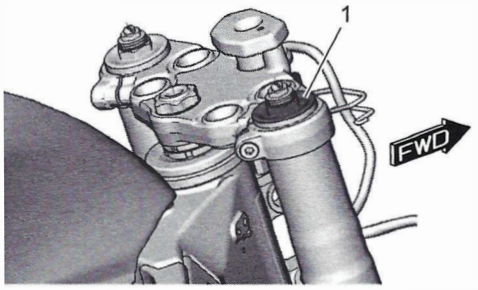
6) Loosen the front fork upper clamp bolt (1).



IM10L1220003-02

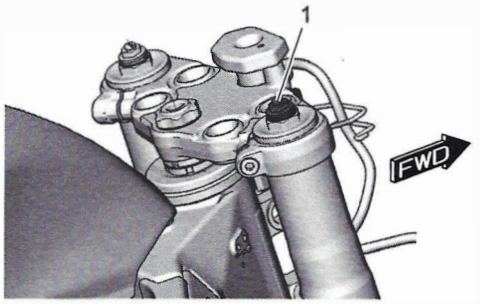
NOTE

- **Slightly loosen the front fork cap bolt (1) to facilitate later disassembly.**



IM10L1220004-02

- **Be sure to adjust the rebound damping force adjuster (1) to the softest position before removing the front fork.**

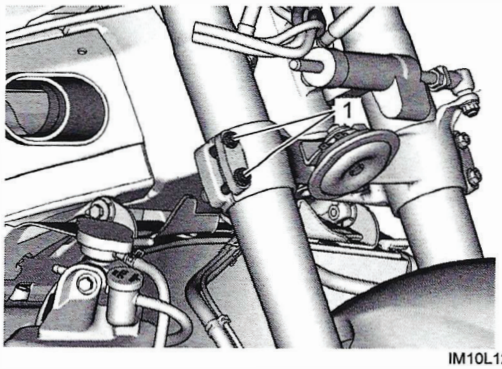


IM10L1220005-02

7) Loosen the front fork lower clamp bolts (1) and remove the front fork.

NOTE

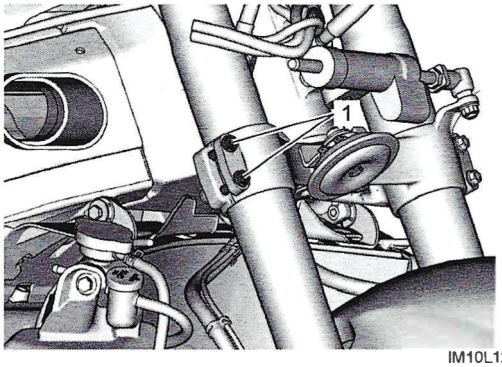
Hold the front fork by hand to prevent it sliding out of the steering stem.



IM10L1220006-04

Installation

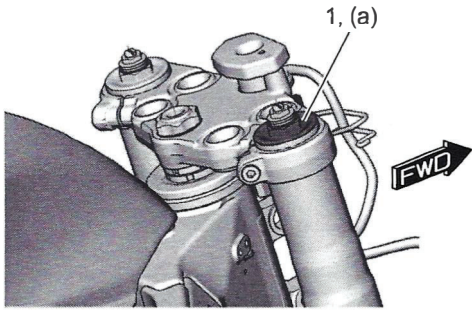
1) Set the front fork to the front fork lower bracket temporarily by tightening the lower clamp bolts (1).



IM10L1220006-04

2) Tighten the front fork cap bolt (1) to the specified torque.

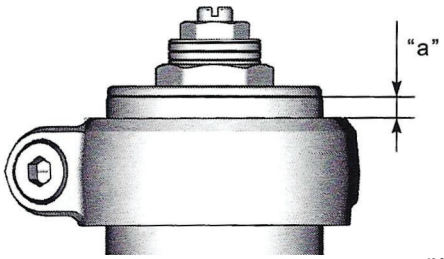
Tightening torque
Front fork cap bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1220007-02

3) Loosen the lower clamp bolts.

4) Set the front fork with the upper surface of the outer tube positioned "a" from the upper surface of the upper bracket.

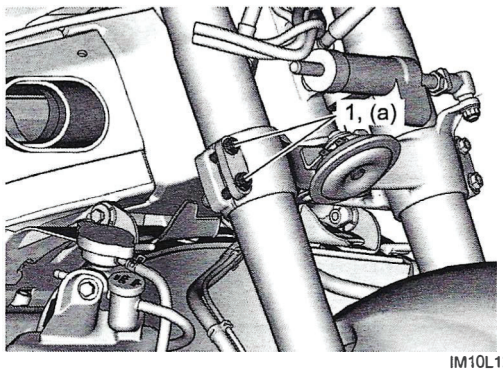


IM10L1220008-02

"a": 5.0 mm (0.20 in)

5) Tighten the front fork lower clamp bolts (1) to the specified torque.

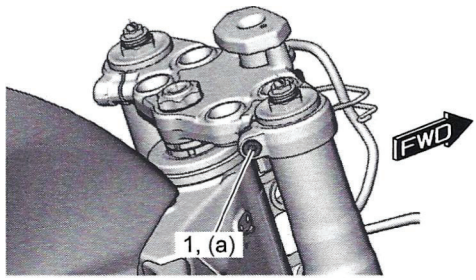
Tightening torque
Front fork lower clamp bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1220009-02

6) Tighten the front fork upper clamp bolt (1) to the specified torque.

Tightening torque
Front fork upper clamp bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1220010-02

7) Install the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation" in Section 2D (Page 2D-3).

8) Install the body cowling assembly. "Body Cowling Assembly Removal and Installation" in Section 9D (Page 9D-44).

9) Adjust the headlight beam if the spring pre-load is adjusted. Refer to "Headlight Beam Adjustment" in Section 9B (Page 9B-4).

Front Suspension Adjustment

BENM10L32206004

After installing the front fork, adjust the spring pre-load and two kinds of damping force as follows:

⚠ WARNING

Adjust the left and right front forks to the same setting.

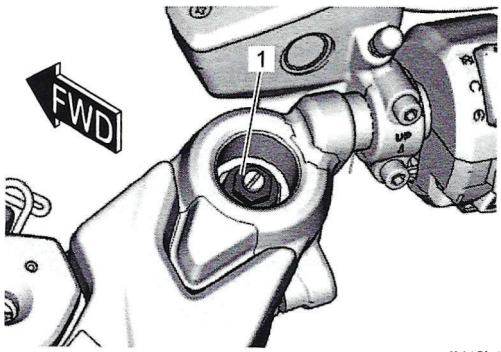
NOTICE

Forcing the adjuster to turn may damage the suspension.
Do not rotate the adjuster beyond the limit.

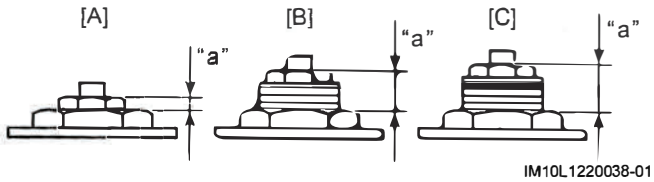
Spring Pre-load Adjustment

1) Turn the spring pre-load adjuster (1) counterclockwise fully. From that position (softest), turn it clockwise to the specified position "a".

Front fork spring adjuster
[Standard]: 10 mm (0.39 in)
[Adjustable range]: 4 – 10 mm (0.16 – 0.55 in)



IM10L1220011-02



IM10L1220038-01

[A]:	4 mm (0.16 in) (stiffest)
[B]:	10 mm (0.39 in) (standard)
[C]:	14 mm (0.55 in) (softest)

2) After adjusting the spring pre-load, adjust the headlight beam. Refer to "Headlight Beam Adjustment" in Section 9B (Page 9B-4).

Damping Force Adjustment

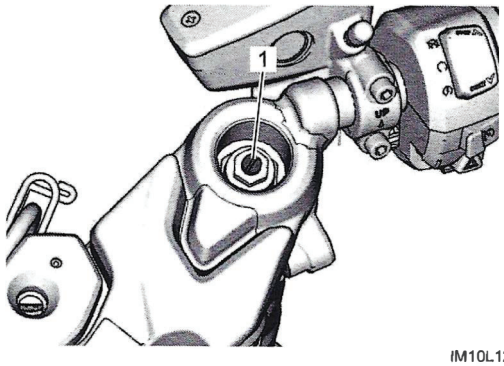
NOTE

Make sure to check the 1st click position by the last click sound when turning in the adjuster.

Rebound damping force

Fully turn the rebound damping force adjuster (1) clockwise. From that position (stiffest), turn it out to standard setting position.

Front fork damping force adjuster
Rebound side
[Standard]: 8 clicks counterclockwise from stiffest position
[Adjustable range]: 0 – 11 clicks counterclockwise from stiffest position

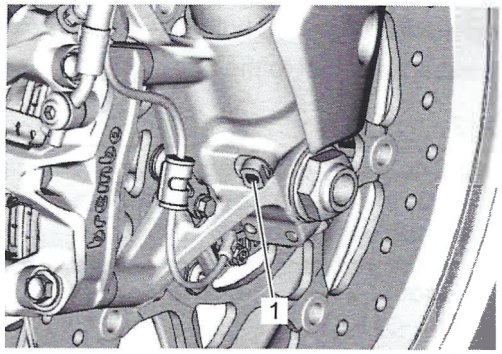


IM10L1220012-02

Compression damping force

Fully turn the compression damping force adjuster (1) clockwise. From that position (stiffest), turn it out to the standard setting position.

Front fork damping force adjuster
Compression side
[Standard]: 2 turns counterclockwise from stiffest position
[Adjustable range]: 0 – 3 turns counterclockwise from stiffest position



IM10L1220013-02

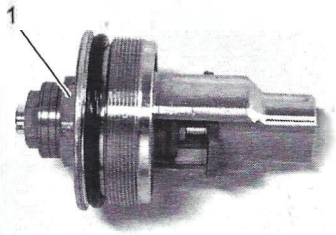
Front Fork Disassembly and Assembly

BENM10L32206005

Refer to "Front Fork Assembly Removal and Installation" (Page 2B-2).

NOTICE

Do not disassemble the front fork cap bolt (1).



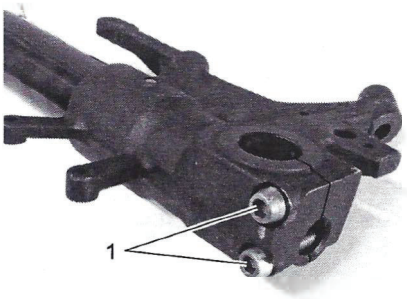
IM10L1220014-02

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) Remove the front axle pinch bolts (1).



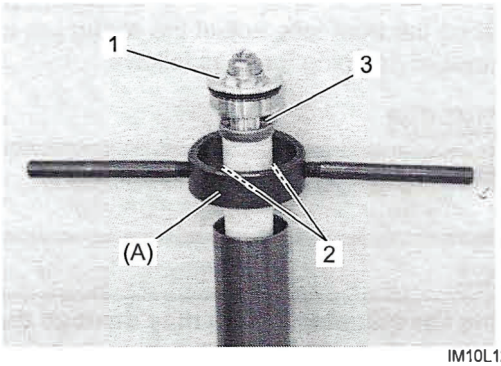
IM10L1220015-02

2) Loosen the front fork cap bolt (1).
3) Install the special tool to the holes (2).

NOTICE

Align the holes (2) of the spacer with the cutaway (3) of the fork cap bolt before installing the special tool.

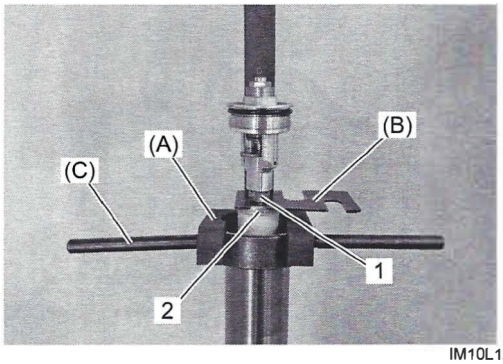
Special tool
(A): 09940–94930



IM10L1220016-02

4) Set the special tool (A) referring to the manual.
5) Compress the fork spring using the special tool (A) and insert the special tool (B) between the lock-nut (1) and spring retainer (2). Then, expand the special tool (A) and pinch the special tool (B) between the lock-nut and the spring retainer.

Special tool
(A): 09940–93110
(B): 09940–94922
(C): 09940–94930



IM10L1220036-02

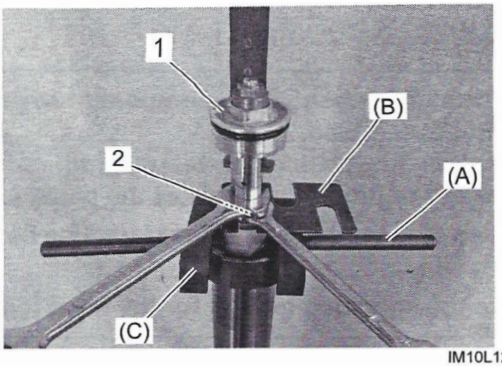
6) Remove the front fork cap bolt (1) from the inner rod by loosening the lock-nut (2).

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.

7) Compress the fork spring with the special tool (A) and remove the special tool (B).

Special tool
(A): 09940–93110
(B): 09940–94922
(C): 09940–94930



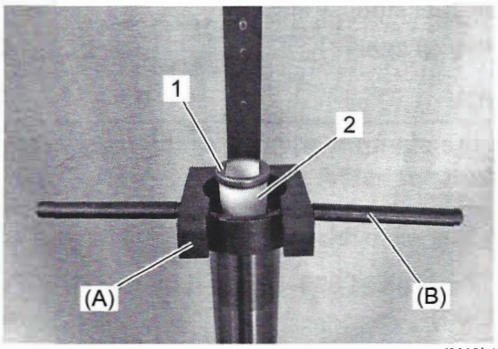
IM10L1220037-02

8) Expand slowly the special tool (A) and remove the special tool (B). Then, remove the spring retainer (1) and the spacer (2).

NOTE

Hold front fork by hand to prevent it sliding.

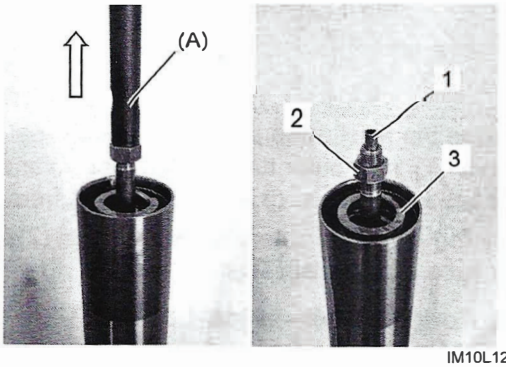
Special tool
(A): 09940–93110
(B): 09940–94930



IM10L1220019-02

9) Pull up the inner rod using the special tool and remove the adjuster rod (1), lock-nut (2) and spring (3).

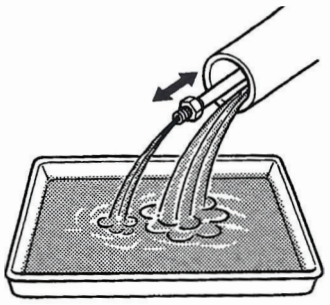
Special tool
(A): 09940–52841



IM10L1220020-02

10) Invert the fork and stroke it several times to drain out fork oil.

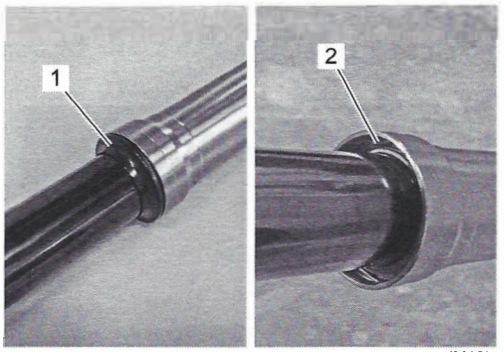
11) Hold the fork inverted for a few minutes to drain oil.



I823H1220018-01

12) Remove the dust seal (1).

13) Remove the oil seal stopper ring (2).

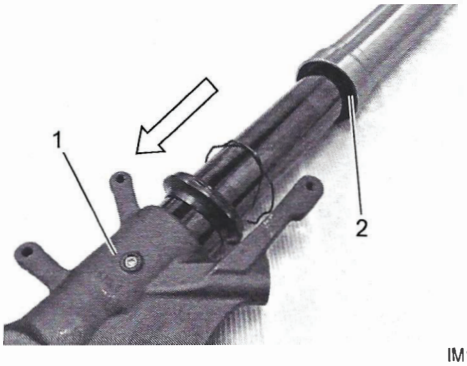


IM10L1220021-03

NOTICE

- **Scratches on the inner tube could cause oil leaks.**
- **Avoid scratching when removing.**

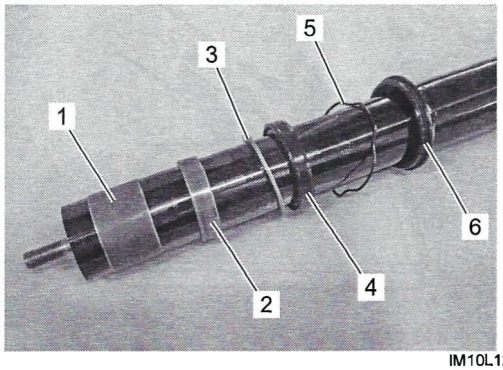
14) Remove the oil seal (1) by pulling out the inner tube (2).



IM10L1220022-02

15) Remove the following parts from the inner tube.

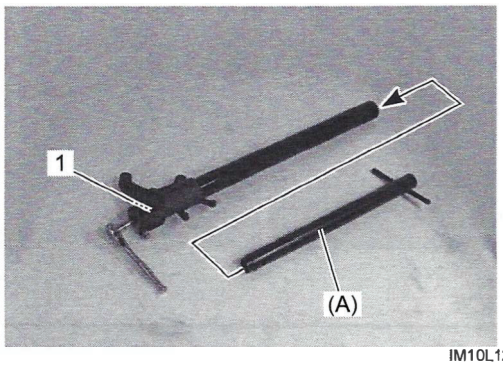
- Inner tube slide metal (1)
- Outer tube slide metal (2)
- Oil seal retainer (3)
- Oil seal (4)
- Oil seal stopper ring (5)
- Dust seal (6)



IM10L1220023-02

16) Remove the damper rod bolt (1) with the special tool.

Special tool
(A): 09940–30221

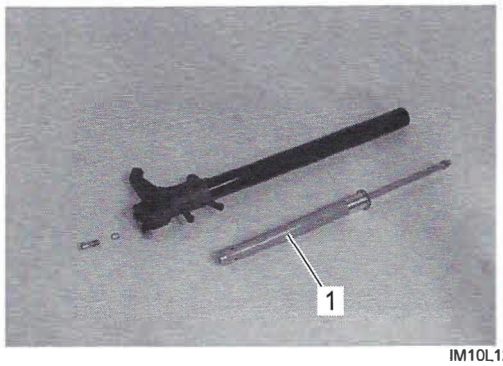


IM10L1220024-02

17) Remove the inner rod/damper rod (cartridge) (1).

⚠ CAUTION

Do not disassemble the inner rod/damper rod (cartridge).



IM10L1220025-02

Reassembly

NOTICE

- **Thoroughly wash all the component parts being assembled.**
  Insufficient washing can result in oil leakage or premature wear of the parts.
- **When reassembling the front fork, use new fork oil.**
- **Use the specified fork oil for the front fork.**

1) Cover the inner tube with a plastic film.

NOTICE

Scratches on the oil seal lip may cause oil leakage. When installing the seals, place a plastic film over the slide bushing groove and edges of the inner tube to avoid damaging the seals' lip.

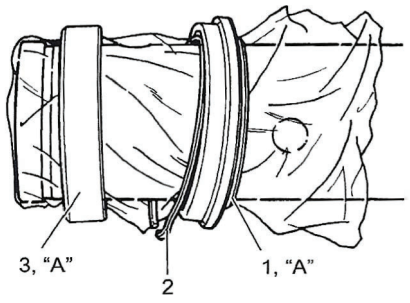
2) Install the following parts onto the inner tube.
   a) New dust seal (1)
   b) Oil seal stopper ring (2)
   c) New oil seal (3)

NOTICE

Face the stamp mark side of the oil seal to the dust seal side.

3) Apply fork oil to the dust seal lip and oil seal lip.

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

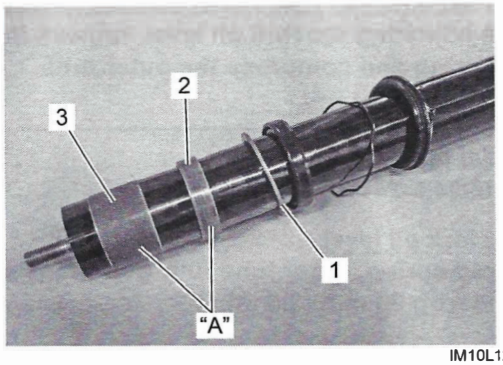


IE31J1220030-01

4) Remove the plastic film and install the oil seal retainer (1), new outer tube slide metal (2) and new inner tube slide metal (3) keep them free from dust.

5) Apply fork oil to the outer tube slide metal (2) and inner tube slide metal (3).

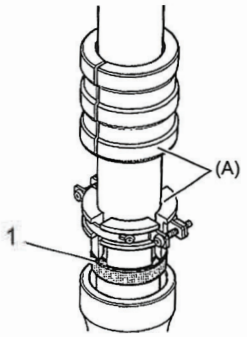
"A": Fork oil 99000–99044–L01 (SUZUKI FORK OIL L-01)



IM10L1220027-02

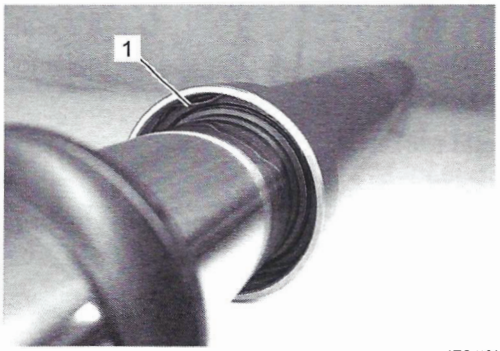
6) Insert the inner tube into the outer tube.
7) Press fit the oil seal (1) using the special tool until the stopper ring groove on the outer tube can be seen.

Special tool
(A): 09940–52861



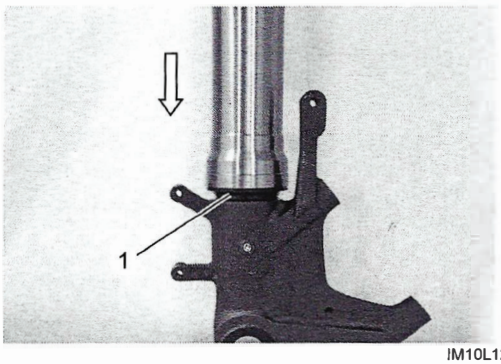
ID26J1220024-02

8) When installing the stopper ring (1), make sure that the stopper ring is fitted securely into the groove.



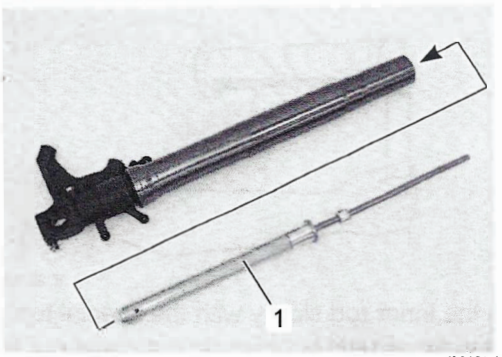
IF04K1220028-01

9) Press fit the dust seal (1).



IM10L1220028-02

10) Install the inner rod/damper rod (cartridge) (1) into the inner tube.



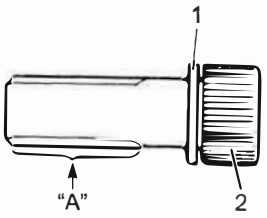
IM10L1220029-02

11) Install the new gasket (1) to the damper rod bolt (2).
12) Apply thread lock to the damper rod bolt (2) and tighten it to the specified torque with the special tools.

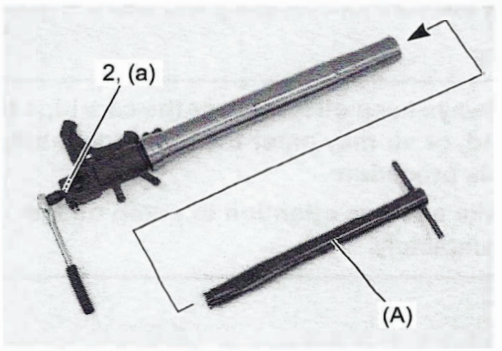
"A": Thread lock cement 99000–32150 (THREAD LOCK CEMENT 1322D)

Special tool
(A): 09940–30221

Tightening torque
Front fork damper rod bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IE12J1220019-01

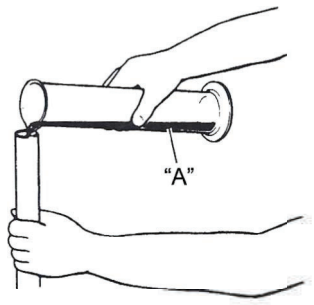


IM10L1220030-02

13) Place the front fork vertically without spring.
14) Compress it fully.
15) Pour specified front fork oil up to the top level of the inner tube.

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

Front fork oil capacity
Each leg [Standard]: 520 ml (17.58 US oz, 18.30 Imp oz)



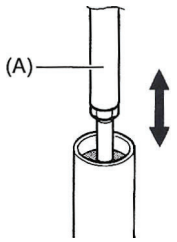
ID26J1220030-01

16) Move the inner rod slowly with the special tool more than ten times until bubbles do not come out from the oil.

NOTE

Refill front fork oil up to the top of the outer tube to find bubbles while bleeding air.

Special tool
(A): 09940–52841



IE31J1220038-01

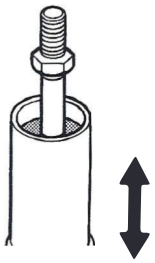
17) Refill specified front fork oil up to the top level of the inner tube again.

18) Move the outer tube up and down several strokes until bubbles do not come out from the oil.

19) 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

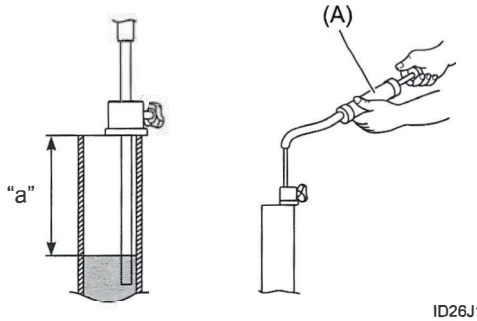
20) Hold the front fork vertically and adjust fork oil level with the special tool.

NOTE

When adjusting the fork oil level, remove the fork spring and compress the outer tube fully.

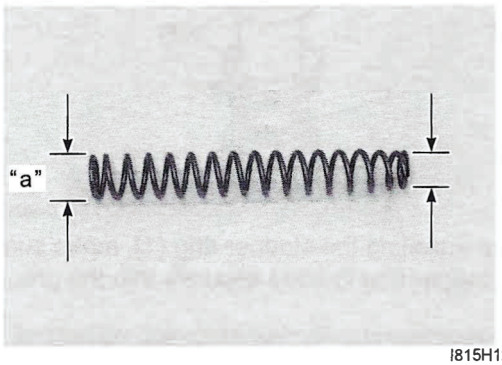
Special tool
(A): 09943–74111

Front fork oil level
Without spring, outer tube fully compressed
[Standard]: 88 mm (3.5 in)



ID26J1220031-02

21) Install the fork spring into the inner tube with its larger diameter "a" facing the bottom side.



I815H1220029-01

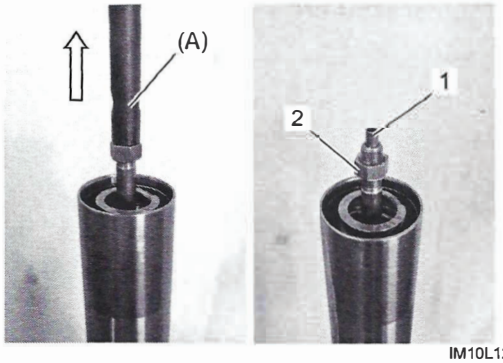
22) Pull up the inner rod with the special tool and install the adjuster rod (1).

Special tool
(A): 09940–52841

23) Turn the lock-nut (2) until stops on the inner rod threads.

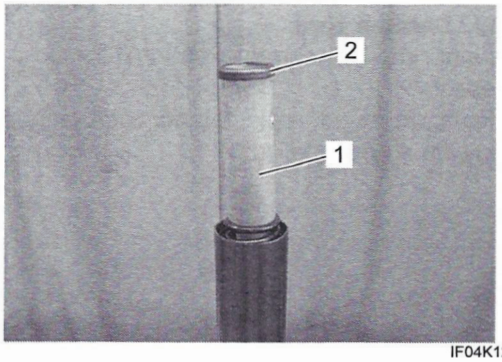
NOTE

Face the chamfer side of the lock-nut (2) downward.



IM10L1220031-02

24) Install the spacer (1) and spring retainer (2).



IF04K1220035-01

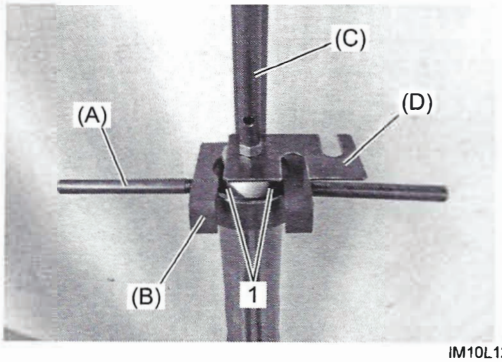
25) Install the special tool (A) to the holes (1) on the spacer.

26) Set the special tool (B) referring to the manual.

27) Pull up the inner rod using the special tool (C).

28) Compress the spring using the special tool (B) and then insert the special tool (D) between the lock-nut and spring retainer.
Then, expand the special tool (B) and pinch the special tool (D) between the lock-nut and the spring retainer.

Special tool
(A): 09940–94930
(B): 09940–93110
(C): 09940–52841
(D): 09940–94922

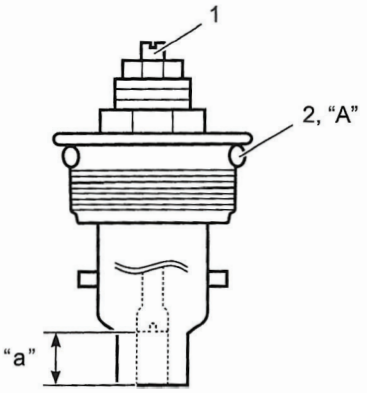


IM10L1220032-03

29) Turn the rebound damping force adjuster (1) clockwise until the first click is heard after distance "a" is obtained (stiffest position).

30) Apply fork oil to the new O-ring (2).

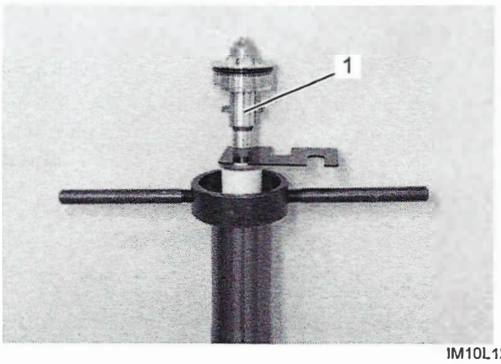
"A": Fork oil 99000–99044–L01 (SUZUKI FORK OIL L-01)



IE31J1220052-01

"a": 13 mm (0.51 in)

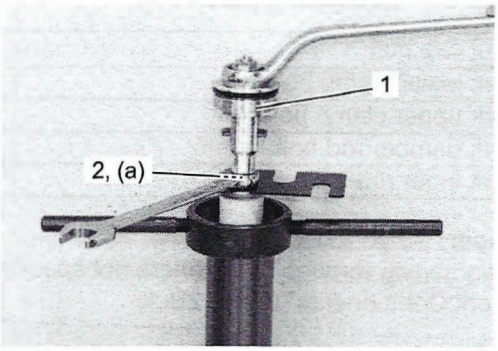
31) Slowly turn the cap bolt (1) completely by hand until the end of the cap bolt seats on the lock-nut.



IM10L1220033-02

32) 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)



IM10L1220034-02

33) Remove the special tools.

NOTE

Hold front fork by hand to prevent it sliding.

34) Tighten the front fork cap to the outer tube temporarily.
35) Install the front axle pinch bolts.
36) After installing the front fork, adjust the spring pre-load and two kinds of damping force.

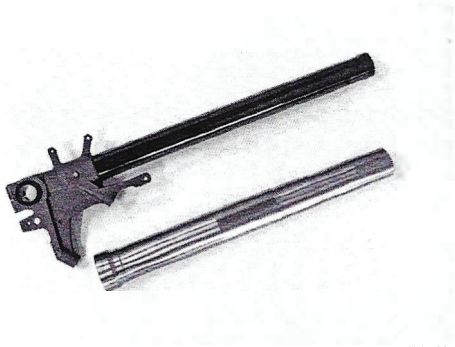
Front Fork Parts Inspection

BENM10L32206006

Refer to "Front Fork Disassembly and Assembly" (Page 2B-5).

Inner Tube / Outer Tube

Inspect the inner tube sliding surface and outer tube sliding surface for scuffing. If any defect is found, replace the part with a new one.

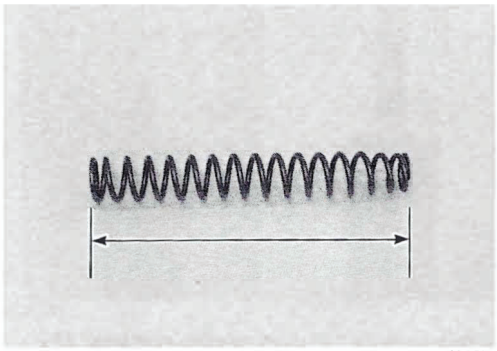


IM10L1220035-02

Fork Spring

Measure the fork spring free length. If it is shorter than the service limit, replace it with a new one.

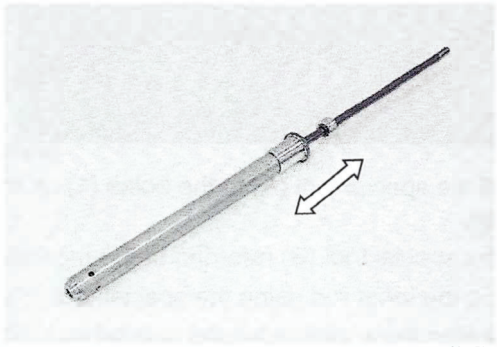
Front fork spring free length
[Limit]: 258 mm (10.1 in)



I815H1220034-01

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 (cartridge) with a new one.



I815H1220035-01

Specifications

Tightening Torque Specifications

BENM10L32207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front fork cap bolt	23	2.3	17.0	☞(Page 2B-3)
Front fork lower clamp bolt	23	2.3	17.0	☞(Page 2B-3)
Front fork upper clamp bolt	23	2.3	17.0	☞(Page 2B-3)
Front fork damper rod bolt	23	2.3	17.0	☞(Page 2B-8)
Front fork inner rod lock-nut	15	1.5	11.0	☞(Page 2B-10)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:
"Front Fork Components" (Page 2B-1)

Special Tools and Equipment

Recommended Service Material

BENM10L32208001

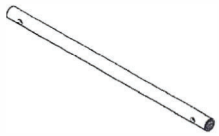
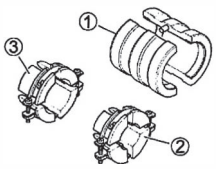
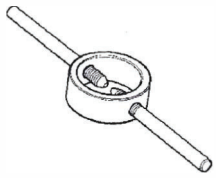
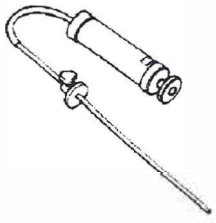
Material	SUZUKI recommended product or Specification		Note
Fork oil	SUZUKI FORK OIL L-01	P/No.: 99000–99044–L01	☞(Page 2B-7) / ☞(Page 2B-7) / ☞(Page 2B-8) / ☞(Page 2B-10)
Thread lock cement	THREAD LOCK CEMENT 1322D	P/No.: 99000–32150	☞(Page 2B-8)

NOTE

Required service material(s) is also described in:
"Front Fork Components" (Page 2B-1)

Special Tool

BENM10L32208002

09940–30221 Front fork cylinder holder ☞(Page 2B-7) / ☞(Page 2B-8) 	09940–52841 Front fork inner rod holder ☞(Page 2B-6) / ☞(Page 2B-9) / ☞(Page 2B-9) / ☞(Page 2B-10) 
09940–52861 Front fork oil seal installer set 1. Hammer (09941-53610) 2. Attachment (09940-52870) 3. Attachment (09940-52880) ☞(Page 2B-8) 	09940–93110 Fork spring compressor ☞(Page 2B-5) / ☞(Page 2B-5) / ☞(Page 2B-6) / ☞(Page 2B-10) 
09940–94922 Front fork spring stopper plate This tool is included in Front fork spacer holder set (09940-94922). ☞(Page 2B-5) / ☞(Page 2B-5) / ☞(Page 2B-10) 	09940–94930 Front fork spacer holder ☞(Page 2B-5) / ☞(Page 2B-5) / ☞(Page 2B-5) / ☞(Page 2B-6) / ☞(Page 2B-10) 
09943–74111 Front fork oil level gauge ☞(Page 2B-9) 	

Rear Suspension

Precautions

Precautions for Rear Suspension

BENM10L32300001

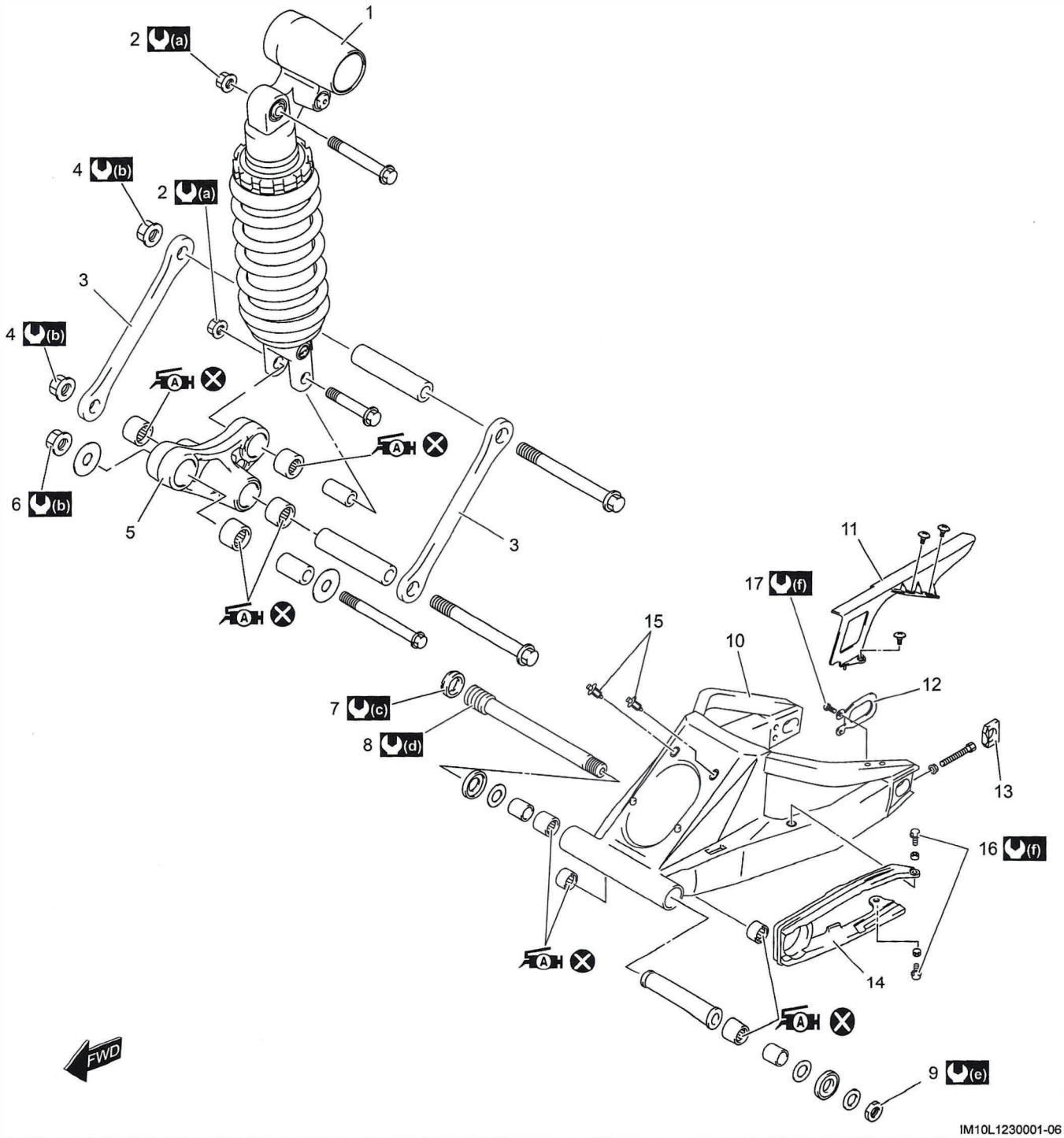
NOTICE

Do not attempt to disassemble the rear shock absorber. It is unserviceable.

Repair Instructions

Rear Suspension Components

BENM10L32306001



IM10L1230001-06

1. Rear shock absorber	10. Swingarm	(b) : 78 N·m (8.0 kgf-m, 57.5 lbf-ft)
2. Rear shock absorber mounting nut	11. Chain case	(c) : 90 N·m (9.2 kgf-m, 66.5 lbf-ft)
3. Cushion rod	12. Plate	(d) : 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
4. Cushion rod mounting nut	13. Chain adjuster	(e) : 100 N·m (10.2 kgf-m, 74.0 lbf-ft)
5. Cushion lever	14. Chain buffer	(f) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
6. Cushion lever mounting nut	15. Fastener	A : Apply grease to the bearing.
7. Swingarm pivot lock-nut	16. Chain buffer bolt	⊗ : Do not reuse.
8. Swingarm pivot shaft	17. Plate bolt	
9. Swingarm pivot nut	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	

Rear Suspension Adjustment

BENM10L32306002

Refer to "Rear Shock Absorber Removal and Installation" (Page 2C-4).

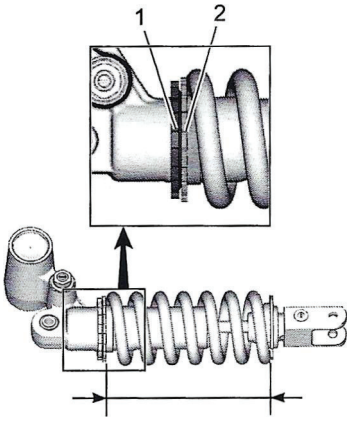
NOTICE

Forcing the adjuster to turn may damage the suspension.
Do not rotate the adjuster beyond the limit.

Spring Pre-load Adjustment

1) Loosen the adjuster lock nut (1) and rotate the adjuster nut (2) to adjust the spring pre-set length.
   - The set length 190 mm provides the stiffest spring pre-load.
   - The set length 200 mm provides the softest spring pre-load.

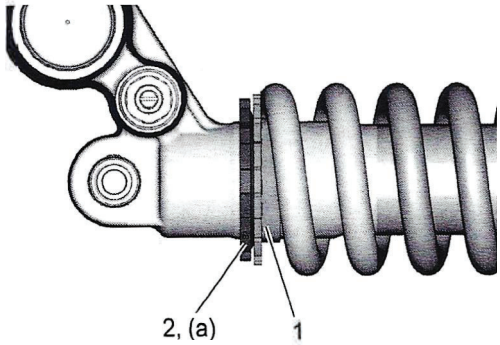
   Rear shock absorber spring pre-set length
   [Standard]: 195 mm (7.68 in)
   [Adjustable range]: 190 – 200 mm (7.48 – 7.87in)



IM10L1230008-04

2) Hold the adjuster nut (1) and tighten the adjuster lock nut (2) to the specified torque.

   Tightening torque
   Adjuster lock nut (a): 30 N·m (3.1 kgf-m, 22.5 lbf-ft)



IM10L1230050-01

3) After adjusting the spring pre-set length, adjust the headlight beam. Refer to "Headlight Beam Adjustment" in Section 9B (Page 9B-4).

Damping Force Adjustment

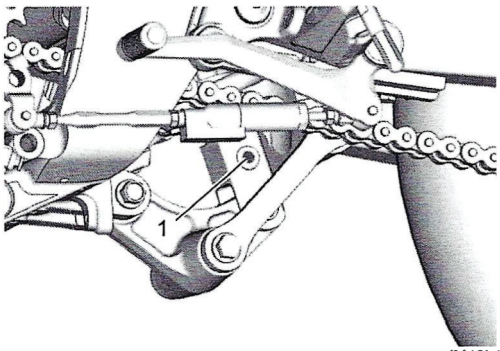
NOTE

- **Turn the adjuster clockwise to stiffen the damping force and turn it counterclockwise to soften the damping force.**
- **Fine-tune the adjuster by turning it slightly until punch marks align.**

Rebound side

Fully turn the compression damping force adjuster (1) clockwise. From that position (stiffest), turn it out to standard setting position.

Rear shock absorber damping force adjuster
Rebound side
[Standard]: 1.5 turns counterclockwise from stiffest position
[Adjustable range]: 0 – 1.8 turns counterclockwise from stiffest position

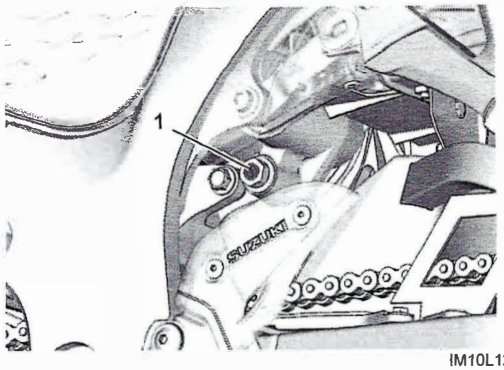


IM10L1230009-02

Compression side

Fully turn the rebound damping force adjuster (1) clockwise. From that position (stiffest), turn it out to standard setting position.

Rear shock absorber damping force adjuster
Compression side
[Standard]: 8 clicks counterclockwise from stiffest position
[Adjustable range]: 0 – 18 clicks counterclockwise from stiffest position



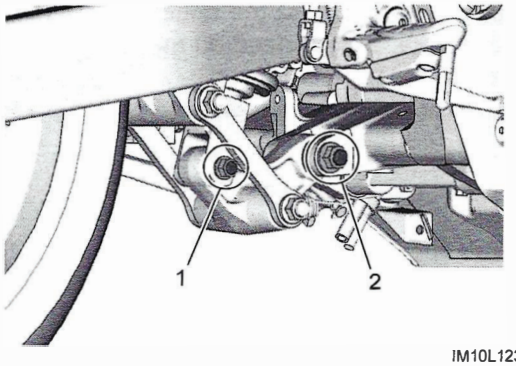
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Rear Shock Absorber Removal and Installation

BENM10L32306003

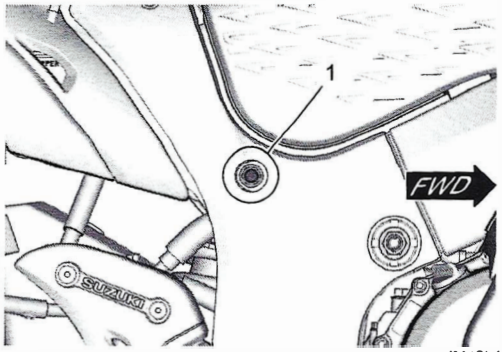
Removal

1) Remove the exhaust pipe and muffler. ☞(Page 1K-2).
2) Support the motorcycle with a jack to relieve load on the rear shock absorber.
3) Lift and support the fuel tank. ☞(Page 1G-12)
4) Remove the shock absorber lower mounting bolt and nut (1).
5) Remove the cushion lever mounting bolt and nut (2).



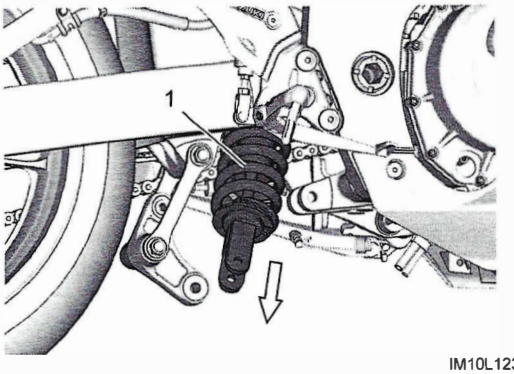
IM10L1230002-02

6) Remove the rear shock absorber upper mounting bolt and nut (1).



IM10L1230003-02

7) Remove the rear shock absorber (1) downward.



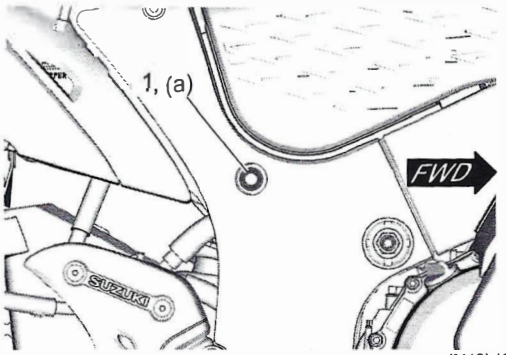
IM10L1230004-03

Installation

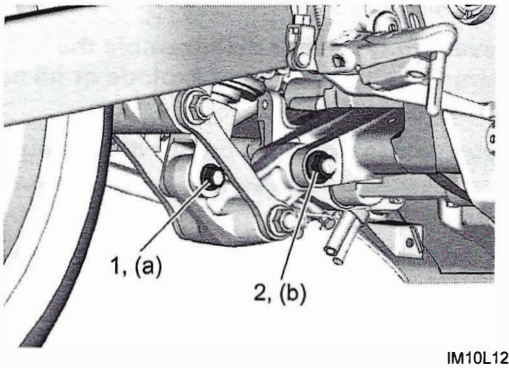
Install the rear shock absorber in the reverse order of removal. Pay attention to the following points:

- Temporarily install the rear shock absorber and cushion lever mounting bolt.
- Tighten the rear shock absorber upper/lower mounting nuts (1) and cushion lever mounting nut (2) to the specified torque.

Tightening torque
Rear shock absorber mounting nut (a): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
Cushion lever mounting nut (b): 78 N·m (8.0 kgf-m, 57.5 lbf-ft)



IM10L1230005-03



IM10L1230006-03

- Adjust the headlight beam if the spring pre-set length is adjusted. Refer to "Headlight Beam Adjustment" in Section 9B (Page 9B-4).

Rear Suspension On-Vehicle Inspection

BENM10L32306004

Refer to "Rear Suspension" in Section 0B (Page 0B-28).

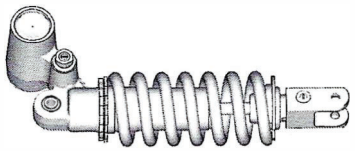
Rear Shock Absorber Inspection

BENM10L32306005

Refer to "Rear Shock Absorber Removal and Installation" (Page 2C-4).
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.



IM10L1230007-02

Rear Shock Absorber Disposal

BENM10L32306006

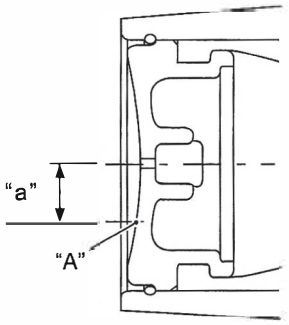
Refer to "Rear Shock Absorber Removal and Installation" (Page 2C-4).
The rear shock absorber unit contains high-pressure nitrogen gas.

⚠ WARNING

- **Mishandling can cause explosion.**
- **Keep away from fire and heat. High gas pressure caused by heat can cause an explosion.**
- **Never apply heat or disassemble the damper unit since it can explode or oil can splash hazardously.**
- **Release gas pressure before disposing.**

Gas Pressure Release

1) Mark the drill center at the location "A" using a center punch.



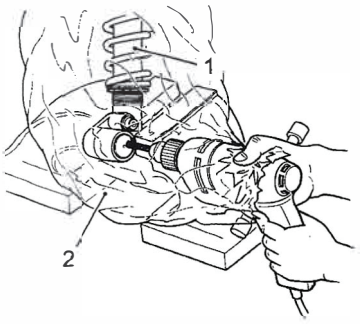
I823H1230009-01

"a": 9 mm (0.35 in)	"A": Mark the drill hole

2) Wrap rear shock absorber (1) with a plastic bag (2) and fix it on a vise as shown in the figure.
3) Drill a 2 – 3 mm (0.08 – 0.12 in) hole at the marked drill center using a drilling machine and let out gas while taking care not to get the plastic bag entangled with the drill bit.

⚠ WARNING

- **Be sure to wear protective glasses since drilling chips and oil may fly off with blowing gas when the drill bit has penetrated through the body.**
- **Make sure to drill at the specified position. Otherwise, pressurized oil many spout out forcefully.**



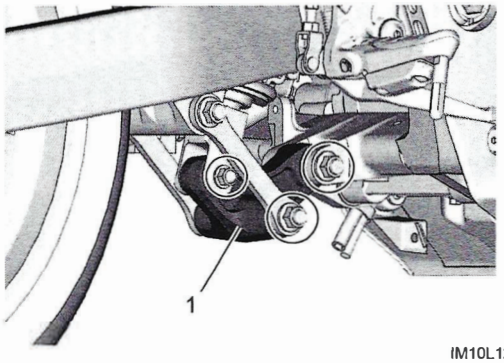
I823H1230010-01

Cushion Lever Removal and Installation

BENM10L32306007

Removal

1) Support the motorcycle with a jack to relieve load on the cushion lever.
2) Remove the cushion lever (1).

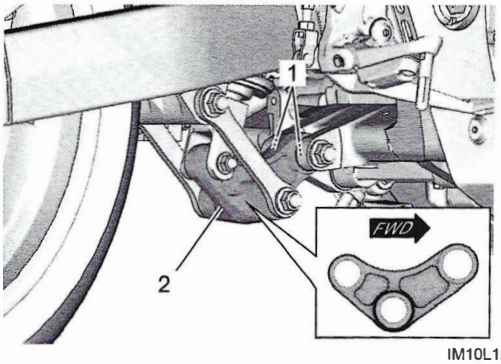


IM10L1230011-02

Installation

Install the cushion lever in the reverse order of removal. Pay attention to the following point:

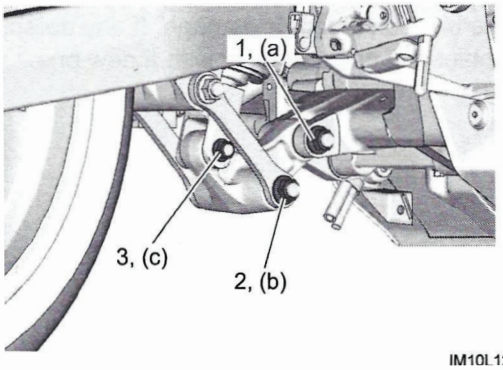
- Install the washers (1) between the cushion rods and cushion lever.
- Install the cushion lever (2) as shown in the figure.



IM10L1230048-02

- Tighten each new cushion lever mounting nut (1), cushion rod mounting nut (2) and rear shock absorber lower mounting nut (3) to the specified torque.

Tightening torque
Cushion lever mounting nut (a): 78 N·m (8.0 kgf-m, 57.5 lbf-ft)
Cushion rod mounting nut (b): 78 N·m (8.0 kgf-m, 57.5 lbf-ft)
Rear shock absorber mounting nut (c): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



IM10L1230013-03

Cushion Lever Inspection

BENM10L32306008

Refer to "Cushion Lever Removal and Installation" (Page 2C-6).

Spacer

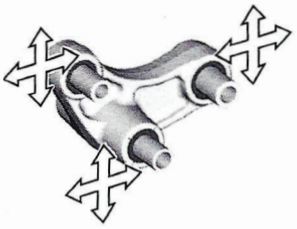
1) Remove the spacers from the cushion lever.
2) Inspect the spacers for any flaws or other damage. If any defects are found, replace the spacers with new ones.



IM10L1230014-02

Cushion Lever Bearing

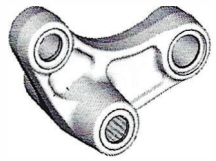
1) Insert the spacers into bearings.
2) Check the play by moving the spacers up and down. If excessive play is noted, replace the bearing with a new one. Refer to "Cushion Lever Bearing Removal and Installation" (Page 2C-7).



IM10L1230015-02

Cushion Lever

Inspect the cushion lever for damage. If any defect is found, replace the cushion lever with a new one.



IM10L1230016-02

Cushion Lever Bearing Removal and Installation

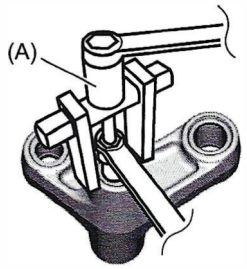
BENM10L32306009

Refer to "Cushion Lever Removal and Installation" (Page 2C-6).

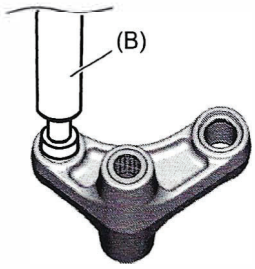
Removal

1) Remove the cushion lever bearings using the special tools.

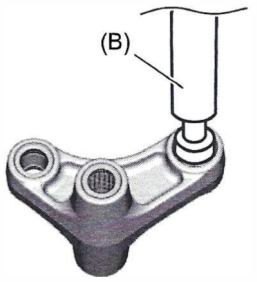
Special tool
(A): 09921–20240
(B): 09913–70210



IM10L1230017-02



IM10L1230018-02



IM10L1230019-02

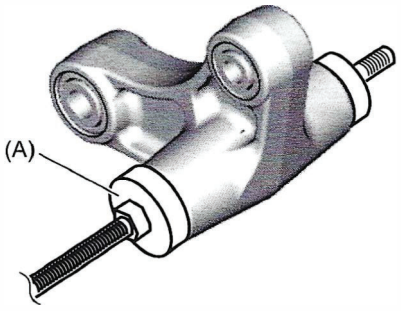
Installation

1) Press the new bearings into the cushion lever with the special tool.

NOTE

When installing the bearing, stamped mark on the bearing must face outside.

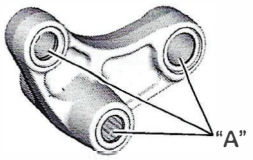
Special tool
(A): 09924–84521



IM10L1230020-02

2) Apply grease to the bearings.

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



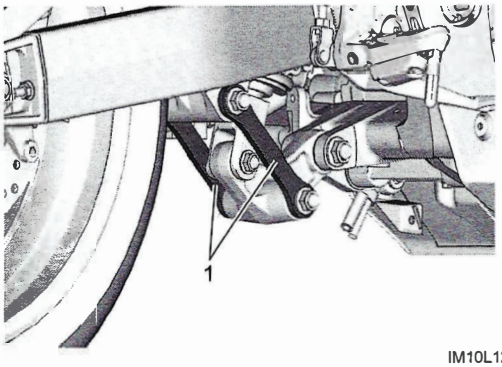
IM10L1230021-02

Cushion Rod Removal and Installation

BENM10L32306010

Removal

1) Support the motorcycle with a jack to relieve load on the cushion lever.
2) Remove the cushion rod (1).

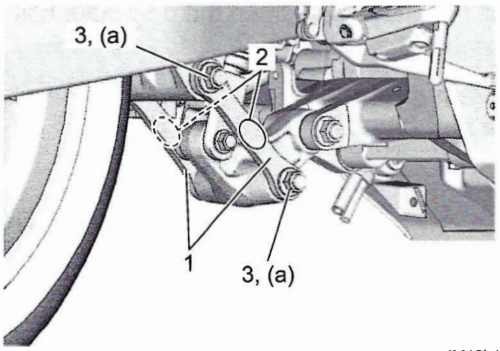


IM10L1230022-02

Installation

1) Set the cushion rods (1) so that the stamped marks (2) should be face outside.
2) Insert the cushion rod mounting bolts from left side, and tighten their new nuts (3) to the specified torque.

Tightening torque
Cushion rod mounting nut (a): 78 N·m (8.0 kgf-m, 57.5 lbf-ft)



IM10L1230023-03

Cushion Rod Inspection

BENM10L32306011

Refer to "Cushion Rod Removal and Installation" (Page 2C-8).

Cushion rod

Inspect the cushion rods for damage and bend. If any defects are found, replace the cushion rods with new ones.



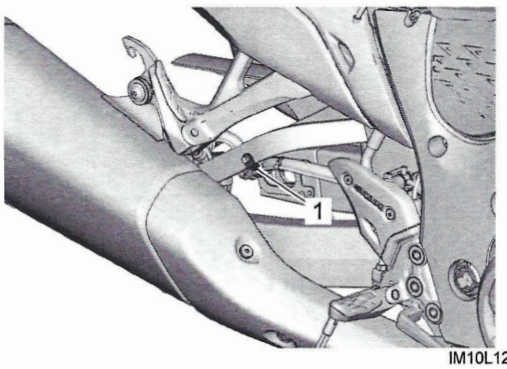
IM10L1230024-02

Swingarm Removal and Installation

BENM10L32306012

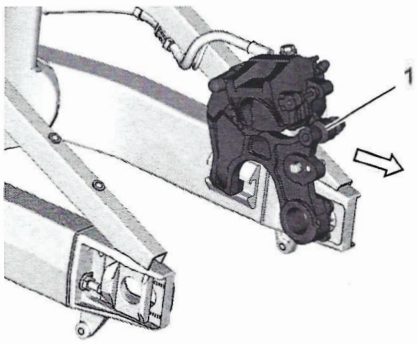
Removal

1) Cut the drive chain. Refer to "Drive Chain Replacement" in Section 3A (Page 3A-8).
2) Remove the rear wheel assembly. ☞(Page 2D-8)
3) Remove the brake hose clamp (1).



IM10L1230025-03

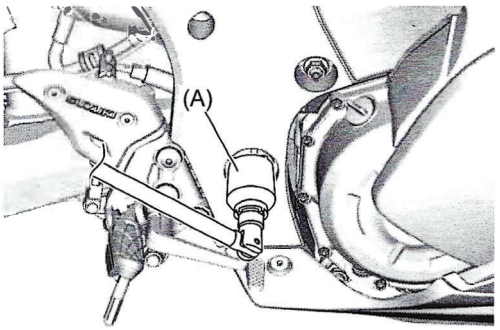
4) Remove the rear brake caliper bracket (1) from the swingarm.



IM10L1230049-02

5) Remove the rear shock absorber. ☞(Page 2C-4)
6) Remove the swingarm pivot shaft lock-nut with the special tool.

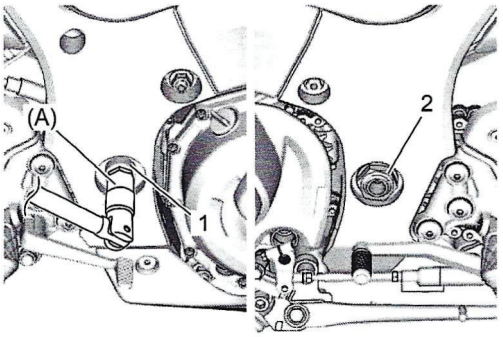
Special tool
(A): 09940–14970



IM10L1230027-02

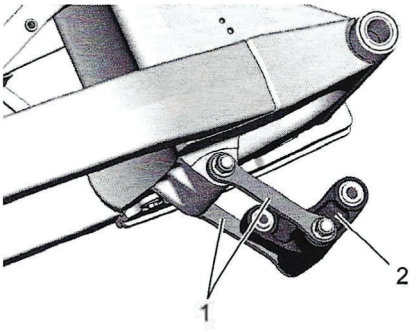
7) Hold the swingarm pivot shaft (1) with the special tool and remove the swingarm pivot nut (2). Then loosen the swing arm pivot shaft (1).

Special tool
(A): 09900–18740



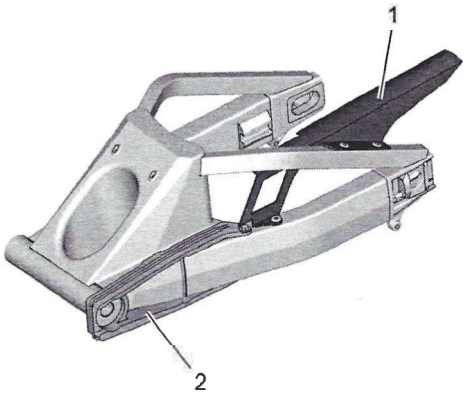
IM10L1230028-02

8) Remove the swingarm by removing the swingarm pivot shaft.
9) Remove the cushion lever (1) and cushion rods (2) from the swingarm.



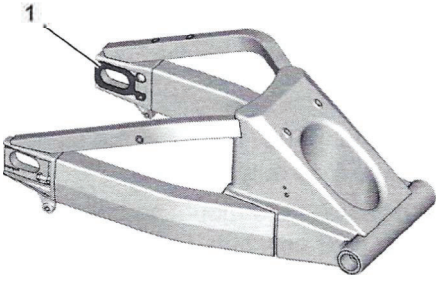
IM10L1230029-02

10) Remove the chain case (1) and chain buffer (2) from the swingarm.



IM10L1230030-02

11) Remove the plate (1).

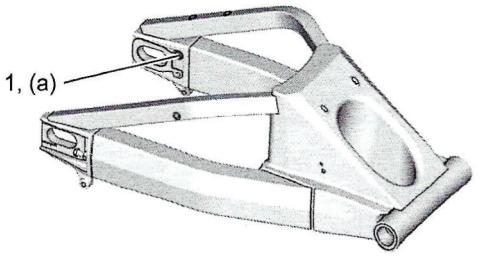


IM10L1230031-02

Installation

1) Install the plate and tighten the new plate bolt (1) to the specified torque.

Tightening torque
Plate bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



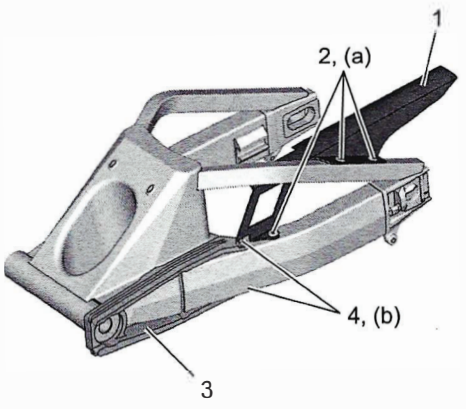
IM10L1230032-03

2) Install the chain case (1) and tighten the chain case bolts (2) to the specified torque.

Tightening torque
Chain case bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)

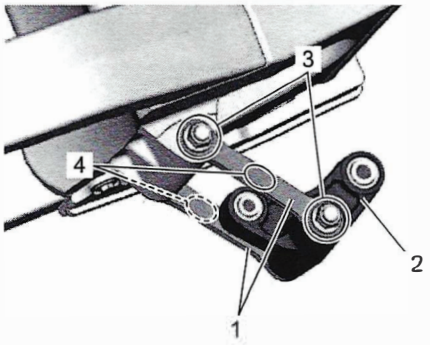
3) Install the chain buffer (3) and tighten the chain buffer bolts (4) to the specified torque.

Tightening torque
Chain buffer bolt (b): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



IM10L1230033-03

4) Install the cushion rods (1) and cushion lever (2) and tighten the mounting nuts (3) temporarily.
5) The stamped marks (4) on the cushion rod should be face out side.

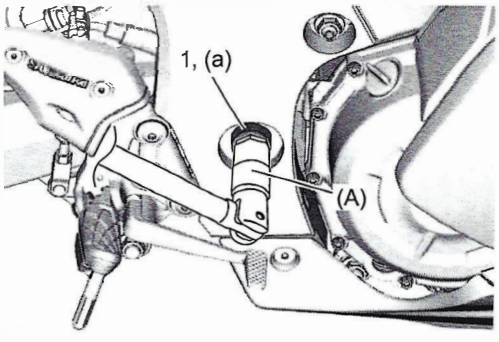


IM10L1230034-03

6) Adjust swingarm pivot thrust clearance in the following procedures:
   a) Insert the swingarm pivot shaft (1) and tighten it to the specified torque with the special tool.

Special tool
(A): 09900–18740

Tightening torque
Swingarm pivot shaft (a): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)

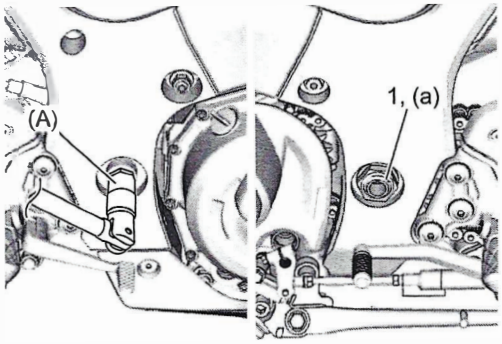


IM10L1230035-02

   b) Hold the swingarm pivot shaft with the special tool and tighten the swingarm pivot nut (1) to the specified torque.

Special tool
(A): 09900–18740

Tightening torque
Swingarm pivot nut (a): 100 N·m (10.2 kgf-m, 74.0 lbf-ft)

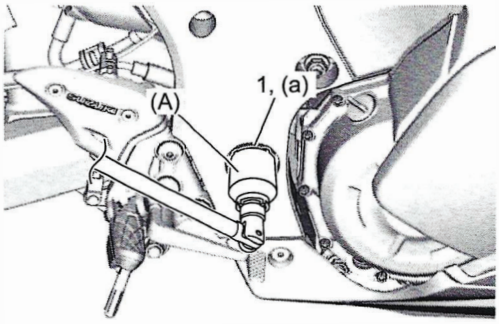


IM10L1230036-02

   c) Tighten the swingarm pivot lock-nut (1) to the specified torque with the special tool.

Special tool
(A): 09940–14970

Tightening torque
Swingarm pivot lock-nut (a): 90 N·m (9.2 kgf-m, 66.5 lbf-ft)



IM10L1230037-02

   d) Tighten the rear shock absorber mounting nut to the specified torque. Refer to "Rear Shock Absorber Removal and Installation" (Page 2C-4).
   e) Tighten the cushion lever mounting nut and cushion rod mounting nut to the specified torque. Refer to "Rear Shock Absorber Removal and Installation" (Page 2C-4).
7) Install the rear wheel assembly. ☞(Page 2D-8)
8) Install the rear brake hose clamp and connect the rear brake hose into the clamp. Refer to "Rear Brake Hose Routing Diagram" in Section 4A (Page 4A-6).
9) Connect the drive chain. Refer to "Drive Chain Replacement" in Section 3A (Page 3A-8).
10) Adjust the drive chain slack, after connecting it. ☞(Page 3A-3)

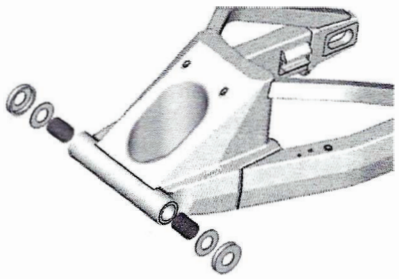
Swingarm Inspection

BENM10L32306013

Refer to "Swingarm Removal and Installation" (Page 2C-8).

Spacers

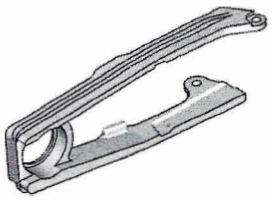
1) Remove the dust seals, washers and spacers from the swingarm. Refer to "Swingarm Bearing Removal and Installation" (Page 2C-12).
2) Inspect the spacers for wear and damage. If any defects are found, replace the spacers with new ones.



IM10L1230038-02

Chain Buffer

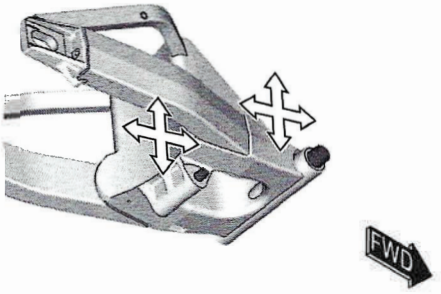
Inspect the chain buffer for wear and damage. If any defect is found, replace the chain buffer with a new one.



IM10L1230039-02

Swingarm Bearing and Cushion Rod Bearing

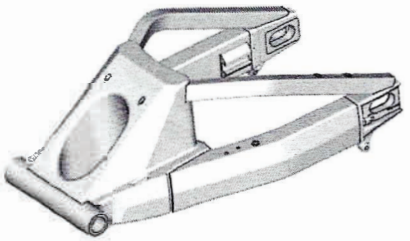
1) Insert the spacers into bearings.
2) Check the play by moving the spacers up and down. If excessive play is noted, replace the bearing with a new one. Refer to "Swingarm Bearing Removal and Installation" (Page 2C-12).



IM10L1230040-02

Swingarm

Inspect the swingarm for damage. If any defect is found, replace the swingarm with a new one.



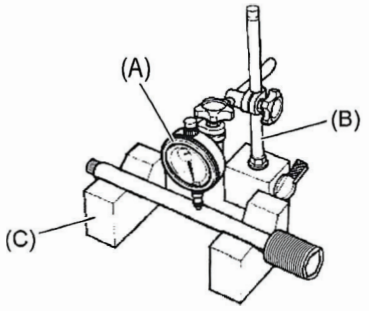
IM10L1230041-02

Swingarm Pivot Shaft

Using a dial gauge, check the swingarm pivot shaft runout. If the runout exceeds the service limit, replace the pivot shaft.
Actual runout is 1/2 of the total indicator reading.

Special tool
(A): 09900–20607
(B): 09900–20701
(C): 09900–21304

Swingarm pivot shaft runout
Service limit: 0.3 mm (0.011 in)



IE31J1230060-01

Swingarm Bearing Removal and Installation

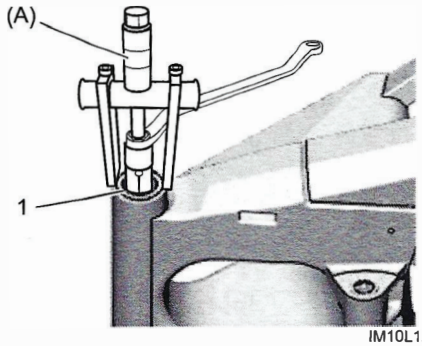
BENM10L32306014

Refer to "Swingarm Removal and Installation" (Page 2C-8).

Removal

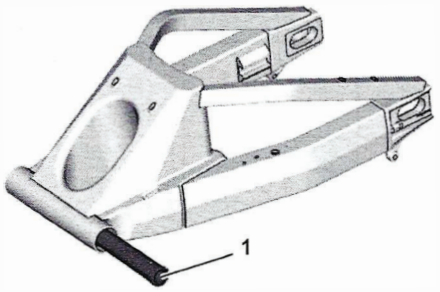
1) Remove the swingarm pivot bearings (1) on both sides using the special tool.

Special tool
(A): 09921–20240



IM10L1230042-02

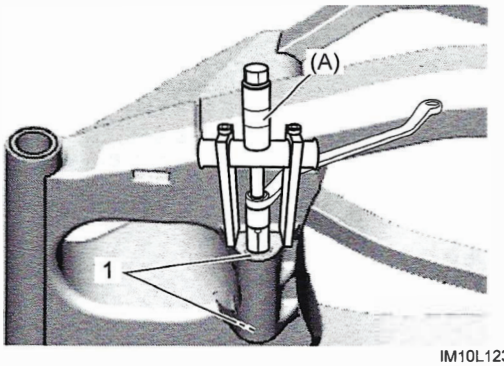
2) Remove the center spacer (1).



IM10L1230043-02

3) Remove the swingarm cushion rod bearings (1) on both sides using the special tool.

Special tool
(A): 09921–20240



IM10L1230044-02

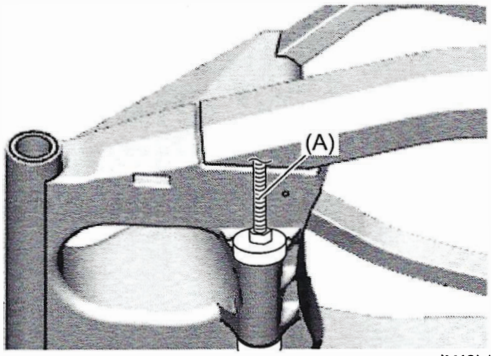
Installation

1) Press the new swingarm cushion rod bearings with the special tool.

NOTE

When installing the bearing, stamped mark on the bearing must face outside.

Special tool
(A): 09924–84521



IM10L1230045-03

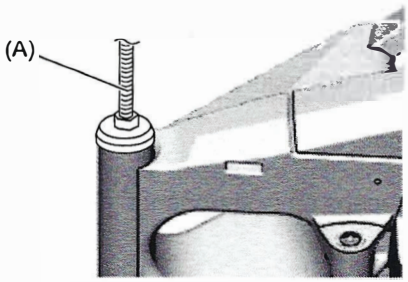
2) Install the center spacer.

3) 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.

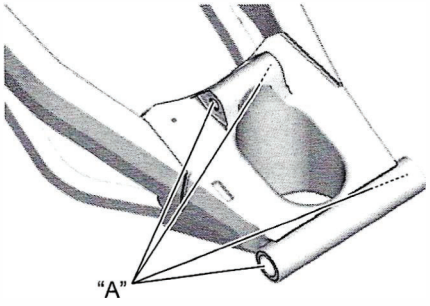
Special tool
(A): 09941–34513



IM10L1230046-03

4) Apply grease to the bearings.

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



IM10L1230047-03

5) Install the swingarm. ☞(Page 2C-8).

Specifications

Tightening Torque Specifications

BENM10L32307001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Adjuster lock nut	30	3.1	22.5	☞(Page 2C-3)
Rear shock absorber mounting nut	50	5.0	36.0	☞(Page 2C-4) / ☞(Page 2C-6)
Cushion lever mounting nut	78	8.0	57.5	☞(Page 2C-4) / ☞(Page 2C-6)
Cushion rod mounting nut	78	8.0	57.5	☞(Page 2C-6) / ☞(Page 2C-8)
Plate bolt	5.5	0.56	4.05	☞(Page 2C-9)
Chain case bolt	5.5	0.56	4.05	☞(Page 2C-9)
Chain buffer bolt	5.5	0.56	4.05	☞(Page 2C-9)
Swingarm pivot shaft	15	1.5	11.0	☞(Page 2C-10)
Swingarm pivot nut	100	10.2	74.0	☞(Page 2C-10)
Swingarm pivot lock-nut	90	9.2	66.5	☞(Page 2C-10)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Rear Suspension Components" (Page 2C-2)

Special Tools and Equipment

Recommended Service Material

BENM10L32308001

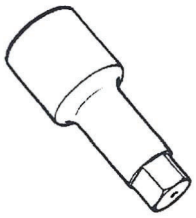
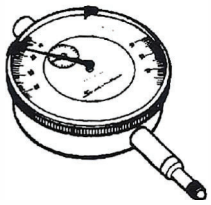
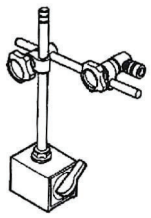
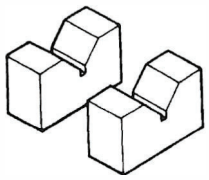
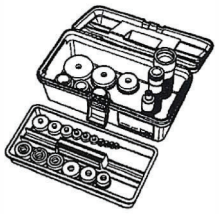
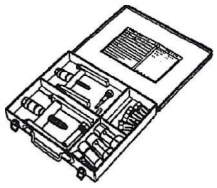
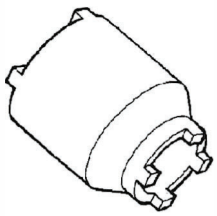
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A	P/No.: 99000–25010	☞(Page 2C-7) / ☞(Page 2C-13)

NOTE

Required service material(s) is also described in:
"Rear Suspension Components" (Page 2C-2)

Special Tool

BENM10L32308002

09900–18740 Hexagon bit socket (24 mm: 1/2 sq.) ☞(Page 2C-9) / ☞(Page 2C-10) / ☞(Page 2C-10)		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)	
09913–70210 Bearing installer set ☞(Page 2C-7)		09921–20240 Bearing remover set ☞(Page 2C-7) / ☞(Page 2C-12) / ☞(Page 2C-12)	
09924–84521 Bearing installer set ☞(Page 2C-7) / ☞(Page 2C-12)		09940–14970 Swingarm pivot adjuster wrench ☞(Page 2C-8) / ☞(Page 2C-10)	
09941–34513 Bearing installer set ☞(Page 2C-12)			

Wheels and Tires

Precautions

Precautions for Wheel and Tire

BENM10L32400001

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

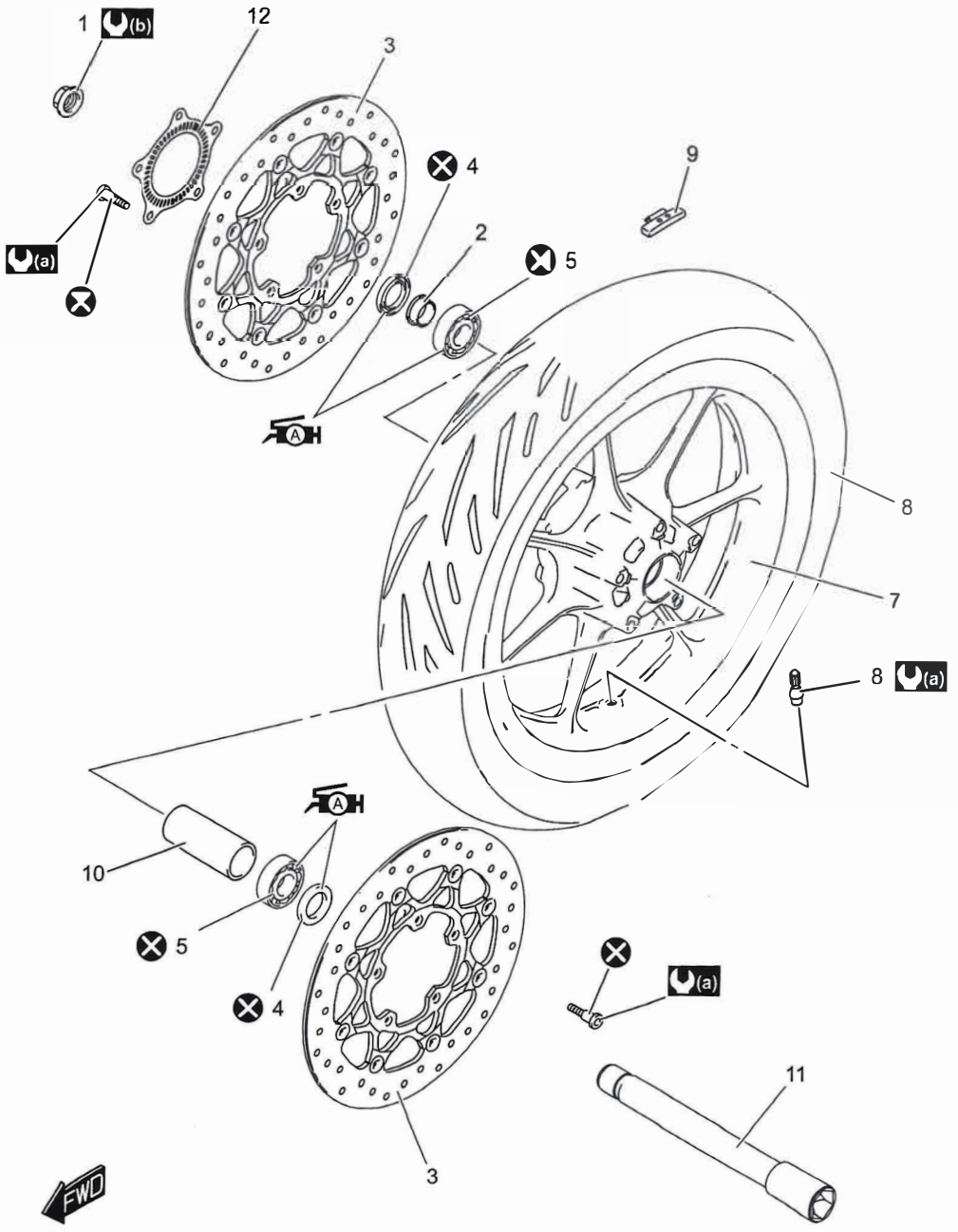
⚠ WARNING

- **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.**
- **Replacement wheel must be equivalent to the original equivalent wheel.**

Repair Instructions

Front Wheel Components

BENM10L32406001



IM10L1240001-03

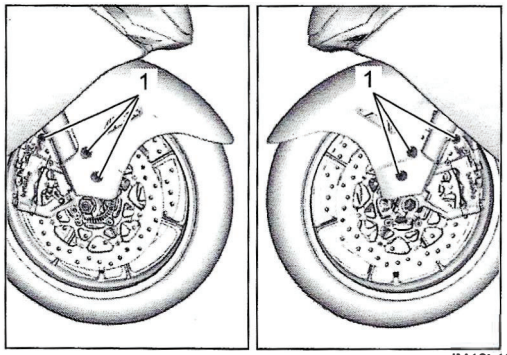
1. Front axle nut	5. Bearing	9. Wheel balancer	(a) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
2. Collar	6. Tire	10. Spacer	(b) : 100 N·m (10.2 kgf-m, 74.0 lbf-ft)
3. Brake disc	7. Front wheel	11. Front axle	A : Apply grease.
4. Dust seal	8. Air valve	12. Wheel speed sensor rotor	: Do not reuse.

Front Wheel Assembly Removal and Installation

BENM10L32406002

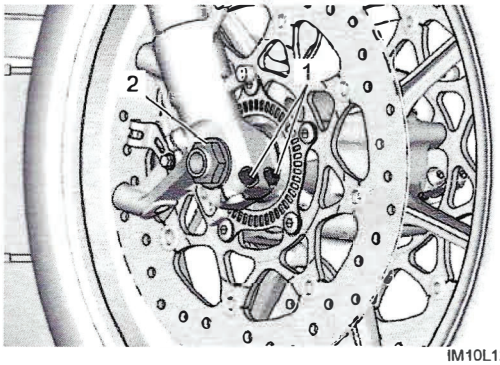
Removal

1) Remove the front wheel speed sensor from the front fork. Refer to "Front Wheel Speed Sensor Removal and Installation" in Section 4E (Page 4E-53).
2) Remove the front reflex reflector. (if equipped) ☞(Page 9B-8)
3) Remove the front fender by removing the bolts (1), left and right.



IM10L1240002-02

4) Remove the brake calipers, left and right. ☞(Page 4B-3)
5) Loosen two axle pinch bolts (1) on the right front fork leg.
6) Remove the front axle nut (2).



IM10L1240003-02

7) Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

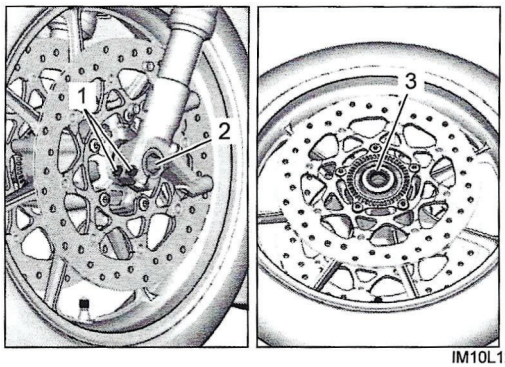
⚠ CAUTION

Do not carry out the work with the motorcycle resting on the side-stand. Do not support the motorcycle with the exhaust pipes. Make sure that the motorcycle is supported securely.

8) Loosen two axle pinch bolts (1) on the left front fork leg.
9) Draw out the front axle (2) and remove the front wheel.
10) Remove the collar (3) (RH only).

NOTE

After removing the front wheel, fit the calipers temporarily to the original positions.

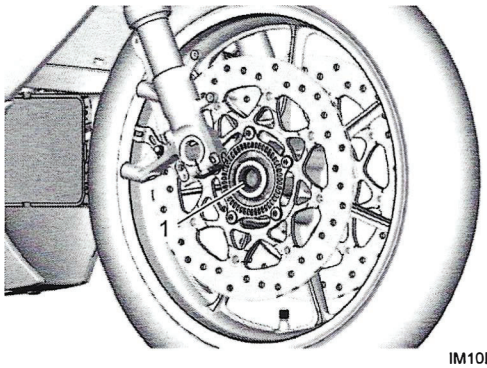


IM10L1240004-02

11) If necessary, remove the following parts.
- Tire ☞(Page 2D-13)
- Front brake disc ☞(Page 4B-5)
- Front wheel speed sensor rotor ☞(Page 4E-54)
- Front wheel dust seal and bearing ☞(Page 2D-4)
- Air valve ☞(Page 2D-14)

Installation

1) Install the collar (1) to the right side of the wheel.

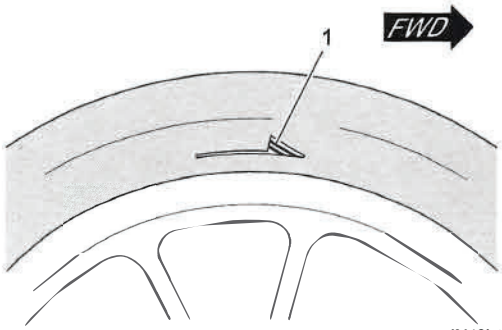


IM10L1240005-02

2) Install the front wheel with the front axle and tighten the front axle bolt temporarily.

▲ WARNING

The directional arrow (1) on the tire should point to the wheel rotation, when remounting the wheel.

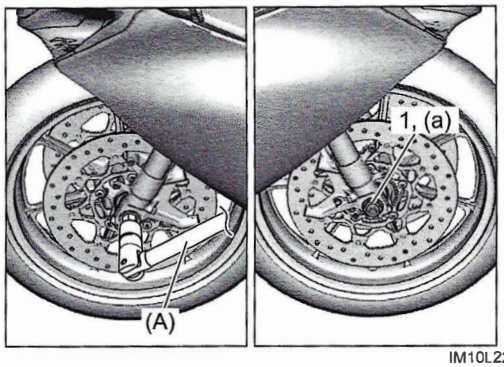


IM10L1240036-04

3) Remove a jack or a wooden block.
4) Install the front brake calipers. ☞(Page 4B-3)
5) Hold the front axle with the special tool and tighten the front axle nut (1) to the specified torque.

Special tool
(A): 09900–18740

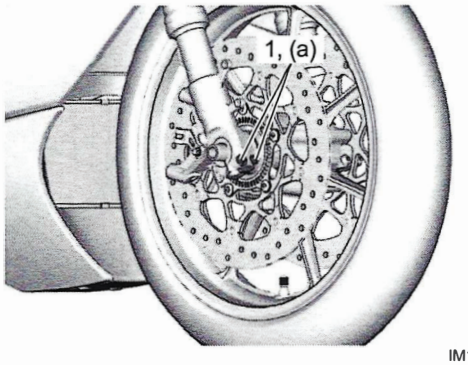
Tightening torque
Front axle nut (a): 100 N·m (10.2 kgf-m, 74.0 lbf-ft)



IM10L2240001-01

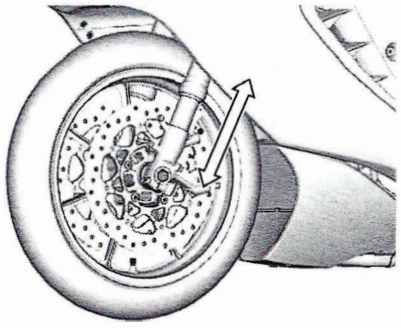
6) Tighten two axle pinch bolts (1) on the right fork leg to the specified torque.

Tightening torque
Front axle pinch bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1240007-02

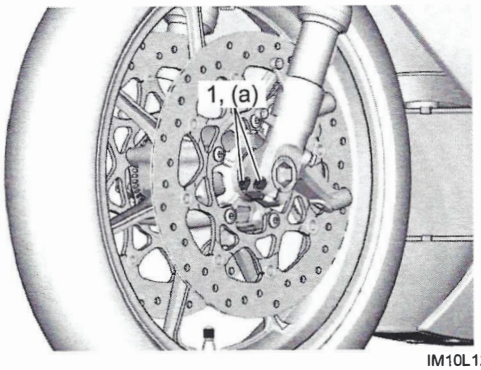
7) Move the front fork up and down 4 or 5 times.



IM10L1240008-02

8) Tighten two axle pinch bolts (1) on the left front fork leg to the specified torque.

Tightening torque
Front axle pinch bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1240009-02

9) Install the front reflex reflector. (if equipped) ☞(Page 9B-8)
10) Install the front wheel speed sensor. ☞(Page 4E-53)

Front Wheel Dust Seal / Bearing Removal and Installation

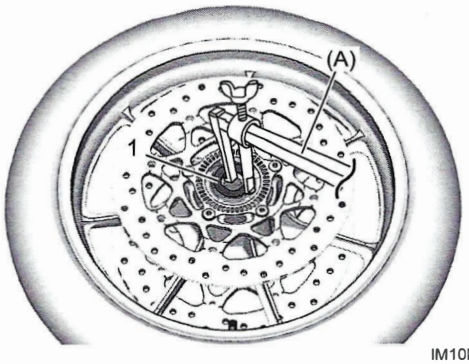
BENM10L32406003

Refer to "Front Wheel Assembly Removal and Installation" (Page 2D-3).

Removal

1) Remove the front wheel speed sensor rotor. ☞(Page 4E-54)
2) Remove the dust seals (1) on both sides with the special tool.

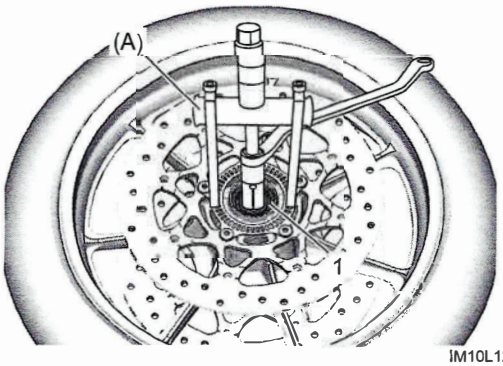
Special tool
(A): 09913–50121



IM10L1240010-02

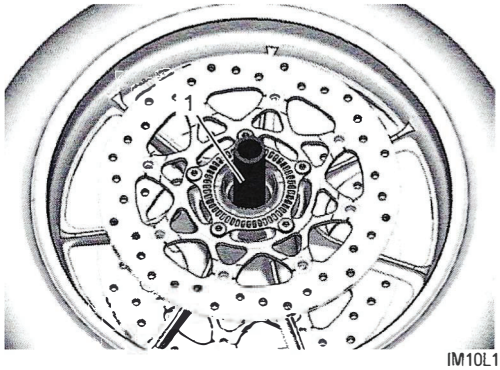
3) Remove the bearings (1) on both sides with the special tool.

Special tool
(A): 09921–20240



IM10L1240011-03

4) Remove the spacer (1).

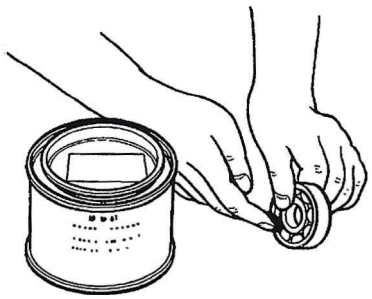


IM10L1240012-02

Installation

1) Apply grease to the new wheel bearings.

Grease 99000–25011 (SUZUKI SUPER GREASE A)



I649G1240019-02

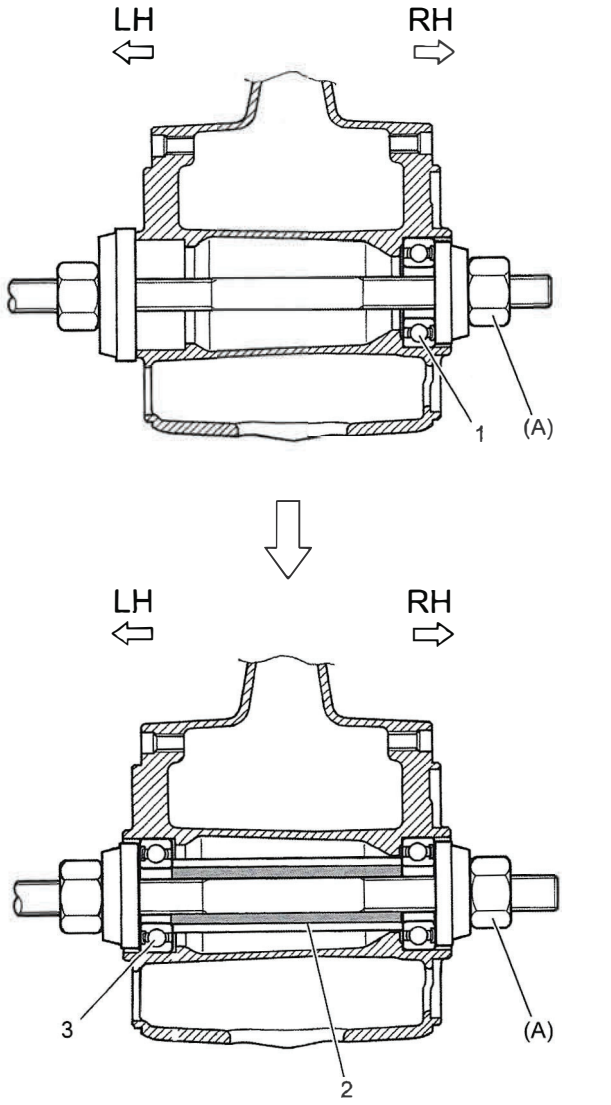
2) Using the special tools, bump and install the new right wheel bearing (1) against the wheel hub then insert the spacer (2).

3) Also bump and install the new left wheel bearing (3) against the spacer.

Special tool
(A): 09924–84510

NOTICE

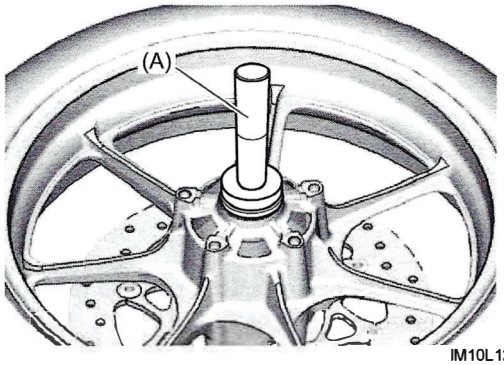
The sealed cover of the bearing must face outside.



IM10L1240013-03

4) Install the new dust seals on both sides with the special tool.

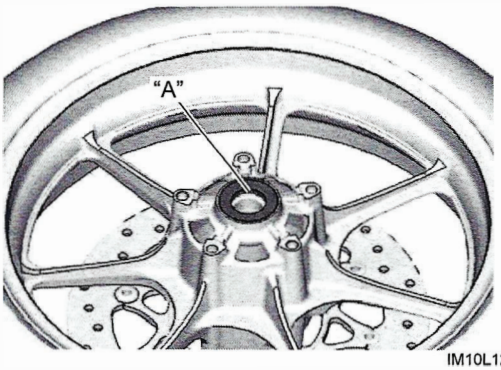
Special tool
(A): 09913–70210



IM10L1240014-02

5) Apply grease to the lip of dust seals on both sides.

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

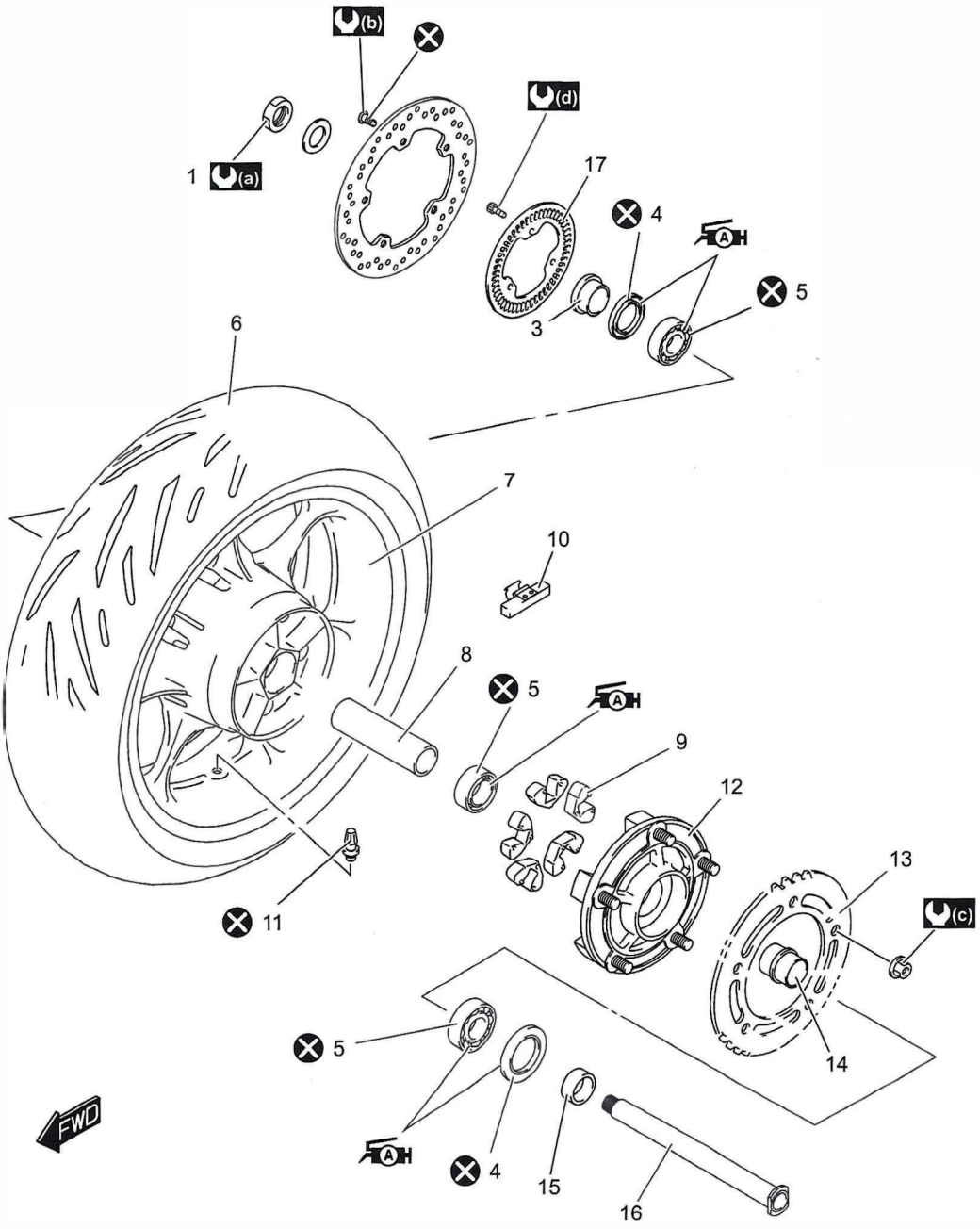


IM10L1240015-02

6) Install the front wheel speed sensor rotor and front brake disc. ☞(Page 4E-54)

Rear Wheel Components

BENM10L32406004



IM10L1240016-05

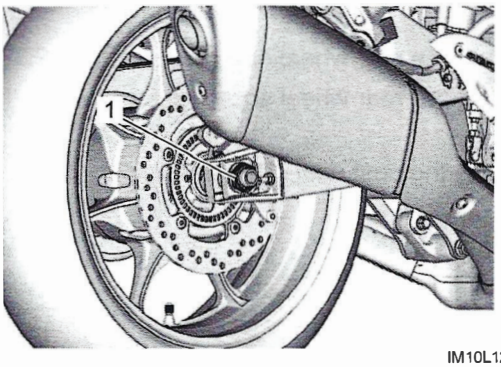
1. Rear axle nut	9. Wheel damper	17. Wheel speed sensor rotor
2. Rear brake disc	10. Wheel balancer	(a) : 100 N·m (10.2 kgf-m, 74.0 lbf-ft)
3. Collar	11. Air valve	(b) : 35 N·m (3.5 kgf-m, 25.5 lbf-ft)
4. Dust seal	12. Sprocket mounting drum	(c) : 60 N·m (6.0 kgf-m, 43.5 lbf-ft)
5. Bearing	13. Rear sprocket	(d) : 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)
6. Tire	14. Retainer	A : Apply grease.
7. Rear wheel	15. Spacer	: Do not reuse.
8. Spacer	16. Rear axle	

Rear Wheel Assembly Removal and Installation

BENM10L32406005

Removal

1) Remove the rear wheel speed sensor. ☞(Page 4E-53)
2) Loosen the axle nut (1).



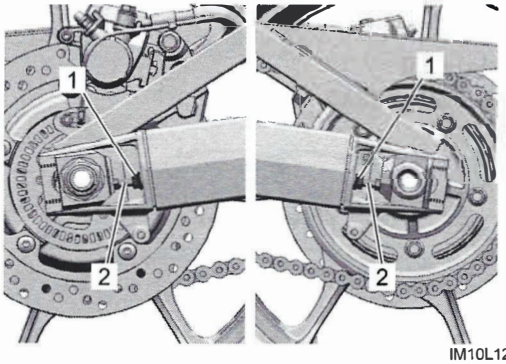
IM10L1240019-02

3) Raise the rear wheel off the ground and support the motorcycle with a jack or wooden block.

⚠ CAUTION

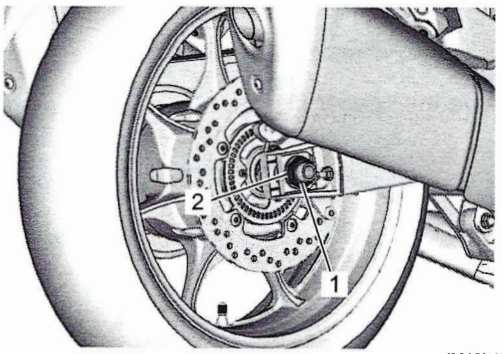
Make sure that the motorcycle is supported securely.

4) Loosen the left and right chain adjuster lock-nuts (1) and turn in the chain adjuster bolts (2).



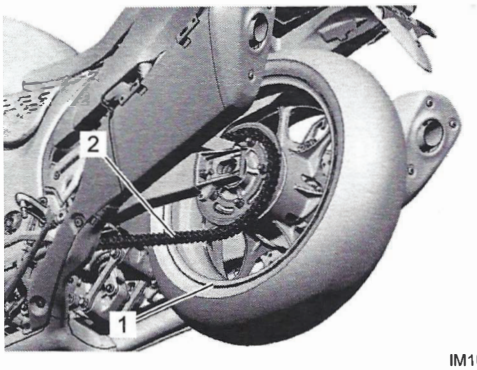
IM10L1240044-01

5) Remove the axle nut (1) and spacer (2).



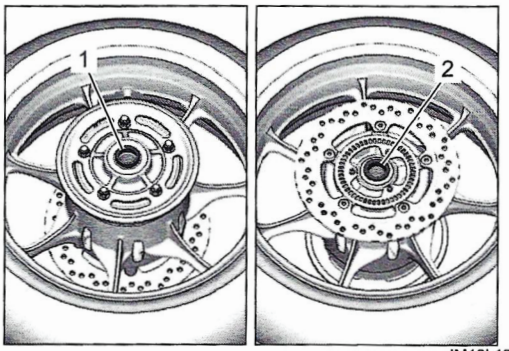
IM10L1240017-03

6) Draw out the rear axle.
7) Remove the rear wheel assembly (1) by disengaging the drive chain (2).



IM10L1240020-04

8) Remove the spacer (1) and collar (2).

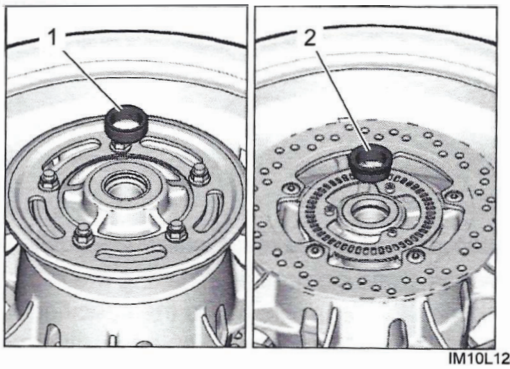


IM10L1240021-02

9) If necessary, remove the following parts.
- Tire ☞(Page 2D-13)
- Rear brake disc ☞(Page 4C-6)
- Rear wheel speed sensor rotor ☞(Page 4E-54)
- Rear wheel dust seal and bearing ☞(Page 2D-9)
- Air valve ☞(Page 2D-14)

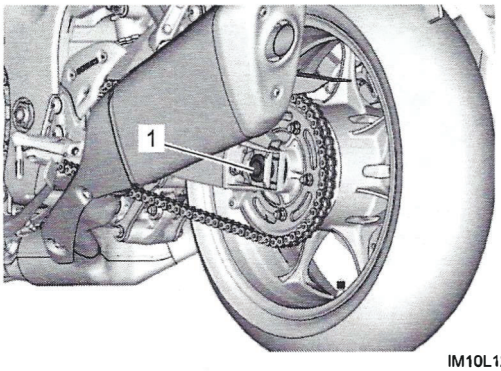
Installation

1) Install the spacer (1) and collar (2).



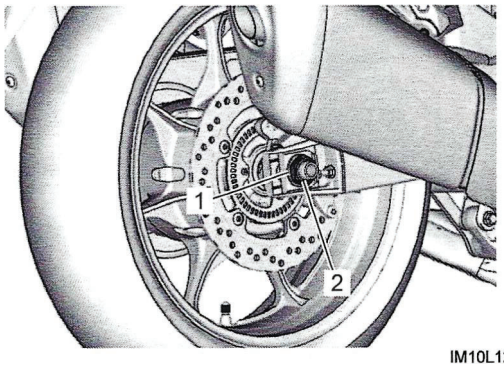
IM10L1240022-02

2) Remount the rear wheel and install the rear axle shaft (1).



IM10L1240023-02

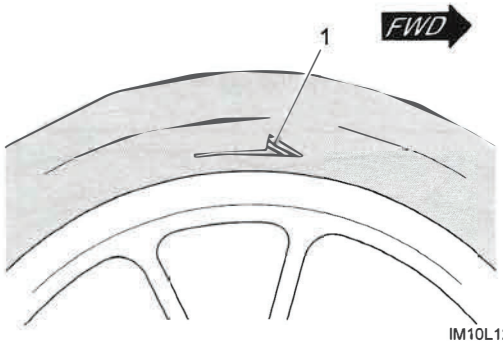
3) Install the washer (1) and tighten the rear axle nut (2) temporarily.



IM10L1240037-02

⚠ WARNING

The directional arrow (1) on the tire should point to the wheel rotation, when remounting the wheel.



IM10L1240036-04

4) Adjust the chain slack after installing the rear wheel and tighten the rear axle nut to the specified torque. Refer to "Drive Chain Inspection and Adjustment" in Section 3A (Page 3A-3).

⚠ WARNING

After remounting the rear wheel, pump the brake pedal several times to check for proper brake operation.

5) Install the rear wheel speed sensor. ☞(Page 4E-53)

Rear Wheel Dust Seal / Bearing Removal and Installation

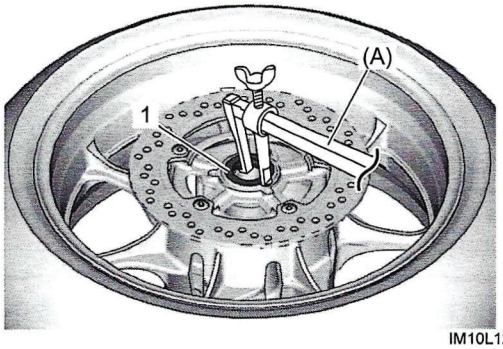
BENM10L32406006

Refer to "Rear Sprocket Mounting Drum Assembly Removal and Installation" in Section 3A (Page 3A-6).

Removal

1) Remove the rear wheel dampers. ☞(Page 2D-12)
2) Remove the rear wheel speed sensor rotor. ☞(Page 4E-54)
3) Remove the dust seal (1) with the special tool.

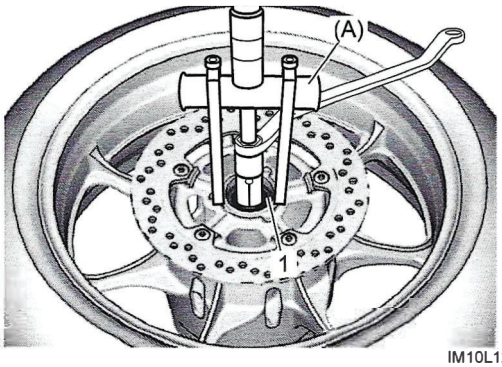
Special tool
(A): 09913–50121



IM10L1240024-02

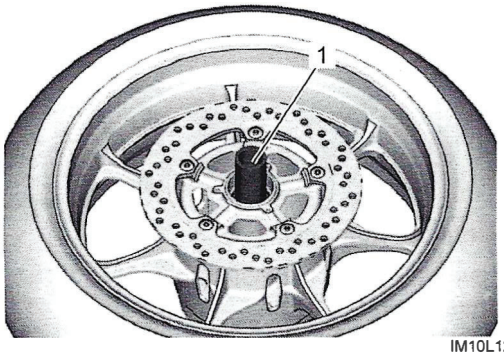
4) Remove the bearings (1) on both sides using the special tool.

Special tool
(A): 09921–20240



IM10L1240025-02

5) Remove the spacer (1).



IM10L1240026-02

Installation

1) Apply grease to the wheel bearings.

Grease 99000–25011 (SUZUKI SUPER GREASE A)



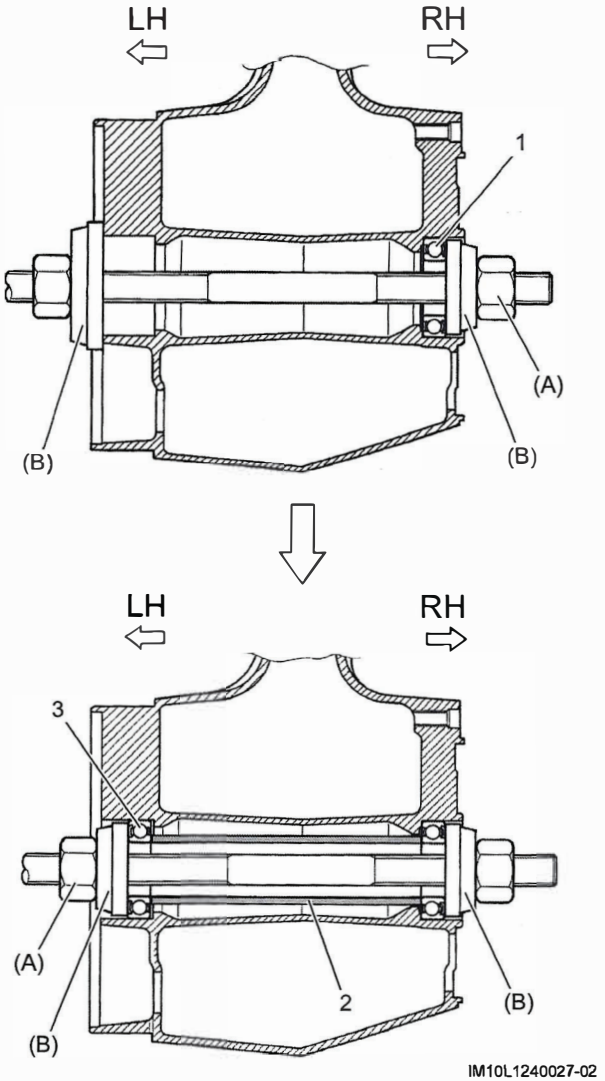
I649G1240019-02

2) Using the special tools, bump and install the right wheel bearing (1) against the wheel hub then insert the spacer (2).
3) Also bump and install the left wheel bearing (3) against the spacer.

Special tool
(A): 09941–34513
(B): 09924–84510

NOTICE

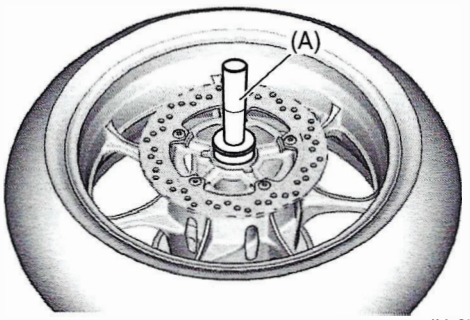
The sealed cover of the bearing must face outside.



IM10L1240027-02

4) Install a new dust seal with the special tool.

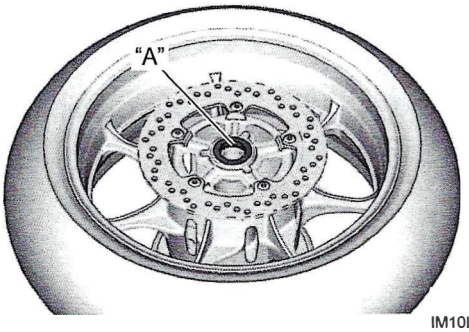
Special tool
(A): 09913–70210



IM10L1240028-02

5) Apply grease to the dust seal lip.

"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1240029-02

6) Install the rear wheel dampers. ☞(Page 2D-12)
7) Install the rear wheel speed sensor rotor. ☞(Page 4E-54)

Wheel / Wheel Axle Inspection

BENM10L32406007

Refer to "Front Wheel Assembly Removal and Installation" (Page 2D-3).
Refer to "Rear Wheel Assembly Removal and Installation" (Page 2D-8).

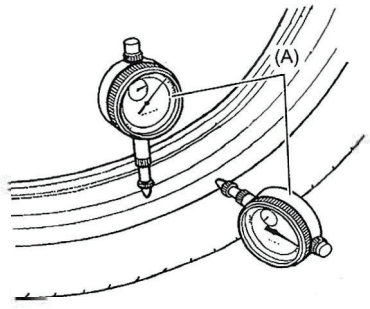
Wheel rim runout

1) Remove the brake pads.
   - Front: ☞(Page 4B-2)
   - Rear: ☞(Page 4C-2)
2) Make sure that the wheel runout checked as shown does not exceed the service limit. An excessive runout is usually due to worn or loosened wheel bearings and can be reduced by replacing the bearings.
   - Front: ☞(Page 2D-4)
   - Rear: ☞(Page 2D-9)

   If bearing replacement fails to reduce the runout, replace the wheel.

Wheel rim runout
Front
Axial & Radial [Limit]: 2.0mm (0.08in)
Rear
Axial & Radial [Limit]: 2.0mm (0.08in)

Special tool
(A): 09900–20607



ID26J1240033-01

3) Install the brake pads.
   - Front: ☞(Page 4B-2)
   - Rear: ☞(Page 4C-2)

Wheel Rim

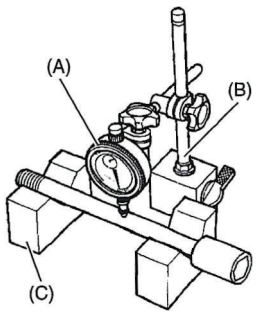
Refer to "Wheel Rim / Air Valve Inspection and Cleaning" (Page 2D-14).

Wheel Axle

Using a dial gauge, check the wheel axle for runout, If the runout exceeds the limit, replace the wheel axle. Actual runout is 1/2 of the total indicator reading.

Wheel axle runout
Front & Rear [Limit]: 0.25 mm (0.010 in)

Special tool
(A): 09900–20607
(B): 09900–20701
(C): 09900–21304

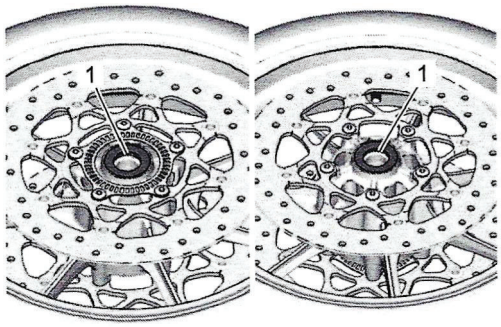


ID26J1240034-03

Dust Seal

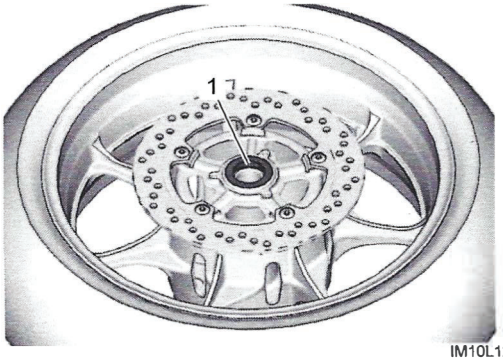
Inspect the dust seals lip (1) for wear or damage. If any defects is found, replace the dust seals with new ones.

- Front: ☞(Page 2D-4)



IM10L1240041-02

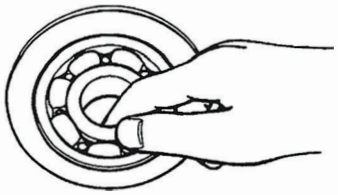
- Rear: ☞(Page 2D-9)



IM10L1240042-02

Wheel Bearing

1) Remove the rear sprocket mounting drum assembly (Rear wheel only). ☞(Page 3A-6)
2) 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.
   - Front: ☞(Page 2D-4)
   - Rear: ☞(Page 2D-9)



I649G1240015-02

3) Install the rear sprocket mounting drum assembly (Rear wheel only). ☞(Page 3A-6)

Brake Disc

Refer to "Front Brake Disc Inspection" in Section 4B (Page 4B-6).
Refer to "Rear Brake Disc Inspection" in Section 4C (Page 4C-6).

Wheel Speed Sensor Rotor

Refer to "Wheel Speed Sensor and Sensor Rotor Inspection" in Section 4E (Page 4E-55).

Rear Sprocket

Refer to "Rear Sprocket Mounting Drum / Sprocket Inspection" in Section 3A (Page 3A-6).

Tire

Refer to "Tire Inspection and Cleaning" (Page 2D-12).

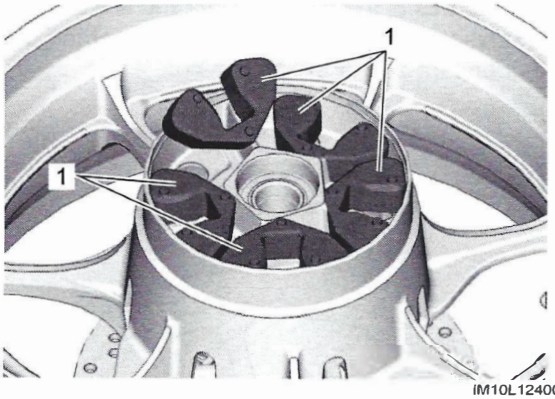
Rear Wheel Damper Removal and Installation

BENM10L32406008

Refer to "Rear Sprocket Mounting Drum Assembly Removal and Installation" in Section 3A (Page 3A-6).

Removal

1) Remove the rear wheel dampers (1).

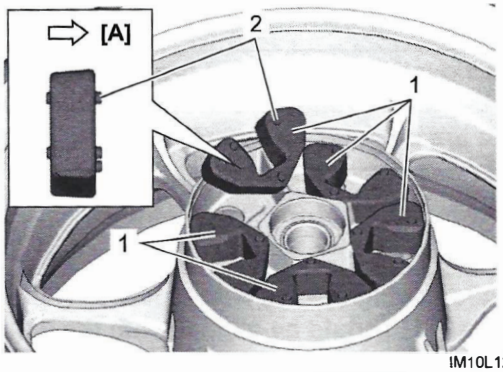


IM10L1240032-03

Installation

Install the rear wheel dampers in the reverse order of removal. Pay attention to the following points:

- Install the rear wheel dampers (1) with its longer protrusions (2) facing the outside.



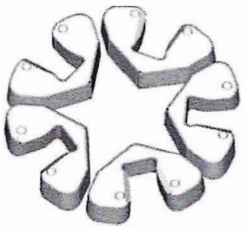
IM10L1240033-03

[A]: Outside

Rear Wheel Damper Inspection

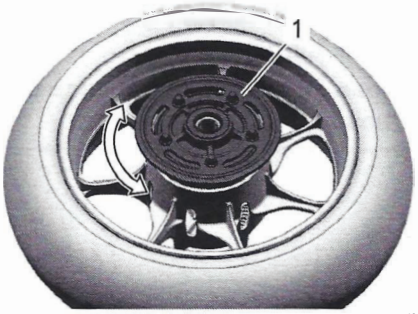
BENM10L32406009

- Inspect the rear wheel dampers for wear, damage and deformation. If any defects are found, replace the rear wheel damper.



IM10L1240034-03

- Turn the rear sprocket mounting drum assembly (1) and check there is no play between the rear sprocket mounting drum assembly and the rear wheel.
  If play is found, replace the rear wheel dampers with new ones.



IM10L1240043-03

Tire Inspection and Cleaning

BENM10L32406010

Refer to "Tires" in Section 0B (Page 0B-26).

Tire Removal and Installation

BENM10L32406011

Refer to "Front Wheel Assembly Removal and Installation" (Page 2D-3).
Refer to "Rear Sprocket Mounting Drum Assembly Removal and Installation" in Section 3A (Page 3A-6).

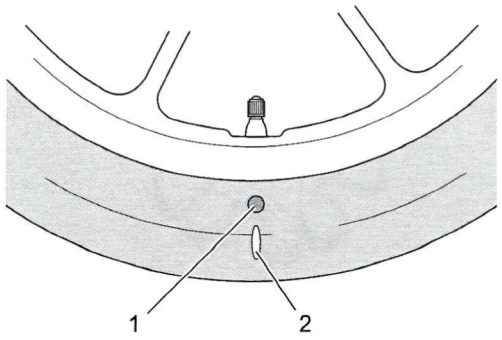
NOTICE

For removal and installation procedure of tire onto the wheel, follow the instructions given by the tire changer manufacturer.

Removal

NOTE

When replacing the tire with a new one, the tire mark (1) should be aligned with the valve position. However, 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.



IM10L1240038-02

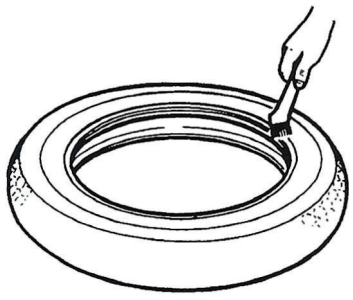
2. Chalk mark

Installation

1) Apply tire lubricant to the tire bead.

NOTICE

- **Do not use oil, grease or gasoline in place of tire bead lubricant.**
- **Do not use oil, grease or gasoline in place of tire bead lubricant.**

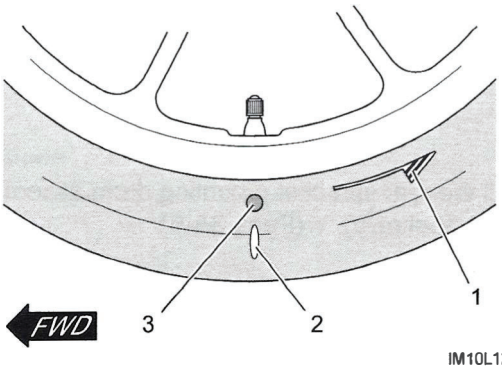


I649G1240038-02

2) Install the tire aligning the arrow (1) on the side wall with the direction of the wheel rotation.

NOTE

- **When installing a repaired tire, align the chalk mark (2) put on the tire at the time of removal with the valve position.**
- **When installing a new tire, align the light point mark (3) on the tire side wall with the valve position.**



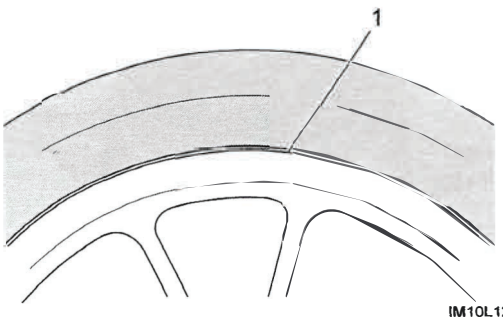
IM10L1240039-03

3) Bounce the tire several times while rotating. This makes the tire bead expand outward to contact the wheel, thereby facilitating air inflation.
4) Inflate the tire.

⚠ WARNING

- **Do not stand over a tire being inflated. Tire bead may break when the bead snaps over rim's safety hump and cause serious personal injury.**
- **Do not inflate tires exceeding 400 kPa (4.0 kgf/cm², 57 psi). Over-inflation may cause the bead to break, which may cause serious personal injury.**

5) In this condition, check the "rim line" (1) 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 (1) 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.



IM10L1240040-02

7) When the bead has been fitted properly, adjust the pressure to specification. ☞(Page 2D-12)
8) As necessary, adjust the tire balance. ☞(Page 2D-15)

Wheel Rim / Air Valve Inspection and Cleaning

BENM10L32406012

Refer to "Tire Removal and Installation" (Page 2D-13).
Refer to "Air Valve Removal and Installation" (Page 2D-14).

Wheel Rim

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. ☞(Page 2D-11)

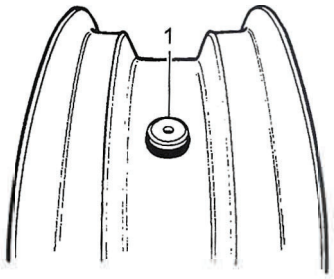
Wheel rim size
Front [Standard]: 17M/C × MT 3.50
Rear [Standard]: 17M/C × MT 6.00



I649G1240041-02

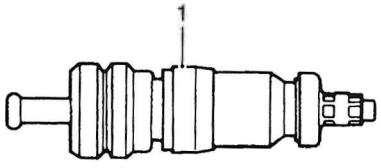
Air Valve

Inspect the air valve (1) for peeling and damage. If any defect is found, replace the air valve with a new one.



IE31J1240038-01

Inspect the valve core seal (1) for wear and damage. If any defect is found, replace the valve core with a new one.



I649G1240045-02

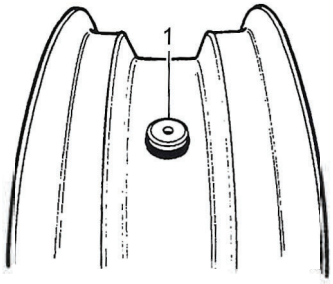
Air Valve Removal and Installation

BENM10L32406013

Refer to "Tire Removal and Installation" (Page 2D-13).

Removal

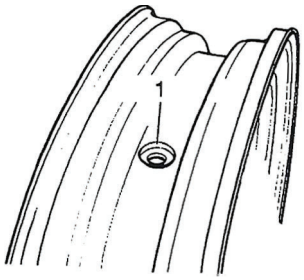
1) Remove the air valve (1) from the wheel.



IE31J1240038-01

Installation

1) Clean off the dirt around the valve hole (1).

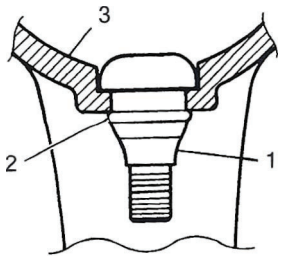


IE31J1240041-01

2) Install the new air valve (1) into the air valve hole with a special tire lubricant or neutral soapy liquid applied at the valve lip (2).

NOTICE

Be careful not to damage the valve lip of the air valve.



ID26J1240049-02

3. Wheel

Wheel Balance Check and Adjustment

BENM10L32406014

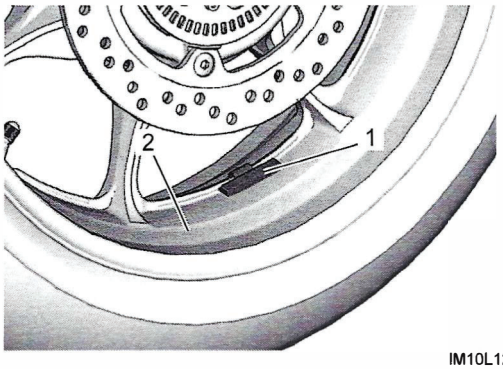
Refer to "Rear Wheel Assembly Removal and Installation" (Page 2D-8).
Refer to "Rear Sprocket Mounting Drum Assembly Removal and Installation" in Section 3A (Page 3A-6).

1) 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.

2) When installing the balancer weight (1) to the wheel (2), set the balancer weight on center rib of the wheel.



IM10L1240035-03

3) Recheck the wheel balance.

Specifications

Tightening Torque Specifications

BENM10L32407001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front axle nut	100	10.2	74.0	☞(Page 2D-4)
Front axle pinch bolt	23	2.3	17.0	☞(Page 2D-4) / ☞(Page 2D-4)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Front Wheel Components" (Page 2D-2)
"Rear Wheel Components" (Page 2D-7)

Special Tools and Equipment

Recommended Service Material

BENM10L32408001

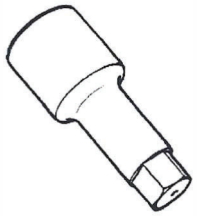
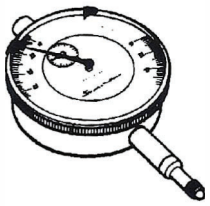
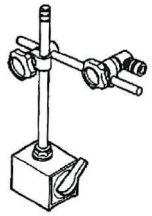
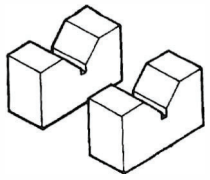
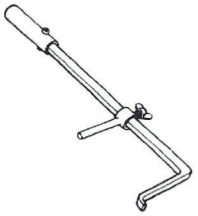
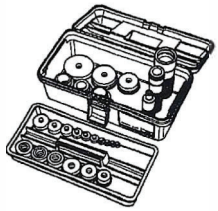
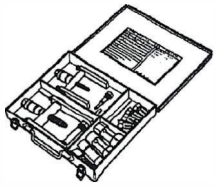
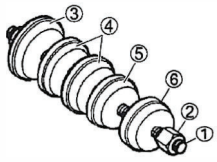
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A	P/No.: 99000–25010	☞(Page 2D-6)
	SUZUKI SUPER GREASE A	P/No.: 99000–25011	☞(Page 2D-5) / ☞(Page 2D-10) / ☞(Page 2D-10)

NOTE

Required service material(s) is also described in:
"Front Wheel Components" (Page 2D-2)
"Rear Wheel Components" (Page 2D-7)

Special Tool

BENM10L32408002

09900–18740 Hexagon bit socket (24 mm: 1/2 sq.) ☞(Page 2D-4)		09900–20607 Dial gauge (10 x 0.01 mm) ☞(Page 2D-11) / ☞(Page 2D-11)	
09900–20701 Dial gauge chuck ☞(Page 2D-11)		09900–21304 V blocks ☞(Page 2D-11)	
09913–50121 Oil seal remover ☞(Page 2D-4) / ☞(Page 2D-9)		09913–70210 Bearing installer set ☞(Page 2D-5) / ☞(Page 2D-10)	
09921–20240 Bearing remover set ☞(Page 2D-4) / ☞(Page 2D-9)		09924–84510 Bearing installer set ☞(Page 2D-5) / ☞(Page 2D-10)	
09941–34513 Bearing installer set ☞(Page 2D-10)			

Section 3

Driveline / Axle

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Precautions

Precautions

Precautions for Driveline / Axle

BENM10L33000001

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 any similar solvent. These fluids will damage the seal rings of the drive chain.**
- **Clean the drive chain with a spray-type chain cleaner and blow dry with compressed air. 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 seal rings.**
- **When drive chain replacement is necessary, the original equipment type drive chain should be used.**

Drive Chain / Drive Train / Drive Shaft

Diagnostic Information and Procedures

Drive Chain and Sprocket Symptom Diagnosis

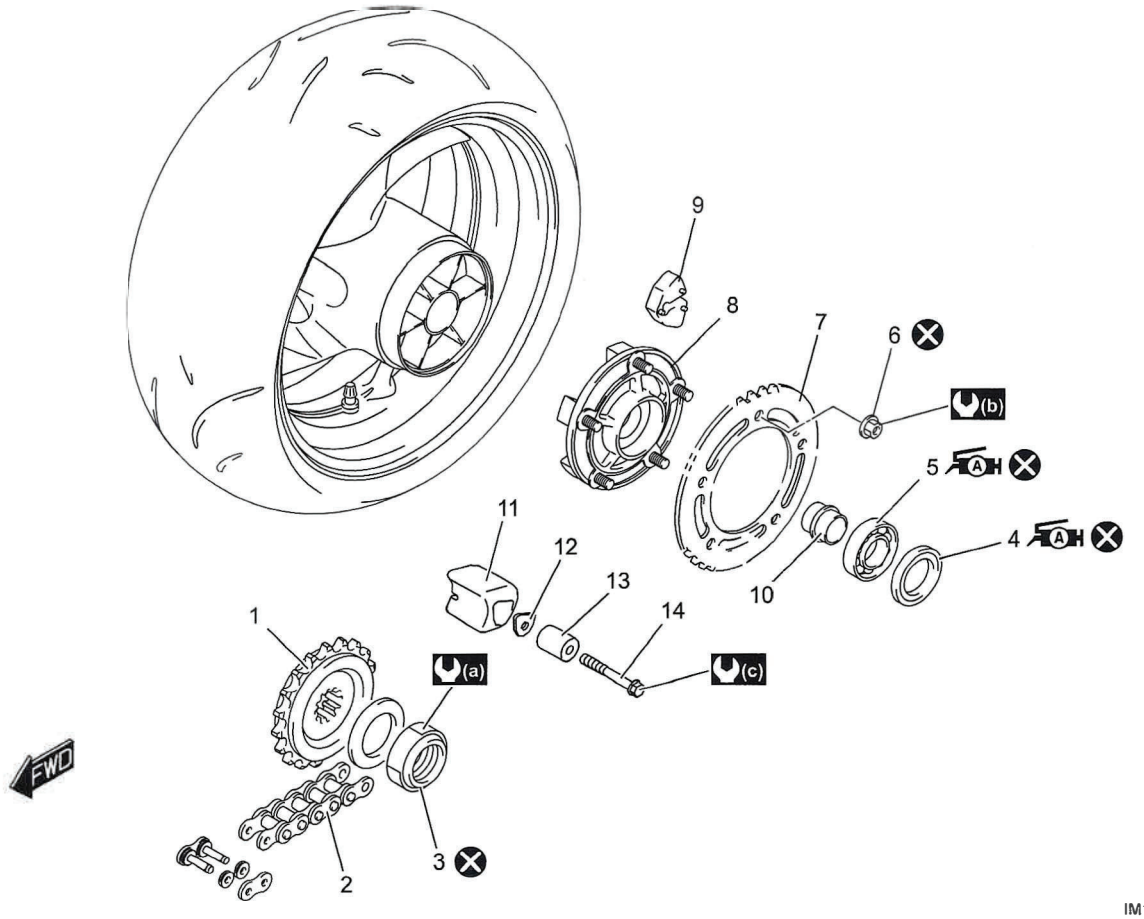
BENM10L33104001

Condition	Possible cause	Correction / Reference Item
Noisy Drive Chain	Worn sprocket.	*Replace. ☞(Page 3A-3)* *☞(Page 3A-5)*
	Worn drive chain.	*Replace. ☞(Page 3A-8)*
	Stretched drive chain.	*Replace. ☞(Page 3A-8)* *Replace. ☞(Page 3A-5)*
	Too large drive chain slack.	*Adjust. ☞(Page 3A-3)* *Replace. ☞(Page 3A-5)*
	Drive chain out of adjustment.	*Adjust. ☞(Page 3A-3)* *Replace. ☞(Page 3A-5)*
	Worn gear shift cover protector.	*Replace. ☞(Page 3A-5)*

Repair Instructions

Drive Chain Related Components

BENM10L33106001

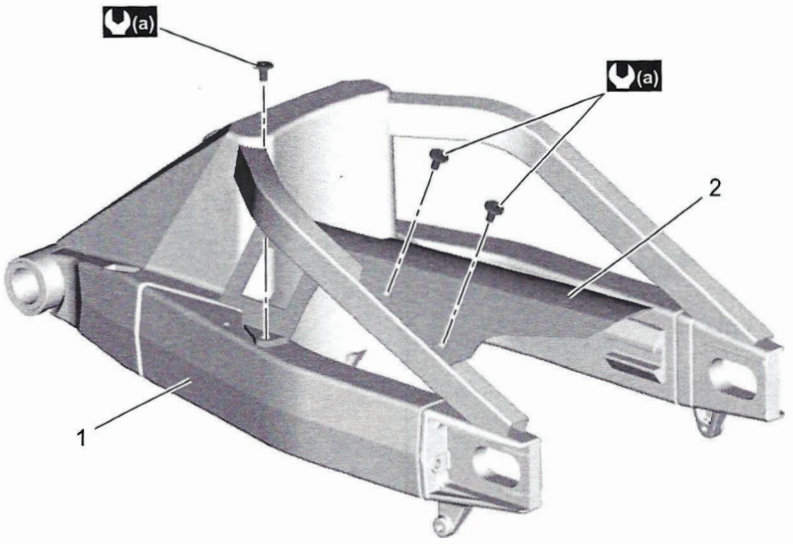


IM10L1310017-01

1. Engine sprocket	8. Rear sprocket mounting drum	(a) : 150 N·m (15.3 kgf-m, 111.0 lbf-ft)
2. Drive chain	9. Wheel damper	(b) : 60 N·m (6.1 kgf-m, 44.5 lbf-ft)
3. Engine sprocket nut	10. Retainer	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
4. Dust seal	11. Gear shift cover protector	A : Apply grease.
5. Bearing	12. Plate	⊗ : Do not reuse.
6. Rear sprocket nut	13. Spacer	
7. Rear sprocket	14. Gear shift cover protector bolt	

Chain Case Construction

BENM10L33106002



IM10L1310001-02

1. Swingarm	(a) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
2. Chain case	

Drive Chain Inspection and Adjustment

BENM10L33106003

Refer to "Inspection" and "Adjustment" under "Drive Chain" in Section 0B (Page 0B-18). And if necessary, replace the drive chain with a new one.

Drive Chain Cleaning and Lubricating

BENM10L33106004

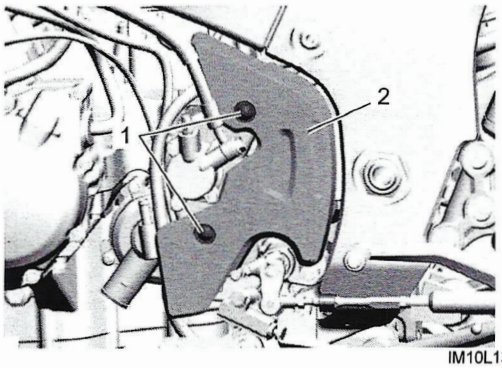
Refer to "Cleaning and Lubricating" under "Drive Chain" in Section 0B (Page 0B-18).

Engine Sprocket Removal and Installation

BENM10L33106005

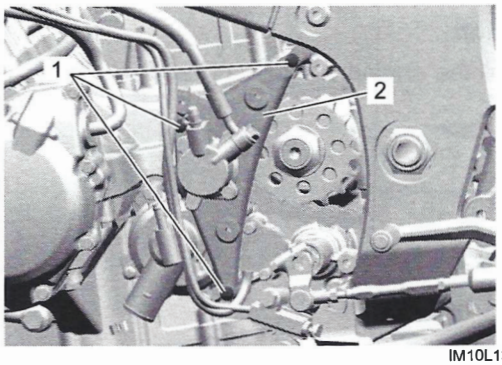
Removal

1) Remove the side cowling assembly (LH). Refer to "Side Cowling Assembly Removal and Installation" in Section 9D (Page 9D-37).
2) Remove the engine sprocket cover bolts (1) engine sprocket cover (2).



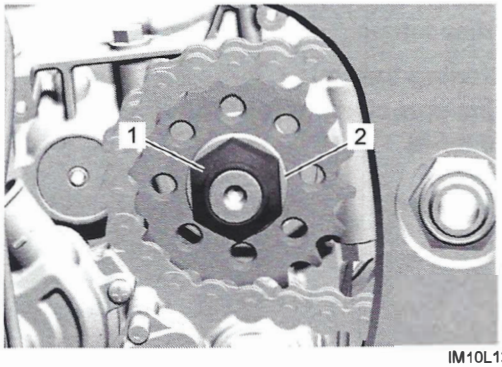
IM10L1310005-02

3) Remove the clutch release cylinder holder bolts (1) and move the clutch release cylinder holder (2).



