

Emission Control Devices

Precautions

Precautions for Emission Control Devices

B718H1120001

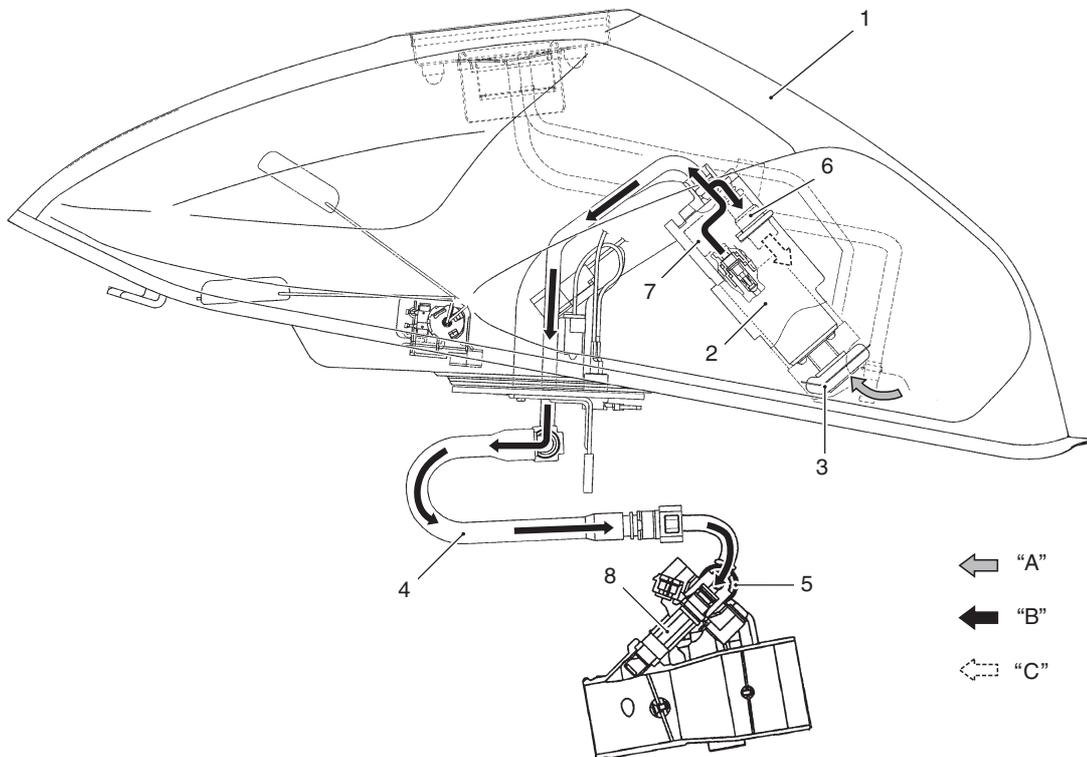
Refer to "General Precautions in Section 00 (Page 00-1)".

General Description

Fuel Injection System Description

B718H11201001

GSF1250 motorcycles are equipped with a fuel injection system for emission level control. This fuel injection system is precision designed, manufactured and adjusted to comply with the applicable emission limits. With varying engine conditions, all of the fuel injection volumes are precisely controlled by the programmed injection maps in the ECM to reduce CO, NOX and HC. Adjusting, interfering with, improper replacement, or resetting of any of the fuel injection components may adversely affect injection performance and cause the motorcycle to exceed the exhaust emission level limits.



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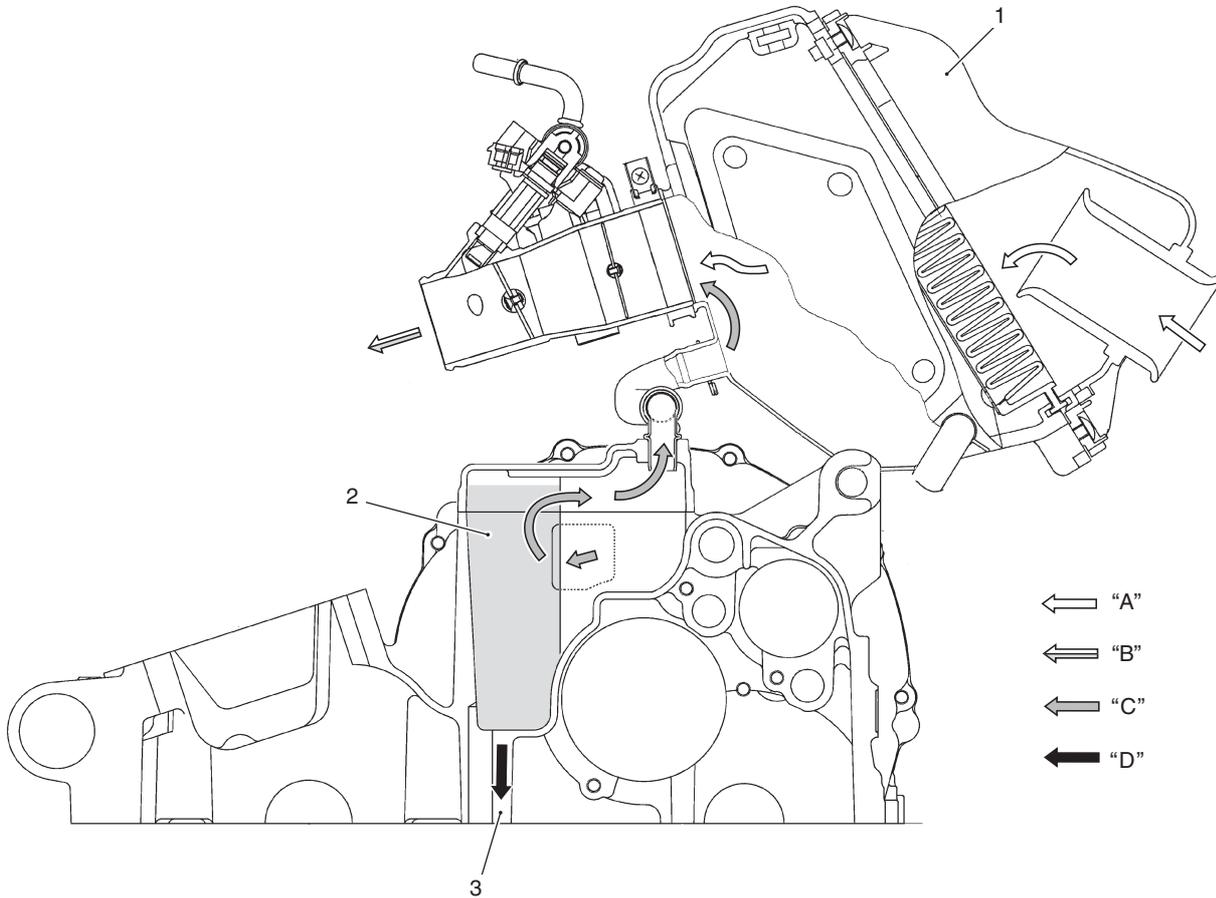
1. Fuel tank	5. Fuel delivery pipe	"A": Before-pressurized fuel
2. Fuel pump	6. Fuel pressure regulator	"B": Pressurized fuel
3. Fuel mesh filter (For low pressure)	7. Fuel filter (For high pressure)	"C": Relieved fuel
4. Fuel feed hose	8. Fuel injector	

1B-2 Emission Control Devices:

Crankcase Emission Control System Description

B718H11201002

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



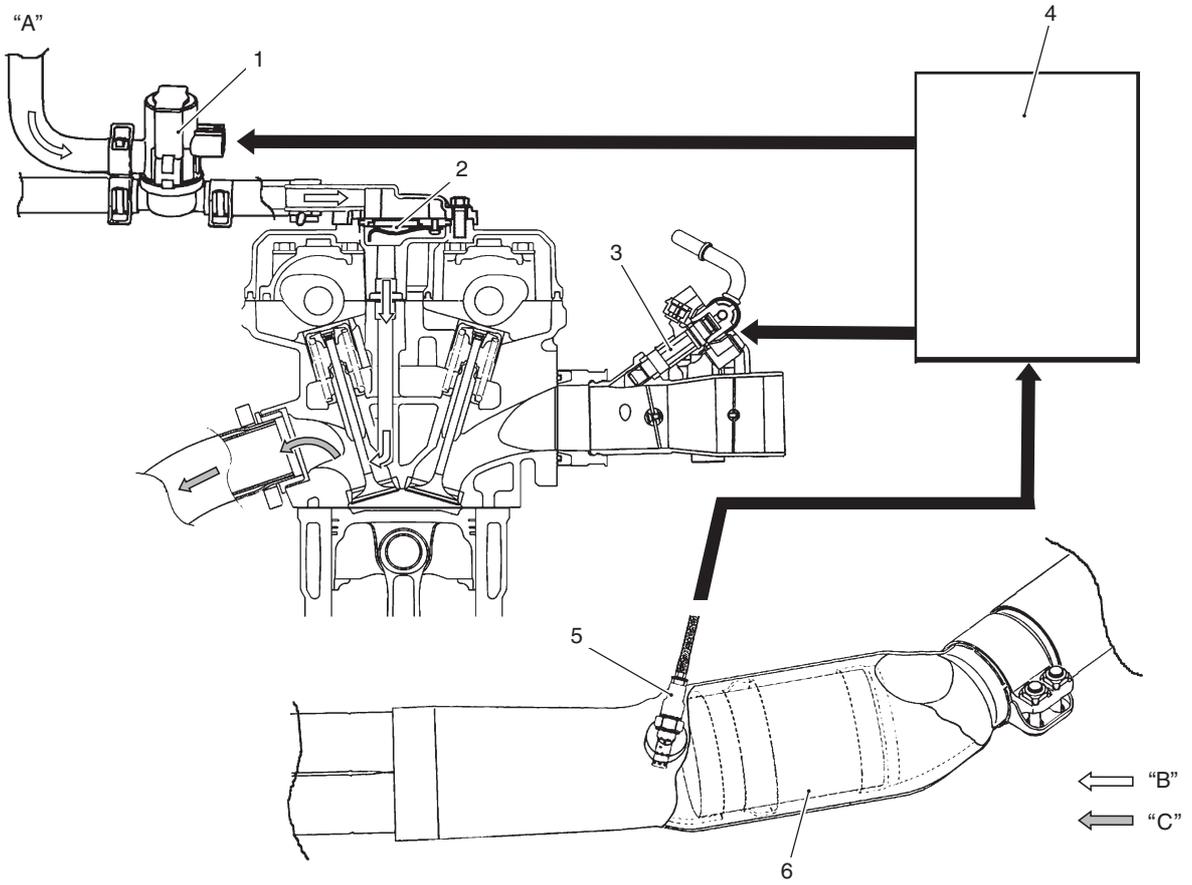
I718H1120038-04

1. Air cleaner box	3. Oil return	"B": Fuel/Air mixture	"D": Engine oil
2. Oil breather separator	"A": Fresh air	"C": Blow-by gas	

Exhaust Emission Control System Description

B718H11201003

The exhaust emission control system is composed of the PAIR system, catalyst system and ISC system. The fresh air is drawn into the exhaust port through the PAIR control solenoid valve and PAIR reed valve. The PAIR control solenoid valve is operated by the ECM, which is controlled according to the signals from TPS, ECTS, IATS, IAPS and CKPS. ISC valve adjusts the bypass air volume of the throttle body to control engine idling speed with various sensor signals by varying engine running conditions and the idling control contributes to reduce exhaust emission level.



I718H1120039-03

1. PAIR control solenoid valve	4. ECM	"A": From air cleaner box
2. PAIR reed valve	5. HO2 sensor	"B": Fresh air
3. Fuel injector	6. Catalyst	"C": Exhaust gas

Noise Emission Control System Description

B718H11201004

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

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

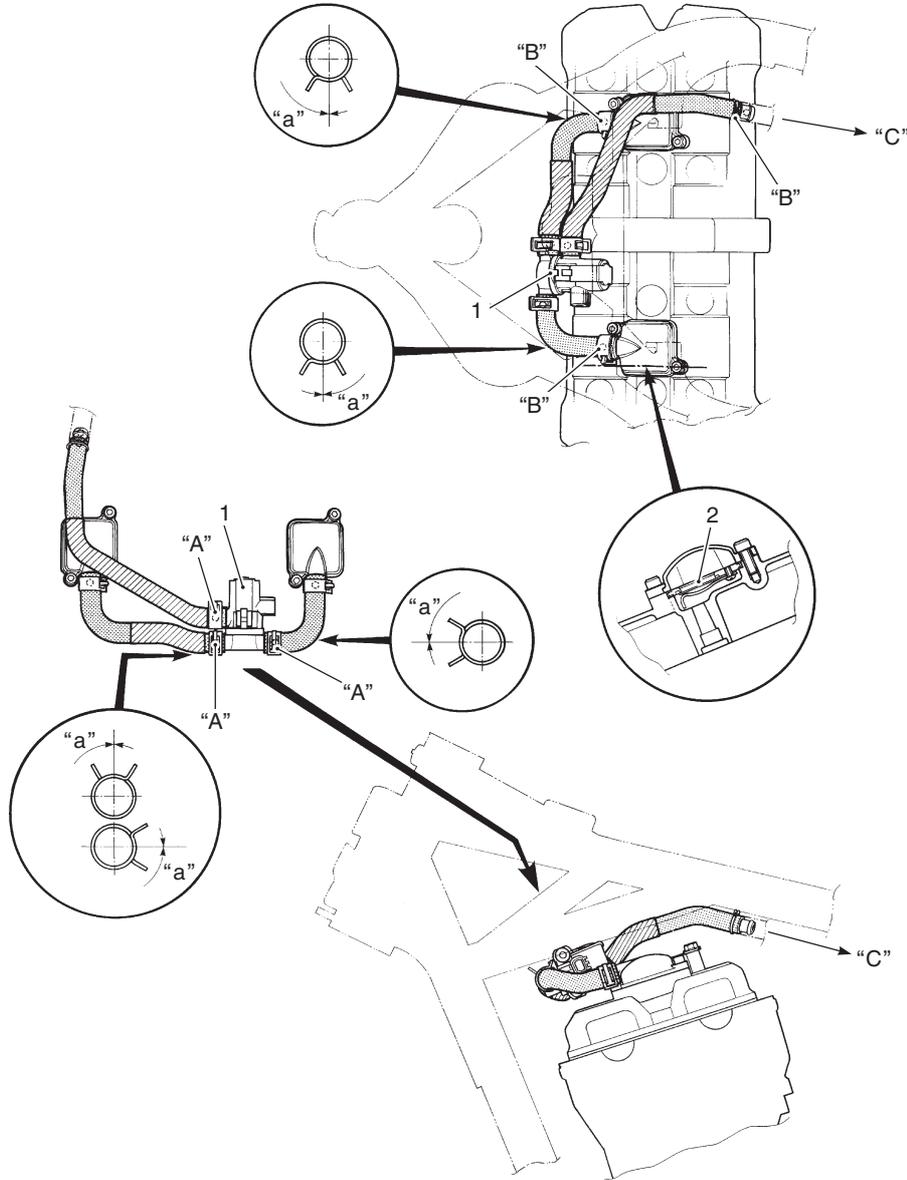
Among Those Acts Presumed to Constitute Tampering are the Acts Listed Below:

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

Schematic and Routing Diagram

PAIR System Hose Routing Diagram

B718H11202001



I718H1120043-01

1. PAIR control solenoid valve	"A": Marking (Yellow)	"C": To air cleaner box
2. PAIR reed valve	"B": Marking (White)	"a": Approx. 0°

Repair Instructions

Heated Oxygen Sensor (HO2S) Removal and Installation

B718H11206005

Removal

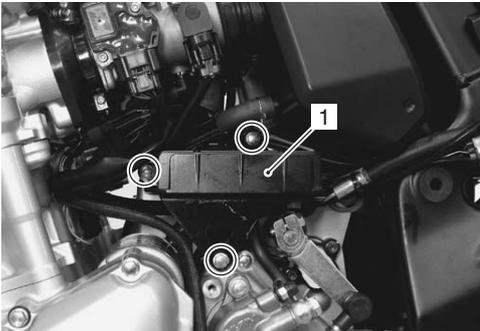
⚠ WARNING

Do not remove the HO2 sensor while it is hot.

⚠ CAUTION

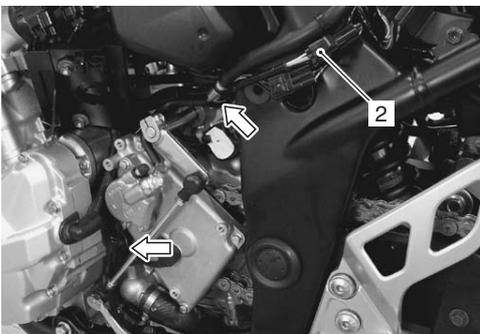
- Be careful not to expose the HO2 sensor to excessive shock.
- Do not use an impact wrench when removing or installing the HO2 sensor.
- Be careful not to twist or damage the sensor lead wires.

- 1) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
- 2) Remove the engine sprocket outer cover. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
- 3) Move the regulator/rectifier assembly (1) by removing the regulator/rectifier bracket bolts.



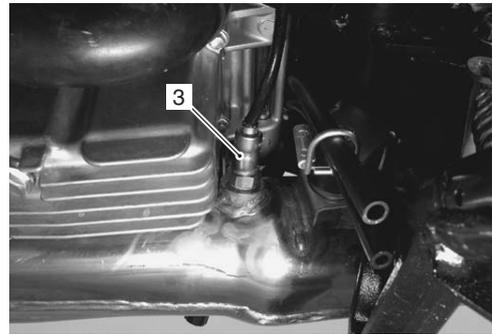
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- 4) Disconnect the HO2 sensor coupler (2).
- 5) Release the HO2 sensor lead wire from the clamps.



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- 6) Remove the HO2 sensor (3).



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Installation

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

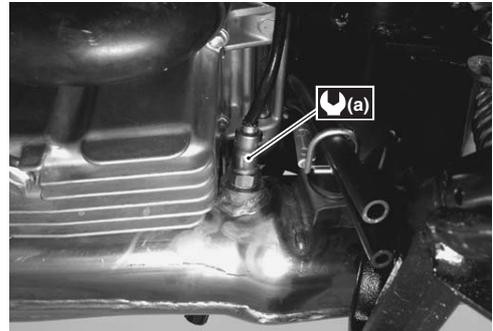
⚠ CAUTION

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

- Tighten the HO2 sensor to the specified torque.

Tightening torque

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



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

Heated Oxygen Sensor (HO2S) Inspection

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Refer to "DTC "C44" (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction in Section 1A (Page 1A-102)".

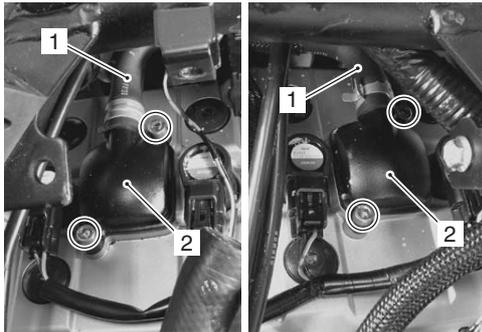
1B-6 Emission Control Devices:

PAIR Reed Valve Removal and Installation

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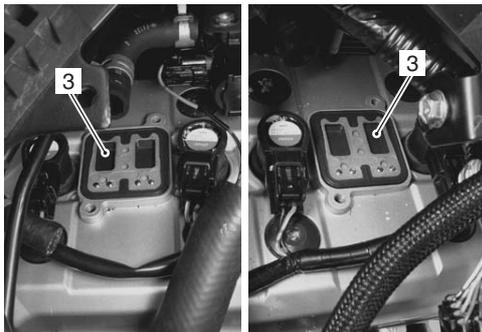
Removal

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



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- 4) Remove the PAIR reed valves (3).



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Installation

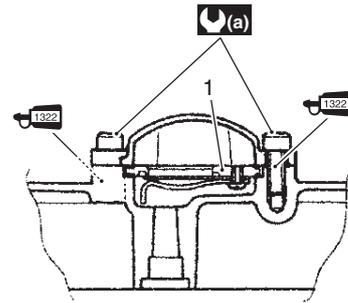
Install the PAIR reed valve in the reverse order of removal. Pay attention to the following points:

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

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

Tightening torque

PAIR reed valve cover bolt (a): 11 N·m (1.1 kgf-m, 8.0 lb-ft)



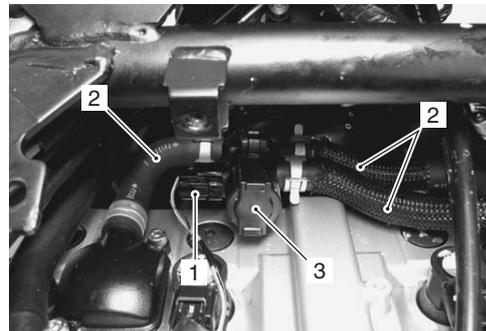
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PAIR Control Solenoid Valve Removal and Installation

B718H11206001

Removal

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



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Installation

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

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

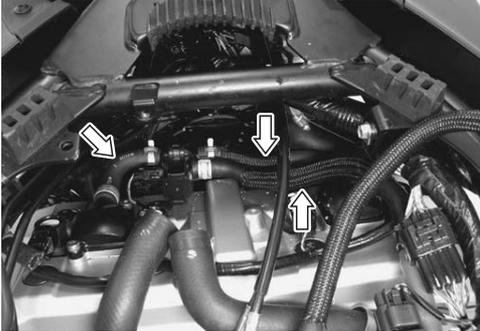
PAIR System Inspection

B718H11206002

PAIR Hose

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

- 2) Inspect the hoses for wear or damage. If it is worn or damaged, replace the PAIR hose with a new one. Refer to "PAIR System Hose Routing Diagram (Page 1B-4)".



I718H1120031-01

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

PAIR Reed Valve

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



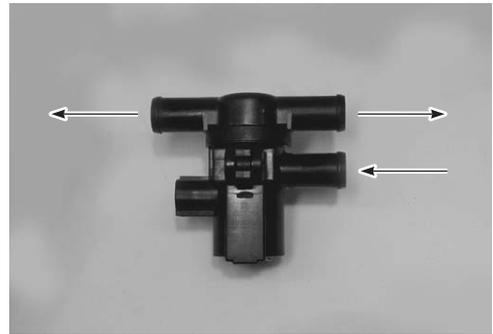
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- 3) Reinstall the PAIR reed valve. Refer to "PAIR Reed Valve Removal and Installation (Page 1B-6)".

PAIR Control Solenoid Valve

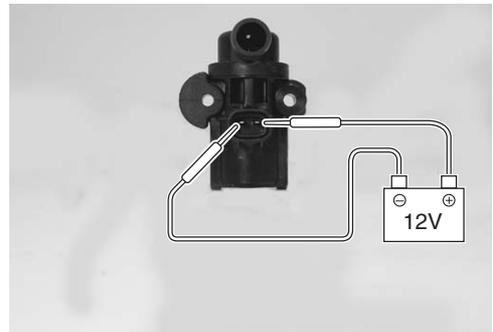
- 1) Remove the PAIR control solenoid valve. Refer to "PAIR Control Solenoid Valve Removal and Installation (Page 1B-6)".

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



I718H1120033-01

- 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.



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

Special tool

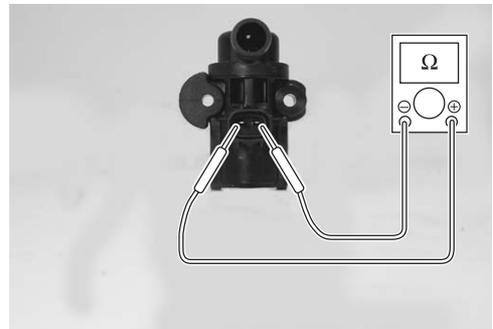
 : 09900-25008 (Multi-circuit tester set)

Tester knob indication

Resistance (Ω)

PAIR control solenoid valve resistance

18 – 22 Ω at 20 – 30 °C (68 – 86 °F)



I718H1120035-01

1B-8 Emission Control Devices:

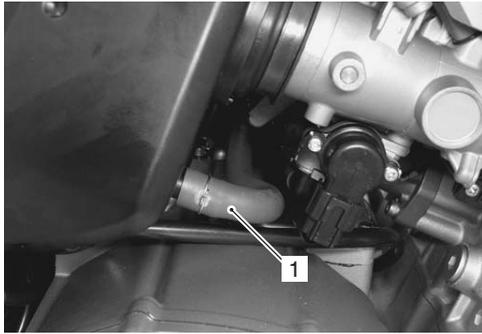
- 5) Reinstall the PAIR control solenoid valve. Refer to "PAIR Control Solenoid Valve Removal and Installation (Page 1B-6)".

Crankcase Breather (PCV) Hose Inspection

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Inspect the PCV hose (1) for wear and damage. If it is worn or damaged, replace the PCV hose with a new one.

Check that the PCV hose (1) is securely connected.



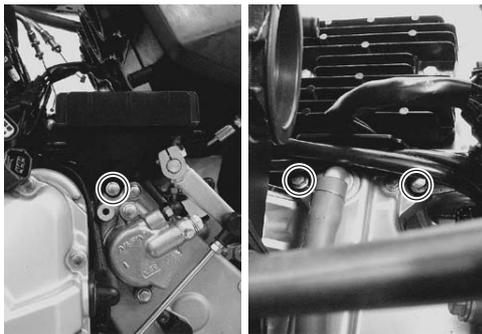
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Crankcase Breather (PCV) Hose / Cover / Separator Removal and Installation

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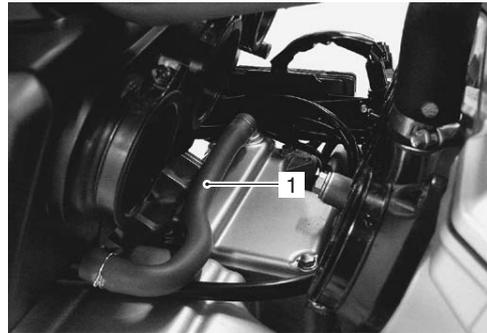
Removal

- 1) Remove the throttle body. Refer to "Throttle Body Removal and Installation in Section 1D (Page 1D-9)".
- 2) Remove the engine sprocket outer cover. Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
- 3) Remove the regulator/rectifier bracket bolts and move the regulator/rectifier assembly.



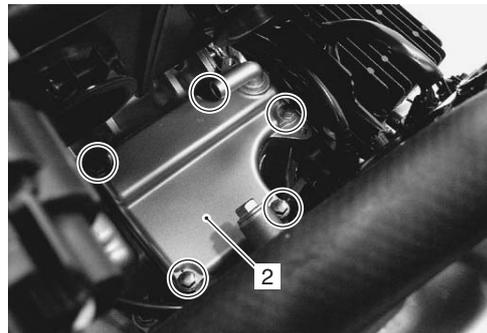
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- 4) Remove the PCV hose (1).



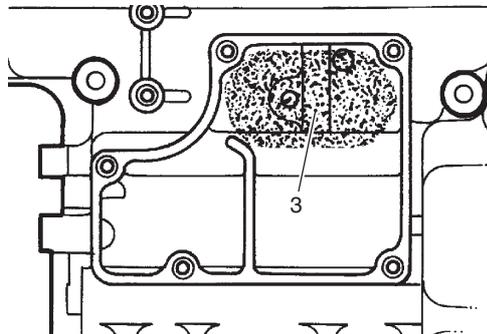
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- 5) Remove the crankcase breather (PCV) cover (2).



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- 6) Remove the oil breather separator (3).



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Installation

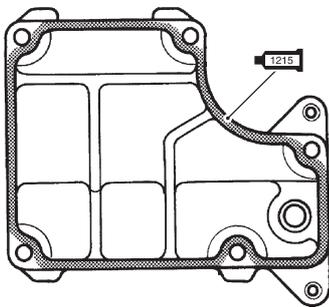
Installation is in the reverse order of removal. Pay attention to the following points:

- Apply bond to the mating surface of the breather cover.

1215 : Sealant 99000-31110 (SUZUKI BOND No.1215 or equivalent)

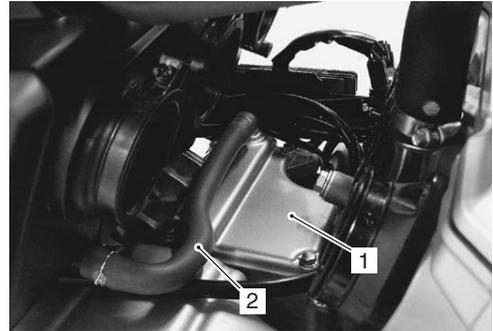
NOTE

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



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- Fit the breather cover (1) and tighten the bolts.
- Connect the PCV hose (2) securely.



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Crankcase Breather (PCV) Cover Inspection

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

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



I718H1120015-02

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

Specifications

Service Data

B718H11207002

FI sensors

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

Tightening Torque Specifications

B718H11207003

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
HO2 sensor	25	2.5	18.0	☞ (Page 1B-5)
PAIR reed valve cover bolt	11	1.1	8.0	☞ (Page 1B-6)

Reference:

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

Special Tools and Equipment

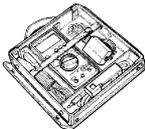
Recommended Service Material

B718H11208001

Material	SUZUKI recommended product or Specification		Note
Sealant	SUZUKI BOND No.1215 or equivalent	P/No.: 99000–31110	☞ (Page 1B-9)
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞ (Page 1B-6)

Special Tool

B718H11208002

09900–25008 Multi-circuit tester set ☞ (Page 1B-7)	
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Engine Electrical Devices

Precautions

Precautions for Engine Electrical Device

B718H11300001

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

Component Location

Engine Electrical Components Location

B718H11303001

Refer to "Electrical Components Location in Section 0A (Page 0A-8)".

Diagnostic Information and Procedures

Engine Symptom Diagnosis

B718H11304001

Refer to "Engine Symptom Diagnosis in Section 1A (Page 1A-7)".

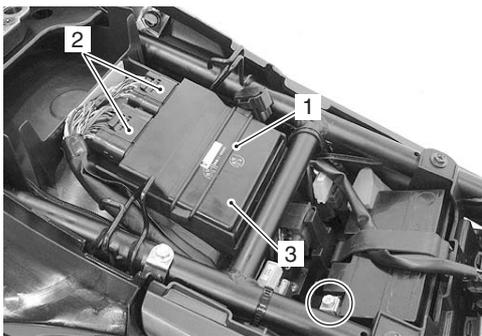
Repair Instructions

ECM Removal and Installation

B718H11306023

Removal

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
- 2) Remove the battery (-) lead wire.
- 3) Remove the rubber band (1).
- 4) Disconnect the ECM couplers (2) and remove the ECM (3).



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Installation

Install the ECM in the reverse order of removal.

CKP Sensor Inspection

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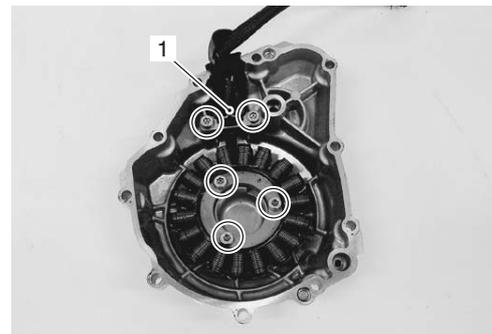
Refer to "CKP Sensor Inspection in Section 1H (Page 1H-7)".