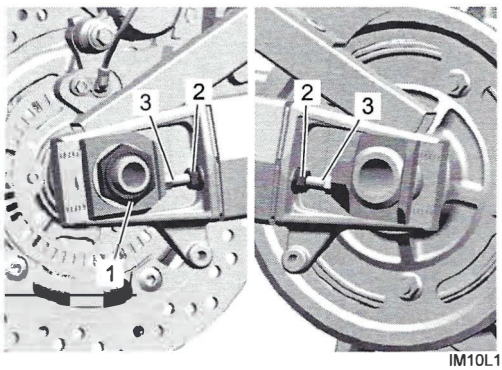
IM10L1310006-01

4) Remove the engine sprocket nut (1) while depressing the rear brake pedal.
5) Remove the washer (2).



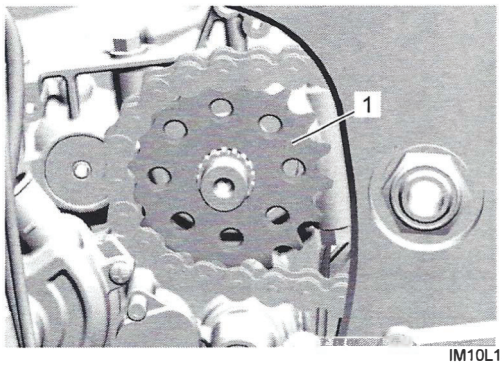
IM10L1310007-01

6) Loosen the rear axle nut (1).
7) Support the motorcycle with a jack or wooden block.
8) Loosen the left and right lock-nuts (2) and turn in the adjuster bolts (3) to provide additional chain slack.



IM10L1310002-02

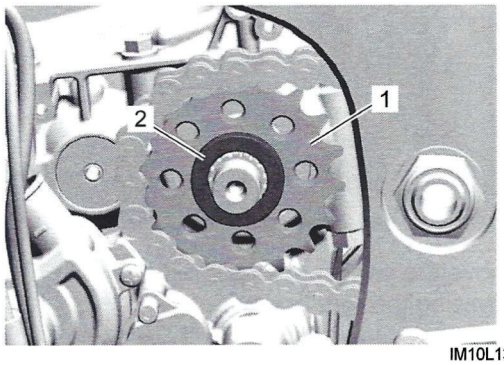
9) Remove the engine sprocket (1).



IM10L1310008-01

Installation

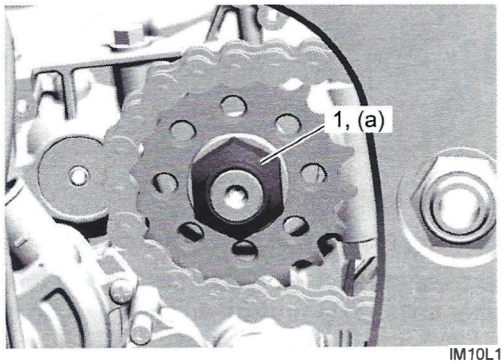
1) Install the engine sprocket (1) and washer (2).



IM10L1310009-01

2) Tighten the new engine sprocket nut (1) to the specified torque.

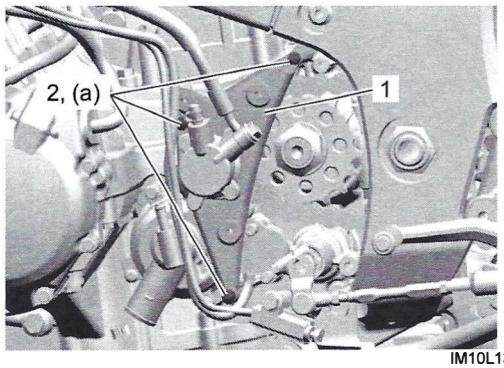
Tightening torque
Engine sprocket nut (a): 150 N·m (15.3 kgf-m, 111.0 lbf-ft)



IM10L1310010-01

3) Install the clutch release holder (1) and tighten the clutch release holder bolt (2) to the specified torque.

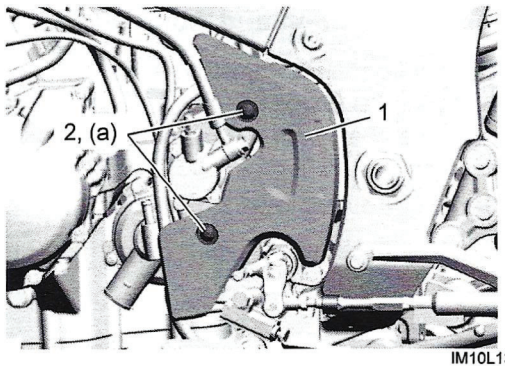
Tightening torque
Engine sprocket cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1310018-01

4) Install the engine sprocket cover and tighten the engine sprocket cover bolt (1) to the specified torque.

Tightening torque
Engine sprocket cover bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



IM10L1310019-01

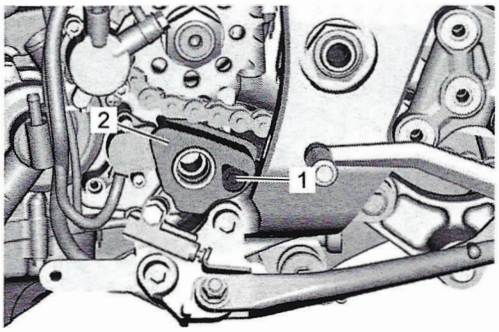
5) Adjust the drive chain slack. Refer to "Drive Chain Inspection and Adjustment" (Page 3A-3).

Gear Shift Cover Protector Removal and Installation

BENM10L33106006

Removal

1) Remove the engine sprocket cover. ☞(Page 3A-3)
2) Remove the gearshift link arm. ☞(Page 5B-18)
3) Remove the gear shift cover protector bolt (1) and remove the gear shift cover protector (2).



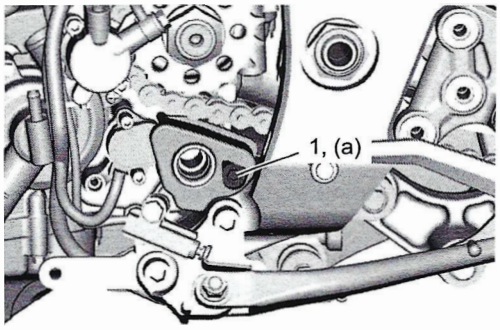
IM10L2310001-01

Installation

Install the gear shift cover protector in the reverse order of removal.
Pay attention to the following point:

- Tighten the gear shift cover protector bolt (1) to the specified torque.

Tightening torque
Gear shift cover protector bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L2310002-01

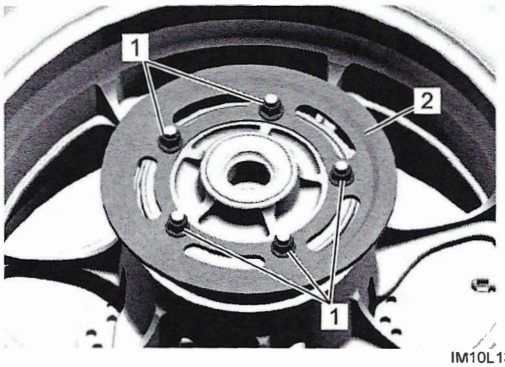
Rear Sprocket Removal and Installation

BENM10L33106007

Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-8).

Removal

1) Remove the rear sprocket bolts (1) and remove the rear sprocket (2).



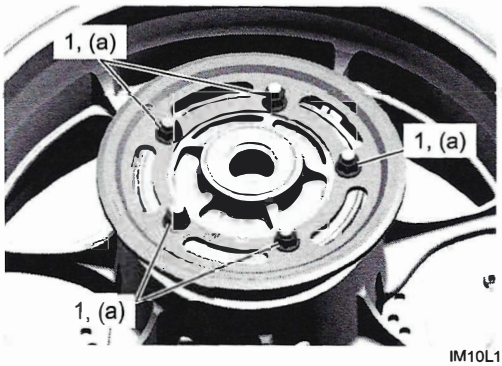
IM10L1310011-01

Installation

Install the rear sprocket in the reverse order of removal.
Pay attention to the following point:

- Tighten the new rear sprocket nuts (1) to the specified torque.

Tightening torque
Rear sprocket nut (a): 60 N·m (6.1 kgf-m, 44.5 lbf-ft)



IM10L1310012-01

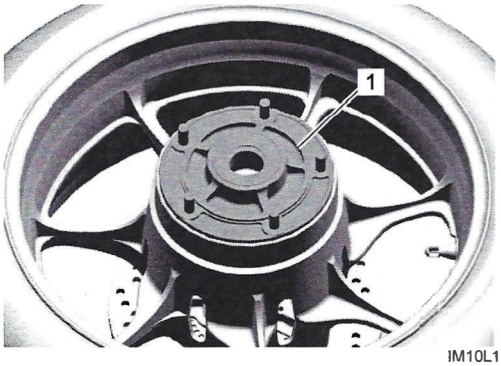
Rear Sprocket Mounting Drum Assembly Removal and Installation

BENM10L33106008

Refer to "Rear Sprocket Removal and Installation" (Page 3A-5).

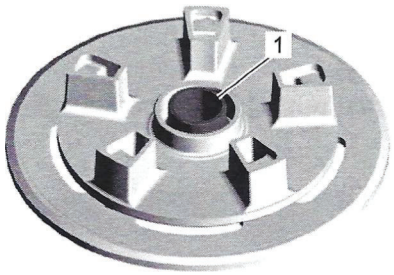
Removal

1) Remove the rear sprocket mounting drum assembly (1).



IM10L1310013-02

2) Remove the retainer (1).



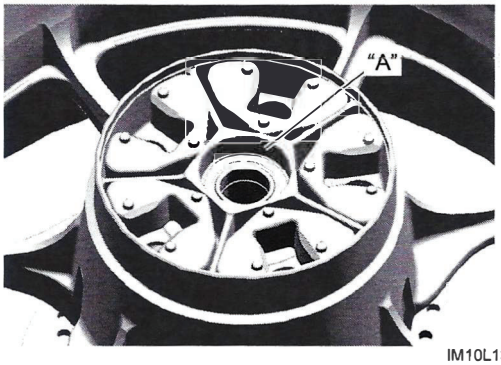
IM10L1310014-01

Installation

Install the rear sprocket mounting drum assembly in the reverse order of removal. Pay attention to the following point:

- Apply grease to the contacting surface between the rear wheel hub and rear sprocket mounting drum.

  "A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1310015-02

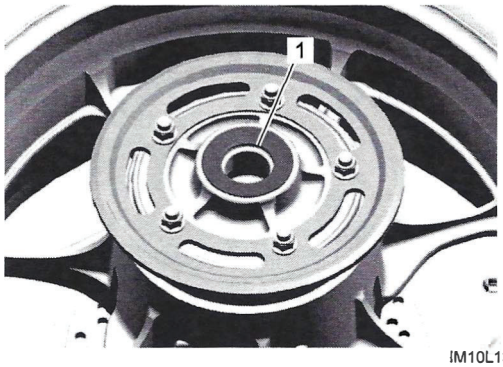
Rear Sprocket Mounting Drum / Sprocket Inspection

BENM10L33106009

Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-8).

Dust Seal

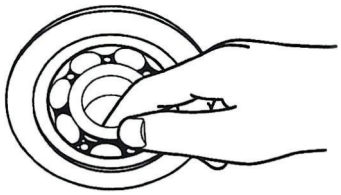
Inspect the sprocket mounting drum dust seal lip (1) for wear or damage. If any damage is found, replace the dust seal with a new one. ☞(Page 3A-7)



IM10L1310016-01

Bearing

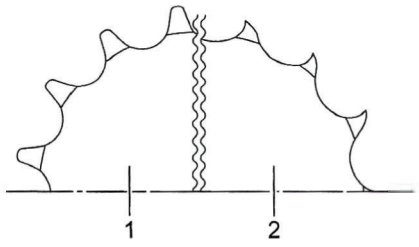
Inspect the play of the sprocket mounting drum bearing by hand while they are in the drum. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual. ☞(Page 3A-7)



I649G1310015-03

Sprocket

1) Remove the engine sprocket cover. (Engine sprocket only) ☞(Page 3A-3)
2) Inspect the sprocket teeth for wear. If they are worn as shown, replace the engine sprocket, rear sprocket and drive chain as a set.
   - Engine: ☞(Page 3A-3)
   - Rear: ☞(Page 3A-5)
   - Drive chain: ☞(Page 3A-8)



IE31J1310022-02

1. Normal wear	2. Excessive wear

3) Install the engine sprocket cover. (Engine sprocket only) ☞(Page 3A-3)

Wheel Damper
Refer to "Rear Wheel Damper Inspection" in Section 2D (Page 2D-12).

Drive Chain
Refer to "Drive Chain Inspection and Adjustment" (Page 3A-3).

Rear Sprocket Mounting Drum Dust Seal / Bearing Removal and Installation

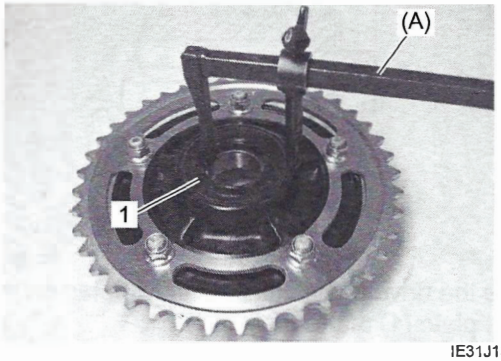
BENM10L33106010

Refer to "Rear Sprocket Mounting Drum Assembly Removal and Installation" (Page 3A-6).

Removal

1) Remove the dust seal (1) using the special tool.

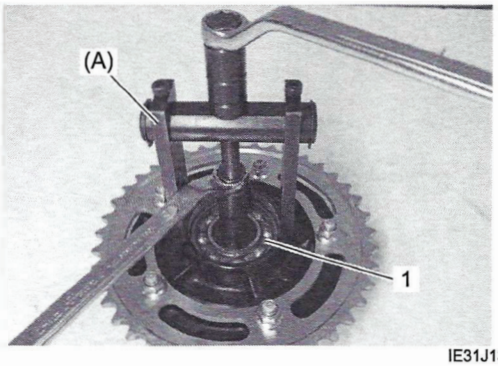
Special tool
(A): 09913–50121



IE31J1310023-01

2) Remove the bearing (1) with the special tool.

Special tool
(A): 09921–20240



IE31J1310024-01

Installation

1) Apply grease to the new bearing.

Grease 99000–25011 (SUZUKI SUPER GREASE A)



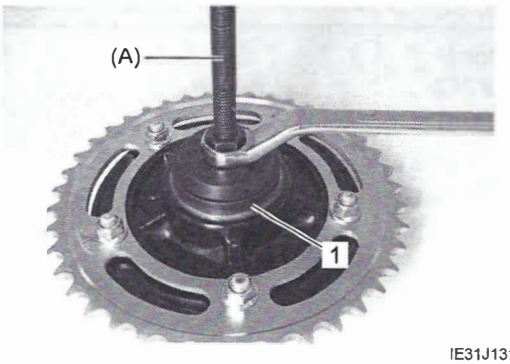
I649G1310020-02

2) Install the bearing (1) with the special tool.

NOTICE

The sealed cover of the bearing must face inside.

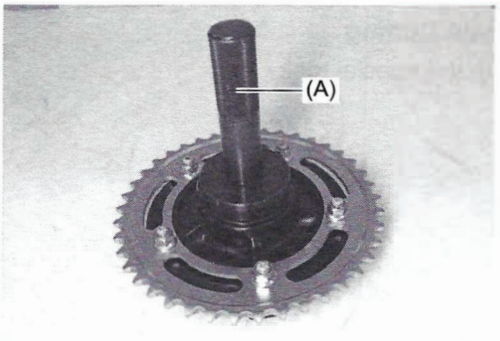
Special tool
(A): 09924–84510



IE31J1310025-01

3) Install a new dust seal (1) with the special tool.

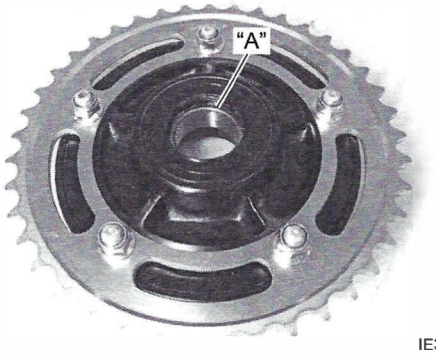
Special tool
(A): 09913–70210



IE31J1310026-01

4) Apply grease to the dust seal lip.

"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IE31J1310027-01

Drive Chain Replacement

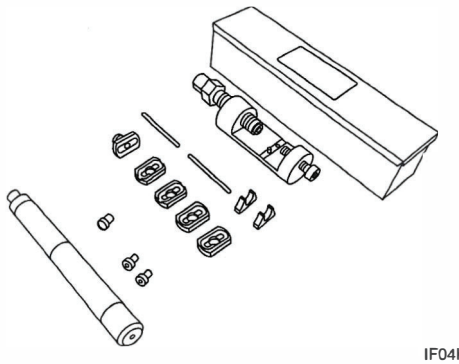
BENM10L33106011

Use the special tool in the following procedure, 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.

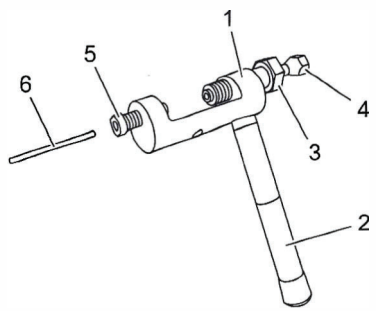
Special tool
09922–22712



IF04K1310024-02

Drive Chain Cutting

1) Set up the special tool.

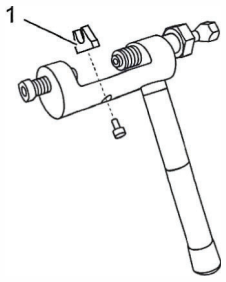


IF04K1310025-03

1. Tool body	4. Pressure bolt B
2. Grip handle	5. Adjuster bolt
3. Pressure bolt A	6. Cutting pin

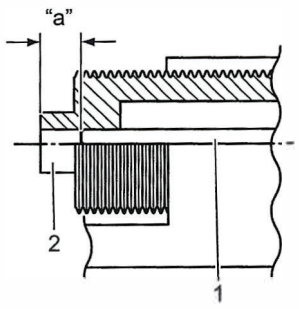
2) Select the correct guide plate (1) from table below, and mount it to the tool body.

Drive chain size	Guide plate
520, 525, 530 (50)	500
532	532



IF04K1310033-02

3) The tip of cutting pin (1) should be positioned inside "a" approximately 5 mm (0.2 in) from the end face of pressure bolt A (2).

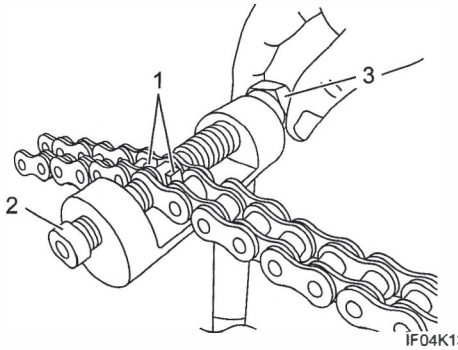


IE31J1310029-02

4) Place the drive chain link being disjointed on the guide plate (1) of the tool.

5) Turn in both the adjuster bolt (2) and pressure bolt A (3) so that each of their end hole fits over the joint pin properly.

6) Tighten the pressure bolt A (3).



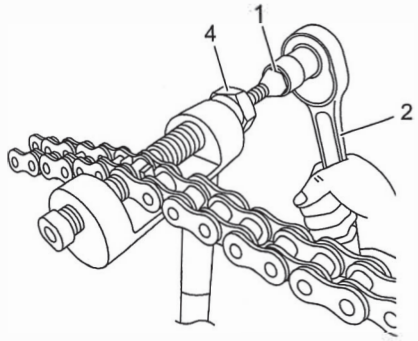
IF04K1310026-04

7) Turn in the pressure bolt B (1) with the wrench (2) and force out the joint pin (3).

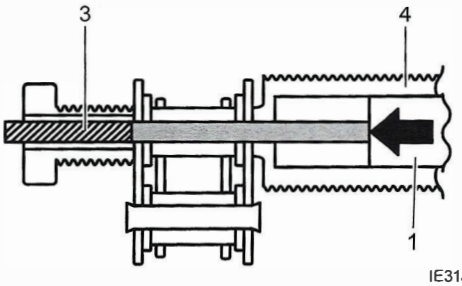
NOTE

Continue turning in the pressure bolt B (1) until the joint pin should been completely pushed out of the drive chain.

8) After the joint pin (3) is removed, loosen the pressure bolt B (1) and then pressure bolt A (4).



IF04K1310027-06



IE31J1310032-02

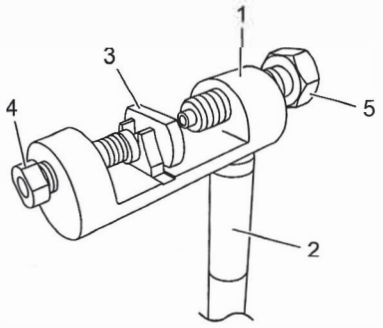
Drive Chain Connecting

⚠ 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.



IF04K1310028-05

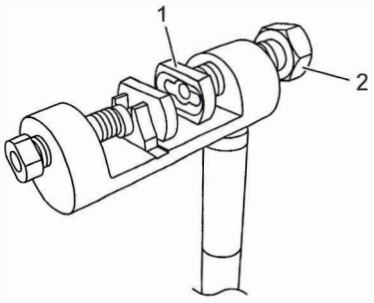
1. Tool body	4. Adjuster bolt
2. Grip handle	5. Pressure bolt A
3. Wedge holder	

2) Select the correct pressure holder (1) from table below, and set it to pressure bolt A (2).

Drive chain size / Type	Pressure holder
530 (50), 532 / Riveting type	F-50
520, 525 / Riveting type	F-520
530 (50), 532 / Clip type	C-50
520, 525 / Clip type	C-520

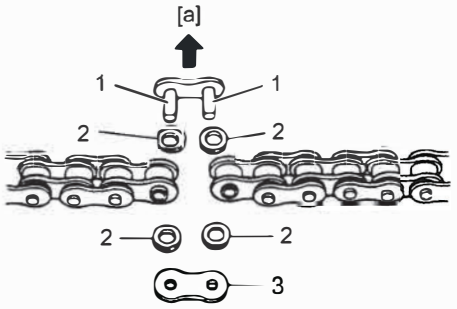
NOTE

In case joint plate is too large to fit on "520 pressure holder". Please select "50 pressure holder".



IF04K1310034-02

3) Connect both ends of the drive chain with the joint pins (1) inserted from the wheel side [a] as installed on the motorcycle.



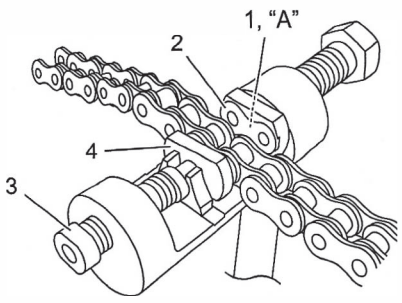
IF04K1310035-01

2. Seal ring	3. Joint plate

4) Apply grease on the recessed portion of the pressure holder (1). Then install the joint plate (2) on the tool, its stamp mark must face the pressure holder (1) side.

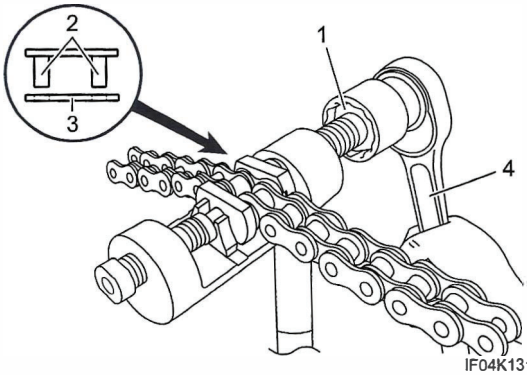
"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)

5) Set the drive chain on the tool as illustrated and turn in the adjuster bolt (3) to secure the wedge holder (4) with joint pin.



IF04K1310029-04

6) Turn in the pressure bolt A (1) and align two joint pins (2) properly with the respective holes of the joint plate (3).
7) Turn in the pressure bolt A (1) further using the wrench (4) to press the joint plate over the joint pins.



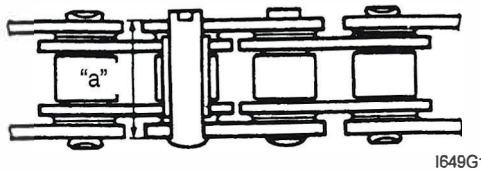
IF04K1310030-04

8) Continue pressing the joint plate until the distance "a" between the two joint plates come to the specification.

Joint plate distance specification
[Standard]: 21.85 – 22.15 mm (0.8602 – 0.8720 in)

NOTICE

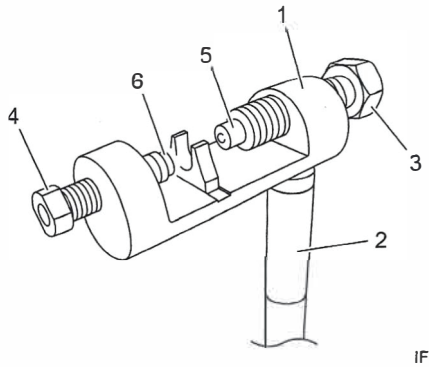
If pressing of the joint plate makes the dimension out of specification excessively, the work must be carried out again by using new joint parts.



I649G1310033-03

Joint pin staking

1) Set up the special tool.



IF04K1310031-03

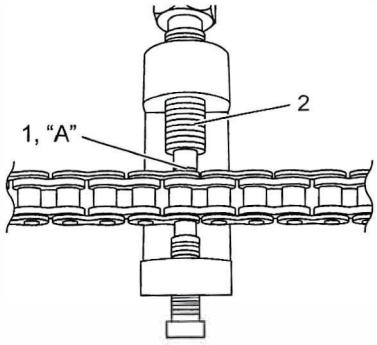
1. Tool body	4. Adjuster bolt
2. Grip handle	5. Flare pin
3. Pressure bolt A	6. Back-up pin

2) Apply grease to the flare pin (1).

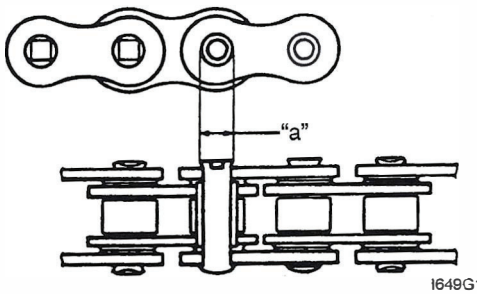
"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)

3) Stake the joint pin by turning (approximately 7/8 turn) the pressure bolt A (2) until the pin end diameter "a" becomes the specified dimension.
4) After joining of the drive chain has been completed, check to make sure that the link is smooth and no abnormal condition (no cracked joint pin, etc) is found.

Pin end diameter specification
[Standard]: 5.45 – 5.80 mm (0.2146 – 0.2283 in)



IF04K1310032-03



I649G1310036-03

5) Adjust the drive chain slack, after connecting it. Refer to "Drive Chain Inspection and Adjustment" (Page 3A-3).

Specifications

Tightening Torque Specifications

BENM10L33107001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Engine sprocket nut	150	15.3	111.0	☞(Page 3A-4)
Engine sprocket cover bolt	10	1.0	7.5	☞(Page 3A-4)
Engine sprocket cover bolt	5.5	0.56	4.05	☞(Page 3A-4)
Gear shift cover protector bolt	10	1.0	7.5	☞(Page 3A-5)
Rear sprocket nut	60	6.1	44.5	☞(Page 3A-5)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Drive Chain Related Components" (Page 3A-2)
"Chain Case Construction" (Page 3A-3)

Special Tools and Equipment

Recommended Service Material

BENM10L33108001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A	P/No.: 99000–25011	☞(Page 3A-6) / ☞(Page 3A-7) / ☞(Page 3A-8) / ☞(Page 3A-9) / ☞(Page 3A-10)

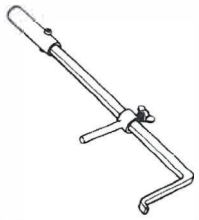
NOTE

Required service material(s) is also described in:
"Drive Chain Related Components" (Page 3A-2)

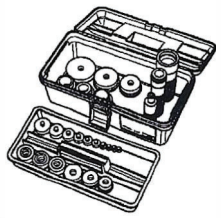
Special Tool

BENM10L33108002

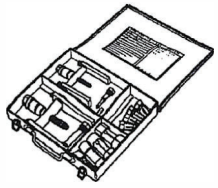
09913–50121
Oil seal remover
☞(Page 3A-7)



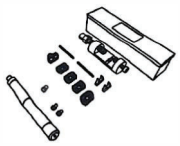
09913–70210
Bearing installer set
☞(Page 3A-7)



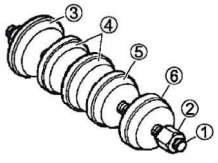
09921–20240
Bearing remover set
☞(Page 3A-7)



09922–22712
Drive chain cut / rivet tool set
☞(Page 3A-8)



09924–84510
Bearing installer set
☞(Page 3A-7)



Section 4

Brakes

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Precautions

Precautions

Precautions for Brake System

BENM10L34000001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2) and "Precautions for Circuit Tester" in Section 00 (Page 00-8).

Brake Fluid Information

BENM10L34000002

⚠ 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.**
- **After removal and installation of the brake caliper, master cylinder, brake hose and ABS control unit / HU, be sure to carry out the air bleeding operation.**
- **Brake hose seal washers should be replaced with the new ones to prevent fluid leakage.**

NOTICE

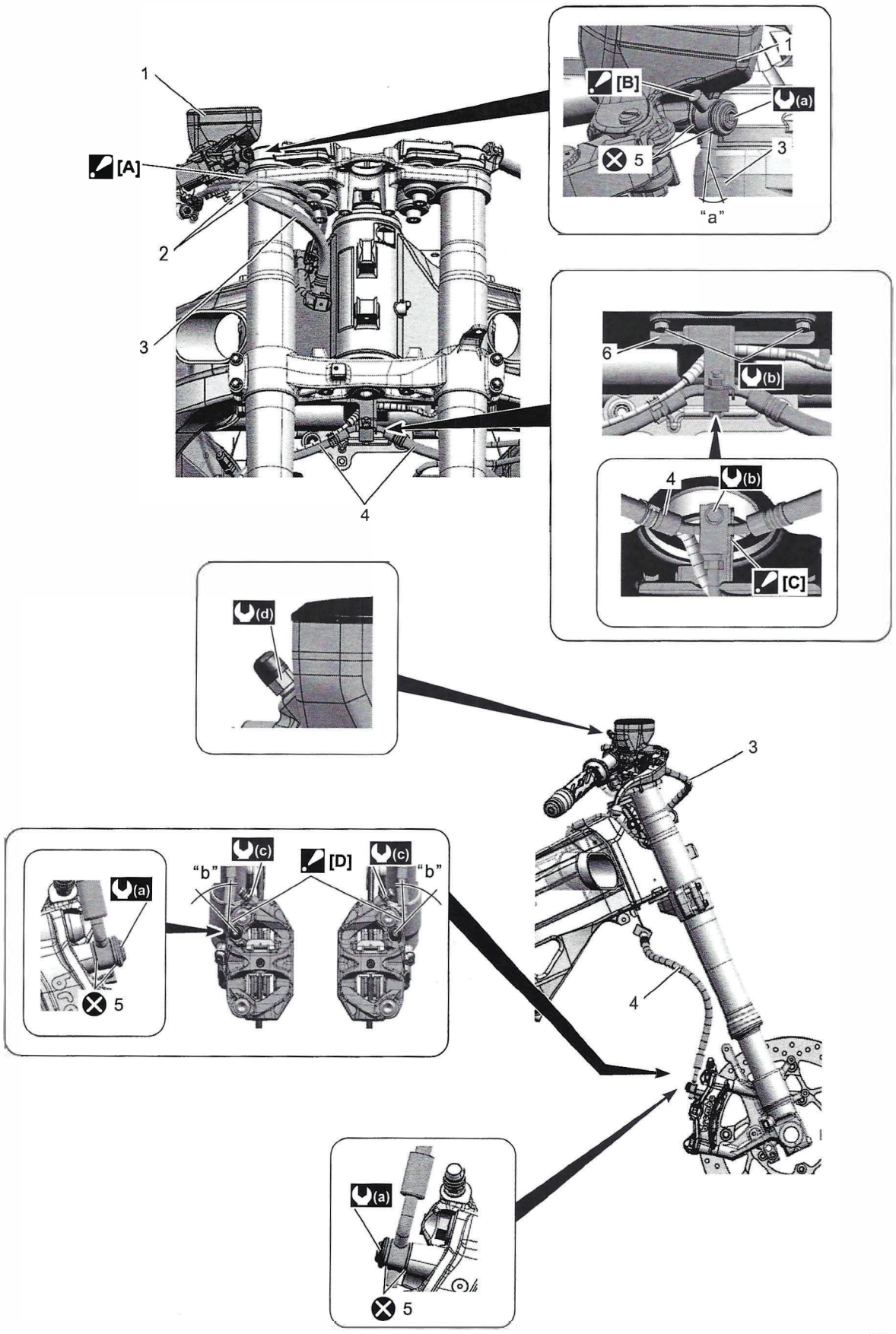
The brake fluid is damaging to painted surfaces, plastics and rubber materials, and do not allow the fluid to spill on the surrounding parts.
If the fluid is spilled, flush it with water immediately.

Brake Control System and Diagnosis

Schematic and Routing Diagram

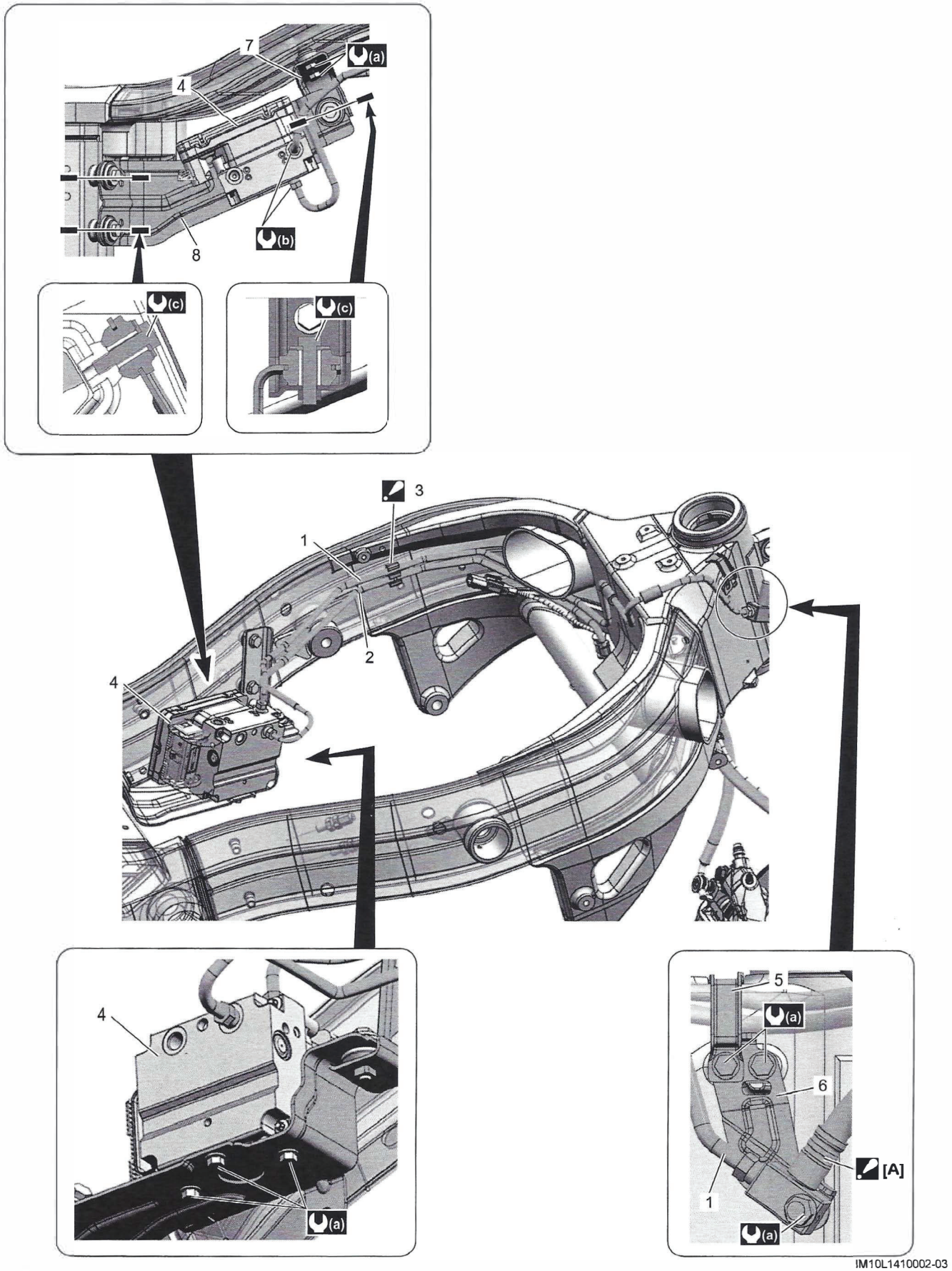
Front Brake Hose Routing Diagram

BENM10L34102001



IM10L1410001-04

[A]: Pass the front brake hose to the rear of the throttle cables.	3. Front brake hose (master cylinder to ABS control unit / HU)	(c) : 8.5 N·m (0.87 kgf-m, 6.30 lbf-ft)
[B]: After the brake hose union has contacted to the master cylinder, tighten the union bolt to the specified torque.	4. Front brake hose (ABS control unit / HU to front brake caliper)	(d) : 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)
[C]: After the pipe of front brake hose contacted the stopper of the brake hose bracket, tighten the bolt to the specified torque.	5. Seal washer	"a": 45°
[D]: After the brake hose union has contacted the stopper of the front brake caliper, tighten the union bolt to the specified torque.	6. Brake hose bracket	"b": 40°
1. Front brake master cylinder	(a) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)	⊗ : Do not reuse.
2. Throttle cable	(b) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)	

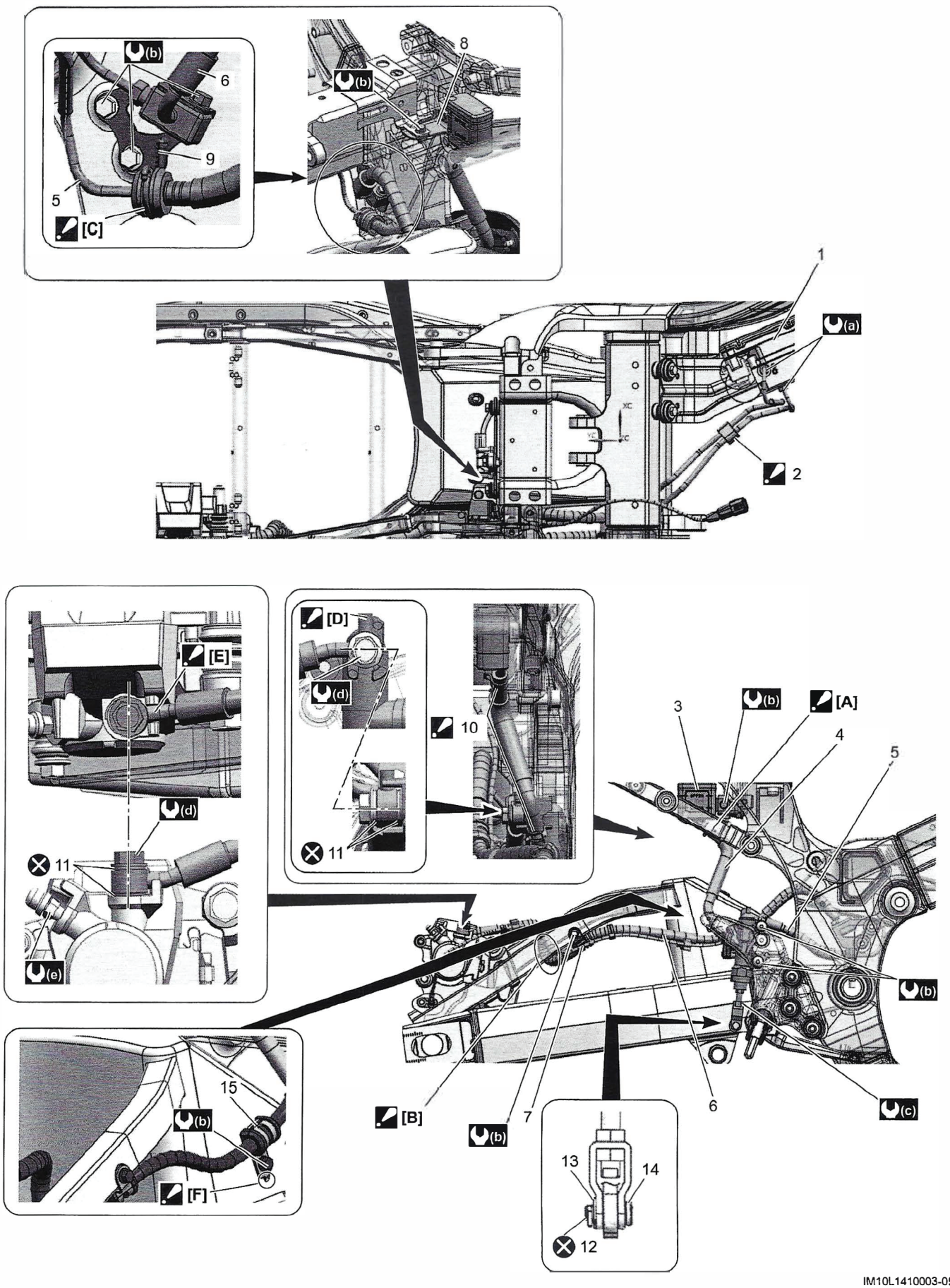


IM10L1410002-03

[A]: Install the front brake hose in the direction shown in the figure.	4. ABS control unit / HU	8. ABS control unit / HU holder
1. Front brake hose (master cylinder to ABS control unit / HU)	5. Cable guide	(a) : 8.0 N·m (0.82 kgf-m, 5.90 lbf-ft)
2. Front brake hose (ABS control unit / HU to front brake caliper)	6. Front brake hose bracket	(b) : 16 N·m (1.6 kgf-m, 12.0 lbf-ft)
3. Clamp : Clamp to the marking position of brake pipes.	7. ABS control unit / HU holder bracket	(c) : 12 N·m (1.2 kgf-m, 9.0 lbf-ft)

Rear Brake Hose Routing Diagram

BENM10L34102002



IM10L1410003-05

[A]: Face the paint mark of rear brake hose to the outside.	4. Rear brake master cylinder reservoir hose	13. Washer
[B]: Pass the rear brake hose to the inside of swing arm.	5. Rear brake hose (master cylinder to ABS control unit / HU)	14. Pin
[C]: Install the brake hose into the brake hose guide.	6. Rear brake hose (ABS control unit / HU to rear brake caliper)	15. Clamp
[D]: After the brake hose union has contacted the stopper of the rear brake master cylinder, tighten the union bolt to the specified torque.	7. Clamp	(o) : 16 N·m (1.6 kgf-m, 12.0 lbf-ft)
[E]: After the brake hose union has contacted the stopper of the rear brake caliper, tighten the union bolt to the specified torque.	8. Rear brake master cylinder reservoir bracket	(o) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[F]: Install the projection of clamp to the hole.	9. Rear brake hose guide	(o) : 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
1. ABS control unit / HU	10. Clamp : Assemble the clamp in the direction as shown in figure.	(o) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
2. Clamp : Clamp to the marking position of brake pipes.	11. Seal washer	(o) : 8.0 N·m (0.82 kgf-m, 5.90 lbf-ft)
3. Rear brake master cylinder reservoir	12. Cotter pin	⊗ : Do not reuse.

Diagnostic Information and Procedures

Brake Symptom Diagnosis

BENM10L34104001

Condition	Possible cause	Correction / Reference Item
Insufficient brake power	Leakage of brake fluid from hydraulic system.	*Repair or replace.*
	Worn pads and/or disc.	*Replace.* *☞(Page 4B-2)* *☞(Page 4C-2)* *☞(Page 4B-5)* *☞(Page 4C-6)*
	Oil adhesion on friction surface of pads.	*Clean disc and pads.*
	Air in hydraulic system.	*Bleed air. ☞(Page 4A-11)*
	Not enough brake fluid in the reservoir.	*Replenish. ☞(Page 4A-10)*
	Excessive brake pedal play.	*Adjust. ☞(Page 0B-20)*
Brake squeaking	Carbon adhesion on pad surface.	*Repair surface with sandpaper.*
	Tilted pad.	*Correct pad fitting or replace. ☞(Page 4B-2)* *☞(Page 4C-2)*
	Damaged wheel bearing.	*Replace. ☞(Page 2D-4)* *☞(Page 2D-9)*
	Loose front wheel axle or rear wheel axle.	*Tighten to specified torque. ☞(Page 0B-29)*
	Worn pads and/or disc.	*Replace.* *☞(Page 4B-2)* *☞(Page 4C-2)* *☞(Page 4B-5)* *☞(Page 4C-6)*
	Foreign material in brake fluid.	*Replace brake fluid. ☞(Page 4A-14)*
	Clogged return port of master cylinder.	*Disassemble and clean master cylinder.*
Excessive brake lever stroke	Air in hydraulic system.	*Bleed air. ☞(Page 4A-11)*
	Insufficient brake fluid.	*Replenish fluid to specified level. ☞(Page 4A-10)*
	Improper quality of brake fluid.	*Replace with correct fluid. ☞(Page 4A-14)*
Leakage of brake fluid	Insufficient tightening of connection joints.	*Tighten to specified torque. ☞(Page 0B-29)*
	Cracked hose.	*Replace.* *☞(Page 4A-14)* *☞(Page 4A-14)*
	Worn master cylinder piston and/or cup.	*Replace master cylinder piston and/or cup.* *☞(Page 4A-16)* *☞(Page 4A-22)*
	Worn brake caliper piston seal and dust seal.	*Replace brake caliper piston seal and dust seal.* *☞(Page 4B-3)* *☞(Page 4C-3)*
Brake drags	Rusty part.	*Clean and lubricate. ☞(Page 0B-32)*
	Insufficient front brake lever or rear brake pedal pivot lubrication.	*Lubricate. ☞(Page 0B-32)*

Repair Instructions

Front Brake Light Switch Inspection

BENM10L34106001

Refer to "Brakes" in Section 0B (Page 0B-20).

Rear Brake Light Switch Inspection

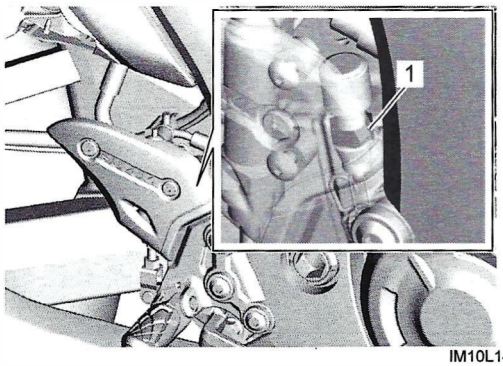
BENM10L34106002

Refer to "Brakes" in Section 0B (Page 0B-20).

Rear Brake Light Switch Inspection and Adjustment

BENM10L34106003

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.



IM10L1410004-02

Front Brake Light Switch Removal and Installation

BENM10L34106004

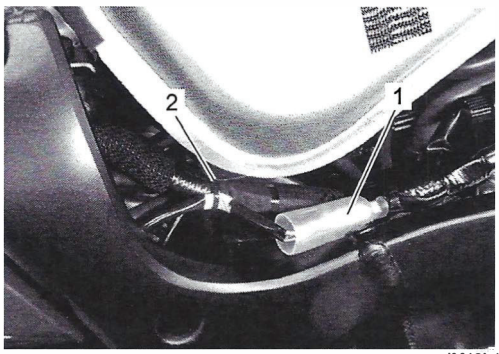
Refer to "Front Brake Master Cylinder Assembly / Brake Lever Disassembly and Reassembly" (Page 4A-16).

Rear Brake Light Switch Removal and Installation

BENM10L34106005

Removal

1) Lift and support the fuel tank. ☞(Page 1G-12)
2) Disconnect the rear brake light switch coupler (1).
3) Remove the clamp (2).



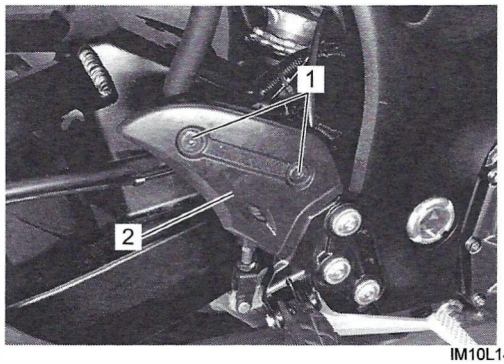
IM10L1410005-04

4) Loosen the rear brake master cylinder rod lock-nut (1).



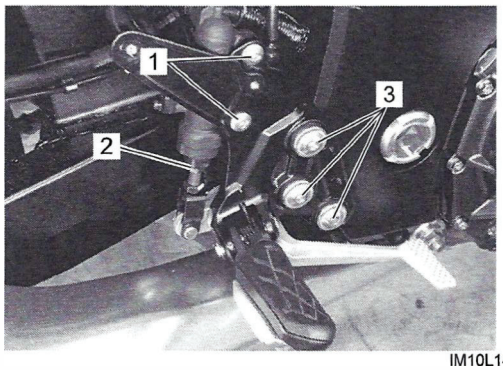
IM10L1410006-02

5) Remove the front footrest guard bolt (1) and front footrest guard (2).



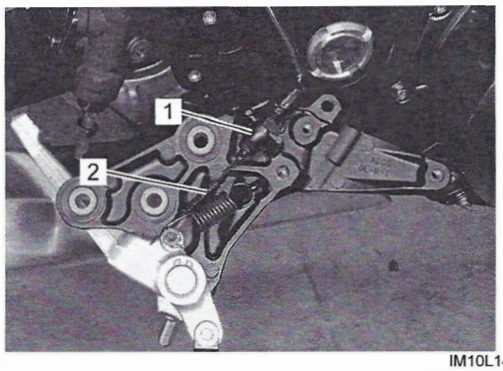
IM10L1410007-02

6) Remove the rear brake master cylinder bolts (1).
7) Remove the rear brake master cylinder from the brake pedal by turning the push rod (2).
8) Remove the front footrest bolts (3).



IM10L1410060-01

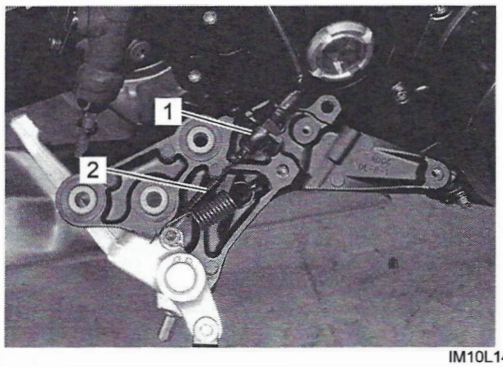
9) Remove the rear brake light switch (1) and spring (2) from the front footrest bracket.



IM10L1410009-04

Installation

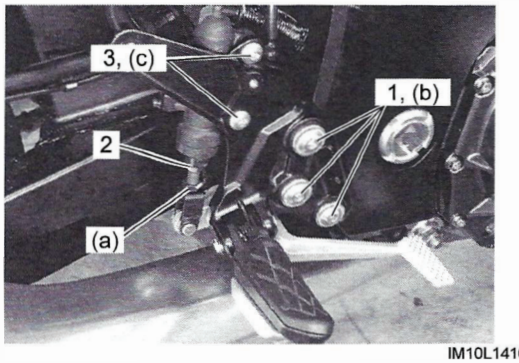
1) Install the rear brake light switch (1) to the front footrest bracket and hook the spring (2) in the correct direction. Refer to "Front Footrest Construction" in Section 9E (Page 9E-2).



IM10L1410009-04

2) Install the front footrest bolts (1).
3) Install the rear brake master cylinder to the brake pedal by turning the push rod (2).
4) Install the rear brake master cylinder mounting bolts (3).
5) Tighten the following bolt and nut to the specified torque.

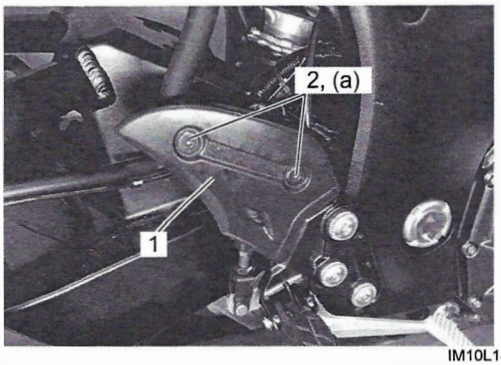
Tightening torque
Rear brake master cylinder rod lock-nut (a): 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
Front footrest bolt (b): 26 N·m (2.7 kgf-m, 19.5 lbf-ft)
Rear brake master cylinder mounting bolt (c): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1410061-01

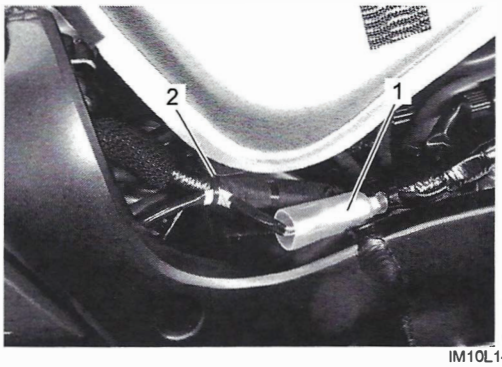
6) Install the footrest guard (1), and then tighten the footrest guard bolts (2) to the specified torque.

Tightening torque
Front footrest guard bolt (a): 5.0 N·m (0.51 kgf-m, 3.70 lbf-ft)



IM10L1410062-01

7) Route the rear brake light switch lead wire properly and bind the rear brake light switch and rear wheel speed sensor lead wires with the clamp. ☞(Page 9A-13)
8) Connect the rear brake light switch coupler (1).
9) Install the clamp (2).



IM10L1410005-04

10) Inspect the rear brake light switch. ☞(Page 4A-9)
11) Inspect the brake pedal height. ☞(Page 0B-20)
12) Install the fuel tank. ☞(Page 1G-12)

Brake Fluid Level Check

BENM10L34106006

Refer to "Brake Fluid" in Section 0B (Page 0B-22).

Brake Hose Inspection

BENM10L34106007

Refer to "Brakes" in Section 0B (Page 0B-20).

Rear Brake Pedal Construction

BENM10L34106008

Refer to "Front Footrest Construction" in Section 9E (Page 9E-2).

Brake Pedal Height Inspection and Adjustment

BENM10L34106009

Refer to "Brakes" in Section 0B (Page 0B-20).

Air Bleeding from Brake Line

BENM10L34106010

Air trapped in the brake lines acts like a cushion to absorb a large proportion of the pressure developed by the master cylinder and thus greatly reduces the braking force. The presence of air bubbles is indicated by a "spongy" feel in the brake lever and low braking force. This condition is extremely dangerous, and therefore the air must be bled every time after replacing any parts in the brake lines in the following manner.

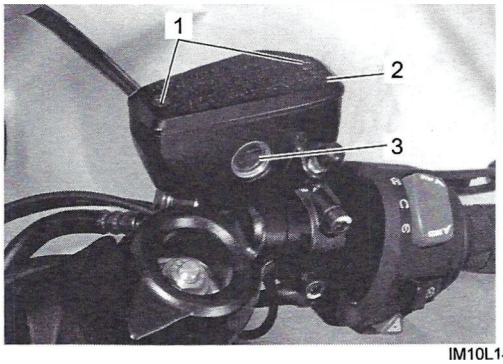
NOTE

It is essential to purge air from the fluid circuit before inspecting the function of the brake fluid pressure-decreasing mode. Without air bleeding, trapped air in the circuit will enter the HU.

Front Brake

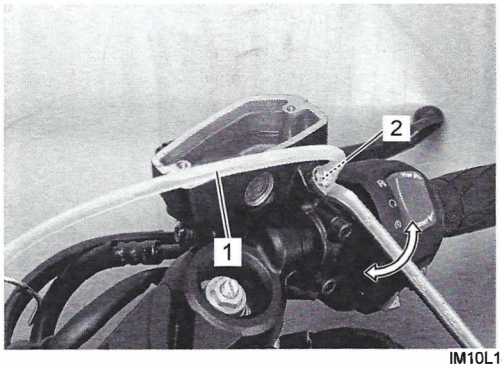
1) Place the motorcycle on a level surface and keep the handlebars straight.
2) Remove the reservoir cap screws (1), reservoir cap (2) and diaphragm from the front brake master cylinder reservoir.
3) Fill the reservoir with new brake fluid to the top of the inspection window (3). Place the reservoir cap to prevent dirt from entering.

Brake fluid (DOT 4)

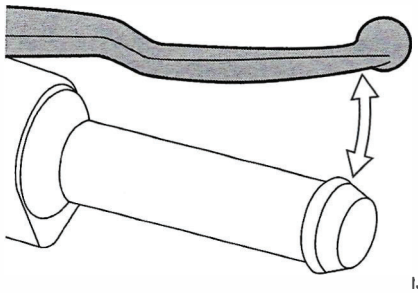


IM10L1410014-02

4) Attach a clear hose (1) to the front brake master cylinder air bleeder valve (2), and insert the free end of the hose into a receptacle.
5) Operate the brake lever several times and, while holding the lever gripped, loosen the front brake master cylinder air bleeder valve (2) and drain the brake fluid into the receptacle.



IM10L1410063-01



IJ27K1410061-01

6) Tighten the front brake master cylinder air bleeder valve and release the brake lever slowly.
7) Repeat the steps 5) and 6) until the fluid is flowing out without bubbles.

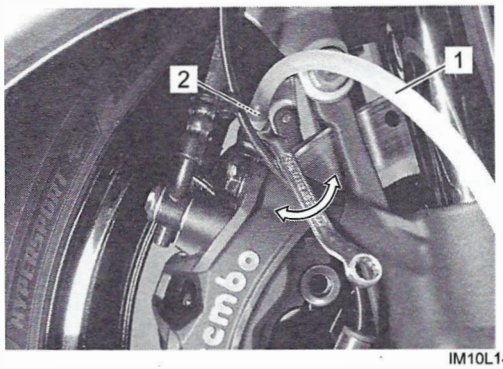
NOTE

While bleeding the brake system, replenish the reservoir with brake fluid as necessary to keep the fluid above the lower level.

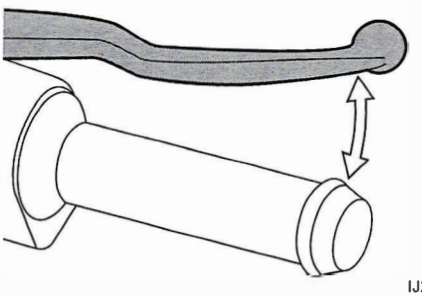
8) Remove the clear hose from the front brake master cylinder air bleeder valve.
9) Tighten the front brake master cylinder air bleeder valve to the specified torque.

Tightening torque
Front brake master cylinder air bleeder valve: 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)

10) Attach the clear hose (1) to the left side front brake caliper air bleeder valve (2), and insert the free end of the hose into a receptacle.
11) Operate the brake lever several times and, while holding the lever gripped, loosen the left brake caliper air bleeder valve (2) and drain brake fluid into a receptacle.



IM10L1410016-02



IJ27K1410061-01

12) Tighten the left brake caliper air bleeder valve and release the brake lever slowly.
13) Repeat the steps 11) and 12) until the fluid is flowing out without bubbles.

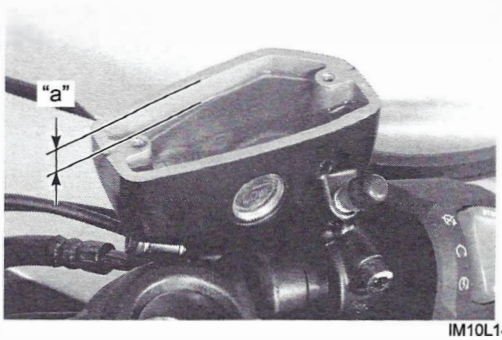
NOTE

While bleeding the brake system, replenish the reservoir with brake fluid as necessary to keep the fluid above the lower level.

14) Remove the clear hose from the brake caliper air bleeder valve.
15) Tighten the left brake caliper air bleeder valve to the specified torque.

Tightening torque
Front brake caliper air bleeder valve: 8.5 N·m (0.87 kgf-m, 6.30 lbf-ft)

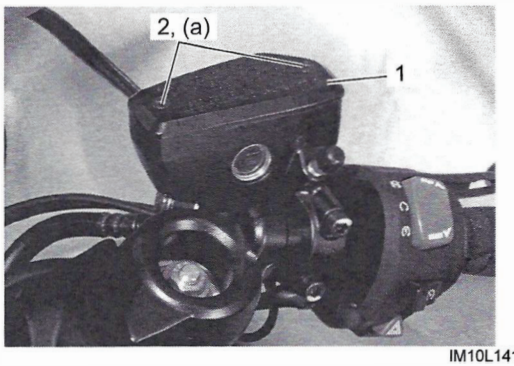
16) Bleed air from the right brake caliper side in the same manner as the left brake caliper side.
17) Fill the reservoir with brake fluid to the depth "a" of 8 mm (0.3 in) from the reservoir tank edge.



IM10L1410017-02

18) Install the diaphragm, reservoir cap (1) and reservoir cap screws (2) to the front brake master cylinder reservoir.
19) Tighten the reservoir cap screws (2) to the specified torque.

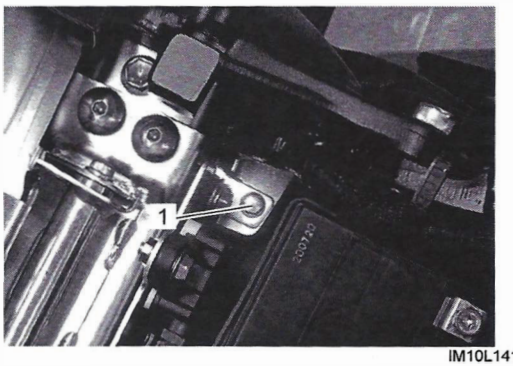
Tightening torque
Front reservoir cap screw (a): 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)



IM10L1410018-02

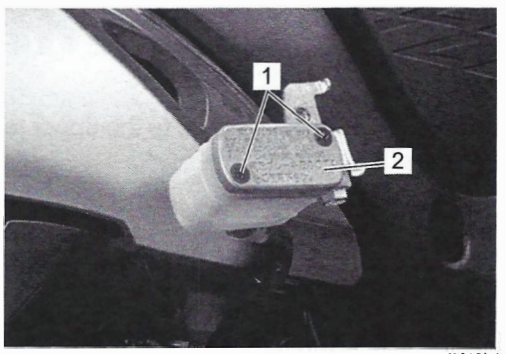
Rear Brake

1) Place the motorcycle on a level surface.
2) Remove the front seat. ☞(Page 9D-34)
3) Remove the reservoir tank bracket bolt (1).



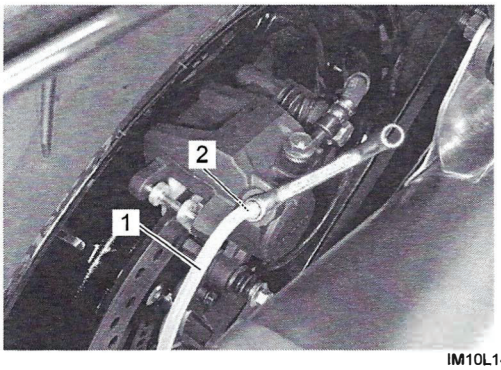
IM10L1410068-02

4) Move the reservoir tank with reservoir tank bracket to outside of the frame.
5) Remove the reservoir cap screws (1), reservoir cap (2) and diaphragm from the rear brake master cylinder reservoir.
6) Fill the reservoir with brake fluid up to the upper level of the reservoir. Place the reservoir cap to prevent dirt from entering.

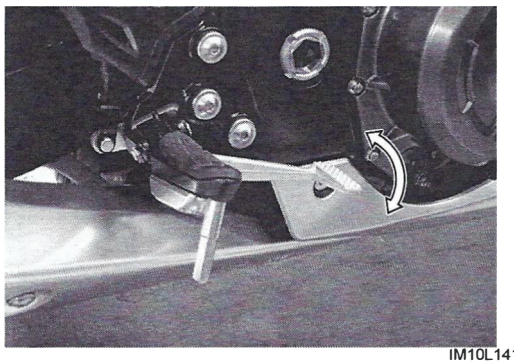


IM10L1410020-03

7) Attach a clear hose (1) to the rear brake caliper air bleeder valve (2), and insert the free end of the hose into a receptacle.
8) Operate the brake pedal several times and, while depressing the pedal, loosen the rear brake caliper air bleeder valve (2) and drain the brake fluid into the receptacle.



IM10L1410021-02


IM10L1410022-02

9) Tighten the rear brake caliper air bleeder valve and release the brake pedal slowly.
10) Repeat the steps 7) and 8) until the fluid is flowing out without bubbles.

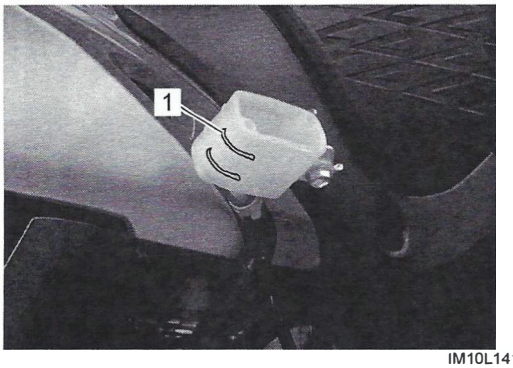
NOTE

While bleeding the brake system, replenish the reservoir with the brake fluid as necessary to keep the fluid above the lower level.

11) Remove the clear hose from the brake caliper air bleeder valve.
12) Tighten the rear brake caliper air bleeder valve to the specified torque.

Tightening torque
Rear brake caliper air bleeder valve: 8.0 N·m (0.82 kgf-m, 5.90 lbf-ft)

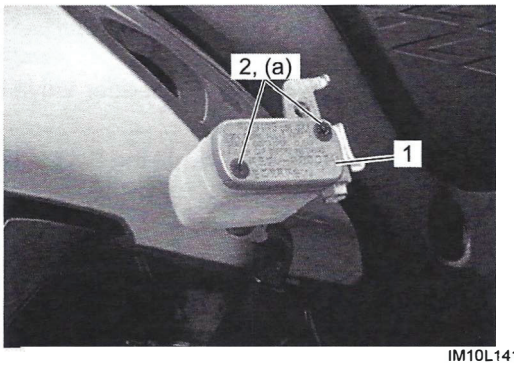
13) Fill the reservoir with brake fluid to the upper level (1) of the reservoir.



IM10L1410023-03

14) Install the diaphragm and reservoir cap (1).
15) Tighten the reservoir cap screws (2) to the specified torque.

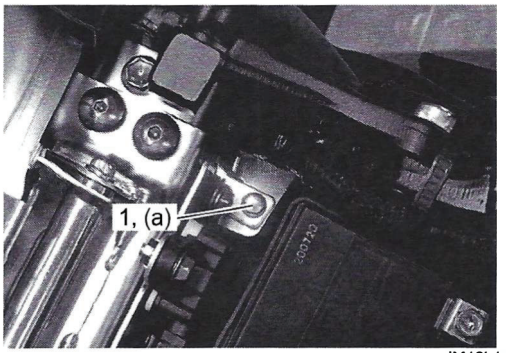
Tightening torque
Rear master cylinder reservoir cap screw (a): 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)



IM10L1410024-03

16) Install the reservoir tank to inside of the frame.
17) Tighten the reservoir tank bracket bolt (1) to the specified torque.

Tightening torque
Rear brake master cylinder reservoir tank bracket bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1410069-02

18) Install the front seat. ☞(Page 9D-34)

Brake Fluid Replacement

BENM10L34106011

Refer to "Brake Fluid" in Section 0B (Page 0B-22).

Front Brake Hose Removal and Installation

BENM10L34106012

Refer to "Brake Hose" in Section 0B (Page 0B-25).

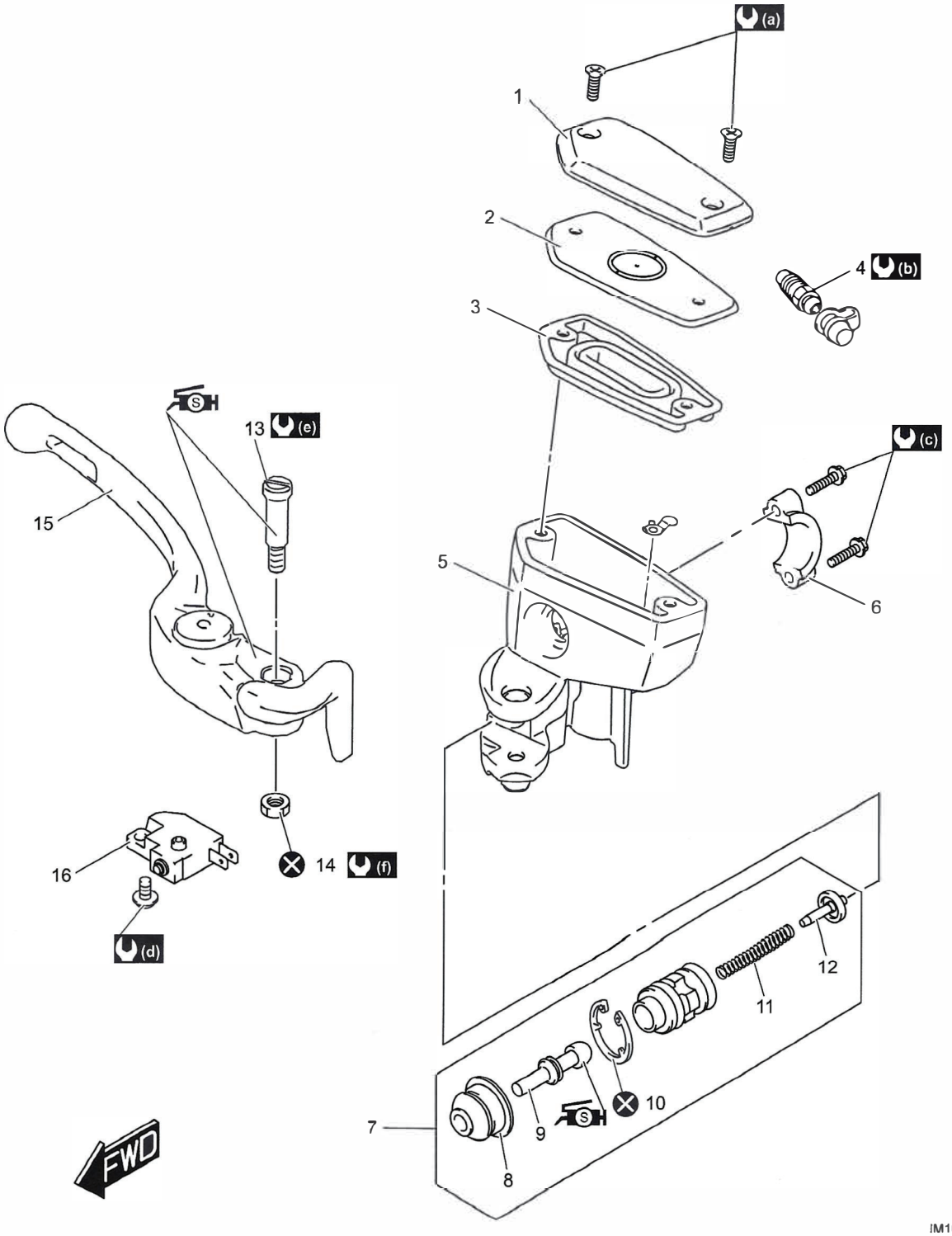
Rear Brake Hose Removal and Installation

BENM10L34106013

Refer to "Brake Hose" in Section 0B (Page 0B-25).

Front Brake Master Cylinder Assembly / Brake Lever Components

BENM10L34106014



IM10L1410025-03

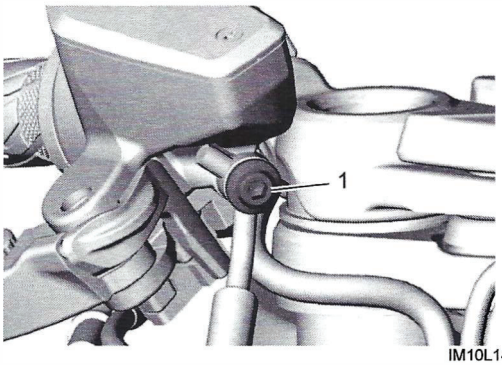
1. Reservoir cap	9. Push rod	(a) : 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)
2. Plate	10. Snap ring	(b) : 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)
3. Diaphragm	11. Spring	(c) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
4. Brake master cylinder air bleeder valve	12. Return spring guide	(d) : 1.2 N·m (0.12 kgf-m, 0.90 lbf-ft)
5. Master cylinder	13. brake lever pivot bolt	(e) : 1.0 N·m (0.10 kgf-m, 0.75 lbf-ft)
6. Master cylinder holder	14. brake lever pivot nut	(f) : 5.9 N·m (0.60 kgf-m, 4.35 lbf-ft)
7. Piston/Cup set	15. Brake lever	S : Apply SUZUKI SILICONE GREASE.
8. Dust boot	16. Brake light switch	: Do not reuse.

Front Brake Master Cylinder Assembly Removal and Installation

BENM10L34106015

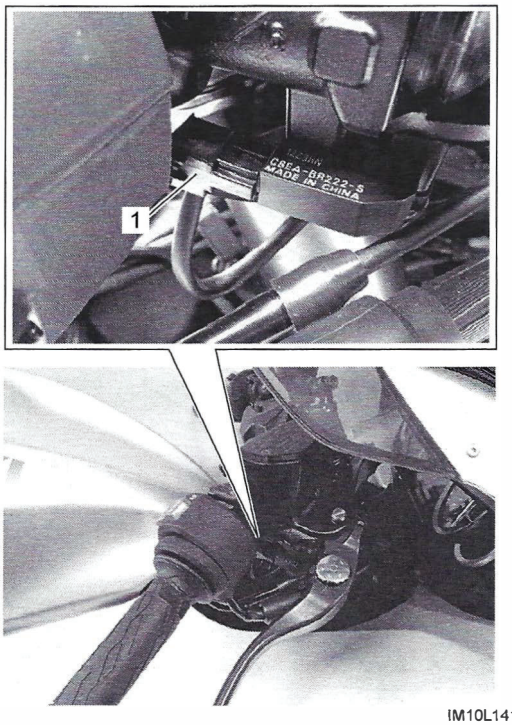
Removal

1) Drain brake fluid. ☞(Page 4A-14)
2) Place a rag underneath the brake hose union bolt (1) on the master cylinder to catch any spilt brake fluid.
3) Remove the brake hose union bolt (1) and disconnect the brake hose.



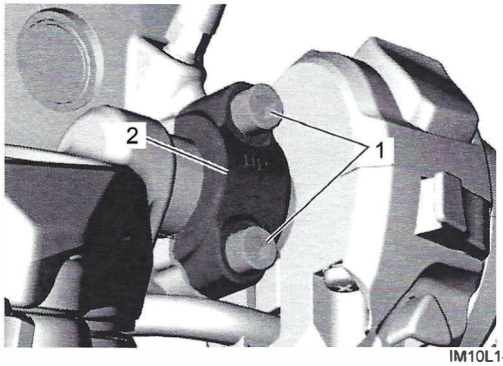
IM10L1410026-02

4) Disconnect the front brake light switch lead wire coupler (1) from the front brake light switch.



IM10L1410064-01

5) Remove the master cylinder holder bots (1) and master cylinder holder (2).



IM10L1410028-02

Installation

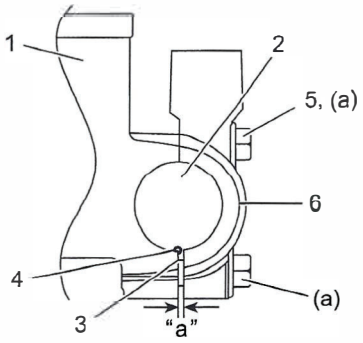
Install the front brake master cylinder in the reverse order of removal. Pay attention to the following points:

- When installing the master cylinder assembly (1) onto the handlebar (2), align the edge (3) of master cylinder with the punch mark (4) on the handlebar (2) and tighten the upper bolt (5) first.

NOTE

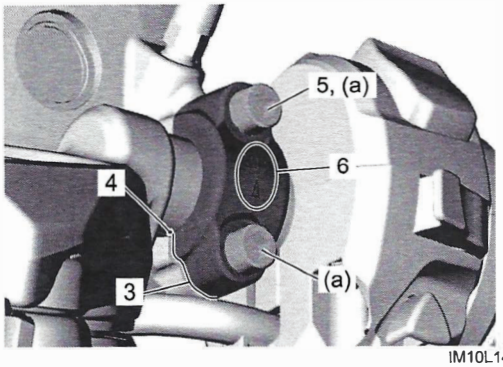
Face the up mark (6) upward.

Tightening torque
Front brake master cylinder holder bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IK07L1410033-01

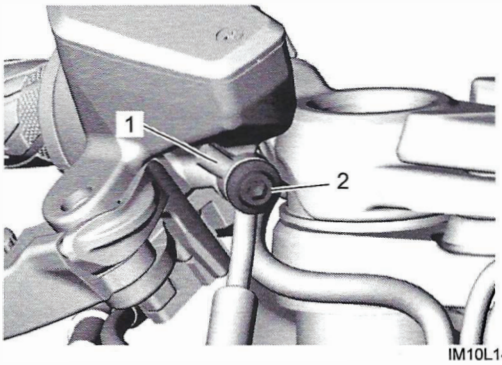
"a": Clearance



IM10L1410065-01

- Install the brake hose union bolt and new seal washers to the brake hose.
- After the brake hose union (1) has contacted the master cylinder, tighten the union bolt (2) to the specified torque.

Tightening torque
Brake hose union bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1410030-02

- Bleed air from the brake system. ☞(Page 4A-11)

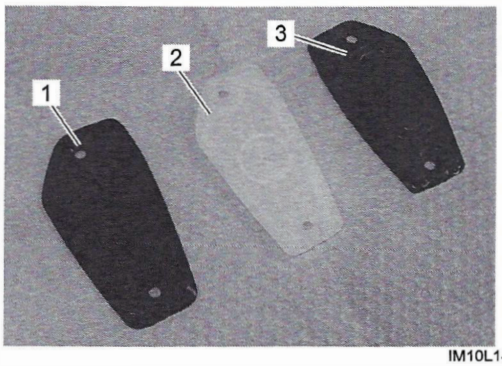
Front Brake Master Cylinder Assembly / Brake Lever Disassembly and Reassembly

BENM10L34106016

Refer to "Front Brake Master Cylinder Assembly Removal and Installation" (Page 4A-15).

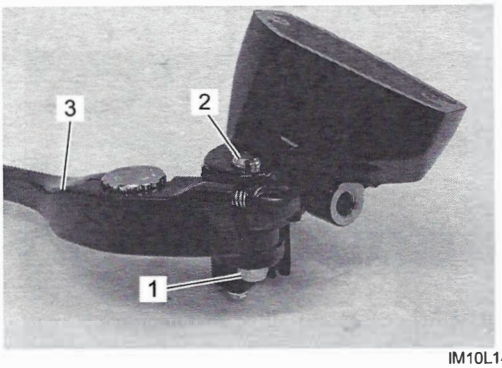
Disassembly

1) Remove the reservoir cap (1), plate (2) and diaphragm (3) from the front brake master cylinder.



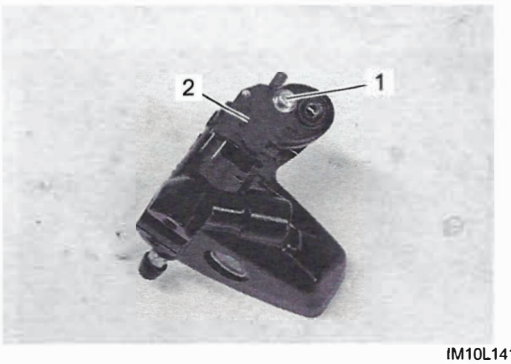
IM10L1410031-02

2) Remove the brake lever pivot nut (1), bolt (2) and brake lever (3).



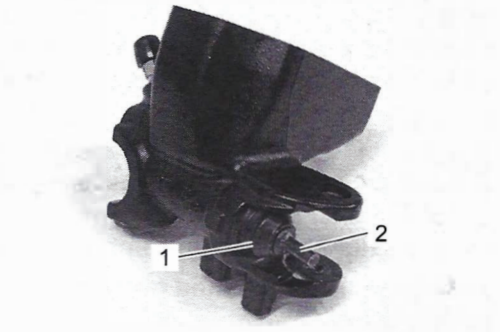
IM10L1410032-02

3) Remove the front brake light switch screw (1) and front brake light switch (2) from the master cylinder.



IM10L1410033-02

4) Remove the dust boot (1) and push rod (2).



IM10L1410034-02

5) Remove the snap ring (1) using the special tool.

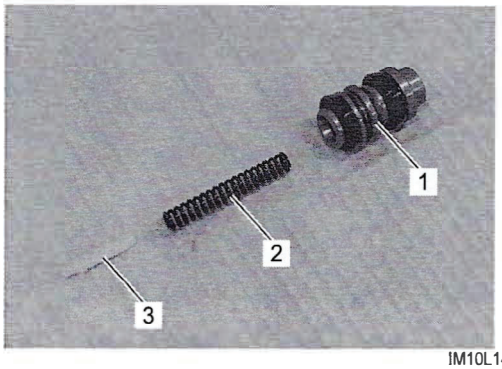
Special tool
09900–06108



IM10L1410035-04

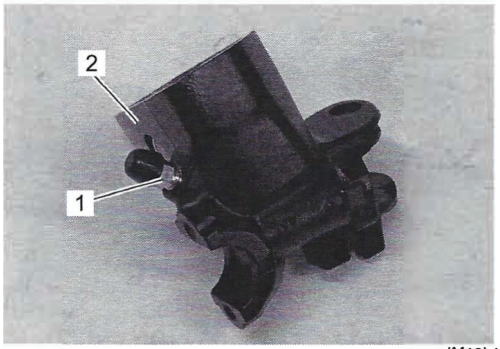
6) Remove the following parts from the master cylinder.
- Piston/cup set (1)
- Return spring (2)

- Return spring guide (3)



IM10L1410036-02

7) Remove the front brake master cylinder air bleeder valve (1) from the master cylinder (2).



IM10L1410037-02

Reassembly

Reassemble the front brake master cylinder and brake lever in the reverse order of disassembly. Pay attention to the following points:

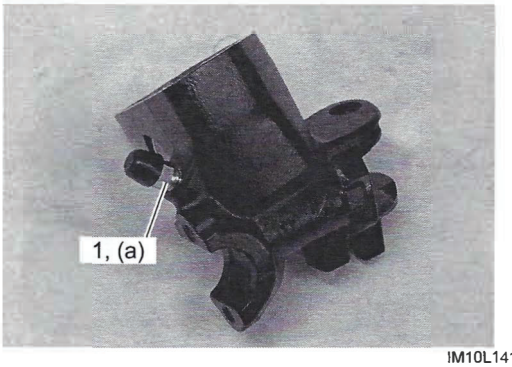
NOTICE

- **Wash the master cylinder components with new brake fluid before reassembly.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.**
- **Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.**

Brake fluid (DOT 4)

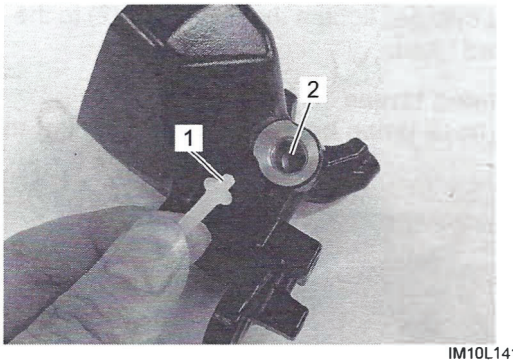
- Tighten the front brake master cylinder air bleeder valve (1) to the specified torque.

Tightening torque
Front brake master cylinder air bleeder valve (a): 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)



IM10L1410038-02

- When installing the return spring guide, fit the spring guide end (1) into the hole (2) of the master cylinder.



IM10L1410039-02

- Install the new snap ring (1) using the special tool.

Special tool
09900–06108

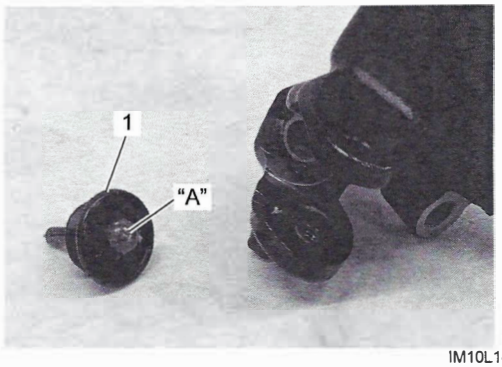


IM10L1410035-04

- Apply grease to the push rod end.

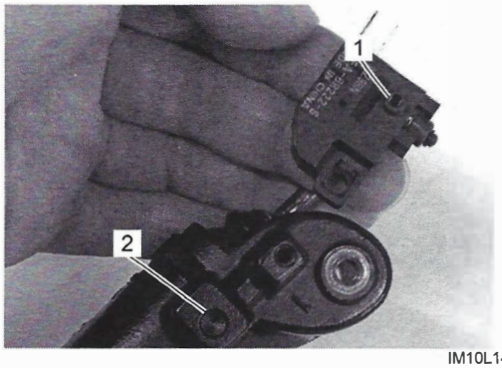
"A": Grease 99000–25100 (SUZUKI SILICONE GREASE)

- Set the dust boot (1) to the master cylinder securely.



IM10L1410040-02

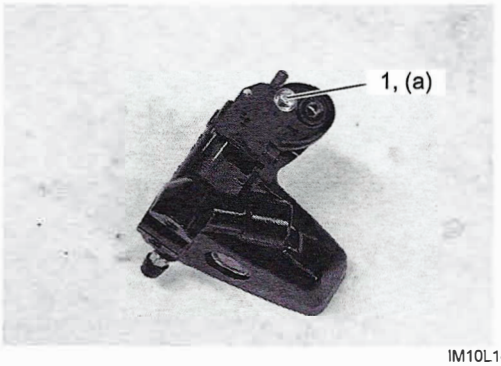
- When installing the front brake light switch, align the projection (1) on the switch with the hole (2) in the master cylinder.



IM10L1410041-02

- Tighten the front brake light switch screw (1) to the specified torque.

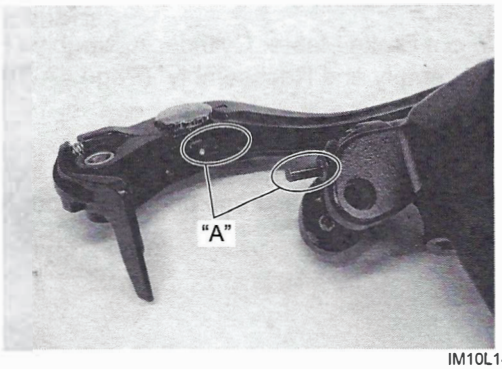
Tightening torque
Front brake light switch screw (a): 1.2 N·m (0.12 kgf-m, 0.90 lbf-ft)



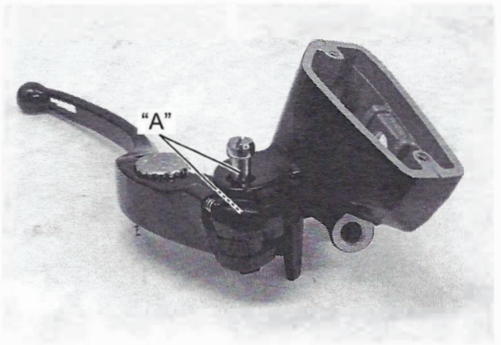
IM10L1410042-03

- Apply grease to the contact point between push rod and brake lever.
- Apply grease to the brake lever pivot bolt and brake lever sliding surfaces.

"A": Grease 99000–25100 (SUZUKI SILICONE GREASE)



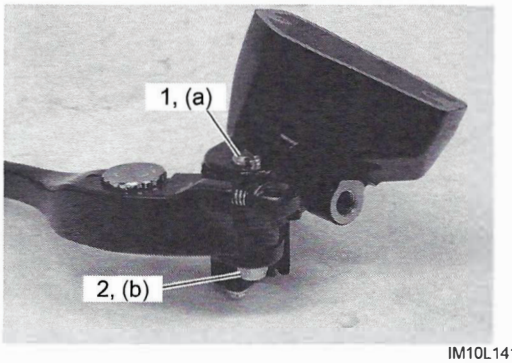
IM10L1410043-02



IM10L1410044-02

- Tighten the pivot bolt (1) and new lock-nut (2) to the specified torque.

Tightening torque
Brake lever pivot bolt (a): 1.0 N·m (0.10 kgf-m, 0.75 lbf-ft)
Brake lever pivot bolt lock-nut (b): 5.9 N·m (0.60 kgf-m, 4.35 lbf-ft)



IM10L1410045-02

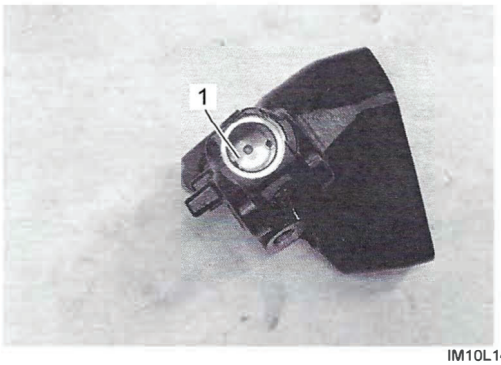
Front Brake Master Cylinder Parts Inspection

BENM10L34106017

Refer to "Front Brake Master Cylinder Assembly / Brake Lever Disassembly and Reassembly" (Page 4A-16).

Master Cylinder

Inspect the master cylinder bore (1) for any scratches corrosion or other damage. If any damage is found, replace it with a new one.



IM10L1410046-02

Dust Boot

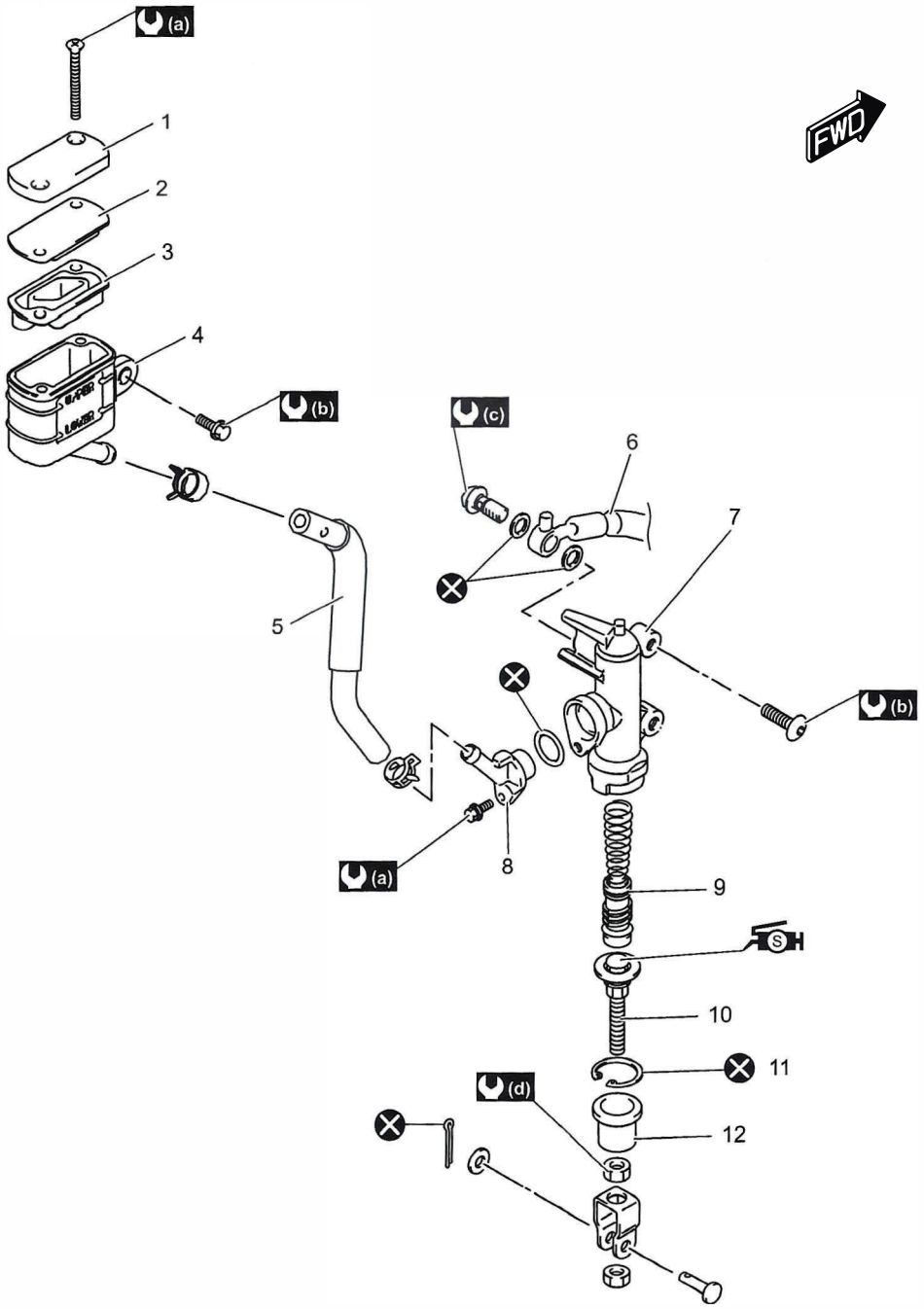
Inspect the dust boot for wear or damage. If any defects are found, replace it with a new one.



IK07L1410018-02

Rear Brake Master Cylinder Assembly Components

BENM10L34106018



IM10L1410048-03

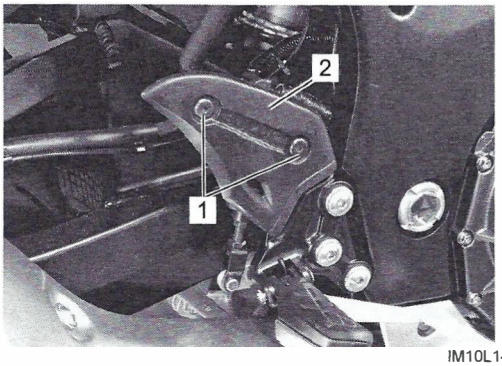
1. Reservoir cap	7. Brake master cylinder	(a) : 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)
2. Plate	8. Brake hose connector	(b) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
3. Diaphragm	9. Piston/cup set	(b) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
4. Reservoir tank	10. Push rod	(d) : 18 N·m (1.8 kgf-m, 13.5 lbf-ft)
5. Reservoir hose	11. Snap ring	(S)H : Apply SUZUKI SILICONE GREASE.
6. Brake hose	12. dust boot	⊗ : Do not reuse.

Rear Brake Master Cylinder Assembly Removal and Installation

BENM10L34106019

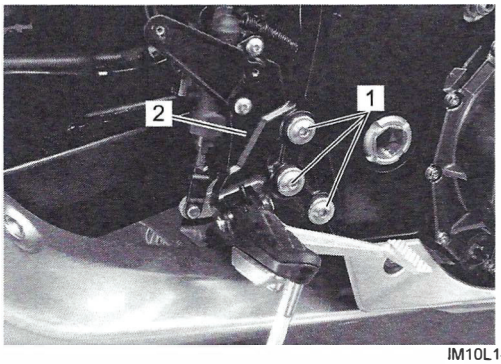
Removal

1) Drain brake fluid. ☞(Page 4A-14)
2) Remove the footrest guard bolts (1) and footrest guard (2) from the footrest.



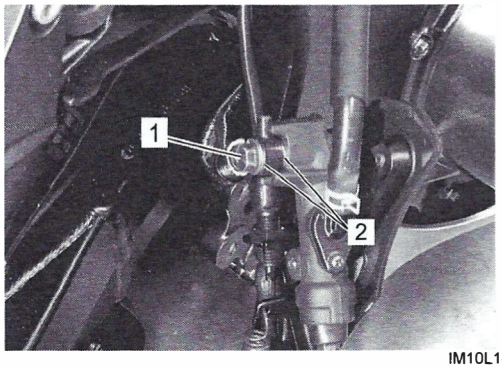
IM10L1410049-02

3) Remove the front footrest bolts (1) and front footrest (2).



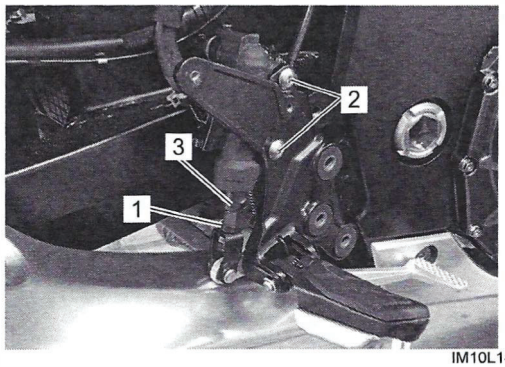
IM10L1410050-02

4) Place a clean rag underneath the brake hose union bolt (1) on the master cylinder to catch any spilt brake fluid.
5) Remove the brake hose union bolt and seal washers (2).



IM10L1410066-01

6) Loosen the lock-nut (1).
7) Remove the master cylinder mounting bolts (2).
8) Remove the master cylinder with the reservoir tank by turning the push rod (3).

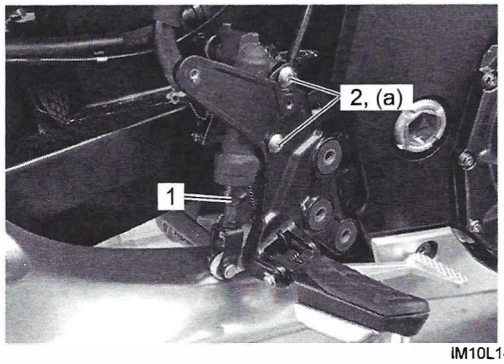


IM10L1410052-02

Installation

1) Install the master cylinder with the reservoir tank by turning the push rod (1).
2) Tighten the master cylinder mounting bolts (2) to the specified torque.

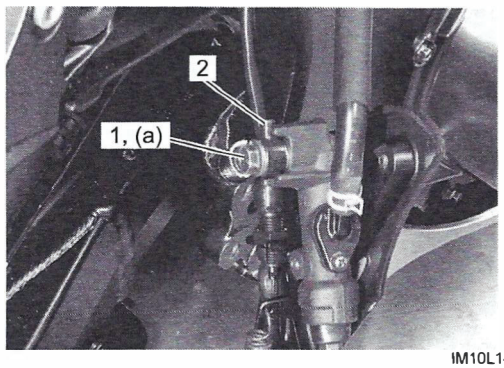
Tightening torque
Rear brake master cylinder mounting bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1410053-02

3) Install the brake hose union bolt (1) and new seal washers to the brake hose.
4) After the brake hose union (2) has contacted the stopper of rear brake master cylinder, tighten the union bolt to the specified torque.

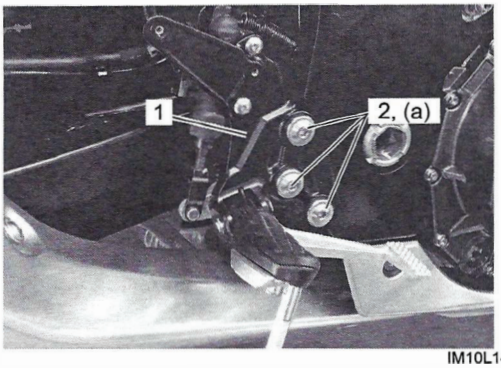
Tightening torque
Brake hose union bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1410067-01

5) Install the front footrest (1), and then tighten the front footrest bolts (2) to the specified torque.

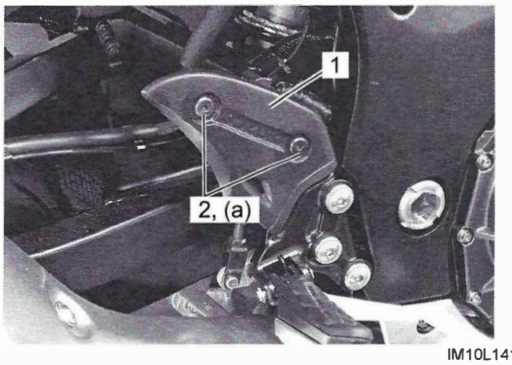
Tightening torque
Front footrest bolt (a): 26 N·m (2.7 kgf-m, 19.5 lbf-ft)



IM10L1410055-02

6) Install the front footrest guard (1), and then tighten the front footrest guard bolt (2) to the specified torque.

Tightening torque
Front footrest guard bolt (a): 5.0 N·m (0.51 kgf-m, 3.70 lbf-ft)



IM10L1410056-02

7) Bleed air from the rear brake system. ☞(Page 4A-11)
8) Inspect the brake pedal height. ☞(Page 0B-20)

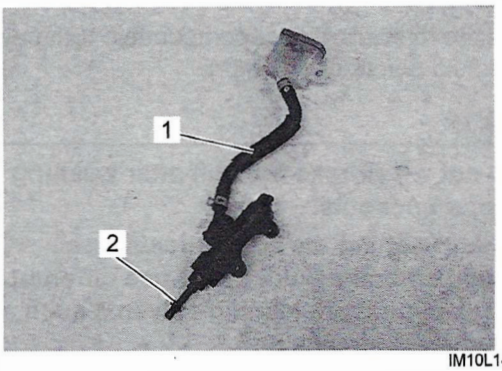
Rear Brake Master Cylinder Disassembly and Reassembly

BENM10L34106020

Refer to "Front Brake Master Cylinder Assembly Removal and Installation" (Page 4A-15).

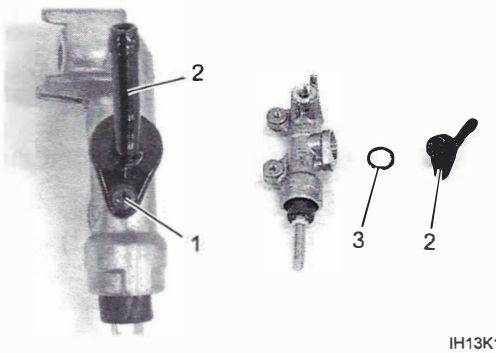
Disassembly

1) Remove the reservoir hose (1).
2) Remove the lock-nut (2).



IM10L1410057-02

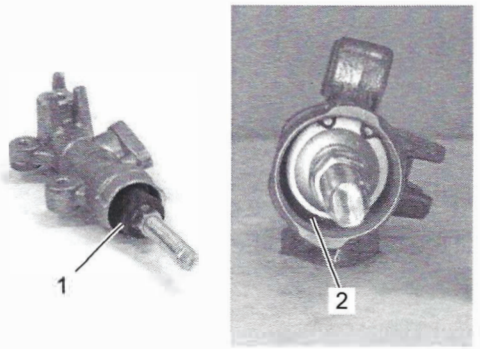
3) Remove the screw (1), brake hose connector (2) and O-ring (3).



IH13K1410053-01

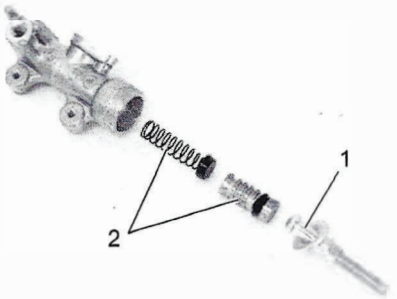
4) Remove the dust boot (1).
5) Remove the snap ring (2) with the special tool.

Special tool
09900–06108



IH13K1410054-01

6) Remove the push rod (1) and piston/cup set (2) from the master cylinder.



IH13K1410055-01

Reassembly

1) Wash the master cylinder components with new brake fluid before reassembly.

NOTICE

- **Do not wipe brake fluid off after washing the components.**
- **When washing the components, use 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.**

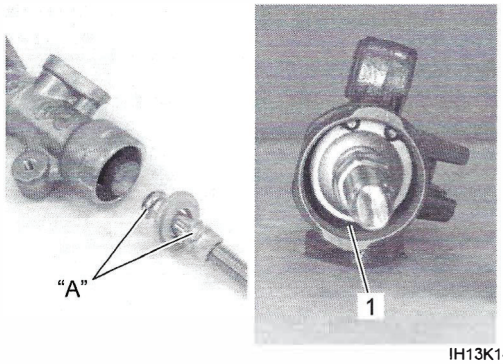
Brake fluid (DOT 4)

2) Install the piston/cup set into the master cylinder.
3) Apply grease to the push rod.

"A": Grease 99000–25100 (SUZUKI SILICONE GREASE)

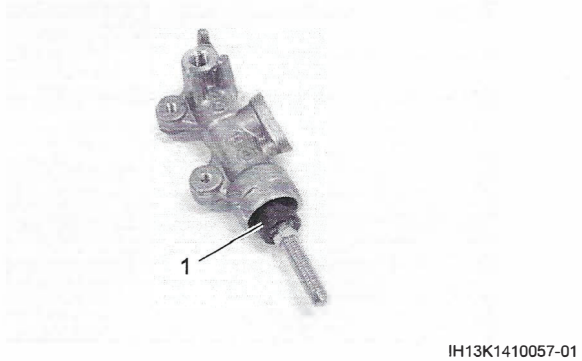
4) Install the push rod and new snap ring (1) with the special tool.

Special tool
09900–06108



IH13K1410056-02

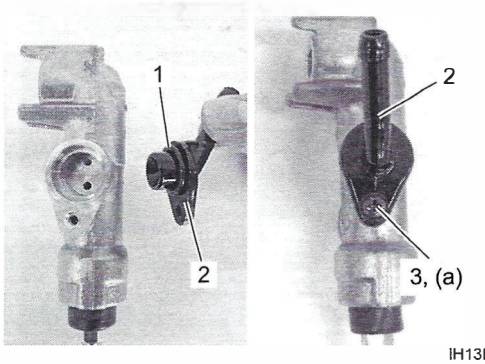
5) Install the dust boot (1).



IH13K1410057-01

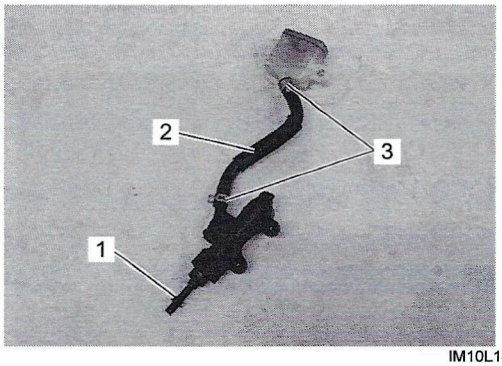
6) Install the new O-ring (1) to the brake hose connector (2).
7) Install the brake hose connector (2) and tighten the screw (3) to the specified torque.

Tightening torque
Brake hose connector screw (a): 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)



IH13K1410058-02

8) Install the lock-nut (1).
9) Install the reservoir hose (2) and set the clamps (3). Refer to "Rear Brake Hose Routing Diagram" (Page 4A-6).



IM10L1410058-02

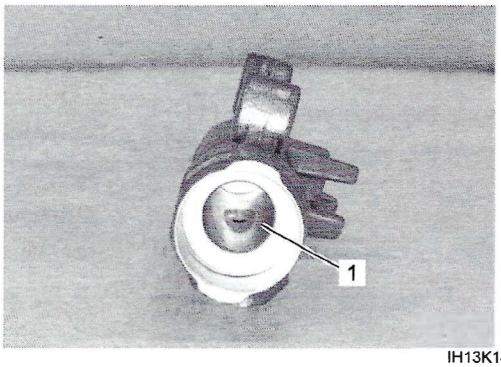
Rear Brake Master Cylinder Parts Inspection

BENM10L34106021

Refer to "Rear Brake Master Cylinder Disassembly and Reassembly" (Page 4A-22).

Master Cylinder

Inspect the master cylinder bore (1) for any scratches or other damage. If any defect is found, replace the master cylinder with a new one.



IH13K1410060-01

Dust Boot
Inspect the dust boot for wear or damage. If any defect is found, replace the dust boot with a new one.



IH13K1410062-01

Specifications

Tightening Torque Specifications

BENM10L34107001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear brake master cylinder rod lock-nut	18	1.8	13.5	☞(Page 4A-10)
Front footrest bolt	26	2.7	19.5	☞(Page 4A-10) / ☞(Page 4A-22)
Rear brake master cylinder mounting bolt	10	1.0	7.5	☞(Page 4A-10) / ☞(Page 4A-21)
Front footrest guard bolt	5.0	0.51	3.70	☞(Page 4A-10) / ☞(Page 4A-22)
Front brake master cylinder air bleeder valve	6.0	0.61	4.45	☞(Page 4A-11) / ☞(Page 4A-17)
Front brake caliper air bleeder valve	8.5	0.87	6.30	☞(Page 4A-12)
Front reservoir cap screw	1.5	0.15	1.10	☞(Page 4A-12)
Rear brake caliper air bleeder valve	8.0	0.82	5.90	☞(Page 4A-13)
Rear master cylinder reservoir cap screw	1.5	0.15	1.10	☞(Page 4A-13)
Rear brake master cylinder reservoir tank bracket bolt	10	1.0	7.5	☞(Page 4A-13)
Front brake master cylinder holder bolt	10	1.0	7.5	☞(Page 4A-15)
Brake hose union bolt	23	2.3	17.0	☞(Page 4A-16) / ☞(Page 4A-21)
Front brake light switch screw	1.2	0.12	0.90	☞(Page 4A-18)
Brake lever pivot bolt	1.0	0.10	0.75	☞(Page 4A-18)
Brake lever pivot bolt lock-nut	5.9	0.60	4.35	☞(Page 4A-18)
Brake hose connector screw	1.5	0.15	1.10	☞(Page 4A-23)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Front Brake Hose Routing Diagram" (Page 4A-2)
"Rear Brake Hose Routing Diagram" (Page 4A-6)
"Front Brake Master Cylinder Assembly / Brake Lever Components" (Page 4A-14)
"Rear Brake Master Cylinder Assembly Components" (Page 4A-20)

Special Tools and Equipment

Recommended Service Material

BENM10L34108001

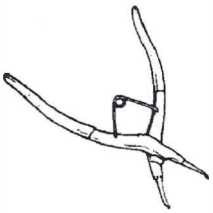
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4A-11) / ☞(Page 4A-17) / ☞(Page 4A-23)
Grease	SUZUKI SILICONE GREASE	P/No.: 99000–25100	☞(Page 4A-17) / ☞(Page 4A-18) / ☞(Page 4A-23)

NOTE

Required service material(s) is also described in:
"Front Brake Master Cylinder Assembly / Brake Lever Components" (Page 4A-14)
"Rear Brake Master Cylinder Assembly Components" (Page 4A-20)

Special Tool

BENM10L34108002

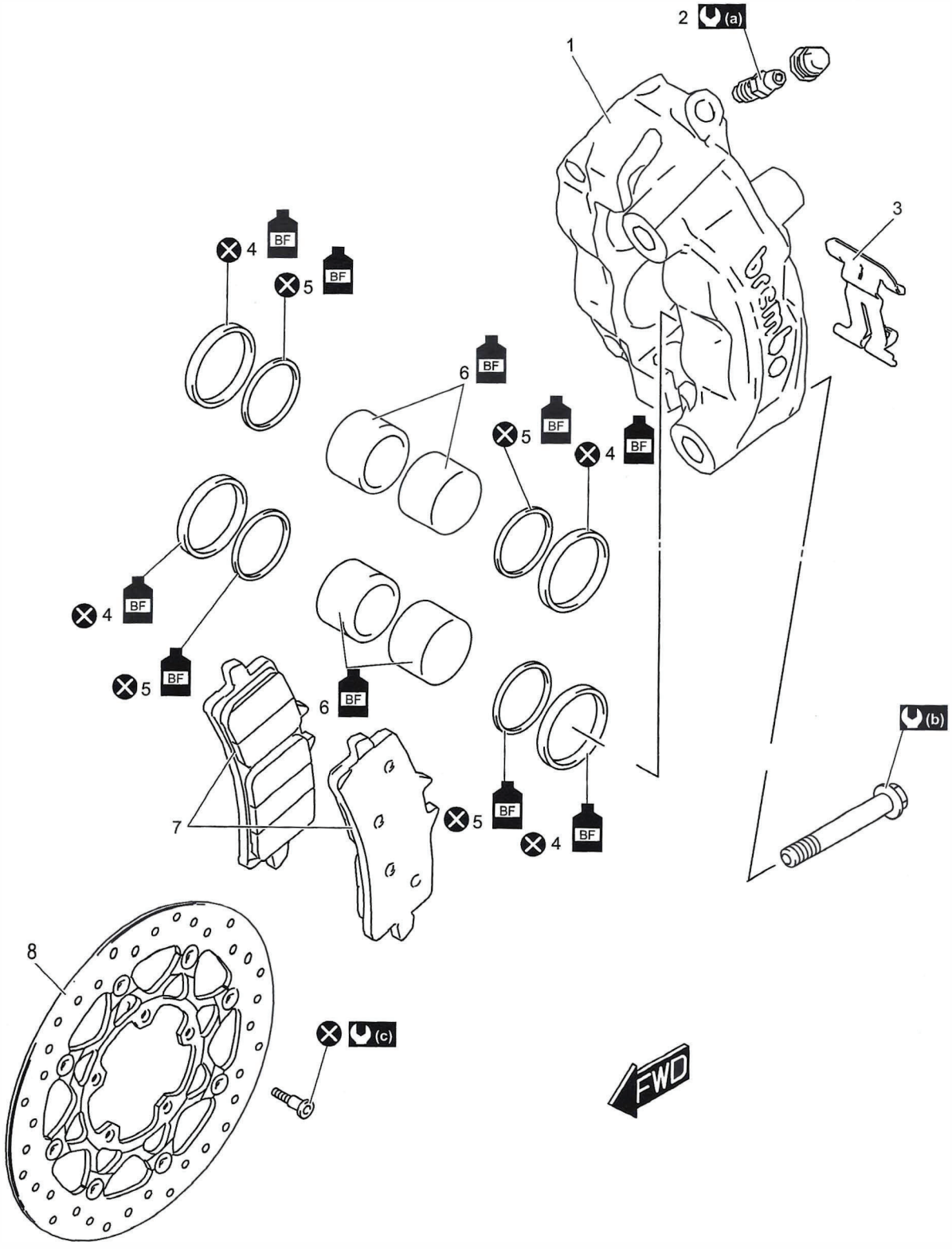
09900–06108 Snap ring pliers (Internal) ☞(Page 4A-16) / ☞(Page 4A-17) / ☞(Page 4A-22) / ☞(Page 4A-23)		

Front Brakes

Repair Instructions

Front Brake Components

BENM10L34206001



IM10L1420001-03

1. Brake caliper	6. Piston	(G) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
2. Brake air bleed valve	7. Brake pad	BF : Apply or use brake fluid.
3. Brake pad spring	8. Front brake disc	: Do not reuse.
4. Piston seal	(a) : 8.5 N·m (0.87 kgf-m, 6.30 lbf-ft)	
5. Dust seal	(b) : 39 N·m (4.0 kgf-m, 29.0 lbf-ft)	

Front Brake Pad Inspection

BENM10L34206002

Refer to "Brakes" in Section 0B (Page 0B-20).

Front Brake Pad Replacement

BENM10L34206003

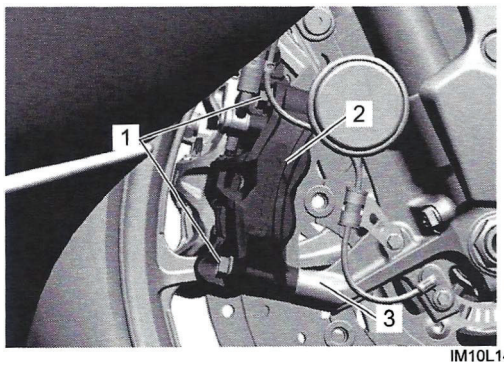
NOTICE

The right and left brake pads are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

NOTE

After replacing the brake pads, pump the brake lever several times to check for proper brake operation and then check the brake fluid level.

1) Remove the brake caliper mounting bolts (1) and brake caliper (2) from the front fork (3).

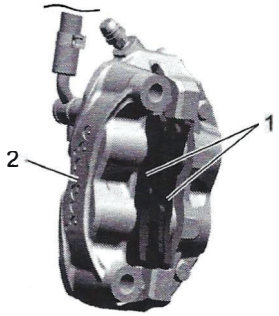


IM10L1420002-02

2) Remove the brake pads (1) from the front brake caliper (2).

NOTE

Do not operate the brake lever while removing the brake pads.



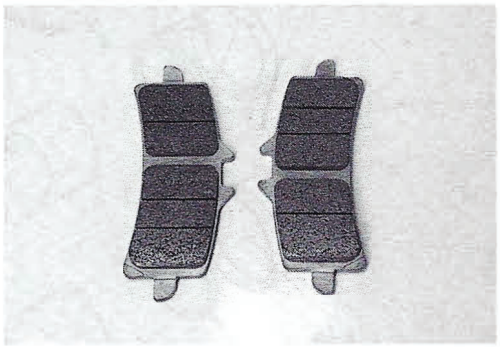
IM10L1420003-02

3) Clean up the caliper especially around the caliper pistons.

4) Install the new brake pads to the brake caliper.

NOTE

- **Replace the brake pads as a set.**
- **Pushing back the caliper pistons into the caliper will facilitate installation of the brake pads. At the time, observe the reservoir level not to exceed the upper level.**

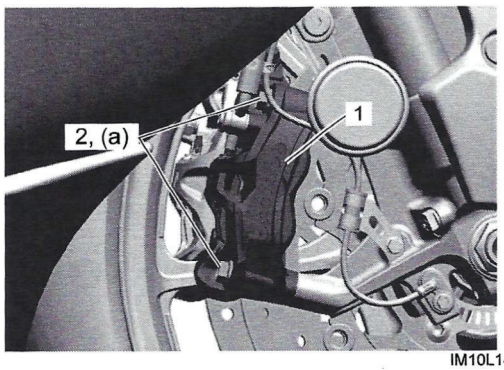


IF04K1420004-01

5) Install the brake caliper (1) to the front fork.

6) Tighten the brake caliper mounting bolts (2) to the specified torque.

Tightening torque
Front brake caliper mounting bolt (a): 39 N·m (4.0 kgf-m, 29.0 lbf-ft)



IM10L1420004-02

Front Brake Caliper Removal and Installation

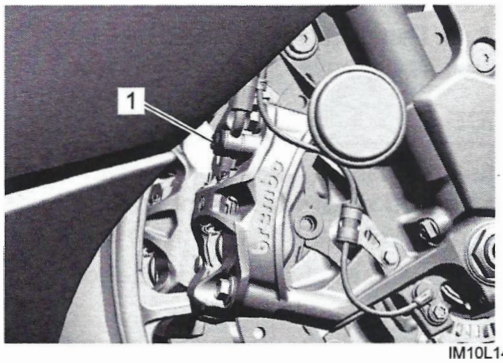
BENM10L34206004

NOTE

The right and left calipers are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

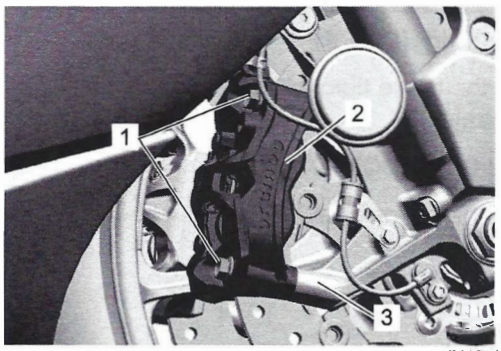
Removal

1) Drain brake fluid. ☞(Page 4A-14)
2) Place a 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.



IM10L1420005-02

4) Remove the brake caliper bolt (1) and brake caliper (2) from the front fork (3).



IM10L1420006-02

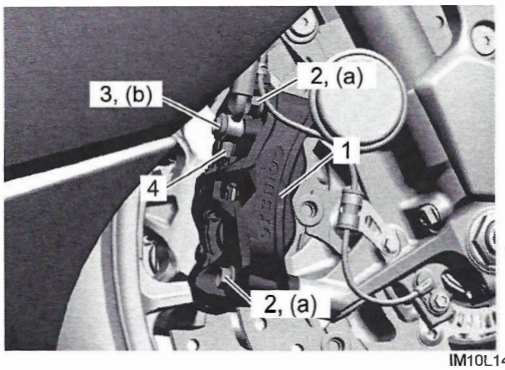
Installation

1) Install the brake caliper (1) to the front fork.
2) Tighten caliper mounting bolts (2) to the specified torque.

Tightening torque
Front brake caliper mounting bolt (a): 39 N·m (4.0 kgf-m, 29.0 lbf-ft)

3) Install the brake hose union bolt (3) and new seal washers to brake hose.
4) After setting the brake hose union (4) to the stopper of the brake caliper, tighten the union bolt to the specified torque.

Tightening torque
Brake hose union bolt (b): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1420007-02

5) Bleed air from the brake system after installing the caliper. ☞(Page 4A-11)
6) Check the brake fluid leakage referring to "Brake Hose Inspection" in Section 4A (Page 4A-10) and brake operation.

Front Brake Caliper Disassembly and Reassembly

BENM10L34206005

Refer to "Front Brake Caliper Removal and Installation" (Page 4B-3).

⚠ CAUTION

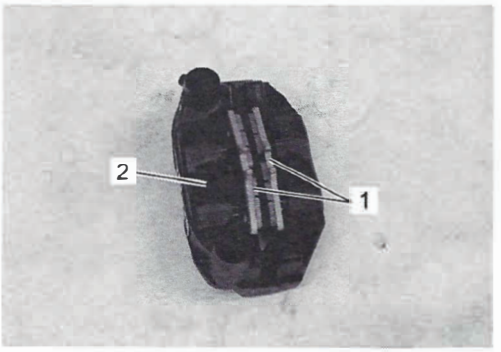
Take care not to damage piston and caliper cylinder of front brake caliper.

NOTE

The right and left calipers are installed symmetrically and therefore the disassembly procedure for one side is the same as that for the other side.

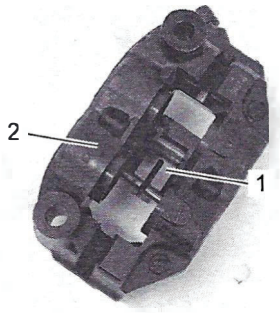
Disassembly

1) Remove the brake pads (1) from the brake caliper (2).



IM10L1420008-02

2) Remove the pad spring (1) from the brake caliper (2).

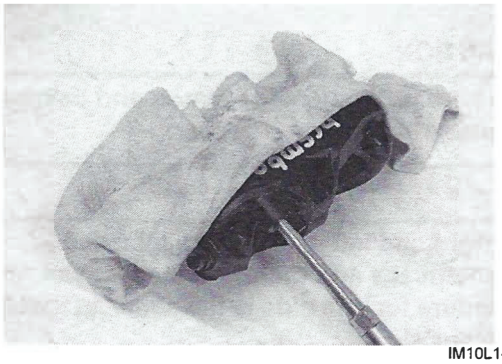


IM10L1420009-02

3) Remove the caliper pistons applying compressed air gradually from the hole for the brake hose.

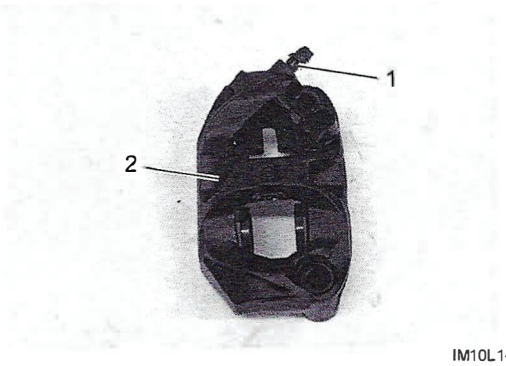
⚠ WARNING

Do not apply highly compressed air to the piston as it is. Place a cloth to prevent brake piston from jumping-out. Gradually apply compressed air. Do not place your fingers in front of brake piston while applying compressed air.



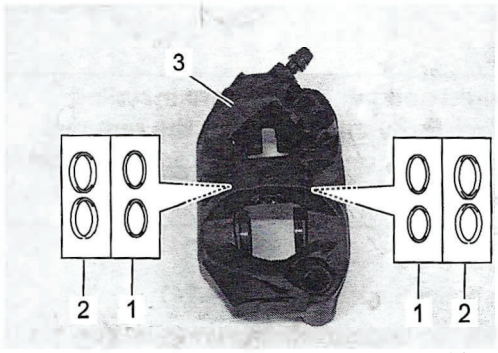
IM10L1420010-02

4) Remove the brake air bleed valve (1) from the brake caliper (2).



IM10L1420011-02

5) Remove the dust seals (1) and piston seals (2) from the brake caliper (3).



IM10L1420012-02

Reassembly

Reassemble the brake 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.

NOTICE

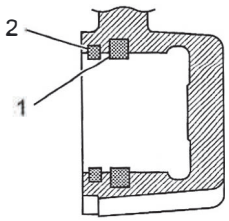
- **Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.**

Brake fluid (DOT 4)

- Apply the brake fluid to new piston seals (1) and new dust seals (2).

Brake fluid (DOT 4)

- Install the piston seals (1) and dust seals (2) to the brake caliper.



IL41K1420023-01

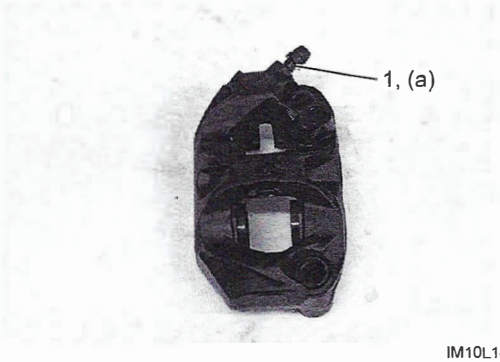
- When installing the brake pad spring, fit the brake pad spring claws to the grooves of the brake caliper.
- The arrow mark (1) on the brake pad spring with the direction shown in the figure.



IM10L1420013-02

- Tighten the brake air bleed valve (1) to the specified torque.

Tightening torque
Brake air bleed valve (a): 8.5 N·m (0.87 kgf-m, 6.30 lbf-ft)



IM10L1420014-02

Front Brake Caliper Parts Inspection

BENM10L34206006

Refer to "Front Brake Caliper Disassembly and Reassembly" (Page 4B-3).

Brake Caliper Cylinder

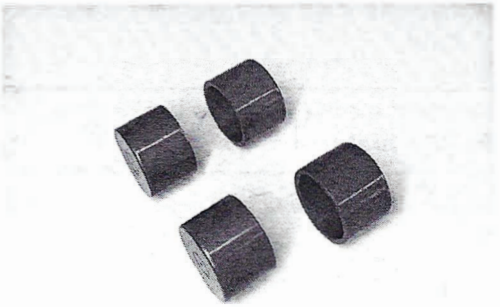
Inspect the brake caliper cylinder wall (1) for nicks, scratches or other damage. If any damage is found, replace the caliper with a new one.



IM10L1420015-03

Brake Caliper Piston

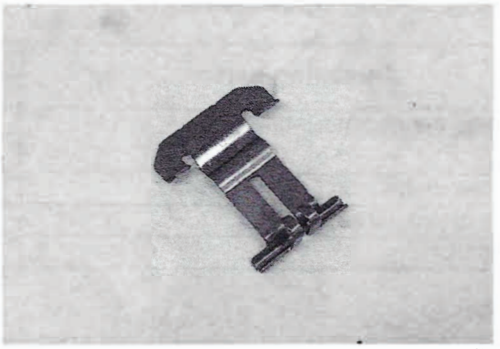
Inspect the brake caliper pistons surface for any scratches or other damage. If any damage is found, replace them with new ones.



IF04K1420015-01

Brake Pad Spring

Inspect the brake pad spring for damage and excessive bend. If any defects are found, replace it with a new one.



IM10L1420016-02

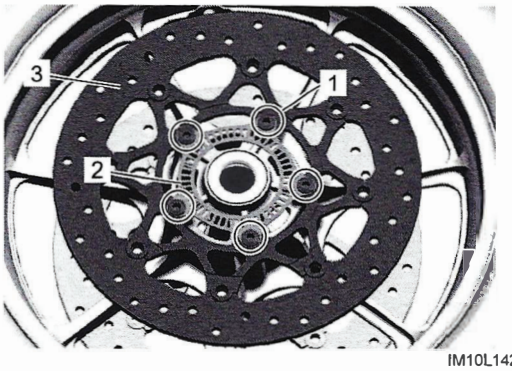
Front Brake Disc Removal and Installation

BENM10L34206007

Refer to "Front Wheel Assembly Removal and Installation" in Section 2D (Page 2D-3).

Removal

1) Remove the front brake disc bolts (1), and then remove the front wheel speed sensor rotor (2) and front brake disc (3) from the front wheel.



IM10L1420017-02

Installation

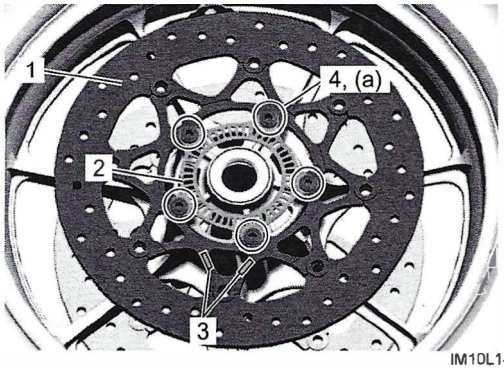
1) Make sure that the brake disc is clean and free of any grease.
2) Install the front brake disc (1) and front wheel speed sensor rotor (2).

NOTE

The stamped mark (3) on the brake disc should face to the outside.

3) Tighten the new brake disc bolt (4) to specified torque.

Tightening torque
Brake disc bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1420018-02

Front Brake Disc Inspection

BENM10L34206008

Refer to "Brakes" in Section 0B (Page 0B-20).

Specifications

Tightening Torque Specifications

BENM10L34207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front brake caliper mounting bolt	39	4.0	29.0	☞(Page 4B-2) / ☞(Page 4B-3)
Brake hose union bolt	23	2.3	17.0	☞(Page 4B-3)
Brake air bleed valve	8.5	0.87	6.30	☞(Page 4B-5)
Brake disc bolt	23	2.3	17.0	☞(Page 4B-6)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Front Brake Components" (Page 4B-1)

Special Tools and Equipment

Recommended Service Material

BENM10L34208001

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

NOTE

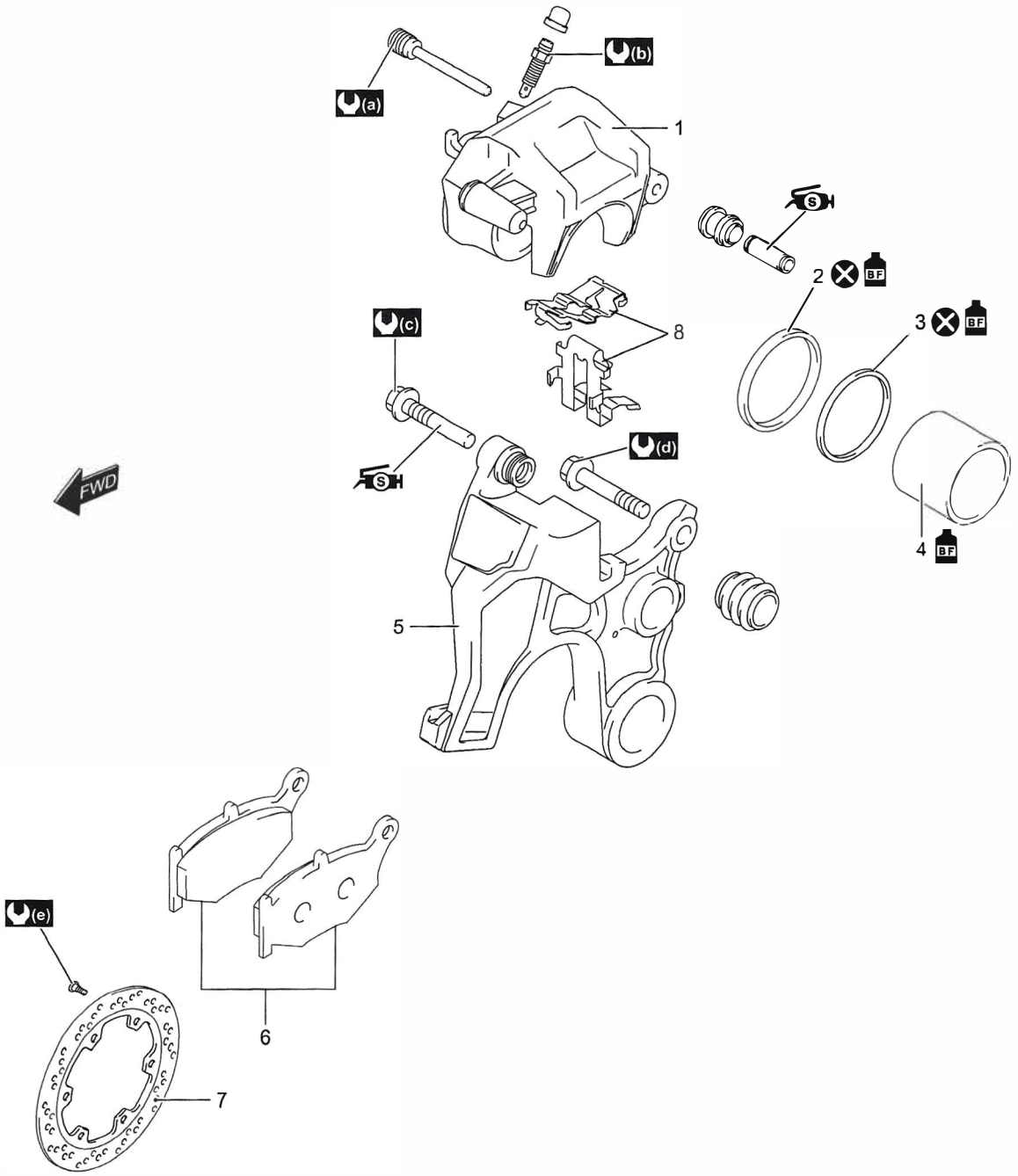
Required service material(s) is also described in:
"Front Brake Components" (Page 4B-1)

Rear Brakes

Repair Instructions

Rear Brake Components

BENM10L34306001



IM10L1430001-03

1. Rear caliper	7. Rear brake disc	(e) : 35 N·m (3.6 kgf-m, 26.0 lbf-ft)
2. Piston seal	8. Brake pad spring	(S) : Apply silicone grease to sliding surface.
3. Dust seal	(a) : 15 N·m (1.5 kgf-m, 11.0 lbf-ft)	BF : Apply brake fluid.
4. Piston	(b) : 8.0 N·m (0.82 kgf-m, 5.90 lbf-ft)	⊗ : Do not reuse.
5. Rear caliper bracket	(c) : 32 N·m (3.3 kgf-m, 24.0 lbf-ft)	
6. Rear brake pad set	(d) : 17 N·m (1.7 kgf-m, 12.5 lbf-ft)	

Rear Brake Pad Inspection

BENM10L34306002

Refer to "Brakes" in Section 0B (Page 0B-20).

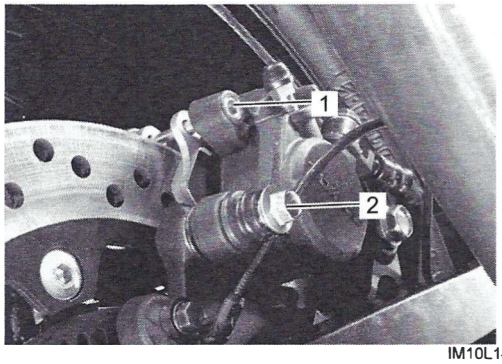
Rear Brake Pad Replacement

BENM10L34306003

NOTE

After replacing the brake pads, pump the brake pedal several times to check for proper brake operation and then check the brake fluid level.

1) Remove the pad mounting pin (1) from the brake caliper.
2) Remove the caliper mounting bolt (2) from the brake caliper.

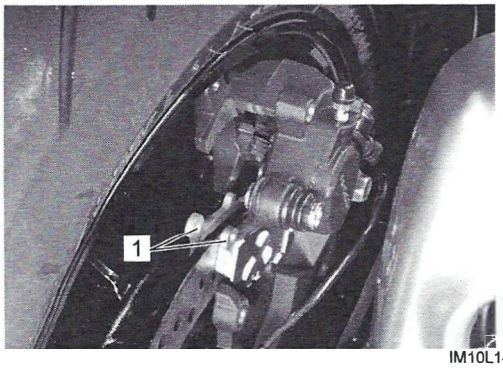


IM10L1430002-02

3) Remove the brake pads (1) from the brake caliper with the rear caliper pivoted up.

NOTE

Do not operate the brake pedal while removing the brake pads.

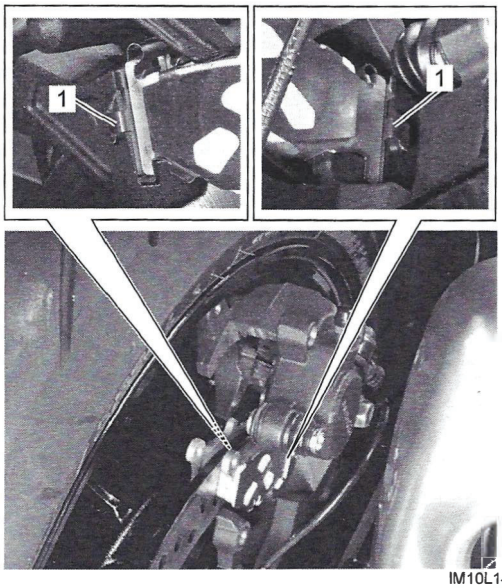


IM10L1430003-02

4) Clean up the caliper, especially around the caliper piston.
5) Install the new brake pads.

NOTE

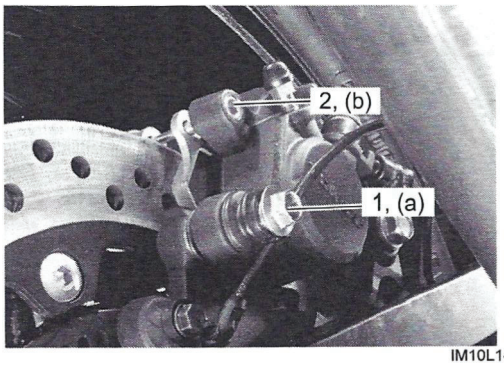
- **Pushing back the caliper piston into the caliper will facilitate installation of the brake pads. At the time, observe the reservoir tank level not to exceed the upper line.**
- **Make sure that the detent of the pad is seated onto the retainer (1) on the caliper bracket.**



IM10L1430004-02

6) Tighten the caliper mounting bolt (1) and pad mounting pin (2) to the specified torque.

Tightening torque
Rear brake caliper mounting bolt (a): 17 N·m (1.7 kgf-m, 12.5 lbf-ft)
Rear brake pad mounting pin (b): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)



IM10L1430005-02

Rear Brake Caliper Removal and Installation

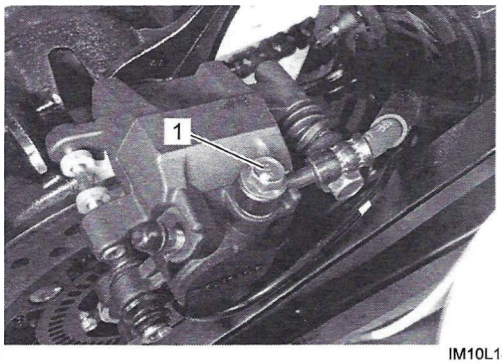
BENM10L34306004

Removal

1) Drain brake fluid. Refer to "Brake Fluid" in Section 0B (Page 0B-22).
2) Remove the brake hose from the caliper by removing the union bolt (1) and catch the brake fluid in a suitable receptacle.

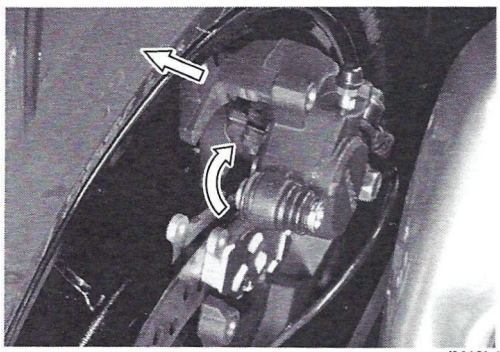
NOTE

Place a rag underneath the union bolt on the brake caliper to catch any spilt brake fluid.



IM10L1430006-02

3) Remove the brake pads. Refer to "Rear Brake Pad Replacement" (Page 4C-2).
4) Pivot the caliper up and remove the caliper from the caliper bracket.



IM10L1430007-02

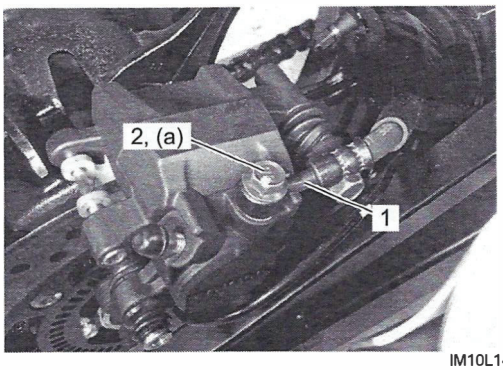
5) Remove the brake caliper bracket. ☞(Page 2C-8)

Installation

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

- Install the brake pad and remount the brake caliper. Refer to "Rear Brake Pad Replacement" (Page 4C-2).
- Install the new seal washers to the brake hose.
- After setting the brake hose union (1) to the stopper of the brake caliper, tighten the union bolt (2) to the specified torque.

Tightening torque
Brake hose union bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



IM10L1430008-02

- Bleed air from the brake system after installing the caliper. Refer to "Air Bleeding from Brake Line" in Section 4A (Page 4A-11).
- 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.

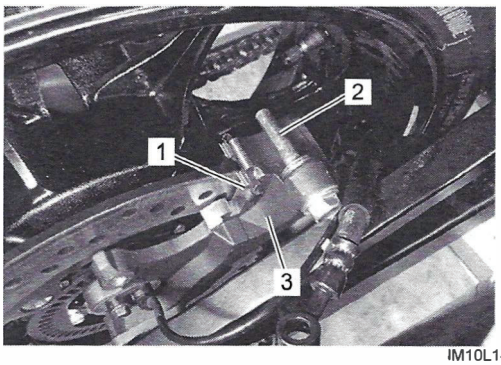
Rear Brake Caliper Disassembly and Assembly

BENM10L34306005

Refer to "Rear Brake Caliper Removal and Installation" (Page 4C-3).

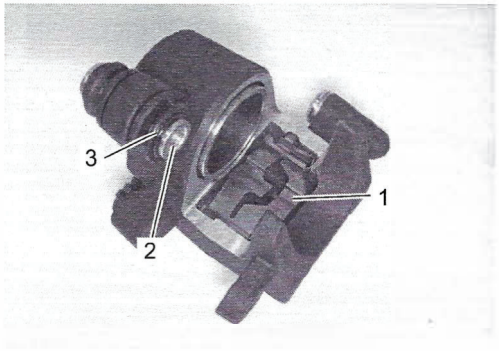
Disassembly

1) Remove the pad spring (1) and sliding pin (2) from the brake caliper bracket (3).