CKP Sensor Removal and Installation

B718H11306004

Removal

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



I718H1130012-01

Installation

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

IAP Sensor (No.1) Inspection

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Refer to "DTC "C13" (P0105-H/L): IAP Sensor (No.1) Circuit Malfunction in Section 1A (Page 1A-28)".

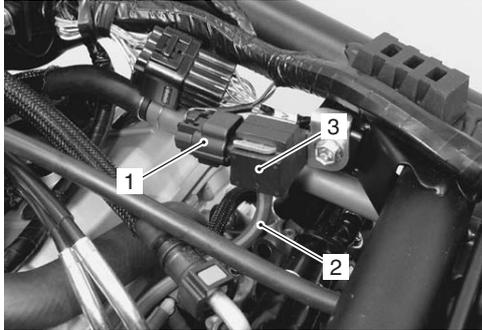
1C-2 Engine Electrical Devices:

IAP Sensor (No.1) Removal and Installation

B718H11306035

Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Disconnect the IAP sensor (No.1) coupler (1) and vacuum hose (2).
- 3) Remove the IAP sensor (No.1) (3).



I718H1130013-01

Installation

Install the IAP sensor (No.1) in the reverse order of removal.

IAP / TP / IAT Sensor Inspection

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Refer to "DTC "C17" (P1750-H/L): IAP Sensor (No.2) Circuit Malfunction in Section 1A (Page 1A-52)", "DTC "C14" (P0120-H/L): TP Sensor Circuit Malfunction in Section 1A (Page 1A-37)" and "DTC "C21" (P0110-H/L): IAT Sensor Circuit Malfunction in Section 1A (Page 1A-60)".

NOTE

IAP sensor (No.2)/TP sensor/IAT sensor are combined into one.

IAP / TP / IAT Sensor Removal and Installation

B718H11306006

Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-10)".

CAUTION

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

ECT Sensor Removal and Installation

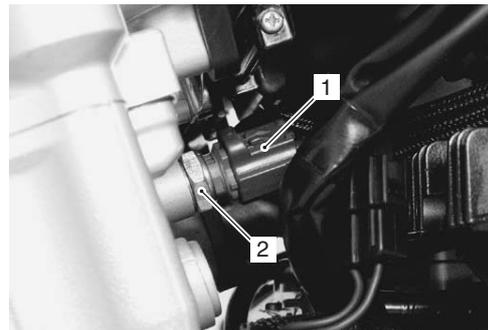
B718H11306011

Removal

- 1) Drain engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-12)".
- 2) Disconnect the coupler (1) and remove the ECT sensor (2).

CAUTION

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



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Installation

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

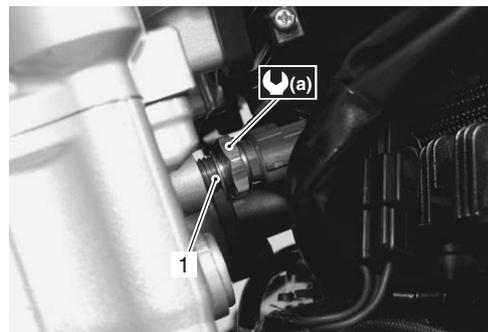
- Tighten the ECT sensor to the specified torque.

CAUTION

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

Tightening torque

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



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

ECT Sensor Inspection

B718H11306010

Refer to “DTC “C15” (P0115-H/L): ECT Sensor Circuit Malfunction in Section 1A (Page 1A-45)”.
Inspect the ECT sensor in the following procedures:

Inspect the ECT sensor in the following procedures:

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

⚠ CAUTION

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

Special tool

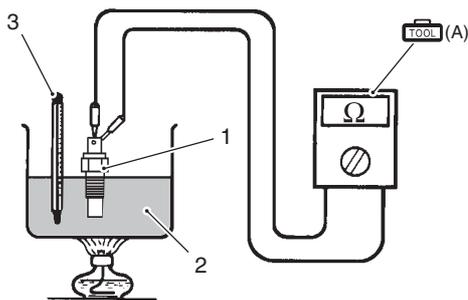
 (A): 09900-25008 (Multi-circuit tester set)

Tester knob indication

Resistance (Ω)

Temperature sensor specification

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



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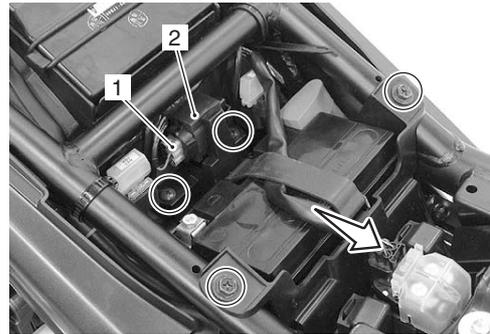
- 4) Install the ECT sensor. Refer to “ECT Sensor Removal and Installation (Page 1C-2)”.

TO Sensor Removal and Installation

B718H11306019

Removal

- 1) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
- 2) Move the battery case by removing the bolts and screws.
- 3) Disconnect the coupler (1) and remove the TO sensor (2).

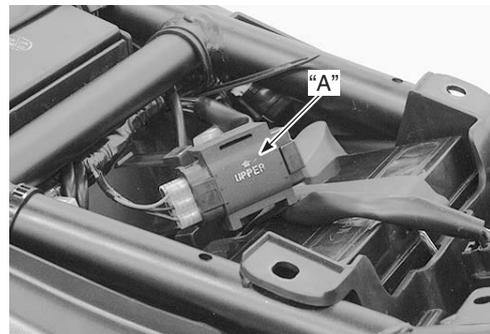


I718H1130024-01

Installation

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

- When installing the TO sensor, bring the “UPPER” letters and arrow mark “A” upward.



I718H1130022-01

TO Sensor Inspection

B718H11306018

Refer to “DTC “C23” (P1651-H/L): TO Sensor Circuit Malfunction in Section 1A (Page 1A-67)”.

STP Sensor Inspection

B718H11306024

Refer to “DTC “C29” (P1654-H/L): Secondary Throttle Position Sensor (STPS) Circuit Malfunction in Section 1A (Page 1A-77)”.

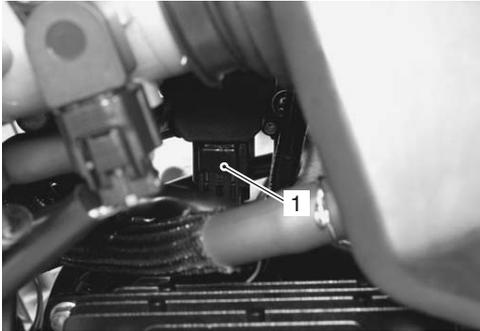
1C-4 Engine Electrical Devices:

STP Sensor Adjustment

B718H11306025

Adjust the STP sensor in the following procedures:

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



I718H1130002-01

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

Special tool

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

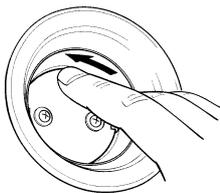
 (B): 09900-25009 (Needle pointed probe set)

Tester knob indication

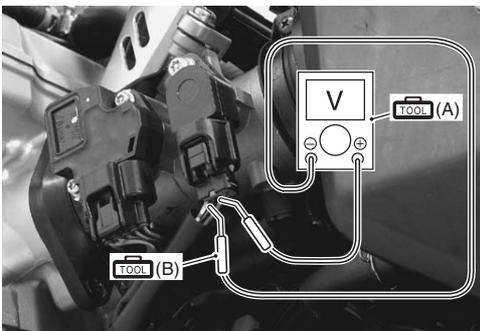
Voltage (---)

STP sensor output voltage

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



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I718H1130016-02

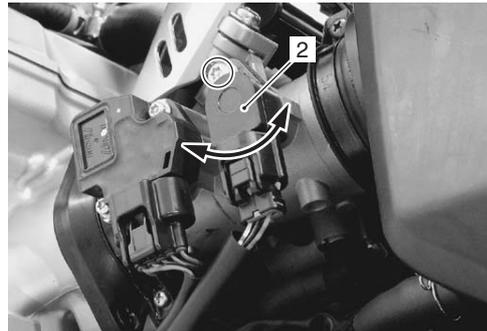
- 6) Loosen the STP sensor mounting screw adjust the STP sensor (2) until the output voltage comes within the specified value and tighten the STP sensor mounting screw.

Special tool

 : 09930-11950 (Torx wrench)

Tightening torque

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



I718H1130003-01

- 7) Reinstall the removed parts.

STP Sensor Removal and Installation

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Removal

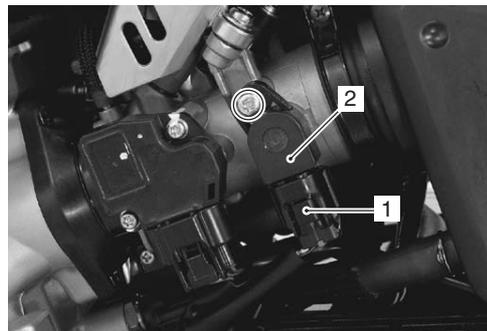
- 1) Turn the ignition switch OFF.
- 2) Disconnect the coupler (1) and remove the STP sensor (2) with the special tool.

NOTE

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

Special tool

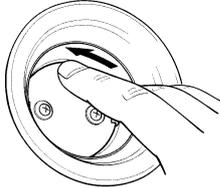
 : 09930-11950 (Torx wrench)



I718H1130004-01

Installation

- 1) Remove the air cleaner cover and air cleaner element. Refer to "Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)".
- 2) Close the secondary throttle valve by finger.



I718H1130017-01

- 3) With the STV fully closed, install the STP sensor (1) and tighten the STP sensor mounting screw to the specified torque.

⚠ CAUTION

Replace the O-ring (2) with a new one.

NOTE

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

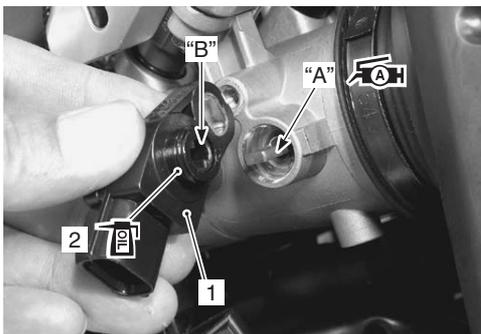
: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

Special tool

: 09930-11950 (Torx wrench)

Tightening torque

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



I718H1130009-01

- 4) Make sure the STP valve open or close smoothly.
- 5) Adjust the position of STP sensor. Refer to "STP Sensor Adjustment (Page 1C-4)".
- 6) Reinstall the removed parts.

STV Actuator Inspection

B718H11306031

Refer to "DTC "C28" (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction in Section 1A (Page 1A-73)".

STV Actuator Removal and Installation

B718H11306032

Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-10)".

⚠ CAUTION

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

ISC Valve Inspection

B718H11306027

Refer to "DTC "C40" (P0505 / P0506 / P0507): ISC Valve Circuit Malfunction in Section 1A (Page 1A-91)".

ISC Valve Removal and Installation

B718H11306028

Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-10)".

⚠ CAUTION

Be careful not to disconnect the ISC valve coupler at least 5 seconds after ignition switch is turned to OFF. If the ECM coupler or ISC valve coupler is disconnected within 5 seconds after ignition switch is turned to OFF, there is a possibility of an unusual valve position being written in ECM and causing an error of ISC valve operation.

NOTE

When the ISC valve is removed or replaced, the ISC valve or new one should be set to Preset position. Refer to "ISC Valve Preset and Opening Initialization (Page 1C-6)".

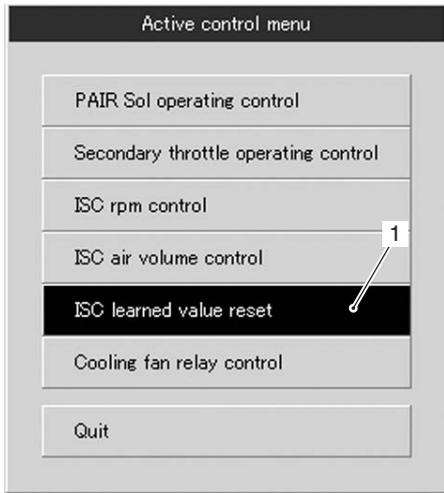
1C-6 Engine Electrical Devices:

ISC Valve Preset and Opening Initialization

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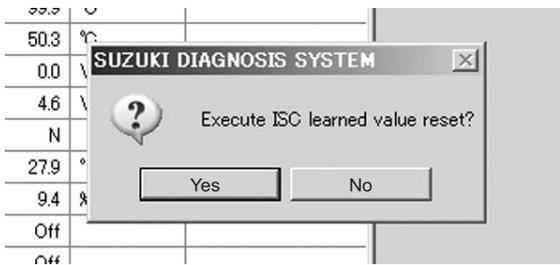
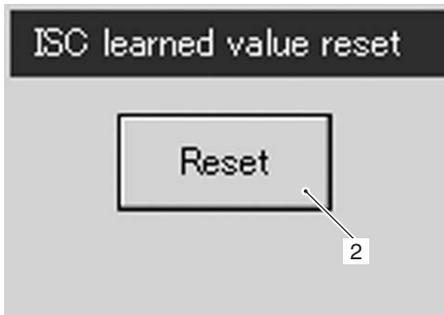
When removing or replacing the ISC valve, set the ISC valve to the following procedures:

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



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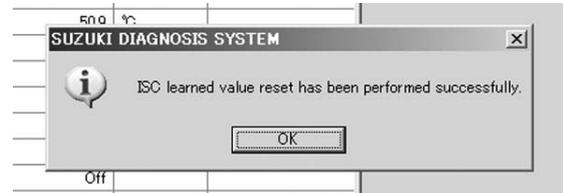
- 5) Click the "Reset" button to clear the ISC leaned valve.



I718H1130023-02

NOTE

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



I718H1130019-01

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

NOTE

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

HO2 Sensor Inspection

B718H11306020

Refer to "DTC "C44" (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction in Section 1A (Page 1A-102)".

HO2 Sensor Removal and Installation

B718H11306021

Refer to "Heated Oxygen Sensor (HO2S) Removal and Installation in Section 1B (Page 1B-5)".

GP Switch Inspection

B718H11306033

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

GP Switch Removal and Installation

B718H11306034

Refer to "Gear Position (GP) Switch Removal and Installation in Section 5B (Page 5B-12)".