IM10L1430009-02

2) Remove the pad spring (1) from the caliper.
3) Remove the spacer (2) and rubber boot (3) from the caliper.

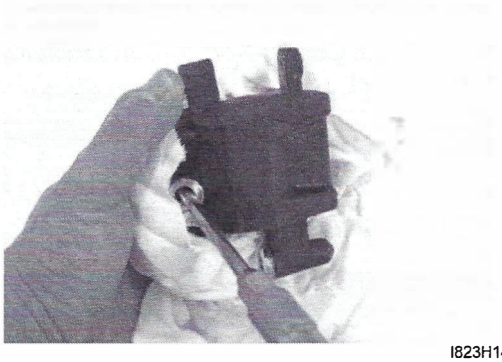


IM10L1430010-02

4) Remove the caliper piston applying compressed air gradually from the hole for the brake hose.

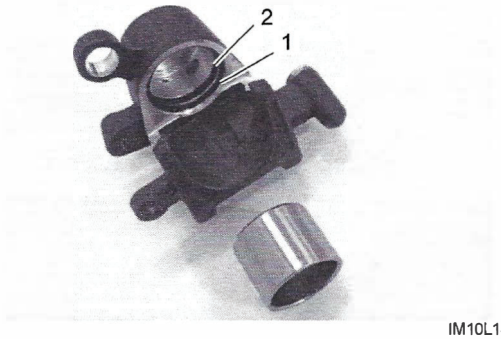
⚠ WARNING

Do not apply highly compressed air to the piston as it is. Place a cloth to prevent brake piston from jumping-out. Gradually apply compressed air. Do not place your fingers in front of brake piston while applying compressed air.



I823H1430012-01

5) Remove the dust seal (1) and piston seal (2) from the caliper.



IM10L1430011-02

Reassembly

Reassemble 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.

NOTICE

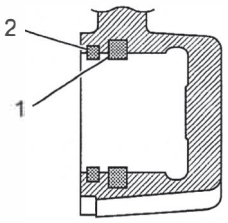
- **Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.**

Brake fluid (DOT 4)

- Apply the brake fluid to new piston seal (1) and new dust seal (2).

Brake fluid (DOT 4)

- Install the piston seal (1) and dust seal (2).

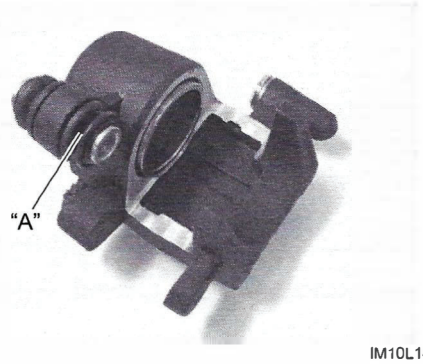


IL41K1430011-01

- Apply grease to the inside of the rubber boot.

"A": Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)

- Set the rubber boot to the caliper.
- Install the spacer into the rubber boot.

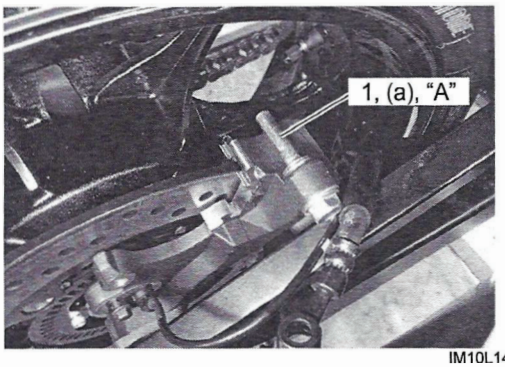


IM10L1430012-02

- Tighten the sliding pin (1) and apply grease to the sliding pin.

"A": Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)

Tightening torque
Rear brake caliper sliding pin bolt (a): 32 N·m (3.3 kgf-m, 24.0 lbf-ft)



IM10L1430013-02

Rear Brake Caliper Parts Inspection

BENM10L34306006

Refer to "Rear Brake Caliper Disassembly and Assembly" (Page 4C-3).

Brake Caliper Cylinder

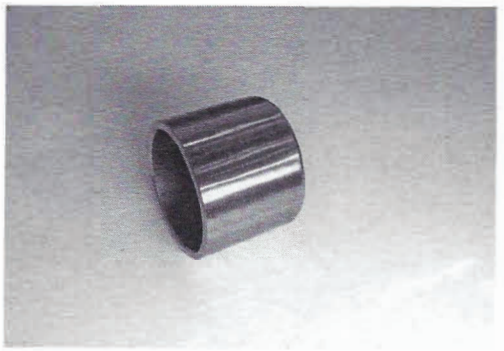
Inspect the brake caliper cylinder wall for nicks, scratches or other damage. If any damage is found, replace the caliper with a new one.



I823H1430018-01

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.



I823H1430017-01

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.



I823H1430019-01

Boot and Spacer

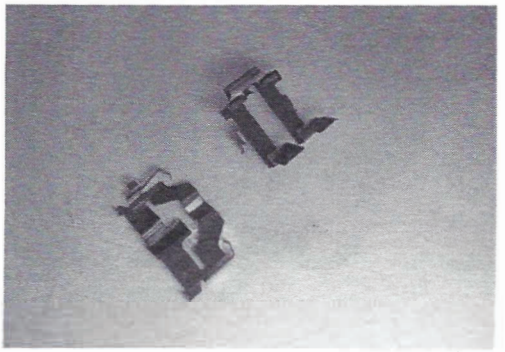
Inspect the boots and spacer for damage and wear. If any defects are found, replace them with new ones.



I823H1430020-01

Brake Pad Spring

Inspect the brake pad springs for damage and excessive bend. If any defects are found, replace them with new ones.



I823H1430021-01

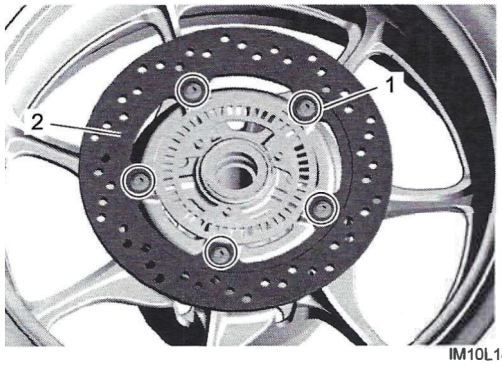
Rear Brake Disc Removal and Installation

BENM10L34306007

Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-8).

Removal

Remove the rear brake disc bolts (1), and then remove the rear brake disc (2) from the rear wheel.



IM10L1430014-02

Installation

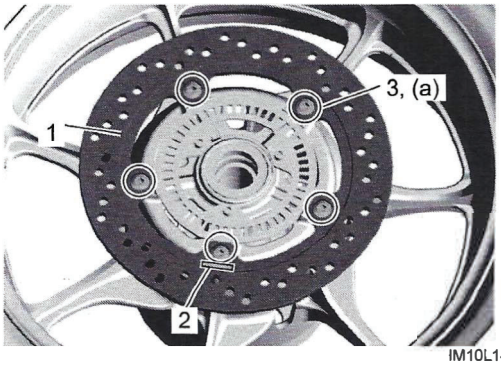
1) Make sure that the brake disc (1) is clean and free of any grease.
2) Install the rear brake disc (1) to the rear wheel.

NOTE

The stamped mark (2) on the brake disc should face to the outside.

3) Tighten the new brake disc bolt (3) to specified torque.

Tightening torque
Brake disc bolt (a): 35 N·m (3.6 kgf-m, 26.0 lbf-ft)



IM10L1430015-02

Rear Brake Disc Inspection

BENM10L34306008

Refer to "Brakes" in Section 0B (Page 0B-20).

Specifications

Tightening Torque Specifications

BENM10L34307001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear brake caliper mounting bolt	17	1.7	12.5	☞(Page 4C-2)
Rear brake pad mounting pin	15	1.5	11.0	☞(Page 4C-2)
Brake hose union bolt	23	2.3	16.5	☞(Page 4C-3)
Rear brake caliper sliding pin bolt	32	3.3	24.0	☞(Page 4C-4)
Brake disc bolt	35	3.6	26.0	☞(Page 4C-6)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Rear Brake Components" (Page 4C-1)

Special Tools and Equipment

Recommended Service Material

BENM10L34308001

Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4C-4) / ☞(Page 4C-4)
Grease	SUZUKI Silicone Grease or equivalent	P/No.: 99000–25100	☞(Page 4C-4) / ☞(Page 4C-4)

NOTE

Required service material(s) is also described in:
"Rear Brake Components" (Page 4C-1)

ABS

Precautions

Precautions for ABS Service

BENM10L34500001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2) and "Precautions for Circuit Tester" in Section 00 (Page 00-8).

- Battery voltage is always applied to the ABS control unit. Therefore, disconnect the battery (–) lead wire before disconnecting the ABS control unit coupler.
- When the ABS control unit coupler is connected, do not disconnect the sensor coupler(s) with the ignition switch turned ON. If the sensor coupler is disconnected with the ignition ON, DTC will be stored in the ABS control unit.
- The wheel speed sensor and ABS control unit / HU cannot be disassembled.

Precautions for Diagnosing Troubles

BENM10L34500002

To ensure that the trouble diagnosis is done accurately and smoothly, observe the following and follow "ABS Check" (Page 4E-13).

- The information on the DTCs detected by the ABS control unit can be checked and cleared using the SDS-II. For the usage and available functions of the SDS-II, refer to the SDS-II operation manual.
- If the motorcycle was operated in any of the following conditions, ABS indicator light may light but this does not indicate any fault in ABS.
  - The motorcycle is stuck in mud, sand, etc.
  - Wheel spins while driving.
  - Wheels are rotated while the motorcycle is jacked up.
- Be sure to follow the trouble diagnosis procedure described in "ABS Check" (Page 4E-13). If the trouble diagnosis procedure is not followed properly, incorrect diagnosis may result. (If the incorrect procedure is performed, other DTC may be stored in the ABS control unit.)

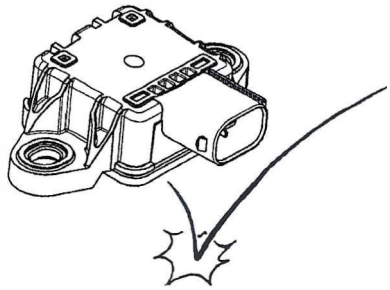
NOTE

After repairing the trouble, clear the DTC using SDS-II. ☞(Page 4E-16)

Precautions for IMU

BENM10L34500003

- Pay attention not to expose the IMU to strong shocks, such as striking or dropping it.
- When IMU is removed / installed, do not use an impact wrench, as shock it generates may damage the IMU.
- In the case that IMU is dropped, do not use it after that.



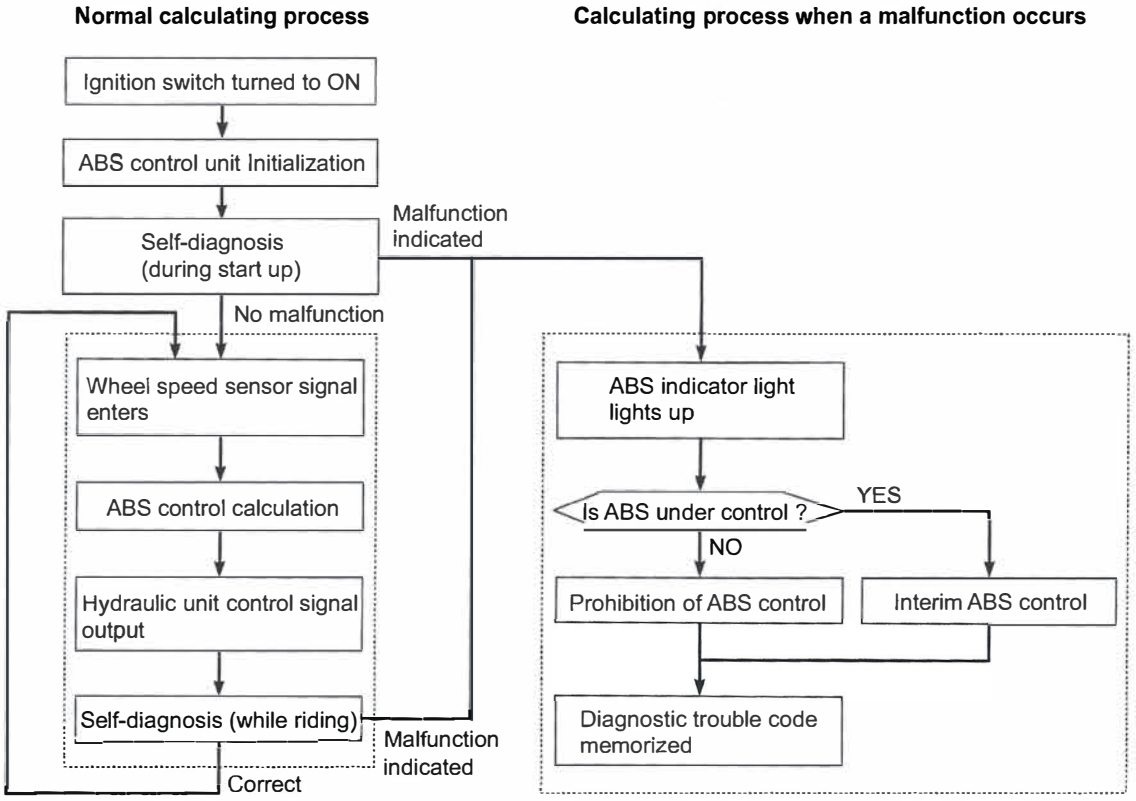
IJ31J1452001-01

General Description

ABS Control Unit Calculating Process

BENM10L34501001

The ABS controls and its calculations, in addition to the self-diagnosing and the fail-safe processes, occur during the ABS control unit calculating process. In addition, if a malfunction is detected by the self-diagnosis function, the brake stops being controlled by the ABS and a diagnostic trouble code is stored.



I823H3450006-01

Self-diagnosis Function

BENM10L34501002

The ABS control unit performs the self-diagnosis and can store any electronically detected malfunctions as DTCs (diagnostic trouble codes). And when detecting any malfunction, ABS control unit performs a warning function to inform the rider of the malfunction.

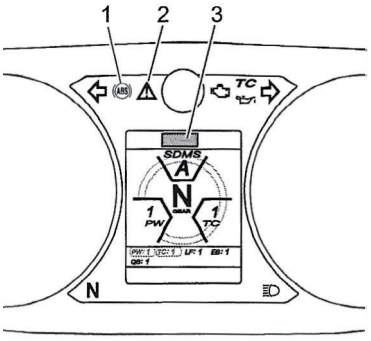
Warning Function

- The ABS control unit warns riders to turn the ABS indicator light (1) on it depending on the failure place or its content. When the ignition switch is turned to ON, the ABS indicator light lights up even if no malfunction has occurred, to indicate that the LED is not burnt out. It will go off after the motorcycle is ridden at more than 5 km/h (3.1 mile/h).
  If an ABS malfunction has occurred, the ABS indicator light keeps lighting up.
- When any of the DTCs is detected, the ABS controller turns the master warning indicator light (2) on.

NOTE

- **Some DTCs do not light the ABS indicator light or master warning indicator. For details of ABS indicator light and master warning indicator operation, referring to the "DTC Table" (Page 4E-18).**
- **ABS control unit has a fail-safe function, ABS is inactivated while a malfunction is detected. And in this case, it functions as the normal brake. However, ABS is being activated, when ABS control unit diagnoses that the operation can continue, it will effectuate ABS provisional control. Upon the moment when the provisional control is over, ABS will be set inactivated. ☞(Page 4E-20)**

- For LCD indication (3), referring to "Combination Meter System Description": Technical Features in Section 0A (Page 0A-28).



IM10L1450001-01

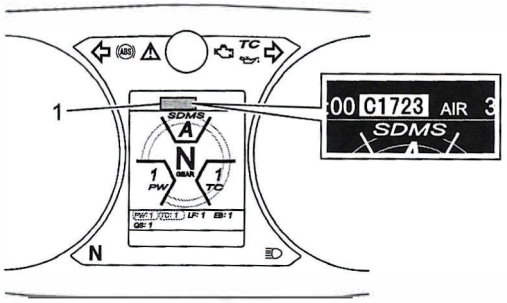
Displayed DTCs (Diagnostic Trouble Codes)

The defective function is memorized in the ABS control unit. Use the mode select coupler (6P) to connect to the special tool. The memorized DTC is displayed on LCD (1). Malfunction means that the ABS control unit does not receive signal from the devices. These affected devices are indicated in the code form.

Special tool
09930–83130

NOTE

- **Before checking the DTC, do not disconnect the ABS control unit coupler. If the coupler from the ABS control unit is disconnected, the DTC memory is erased and the DTC can not be checked.**
- **Check and see if any DTC remains, by actually running the machine to activate ABS and by carrying out the self-diagnosis after deleting the DTC once the malfunctioned part is repaired.**

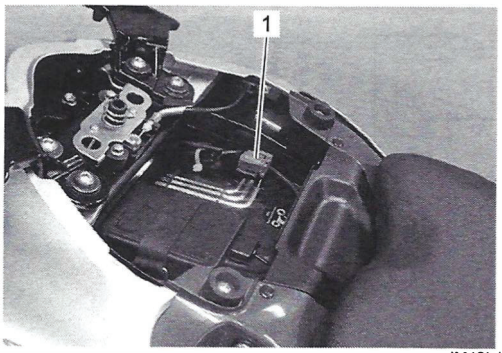


IM10L1450007-01

Diagnostic coupler location

Mode select coupler (6P) (1) is located under the rear seat. Mode select coupler (6P) can use mode select switch and SDS-II.

Special tool
09930–83130
09904–41031
09904–41041
09904–41071

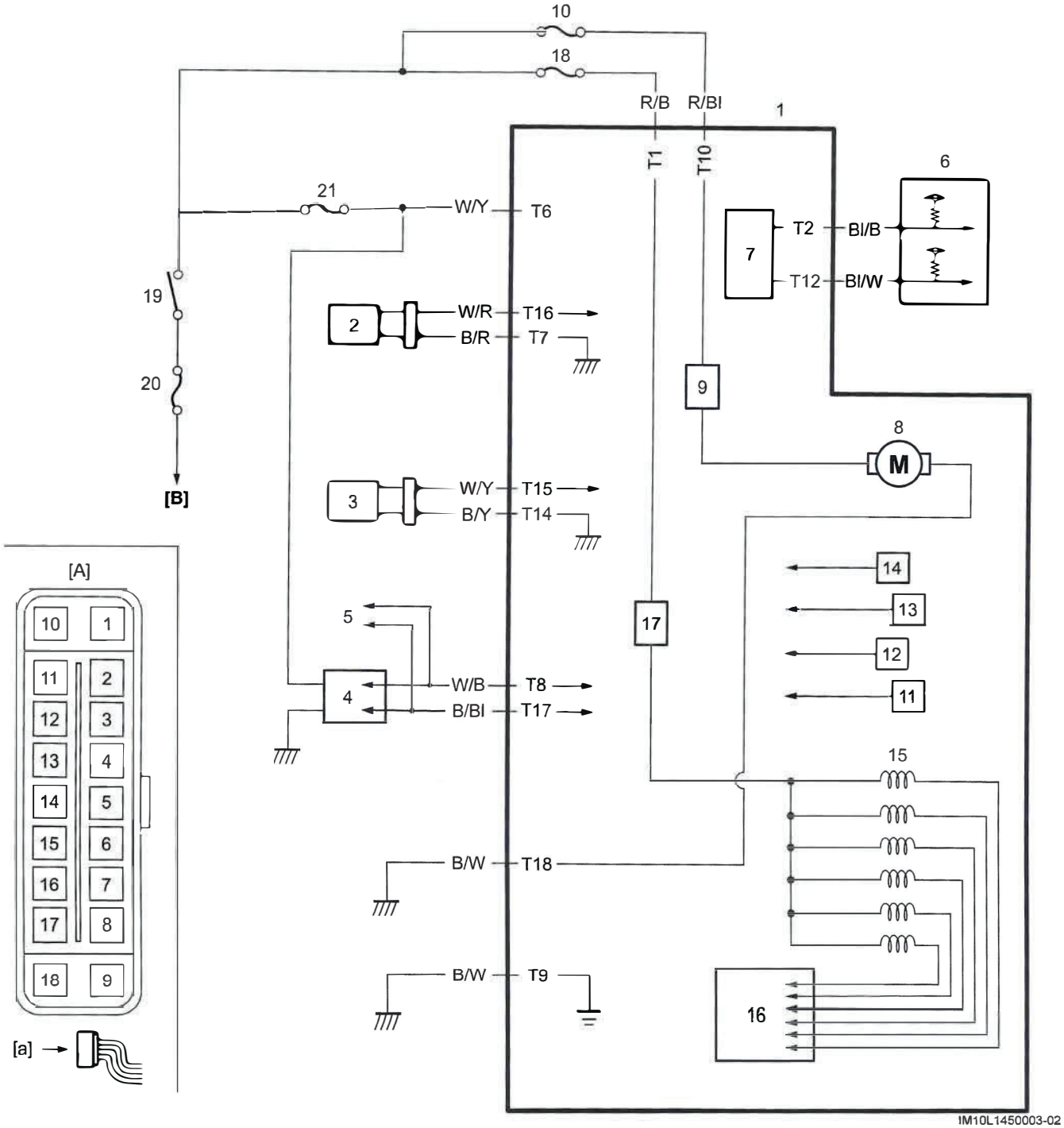


IM10L1110126-02

Schematic and Routing Diagram

ABS Circuit Diagram

BENM10L34502001



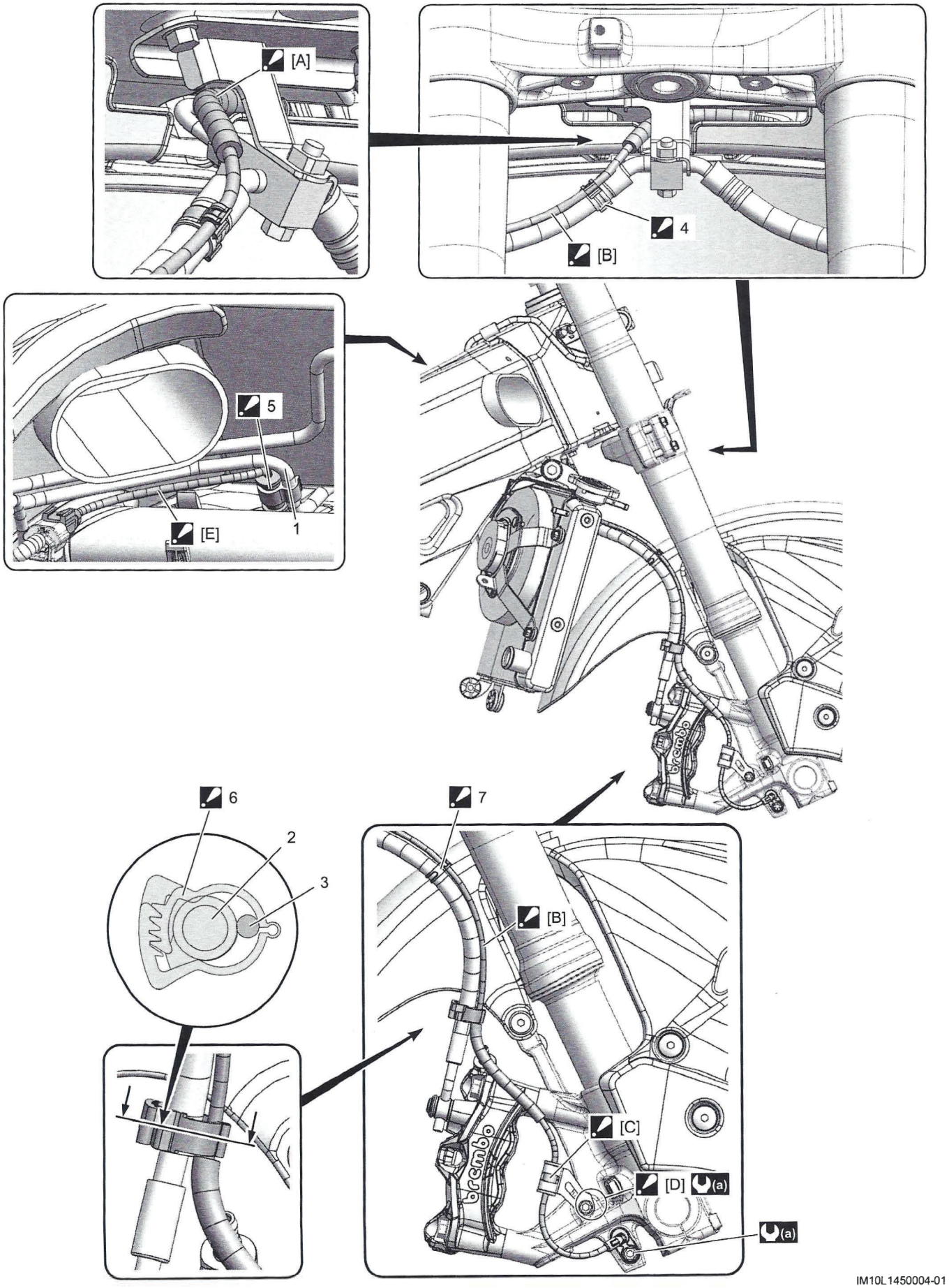
[A]: ABS control unit coupler (View: [a])	7. Wheel speed output circuit	15. Solenoid valve
[B]: To battery	8. Pump motor	16. Solenoid valve drive circuit
1. CPU (ABS controller)	9. Pump motor relay	17. Solenoid valve relay
2. Front wheel speed sensor	10. ABS motor fuse (30A)	18. ABS solenoid valve fuse (15A)
3. Rear wheel speed sensor	11. Front brake master cylinder pressure sensor	19. Ignition switch
4. IMU	12. Front brake caliper pressure sensor	20. Main fuse (30A)
5. To ECM and Combination meter by CAN	13. Rear brake master cylinder pressure sensor	21. Ignition fuse (10A)
6. ECM	14. Rear brake caliper pressure sensor	

Front Wheel Speed Sensor Routing Diagram

BENM10L34502002

NOTICE

- **Be careful not to twist lead wire.**
- **Set clamps without looseness of lead wire.**



IM10L1450004-01

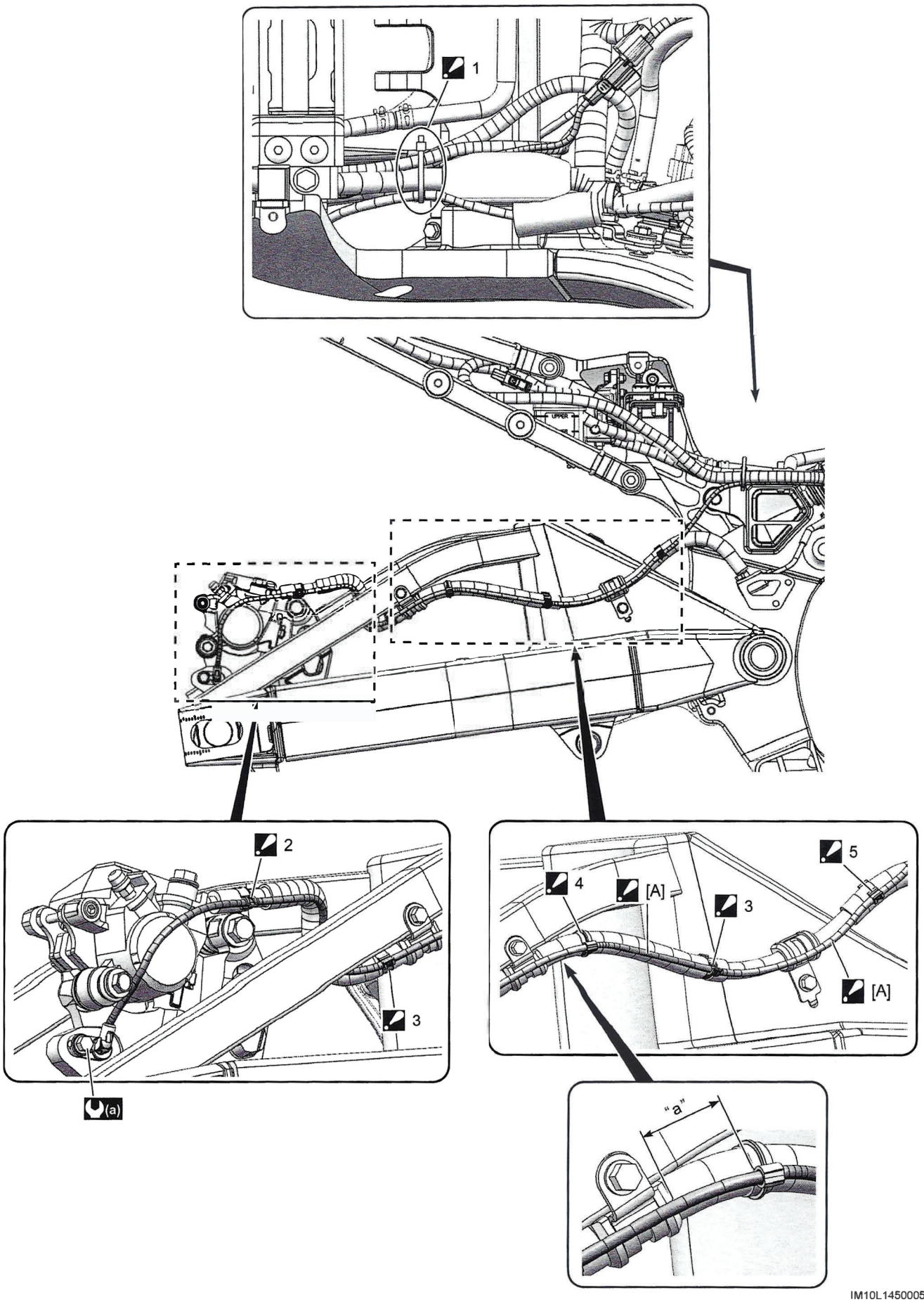
[A]: Pass the front wheel speed sensor lead wire upper of the brake pipe.	3. Front wheel speed sensor lead wire
[B]: Pass the front wheel speed sensor lead wire along the brake hose.	4. Clamp : Pass the front wheel speed sensor lead wire front side of brake hose end. Face the clamp openings to downward.
[C]: Fix the front wheel speed sensor lead wire sleeve to the clamp firmly.	5. Clamp : Fix the front wheel speed sensor lead wire sleeve to the clamp firmly. Clamp the sleeve left side of the brake pipe.
[D]: After the stopper of clamp has contacted the bracket of front fork inner tube, tighten the bolt.	6. Clamp : Clamp the wheel speed sensor lead wire at front side of protector edge of brake hose. Face the claw part of clamp to backward.
[E]: Pass the front wheel speed sensor lead wire under of the duct.	7. Clamp : Pass the front wheel speed sensor lead wire front side of brake hose and clamp it at the marking portion. Face the clamp openings to left side.
1. Front brake pipe (ABS control unit / HU to brake caliper)	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
2. Front brake hose (ABS control unit / HU to brake caliper)	

Rear Wheel Speed Sensor Routing Diagram

BENM10L34502003

NOTICE

- **Be careful not to twist lead wire.**
- **Set clamps without looseness of lead wire.**



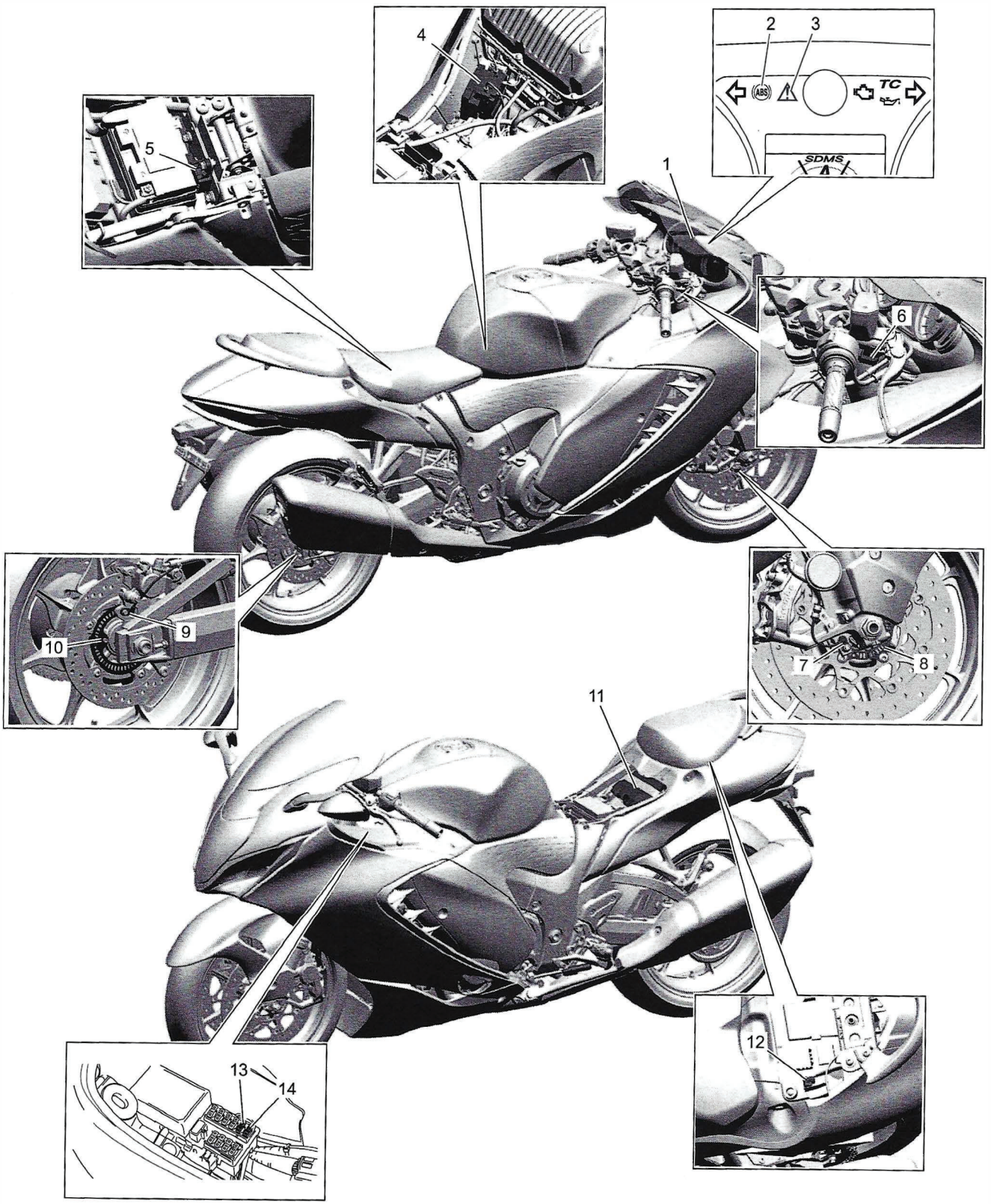
IM10L1450005-01

[A]: Pass the front wheel speed sensor lead wire along the brake hose.	4. Clamp : Clamp the rear wheel speed sensor lead wire outside of the rear brake hose.
1. Clamp : Clamp the rear wheel speed sensor lead wire between harness protector and battery cable.	5. Clamp : Clamp the marking portion of the rear wheel speed sensor lead wire outside of brake hose protector. Face the clamp openings to downward.
2. Clamp : Pass the rear wheel speed sensor lead wire outside of the rear brake hose and clamp it at the brake hose edge part. Face the clamp openings to downward.	"a": 20 – 40mm
3. Clamp : Clamp the marking portion of the rear wheel speed sensor lead wire outside of brake hose protector. Face the clamp openings to upward.	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

Component Location

ABS Components Location

BENM10L34503001



IM10L1450006-03

1. Combination meter	6. Brake light switch	11. ECM
2. ABS indicator light	7. Front wheel speed sensor	12. Mode select coupler (6P)
3. Master warning indicator light	8. Front wheel speed sensor rotor	13. ABS motor fuse (30 A)
4. ABS control unit / HU	9. Rear wheel speed sensor	14. ABS valve fuse (15 A)
5. IMU	10. Rear wheel speed sensor rotor	

Diagnostic Information and Procedures

ABS Check

BENM10L34504001

Refer to the following items for the details of each step.

Step 1

Customer complaint analysis

1) Perform customer complaint analysis. ☞(Page 4E-14)

Was customer complaint analysis performed?

Yes Go to Step 2.

No Perform customer complaint analysis.

Step 2

DTC check

1) Check for DTCs (including pending DTC). ☞(Page 4E-15)

Is there any DTC(s)?

Yes Print DTCs write down and check and repair according to applicable DTC troubleshooting, and go to Step 5.

No Go to Step 3.

Step 3

Visual inspection

1) Perform visual inspection. ☞(Page 4E-15)

Is there any faulty condition?

Yes Repair or replace defective part, and then go to Step 5.

No Go to Step 4.

Step 4

Trouble symptom confirmation

1) Check trouble symptom. ☞(Page 4E-15)

Is trouble symptom identified?

Yes Repair or replace defective part, and then go to Step 5.

No Go to Step 5.

Step 5

Final confirmation test

1) Perform final confirmation test. ☞(Page 4E-15)

Does the trouble recur?

Yes Go to Step 2.

No End.

Step 1: 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:	

PROBLEM SYMPTOMS	
ABS operation	Past malfunctions and repairs
ABS does not work	
ABS works so often with	
Too long stopping distance	
Other	

CONDITION WHEN MALFUNCTION OCCURRED	
ABS indicator light	Riding conditions
Does not light up	While stopping
Lights up	Over 5 km/h (3.1 mile/h)
Goes off after running over 5 km/h (3.1 mile/h): Yes / No	When turning
Flashes	Others
Tires	Brake operating conditions
Abnormal air pressure	Usual braking
Less thread depth	Quick/hard braking
No specified tires installed	
	Interface
Road surface	Too big pulsations at brake lever and pedal
Paved road: Dry / Wet / Others	Too large brake lever and pedal strokes
	Others
Unpaved road: Gravel / Muddy / Uneven / Others	
	Others
	Abnormal noise from the ABS control unit/HU
	Skid noise from the calipers
	Vibration at the brake lever and pedal
NOTE:	

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Step 2: DTC Check
First, check DTC (including pending DTC). ☞(Page 4E-15)

Step 3: Visual Inspection
As a preliminary step, perform visual check of the items that support proper function of the ABS. ☞(Page 4E-29)

Step 4: Trouble Symptom Confirmation
Based on information obtained in "Step 1: Customer Complaint Analysis" (Page 4E-14), check trouble symptoms.

Step 5: Final Confirmation Test
Ride the motorcycle at more than 30 km/h (19 mile/h). Make sure the ABS indicator light is off and quickly apply the brakes to check that the ABS activates correctly. Confirm that the problem symptom is not observed anymore and ABS is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC referring to "DTC Clearance" (Page 4E-16) and perform test riding and confirm that the DTC is not indicated.

DTC Check

BENM10L34504002

NOTE

- **Don't disconnect couplers from ABS control unit, the battery cable from the battery, ABS control unit ground wire harness from the main fuse before confirming the DTC stored in memory. Such disconnection will erase the memorized information in ABS control unit memory.**
- **Before proceeding DTC check, read "Self-diagnosis Function" (Page 4E-3) and correctly understand the function and usage.**

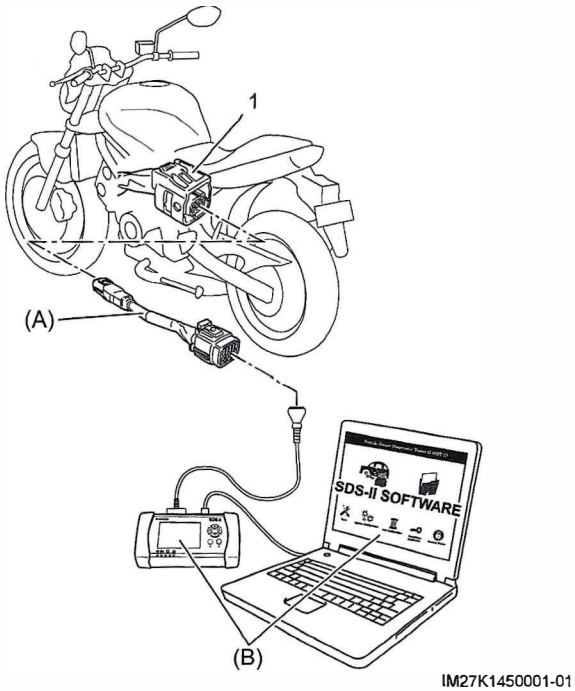
Use of SDS-II

1) Turn the ignition switch "OFF".
2) Remove the rear seat. ☞(Page 9D-34)
3) Connect the conversion cable (ISO) to mode select coupler (6P) (1).
☞(Page 4E-12)

Special tool
(A): 09904–41071

4) Connect the SDS-II to conversion cable (ISO).

Special tool
(B): 09904–41031
09904–41041



IM27K1450001-01

5) Turn the ignition switch "ON".
6) Read DTC according to instructions displayed on SDS-II and print it or write it down. Refer to Operation Manual of SDS-II for further details.

NOTE

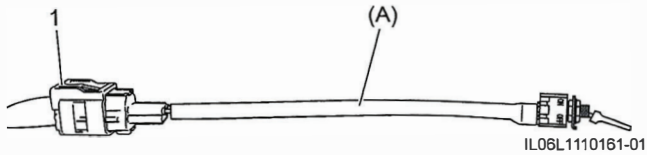
- **If communication between SDS-II and ABS control unit is not possible, perform the following checks.**
  - **Check wire harness between mode select coupler (6P) and ABS coupler.**
  - **Check DIG-cable between mode select coupler (6P) and SDS-II. If necessary, check DIG-cable and conversion cable (ISO) by substituting a known-good cable.**
  - **Check CAN communication system. ☞(Page 10H-4)**
  - **Check ABS power circuit and ground circuit. ☞(Page 4E-48)**
- **Not only SDS-II used for detecting DTCs but also for reproducing and checking on screen the failure condition as described by customers using the trigger. How to use trigger referring to the SDS-II operation manual for further details.**

7) Close the SDS-II and turn the ignition switch OFF.
8) Disconnect the SDS-II from conversion cable (ISO).
9) Disconnect the conversion cable (ISO) from mode select coupler (6P).
10) Install the removed parts.

Use of Mode Select Switch

1) Remove the rear seat. ☞(Page 9D-34)
2) Connect the special tool to the mode select coupler (6P) (1) at the wiring harness.

Special tool
09930–83130



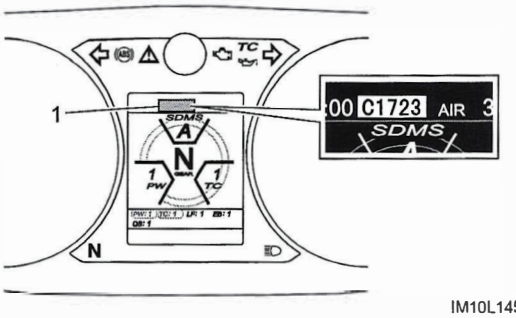
IL06L1110161-01

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



IJ10K1110012-01

5) Check the DTC (1) to determine the malfunction part. ☞(Page 4E-18)



IM10L1450007-01

DTC Clearance

BENM10L34504003

NOTE

The malfunction code is memorized in the ABS control unit also when the lead wire coupler of any sensor is disconnected. Therefore, when a lead wire coupler has been disconnected in the diagnosis, erase the stored past DTC.

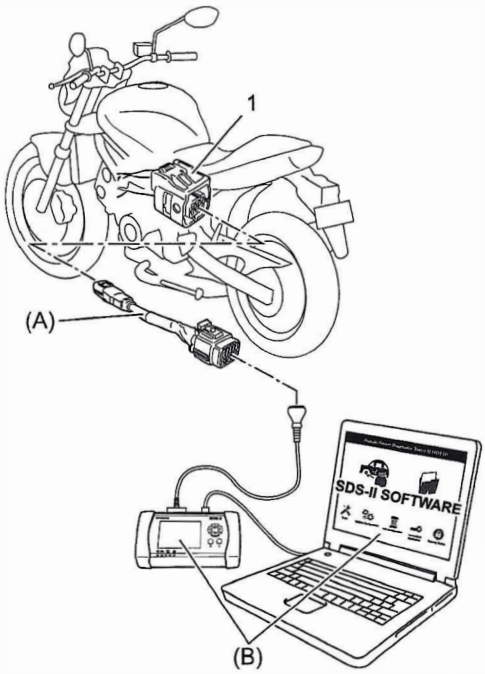
Use of SDS-II

1) Turn the ignition switch OFF.
2) Remove the seat. ☞(Page 9D-34)
3) Connect the conversion cable (ISO) to mode select coupler (6P) (1). ☞(Page 4E-12)

Special tool
(A): 09904–41071

4) Connect the SDS-II to conversion cable (ISO).

Special tool
(B): 09904–41031
09904–41041



IM27K1450001-01

5) Turn the ignition switch "ON".
6) Clear DTC according to instructions displayed on SDS-II tool. Refer to Operation Manual of SDS-II for further details.
7) After completing the clearance, close the SDS-II and turn the ignition switch "OFF".
8) Check that the ABS hydraulic operation is normal. ☞(Page 4E-17)
9) Disconnect the SDS-II and install the removed parts.
10) Ride the motorcycle at more than 30 km/h (18.6 mile/h) and quickly apply the brakes to check that the ABS activates correctly.

NOTE

If communication between SDS-II and ABS control unit is not possible, perform the following checks.

- **Check wire harness between mode select coupler (6P) and ABS coupler.**
  Check DIG-cable between mode select coupler (6P) and SDS-II. If necessary, check DIG-cable and conversion cable (ISO) by substituting a known-good cable.
  Check CAN communication system. ☞(Page 10H-4)
  Check ABS power circuit and ground circuit. ☞(Page 4E-48)

ABS Hydraulic Unit Operation Check

BENM10L34504004

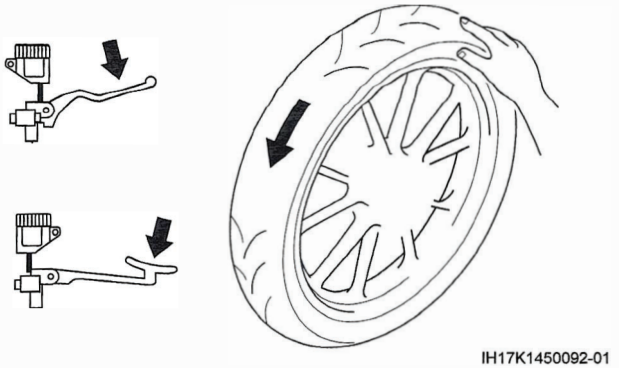
NOTE

- **A false diagnosis may result if operation check of the ABS hydraulic unit is performed without satisfying all of the specified condition below.**
  Check that all the following conditions are met before performing operation check of the ABS hydraulic unit.
  - **Battery voltage is 12.8 V or more.**
  - **No air is trapped in the brake system.**
  - **Brakes do not drag.**
  - **No DTC is stored in ABS hydraulic unit / control module.**
  - **The brake piping is connected correctly.**
- **If the ABS hydraulic unit operation check is performed with air remaining in the brake system, air may enter the ABS hydraulic unit and the ABS may not operate properly.**
- **Operation check must be performed by 2 persons.**

1) Remove the rear seat. ☞(Page 9D-34)
2) Raise the front and rear wheels off the ground and support the motorcycle with a jack.
3) Shift the transmission into neutral.
4) Set up the SDS-II tool referring to the SDS-II operation manual for further details.
5) Turn the ignition switch ON.
6) Click the "Active control".
7) Click the "ABS HU operating".
8) Perform the following procedures.
   a) Apply the front brake.
   b) Select front wheel by SDS-II tool.
   c) Check whether the front wheel rotates freely by hand due to brake depressurization.
   d) Check the rear wheel in the same manner as described previously.

NOTE

Depressurization by SDS-II tool is available for 5 seconds.



IH17K1450092-01

9) If any defects are found, check that the brake pipes are connected correctly. Repair or replace the brake piping as necessary. ☞(Page 4E-50)
10) Close the SDS-II tool and turn the ignition switch OFF.

DTC Table

BENM10L34504005

NOTE

***1: Display on the LCD only. (If the ABS is normal but the ECM detects DTC, ECM-related DTC(s) is displayed.)**
***2: It goes off after running at more than 5 km/h (3.1 mile/h).**
***3: The wheel speed sensor lead wire is connected to the ABS control unit, but a short-circuit or faulty continuity inside the ABS control unit caused this DTC to appear, therefore, the ABS control unit / HU assembly must be replaced. An insufficient wheel speed sensor output voltage is the cause of a malfunction in which the ABS is activated even if the brakes are not suddenly applied. If this occurs frequently even though the wheel speed sensor is operating correctly, the ABS control unit / HU assembly should be replaced.**
***4: When the voltage resumes the normal level, the ABS indicator light will go off.**
***5: These are times that the ABS indicator light does not light up.**

DTC	Malfunction cause	ABS indicator	Master warning indicator	Reference
00000*1	Normal	ON*2	OFF	—
C1711	ABS control unit malfunction	ON*5	ON	☞(Page 4E-30)
C1712	ABS CAN controller malfunction	ON*5	ON	☞(Page 4E-30)
C1715	Supply voltage (Increased)	ON*4	ON	☞(Page 4E-31)
C1716	Supply voltage (Decreased)	ON*4	ON	☞(Page 4E-31)
C1717	CAN high voltage	ON	ON	☞(Page 4E-31)
C1718	CAN low voltage	ON	ON	☞(Page 4E-31)
C1721*3	Wheel speed sensor circuit open (F)	ON	ON	☞(Page 4E-32)
C1722*3		ON	ON	
C1723*3	Wheel speed sensor signal malfunction (F)	ON	ON	☞(Page 4E-34)
C1724*3		ON	ON	
C1725*3		ON	ON	
C1726*3		ON	ON	
C1727*3		ON	ON	
C1728*3		ON	ON	
C1729*3	Wheel speed sensor temporary abnormal noise (F)	ON	ON	☞(Page 4E-34)
C1731*3	Wheel speed sensor circuit open (R)	ON	ON	☞(Page 4E-35)
C1732*3		ON	ON	☞(Page 4E-35)
C1733*3	Wheel speed sensor signal malfunction (R)	ON	ON	☞(Page 4E-37)
C1734*3		ON	ON	
C1735*3		ON	ON	
C1736*3		ON	ON	
C1737*3		ON	ON	
C1738*3		ON	ON	
C1739*3	Wheel speed sensor temporary abnormal noise (R)	ON	ON	☞(Page 4E-37)
C173F*3	Wheel speed sensor related malfunction	ON	ON	☞(Page 4E-37)
C1741	ABS motor malfunction	ON	ON	☞(Page 4E-38)
C1742		ON	ON	
C1743		ON	ON	
C1744		ON	ON	
C1745		ON	ON	
C1746		ON	ON	
C1750	Valve relay malfunction	ON	ON	☞(Page 4E-39)
C1751	Valve relay lock (ON)	ON	ON	☞(Page 4E-39)
C1752	Valve relay lock (OFF)	ON	ON	☞(Page 4E-39)
C1753	Inlet valve malfunction (F)	ON	ON	☞(Page 4E-39)
C1754	Inlet valve malfunction (R)	ON	ON	☞(Page 4E-39)
C1755	Outlet valve malfunction (F)	ON	ON	☞(Page 4E-39)
C1756	Outlet valve malfunction (R)	ON	ON	☞(Page 4E-39)

DTC	Malfunction cause	ABS indicator	Master warning indicator	Reference
C1757	High pressure switching valve malfunction (R)	ON	ON	☞(Page 4E-39)
C1758	Pilot valve malfunction (R)	ON	ON	☞(Page 4E-39)
C1762	Inertial sensor	ON	ON	☞(Page 4E-41)
C1763		ON	ON	
C1764		ON	ON	
C1765		ON	ON	
C1766		ON	ON	
C1767		ON	ON	
C1768	IMU wrong mounting	ON	ON	☞(Page 4E-42)
C1769	IMU sensor value out of specified range	ON	ON	☞(Page 4E-43)
C176A		ON	ON	
C176B		ON	ON	
C176C	CAN invalid data from IMU	ON	ON	☞(Page 4E-43)
C176D		ON	ON	
C1771	Pressure sensor power supply malfunction	ON	ON	☞(Page 4E-44)
C1772	Pressure sensor hardware malfunction (F)	ON	ON	☞(Page 4E-44)
C1773		ON	ON	
C1774	Pressure sensor hardware malfunction (R)	ON	ON	☞(Page 4E-44)
C1775		ON	ON	
C1776	Pressure sensor value out of specified range (F)	ON	ON	☞(Page 4E-44)
C1777		ON	ON	
C1778	Pressure sensor value out of specified range (R)	ON	ON	☞(Page 4E-44)
C1779		ON	ON	
C177A	Pressure sensor temporary abnormal noise (F)	ON	ON	☞(Page 4E-44)
C177B	Pressure sensor temporary abnormal noise (R)	ON	ON	☞(Page 4E-44)
C1781	CAN Invalid Data from Instrument Panel Cluster (IPC) Control Module	OFF	ON	☞(Page 4E-44)
C1782	CAN Invalid Data from ECM	OFF	ON	☞(Page 4E-45)
C1783	CAN invalid data from IPC	OFF	ON	☞(Page 4E-44)
C1784	CAN invalid data from ECM	OFF	ON	☞(Page 4E-45)
C1785	CAN invalid data from IPC	OFF	ON	☞(Page 4E-44)
C1786	CAN invalid data from ECM	OFF	ON	☞(Page 4E-45)
C1802	Control Module Programming Error	ON	OFF	☞(Page 4E-46)
U0073	Control Module Communication Bus Off	ON*5	ON	☞(Page 4E-46)
U0100	Lost Communication With ECM	OFF	ON	☞(Page 4E-46)
U0123	Lost Communication With Inertial Measurement Unit	ON	ON	☞(Page 4E-46)
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	OFF	ON	☞(Page 4E-46)

Fail-Safe Table

BENM10L34504006

When any of the following DTCs is detected, ABS control unit enters fail-safe mode and ABS functions are deactivated until ABS control module judges the system is normal.

NOTE

- **○ : Activated**
- **–: Deactivated**
- ***1: The corresponding function is blocked after the end of control.**
- ***2: The control is gradually reduced, and the corresponding function is blocked after the end of control.**

DTC	Fail-safe operation							Fail-safe cancel condition
	ABS	Cornering brake control	Combined brake control	Cornering Combined brake control	Slope dependant control	Hill hold control	Emergency stop signal control	
C1711	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1712	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1715	—	—	—	—	—	—	—	Recovery can be performed if normal state occurs in the same ignition cycle.
C1716	—	—	—	—	—	—	—	Recovery can be performed if normal state occurs in the same ignition cycle.
C1717	○	—	○	—	—	—	—	Recovery can be performed if normal state occurs in the same ignition cycle.
C1718	○	—	○	—	—	—	—	Recovery can be performed if normal state occurs in the same ignition cycle.
C1721	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1722	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1723	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1724	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)

DTC	Fail-safe operation							Fail-safe cancel condition
	ABS	Cornering brake control	Combined brake control	Cornering Combined brake control	Slope dependant control	Hill hold control	Emergency stop signal control	
C1725	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1726	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1727	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1728	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1729	—	—	—	—	—	—	—	Recovery can be performed if normal state occurs in the same ignition cycle.
C1731	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1732	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1733	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1734	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1735	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1736	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)

DTC	Fail-safe operation							Fail-safe cancel condition
	ABS	Cornering brake control	Combined brake control	Cornering Combined brake control	Slope dependant control	Hill hold control	Emergency stop signal control	
C1737	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1738	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1739	—	—	—	—	—	—	—	Recovery can be performed if normal state occurs in the same ignition cycle.
C173F	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1741	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment) However, the "pump motor power supply voltage monitor error" can be recovered if normal state occurs in the same ignition cycle.
C1742	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1743	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment) However, the "pump motor power supply voltage monitor error" can be recovered if normal state occurs in the same ignition cycle.
C1744	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment) However, the "pump motor power supply voltage monitor error" can be recovered if normal state occurs in the same ignition cycle.

DTC	Fail-safe operation							Fail-safe cancel condition
	ABS	Cornering brake control	Combined brake control	Cornering Combined brake control	Slope dependant control	Hill hold control	Emergency stop signal control	
C1745	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment) However, the "pump motor power supply voltage monitor error" can be recovered if normal state occurs in the same ignition cycle.
C1746	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment) However, the "pump motor power supply voltage monitor error" can be recovered if normal state occurs in the same ignition cycle.
C1750	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1751	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1752	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1753	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1754	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1755	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1756	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)

DTC	Fail-safe operation							Fail-safe cancel condition
	ABS	Cornering brake control	Combined brake control	Cornering Combined brake control	Slope dependant control	Hill hold control	Emergency stop signal control	
C1757	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1758	—	—	—	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1762	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1763	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1764	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1765	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1766	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1767	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1768	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1769	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C176A	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)

DTC	Fail-safe operation							Fail-safe cancel condition
	ABS	Cornering brake control	Combined brake control	Cornering Combined brake control	Slope dependant control	Hill hold control	Emergency stop signal control	
C176B	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C176C	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C176D	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1771	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1772	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1773	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1774	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1775	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1776	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1777	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1778	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)

DTC	Fail-safe operation							Fail-safe cancel condition
	ABS	Cornering brake control	Combined brake control	Cornering Combined brake control	Slope dependant control	Hill hold control	Emergency stop signal control	
C1779	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C177A	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C177B	*1	*1	*2	*2	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1781	○	○	○	○	○	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1782	○	○	○	○	○	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1783	○	○	○	○	○	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1784	○	○	○	○	○	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1785	○	○	○	○	○	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1786	○	○	○	○	○	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
C1802	—	—	—	—	—	—	—	The "Reprogramming" of ABS control unit is completed correctly.
U0073	○	—	○	—	—	—	—	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)

DTC	Fail-safe operation							Fail-safe cancel condition
	ABS	Cornering brake control	Combined brake control	Cornering Combined brake control	Slope dependant control	Hill hold control	Emergency stop signal control	
U0100	○	○	○	○	○	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
U0123	○	—	○	—	—	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)
U0155	○	○	○	○	○	—	○	Turn the ignition OFF and then ON, and perform diagnosis again. (Recovery is not performed based on normal judgment)

Scan Tool Data

BENM10L34504007

As the data values are standard values estimated on the basis of values obtained from the new vehicles of the following conditions by using a scan tool, use them as reference values.

- Park vehicle in a flat area.
- Adjust air pressure of all tires to specified value.
- Use new genuine tires and genuine suspension.
- Do not modify suspension.

Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with these data alone.

NOTE

If communication between SDS-II and ABS control unit is not possible, perform the following checks:

- **Check wire harness between mode select coupler (6P) and ABS coupler.**
- **Check DIG-cable between mode select coupler (6P) and SDS-II. If necessary, check DIG-cable and conversion cable (ISO) by substituting a known-good cable.**
- **Check CAN communication system. ☞(Page 10H-4)**
- **Check ABS power circuit and ground circuit. ☞(Page 4E-48)**

Scan tool data	Vehicle condition	Condition / Reference value
Wheel speed sensor (F)	At stop (Stationary vehicle)	0 km/h (0 mph)
	Turn a wheel	Numerical value increases
Wheel speed sensor (R)	At stop (Stationary vehicle)	0 km/h (0 mph)
	Turn a wheel	Numerical value increases
IG monitoring voltage	Ignition "ON" (Engine stopped)	Battery voltage
Inertial sensor Output Ax Axis	Side-stand position with steering fully turn to left side	3.78 to 0.73 m/s^2
	Upright position	Numerical Value increases to the negative side
Inertial sensor Output Ay Axis	Side-stand position with steering fully turn to left side	10.96 to 8.71 m/s^2
	Upright position	Numerical Value increases to the positive side
Inertial sensor Output Az Axis	Side-stand position with steering fully turn to left side	1.47 to -1.61 m/s^2
	Upright position	Numerical Value does not change

Scan tool data	Vehicle condition		Condition / Reference value
Inertial sensor Output Ox	Static	Side-stand position with steering fully turn to left side	3.12 to -3.12 deg/s
	Dynamic	Raise to upright position from side-stand position (While raising)	Numerical Value increases to the positive or negative side
Inertial sensor Output Oy	Static	Side-stand position with steering fully turn to left side	3.12 to -3.12 deg/s
	Dynamic	Raise to upright position from side-stand position (While raising)	Numerical Value increases to the positive or negative side
Inertial sensor Output Oz	Static	Side-stand position with steering fully turn to left side	3.12 to -3.12 deg/s
	Dynamic	Raise to upright position from side-stand position (While raising)	Numerical Value increases to the negative side
Pressure sensor Output master cylinder (F)	Not brake lever operating		0.0 Mpa
	Brake lever operating		Numerical value increases
Pressure sensor Output caliper (F)	Not brake lever operating		0.0 Mpa
	Brake lever operating		Numerical value increases
Pressure sensor Output master cylinder (R)	Not brake pedal operating		0.0 Mpa
	Brake pedal operating		Numerical value increases
Pressure sensor Output caliper (R)	Not brake pedal operating		0.0 Mpa
	Brake pedal operating		Numerical value increases
ABS control	Ignition "ON" (Engine stopped)		Normal
CBS control	Ignition "ON" (Engine stopped)		Normal
Hill hold control	Ignition "ON" (Engine stopped)		Normal
ESS control	Ignition "ON" (Engine stopped)		Normal
Hill hold state	Ignition "ON" (Engine stopped)		Normal
ABS solenoid valve relay	Ignition "ON" (Engine stopped)		ON
ABS solenoid IN/V (F)	Ignition "ON" (Engine stopped)		OFF
ABS solenoid OUT/V (F)	Ignition "ON" (Engine stopped)		OFF
Pilot valve (R)	Ignition "ON" (Engine stopped)		OFF
High pressure switching valve (R)	Ignition "ON" (Engine stopped)		OFF
ABS solenoid IN/V (R)	Ignition "ON" (Engine stopped)		OFF
ABS solenoid OUT/V (R)	Ignition "ON" (Engine stopped)		OFF
ABS motor	Ignition "ON" (Engine stopped)		Normal

Visual Inspection

BENM10L34504008

Check the following parts and systems visually.

Inspection Item		Referring Section
Couplers of electric wire harness	Disconnection, friction	"Precautions for Electrical Circuit Service" in Section 00 (Page 00-2)
Fuses	Burning	"Precautions for Electrical Circuit Service" in Section 00 (Page 00-2)
Brake pad	Worn	"Front Brake Pad Inspection" in Section 4B (Page 4B-2) "Rear Brake Pad Inspection" in Section 4C (Page 4C-2)
Brake fluid	Level, leakage	"Brake Fluid Level Check" in Section 4A (Page 4A-10)
ABS indicator light	Operation	"ABS Indicator Light Inspection" (Page 4E-30)
Master Warning Indicator Light	Operation	"Master Warning Indicator Inspection" in Section 1A (Page 1A-31)
Tire	Pressure	"Tire Inspection and Cleaning" in Section 2D (Page 2D-12)
	Type, size	
	Damage, wear	
Wheel	Runout, play	"Wheel / Wheel Axle Inspection" in Section 2D (Page 2D-11)
Wheel speed sensor	Damage, wear	"Wheel Speed Sensor and Sensor Rotor Inspection" (Page 4E-55)
Wheel speed sensor rotor	Damage, wear	
Other parts that can be checked visually		—

ABS Symptom Diagnosis

BENM10L34504009

Condition	Possible cause	Correction / Reference Item
The ABS indicator light keeps lighting up even though the motorcycle is ridden at more than 5 km/h (3.1 mile/h).	Malfunctioning the ABS function.	*Perform the ABS check. ☞(Page 4E-13)*
	Malfunctioning the ABS indicator light circuit.	*Check the ABS indicator light circuit. ☞(Page 4E-30)*
The ABS indicator light does not light up when turning the ignition switch to ON.	Malfunctioning the ABS function.	*Perform the ABS check. ☞(Page 4E-13)*
	Malfunctioning the ABS indicator light circuit.	*Check the ABS indicator light circuit. ☞(Page 4E-30)*
	Malfunctioning the combination meter.	*Check the combination meter. ☞(Page 9C-9)*

ABS Indicator Light Inspection

BENM10L34504010

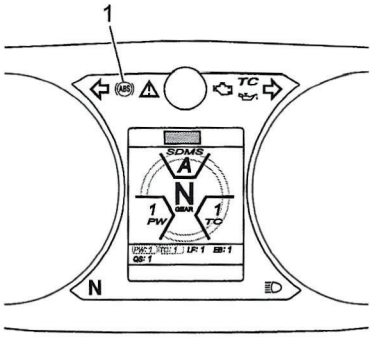
Wiring Diagram

Refer to "ABS Circuit Diagram" (Page 4E-5).

Troubleshooting

Step 1

1) Check if the ABS indicator light (1) lights up when turning the ignition switch ON.



IM10L1450008-01

Does the ABS indicator light lights up?

Yes — Go to Step 3.

No — Go to Step 2.

Step 2

(The ABS indicator light does not light up)

1) Check the other indicator light. ☞(Page 9C-9)

Is check result OK?

Yes — Replace the combination meter. ☞(Page 9C-13)

No — Check the combination meter power supply and ground circuit.

If combination meter power supply and ground circuit is good condition, replace the combination meter. ☞(Page 9C-13)

Step 3

(The ABS indicator light lights up)

1) Ride the motorcycle at more than 5 km/h (3 mile/h).

Does the ABS indicator light go off?

Yes — Go to Step 4.

No
- DTC output. ☞(Page 4E-15)
- If DTC can not be output, check the combination meter. ☞(Page 9C-9)

If combination meter is good condition, replace the ABS control unit / HU and inspect it again. ☞(Page 4E-50)

Step 4

Is "- - - - -" or "CHEC" displayed to LCD?

Yes — Perform the "CAN Communication Check" in Section 10H (Page 10H-4).

No — Normal. (No DTC exists)

Master Warning Indicator Light Inspection

BENM10L34504011

Refer to "Master Warning Indicator Inspection" in Section 1A (Page 1A-31).

DTC C1711 / C1712

BENM10L34504012

Possible Cause
C1711: ABS control unit malfunction **C1712: ABS control unit CAN controller error** Faulty ABS control unit

Troubleshooting

Step 1

1) Turn the ignition switch OFF.
2) Disconnect the ABS control unit coupler. ☞(Page 4E-50)
3) Check for proper terminal connection to the ABS control unit coupler.
4) If connections are OK, reconnect the ABS control unit coupler.
5) Perform "DTC Check" (Page 4E-15) and check DTC.

Is DTC C1711 or C1712 still detected?

Yes — Replace the ABS control unit / HU. ☞(Page 4E-50)

No — Intermittent trouble. ☞(Page 00-7)

DTC C1715 / C1716 / C1717 / C1718

BENM10L34504013

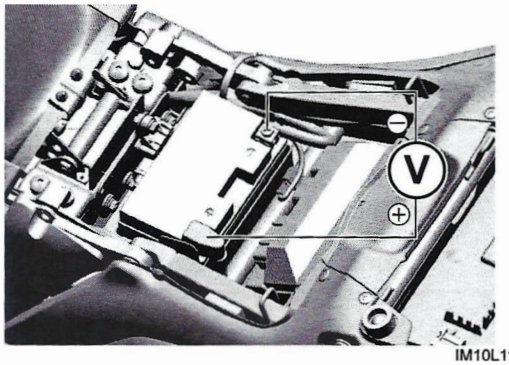
Possible Cause
C1715: Ignition supply voltage – Increase
C1716: Ignition supply voltage – Decrease
C1717: CAN high voltage
C1718: CAN low voltage
• Faulty generator or regulator/rectifier
• Faulty battery
• Faulty ABS control unit
• Faulty wire harness, etc.

Wiring Diagram
Refer to "ABS Circuit Diagram" (Page 4E-5).

Troubleshooting

Step 1

1) Turn the ignition switch OFF.
2) Remove the seat. ☞(Page 9D-34)
3) Measure the voltage between the (+) and (–) battery terminals.



IM10L11A0028-01

Is voltage 12 V or more?

Yes — Go to Step 2.

No — Charge or replace the battery. ☞(Page 1J-8)

Step 2

1) Start the engine at 5000 r/min with the dimmer switch set to HI.
2) Measure the voltage between the (+) and (–) battery terminals.

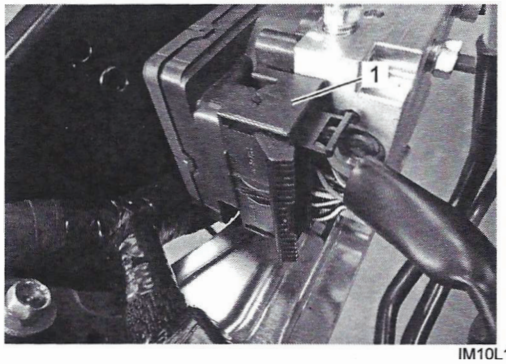
Is voltage 14.0 – 15.5 V?

Yes — Go to Step 3.

No — Inspect the generator and regulator/rectifier.
- Generator: ☞(Page 1J-4)
- Regulator/rectifier: ☞(Page 1J-7)

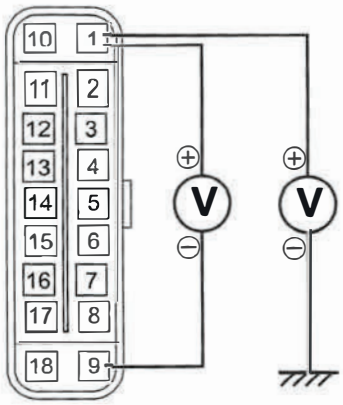
Step 3

1) Turn the ignition switch OFF.
2) Check the ABS control unit coupler (1) for loose or poor contacts. If OK, then disconnect the ABS control unit coupler. ☞(Page 4E-50)



IM10L1450011-01

3) Start the engine at 5000 r/min with the dimmer switch set to HI.
4) Measure the voltage between the "T1" at the ABS control unit coupler and ground.
5) If OK, measure the voltage between "T1" and "T9" at the ABS control unit coupler.



IM10L1450027-02

Is voltage 14.0 – 15.5 V?

Yes — Replace the ABS control unit / HU. ☞(Page 4E-50)

No	Repair or replace the defective wire harness. (Faulty ignition or ground wire)

DTC C1721 / C1722

BENM10L34504014

Possible Cause
C1721: Wheel speed sensor circuit (F) – Start-up test **C1722: Wheel speed sensor circuit (F) – Line monitoring** Wheel speed sensor circuit open or short, loosen contact in wheel speed sensor coupler, input amplifier in ABS control unit failure, etc.

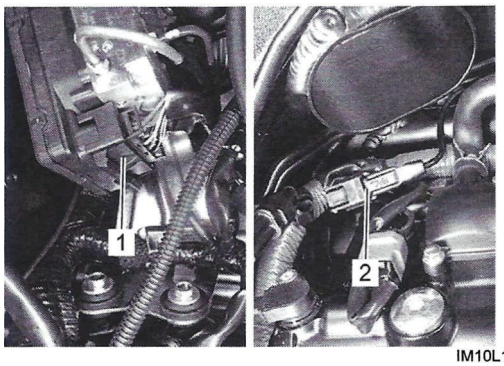
Wiring Diagram

Refer to "ABS Circuit Diagram" (Page 4E-5).

Troubleshooting

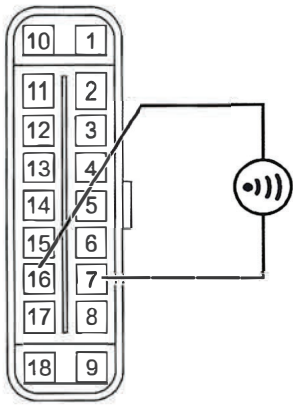
Step 1

1) Turn ignition switch OFF.
2) Check the ABS control unit coupler (1) and front wheel speed sensor coupler (2) for loose or poor contacts. If OK, then disconnect the ABS control unit coupler.
   - Front wheel speed sensor coupler: ☞(Page 4E-53)
   - ABS control unit coupler: ☞(Page 4E-50)



IM10L1450014-01

3) Check for continuity between "T16" and "T7" at the ABS control unit coupler.



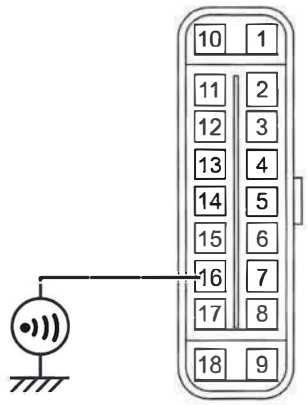
IM10L1450015-01

Is no continuity indicated?

Yes	Go to Step 2.
No	• Repair or replace the defective wire harness. (Faulty sensor wire) • Faulty front wheel speed sensor. ☞(Page 4E-53)

Step 2

1) Check for continuity between "T16" and ground at the ABS control unit coupler.



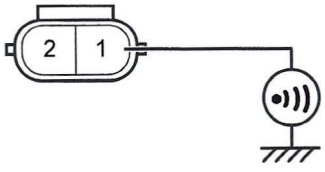
IM10L1450016-01

Is no continuity indicated?

Yes	Go to Step 4.
No	Go to Step 3.

Step 3

1) Disconnect the front wheel speed sensor coupler.
2) Check for continuity between "T1" at the front wheel speed sensor lead wire coupler and ground.



IM10L1450017-02

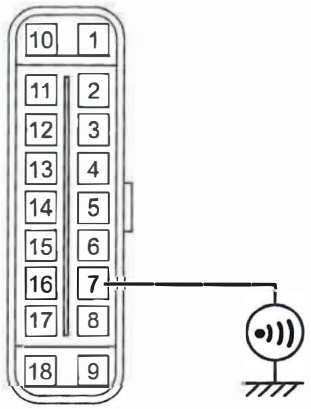
Is no continuity indicated?

Yes	Repair or replace the defective wire harness. (Faulty "T16" wire at the ABS control unit coupler)

No Faulty front wheel speed sensor. ☞(Page 4E-53)

Step 4

1) Check for continuity between "T7" and ground at the ABS control unit coupler.



IM10L1450018-01

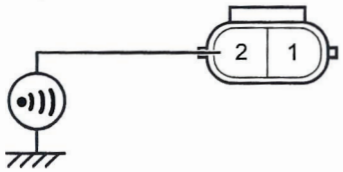
Is no continuity indicated?

Yes Go to Step 6.

No Go to Step 5.

Step 5

1) Disconnect the front wheel speed sensor coupler.
2) Check for continuity between "T2" at the front wheel speed sensor lead wire coupler and ground.



IM10L1450019-02

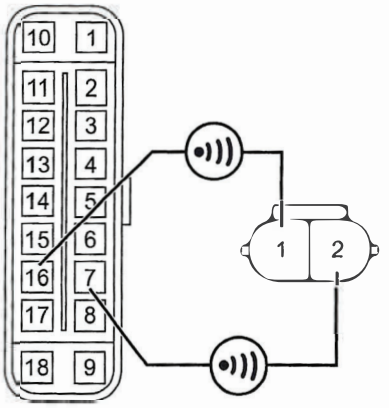
Is no continuity indicated?

Yes Repair or replace the defective wire harness. (Faulty "T7" wire at the ABS control unit coupler)

No Faulty front wheel speed sensor. ☞(Page 4E-53)

Step 6

1) Disconnect the front wheel speed sensor coupler.
2) Check for continuity between "T16" on the ABS control unit coupler and "T1" on the front wheel speed sensor coupler.
3) Check for continuity between "T7" on the ABS control unit coupler and "T2" on the front wheel speed sensor coupler.



IM10L1450020-01

Is continuity indicated?

Yes Go to Step 7.

No Repair or replace the defective wire harness.

Step 7

1) Measure the front wheel speed sensor current. Refer to "Wheel Speed Sensor Current" under "Wheel Speed Sensor and Sensor Rotor Inspection" (Page 4E-55).

Is current result OK?

Yes Replace the ABS control unit / HU. ☞(Page 4E-50)

No Replace the front wheel speed sensor. ☞(Page 4E-53)

DTC C1723 / C1724 / C1725 / C1726 / C1727 / C1728 / C1729

BENM10L34504015

Possible Cause
C1723: Wheel speed sensor signal malfunction (F) – Dynamic monitoring
C1724: Wheel speed sensor signal malfunction (F) – Drive off monitoring Low
C1725: Wheel speed sensor signal malfunction (F) – Drive off monitoring High
C1726: Wheel speed sensor signal malfunction (F) – v Difference monitoring
C1727: Wheel speed sensor signal malfunction (F) – Long-term signal disturbance monitoring
C1728: Wheel speed sensor signal malfunction (F) – TDF Monitoring
C1729: Wheel speed sensor signal malfunction (F) – Long-term signal disturbance monitoring suspicious
Too great air gap, worn or missing teeth, noise, interference between lines, loose contact in wheel speed sensor coupler, wheel speed sensor not securely fastened, input amplifier in wheel speed sensor coupler, input amplifier in ABS control unit failure, etc.

Troubleshooting

Step 1

1) Inspect the clearance between the front wheel speed sensor and sensor rotor using the thickness gauge. ☞(Page 4E-55)

Is the clearance OK?

Yes — Go to Step 2.

No — Find and repair the cause. ☞(Page 4E-55)

Step 2

1) Inspect the front wheel speed sensor rotor for damage and check that no foreign objects are caught in the rotor openings.

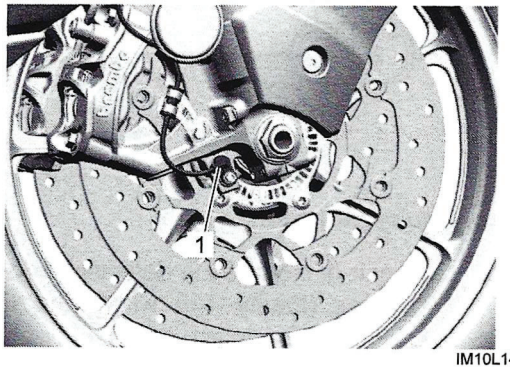
Is the sensor rotor OK?

Yes — Go to Step 3.

No — Clean or replace the sensor rotor. ☞(Page 4E-54)

Step 3

1) Check that the front wheel speed sensor (1) is mounted securely.



IM10L1450013-01

Is the sensor mounted securely?

Yes — Check the front wheel speed sensor circuits according to "DTC C1721 / C1722" (Page 4E-32).

No — Tighten the mounting bolt.

DTC C1731 / C1732

BENM10L34504016

Possible Cause
C1731: Wheel speed sensor circuit (R) – Start-up test **C1732: Wheel speed sensor circuit (R) – Line monitoring** Wheel speed sensor circuit open or short, loosen contact in wheel speed sensor coupler, input amplifier in ABS control unit failure, etc.

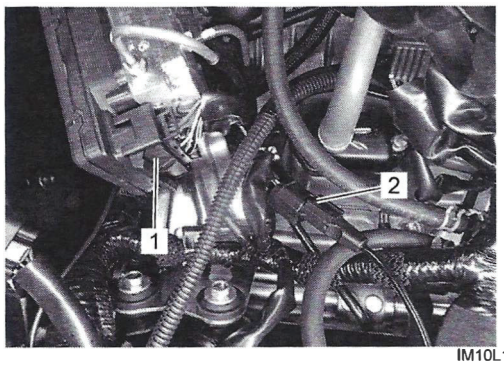
Wiring Diagram

Refer to "ABS Circuit Diagram" (Page 4E-5).

Troubleshooting

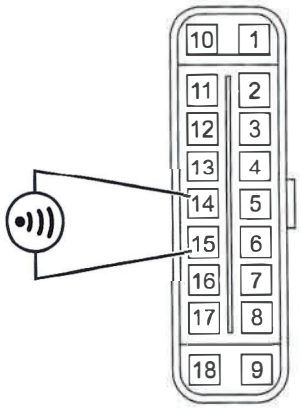
Step 1

1) Turn ignition switch OFF.
2) Check the ABS control unit coupler (1) and rear wheel speed sensor coupler (2) for loose or poor contacts. If OK, then disconnect the ABS control unit coupler.
   - Rear wheel speed sensor coupler: ☞(Page 4E-53)
   - ABS control unit coupler: ☞(Page 4E-50)



IM10L1450022-01

3) Check for continuity between "T15" and "T14" at the ABS control unit coupler.



IM10L1450023-01

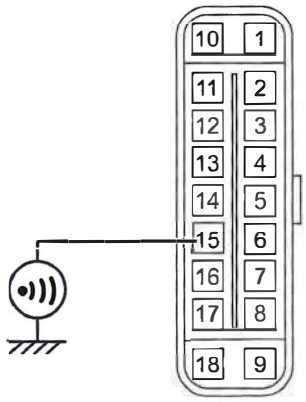
Is no continuity indicated?

Yes — Go to Step 2.

No
- Repair or replace the defective wire harness. (Faulty sensor wire)
- Faulty rear wheel speed sensor. ☞(Page 4E-53)

Step 2

1) Check for continuity between "T15" and ground at the ABS control unit coupler.



IM10L1450024-01

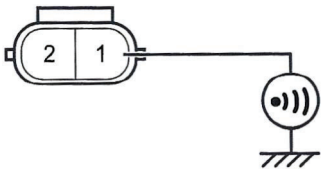
Is no continuity indicated?

Yes — Go to Step 4.

No — Go to Step 3.

Step 3

1) Disconnect the rear wheel speed sensor coupler.
2) Check for continuity between "T1" at the rear wheel speed sensor lead wire coupler and ground.



IM10L1450017-02

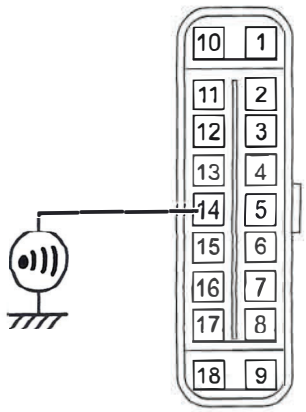
Is no continuity indicated?

Yes — Repair or replace the defective wire harness. (Faulty "T15" wire at the ABS control unit coupler)

No — Replace the rear wheel speed sensor. ☞(Page 4E-53)

Step 4

1) Check for continuity between "T14" and ground at the ABS control unit coupler.



IM10L1450025-01

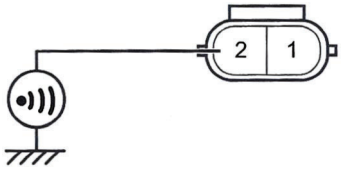
Is no continuity indicated?

Yes Go to Step 6.

No Go to Step 5.

Step 5

1) Disconnect the rear wheel speed sensor coupler.
2) Check for continuity between "T2" at the rear wheel speed sensor lead wire coupler and ground.



IM10L1450019-02

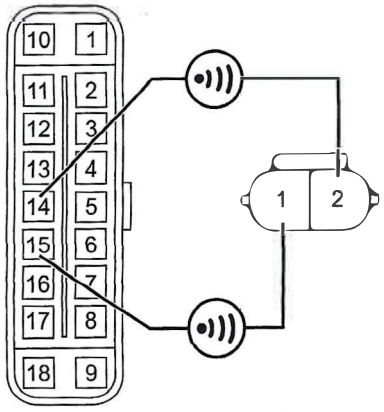
Is no continuity indicated?

Yes Repair or replace the defective wire harness. (Faulty "T14" wire at the ABS control unit coupler)

No Replace the rear wheel speed sensor. ☞(Page 4E-53)

Step 6

1) Disconnect the rear wheel speed sensor coupler.
2) Check for continuity between "T15" on the ABS control unit coupler and "T1" on the rear wheel speed sensor coupler.
3) Check for continuity between "T14" on the ABS control unit coupler and "T2" wire on the rear wheel speed sensor coupler.



IM10L1450026-01

Is continuity indicated?

Yes Go to Step 7.

No Repair or replace the defective wire harness.

Step 7

1) Measure the rear wheel speed sensor current. Refer to "Wheel Speed Sensor Current" under "Wheel Speed Sensor and Sensor Rotor Inspection" (Page 4E-55).

Is rear wheel speed sensor OK?

Yes Replace the ABS control unit / HU. ☞(Page 4E-50)

No Replace the rear wheel speed sensor. ☞(Page 4E-53)

DTC C1733 / C1734 / C1735 / C1736 / C1737 / C1738 / C1739

BENM10L34504017

Possible Cause
C1733: Wheel speed sensor signal malfunction (R) – Dynamic monitoring **C1734: Wheel speed sensor signal malfunction (R) – Drive off monitoring Low** **C1735: Wheel speed sensor signal malfunction (R) – Drive off monitoring High** **C1736: Wheel speed sensor signal malfunction (R) – v Difference monitoring** **C1737: Wheel speed sensor signal malfunction (R) – Long-term signal disturbance monitoring** **C1738: Wheel speed sensor signal malfunction (R) – TDF Monitoring** **C1739: Wheel speed sensor signal malfunction (R) – Long-term signal disturbance monitoring suspicious** Too great air gap, worn or missing teeth, noise, interference between lines, loose contact in wheel speed sensor coupler, wheel speed sensor not securely fastened, input amplifier in ABS control unit failure, etc.

Troubleshooting

Step 1

1) Inspect the clearance between the rear wheel speed sensor and sensor rotor using the thickness gauge. ☞(Page 4E-55)

Is the clearance OK?

Yes Go to Step 2.

No Adjust the clearance.

Step 2

1) Inspect the rear wheel speed sensor rotor for damage and check that no foreign objects are caught in the rotor openings.

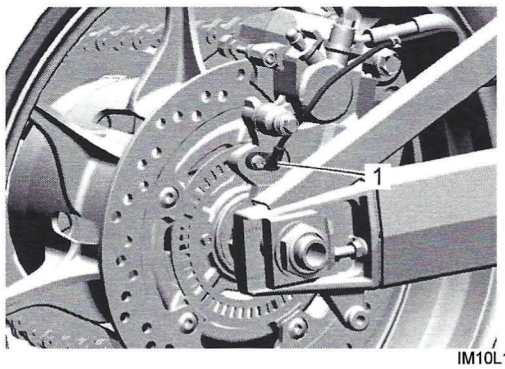
Is the sensor rotor OK?

Yes Go to Step 3.

No Clean or replace the sensor rotor. ☞(Page 4E-54)

Step 3

1) Check that the rear wheel speed sensor (1) is mounted securely.



IM10L1450021-01

Is the sensor mounted securely?

Yes Check the rear wheel speed sensor circuits according to "DTC C1731 / C1732" (Page 4E-35).

No Tighten the mounting bolt.

DTC C173F

BENM10L34504018

Possible Cause
Wheel Speed Sensor Related Malfunction Incorrect tire size, poor tire pressure, deformed wheel, wheel spinning, incorrect tooth count, interference at one or more wheels, permanent bad signal, etc.

Troubleshooting

Step 1

1) Check that the specified tires are installed. ☞(Page 0B-26)

Are the tires OK?

Yes Go to Step 2.

No Use the specified tires.

Step 2

1) Make sure the tire pressure for each tire. ☞(Page 0B-26)

Is the tire pressure for each tire correct?

Yes Go to Step 3.

No Adjust the tire pressure.

Step 3

1) Inspect both wheel speed sensor rotors for damage and check that no foreign objects are caught in the rotor openings.

Are the rotors OK?

Yes Go to Step 4.

No Clean or replace the rotor.

- Front wheel speed sensor rotor. ☞(Page 4E-54)
- Rear wheel speed sensor rotor. ☞(Page 4E-54)

Step 4

1) Inspect the clearances of the front and rear wheel speed sensor – sensor rotor using the thickness gauge. ☞(Page 4E-55)

Are the clearances OK?

Yes Replace the ABS control unit / HU. ☞(Page 4E-50)

No Find and repair the cause. ☞(Page 4E-55)

DTC C1741 / C1742 / C1743 / C1744 / C1745 / C1746

BENM10L34504019

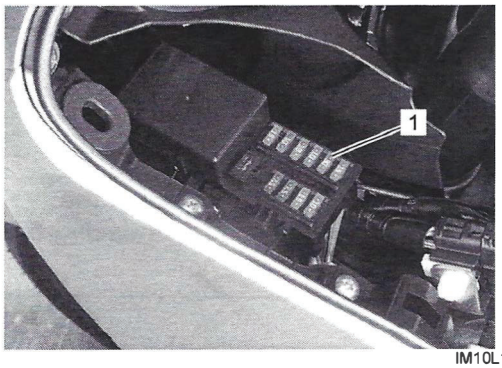
Possible Cause
ABS Motor Malfunction Motor relay circuit open or short, broken fuse for motor relay, pump motor circuit open or short, faulty motor relay, faulty ABS motor, faulty ABS control unit, etc.

Wiring Diagram
Refer to "ABS Circuit Diagram" (Page 4E-5).

Troubleshooting

Step 1

1) Turn the ignition switch OFF.
2) Remove the meter panel (LH). ☞(Page 9D-37)
3) Open the fuse box and inspect the ABS motor fuse (30 A) (1).



IM10L1450009-01

NOTE

If a fuse is blown, find the cause of the problem and correct it before replacing the fuse.

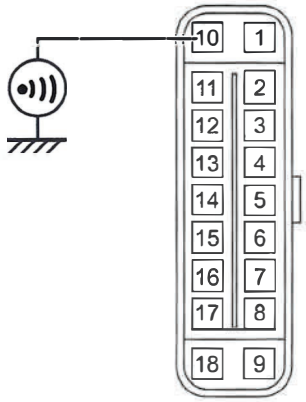
Is the ABS motor fuse OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2

1) Remove the ABS motor fuse (30A).
2) Disconnect the ABS control unit coupler. ☞(Page 4E-50)
3) Measure the continuity between "T10" at the ABS control unit coupler and ground.



IM10L1450010-01

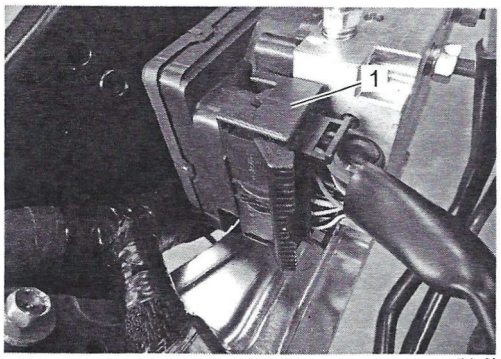
Is no continuity indicated?

Yes Faulty ABS control unit / HU. Replace the ABS control unit / HU. ☞(Page 4E-50)

No Repair the wire harness. (Faulty "T10" wire)

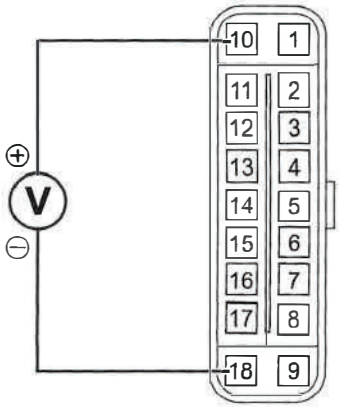
Step 3

1) Check the ABS control unit coupler (1) for loose or poor contacts. If OK, then disconnect the ABS control unit coupler. ☞(Page 4E-50)



IM10L1450011-01

2) Turn the ignition switch ON.
3) Measure the voltage between "T10" and "T18" at the ABS control unit coupler.



IM10L1450012-01

Is voltage 12.0 V or more?

Yes — Replace the ABS control unit / HU. ☞(Page 4E-50)

No — Repair the wire harness. (Faulty "T10" or "T18" wire at the ABS control unit coupler.)

DTC C1750 / C1751 / C1752 / C1753 / C1754 / C1755 / C1756 / C1757 / C1758

BENM10L34504020

Possible Cause
C1750: ABS solenoid valve relay malfunction – Continuous operation
C1751: ABS solenoid valve relay malfunction – ON stick
C1752: ABS solenoid valve relay malfunction – OFF stick
C1753: ABS solenoid malfunction – Front inlet valve
C1754: ABS solenoid malfunction – Rear inlet valve
C1755: ABS solenoid malfunction – Front outlet valve
C1756: ABS solenoid malfunction – Rear outlet valve
C1757: ABS solenoid malfunction – High pressure switch valve
C1758: ABS solenoid malfunction – Pilot valve
Valve relay circuit open or short, broken fuse for valve relay, faulty valve relay, interruption of valve, failure output from ABS control unit, etc.

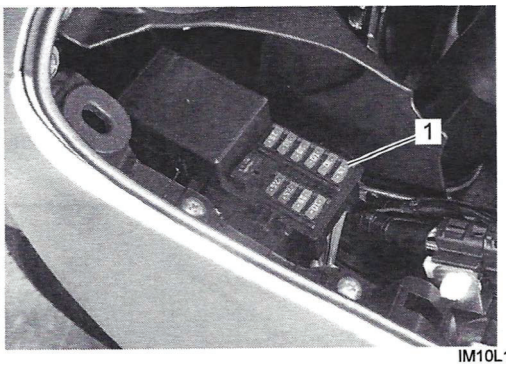
Troubleshooting

Step 1

1) Turn the ignition switch OFF.
2) Remove the meter panel (LH). ☞(Page 9D-37)
3) Open the fuse box and inspect the ABS valve fuse (15 A) (1).

NOTE

If a fuse is blown, find the cause of the problem and correct it before replacing the fuse.



IM10L1450028-01

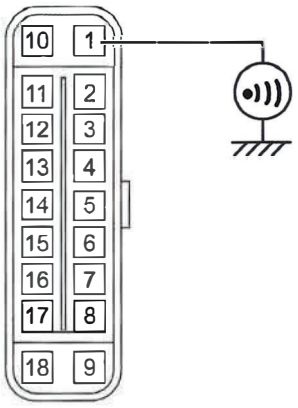
Is the ABS valve fuse OK?

Yes Go to Step 3.

No Go to Step 2.

Step 2

1) Remove the ABS valve fuse (15A).
2) Disconnect the ABS control unit coupler. ☞(Page 4E-50)
3) Measure the continuity between "T1" at the ABS control unit coupler and ground.



IM10L1450029-01

Is no continuity indicated?

Yes Faulty ABS control unit / HU. Replace the ABS control unit / HU. ☞(Page 4E-50)

No Repair the wire harness. (Faulty "T1" wire)

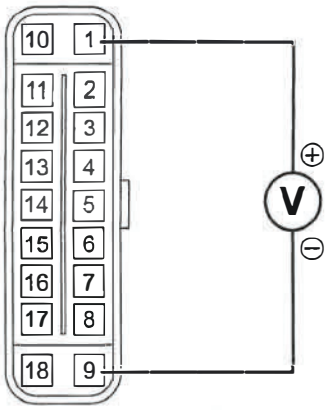
Step 3

1) Check the ABS control unit coupler (1) for loose or poor contacts. If OK, then disconnect the ABS control unit coupler. ☞(Page 4E-50)



IM10L1450011-01

2) Turn the ignition switch ON.
3) Measure the voltage between "T1" and "T9" at the ABS control unit coupler.



IM10L1450030-01

Is voltage 12.0 V or more?

Yes Replace the ABS control unit / HU. ☞(Page 4E-50)

No Repair or replace the defective wire harness. (Faulty "T1" or "T9" wire)

DTC C1762 / C1763 / C1764 / C1765 / C1766 / C1767

BENM10L34504021

Possible Cause
C1762: Inertial sensor signal value – Ax **C1763: Inertial sensor signal value – Ay** **C1764: Inertial sensor signal value – Az** **C1765: Inertial sensor signal value – Ωx** **C1766: Inertial sensor signal value – Ωy** **C1767: Inertial sensor signal value – Ωz** • Abnormality in installation position of IMU • Faulty CAN communication circuit • Faulty IMU • Faulty ABS control unit

Troubleshooting

NOTE

When the vehicle is moved immediately after the ignition switch is turned ON, DTC C1762, C1763, C1764, C1765, C1766 and/or C1767 may be detected.
Do not move the vehicle immediately after the ignition switch is turned ON.

Step 1

DTC check

1) Perform "DTC Clearance", and clear DTC.
2) Perform "DTC Check", and check DTC.

Is DTC C1762, C1763, C1764, C1765, C1766 and/or C1767 detected?

Yes — Go to Step 2.

No — End.

Step 2

1) Check the mounting status of IMU according to "Step 1" – "Step 2" under "DTC C1768" (Page 4E-42).

Is check result OK?

Yes — Go to Step 3.

No — Reinstall the IMU properly.

Step 3

1) Check the IMU circuits according to "Step 2" – "Step 3" under "DTC C1769 / C176A / C176B / C176C / C176D" (Page 4E-43).

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace the defective wire harness.

Step 4

1) Replace the IMU. ☞(Page 4E-51)
2) Perform "DTC Clearance" (Page 4E-16), and clear DTC.
3) Perform "DTC Check" (Page 4E-15), and check DTC.

Is DTC C1762, C1763, C1764, C1765, C1766 or C1767 still detected?

Yes — Faulty ABS control unit / HU. Replace the ABS control unit / HU. ☞(Page 4E-50)

No — End.

DTC C1768

BENM10L34504022

Possible Cause
Inertial Sensor Malfunction
• Abnormality in installation position of IMU
• Faulty IMU
• Faulty ABS control unit

Troubleshooting

Step 1

1) Turn the ignition switch OFF.
2) Check the IMU coupler (1) for loose or poor contacts. ☞(Page 4E-51)



IM10L1450031-01

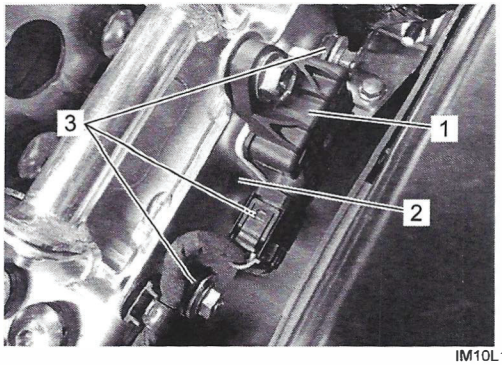
Is check result OK?

Yes — Go to Step 2.

No — Repair or replace the defective parts.

Step 2

1) Check the following points.
   - IMU (1) and IMU holder (2) are mounted securely. ☞(Page 4E-51)
   - Bushing (3) is free from damage.



IM10L1450032-01

Is check result OK?

Yes — Go to Step 3.

No — Reinstall the IMU properly or replace the defective parts.

Step 3

1) Replace the IMU. ☞(Page 4E-51).
2) Perform "DTC Clearance" (Page 4E-16), and clear DTC.
3) Perform "DTC Check" (Page 4E-15), and check DTC.

Is DTC C1768 still detected?

Yes — Replace the ABS control unit / HU.

No — End.

DTC C1769 / C176A / C176B / C176C / C176D

BENM10L34504023

Possible Cause
C1769: Inertial sensor open / short – Plausibility monitor **C176A: Inertial sensor open / short – Permanent Invalid monitor** **C176B: Inertial sensor open / short – Sensor offset monitor** **C176C: Inertial sensor open / short – Message counter failure** **C176D: Inertial sensor open / short – CRC** • Faulty IMU • Faulty CAN communication circuit • Faulty ABS control unit

Troubleshooting

NOTE

When the vehicle is moved immediately after the ignition switch is turned ON, DTC C176A may be detected.
Do not move the vehicle immediately after the ignition switch is turned ON.

Step 1

1) Check DTC related to CAN communication.

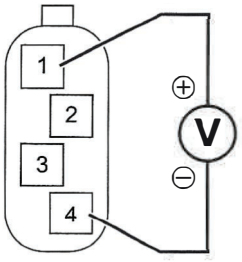
Is there any CAN-DTC(s) detected?

Yes — Go to troubleshooting for applicable DTC.

No — Go to Step 2.

Step 2

1) Disconnect the IMU coupler. ☞(Page 4E-51)
2) Turn ignition switch ON.
3) Measure the voltage between "T1" and "T4" at the IMU coupler.



IL06L1450068-01

Is check result almost the same as the battery voltage?

Yes — Go to Step 3.

No — Repair or replace the defective wire harness. (Faulty "T1" wire or "T4" wire at the IMU coupler)

Step 3

1) Check the CAN communication circuits of IMU according to "Diagnosis flow: [c]" under "Troubleshooting for Lost Communication" in Section 10H (Page 10H-9).

Is check result OK?

Yes — Go to Step 4.

No — Repair or replace the defective wire harness.

Step 4

1) Replace the IMU. ☞(Page 4E-51)
2) Perform "DTC Clearance" (Page 4E-16), and clear DTC.
3) Perform "DTC Check" (Page 4E-15), and check DTC.

Is DTC C1769, C176A, C176B, C176C or C176D still detected?

Yes — Replace the ABS control unit / HU.

No — End.

DTC C1771 / C1772 / C1773 / C1774 / C1775 / C1776 / C1777 / C1778 / C1779 / C177A / C177B

BENM10L34504024

Possible Cause
C1771: ABS pressure sensor – power supply
C1772: ABS pressure sensor – Front brake master cylinder 1
C1773: ABS pressure sensor – Front brake caliper 1
C1774: ABS pressure sensor – Rear brake master cylinder 1
C1775: ABS pressure sensor – Rear brake caliper 1
C1776: ABS pressure sensor – Front brake master cylinder 2
C1777: ABS pressure sensor – Front brake caliper 2
C1778: ABS pressure sensor – Rear brake master cylinder 2
C1779: ABS pressure sensor – Rear brake caliper 2
C177A: ABS pressure sensor – Front brake circuit pressure
C177B: ABS pressure sensor – Rear brake circuit pressure
Faulty ABS control unit / HU

Troubleshooting

Step 1

1) Turn the ignition switch OFF.
2) Disconnect the ABS control unit coupler. ☞(Page 4E-50)
3) Check for proper terminal connection to the ABS control unit coupler.
4) If connections are OK, reconnect the ABS control unit coupler.
5) Perform "DTC Check" (Page 4E-15) and check DTC.

Is DTC C1771, C1772, C1773, C1774, C1775, C1776, C1777, C1778, C1779, C177A or C177B still detected?

Yes — Go to Step 2.

No — Intermittent trouble. ☞(Page 00-7)

Step 2

1) Check the following points.
   - Leakage of brake fluid or air in the hydraulic brake system.
   - Too large front brake pad-to-disc clearance.
   - Too large rear brake pad-to-disc clearance.

Is check result OK?

Yes — Faulty ABS control unit / HU. Replace the ABS control unit / HU. ☞(Page 4E-50)

No — Repair, replace or adjust brake system.

DTC C1781 / C1783 / C1785

BENM10L34504025

Possible Cause
C1781: CAN Invalid Data from Instrument Panel Cluster (IPC) Control Module – Control data
C1783: CAN Invalid Data from Instrument Panel Cluster (IPC) Control Module – Message counter
C1785: CAN Invalid Data from Instrument Panel Cluster (IPC) Control Module – CRC
• Faulty ABS control unit / HU
• Faulty combination meter

Troubleshooting

Step 1

1) Perform "DTC Check" (Page 4E-15).

Is other DTC(s) than C1781, C1783 and C1785 detected?

Yes — Go to troubleshooting for applicable DTC. (If any DTCs together with CAN-DTC(s) is displayed, start troubleshooting of CAN communication first.)

No — Go to Step 2.

Step 2

1) Check the CAN communication circuits of combination meter according to "Diagnosis flow: [b]" under "Troubleshooting for Lost Communication" in Section 10H (Page 10H-9).

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the defective wire harness.

Step 3

1) Replace the combination meter with a known good one. "Combination Meter Removal and Installation" in Section 9C (Page 9C-13).
2) Perform "DTC Clearance" (Page 4E-16), and clear DTC.
3) Perform "DTC Check" (Page 4E-15), and check DTC.

Is DTC C1781, C1783 or C1785 still detected?

Yes — Replace the ABS control unit / HU with a known good one, and recheck DTC. ☞(Page 4E-50)

No — End.

DTC C1782 / C1784 / C1786

BENM10L34504026

Possible Cause
C1782: CAN Invalid Data from ECM – Control data **C1784: CAN Invalid Data from ECM – Message counter** **C1786: CAN Invalid Data from ECM – CRC** • Faulty ABS control unit / HU • Faulty ECM

Troubleshooting

Step 1

1) Perform DTC Check.
   - ECM: ☞(Page 1A-11)
   - ABS: ☞(Page 4E-15)

Is other DTC(s) than C1782, C1784 and C1786 detected?

Yes — Go to troubleshooting for DTCs. (If any DTCs together with CAN-DTC(s) is displayed, start troubleshooting of CAN communication first.)

No — Go to Step 2.

Step 2

1) Check the CAN communication circuits of ECM according to "Diagnosis flow: [a]" under "Troubleshooting for Lost Communication" in Section 10H (Page 10H-9).

Is check result OK?

Yes — Go to Step 3.

No — Repair or replace the defective wire harness.

Step 3

1) Replace the ECM. ☞(Page 1C-2)
2) Perform "DTC Clearance" (Page 4E-16), and clear DTC.
3) Perform "DTC Check" (Page 4E-15), and check DTC.

Is DTC C1782, C1784 or C1786 still detected?

Yes — Replace the ABS control unit / HU with a known good one, and recheck DTC. ☞(Page 4E-50)

No — End.

DTC C1802

BENM10L34504027

Possible Cause
Control module programming error
• Reprogramming failure of ABS control unit
• Faulty ABS control unit

Troubleshooting

Step 1

Was reprogramming of ABS control unit executed?

Yes	Execute reprogramming of ABS control unit correctly once again. If this DTC is detected again, replace the ABS control unit / HU. ☞(Page 4E-50)
No	Faulty ABS control unit / HU. Replace the ABS control unit / HU. ☞(Page 4E-50)

DTC U0073

BENM10L34504028

Refer to "Troubleshooting for Communication Bus Off" in Section 10H (Page 10H-13).

DTC U0100

BENM10L34504029

Refer to "Troubleshooting for Lost Communication" in Section 10H (Page 10H-9).

DTC U0123

BENM10L34504030

Refer to "Troubleshooting for Lost Communication" in Section 10H (Page 10H-9).

DTC U0155

BENM10L34504031

Refer to "Troubleshooting for Lost Communication" in Section 10H (Page 10H-9).

ABS Circuits Inspection (With motion track brake system)

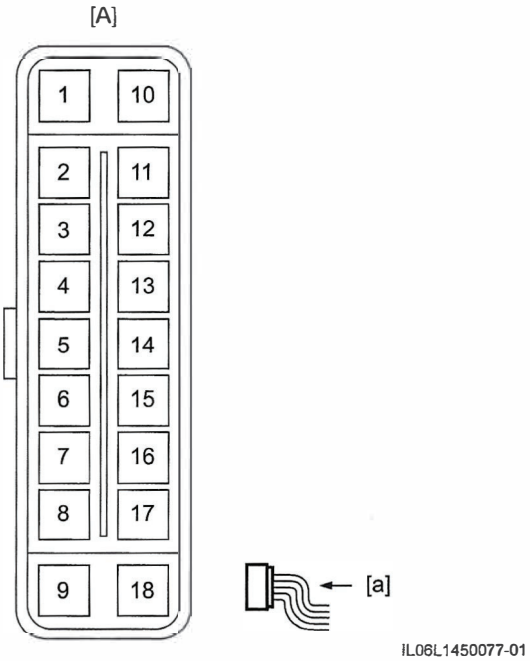
BENM10L34504032

Refer to "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2).
Refer to "Precautions for Circuit Tester" in Section 00 (Page 00-8).

ABS Circuits Inspection

BENM10L34504033

Voltage and Signal Check



[A]: ABS control unit coupler (View [a])

ABS control unit / HU terminal standard voltage table (reference)

NOTICE

Failure to observe "Precautions for Electrical Circuit Service" and "Precautions for Circuit Tester" may cause damage to motorcycle or parts when measuring voltage.
Read "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2) and "Precautions for Circuit Tester" in Section 00 (Page 00-8) before starting the operations described below and follow all of the instructions provided.

NOTE

- **As each terminal voltage is affected by battery voltage, check that battery voltage is 12 V or more when ignition is "ON".**
- **Voltage with asterisk (*) cannot be measured with voltmeter because it is pulse signal. Use oscilloscope for its check.**

Terminal No.	Wire color	Circuit	Normal voltage	Condition
T1	R/B	Solenoid valve power supply circuit	10 to 14 V	Any condition
T2	Bl/B	Front wheel speed sensor output	0 to 5 V	Ignition switch: ON
T6	W/Y	ABS controller power supply circuit	10 to 14 V	Ignition switch: ON
T7	B/R	Front wheel speed sensor signal	Approx. 0 V	Any condition
T8	W/B	CAN signal (High)	Approx. 3.5 V ↑↓ Approx. 2.5 V	Ignition switch: ON
T9	B/W	Ground	Approx. 0 V	Any condition
T10	R/Bl	Pump motor power supply circuit	10 to 14 V	Any condition
T12	Bl/W	Rear wheel speed sensor output	0 to 5 V	Ignition switch: ON

Terminal No.	Wire color	Circuit	Normal voltage	Condition
T14	B/Y	Rear wheel speed sensor signal	Approx. 0 V	Any condition
T15	W/Y	Rear wheel speed sensor power supply circuit	5 to 14 V	Ignition switch: ON
T16	W/R	Front wheel speed sensor power supply circuit	5 to 14 V	Ignition switch: ON
T17	B/BI	CAN signal (Low)	Approx. 2.5 V ↑↓ Approx. 1.5 V	Ignition switch: ON
T18	B/W	Pump motor ground	Approx. 0 V	Any condition

ABS Control unit / HU Power Supply and Ground Circuit Check

BENM10L34504034

Circuit Diagram

Refer to "ABS Circuit Diagram" (Page 4E-5).

Troubleshooting

Step 1

Fuse check

1) Remove the meter panel (LH). ☞(Page 9D-37)
2) Open the fuse box and inspect the fuses. Refer to "ABS Components Location" (Page 4E-12).

"ABS motor fuse", "ABS solenoid valve fuse", "Main fuse" and "Ignition fuse" in good condition?

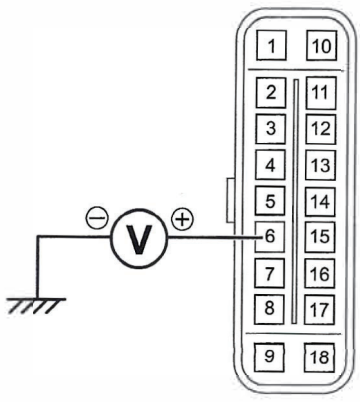
Yes — Go to Step 2.

No — Replace fuse and check for short circuit to ground.

Step 2

ABS controller power supply circuit check

1) Check that ignition is "OFF".
2) Disconnect ABS control unit coupler. ☞(Page 4E-50)
3) Check for proper terminal connection to ABS control unit coupler.
4) If connections are OK, set ignition "ON".
5) Check that voltage between ABS controller power supply circuit "T6" and ground is battery voltage.



IL06L1450081-02

Is check result OK?

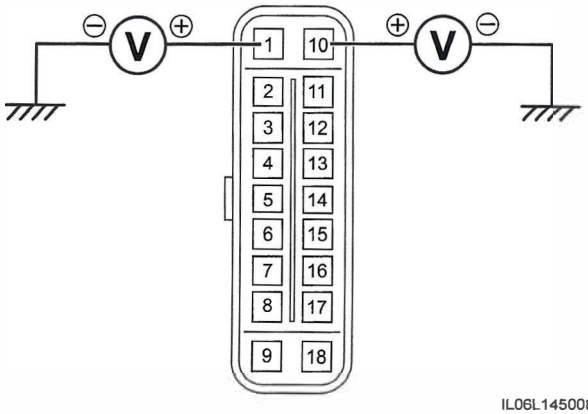
Yes — Go to Step 3.

No — Repair or replace ABS controller power supply circuit.

Step 3

Pump motor and solenoid valve power supply circuit check.

1) Set ignition "OFF".
2) Check the following points.
   - Voltage between Pump motor power supply circuit "T10" circuit and ground is battery voltage.
   - Voltage between Solenoid valve power supply circuit "T1" circuit and ground is battery voltage.



IL06L1450082-01

Is check result OK?

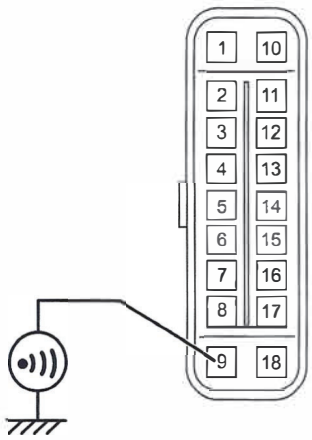
Yes — Go to Step 4.

No — Repair or replace Pump motor power supply circuit or Solenoid valve power supply circuit.

Step 4

ABS control unit / HU ground circuit check

1) Check that ignition is "OFF".
2) Check that resistance between ABS controller ground circuit "T9" and body ground is less than 1 Ω.



IL06L1450083-01

Is check result OK?

Yes	ABS control unit / HU power supply and ground circuit are in good condition.
No	Repair or replace ABS controller ground circuit.

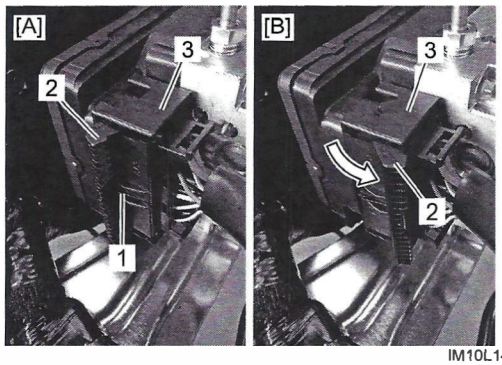
Repair Instructions

ABS Control Unit Coupler Disconnect and Connect

BENM10L34506001

Disconnect

1) Turn the ignition switch OFF.
2) Remove the seat. ☞(Page 9D-34)
3) Remove the fuel tank. ☞(Page 1G-12)
4) Push the tab (1) and pull up the lock lever (2) and disconnect the ABS control unit coupler (3).



IM10L1450033-01

[A]:	Locked position
[B]:	Unlocked position

Connect

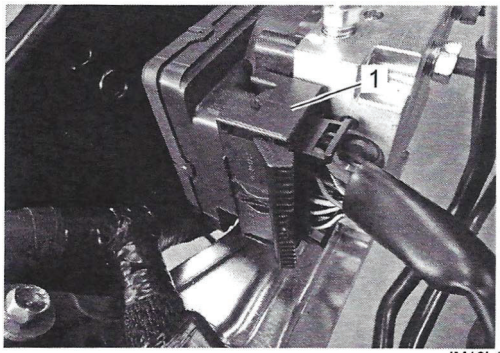
1) Connect the ABS control unit coupler.
2) Install the fuel tank. ☞(Page 1G-12)
3) Install the seat. ☞(Page 9D-34)

ABS Control Unit / HU Removal and Installation

BENM10L34506002

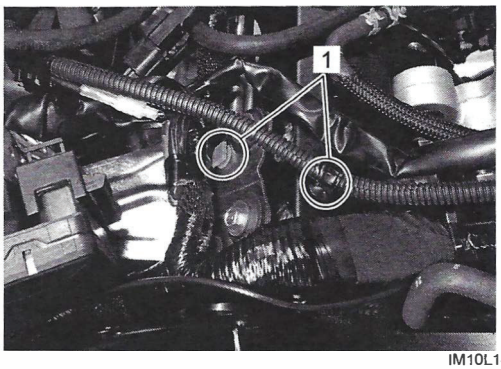
Removal

1) Turn the ignition switch OFF.
2) Drain the brake fluid. ☞(Page 0B-22)
3) Remove the fuel tank. ☞(Page 1G-12)
4) Remove the side cowling assembly. ☞(Page 9D-37)
5) Disconnect the ABS control unit coupler (1). ☞(Page 4E-50)

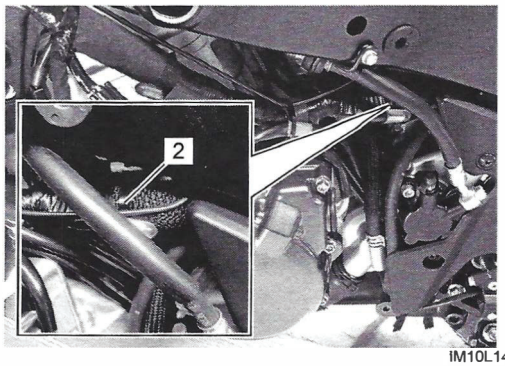


IM10L1450011-01

6) Dismount the harness clamp (1) and (2).

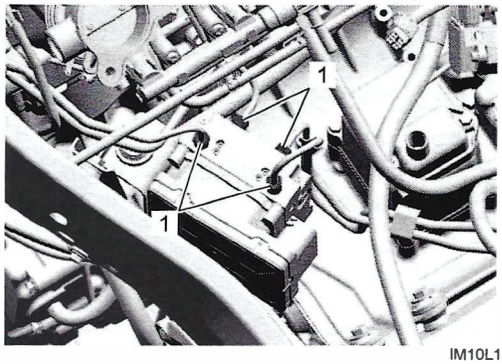


IM10L1450034-01



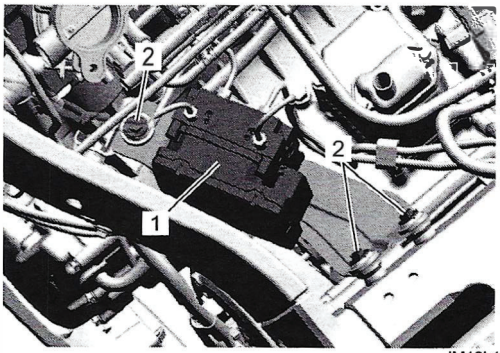
IM10L1450035-03

7) Loosen the flare nuts (1) and disconnect the brake pipes.



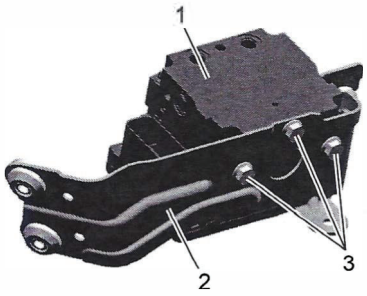
IM10L1450036-01

8) Remove the ABS control unit / HU assembly (1) by removing the holder mounting bolts (2).



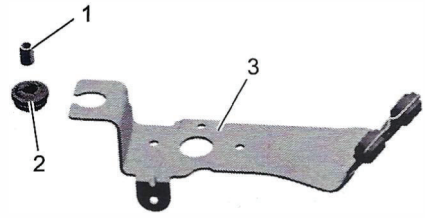
IM10L1450037-01

9) Remove the ABS control unit / HU (1) from the holder (2) by removing the bolts (3).



IM10L1450038-01

10) Remove the collars (1) and bushings (2) from the bracket (3).



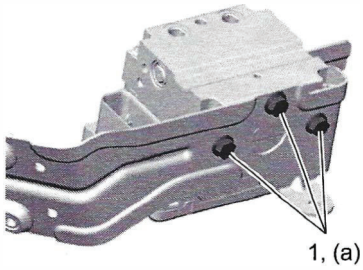
IM10L1450039-01

Installation

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

- Tighten the ABS control unit / HU mounting bolts (1) to the specified torque.

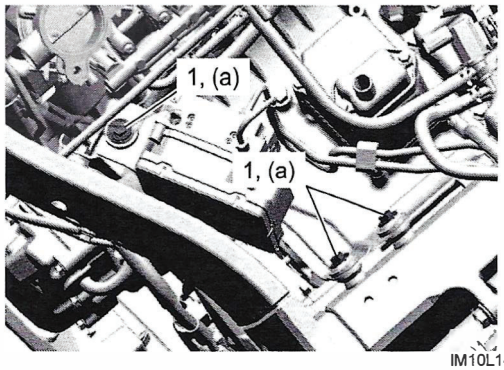
  Tightening torque
  ABS control unit / HU mounting bolt (a): 8.0 N·m (0.82 kgf-m, 5.90 lbf-ft)



IM10L1450061-01

- Tighten the ABS control unit / HU holder mounting bolts (1) to the specified torque.

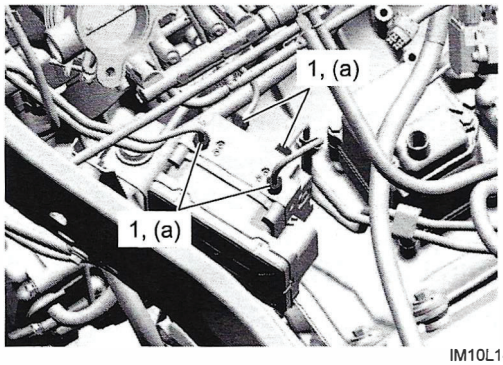
  Tightening torque
  Tightening torque ABS control unit / HU mounting bolt (a): 12 N·m (1.2 kgf-m, 9.0 lbf-ft)



IM10L1450062-01

- Route the brake hoses correctly.
  - Front brake hose: ☞(Page 4A-2)
  - Rear brake hose: ☞(Page 4A-6)
- Make sure to hold the brake pipe when tightening the flare nut, or it may be misaligned.
- Tighten the brake pipe flare nuts (1) to the specified torque.

  Tightening torque
  Brake pipe flare nut (a): 16 N·m (1.6 kgf-m, 11.5 lbf-ft)



IM10L1450040-01

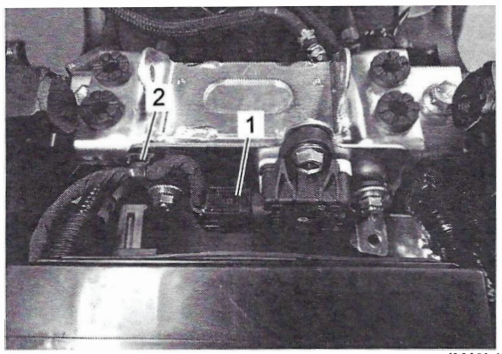
- Bleed air from the brake fluid circuit. ☞(Page 4A-11)
- Perform the ABS hydraulic unit operation check. ☞(Page 4E-17)

IMU Removal and Installation

BENM10L34506003

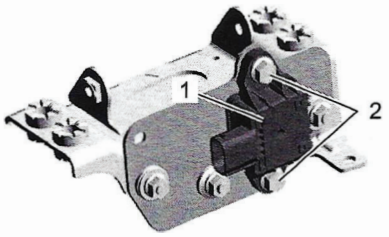
Removal

1) Turn the ignition switch "OFF".
2) Remove the fuel tank. ☞(Page 1G-12)
3) Disconnect the IMU coupler (1) and remove the clamp (2).



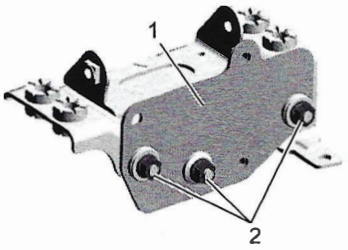
IM10L1450041-02

4) Remove the IMU (1) by removing the bolts (2).



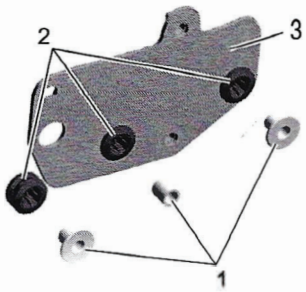
IM10L1450059-02

5) Remove the IMU holder (1) by removing the IMU holder nuts (2).



IM10L1450042-01

6) Remove the spacers (1) and bushing (2) from the IMU holder (3).



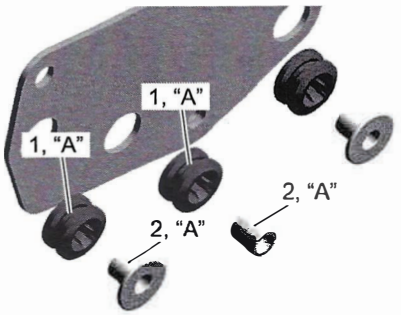
IM10L1450043-01

Installation

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

- Inspect the IMU holder bushings. If defect is found, replace bushings with a new one.
- Apply silicone grease to the bushings (1) and spacers (2).

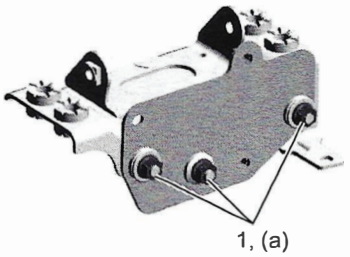
"A": Grease 99000–25100 (SUZUKI SILICONE GREASE)



IM10L1450044-01

- Tighten the IMU holder nuts (1) to the specified torque.

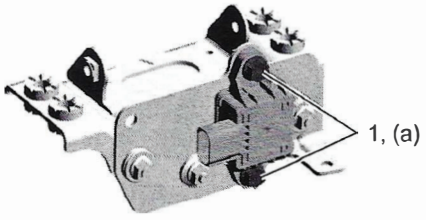
Tightening torque
IMU holder nut (a): 6.5 N·m (0.66 kgf-m, 4.80 lbf-ft)



IM10L1450045-01

- Tighten the IMU bolts (1) to the specified torque.

Tightening torque
IMU bolt (a): 6.5 N·m (0.66 kgf-m, 4.80 lbf-ft)



IM10L1450046-01

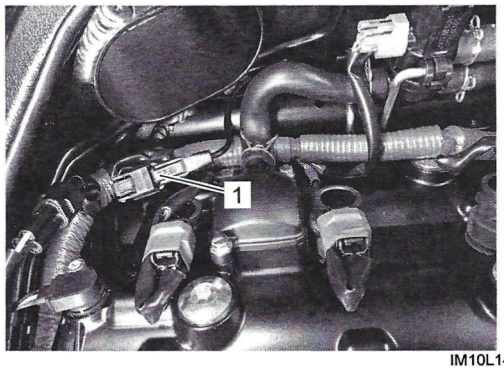
- Reset the IMU learning value when replacing the IMU. ☞(Page 1C-3)

Front Wheel Speed Sensor Removal and Installation

BENM10L34506004

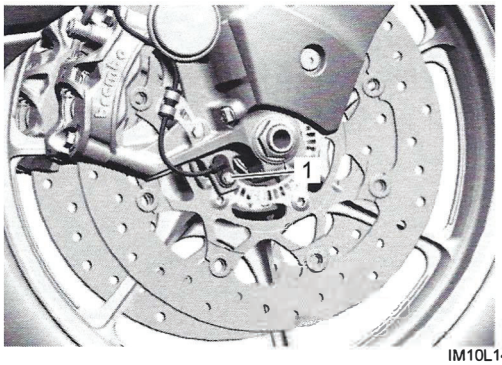
Removal

1) Turn the ignition switch OFF.
2) Remove the air cleaner box. ☞(Page 1D-6)
3) Disconnect the front wheel speed sensor lead wire coupler (1).



IM10L1450047-01

4) Remove the front wheel speed sensor mounting bolt (1).



IM10L1450048-01

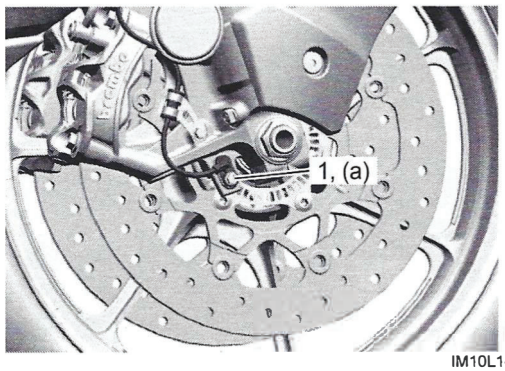
5) Remove the front wheel speed sensor as shown in the front wheel speed sensor routing diagram. ☞(Page 4E-6)

Installation

Install the front wheel speed sensor in the reverse order of removal. Pay attention to the following points:

- Install the front wheel speed sensor as shown in the front wheel speed sensor routing diagram. Refer to "Front Wheel Speed Sensor Routing Diagram" (Page 4E-6).
- Tighten the wheel speed sensor bolt (1) to the specified torque.

Tightening torque
Wheel speed sensor bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1450049-01

- Check the clearance between the front wheel speed sensor and sensor rotor. Refer to "Wheel Speed Sensor and Sensor Rotor Inspection" (Page 4E-55).

Rear Wheel Speed Sensor Removal and Installation

BENM10L34506005

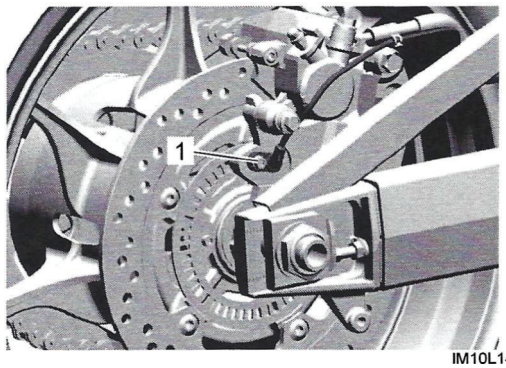
Removal

1) Turn the ignition switch OFF.
2) Remove the fuel tank. ☞(Page 1G-12)
3) Disconnect the rear wheel speed sensor lead wire coupler (1).



IM10L1450050-01

4) Remove the rear wheel speed sensor mounting bolt (1).



IM10L1450051-01

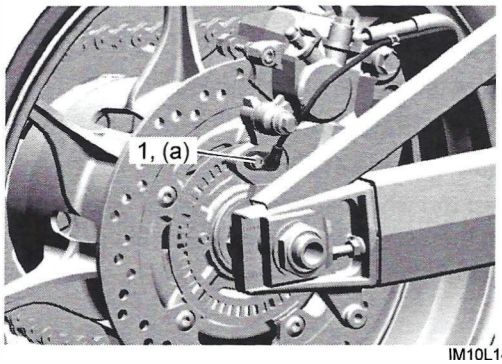
5) Remove the rear wheel speed sensor as shown in the rear wheel speed sensor routing diagram. Refer to "Rear Wheel Speed Sensor Routing Diagram" (Page 4E-9).

Installation

Install the rear wheel speed sensor in the reverse order of removal. Pay attention to the following points:

- Install the rear wheel speed sensor as shown in the rear wheel speed sensor routing diagram. Refer to "Rear Wheel Speed Sensor Routing Diagram" (Page 4E-9).
- Tighten the wheel speed sensor bolt (1) to the specified torque.

Tightening torque
Wheel speed sensor bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1450052-01

- Check the clearance between the rear wheel speed sensor and sensor rotor. ☞(Page 4E-55)

Front Wheel Speed Sensor Rotor Removal and Installation

BENM10L34506006

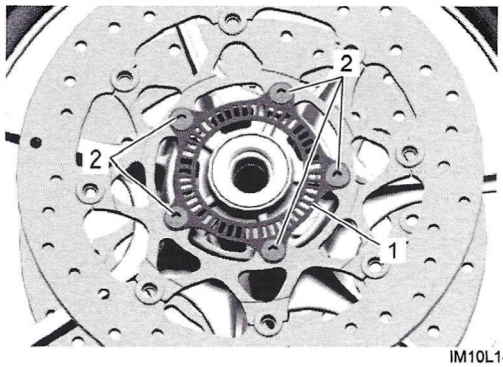
Refer to "Front Wheel Assembly Removal and Installation" in Section 2D (Page 2D-3).

NOTICE

- **Do not hit the front wheel speed sensor rotor when dismounting the front wheel.**
- **Keep any type of magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the wheel speed sensor or sensor rotor.**

Removal

Remove the front wheel speed sensor rotor (1) by removing the front brake disc bolts (2).

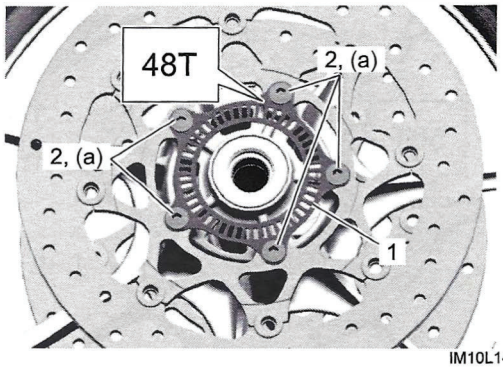


IM10L1450053-01

Installation

1) Install the front wheel speed sensor rotor (1) as the letters "48T" face outside.
2) Tighten the front brake disc bolts (2) to the specified torque.

Tightening torque
Front brake disc bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1450054-01

3) Check the clearance between the front wheel speed sensor and sensor rotor. Refer to "Wheel Speed Sensor and Sensor Rotor Inspection" (Page 4E-55).

Rear Wheel Speed Sensor Rotor Removal and Installation

BENM10L34506007

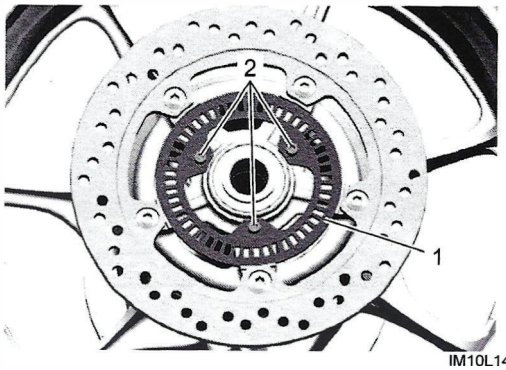
Refer to "Rear Wheel Assembly Removal and Installation" in Section 2D (Page 2D-8).

NOTICE

- **Do not hit the front wheel speed sensor rotor when dismounting the front wheel.**
- **Keep any type of magnets (including magnetic pick-up tools, magnetic screwdrivers, etc.) away from the wheel speed sensor or sensor rotor.**

Removal

Remove the front wheel speed sensor rotor (1) by removing the bolts (2).

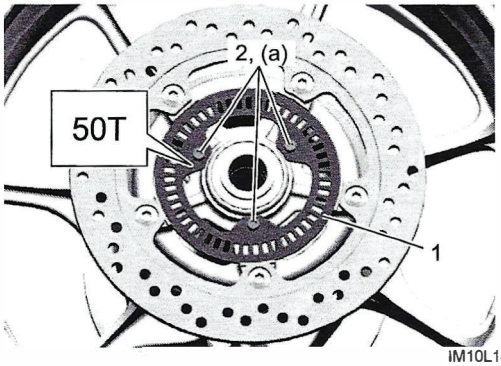


IM10L1450055-01

Installation

1) Install the rear wheel speed sensor rotor (1) as the letters "50T" face outside.
2) Tighten the rear wheel speed sensor rotor bolts (2) to the specified torque.

Tightening torque
Wheel speed sensor rotor bolt (a): 6.5 N·m (0.66 kgf-m, 4.80 lbf-ft)



IM10L1450056-01

3) Check the clearance between the rear wheel speed sensor and sensor rotor. Refer to "Wheel Speed Sensor and Sensor Rotor Inspection" (Page 4E-55).

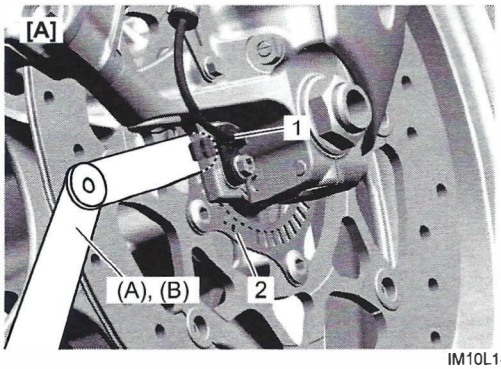
Wheel Speed Sensor and Sensor Rotor Inspection

BENM10L34506008

Wheel Speed Sensor – Sensor Rotor Clearance
Check the clearance between the wheel speed sensor (1) and sensor rotor (2) using the thickness gauge.

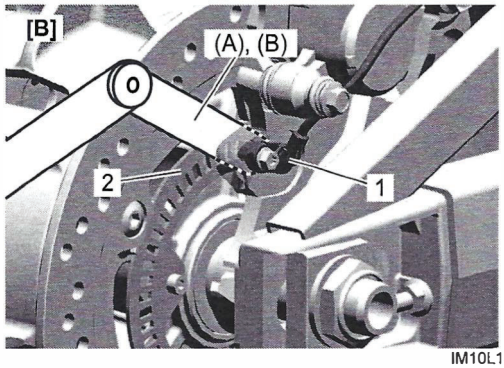
Special tool
(A): 09900–20803
(B): 09900–20806

Wheel speed sensor – Sensor rotor clearance
Front [Standard]: 0.11 – 1.42 mm (0.004 – 0.056 in)
Rear [Standard]: 0.25 – 1.48 mm (0.010 – 0.058 in)



IM10L1450057-02

[A]: Front

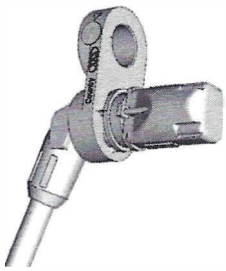


IM10L1450058-02

[A]: Rear

Wheel Speed Sensor

1) Remove the wheel speed sensor.
   - Front: ☞(Page 4E-53)
   - Rear: ☞(Page 4E-53)
2) Inspect the wheel speed sensor for damage. Clean the sensor if any metal particle or foreign material stuck on it.



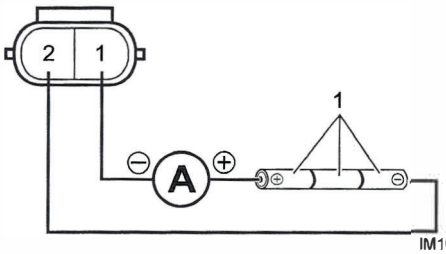
IL41K1450042-01

3) After finishing the wheel speed sensor inspection, install the wheel speed sensor.
   - Front: ☞(Page 4E-53)
   - Rear: ☞(Page 4E-53)

Wheel Speed Sensor Current

1) Disconnect the front wheel speed sensor coupler. ☞(Page 4E-53)
2) Connect three 1.5 V dry cells (1) in series as shown and make sure that their total voltage is more than 4.5 V. Measure the current between (+) dry cells terminal and "T1" on the wheel speed sensor coupler.

Normal value
5.9 – 16.8 mA



IM10L1450060-01

3) Install the removed parts.

Wheel Speed Sensor Rotor

1) Raise the front wheel off the ground and support the motorcycle with a jack.
2) Check that no wheel speed sensor rotor teeth are broken and that no foreign objects are caught in the wheel speed sensor. If any defects are found, replace the wheel speed sensor rotor with a new one. ☞(Page 4E-54)

Specifications

Tightening Torque Specifications

BENM10L34507001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
ABS control unit / HU mounting bolt	8.0	0.82	5.90	☞(Page 4E-51)
Tightening torque ABS control unit / HU mounting bolt	12	1.2	9.0	☞(Page 4E-51)
Brake pipe flare nut	16	1.6	11.5	☞(Page 4E-51)
IMU holder nut	6.5	0.66	4.80	☞(Page 4E-52)
IMU bolt	6.5	0.66	4.80	☞(Page 4E-52)
Wheel speed sensor bolt	10	1.0	7.5	☞(Page 4E-53) / ☞(Page 4E-54)
Front brake disc bolt	23	2.3	17.0	☞(Page 4E-54)
Wheel speed sensor rotor bolt	6.5	0.66	4.80	☞(Page 4E-55)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Front Wheel Speed Sensor Routing Diagram" (Page 4E-6)
"Rear Wheel Speed Sensor Routing Diagram" (Page 4E-9)
"Fasteners Information" in Section 0C (Page 0C-6)

Special Tools and Equipment

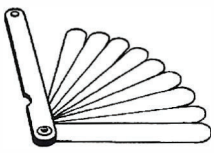
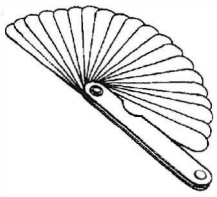
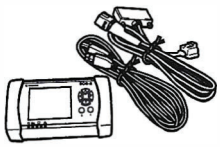
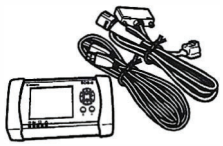
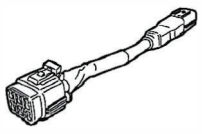
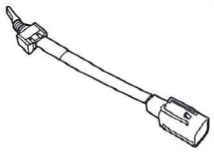
Recommended Service Material

BENM10L34508001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SILICONE GREASE	P/No.: 99000–25100	☞(Page 4E-52)

Special Tool

BENM10L34508002

09900–20803 Thickness gauge ☞(Page 4E-55)	
09900–20806 Thickness gauge ☞(Page 4E-55)	
09904–41031 SDS-II set ☞(Page 4E-4) / ☞(Page 4E-15) / ☞(Page 4E-16)	
09904–41041 SDS-II (oscilloscope) set ☞(Page 4E-4) / ☞(Page 4E-15) / ☞(Page 4E-16)	
09904–41071 Conversion cable (ISO) ☞(Page 4E-4) / ☞(Page 4E-15) / ☞(Page 4E-16)	
09930–83130 Mode selection switch (ISO) ☞(Page 4E-3) / ☞(Page 4E-4) / ☞(Page 4E-16)	

Section 5

Transmission / Transaxle

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Gearshift Sensor Inspection 5B-20
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Precautions

Precautions

Precautions for Transmission / Transaxle

BENM10L35000001

Refer to “General Precautions” in Section 00 (Page 00-1), “Precautions for Electrical Circuit Service” in Section 00 (Page 00-2) and “Precautions for Circuit Tester” in Section 00 (Page 00-8).