Specifications

Service Data

B718H11307002

FI Sensors

Item	Specification		Note
CKP sensor resistance	90 – 150 Ω		
CKP sensor peak voltage	2.0 V and more		When cranking
IAP sensor input voltage (No.1)	4.5 – 5.5 V		
IAP sensor output voltage (No.1)	Approx. 2.7 V at idle speed		
IAP sensor input voltage (No.2)	4.5 – 5.5 V		
IAP sensor output voltage (No.2)	2.0 – 3.0 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.3 V	
ECT sensor input voltage	4.5 – 5.5 V		
ECT sensor output voltage	0.15 – 4.85 V		
ECT sensor resistance	Approx. 2.45 k Ω at 20 °C (68 °F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor output voltage	Approx. 2.4 V at 20 °C (68 °F)		
IAT sensor resistance	Approx. 2.56 k Ω at 20 °C (68 °F)		
TO sensor resistance	16.5 – 22.3 k Ω		
TO sensor voltage	Normal	0.4 – 1.4 V	
	Leaning	3.7 – 4.4 V	When leaning 65°
GP switch voltage	0.6 V and more		From 1st to Top
Injector voltage	Battery voltage		
Ignition coil primary peak voltage	80 V and more		When cranking
STP sensor input voltage	4.5 – 5.5 V		
STP sensor output voltage	Closed	Approx. 0.6 V	
	Opened	Approx. 4.5 V	
STV actuator resistance	Approx. 7.0 Ω		
ISC valve resistance	Approx. 20 Ω at 20 °C (68 °F)		
HO2 sensor resistance	Approx. 8 Ω at 23 °C (73 °F)		
HO2 sensor output voltage	0.3 V and less at idle speed		
	0.6 V and more at 3 000 r/min		
PAIR control solenoid valve resistance	18 – 22 Ω at 20 – 30 °C (68 – 86 °F)		
EVAP purge control valve	Approx. 32 Ω at 20 °C (68 °F)		

1C-8 Engine Electrical Devices:

Tightening Torque Specifications

B718H11307003

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
ECT sensor	18	1.8	13.0	☞(Page 1C-2)
STP sensor mounting screw	3.5	0.35	2.5	☞(Page 1C-4) / ☞(Page 1C-5)

Reference:

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

Special Tools and Equipment

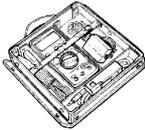
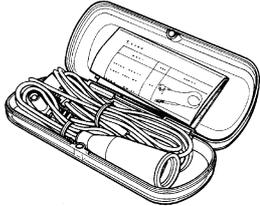
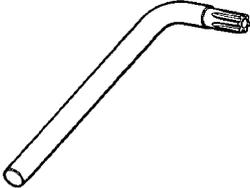
Recommended Service Material

B718H11308001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	☞(Page 1C-5)

Special Tool

B718H11308002

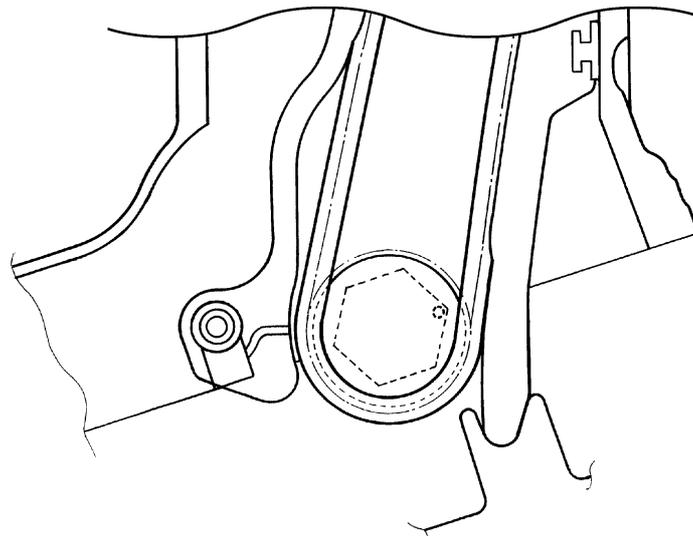
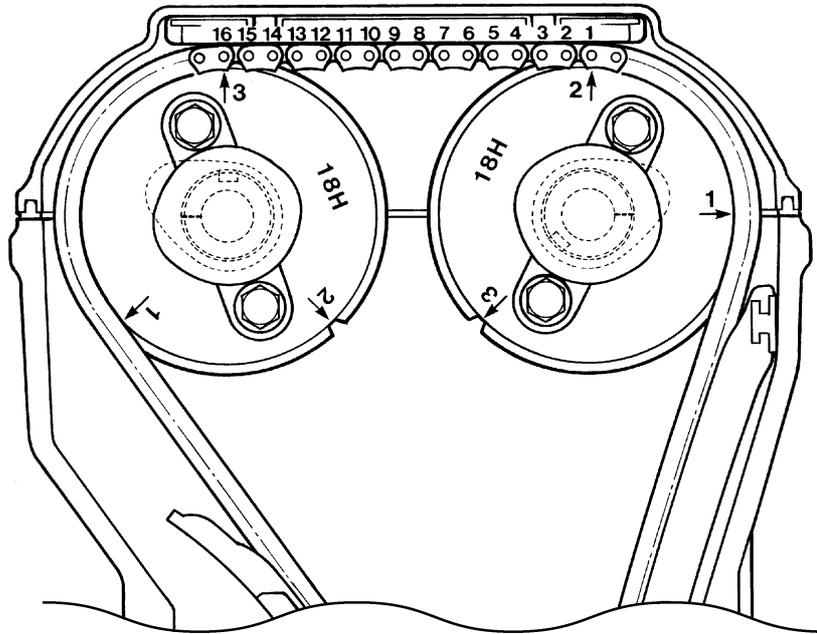
09900-25008 Multi-circuit tester set ☞(Page 1C-3) / ☞(Page 1C-4)		09900-25009 Needle pointed probe set ☞(Page 1C-4)	
09930-11950 Torx wrench ☞(Page 1C-4) / ☞(Page 1C-4) / ☞(Page 1C-5)			

Engine Mechanical

Schematic and Routing Diagram

Camshaft and Sprocket Assembly Diagram

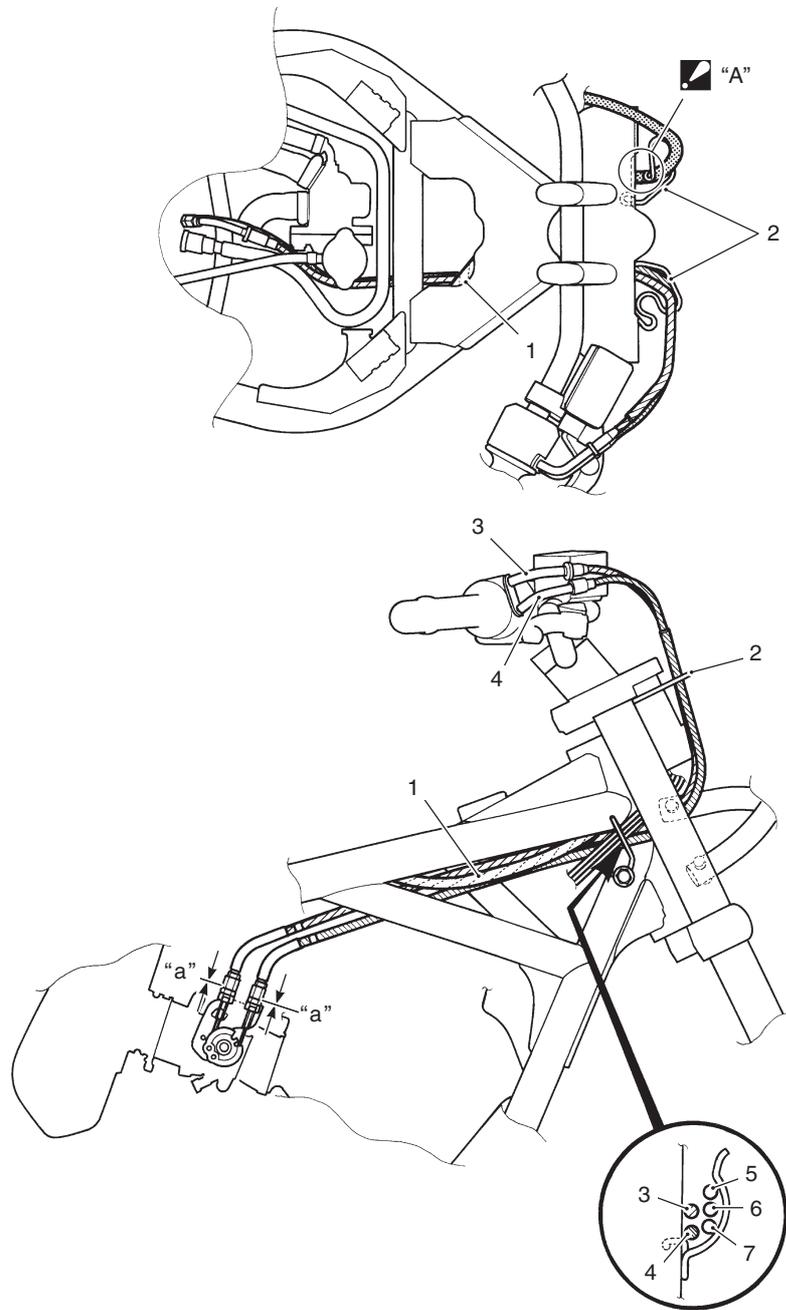
B718H11402001



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Throttle Cable Routing Diagram

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I718H1140308-03

1. Wiring harness	4. Throttle cable No.2	7. Ignition switch lead wire
2. Cable guide (GSF1250S/SA only)	5. Handlebar switch lead wire (L)	"a": 0 mm (0 in)
3. Throttle cable No.1	6. Handlebar switch lead wire (R)	▣ "A": Don't contact the tip of cable guide with the upper bracket.

Diagnostic Information and Procedures

Engine Mechanical Symptom Diagnosis

B718H11404002

Refer to "Engine Symptom Diagnosis in Section 1A (Page 1A-7)".

Compression Pressure Check

B718H11404001

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

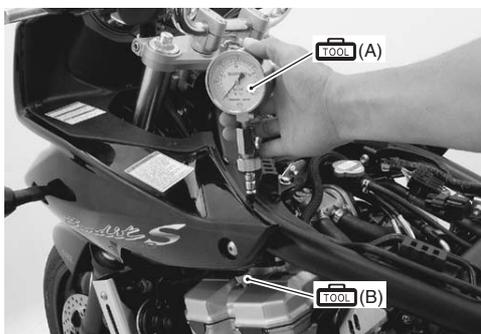
NOTE

- Before checking the engine for compression pressure, make sure that the cylinder head nuts are tightened to the specified torque values and the valves are properly adjusted.
- Make sure that the battery is in fully-charged condition.

- 1) Warm up the engine.
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Remove the frame head covers, left and right. (GSF1250/A) Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
- 4) Remove all the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)".
- 5) Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.

Special tool

- TOOL (A): 09915-64512 (Compression gauge)**
TOOL (B): 09915-63311 (Compression gauge attachment)



I718H1140380-01

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



I718H1140381-01

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

Compression pressure specification

Standard	Limit	Difference
1 300 – 1 700 kPa (13 – 17 kgf/cm ² , 185 – 242 psi)	1 000 kPa (10 kgf/cm ² , 142 psi)	200 kPa (2 kgf/cm ² , 28 psi)

Low compression pressure can indicate any of the following conditions:

- Excessively worn cylinder walls
- Worn piston or piston rings
- Piston rings stuck in grooves
- Poor valve seating
- Ruptured or otherwise defective cylinder head gasket

Overhaul the engine in the following cases:

- Compression pressure in one of the cylinders is 1 000 kPa (10 kgf/cm², 142 psi) and less.
 - The difference in compression pressure between any two cylinders is 200 kPa (2 kgf/cm², 28 psi) and more.
 - All compression pressure readings are below 1 300 kPa (13 kgf/cm², 185 psi) even when they measure 1 000 kPa (10 kgf/cm², 142 psi) and more.
- 9) After checking the compression pressure, reinstall the removed parts.

Repair Instructions

Engine Components Removable with the Engine in Place

B718H11406001

Engine components which can be removed while the engine is installed on the frame are as follows. For the installing and removing procedures, refer to respective paragraphs describing each component.

Center of Engine

Item	Removal	Inspection	Installation
Air cleaner element	Refer to "Air Cleaner Element Removal and Installation (Page 1D-6)".	Refer to "Air Cleaner Element Inspection and Cleaning in Section 0B (Page 0B-3)".	Refer to "Air Cleaner Element Removal and Installation (Page 1D-6)".
Exhaust pipes/Muffler	Refer to "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)".	Refer to "Exhaust System Inspection in Section 1K (Page 1K-6)".	Refer to "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)".
Oil filter	Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-10)".	—	Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-10)".
Oil cooler	Refer to "Oil Cooler Removal and Installation in Section 1E (Page 1E-7)".	—	Refer to "Oil Cooler Removal and Installation in Section 1E (Page 1E-7)".
Oil pan	Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation in Section 1E (Page 1E-4)".	—	Refer to "Oil Pan / Oil Strainer / Oil Pressure Regulator Removal and Installation in Section 1E (Page 1E-4)".
Throttle body	Refer to "Throttle Body Removal and Installation (Page 1D-9)".	Refer to "Throttle Body Inspection and Cleaning (Page 1D-15)".	Refer to "Throttle Body Removal and Installation (Page 1D-9)".
Cam chain tension adjuster	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Cam Chain Tension Adjuster Inspection (Page 1D-39)".	Refer to "Engine Top Side Assembly (Page 1D-28)".
Cylinder head cover	Refer to "Engine Top Side Disassembly (Page 1D-24)".	—	Refer to "Engine Top Side Assembly (Page 1D-28)".
Camshafts	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Camshaft Inspection (Page 1D-36)".	Refer to "Engine Top Side Assembly (Page 1D-28)".
Cylinder head	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Cylinder Head Related Parts Inspection (Page 1D-44)".	Refer to "Engine Top Side Assembly (Page 1D-28)".
Cylinder	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Cylinder Inspection (Page 1D-50)".	Refer to "Engine Top Side Assembly (Page 1D-28)".
Pistons	Refer to "Engine Top Side Disassembly (Page 1D-24)".	Refer to "Piston and Piston Ring Inspection (Page 1D-52)".	Refer to "Engine Top Side Assembly (Page 1D-28)".
Starter motor	Refer to "Starter Motor Removal and Installation in Section 1I (Page 1I-4)".	Refer to "Starter Motor Inspection in Section 1I (Page 1I-6)".	Refer to "Starter Motor Removal and Installation in Section 1I (Page 1I-4)".
Crank balancer	Refer to "Engine Bottom Side Disassembly (Page 1D-53)".	Refer to "Crank Balancer Inspection (Page 1D-73)".	Refer to "Engine Bottom Side Assembly (Page 1D-61)".

Engine Right Side

Item	Removal	Inspection	Installation
Clutch cover	Refer to "Clutch Removal in Section 5C (Page 5C-13)".	—	Refer to "Clutch Installation in Section 5C (Page 5C-14)".
Clutch plates	Refer to "Clutch Removal in Section 5C (Page 5C-13)".	Refer to "Clutch Parts Inspection in Section 5C (Page 5C-18)".	Refer to "Clutch Installation in Section 5C (Page 5C-14)".
Clutch sleeve hub	Refer to "Clutch Removal in Section 5C (Page 5C-13)".	—	Refer to "Clutch Installation in Section 5C (Page 5C-14)".
Primary driven gear	Refer to "Clutch Removal in Section 5C (Page 5C-13)".	Refer to "Clutch Parts Inspection in Section 5C (Page 5C-18)".	Refer to "Clutch Installation in Section 5C (Page 5C-14)".
Oil pump drive gear	Refer to "Oil Pump Removal and Installation in Section 1E (Page 1E-11)".	—	Refer to "Oil Pump Removal and Installation in Section 1E (Page 1E-11)".
Oil pump	Refer to "Oil Pump Removal and Installation in Section 1E (Page 1E-11)".	Refer to "Oil Pump Inspection in Section 1E (Page 1E-13)".	Refer to "Oil Pump Removal and Installation in Section 1E (Page 1E-11)".
Oil pressure switch	Refer to "Oil Pressure Switch Removal and Installation in Section 1E (Page 1E-7)".	Refer to "Gearshift Linkage Inspection in Section 5B (Page 5B-18)".	Refer to "Oil Pressure Switch Removal and Installation in Section 1E (Page 1E-7)".
Gearshift shaft	Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation in Section 5B (Page 5B-15)".	Refer to "Gearshift Linkage Inspection in Section 5B (Page 5B-18)".	Refer to "Gearshift Shaft / Gearshift Cam Plate Removal and Installation in Section 5B (Page 5B-15)".

Engine Left Side

Item	Removal	Inspection	Installation
Generator	Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".	Refer to "Generator Inspection in Section 1J (Page 1J-3)".	Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".
Engine sprocket	Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".	Refer to "Drive Chain Related Parts Inspection in Section 3A (Page 3A-5)".	Refer to "Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)".
Driven chain	Refer to "Drive Chain Replacement in Section 3A (Page 3A-7)".	Refer to "Drive Chain Inspection and Adjustment in Section 0B (Page 0B-15)".	Refer to "Drive Chain Replacement in Section 3A (Page 3A-7)".
Gear position switch	Refer to "Gear Position (GP) Switch Removal and Installation in Section 5B (Page 5B-12)".	Refer to "Gear Position (GP) Switch Inspection in Section 5B (Page 5B-12)".	Refer to "Gear Position (GP) Switch Removal and Installation in Section 5B (Page 5B-12)".
Starter idle gear	Refer to "Starter Clutch Removal and Installation in Section 1I (Page 1I-10)".	—	Refer to "Starter Clutch Removal and Installation in Section 1I (Page 1I-10)".
Starter clutch	Refer to "Starter Clutch Removal and Installation in Section 1I (Page 1I-10)".	Refer to "Starter Clutch Inspection in Section 1I (Page 1I-12)".	Refer to "Starter Clutch Removal and Installation in Section 1I (Page 1I-10)".
CKP sensor	Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".	Refer to "CKP Sensor Inspection in Section 1H (Page 1H-7)".	Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".
Water pump	Refer to "Water Pump Removal and Installation in Section 1F (Page 1F-13)".	Refer to "Water Pump Related Parts Inspection in Section 1F (Page 1F-17)".	Refer to "Water Pump Removal and Installation in Section 1F (Page 1F-13)".

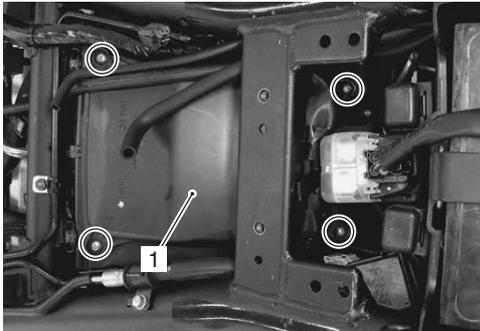
1D-6 Engine Mechanical:

Air Cleaner Element Removal and Installation

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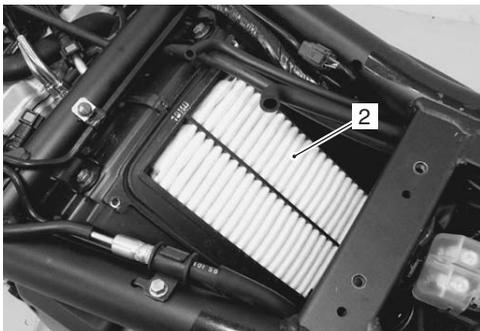
Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Remove the air cleaner cover screws.
- 3) Remove the air cleaner cover (1).



I718H1140310-04

- 4) Remove the air cleaner element (2).



I718H1140311-01

Installation

Installation in the reverse order of removal.

Air Cleaner Element Inspection and Cleaning

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Refer to "Air Cleaner Element Inspection and Cleaning in Section 0B (Page 0B-3)".

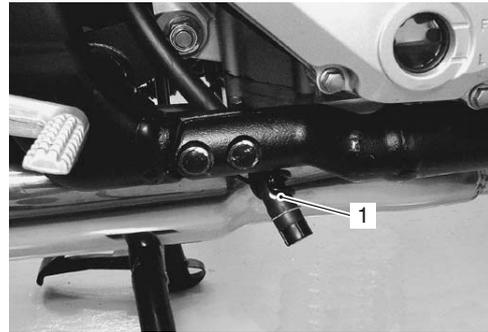
Air Cleaner Box Removal and Installation

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Removal

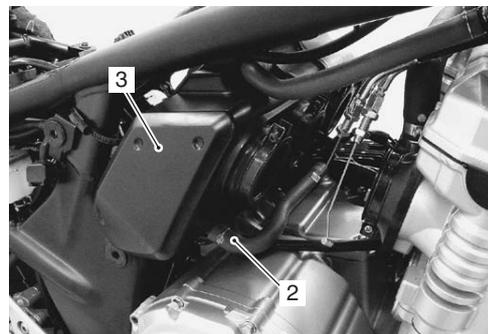
- 1) Remove the throttle body. Refer to "Throttle Body Removal and Installation (Page 1D-9)".
- 2) Remove the air cleaner cover and air cleaner element. Refer to "Air Cleaner Element Removal and Installation (Page 1D-6)".

- 3) Release the drain hose from the clamp (1).



I718H1140312-01

- 4) Disconnect the breather hose (2) and remove the air cleaner box (3).



I718H1140313-01

Installation

Install the air cleaner box in the reverse order of removal. Pay attention to the following point:

- Route the hoses properly. Refer to "Throttle Body Construction (Page 1D-8)".

Throttle Cable Removal and Installation

B718H11406037

Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 2) Remove the right handlebar switch box. Refer to "Handlebar Removal and Installation in Section 6B (Page 6B-3)".
- 3) Remove the throttle cables as shown in the cable routing diagram. Refer to "Throttle Cable Routing Diagram (Page 1D-2)".

Installation

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

- Install the throttle cables as shown in the cable routing diagram. Refer to "Throttle Cable Routing Diagram (Page 1D-2)".
- Check the throttle cable play and proper operation.

Throttle Cable Inspection

B718H11406038

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

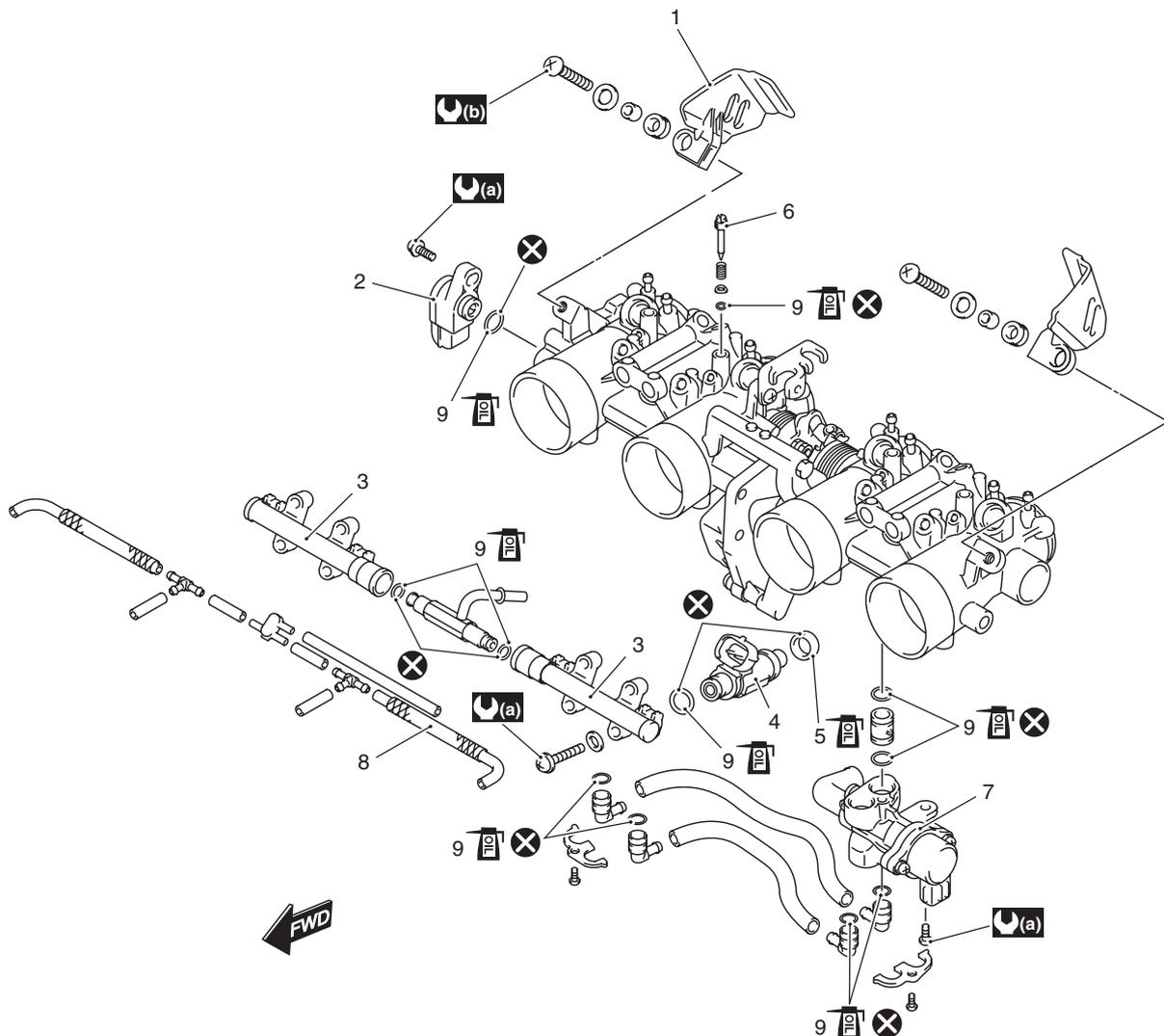
Throttle Cable Play Inspection and Adjustment

B718H11406039

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

Throttle Body Components

B718H11406040

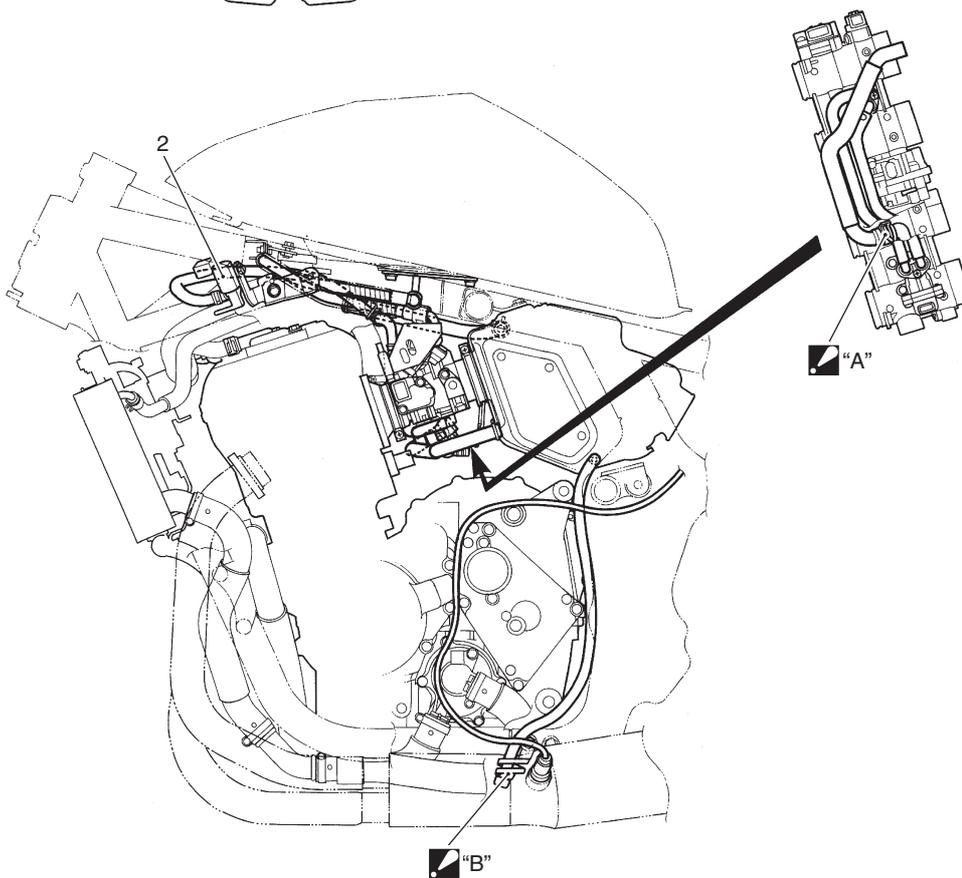
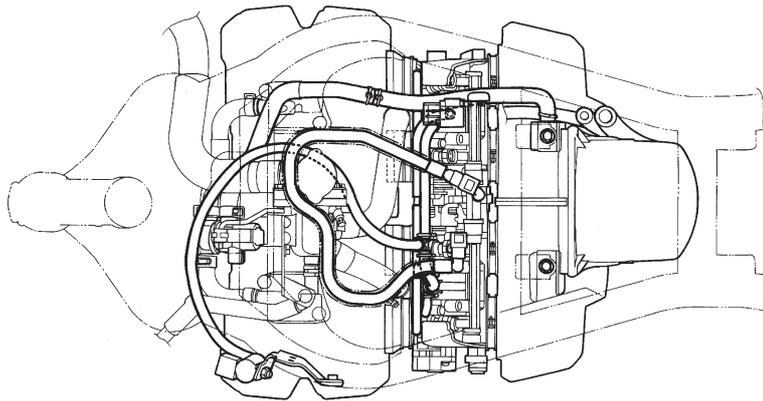
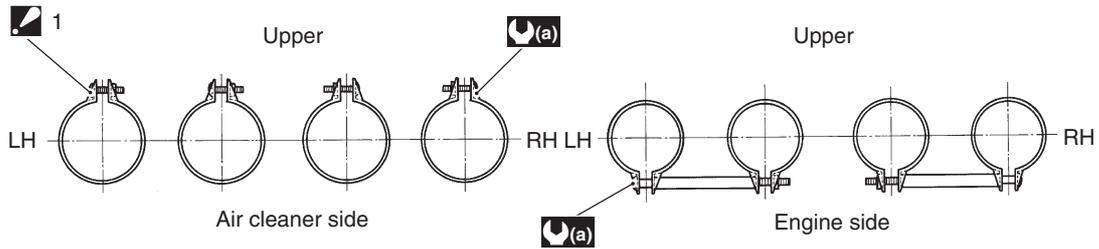


I718H1140309-01

1. Fuel injector cover	6. Air screw	(a) : 3.5 N·m (0.35 kgf·m, 2.5 lb·ft)
2. STP sensor	7. ISC valve	(b) : 5 N·m (0.5 kgf·m, 3.5 lb·ft)
3. Fuel delivery pipe	8. Vacuum hose	X : Do not reuse.
4. Fuel injector	9. O-ring	
5. Cushion seal	🛢️ : Apply engine oil	

Throttle Body Construction

B718H11406041



<p>1. Clamp (Air cleaner side) : After tighten the clamp band #3, 4 and tighten the clamp band #1, 4.</p>	<p>"B": Clamp the drain hose at mark position.</p>
<p>2. EVAP purge control valve (E-33 only)</p>	<p>(a) : 1.5 N-m (0.15 kgf-m, 1.0 lb-ft)</p>
<p>"A": White mark downward.</p>	

I718H1140314-01

Throttle Body Removal and Installation

B718H11406042

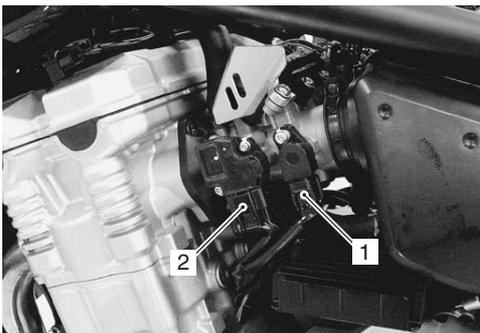
Removal

- 1) Disconnect the battery (-) lead wire. Refer to "Battery Removal and Installation in Section 1J (Page 1J-12)".
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Remove the air cleaner box mounting bolts.



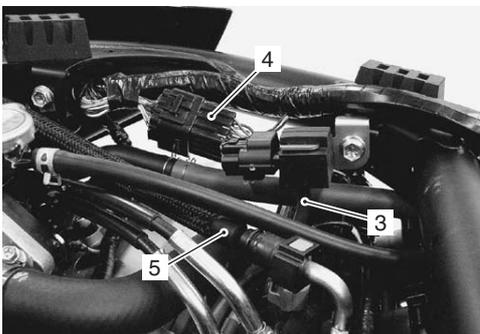
I718H1140315-01

- 4) Disconnect the STP sensor coupler (1) and IAP/TP/IAT sensor coupler (2).