Manual Transmission

Diagnostic Information and Procedures

Manual Transmission Symptom Diagnosis

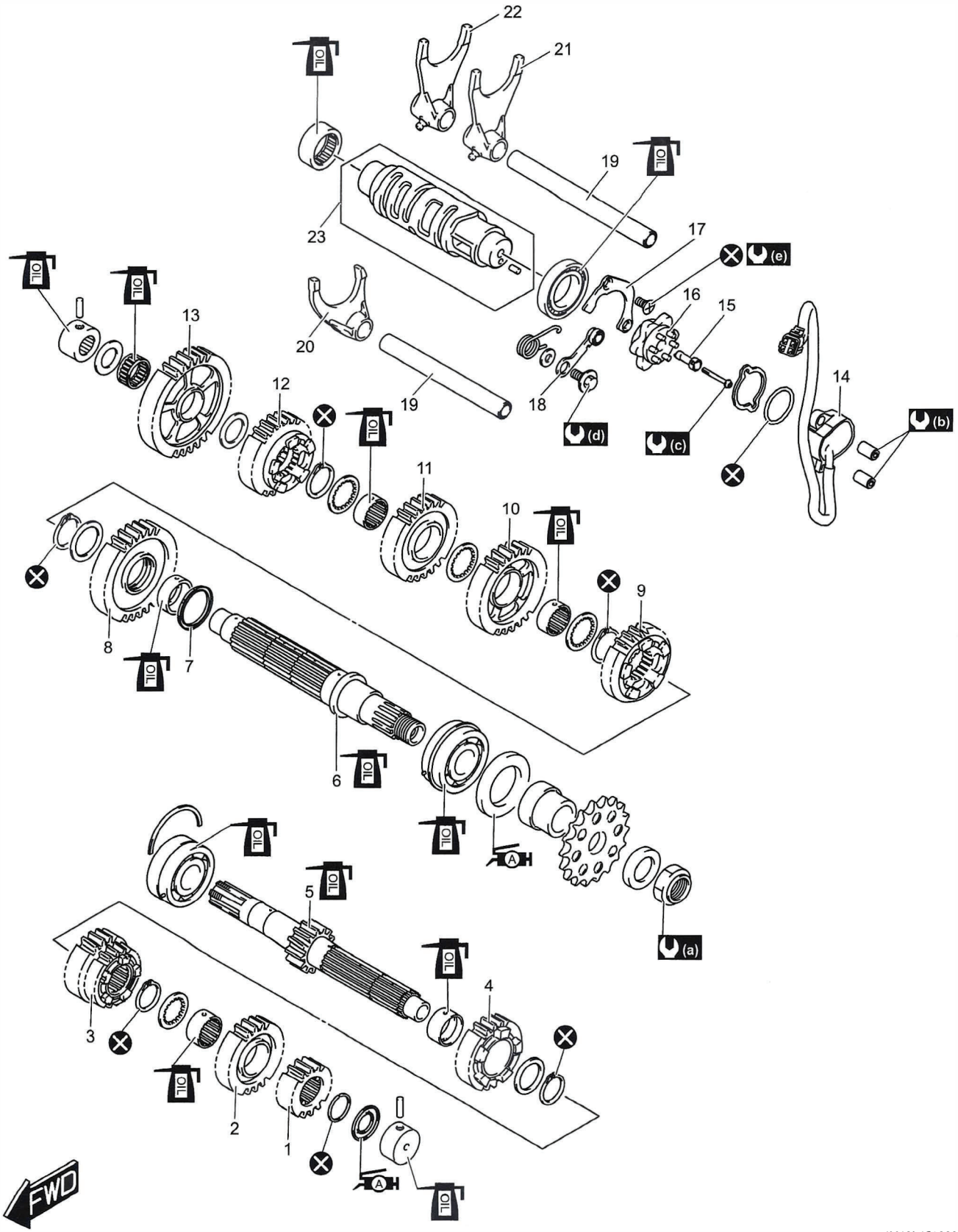
BENM10L35204001

Condition	Possible cause	Correction / Reference Item
Engine is noisy (Noise seems to come from the transmission)	Worn or rubbing gear.	*Replace. ☞(Page 5B-8)*
	Worn countershaft spline.	*Replace countershaft. ☞(Page 5B-8)*
	Worn driveshaft spline.	*Replace driveshaft. ☞(Page 5B-8)*
	Worn bearing.	*Replace. ☞(Page 5B-8)*
Transmission will not shift	Broken gearshift cam.	*Replace. ☞(Page 5B-3) ☞(Page 5B-4)*
	Distorted gearshift fork.	*Replace. ☞(Page 5B-3) ☞(Page 5B-4)*
	Worn gearshift pawl.	*Replace. ☞(Page 5B-22)*
Transmission will not shift back	Broken return spring on shift shaft.	*Replace. ☞(Page 5B-22)*
	Rubbing or stuck gearshift shaft.	*Repair or replace. ☞(Page 5B-22)*
	Worn or distorted gearshift fork.	*Replace. ☞(Page 5B-3) ☞(Page 5B-4)*
Transmission jumps out of gear	Worn shifting gears on driveshaft or countershaft.	*Replace. ☞(Page 5B-8)*
	Worn or distorted gearshift fork.	*Replace. ☞(Page 5B-3) ☞(Page 5B-4)*
	Weakened gearshift stopper spring.	*Replace. ☞(Page 5B-22)*
	Worn gearshift cam plate.	*Replace. ☞(Page 5B-22)*

Repair Instructions

Transmission Components

BENM10L35206001



IM10L1520001-04

1. 2nd drive gear	12. 5th driven gear	23. Gearshift cam
2. 6th drive gear	13. 1st driven gear	(a) : 150 N·m (15.3 kgf-m, 111.0 lbf-ft)
3. 3rd/4th drive gears	14. GP sensor	(b) : 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)
4. 5th drive gear	15. Gearshift cam plate stopper	(c) : 13 N·m (1.3 kgf-m, 9.5 lbf-ft)
5. Countershaft / 1st drive gear	16. Gearshift cam plate	(d) : 10 N·m (1.0 kgfm,7.5 lbf-ft)
6. Driveshaft	17. Gearshift cam bearing retainer	(a) : 8.4 N·m (0.86 kgf-m, 6.20 lbf-ft)
7. Friction ring	18. Gearshift cam stopper	: Apply engine oil.
8. 2nd driven gear	19. Gearshift fork shaft	: Apply SUZUKI SUPER GREASE A.
9. 6th driven gear	20. Gearshift fork (For 3rd/4th drive gears)	: Do not reuse.
10. 3rd driven gear	21. Gearshift fork (For 6th driven gear)	
11. 4th driven gear	22. Gearshift fork (For 5th driven gear)	

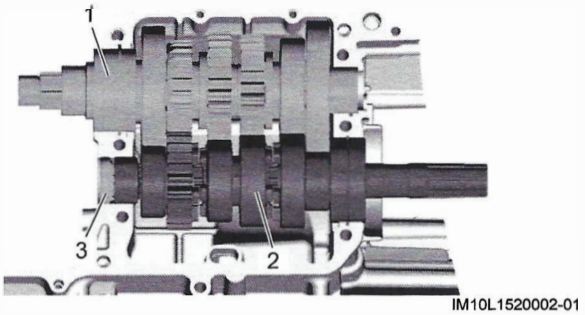
Transmission Removal

BENM10L35206002

1) Remove the engine assembly from the frame. Refer to "Engine Assembly Removal" in Section 1D (Page 1D-27).
2) Separate the upper and lower crankcases. Refer to "Crankcase / Crankshaft Removal" in Section 1D (Page 1D-71).

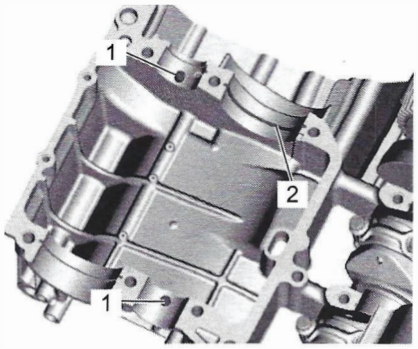
Driveshaft Assembly / Countershaft Assembly

1) Remove the driveshaft assembly (1) and countershaft assembly (2) from the upper crankcase.
2) Remove the oil seal (3) from the counter shaft assembly.



IM10L1520002-01

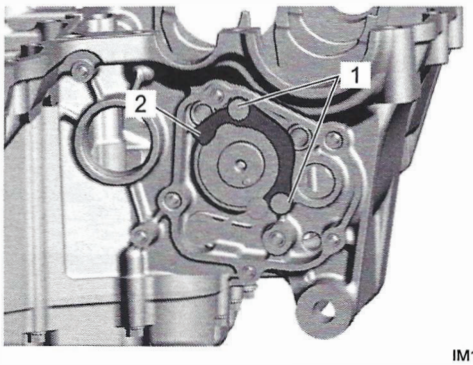
3) Remove the bearing pins (1) and C-ring (2) from the upper crankcase.



IM10L1520003-02

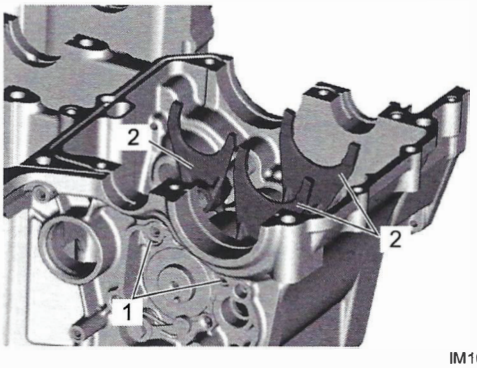
Gearshift Fork and Gearshift Cam

1) Remove the gearshift cam bearing retainer screws (1) and gearshift cam bearing retainer (2) from the lower crankcase.



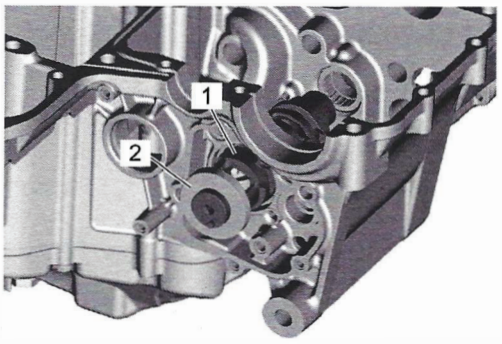
IM10L1520004-01

2) Remove the gearshift fork shafts (1) and gearshift forks (2) from the lower crankcase.



IM10L1520005-01

3) Remove the gearshift cam (1) along with its bearing (2) from the lower crankcase.

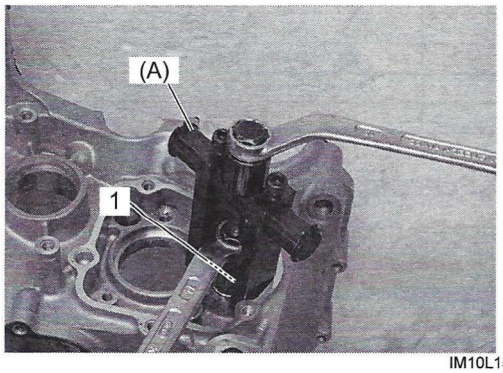


IM10L1520006-02

Bearing

1) Remove the gearshift shaft bearing (1) using the special tool.

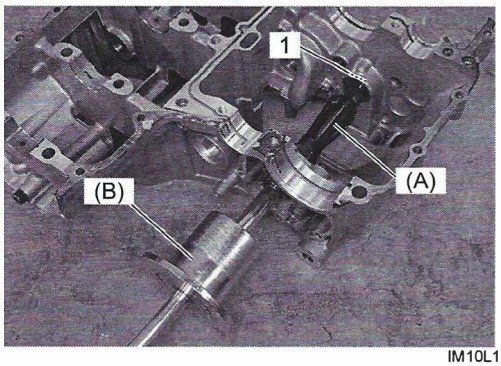
Special tool
(A): 09921–20240



IM10L1520076-01

2) Remove the gearshift cam bearing (1) using the special tools.

Special tool
(A): 09923–74511
(B): 09930–30104



IM10L1520008-01

Transmission Installation

BENM10L35206003

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

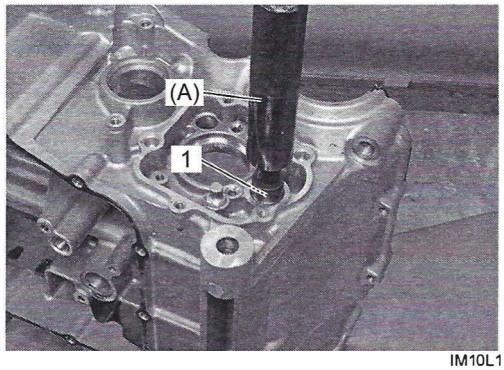
Bearing

- Install the new gearshift shaft bearing (1) using the special tool.

Special tool
(A): 09913–70210

NOTE

The stamped mark side of the gearshift shaft bearing faces outside.



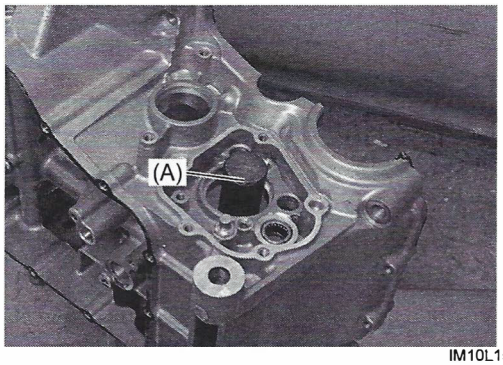
IM10L1520009-01

- Install the new gearshift cam bearing using the special tool.

Special tool
(A): 09913–70210

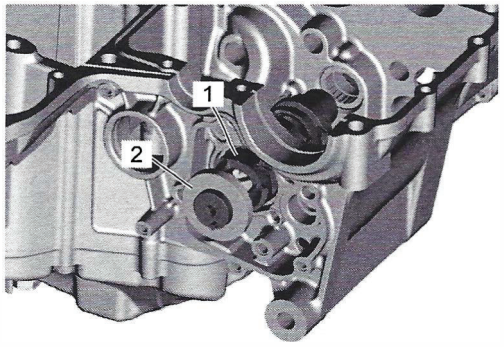
NOTE

The stamped mark side of gearshift cam bearing faces the gearshift cam.



IM10L1520010-01

- Install the gearshift cam (1) along with the bearing (2).



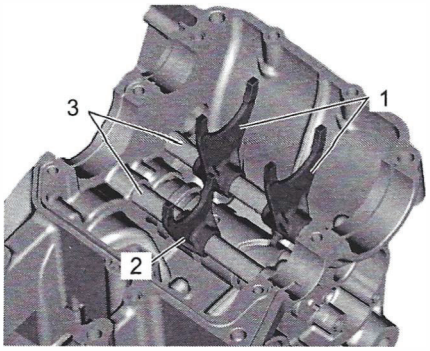
IM10L1520006-02

- Install the gearshift forks No.1 (1), No.3 (2) and gearshift fork shafts (3).

NOTE

- **The gearshift forks No.1 are same parts.**
- **Install the gearshift forks and their shafts in position.**

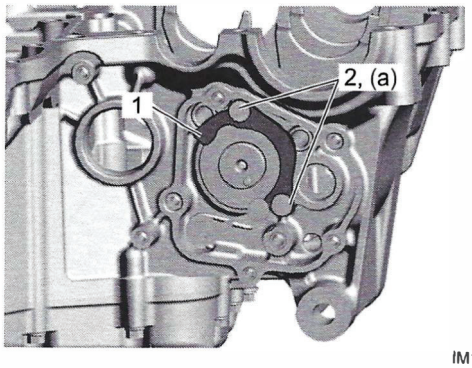
- With engaging each fork end to the cam groove, insert the fork shaft.



IM10L1520011-01

- Install the gearshift cam bearing retainer (1) and new gearshift cam bearing retainer screws (2), and then tighten the gearshift cam bearing retainer screws to the specified torque.

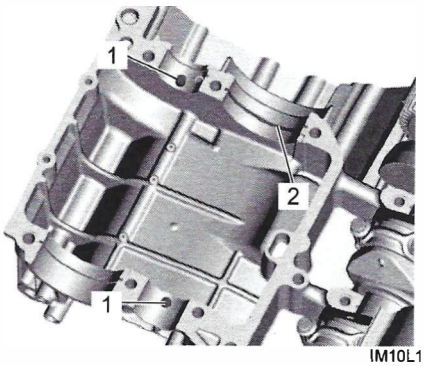
Tightening torque
Gearshift cam bearing retainer screw (a): 8.4 N·m (0.86 kgf-m, 6.20 lbf-ft)



IM10L1520012-01

Driveshaft / Countershaft Assembly

- Install the bearing pins (1) and C-ring (2) on the upper crankcase.

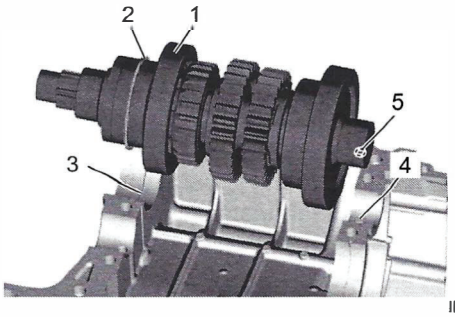


IM10L1520003-02

- Install the driveshaft assembly (1) on the upper crankcase.

NOTE

Align the bearing ring (2) with the groove (3) in the crankcase and the bearing pin (4) with the hole (5) in the bearing.

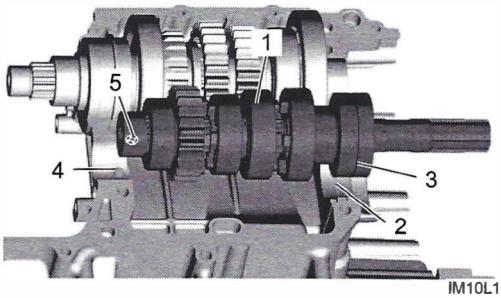


IM10L1520013-01

- Install the countershaft assembly (1) in the upper crankcase.

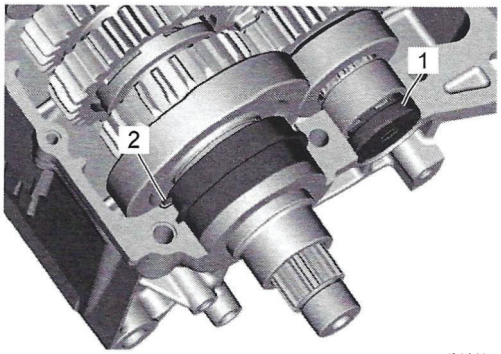
NOTE

Align the C-ring (2) with the groove (3) in the bearing and the bearing pin (4) with the hole (5) in the bearing.

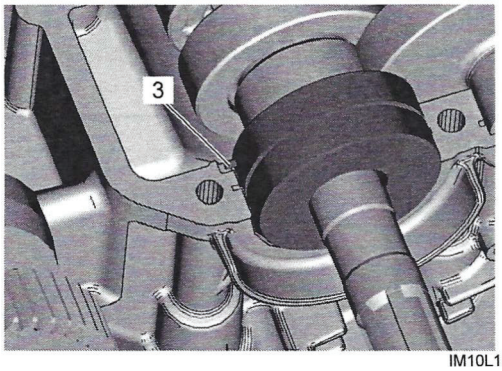


IM10L1520014-01

- Install the oil seal (1) to the counter shaft.
- Turn each bearing to set the bearing dowel pin (2) and (3) in position.



IM10L1520015-01

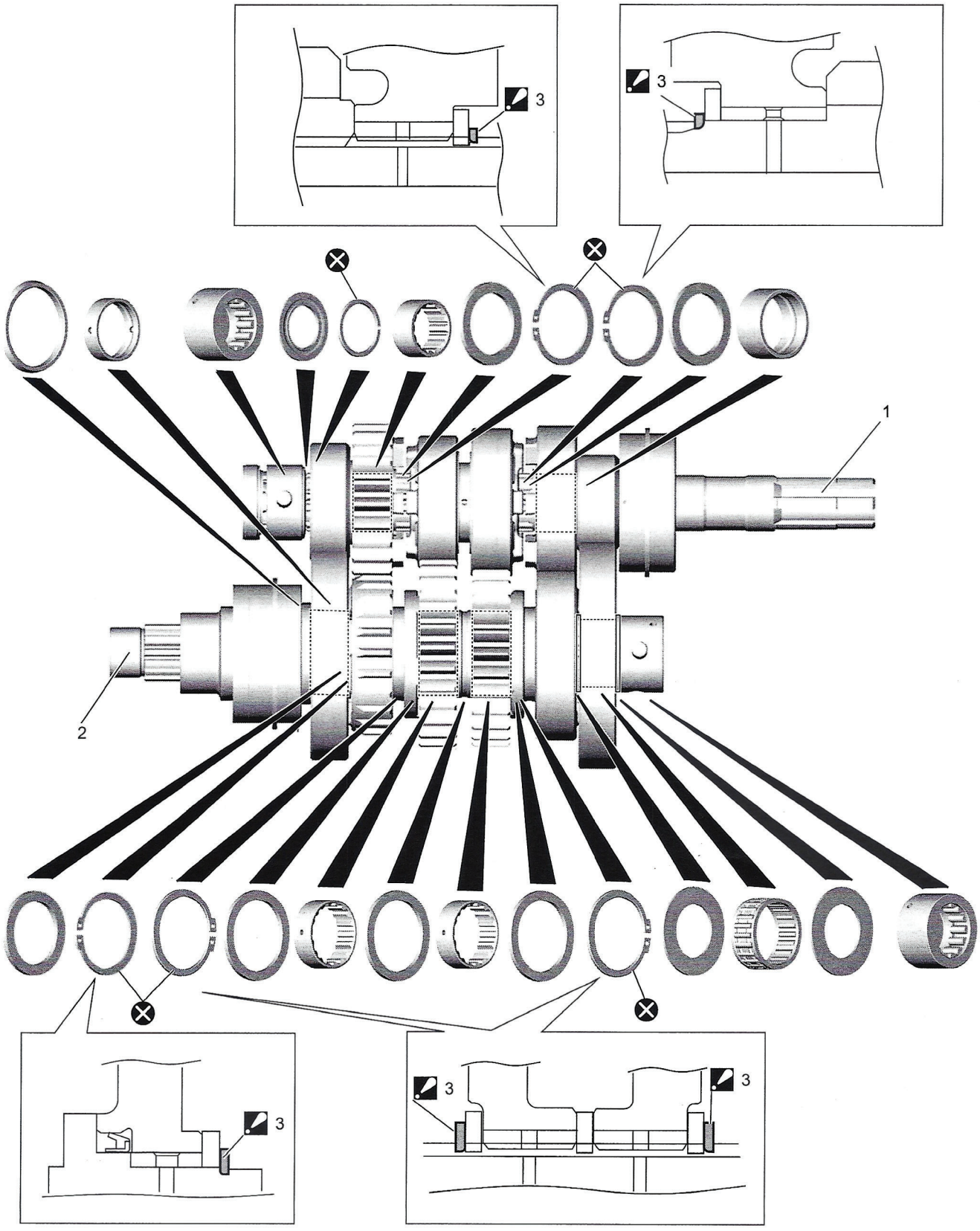


IM10L1520016-01

- Reassembly the upper and lower crankcase. Refer to "Crankcase / Crankshaft Installation" in Section 1D (Page 1D-74).
- Reinstall the engine assembly to the frame. Refer to "Engine Assembly Installation" in Section 1D (Page 1D-30).

Transmission Construction

BENM10L35206004



IM10L1520017-01

1. Countershaft	2. Driveshaft	3. Snap ring : Face the sharp edge outside.	: Do not reuse.

Countershaft Gear / Driveshaft Gear Disassembly and Reassembly

BENM10L35206005

Refer to "Transmission Removal" (Page 5B-3) and "Transmission Installation" (Page 5B-4).

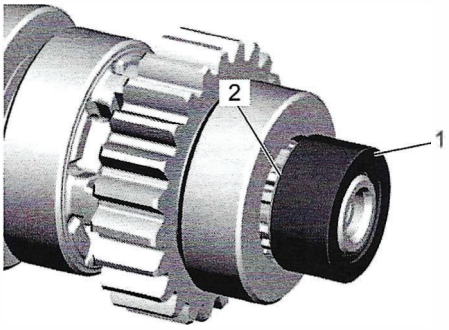
Disassembly

⚠ CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (i.e., drive or driven) so that they can be reinstalled in their original positions.

Countershaft

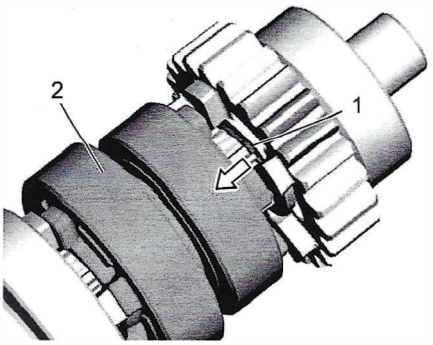
1) Remove the bearing (1) and oil seal (2).



IM10L1520018-01

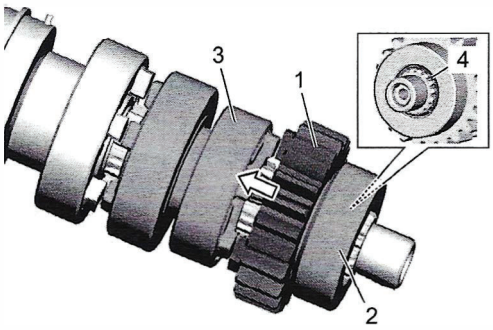
2) Remove the 6th drive gear snap ring (1) from its groove and slide it towards the 3rd/4th drive gears (2) to arrow shown in the figure.

Special tool
09900–06104



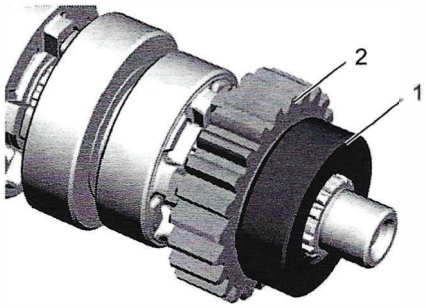
IM10L1520019-01

3) Slide the 6th (1) and 2nd (2) drive gears toward the 3rd/4th drive gear (3) to arrow shown in the figure, and then remove the 2nd drive gear circlip (4).



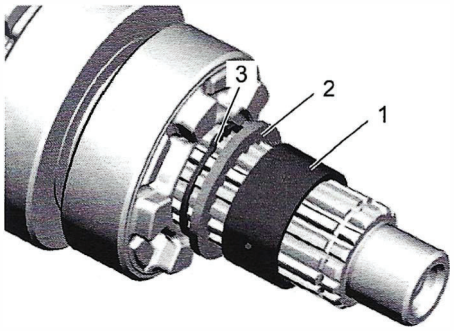
IM10L1520020-01

4) Remove the 2nd drive gear (1) and 6th drive gear (2) from the countershaft.



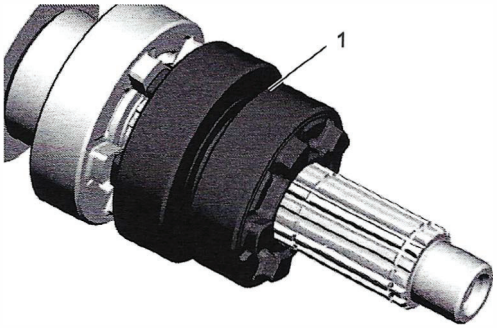
IM10L1520021-01

5) Remove the 6th drive gear bushing (1), washer (2) and snap ring (3) from the countershaft.



IM10L1520022-01

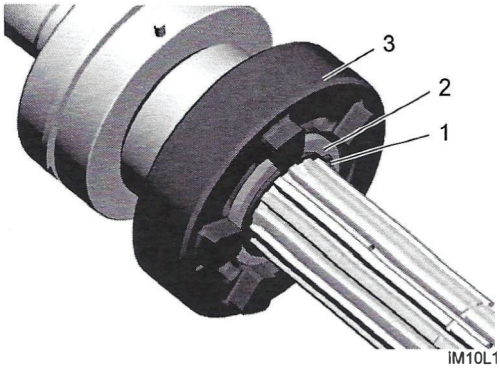
6) Remove the 3rd/4th drive gear (1) from the countershaft.



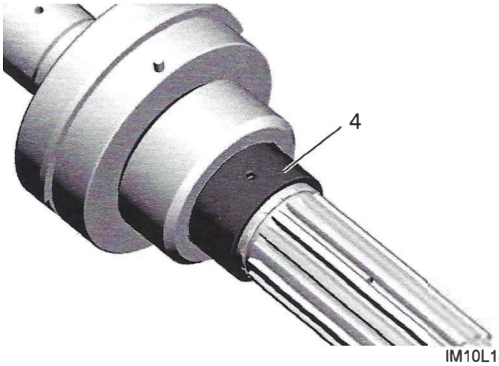
IM10L1520023-01

7) Remove the snap ring (1) and washer (2) from the countershaft.

8) Remove the 5th drive gear (3) and 5th drive gear bushing (4) from the countershaft.

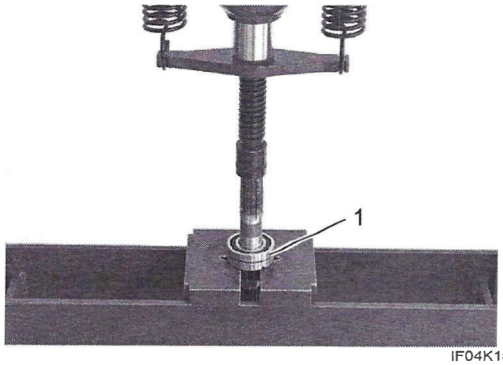


IM10L1520024-01



IM10L1520025-02

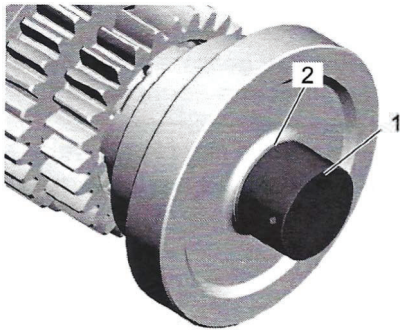
9) Remove the countershaft bearing (1) using hydraulic press.



IF04K1520021-01

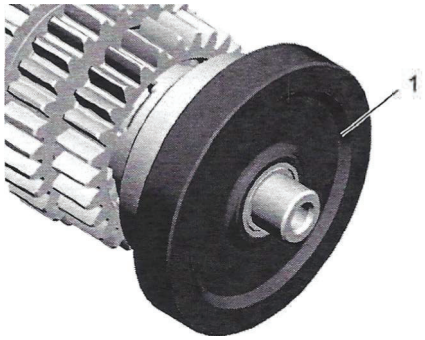
Driveshaft

1) Remove the bearing (1) and washer (2) from the driveshaft.



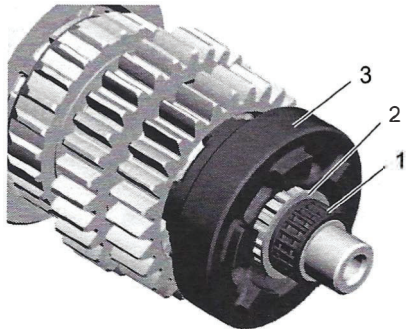
IM10L1520026-01

2) Remove the 1st driven gear (1) from the driveshaft.



IM10L1520027-01

3) Remove the bearing (1), washer (2) and 5th driven gear (3).

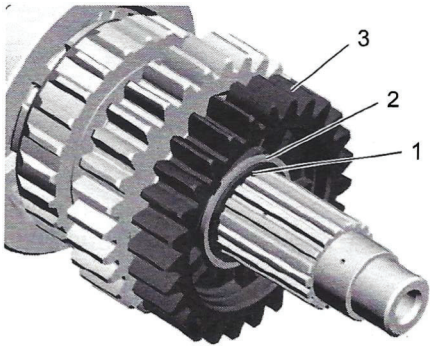


IM10L1520028-01

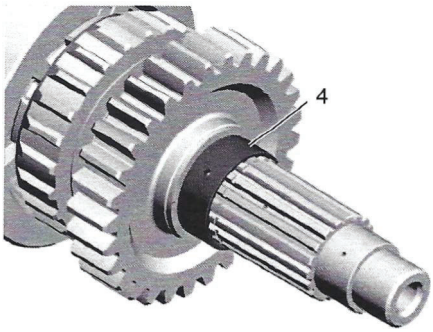
4) Remove the snap ring (1) with the special tool.

Special tool
09900–06107

5) Remove the washer (2), 4th driven gear (3) and 4th driven gear bushing (4).

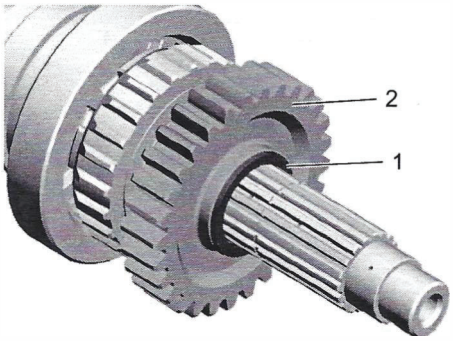


IM10L1520029-01

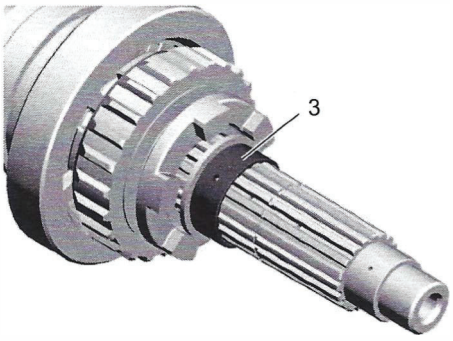


IM10L1520030-01

6) Remove the washer (1), 3rd driven gear (2) and 3rd driven gear bushing (3).

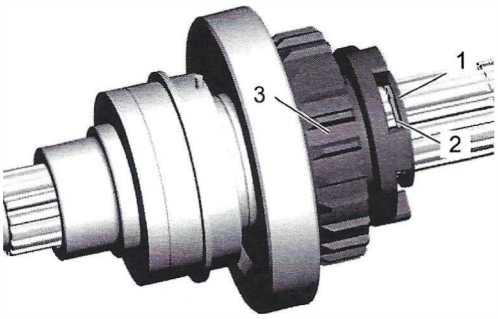


IM10L1520031-01



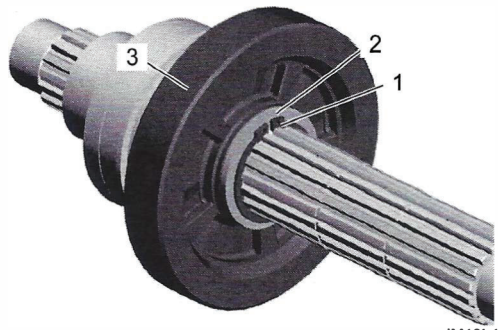
IM10L1520032-01

7) Remove the washer (1), snap ring (2) and 6th driven gear (3).



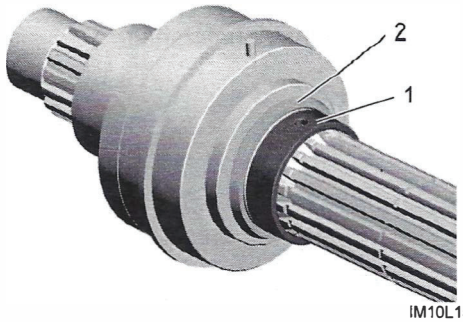
IM10L1520033-01

8) Remove the snap ring (1) washer (2) and 2nd driven gear (3).



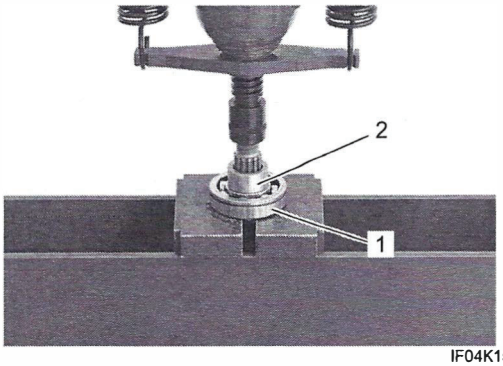
IM10L1520034-01

9) Remove the 2nd driven gear bushing (1) and oil seal (2).



IM10L1520035-01

10) Remove the driveshaft bearing (1), and engine sprocket spacer (2) using hydraulic press.



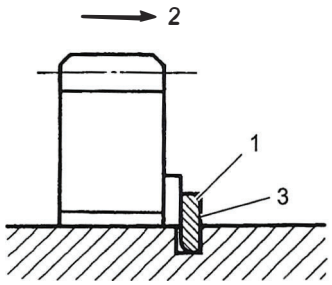
IF04K1520030-01

Reassembly

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).**
- **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 engine oil to the driveshaft and countershaft.**

- When installing a new snap ring (1), pay attention to its direction. Fit it to the side where the thrust (2) is as shown in the figure.



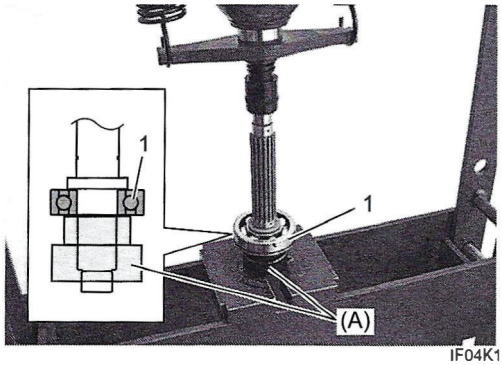
IF04K1520031-01

3. Sharp edge

Driveshaft

- Install the driveshaft bearing (1) using a hydraulic press and special tool.

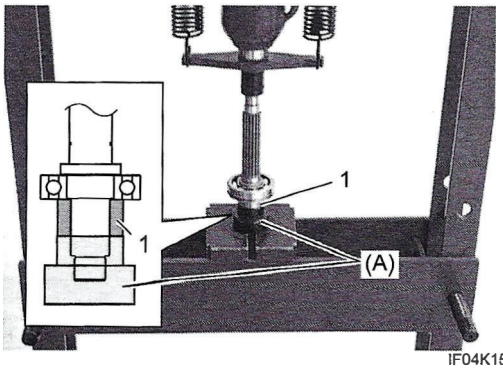
  Special tool
  (A): 09913–70210



IF04K1520032-02

- Install the engine sprocket spacer (1) using a hydraulic press and special tool.

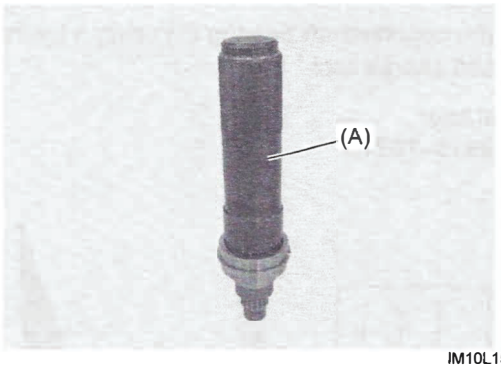
  Special tool
  (A): 09913–70210



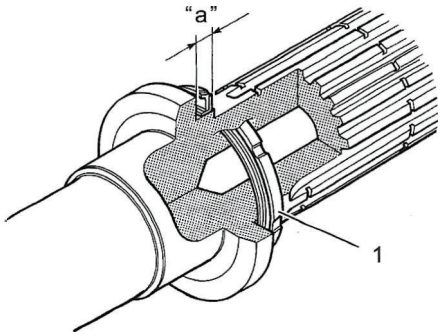
IF04K1520033-02

- Press fit the friction ring (1) of the driveshaft with the special tool until the dimension "a" becomes 4.5 – 4.8 mm (0.18 – 0.19 in).

  Special tool
  (A): 09913–70210



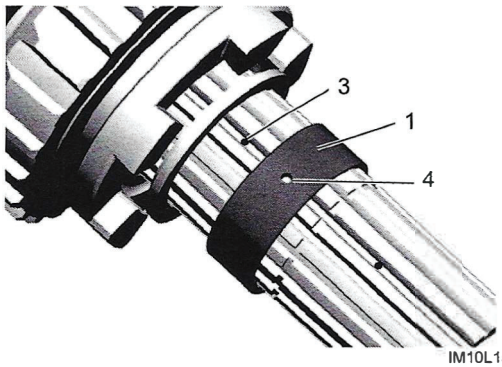
IM10L1520036-01



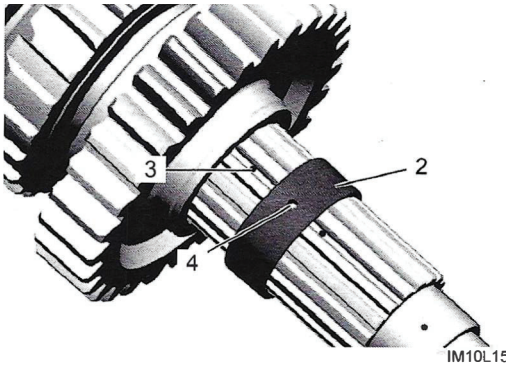
IM10L1520037-01

"a": 4.5 – 4.8 mm (0.18 – 0.19 in)

- When installing the 4th driven gear bushing (1) and 3rd driven gear bushing (2) onto the driveshaft, align the shaft oil hole (3) with the bushing oil hole (4).



IM10L1520038-01

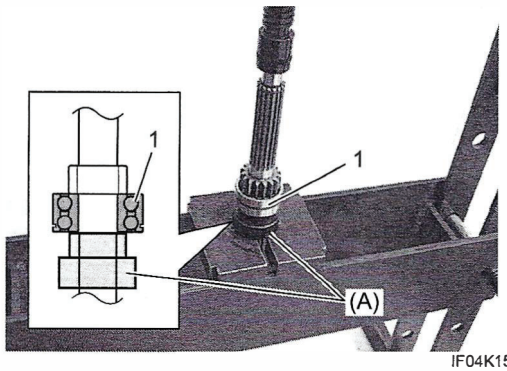


IM10L1520039-01

Countershaft

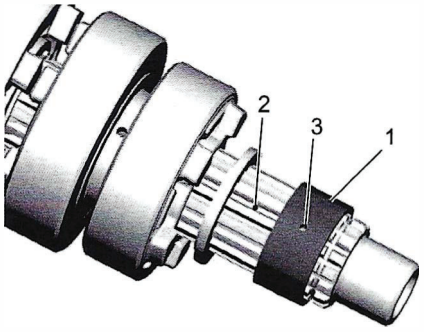
- Install the countershaft bearing (1) using a hydraulic press and special tool.

Special tool
(A): 09913–70210



IF04K1520036-04

- When installing the 6th drive gear bushing (1) onto the countershaft, align the shaft oil hole (2) with the bushing oil hole (3).



IM10L1520040-01

Gearshift Fork / Gearshift Cam Inspection

BENM10L35206006

Refer to "Transmission Removal" (Page 5B-3) and "Countershaft Gear / Driveshaft Gear Disassembly and Reassembly" (Page 5B-8).

Gearshift Fork to Groove Clearance

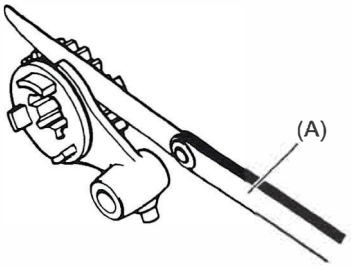
NOTE

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.

Gearshift fork to groove clearance
[Standard]: 0.1 – 0.3 mm (0.004 – 0.011 in)
[Limit]: 0.5 mm (0.019 in)

Special tool
(A): 09900–20803

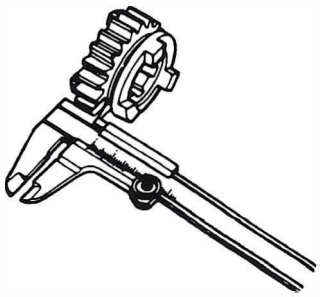


IF04K1520039-01

Gearshift Fork Groove Width

Measure the gearshift fork groove width using the vernier calipers.

Gearshift fork groove width
[Standard]: 5.0 – 5.1 mm (0.197 – 0.200 in)

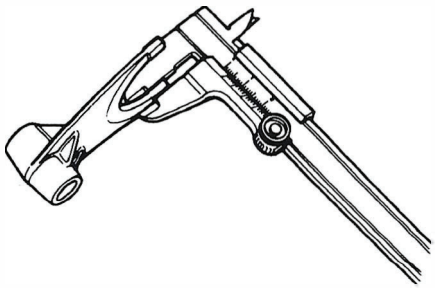


IK46K1520024-01

Gearshift Fork Thickness

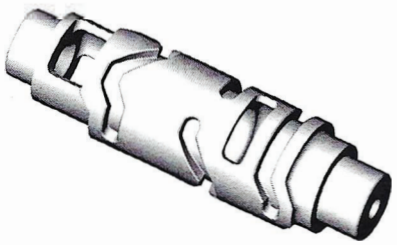
Measure the gearshift fork thickness using the vernier calipers.

Gearshift fork thickness
[Standard]: 4.8 – 4.9 mm (0.189 – 0.192 in)



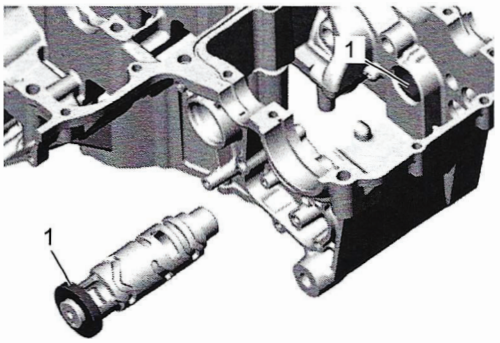
IK46K1520025-01

Gearshift Cam
Inspect the gearshift cam groove for abnormal wear and damage. If any defects are found, replace the gearshift cam with a new one.



IM10L1520041-01

Gearshift Cam Bearing
Inspect the gearshift cam bearings (1), 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).

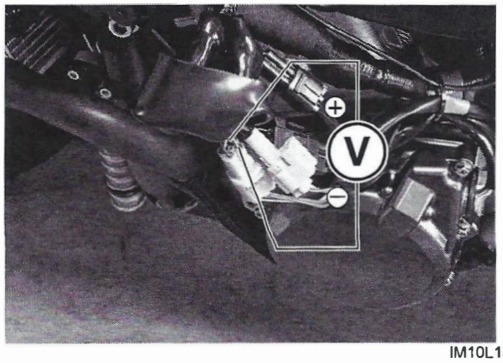


IM10L1520042-01

GP Sensor Inspection
BENM10L35206007

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Turn the ignition switch ON.
3) For neutral signal, measure the voltage between B/Br and Bl lead wires with the transmission in neutral position.

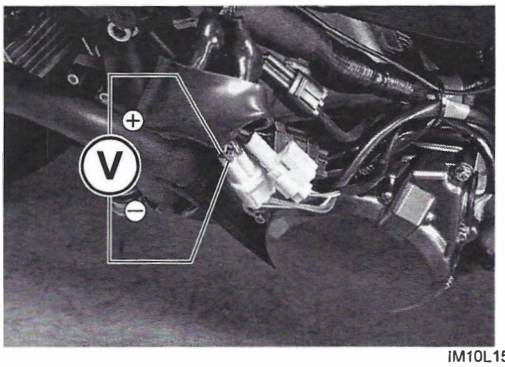
Neutral signal voltage
Neutral [Standard]: Approx. 0 V
Other than neutral [Standard]: Approx. 12 V



IM10L1520077-01

4) For gear position signal, measure the voltage between P and B/Br lead wires when shifting the gearshift lever from low to top.

Gear position signal voltage
1st [Standard]: 0.53 – 0.73 V
Neutral [Standard]: 1.08 – 1.26 V
2nd [Standard]: 1.61 – 1.81 V
3rd [Standard]: 2.27 – 2.47 V
4th [Standard]: 2.94 – 3.14 V
5th [Standard]: 3.61 – 3.81 V
6th [Standard]: 4.28 – 4.48 V

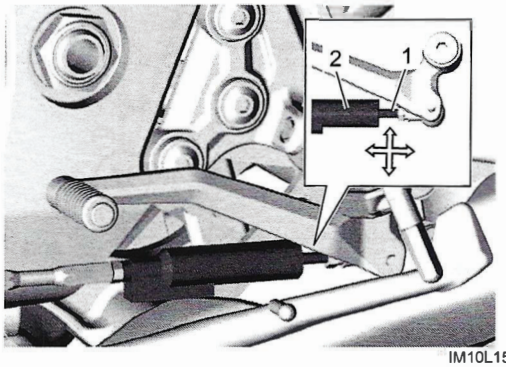


IM10L1520078-01

5) Turn the ignition switch OFF.
6) Install the removed parts.

Gearshift Sensor Inspection
BENM10L35206008

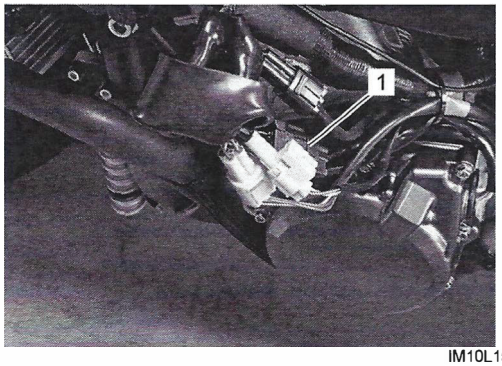
Gearshift Sensor Push Rod Play
Check the push rod (1) of the gearshift sensor (2) for both radial play and thrust play. If noticeable play is found, replace the gearshift sensor with a new one. ☞(Page 5B-19)



IM10L1520043-01

Gearshift Sensor Output Voltage

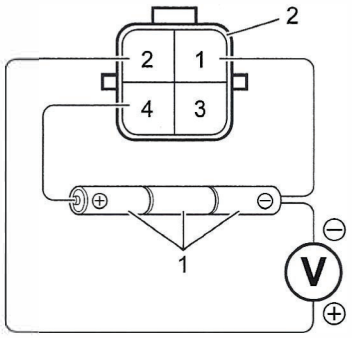
1) Remove the side cowling assembly (LH). ☞(Page 9D-37)
2) Disconnect the gearshift sensor lead wire coupler (1).



IM10L1520044-02

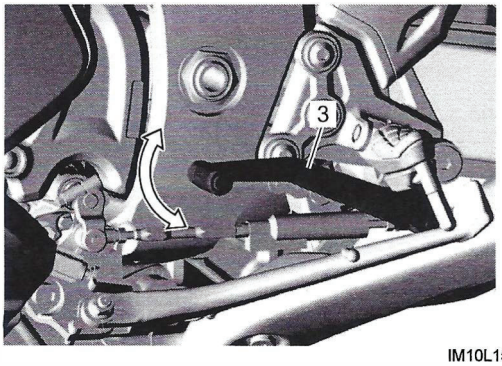
3) Arrange 3 new 1.5 V batteries (1) in series (check that total voltage is 4.5 – 5.0 V) and connect (–) terminal to the "T1" and (+) terminal to the "T4".
4) Measure the voltage between "T2" and "T1" by moving the gearshift lever (3) up and down fully in the neutral position.
If faulty condition is found, replace the gearshift sensor with a new one. ☞(Page 5B-19)

Gearshift sensor output voltage
Fully upped [Standard]: 4.48 – 4.65 V
Fully downed [Standard]: 0.35 – 0.52 V
Neutral position [Standard]: 2.38 – 2.62 V



IM10L1520045-01

2. Gearshift sensor



IM10L1520046-01

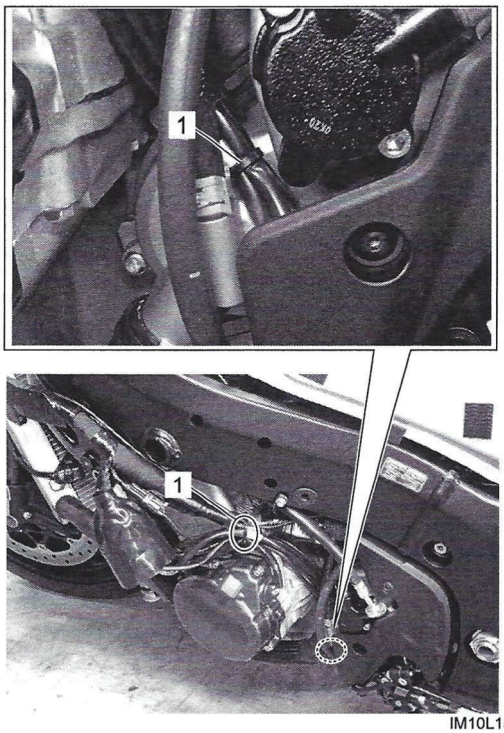
5) After finishing the gearshift sensor inspection, install the removed parts.

GP Sensor Removal and Installation

BENM10L35206009

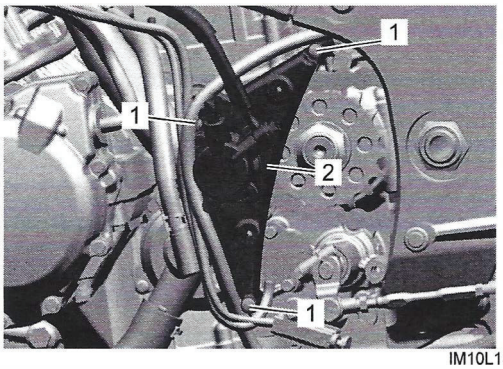
Removal

1) Turn the ignition switch OFF.
2) Remove the side cowling assembly (LH). ☞(Page 9D-37)
3) Release the clamp (1), and then disconnect the GP sensor coupler (2).



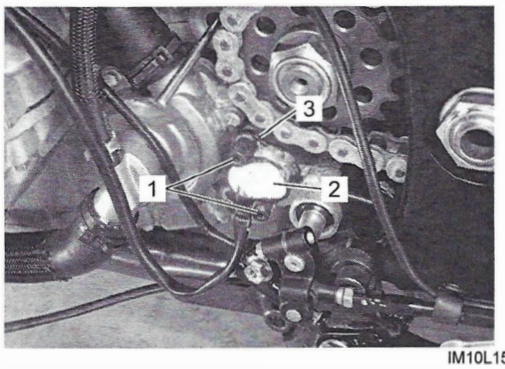
IM10L1520047-03

4) Remove the engine sprocket cover. ☞(Page 3A-3)
5) Remove the clutch release cylinder holder bolts (1) and clutch release cylinder holder (2).



IM10L1520048-01

6) Remove the GP sensor nuts (1), GP sensor (2) and GP sensor plate (3) from the gear shift cover.



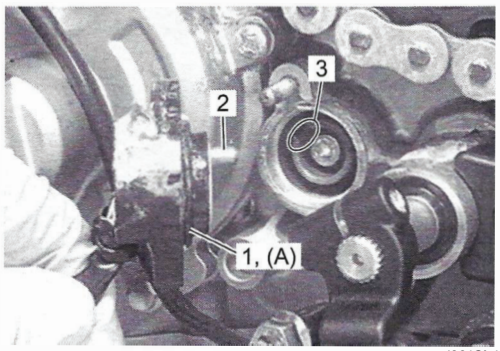
IM10L1520049-01

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

- Apply grease to the new O-ring (1).

  "A": Grease 99000–25011 (SUZUKI SUPER GREASE A)

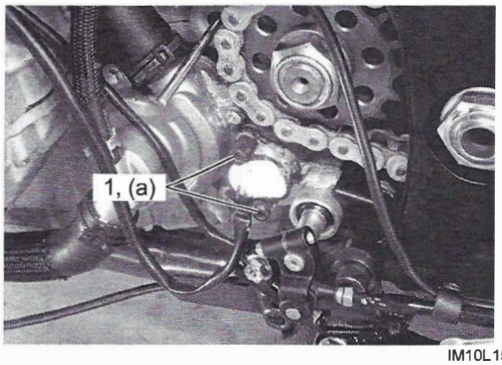
- Align the GP sensor pin (2) with the gearshift cam slot (3).



IM10L1520050-07

- Tighten the GP sensor nut (1) to the specified torque.

  Tightening torque
  GP sensor nut (a): 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)

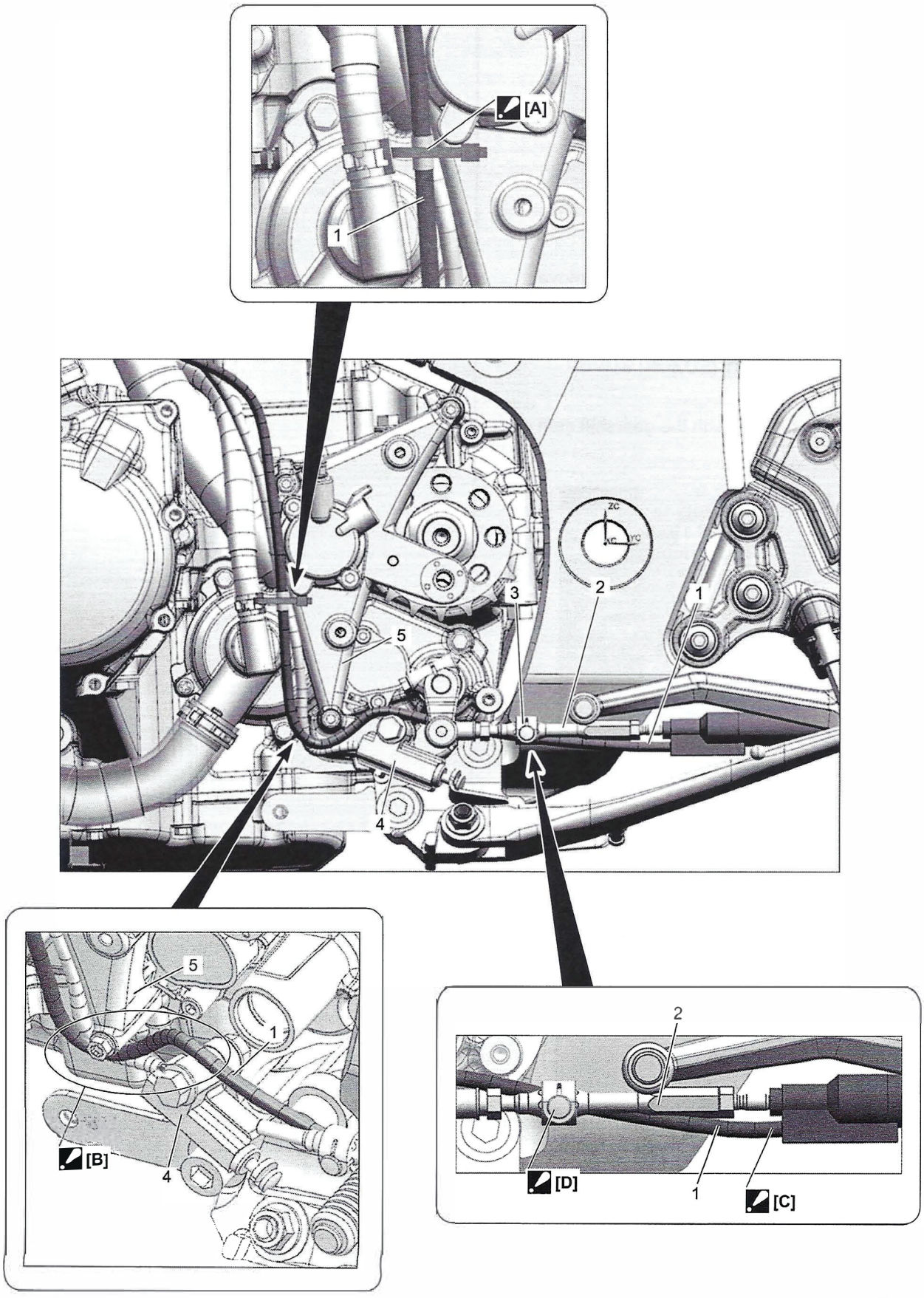


IM10L1520051-01

- Route the GP sensor lead wire. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-13).
- Reset the gear position learning value. ☞(Page 1C-3)

Gearshift Sensor Lead Routing Diagram

BENM10L35206010

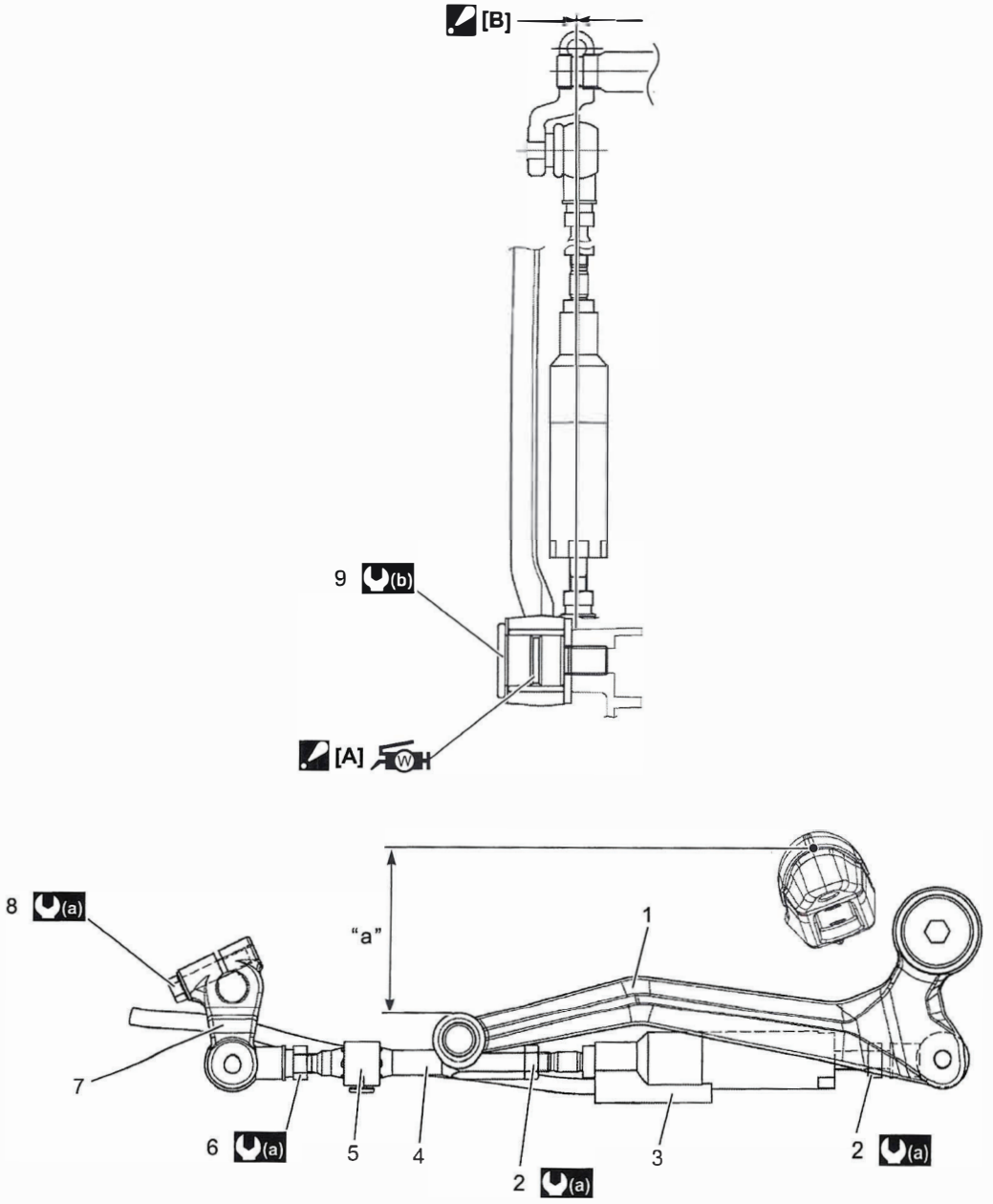


IM10L1520080-01

[A]: Align the white tape and clamp.	[D]: Clamp the gearshift sensor lead wire to inside of the gearshift link rod.	3. Clamp
[B]: Pass the gearshift sensor lead wire to the upper side of side-stand switch and lower side of clutch release cylinder holder.	1. Gearshift sensor lead wire	4. Side-stand switch
[C]: Make sure that the gearshift sensor lead wire is on the bottom when installing the gearshift sensor.	2. Gearshift link rod	5. Clutch release cylinder holder

Gearshift Lever Construction

BENM10L35206011



IM10L1520053-03

[A]: Apply grease to the groove of gearshift lever bolt.	4. Gearshift link rod	9. Gearshift lever bolt
[B]: Align the center of the gear shift link arm hole with the center of the gear shift shaft.	5. Gearshift sensor lead wire clamp	"a": 55 – 65 mm (2.17 – 2.56 in)
1. Gearshift lever	6. Gearshift link rod nut (left-hand threads)	(a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
2. Gearshift link rod nut	7. Gearshift link arm	(b): 40 N·m (4.1 kgf-m, 29.5 lbf-ft)
3. Gearshift sensor	8. Gearshift link arm bolt	(W): Apply SUZUKI WATER RESISTANT GREASE EP2.

Gearshift Lever Removal and Installation

BENM10L35206012

Refer to "Gearshift Lever Construction" (Page 5B-17).

Removal

Remove the gearshift lever.

Installation

1) Install the gearshift lever.
2) After installing the gearshift lever, check the gearshift lever height. ☞(Page 5B-18)

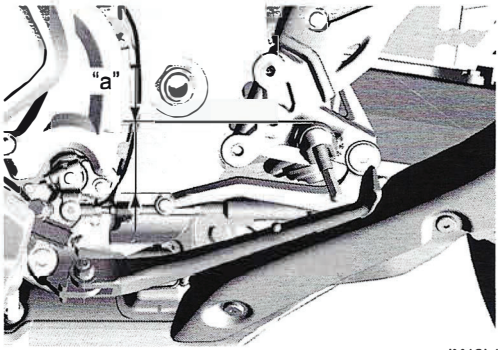
Gearshift Lever Height Inspection and Adjustment

BENM10L35206013

Inspection

Inspect the gearshift lever height "a" between the pedal top face and footrest.

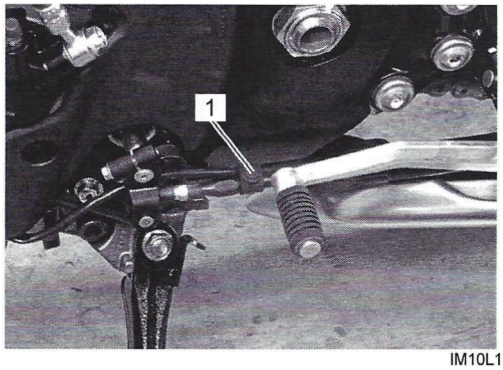
Gearshift lever height
[Standard]: 55 – 65 mm (2.17 – 2.56 in)



IM10L1520054-02

Adjustment

1) Release the gearshift sensor lead wire clamp (1).



IM10L1520079-01

2) Loosen the lock-nuts (1) and (2).
3) Turn the gearshift link rod (3) until the gearshift lever height is within the specification.

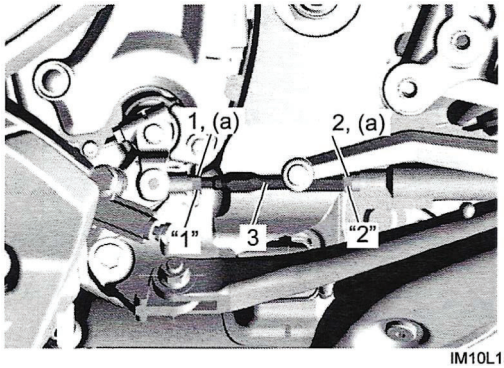
Gearshift lever height
[Standard]: 55 – 65 mm (2.17 – 2.56 in)

4) Tighten the lock-nuts (1) and (2) to the specified torque in order of "1" → "2".

NOTE

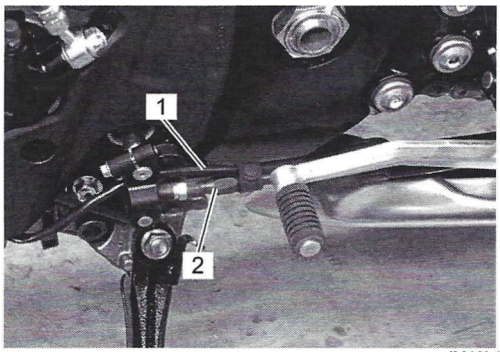
This lock nut (1) has left-hand threads.

Tightening torque
Gearshift link rod nut (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1520055-03

5) Clamp the gearshift sensor lead wire (1) to inside of the gearshift link rod (2).



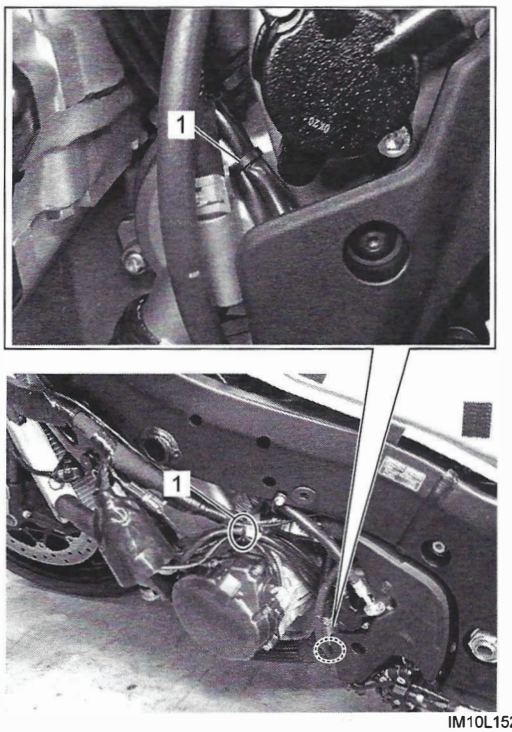
IM10L1520081-01

Gearshift Sensor Removal and Installation

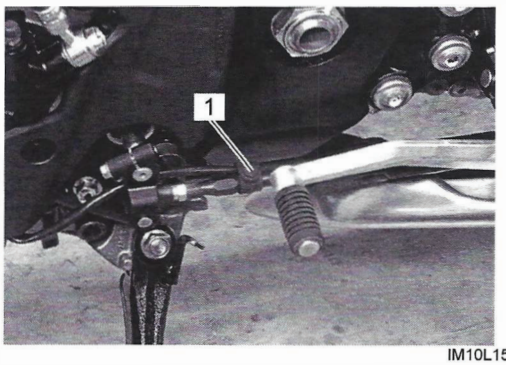
BENM10L35206014

Removal

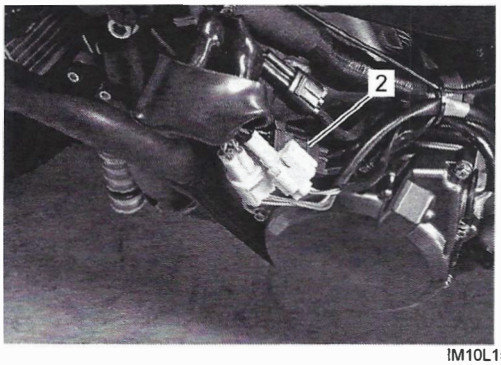
1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Release the gearshift sensor lead wire from the clamps (1) and disconnect the gearshift sensor coupler (2).



IM10L1520047-03

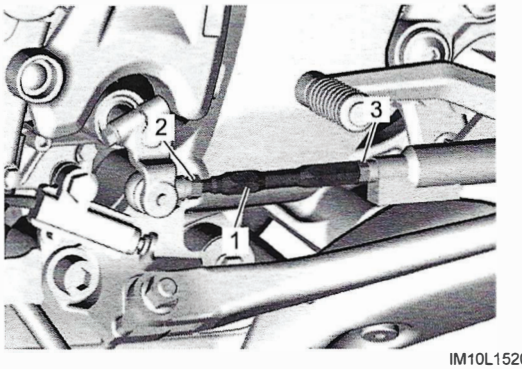


IM10L1520079-01



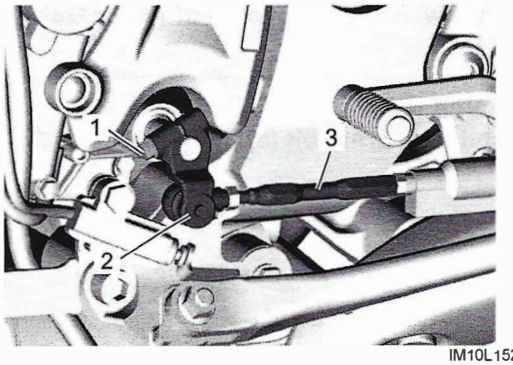
IM10L1520056-02

3) While holding the gearshift link rod at width across flats (1), loosen the lock-nut (2) (left-hand threads) and (3).



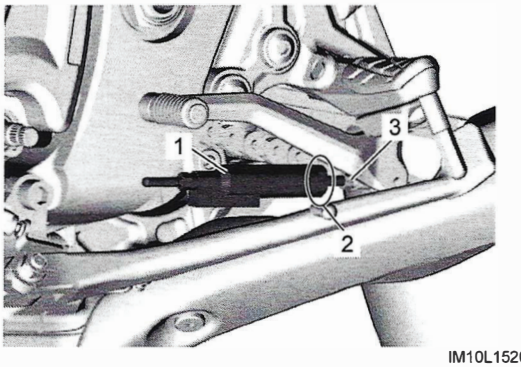
IM10L1520057-01

4) Remove the gearshift link arm bolt (1) from the gearshift link arm.
5) Remove the gearshift link arm (2) from the gearshift shaft and gearshift link rod (3).
6) Remove the link rod (3) from the gear shift sensor.



IM10L1520058-01

7) While holding the gear shift sensor (1) at width across flats (2), loosen the lock-nut (3).
8) Remove the gear shift sensor.



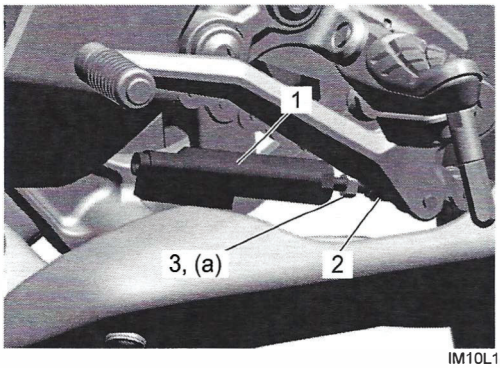
IM10L1520059-01

Installation

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

- Turn the gear shift sensor (1) until the screw end of the gear shift sensor contacts the ball joint (2) of gearshift lever.
- Tighten the gear shift sensor lock-nut (3) to the specified torque.

Tightening torque
Gear shift sensor lock-nut (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



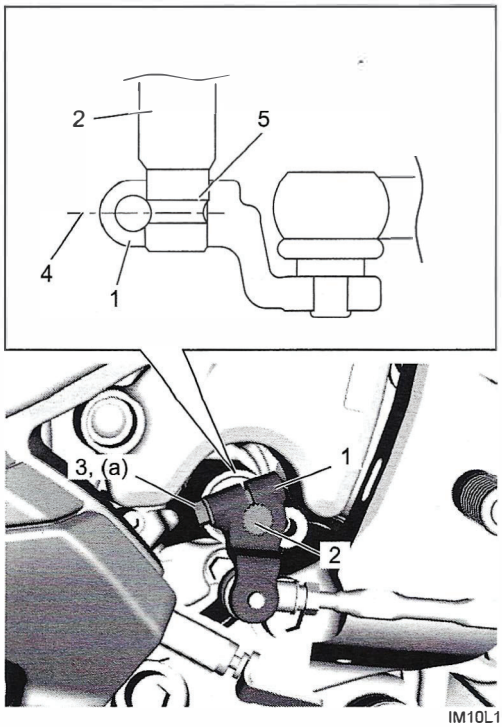
IM10L1520060-01

- Install the gearshift link arm (1) to the gearshift shaft (2), and then tighten the gearshift link arm bolt (3) to the specified torque.

NOTE

Align the center of hole (4) of the gearshift link arm with the groove (5) of the gearshift shaft.

Tightening torque
Gearshift link arm bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1520061-01

- Route the gearshift sensor lead wire. ☞(Page 5B-16)
- After installing the gearshift sensor, adjust the gearshift lever height. ☞(Page 5B-18)

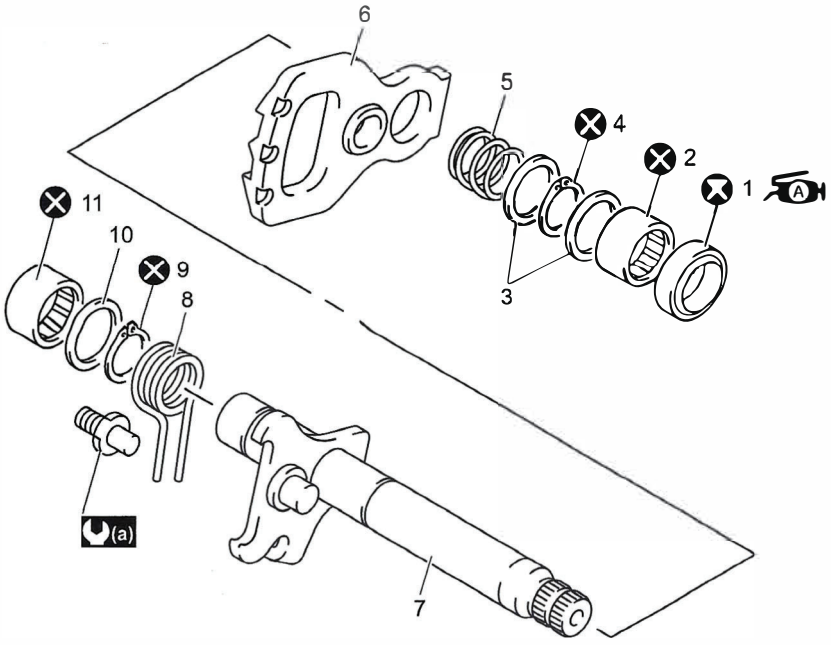
Gearshift Sensor Inspection

BENM10L35206015

Refer to "Gearshift Sensor Inspection" (Page 5B-13).

Gearshift Shaft / Gearshift Cam Plate Components

BENM10L35206016

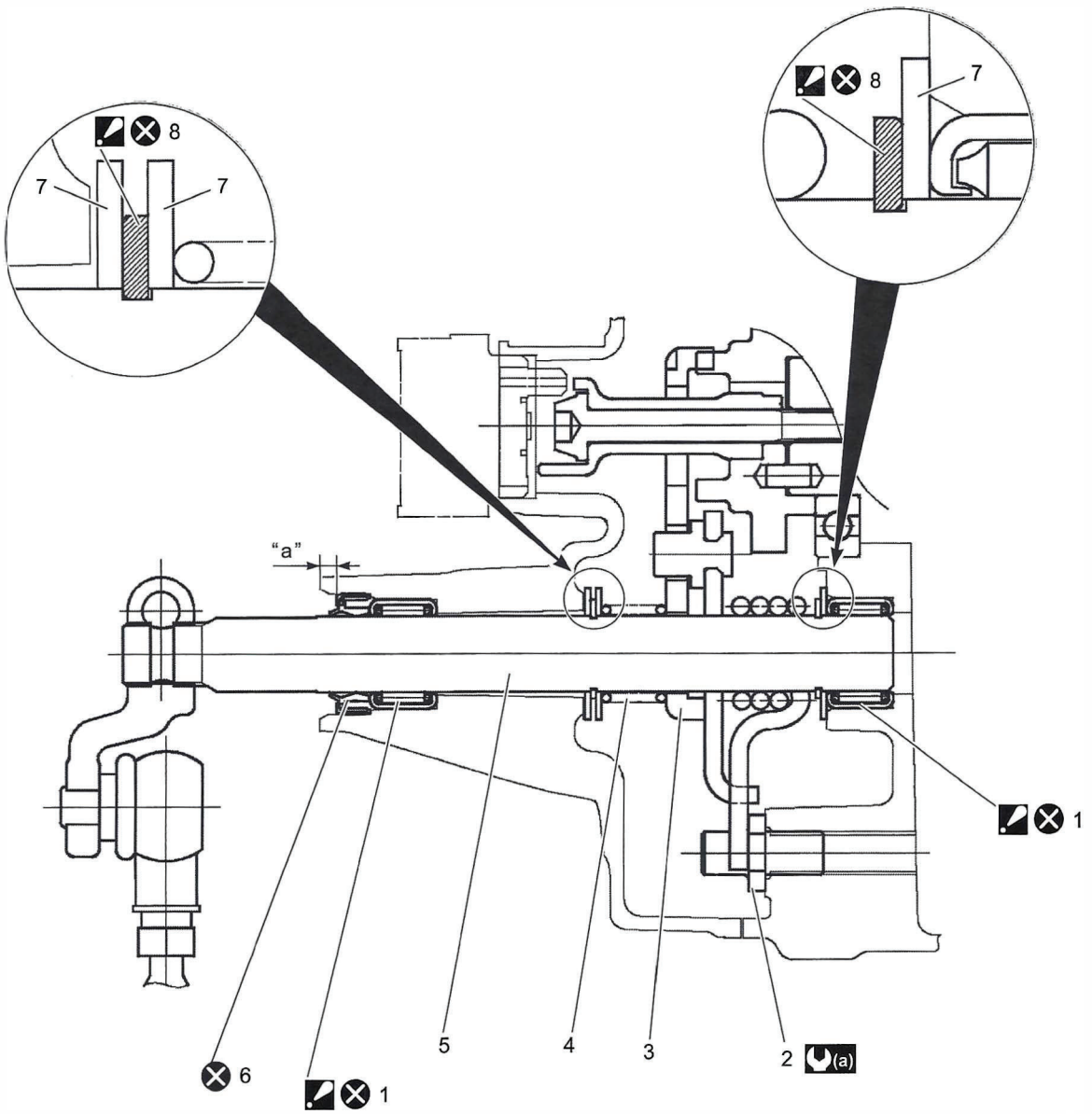


IM10L1520062-02

1. Oil seal	6. Gearshift cam drive plate	11. Bearing
2. Bearing	7. Gearshift shaft	(a) : 19 N·m (1.9 kgf-m, 14.0 lbf-ft)
3. Washer	8. Gearshift shaft return spring	A : Apply SUZUKI SUPER GREASE A.
4. Snap ring	9. Snap ring	: Do not reuse.
5. Gearshift plate return spring	10. Washer	

Gearshift Shaft Construction

BENM10L35206017



IM10L1520063-02

1. Bearing : Face the stamped mark side faces outside.	5. Gearshift shaft	"a": 1.5 – 2.5 mm (0.06 – 0.10 in)
2. Gearshift arm stopper	6. Gearshift shaft oil seal	(a) : 19 N·m (1.9 kgf-m, 14.0 lbf-ft)
3. Gearshift cam drive plate	7. Washer	: Do not reuse.
4. Gearshift plate return spring	8. Snap ring : Face the sharp edge inside.	

Gearshift Shaft / Gearshift Cam Plate Removal and Installation

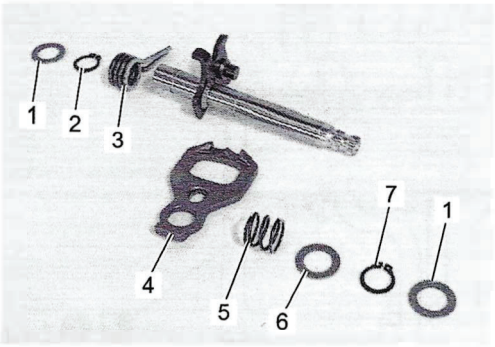
BENM10L35206018

Refer to "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand / Oil Pipe Removal" in Section 1D (Page 1D-58) and "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand Installation" in Section 1D (Page 1D-61).

Removal

1) Remove the gearshift shaft, gearshift cam plate and gearshift cam stopper. Refer to "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand / Oil Pipe Removal" in Section 1D (Page 1D-58).
2) Remove the parts in the figure from the gearshift shaft.

Special tool
09900–06107



IM10L1520064-01

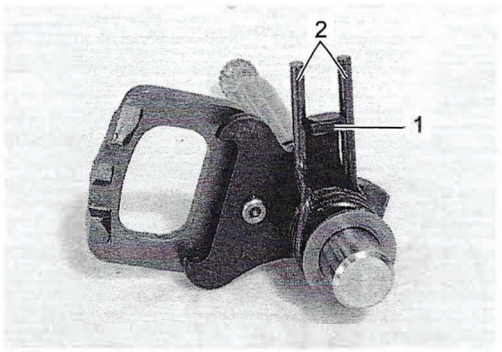
1.	Washer
2.	Snap ring
3.	Gearshift shaft return spring
4.	Gearshift cam drive plate
5.	Gearshift plate return spring
6.	Washer
7.	Snap ring

Installation

Refer to "Crank Balancer / Cam Chain Tensioner / Oil Filter / Oil Filter Stand Installation" in Section 1D (Page 1D-61).

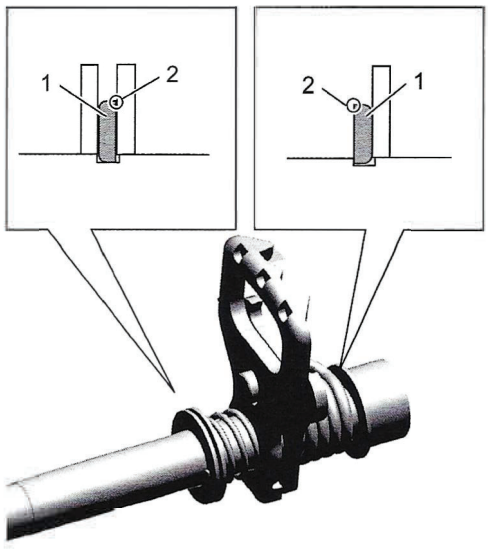
Install the gearshift shaft and gearshift cam plate in the reverse order of removal. Pay attention to the following points:

- When installing the gearshift shaft return spring, position the stopper (1) of gearshift arm between the shaft return spring ends (2).



IM10L1520065-01

- When installing the new snap rings (1), face the sharp edge (2) inside.



IM10L1520066-01

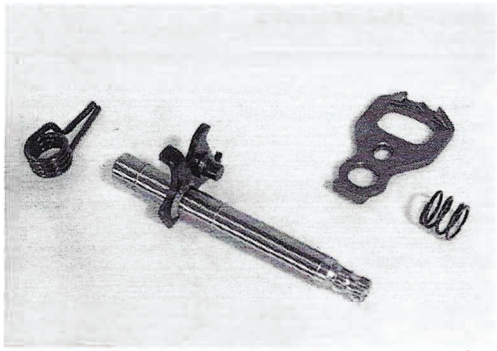
Gearshift Linkage Inspection

BENM10L35206019

Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation" (Page 5B-22).

Gearshift Shaft

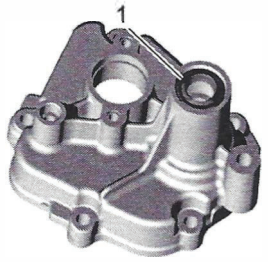
Check the gearshift shaft for bend or wear.
Check the return spring for damage or fatigue.
If any defects are found, replace the defective part(-s).



I823H1520041-01

Gearshift Shaft Oil Seal

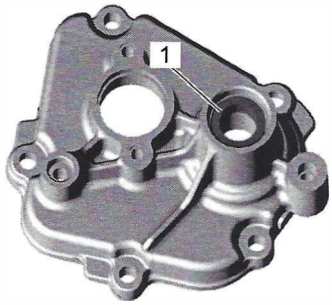
Inspect the gearshift shaft oil seal lip (1) for damage or wear. If any defect is found, replace the oil seal with a new one.



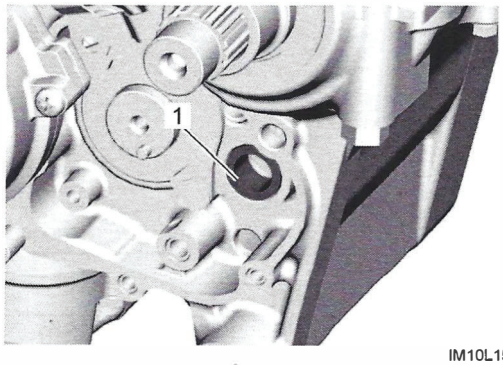
IM10L1520067-02

Gearshift Shaft Bearing

Inspect the gearshift shaft bearings (1) for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



IM10L1520068-01



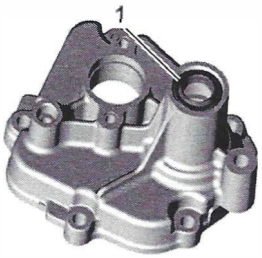
IM10L1520069-01

Gearshift Shaft Oil Seal / Bearing Removal and Installation

BENM10L35206020

Removal

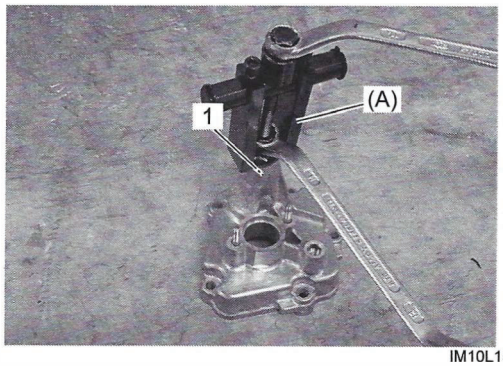
1) Remove the gearshift shaft. Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation" (Page 5B-22).
2) Remove the gearshift shaft oil seal (1).



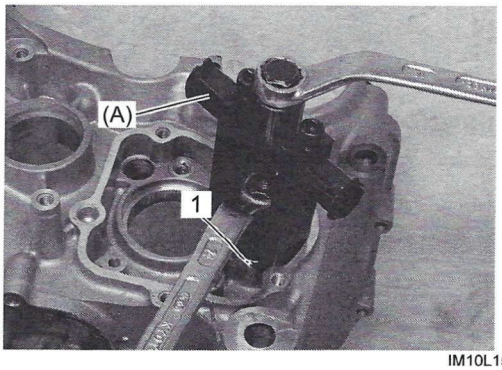
IM10L1520067-02

3) Remove the bearings (1) with the special tools.

Special tool
(A): 09921–20240



IM10L1520070-01



IM10L1520071-01

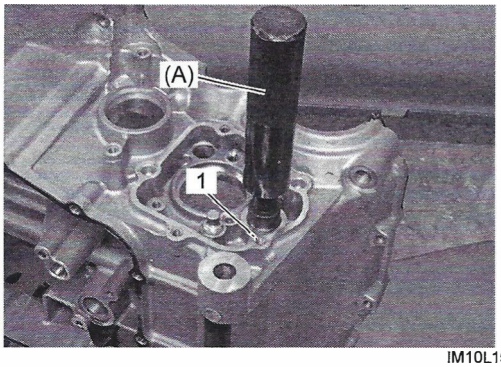
Installation
Install the oil seal and bearings in the reverse order of removal. Pay attention to the following points:

- Install the new bearing (1) with the special tool.

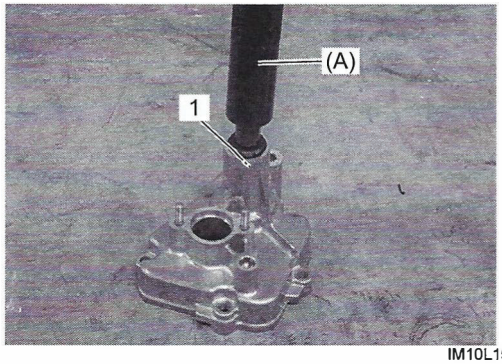
NOTE

The stamped mark side of gearshift shaft bearing faces outside.

Special tool
(A): 09913–70210



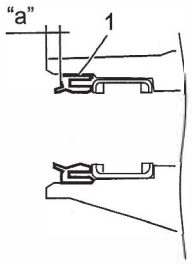
IM10L1520072-01



IM10L1520073-01

- Install the new oil seal (1) with the special tool.

Special tool
09913–70210

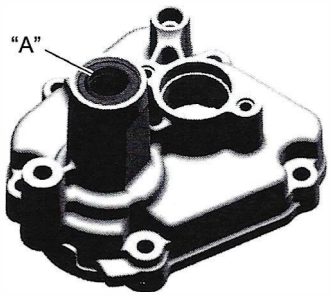


IM10L1520075-01

"a": 1.5 – 2.5 mm (0.06 – 0.10 in)

- Apply grease to the oil seal lip.

"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1520074-01

Specifications

Tightening Torque Specifications

BENM10L35207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Gearshift cam bearing retainer screw	8.4	0.86	6.20	☞(Page 5B-5)
GP sensor nut	6.0	0.61	4.45	☞(Page 5B-15)
Gearshift link rod nut	10	1.0	7.5	☞(Page 5B-18)
Gear shift sensor lock-nut	10	1.0	7.5	☞(Page 5B-19)
Gearshift link arm bolt	10	1.0	7.5	☞(Page 5B-20)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Transmission Components" (Page 5B-2)
"Gearshift Lever Construction" (Page 5B-17)
"Gearshift Shaft / Gearshift Cam Plate Components" (Page 5B-20)
"Gearshift Shaft Construction" (Page 5B-21)

Special Tools and Equipment

Recommended Service Material

BENM10L35208001

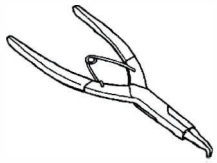
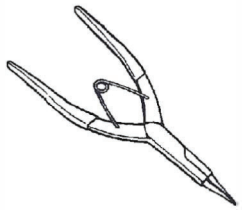
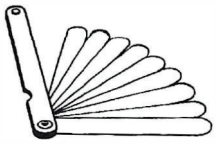
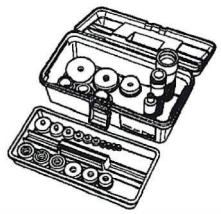
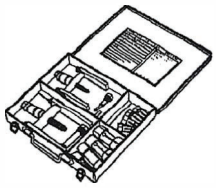
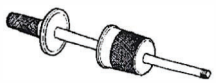
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A	P/No.: 99000–25011	☞(Page 5B-15) / ☞(Page 5B-24)

NOTE

Required service material(s) is also described in:
"Transmission Components" (Page 5B-2)
"Gearshift Lever Construction" (Page 5B-17)
"Gearshift Shaft / Gearshift Cam Plate Components" (Page 5B-20)

Special Tool

BENM10L35208002

09900–06104 Snap ring pliers (External: Bent nose) ☞(Page 5B-8)		09900–06107 Snap ring pliers (External) ☞(Page 5B-9) / ☞(Page 5B-22)	
09900–20803 Thickness gauge ☞(Page 5B-12)		09913–70210 Bearing installer set ☞(Page 5B-4) / ☞(Page 5B-4) / ☞(Page 5B-11) / ☞(Page 5B-11) / ☞(Page 5B-11) / ☞(Page 5B-12) / ☞(Page 5B-24) / ☞(Page 5B-24)	
09921–20240 Bearing remover set ☞(Page 5B-4) / ☞(Page 5B-23)		09923–74511 Bearing remover (ø20 - 35) ☞(Page 5B-4)	
09930–30104 Rotor remover sliding shaft This tool is included in Rotor remover set (09930-30135). ☞(Page 5B-4)			

Clutch

Precautions

Precautions for Clutch System

BENM10L35300001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2) and "Precautions for Circuit Tester" in Section 00 (Page 00-8).

Clutch Fluid (Brake Fluid) Information

BENM10L35300002

⚠ WARNING

- **This clutch control 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 clutch control system components, use new brake fluid. Never use cleaning solvent.**
- **Clutch hose seal washers should be replaced with the new ones to prevent fluid leakage.**

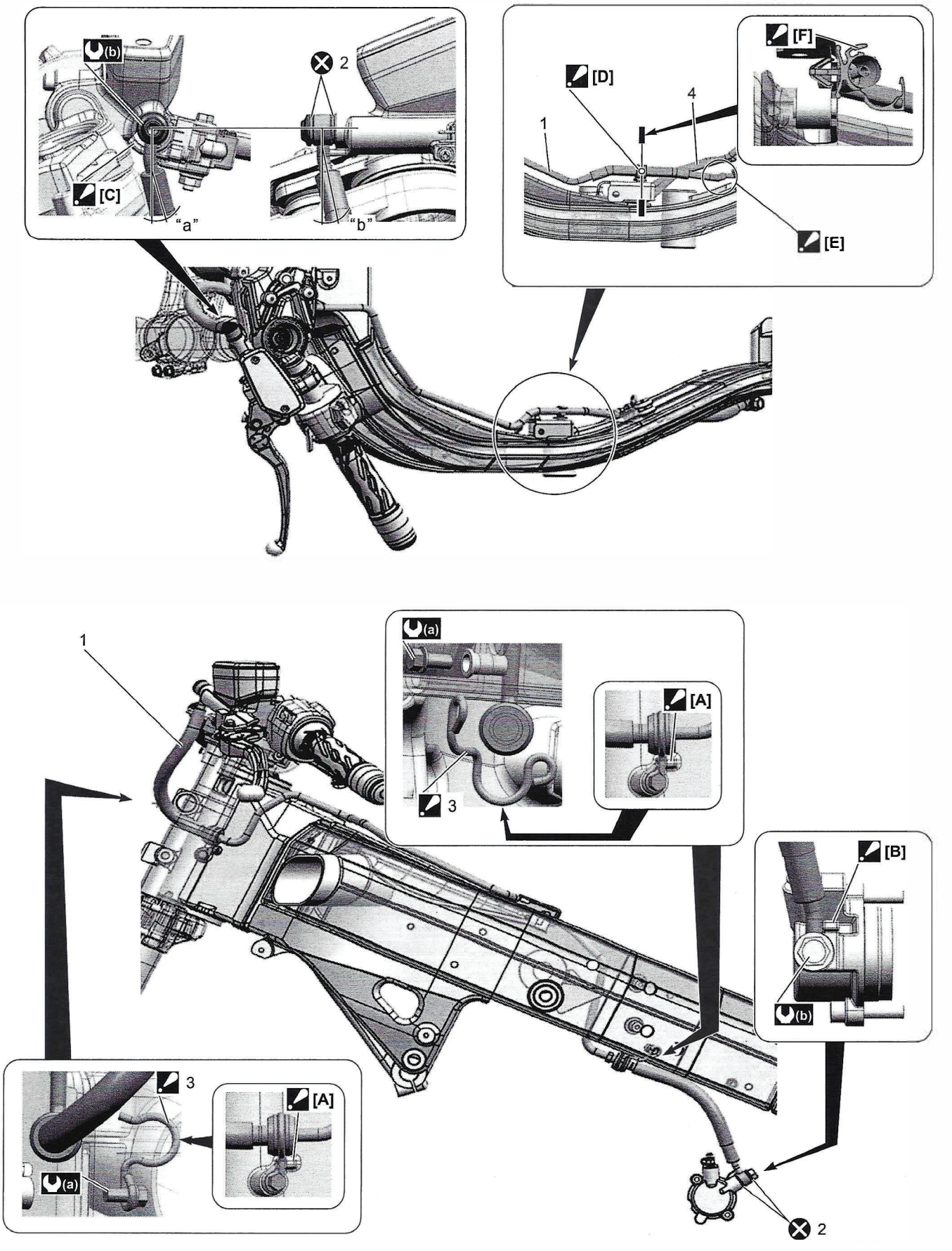
NOTICE

The brake fluid is damaging to painted surfaces, plastics and rubber materials, and do not allow the fluid to spill on the surrounding parts.
If the fluid is spilled, flush it with water immediately.

Schematic and Routing Diagram

Clutch Hose Routing Diagram

BENM10L35302001



IM10L1530066-02

[A]: After the clamp contacts the stopper, tighten the union bolt to the specified torque.	[F]: The clamp direction as shown in the figure. Close the clamp firmly.	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[B]: After the clutch hose contacts the stopper of the clutch release cylinder, tighten the union bolt to the specified torque.	1. Clutch hose	(b) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
[C]: After the clutch hose contacts the stopper of the clutch master cylinder, tighten the union bolt to the specified torque.	2. Seal washer	"a": 21°
[D]: Align the hose clamp with the marking on the clutch hose.	3. Clamp	"b": 14°
[E]: Pass the clutch hose to out side of the front brake pipes.	4. Front brake pipe	⊗ : Do not reuse.

Diagnostic Information and Procedures

Clutch System Symptom Diagnosis

BENM10L35304001

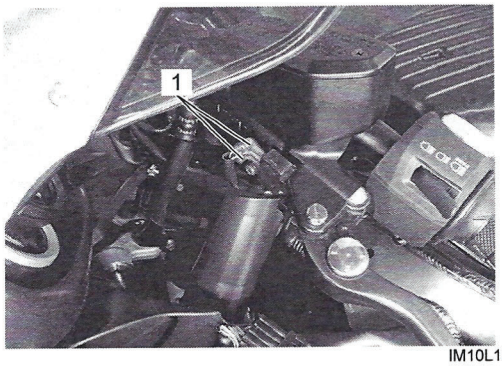
Condition	Possible cause	Correction / Reference Item
Noisy engine (Noise seems to come from the clutch)	Worn countershaft spline.	*Replace countershaft. ☞(Page 5B-8)*
	Worn clutch sleeve hub spline.	*Replace clutch sleeve hub. ☞(Page 5C-17) ☞(Page 5C-19)*
	Worn clutch plate teeth.	*Replace clutch plate. ☞(Page 5C-17) ☞(Page 5C-19)*
	Distorted clutch plates, driven and drive.	*Replace. ☞(Page 5C-17) ☞(Page 5C-19)*
	Worn clutch release bearing.	*Replace. ☞(Page 5C-17) ☞(Page 5C-19)*
	Weakened clutch dampers.	*Replace primary driven gear. ☞(Page 5C-17) ☞(Page 5C-19)*
	Worn or rubbing primary gears.	*Replace. ☞(Page 5C-17) ☞(Page 5C-19)*
Clutch slips	Weakened clutch springs.	*Replace. ☞(Page 5C-17) ☞(Page 5C-19)*
	Worn or distorted clutch pressure plate.	*Replace. ☞(Page 5C-17) ☞(Page 5C-19)*
	Distorted clutch plates.	*Replace. ☞(Page 5C-17) ☞(Page 5C-19)*
Clutch drags	Leakage of clutch fluid.	*Repair or replace.*
	Worn or damaged clutch master cylinder/release cylinder.	*Replace. ☞(Page 5C-10) ☞(Page 5C-15)*
	Some clutch springs are weak, while others are not.	*Replace. ☞(Page 5C-17) ☞(Page 5C-19)*
	Worn or distorted clutch pressure plate.	*Replace. ☞(Page 5C-17) ☞(Page 5C-19)*
	Distorted clutch plates.	*Replace. ☞(Page 5C-17) ☞(Page 5C-19)*
Leakage of clutch fluid	Leakage of clutch fluid from system.	*Repair or replace.*
Excessive clutch lever stroke	Air in hydraulic system.	*Bleed air. ☞(Page 5C-6)*

Repair Instructions

Clutch Lever Position Switch Inspection

BENM10L35306001

1) Disconnect the clutch lever position switch lead wire connectors (1) from the clutch lever position switch.



IM10L1530001-01

2) Inspect the clutch lever position switch for continuity between "T1" (1) and "T2" (2) using a circuit tester. If any defect is found, replace the clutch lever position switch with a new one. Refer to "Clutch Master Cylinder / Clutch Lever Disassembly and Reassembly" (Page 5C-10).

Terminal / Position	T1	T2
Free		
Grasped	○	○

IL41K1410066-01

3) Connect the clutch lever position switch lead wire connectors.

Clutch Fluid Level Inspection

BENM10L35306002

Refer to "Clutch Fluid" in Section 0B (Page 0B-17).

Clutch Hose Inspection

BENM10L35306003

Refer to "Clutch Hose" in Section 0B (Page 0B-18).

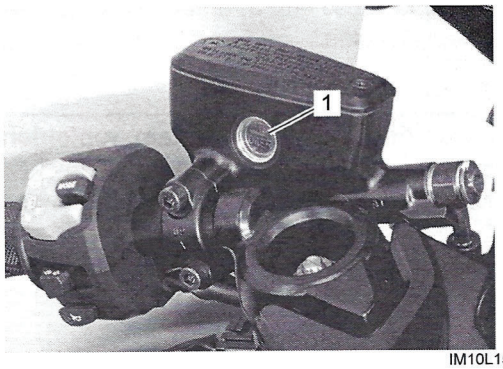
Air Bleeding from Clutch Line

BENM10L35306004

The clutch line must be purged of air in the following manner:

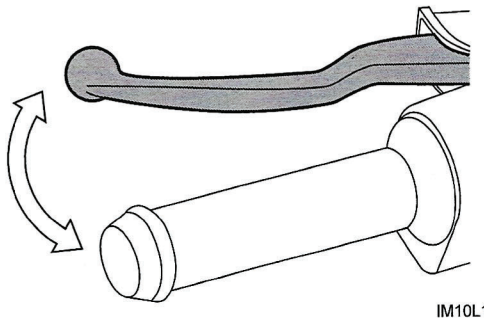
1) Remove the side cowling assembly (LH). ☞(Page 9D-37).
2) Place the motorcycle on a level surface and keep the handlebars straight.
3) Fill the master cylinder reservoir with new clutch fluid to the top of the inspection window (1). Place the reservoir cap to prevent dirt from entering.

   Brake fluid (DOT 4)

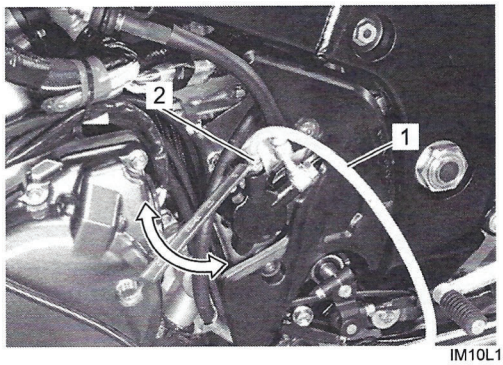


IM10L1530002-01

4) Attach a clear hose (1) to the air bleeder valve, and insert the free end of the hose into a receptacle.
5) Operate the clutch lever several times and, while holding the lever gripped, loosen the air bleeder valve (2) and drain the clutch fluid into a receptacle.



IM10L1530003-01



IM10L1530004-01

6) Tighten the air bleeder valve and release the clutch lever slowly.
7) Repeat the steps 4) and 5) until the fluid is flowing out without bubbles.

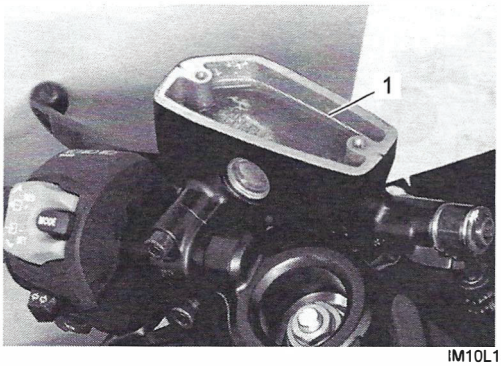
NOTE

While bleeding the clutch system, replenish the reservoir with the clutch fluid as necessary to keep the fluid above the lower level.

8) Tighten the air bleeder valve to the specified torque.

Tightening torque
Clutch air bleeder valve: 5.4 N·m (0.55 kgf-m, 4.00 lbf-ft)

9) Fill the reservoir with clutch fluid to the upper mark (1) of the reservoir.



IM10L1530005-01

10) Install the reservoir cap to the master cylinder.
11) Tighten the reservoir cap screws to the specified torque.

Tightening torque
Reservoir cap screw: 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)

Clutch Fluid Replacement

BENM10L35306005

Refer to "Clutch Fluid" in Section 0B (Page 0B-17).

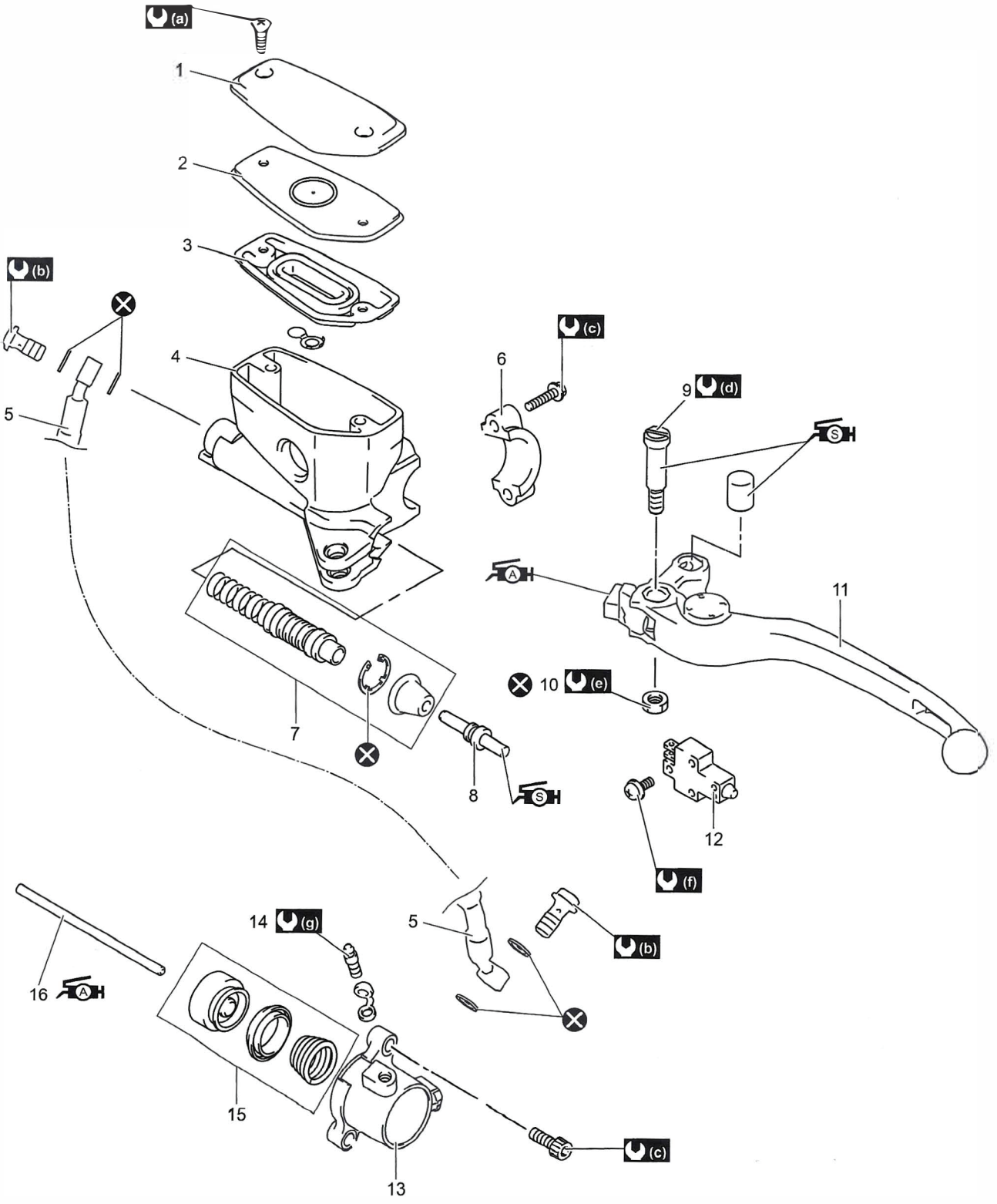
Clutch Hose Removal and Installation

BENM10L35306006

For removal and installation procedure, refer to "Clutch Hose" in Section 0B (Page 0B-18). And if necessary, replace the clutch hose with a new one.

Clutch Control System Components

BENM10L35306007



IM10L1530067-03

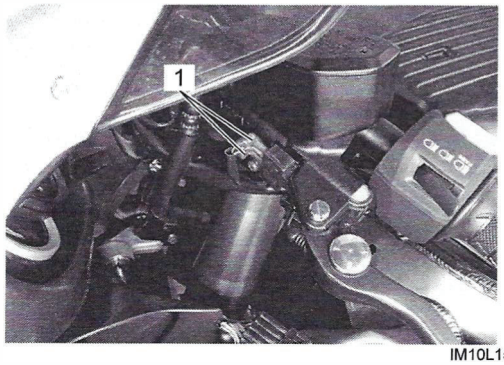
1. Reservoir cap	10. Clutch lever pivot nut	(c) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
2. Plate	11. Clutch lever	(d) : 1.0 N·m (0.10 kgf-m,0.75 lbf-ft)
3. Diaphragm	12. Clutch lever position switch	(e) : 5.9 N·m (0.60 kgf-m, 4.35 lbf-ft)
4. Clutch master cylinder	13. Clutch release cylinder	(f) : 1.2 N·m (0.12 kgf-m, 0.90 lbf-ft)
5. Clutch hose	14. Clutch air bleeder valve	(g) : 5.4 N·m (0.55 kgf-m,4.00 lbf-ft)
6. Clutch master cylinder holder	15. Clutch release cylinder piston	A : Apply SUZUKI SUPER GREASE A.
7. Piston/Cup set	16. Push rod (left)	S : Apply SUZUKI SILICONE GREASE.
8. Push rod	(e) : 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)	: Do not reuse.
9. Clutch lever pivot bolt	(b) : 23 N·m (2.3 kgf-m,17.0 lbf-ft)	

Clutch Master Cylinder Assembly Removal and Installation

BENM10L35306008

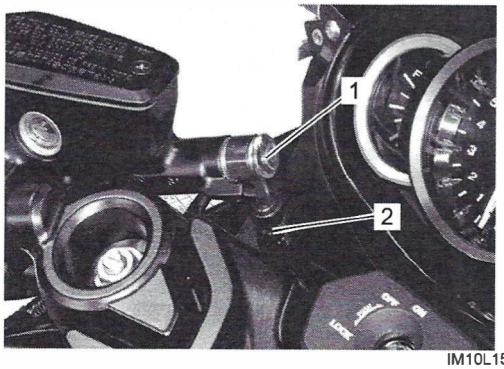
Removal

1) Drain clutch fluid. ☞(Page 5C-7)
2) Disconnect the clutch lever position switch lead wire connectors (1) from the clutch lever position switch.



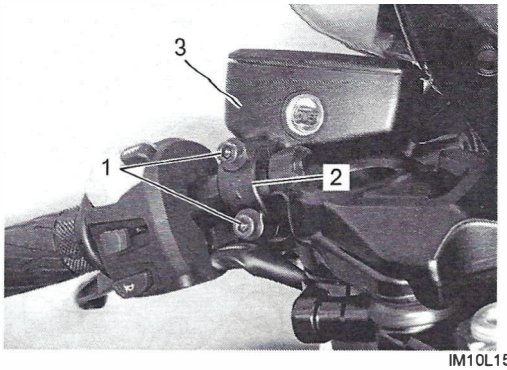
IM10L1530006-01

3) Place a rag underneath the clutch hose union bolt (1) on the master cylinder to catch any spilt clutch fluid.
4) Remove the clutch hose union bolt (1) and disconnect the clutch hose (2) from the clutch master cylinder.



IM10L1530007-01

5) Remove the clutch master cylinder holder bolts (1), clutch master cylinder holder (2) and clutch master cylinder assembly (3) from the handlebar.



IM10L1530008-01

Installation

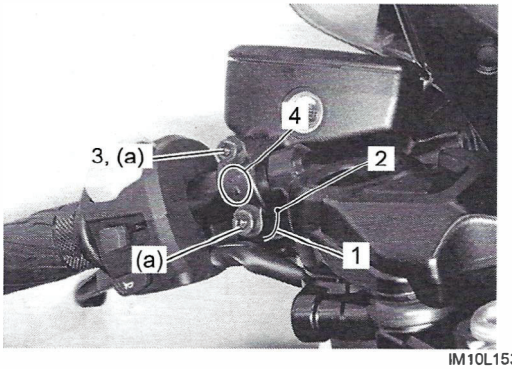
Install the clutch master cylinder in the reverse order of removal. Pay attention to the following points:

- When installing the master cylinder onto the handlebars, align the master cylinder's mating surface (1) with the punch mark (2) on the handlebars and tighten the upper mounting bolt (3) first.

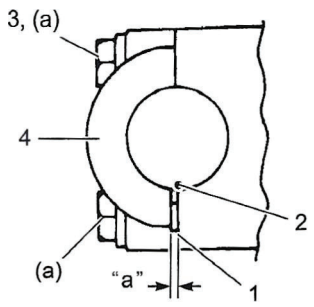
NOTE

Face the up mark (4) upward.

Tightening torque
Clutch master cylinder mounting bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1530009-01

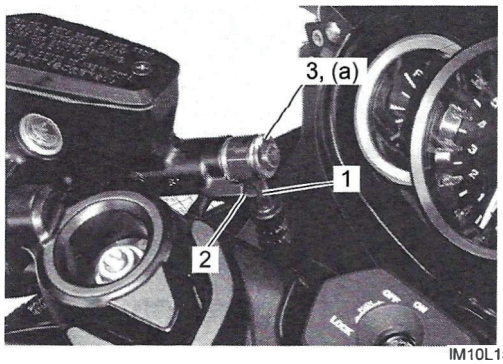


IE31J1530015-02

"a": Clearance

- After the clutch hose union (1) has contacted the stopper (2) of the master cylinder, tighten the union bolt (3) to the specified torque.

  Tightening torque
  Clutch hose union bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1530010-01

- Bleed air from the clutch system. ☞(Page 5C-6)

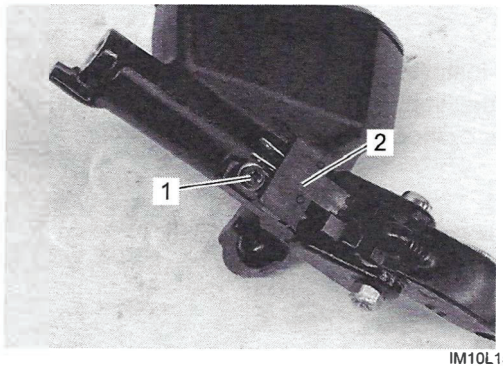
Clutch Master Cylinder / Clutch Lever Disassembly and Reassembly

BENM10L35306009

Refer to "Clutch Master Cylinder Assembly Removal and Installation" (Page 5C-9).

Disassembly

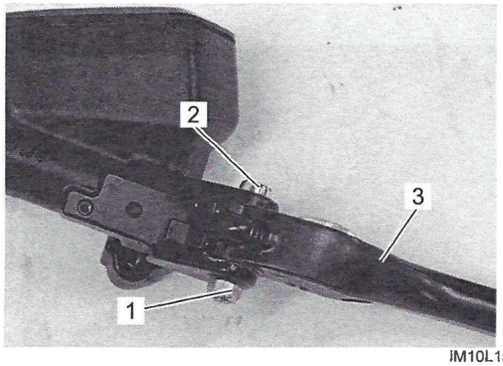
1) Remove the clutch lever position switch screw (1) and clutch lever position switch (2) from the master cylinder.



IM10L1530011-01

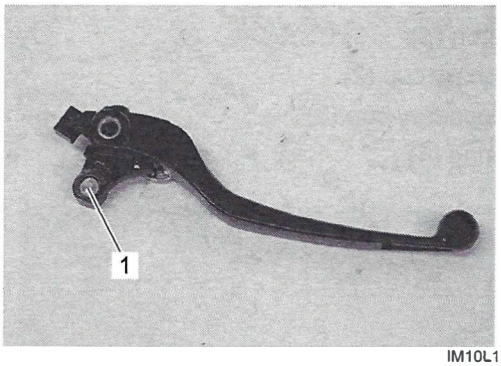
2) Remove the lock-nut (1) and clutch lever pivot bolt (2) from the master cylinder.

3) Remove the clutch lever (3) from the master cylinder.



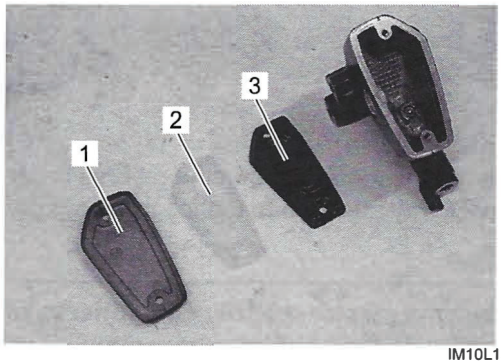
IM10L1530012-01

4) Remove the bushing (1) from the brake lever.



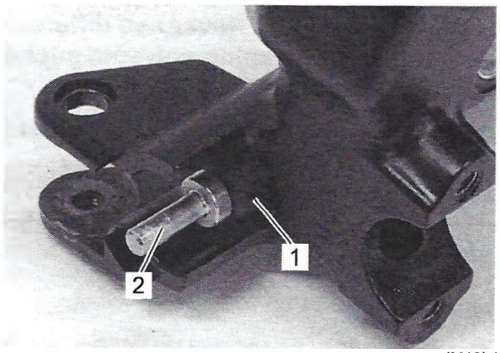
IM10L1530013-01

5) Remove the reservoir cap screws, reservoir cap (1), plate (2) and diaphragm (3) from the master cylinder.



IM10L1530014-01

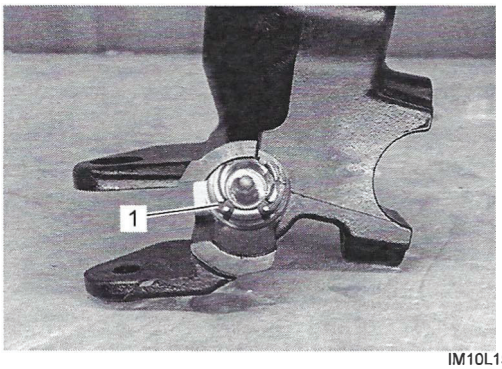
6) Remove the dust boot (1) and push rod (2) from the master cylinder.



IM10L1530015-02

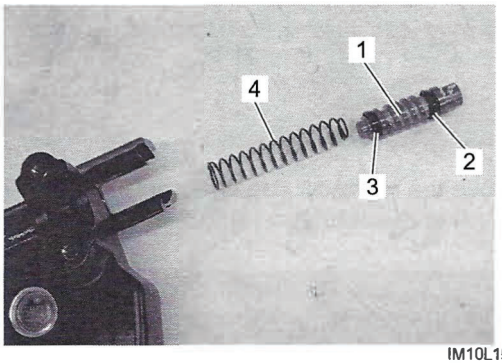
7) Remove the snap ring (1) from the master cylinder with the special tool.

Special tool
09900–06108



IM10L1530016-02

8) Remove the following parts from the master cylinder.
- Piston (1)
- Primary cup (2)
- Secondary cup (3)
- Spring (4)



IM10L1530017-01

Reassembly
Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

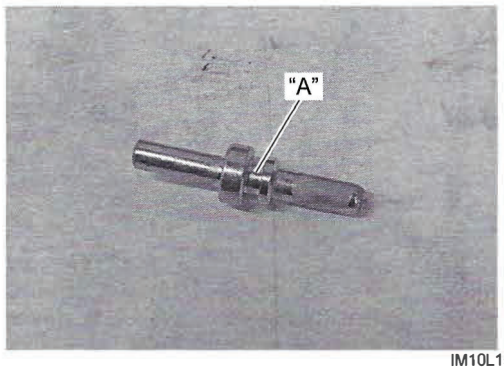
NOTICE

- **Wash the master cylinder components with new brake fluid before reassembly.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.**
- **Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.**

Brake fluid (DOT 4)

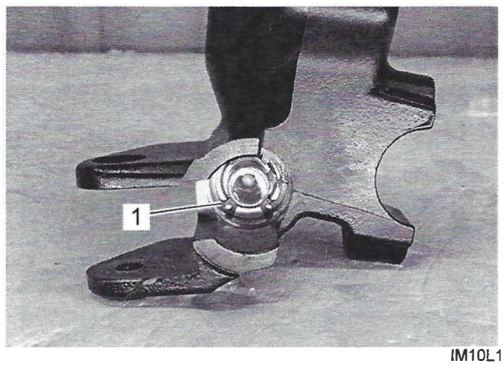
- Apply grease to the push rod.

"A": Grease 99000–25100 (SUZUKI SILICONE GREASE)



IM10L1530018-01

- Install the new snap ring (1) to the master cylinder with the special tool.

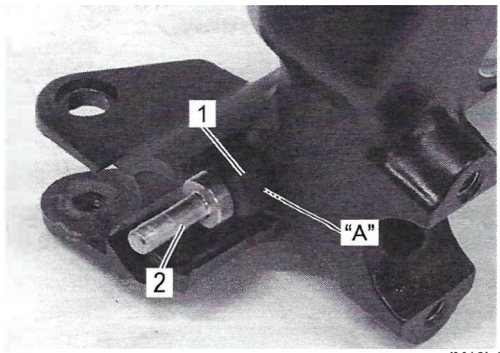


IM10L1530016-02

Special tool
09900–06108

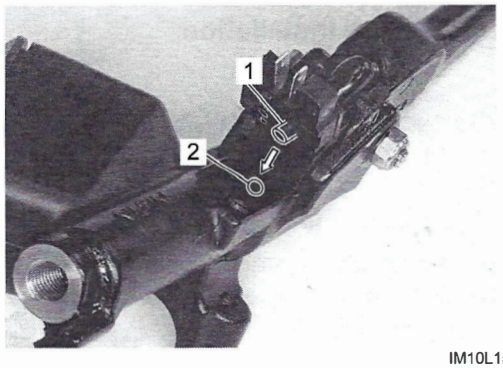
- Install the dust boot (1) to the push rod (2).
- Apply grease to the push rod end.

"A": Grease 99000–25100 (SUZUKI SILICONE GREASE)



IM10L1530019-02

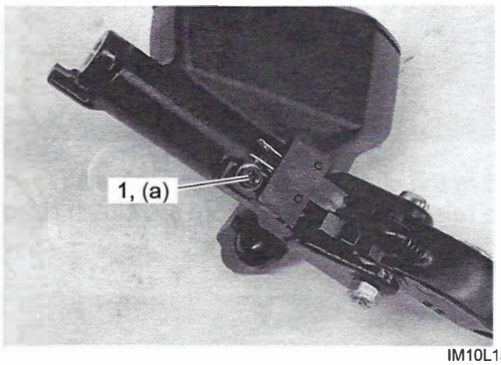
- When installing the clutch lever position switch, align the projection (1) on the switch with the hole (2) in the master cylinder.



IM10L1530020-01

- Tighten the clutch lever position switch screw (1) to the specified torque.

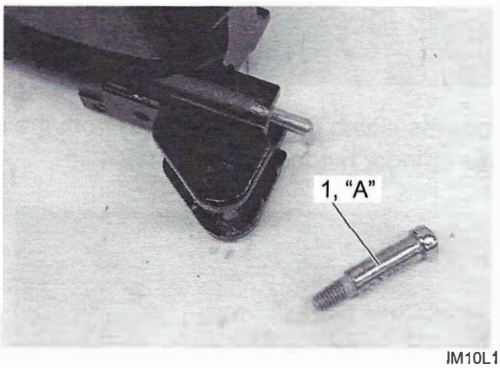
Tightening torque
Clutch lever position switch screw (a): 1.2 N·m (0.12 kgf-m, 0.90 lbf-ft)



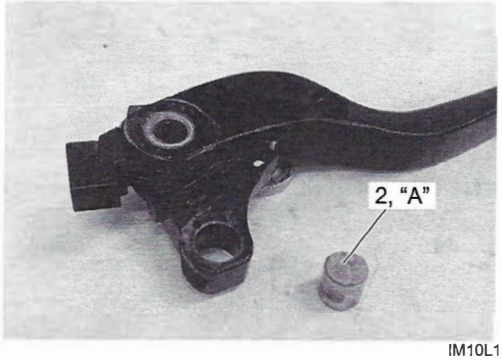
IM10L1530021-01

- Apply grease to the clutch lever pivot bolt (1).
- Apply grease to the bushing (2).

"A": Grease 99000–25100 (SUZUKI SILICONE GREASE)



IM10L1530023-01

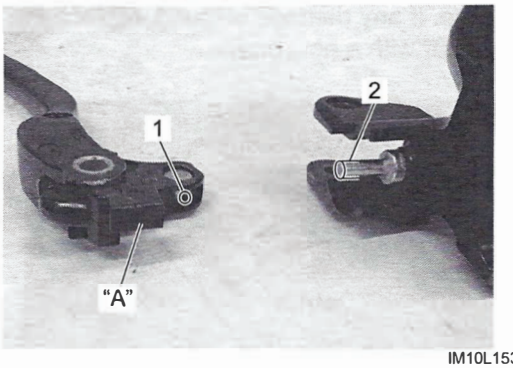


IM10L1530022-01

- Apply grease to the clutch lever.

"A": Grease 99000–25011 (SUZUKI SUPER GREASE A)

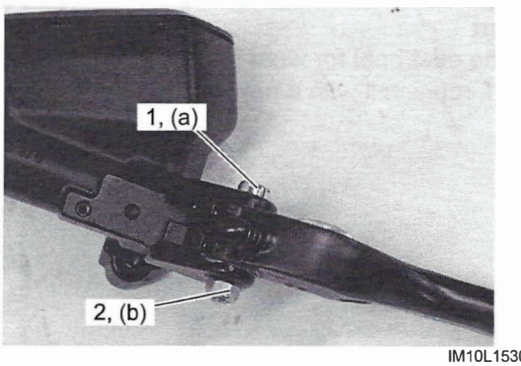
- When installing the clutch lever to the master cylinder, align the hole (1) of bushing with the push rod end (2).



IM10L1530024-02

- Tighten the pivot bolt (1) and new lock-nut (2) to the specified torque.

Tightening torque
Clutch lever pivot bolt (a): 1.0 N·m (0.10 kgf-m, 0.75 lbf-ft)
Clutch lever pivot bolt lock-nut (b): 5.9 N·m (0.60 kgf-m, 4.35 lbf-ft)



IM10L1530025-01

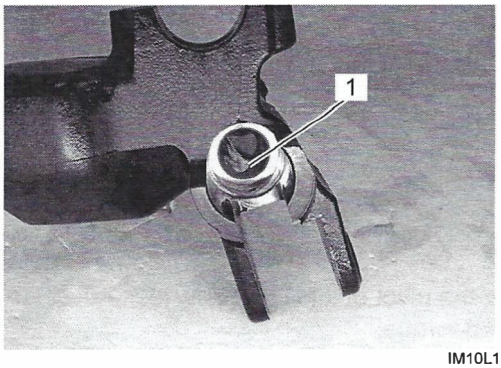
Clutch Master Cylinder Parts Inspection

BENM10L35306010

Refer to "Clutch Master Cylinder / Clutch Lever Disassembly and Reassembly" (Page 5C-10).

Master Cylinder

Inspect the master cylinder bore (1) for any scratches or other damage. If any damage is found, replace the master cylinder with a new one.



IM10L1530026-01

Piston

Inspect the piston surface for any scratches or other damage. If any damage is found, replace it with a new one.

Dust Boot

Inspect the dust boot for wear or damage. If any defects are found, replace it with a new one.



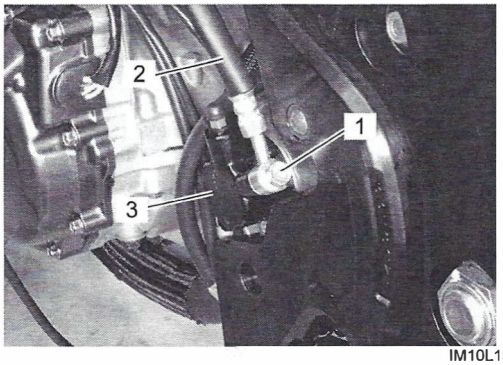
IK07L1410018-02

Clutch Release Cylinder / Clutch Push Rod (Left) Removal and Installation

BENM10L35306011

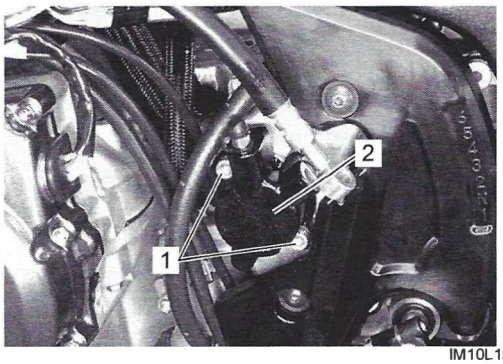
Removal

1) Remove the side cowling assembly (LH). ☞(Page 9D-37)
2) Drain clutch fluid. ☞(Page 5C-7)
3) Remove the clutch hose union bolt (1) and disconnect the clutch hose (2) from the clutch release cylinder (3).



IM10L1530027-01

4) Remove the clutch release cylinder bolts (1) and clutch release cylinder (2) from the clutch release cylinder holder.



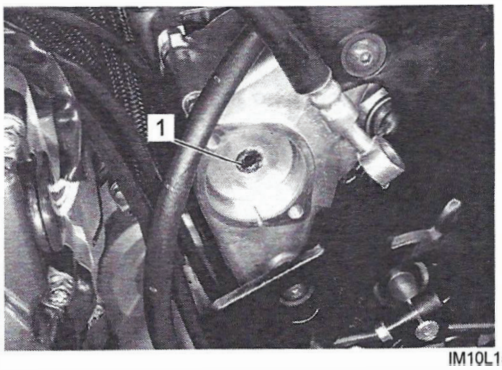
IM10L1530028-01

5) Remove the clutch push rod (left) (1) from the clutch release cylinder holder.



IM10L1530029-01

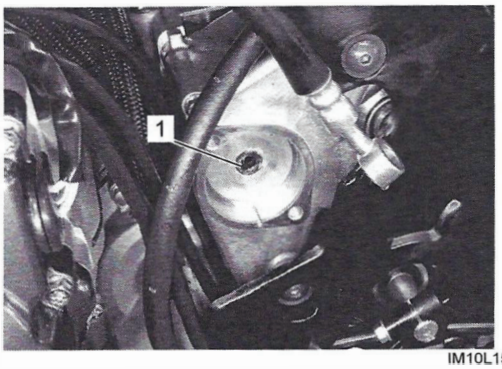
6) Remove the clutch push rod oil seal (1).



IM10L1530030-01

Installation
Install the clutch release cylinder/clutch push rod (left) in the reverse order of removal. Pay attention to the following points:

- Install the new clutch push rod oil seal (1).



IM10L1530030-01

- Apply a small quantity of grease to the clutch push rod end.

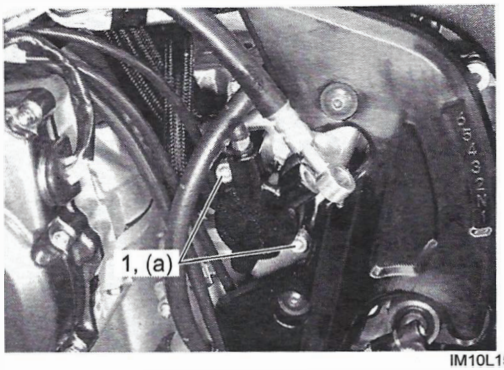
  "A": Grease 99000–25011 (SUZUKI SUPER GREASE A)



IM10L1530032-01

- Tighten the clutch release cylinder mounting bolts (1) to the specified torque.

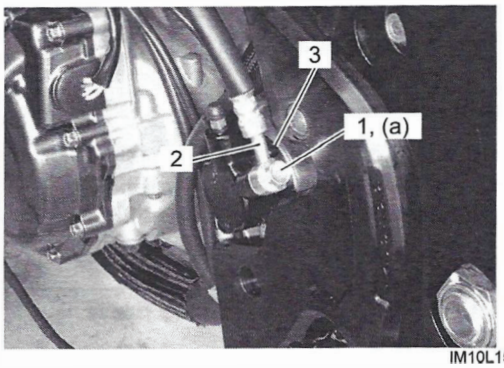
  Tightening torque
  Clutch release cylinder mounting bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1530033-01

- Install the clutch hose union bolt (1) and new washers to clutch hose.
- After the clutch hose union (2) has contacted the stopper (3) of clutch release cylinder, tighten the union bolt to the specified torque.

  Tightening torque
  Clutch hose union bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1530034-01

- Bleed air from the clutch system. ☞(Page 5C-6)

Clutch Push Rod (Left) Inspection

BENM10L35306012

Refer to "Clutch Release Cylinder / Clutch Push Rod (Left) Removal and Installation" (Page 5C-13).
Inspect the clutch push rod (left) for wear or bend. If any defects are found, replace it with a new one.



IE31J1530032-01

Clutch Release Cylinder Disassembly and Reassembly

BENM10L35306013

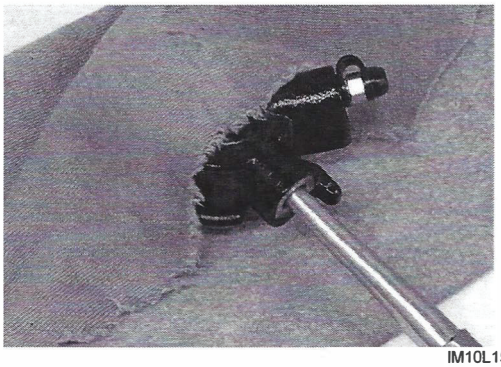
Refer to "Clutch Release Cylinder / Clutch Push Rod (Left) Removal and Installation" (Page 5C-13).

Disassembly

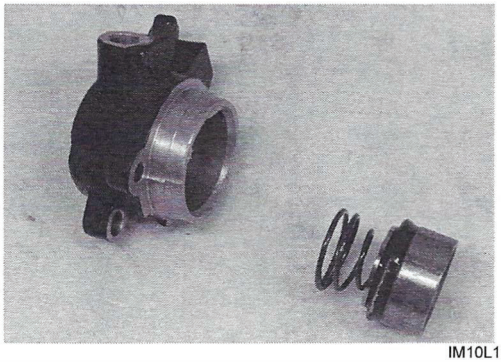
1) Place a rag over the piston to prevent popping out and then force out the piston applying compressed air gradually from the hole for the clutch hose.

NOTICE

Do not use high pressure air to prevent piston damage.



IM10L1530035-01



IM10L1530036-01

Reassembly

Assemble the clutch release cylinder in the reverse order of disassembly. Pay attention to the following points:

- Wash the cylinder bore and piston with specified brake fluid.

Brake fluid (DOT 4)

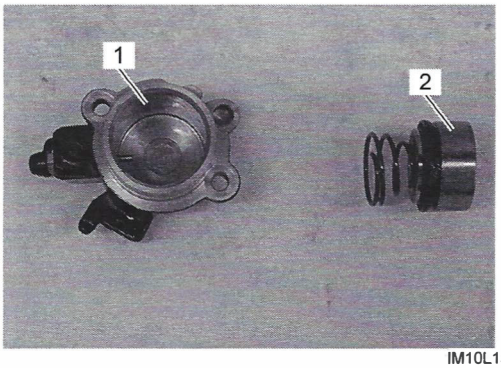
NOTICE

- **Wash the clutch release cylinder components with new brake fluid before reassembly.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.**
- **Apply brake fluid to the clutch release cylinder bore and all of the clutch release cylinder component to be inserted into the bore.**

Clutch Release Cylinder Inspection

BENM10L35306014

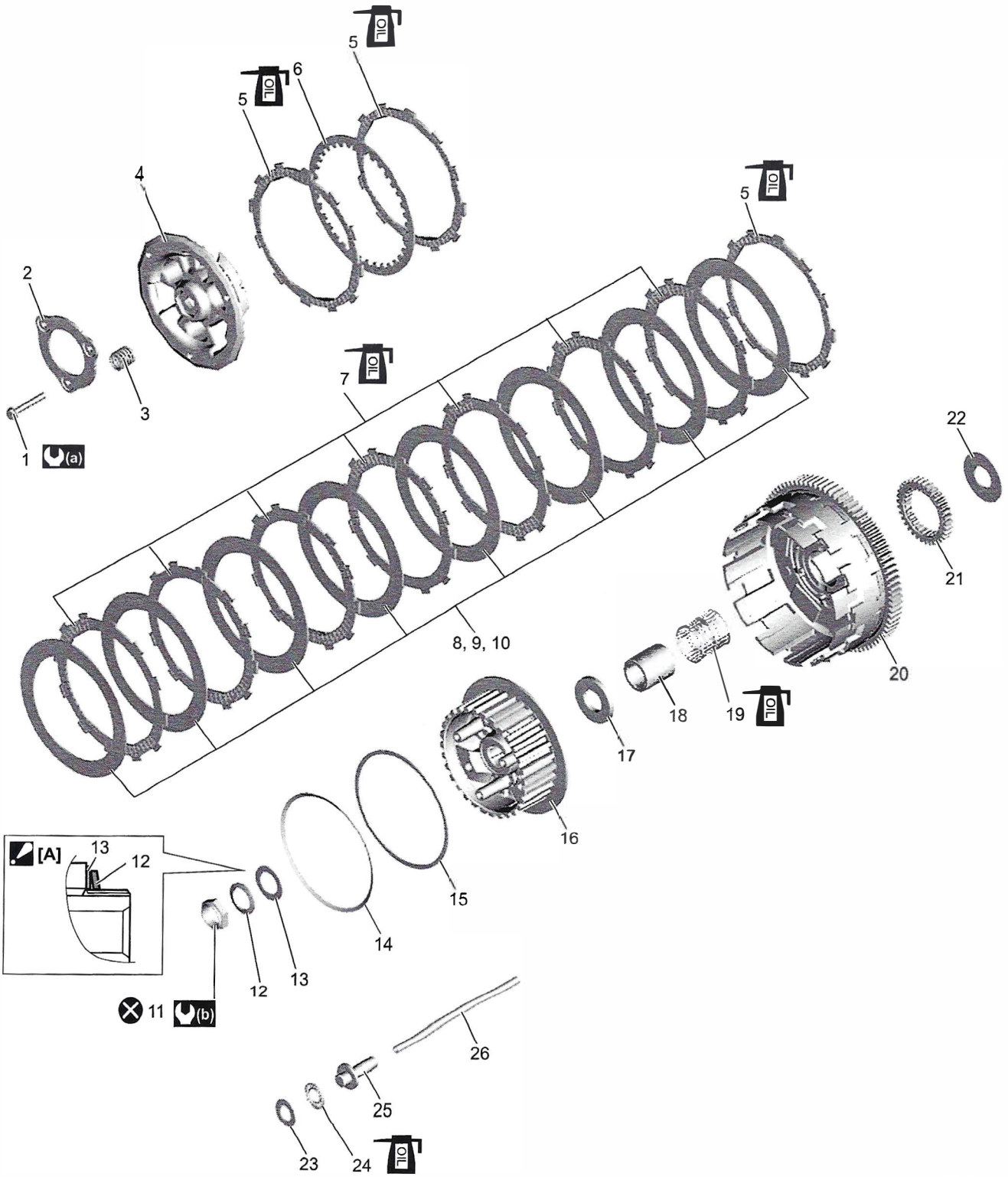
Refer to "Clutch Release Cylinder Disassembly and Reassembly" (Page 5C-15).
Inspect the clutch release cylinder bore wall (1) for nicks, scratches or other damage. If any damage is found, replace it with a new one.
Inspect the piston surface (2) for any scratches or other damage. If any damage is found, replace it with a new one.



IM10L1530037-01

Clutch Components

BENM10L35306015



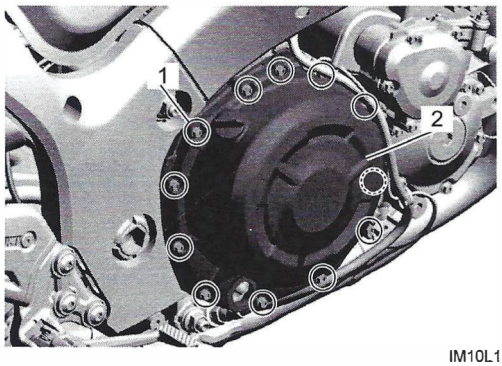
IM10L1530068-03

[A]: The conical curve side of spring washer faces outside.	11. Clutch sleeve hub nut	22. Thrust washer
1. Clutch spring set bolt	12. Spring washer	23. Thrust washer
2. Clutch spring plate	13. Washer	24. Clutch release bearing
3. Clutch spring	14. Wave washer	25. Clutch push piece
4. Clutch pressure plate	15. Washer seat	26. Push rod (right)
5. Drive plate No. 2	16. Clutch sleeve hub assembly	(a) : 150 N·m (15.3 kgf-m,111.0 lbf-ft)
6. Driven plate No. 2	17. Thrust washer	(b) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
7. Drive plate No. 1	18. Spacer	: Apply engine oil.
8. Driven plate No. 1 (7 – 5 pcs.)	19. Bearing	: Do not reuse.
9. Driven plate No. 3 (0 – 2 pcs.)	20. Primary driven gear assembly	
10. Driven plate No. 4 (0 – 2 pcs.)	21. Oil pump drive gear	

Clutch Removal

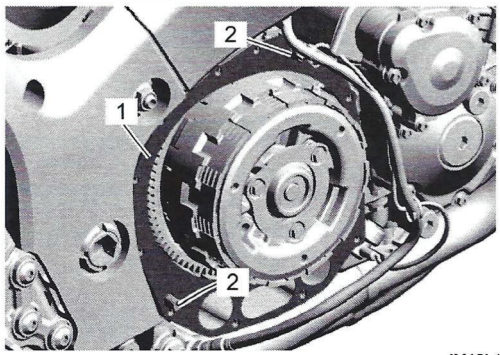
BENM10L35306016

1) Drain engine oil. ☞(Page 0B-11)
2) Remove the side cowling assembly (LH). ☞(Page 9D-37)
3) Remove the clutch cover bolts (1), lead wire guide and clutch cover (2) from the crankcase.



IM10L1530038-01

4) Remove the gasket (1) and dowel pins (2) from the crankcase.

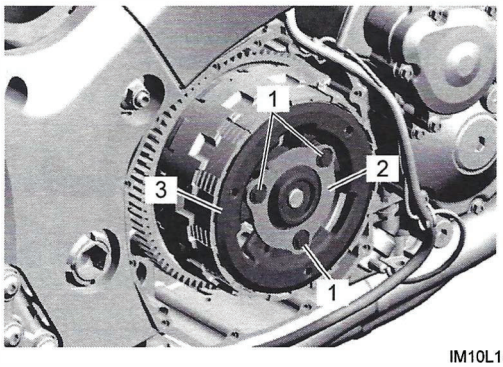


IM10L1530039-02

5) Remove the clutch spring set bolts (1), clutch spring plate (2), clutch springs and clutch pressure plate (3).

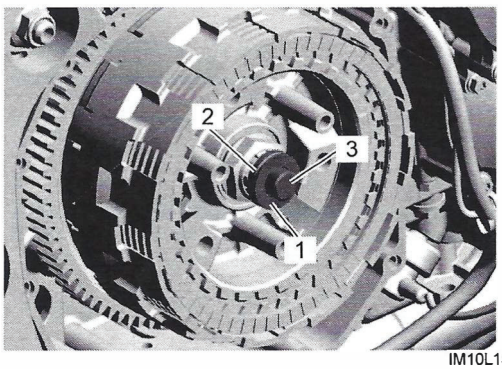
NOTE

Loosen the clutch spring set bolts evenly little by little.



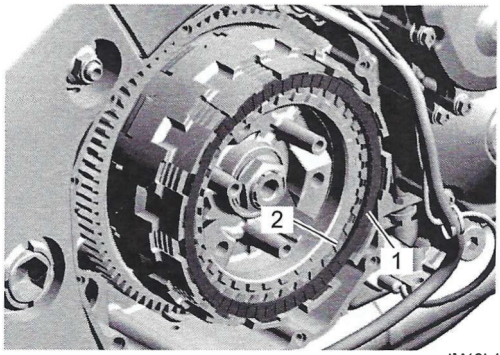
IM10L1530040-01

6) Remove the thrust washer (1), bearing (2) and clutch push piece (3).



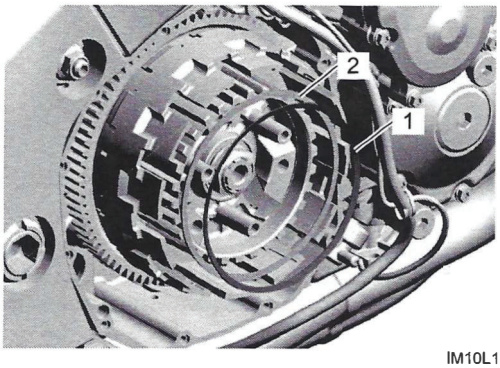
IM10L1530041-01

7) Remove the clutch drive plates (1) and driven plates (2) from the clutch sleeve hub.



IM10L1530042-01

8) Remove the wave washer (1) and wave washer seat (2).

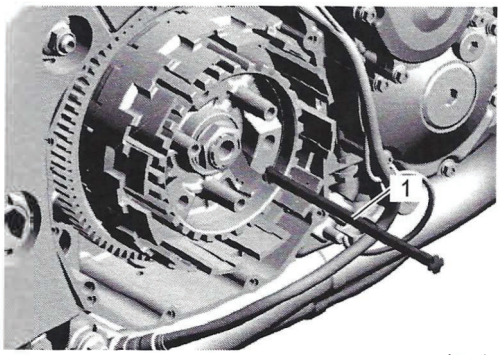


IM10L1530043-01

9) Remove the clutch push rod (right) (1).

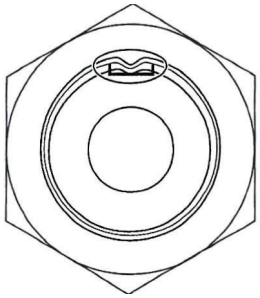
NOTE

If it is difficult to pull out the push rod (right) (1), use a magnetic hand or wire.



IM10L1530044-02

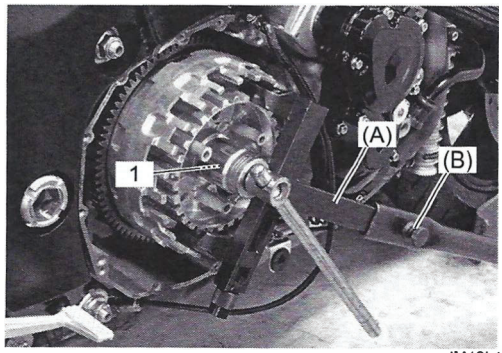
10) Unlock the clutch sleeve hub nut.



IM10L1530045-04

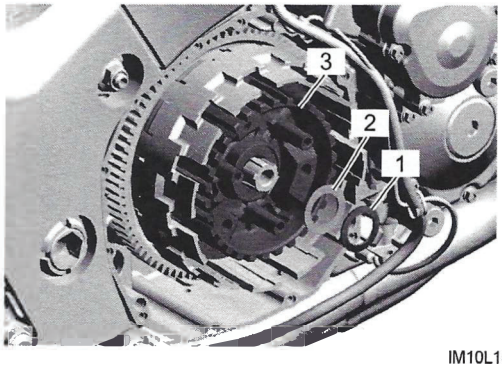
11) Hold the clutch sleeve hub with the special tools and remove the clutch sleeve hub nut (1).

Special tool
(A): 09920–53740
(B): 09920–31021



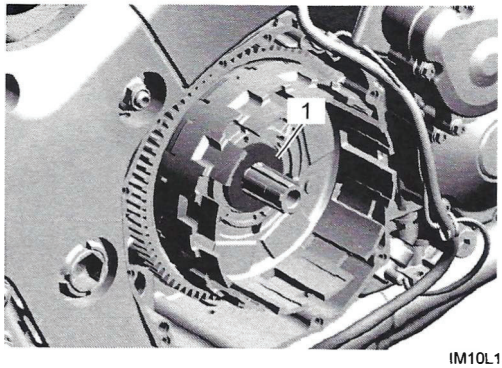
IM10L1530046-01

12) Remove the spring washer (1), washer (2) and clutch sleeve hub assembly (3).



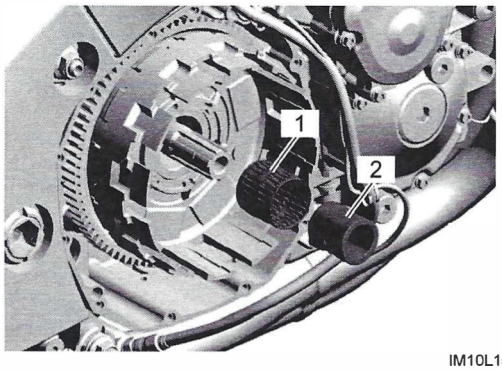
IM10L1530047-01

13) Remove the thrust washer (1).



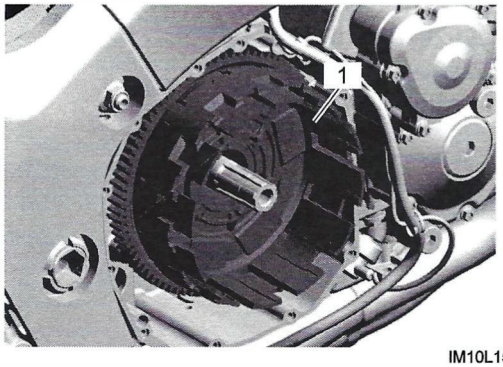
IM10L1530048-02

14) Remove the bearing (1) and spacer (2).



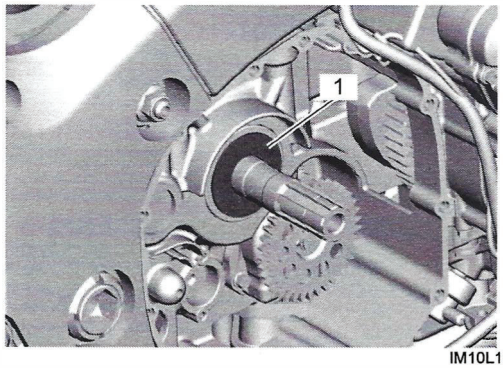
IM10L1530049-01

15) Remove the primary driven gear assembly (1).



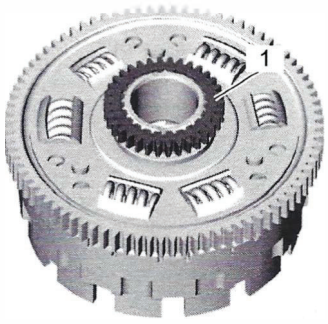
IM10L1530050-01

16) Remove the thrust washer (1).



IM10L1530051-01

17) Remove the oil pump drive gear (1) from the primary drive gear assembly.



IM10L1530052-02

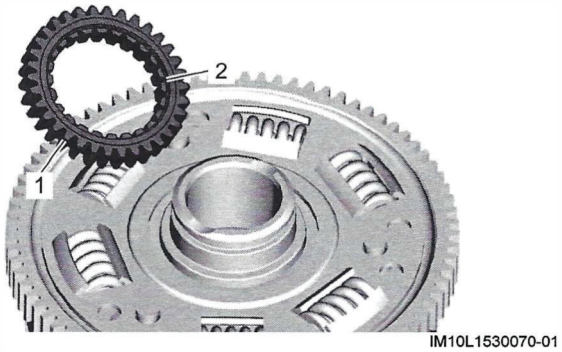
Clutch Installation

BENM10L35306017

1) Install the oil pump drive gear (1) to the primary driven gear assembly.

NOTE

The off-set side (2) of the oil pump drive gear faces the primary driven gear side.

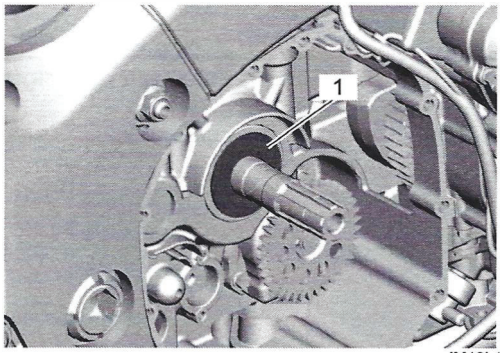


IM10L1530070-01

2) Install the thrust washer (1).

NOTE

The chamfer side of thrust washer faces the crankcase side.



IM10L1530053-01

3) Install the primary driven gear assembly (1).

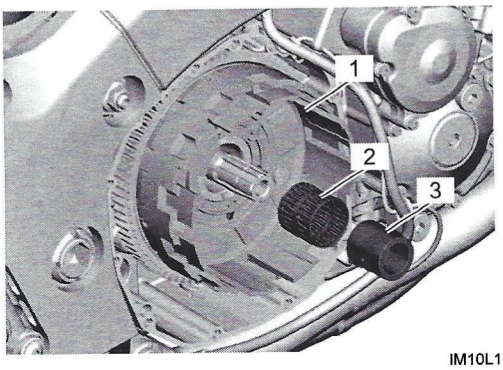
NOTICE

Be sure to engage the oil pump drive gear with driven gear, and primary driven gear with drive gear.

NOTE

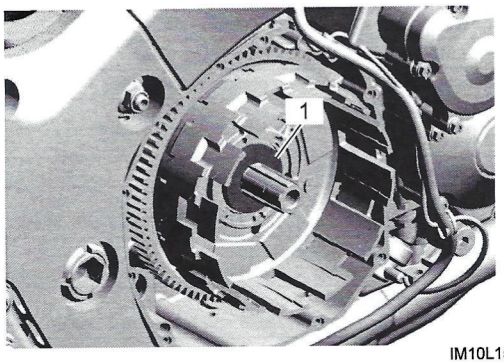
If it is difficult to install the primary driven gear, rotate the crankshaft.

4) Apply engine oil to the bearing (2) and install it.
5) Install the spacer (3).



IM10L1530054-01

6) Install the thrust washer (1).

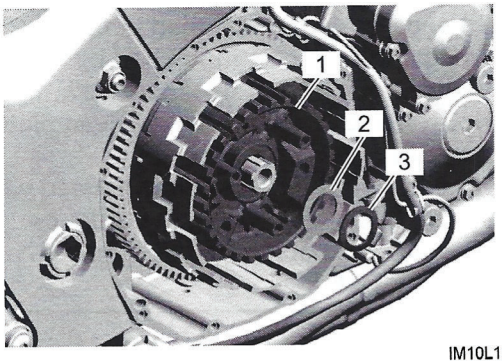


IM10L1530048-02

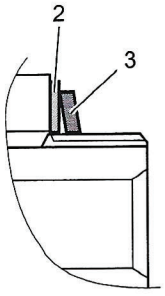
7) Install the clutch sleeve hub assembly (1), washer (2) and spring washer (3).

NOTE

The conical curve side of spring washer (3) faces outside.



IM10L1530055-01

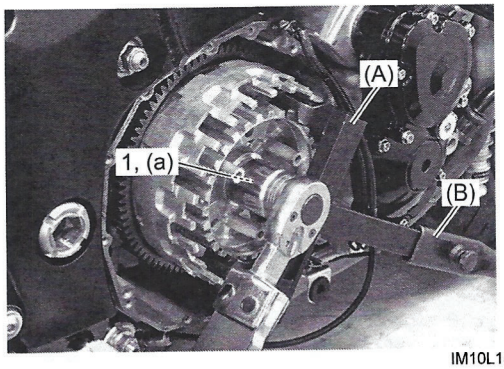


IJ04K1532024-01

8) Hold the clutch sleeve hub with the special tools and tighten the new clutch sleeve hub nut (1) to the specified torque.

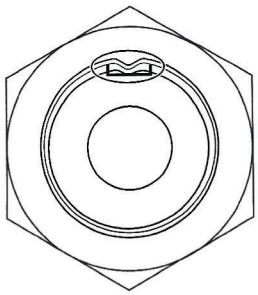
Special tool
(A): 09920–53740
(B): 09920–31020

Tightening torque
Clutch sleeve hub nut (a): 150 N·m (15.3 kgf-m, 111.0 lbf-ft)



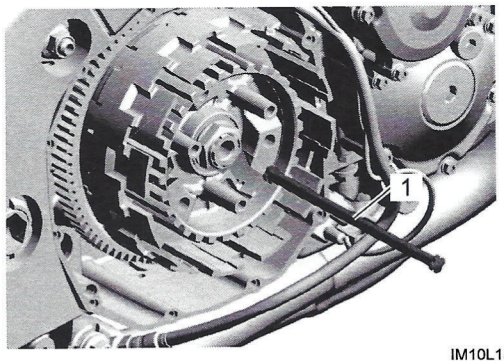
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9) Lock the clutch sleeve hub nut with a center punch.



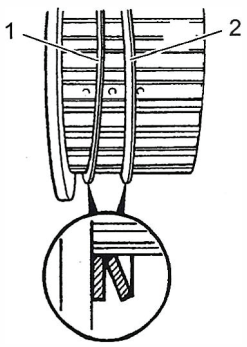
IM10L1530045-04

10) Install the clutch push rod (right) (1) into the countershaft.



IM10L1530044-02

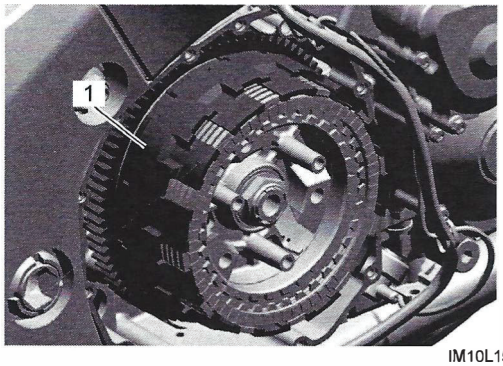
11) Install the wave washer seat (1) and wave washer (2) onto the clutch sleeve hub.



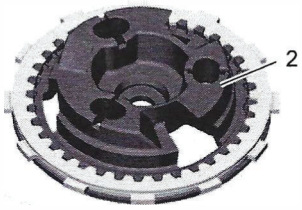
IF04K1530056-01

12) Apply engine oil to the both side of clutch drive plates.

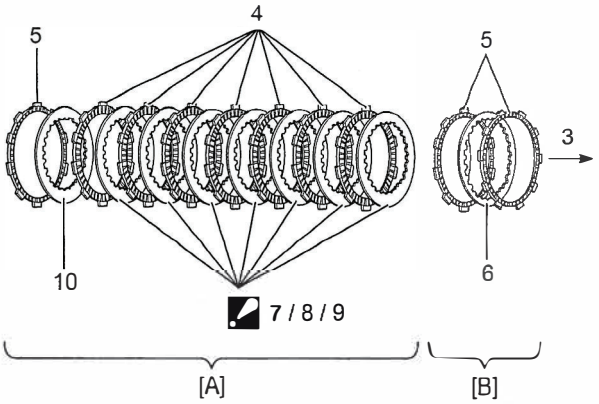
13) Insert the clutch drive plates and driven plates one into the clutch sleeve hub (1) and clutch pressure plate (2) in the prescribed order.



IM10L1530057-01



IM10L1530058-01



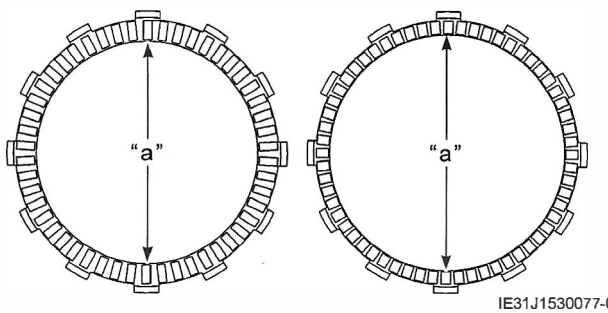
IM10L1530059-01

[A]:	Insert the plates to the clutch sleeve hub.
[B]:	Insert the plates to the clutch pressure plate.
3.	Direction of outside (Clutch pressure plate side)
4.	Drive plate No. 1
5.	Drive plate No. 2
6.	Driven plate No. 2
7.	Driven plate No. 1 (7 – 5 pcs.) : The driven plates No. 1, No. 3 and No. 4 are 7 pcs. in total.
8.	Driven plate No. 3 (0 – 2 pcs.) : The driven plates No. 1, No. 3 and No. 4 are 7 pcs. in total.
9.	Driven plate No. 4 (0 – 2 pcs.) : The driven plates No. 1, No. 3 and No. 4 are 7 pcs. in total.
10.	Driven plate No. 3

NOTE

For drive plate
Two kinds of the drive plate (No. 1 and No. 2) are equipped in the clutch system, they can be distinguished by the inside diameter "a".
For driven plate
Four kinds of the driven plate (No. 1, No. 2,No. 3 and No. 4) are equipped in the clutch system, they can be distinguished by the inside diameter "b" and thickness "c".
The No. 1, No. 2, No. 3 and No. 4 driven plates are 9 pcs. in total.
5 – 7 pcs. of No. 1 driven plates are used with 1 pc. of No. 2, 2 – 0 pc(-s). of No. 3 driven plate(-s) and 2 – 0 pc(-s). of No. 4 driven plate(-s) as a set.

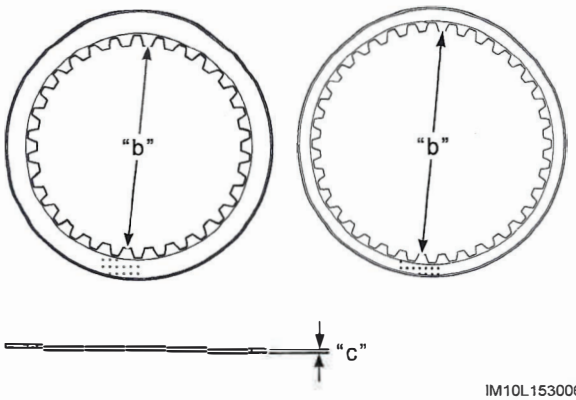
Drive plate



IE31J1530077-01

Drive plate	I.D. "a"
No. 1	126 mm (5.0 in)
No. 2	135 mm (5.3 in)

Driven plate

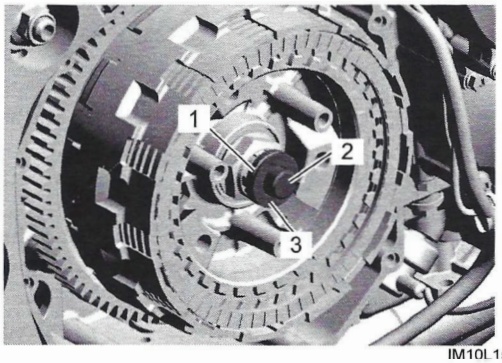


IM10L1530060-01

Drive plate	I.D. "a"	Thickness "b"
No. 1	115.5 mm (4.55 in)	2.0 mm (0.08 in)
No. 2	126.0 mm (4.96 in)	2.0 mm (0.08 in)
No. 3	115.5 mm (4.55 in)	2.0 mm (0.08 in)
No. 4	115.5 mm (4.55 in)	2.3 mm (0.09 in)

14) Apply engine oil to clutch release bearing (1).

15) Install the clutch push piece (2), clutch release bearing (1) and thrust washer (3).

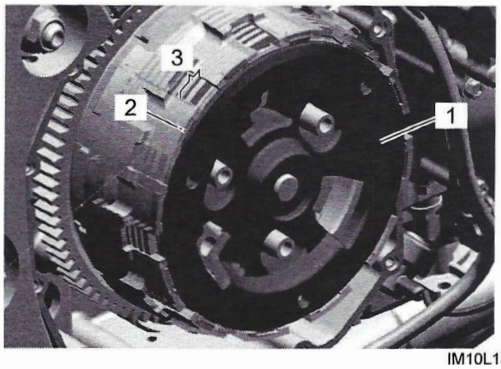


IM10L1530061-01

16) Install the clutch pressure plate (1) with the plates.

NOTE

Insert the outermost drive plate (No. 2) claws (2) to the other slits (3) of clutch housing as shown.



IM10L1530062-01

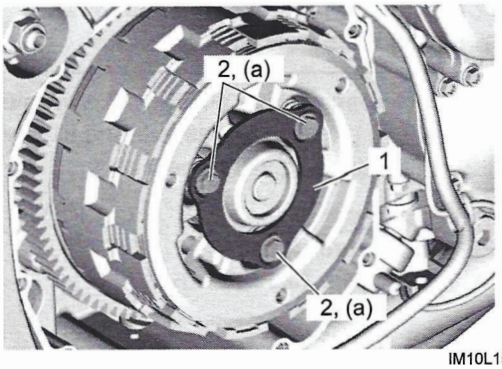
17) Install the clutch springs, stopper plate (1) and clutch spring set bolts (2).

18) Tighten the clutch spring set bolts to the specified torque.

NOTE

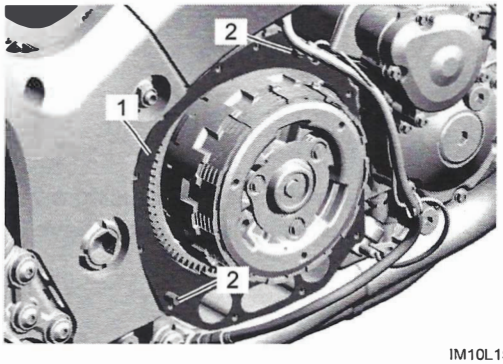
Tighten the clutch spring set bolts evenly little by little.

Tightening torque
Clutch spring set bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1530063-01

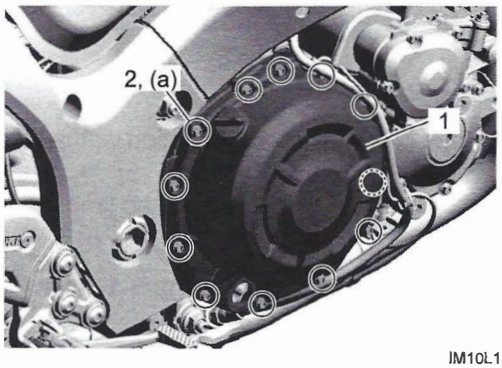
19) Install the new gasket (1) and dowel pins (2).



IM10L1530039-02

20) Install the clutch cover (1) and lead wire guide, and then tighten the clutch cover bolts (2) to the specified torque.

Tightening torque
Clutch cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1530064-01

21) Install the removed parts.

22) Pour engine oil. ☞(Page 0B-11)

Clutch Parts Inspection

BENM10L35306018

Refer to "Clutch Removal" (Page 5C-17) and "Clutch Installation" (Page 5C-19).

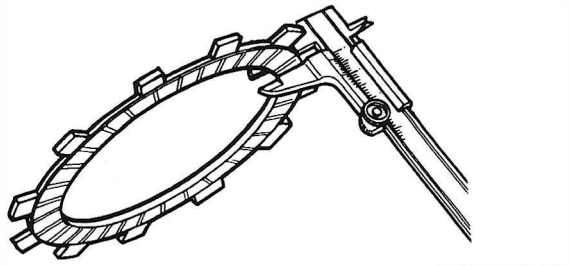
Clutch Drive and Driven Plate

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.

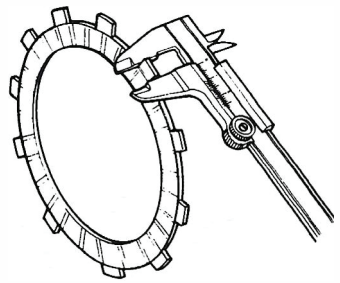
Drive plate thickness
[Limit (No. 1)]: 2.4 mm (0.0944in)
[Limit (No. 2)]: 3.4 mm (0.1339 in)



IK46K1530041-01

Measure the claw width of drive plates using a vernier calipers. Replace the drive plates found to have worn down to the limit.

Drive plate claw width
[Limit (No. 1)]: 11.35 mm (0.4469 in)
[Limit (No. 2)]: 13.40 mm (0.5276 in)

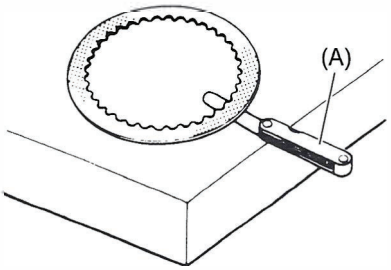


IK46K1530042-01

Measure each driven plate for distortion with a thickness gauge and surface plate.
Replace driven plates which exceed the limit.

Driven plate distortion
[Limit (No.1, No.2, No.3 and No.4)]: 0.10 mm (0.004 in)

Special tool
(A): 09900–20803

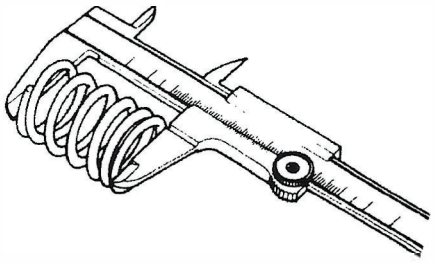


IF04K1530066-01

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.

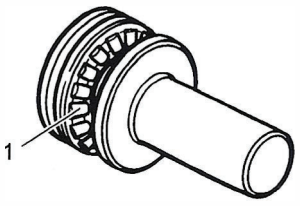
Clutch spring free length
[Limit]: 44.2 mm (1.74 in)



IK46K1530043-01

Clutch Release Bearing

Inspect the clutch release bearing (1) 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.



IF04K1530068-01

Push Rod (Right)

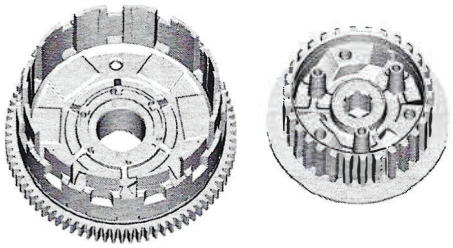
Inspect the push rod for wear and damage.
If any defects are found, replace the push rod with a new one.



IJ04K1532038-01

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.



IM10L1530065-01

Specifications

Tightening Torque Specifications

BENM10L35307001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Clutch air bleeder valve	5.4	0.55	4.00	☞(Page 5C-7)
Reservoir cap screw	1.5	0.15	1.10	☞(Page 5C-7)
Clutch master cylinder mounting bolt	10	1.0	7.5	☞(Page 5C-9)
Clutch hose union bolt	23	2.3	17.0	☞(Page 5C-10) / ☞(Page 5C-14)
Clutch lever position switch screw	1.2	0.12	0.90	☞(Page 5C-12)
Clutch lever pivot bolt	1.0	0.10	0.75	☞(Page 5C-12)
Clutch lever pivot bolt lock-nut	5.9	0.60	4.35	☞(Page 5C-12)
Clutch release cylinder mounting bolt	10	1.0	7.5	☞(Page 5C-14)
Clutch sleeve hub nut	150	15.3	111.0	☞(Page 5C-20)
Clutch spring set bolt	10	1.0	7.5	☞(Page 5C-22)
Clutch cover bolt	10	1.0	7.5	☞(Page 5C-22)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

"Clutch Hose Routing Diagram" (Page 5C-3)

"Clutch Control System Components" (Page 5C-8)

"Clutch Components" (Page 5C-16)

"Fasteners Information" in Section 0C (Page 0C-6)

Special Tools and Equipment

Recommended Service Material

BENM10L35308001

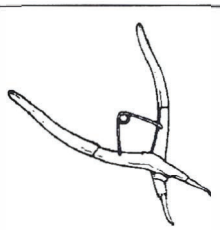
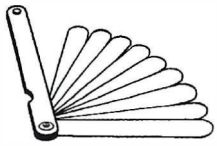
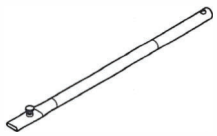
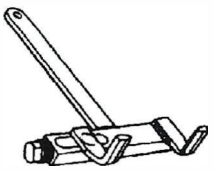
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 5C-6) / ☞(Page 5C-11) / ☞(Page 5C-15)
Grease	SUZUKI SUPER GREASE A	P/No.: 99000–25011	☞(Page 5C-12) / ☞(Page 5C-14)
	SUZUKI SILICONE GREASE	P/No.: 99000–25100	☞(Page 5C-11) / ☞(Page 5C-11) / ☞(Page 5C-12)

NOTE

Required service material(s) is also described in:
"Clutch Control System Components" (Page 5C-8)
"Clutch Components" (Page 5C-16)

Special Tool

BENM10L35308002

09900–06108 Snap ring pliers (Internal) ☞(Page 5C-11) / ☞(Page 5C-11) 	09900–20803 Thickness gauge ☞(Page 5C-23) 
09920–31020 Extension handle ☞(Page 5C-20) 	09920–31021 Extension handle ☞(Page 5C-18) 
09920–53740 Clutch sleeve hub holder ☞(Page 5C-18) / ☞(Page 5C-20) 	

Section 6

Steering

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Precautions

Precautions

Precautions for Steering

BENM10L36000001

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

Steering General Diagnosis

Diagnostic Information and Procedures

Steering Symptom Diagnosis

BENM10L36104001

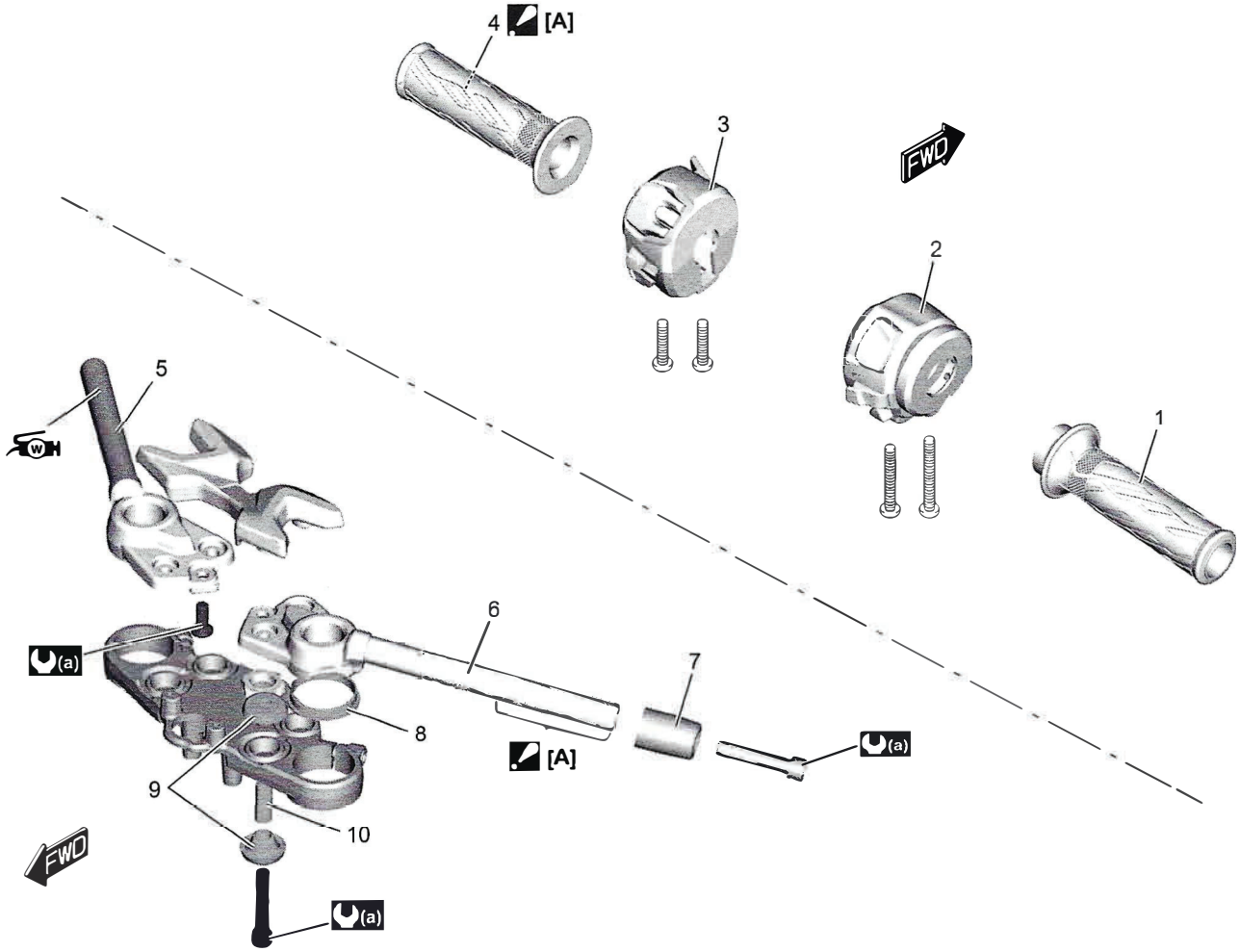
Condition	Possible cause	Correction / Reference Item
Heavy steering	Over tightened steering stem adjust-nut.	*Adjust. ☞(Page 0B-26)*
	Broken bearing in steering stem.	*Replace. ☞(Page 6B-16)*
	Distorted steering stem.	*Replace. ☞(Page 6B-13)*
	Not enough pressure in tires.	*Adjust. ☞(Page 0B-26)*
	Defective steering damper.	*Replace. ☞(Page 6B-11)*
Wobbly handlebar	Loss of balance between right and left front forks.	*Replace fork, adjust fork oil level or replace fork spring.* • *Replace fork: ☞(Page 2B-2)* • *Adjust fork oil level or replace fork spring: ☞(Page 2B-5)*
	Distorted front fork.	*Repair or replace. ☞(Page 2B-5)*
	Distorted front axle or crooked tire.	*Replace.* • *Front axle: ☞(Page 2D-3)* • *Front tire: ☞(Page 2D-13)*
	Loose steering stem adjust-nut.	*Adjust. ☞(Page 0B-26)*
	Worn or incorrect tire.	*Replace. ☞(Page 2D-13)*
	Incorrect tire pressure.	*Adjust. ☞(Page 0B-26)*
	Worn bearing/race in steering stem.	*Replace. ☞(Page 6B-16)*

Steering / Handlebar

Repair Instructions

Handlebar Components

BENM10L36206001

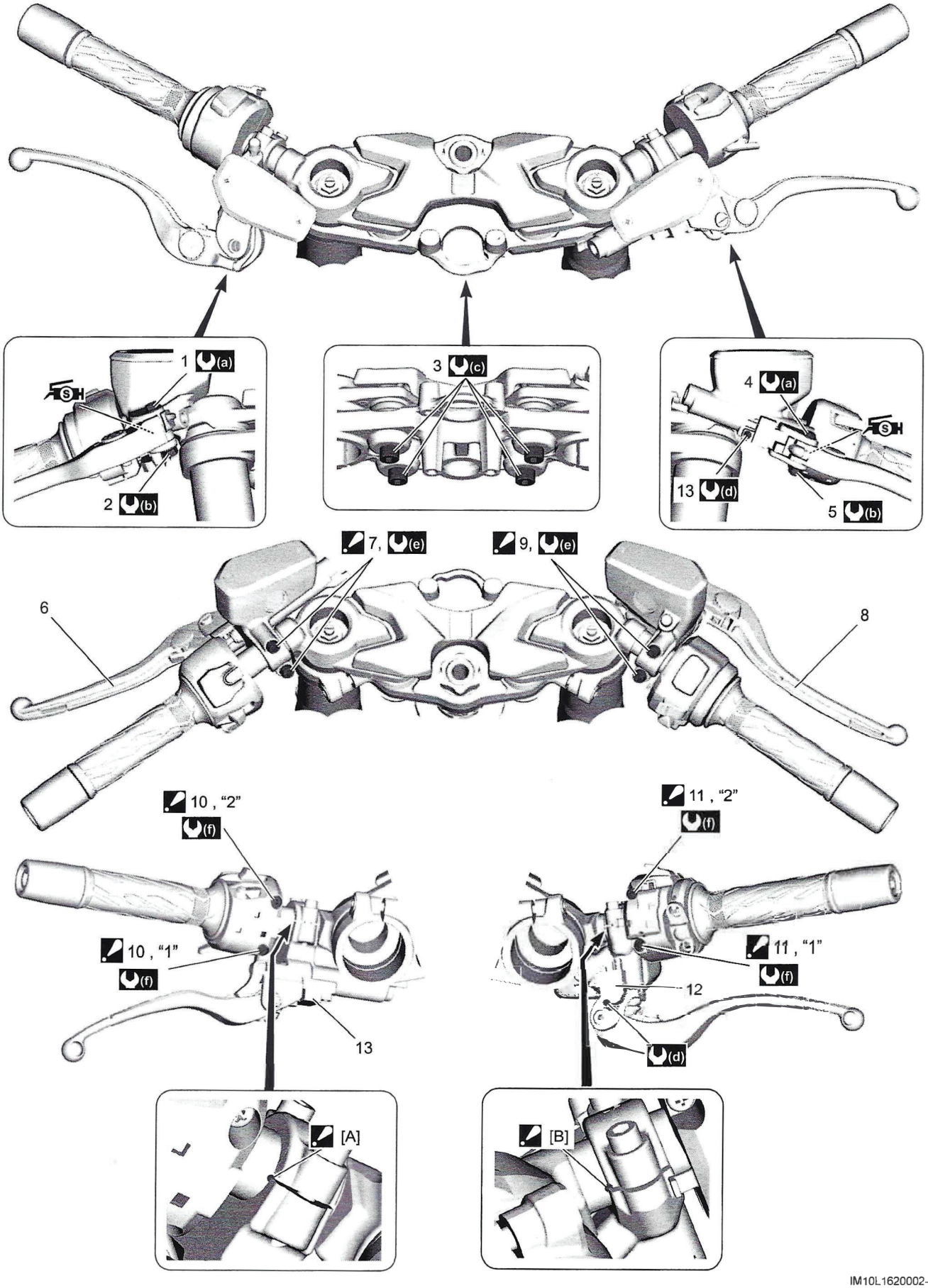


IM10L1620001-03

[A]: Apply handle grip glue.	5. Right handlebar	10. Upper bracket spacer
1. Throttle grip	6. Left handlebar	(a) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
2. Right handle switch	7. Handlebar balancer	W : Apply water resistant grease EP2.
3. Left handle switch	8. Handlebar holder cushion	
4. Left handlebar grip	9. Upper bracket cushion	

Handlebar Construction

BENM10L36206002



IM10L1620002-04

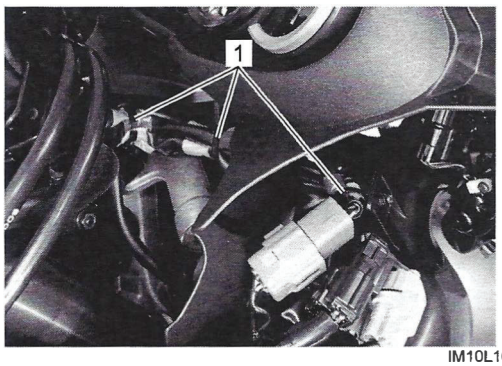
[A]: Align the punch mark of handlebar with the edge of clutch lever holder.	7. Clutch master cylinder bolt	(b) : 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)
[B]: Align the punch mark of handlebar with the edge of front brake master cylinder.	8. Front brake lever	(c) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
1. Blake lever pivot bolt	9. Front master cylinder bolt	(d) : 1.2 N·m (0.12 kgf-m, 0.90 lbf-ft)
2. Blake lever pivot nut	10. Left handle switch screw Tighten the Left handle switch screws in order of "1" → "2".	(e) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
3. Handlebar holder bolt	11. Right handle switch screw Tighten the Right handle switch crews in order of "1" → "2".	(f) : 3.0 N·m (0.31 kgf-m, 2.25 lbf-ft)
4. Clutch lever pivot bolt	12. Front brake light switch	(w) : Apply grease.
5. Clutch lever pivot nut	13. Clutch switch	(s) : Apply silicone grease.
6. Clutch lever	(a) : 1.0 N·m (0.10 kgf-m, 0.75 lbf-ft)	

Handlebar Removal and Installation

BENM10L36206003

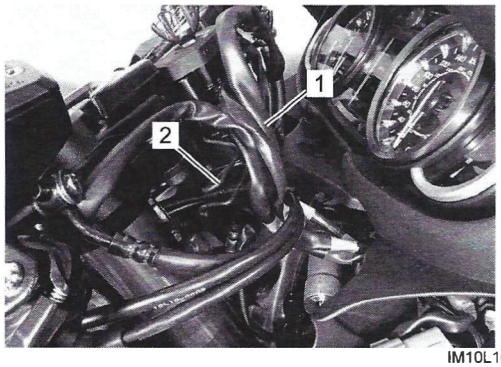
Removal

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Release the clamps (1).



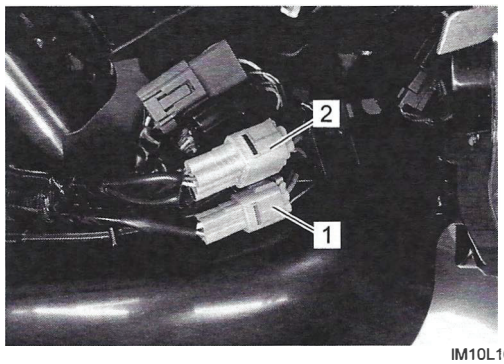
IM10L1620003-02

3) Release the ignition switch lead wires, immobilizer antenna lead wires, and handle switch lead wires (1) from guide (2).



IM10L1620004-02

4) Disconnect the ignition switch lead wire coupler (1) and immobilizer antenna lead wire coupler (2). (If equipped)

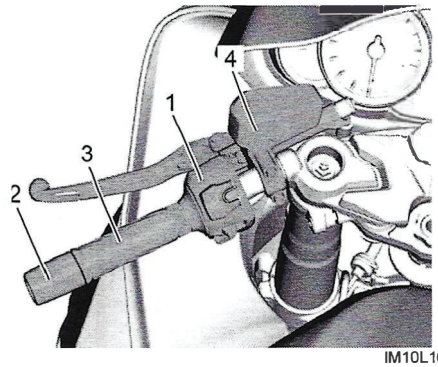


IM10L1620005-02

5) Remove the following parts from the left side of the handlebar.
   - Left handle switch (1) ☞(Page 6B-9)
   - Handlebar balancer (2)
   - Left handlebar grip (3)
   - Clutch master cylinder/clutch lever (4) ☞(Page 5C-9)

NOTE

Do not turn the clutch master cylinder upside down.

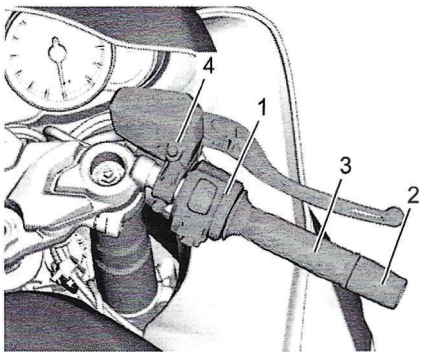


IM10L1620006-02

6) Remove the following parts from the right side of the handlebar.
   - Right handle switch (1) ☞(Page 6B-7)
   - Handlebar balancer (2)
   - Throttle grip (3)
   - Front brake master cylinder assembly (4). ☞(Page 4A-15)

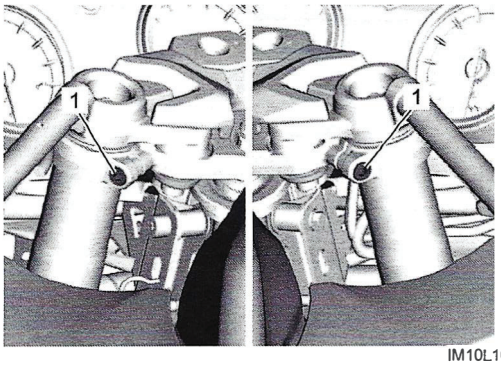
NOTE

Do not turn the front brake master cylinder upside down.



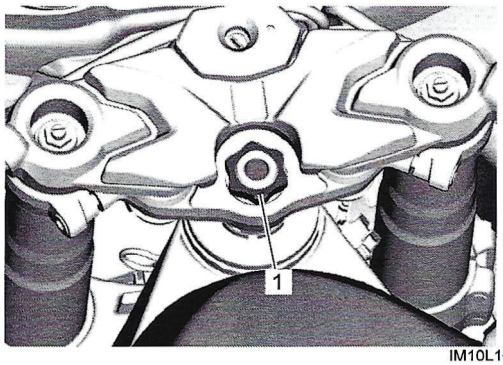
IM10L1620007-01

7) Loosen the front fork upper clamp bolts (1).



IM10L1620008-01

8) Remove the steering stem top nut (1).

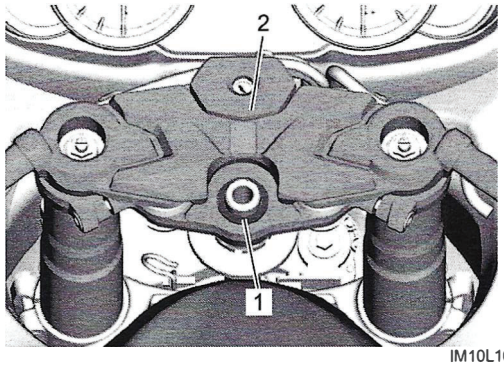


IM10L1620009-01

9) Remove the washer (1) and steering stem upper bracket assembly (2).

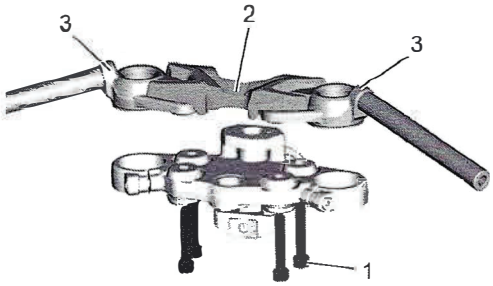
NOTICE

Place a rag under the steering stem upper bracket to prevent scratching the body cowling and the combination meter.



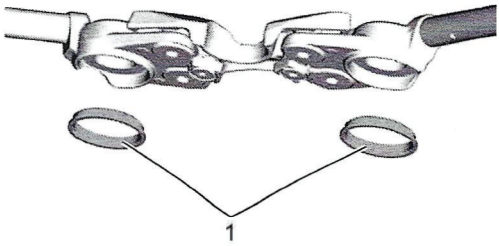
IM10L1620010-01

10) Remove the handlebar holder bolts (1), remove the handlebar holder (2) and handlebars (3) as a set.



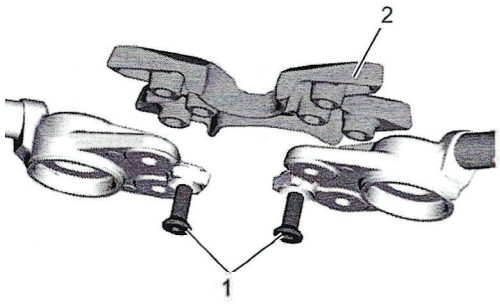
IM10L1620012-01

11) Remove the handle holder cushion (1).



IM10L1620014-03

12) Remove the handlebar bolts (1) and remove the handlebar holder (2).

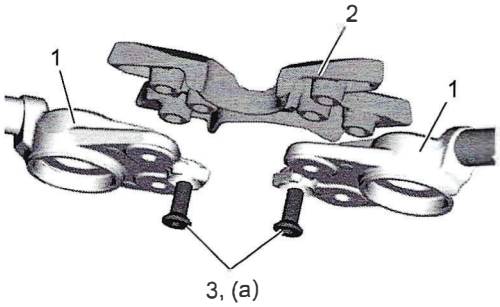


IM10L1620013-01

Installation

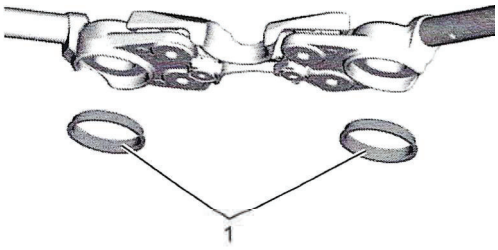
1) Install the handlebars (1) to the handlebar holder (2) and tighten the handlebar bolts (3) to the specified torque.

Tightening torque
handlebar bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1620015-02

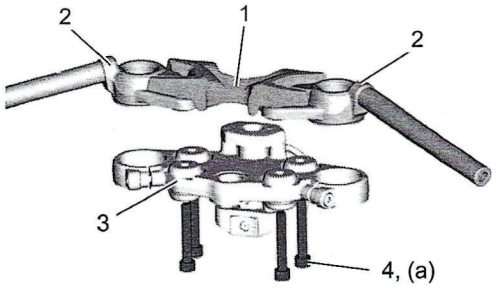
2) Install the handle holder cushion (1).



IM10L1620014-03

3) Install the handlebar holder (1), handlebars (2) to the steering stem upper bracket (3) and tighten the handlebar holder bolts (4) to the specified torque.

Tightening torque
Handlebar holder bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)

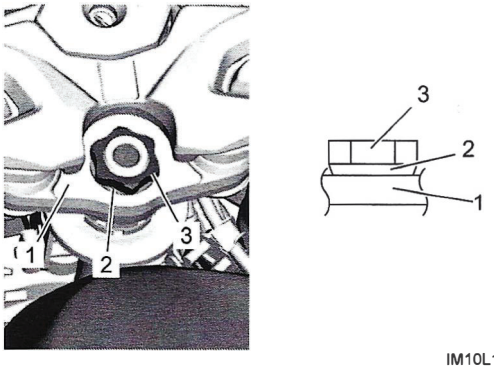


IM10L1620016-02

4) Install the steering stem upper bracket assembly (1), washer (2) and steering stem top nut (3) temporarily.

NOTE

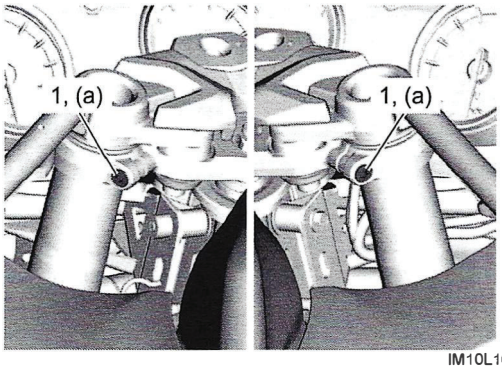
Face the chamfer side of the washer downward.



IM10L1620017-01

5) Tighten the front fork upper clamp bolts (1).

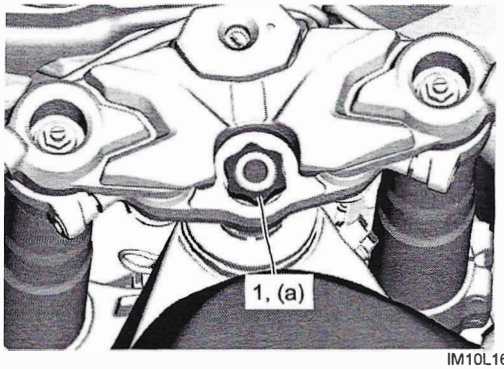
Tightening torque
Front fork upper clamp bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1620018-02

6) Tighten the steering stem top nut (1) to the specified torque.

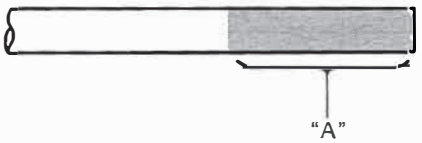
Tightening torque
Steering stem top nut (a): 90 N·m (9.2 kgf-m, 66.5 lbf-ft)



IM10L1620019-02

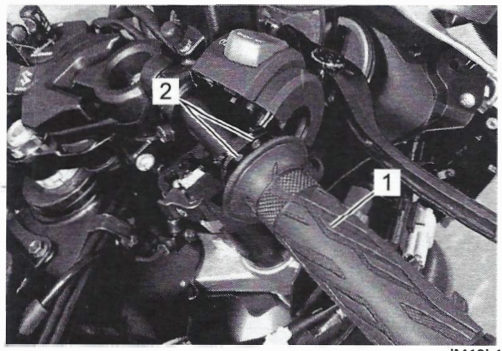
7) Install the front brake master cylinder assembly. ☞(Page 4A-15)
8) Apply grease onto the handlebar before installing the throttle grip.

"A": Grease 99000–25350 (SUZUKI WATER RESISTANT GREASE EP2)



IE31J1620008-02

9) Install the throttle grip (1) and set the throttle cable end (2).



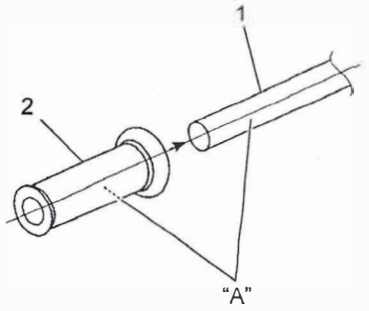
IM10L1620020-02

10) Install the right handlebar balancer and tighten the handlebar balancer screw.

Tightening torque
Handlebar balancer screw: 23 N·m (2.3 kgf-m, 17.0 lbf-ft)

11) Install the right handle switch. ☞(Page 6B-7)
12) Clean, degrease and dry both the left handlebar outer surface (1) on which the grip is being fitted and internal surface of the left handlebar grip (2).
13) Apply handle grip glue to both the left handlebar outer surface (1) on which the grip is being fitted and internal surface of the left handlebar grip (2) evenly.

"A": Adhesive (Handle grip glue)

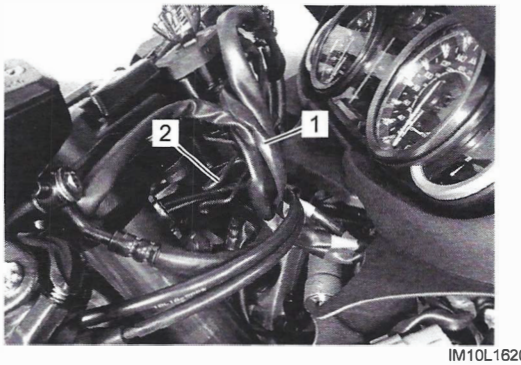


IE31J1620012-01

14) Install the left handlebar balancer and tighten the handlebar balancer screw.

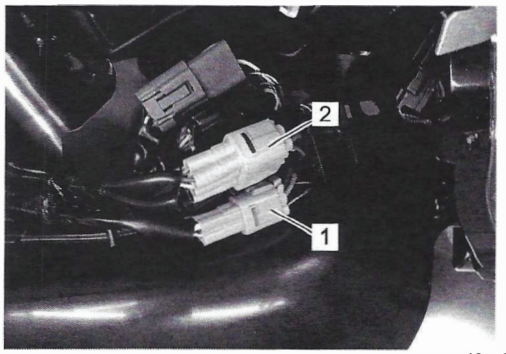
Tightening torque
Handlebar balancer screw: 23 N·m (2.3 kgf-m, 17.0 lbf-ft)

15) Install the left handle switch. ☞(Page 6B-9)
16) Install the clutch master cylinder assembly. ☞(Page 5C-9)
17) Set the ignition switch lead wires, immobilizer antenna lead wires, and handle switch lead wires (1) to the guide (2).



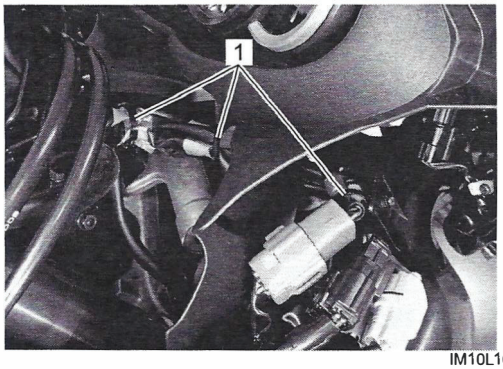
IM10L1620021-02

18) Connect the ignition switch lead wire coupler (1) and immobilizer coupler (2).



IM10L1620022-02

19) Clamp the ignition switch lead wires (1).



IM10L1620023-02

20) Install the side cowling assembly. ☞(Page 9D-37)
21) Check to make sure that the wire harnesses, cables and hoses are properly routed.
- Wire harness: ☞(Page 9A-13)
- Cable: ☞(Page 1D-2)
- Hose: ☞(Page 4A-2)

22) Check the throttle cable for the play and smooth operation. ☞(Page 0B-12)

Handlebar Inspection

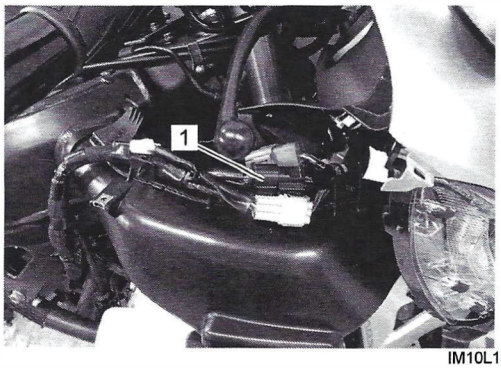
BENM10L36206004

Refer to "Handlebar Removal and Installation" (Page 6B-3).
Inspect the handlebars for distortion and damage.
If any defect is found, replace the handlebar with a new one.

Right Handle Switch Inspection

BENM10L36206005

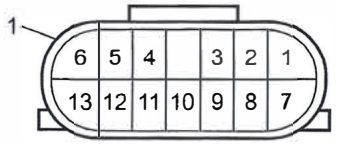
1) Remove the right side meter panel. ☞(Page 9D-37)
2) Disconnect the right handle switch lead wire coupler (14P) (1).



IM10L1620074-01

3) Inspect the right handle switch for continuity with a tester. If any abnormality is found, right handle switch with a new one.

Right handle switch coupler



IM10L1620025-02

Engine stop / starter switch

Position \ Terminal No.	T6	T5	T4	T10
OFF (⊗)				
RUN (○)	○	○		
START (⚷)	○	○	○	○

IM10L1620026-02

Hazard switch

Position \ Terminal No.	T3	T2	T13
OFF			
ON	○	○	○

IM10L1620027-03

Cruise control switch

Position \ Terminal No.	T9	T8
FREE		
PUSH	○	○

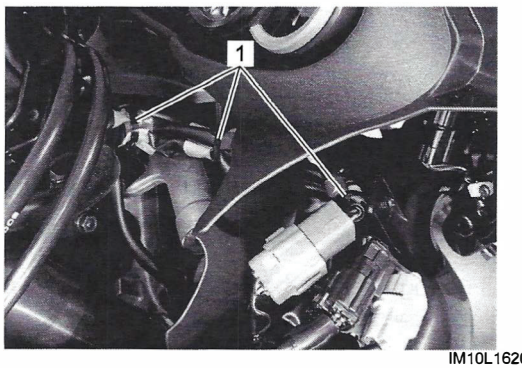
IM10L1620028-02

Right Handle Switch Removal and Installation

BENM10L36206006

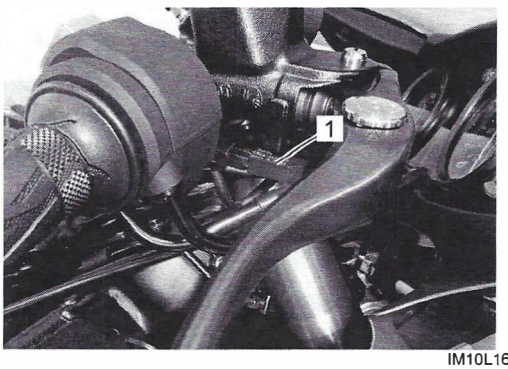
Removal

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Release the clamps (1).



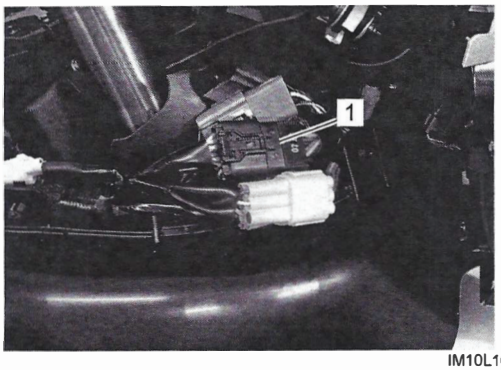
IM10L1620029-04

3) Disconnect the front brake light switch lead wire (1).



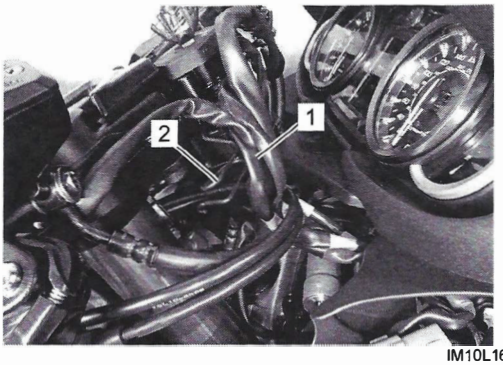
IM10L1620030-02

4) Disconnect the right handle switch lead wire coupler (1).



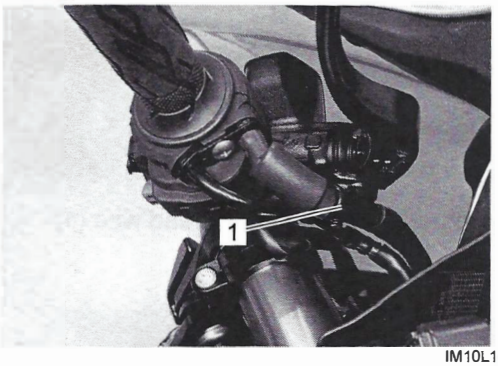
IM10L1620031-02

5) Release the right handle switch lead wires (1) from harness guide (2).



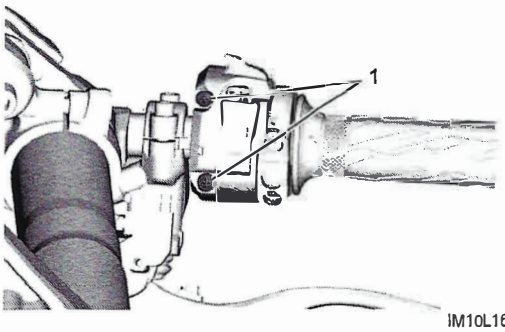
IM10L1620032-02

6) Release the throttle cable adjuster (1).



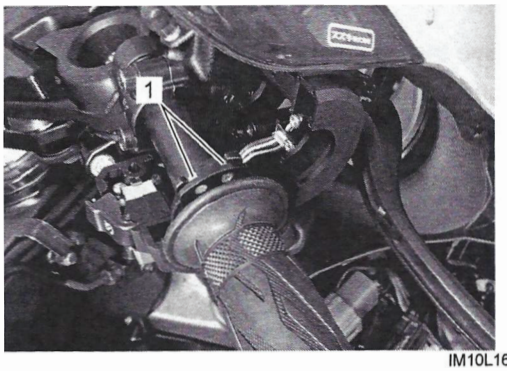
IM10L1620033-02

7) Remove the right handle switch screws (1).



IM10L1620034-02

8) Disconnect the throttle cable end (1).



IM10L1620036-02

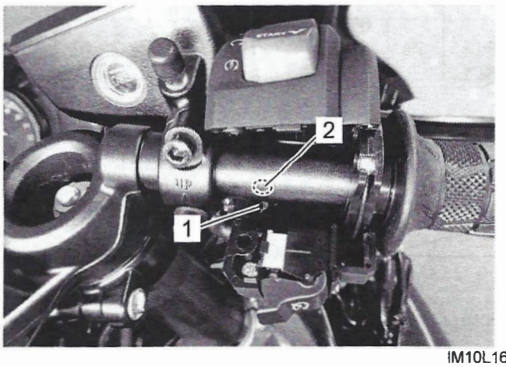
9) Remove the right handle switch (1).

Installation

Install the right handle switch in the reverse order of removal.

Pay attention to the following point:

- Route the right handle switch harness. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-13).
- Insert the projection (1) of the right handle switch into the hole (2) of the right handlebar.

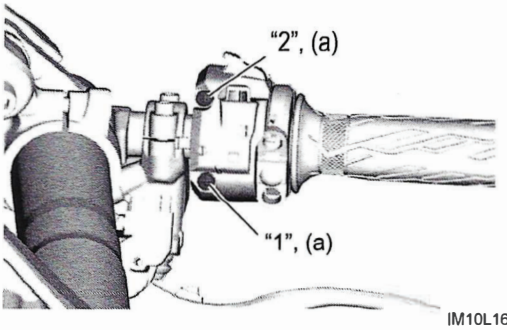


IM10L1620037-02

- Tighten right handle switch screws (1) to the specified torque in order of "1" → "2".

Tightening torque

Throttle grip screw (a): 3.0 N·m (0.31 kgf-m, 2.25 lbf-ft)



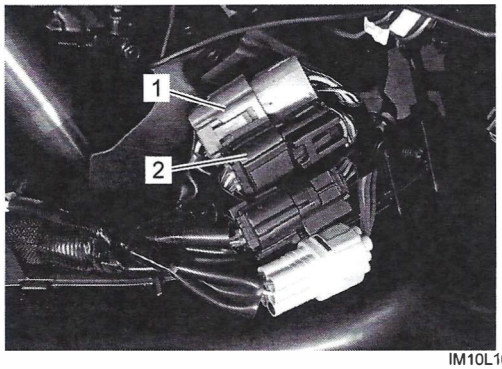
IM10L1620038-02

- Check that the throttle grip can operate smoothly.
- Adjust the throttle cable play.

Left Handle Switch Inspection

BENM10L36206007

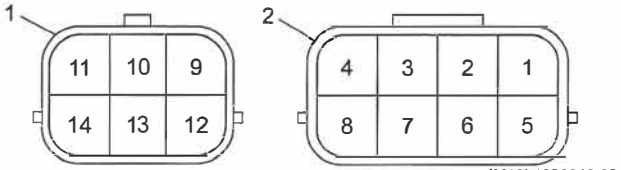
1) Remove the right side meter panel. ☞(Page 9D-37)
2) Disconnect the left handle switch lead wire coupler (6P) (1) and (8P) (2).



IM10L1620039-04

3) Inspect the left handle switch for continuity with a tester. If any abnormality is found, right handle switch with a new one.

Left handle switch coupler (6P) (1) and (8P) (2)



IM10L1620040-02

Turn Signal Switch

Position \ Terminal No.	T14	T7	T6
L	○	○	
PUSH			
R		○	○

IM10L1620041-01

Dimmer / Passing Switch

Position \ Terminal No.	T10	T13
HI	○	○
LO		
PASS	○	○

IM10L1620042-01

Horn Switch

Position \ Terminal No.	T9	T12
FREE		
PUSH	○	○

IM10L1620043-01

Mode Switch

Position \ Terminal No.	T4	T8	T1
UP	○		○
FREE			
DOWN		○	○

IM10L1620044-02

Select Switch

Position \ Terminal No.	T3	T1
FREE		
PUSH	○	○

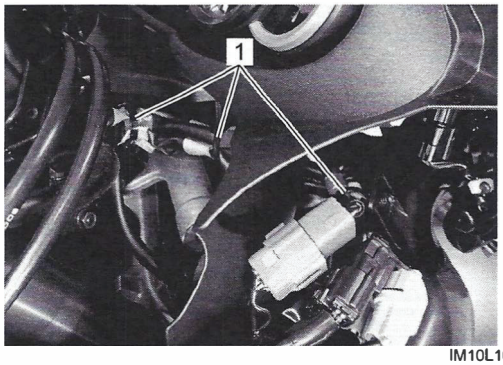
IM10L1620045-01

Left Handle Switch Removal and Installation

BENM10L36206008

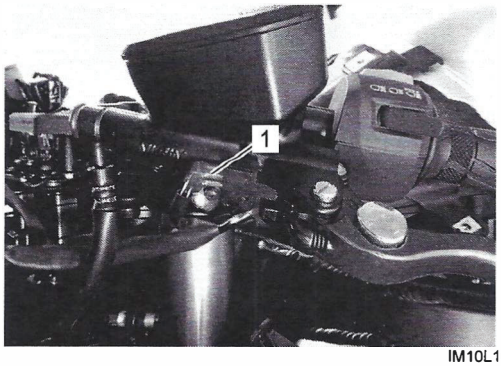
Removal

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Release the clamps (1).



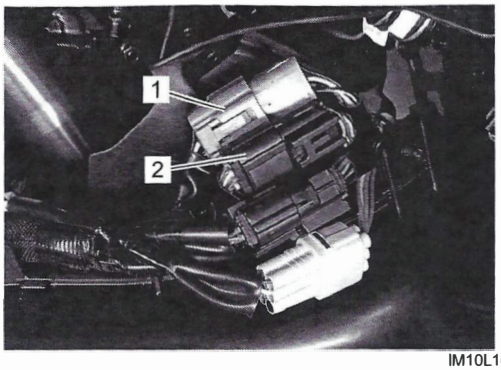
IM10L1620029-04

3) Disconnect the crutch switch lead wire (1).



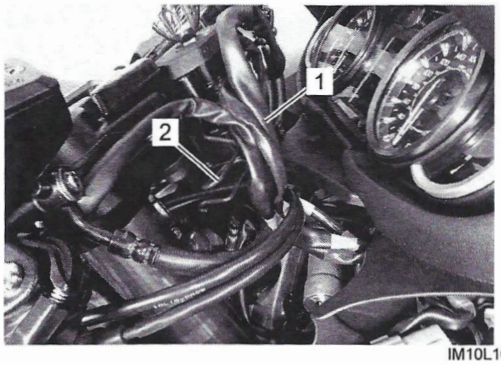
IM10L1620047-02

4) Disconnect the left handle switch lead wire coupler (1) and (2).

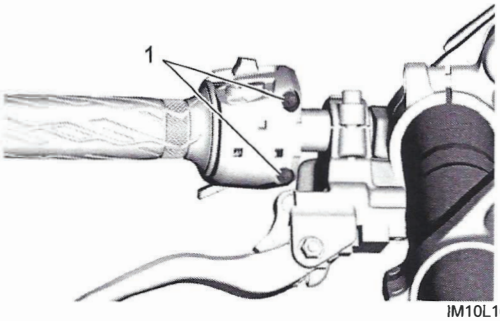


IM10L1620039-04

5) Release the left handle switch lead wires (1) from harness guide (2).



IM10L1620049-02



IM10L1620050-01

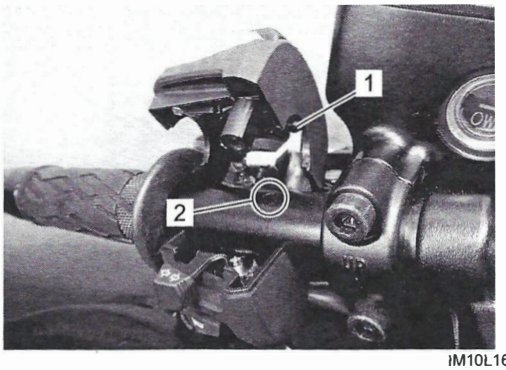
6) Remove the left handle switch.

Installation

Install the left handle switch in the reverse order of removal.

Pay attention to the following point:

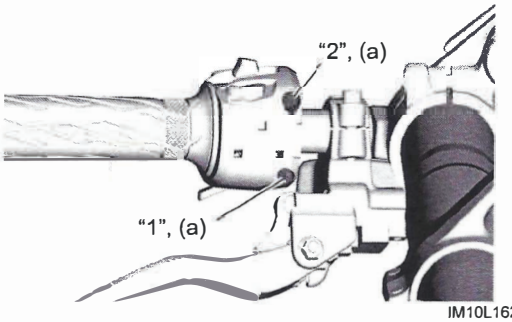
- Route the left handle switch harness. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-13).
- Insert the projection (1) of the left handle switch box into the hole of the handlebars.



IM10L1620051-03

- Tighten left handle switch screws (1) to the specified torque in order of "1" → "2".

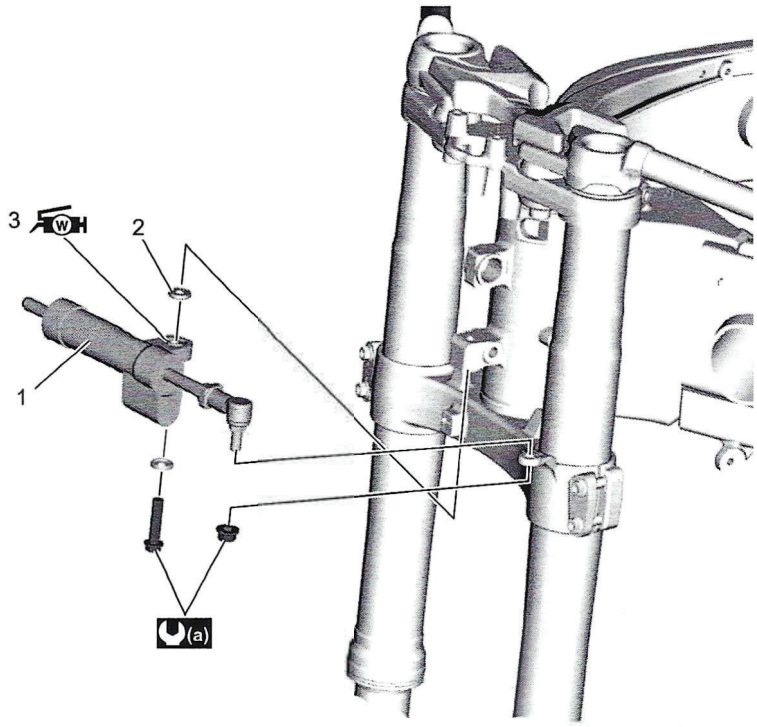
Tightening torque
Left handle switch screw (a): 3.0 N·m (0.31 kgf-m, 2.25 lbf-ft)



IM10L1620052-02

Steering Damper Construction

BENM10L36206009



IM10L1620053-01

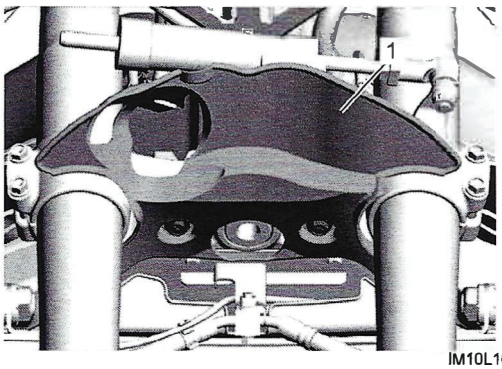
1. Steering damper	2. Dust seal	3. Bearing	(a) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)	: Apply water resistant grease EP2.

Steering Damper Removal and Installation

BENM10L36206010

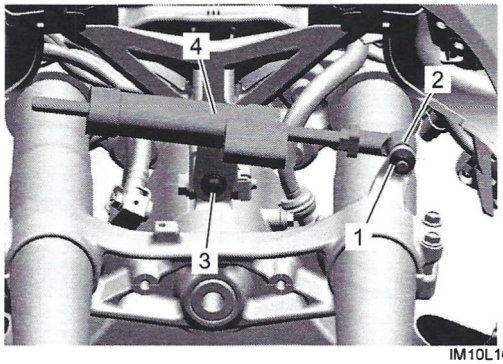
Removal

1) Remove the body cowling. ☞(Page 9D-43)
2) Remove the lower bracket cover (1).



IM10L1620054-02

3) Remove the steering damper rod end nut (1) while holding the rod end bolt (2).
4) Remove the steering damper mounting bolt (3).
5) Remove the steering damper (4).



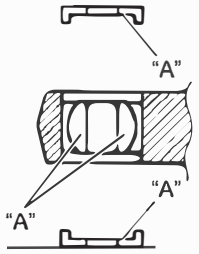
IM10L1620055-01

Installation

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

- Apply grease to the bearings and dust seals.

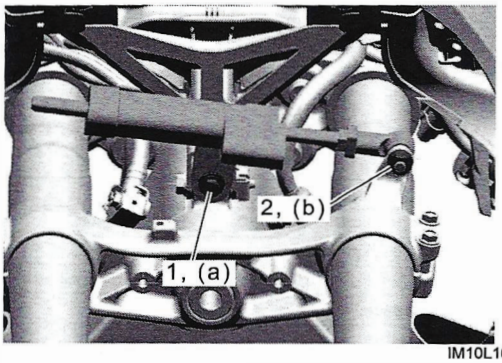
  "A": Grease 99000–25350 (SUZUKI WATER RESISTANT GREASE EP2)



IH17K1620025-01

- Install the steering damper and tighten the bolt (1) and nut (2) to the specified torque.

  Tightening torque
  Steering damper mounting bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
  Steering damper rod end nut (b): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



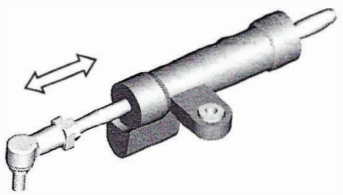
IM10L1620056-01

Steering Damper Inspection

BENM10L36206011

Refer to "Steering Damper Removal and Installation" (Page 6B-11).

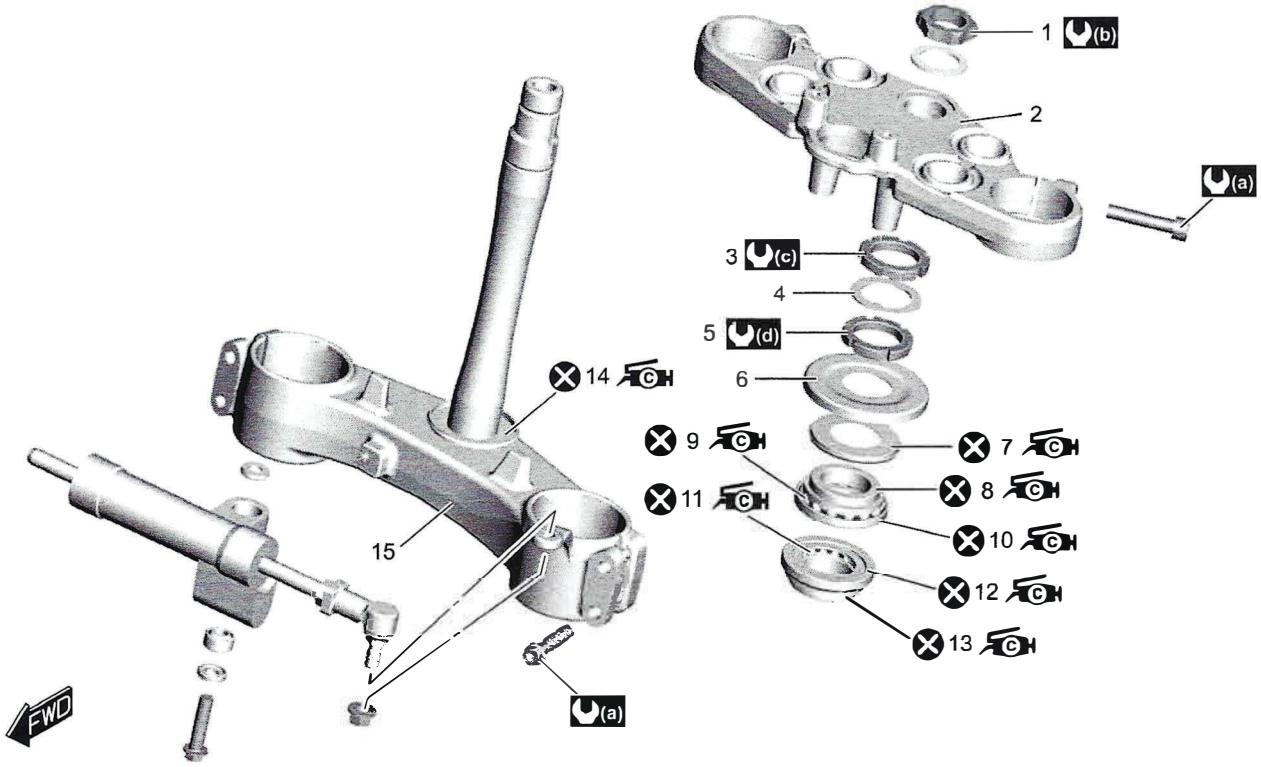
- Inspect the steering damper body, bearing and oil seal for damage and oil leaking. If any defects are found, replace the steering damper with a new one.
- Move the steering damper rod by hand to inspect for a smooth movement. If it does not move smoothly, replace the steering damper with a new one.



IM10L1620057-01

Steering Stem Components

BENM10L36206012



IM10L1620058-02

1. Steering stem top nut	8. Steering stem upper bearing outer race	15. Steering stem lower bracket
2. Steering stem upper bracket	9. Steering stem upper bearing	(a) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
3. Steering stem lock-nut	10. Steering stem upper bearing inner race	(b) : 90 N·m (9.2 kgf-m, 66.5 lbf-ft)
4. Washer	11. Steering stem lower bearing	(c) : 80 N·m (8.2 kgf-m, 59.0 lbf-ft)
5. Steering stem adjust-nut	12. Steering stem lower bearing inner race	(d) : 20 N·m (2.0 kgf-m, 15.0 lbf-ft) → turn counterclockwise 0 – 1/4
6. Dust cover	13. Steering stem lower bearing outer race	: Apply grease.
7. Dust seal	14. Lower seal	: Do not reuse.

Steering On-Vehicle Inspection

BENM10L36206013

Refer to "Inspection" under "Steering" in Section 0B (Page 0B-26).

Steering Tension Adjustment

BENM10L36206014

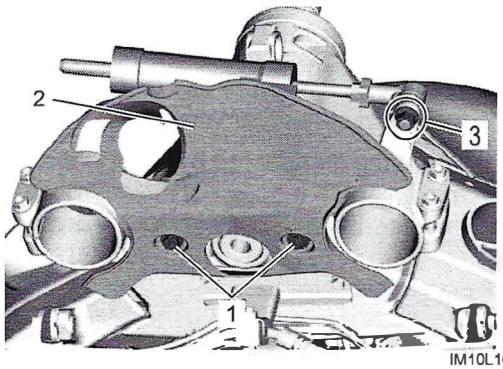
Refer to "Adjustment" under "Steering" in Section 0B (Page 0B-26).

Steering Stem Removal and Installation

BENM10L36206015

Removal

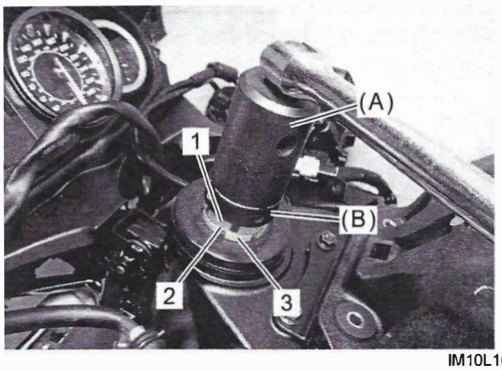
1) Remove the body cowling. ☞(Page 9D-43)
2) Remove the handlebars and steering upper bracket. ☞(Page 6B-3)
3) Remove the front forks. ☞(Page 2B-2)
4) Remove the lower bracket cover bolts (1) and remove the lower bracket cover (2).
5) Remove the steering damper rod end nut (3) while holding the rod end bolt (4).
6) Disconnect the steering damper rod from the steering stem lower bracket.



IM10L1620059-02

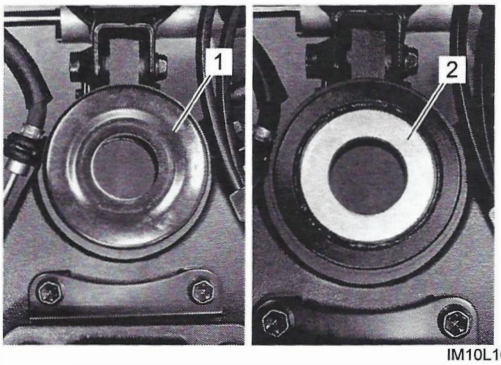
7) While holding the steering stem lower bracket, remove the steering stem lock-nut (1), washer (2) and steering stem adjust-nut (3) with the special tools.

Special tool
(A): 09940–14911
(B): 09940–14960

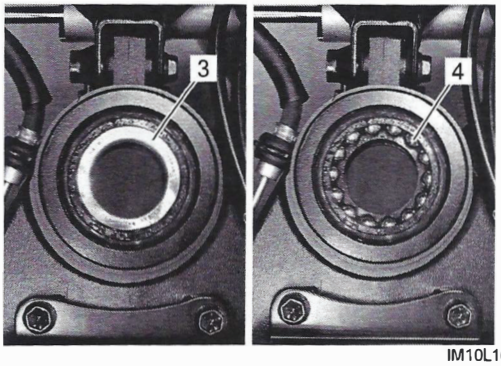


IM10L1620062-02

8) Remove the steering stem lower bracket.
9) Remove the dust cover (1), dust seal (2), steering stem upper bearing outer race (3) and steering stem upper bearing (4).

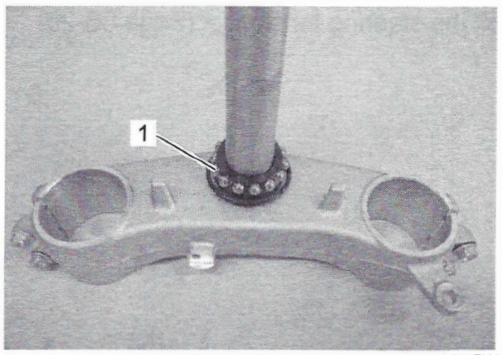


IM10L1620063-02



IM10L1620064-03

10) Remove the steering stem lower bearing (1).

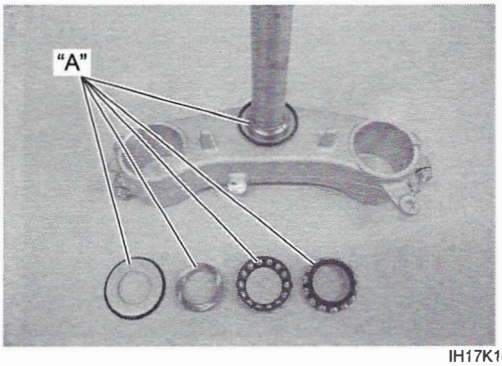


IH17K1620040-01

Installation

1) Apply grease to the bearings, races, lower seal and new dust seal lip, and install the steering stem lower bracket to the frame.

"A": Grease 99000–25030 (SUZUKI SUPER GREASE C)



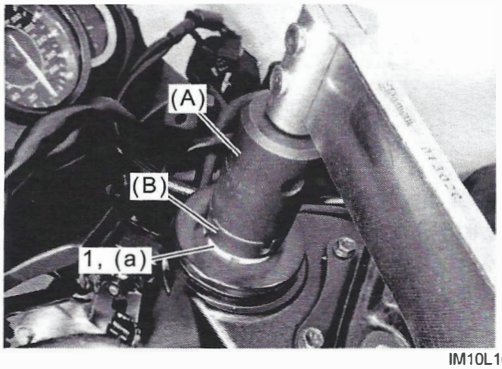
IH17K1620041-01

2) Install the steering stem adjust-nut (1) and temporarily tighten it to the specified torque (20 N·m (2.0 kgf-m, 15.0 lbf-ft)) with the special tools.

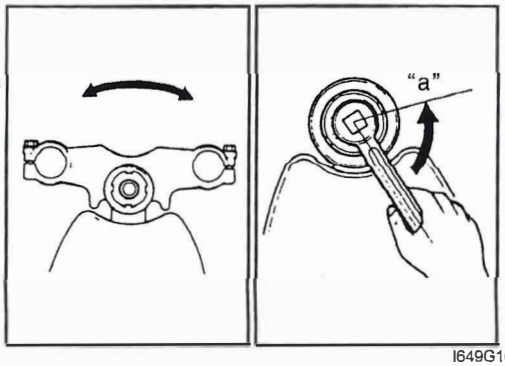
Special tool
(A): 09940–14911
(B): 09940–14960

3) Turn the steering stem lower bracket to the left and right about five or six times so that the taper roller bearings seat properly.
4) Loosen the steering stem adjust-nut 0 – 1/4 turn "a".

Tightening torque
Steering stem adjust-nut (a): 20 N·m (2.0 kgf-m, 15.0 lbf-ft) → turn counterclockwise 0 – 1/4

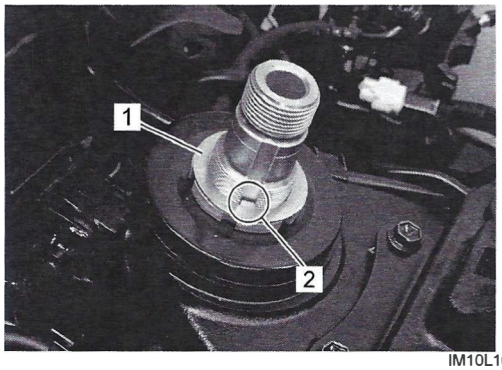


IM10L1620065-03



I649G1620026-02

5) In this condition, check that the steering stem lower bracket can turn smoothly without rattle and stiffness. If there is a rattle or heavy movement, readjust the tightness by the stem adjust-nut.
6) When installing the washer (1), align the lug (2) of the washer to the groove of the steering stem.

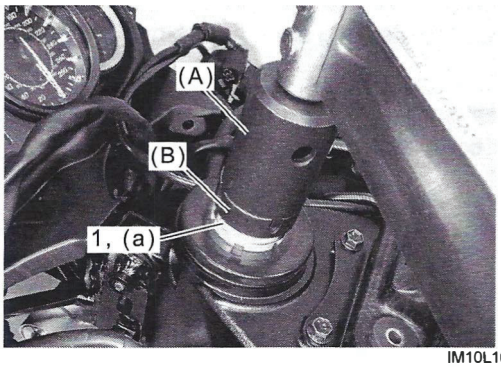


IM10L1620066-02

7) Tighten the steering stem lock-nut (1) to the specified torque with the special tools.

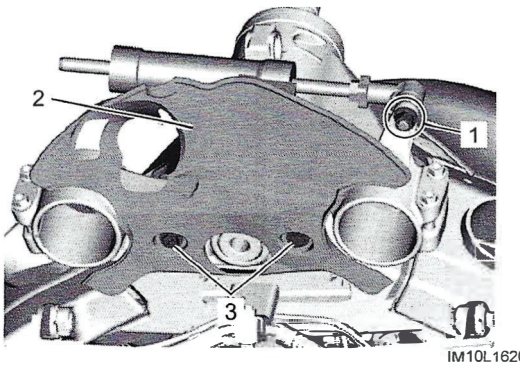
Special tool
(A): 09940–14911
(B): 09940–14960

Tightening torque
Steering stem lock-nut (a): 80 N·m (8.2 kgf-m, 59.0 lbf-ft)



IM10L1620067-02

8) Connect the steering damper rod end (1). Refer to "Steering Damper Removal and Installation" (Page 6B-11).
9) Install the lower bracket cover (2) and tighten the lower bracket cover bolts (3).

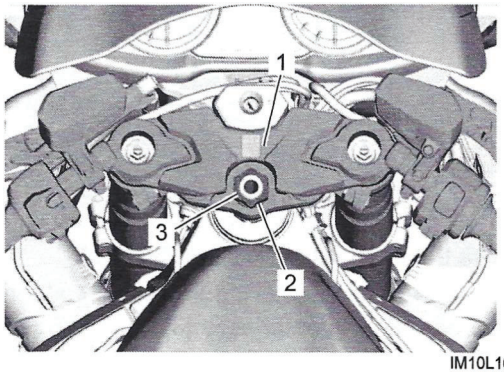


IM10L1620068-03

10) Install the steering stem upper bracket (1), washer (2) and steering stem top nut (3) temporarily.

NOTE

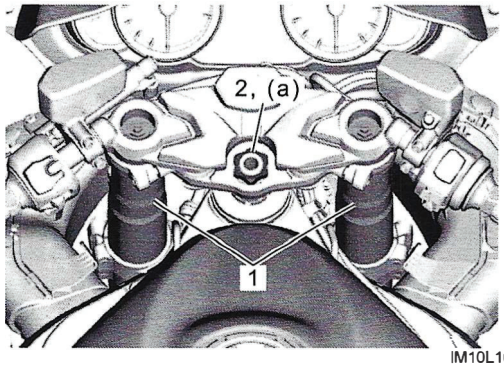
Face the chamfer side of the washer (2) downward.



IM10L1620069-02

11) Install the front forks (1) temporarily.
12) Tighten the steering stem top nut (3) to the specified torque.

Tightening torque
Steering stem top nut (a): 90 N·m (9.2 kgf-m, 66.5 lbf-ft)



IM10L1620070-02

13) Install the front forks in proper position. Refer to "Front Fork Assembly Removal and Installation" in Section 2B (Page 2B-2).
14) Tighten the steering damper rod end nut to the specified torque. Refer to "Steering Damper Removal and Installation" (Page 6B-11).
15) Install the removed parts.
16) Check the steering tension. ☞(Page 0B-26)

Steering Stem Inspection

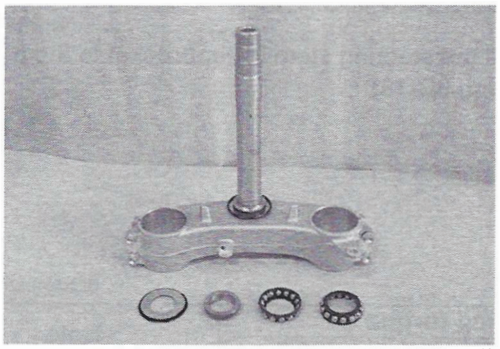
BENM10L36206016

Refer to "Steering Stem Removal and Installation" (Page 6B-13).

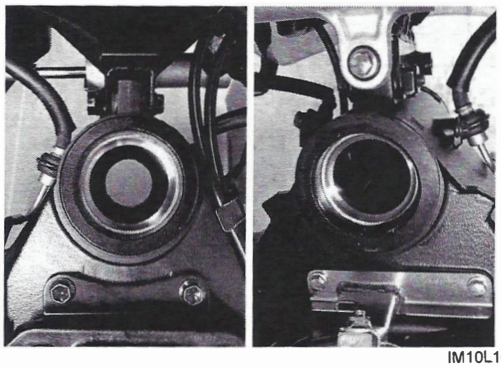
Inspect the removed parts for the following abnormalities:

- Distortion of the steering stem
- Bearing wear or damage
- Abnormal bearing noise
- Race wear or damage
- Bearing lower seal damage
- Dust seal wear or damage

If any abnormal points are found, replace defective parts with new ones.



IH17K1620048-01



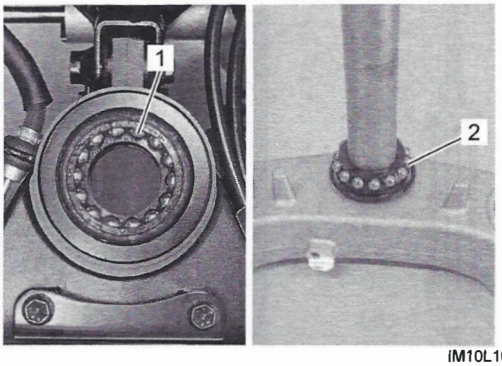
IM10L1620071-02

Steering Stem Bearing Removal and Installation

BENM10L36206017

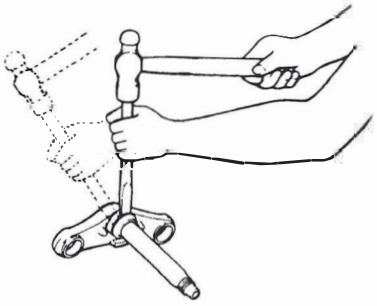
Removal

1) Remove the steering stem upper bearing (1) and steering stem lower bearing (2). Refer to "Steering Stem Removal and Installation" (Page 6B-13).



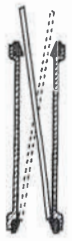
IM10L1620072-02

2) Remove the steering stem lower bearing outer race with a chisel.
3) Remove the dust seal.



I649G1620033-02

4) Remove the steering stem upper and lower bearing inner races using the steel rod.



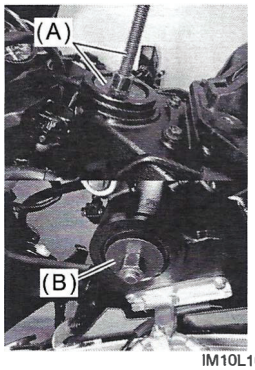
I837H1620033-01

Installation

1) Press in the new upper and lower outer races using the special tools.

Special tool
(A): 09941–34513
(B): 09913–70210

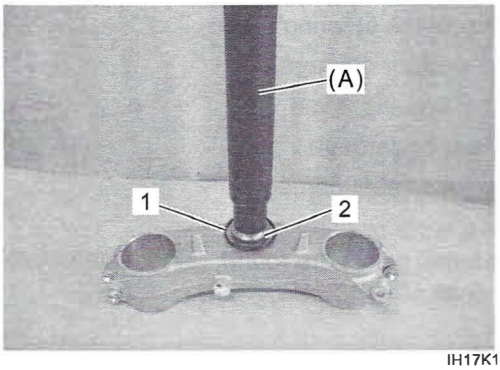




IM10L1620073-02

2) Set the dust seal (1) and press in the new lower inner race (2) using the special tool.

Special tool
(A): 09925–18011



IH17K1620052-01

3) Install the steering stem lower bracket to the frame. ☞(Page 6B-13)

Specifications

Tightening Torque Specifications

BENM10L36207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
handlebar bolt	23	2.3	17.0	☞(Page 6B-5)
Handlebar holder bolt	23	2.3	17.0	☞(Page 6B-5)
Front fork upper clamp bolt	23	2.3	17.0	☞(Page 6B-5)
Steering stem top nut	90	9.2	66.5	☞(Page 6B-5) / ☞(Page 6B-15)
Handlebar balancer screw	23	2.3	17.0	☞(Page 6B-6) / ☞(Page 6B-6)
Throttle grip screw	3.0	0.31	2.25	☞(Page 6B-8)
Left handle switch screw	3.0	0.31	2.25	☞(Page 6B-10)
Steering damper mounting bolt	23	2.3	17.0	☞(Page 6B-12)
Steering damper rod end nut	23	2.3	17.0	☞(Page 6B-12)
Steering stem adjust-nut	20 N·m (2.0 kgf-m, 15.0 lbf-ft) → turn counterclockwise 0 – 1/4			☞(Page 6B-14)
Steering stem lock-nut	80	8.2	59.0	☞(Page 6B-15)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Handlebar Components" (Page 6B-1)
"Handlebar Construction" (Page 6B-2)
"Steering Damper Construction" (Page 6B-11)
"Steering Stem Components" (Page 6B-13)

Special Tools and Equipment

Recommended Service Material

BENM10L36208001

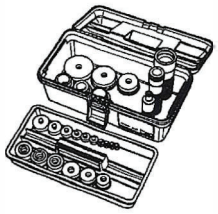
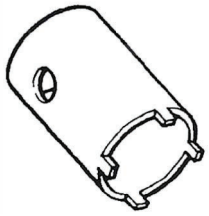
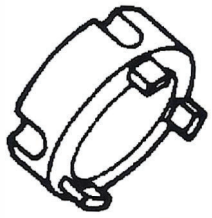
Material	SUZUKI recommended product or Specification		Note
Adhesive	Handle grip glue	—	☞(Page 6B-6)
Grease	SUZUKI SUPER GREASE C	P/No.: 99000–25030	☞(Page 6B-14)
	SUZUKI WATER RESISTANT GREASE EP2	P/No.: 99000–25350	☞(Page 6B-6) / ☞(Page 6B-12)

NOTE

Required service material(s) is also described in:
"Handlebar Components" (Page 6B-1)
"Handlebar Construction" (Page 6B-2)
"Steering Damper Construction" (Page 6B-11)
"Steering Stem Components" (Page 6B-13)

Special Tool

BENM10L36208002

09913–70210 Bearing installer set ☞(Page 6B-17)		09925–18011 Bearing installer ☞(Page 6B-17)	
09940–14911 Steering stem nut socket ☞(Page 6B-13) / ☞(Page 6B-14) / ☞(Page 6B-15)		09940–14960 Steering stem nut socket wrench ☞(Page 6B-13) / ☞(Page 6B-14) / ☞(Page 6B-15)	
09941–34513 Bearing installer set ☞(Page 6B-17)			

Section 9

Body and Accessories

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Precautions

Precautions

Precautions for Electrical System

BENM10L39000001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2) and "Precautions for Circuit Tester" in Section 00 (Page 00-8).

Component Location

Electrical Components Location

BENM10L39003001

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

Wiring Systems

General Description

Abbreviations

BENM10L39101001

Refer to the “Abbreviations”: Service Manual Information in Section 0A (Page 0A-1) for the general abbreviations.

How to Read System Circuit Diagram

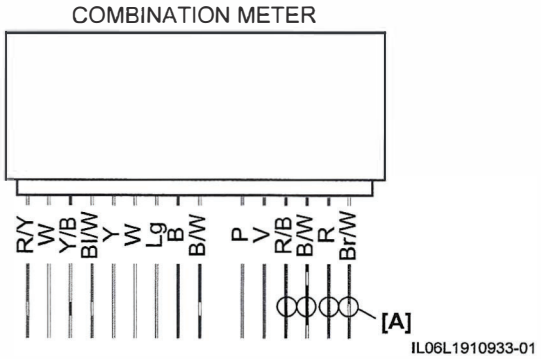
BENM10L39101002

Refer to “Wire Color Symbols”: Service Manual Information in Section 0A (Page 0A-4).

How to Read Terminal Nos.

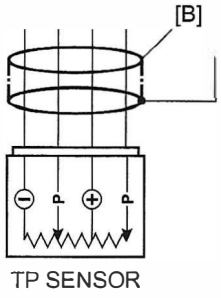
BENM10L39101003

[A]: Twisted wires (Both CAN lines and non-CAN lines)



IL06L1910933-01

[B]: Shield wire



IM10L1910901-02

Glossary

BENM10L39101004

English	
2WD/4WD/DIFF-LOCK ACTUATOR	
2WD/4WD/DIFF-LOCK SWITCH	
4WD POSITION DIODE	
ABS	
ABS CONTROL UNIT	
ABS FUSE	
ABS MOTOR	
ABS SHORT COUPLER	
ABS VALVE	
ACCELERATOR POSITION SENSOR	
ALARM	
AMBIENT AIR TEMP SENSOR	
AP SENSOR	
AUXILIARY HEADLIGHT	
BATTERY	
BONDER	
BRAKE LIGHT SWITCH	
CAN TERMINATION RESISTOR	
CAP	
CARBURETOR SWITCH	
CDI UNIT	
CKP SENSOR	
CLUTCH LEVER POSITION SWITCH	
CLUTCH SWITCH	
CMP SENSOR	
COMBINATION METER	
CONDENSER	
COOLING FAN MOTOR	
COOLING FAN RELAY	
COOLING FAN THERMO-SWITCH	
DIFFERENTIAL DIODE	
DIFF-LOCK RELAY	
DIMMER	
DIMMER SWITCH	
DIMMER/PASSING LIGHT SWITCH	
DIODE	
DRIVE RELAY (2WD)	
DRIVE RELAY (DIFF-LOCK)	
ECM	
ECT SENSOR	
EMERGENCY SWITCH	
ENGINE STOP SWITCH	
ENGINE STOP/STARTER SWITCH	
EPS CONTROL UNIT	
EPS MOTOR	
ET SENSOR	
EVAP SYSTEM PURGE CONTROL SOLENOID VALVE	
EXCV ACTUATOR	
FAN	
FAN RELAY	
FI INDICATOR LIGHT	
FOG LIGHT	
FRONT BRAKE LIGHT SWITCH	
FRONT TURN SIGNAL LIGHT	
FRONT WHEEL SPEED SENSOR	
FUEL	
FUEL INJECTOR	

English	
FUEL LEVEL GAUGE	
FUEL METER	
FUEL PUMP	
FUEL PUMP RELAY	
FUSE BOX	
GEARSHIFT SENSOR	
GENERATOR	
GP SENSOR	
GP SWITCH	
HANDLE SWITCH	
HANDLEBAR SWITCH	
HAZARD SWITCH	
HEADLIGHT	
HEADLIGHT HI	
HEADLIGHT LO	
HI BEAM INDICATOR LIGHT	
HIGH BEAM INDICATOR LIGHT	
HIGH BEAM RELAY	
HIGH POSITION DIODE	
HO2 SENSOR	
HORN	
HORN BUTTON	
HORN SWITCH	
IAP SENSOR	
IAP/TP SENSOR	
IAP/TP/IAT SENSOR	
IAT SENSOR	
IF EQUIPPED	
IGNITER	
IGNITION	
IGNITION COIL	
IGNITION SWITCH	
ILLUMINATION LIGHT	
IMMOBILIZER ANTENNA	
IMU	
INSTRUMENT PANEL LIGHT	
ISC VALVE	
J/C	
LICENSE PLATE LIGHT	
LIGHT/HORN RELAY	
LIGHTING SWITCH	
LOW BEAM RELAY	
LOW POSITION DIODE	
MAIN	
MAIN FUSE	
MALFUNCTION INDICATOR LAMP	
MALFUNCTION INDICATOR LIGHT	
METER	
MODE SELECT COUPLER	
MODE SWITCH	
NEUTRAL INDICATOR LIGHT	
NEUTRAL POSITION DIODE	
NEUTRAL RELAY	
NEUTRAL SWITCH	
O2 SENSOR	
OIL PRESSURE SWITCH	
OPTION	
OVERRIDE SWITCH	
PAIR CONTROL SOLENOID VALVE	

English	
PARK	
PARKING	
PARKING BRAKE RELAY	
PARKING BRAKE SWITCH	
PARKING/REAR BRAKE LIGHT SWITCH	
PASSING LIGHT SWITCH	
PASSING RELAY	
POSITION LIGHT	
POWER SOURCE	
POWER SOURCE FUSE	
PRIMARY FUEL INJECTOR	
REAR BRAKE LIGHT SWITCH	
REAR COMBINATION LIGHT	
REAR TURN SIGNAL LIGHT	
REAR WHEEL SPEED SENSOR	
REGULATOR/RECTIFIER	
RESISTOR	
SECONDARY FUEL INJECTOR	
SELECT SWITCH	
S-HAC	
SIDE-STAND DIODE	
SIDE-STAND RELAY	
SIDE-STAND SWITCH	
SIGNAL	
SPEED SENSOR	
SPEEDOMETER	
SPEEDOMETER LIGHT	
STARTER BUTTON	
STARTER MOTOR	
STARTER RELAY	
STARTER SUB RELAY	
STARTER SWITCH	
STEERING DAMPER SOLENOID VALVE	
STP SENSOR	
STV ACTUATOR	
SUB	
SUB FUSE	
THROTTLE VALVE MOTOR	
TO SENSOR	
TOP GEAR POSITION INDICATOR LIGHT	
TORQUE SENSOR	
TP SENSOR	
TRACTION CONTROL SYSTEM SELECT SWITCH	
TRACTION CONTROL SYSTEM SWITCH	
TURN SIGNAL INDICATOR LIGHT	
TURN SIGNAL RELAY	
TURN SIGNAL SWITCH	
WITH IMMOBILIZER SYSTEM	
WITHOUT EVAP CONTROL SYSTEM	
WITHOUT EVAP SYSTEM	
WITHOUT EVAP SYSTEM PURGE CONTROL SOLENOID VALVE	
WITHOUT IMMOBILIZER SYSTEM	
WITHOUT POSITION LIGHT	

Schematic and Routing Diagram

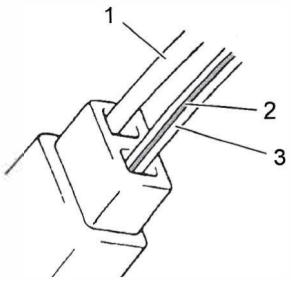
Wiring Diagram

BENM10L39102001

Wire Color Symbols

Symbol	Wire Color	Symbol	Wire Color
B	Black	Lbl	Light blue
Be	Beige	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

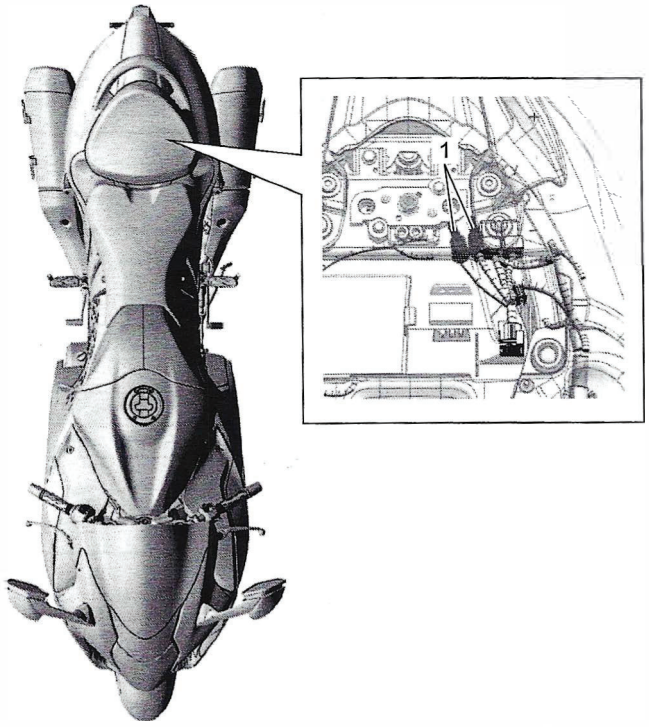
There are two kinds of colored wire used in this vehicle. One is single-colored wire and the other is dual-colored (striped) wire.
The single-colored wire uses only one color symbol (i.e. G). The dual-colored wire uses two color symbols (i.e. G/Y). The first symbol represents the base color of the wire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



ID26J1010224-02

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

Option Coupler Location

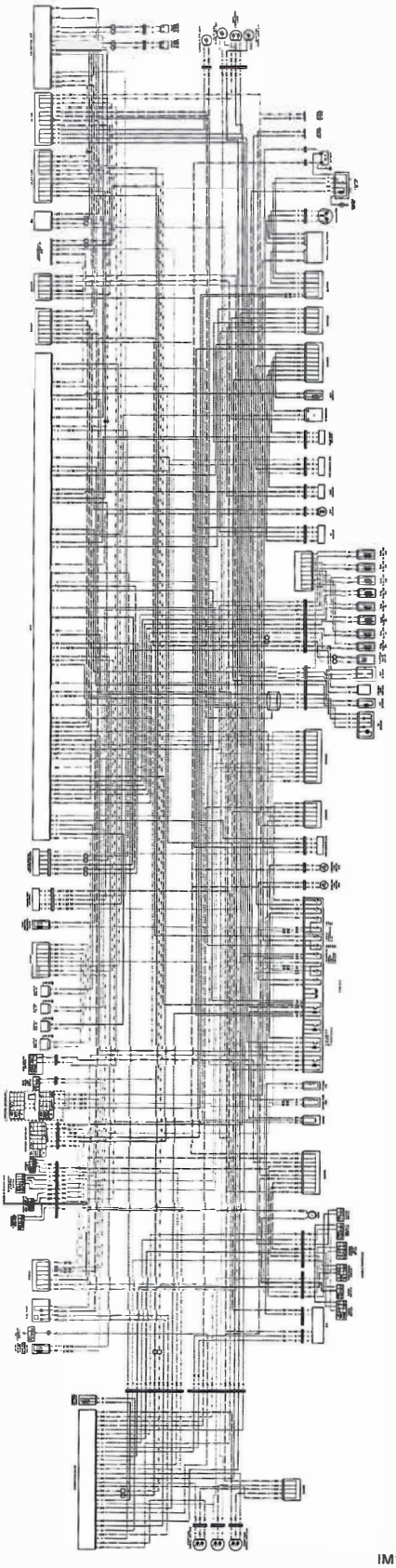


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1. Option couplers
   - Option coupler (White)
   - Option coupler for alarm (Blue)

Wiring Diagram

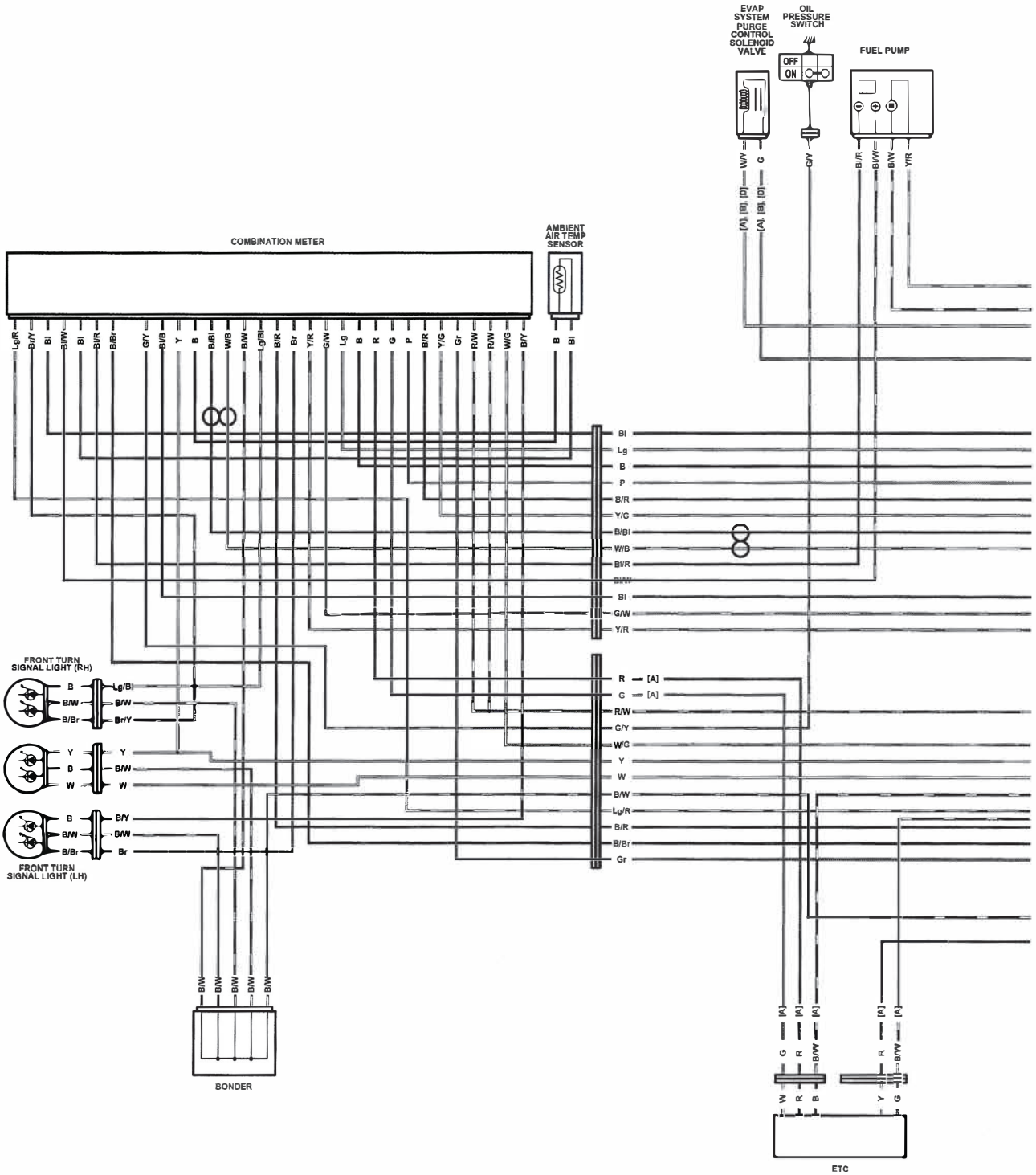
General view



IM10L1910920-01

[A]: For Japan	[B]: For California State and Brazil	[C]: For U.S.A. and Canada	[D]: For others

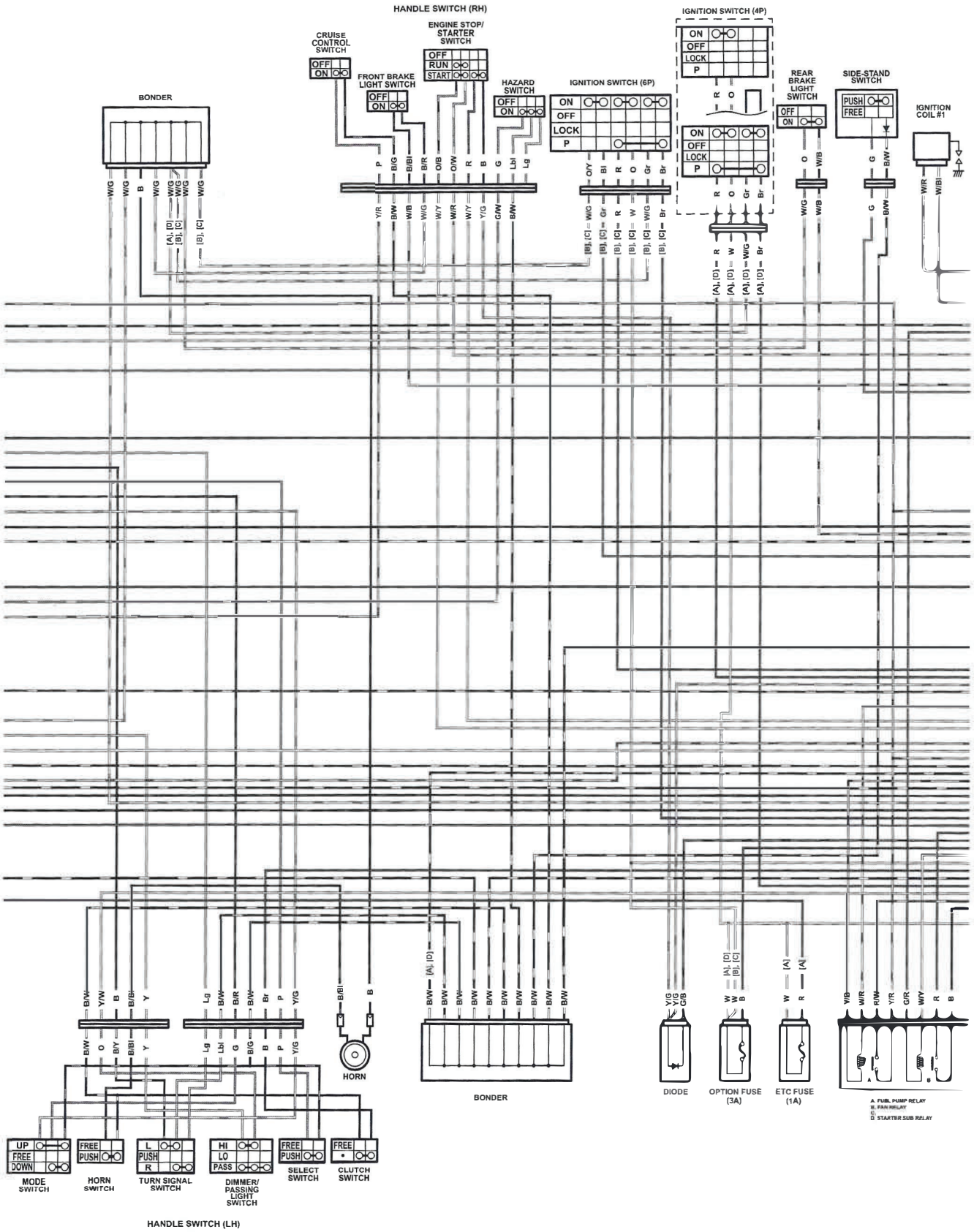
1/6



IM10L1910904-04

[A]: For Japan	[B]: For California State and Brazil	[C]: For U.S.A. and Canada	[D]: For others

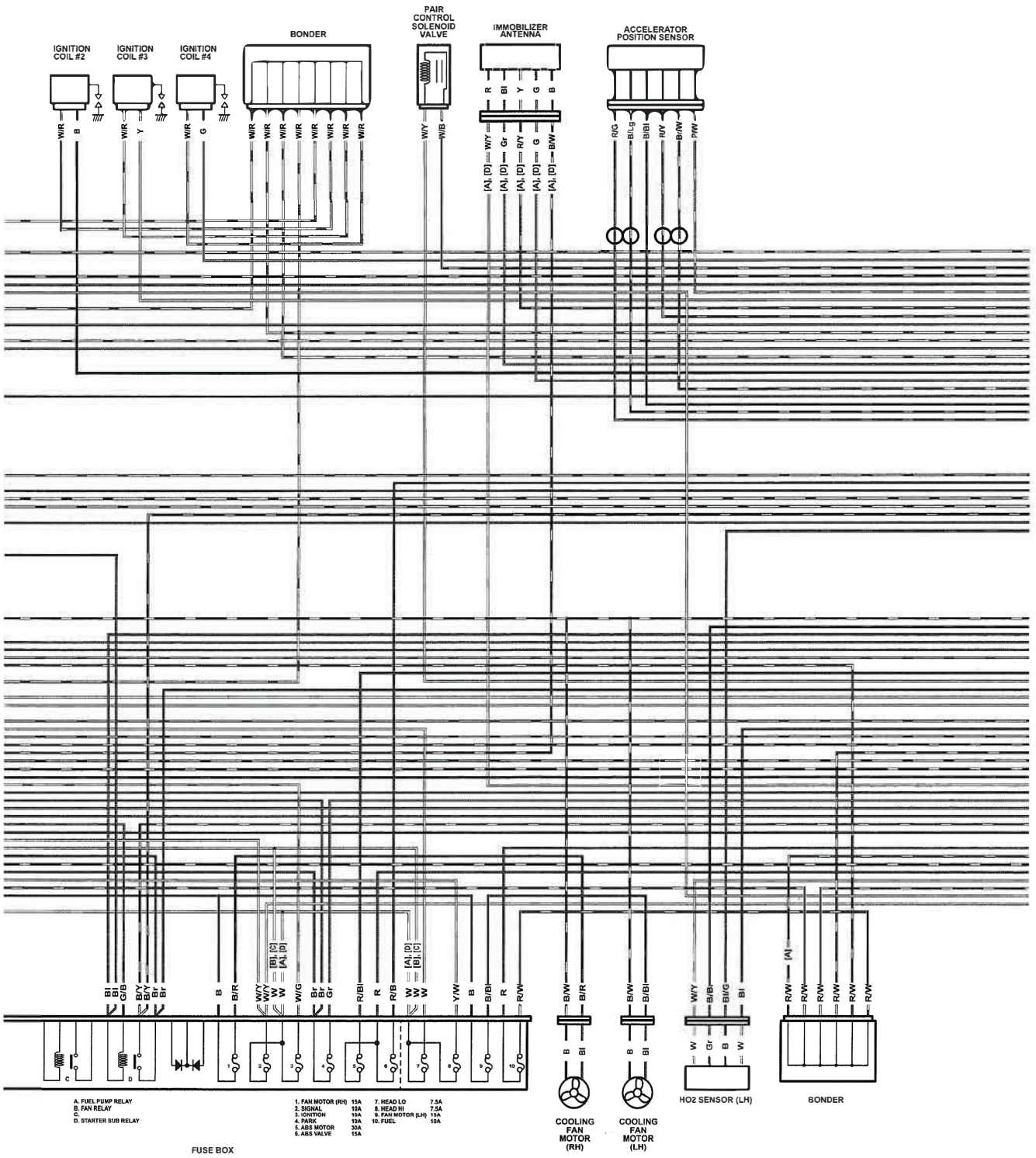
2/6



IM10L1910905-05

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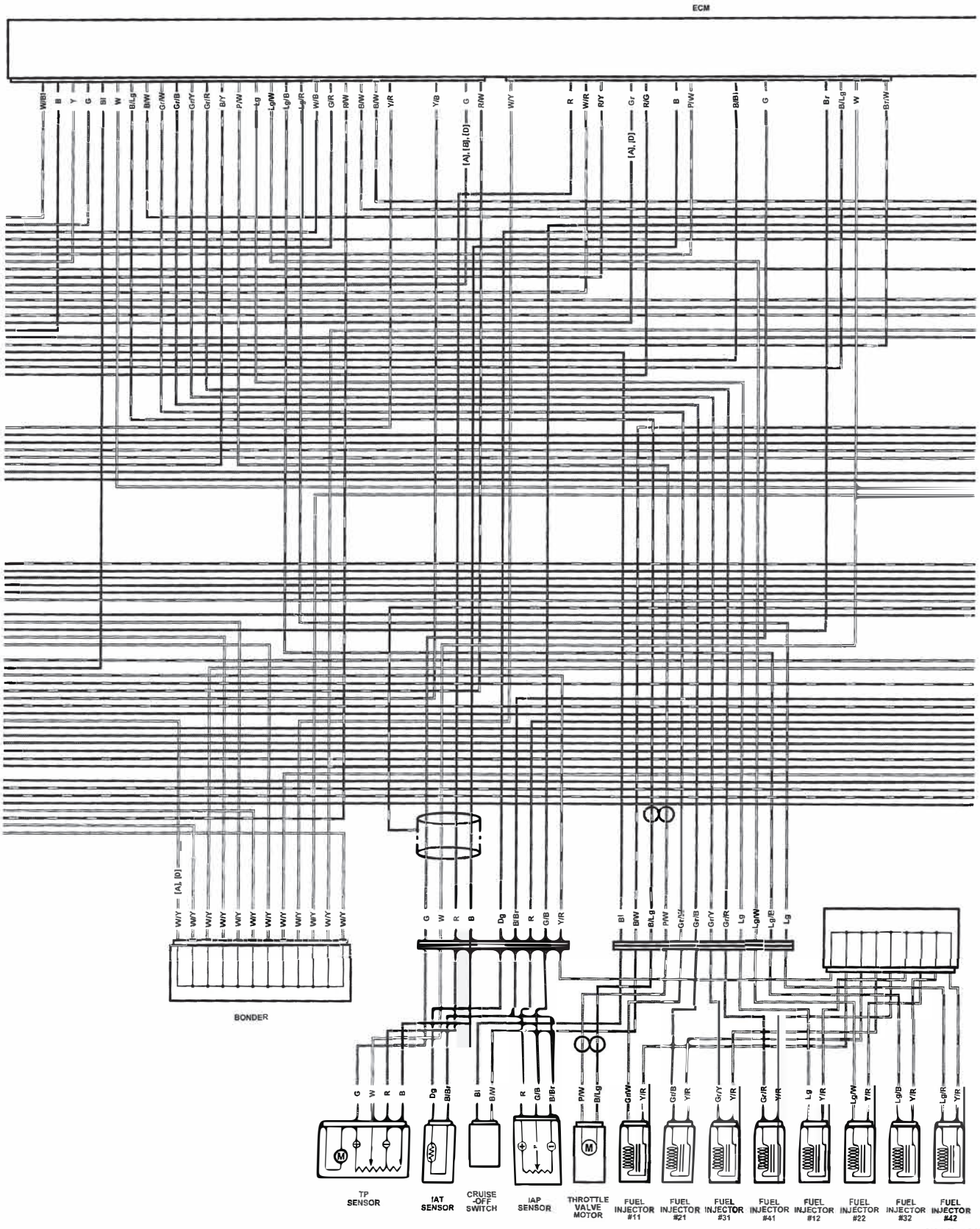
3/6



IM10L1910906-03

[A]: For Japan	[B]: For California State and Brazil	[C]: For U.S.A. and Canada	[D]: For others

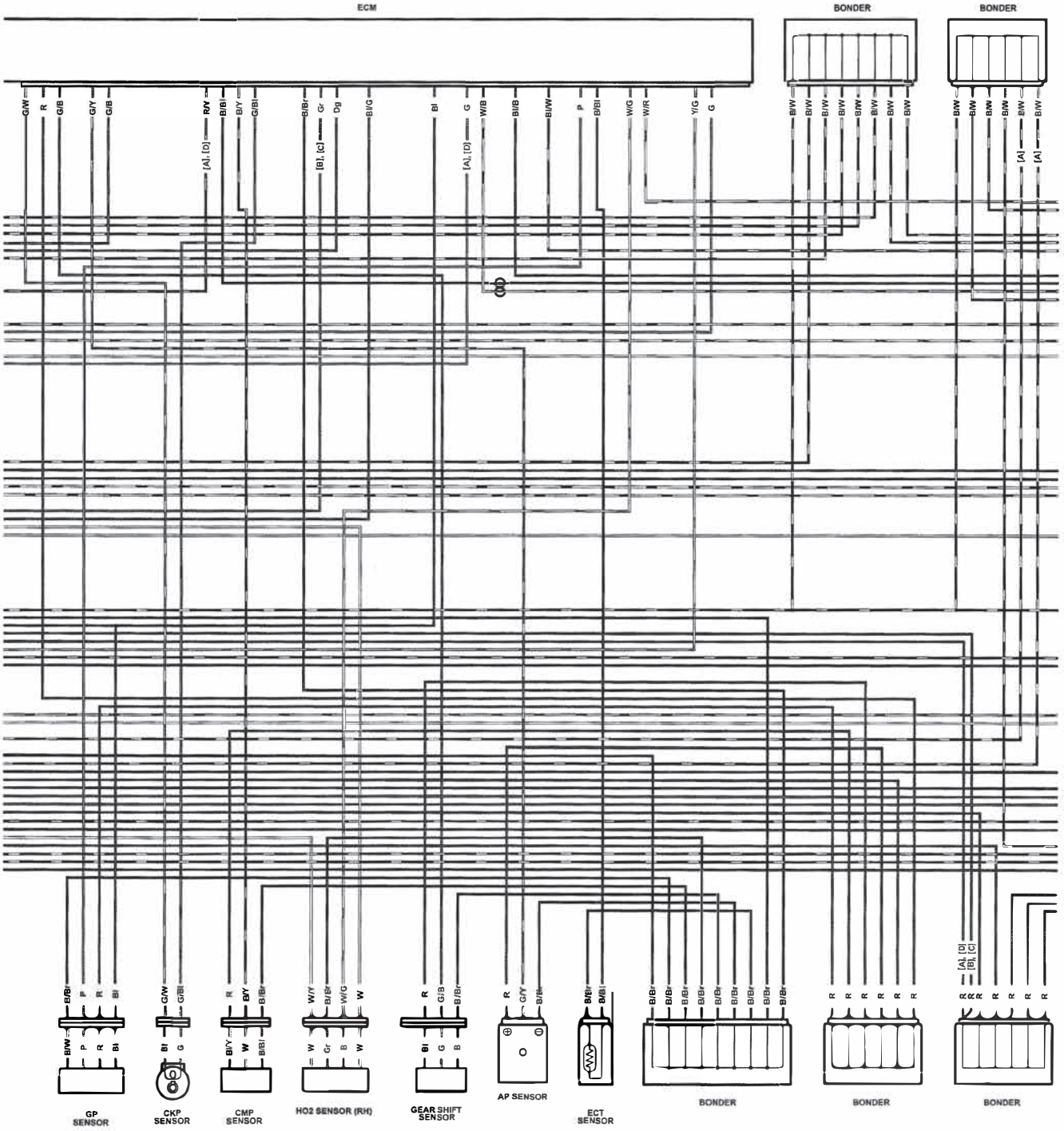
4/6



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[A]: For Japan	[B]: For California State and Brazil	[C]: For U.S.A. and Canada	[D]: For others

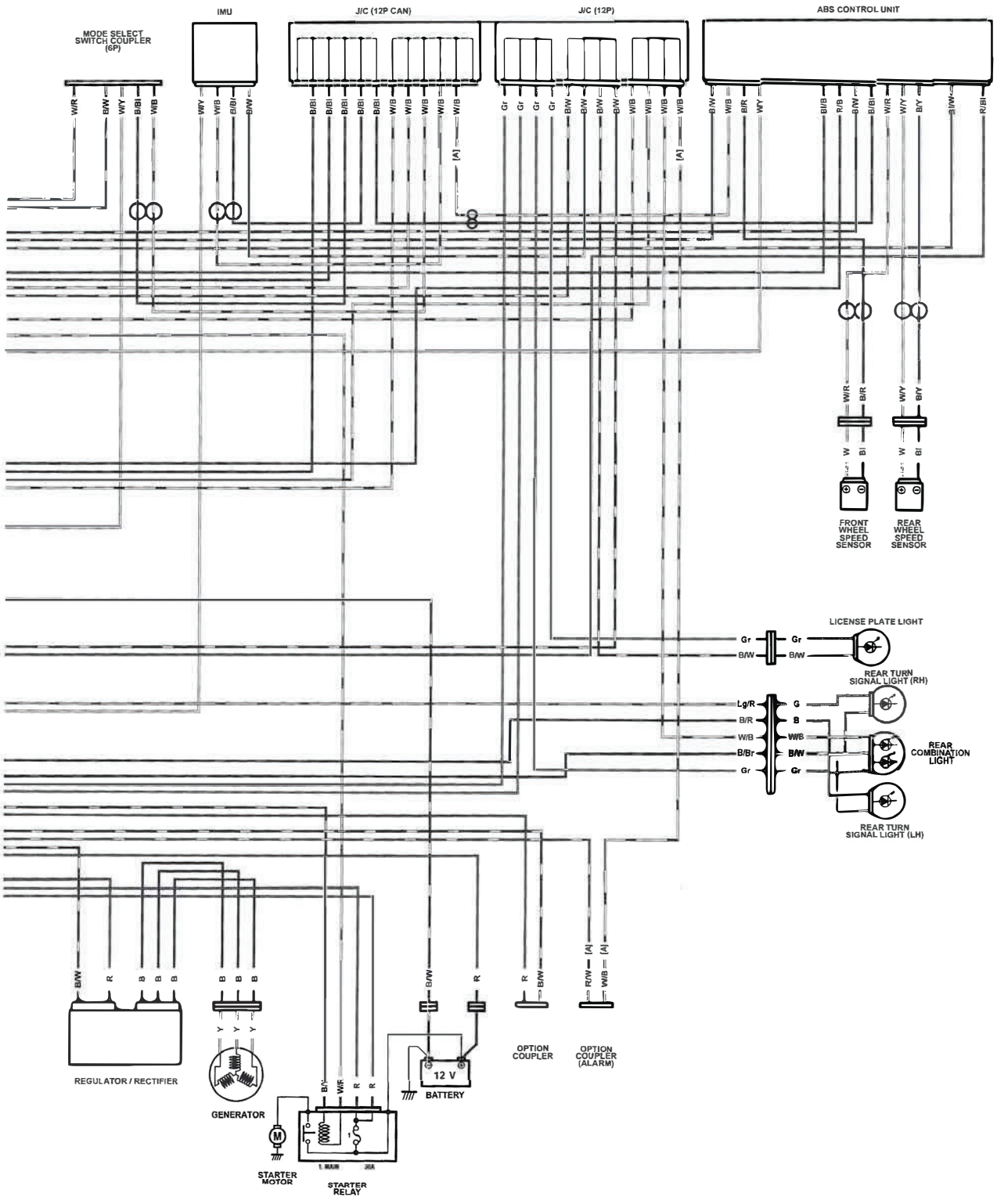
5/6



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[A]: For Japan	[B]: For California State and Brazil	[C]: For U.S.A. and Canada	[D]: For others

6/6



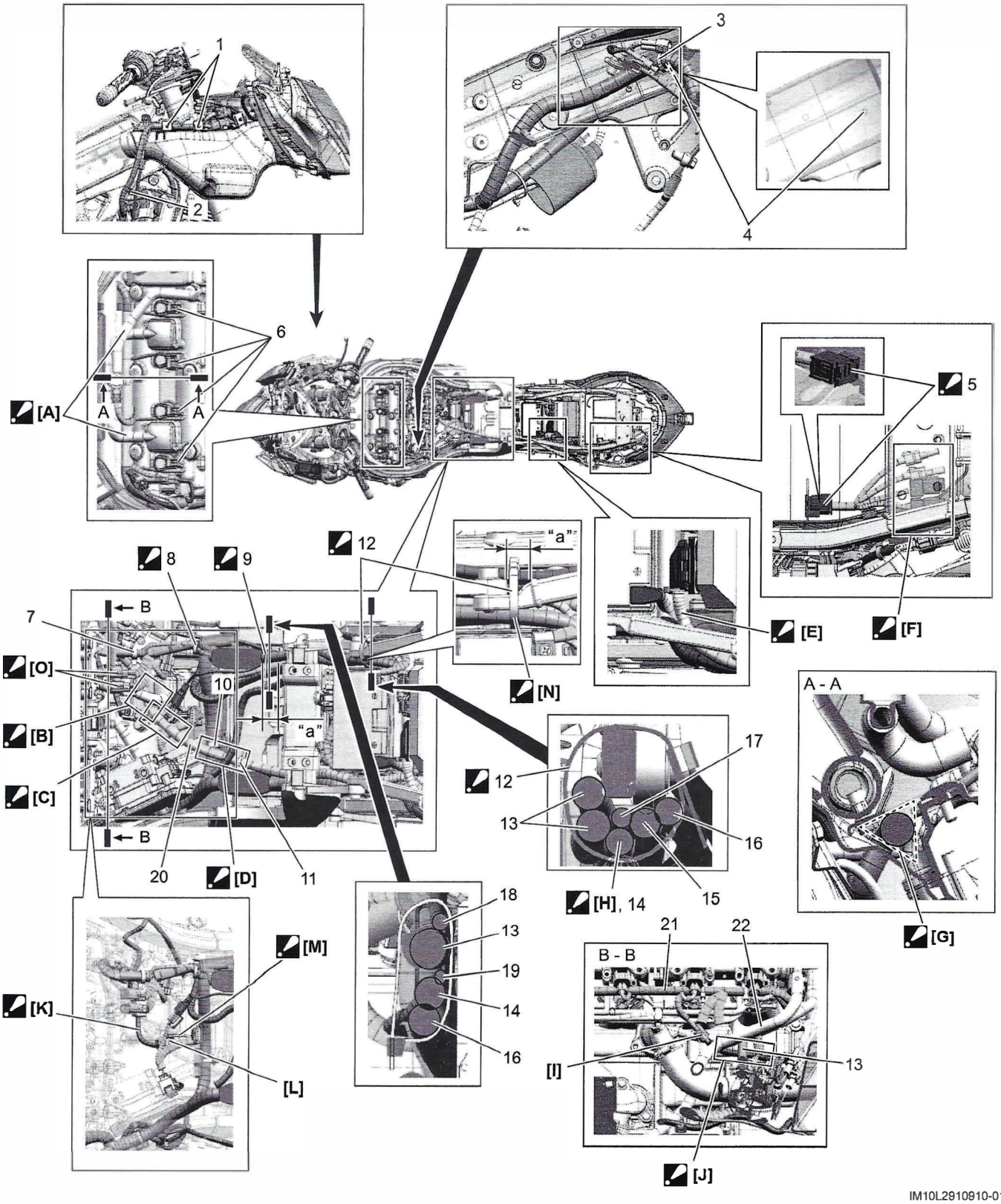
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[A]: For Japan	[B]: For California State and Brazil	[C]: For U.S.A. and Canada	[D]: For others

Wiring Harness Routing Diagram

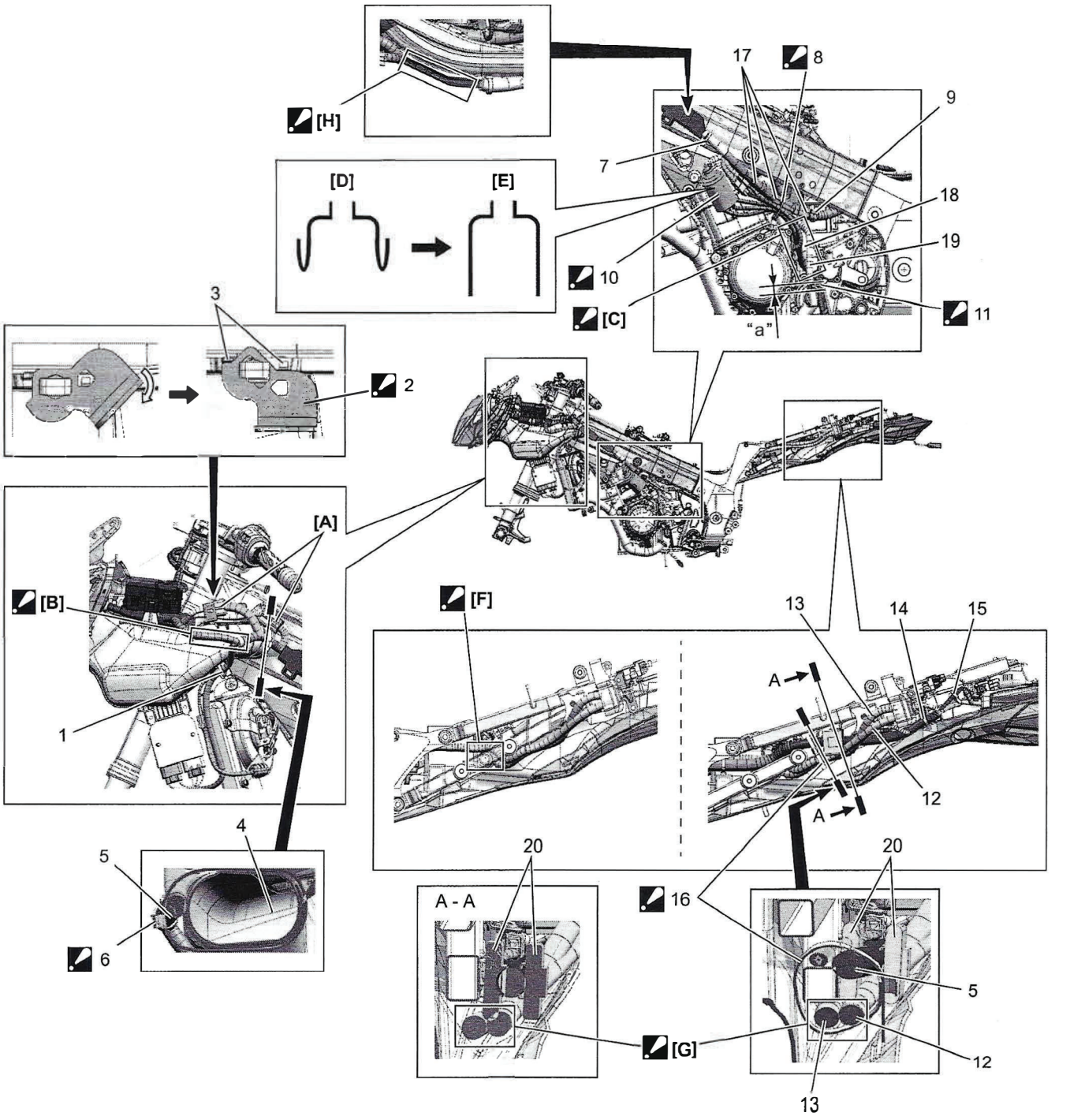
BENM10L39102002

Wiring Harness



IM10L2910910-01

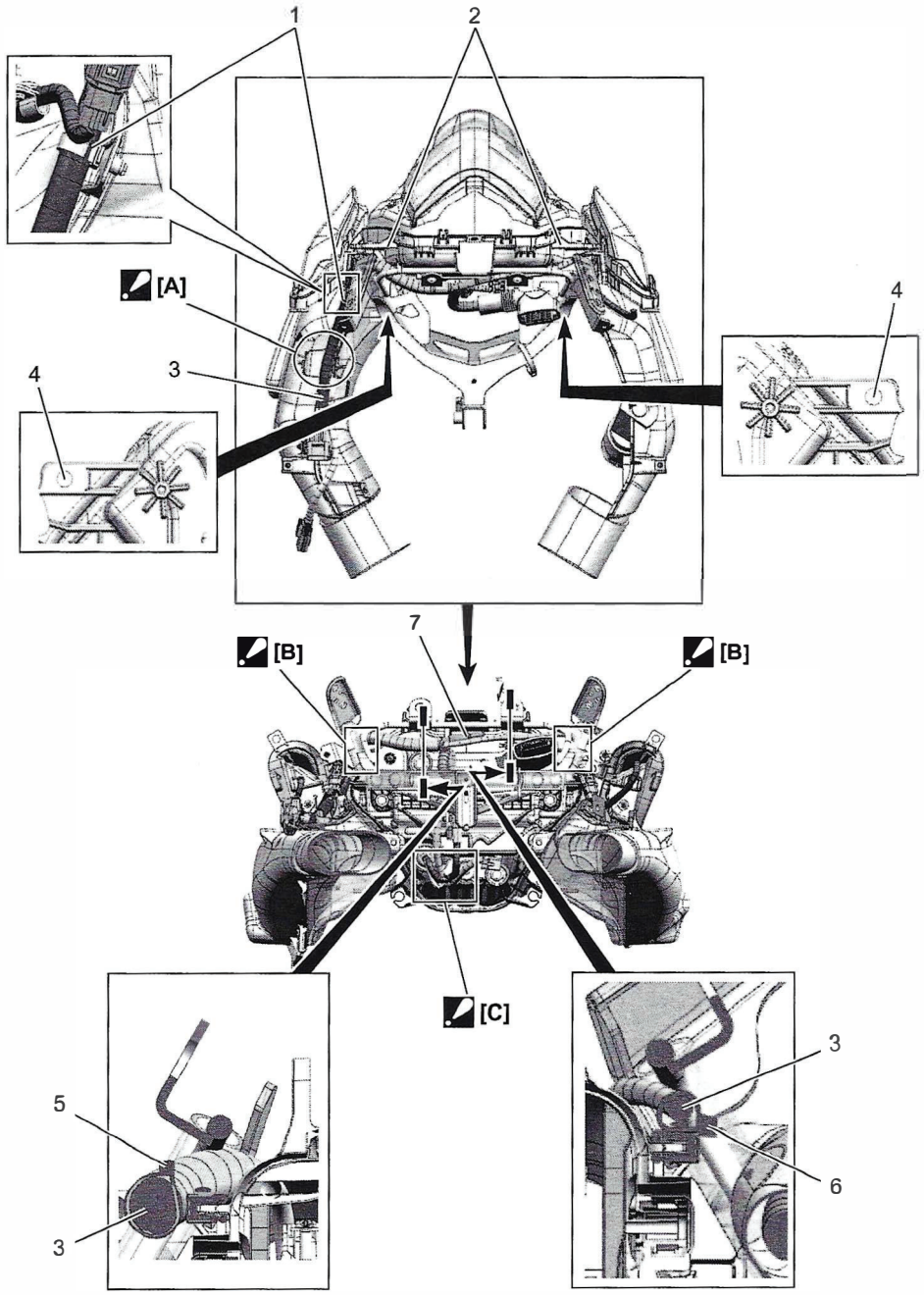
[A]: Pass the wiring harness under the PAIR hose.	[N]: Clamp within the dent of the frame and seat rail fastening part.	12. Clamp : Clamp the wiring harness No.1, battery minus lead wire, purge hose No.1 and purge hose No.2. Face the lock part of clamp outside. Face the tip of clamp downward.
[B]: Pass the starter motor lead wire through the left side of the breather tube.	[O]: After connecting to the wiring harness No.3, place the coupler inside the harness trunk line.	13. Wiring harness No.1
[C]: Pass the branch lead wire (HO2 sensor and ABS Control Unit / HU) under the starter motor lead wire.	1. Clamp of wiring harness No.1 (Intake pipe assembly (RH))	14. Battery minus lead wire
[D]: Place purge hose, starter motor lead, and wiring harness in that order from above.	2. Clamp of wiring harness No.1 (Radiator)	15. Purge hose No.2
[E]: Pass the battery plus lead wire under the branch lead wire (ECU).	3. Clamp of wiring harness No.1 (Frame tube)	16. Purge hose No.1
[F]: Place the ETC fuse, option fuse and alarm prewire inside the rear fender (front).	4. Hole for insert clamp	17. Battery minus of wiring harness No.1
[G]: Place the harness between the frame, cylinder head and radiator heat shield as shown in the figure.	5. Mode select coupler (6P) : Set the cap into the rear fender (front) rib.	18. Rear brake switch lead wire
[H]: Pass the battery minus lead wire through the outside of the wiring harness No.1.	6. Ignition coil coupler	19. Rear wheel speed sensor lead wire
[I]: Connection position of the cruise control cancel switch lead wire.	7. Clamp of wiring harness No.1 (AP sensor bracket)	20. Starter motor lead wire
[J]: Pass the cruise control cancel switch lead wire under the wiring harness and breather tube.	8. Clamp : Clamp the wiring harness and rear brake light switch lead wire. Cut off the tip of the clamp leaving 0 – 5 mm (0 – 0.19 in).	21. Wiring harness No.3
[K]: Pass the HO2 sensor lead wire and oil pressure switch lead wire along the starter motor lead wire.	9. Clamp : Clamp the wiring harness, battery minus lead wire (Blue tape position), rear wheel speed sensor lead wire, rear brake light switch lead wire (white tape position) and purge hose No.1 in range "a". Face the clamp lock inside. Face the tip of clamp inside. Cut off the tip of the clamp leaving 0 – 5 mm (0 – 0.19 in).	22. Breather tube
[L]: Connection position of the HO2 sensor lead wire.	10. Clamp of wiring harness No.1 (ABS control unit / HU section)	"a": 30mm (1.1 in) from the frame bridge.
[M]: Connection position of the oil pressure switch lead wire. This connection position is placed under the ABS control unit lead wire of wiring harness No.1 and starter motor lead wire.	11. Clamp of starter motor lead wire (Frame body upper bridge)	