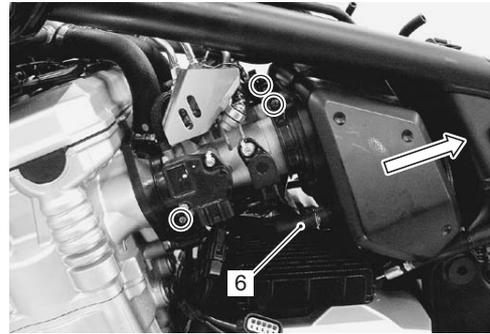
I718H1140316-01

- 5) Disconnect the vacuum hose (3) and fuel injector coupler (4).
- 6) Remove the fuel feed hose (5).



I718H1140317-01

- 7) Loosen the throttle body clamp screws and disconnect the ISC valve hose (6).
- 8) Move the air cleaner box backward.



I718H1140318-01



I718H1140319-01

- 9) Move the throttle body right side.
- 10) Disconnect the throttle cables and remove the throttle body.

⚠ CAUTION

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



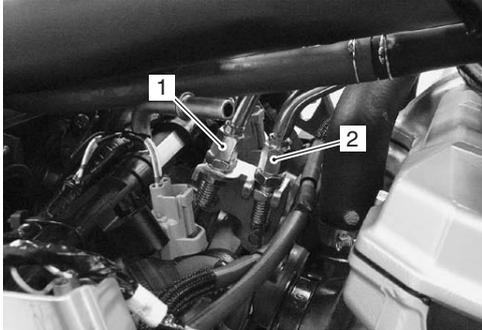
I718H1140320-01

1D-10 Engine Mechanical:

Installation

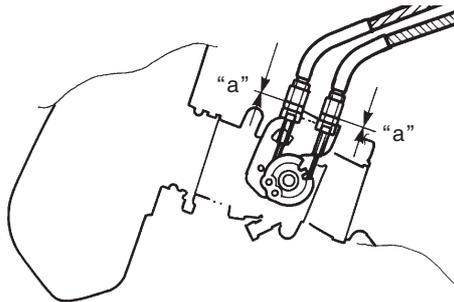
Install the throttle body in the reverse order of removal. Pay attention to the following points:

- Connect the throttle pulling cable (1) and throttle returning cable (2) to the throttle cable drum.



I718H1140321-01

- Tighten the throttle body clamp screws. Refer to "Throttle Body Construction (Page 1D-8)".
- Loosen each throttle cable lock-nut.
- Turn in each throttle cable adjuster fully and locate each outer cable so that the clearance "a" is 0 mm (0 in).



I718H1140322-01

"a": 0 mm (0 in)

- Tighten each lock-nut.
- Adjust the throttle cable play. Refer to "Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-12)".

Throttle Body Disassembly and Assembly

B718H11406043

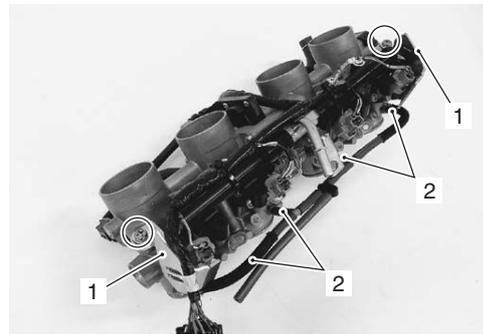
Refer to "Throttle Body Removal and Installation (Page 1D-9)".

Disassembly

⚠ CAUTION

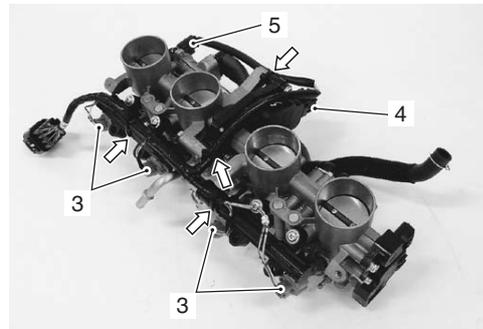
Identify the position of each removed part. Organize the parts in their respective groups so that they can be reinstalled in their original positions.

- 1) Remove the injector covers (1) and disconnect the respective vacuum hoses (2) from each throttle body.



I718H1140324-01

- 2) Remove the clamps and disconnect the fuel injector couplers (3), STVA coupler (4) and ISC valve coupler (5).

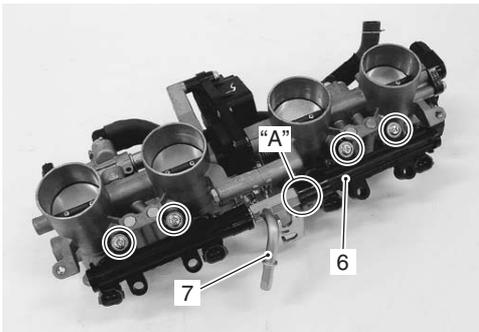


I718H1140325-01

3) Remove the fuel delivery pipe assembly (6).

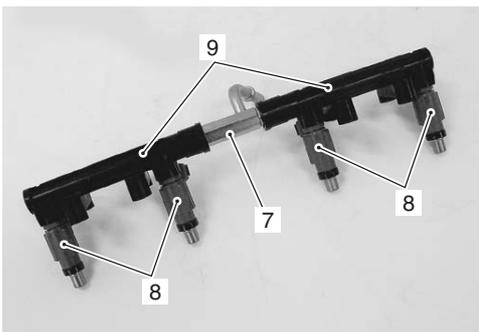
⚠ CAUTION

Be careful not to twist the fuel delivery pipe's T-joint (7), when disconnecting the fuel feed hose or removing the fuel delivery pipes, or joint part "A" of the fuel delivery pipe get damage.



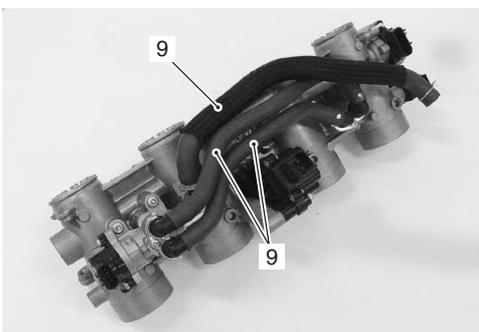
I718H1140326-01

4) Remove the fuel injectors (8) and fuel delivery pipes (9) from the T-joint (7).



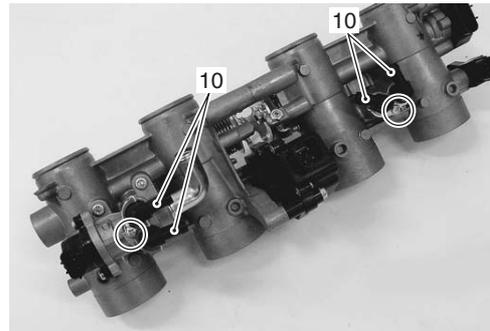
I718H1140323-02

5) Disconnect the ISC valve hoses (9).



I718H1140328-01

6) Remove the plates and joint pipes (10).

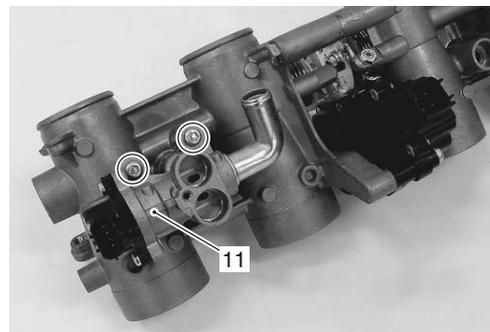


I718H1140329-01

7) Remove the ISC valve assembly (11).

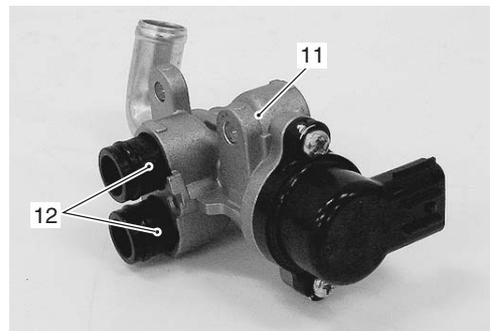
Special tool

🔧 : 09930-11950 (Torx wrench)



I718H1140330-02

8) Remove the joint pipes (12) from the ISC valve assembly (11).



I718H1140031-01

1D-12 Engine Mechanical:

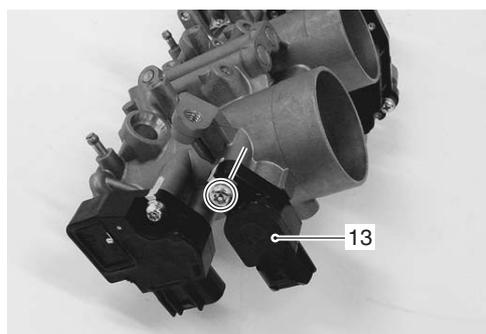
9) Remove the STP sensor (13).

NOTE

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

Special tool

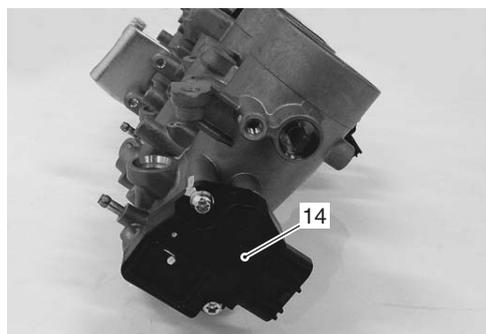
 : 09930-11950 (Torx wrench)



I718H1140327-02

CAUTION

Never remove the IAP/TP/IAT sensor (14) from the throttle body.



I718H1140331-02

CAUTION

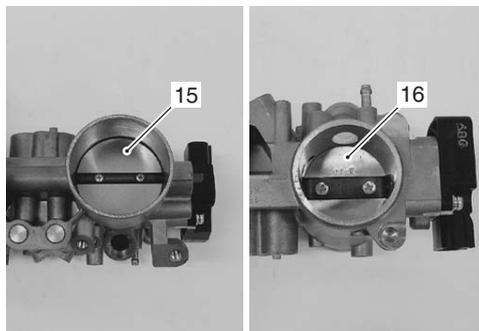
Never separate the throttle bodies, left and right.



I718H1140332-01

CAUTION

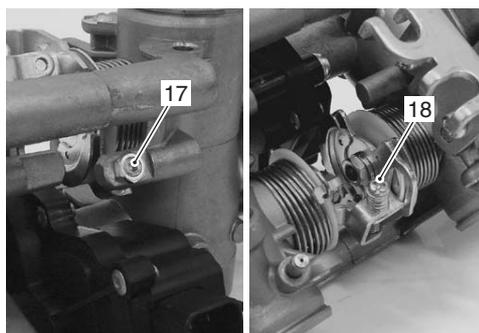
Never remove the throttle valve (15) and secondary throttle valve (16).



I718H1140333-03

CAUTION

These adjusting screws (17), (18) are factory-adjusted at the time of delivery and therefore avoid removing or turning them unless necessary.



I718H1140334-02

Assembly

Assembly is the throttle body in the reverse order of removal. Pay attention to the following points:

- Apply a thin coat of engine oil to the O-ring.
- With the STV fully closed, install the STP sensor (1) and tighten the STP sensor mounting screw to the specified torque.

NOTE

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

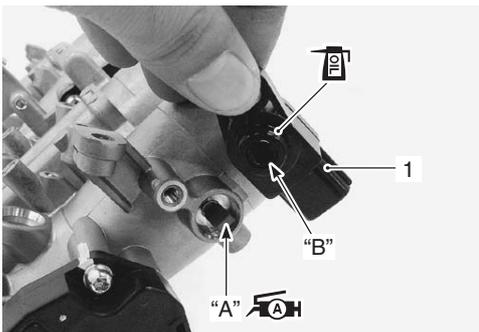
 Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

Special tool

 : 09930-11950 (Torx wrench)

Tightening torque

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



I718H1140335-01

NOTE

Make sure the STP valve open or close smoothly. If the STP sensor adjustment is necessary, refer to “STP Sensor Adjustment in Section 1C (Page 1C-4)”.



I718H1140336-01

- Apply a thin coat of engine oil to the O-rings and install the ISC valve assembly.

CAUTION

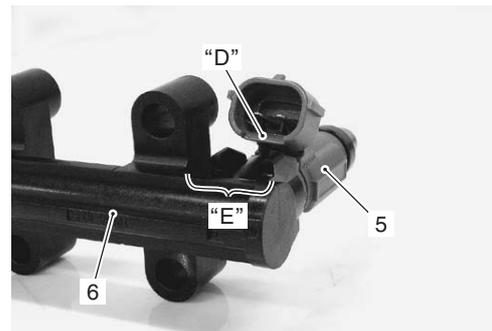
Replace the O-rings with new ones.

Special tool

 : 09930-11950 (Torx wrench)

Tightening torque

ISC valve mounting screw (a): 3.5 N·m (0.35 kgf·m, 2.5 lb·ft)



I718H1140395-01

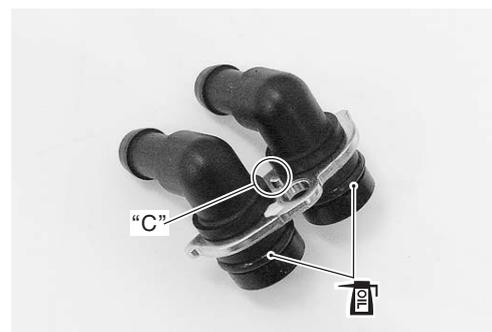
- Apply a thin coat of engine oil to the O-rings and install the plate.

CAUTION

Replace the O-rings with new ones.

NOTE

The boss “C” of the outside.



I718H1140338-01

- Connect the ISC valve hoses securely.



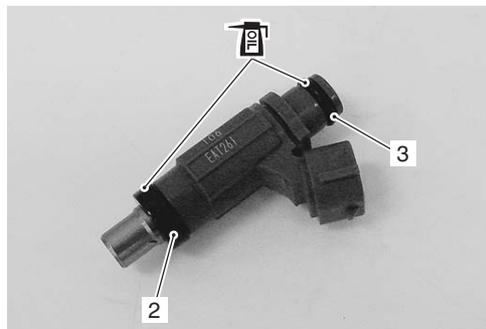
I718H1140339-02

1D-14 Engine Mechanical:

- Apply a thin coat of engine oil to the new cushion seal (2) and the O-ring (3).

⚠ CAUTION

Replace the cushion seal and O-ring with the new ones.

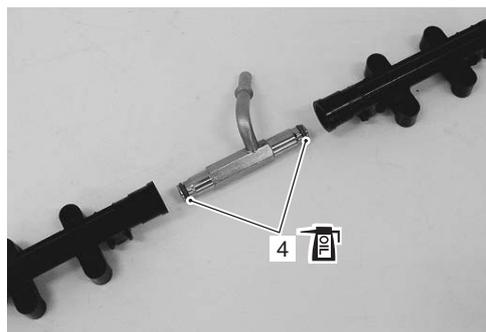


I718H1140340-02

- Apply a thin coat of engine oil to the new O-rings (4).

⚠ CAUTION

Replace the O-rings with the new ones.



I718H1140341-02

- Assemble the fuel delivery pipes as shown.



I718H1140342-01

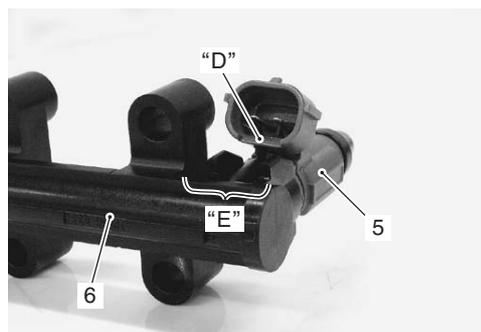
- Install the fuel injector (5) by pushing it straight to the delivery pipe (6).

⚠ CAUTION

Never turn the injector while pushing it.

NOTE

Align the coupler "D" of injector with boss "E" of the delivery pipe.