IM10L1910911-03

[A]: Connection position with wiring harness No.2	3. Lock part	13. Battery plus lead wire
[B]: The branch line to the fuse box must pass under the screw fastening position of intake pipe.	4. Intake pipe assembly (LH)	14. Clamp of wiring harness No.1 (Relay bracket)
[C]: Pass the following lead wires through the outside of the inlet hose and the inside of the water bypass hose. • Side-stand Switch lead wire • Generator lead wire • GP sensor lead wire • Gearshift sensor lead wire • HO2 sensor	5. Wiring harness No.1	15. Clamp of wiring harness No.1 (Seat rail)
[D]: Before connection	6. Clamp : Clamp the wiring harness No.1 at the white tape position. Face the lock part of clamp outside. Face the tip of clamp downward. Cut off the tip of the clamp leaving 0 – 5 mm (0 – 0.19 in).	16. Clamp : Clamp the following lead wires. • Wiring harness no.1 • Battery plus lead wire • Starter motor lead wire Face the lock part of clamp outside. Face the tip of clamp downward.
[E]: After connection	7. Clamp of wiring harness No.1 (Frame)	17. Bonder
[F]: Pass the starter motor lead wire through the top of the seat rail bridge.	8. Clamp : Clamp the following lead wires. • Wiring harness No.1 (Blue tape position) • Side-stand Switch lead wire • Generator lead wire • GP sensor lead wire • Gearshift sensor lead wire • HO2 sensor Cut off the tip of the clamp leaving 0 – 5 mm (0 – 0.19 in).	18. Cylinder inlet hose
[G]: Pass the battery plus lead wire and starter motor lead wire under the J/C. Pass the battery plus lead wire inside of the starter motor lead wire.	9. Clamp of wiring harness No.1 (ABS control unit / HU holder)	19. Water bypass hose
[H]: Assemble the resin guide part along the frame.	10. Boot : Side-stand switch, GP sensor, gearshift sensor couplers shall be placed in the boot after connection.	20. J/C
1. Clamp of wiring harness No.1 (Intake pipe assembly (LH))	11. Clamp : Clamp the following lead wires. • Side-stand Switch lead wire • GP sensor lead wire • Gearshift sensor lead wire (White tape position) • HO2 sensor Cut off the tip of the clamp leaving 0 – 5 mm (0 – 0.19 in).	"a": Clamp area
2. Harness bracket : After fitting to the intake pipe assembly (LH), turn it clockwise to the locked position.	12. Starter motor lead wire	

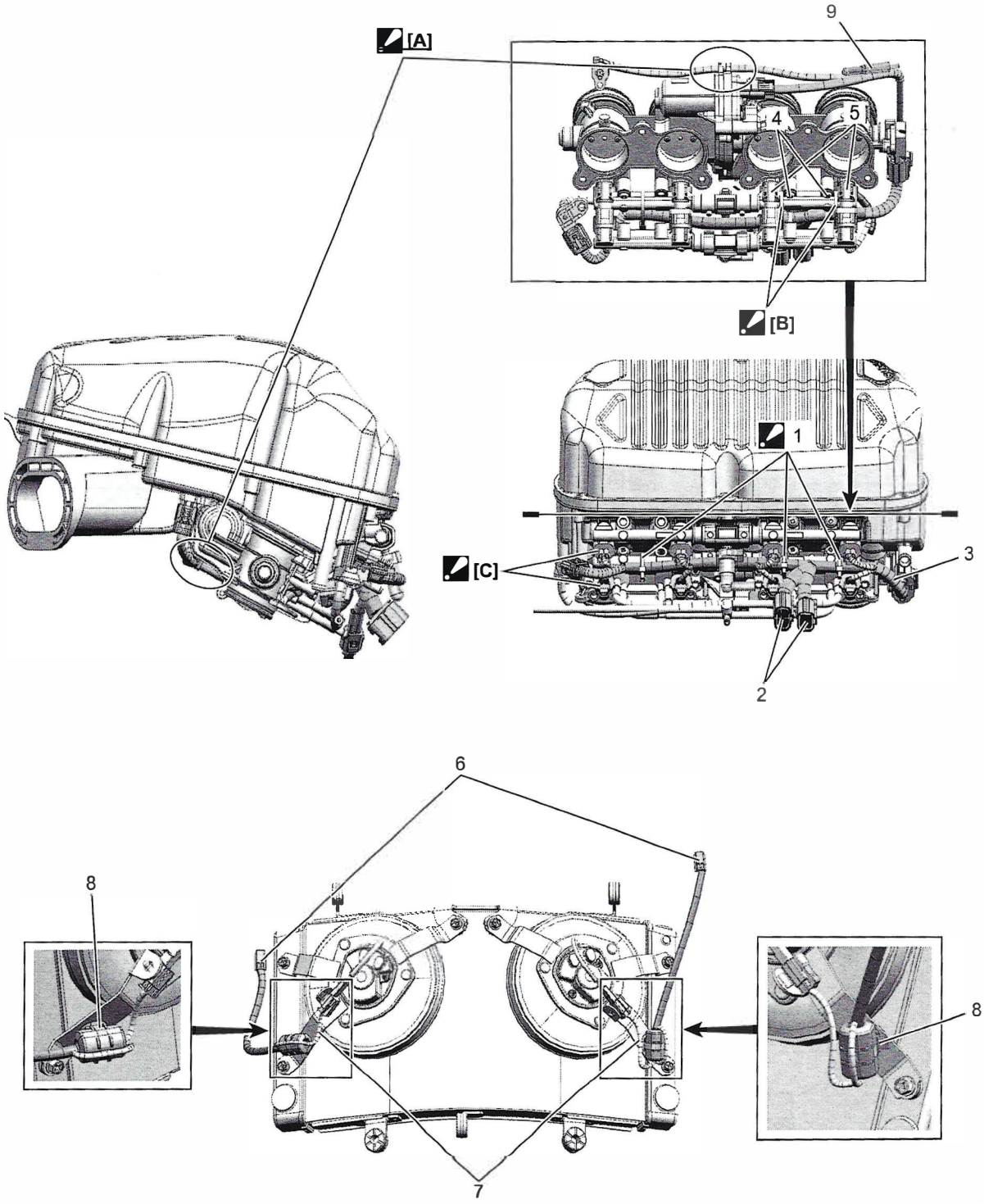
Headlight



IM10L1910912-02

[A]: Pass the wiring harness No.2 between the fuse box ribs.	2. Clamp of wiring harness No.2 (Hole for assembling Headlight)	6. Clamp of wiring harness No.2 (Headlight)
[B]: Pass the wiring harness No.2 between the headlight and brace.	3. Wiring harness No.2	7. Bonder
[C]: Pass the branch lead wire (ambient air temperature sensor) between branch lead wire (headlight) and headlight.	4. Hole for assembling Headlight	
1. Clamp of wiring harness No.2 (Intake pipe assembly)	5. Clamp of wiring harness No.2 (Headlight)	

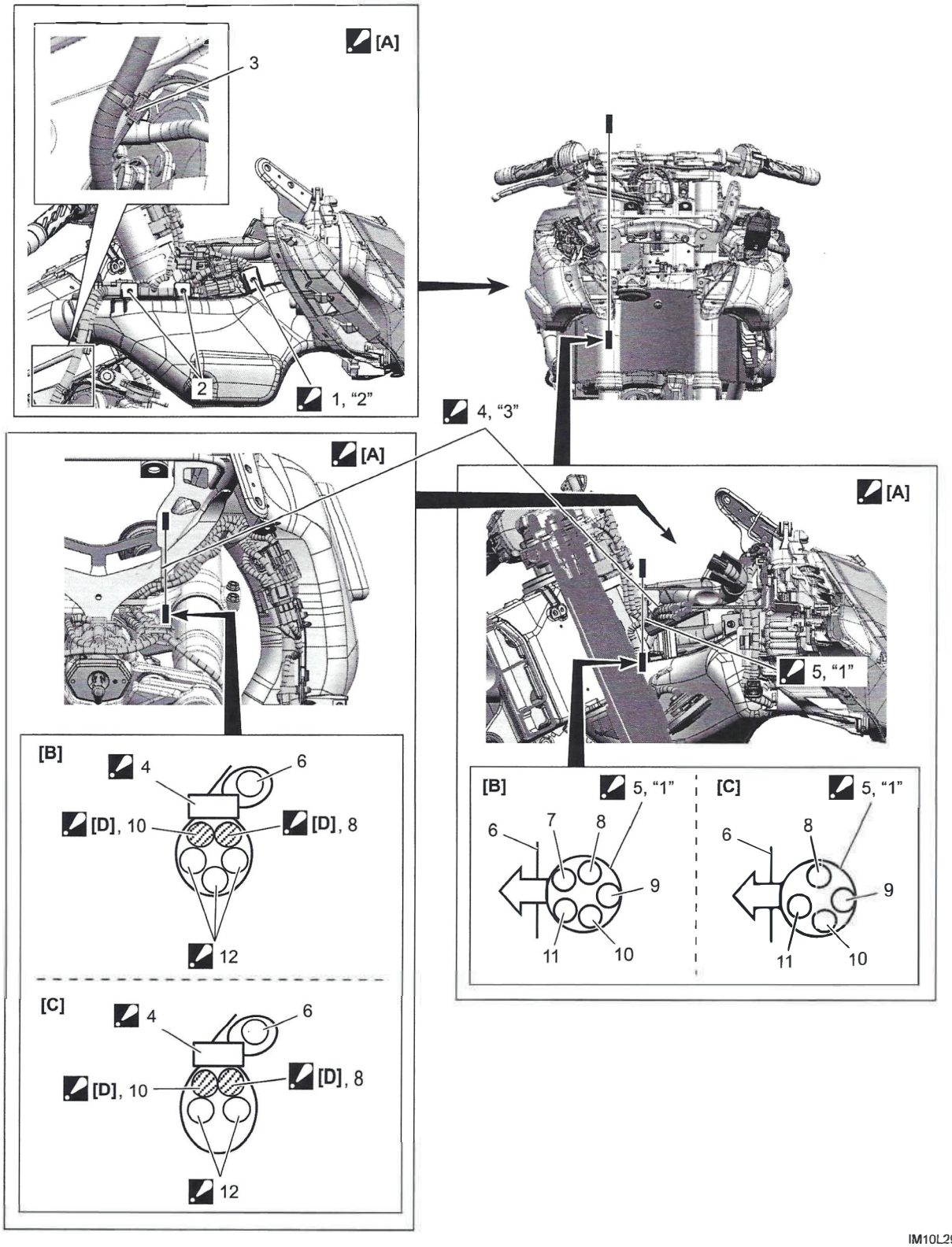
Intake System



IM10L1910913-03

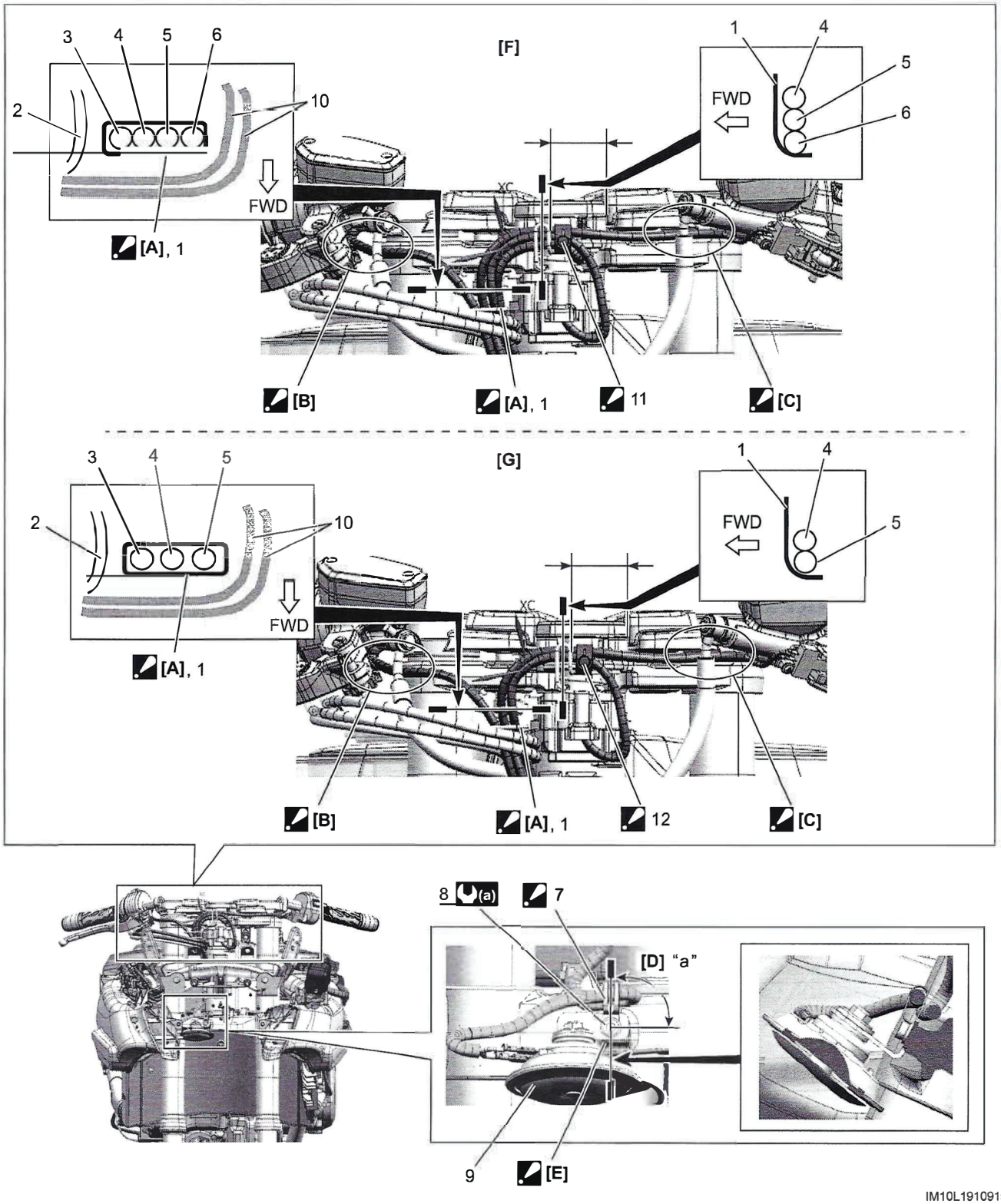
[A]: Pass the branch lead wire (IAT sensor) under the throttle body.	2. Connection part with wiring harness No.1	6. Connection part with wiring harness No.1
[B]: Clamp the wiring harness No.3 on fuel delivery pipe between the fuel injector and bolt.	3. Wiring harness No.3	7. Fan motor lead wire
[C]: Injector coupler color Upper side: Gray Lower side: Brown	4. Bolt	8. Clamp of fan motor lead wire (Fan motor bracket)
1. Clamp : Clamp at the white tape position. Face the lock part of clamp to backside. Face the tip of clamp to backside. Cut off the tip of the clamp leaving 0 – 5 mm (0 – 0.19 in).	5. Fuel injector	9. Bonder

Handle Switch



IM10L2910911-01

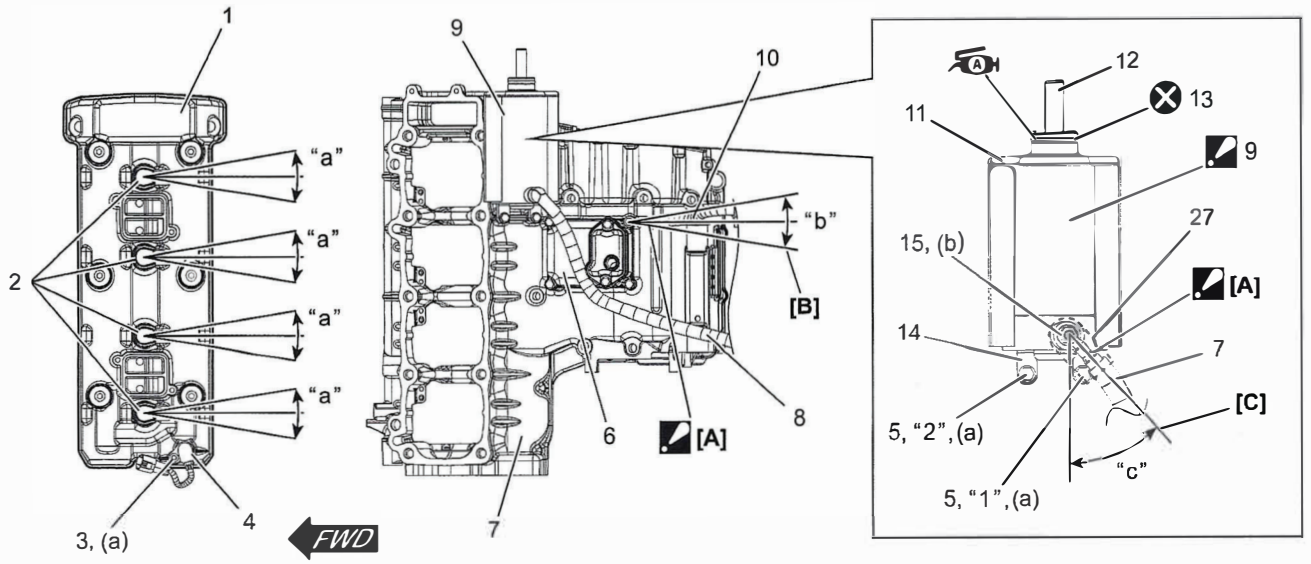
☑ [A]: Clamp in the order of "1", "2" and "3".	3. Clamp of wiring harness No.1 (Radiator)	9. Horn lead wire of wiring harness No.1
[B]: With immobilizer	☑ 4. Clamp : Clamp the following lead wires. • Left handle switch lead wire (Gray tape position) • Right handle switch lead wire (Gray tape position) • Immobilizer antenna lead wire (Blue tape position) (If equipped) • Ignition switch lead wire (Blue tape position) • Horn lead wire of wiring harness No.1 (Blue tape position) • Cowling brace Face the lock part of clamp to backside. Face the tip of clamp upward.Cut off the tip of the clamp leaving 0 – 3 mm (0 – 0.11 in).	10. Right handle switch lead wire
[C]: Without immobilizer	☑ 5. Insert clamp : Clamp the following lead wires. • Left handle switch lead wire (Gray tape position) • Right handle switch lead wire (Gray tape position) • Immobilizer antenna lead wire (Blue tape position) (If equipped) • Ignition switch lead wire (Blue tape position) • Horn lead wire of wiring harness No.1 (Blue tape position) Insert the clamp into the cowling brace. Cut off the tip of the clamp leaving 0 – 3 mm (0 – 0.11 in).	11. Ignition switch lead wire
☑ [D]: Arrange right handle switch lead wire and left handle switch lead wire side by side.	6. Cowling brace	☑ 12. Ignition switch lead wire, horn lead wire of wiring harness No.1 and immobilizer antenna lead wire (If equipped). : These lead wires are arranged in any order.
☑ 1. Insert clamp : Clamp the following lead wires. • Left handle switch lead wire (Gray tape position) • Right handle switch lead wire (Gray tape position) • Immobilizer antenna lead wire (Red tape position) (If equipped) • Ignition switch lead wire (Gray tape position) • Horn lead wire of wiring harness No.1 (Blue tape position) Insert the clamp into the intake pipe assembly (RH). Face the tip of clamp upward. Cut off the tip of the clamp leaving 0 – 3 mm (0 – 0.11 in).	7. Immobilizer antenna lead wire (If equipped)	
2. Clamp of wiring harness No.1 (Intake pipe assembly (RH))	8. Left handle switch lead wire	

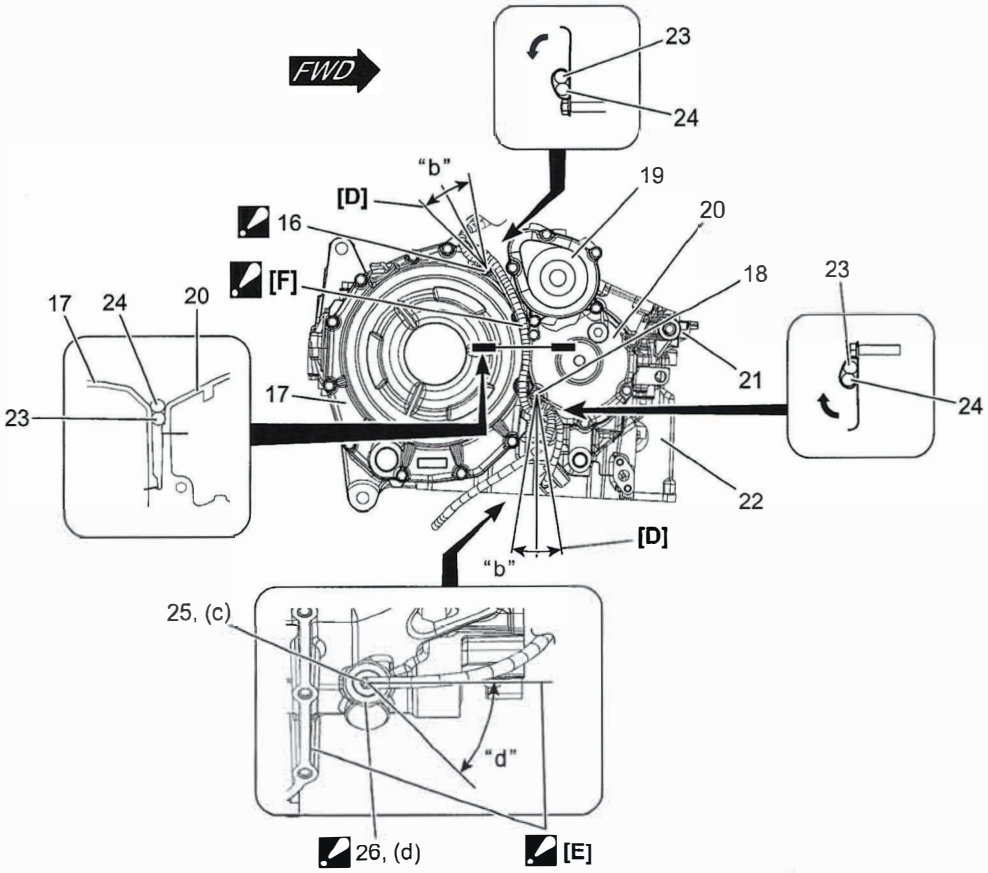


IM10L1910915-03

[A]: Pass the following lead wire into the guide. • Left handle switch lead wire • Right handle switch lead wire • Immobilizer antenna lead wire (If equipped) • Ignition switch lead wire	1. Guide	8. Horn bolt
[B]: Pass the right handle switch lead wire through the back of the throttle cables and front brake hose.	2. Front brake hose	9. Horn
[C]: Pass the left handle switch lead wire through the back of the clutch hose.	3. Right handle switch lead wire	10. Throttle cables
[D]: Clamp mounting angle	4. Left handle switch lead wire	11. Clamp : Clamp the following lead wires. • Left handle switch lead wire • Immobilizer antenna lead wire (If equipped) • Ignition switch lead wire Clamp between the left end of immobilizer antenna and the guide as shown in the figure.
[E]: After the horn bracket has contacted the stopper of the steering stem lower bracket, tighten the horn bolt to the specified torque.	5. Ignition switch lead wire	12. Clamp : Clamp the following lead wires. • Left handle switch lead wire • Immobilizer antenna lead wire (If equipped) • Ignition switch lead wire Clamp between the left end of steering lock cover and the guide as shown in the figure.
[F]: With immobilizer	6. Immobilizer antenna lead wire (If equipped)	"a": 75 – 105°
[G]: Without immobilizer	7. Clamp : Clamp at the folding position of branch line.	(a) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)

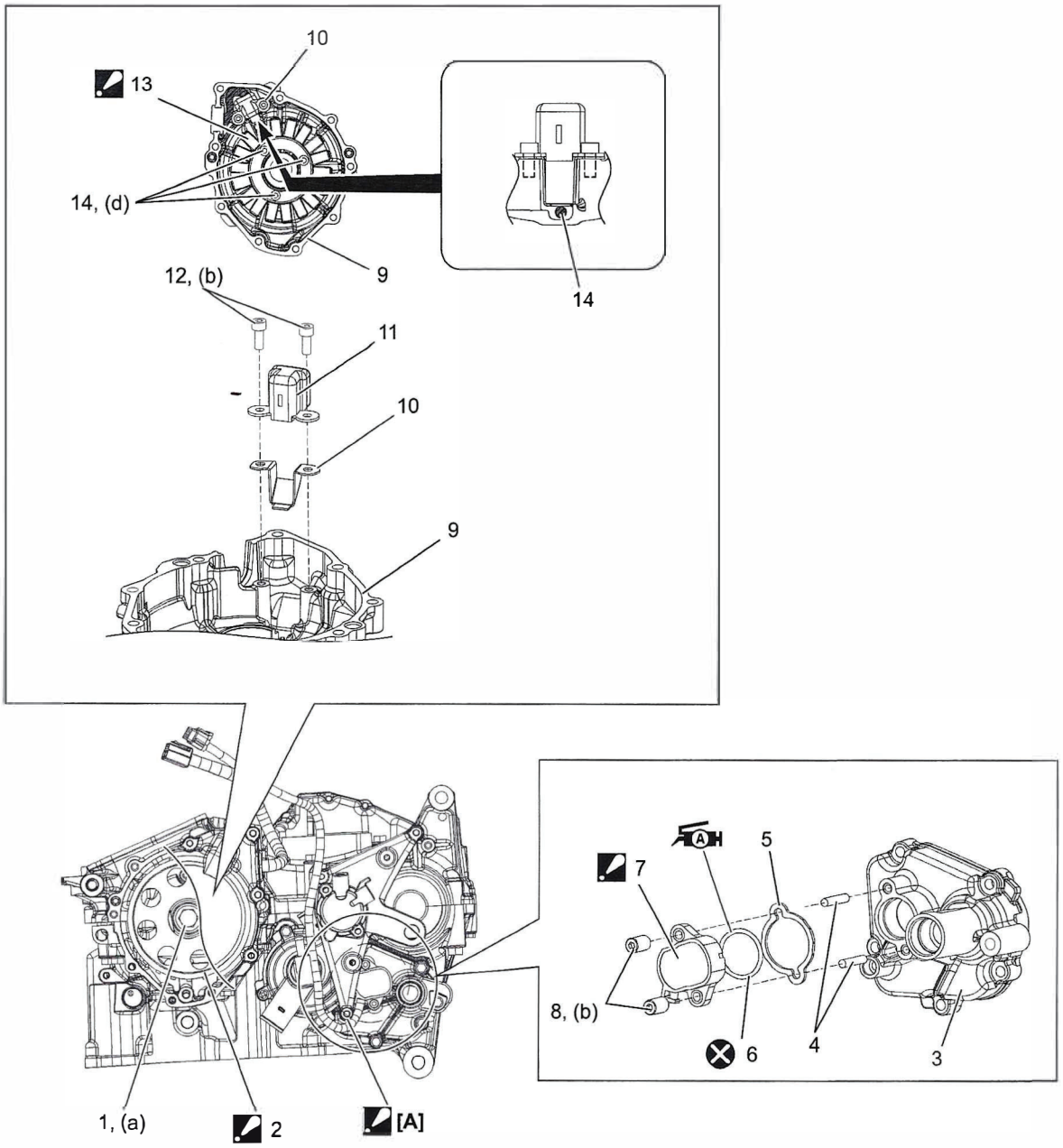
Engine Electrical Parts





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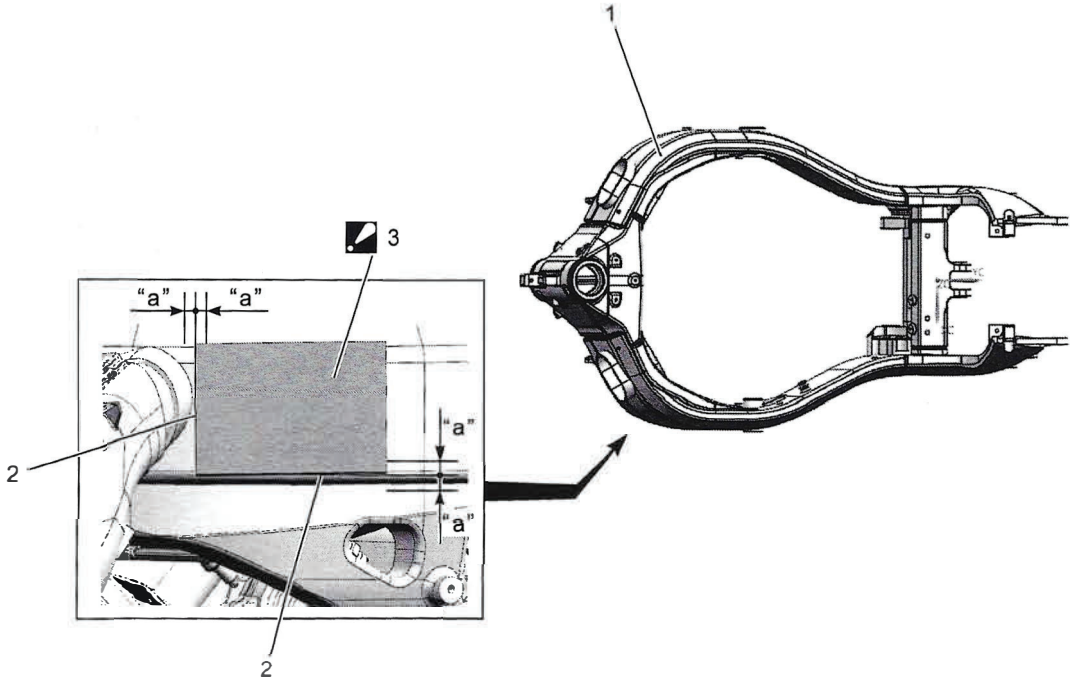
[A]: Face the crimped part upper.	10. Battery minus lead wire	25. Oil pressure switch lead wire connecting screw
[B]: Battery minus lead wire mounting angle	11. Housing end (Inside)	26. Oil pressure switch : Fill the inside of Switch with engine oil, and install it, Do not apply engine oil to thread part.
[C]: Starter motor lead wire mounting angle	12. Gear	27. Terminal cover
[D]: Clamp mounting angle	13. O-ring	"a": -5 – 5°
[E]: Assemble the oil pressure switch lead wire perpendicular to the oil pan mounting surface.	14. Housing end (Outside)	"b": -10 – 10°
[F]: Do not twist HO2 sensor lead wire and oil pressure switch lead wire.	15. Starter motor terminal nut	"c": 35 – 45°
1. Cylinder head	16. Clamp : Face the clamp to rubber plug.	"d": maximum 45°
2. Ignition coil	17. Clutch cover	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
3. CMP sensor bolt	18. Clamp	(b) : 5.0 N·m (0.51 kgf-m, 3.70 lbf-ft)
4. CMP sensor bolt	19. Starter torque limiter cover	(c) : 1.5 N·m (0.15 kgf-m, 1.10 lbf-ft)
5. Starter motor bolt	20. Starter clutch cover	(d) : 13 N·m (1.3 kgf-m, 9.5 lbf-ft)
6. Breather cover	21. Upper crankcase	(A) : Apply SUZUKI SUPER GREASE A.
7. Starter motor lead wire	22. Lower crankcase	: Do not reuse.
8. Upper crankcase	23. Oil pressure switch lead wire	
9. Starter motor : Install as the following procedure. 1. Install the new o-ring to housing end (Inside) and apply grease to o-ring. 2. Install the starter motor to the upper crankcase while inserting the gear into the starter clutch cover. 3. Tighten the starter motor bolts in the order of "1" and "2" to the specified torque. 4. Terminal cover securely covers each terminals.	24. HO2 sensor lead wire	



IM10L1910917-01

[A]: When install the clutch release cylinder holder, be careful not to catch GP sensor lead wire.	7. GP sensor : Install as the following procedure. 1. Install the sud bolts to the gear shift cover. 2. Install the GP sensor plate. 3. Apply grease to new o-ring and install it to GP sensor. 4. Install the GP sensor and tighten the nuts to the specified torque.	14. Generator lead wire
1. Generator rotor bolt	8. GP sensor nut	(a) : 120 N·m (12.2 kgf-m, 88.5 lbf-ft)
2. Generator rotor	9. Generator cover	(b) : 6.0 N·m (0.61 kgf-m, 4.45 lbf-ft)
3. Gearshift cover	10. Generator lead wire clamp	(c) : 6.5 N·m (0.66 kgf-m, 4.80 lbf-ft)
4. GP sensor stud bolt	11. CKP sensor	(d) : 11 N·m (1.1 kgf-m, 8.5 lbf-ft)
5. GP sensor plate	12. CKP sensor bolt	: Apply SUZUKI SUPER GREASE A.
6. O-ring	13. Generator stator : Install as the following procedure. 1. Install the grommet of the generator stater to the generator cover. 2. Tighten the bolts to the specified torque. 3. Pass the generator lead wire between ribs of the generator cover. 4. Install the generator lead wire clamp and tighten the clamp bolt to the specified torque, taking care not to pinch the lead wire between clamp and rib.	: Do not reuse.

Wiring Harness Cushion



IM10L1910919-01

1. Frame	2. Weld bead end	3. Cushion : Stick the cushion within ± 10 mm of the weld bead end as shown in the figure.	"a": 10mm

Component Location

Electrical Components Location

BENM10L39103001

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

Specifications

Tightening Torque Specifications

BENM10L3910S001

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Wiring Harness Routing Diagram" (Page 9A-13)
"Fasteners Information" in Section 0C (Page 0C-6)

Special Tools and Equipment

Recommended Service Material

BENM10L3910T001

NOTE

Required service material(s) is also described in:
"Wiring Harness Routing Diagram" (Page 9A-13)

Lighting Systems

Precautions

Precautions for Lighting Systems

BENM10L39200001

NOTICE

- **When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soap water to prevent premature bulb failure.**
- **Do not use the bulb of a wattage other than specification.**

Diagnostic Information and Procedures

Headlight Symptom Diagnosis

BENM10L39204001

Condition	Possible cause	Correction / Reference Item
Low beam does not light up	Circuit fuse blown.	*Replace fuse and check short circuit.*
	Faulty LED.	*Replace headlight. ☞(Page 9B-4)*
	Faulty wiring or ground.	*Repair wiring. ☞(Page 9A-5)*
	Faulty dimmer / passing light switch.	*Check dimmer / passing light switch. ☞(Page 9B-8)*
High beam does not light up	Circuit fuse blown.	*Replace fuse and check short circuit.*
	Faulty LED.	*Replace headlight. ☞(Page 9B-4)*
	Faulty wiring or ground.	*Repair wiring. ☞(Page 9A-5)*
	Faulty dimmer/passing light switch.	*Check dimmer / passing light switch. ☞(Page 9B-8)*

Turn Signal Light and Hazard Light Symptom Diagnosis

BENM10L39204002

Condition	Possible cause	Correction / Reference Item
Flash rate high or one side only flashes	Faulty hazard switch.	*Check hazard switch. ☞(Page 9B-8)*
	Faulty LED.	*Replace turn signal light. ☞(Page 9B-7)*
	Faulty wiring or grounding.	*Repair wiring. ☞(Page 9A-5)*
	Faulty combination meter.	*Replace combination meter. ☞(Page 9C-13)*

Rear Combination Light Symptom Diagnosis

BENM10L39204003

Condition	Possible cause	Correction / Reference Item
Taillight does not light up	Circuit fuse blown.	*Replace fuse and check short circuit.*
	Faulty LED.	*Replace rear combination light. ☞(Page 9B-7)*
	Faulty wiring or grounding.	*Repair wiring. ☞(Page 9A-5)*
Some lights do not light up	Faulty LED.	*Replace rear combination light. ☞(Page 9B-7)*
	Faulty wiring or grounding.	*Repair wiring. ☞(Page 9A-5)*
Brake light do not light up	Circuit fuse blown.	*Replace fuse and check short circuit.*
	Faulty front brake light switch.	*Check front brake light switch. ☞(Page 4A-9)*
	Faulty rear brake light switch.	*Check rear brake light switch. ☞(Page 4A-9)*
	Faulty wiring or grounding.	*Repair wiring. ☞(Page 9A-5)*
	Faulty LED.	*Replace rear combination light. ☞(Page 9B-7)*
Brake light stay on	Faulty front brake light switch.	*Check front brake light switch. ☞(Page 4A-9)*
	Faulty rear brake light switch.	*Check rear brake light switch. ☞(Page 4A-9)*
	Faulty LED.	*Replace rear combination light. ☞(Page 9B-7)*
	Faulty wiring or grounding.	*Repair wiring. ☞(Page 9A-5)*

Position light Symptom Diagnosis

BENM10L39204004

Condition	Possible cause	Correction / Reference Item
Position light does not light up	Faulty parking switch. (If equipped)	*Check parking switch. ☞(Page 9B-8)*
	Faulty LED.	*Replace front turn signal light. ☞(Page 9B-7)*
	Faulty wiring or grounding.	*Repair wiring. ☞(Page 9A-5)*
	Faulty combination meter.	*Replace combination meter. ☞(Page 9C-13)*

License Plate Light Symptom Diagnosis

BENM10L39204005

Condition	Possible cause	Correction / Reference Item
License plate light does not light up	Circuit fuse blown.	*Replace fuse and check short circuit.*
	Faulty LED.	*Replace rear combination light. ☞(Page 9B-7)*
	Faulty wiring or grounding.	*Repair wiring. ☞(Page 9A-5)*

Parking light system Symptom Diagnosis

BENM10L39204006

NOTE

When the ignition switch is switched to "P" (Parking), the following lights light up.

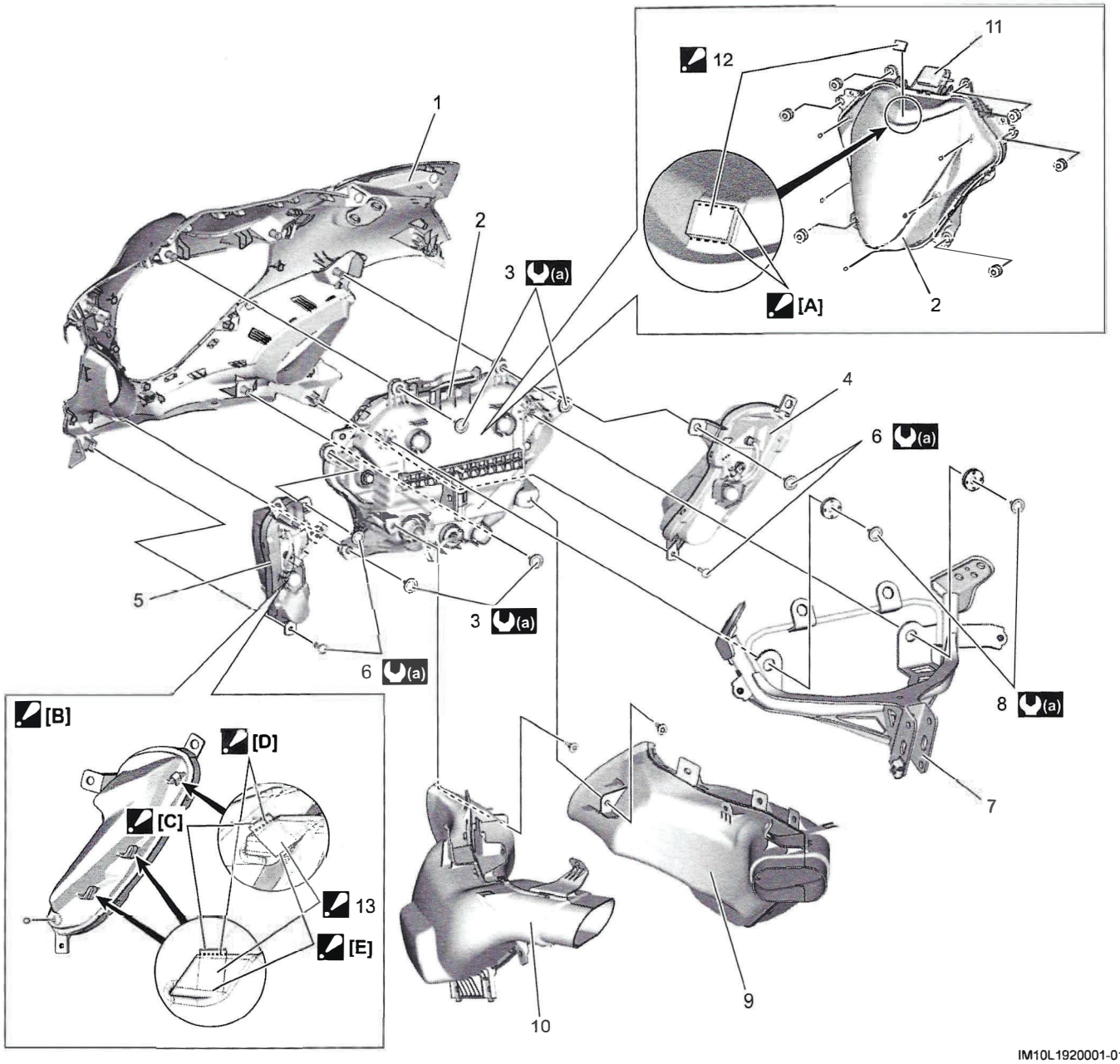
- **Front position light**
- **Taillight**
- **License plate light**

Condition	Possible cause	Correction / Reference Item
Some lights do not light up	Circuit fuse blown.	*Replace fuse and check short circuit.*
	Faulty LED.	*Replace the light.* • *Front turn signal light ☞(Page 9B-7)* • *Rear position light ☞(Page 9B-7)* • *License plate light ☞(Page 9B-7)*
	Faulty wiring or ground.	*Repair wiring. ☞(Page 9A-5)*
	Faulty combination meter.	*Replace combination meter. ☞(Page 9C-13)*
All lights do not light up	Circuit fuse blown.	*Replace fuse and check short circuit.*
	Faulty parking switch. (If equipped)	*Check parking switch. ☞(Page 9B-8)*

Repair Instructions

Headlight / Turn Signal Light Construction

BENM10L39206001



IM10L1920001-01

[A]: Stick the headlight fastener aligning with the emboss line.	2. Headlight	8. Cowl brace screw
[B]: The same procedures is applicable to both right and left parts.	3. Headlight screw	9. Intake pipe assembly (RH)
[C]: Stick the cushion by folding it inward.	4. Front turn signal (RH)	10. Intake pipe assembly (LH)
[D]: Stick the cushion so that it is perpendicular to the top end.	5. Front turn signal (LH)	11. ETC antenna (if equipped)
[E]: Stick the cushion along the end of the curved surface on the rib.	6. Front turn screw	12. Cushion : Clean the adhesive surface before sticking the fastener.
1. Body cowling assembly	7. Brace assembly	13. Cushion : Clean the adhesive surface before sticking the cushion.

Headlight Removal and Installation

BENM10L39206002

NOTE

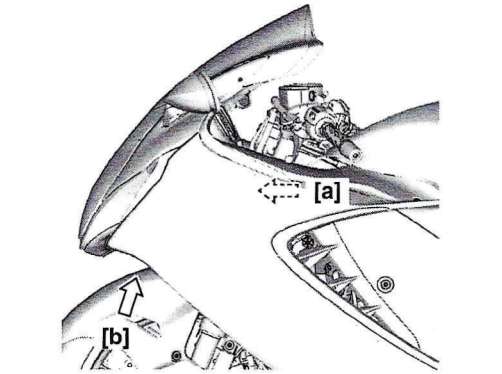
- **Headlight is LED. Replace the headlight as an assembly if headlight is defective.**
- **After installation of the headlight, check the headlight aiming.**

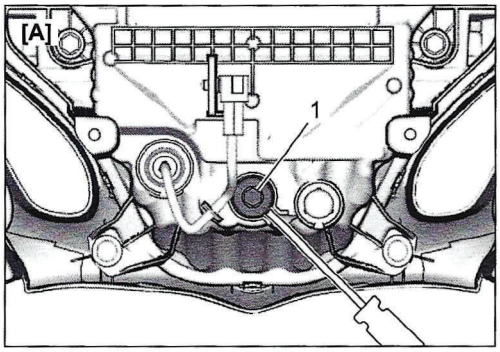
Refer to "Body Cowling Assembly Disassembly and Reassembly" in Section 9D (Page 9D-47).

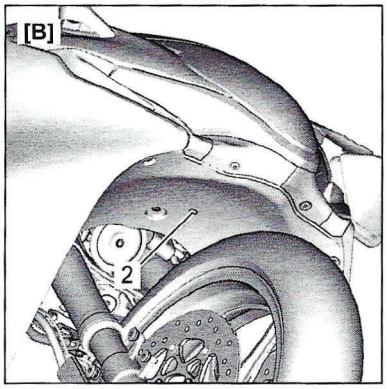
Headlight Beam Adjustment

BENM10L39206003

1) Adjust the headlight beam vertically turning the bolt (1) with a screwdriver from adjusting hole (2).





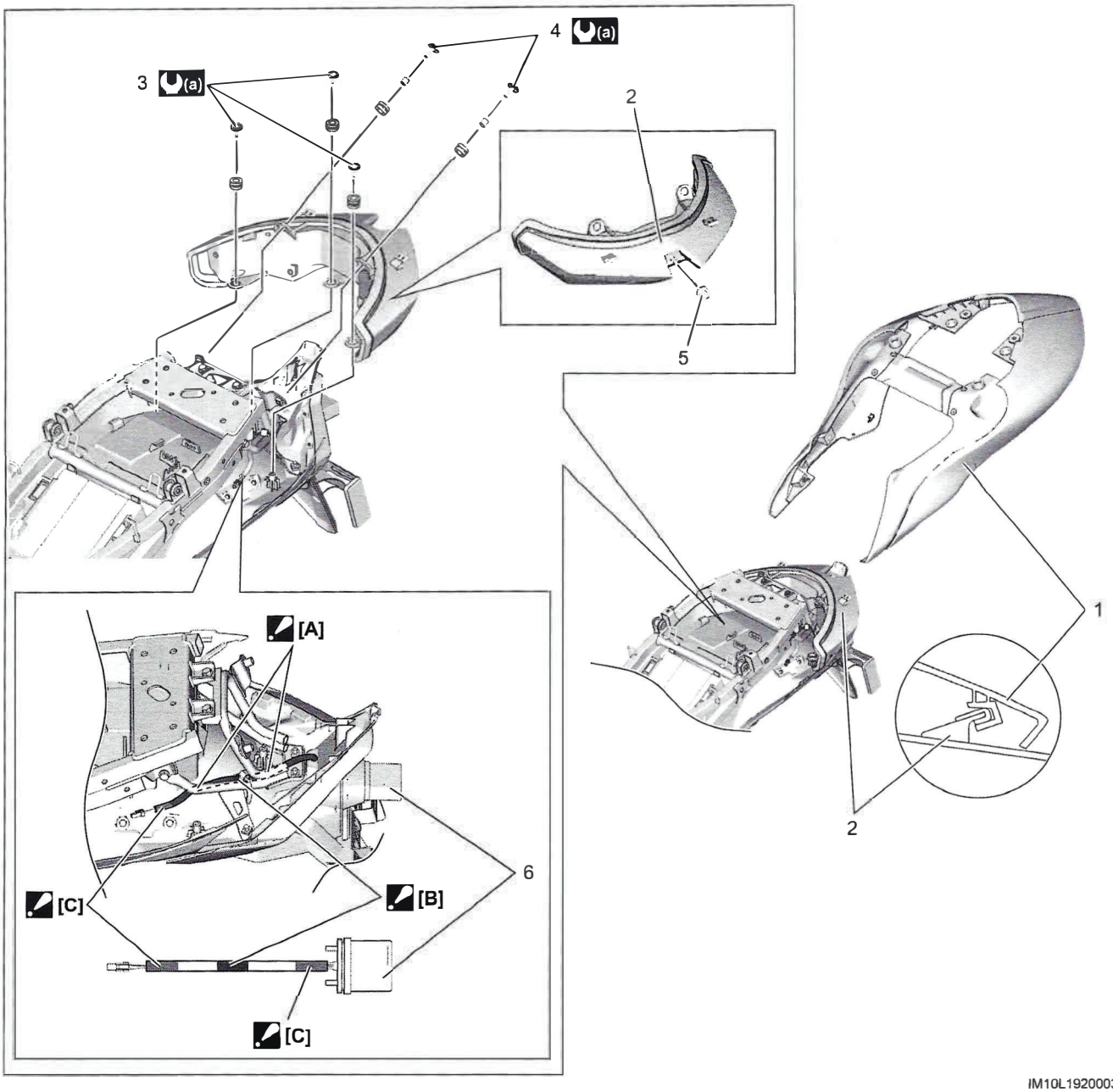


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[A]: View [a]	[B]: View [b]

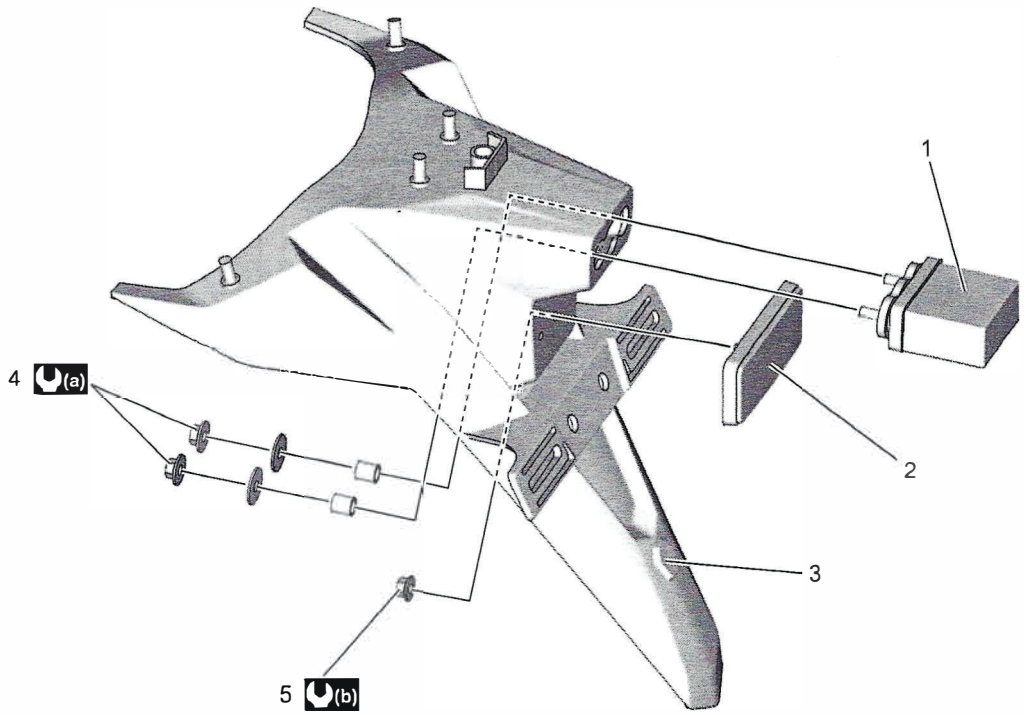
Rear Lighting System Construction

BENM10L39206004



IM10L1920003-03

[A]: Pass the license plate light lead wire inside of pipe.	2. Rear combination light	6. License plate light
[B]: Clamp the license plate light lead wire at this blue tape position.	3. Rear combination light screw	(a) : 2.5 N·m (0.25 kgf-m, 1.85 lbf-ft)
[C]: Do not clamp the license plate light lead wire at this blue tape position.	4. Rear combination light bolt	(b) : 5.0 N·m (0.51 kgf-m, 3.70 lbf-ft)
1. Frame cover assembly	5. Cushion	



IM10L1920004-01

1. License plate light	4. License plate light nut	(b) : 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)
2. Rear reflex reflector	5. Rear reflex reflector nut	
3. Rear fender (rear)	(a) : 3.0 N·m (0.31 kgf-m, 2.25 lbf-ft)	

Rear Combination Light Removal and Installation

BENM10L39206005

NOTE

Taillight and brake light are LED. Replace the rear combination light as an assembly if taillight or brake light is defective.

Removal

1) Remove the frame cover assembly. ☞(Page 9D-51)
2) Disconnect the coupler and remove the rear combination light. Refer to "Rear Lighting System Construction" (Page 9B-5).

Installation

Install the rear combination light in the reverse order of removal.

License Plate Light Removal and Installation

BENM10L39206006

NOTE

License plate light is LED. Replace the license plate light as an assembly if license plate light is defective.

Removal

1) Remove the rear fender (rear). ☞(Page 9D-53)
2) Disconnect the license plate light coupler and remove the clamps. Refer to "Rear Lighting System Construction" (Page 9B-5).
3) Remove the license plate light. Refer to "Rear Lighting System Construction" (Page 9B-5).

Installation

Install the license plate light in the reverse order of removal.

Turn Signal Light Construction

BENM10L39206007

Front

Refer to "Headlight / Turn Signal Light Construction" (Page 9B-3).

Rear

NOTE

Rear turn signal light is integral with rear combination light.

Refer to "Rear Lighting System Construction" (Page 9B-5).

Turn Signal Light Removal and Installation

BENM10L39206008

Front turn signal light

NOTE

Front turn signal light is LED. Replace the front turn signal light as an assembly if front turn signal light is defective.

Removal

Refer to "Body Cowling Assembly Disassembly and Reassembly" in Section 9D (Page 9D-47).

Installation

Install the front turn signal light in the reverse order of removal.

Rear turn signal light

NOTE

- **Rear turn signal light is integral with rear combination light.**
- **Rear turn signal light is LED. Replace the rear combination light as an assembly if rear turn signal light is defective.**

Refer to "Rear Combination Light Removal and Installation" (Page 9B-7).

Position Light Removal and Installation

BENM10L39206009

NOTE

- **Front position light is integral with front turn signal light.**
- **Front position light is LED. Replace the front turn signal light as an assembly if front position light is defective.**

Refer to "Turn Signal Light Removal and Installation" (Page 9B-7).

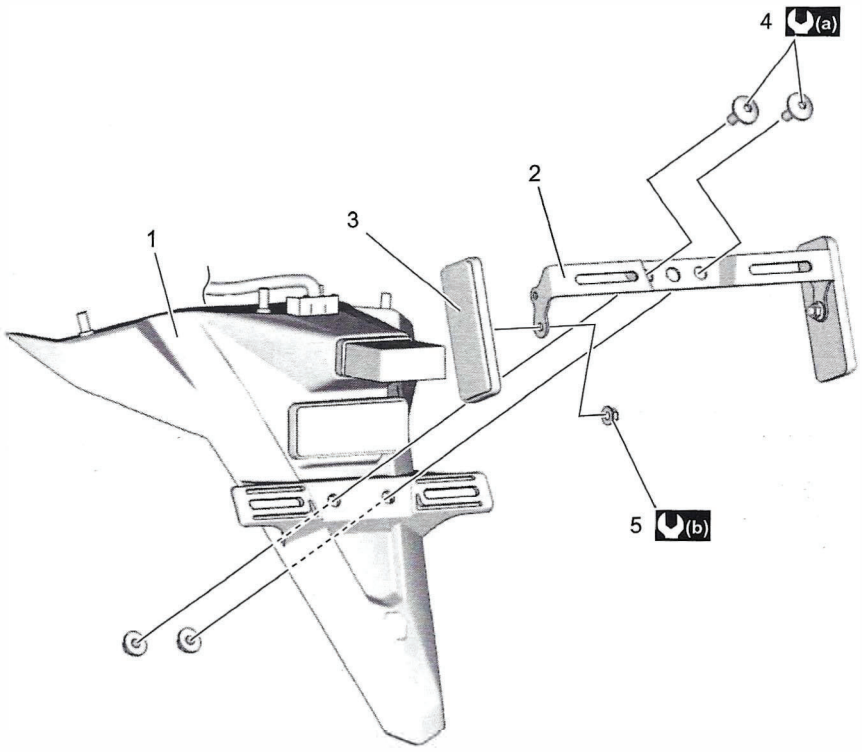
Reflex Reflector Construction (If Equipped)

BENM10L39206010

Front Reflex Reflector

Refer to "Front Fender Construction" in Section 9D (Page 9D-5).

Rear Reflex Reflector



IM10L1920005-01

1. Rear fender (rear)	4. License plate bracket bolt	(b) : 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)
2. License plate bracket	5. Rear side reflex reflector nut	
3. Rear side reflex reflector	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)	

Reflex Reflector Removal and Installation

BENM10L39206011

Refer to "Reflex Reflector Construction (If Equipped)" (Page 9B-8).

Turn Signal Switch Inspection

BENM10L39206012

Refer to "Left Handle Switch Inspection" in Section 6B (Page 6B-9).

Hazard Switch Inspection

BENM10L39206013

Refer to "Right Handle Switch Inspection" in Section 6B (Page 6B-7).

Dimmer / Passing Light Switch Inspection

BENM10L39206014

Refer to "Left Handle Switch Inspection" in Section 6B (Page 6B-9).

Parking Switch Inspection (If Equipped)

BENM10L39206015

NOTE

Parking switch is integral with ignition switch.

Refer to "Ignition Switch Inspection" in Section 1H (Page 1H-6).

Specifications

Tightening Torque Specifications

BENM10L39207001

Reference:

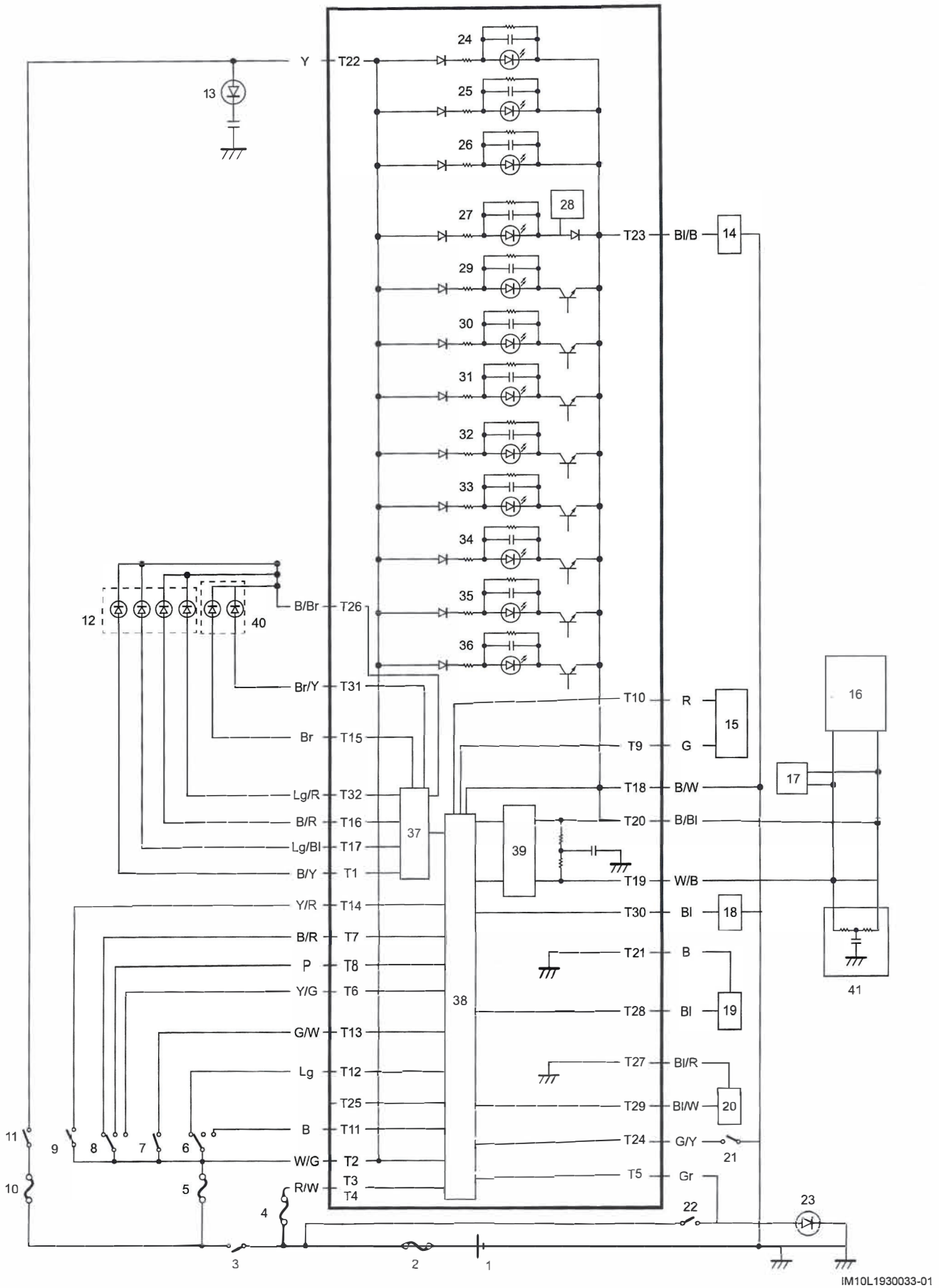
For the tightening torques of fasteners not specified in this page, refer to:
"Rear Lighting System Construction" (Page 9B-5)
"Reflex Reflector Construction (If Equipped)" (Page 9B-8)
"Fasteners Information" in Section 0C (Page 0C-6)

Combination Meter / Fuel Meter / Horn

Schematic and Routing Diagram

Combination Meter Circuit Diagram

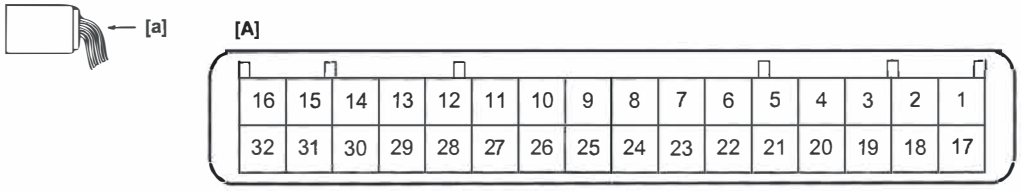
BENM10L39302001



IM10L1930033-01

1. Battery	15. ETC unit	29. Illumination
2. Main fuse (30 A)	16. ABS control unit	30. Engine rpm indicator light
3. Ignition switch	17. IMU	31. ABS indicator light
4. Fuel fuse (10 A)	18. TP sensor	32. Master warning indicator light
5. Signal fuse (10 A)	19. Ambient air temp sensor	33. Malfunction indicator light (MIL)
6. Turn signal switch	20. Fuel level sensor	34. Engine coolant temperature indicator light
7. Hazard switch	21. Oil pressure switch	35. Oil pressure indicator light
8. Select switch and MODE/SET switch	22. Parking switch	36. Traction control indicator light
9. Cruise control switch	23. License plate light and tail light	37. LED driver
10. Head-Hi fuse (7.5A)	24. Hi beam indicator light	38. Micro computer
11. Dimmer switch	25. Turn signal indicator light (RH)	39. Can transceiver
12. Turn signal light	26. Turn signal indicator light (LH)	40. Position light
13. Headlight (Hi)	27. Neutral indicator light	41. ECM
14. GP sensor	28. Micro computer	

Terminal Arrangement of Combination Meter Coupler "T"



IL06L1930002-01

[A]: Combination meter coupler (View [a])

Diagnostic Information and Procedures

Combination Meter Symptom Diagnosis

BENM10L39304001

1) Check combination meter power and ground circuit.
2) Check DTC. ☞(Page 1A-11)
   - If some DTC appears during inspection in Step 2), go to applicable DTC diagnostic flow.
   - If any of troubles described in table below has occurred independently even though DTC display is normal during inspection is Step 2), inspect subject place according to instructions in table below.

Condition	Possible cause	Correction / Reference Item
Speedometer does not operate	Defective front wheel speed sensor.	*Check front wheel speed sensor. ☞(Page 4E-55)*
	Defective speedometer.	*Check speedometer. ☞(Page 9C-14)*
	ECM	*Check ECM. ☞(Page 1A-71)*
	Front wheel speed sensor circuit	*Repair circuit. ☞(Page 9A-5)*
Fuel meter does not operate	Fuel level gauge	*Check fuel level sensor. ☞(Page 9C-14)*
	Fuel meter	*Check fuel level indicator. ☞(Page 9C-13)*
	Fuel level gauge circuit	*Repair circuit. ☞(Page 9A-5)*
Oil pressure indicator light does not operate	Oil pressure switch	*Check oil pressure switch. ☞(Page 9C-17)*
	Oil pressure indicator	*Check oil pressure indicator. ☞(Page 9C-17)*
	Oil pressure switch circuit	*Repair circuit. ☞(Page 9A-5)*
Engine coolant temperature indicator light does not operate	ECT sensor	*Check ECT sensor. ☞(Page 1C-6)*
	ECT indicator	*Check engine coolant temperature indicator/ engine coolant temperature indicator light. ☞(Page 9C-12)*
	ECT sensor circuit	*Repair circuit. ☞(Page 9A-5)*
GP indicator does not operate	Faulty GP sensor.	*Check GP sensor. Refer to "GP Sensor Inspection" in Section 5B (Page 5B-13).*
	Faulty gear position indicator.	*Check GP sensor. Refer to "GP Sensor Inspection" in Section 5B (Page 5B-13).*
	Faulty GP sensor circuit.	*Repair circuit. ☞(Page 9A-5)*

Condition	Possible cause	Correction / Reference Item
Ambient air temperature indicator	Ambient air temperature sensor	*Check ambient air temperature sensor. ☞(Page 9C-17)*
	Ambient air temperature indicator	*Check ambient air temperature indicator. ☞(Page 9C-16)*
	Ambient air temperature sensor circuit	*Repair circuit. ☞(Page 9A-5)*
Indicator light does not operate	Faulty switch or sensor.	*Check switch or sensor.* • *Turn signal switch: ☞(Page 9B-8)* • *GP sensor: ☞(Page 5B-13)* • *Dimmer/passing light switch: ☞(Page 9B-8)* • *Oil pressure switch: ☞(Page 1E-11)* • *ECT sensor: ☞(Page 1C-6)*
	Faulty wiring or grounding.	*Repair wiring. ☞(Page 9A-5)*
	Faulty combination meter unit (LED).	*Replace combination meter unit. ☞(Page 9C-13)*

Horn Symptom Diagnosis

BENM10L39304002

Condition	Possible cause	Correction / Reference Item
Horn does not operate	Faulty horn switch	*Check horn switch. ☞(Page 9C-18)*
	Faulty wiring or grounding	*Repair circuit. ☞(Page 9A-5)*
	Faulty horn	*Check horn. ☞(Page 9C-18)*

Multifunction Display indicates "Air!"

BENM10L39304003

Possible Cause
Ambient Air Temperature Sensor Related Malfunction
• Ambient air temperature sensor circuit open or short.
• Faulty ambient air temperature sensor.

Wiring Diagram

Refer to "Combination Meter Circuit Diagram" (Page 9C-2).

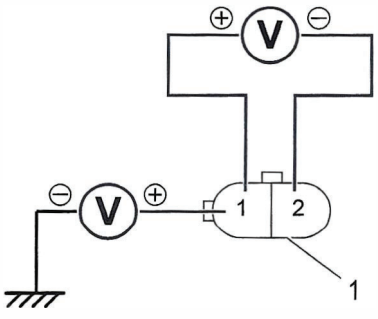
Troubleshooting

Step 1

Ambient air temperature sensor power supply voltage check

1) Turn the ignition switch OFF.
2) Disconnect the ambient air temperature sensor coupler. ☞(Page 9C-15)
3) Check for proper terminal connection to the ambient air temperature sensor coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between the "T2" and ground.
6) If OK, measure the voltage between the "T1" and "T2" wire.

Ambient air temperature sensor power supply voltage
[Standard]: 4.5 – 5.5 V



IL06L1930024-02

Is check result OK?

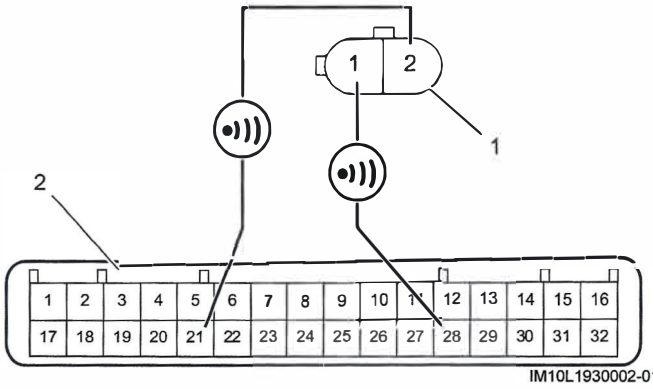
Yes Go to Step 3.

No Go to Step 2.

Step 2

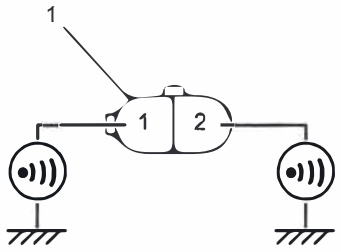
Ambient air temperature sensor signal circuit and ground circuit check

1) Turn the ignition switch OFF.
2) Disconnect the combination meter coupler. ☞(Page 9C-13)
3) Check for proper terminal connection to the combination meter coupler.
4) If connections are OK, check the following points.
   - Resistance
     - Between "T1" at the ambient air temperature coupler (1) and "T28" at the combination meter coupler (2): less than 1 Ω
     - Between "T2" at the ambient air temperature coupler and "T21" at the combination meter coupler: less than 1 Ω



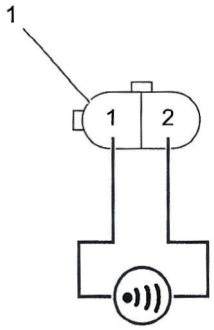
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     - Between "T1" at the ambient air temperature coupler (1) and ground: infinity
     - Between "T2" at the ambient air temperature coupler and ground: infinity



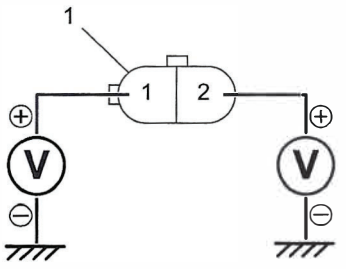
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     - Between "T1" and "T2" at the ambient air temperature coupler (1): infinity



IL06L1930027-01

   - Voltage
     - Turn the ignition switch ON.
     - Between "T1" at the ambient air temperature coupler (1) and ground: approx. 0 V
     - Between "T2" at the ambient air temperature coupler and ground: approx. 0 V



IL06L1930028-01

Is check result OK?

Yes	Replace the combination meter with a known good one, and inspect it again. ☞(Page 9C-13)
No	Repair or replace the defective wire harness.

Step 3

Ambient air temperature sensor resistance check

1) Turn the ignition switch OFF.
2) Measure the ambient air temperature sensor resistance. ☞(Page 9C-17)

Is check result OK?

Yes	Replace the combination meter with a known good one, and inspect it again. ☞(Page 9C-13)
No	Replace the ambient air temperature sensor with a new one. ☞(Page 9C-17)

Multifunction Display indicates "SW!"

BENM10L39304004

Possible Cause
Handle switch Related Malfunction
• Faulty handle switch, combination meter or ECM.
• Handle switch circuit short.

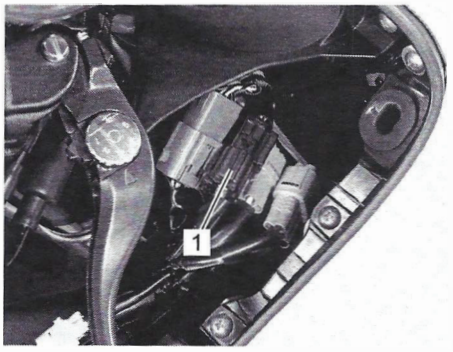
Wiring Diagram

Refer to "Combination Meter Circuit Diagram" (Page 9C-2).

Troubleshooting

Step 1

1) Remove the meter panel. ☞(Page 9D-37)
2) Disconnect the left handle switch coupler (8P) (1) as shown in the figure.



IM10L1930003-02

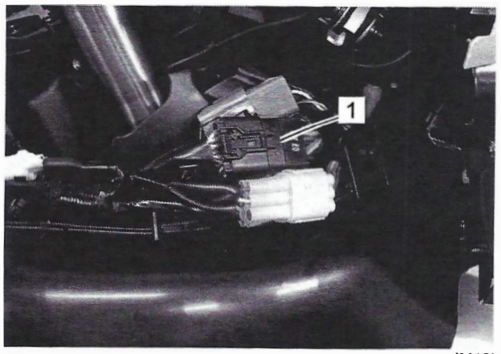
Does the indicator "SW!" go off?

Yes — Replace the left handle switch with a known good one, and inspect it again. ☞(Page 6B-9)

No — Go to Step 2.

Step 2

1) Disconnect the right handle switch lead wire coupler (14P) (1) as shown in the figure.



IM10L1930004-02

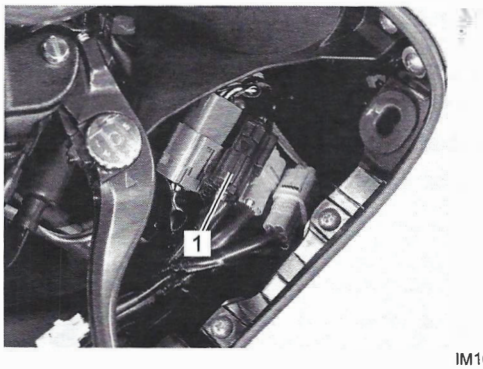
Does the indicator "SW!" go off?

Yes — Replace the right handle switch with a known good one, and inspect it again. ☞(Page 6B-7)

No — Go to Step 3.

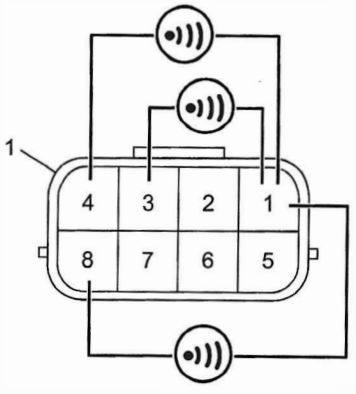
Step 3

1) Turn the ignition switch OFF.
2) Disconnect the left handle switch coupler (8P) (1) as shown in the figure.



IM10L1930003-02

3) Check for proper terminal connection to the ECM coupler.
4) If connections are OK, check the following points.
   - Resistance
     - Between "T1" and "T3" at the left handle switch coupler (1): infinity
     - Between "T1" and "T4" at the left handle switch coupler (1): infinity
     - Between "T1" and "T8" at the left handle switch coupler (1): infinity



IM10L1930005-01

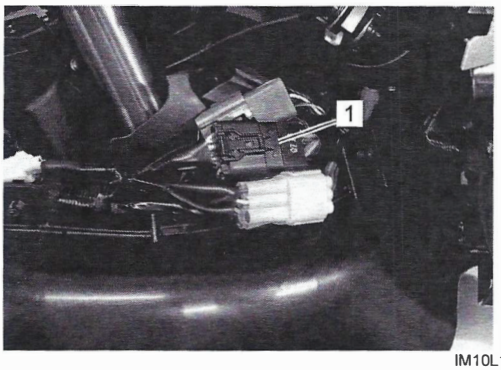
Is check result OK?

Yes — Go to Step 4.

No — Replace the left handle switch or repair the defective wire harness.

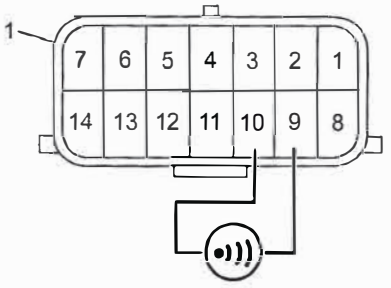
Step 4

1) Disconnect the right handle switch lead wire coupler (14P) (1) as shown in the figure. ☞(Page 6B-7)



IM10L1930004-02

2) Check for proper terminal connection to the ECM coupler.
3) If connections are OK, check the following points.
   - Resistance
     - Between "T9" and "T10" at the throttle grip assembly coupler (1): infinity



IM10L1930006-01

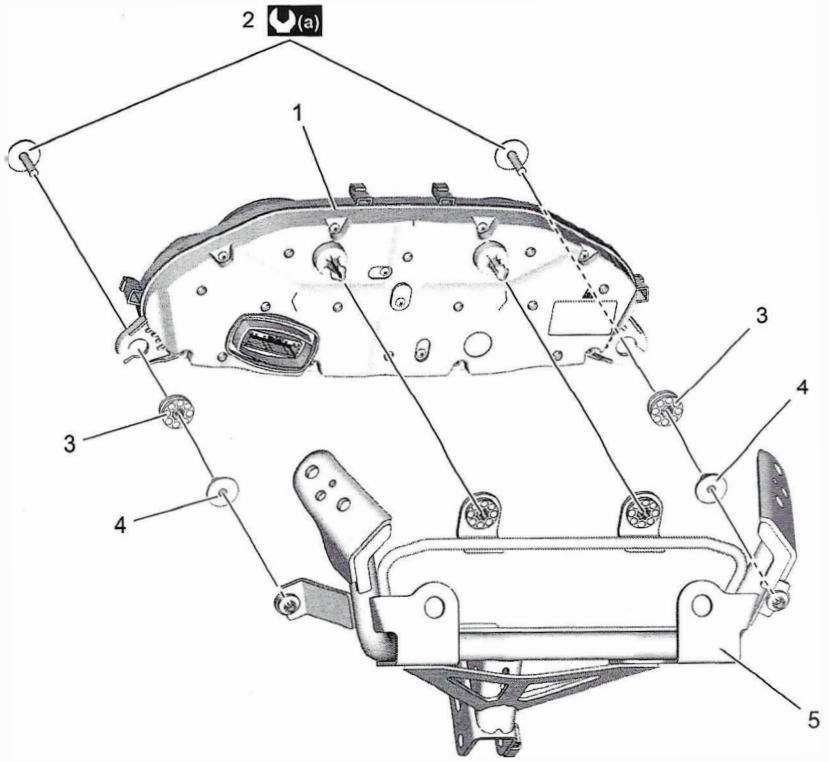
Is check result OK?

Yes	• Replace the combination meter and/or ECM with a known good one, and inspect it again. – Combination meter ☞(Page 9C-13) – ECM ☞(Page 1C-2)
No	Replace the Right handle switch or repair the defective wire harness.

Repair Instructions

Combination Meter Construction

BENM10L39306001

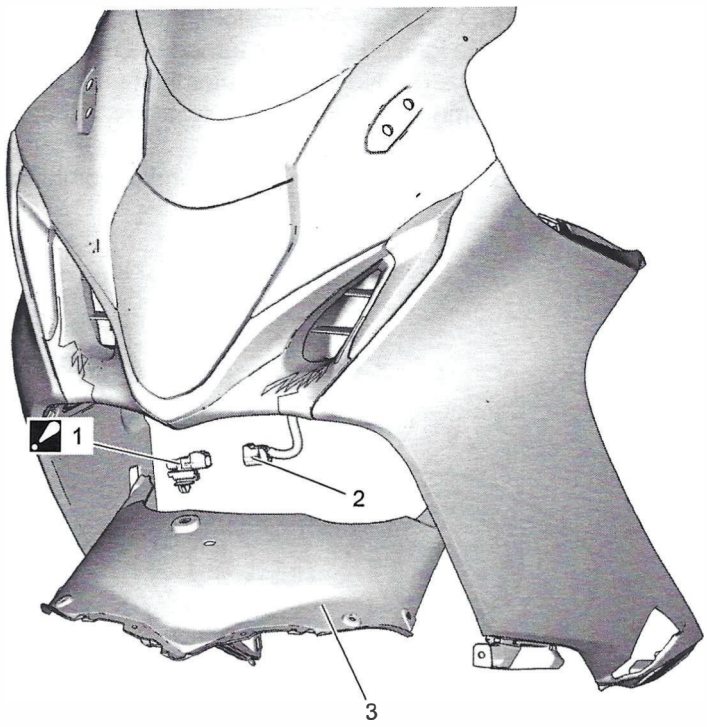


IM10L1930007-01

1. Combination meter	4. Washer
2. Combination meter bolt	5. Cowling brace
3. Cushion	(a) : 5.5 N·m (0.56 kgf-m, 4.05 lbf·ft)

Ambient Air Temperature Sensor Construction

BENM10L39306002

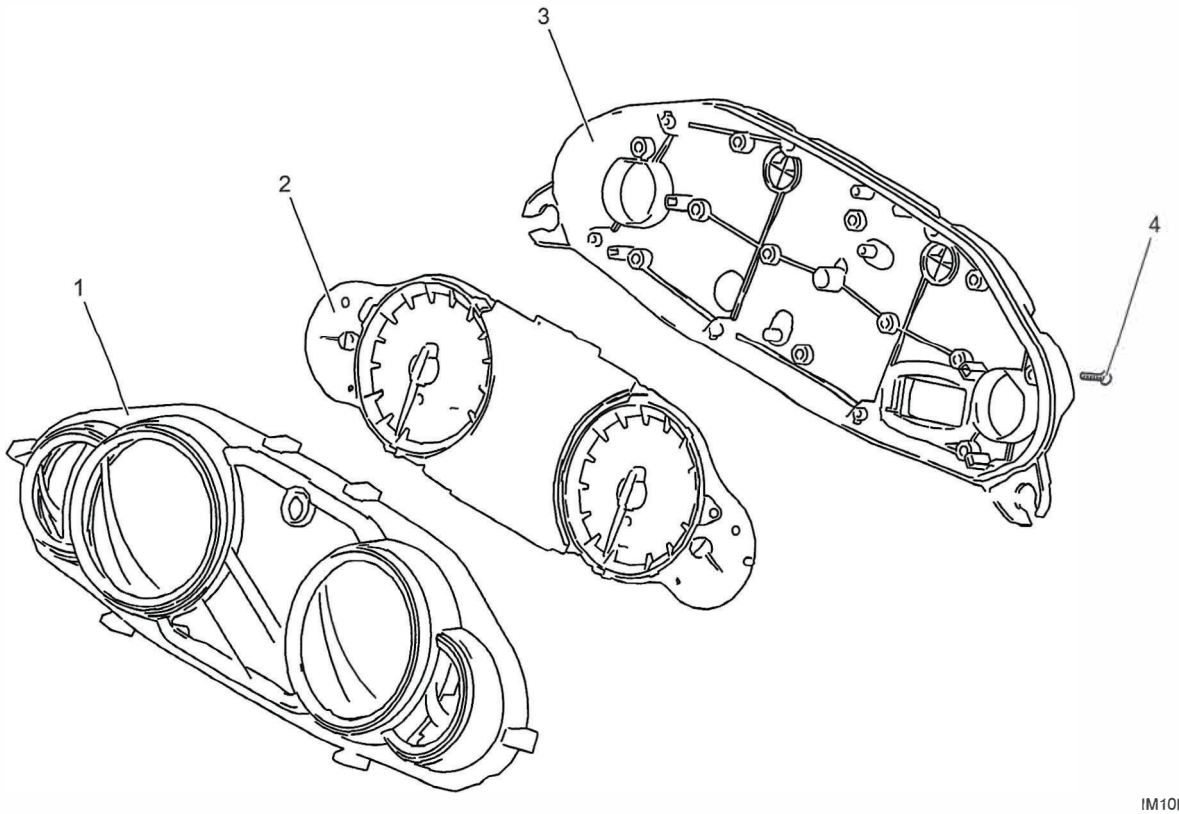


IM10L1910918-01

1. Ambient air temperature sensor : Install the ambient air temperature sensor as shown in the figure.	3. Body cowl cover
2. Wiring harness No.2	

Combination Meter Components

BENM10L39306003



IM10L1930008-01

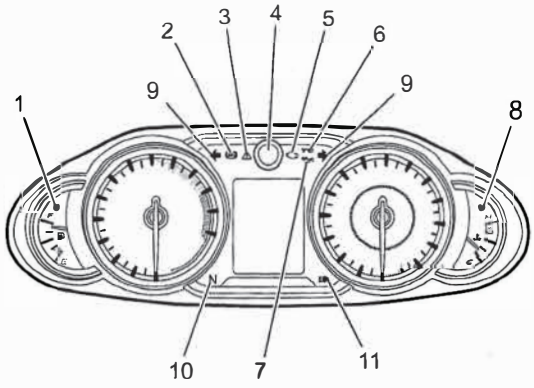
1. Upper case	3. Lower case
2. Combination meter unit	4. Screw

Combination Meter On-Vehicle Inspection

BENM10L39306004

Check that the LEDs (Fuel indicator light (1), ABS indicator light (2), Master warning indicator light (3), Engine rpm indicator light (4), MIL (5), TC indicator light (6), Oil pressure indicator light (7), and Engine coolant temperature indicator light (8)) immediately lights up when the ignition switch is turned to ON.
Check that other LEDs (Turn signal indicator lights (9), Neutral indicator light (10), and High beam indicator light (11)) light up/go off by operating the gearshift lever, dimmer and turn signal switches. If these LEDs are defective, check the switches and wiring and repair them if necessary.
If ABS indicator light dose not light up, replace the ABS control unit /HU and/or combination meter with a new one after checking its wire harness/coupler.

- ABS control unit /HU: ☞(Page 4E-50)
- Combination meter: ☞(Page 9C-13)



IM10L1930009-02

If abnormal condition is found in other indicators and meters, replace the combination meter unit with a new one after checking its wire harness/coupler. ☞(Page 9C-13)

Service Reminder Reset

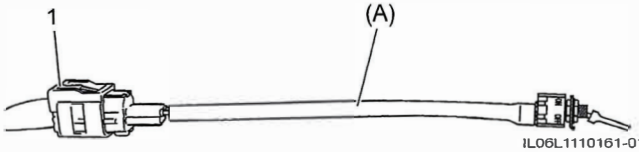
BENM10L39306005

NOTE

- **Before set up the service reminder, check that the multifunction display indicates the current calendar.**
- **The date and distance inputted in the service reminder will not be reset even if the battery cable is disconnected.**

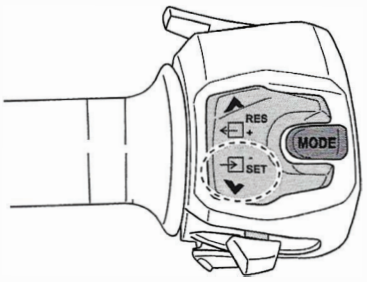
1) Remove the rear seat. ☞(Page 9D-34)
2) Connect the special tool to the mode select coupler (6P) (1) at the wiring harness. Refer to "Electrical Components Location": Service Manual Information in Section 0A (Page 0A-10).

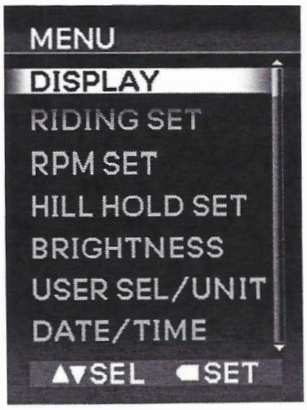
Special tool
(A): 09930–83130



IL06L1110161-01

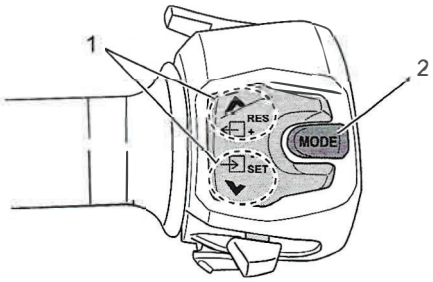
3) Turn the ignition switch ON.
4) Press the select switch (DOWN) (1) for about 2 seconds to switch the screen to "MENU".





IM10L1930021-03

5) Press the select switch (UP or DOWN) (1) to select "SERVICE".
6) Press the MODE/SET switch (2) and display moves to the setting screen.





IM10L1930022-01

- Before the service reminder indicator comes on:



IM10L1930023-01

- When the service reminder indicator comes on:



IM10L1930024-01

7) Turn the special tool's switch ON and "RESET" appears on the screen.



I718H1450040-03



IM10L1930025-01

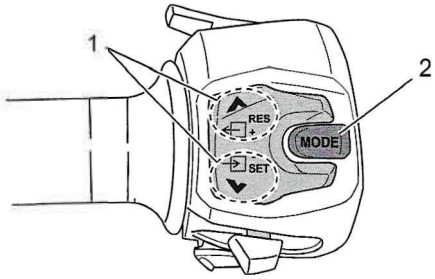
8) Press the select switch (UP or DOWN) (1) to select "RESET".

9) By pressing the MODE/SET (2) switch, "YES" and "NO" appear on the screen.

NOTE

If the following conditions appear, the setting data is canceled and main display returns.

- **Long press the MODE/SET switch.**
- **Speed sensor signal is imputed.**
- **CAN Communication Signal (Hill hold control system is inactive) is received.**
- **Ignition switch is OFF.**



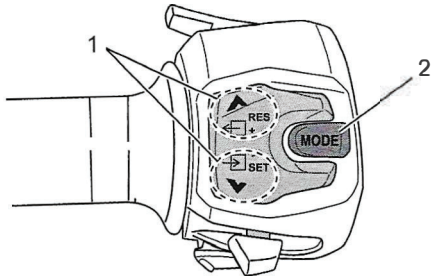


IM10L1930026-01

10) Press select switch (UP or DOWN) (1) to select "YES".
11) Press the MODE/SET switch (2) to set month, day and distance to setting screen.

NOTE

If "NO" is selected and press the MODE/SET switch the screen returns to Step 9).





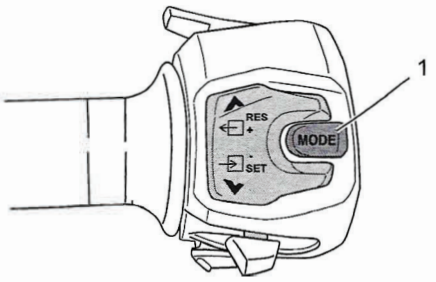
IM10L1930030-01

12) Press the select switch (UP or DOWN) to select month, day, distance and "SET" indication. The selected item is highlighted.

NOTE

- **Even if the special tool's switch is set OFF, the setting mode continues.**
- **If you select "SET" and press the MODE/ SET switch, the setting will be saved and the service reminder will be reset.**

13) Press the MODE/SET switch (1) to move to the setting screen for item, and the selected item is highlighted and blinks.





IM10L1930031-01

14) Press the select switch (UP or DOWN) to set the value of the item, and press MODE/SET switch to confirm.

NOTE

- **Month can be selected from present month plus within one year in 12 steps. Example (if this month is 2020/12): Possible setting is 2021/12 - 2021/1.**
- **Day can be selected within the range of 1 – 31.**
- **Distance can be selected within 1000 – 12000 km in every 1000 km or 600 mile and within 1000 – 7500 mile in every 500 mile.**

15) Press the select switch (UP or DOWN) to select "SET".

16) Press the MODE/SET switch and the service reminder setting is confirmed before returning to setting screen in Step 7).

17) Turn the ignition switch OFF and disconnect the special tool.

18) Install the removed parts.

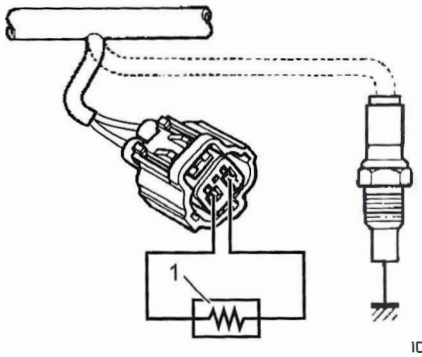
ECT Indicator Inspection

BENM10L39306006

1) Disconnect the ECT sensor coupler. ☞(Page 9C-13)

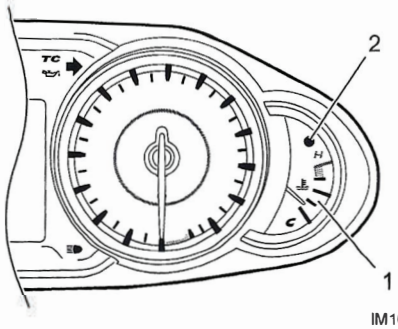
2) Connect the variable resistor (1) between the terminals.

3) Turn the ignition switch ON.

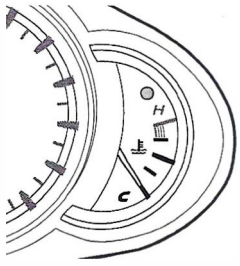
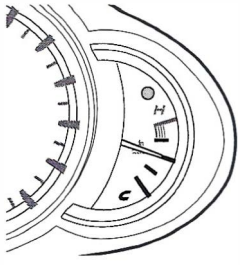
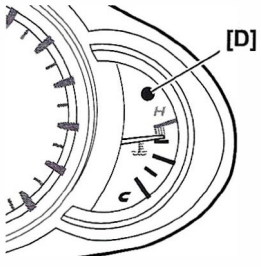
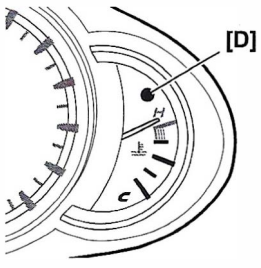


ID26J1930009-01

4) Check the engine coolant temperature meter (1) and engine coolant temperature indicator light (2) operations when the resistance is adjusted to the specified values. If either one or both indications are abnormal, replace the combination meter and/or ECM. Refer to "Combination Meter Removal and Installation" (Page 9C-13) and "ECM Removal and Installation" in Section 1C (Page 1C-2).



IM10L1930013-03

[A]	[B]
Approx. 811Ω	
Approx. 142Ω	
Approx. 111Ω	
[C]	

IM10L1930014-04

[A]: Resistance	[C]: When data cannot be received or abnormal data is received.
[B]: Engine coolant temperature meter	[D]: ON

5) After finishing the ECT indicator inspection, reinstall the removed parts.

Combination Meter Removal and Installation

BENM10L39306007

Refer to "Body Cowling Assembly Removal and Installation" in Section 9D (Page 9D-44).

Combination Meter Disassembly and Reassembly

BENM10L39306008

Disassemble/reassemble the combination meter as shown in the combination meter components. ☞(Page 9C-8)

ECT Sensor Removal and Installation

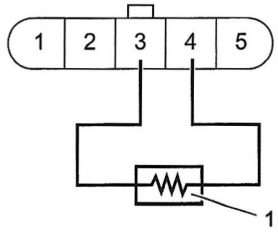
BENM10L39306009

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

Fuel Meter Inspection

BENM10L39306010

1) Disconnect the fuel pump coupler. ☞(Page 1G-16)
2) Connect a variable resistor (1) between the T3 and T4 of the fuel pomp coupler.

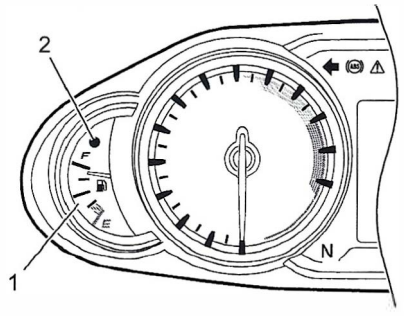


IL06L1930038-01

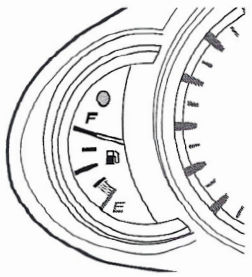
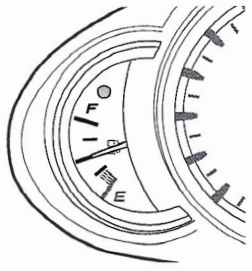
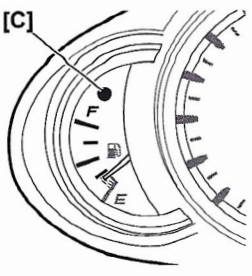
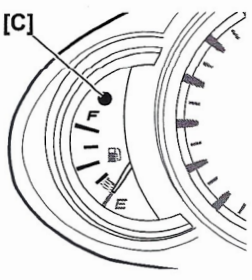
3) Turn the ignition switch ON.
4) Check the fuel meter (1) and indicator light (2) operations when the resistance is adjusted to the specified values.
If either one or both indications are abnormal, replace the combination meter with a new one. Refer to "Combination Meter Removal and Installation" (Page 9C-13).

NOTE

It takes approx. 40 seconds that the fuel level indicator indicates the detected fuel level.

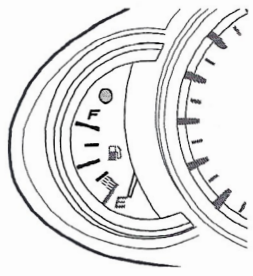
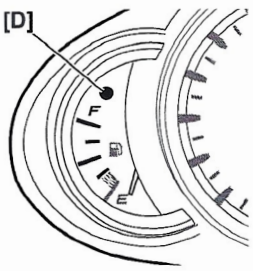


IM10L1930027-01

[A]	[B]
Approx. 34.5Ω	
Approx. 107Ω	
Approx. 175Ω	
Approx. 198Ω	

IM10L1930028-02

[A]: Resistance	[C]: ON
[B]: Fuel meter	

	[C]
[A]	
[B]	

IM10L1930029-02

[A]: When data cannot be received.	[C]: Fuel meter
[B]: When abnormal data is received.	[D]: ON

5) Connect the fuel pump coupler and reinstall the fuel tank. ☞(Page 1G-16)

Fuel Level Gauge Inspection

BENM10L39306011

Refer to "Fuel Pump Assembly / Fuel Level Gauge Removal and Installation" in Section 1G (Page 1G-16).

Speedometer On-Vehicle Inspection

BENM10L39306012

If the speedometer, odometer or trip meter does not function properly, inspect the front wheel speed sensor and the coupler connections. ☞(Page 9C-14)
If the front wheel speed sensor and coupler connections are OK, replace the combination meter unit with a new one. ☞(Page 9C-13)

Speed Sensor Removal and Installation

BENM10L39306013

Refer to "Front Wheel Speed Sensor Removal and Installation" in Section 4E (Page 4E-53).

NOTE

The combination meter receives the signal of the front wheel speed sensor and displays the vehicle speed.

Speed Sensor Inspection

BENM10L39306014

Refer to "Wheel Speed Sensor and Sensor Rotor Inspection" in Section 4E (Page 4E-55).

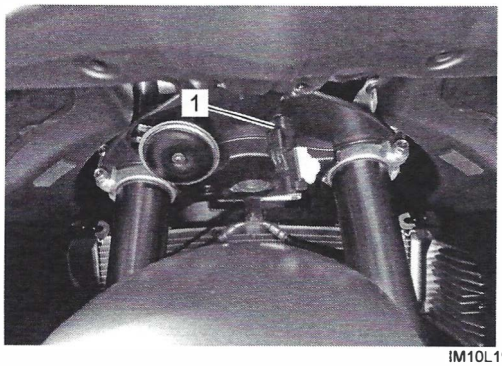
NOTE

The combination meter receives the signal of the front wheel speed sensor and displays the vehicle speed.

Ambient Air Temperature Sensor Removal and Installation

BENM10L39306015

1) Remove the body cowl cover. ☞(Page 9D-43)
2) Disconnect the ambient air temperature sensor coupler (1).

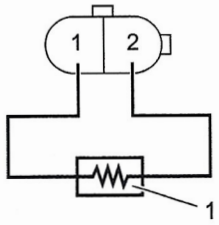


IM10L1930015-01

Freeze Indicator Light / Thermometer Inspection

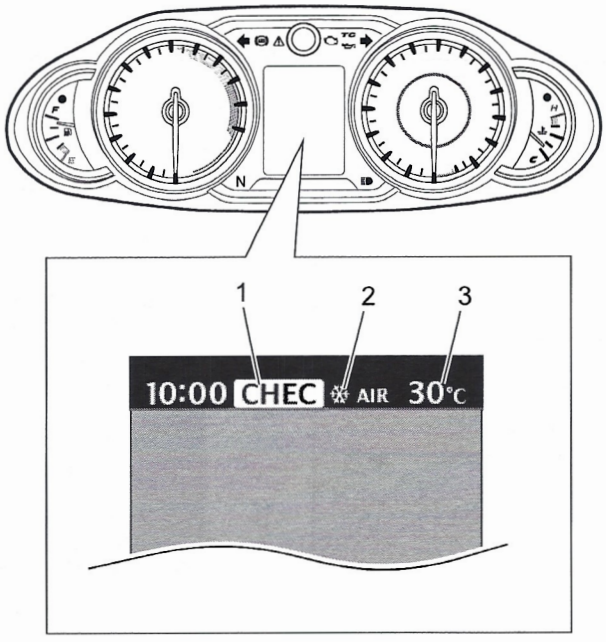
BENM10L39306016

1) Disconnect the ambient air temperature sensor coupler. ☞(Page 9C-15)
2) Connect the variable resistor (1) between the terminals at ambient air temperature sensor coupler.



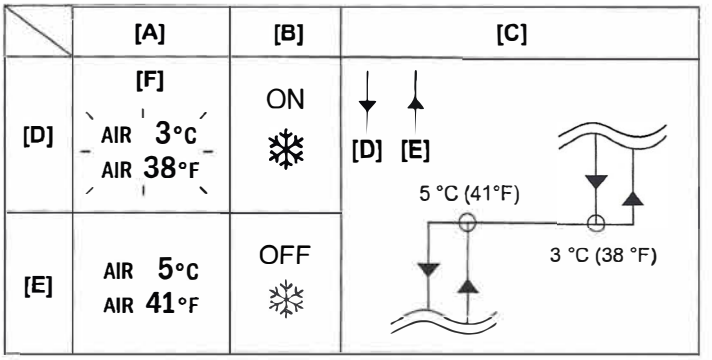
IM10L1930016-01

3) Turn the ignition switch ON.
4) Check the diagnosis display (1), freeze indicator (2) and thermometer (3) operations when the resistance is adjusted to the specified values. If any indication is abnormal, replace the combination meter with a new one. ☞(Page 9C-13)



IM10L1930017-02

Resistance	Diagnosis display (1)	Freeze indicator (2)	Thermometer (3)
Approx. 33000 Ω or more	"AIR!"	—	-- °C (--- °F)
Approx. 9300 – 33000 Ω	—	Turn on	"LO"
Approx. 600 – 9300 Ω	—	Turn on when conditions are met	-10 – 50 °C (14 – 122 °F)
Approx. 162 – 600 Ω	—	—	"HI"
Approx. 162 Ω or less	"AIR!"	—	-- °C (--- °F)



IM10L1930018-01

[A]: Thermometer	[D]: When decreasing the temperature
[B]: Freeze indicator	[E]: When increasing the temperature
[C]: Ambient air temperature	[F]: Flicker

5) Install the removed parts.

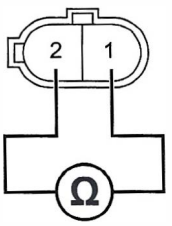
Ambient Air Temperature Sensor Inspection

BENM10L39306017

Refer to "Freeze Indicator Light / Thermometer Inspection" (Page 9C-16).
Measure the resistance between terminals of ambient air temperature sensor.
If any abnormality is found, replace the ambient air temperature sensor with a new one.

NOTE

Ambient air temperature sensor resistance measurement method is the same way as that of the ECT sensor. ☞(Page 1C-6)



IL06L1930043-01

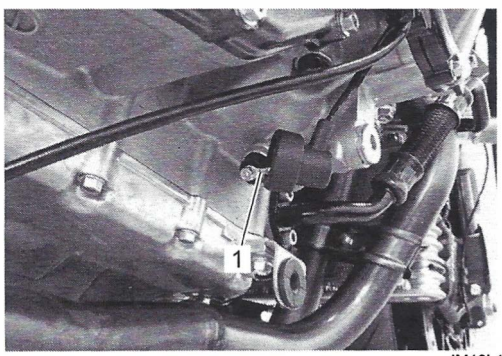
Ambient air temperature sensor resistance

Temperature	Standard resistance
–20 °C (–4 °F)	13779 –19083 Ω
–10 °C (14 °F)	8100 –10609 Ω
0 °C (32 °F)	4928 – 6125 Ω
10 °C (50 °F)	3089 – 3656 Ω
20 °C (68 °F)	1992 – 2251 Ω
25 °C (77 °F)	1615 – 1785 Ω
30 °C (86 °F)	1290 – 1456 Ω
40 °C (104 °F)	838 – 986 Ω

Oil Pressure Indicator Inspection

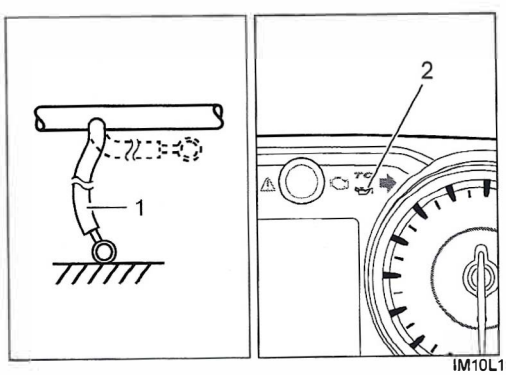
BENM10L39306018

1) Remove the under cowling (LH). ☞(Page 9D-42)
2) Disconnect the oil pressure switch lead wire (1) from the oil pressure switch.



IM10L1930019-01

3) Turn the ignition switch ON.
4) Check if the oil pressure indicator light (LED) (2) will light up when grounding the lead wire (1).
If the oil pressure indicator light does not light up, replace the combination meter with a new one after checking the wiring and connection of couplers.



IM10L1930020-01

5) Install the removed parts.

Horn Inspection

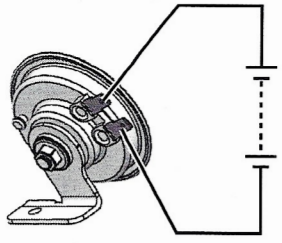
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Horn Switch Inspection

Inspect the horn switch. Refer to "Left Handle Switch Removal and Installation" in Section 6B (Page 6B-9).
If any abnormality is found, replace the left handlebar switch assembly with a new one.

Horn Inspection

Refer to "Horn Removal and Installation" (Page 9C-18).
Connect a 12 V battery between the terminals at the horn.
If the sound is not heard from the horn, replace the horn with a new one.



IM10L1930032-01

Horn Removal and Installation

BENM10L39306020

Refer to "Lower Bracket Cover Removal and Installation" in Section 9D (Page 9D-37).

Mode Switch Inspection

BENM10L39306021

Refer to "Left Handle Switch Removal and Installation" in Section 6B (Page 6B-9).

Select Switch Inspection

BENM10L39306022

Refer to "Left Handle Switch Removal and Installation" in Section 6B (Page 6B-9).

Specifications

Tightening Torque Specifications

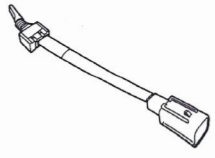
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Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Combination Meter Construction" (Page 9C-7)
"Fasteners Information" in Section 0C (Page 0C-6)

Special Tools and Equipment

Special Tool

BENM10L39308001

09930–83130 Mode selection switch (ISO) ☞(Page 9C-9) 	

Exterior Parts

Precautions

Precautions for Exterior Parts

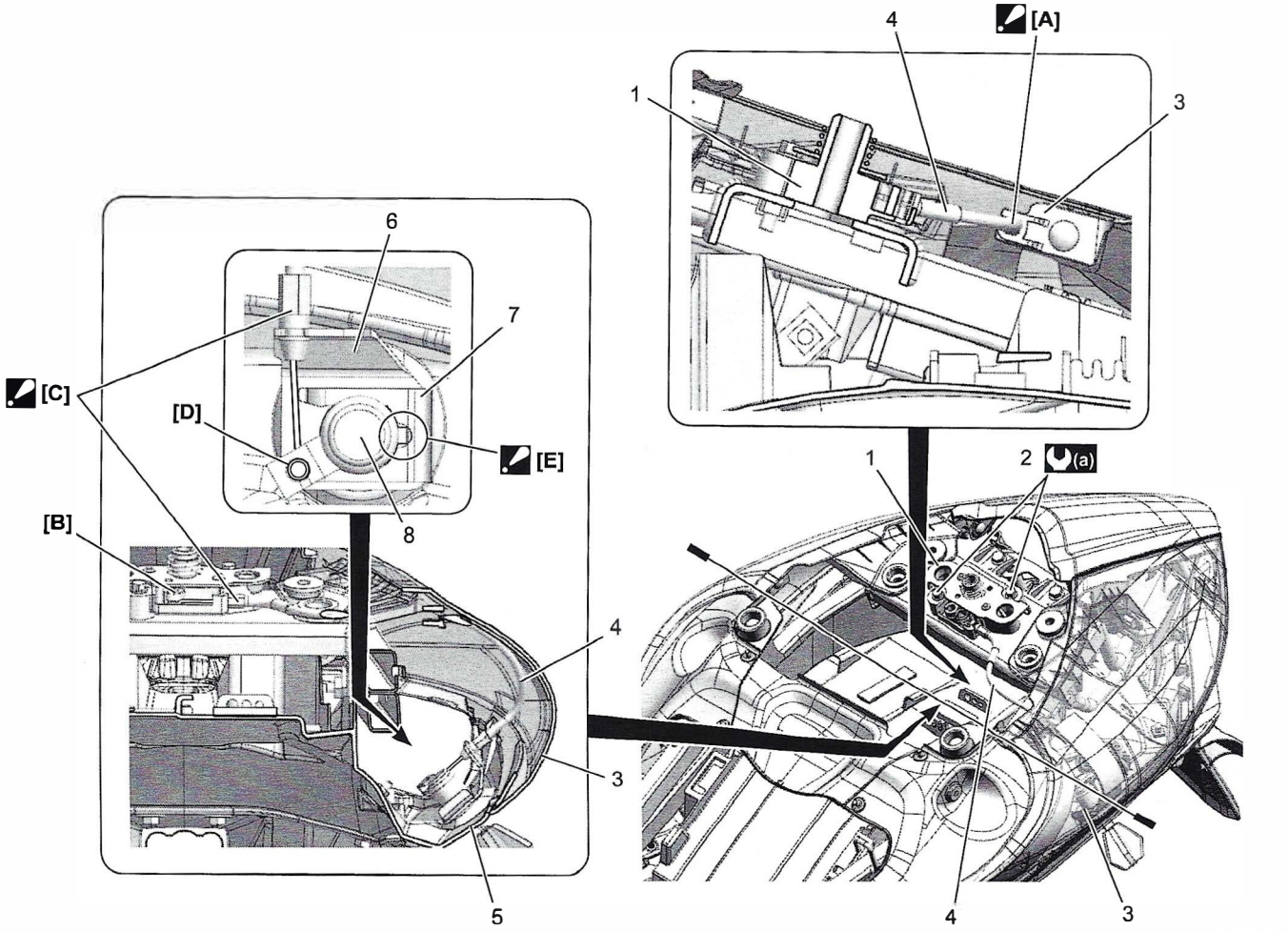
BENM10L39400001

- In the absence of specific instructions, the same procedure applies to both sides.
- Clean the adhesive surface before sticking the cushion, tape and protector.

Schematic and Routing Diagram

Seat Lock Cable Routing Diagram

BENM10L39402001



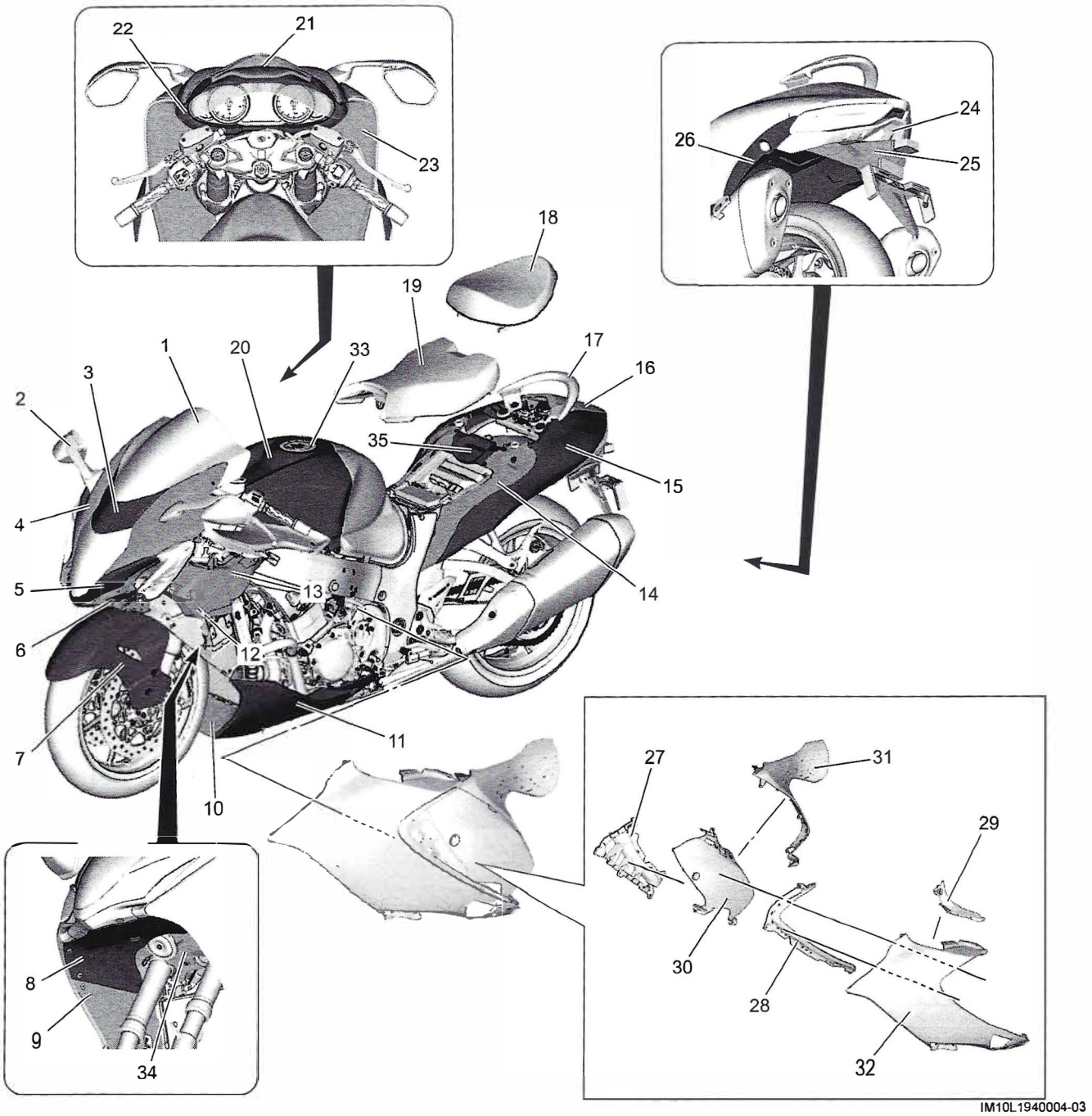
IM10L1940001-01

[A]: Set the seat lock cable firmly to guide of frame rear cover (LH).	1. Striker support bracket	6. Seat lock cable guide
[B]: Spherical cable end	2. Striker support bracket bolt	7. Seat lock cable plate
[C]: Set the seat lock cable firmly to seat lock cable guide.	3. Frame rear cover (LH)	8. Seat lock assembly
[D]: Cylindrical cable end	4. Seat lock cable	(a): 8.8 N·m (0.90 kgf-m, 6.50 lbf-ft)
[E]: Align the rib of seat lock assembly and groove of each part.	5. Rear fender (front)	

Component Location

Exterior Components Location

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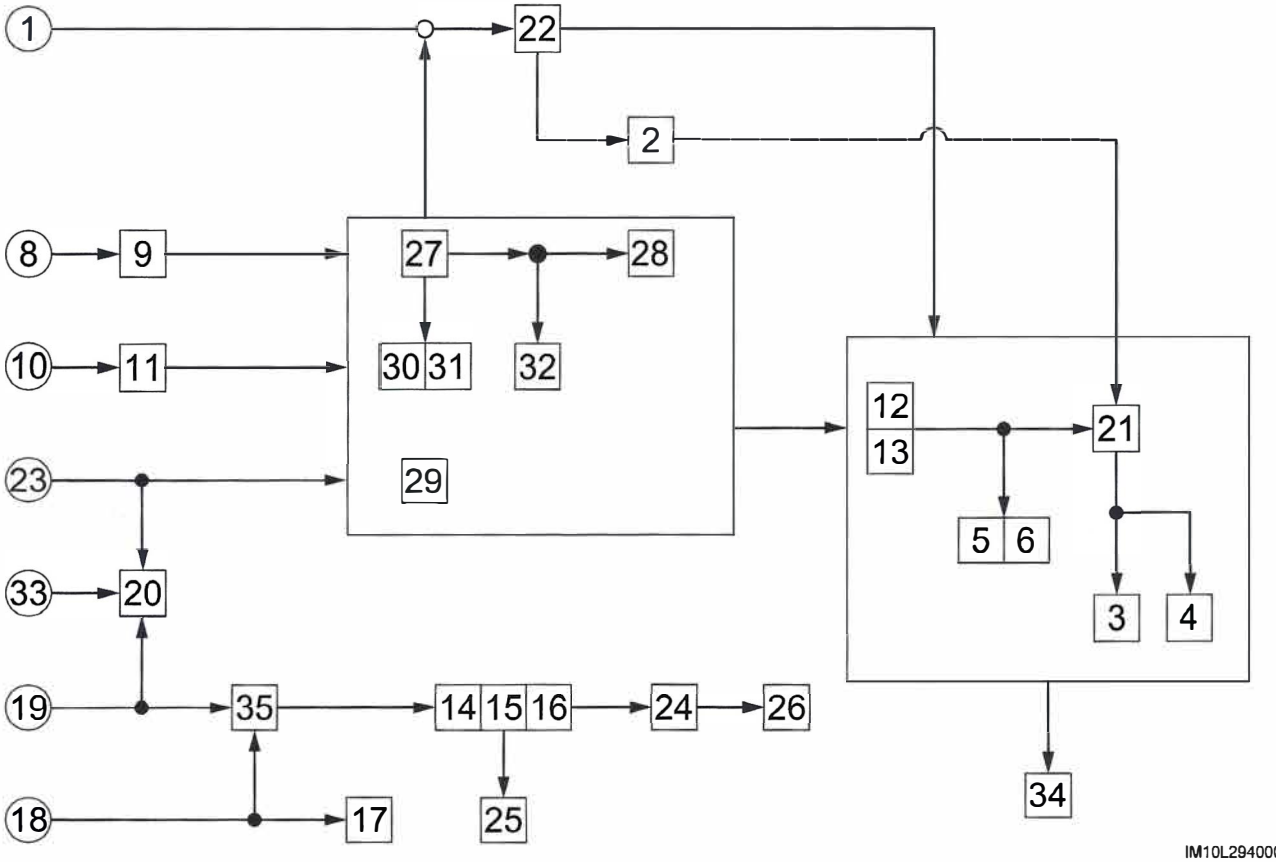


IM10L1940004-03

1. Windscreen ☞(Page 9D-44)	13. Air intake outer pipe ☞(Page 9D-48)	25. Rear fender (rear) ☞(Page 9D-53)
2. Rear view mirror ☞(Page 9D-34)	14. Frame cover ☞(Page 9D-51)	26. Rear fender (front) ☞(Page 9D-53)
3. Body center cowling ☞(Page 9D-47)	15. Frame rear cover ☞(Page 9D-51)	27. Side front cowling No.2 ☞(Page 9D-40)
4. Body cowling ☞(Page 9D-47)	16. Frame center cover ☞(Page 9D-51)	28. Side rear cowling ☞(Page 9D-40)
5. Intake center cover ☞(Page 9D-47)	17. Pillion rider handle ☞(Page 9D-36)	29. Meter front panel No.2 ☞(Page 9D-40)
6. Intake rear cover ☞(Page 9D-47)	18. Rear seat ☞(Page 9D-34)	30. Side cover ☞(Page 9D-40)
7. Front fender ☞(Page 9D-36)	19. Front seat ☞(Page 9D-34)	31. Side rear cover ☞(Page 9D-40)
8. Body cowl cover ☞(Page 9D-43)	20. Fuel tank front cover ☞(Page 9D-49)	32. Side front cowling No.1 ☞(Page 9D-40)
9. Under inner cowling ☞(Page 9D-43)	21. Meter front panel No.1 ☞(Page 9D-47)	33. Fuel tank cap cover ☞(Page 9D-49)
10. Under center cowling ☞(Page 9D-42)	22. Meter panel (center) ☞(Page 9D-44)	34. Lower bracket cover ☞(Page 9D-37)
11. Under cowling ☞(Page 9D-42)	23. Meter panel ☞(Page 9D-37)	35. Frame cover lid ☞(Page 9D-51)
12. Air intake inner pipe ☞(Page 9D-48)	24. Frame under cover ☞(Page 9D-54)	

Exterior Component Removal Chart

- This chart shows removal procedures for exterior component. Carry out each process following the arrow from left to right.
- Indicated number in the chart corresponds to the number in "Exterior Components Location" (Page 9D-2).
- The part shown by circled number (e.g. ①) can be removed from the vehicle individually.
- Adjoining part can be removed as a unit.
- Small white circle (○) indicates joining of the arrows.
  For removal of a part pointed by an arrow from a small white circle, all the part(s) in starting point of arrow(s) to the small white circle must be removed beforehand.
- Small black circle (●) indicates branching of the arrows.
  For removal of parts pointed by arrow(s) from a small black circle, choose an arrow corresponding to a target part to be removed.



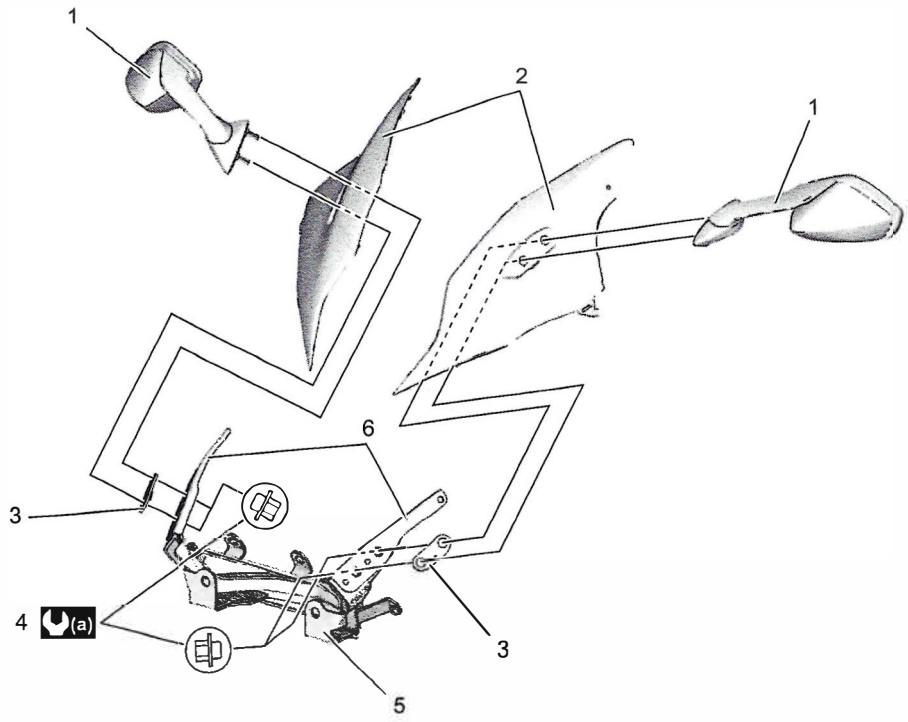
IM10L2940001-01

1. Windscreen ☞(Page 9D-44)	13. Air intake outer pipe ☞(Page 9D-48)	25. Rear fender (rear) ☞(Page 9D-53)
2. Rear view mirror ☞(Page 9D-34)	14. Frame cover ☞(Page 9D-51)	26. Rear fender (front) ☞(Page 9D-53)
3. Body center cowling ☞(Page 9D-47)	15. Frame rear cover ☞(Page 9D-51)	27. Side front cowling No.2 ☞(Page 9D-40)
4. Body cowling ☞(Page 9D-47)	16. Frame center cover ☞(Page 9D-51)	28. Side rear cowling ☞(Page 9D-40)
5. Intake center cover ☞(Page 9D-47)	17. Pillion rider handle ☞(Page 9D-36)	29. Meter front panel No.2 ☞(Page 9D-40)
6. Intake rear cover ☞(Page 9D-47)	18. Rear seat ☞(Page 9D-34)	30. Side cover ☞(Page 9D-40)
7. Front fender ☞(Page 9D-36)	19. Front seat ☞(Page 9D-34)	31. Side rear cover ☞(Page 9D-40)
8. Body cowl cover ☞(Page 9D-43)	20. Fuel tank front cover ☞(Page 9D-49)	32. Side front cowling No.1 ☞(Page 9D-40)
9. Under inner cowling ☞(Page 9D-43)	21. Meter front panel No.1 ☞(Page 9D-47)	33. Fuel tank cap cover ☞(Page 9D-49)
10. Under center cowling ☞(Page 9D-42)	22. Meter panel (center) ☞(Page 9D-44)	34. Lower bracket cover ☞(Page 9D-37)
11. Under cowling ☞(Page 9D-42)	23. Meter panel ☞(Page 9D-37)	35. Frame cover lid ☞(Page 9D-51)
12. Air intake inner pipe ☞(Page 9D-48)	24. Frame under cover ☞(Page 9D-54)	

Repair Instructions

Rear View Mirror Construction

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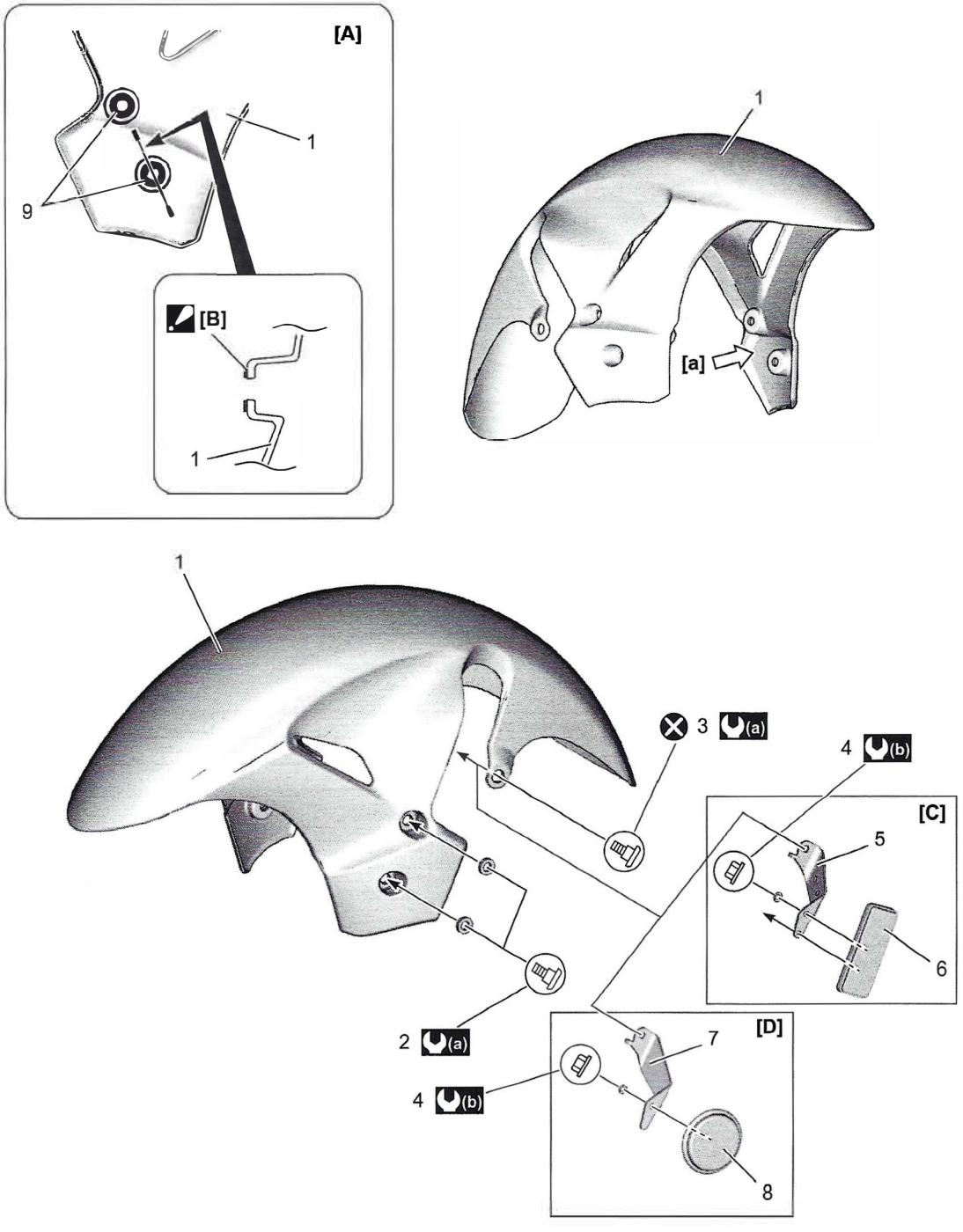


IM10L2940002-01

1. Rear view mirror	4. Rear view mirror nut	(a) : 12 N·m (1.2 kgf-m, 9.0 lbf-ft)
2. Body cowling	5. Cowling brace	
3. Brace cowling cushion	6. Windscreen brace	

Front Fender Construction

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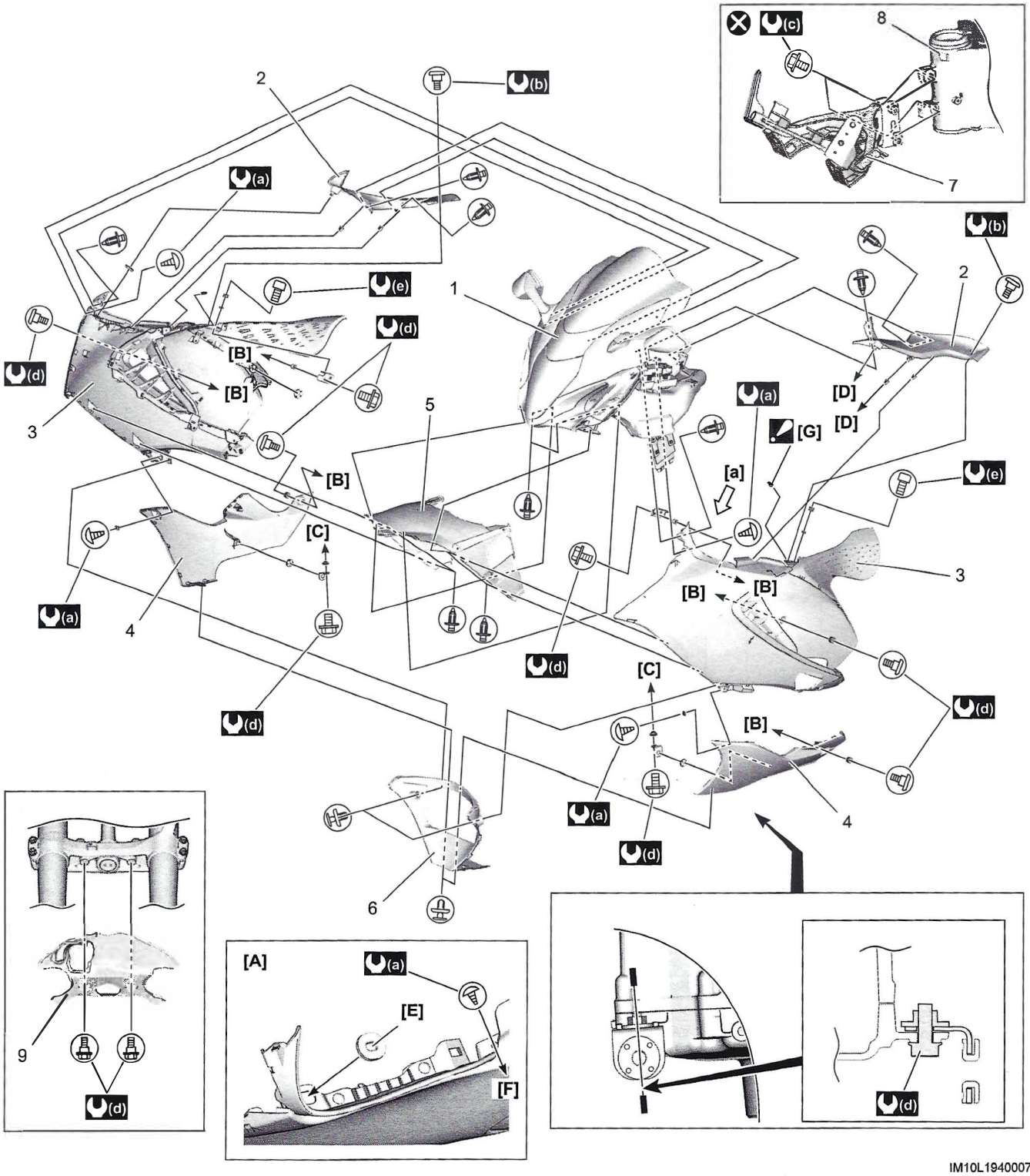


IM10L1940006-03

[A]: View [a]	2. Front fender front bolt	7. Front side reflex reflector bracket
[B]: Stick the tape so as not to block a hole.	3. Front fender rear bolt	8. Front side reflex reflector
[C]: For U.S.A., Canada and California State.	4. Front side reflex reflector nut	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[D]: Except for U.S.A., Canada, California State. Japan and Thailand.	5. Front side reflex reflector bracket	(b) : 2.5 N·m (0.25 kgf-m, 1.85 lbf-ft)
1. Front fender	6. Front side reflex reflector	: Do not reuse.

Cowling Construction

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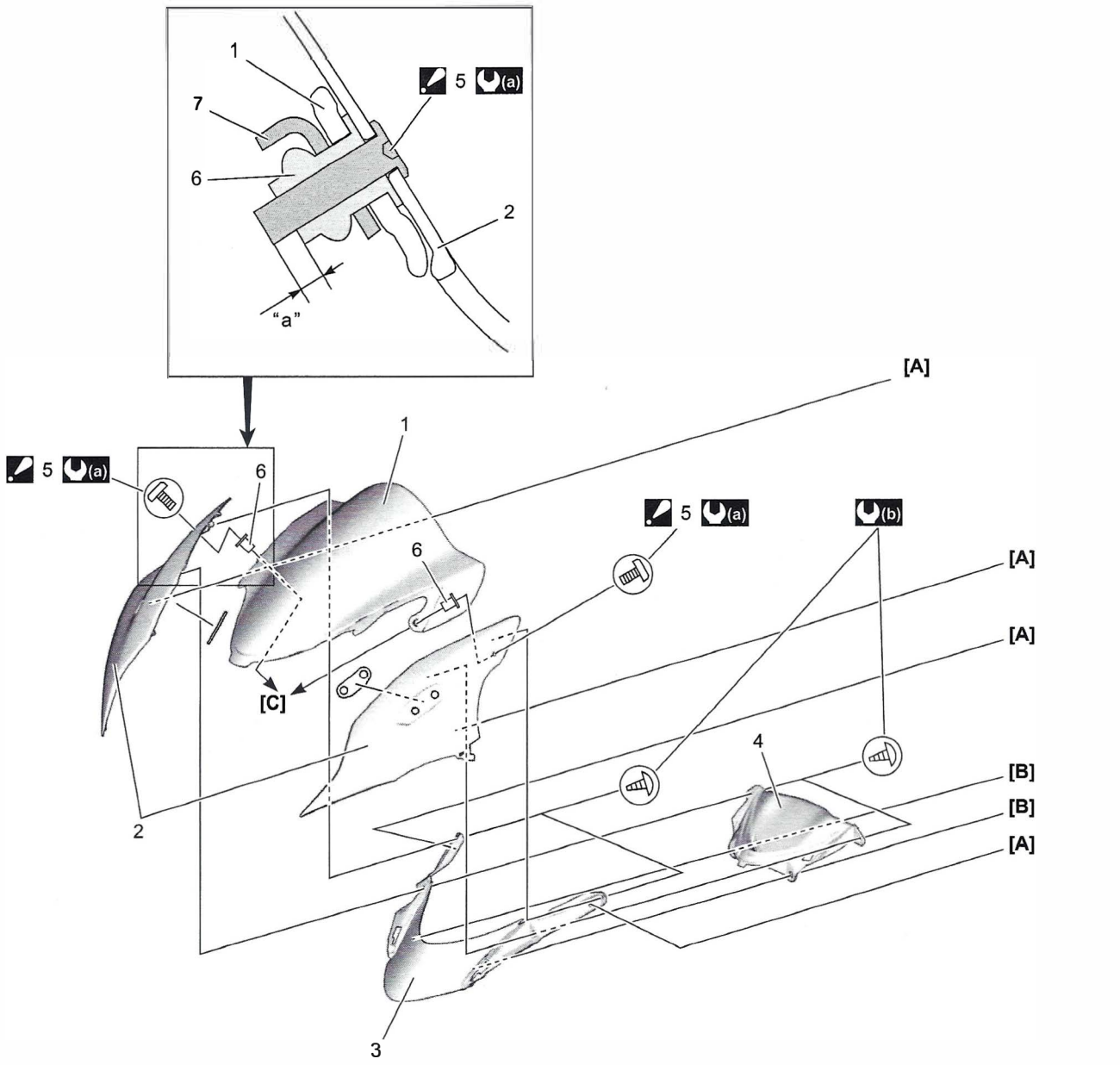


IM10L1940007-04

[A]: View [a]	2. Meter panel	(a) : 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)
[B]: To frame	3. Side cowling assembly	(b) : 4.0 N·m (0.41 kgf-m, 2.95 lbf-ft)
[C]: To engine	4. Under cowling	(c) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
[D]: To side cowling assembly	5. Body cowl and Under inner cowl	(d) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[E]: From meter panel	6. Under center cowling	(e) : 4.5 N·m (0.46 kgf-m, 3.35 lbf-ft)
[F]: To intake pipe assembly	7. Frame	: Do not reuse.
[G]: To avoid damaging the frame, insert this nut after installing the side cowling assembly to frame. (RH and LH)	8. Brace assembly	
1. Body cowling assembly	9. Lower Bracket Cover	

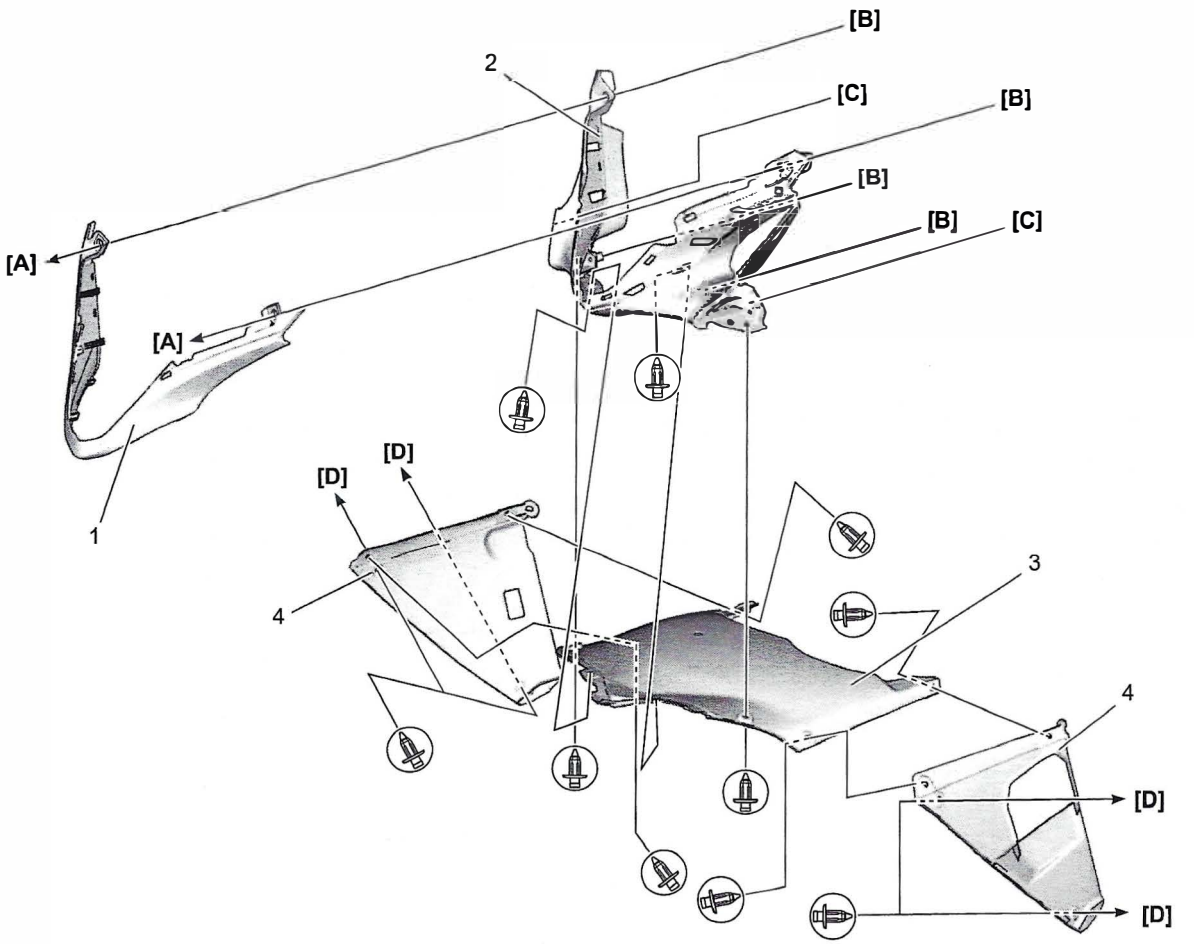
Body Cowling Construction

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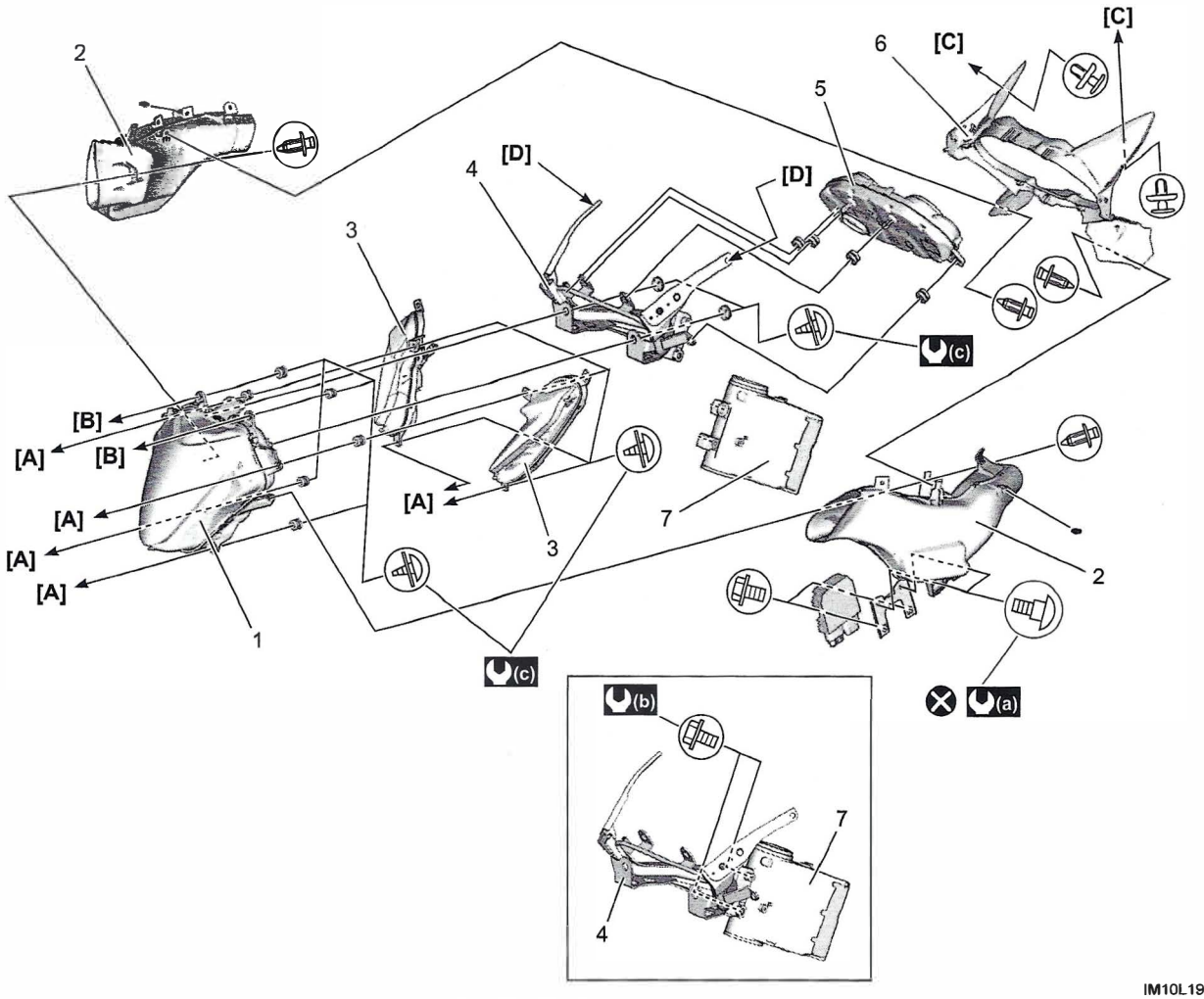
IM10L1940008-02

[A]: From meter panel (center)	3. Body center cowling	(a) : 0.4 N·m (0.04 kgf-m, 0.30 lbf-ft)
[B]: From headlight	4. Meter front panel No.1	(b) : 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)
[C]: To cowling brace	5. Windscreen bolt : Tighten the windscreen bolt to the specified torque or tighten so that the protruding amount of the screw is "a".	"a": 3.0 – 4.0 mm (0.12 – 0.16 in)
1. Windscreen	6. Windscreen nut	
2. Body cowling	7. Cowling brace	



IM10L1940009-01

[A]: To body cowling	[D]: To side cowling assembly	3. Body cowl cover
[B]: To headlight	1. Intake center cover	4. Under inner cowling
[C]: To turn signal light	2. Intake rear cover	

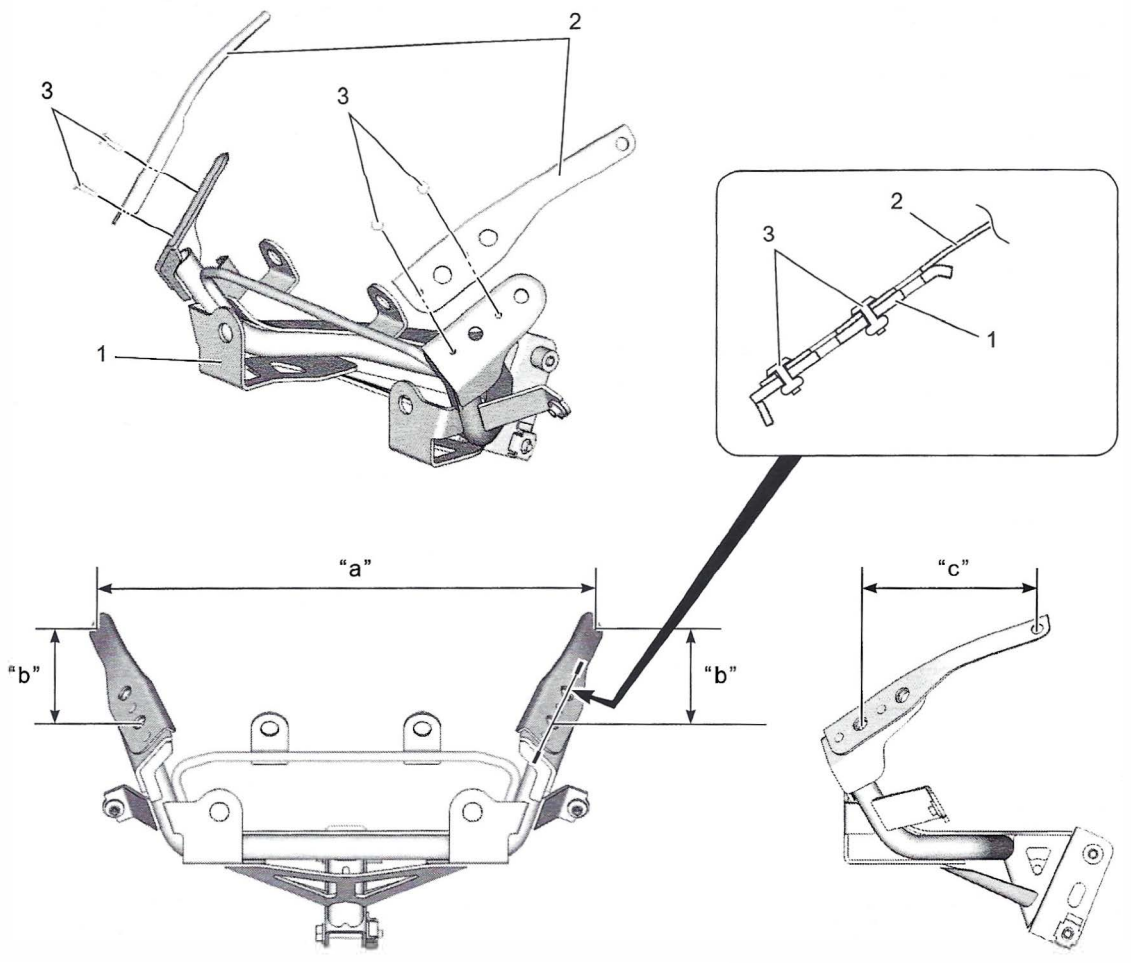


IM10L1940010-03

[A]: To intake rear cover	2. Intake pipe assembly	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[B]: To meter front panel No.1	3. Turn signal light	(b) : 23 N·m (2.3 kgf-m, 17.0 lbf-ft)
[C]: To body center cowling	4. Brace assembly	(c) : 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)
[D]: From windscreen	5. Combination meter	⊗ : Do not reuse.
1. Headlight	6. Meter panel (center)	

Windscreen Brace Construction

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IM10L1940011-01

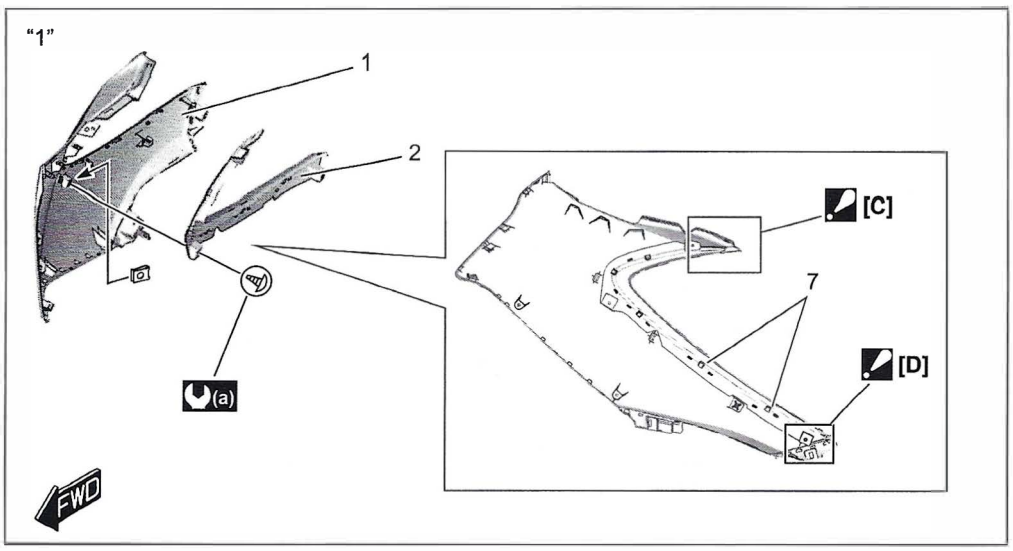
1. Cowling brace	3. Rivet	"b": 75.9 mm (2.99 in)
2. Windscreen brace	"a": 388 – 390 mm (15.28 – 15.35 in)	"c": 138.8 mm (5.465 in)

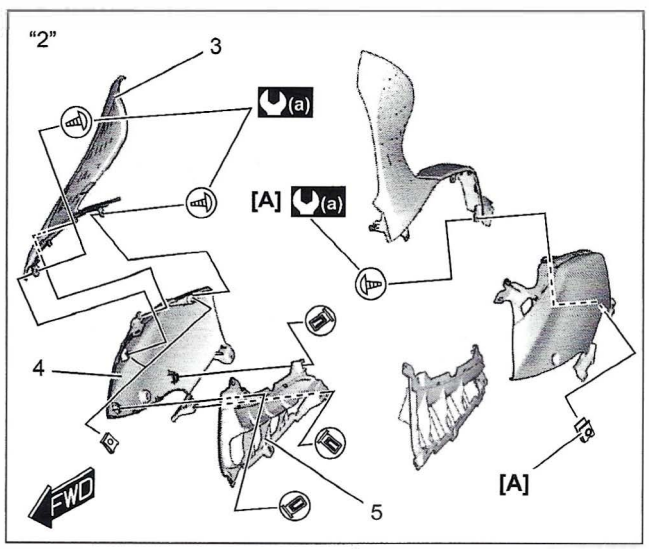
Side Cowling Assembly Construction

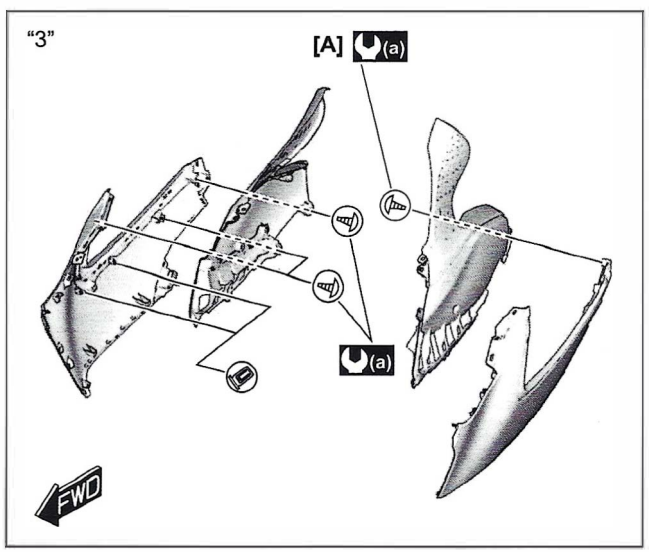
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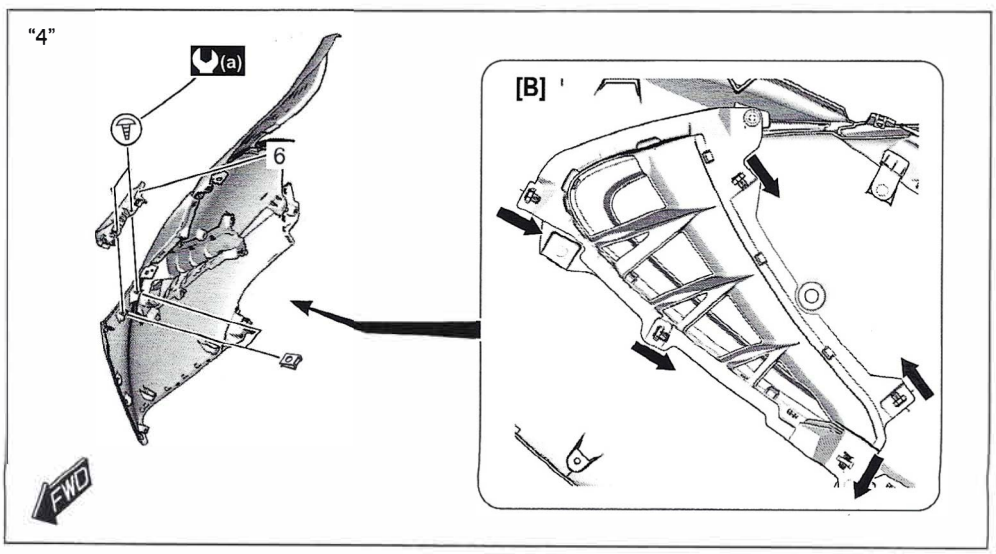
NOTE

The following figure shows the right side. The same procedure applies to the other side except in some cases.





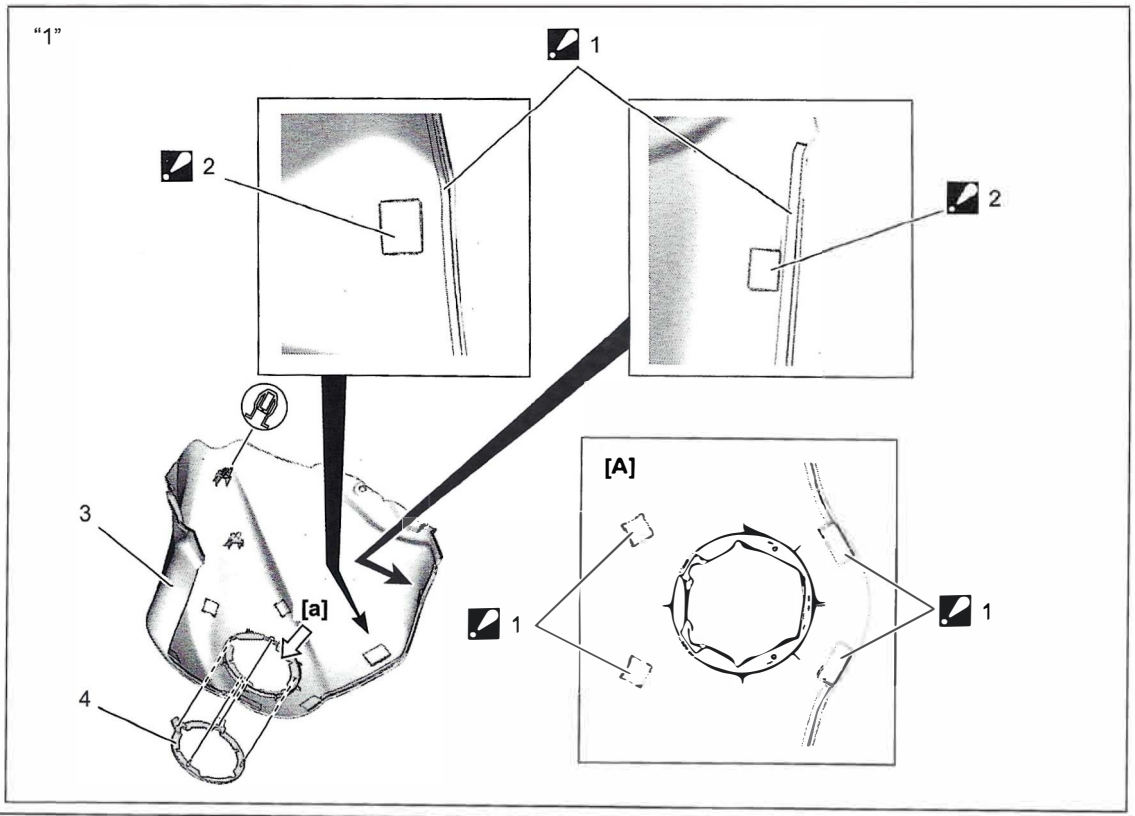


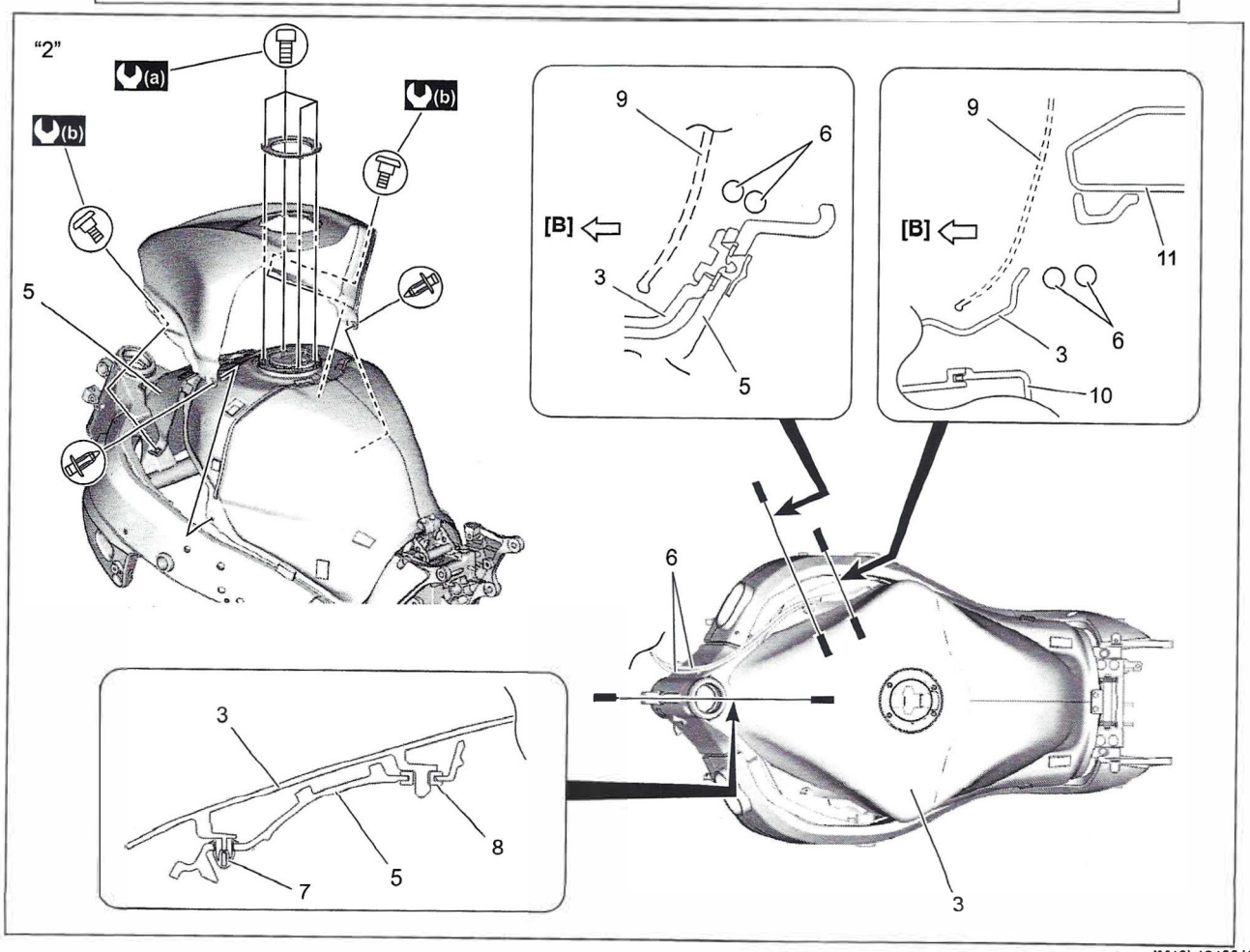


[A]: Left side only	1. Side rear cowling	5. Side front cowling No.2
[B]: Assembling direction of the clip	2. Side front cowling No.1	6. Meter front panel No.2
[C]: First, assemble side rear cowling and side front cowling No.1.	3. Side rear cover	7. Hook
[D]: Align the boss on A with the hole on B, and then secure the hook.	4. Side cover	(a) : 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)

Fuel Tank Front Cover / Fuel Tank Bracket Construction

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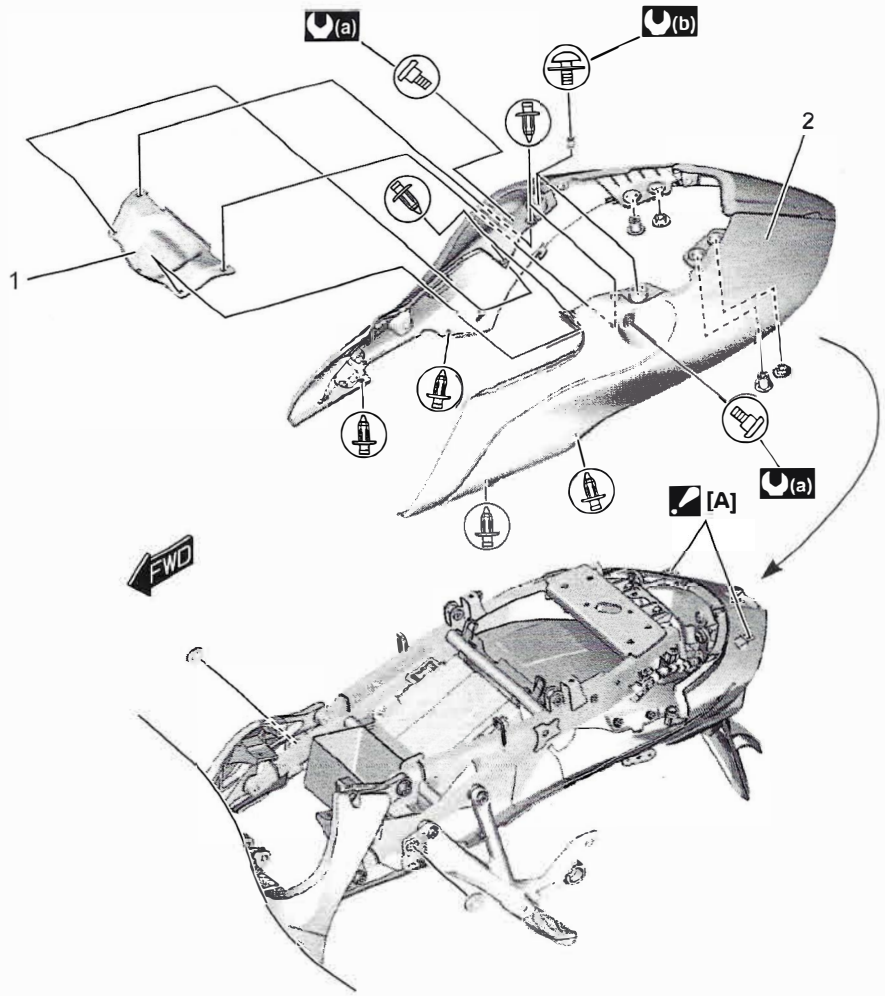


IM10L1940013-02

[A]: View [a]	4. Fuel tank cover rubber	9. Meter panel (RH)
[B]: Top side	5. Fuel tank front bracket	10. Air cleaner box
1. Cushion : Stick the cushion aligning with emboss line.	6. Throttle cables	11. Frame
2. Fastener : Stick the fastener aligning with emboss line.	7. Clip	(a) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
3. Fuel tank front cover	8. Cushion rubber	(b) : 4.0 N·m (0.41 kgf-m, 2.95 lbf-ft)

Frame Cover Assembly Construction

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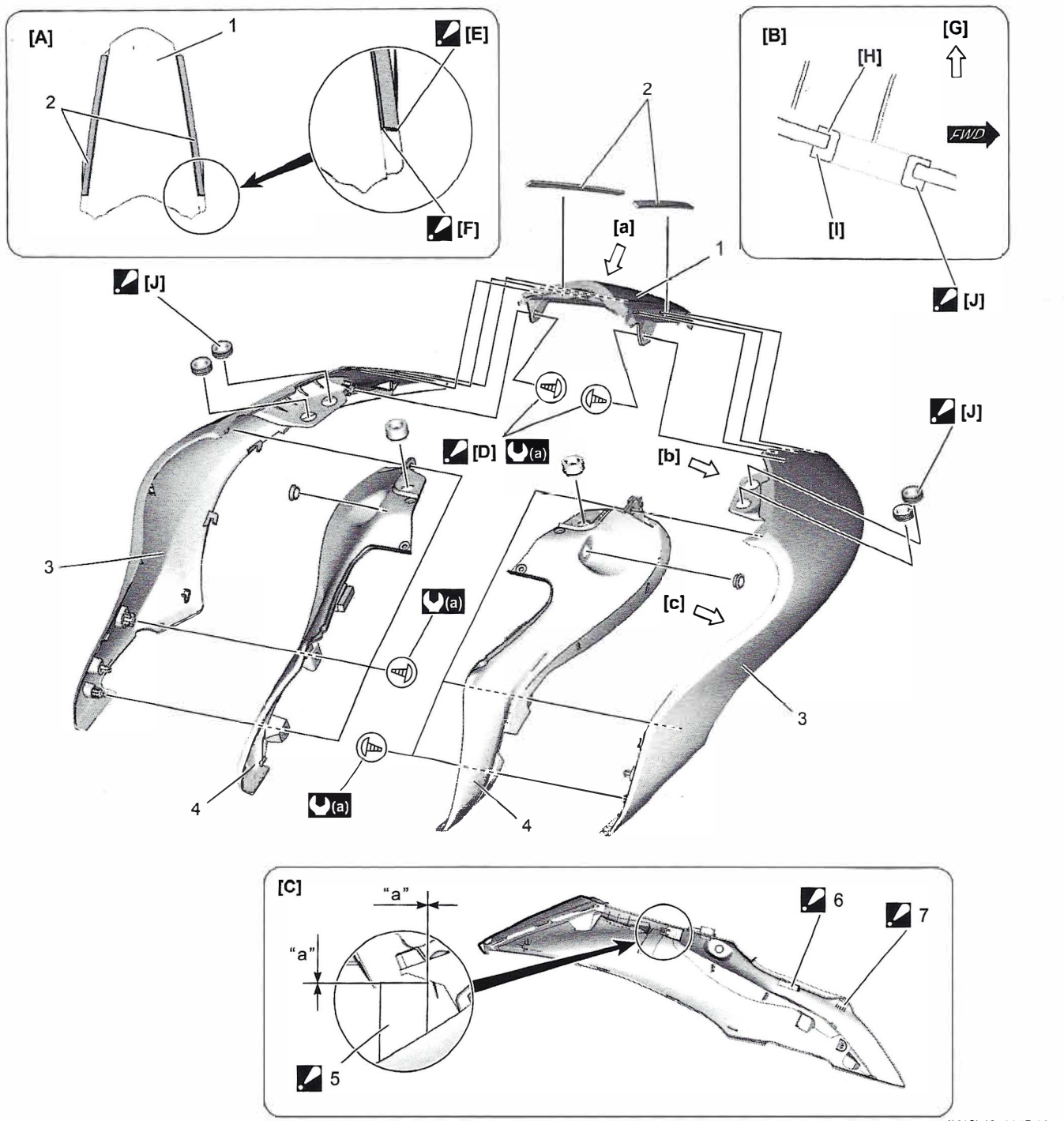


IM10L1940014-02

[A]: Firmly insert into the protrusion inside the cover	2. Frame cover assembly	(b) : 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
1. Frame cover lid	(a) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)	

Frame Cover Construction

BENM10L39406009

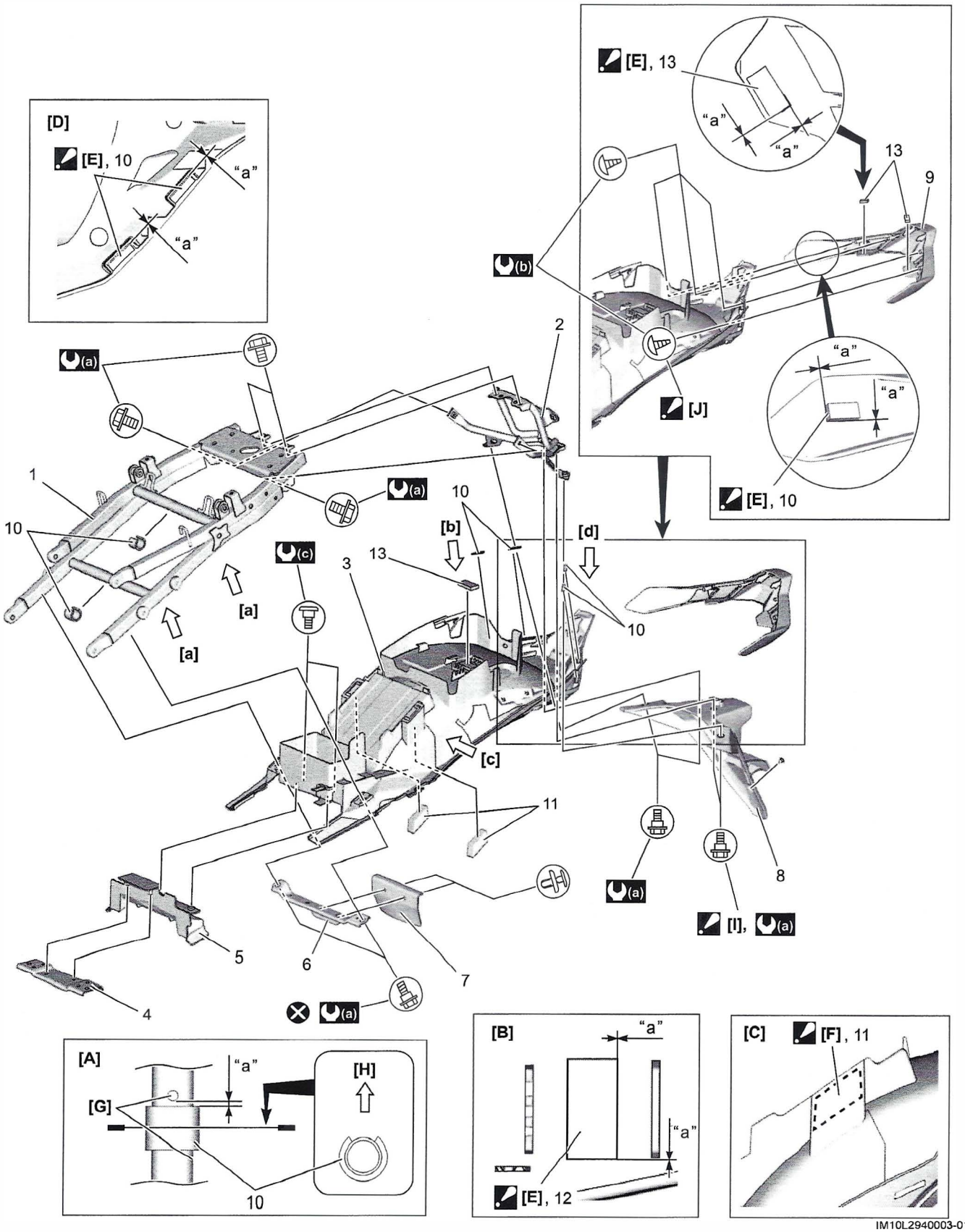


IM10L1940015-03

[A]: View [a]	[H]: Thin	5. Cushion : Stick the cushion aligning with emboss line. (LH only)
[B]: View [b]	[I]: Thick	6. Cushion : Stick the cushion matching with seating surface.
[C]: View [c]	[J]: Be aware of the difference in thickness.	7. Cushion : Stick the cushion matching with rib.
[D]: Tighten the boss securely fitted.	1. Frame center cover	(a): 2.0 N·m (0.20 kgf-m, 1.50 lbf-ft)
[E]: Match the corners.	2. Cushion	"a": 0 – 2 mm (0 – 0.078 in)
[F]: Stick the cushion aligning with cover edge and R end of rib.	3. Frame rear cover	
[G]: Top side	4. Frame cover	

Rear Fender Construction

BENM10L39406010

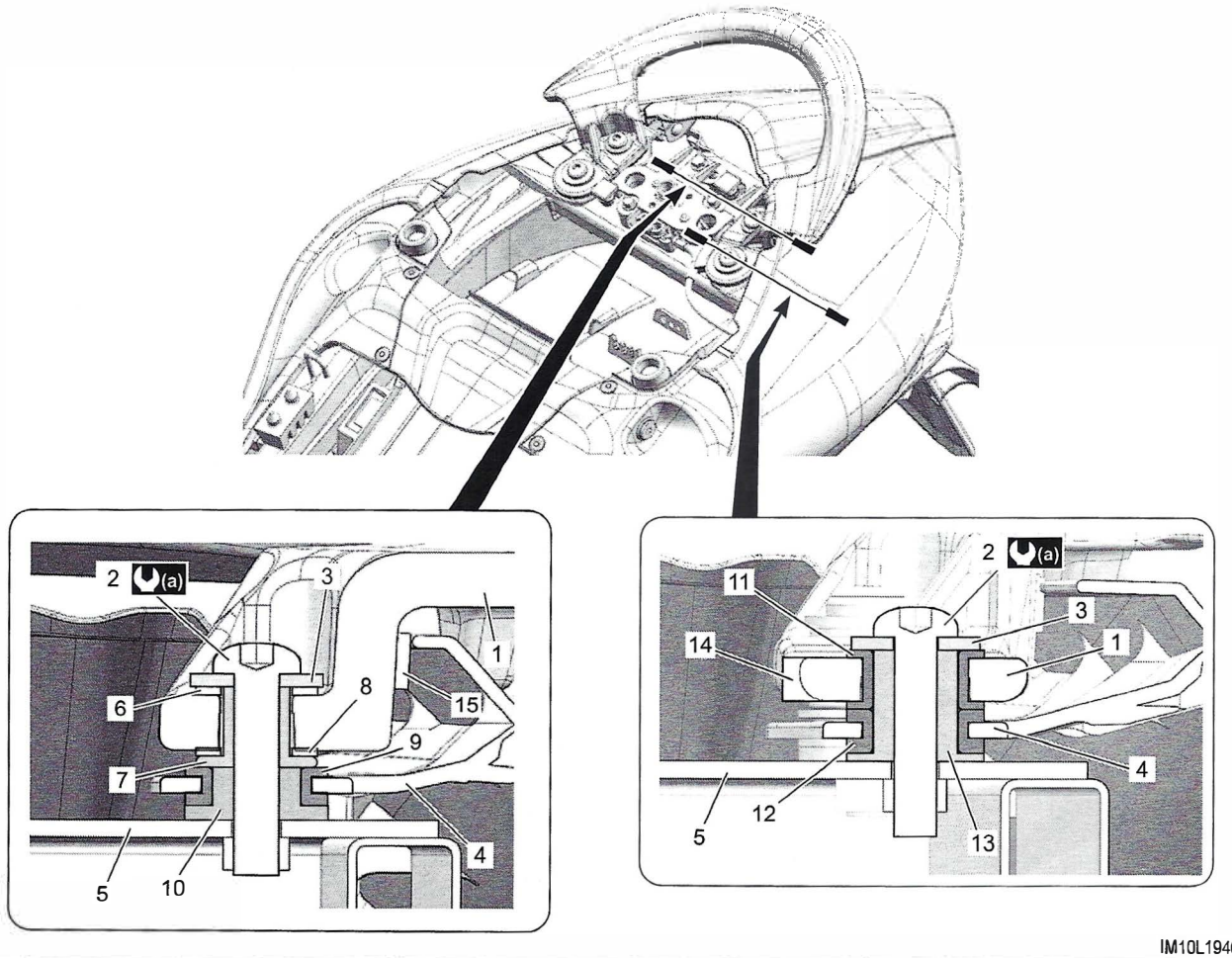


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[A]: View [a]	1. Seat rail	11. Cushion
[B]: View [b]	2. Rear fender bracket	12. Cushion
[C]: View [c]	3. Rear fender (front)	13. Cushion
[D]: View [d]	4. Fuel tank lower bracket	(a) : 12 N·m (1.2 kgf-m, 9.0 lbf-ft)
[E]: Stick the cushion aligning with the emboss line.	5. Battery front shield	(b) : 0.8 N·m (0.08 kgf-m, 0.60 lbf-ft)
[F]: Fit the cushion according to the shape of part.	6. Rear fender (front) brace	(c) : 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
[G]: Drain hole	7. Rear fender mudguard	"a": 0 – 2 mm (0 – 0.079 in)
[H]: Top side	8. Rear fender (rear)	"b": 1.5 – 3.5 mm (0.059 – 0.13)
[I]: Except for india.	9. Frame under cover	: Do not reuse.
[J]: Tighten this screw first.	10. Cushion	

Pillion Rider Handle Construction

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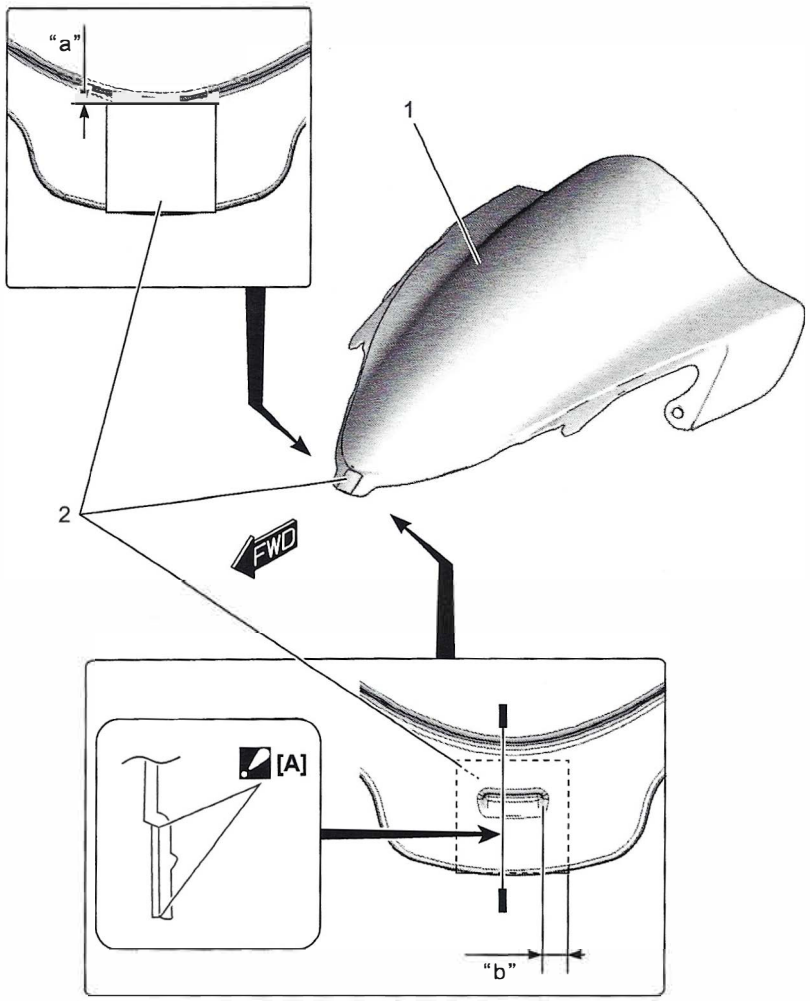


IM10L1940017-01

1. Pillion rider handle	7. Washer	13. Washer
2. Pillion rider handle bolt	8. Cushion	14. Cushion (LH only)
3. Washer	9. Cushion	15. Cushion
4. Frame rear cover	10. Washer	(a) : 25 N·m (2.5 kgf-m, 18.5 lbf-ft)
5. Seat rail	11. Cushion	
6. Cushion	12. Cushion	

Windscreen Cushion Construction

BENM10L39406012

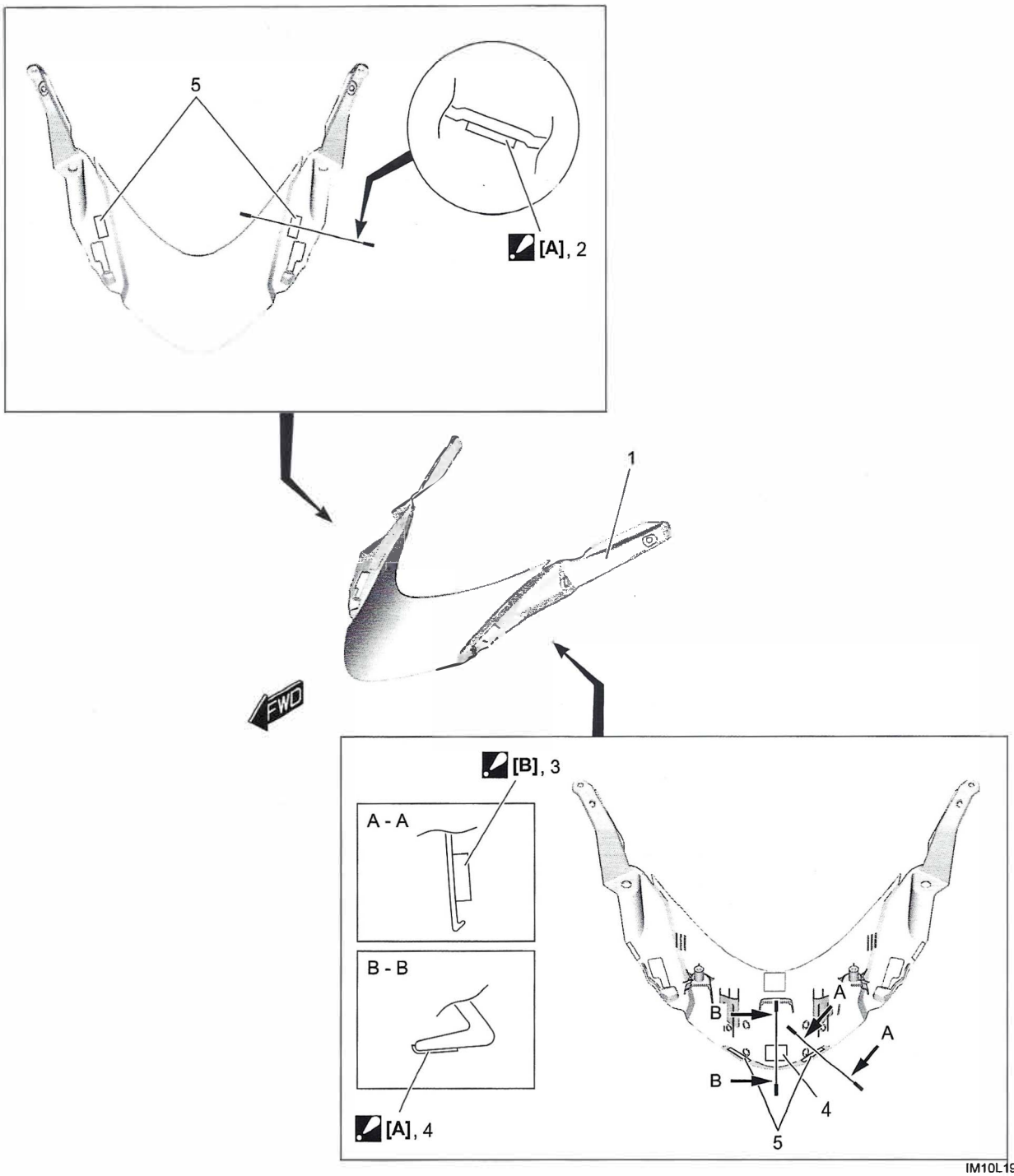


IM10L1940018-01

[A]: Press the cushion after sticking.	2. Cushion	"b": 2.5 – 5.5 mm 0.099 – 0.21 in)
1. Windscreen	"a": 0 – 1 mm (0 – 0.039 in)	

Body Center Cowling Cushion Construction

BENM10L39406013

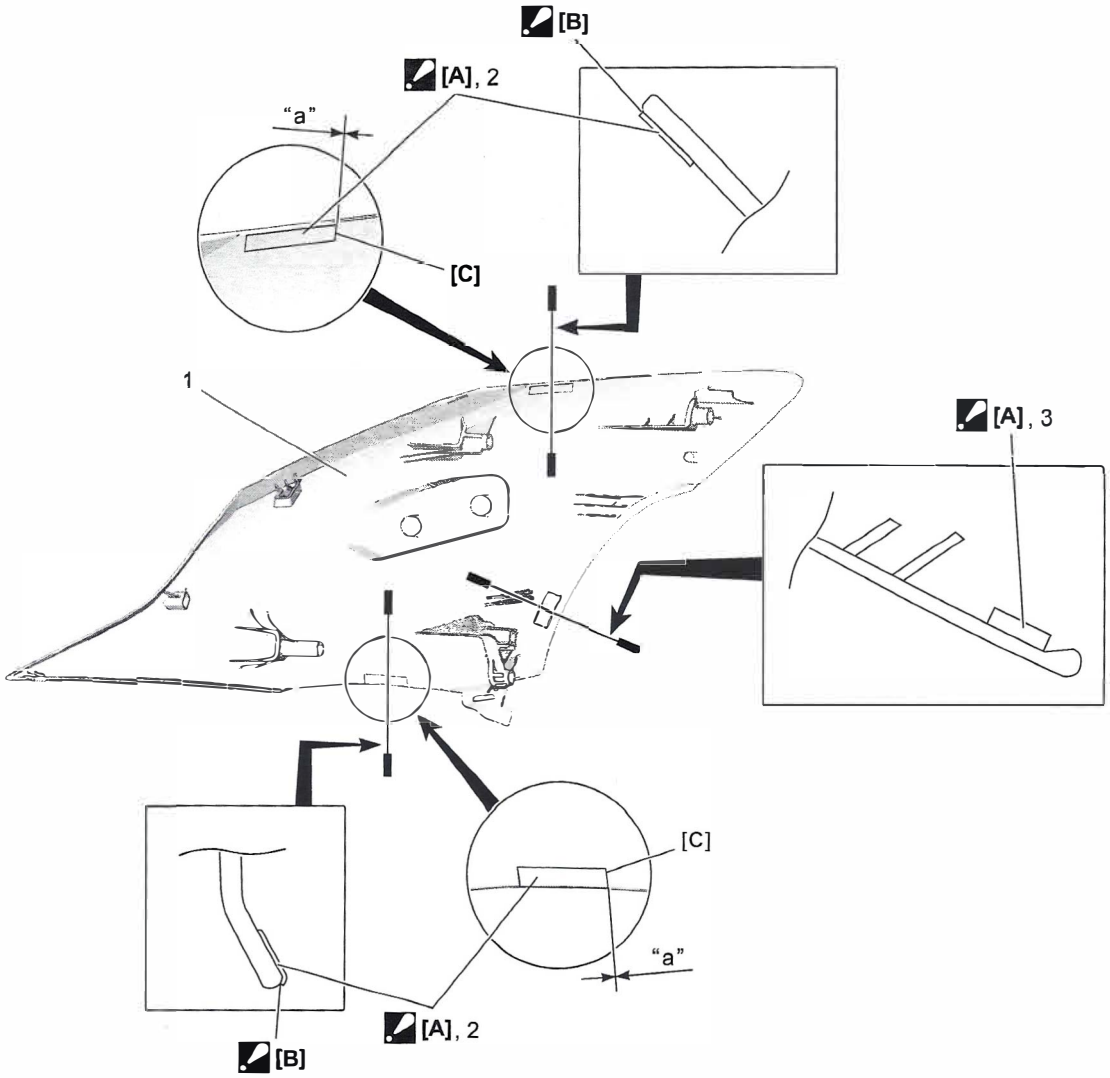


IM10L1940019-01

[A]: Stick the cushion or tape within 1mm (0.039 in) for inside of emboss line. Press the cushion after sticking.	1. Body center cowling	3. Fastener
[B]: Stick the cushion or tape within 1mm (0.039 in) for inside of emboss line.	2. Cushion	4. Tape

Body Cowling Cushion Construction

BENM10L39406014

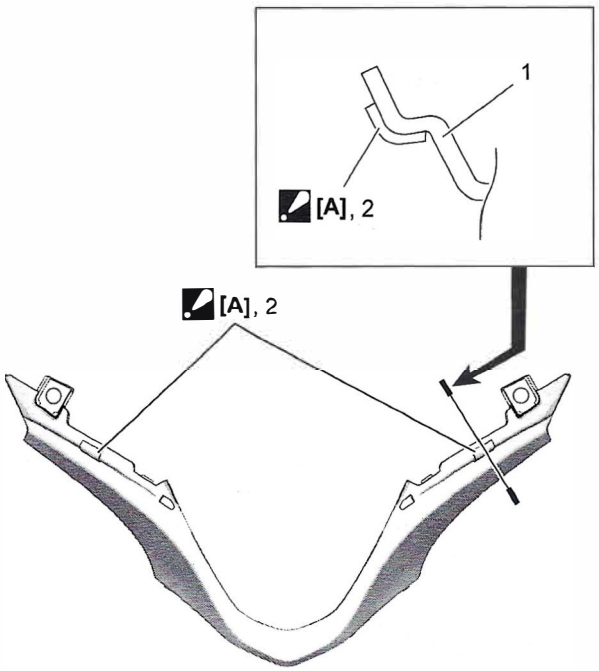


IM10L1940020-01

[A]: Stick the cushion or tape within 1mm (0.039 in) for inside of emboss line. Press the cushion after sticking.	[D]: Emboss line	3. Cushion
[B]: Stick the tape aligning with the end of curved surface.	1. Body cowling	
[C]: Emboss line	2. Tape	

Intake Cover Cushion Construction

BENM10L39406015

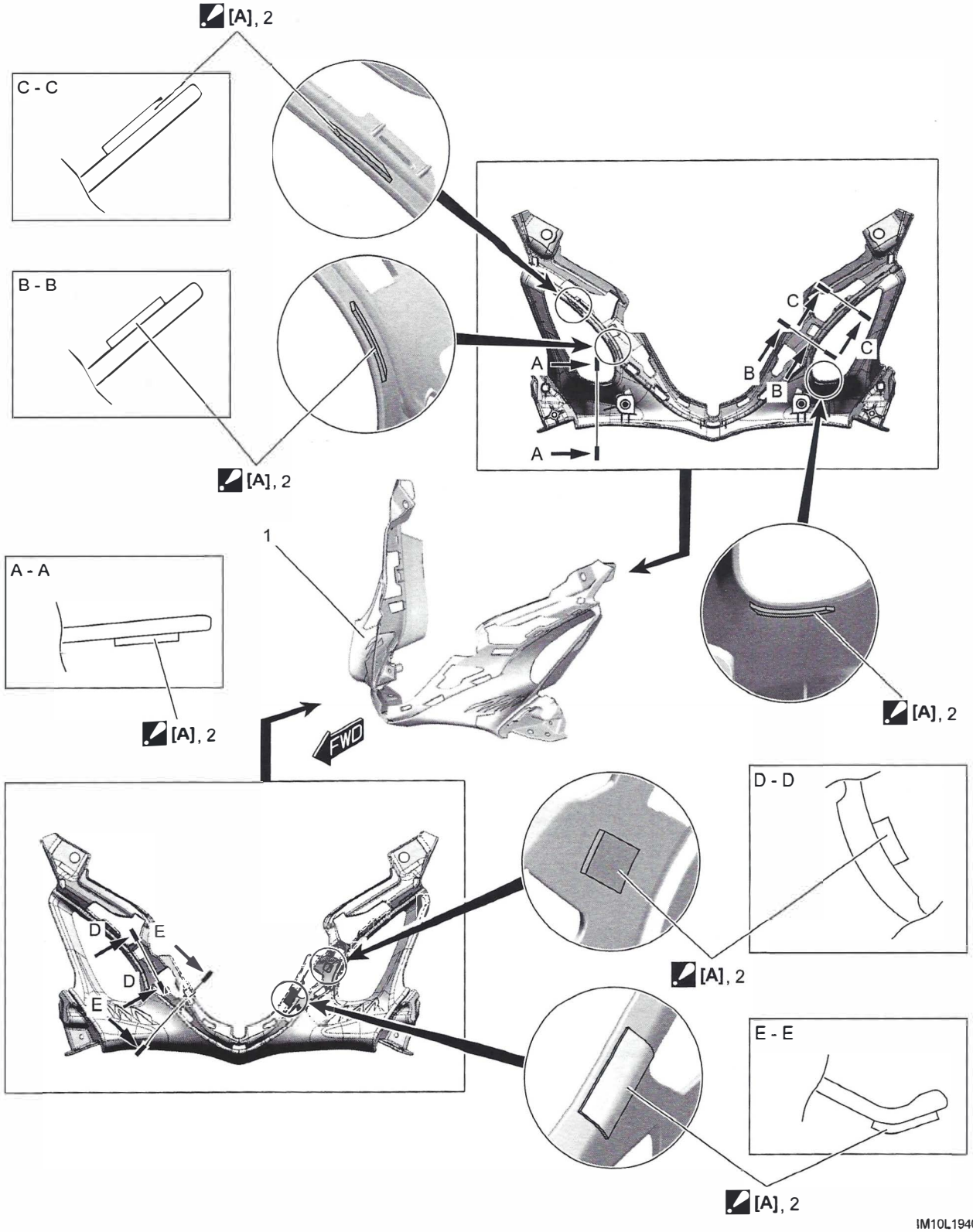


IM10L1940021-01

[A]: Stick the cushion within 1mm (0.039 in) for inside of emboss line. Press the cushion after sticking.	1. Intake center cover	2. Cushion

Intake Cover Cushion Construction No.2

BENM10L39406016

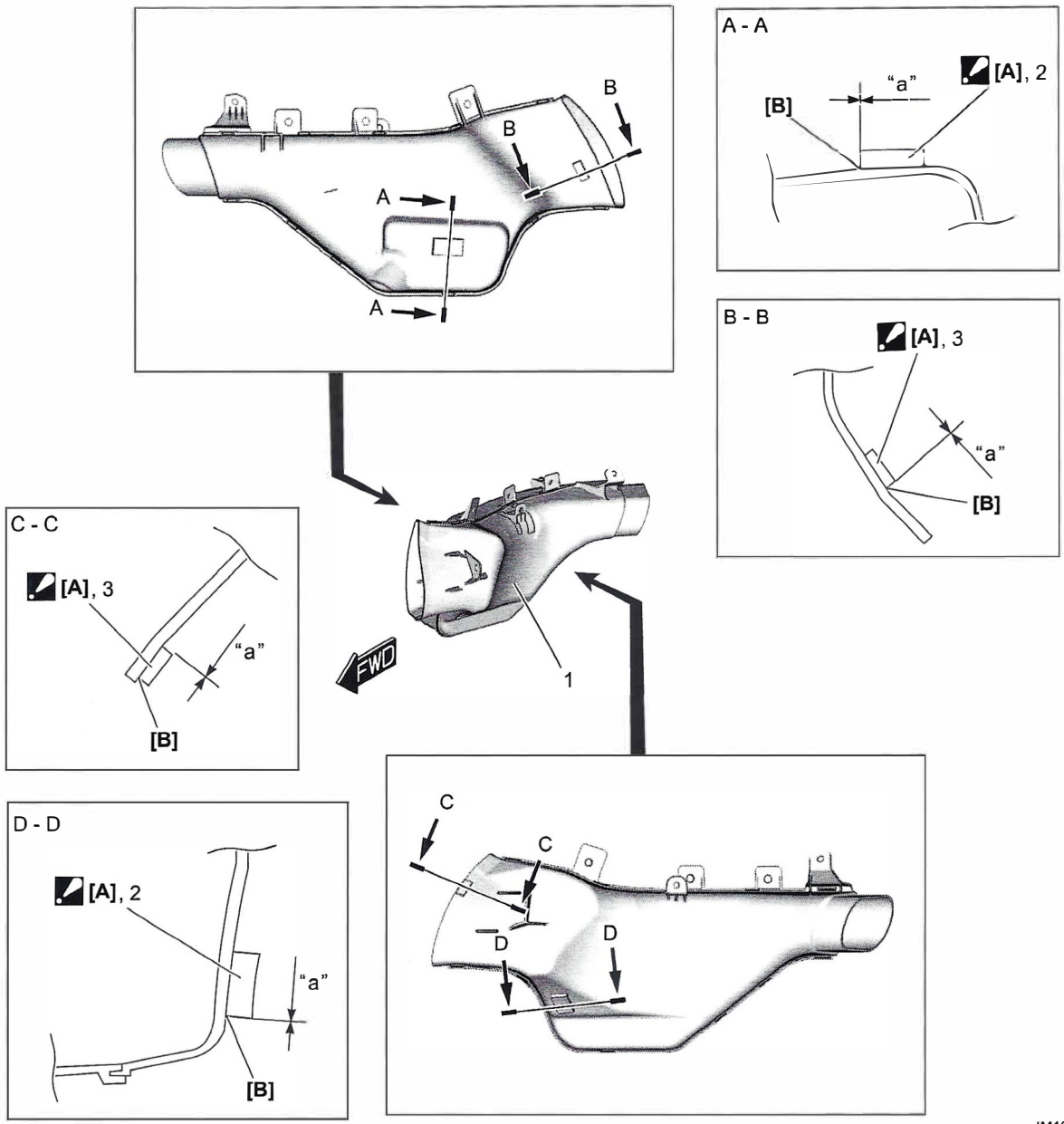


IM10L1940022-02

[A]: Stick the cushion within 1mm (0.039 in) for inside of emboss line. Press the cushion after sticking.	1. Intake rear cover	2. Cushion

Intake Pipe Cushion Construction

BENM10L39406017

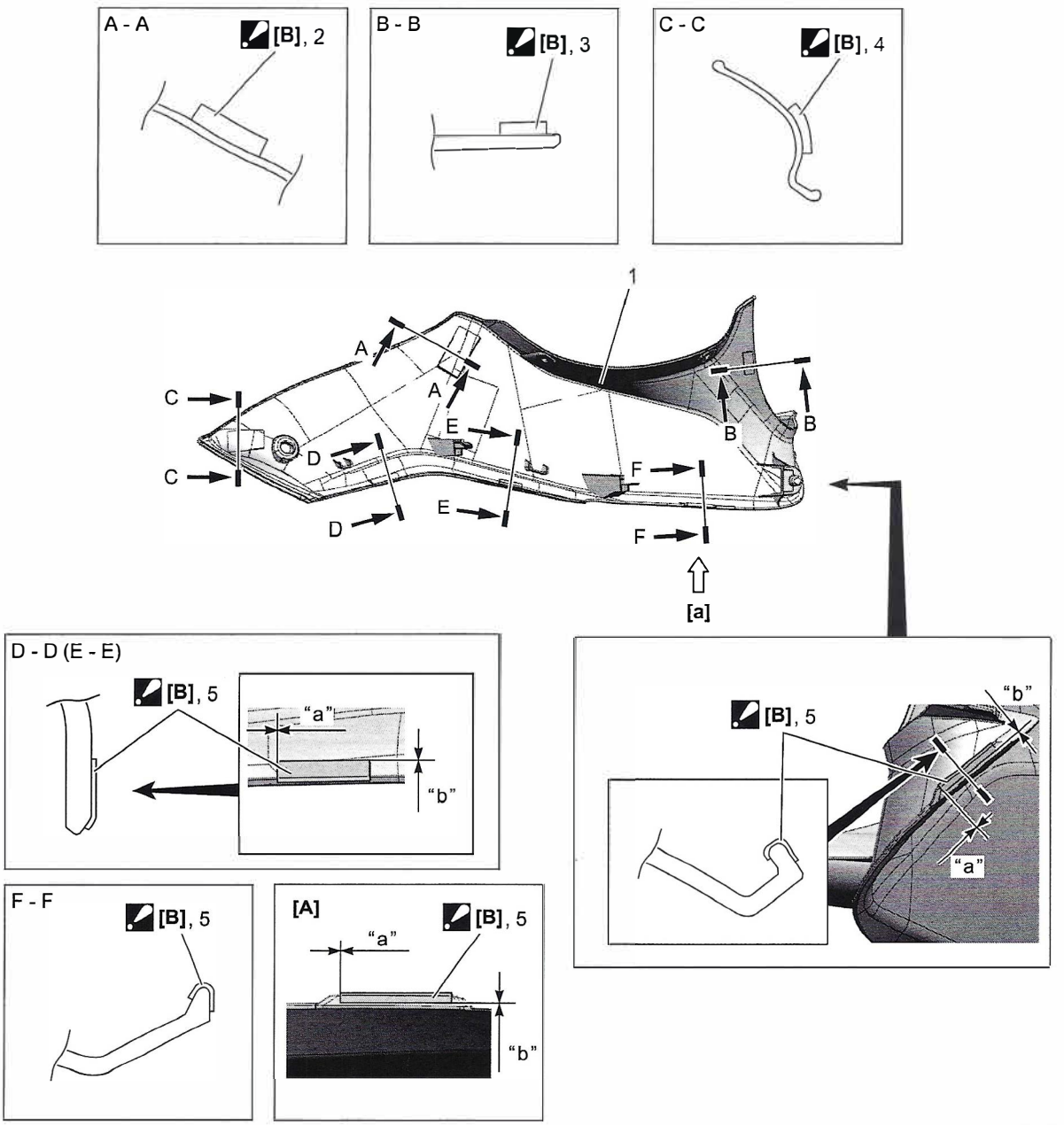


IM10L1940023-01

[A]: Stick the cushion or tape within 1mm (0.039 in) for inside of emboss line. Press the cushion after sticking.	1. Intake pipe assembly	3. Cushion
[B]: Emboss line	2. Cushion	"a": 0 – 1 mm (0 – 0.039 in)

Meter Panel Cushion Construction

BENM10L39406018

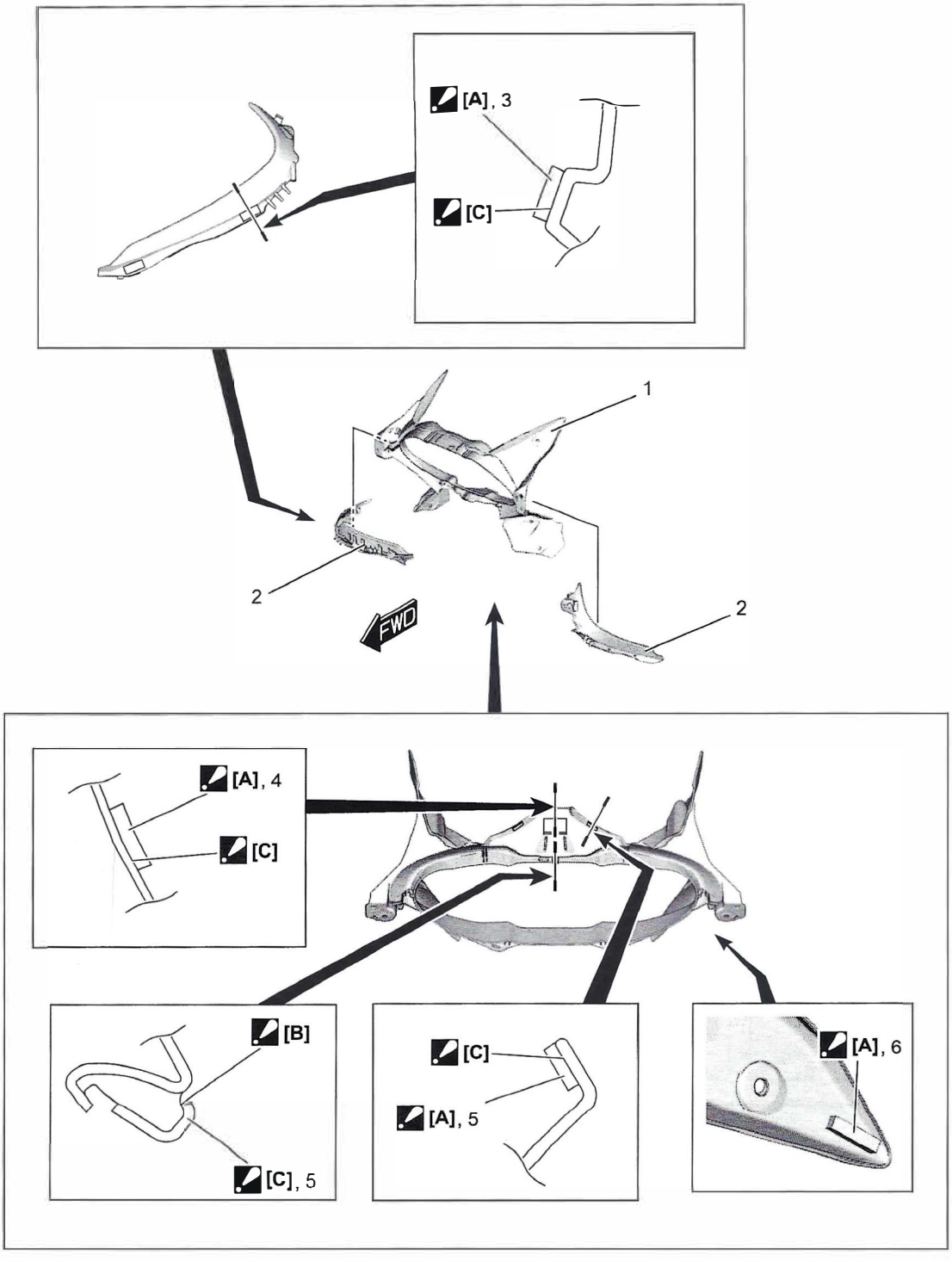


IM10L1940024-02

[A]: View [a]	2. Cushion	5. Cushion
[B]: Stick the cushion within 1mm (0.039 in) for inside of emboss line. Press the cushion after sticking.	3. Cushion	"a": 0 – 1 mm (0 – 0.039 in)
1. Meter panel	4. Cushion	"b": -1 – 0 mm (-0.039 – 0 in)

Meter Panel Cushion Construction No.2

BENM10L39406019

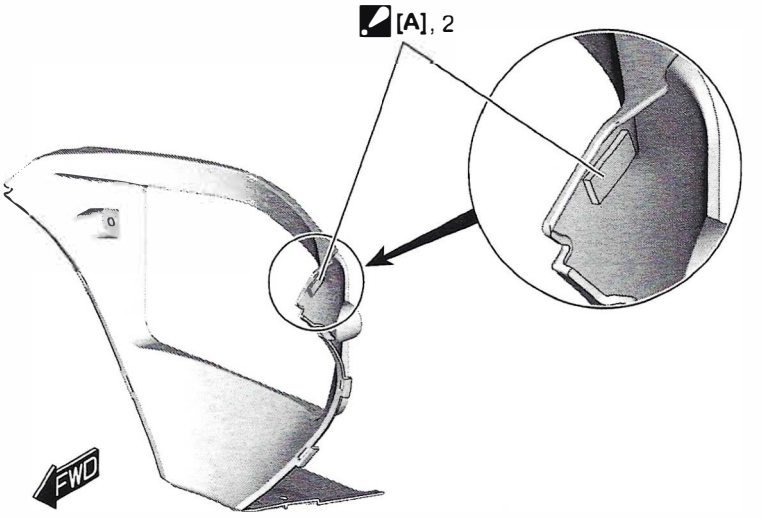


IM10L1940025-02

[A]: Stick the cushion within 1mm (0.039 in) for inside of emboss line. Press the cushion after sticking.	1. Meter panel (center)	4. Cushion
[B]: Stick the cushion aligning with the end of curved surface.	2. Cushion	5. Cushion
[C]: Press the cushion after sticking.	3. Cushion	6. Cushion

Under Cowl Cushion Construction

BENM10L39406020

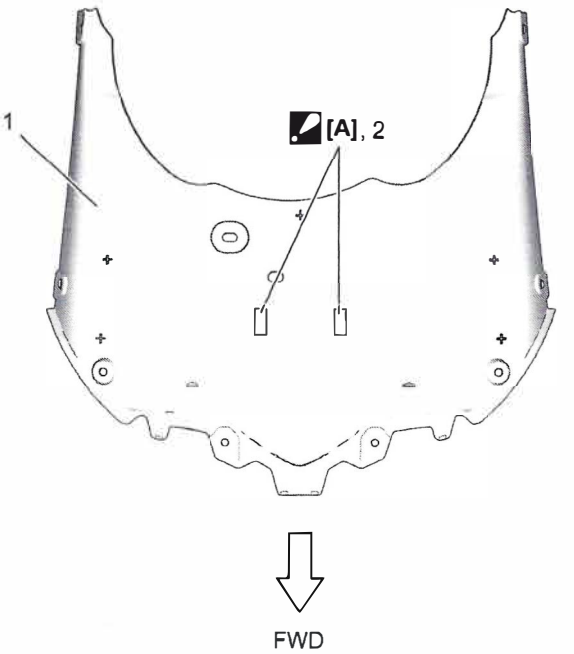


IM10L1940026-01

[A]: Stick the cushion aligning with the emboss line.	1. Under center cowling	2. Cushion

Body Cowl Cover Cushion Construction

BENM10L39406021

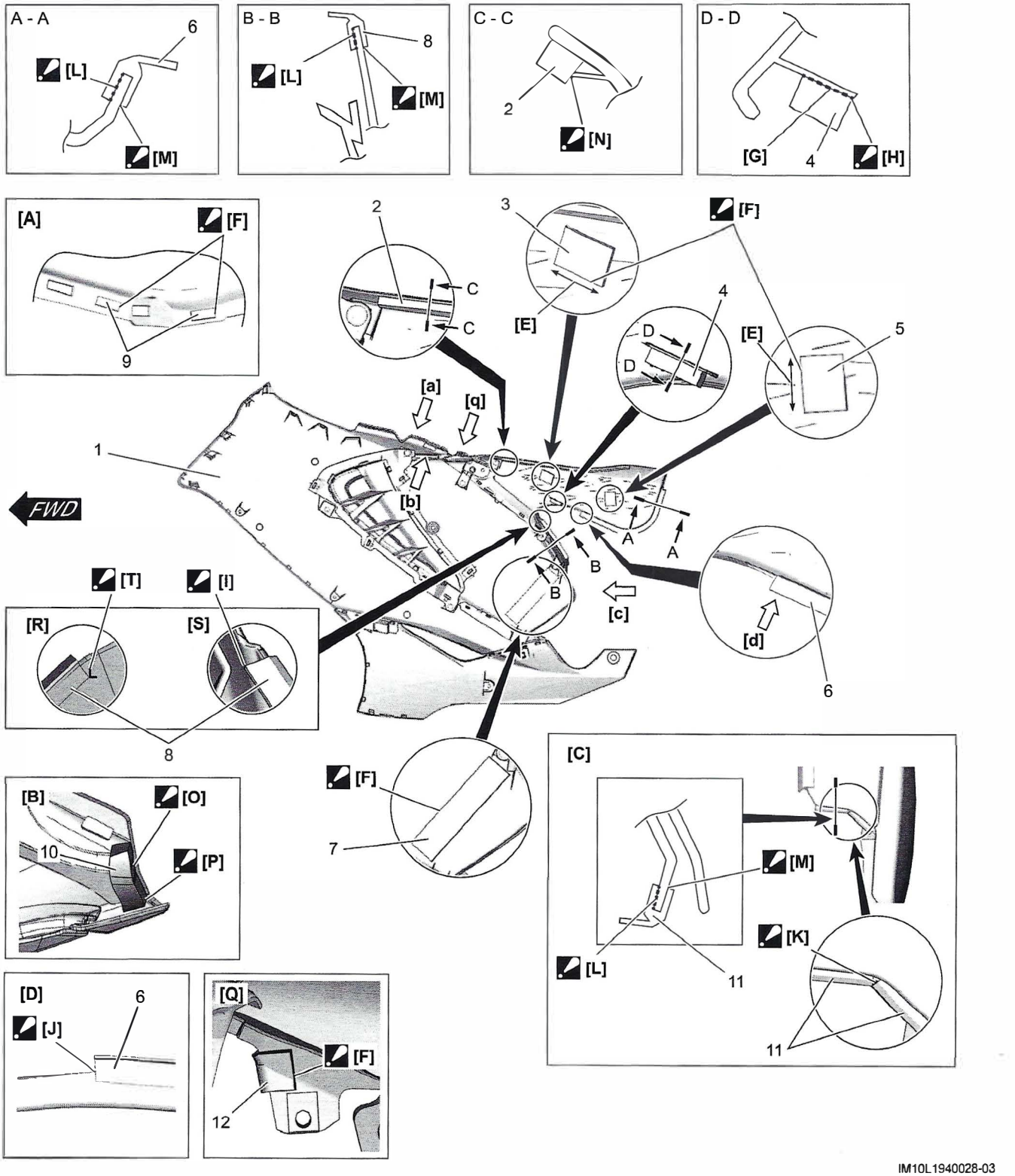


IM10L1940027-01

[A]: Stick the cushion within 1mm (0.039 in) for inside of emboss line.	1. Body cowl cover	2. Cushion

Side Cowling Assembly Cushion Construction

BENM10L39406022

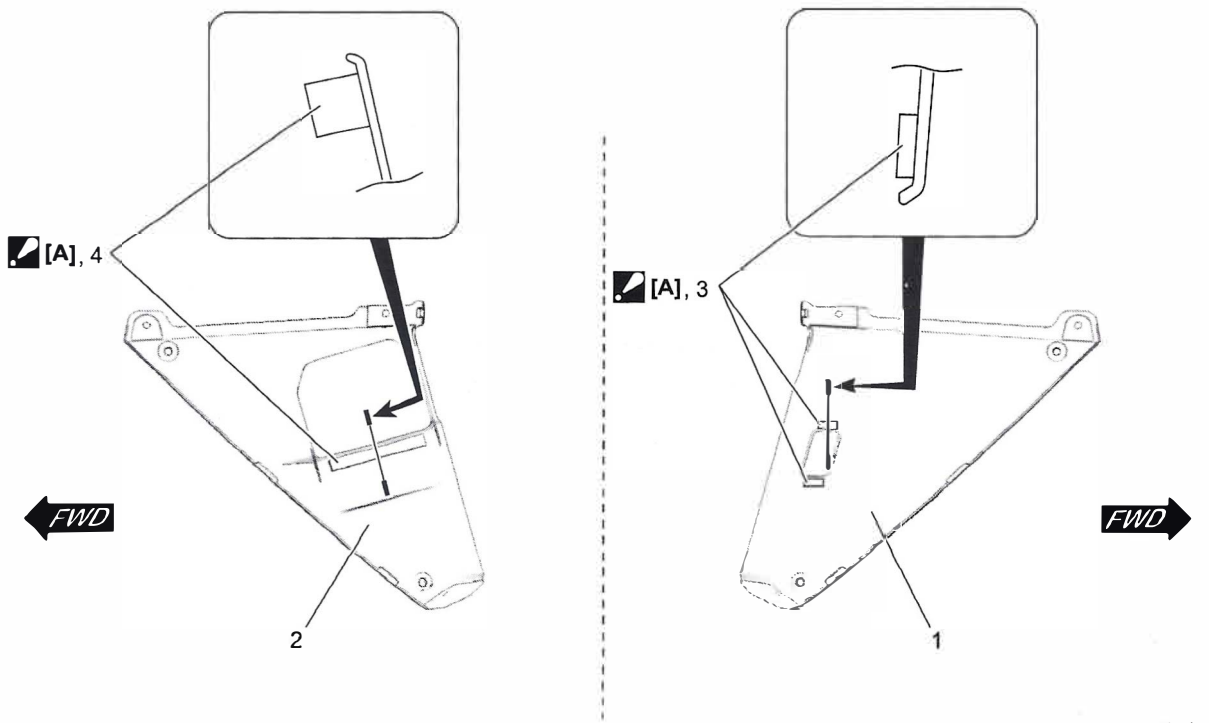


IM10L1940028-03

[A]: View [a]	[L]: In this range, adhered all around.	3. Cushion
[B]: View [b]	[M]: No permit distortion all around.	4. Cushion
[C]: View [c]	[N]: Match the cushion with rib.	5. Cushion
[D]: View [d]	[O]: Cushion does not extend from the edge.	6. Molding
[E]: Long side	[P]: Stick the cushion to the edge.	7. Cushion (LH only)
[F]: Stick the cushion aligning with emboss line.	[Q]: View [q]	8. Molding
[G]: Bonded surface	[R]: Left side	9. Cushion
[H]: Stick the cushion aligning with the edge of the part.	[S]: Right side	10. Cushion
[I]: Do not run aground.	[T]: Stick the molding aligning with the mark.	11. Molding
[J]: Align the molding with the edge.	1. Side cowling assembly	12. Cushion
[K]: Allow overlap.	2. Cushion	

Under Inner Cowling Cushion Construction

BENM10L39406023

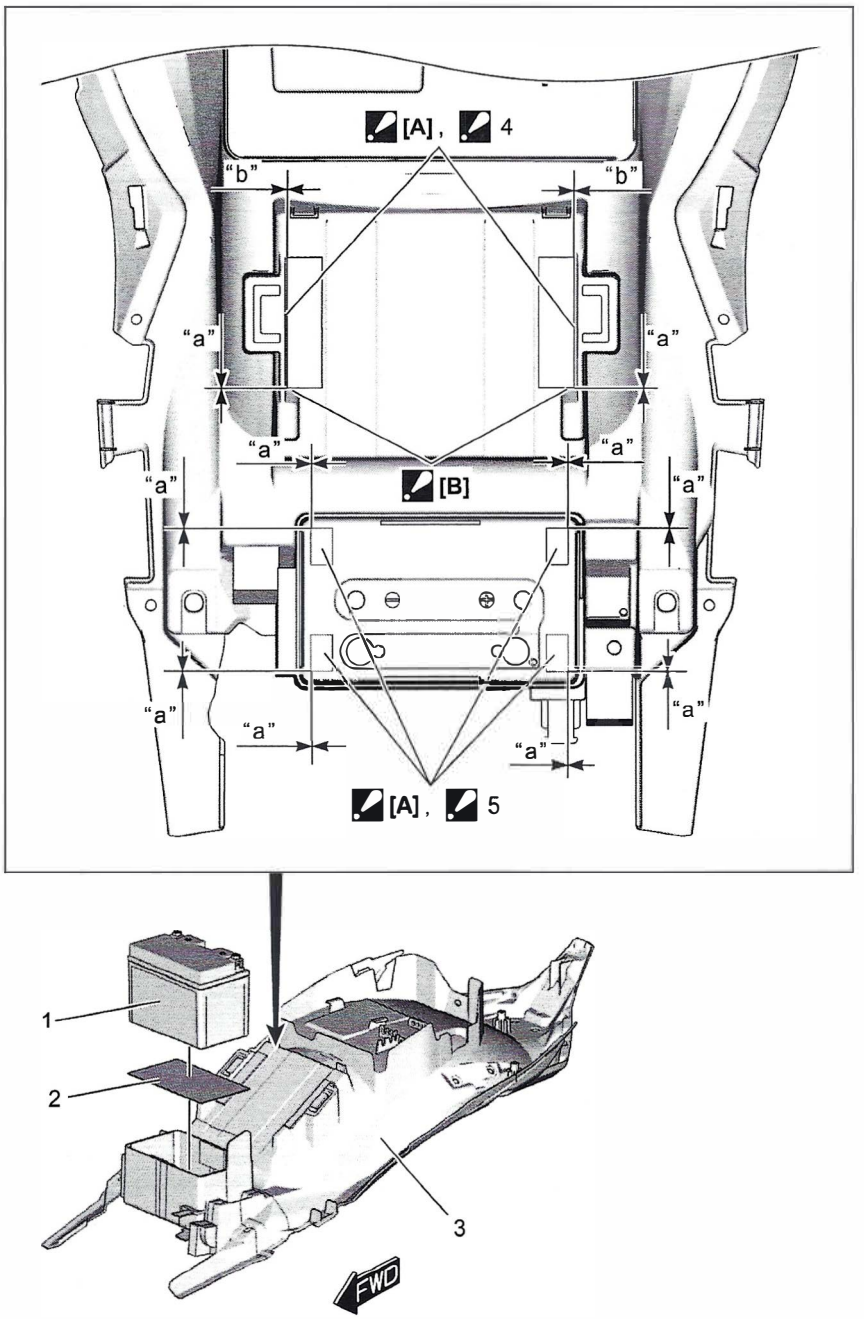


IM10L1940029-01

[A]: Stick the cushion within 1mm (0.039 in) for inside of emboss line. Press the cushion after sticking.	2. Under inner cowling (LH)	4. Cushion
1. Under inner cowling (RH)	3. Cushion	

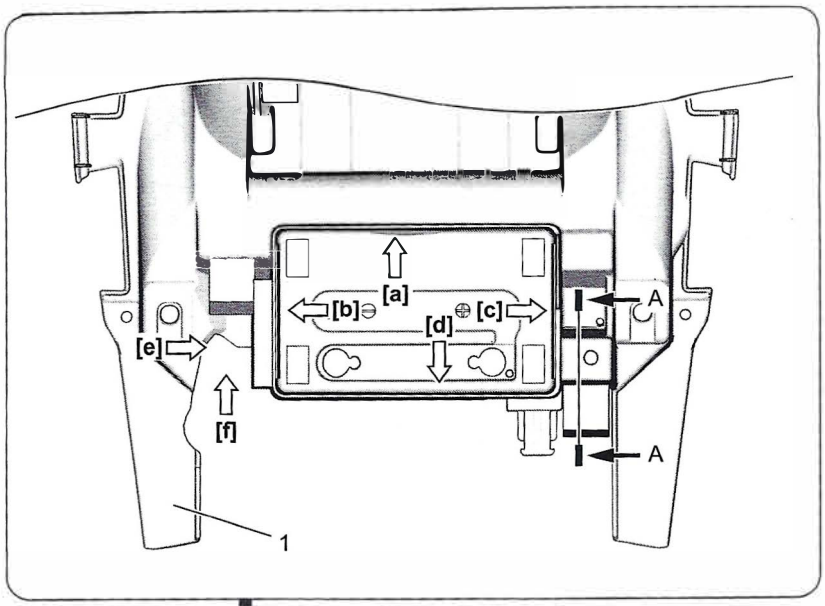
Battery and ECM Cushion Construction

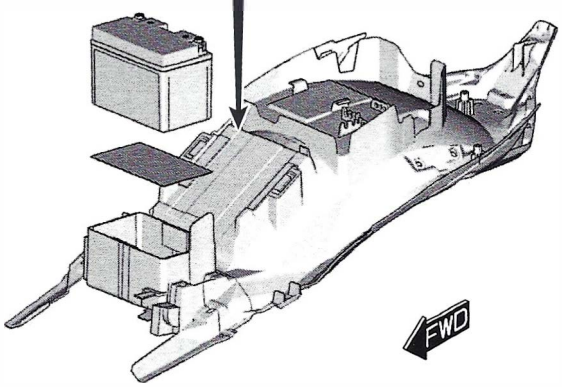
BENM10L39406024

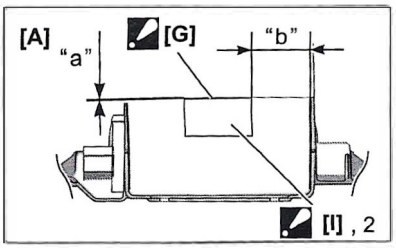


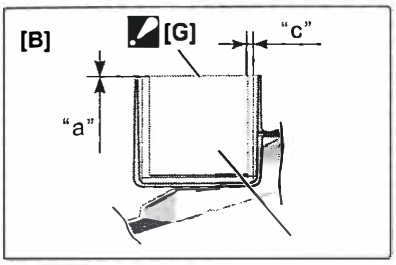
IM10L1940030-02

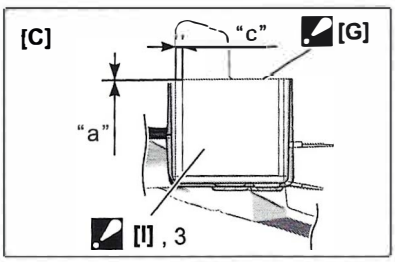
[A]: Align the edge of protector with the end of curved surface.	2. Cushion	5. Protector : Press the protector after sticking.
[B]: Allow the protector to hit the corner.	3. Rear fender (front)	"a": 0 – 3 mm (0 – 0.11 in)
1. Battery	4. Protector : Press the protector after sticking.	"b": 0 – 1 mm (0 – 0.039 in)

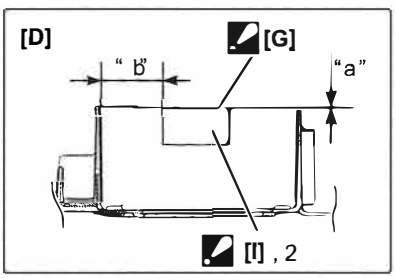


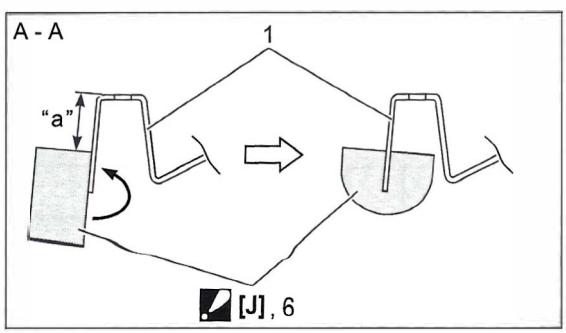


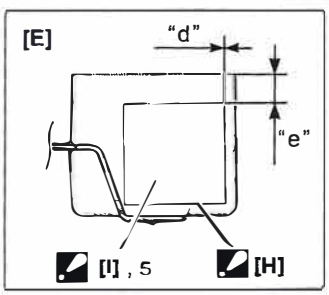


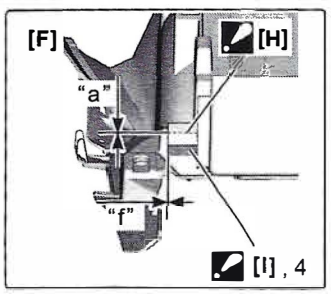










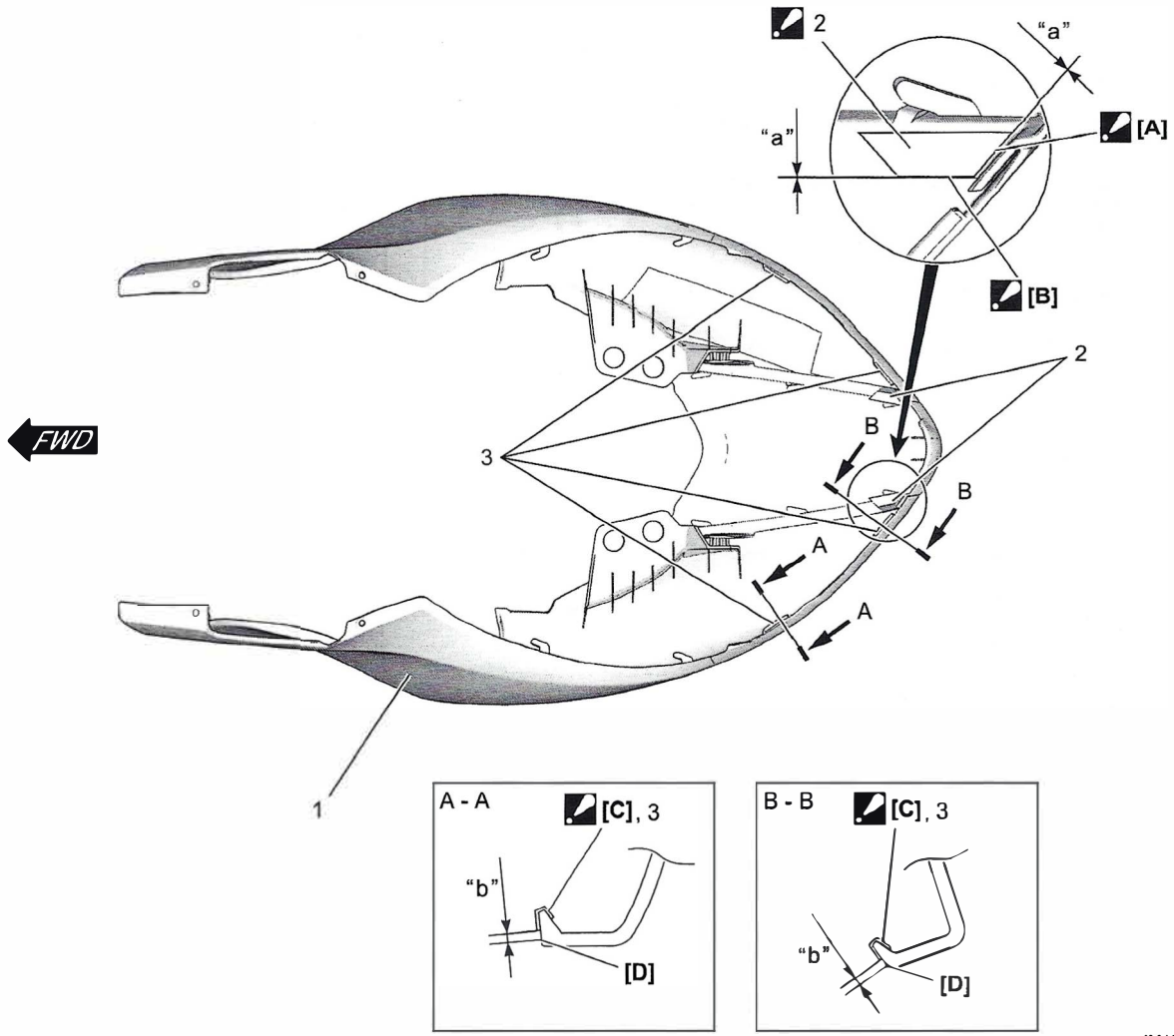


IM10L1940031-01

[A]: View [a]	[I]: Press the cushion or protector after sticking.	"a": 0 – 3 mm (0 – 0.11 in)
[B]: View [b]	[J]: Fold the cushion and stick it. Press the cushion after sticking.	"b": 50 - 60 mm (2.0 – 2.3 in)
[C]: View [c]	1. Rear fender (front)	"c": 2 - 8 mm (0.079 – 0.31 in)
[D]: View [d]	2. Cushion	"d": 0 – 2 mm (0 – 0.078 in)
[E]: View [e]	3. Cushion	"e": 13 – 16 mm (0.52 – 0.62 in)
[F]: View [f]	4. Cushion	"e": 0 – 5 mm (0 – 0.19 in)
[G]: Stick the protector so that it does not protrude from the battery holder.	5. Cushion	
[H]: Align the edge of protector with the end of curved surface.	6. Cushion	

Frame Rear Cover Tape Construction

BENM10L39406025

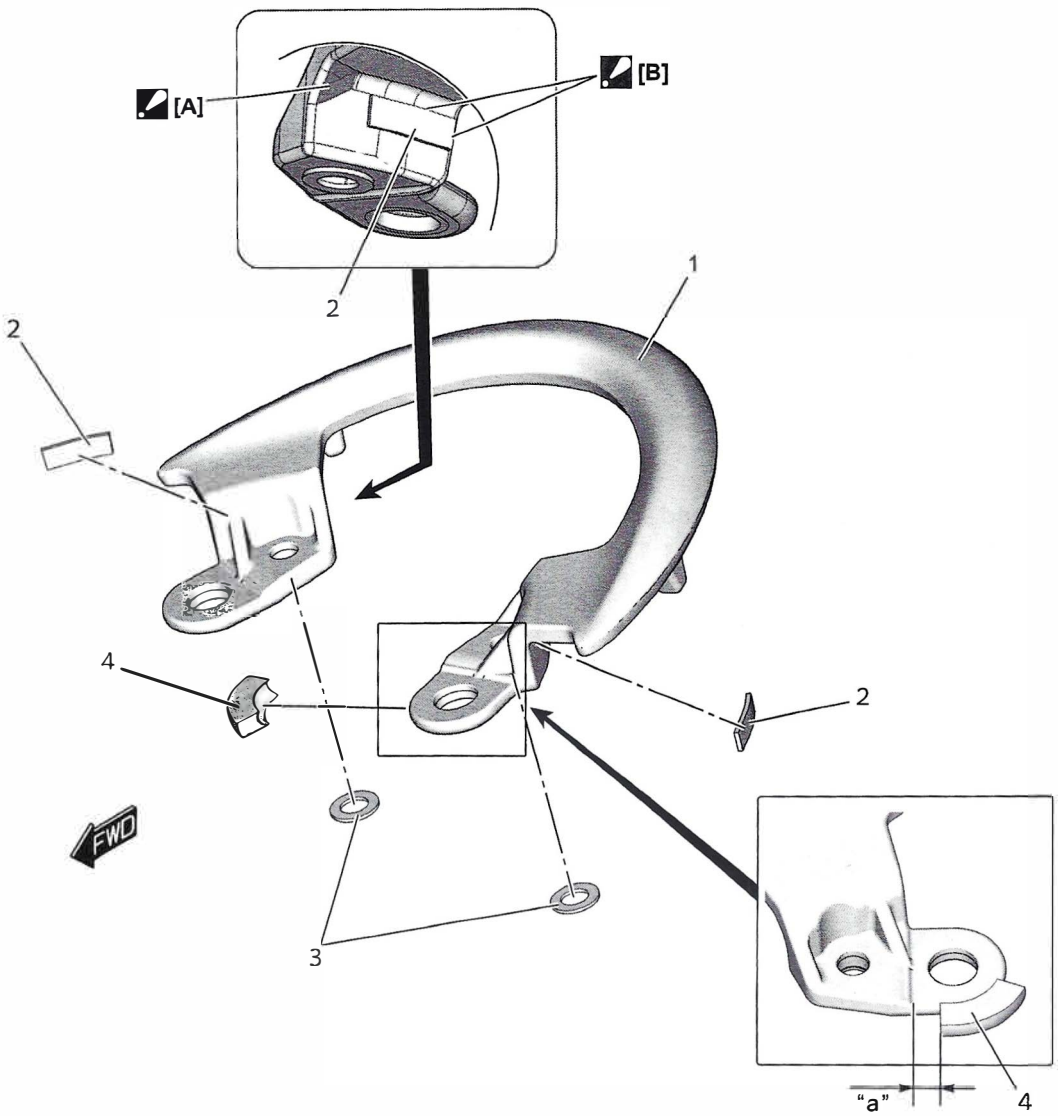


IM10L1940032-01

[A]: Align the edge of cushion with the end of curved surface.	[D]: Emboss line	3. Tape
[B]: Stick the cushion aligning with the edge of the part.	1. Frame cover assembly	"a": 0 – 1.5 mm (0 – 0.059 in)
[C]: Fold the tape inward and stick it. Press the tape after sticking.	2. Cushion : Press the cushion after sticking.	"b": 0 – 1 mm (0 – 0.039 in)

Pillion Rider Handle Cushion Construction

BENM10L39406026



IM10L1940033-02

[A]: Stick the cushion away from this area.	2. Cushion	"a": 7 – 13 mm (0.28 – 0.051 in)
[B]: Align the edge of cushion with the end of curved surface.	3. Cushion	
1. Pillion rider handle	4. Cushion (LH only)	

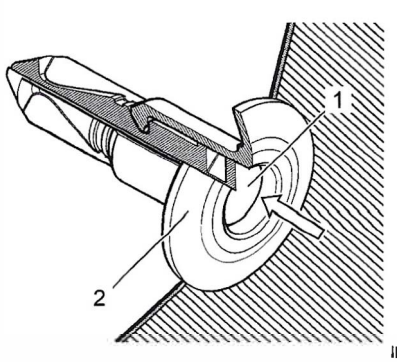
Clip Removal and Installation

BENM10L39406027

Type 1

Removal

1) Depress the head of clip center piece (1).
2) Pull out the clip (2).



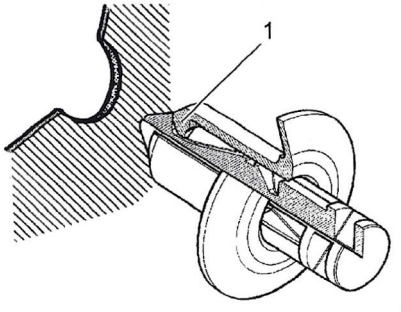
ID26J1940192-01

Installation

1) Let the center piece stick out toward the head so that the claws (1) closes.
2) Insert the clip into the installation hole.

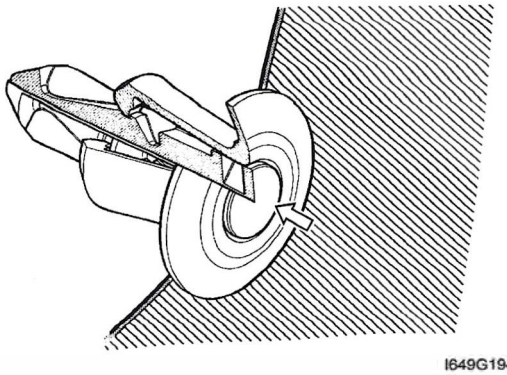
NOTE

To prevent the pawl (1) from damage, insert the clip all the way into the installation hole.



ID26J1940160-01

3) Push in the head of center piece until it becomes flush with the clip outside face.

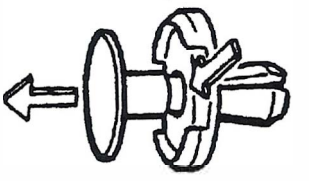


I649G1940007-02

Type 2

Removal

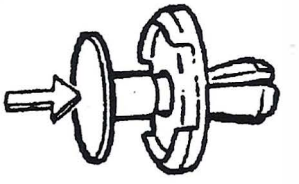
1) Pull up the center piece.
2) Remove the clip.



ID26J1940171-02

Installation

1) Keep the pin pulled out to close the claws.
2) Set the clip into the fitting hole.
3) Push in the center piece.

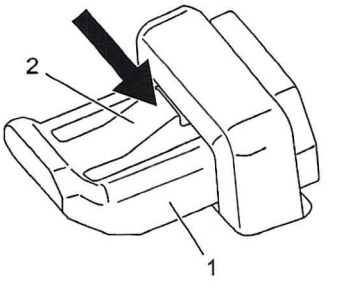


ID26J1940172-02

Type 3

Removal

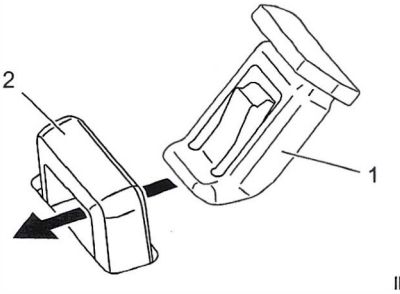
Pull out the clip (1) while depressing the claw (2).



IL41K1940021-01

Installation

Insert the clip (1) into the gate (2) as shown in the figure.



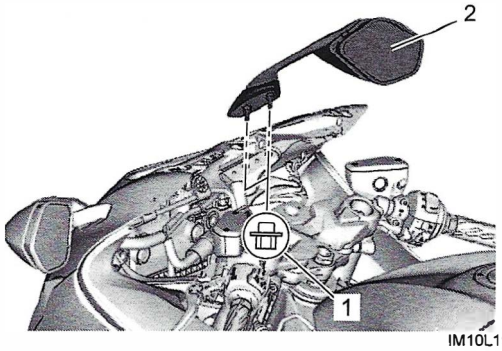
IL41K1940022-01

Rear View Mirror Removal and Installation

BENM10L39406028

Removal

1) Remove the meter panel (center) and combination meter. ☞(Page 9D-44)
2) Remove the rear view mirror bolts (1) and rear view mirror (2).



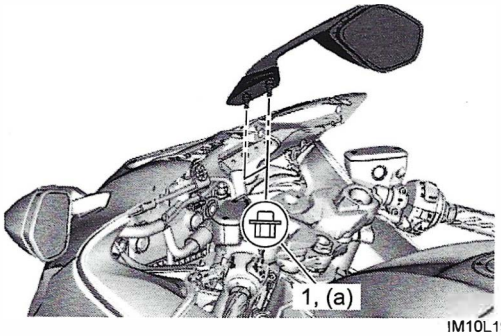
IM10L1940034-01

Installation

Install the rear view mirror in the reverse order of removal. Pay attention to the following point:

- Tighten the rear view mirror nuts (1) to the specified torque.

Tightening torque
Rear view mirror nut (a): 12 N·m (1.2 kgf-m, 9.0 lbf-ft)



IM10L1940035-01

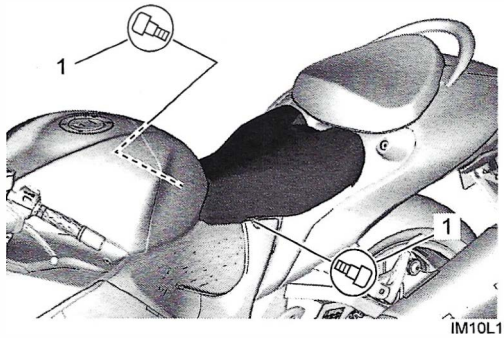
Seat Removal and Installation

BENM10L39406029

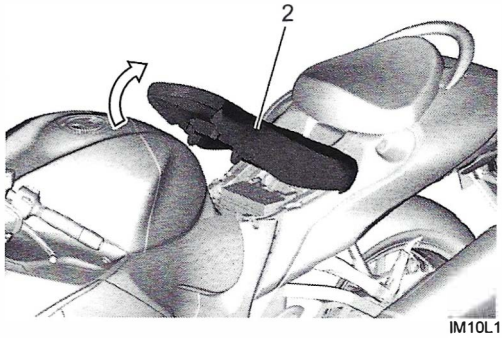
Front Seat

Removal

1) Remove the front seat bolts (1) and front seat (2).



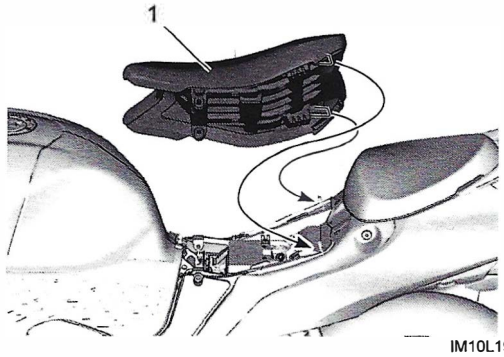
IM10L1940036-01



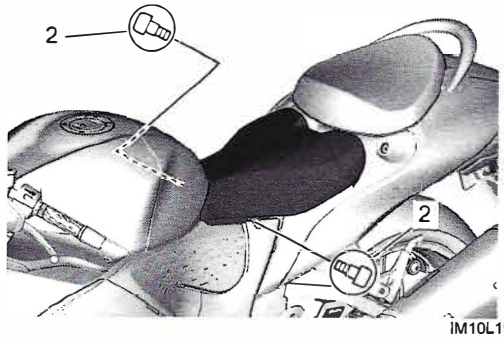
IM10L1940037-01

Installation

1) Slide the front seat (1) into bracket and tighten the front seat bolts (2).



IM10L1940038-01

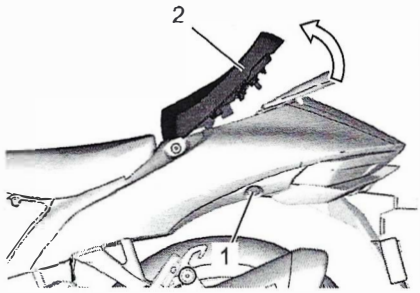


IM10L1940039-01

Rear Seat

Removal

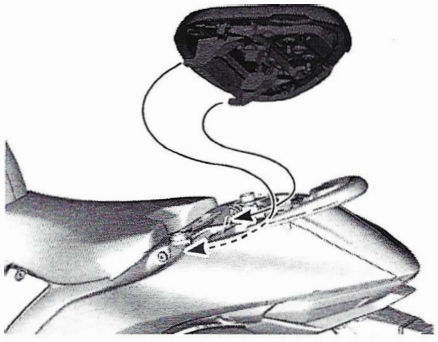
1) Unlock the seat lock (1) with the ignition key.
2) Remove the rear seat (2).



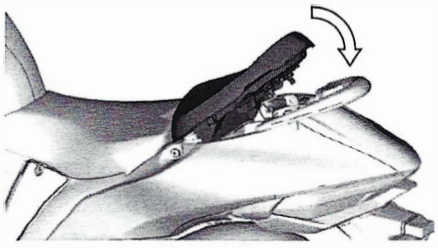
IM10L1940040-02

Installation

Slide the rear seat hook into the seat hook guide and push down firmly until the seat snaps into the locked position.



IM10L1940041-01



IM10L1940127-02

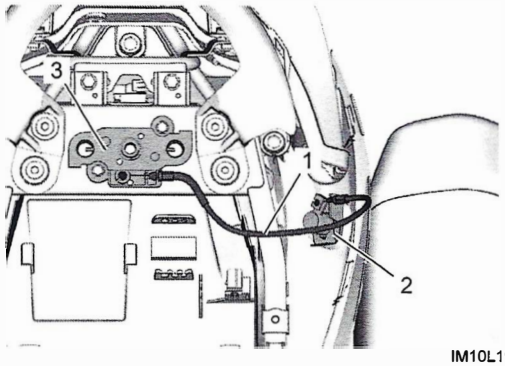
Seat Lock Cable / Seat Lock Assembly / Striker Support Bracket Removal and Installation

BENM10L39406030

Seat Lock Cable

Removal

1) Remove the rear seat. ☞(Page 9D-34)
2) Remove the frame cover assembly. ☞(Page 9D-51)
3) Disconnect the seat lock cable (1) from the seat lock assembly (2) and striker support bracket (3).



IM10L1940042-01

Installation

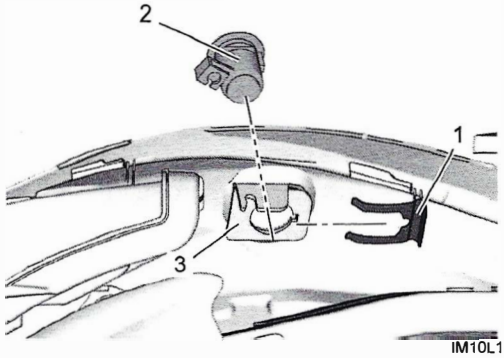
Install the seat lock cable in the reverse order of removal. Pay attention to the following point:

- Install the seat lock seat lock cable. Refer to "Seat Lock Cable Routing Diagram" (Page 9D-1).

Seat Lock Assembly

Removal

1) Disconnect the seat lock cable from the seat lock assembly. Refer to "Seat Lock Cable" under "Seat Lock Cable / Seat Lock Assembly / Striker Support Bracket Removal and Installation" (Page 9D-35).
2) Remove the seat lock cable plate (1), seat lock cable guide (2) and seat lock assembly (3).



IM10L1940043-01

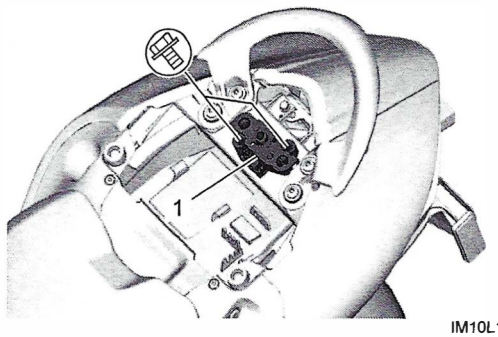
Installation

Install the seat lock assembly in the reverse order of removal. Pay attention to the following point:

- Install the seat lock assembly. Refer to "Seat Lock Cable Routing Diagram" (Page 9D-1).

Striker Support Bracket
Removal

1) Remove the rear seat. ☞(Page 9D-34)
2) Disconnect the seat lock cable from the striker support bracket. Refer to "Seat Lock Cable" under "Seat Lock Cable / Seat Lock Assembly / Striker Support Bracket Removal and Installation" (Page 9D-35).
3) Remove the striker support bracket (1).



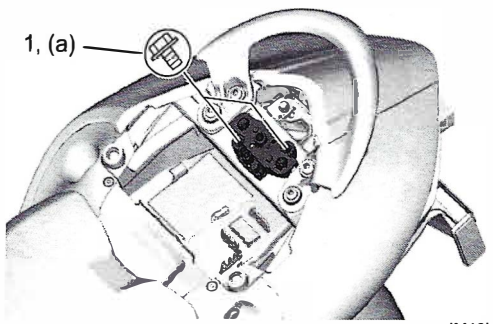
IM10L1940044-01

Installation

Install the striker support bracket in the reverse order of removal. Pay attention to the following point:

- Tighten the striker support bracket bolts (1) to the specified torque.

Tighten torque
Striker support bracket bolt (a): 8.8 N·m (0.90 kgf-m, 6.50 lbf-ft)



IM10L1940045-01

Pillion Rider Handle Removal and Installation

BENM10L39406031

Removal

1) Remove the rear seat. ☞(Page 9D-34)
2) Remove the pillion rider handle. Refer to "Pillion Rider Handle Construction" (Page 9D-17).

Installation

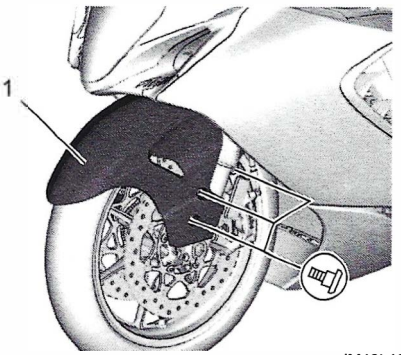
Install the pillion rider handle in the reverse order of removal.

Front Fender Removal and Installation

BENM10L39406032

Removal

1) Remove the front fender (1).



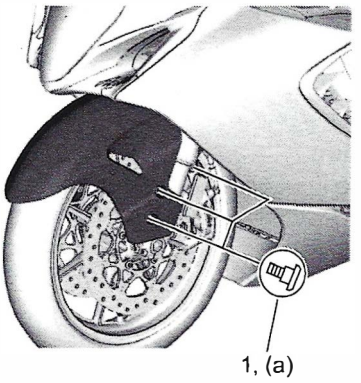
IM10L1940046-01

Installation

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

- Install the front fender with front side reflex reflector (if equipped). Refer to "Front Fender Construction" (Page 9D-5).
- Tighten the front fender bolts (1) to the specified torque.

Tightening torque
Front fender bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



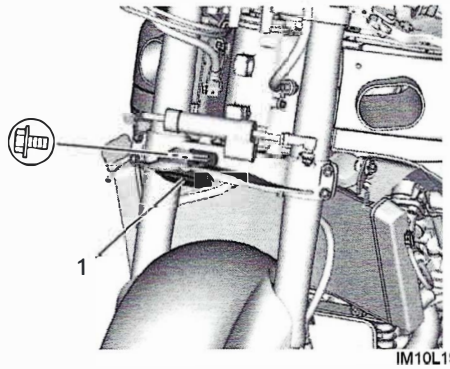
IM10L1940148-01

Lower Bracket Cover Removal and Installation

BENM10L39406033

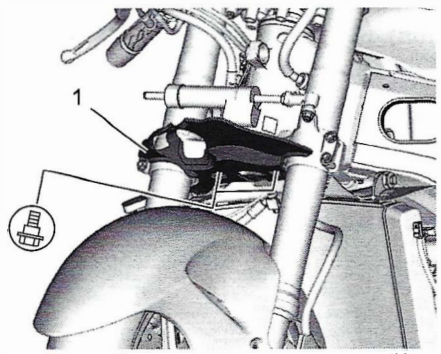
Removal

1) Remove the body cowling assembly. ☞(Page 9D-44)
2) Disconnect the lead wire (1) and remove the horn (2).



IM10L1940047-01

3) Remove the lower bracket cover (1).



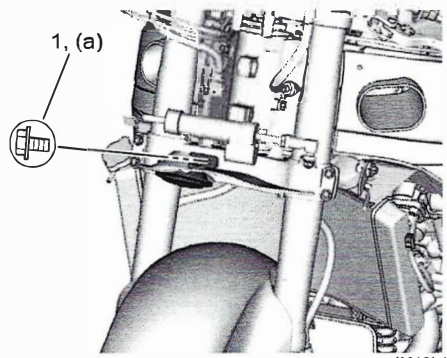
IM10L1940048-01

Installation

Install the lower bracket cover in the reverse order of removal. Pay attention to the following points:

- Tighten the horn bolt (1) to the specified torque.

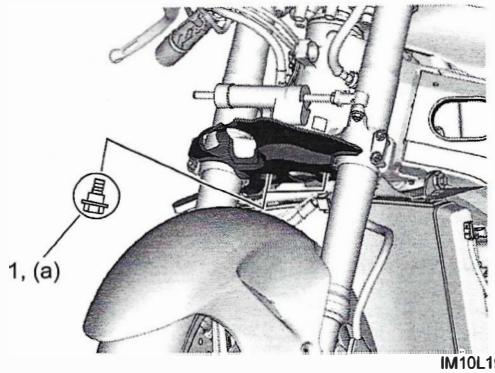
Tightening torque
Horn bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



IM10L1940128-02

- Tighten the lower bracket cover bolts (1) to the specified torque.

Tightening torque
Lower bracket cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



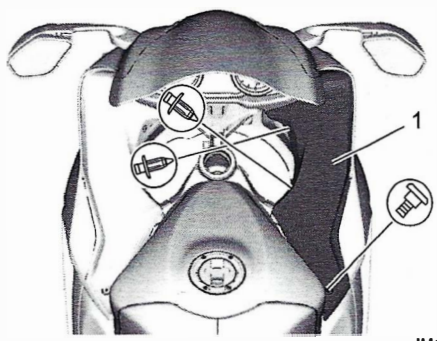
IM10L1940049-01

Side Cowling Assembly Removal and Installation

BENM10L39406034

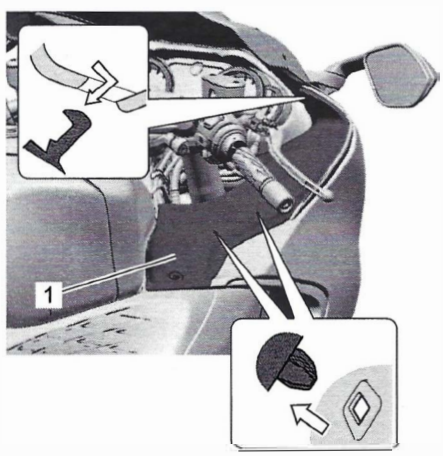
Removal

1) Remove the front seat. ☞(Page 9D-34)
2) Remove the body cowl cover and under inner cowl. ☞(Page 9D-43)
3) Remove the under cowling. ☞(Page 9D-42)
4) Remove the fasteners and bolt from the meter panel (1).

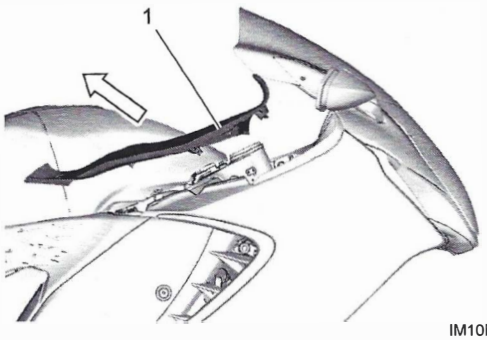


IM10L1940050-01

5) Remove the meter panel (1) in the direction as shown in the figure with unhooking the hooks.

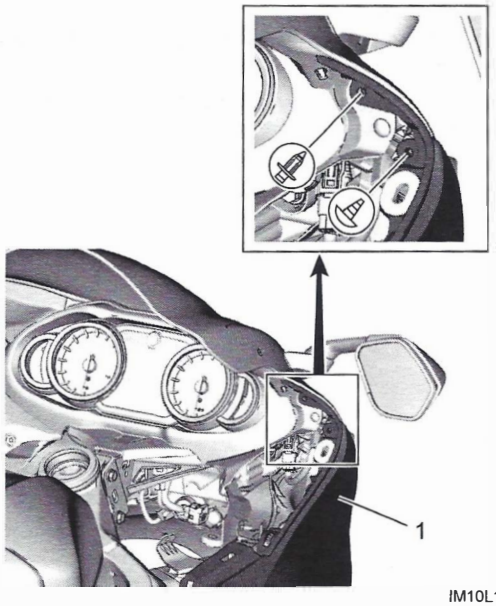


IM10L1940138-01

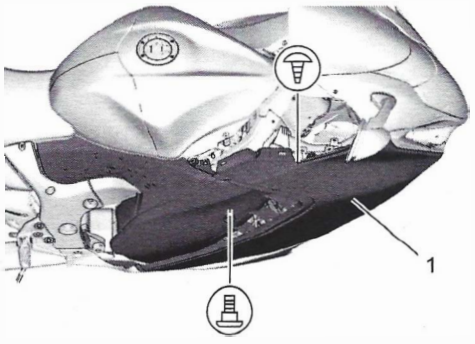


IM10L1940051-02

6) Remove the fastener, screws and bolt from the side cowling assembly (1).

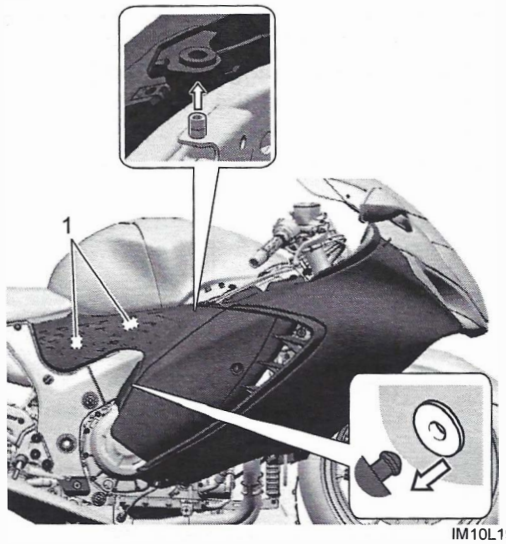


IM10L1940052-02



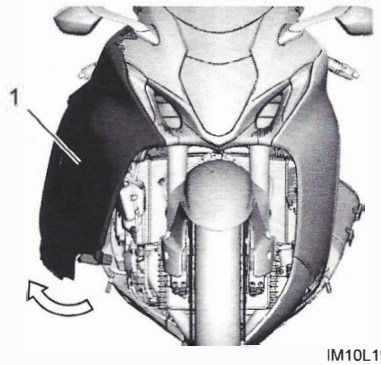
IM10L1940053-01

7) Unhook the hook, protrusion and fasteners (1) as shown in the figure.



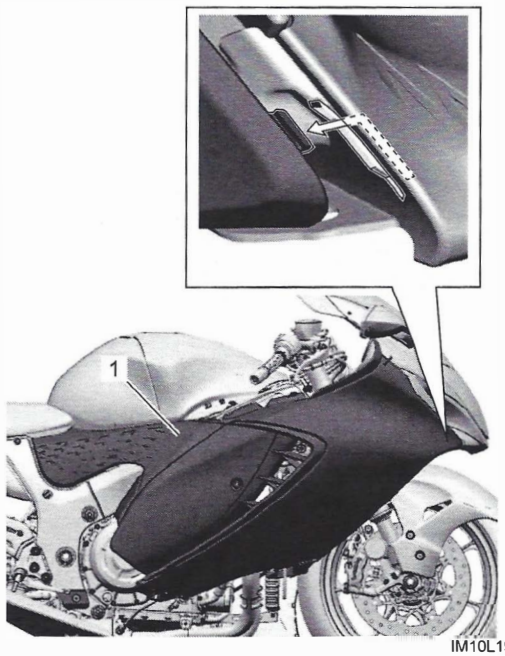
IM10L1940055-02

8) Tilt the side cowling assembly (1).



IM10L1940056-01

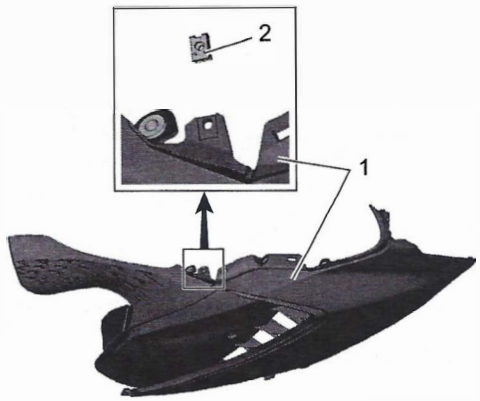
9) Pull the side cowling assembly (1) backward to unhook the hooks and remove it.



IM10L1940057-01

NOTICE

To prevent damage to the frame when installing the side cowling assembly(1), remove the nut (2) from the side cowling assembly.

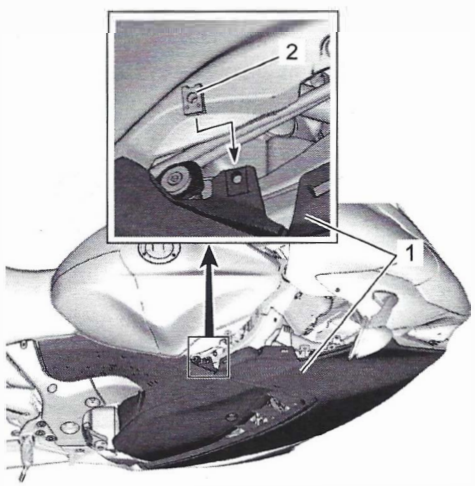


IM10L1940139-01

Installation

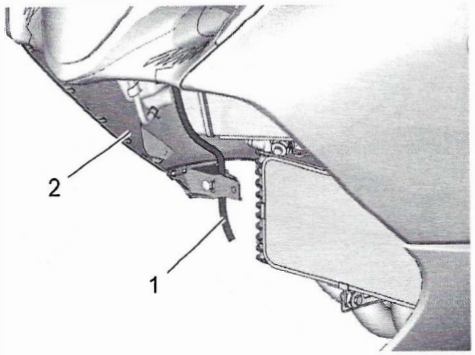
Install the side cowling assembly in the reverse order of removal. Pay attention to the following points:

- After installing the side cowling assembly (1) on vehicle, attach the nut (2) removed in advance to side cowling assembly.



IM10L1940140-01

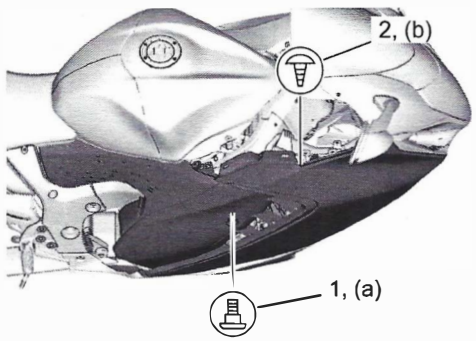
- Pass the reservoir tank over flow hose to hole of side cowling assembly (2).



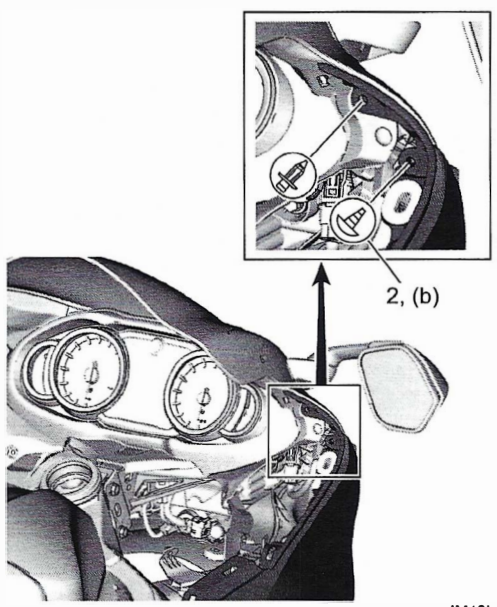
IM10L1940058-01

- Tighten the side cowling assembly bolt (1) and screws (2) to the specified torque.

Tightening torque
Side cowling assembly bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
Side cowling assembly screw (b): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)



IM10L1940059-01



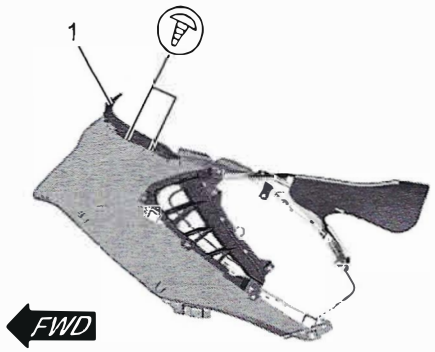
IM10L1940060-02

Side Cowling Assembly Disassembly and Reassembly

BENM10L39406035

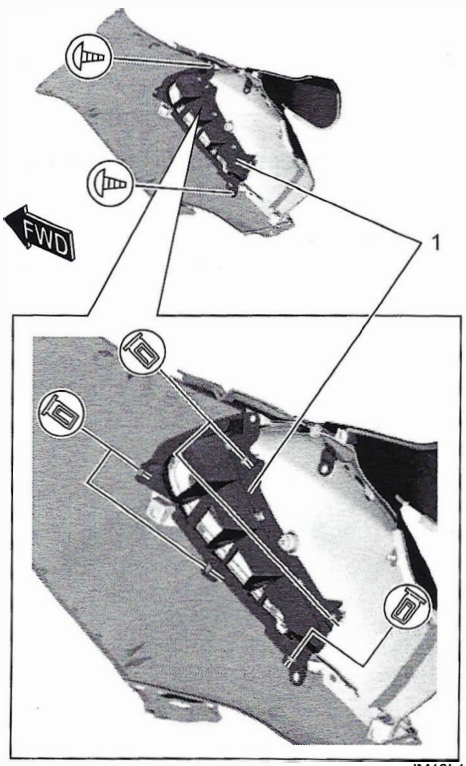
Disassembly

1) Remove the side cowling assembly. ☞(Page 9D-37)
2) Remove the meter front panel No.2 (1).



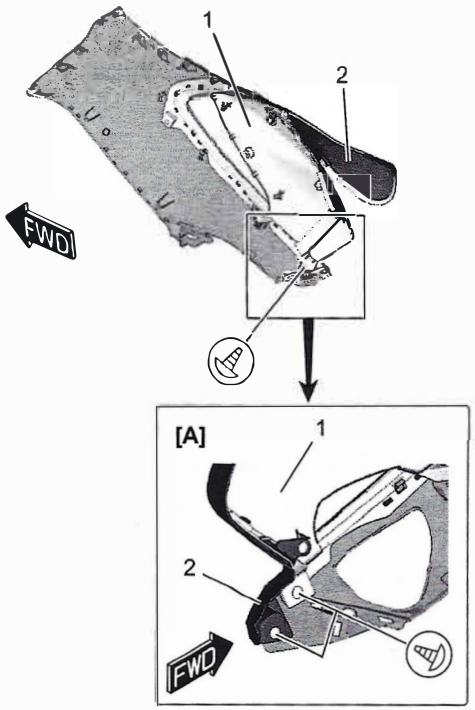
IM10L1940062-01

3) Remove the side front cowling No.2 (1).



IM10L1940061-01

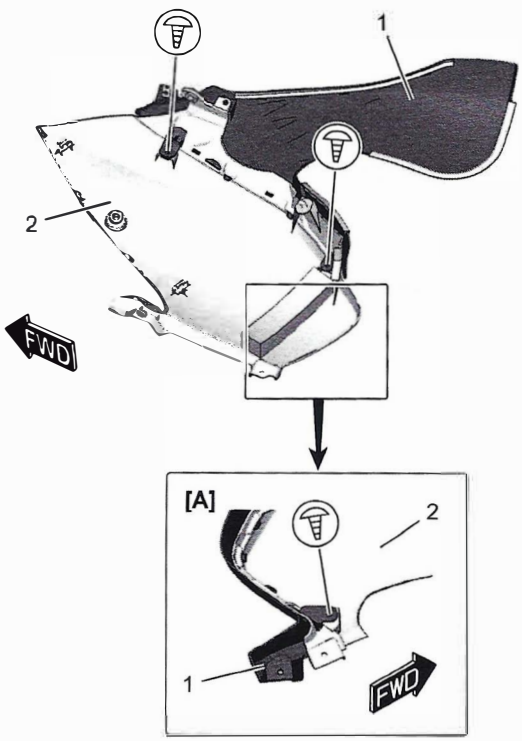
4) Remove the side cover (1) and side rear cover (2) as a assembly.



IM10L1940063-01

[A]: LH

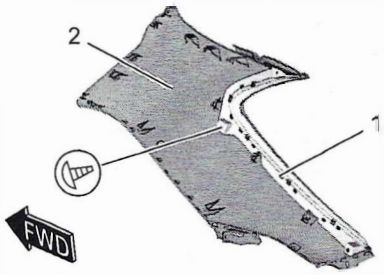
5) Remove the side rear cover (1) from the side cover (2).



IM10L1940064-01

[A]: LH

6) Remove the side rear cowling (1) from the side front cowling No.1 (2).



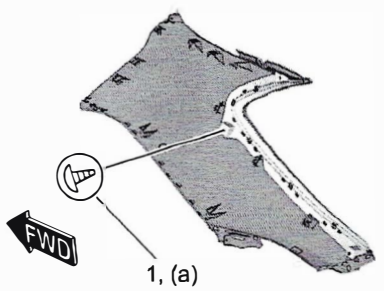
IM10L1940065-01

Reassembly

Reassemble the side cowling assembly in the reverse order of removal. Pay attention to the following points:

- Tighten the side front cowling No.1 screw (1) to the specified torque.

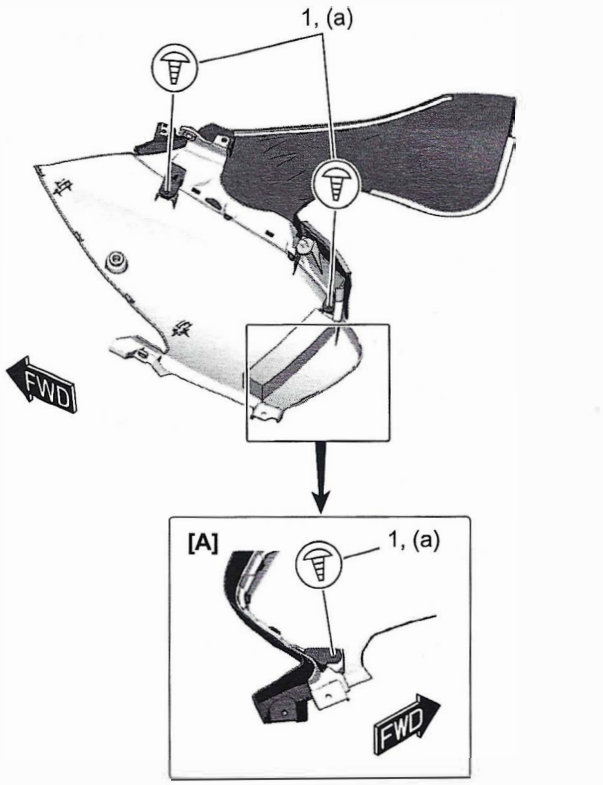
  Tightening torque
  Side front cowling No.1 screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)



IM10L1940066-01

- Tighten the side rear cover screws (1) to the specified torque.

  Tightening torque
  Side rear cover screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)

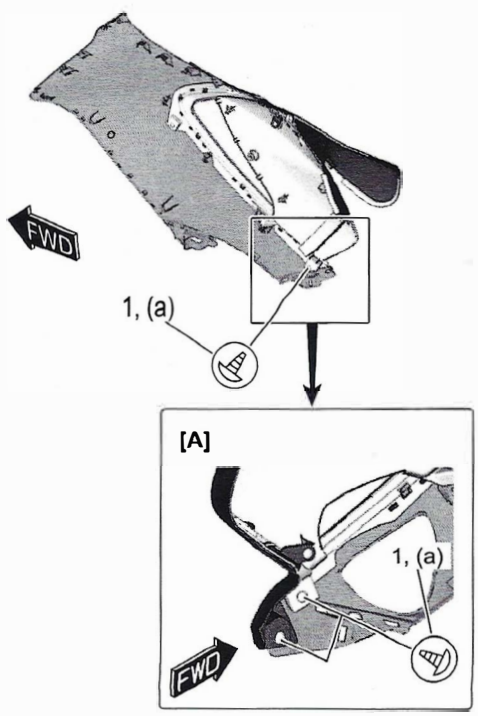


IM10L1940067-01

[A]: LH

- Tighten the side cover screws (1) to the specified torque.

  Tightening torque
  Side cover screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)

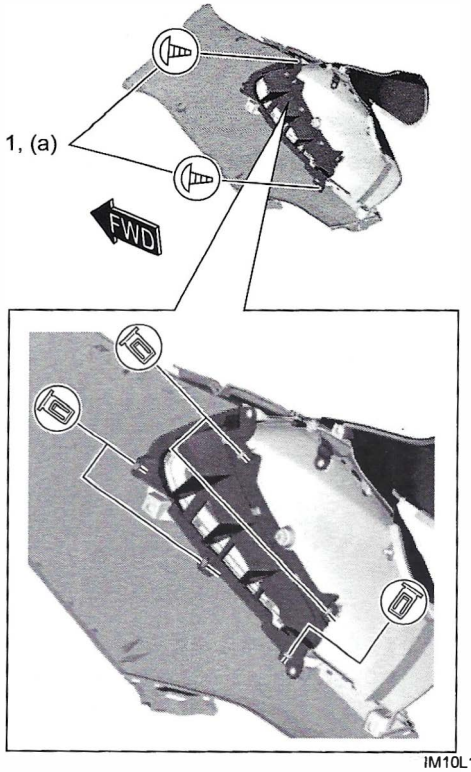


IM10L1940068-01

[A]: LH

- Tighten the side front cowling No.2 screws (1) to the specified torque and install the clip as shown in the figure.

Tightening torque
Side front cowling No.2 screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)



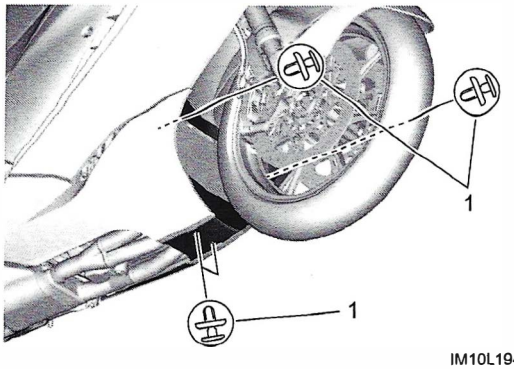
IM10L1940069-01

Under Center Cowling / Under Cowling Removal and Installation

BENM10L39406036

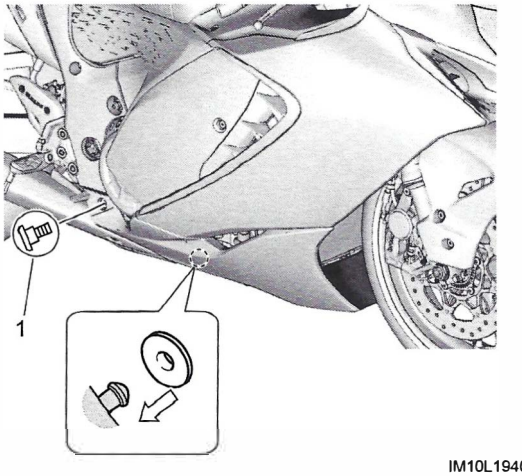
Removal

1) Remove the fasteners (1).



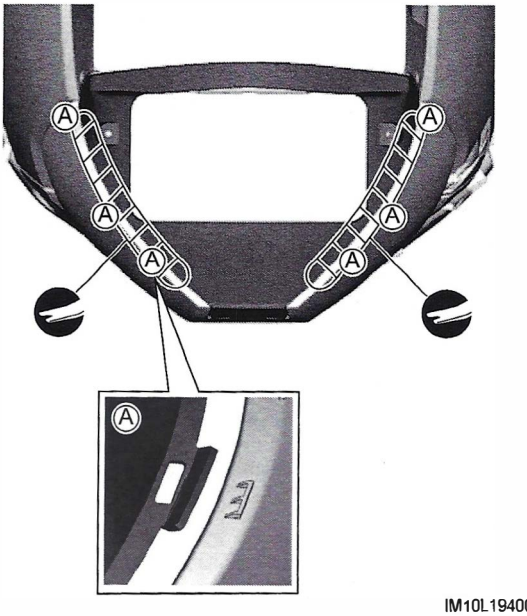
IM10L1940070-01

2) Remove the under cowling bolt (1) and unhook the hook.



IM10L1940141-01

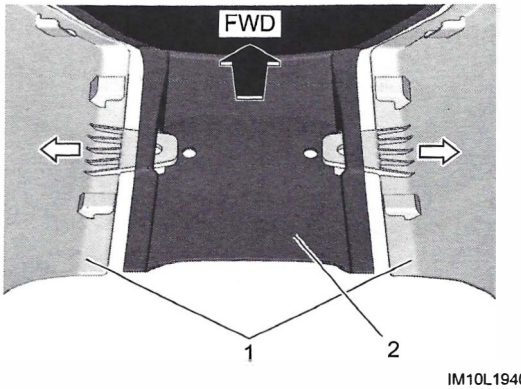
3) Unhook the hooks inserting the remover in the hatched area.



IM10L1940071-02

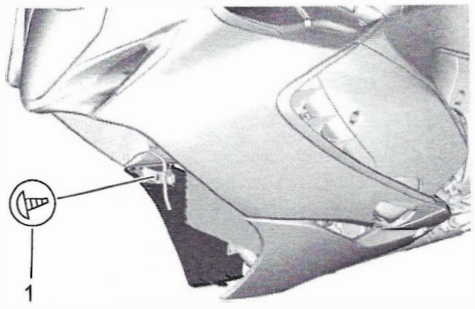
: Inserting position of resin remover

4) Pull the under cowling (1) outside to remove the protrusions.
5) Remove the under center cowling (2).



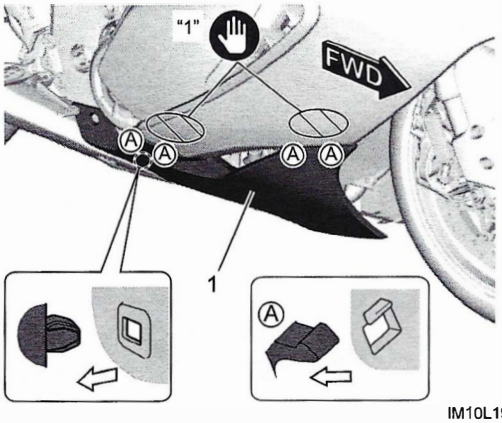
IM10L1940072-01

6) Remove the under cowling screw (1).



IM10L1940073-02

7) Unhook the hooks by holding the hatched areas "1" with hands as shown in the figure, and then remove the under cowling (1).



IM10L1940074-03

: Holding position with hands

8) Remove the other side using the same procedure.

Installation

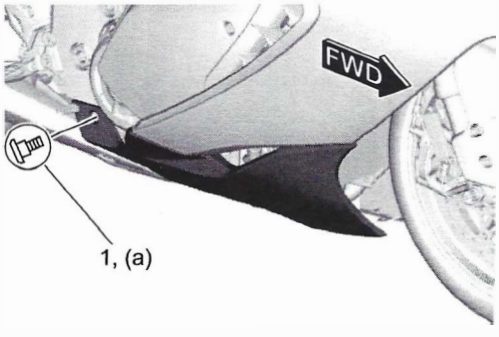
Install the under center cowling and under cowling in the reverse order of removal. Pay attention to the following points:

- Tighten the under cowling bolt (1) and screw (2) to the specified torque.

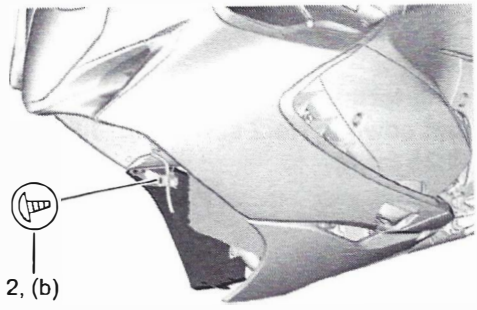
Tightening torque

Under cowling bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)

Under cowling screw (b): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)



IM10L1940076-03



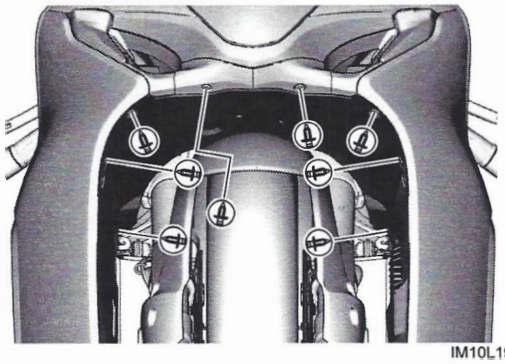
IM10L1940077-02

Body Cowl Cover / Under Inner Cowling Removal and Installation

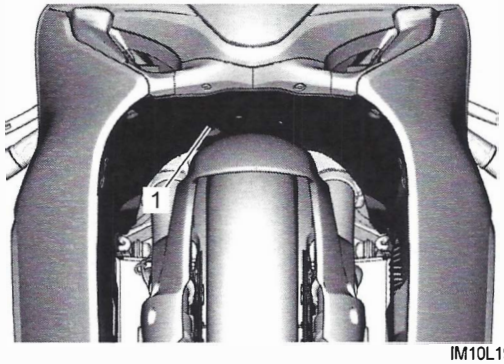
BENM10L39406037

Removal

1) Remove the fasteners and ambient air temperature sensor (1) from body cowl cover.