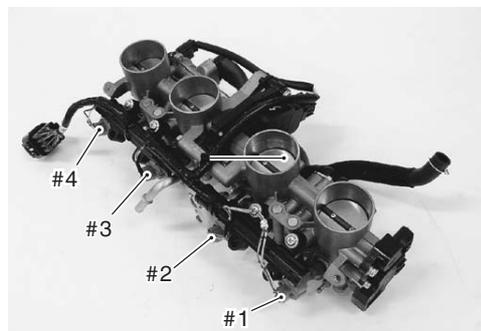


I718H1140404-01

- Connect the fuel injector couplers to the fuel injectors.

NOTE

Make sure that each coupler is installed in the correct position.



I718H1140344-01

Coupler	Wire color
#1	Y/R and Gr/W
#2	Y/R and Gr/B
#3	Y/R and Gr/Y
#4	Y/R and Gr/R

- Install the fuel delivery pipe assembly (7) to the throttle body assembly.

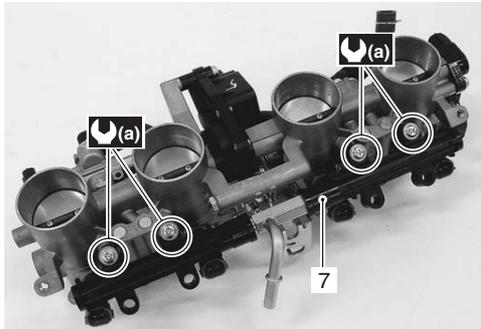
⚠ CAUTION

Never turn the fuel injectors while installing them.

- Tighten the fuel delivery pipe mounting screws to the specified torque.

Tightening torque

Fuel delivery pipe mounting screw (a): 3.5 N·m (0.35 kgf-m, 2.45 lb-ft)



I718H1140345-02

Throttle Body Inspection and Cleaning

B718H11406044

Refer to “Throttle Body Disassembly and Assembly (Page 1D-10)”.

Cleaning

⚠ WARNING

Some carburetor cleaning chemicals, especially dip-type soaking solutions, are very corrosive and must be handled carefully. Always follow the chemical manufacturer’s instructions on proper use, handling and storage.

- Clean passageways with a spray-type carburetor cleaner and blow dry with compressed air.

⚠ CAUTION

- Never clean the main bore of throttle body to prevent come off molybdenum from the throttle valve.
- Do not use wire to clean passageways. Wire can damage passageways. If the components cannot be cleaned with a spray cleaner it may be necessary to use a dip-type cleaning solution and allow them to soak. Always follow the chemical manufacturer’s instructions for proper use and cleaning of the throttle body components. Do not apply carburetor cleaning chemicals to the rubber and plastic materials.

Inspection

Check following items for any defects or clogging. Replace the throttle body if necessary.

- O-ring
- Throttle valve
- Secondary throttle valve
- Vacuum hose

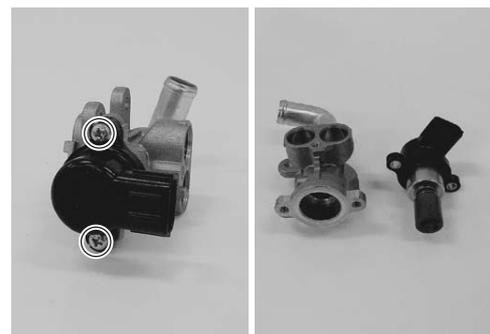
ISC Valve Visual Inspection

Visually inspect the ISC valve if necessary.

- 1) Remove the screws.
- 2) Inspect the ISC valve for any carbon deposition defects. Clean or replace the ISC valve if necessary.

⚠ CAUTION

Normally, the removed O-ring must be replaced with a new one. However, this O-ring is not available for the spare parts. If it is found to be damaged, replace the ISC valve assembly with new one.



I718H1140346-02

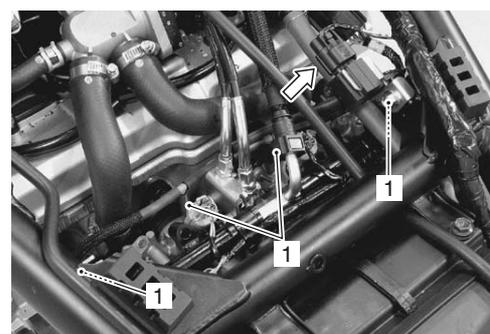
Throttle Valve Synchronization

B718H11406045

Use of SDS Tool

Check and adjust the throttle valve synchronization among four cylinders.

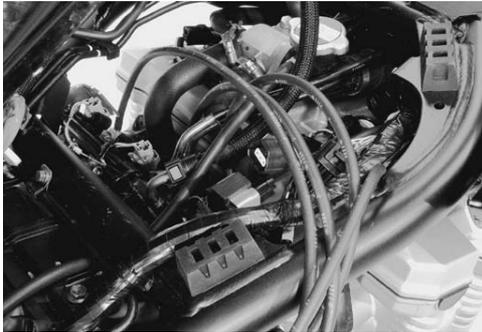
- 1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
- 2) Disconnect the IAP sensor (No.1) coupler and vacuum hoses (1) from the throttle body.



I718H1140347-02

1D-16 Engine Mechanical:

- 3) Connect the respective vacuum tester hoses to each vacuum nipple on the throttle body.



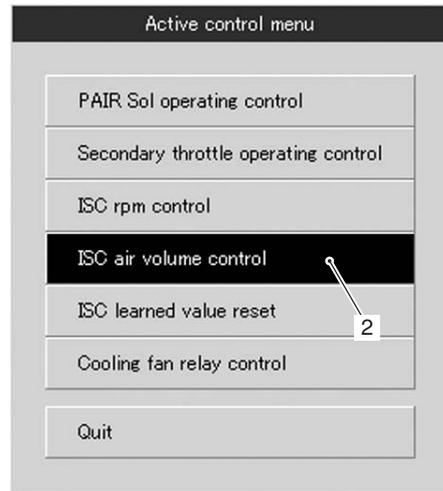
I718H1140389-01

- 4) Start the engine.
 5) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
 6) Click "Data monitor".
 7) Warm up the engine (Water temp. more than 80° (176 °F)).

<input type="checkbox"/> Cooling fan relay	Off	
<input type="checkbox"/> Secondary throttle actuator position sensor	102	%
<input type="checkbox"/> Engine coolant / oil temperature	87.3	°C
<input type="checkbox"/> Engine speed	1171	rpm
<input type="checkbox"/> PAIR control solenoid valve	Off	
<input type="checkbox"/> Intake air temperature	22.1	°C

I718H1140382-01

- 8) Click "Active control".
 9) Click "ISC air volume control" (2).



I718H1140384-01

- 10) Click "ON" button (3) to fix the ISC air volume of four cylinders.

NOTE

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

Item	Value	Unit	
<input type="checkbox"/> Engine speed	"A" → 1191	rpm	
<input type="checkbox"/> Desired idle speed	1167	rpm	
<input type="checkbox"/> ISC valve position	"B" → 77	step	
<input type="checkbox"/> Engine coolant / oil temperature	96.1	°C	←
<input type="checkbox"/> Throttle position	27.5	°	
<input type="checkbox"/> PAIR control solenoid valve	Off		

ISC air volume control

Spec

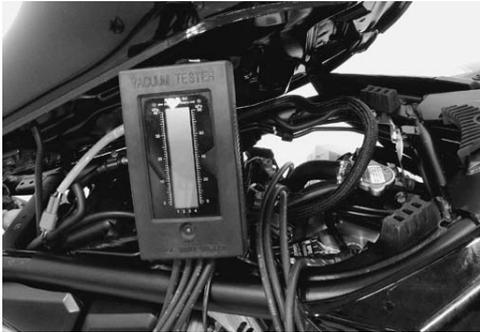
Off

On (3)

I718H1140385-01

"A": Engine speed: Approx. 1 200 rpm "B": ISC valve position: Approx. 77 step

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



I718H1140390-01

- 12) Equalize the vacuum of the cylinders by turning each air screw and keep it running at idling speed.

NOTE

Always set the engine rpm at idle rpm.



I718H1140354-01

- 13) If the adjustment is not yet correct, remove each air screw and clean them with a spray-type carburetor cleaner and blow dry with a compressed air. Also, clean the air screw passageways.

NOTE

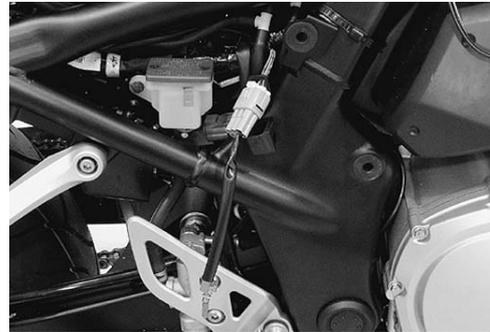
- **Slowly turn the air screw in clockwise and count the number of turns until the screw is lightly seated.**
- **Make a note of how many turns were made in order that the screw can be reset correctly after cleaning.**

- 14) Repeat the procedures from 4) to 12).
 15) Close the SDS tool and turn the ignition switch OFF.
 16) Disconnect the vacuum tester and reinstall the removed parts.
 17) After completing the throttle valve synchronization, clear the DTC and reset the ISC learned valve using SDS tool. Refer to "ISC Valve Preset and Opening Initialization in Section 1C (Page 1C-6)".

Use of Mode Select Switch

The following procedure describes only difference between use of SDS tool and use of mode select switch.

- 1) 1), 2) and 3) are the same as the using SDS tool.
- 2) Connect the special tool (Mode select switch) and turn ON.



I718H1140391-01

- 3) Start the engine and warm up it.
 - * Summer: Approx. 5 min. at idle speed
 - * Winter: Approx. 8 min. at idle speed

NOTE

- **The ISC valve automatically is set at synchronization mode.**
- **Water temperature should be more than 80 °C (176 °F) and then wait 30 seconds.**

- 4) This step is the same as the step 11) of the use of SDS.
- 5) This step is the same as the step 12) of the use of SDS.
- 6) This step is the same as the step 13) of the use of SDS.
- 7) Repeat the procedures of 3).
- 8) Turn OFF the mode select switch.
- 9) Disconnect the vacuum tester and reinstall the removed parts.

Engine Assembly Removal

B718H11406002

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

- 1) Drain engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-10)".
- 2) Remove the seat and frame covers. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
- 3) Remove the frame head covers (GSF1250/A) or cowling (GSF1250S/SA). Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".

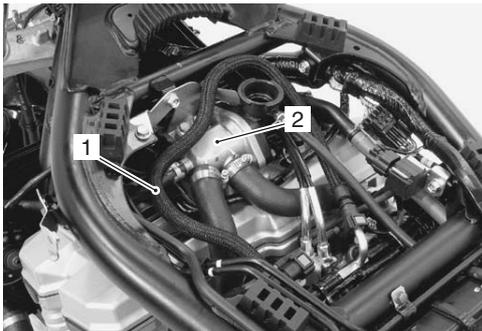
1D-18 Engine Mechanical:

- 4) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 5) Drain engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-12)".
- 6) Disconnect the battery (-) lead wire.



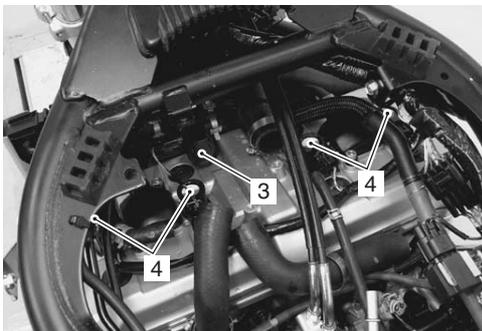
I718H1140388-01

- 7) Disconnect the fuel feed hose (1).
- 8) Remove the thermostat connector (2) and its bracket. Refer to "Thermostat Connector / Thermostat Removal and Installation in Section 1F (Page 1F-9)".



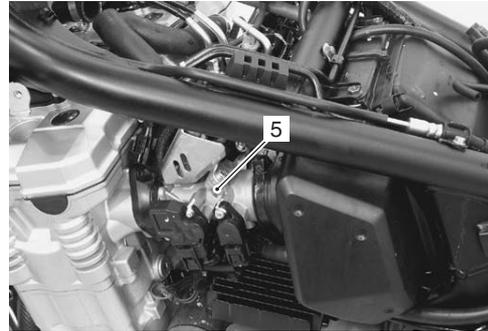
I718H1140356-01

- 9) Remove the PAIR control solenoid valve (3) and hoses.
- 10) Disconnect all ignition coil/plug cap couplers and then remove the ignition coil/plug caps (4).



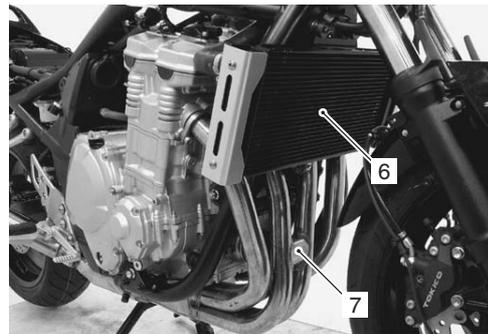
I718H1140357-01

- 11) Remove the throttle body assembly (5). Refer to "Throttle Body Removal and Installation (Page 1D-9)".



I718H1140358-01

- 12) Remove the radiator (6). Refer to "Radiator / Cooling Fan Motor Removal and Installation in Section 1F (Page 1F-5)".
- 13) Remove the muffler and exhaust pipes (7) along with the HO2 sensor. Refer to "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)".



I718H1140359-01

- 14) Remove the air cleaner box (8). Refer to "Air Cleaner Box Removal and Installation (Page 1D-6)".



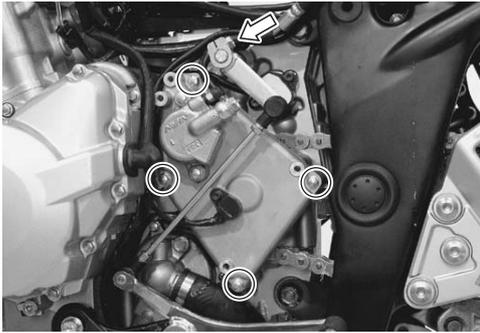
I718H1140360-01

- 15) Disengage the gearshift link arm by removing the bolt.

NOTE

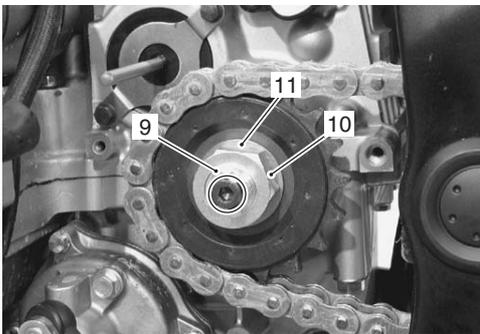
Mark the gearshift shaft head at which the gearshift link arm slit is set for correct reinstallation.

- 16) Remove the engine sprocket inner cover by removing the bolts.



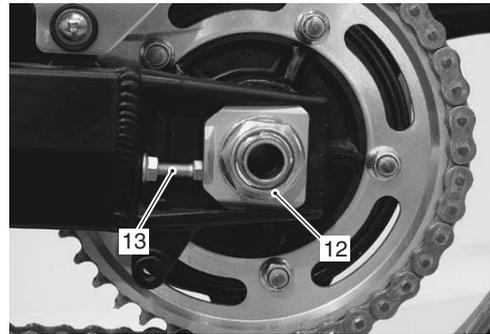
I718H1140361-01

- 17) Remove the speed sensor rotor (9) while depressing the rear brake pedal.
 18) Remove the engine sprocket nut (10) while depressing the rear brake pedal.
 19) Remove the washer (11).