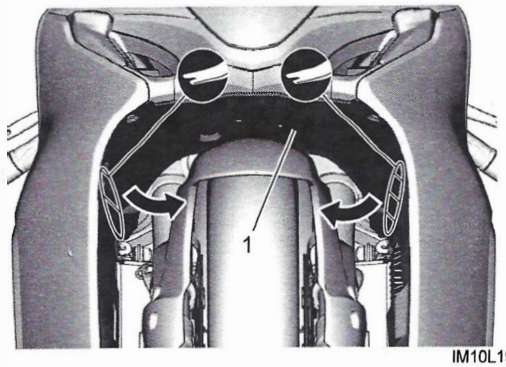


IM10L1940078-02



IM10L1940142-01

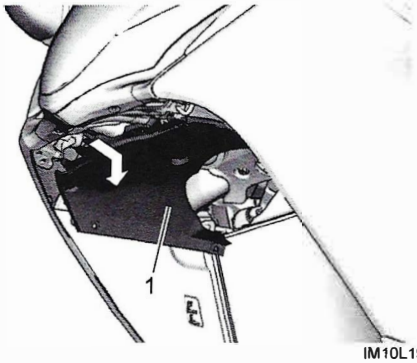
2) Pull body cowl cover (1) inserting the remover in the hatched area.



IM10L1940079-01

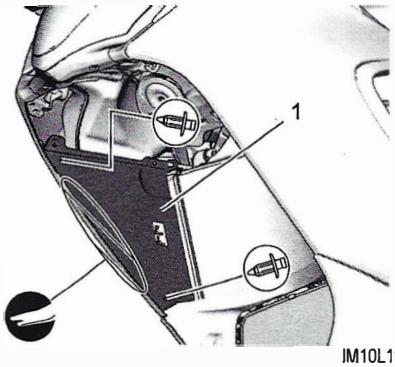
: Inserting position of resin remover

3) Move the body cowl cover (1) backward and move downward.



IM10L1940080-01

4) Remove the fasteners.
5) Remove the under inner cowling (1) inserting the remover in the hatched area.



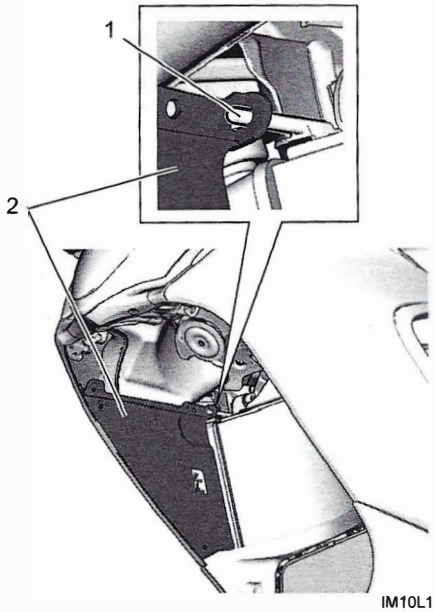
IM10L1940081-02

: Inserting position of resin remover

Installation

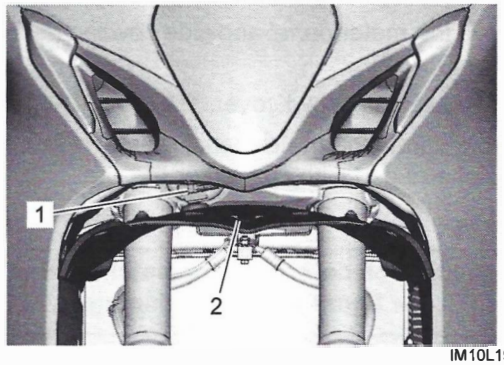
Install the body cowling and under inner cowling in the reverse order of removal. Pay attention to the following point:

- When installing the under inner cowling, pass the projection of the radiator (1) through the hole of the under inner cowling (2).



IM10L1940082-01

- Attach the ambient air temperature sensor (1) to the body cowl cover (2) before install the body cowl cover to the vehicle.



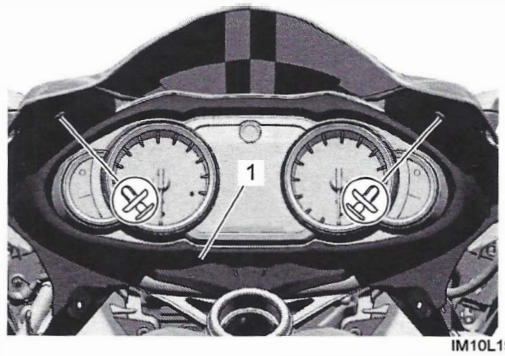
IM10L1940143-01

Body Cowling Assembly Removal and Installation

BENM10L39406038

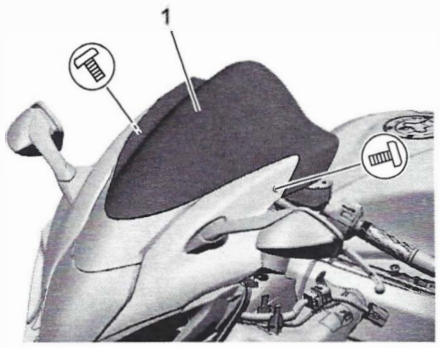
Removal

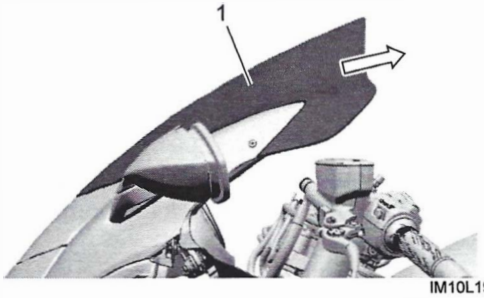
1) Remove the fasteners from the meter panel (center) (1).



IM10L1940083-01

2) Remove the windscreen screws and remove the windscreen (1) in the direction as shown in the figure.



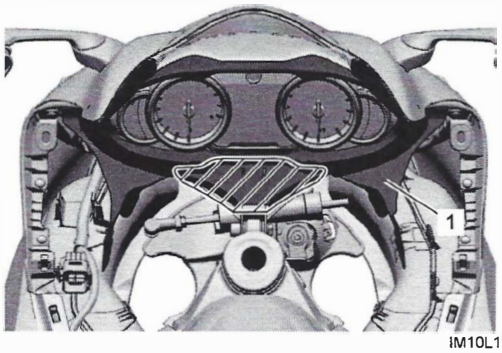


IM10L1940084-01

3) Remove the meter panel and side cowling assembly. ☞(Page 9D-37)
4) Remove the body cowl cover. ☞(Page 9D-43)
5) To avoid damaging meter panel (center) (1), cover it or peripheral part with clothes or the like.

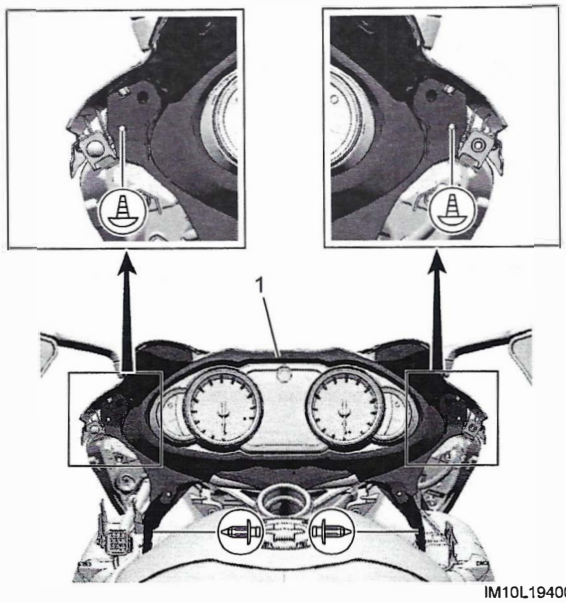
NOTICE

In particular, be careful as the hatched area shown in the figure are easily damaged.



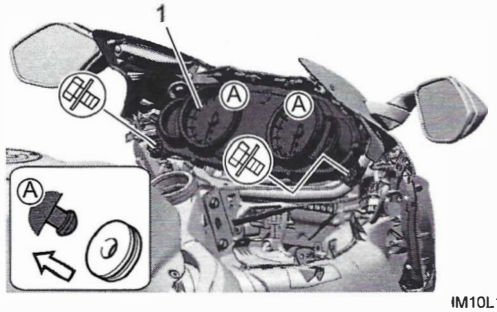
IM10L1940144-01

6) Remove the fasteners and screws and remove the meter panel (center) (1).



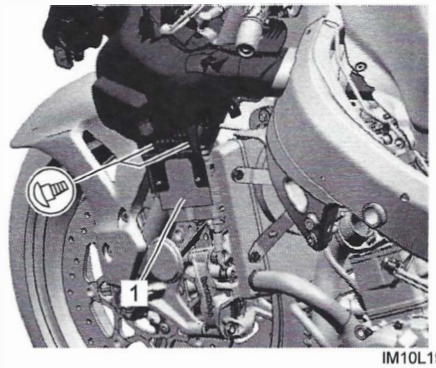
IM10L1940085-02

7) Remove the bolts and remove the combination meter (1).



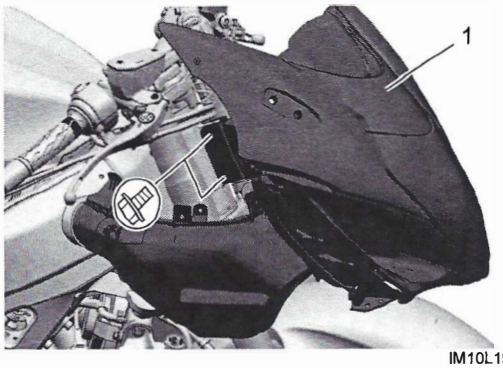
IM10L1940086-01

8) Remove the rear view mirror. ☞(Page 9D-34)
9) Remove the regulator / rectifier bracket (1).



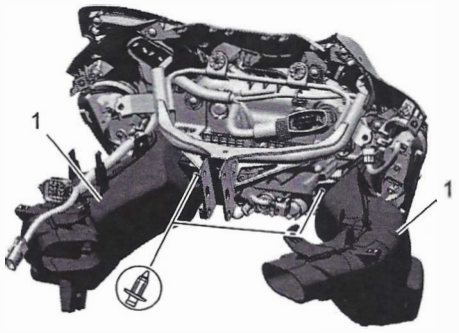
IM10L1940087-01

10) Remove the clamps, electrical parts and disconnect the couplers from the body cowling assembly. Refer to "Wiring Harness Routing Diagram" in Section 9A (Page 9A-13).
11) Remove the body cowling assembly (1).



IM10L1940088-01

12) Remove the fastener and remove the intake pipe assembly (1).



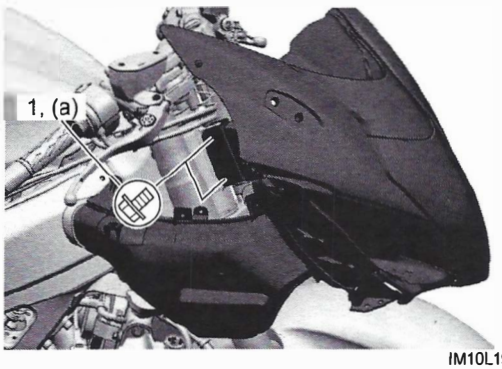
IM10L1940089-01

Installation

Install the body cowling assembly in the reverse order of removal. Pay attention to the following points:

- Tighten the new cowling brace bolts (1) to the specified torque.

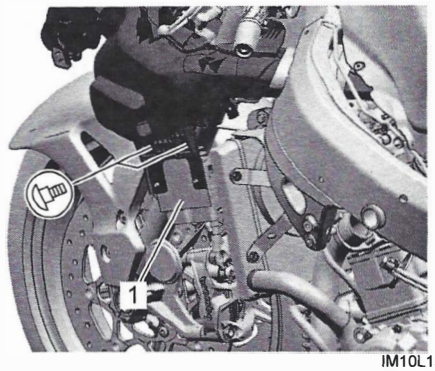
  Tighten torque
  Cowling brace bolt (a): 23 N·m (2.3 kgf-m, 17.0 lbf-ft)



IM10L1940090-01

- Tighten the new regulator / rectifier bracket bolts (1) to the specified torque.

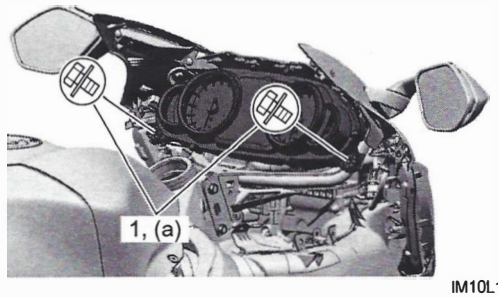
  Tighten torque
  Regulator / rectifier bracket bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1940091-01

- Tighten the combination meter bolts (1) to the specified torque.

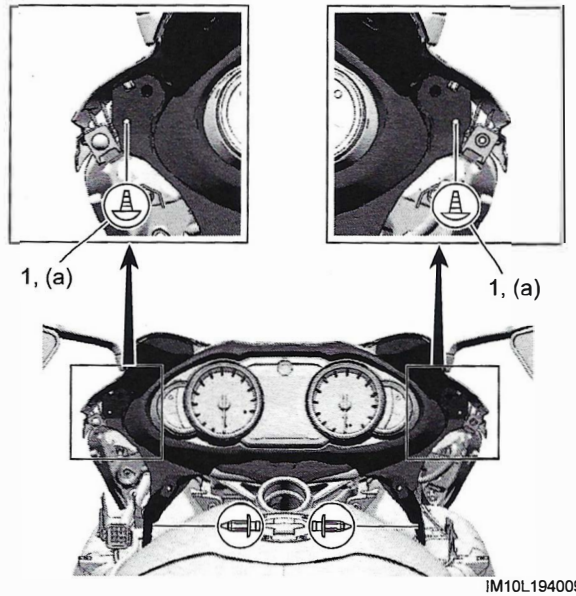
  Tighten torque
  Combination meter bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



IM10L1940092-01

- Tighten the meter panel (center) screws (1) to the specified torque.

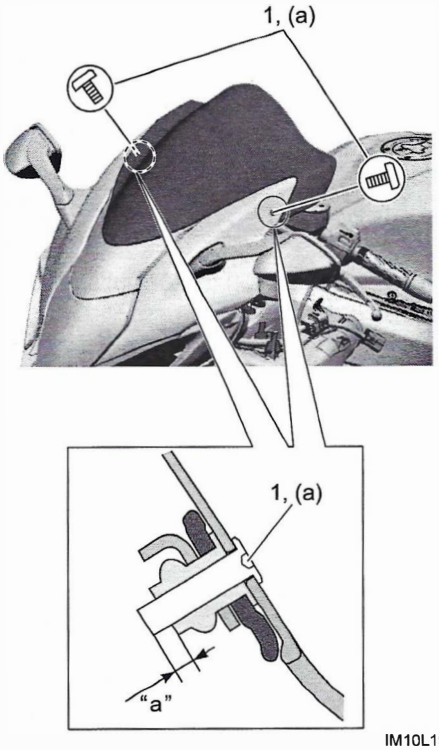
  Tighten torque
  Meter panel (center) screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)



IM10L1940093-02

- Tighten the windscreen bolts (1) to the specified torque or tighten so that the protruding amount of the screw is "a".

Tightening torque
Windscreen bolt (a): 0.4 N·m (0.04 kgf-m, 0.30 lbf-ft)



IM10L1940094-02

"a": 3.0 – 4.0 mm (0.12 – 0.16 in)

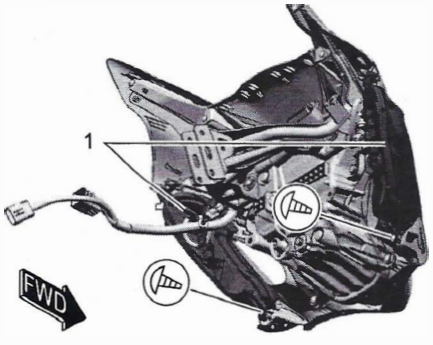
- Adjust the headlight beam. Refer to "Headlight Beam Adjustment" in Section 9B (Page 9B-4).

Body Cowling Assembly Disassembly and Reassembly

BENM10L39406039

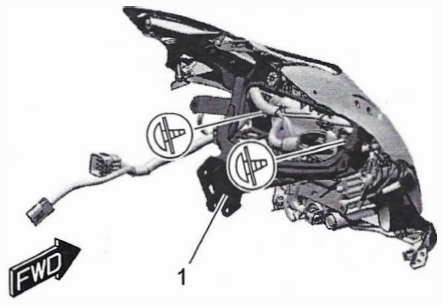
Disassembly

1) Remove the front turn signals (1).



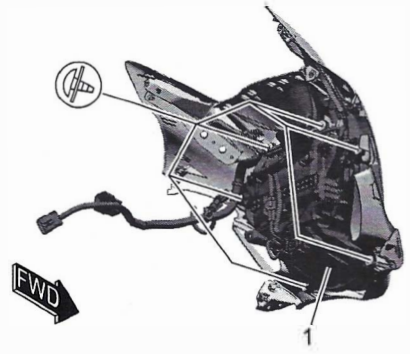
IM10L1940095-01

2) Remove the cowling brace (1).



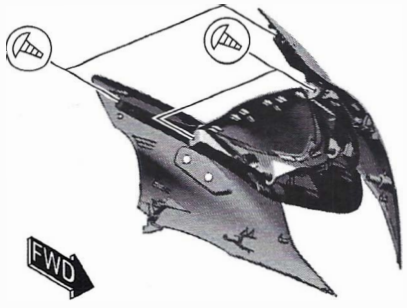
IM10L1940096-01

3) Remove the headlight (1).

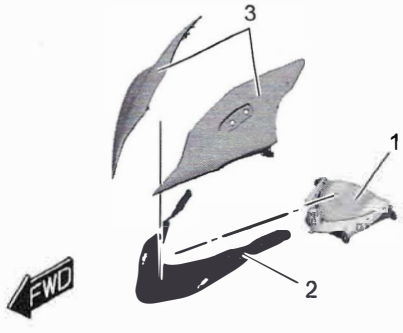


IM10L1940097-01

4) Remove the screws and disassemble into the meter front panel No.1 (1), body center cowling (2) and body cowling (3).

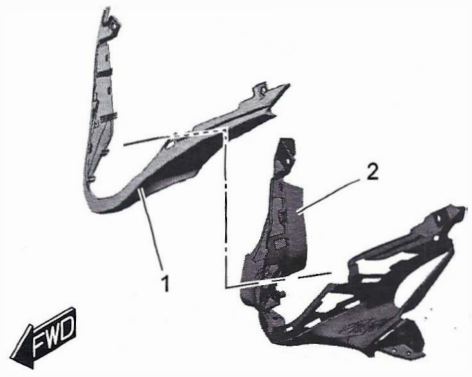


IM10L1940098-01



IM10L1940099-01

5) Disassemble into the Intake center cover (1) and intake rear cover (2).

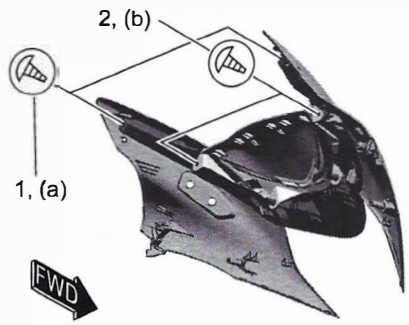


IM10L1940100-01

Reassembly
Reassemble the body cowling assembly in the reverse order of removal. Pay attention to the following points:

- Tighten the body center cowling screws (1) and meter front panel screws (2) to the specified torque.

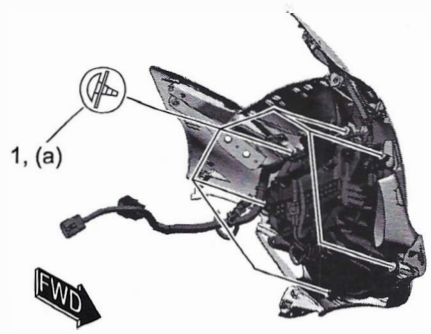
  Tightening torque
  Body center cowling screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)
  Meter front panel screw (b): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)



IM10L1940101-01

- Tighten the headlight screws (1) to the specified torque.

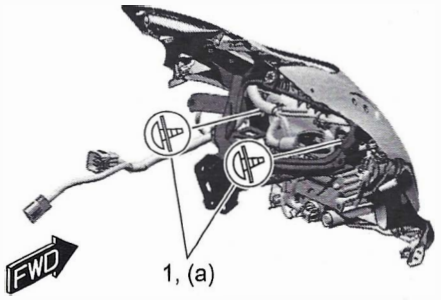
  Tightening torque
  Headlight screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)



IM10L1940102-01

- Tighten the cowling brace screws (1) to the specified torque.

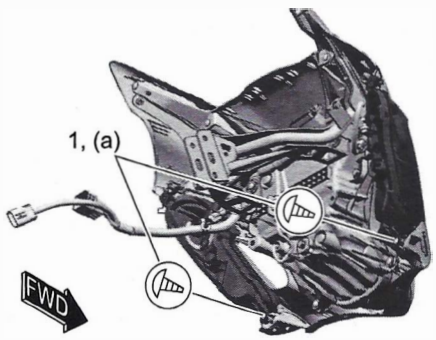
  Tightening torque
  Cowling brace screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)



IM10L1940103-01

- Tighten the front turn signal light screws (1) to the specified torque.

  Tightening torque
  Front turn signal light screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)



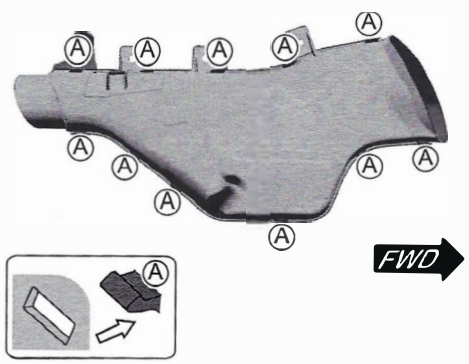
IM10L1940104-01

Intake Pipe Assembly Removal and Installation

BENM10L39406040

Removal

1) Remove the intake pipe assembly. ☞(Page 9D-44)
2) If necessary, disassemble the intake pipe assembly.



IM10L1940105-01

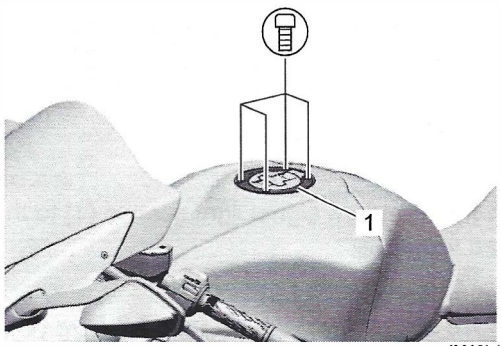
Installation
Install the intake pipe assembly in the reverse order of removal.

Fuel Tank Cap Cover / Fuel Tank Front Cover Removal and Installation

BENM10L39406041

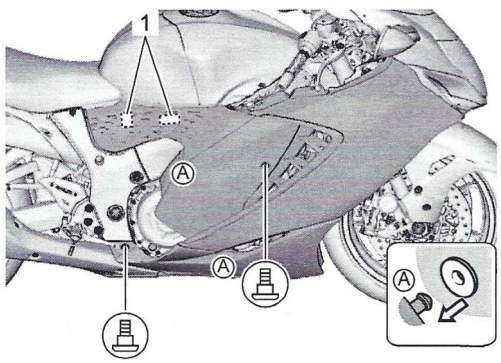
Removal

1) Remove the fuel tank cap cover bolts and remove the fuel tank cap cover (1).
2) Remove the front seat. ☞(Page 9D-34)

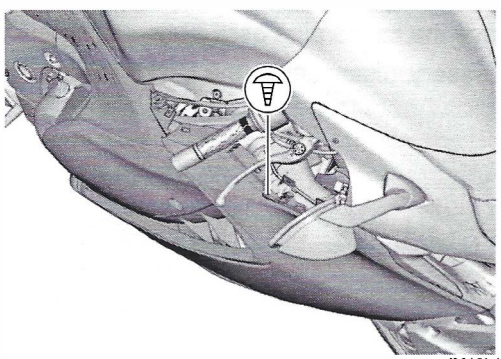


IM10L1940129-01

3) Remove the meter panel. ☞(Page 9D-37)
4) Remove the screw, hook, fasteners (1) and bolts as shown in the figure.

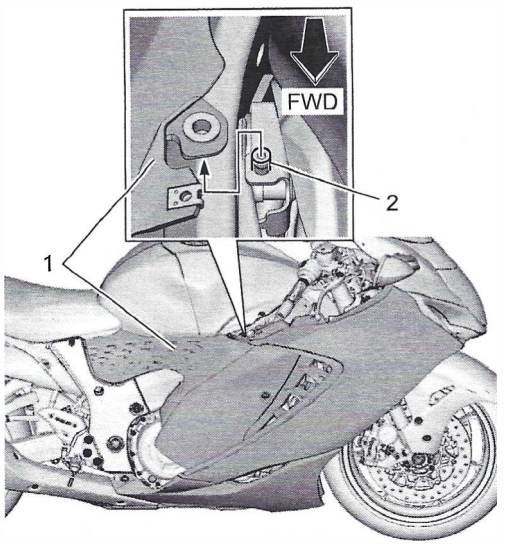


IM10L1940131-02



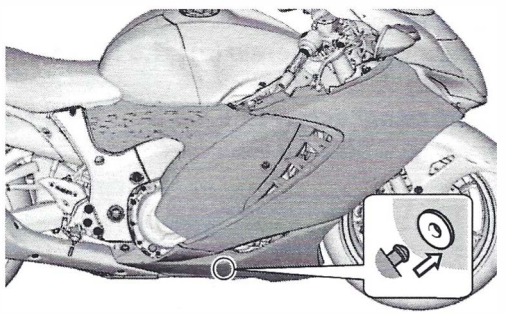
IM10L1940132-02

5) Unhook the side cowling assembly (1) from the protrusion (2) of the bracket.



IM10L1940145-01

6) Reinsert the hook as shown in the figure.



IM10L1940147-01

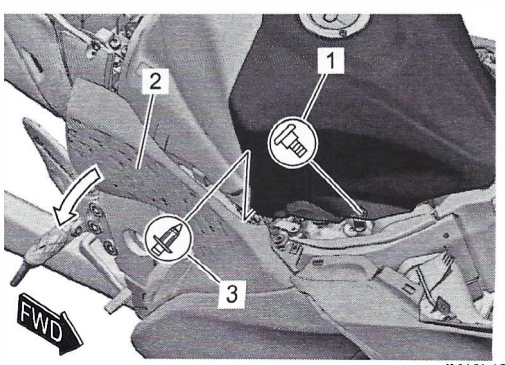
7) Remove the fuel tank front cover bolts (1).
8) Open the side cowling assembly (2) in the direction as shown in the figure to open the space and remove the fasteners (3).

NOTICE

Do not spread the side cowling assembly too wide as it may damage the side cowling assembly.

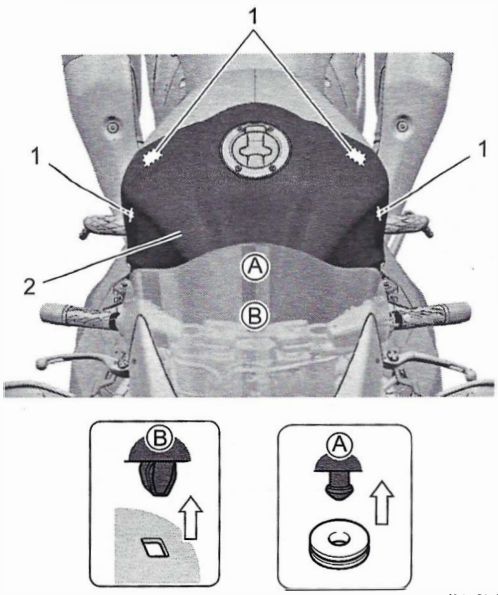
NOTE

Be careful not to drop the fastener (3).



IM10L1940133-01

9) Unhook the hooks and disconnect the fasteners (1) to remove the fuel tank front cover (2).



IM10L1940135-01

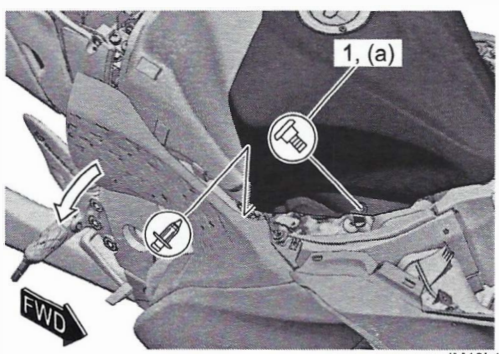
Installation

Install the fuel tank front cover in the reverse order of removal.

Pay attention to the following point:

- Tighten the fuel tank front cover bolts (1) to the specified torque.

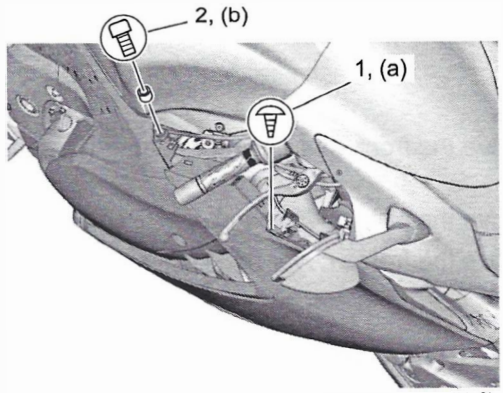
  Tightening torque
  Fuel tank front cover bolt (a): 4.0 N·m (0.41 kgf-m, 2.95 lbf-ft)



IM10L1940134-01

- Tighten the side cowling assembly screws (1) and side cowling assembly bolt No.2 to the specified torque.

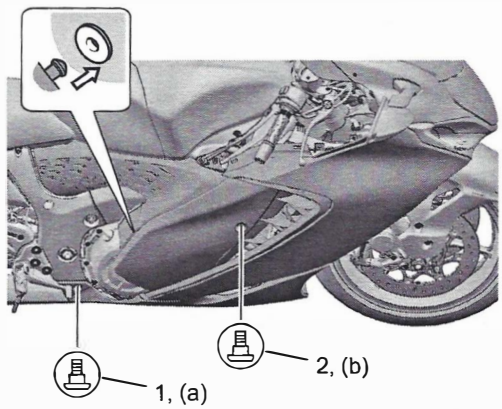
  Tightening torque
  Side cowling assembly screw (a): 1.8 N·m (0.18 kgf-m, 1.35 lbf-ft)
  Side cowling assembly screw No.2 (b): 4.5 N·m (0.46 kgf-m, 3.35 lbf-ft)



IM10L1940137-01

- Tighten the under cowling bolt (1) and side cowling assembly bolt (2) to the specified torque.

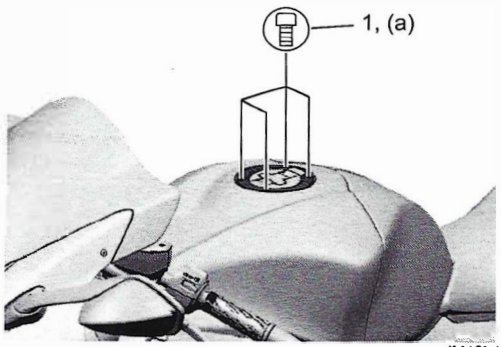
  Tightening torque
  Under cowling bolt (a): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)
  Side cowling assembly bolt (b): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



IM10L1940136-01

- Tighten the fuel tank cap cover bolts (1) to the specified torque.

  Tightening torque
  Fuel tank cap cover bolt (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)



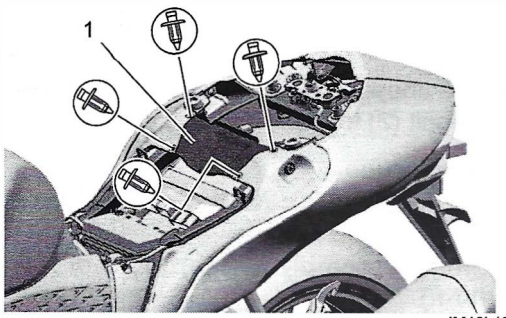
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Frame Cover Assembly Removal and Installation

BENM10L39406042

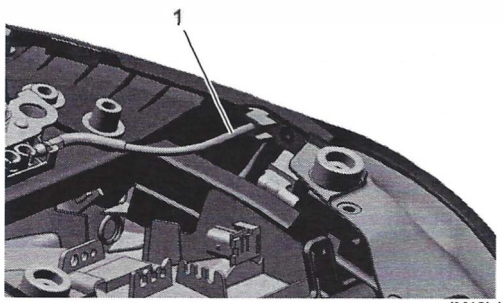
Removal

1) Remove the front seat and rear seat. ☞(Page 9D-34)
2) Remove the pillion rider handle. ☞(Page 9D-36)
3) Remove the frame cover rid (1).



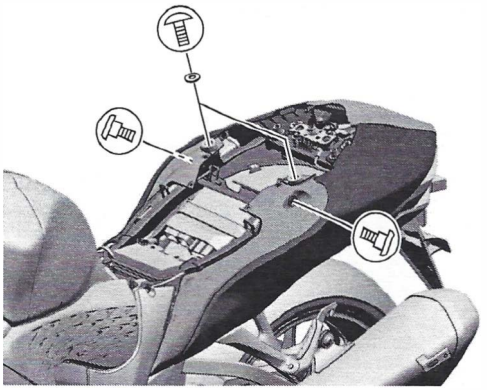
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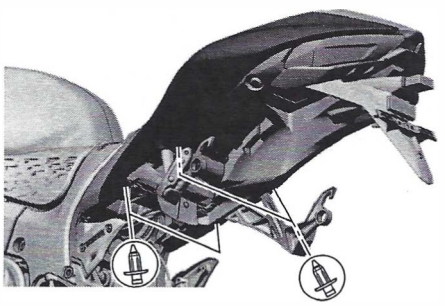
4) Disconnect the seat lock cable (1) from the frame cover assembly.



IM10L1940110-01

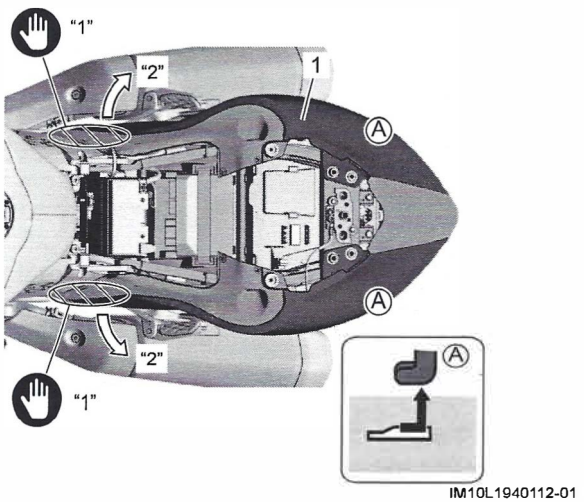
5) Remove the frame cover screws, bolts and fasteners.





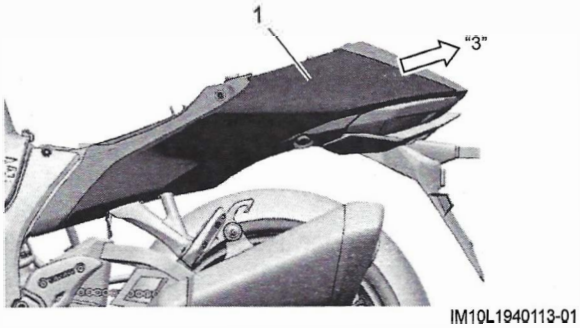
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6) Spread opening end of frame cover assembly (1) in arrow "2" direction by holding the hatched areas "1" with hands.
7) Unhook the hooks and move frame cover assembly (1) in arrow "3" direction.



IM10L1940112-01

: Holding position with hands

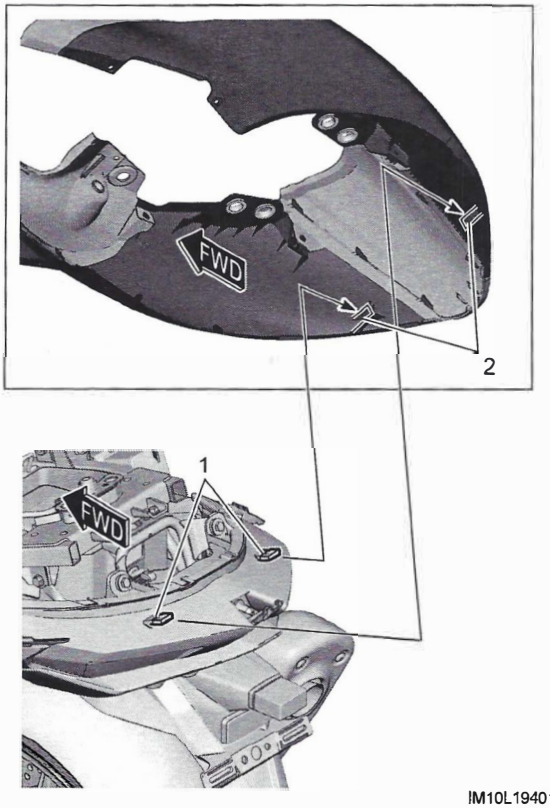


IM10L1940113-01

Installation

Install the frame cover assembly in the reverse order of removal. Pay attention to the following point:

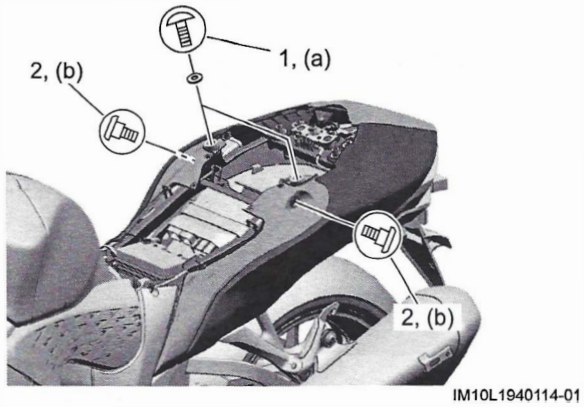
- When installing the frame cover assembly, fit the projections (1) of the rear combination light into the grooves (2) of the frame cover assembly.



IM10L1940146-01

- Tighten the frame cover assembly screws (1) and bolts (2) to the specified torque.

Tightening torque
Frame cover assembly screw (a): 5.5 N·m (0.56 kgf-m, 4.05 lbf-ft)
Frame cover assembly bolt (b): 10 N·m (1.0 kgf-m, 7.5 lbf-ft)



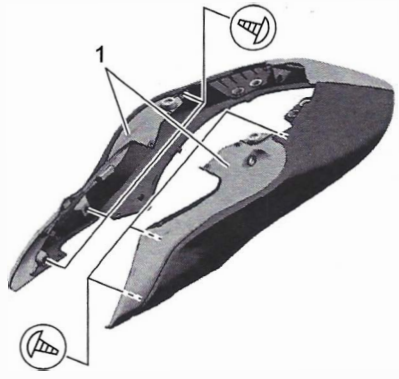
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Frame Cover Assembly Disassembly and Reassembly

BENM10L39406043

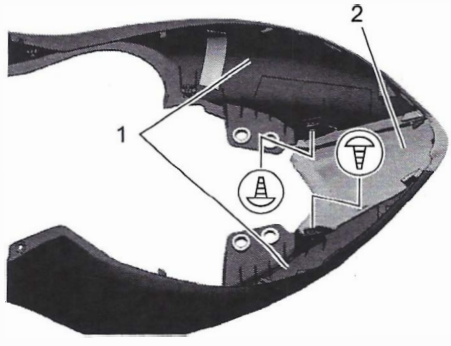
Disassembly

1) Remove the screws and remove the frame cover (1).



IM10L1940115-01

2) Remove the screws and disassemble in to the frame rear cover (1) and frame center cover (2).



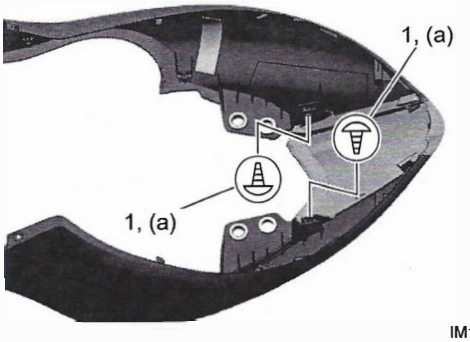
IM10L1940116-01

Reassembly

Reassemble the frame cover assembly in the reverse order of removal. Pay attention to the following points:

- Tighten the frame center cover screws (1) to the specified torque.

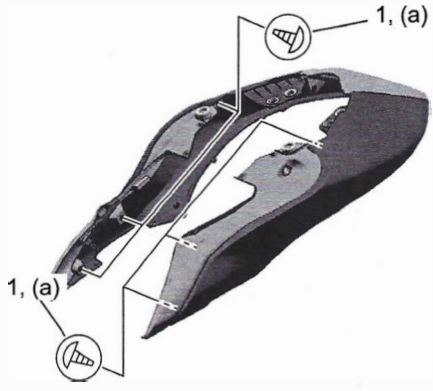
Tightening torque
Frame center cover screw (a): 2.0 N·m (0.20 kgf-m, 1.50 lbf-ft)



IM10L1940117-01

- Tighten the frame cover screws (1) to the specified torque.

Tightening torque
Frame cover screw (a): 2.0 N·m (0.20 kgf-m, 1.50 lbf-ft)



IM10L1940118-01

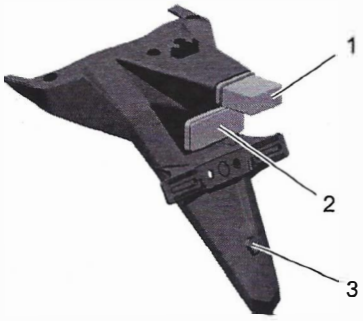
Rear Fender Removal and Installation

BENM10L39406044

Rear Fender (Rear)

Removal

1) Remove the frame cover assembly. ☞(Page 9D-51)
2) Disconnect the license plate light coupler and remove the clamps. Refer to "Rear Lighting System Construction" in Section 9B (Page 9B-5).
3) Remove the license plate light (1) and Rear reflex reflector (2) from the rear fender (rear) (3). Refer to "Rear Lighting System Construction" in Section 9B (Page 9B-5).



IM10L1940119-01

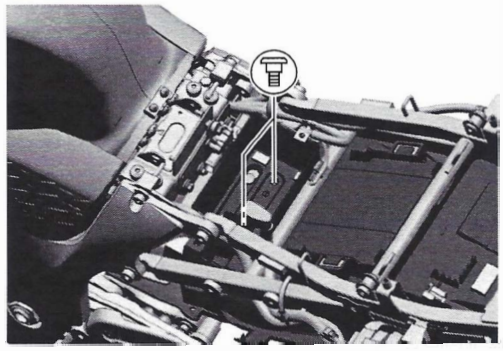
Installation

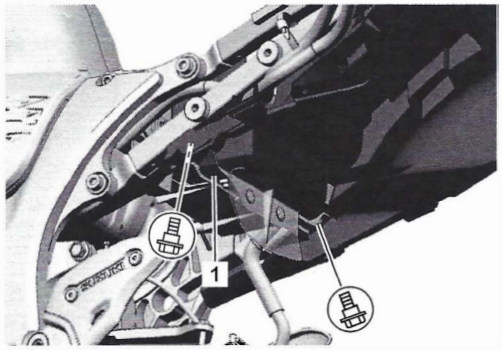
Install the rear fender (rear) in the reverse order of removal.

Rear Fender (Front)

Removal

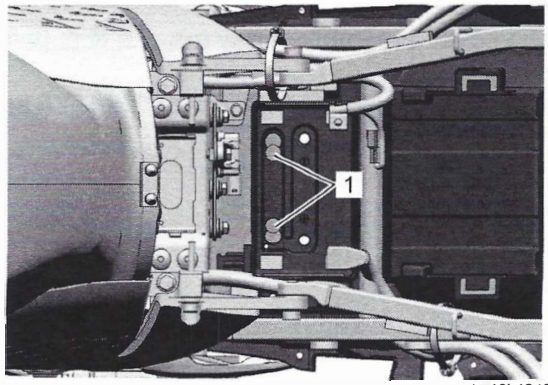
1) Remove the front seat, rear seat and frame cover assembly and rear fender (rear). Refer to "Rear Fender (Rear)" under "Rear Fender Removal and Installation" (Page 9D-53).
2) Remove the battery. ☞(Page 1J-8)
3) Remove the ECM. ☞(Page 1C-2)
4) Remove the seat lock assembly. Refer to "Seat Lock Assembly" under "Seat Lock Cable / Seat Lock Assembly / Striker Support Bracket Removal and Installation" (Page 9D-35).
5) Remove the muffler support bolt. ☞(Page 1K-2)
6) Remove the pillion footrest from the seat rail. ☞(Page 9E-5)
7) Remove the bolts and rear fender (front) bracket (1).





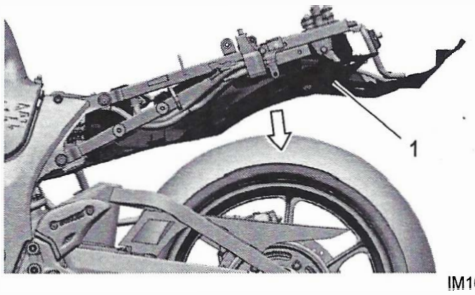
IM10L1940120-01

8) Unhook the hooks (1) of the battery front shield.



IM10L1940121-01

9) Disconnect the couplers and remove the clamps and sensors from the rear fender (front) (1).
10) Remove the rear fender (front) (1) in the direction as shown in the figure.



IM10L1940122-01

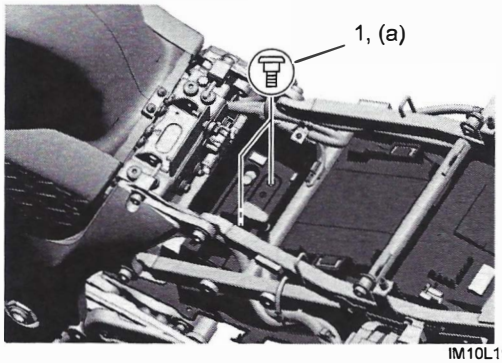
11) If necessary, remove the battery front shield by removing the fuel tank rear bracket No.2. ☞(Page 1G-12)

Installation

Install the rear fender (front) in the reverse order of removal. Pay attention to the following points:

- Tighten the rear fender (front) bracket upper bolts (1).

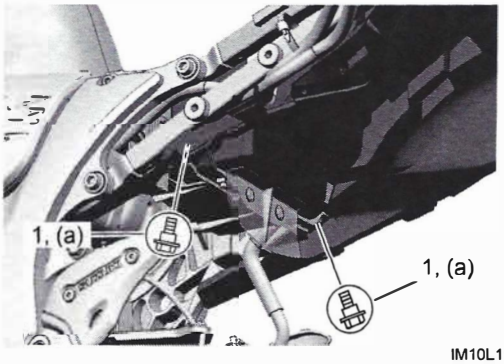
Tightening torque
Rear fender (rear) upper bolt (a): 12 N·m (1.2 kgf-m, 9.0 lbf-ft)



IM10L1940123-01

- Tighten the new rear fender (front) bracket under bolts (1).

Tightening torque
Rear fender (rear) under bolt (a): 12 N·m (1.2 kgf-m, 9.0 lbf-ft)



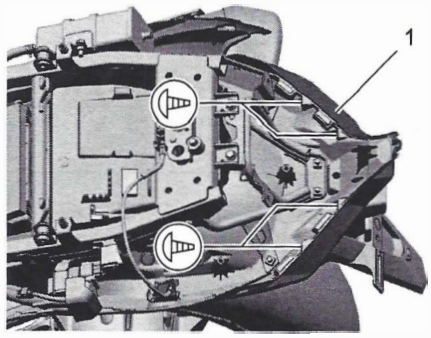
IM10L1940124-01

Frame Under Cover Removal and Installation

BENM10L39406045

Removal

1) Remove the frame cover assembly. ☞(Page 9D-51)
2) Remove the rear combination light. ☞(Page 9B-7)
3) Remove the screws and remove the frame under cover (1).



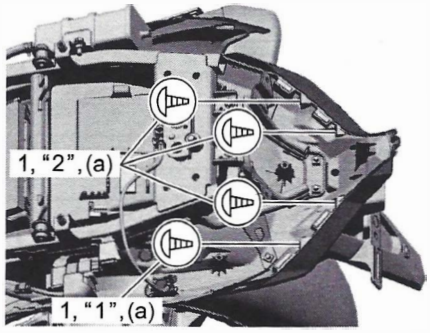
IM10L1940125-01

Installation

Install the frame under cover in the reverse order of removal. Pay attention to the following point:

- Tighten the frame under cover screws (1) in numerical order ("1" – "2") to the specified torque.

Tightening torque
Frame under cover screw (a): 0.8 N·m (0.08 kgf-m, 0.60 lbf-ft)



IM10L2940004-02

Rear Fender Mudguard Removal and Installation

BENM10L39406046

Refer to "Rear Fender Construction" (Page 9D-16).

Specifications

Tightening Torque Specifications

BENM10L39407001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear view mirror nut	12	1.2	9.0	☞(Page 9D-34)
Striker support bracket bolt	8.8	0.90	6.50	☞(Page 9D-36)
Front fender bolt	10	1.0	7.5	☞(Page 9D-36)
Horn bolt	5.5	0.56	4.05	☞(Page 9D-37)
Lower bracket cover bolt	10	1.0	7.5	☞(Page 9D-37)
Side cowling assembly bolt	10	1.0	7.5	☞(Page 9D-39) / ☞(Page 9D-50)
Side cowling assembly screw	1.8	0.18	1.35	☞(Page 9D-39) / ☞(Page 9D-50)
Side front cowling No.1 screw	1.8	0.18	1.35	☞(Page 9D-41)
Side rear cover screw	1.8	0.18	1.35	☞(Page 9D-41)
Side cover screw	1.8	0.18	1.35	☞(Page 9D-41)
Side front cowling No.2 screw	1.8	0.18	1.35	☞(Page 9D-42)
Under cowling bolt	10	1.0	7.5	☞(Page 9D-43) / ☞(Page 9D-50)
Under cowling screw	1.8	0.18	1.35	☞(Page 9D-43)
Cowling brace bolt	23	2.3	17.0	☞(Page 9D-46)
Regulator / rectifier bracket bolt	10	1.0	7.5	☞(Page 9D-46)
Combination meter bolt	5.5	0.56	4.05	☞(Page 9D-46)
Meter panel (center) screw	1.8	0.18	1.35	☞(Page 9D-46)
Windscreen bolt	0.4	0.04	0.30	☞(Page 9D-47)
Body center cowling screw	1.8	0.18	1.35	☞(Page 9D-48)
Meter front panel screw	1.8	0.18	1.35	☞(Page 9D-48)
Headlight screw	1.8	0.18	1.35	☞(Page 9D-48)
Cowling brace screw	1.8	0.18	1.35	☞(Page 9D-48)
Front turn signal light screw	1.8	0.18	1.35	☞(Page 9D-48)
Fuel tank front cover bolt	4.0	0.41	2.95	☞(Page 9D-50)
Side cowling assembly screw No.2	4.5	0.46	3.35	☞(Page 9D-50)
Fuel tank cap cover bolt	5.5	0.56	4.05	☞(Page 9D-50)
Frame cover assembly screw	5.5	0.56	4.05	☞(Page 9D-52)
Frame cover assembly bolt	10	1.0	7.5	☞(Page 9D-52)
Frame center cover screw	2.0	0.20	1.50	☞(Page 9D-52)
Frame cover screw	2.0	0.20	1.50	☞(Page 9D-53)
Rear fender (rear) upper bolt	12	1.2	9.0	☞(Page 9D-54)
Rear fender (rear) under bolt	12	1.2	9.0	☞(Page 9D-54)
Frame under cover screw	0.8	0.08	0.60	☞(Page 9D-54)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:

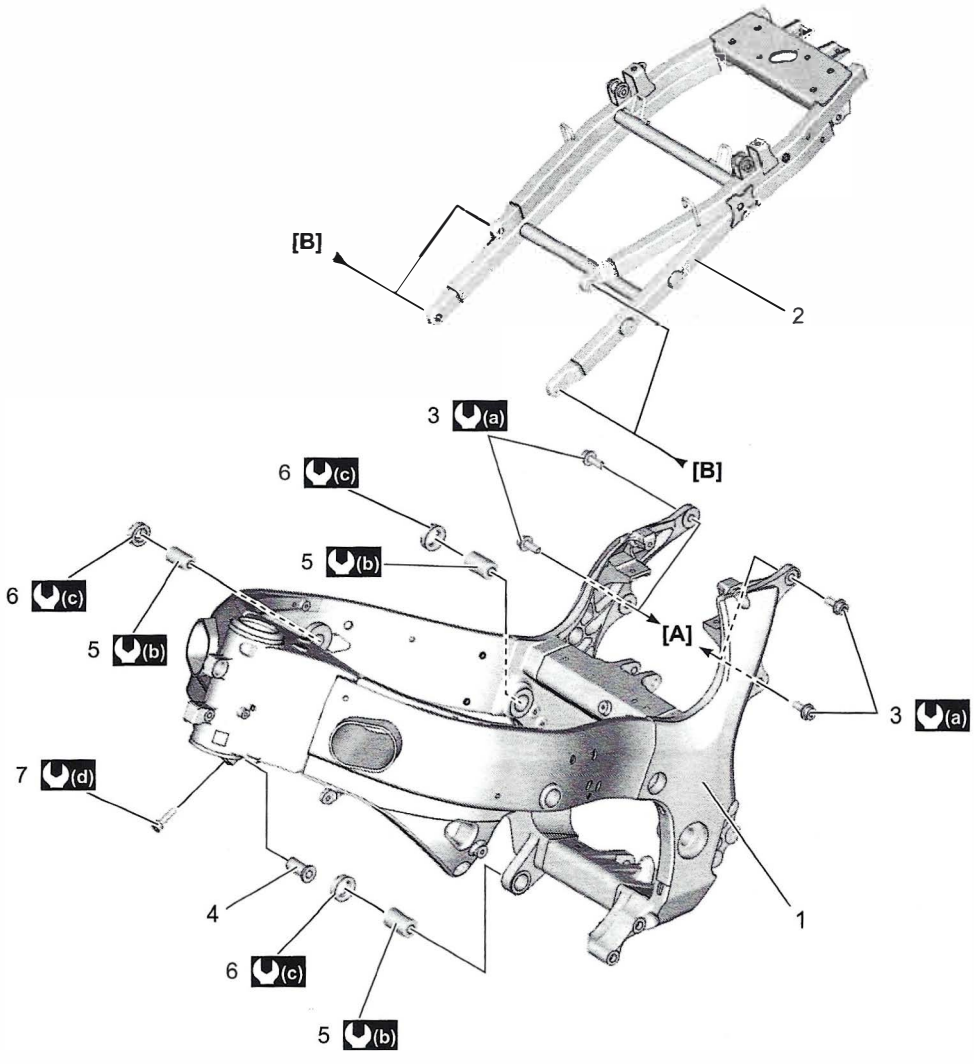
"Seat Lock Cable Routing Diagram" (Page 9D-1)
"Rear View Mirror Construction" (Page 9D-4)
"Front Fender Construction" (Page 9D-5)
"Cowling Construction" (Page 9D-6)
"Body Cowling Construction" (Page 9D-7)
"Side Cowling Assembly Construction" (Page 9D-11)
"Fuel Tank Front Cover / Fuel Tank Bracket Construction" (Page 9D-13)
"Frame Cover Assembly Construction" (Page 9D-14)
"Frame Cover Construction" (Page 9D-15)
"Rear Fender Construction" (Page 9D-16)
"Pillion Rider Handle Construction" (Page 9D-17)
"Fasteners Information" in Section 0C (Page 0C-6)

Body Structure

Repair Instructions

Body Frame Construction

BENM10L39506001

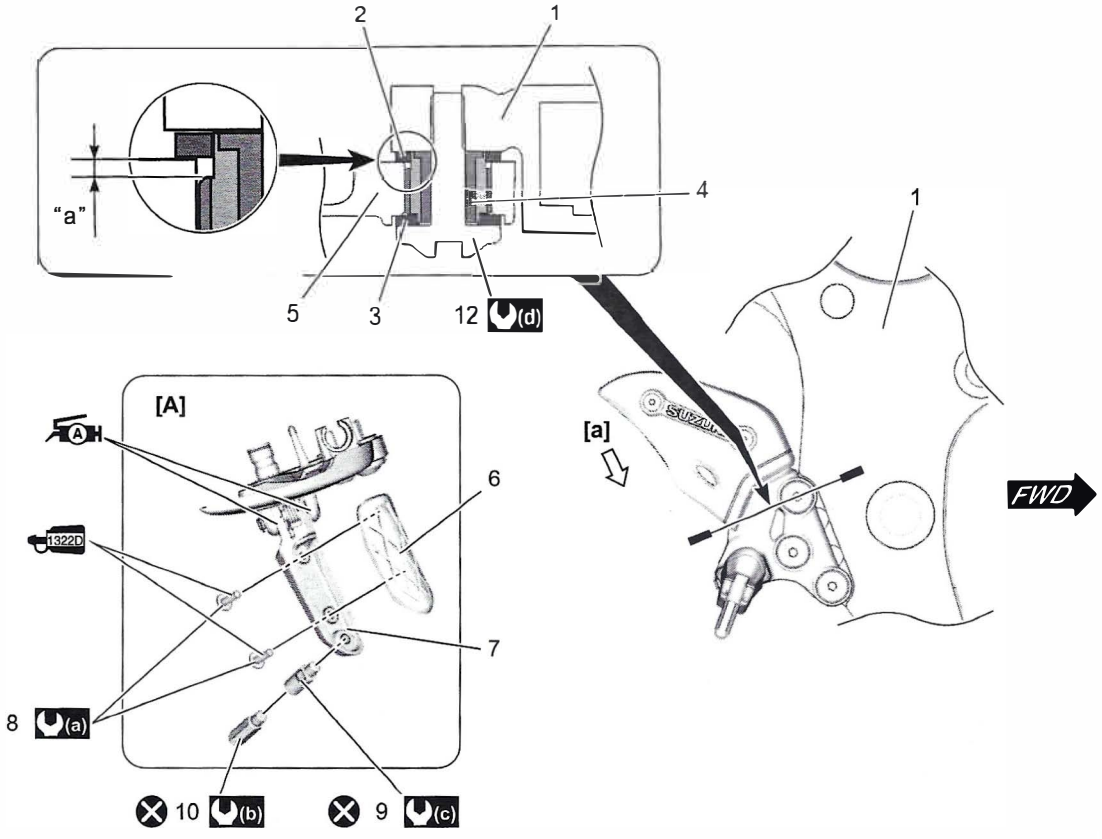


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[A]: To [B]	4. Spacer	(b) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
[B]: From [A]	5. Adjuster	(c) : 45 N·m (4.5 kgf-m, 32.5 lbf-ft)
1. Frame	6. Adjuster lock-nut	(d) : 35 N·m (3.5 kgf-m,25.5 lbf-ft)
2. Seat rail	7. Engine mounting pinch bolt	
3. Seat rail bolt	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	

Front Footrest Construction

BENM10L39506002



IM10L1950002-05

[A]: View [a]	7. Front footrest bar	(a) : 26 N·m (2.7 kgf-m, 19.5 lbf-ft)
1. Frame	8. Footrest bar screw	"a": Press fit dimensions of the bush 2.0 mm (0.08 in)
2. Washer	9. Bank sensor bolt No. 1	A : Apply grease to sliding surface.
3. Washer	10. Bank sensor bolt No. 2	1322D : Apply thread lock to the thread part.
4. Bush	(a) : 3.0 N·m (0.31 kgf-m, 2.25 lbf-ft)	⊗ : Do not reuse.
5. Front footrest bracket	(b) : 13 N·m (1.3 kgf-m, 9.5 lbf-ft)	
6. Footrest rubber	(a) : 18 N·m (1.8 kgf-m, 13.5 lbf-ft)	

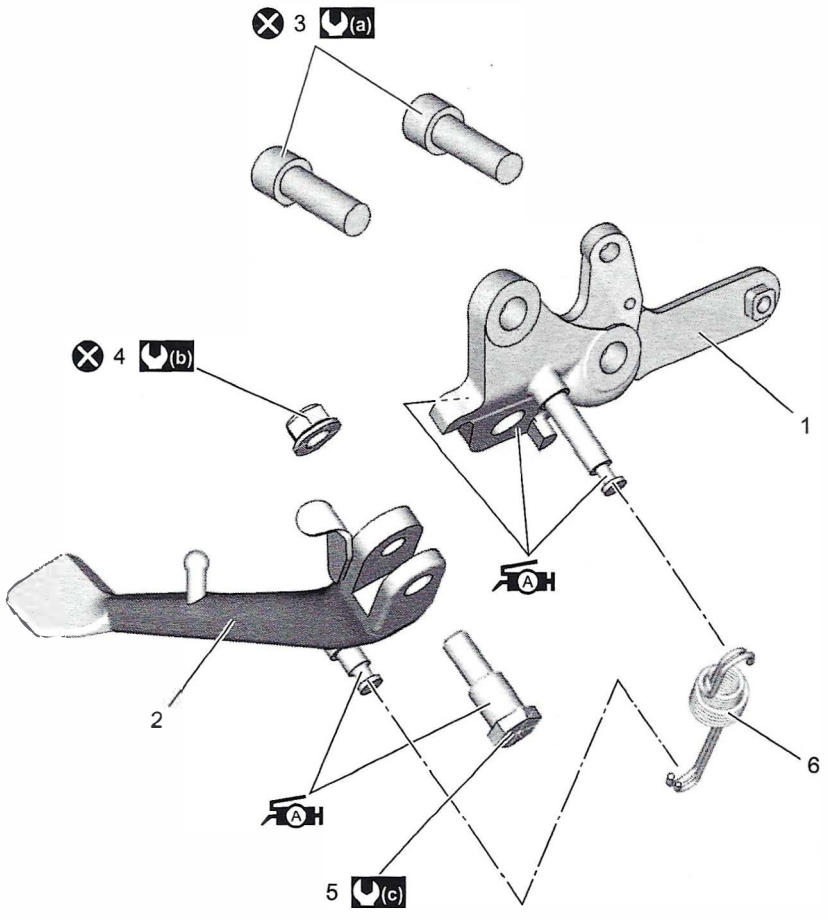
Front Footrest Removal and Installation

BENM10L39506003

Refer to "Front Footrest Construction" (Page 9E-2).

Side-stand Construction

BENM10L39506004



IM10L1950003-04

1. Side-stand bracket	5. Side-stand bolt	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
2. Side-stand	6. Side-stand springs (Inner and outer)	A : Apply grease to sliding surface.
3. Side-stand bracket bolt	(a) : 95 N·m (9.5 kgf-m, 68.5 lbf-ft)	: Do not reuse.
4. Side-stand nut	(b) : 40 N·m (4.1 kgf-m, 29.5 lbf-ft)	

Side-stand Removal and Installation

BENM10L39506005

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.**

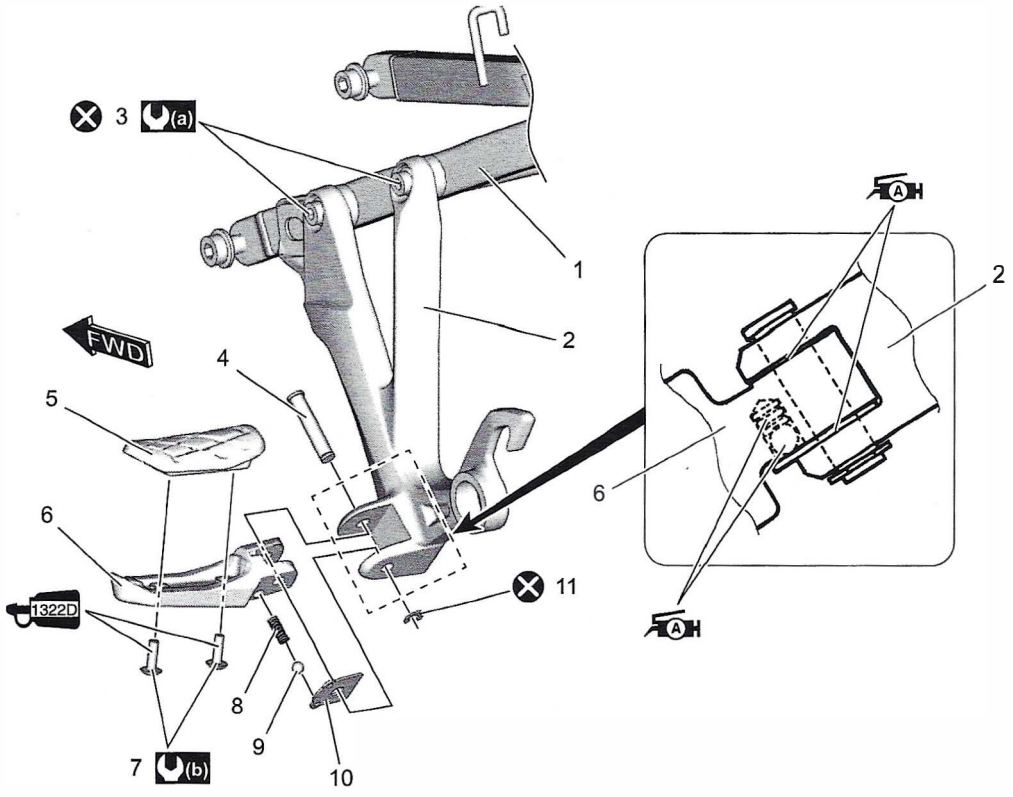
2) Remove the side-stand. ☞(Page 9E-3)

Installation

Install the side-stand in the reverse order of removal.

Pillion Footrest Construction

BENM10L39506006



IM10L1950004-04

1. Seat rail	7. Footrest bar screw	(b) : 3.0 N·m (0.31 kgf-m, 2.25 lbf-ft)
2. Pillion footrest bracket	8. Spring	A : Apply grease to sliding surface.
3. Pillion footrest bracket bolt	9. Ball	1322D : Apply thread lock to the thread part.
4. Pin	10. Plate	⊗ : Do not reuse.
5. Footrest rubber	11. E-ring	
6. Pillion footrest bar	(a) : 35 N·m (3.5 kgf-m, 25.5 lbf-ft)	

Pillion Footrest Removal and Installation

BENM10L39506007

Removal

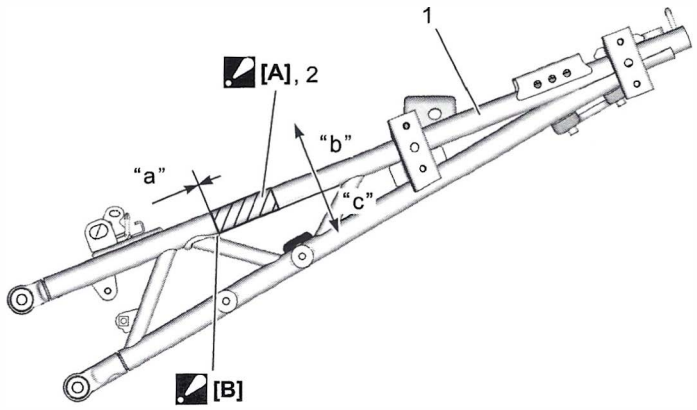
1) Remove the muffler support bolt to remove the muffler from the pillion footrest. Refer to "Exhaust Pipe / Muffler Removal" in Section 1K (Page 1K-2).
2) Remove the pillion footrest. ☞(Page 9E-4)

Installation

Install the pillion footrest in the reverse order of removal.

Seat Rail Tape Construction

BENM10L39506008



IM10L1950005-01

[A]: The same procedures are applicable to both the right and left tapes.	2. Tape : Clean the adhesive surface before sticking the tape. Press the tape after sticking.	"c": 0 mm (0 in)
[B]: Stick the tape using the weld bead as a guide.	"a": -5 – 5 mm (-0.19 – 0.19 in)	
1. Seat rail	"b": 8 mm (0.31 in) max	

Specifications

Tightening Torque Specifications

BENM10L39507001

Reference:

For the tightening torques of fasteners not specified in this page, refer to:
"Body Frame Construction" (Page 9E-1)
"Front Footrest Construction" (Page 9E-2)
"Side-stand Construction" (Page 9E-3)
"Pillion Footrest Construction" (Page 9E-4)

Special Tools and Equipment

Recommended Service Material

BENM10L39508001

NOTE

Required service material(s) is also described in:
"Front Footrest Construction" (Page 9E-2)
"Side-stand Construction" (Page 9E-3)
"Pillion Footrest Construction" (Page 9E-4)

Section 10

Control Systems

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Precautions

Precautions

Precautions for Engine

BENM10L3A000001

Refer to “General Precautions” in Section 00 (Page 00-1), “Precautions for Electrical Circuit Service” in Section 00 (Page 00-2), “Precautions for Circuit Tester” in Section 00 (Page 00-8) and “Precautions for SDS-II” in Section 00 (Page 00-9).

Cruise Control System

Precautions

Precautions for Cruise Control System

BENM10L3A100001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2), "Precautions for Circuit Tester" in Section 00 (Page 00-8) and "Precautions for SDS-II" in Section 00 (Page 00-9).

NOTE

- **Cruise control system is controlled by ECM. If cruise control system is abnormal condition, a malfunction may be detected by engine control systems. ☞(Page 1A-9)**
- **ECM receives following signal from ABS control unit / HU and combination meter by CAN communication.**
  - **ABS control unit / HU: Front brake master cylinder pressure sensor, front brake caliper pressure sensor, rear brake master cylinder pressure sensor and rear brake caliper pressure sensor signal.**
  - **Combination meter: Cruise control switch signal, select switch ("RES / UP" and "SET / DOWN") signal, mode switch signal and cruise control cancel switch signal.**

Schematic and Routing Diagram

Cruise Control System Wiring Diagram

BENM10L3A102001

Refer to "Engine Control System Wiring Diagram" in Section 1A (Page 1A-6).

Component Location

Cruise Control System Component Location

BENM10L3A103001

Refer to "Engine Control System Component Location" in Section 1A (Page 1A-8).

Diagnostic Information and Procedures

Cruise Control System / Active Speed Limiter Check

BENM10L3A104001

Refer to the following items for the details of each step.

Step 1

Customer complaint analysis

1) Perform customer complaint analysis. ☞(Page 10A-3)

Was customer complaint analysis performed?

Yes — Go to Step 2.

No — Perform customer complaint analysis.

Step 2

DTC check

1) Check for DTCs.
   - ECM: refer to "DTC Check" in Section 1A (Page 1A-11)
   - ABS control unit / HU: refer to "DTC Check" in Section 4E (Page 4E-15)

Is there any DTC(s)?

Yes — Check and repair according to applicable DTC troubleshooting, and go to Step 4.

No — Go to Step 3.

Step 3

Trouble symptom confirmation

1) Check trouble symptom. ☞(Page 10A-4)

Is trouble symptom identified?

Yes — Perform "Cruise Control System Symptom Diagnosis" (Page 10A-4) or "Active Speed Limiter Symptom Diagnosis" (Page 10A-5), and go to Step 4.

No — Perform "Intermittent Malfunction Inspection" in Section 00 (Page 00-7), and go to Step 4.

Step 4

Final confirmation test

1) Perform final confirmation test. ☞(Page 10A-4)

Does the trouble recur?

Yes — Go to Step 2.

No — End.

Step 1: 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:

MIL condition	□ Always ON / □ Sometimes ON / □ Always OFF / □ Good condition
Master warning indicator condition	□ Always ON / □ Sometimes ON / □ Always OFF / □ Good condition
Malfunction display/code	User mode: □ No display / □ Malfunction display ( )
	Dealer mode: □ No code / □ Malfunction code ( )

PROBLEM SYMPTOMS
□ Cruise control cannot be on-standby □ Cruise control cannot be set □ Cruise control cannot be canceled □ Set speed cannot be changed □ Cruise control indicator and/or cruise control indicator light (if equipped) dose not turn ON or OFF
□ 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:

Step 2: DTC Check
First, check DTC of ECM. ☞(Page 1A-11)

Step 3: Trouble Symptom Confirmation
Based on information obtained in "Step 1: Customer Complaint Analysis" (Page 10A-3), check trouble symptoms.

Step 4: Final Confirmation Test
Check that the problem symptom has gone and cruise control system is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC referring to "DTC Clearance" in Section 1A (Page 1A-12) and confirm that the DTC is not indicated, based on information obtained in "Step 1: Customer Complaint Analysis" (Page 10A-3).

Scan Tool Data

BENM10L3A104002

The associated data values of the cruise control system can be confirmed using a SDS-II. Refer to "Scan Tool Data" in Section 1A (Page 1A-20).

Cruise Control System Symptom Diagnosis

BENM10L3A104003

NOTE

Cruise control system is controlled by ECM. Before performing symptom diagnosis, check that no DTC is detected in ECM.

Condition	Possible cause	Correction / Reference Item
Cruise control cannot be on-standby	Faulty cruise control switch.	*Check cruise control switch. ☞(Page 10A-6)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*
Cruise control cannot be set	Faulty "SET / DOWN" switch.	*Check "SET / DOWN" switch. ☞(Page 10A-6)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*
Cruise control cannot be canceled	Faulty cruise control cancel switch.	*Check cruise control cancel switch. ☞(Page 10A-6)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*
Set speed cannot be changed	Faulty "RES / UP" Switch and "SET / DOWN" Switch.	*Check "RES / UP" Switch and "SET / DOWN" Switch. ☞(Page 10A-6)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*
Cruise control indicator dose not turn ON or OFF	Faulty cruise control switch.	*Check cruise control switch. ☞(Page 10A-6)*
	Faulty "SET / DOWN" switch.	*Check "SET / DOWN" switch. ☞(Page 10A-6)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*

Active Speed Limiter Symptom Diagnosis

BENM10L3A104004

NOTE

Active speed limiter is controlled by ECM. Before performing symptom diagnosis, check that no DTC is detected in ECM.

Condition	Possible cause	Correction / Reference Item
Active speed limiter cannot be on-standby	Faulty cruise control switch.	*Check cruise control switch. ☞(Page 10A-6)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*
Active speed limiter cannot be set	Faulty "SET / DOWN" switch.	*Check "SET / DOWN" switch. ☞(Page 10A-6)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*
Active speed limiter cannot be canceled	Faulty mode switch.	*Check mode switch. ☞(Page 10A-7)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*
Set speed cannot be changed	Faulty "RES / UP" Switch and "SET / DOWN" switch.	*Check "RES / UP" Switch and "SET / DOWN" switch. ☞(Page 10A-6)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*
Active speed limiter indicator dose not turn ON or OFF	Faulty cruise control switch.	*Check cruise control switch. ☞(Page 10A-6)*
	Faulty mode switch.	*Check mode switch. ☞(Page 10A-7)*
	Faulty wiring or grounding.	*Repair or replace.*
	Faulty combination meter.	*Check combination meter. ☞(Page 9C-9)*
	Faulty ECM.	*Replace ECM after checking that none of above parts is faulty. ☞(Page 1C-2)*

Cruise Control System Circuits Inspection

BENM10L3A104005

Refer to "Engine Control System Circuits Inspection" in Section 1A (Page 1A-105).

Repair Instructions

Cruise Control Switch Inspection

BENM10L3A106001

Refer to"Right Handle Switch Inspection" in Section 6B (Page 6B-7).

Cruise Control Switch Removal and Installation

BENM10L3A106002

Refer to "Right Handle Switch Removal and Installation" in Section 6B (Page 6B-7).

"RES / UP" Switch / "SET / DOWN" Switch Inspection

BENM10L3A106003

Refer to "Left Handle Switch Inspection" in Section 6B (Page 6B-9).

"RES / UP" Switch / "SET / DOWN" Switch Removal and Installation

BENM10L3A106004

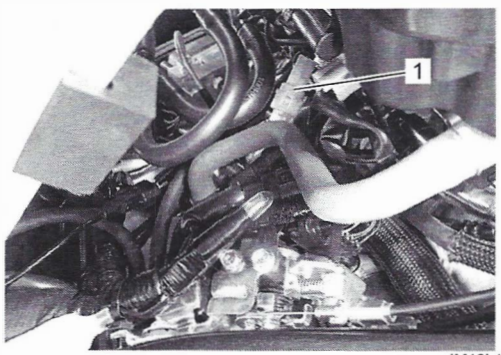
Refer to "Left Handle Switch Removal and Installation" in Section 6B (Page 6B-9).

Cruise Control Cancel Switch Inspection

BENM10L3A106005

Refer to "Precautions for Electric Throttle Control System" in Section 1C (Page 1C-1).

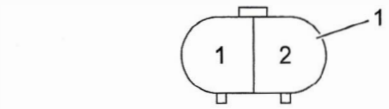
1) Lift and support the fuel tank. ☞(Page 9D-49)
2) Check that throttle cable No.2 has been connected to accelerator body assembly properly. ☞(Page 1D-2)
   If any defect is found, repair or replace the throttle cable No.2 before proceeding to the next step.
3) Disconnect the cruise control cancel switch coupler (1).

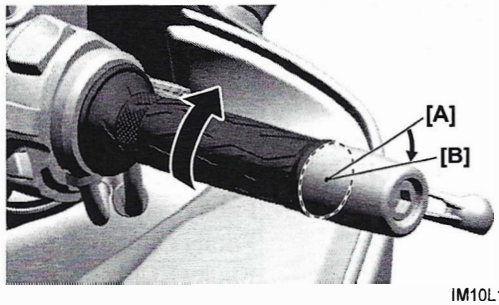


IM10L1130047-01

4) Inspect the cruise control cancel switch (1) for continuity between "T1" and "T2" with the tester.
   If any abnormality is found, replace the cruise control cancel switch with a new one. ☞(Page 10A-6)

Position \ Terminal	T1	T2
Fully closed position: [A]	○	○
Cruise control cancel switch position: [B]		





IM10L1130048-01

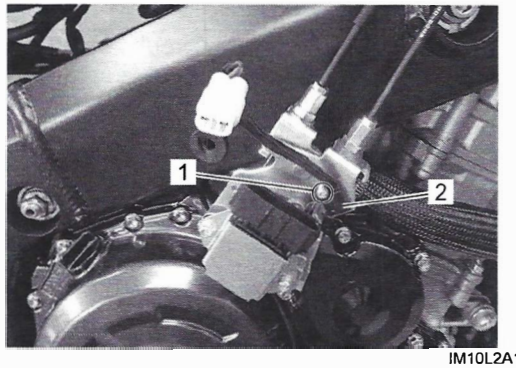
Cruise Control Cancel Switch Removal and Installation

BENM10L3A106006

Refer to "Precautions for Electric Throttle Control System" in Section 1C (Page 1C-1).

Removal

1) Move the accelerator body assembly outside of the motorcycle. ☞(Page 1C-14)
2) Remove the cruise control cancel switch screw (1).
3) Remove the cruise control cancel switch (2) from the accelerator body assembly.



IM10L2A10003-01

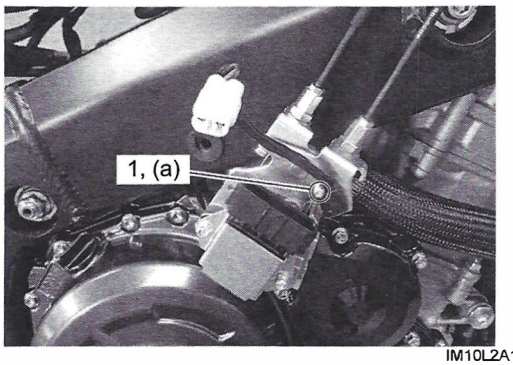
Installation

Install the cruise control cancel switch in the reverse order of removal.

Pay attention to the following point:

- Tighten the new cruise control cancel switch screw (1) to specified torque.

  Tightening torque
  Cruise control cancel switch screw (a): 0.28 N·m (0.03 kgf-m, 0.20 lbf-ft)



IM10L2A10004-01

- After finishing the accelerator body assembly installation, inspect the cruise control cancel switch. ☞(Page 10A-6)

Mode Switch Inspection

BENM10L3A106007

Refer to "Left Handle Switch Inspection" in Section 6B (Page 6B-9).

Mode Switch Removal and Installation

BENM10L3A106008

Refer to "Left Handle Switch Removal and Installation" in Section 6B (Page 6B-9).

Specifications

Tightening Torque Specifications

BENM10L3A107001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Cruise control cancel switch screw	0.28	0.03	0.20	☞(Page 10A-7)

Reference:

For the tightening torques of fasteners not specified in this page, refer to:
"Fasteners Information" in Section 0C (Page 0C-6)

Immobilizer Control System

Precautions

Precautions for DTC Trouble Shooting

BENM10L3A300001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2), "Precautions for Circuit Tester" in Section 00 (Page 00-8) and "Precautions for SDS-II" in Section 00 (Page 00-9).

NOTE

- **Immobilizer control system is controlled by ECM.**
- **After repairing the trouble, clear the DTC using the special tool. ☞(Page 10C-3)**

Precautions for Immobilizer System

BENM10L3A300002

- Ignition key incorporates the transponder. Therefore, it is necessary to register the key ID to ECM, when ignition key is replaced or added.
- Do not turn ON ignition switch with ignition key in contact with or very close to another key. Or, the immobilizer control system may detect some abnormal condition and prevent the engine from starting.
- Do not turn ON ignition switch using ignition key with any type of metal wrapped around its grip or in contact with key. Or, the immobilizer control system may detect some abnormal condition and prevent the engine from starting.
- Do not leave ignition key in a place where temperature is high. High temperature may cause damage to the transponder built in the ignition key.
- Do not turn ignition switch to "ON" position by bringing radio antenna close to immobilizer antenna. Or, the immobilizer control system may detect some abnormal condition and prevent the engine from starting.

General Description

Self-Diagnosis Function

BENM10L3A301001

Refer to "Self-Diagnosis Function" in Section 1A (Page 1A-1).

Schematic and Routing Diagram

Immobilizer Control System Wiring Diagram

BENM10L3A302001

Refer to "Engine Control System Wiring Diagram" in Section 1A (Page 1A-6).

Component Location

Immobilizer Control System Component Location

BENM10L3A303001

Refer to "Engine Control System Component Location" in Section 1A (Page 1A-8).

Diagnostic Information and Procedures

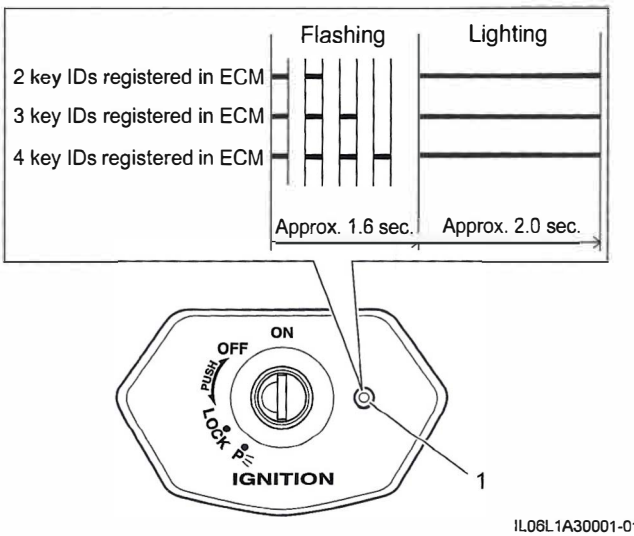
Immobilizer Control System Check

BENM10L3A304001

Step 1

Indicator light operation check

1) When turning the ignition switch ON, check if the indicator light (1) of immobilizer antenna operates as shown in figure.



IL06L1A30001-01

Is check result OK?

Yes — Go to Step 2.

No — Go to Step 3.

Step 2

Engine start check

1) Start engine.

Does engine start?

Yes — Immobilizer control system is in good condition.

No — Go to Step 5.

Step 3

DTC check

Is DTC P1610 detected?

Yes — Go to troubleshooting for "DTC P1610" (Page 10C-4).

No — Go to Step 4.

Step 4

Engine start check

1) Start engine.

Does engine start?

Yes — Check indicator light circuit. If indicator light circuit is in good condition, replace the immobilizer antenna. ☞(Page 10C-6)

No — Go to Step 5.

Step 5

DTC check

Is there any DTC(s)?

Yes — Go to troubleshooting for applicable DTC.

No — Perform "Engine Control System Check" in Section 1A (Page 1A-9).

DTC Check

BENM10L3A304002

Refer to "DTC Check" in Section 1A (Page 1A-11).

DTC Clearance

BENM10L3A304003

Refer to "DTC Clearance" in Section 1A (Page 1A-12).

DTC Table

BENM10L3A304004

NOTE

***1: Display on the LCD only. (If the ECM is normal but the ABS detects DTC, ABS-related DTC(s) is displayed.)**

DTC	DTC name	DTC detecting condition
00000 *1	None	—
P1610	Ignition Switch Signal Circuit ☞(Page 10C-4)	Any of the following conditions is met. • Verification error of key ID between ignition key and ECM. • Communication error between immobilizer antenna and ECM.

Fail-Safe Table

BENM10L3A304005

Refer to "Fail-Safe Table" in Section 1A (Page 1A-19).

DTC P1610

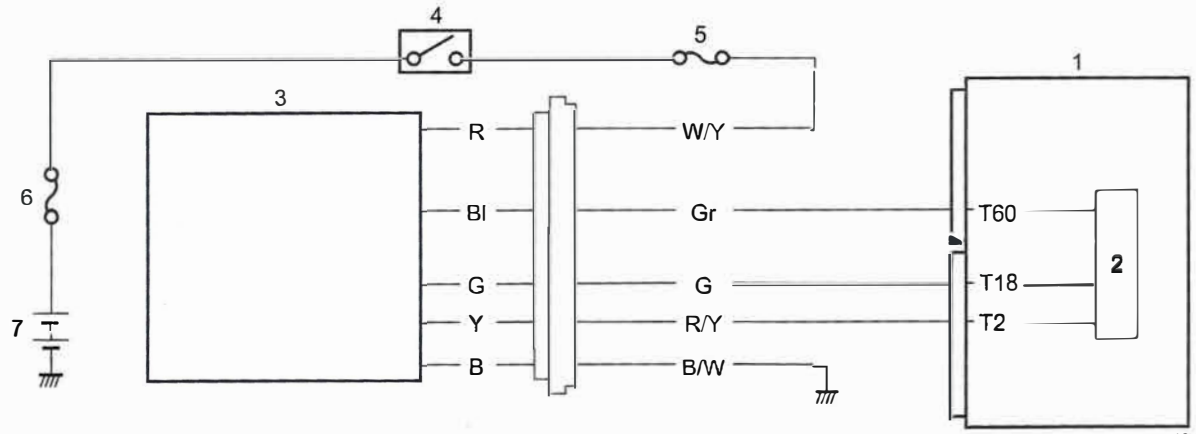
BENM10L3A304006

DTC Detecting Condition and Trouble Area

DTC detecting condition	Trouble area
P1610: Ignition Switch Signal Circuit Any of the following conditions is met. • Verification error of key ID between ignition key and ECM. • Communication error between immobilizer antenna and ECM.	• Key ID is not registered in ECM • Immobilizer antenna • Immobilizer antenna circuit • ECM

Wiring Diagram

Refer to "Immobilizer Control System Wiring Diagram" (Page 10C-1).



IM10L1A30001-01

1. ECM	4. Ignition switch	7. Battery
2. Immobilizer antenna communication and indicator light drive circuit	5. Ignition fuse (10 A)	
3. Immobilizer antenna	6. Main fuse (30 A)	

Troubleshooting

Step 1

Engine start check

1) Start engine using the spare ignition key.

Does engine start?

Yes End. (Ignition key was not registered)

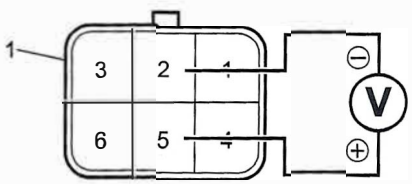
No Go to Step 2.

Step 2

Immobilizer antenna power supply circuit check

1) Turn the ignition switch OFF.
2) Disconnect the immobilizer antenna coupler. ☞(Page 10C-6)
3) Check for proper terminal connection to the immobilizer antenna coupler (1).
4) If connections are OK, turn the ignition switch ON.
5) Measure the voltage between "T5" and "T2".

Immobilizer antenna power supply voltage
[Standard]: Battery voltage



IL06L1A30003-01

Is check result OK?

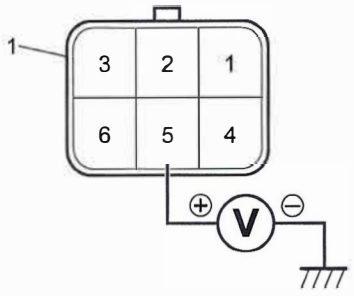
Yes Go to Step 4.

No Go to Step 3.

Step 3

Immobilizer antenna ground circuit check

1) Measure the voltage between "T5" at the immobilizer antenna coupler (1) and ground.



IL06L1A30004-01

Is voltage specified range in Step 2?

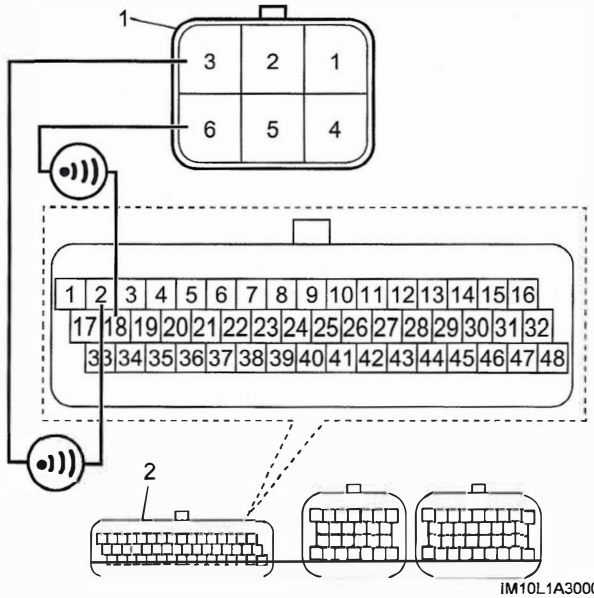
Yes — Repair or replace the "T2" wire at the immobilizer antenna coupler.

No — Repair or replace the "T5" wire at the immobilizer antenna coupler.

Step 4

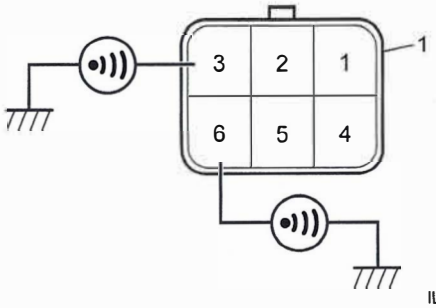
Immobilizer antenna signal circuit check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, check the following points.
   - Resistance
     - Between "T6" at the immobilizer antenna coupler (1) and "T18" at the ECM coupler "A" (2): less than 1 Ω
     - Between "T3" at the immobilizer antenna coupler and "T2" at the ECM coupler "A": less than 1 Ω



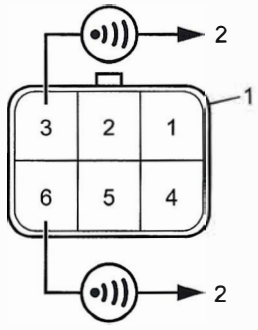
IM10L1A30002-01

- Between "T6" at the immobilizer antenna coupler (1) and ground: infinity
- Between "T3" at the immobilizer antenna coupler and ground: infinity



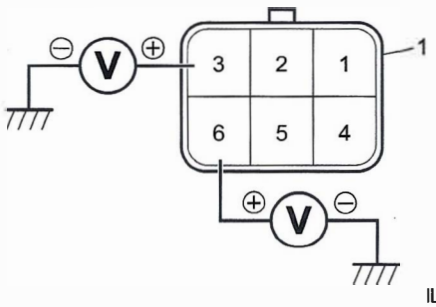
IL06L1A30006-01

- Between "T6" and other terminal (2) at immobilizer antenna coupler (1): infinity
- Between "T3" and other terminal at immobilizer antenna coupler: infinity



IL06L1A30007-02

- Voltage
  a. Turn the ignition switch ON.
  b. Check the following points
     - Between "T6" at the immobilizer antenna coupler (1) and ground: approx. 0 V
     - Between "T3" at the immobilizer antenna coupler and ground: approx. 0 V



IL06L1A30008-01

Is check result OK?

Yes — Go to Step 5.

No — Repair or replace the defective wire harness.

Step 5

Immobilizer antenna check

1) Replace the immobilizer antenna. ☞(Page 10C-6)
2) Recheck DTC.

Is DTC P1610 still detected?

Yes	Replace the ECM and inspect it again. ☞(Page 1C-2)
No	End. (Immobilizer antenna was faulty)

Immobilizer Control System Circuits Inspection

BENM10L3A304007

Refer to "Engine Control System Circuits Inspection" in Section 1A (Page 1A-105).

Repair Instructions

Immobilizer Antenna Removal and Installation

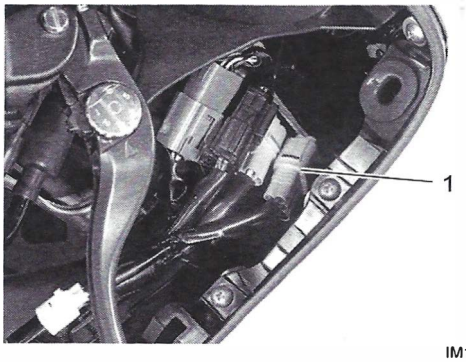
BENM10L3A306001

NOTICE

The immobilizer antenna is a precision unit and can be easily damaged.
Handle the immobilizer antenna carefully and do not expose it to a large shock.

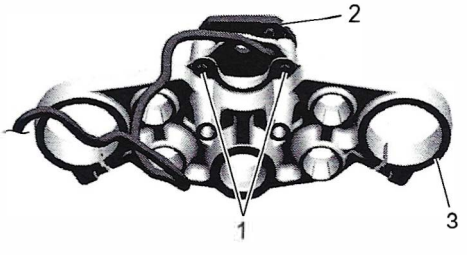
Removal

1) Remove the meter panel (RH). ☞(Page 9D-37)
2) Disconnect the immobilizer antenna coupler (1).



IM10L1A30006-01

3) Remove the ignition switch. ☞(Page 1H-7)
4) Remove the bolts (1) and immobilizer antenna (2) from steering stem upper bracket (3).



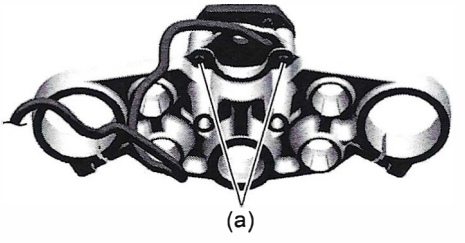
IM10L1A30003-01

Installation

Install the immobilizer antenna in the reverse order of removal. Pay attention to the following point:

- Tighten the immobilizer antenna bolts to the specified torque.

Tightening torque
Immobilizer antenna bolt (a): 4.5 N·m (0.46 kgf-m, 3.35 lbf-ft)



IM10L1A30004-01

Ignition Key Registration

BENM10L3A306002

- It is necessary to perform ignition key registration when carrying out any of the following points.
  - ECM is replaced.
  - Ignition switch is replaced.
  - All ignition keys are lost.

NOTE

- **If the ECM is replaced, at least 2 ignition keys must be registered into the ECM.**
- **If all ignition keys are lost, ECM should be replaced with a new one.**

- It is possible to register 4 ignition keys in ECM.

Specifications

Tightening Torque Specifications

BENM10L3A307001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Immobilizer antenna bolt	4.5	0.46	3.35	☞(Page 10C-6)

Reference:
For the tightening torques of fasteners not specified in this page, refer to:
"Fasteners Information" in Section 0C (Page 0C-6)

Communication System

Precautions

Precautions for DTC Trouble Shooting

BENM10L3A800001

Refer to "General Precautions" in Section 00 (Page 00-1), "Precautions for Electrical Circuit Service" in Section 00 (Page 00-2), "Precautions for Circuit Tester" in Section 00 (Page 00-8) and "Precautions for SDS-II" in Section 00 (Page 00-9).

NOTE

- **Diagnosing target control module / sensor only is not enough to accurately diagnose any trouble of CAN communication system. Check if other control module / sensor detected CAN DTC.**
- **It is possible that CAN system has trouble because of blown fuse or low battery voltage. Before troubleshooting, check that fuse, battery voltage and charging system condition are normal.**
- **CAN communication error is detected if coupler of control modules or sensors being connected to CAN communication line or applicable fuse is connected / disconnected when ignition switch is ON.**
- **Check that no equipment or option other than original parts is connected onto CAN bus. If any of those items are connected, disconnect it before troubleshooting.**
- **If any DTCs together with "Lost Communication" (Reception error) and/or "Communication Bus Off" are displayed, start troubleshooting of CAN communication first.**
- **Before diagnosing trouble, check equipment of motorcycle being serviced as well as control modules and sensors connected to CAN communication line.**
- **After repairing the trouble, clear the DTC using the special tool. ☞(Page 10H-4)**

General Description

Self-Diagnosis Function

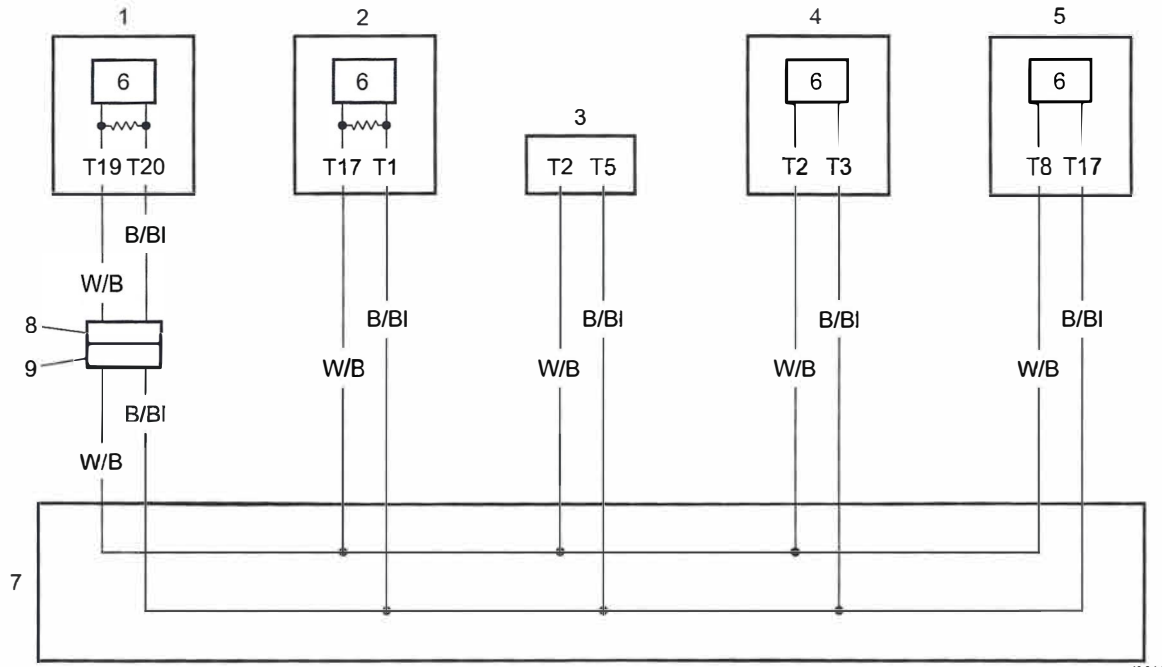
BENM10L3A801001

- ECM: refer to "Self-Diagnosis Function" in Section 1A (Page 1A-1).
- ABS control unit / HU: refer to "Self-diagnosis Function" in Section 4E (Page 4E-3).

Schematic and Routing Diagram

CAN Communication System Wiring Diagram

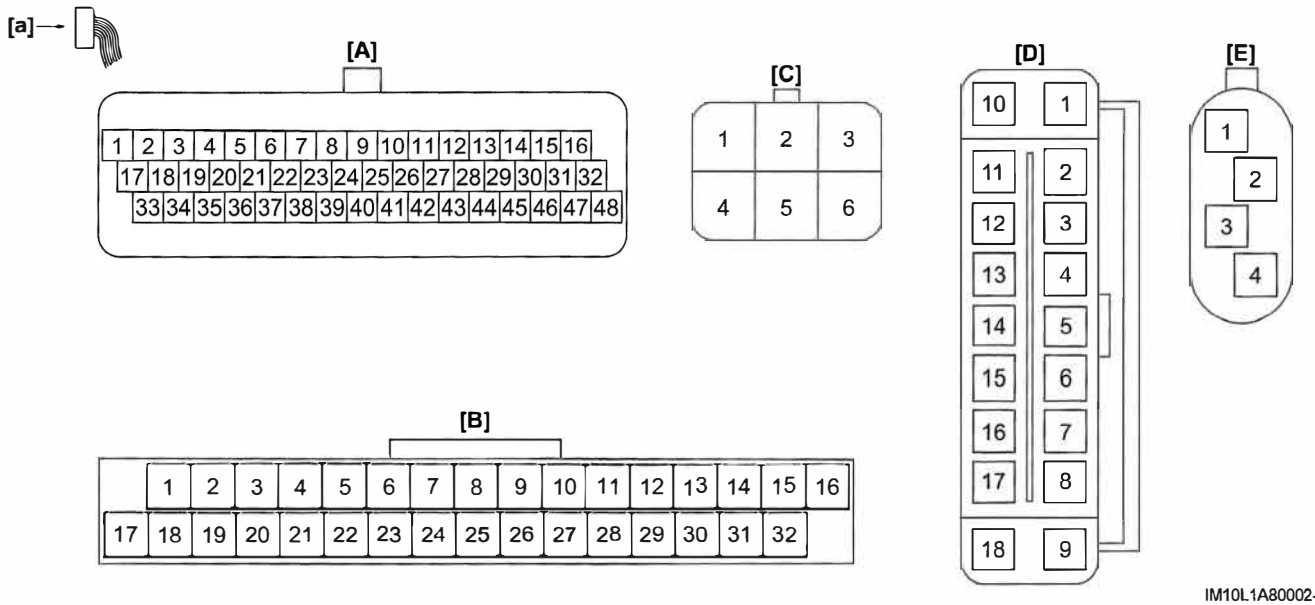
BENM10L3A802001



IM10L1A80001-01

1. Combination meter	4. IMU	7. J/C
2. ECM	5. ABS control unit / HU	8. Wire harness No.2 coupler
3. Mode select coupler (6P)	6. CAN driver	9. Main harness coupler

Terminal Arrangement of Wiring Harness Coupler (View [a])



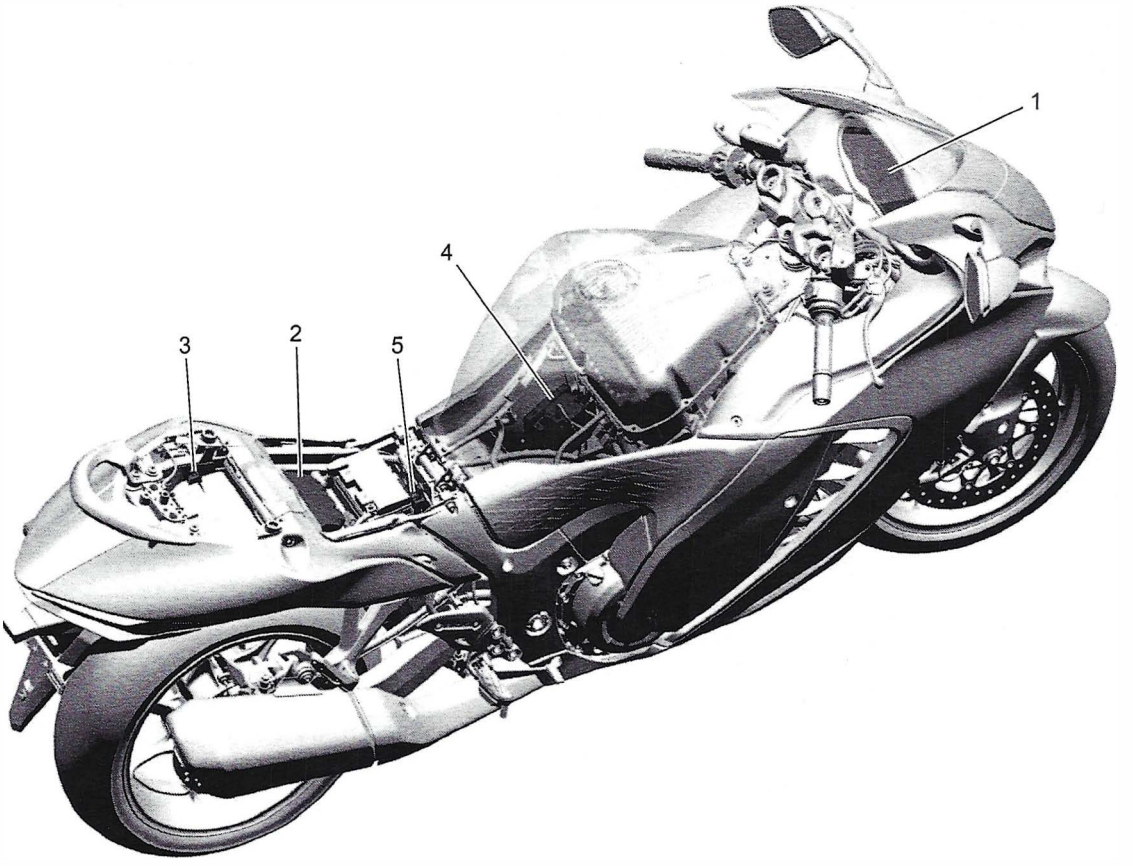
IM10L1A80002-03

[A]: ECM coupler (Coupler "A")	[C]: Mode select coupler (6P)	[E]: IMU coupler
[B]: Combination meter coupler	[D]: ABS control unit / HU coupler	

Component Location

CAN Communication System Component Location

BENM10L3A803001



IM10L1A80003-01

1. Combination meter	3. Mode select coupler (6P)	5. IMU
2. ECM	4. ABS control unit / HU	

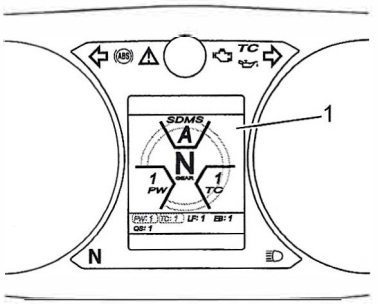
Diagnostic Information and Procedures

CAN Communication Check

BENM10L3A804001

Troubleshooting Selection Procedure

1) Turn the ignition switch ON.
2) Check if the SDMS-α indicator and/or each indicators are displayed normally on the LCD (1).



IM10L1A80004-01

3) Check that communication between SDS-II and ECM is possible.
4) Check that communication between SDS-II and ABS control unit / HU is possible.
5) Perform the troubleshooting according to the following table.

Check result			Troubleshooting
SDMS-α indicator	Communication between SDS-II and ECM	Communication between SDS-II and ABS control unit / HU	
Normal	Possible	Possible	• Perform the "Troubleshooting for Lost Communication" (Page 10H-9). • When CAN-DTC is not detected, CAN communication system is good condition.
		Not possible	Perform the "Troubleshooting for Lost Communication" (Page 10H-9).
	Not possible	Possible	Perform the "Troubleshooting for Lost Communication" (Page 10H-9).
		Not possible	Check CAN communication circuit between mode select coupler (6P) and ECM coupler for open circuit. If CAN communication circuit is in good condition, check DIG-cable between mode select coupler (6P) and SDS-II. If necessary, check DIG-cable and conversion cable (ISO) by substituting a known-good cable.
Abnormal	Possible	Possible	Perform the "Troubleshooting for Lost Communication" (Page 10H-9).
		Not possible	Perform the "Troubleshooting for Lost Communication" (Page 10H-9).
	Not possible	Possible	Perform the "Troubleshooting for Lost Communication" (Page 10H-9).
		Not possible	Perform the "Troubleshooting for Communication Bus Off" (Page 10H-13).

DTC Check

BENM10L3A804002

- ECM: refer to "DTC Check" in Section 1A (Page 1A-11).
- ABS control unit / HU: refer to "DTC Check" in Section 4E (Page 4E-15).

DTC Clearance

BENM10L3A804003

- ECM: refer to "DTC Clearance" in Section 1A (Page 1A-12).
- ABS control unit / HU: refer to "DTC Clearance" in Section 4E (Page 4E-16).

CAN DTC (Lost Communication and Communication Bus Off) Table

BENM10L3A804004

NOTE

If communication between SDS-II and each controller is not possible, perform the "CAN Communication Check" (Page 10H-4).

- **CAN DTC may not be displayed on the LCD, when the CAN circuit is abnormal.**

DTC	DTC name	DTC detecting condition
ECM		
U0073	Control Module Communication Bus Off ☞(Page 10H-13)	ECM fails to transmit and receive the data via CAN for specified time continuously.
U0121	Lost Communication With ABS Control Module ☞(Page 10H-9)	Receiving error of the data from ABS control unit / HU via CAN for specified time continuously.
U0123	Lost Communication With IMU ☞(Page 10H-9)	Receiving error of the data from IMU via CAN for specified time continuously.
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module ☞(Page 10H-9)	Receiving error of the data from combination meter via CAN for specified time continuously.
ABS control unit / HU		
U0073	Control Module Communication Bus Off ☞(Page 10H-13)	ABS control unit / HU fails to transmit and receive the data via CAN for specified time continuously.
U0100	Lost Communication With ECM ☞(Page 10H-9)	Receiving error of the data from ECM via CAN for specified time continuously.
U0123	Lost Communication With IMU ☞(Page 10H-9)	Receiving error of the data from IMU via CAN for specified time continuously.
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module ☞(Page 10H-9)	Receiving error of the data from combination meter via CAN for specified time continuously.

CAN Signal Reference Waveform

BENM10L3A804005

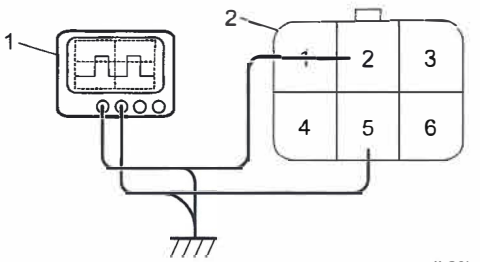
- "Normal Waveform" (Page 10H-6) and "Examples of Abnormal Waveforms" (Page 10H-7) of CAN signal are shown for reference.

NOTE

Waveforms in "Examples of abnormal waveforms" are selected examples of CAN communication waveforms seen when an abnormal condition occurs. However, these waveforms may not be exactly the same in appearance as observed waveforms. Therefore, to identify an abnormal condition, select the waveform that is most similar to the observed waveform from "Examples of Abnormal Waveforms" (Page 10H-7).

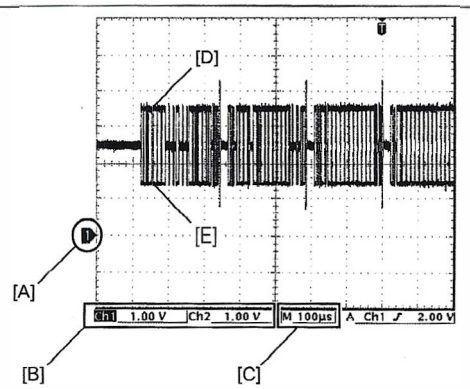
- Observe the waveform according to the following procedure.
  a. Turn the ignition switch OFF.
  b. Connect the oscilloscope (1) to mode select coupler (6P) (2).
  c. Turn the ignition switch ON.
  d. Observe the waveform.

Circuit	Oscilloscope		Terminal No.
	Channel	Probe	
CAN High signal	1	+	"T2"
		–	Ground
CAN Low signal	2	+	"T5"
		–	Ground



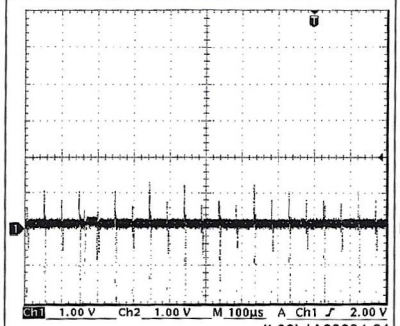
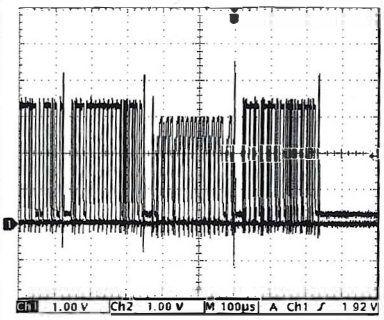
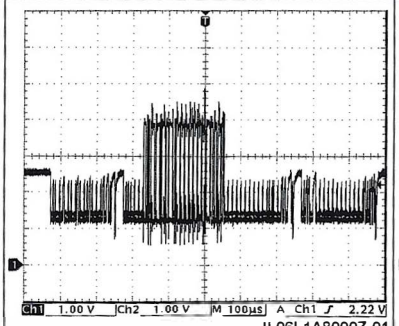
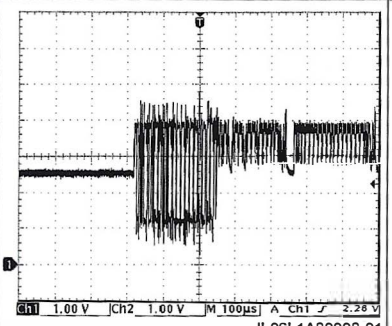
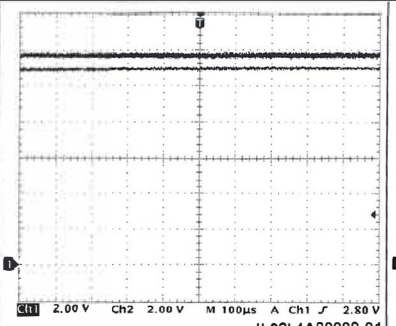
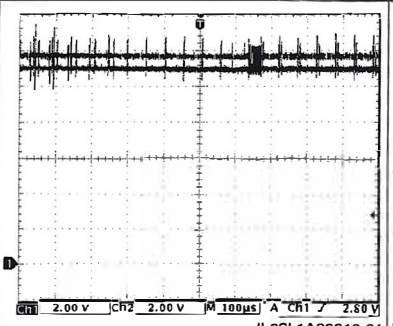
IL06L1A80006-01

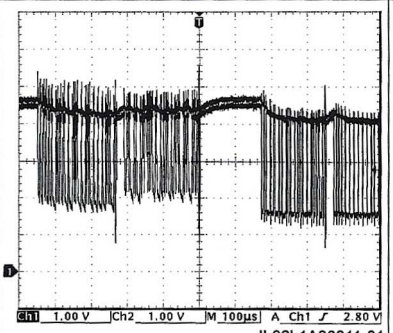
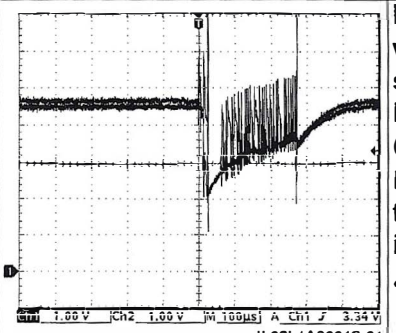
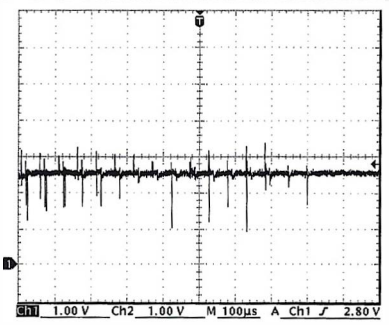
Normal Waveform

Normal waveform	Description
 IL06L1A80003-01	Reference voltages for both CAN High signal and CAN Low signal are 2.5 V. Waveform of CAN High signal is 2.5 – 3.5 V and that of CAN Low signal is 2.5 – 1.5 V.

[A]: Ground level of each channel	[D]: Waveform of channel 1 (CAN High signal)
[B]: VOLT/DIV of each channel	[E]: Waveform of channel 2 (CAN Low signal)
[C]: TIME/DIV of each channel	

Examples of Abnormal Waveforms

Possible cause	Characteristic waveform		Description
	CAN High signal	CAN Low signal	
Shorted to ground	 IL06L1A80004-01	 IL06L1A80005-01	**In case CAN High signal wire is shorted to ground circuit** Both of CAN High signal and CAN Low signal are fixed to GND level (0 V). **In case CAN Low signal wire is shorted to ground circuit** Reference voltages for both of CAN High signal and CAN Low signal are GND level (0 V) and CAN High signal waveform oscillates irregularly. • CAN High signal: Between 0 V and 3.5 V • CAN Low signal: Fixed to 0 V
Opened	 IL06L1A80007-01	 IL06L1A80008-01	**In case CAN High signal wire is open** Reference voltages for both CAN High signal and CAN Low signal are 2.5 V and these waveforms oscillate irregularly. • CAN High signal: Between 4.0 V and 1.0 V • CAN Low signal: Between 2.5 V and 1.0 V **In case CAN Low signal wire is open** Reference voltages for both of CAN High signal and CAN Low signal are 2.5 V and these waveforms oscillate irregularly. • CAN High signal: Between 2.5 V and 4.0 V • CAN Low signal: Between 1.0 V and 4.0 V
Shorted to power supply circuit (12 V)	 IL06L1A80009-01	 IL06L1A80010-01	**In case CAN High signal wire is shorted to power supply circuit (12 V)** CAN High signal is fixed to 12 V and CAN Low signal is fixed to 11 V. **In case CAN Low signal wire is shorted to power supply circuit (12 V)** CAN High signal is fixed to 11 V and CAN Low signal is fixed to 12 V.

Possible cause	Characteristic waveform		Description
	CAN High signal	CAN Low signal	
Shorted to power supply circuit (5 V)	 IL06L1A80011-01	 IL06L1A80012-01	**In case CAN High signal wire is shorted to power supply circuit (5 V)** Reference voltages for both CAN High signal and CAN Low signal are 4.5 V and these waveforms oscillate irregularly. • CAN High signal: Between 5.5 V and 3.5 V • CAN Low signal: Between 5.0 V and 1.0 V **In case CAN Low signal wire is shorted to power supply circuit (5 V)** Reference voltage is 4.5 V and phase is the same for both CAN High signal and CAN Low signal, and waveforms oscillate irregularly between 6.0 V and 1.0 V.
CAN High signal and CAN Low signal wires are shorted to each other	 IL06L1A80013-01		Both of CAN High signal and CAN Low signal are fixed to near 2.5 V.

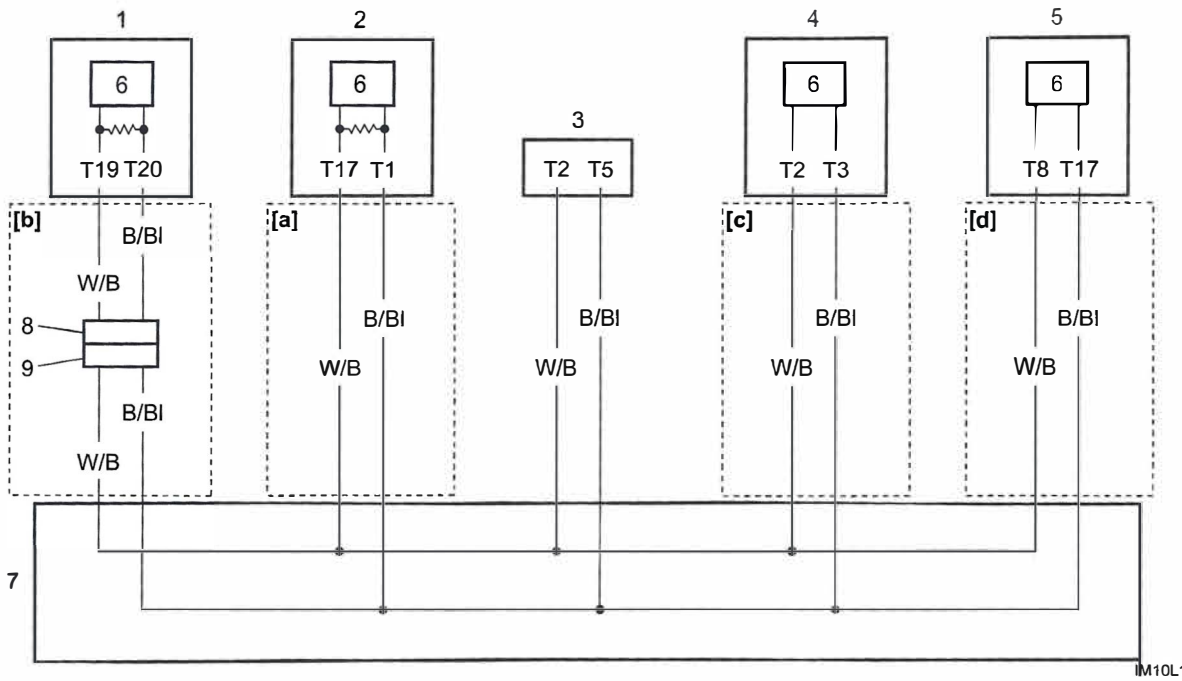
Troubleshooting for Lost Communication

BENM10L3A804006

NOTE

Perform "CAN Communication Check" (Page 10H-4): before performing this troubleshooting.

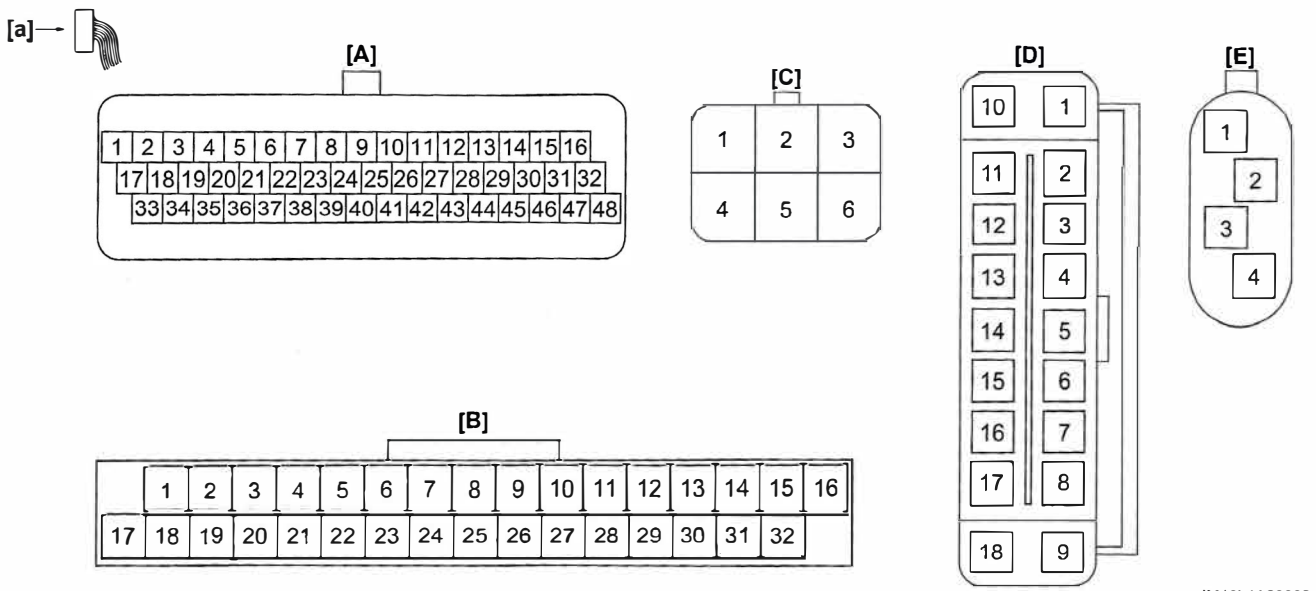
Wiring Diagram



IM10L1A80005-02

[a] to [d]: CAN communication line (linked with diagnosis flows [a] to [d] of "Diagnosis Flow Selection Table")	4. IMU	8. Wire harness No.2
1. Combination meter	5. ABS control unit / HU	9. Main harness coupler
2. ECM	6. CAN driver	
3. Mode select coupler (6P)	7. J/C	

Terminal arrangement of wiring harness coupler (View [a])



IM10L1A80002-03

[A]: ECM coupler (Coupler "A")	[C]: Mode select coupler (6P)	[E]: IMU coupler
[B]: Combination meter coupler	[D]: ABS control unit / HU coupler	

Diagnosis Flow Selection Table

NOTE

- **If an individual control module or sensor fails to communicate, check whether power supply circuit or ground circuit of control module or sensor is in good condition, referring to system circuit diagram, etc. before diagnosing trouble with flow chart.**
- **Diagnosis flows [a] to [d] link with CAN communication lines [a] to [d] of "Wiring Diagram" (Page 10H-9).**
- **Occurrence of multiple troubles is not included in the scope of this trouble diagnosis.**
- **Combination meter in itself does not have a function to diagnose CAN communication error in DTC.**

CAN DTC detecting control module / sensor	Diagnosis flow
U0100	
ABS control unit / HU (When communication between SDS-II and ECM is possible.)	"Diagnosis flow: [d]" (Page 10H-12)
ABS control unit / HU (When communication between SDS-II and ECM is not possible.)	"Diagnosis flow: [a]" (Page 10H-11)
U0121	
ECM (When communication between SDS-II and ABS control unit / HU is possible.)	"Diagnosis flow: [a]" (Page 10H-11)
ECM (When communication between SDS-II and ABS control unit / HU is not possible.)	"Diagnosis flow: [d]" (Page 10H-12)
U0123	
ECM	"Diagnosis flow: [a]" (Page 10H-11)
ABS control unit / HU	"Diagnosis flow: [d]" (Page 10H-12)
ECM and ABS control unit / HU	"Diagnosis flow: [c]" (Page 10H-12)
U0155	
ECM	"Diagnosis flow: [a]" (Page 10H-11)
ABS control unit / HU	"Diagnosis flow: [d]" (Page 10H-12)
ECM and ABS control unit / HU	"Diagnosis flow: [b]" (Page 10H-11)

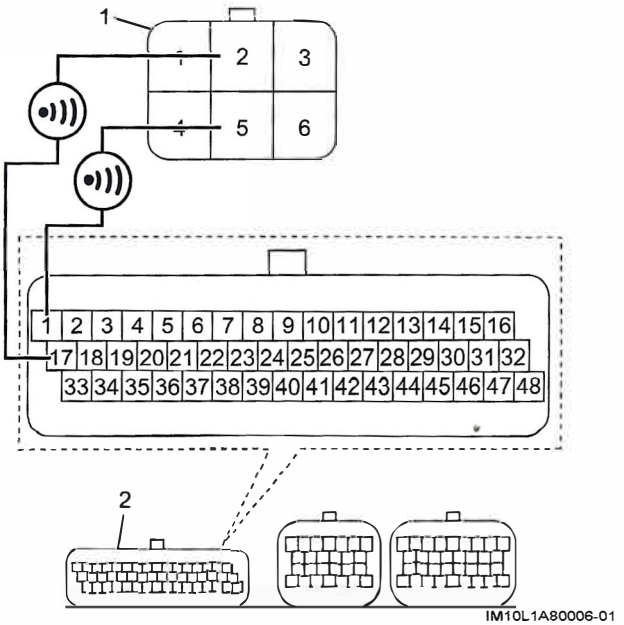
Troubleshooting

Diagnosis flow: [a]

Step 1

CAN communication circuit [a] check

1) Turn the ignition switch OFF.
2) Disconnect the ECM coupler "A". ☞(Page 1C-2)
3) Check for proper terminal connection to the ECM coupler "A".
4) If connections are OK, measure the resistance between the mode select coupler (6P) and ECM coupler "A" as follows.
   - Between "T2" at the mode select coupler (6P) (1) and "T17" at the ECM coupler "A" (2): less than 1 Ω
   - Between "T5" at the mode select coupler (6P) and "T1" at the ECM coupler "A": less than 1 Ω



Is check result OK?

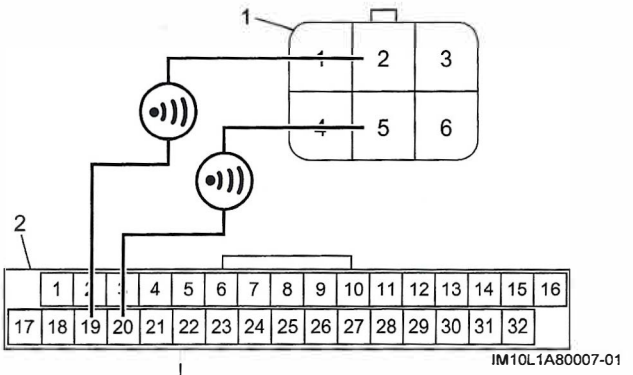
Yes	Replace the ECM and inspect it again. ☞(Page 1C-2)
No	Repair or replace the defective wire harness.

Diagnosis flow: [b]

Step 1

CAN communication circuit [b] check

1) Turn the ignition switch OFF.
2) Disconnect the combination meter coupler. ☞(Page 9C-13)
3) Disconnect the sub harness coupler from main harness coupler.
4) Check for proper terminal connection to the combination meter coupler, sub harness coupler and main harness coupler.
5) If connections are OK, connect the sub harness coupler to the main harness coupler.
6) Measure the resistance between the mode select coupler (6P) and combination meter coupler as follows.
   - Between "T2" at the mode select coupler (6P) (1) and "T19" at the combination meter coupler (2): less than 1 Ω
   - Between "T5" at the mode select coupler (6P) and "T20" at the combination meter coupler: less than 1 Ω



Is check result OK?

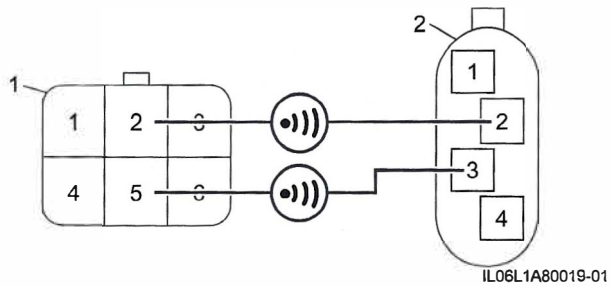
Yes	Replace the combination meter and inspect it again. ☞(Page 9C-13)
No	Repair or replace the defective wire harness.

Diagnosis flow: [c]

Step 1

CAN communication circuit [c] check

1) Turn the ignition switch OFF.
2) Disconnect the IMU coupler. ☞(Page 4E-51)
3) Check for proper terminal connection to the IMU coupler.
4) If connections are OK, measure the resistance between the mode select coupler (6P) and IMU coupler as follows.
   - Between "T2" at the mode select coupler (6P) (1) and "T2" at the IMU coupler (2): less than 1 Ω
   - Between "T5" at the mode select coupler (6P) and "T3" at the IMU coupler: less than 1 Ω



IL06L1A80019-01

Is check result OK?

Yes — Replace the IMU and inspect it again. ☞(Page 4E-51)

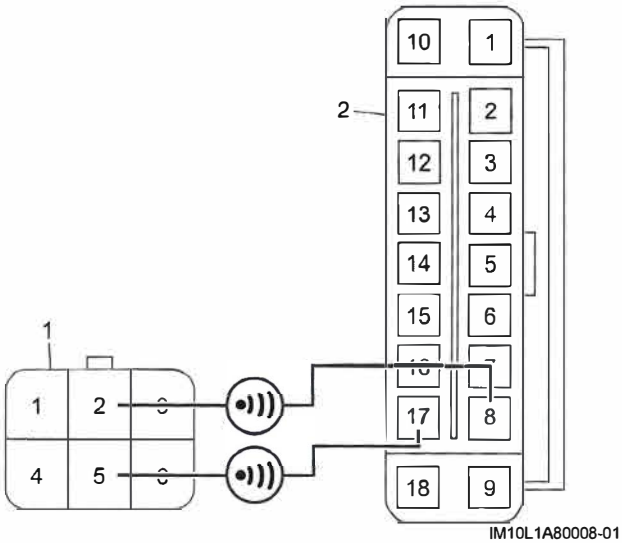
No — Repair or replace the defective wire harness.

Diagnosis flow: [d]

Step 1

CAN communication circuit [d] check

1) Turn the ignition switch OFF.
2) Disconnect the ABS control unit / HU coupler. ☞(Page 4E-50)
3) Check for proper terminal connection to the ABS control unit / HU coupler.
4) If connections are OK, measure the resistance between the mode select coupler (6P) and ABS control unit / HU coupler as follows.
   - Between "T2" at the mode select coupler (6P) (1) and "T8" at the ABS control unit / HU coupler (2): less than 1 Ω
   - Between "T5" at the mode select coupler (6P) and "T17" at the ABS control unit / HU coupler: less than 1 Ω



IM10L1A80008-01

Is check result OK?

Yes — Replace the ABS control unit / HU and inspect it again. ☞(Page 4E-50)

No — Repair or replace the defective wire harness.

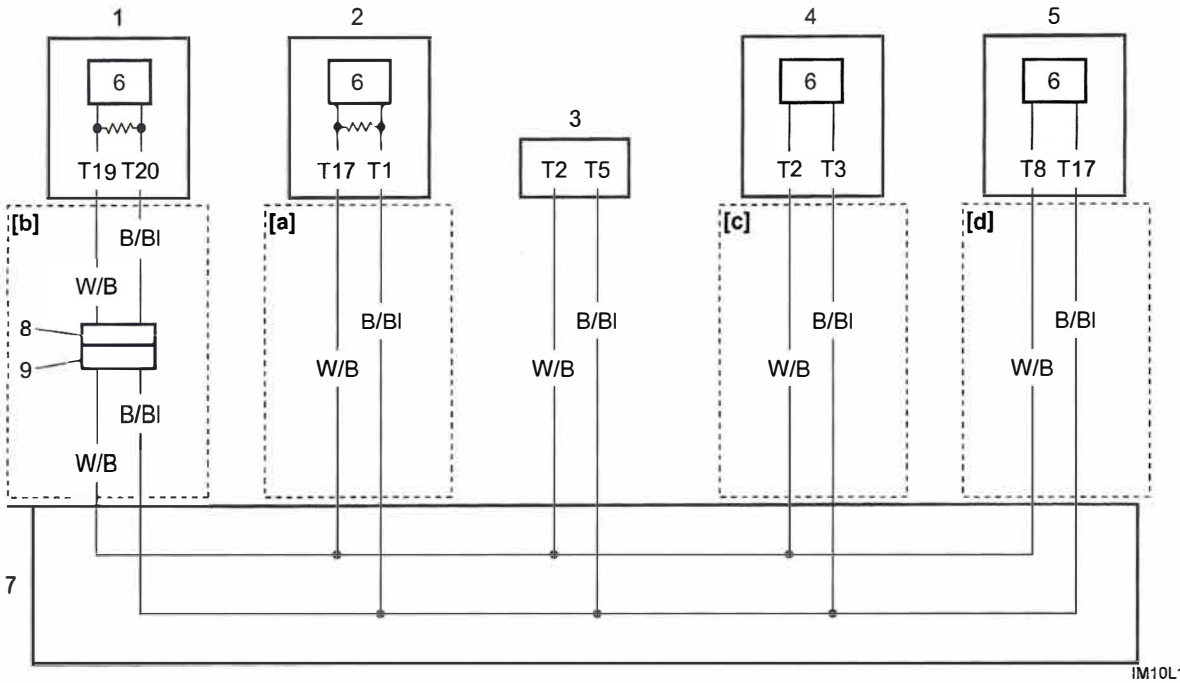
Troubleshooting for Communication Bus Off

BENM10L3A804007

NOTE

Perform "CAN Communication Check" (Page 10H-4): before performing this troubleshooting.

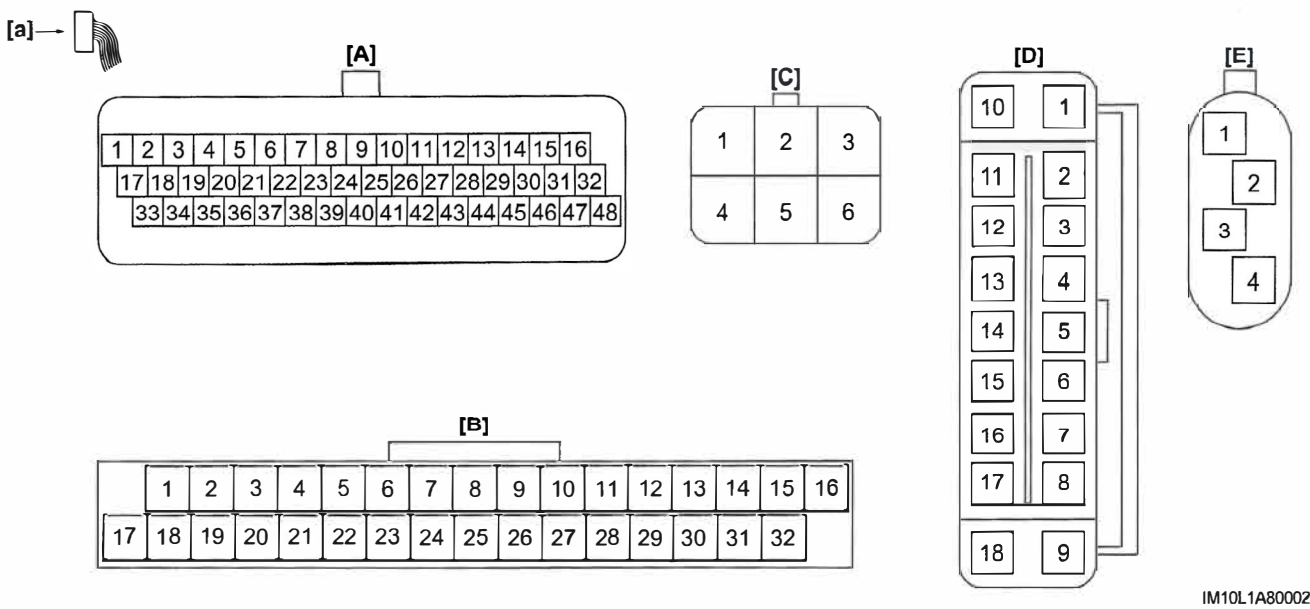
Wiring Diagram



IM10L1A80005-02

[a] to [d]: CAN communication line (linked with diagnosis flows [a] to [d] of "Diagnosis Flow Selection Table")	4. IMU	8. Wire harness No.2 coupler
1. Combination meter	5. ABS control unit / HU	9. Main harness coupler
2. ECM	6. CAN driver	
3. Mode select coupler (6P)	7. J/C	

Terminal arrangement of wiring harness coupler (View [a])



IM10L1A80002-03

[A]: ECM coupler (Coupler "A")	[C]: Mode select coupler (6P)	[E]: IMU coupler
[B]: Combination meter coupler	[D]: ABS control unit / HU coupler	

Troubleshooting

NOTE

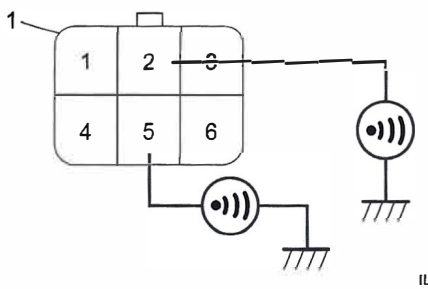
Diagnosis flows [a] to [d] link with CAN communication lines [a] to [d] of "Wiring Diagram" (Page 10H-13).

Diagnosis flow: [a] to [d]

Step 1

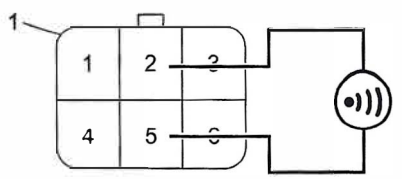
CAN communication circuit check

1) Turn the ignition switch OFF.
2) Disconnect couplers from all the control modules and sensors communicating by CAN.
   - ECM: ☞(Page 1C-2)
   - Combination meter: ☞(Page 9C-13)
   - ABS control unit / HU: ☞(Page 4E-50)
   - IMU: ☞(Page 4E-51)
3) Disconnect the sub harness coupler from the main harness coupler.
4) Check for proper terminal connection to the couplers, which was disconnected in step 2) and 3).
5) If connections are OK, connect the sub harness coupler to the main harness coupler.
6) Check the following points.
   - Resistance
     - Between "T2" at the mode select coupler (6P) (1) and ground: infinity
     - Between "T5" at the mode select coupler (6P) and ground: infinity



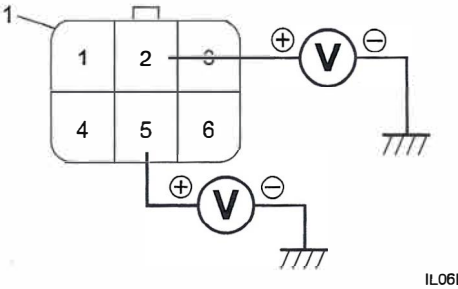
IL06L1A80020-01

     - Between "T2" and "T5" at the mode select coupler (6P) (1): infinity



IL06L1A80014-07

   - Voltage
     - Turn the ignition switch ON.
     - Between "T2" at the mode select coupler (6P) (1) and ground: approx. 0 V
     - Between "T5" at the mode select coupler (6P) (1) and ground: approx. 0 V



IL06L1A80021-01

Is check result OK?

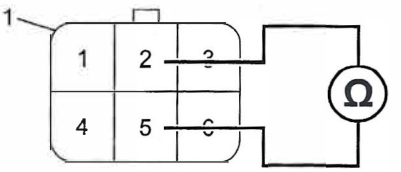
Yes — Go to Step 2.

No — Repair or replace the defective wire harness.

Step 2

Combination meter CAN termination resistor check

1) Connect the combination meter coupler. ☞(Page 9C-13)
2) Measure the resistance between the "T2" and "T5" of mode select coupler (6P) (1).



IL06L1A80025-06

Is resistance 114 – 134 Ω?

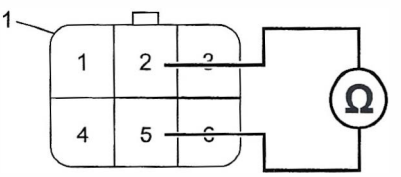
Yes — Go to Step 3.

No — Replace the combination meter and inspect it again. ☞(Page 9C-13)

Step 3

ECM CAN termination resistor check

1) Disconnect the combination meter coupler. ☞(Page 9C-13)
2) Connect the ECM coupler "A". ☞(Page 1C-2)
3) Measure the resistance between the "T2" and "T5" of mode select coupler (6P) (1).



IL06L1A80025-06

Is resistance 114 – 134 Ω?

Yes — Go to Step 4.

No — Replace the ECM and inspect it again. ☞(Page 1C-2)

Step 4

SDS-II communication check

1) Check that communication between SDS-II and ECM is possible.

Is communication possible?

Yes — Go to Step 5.

No — Replace the ECM and inspect it again. ☞(Page 1C-2)

Step 5

SDS-II communication check

1) Turn the ignition switch OFF.
2) Connect the combination meter coupler. ☞(Page 9C-13)
3) Check that communication between SDS-II and ECM is possible.

Is communication possible?

Yes — Go to Step 6.

No — Replace the combination meter and inspect it again. ☞(Page 9C-13)

Step 6

SDS-II communication check

1) Turn the ignition switch OFF.
2) Connect the ABS control unit / HU coupler. ☞(Page 4E-50)
3) Check that communication between SDS-II and ECM is possible.

Is communication possible?

Yes — Replace the IMU and inspect it again. ☞(Page 4E-51)

No — Replace the ABS control unit / HU and inspect it again. ☞(Page 4E-50)

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