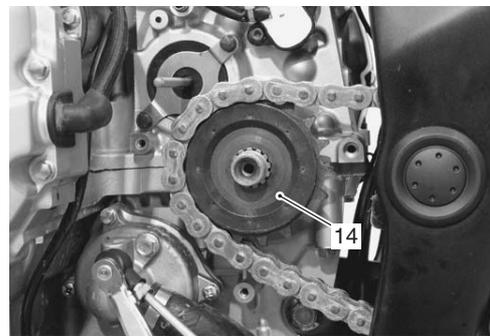
I718H1140362-01

- 20) Loosen the rear axle nut (12) and chain adjusters (13) to provide additional chain slack.



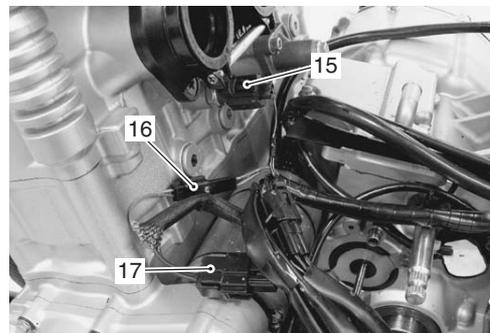
I718H1140363-01

- 21) Remove the engine sprocket (14).



I718H1140364-01

- 22) Disconnect the ECT sensor coupler (15), CKP sensor coupler (16) and generator coupler (17).



I718H1140365-01

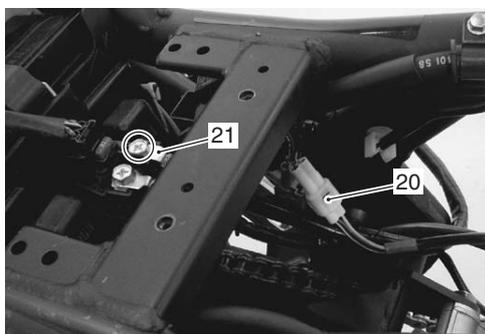
1D-20 Engine Mechanical:

- 23) Disconnect the engine ground wire coupler (18) and oil pressure switch coupler (19).



I718H1140366-01

- 24) Disconnect the GP switch coupler (20) and starter motor lead wire (21).



I718H1140367-01

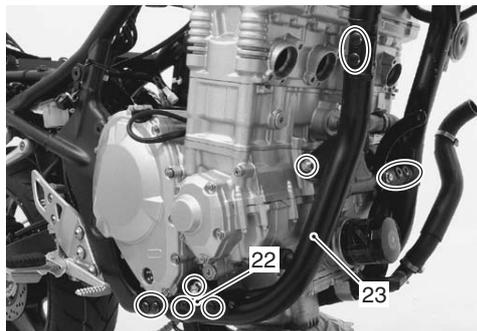
- 25) Support the engine with a proper jack.



I718H1140368-01

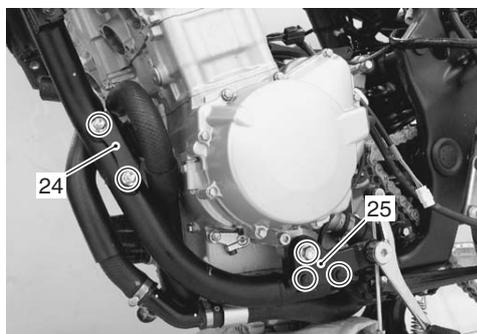
- 26) Remove the right engine mounting No.2 bracket (22).

- 27) Remove the frame down tube (23) by removing their bolts and nuts.



I718H1140369-01

- 28) Remove the engine mounting brackets, No.1 (24) and No.2 (L) (25).



I718H1140370-01

- 29) Remove the engine mounting bolts and nuts.



I718H1140371-01

- 30) Gradually lower the front side of the engine and remove the engine.

▲ WARNING

Care should be taken not to drop the engine accidentally when the engine mounting bolts and nuts are removed.

Engine Assembly Installation

B718H11406003

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

- Insert the two mounting bolts from left side, and tighten their nuts.

NOTE

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



I718H1140371-01

- Install the frame down tube and engine mounting brackets.
- Tighten the bolts and nuts to the specified torque.

NOTE

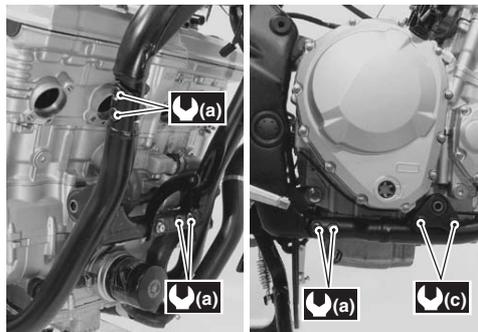
The frame down tube nuts are self-locking. Once the nuts have been removed, they are no longer of any use.

Tightening torque

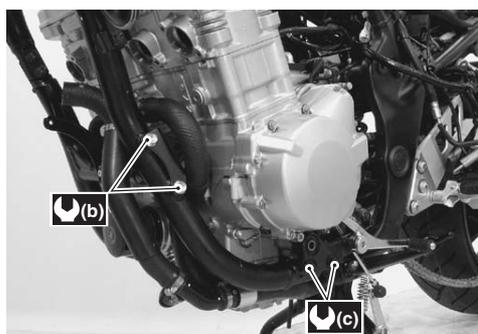
Frame down tube bolt (a): 50 N·m (5.0 kgf-m, 36.0 lb-ft)

Engine mounting No.1 bracket bolts (b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)

Engine mounting No.2 bracket bolts (c): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



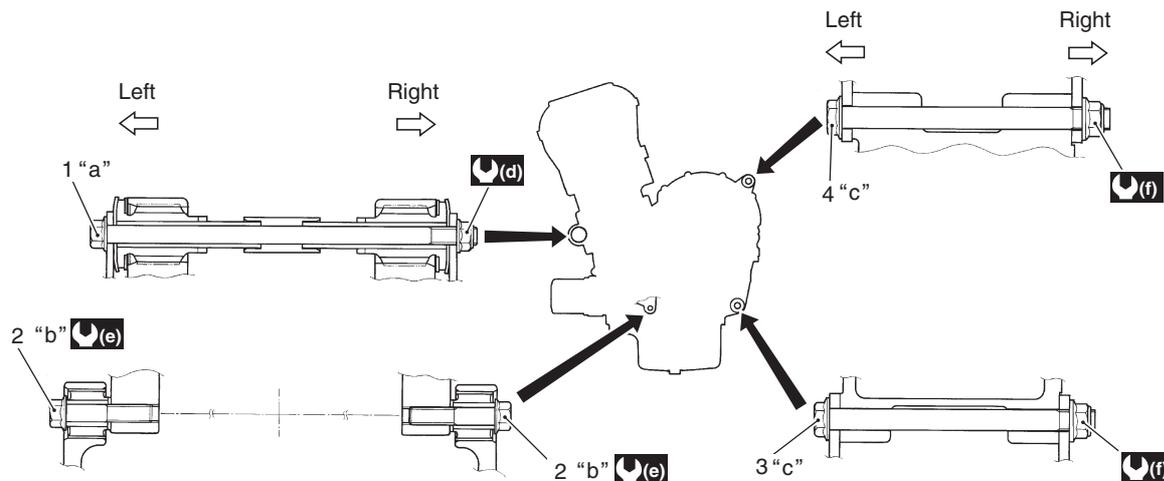
I718H1140373-01



I718H1140374-01

1D-22 Engine Mechanical:

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



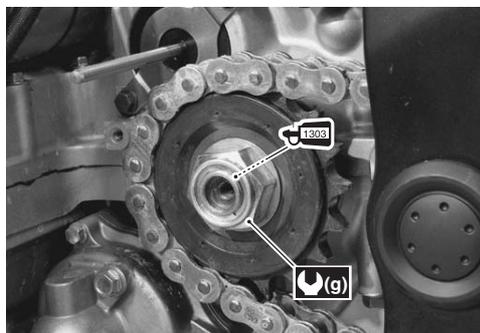
I718H1140375-02

1. Engine mounting bolt (Front upper)	"a": 215 mm (8.5 in)	(e) : 47 N·m (4.7 kgf-m, 34.0 lb-ft)
2. Engine mounting bolt (Center lower)	"b": 50 mm (2.0 in)	(f) : 88 N·m (8.8 kgf-m, 63.5 lb-ft)
3. Engine mounting bolt (Rear lower)	"c": 155 mm (6.1 in)	
4. Engine mounting bolt (Rear upper)	(d) : 55 N·m (5.5 kgf-m, 40.0 lb-ft)	

- Apply **THREAD LOCK SUPER** to the driveshaft.
 - 1303** : Thread lock cement 99000-32030 (**THREAD LOCK CEMENT SUPER 1303** or equivalent)
- Tighten the engine sprocket nut to the specified torque.

Tightening torque

Engine sprocket nut (g): 115 N·m (11.5 kgf-m, 83.0 lb-ft)



I718H1140376-01

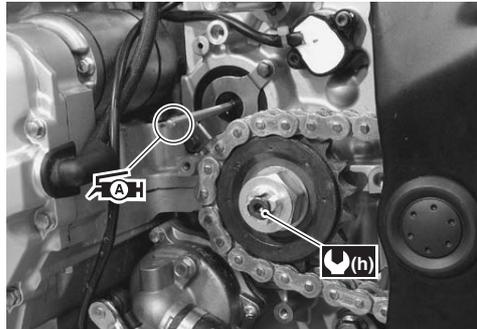
- Tighten the speed sensor rotor bolt to the specified torque.

Tightening torque

Speed sensor rotor bolt (h): 25 N·m (2.5 kgf-m, 18.0 lb-ft)

- Before installing the engine sprocket inner cover, apply a small quantity of SUZUKI SUPER GREASE to the clutch push rod.

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

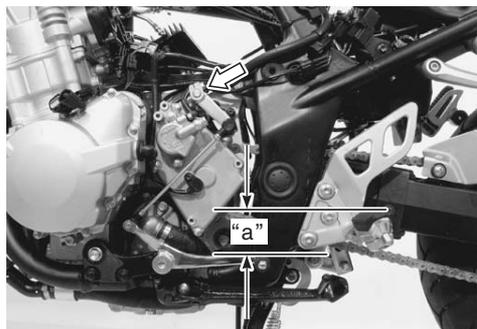


I718H1140377-01

- Install the engine sprocket inner cover. Refer to “Engine Sprocket Removal and Installation in Section 3A (Page 3A-2)”.
- Install the gearshift link arm to the gearshift shaft in the correct position.

Gearshift lever height “d”

Standard: 45 – 55 mm (1.8 – 2.2 in)



I718H1140378-01

- Install the exhaust pipe assembly and muffler. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)”.
- Install the radiator. Refer to “Radiator / Cooling Fan Motor Removal and Installation in Section 1F (Page 1F-5)”.
- Install the throttle body. Refer to “Throttle Body Removal and Installation (Page 1D-9)”.
- After remounting the engine, route the wiring harness, cable and hoses properly. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-8)”, “Throttle Cable Routing Diagram (Page 1D-2)” and “Water Hose Routing Diagram in Section 1F (Page 1F-3)”.
- Pour engine coolant and engine oil. Refer to “Cooling System Inspection in Section 0B (Page 0B-12)” and “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.
- After finishing the engine installation, check the following items.
 - Throttle cable play
Refer to “Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-12)”.
 - Throttle valve synchronization
Refer to “Throttle Valve Synchronization (Page 1D-15)”.
 - Drive chain slack
Refer to “Drive Chain Inspection and Adjustment in Section 0B (Page 0B-15)”.
 - Engine oil and coolant leakage
Refer to “Cooling Circuit Inspection in Section 1F (Page 1F-4)”.

1D-24 Engine Mechanical:

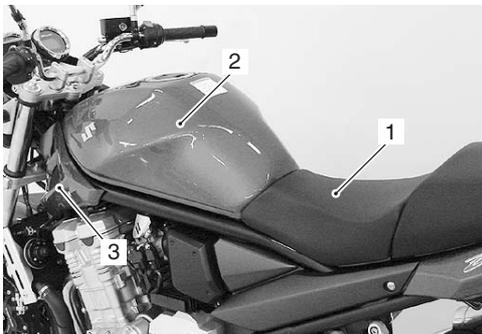
Engine Top Side Disassembly

B718H11406006

⚠ CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (e.g., intake, exhaust) so that they can be reinstalled in their original positions.

- 1) Remove the seat (1) and disconnect the battery (-) lead wire.
- 2) Remove the fuel tank (2). Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
- 3) Remove the frame head covers (3) (GSF1250/A) or cowling (GSF1250S/SA). Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".



I718H1140001-02

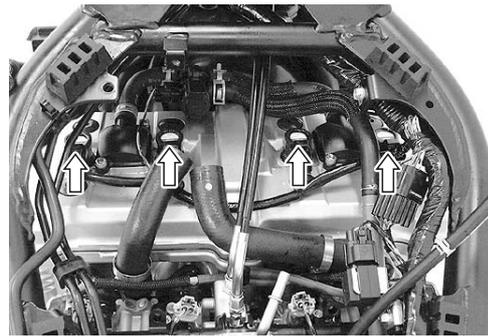
- 4) Drain engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-12)".
- 5) Disconnect the water hoses and remove the thermostat connector (4) along with bracket.



I718H1140002-01

Ignition Coil / Plug Cap

- 1) Disconnect all lead wire couplers from ignition coil / plug caps.
- 2) Remove the ignition coil caps. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)".



I718H1140007-01

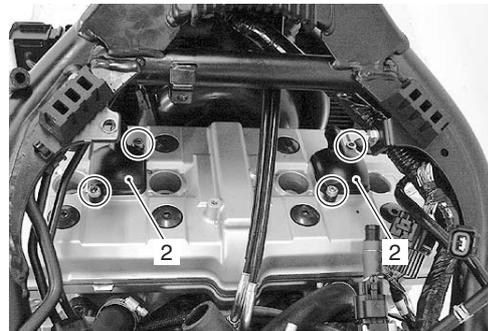
PAIR System

- 1) Disconnect the PAIR hoses and lead wire coupler.
- 2) Remove the PAIR control solenoid valve (1).



I718H1140008-01

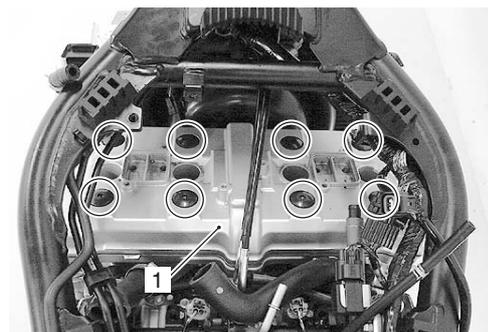
- 3) Remove the PAIR reed valve covers (2) and reed valves.



I718H1140009-01

Cylinder Head Cover

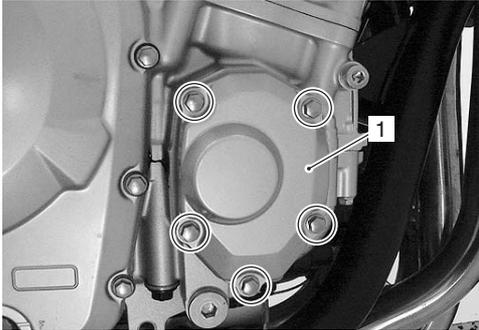
Remove the cylinder head cover (1) and its gasket.



I718H1140010-01

Camshaft

- 1) Remove the right crankshaft cover (1).



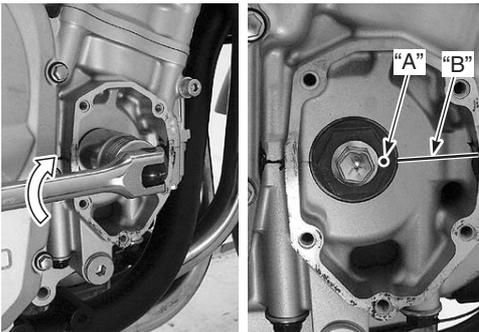
I718H1140011-01

- 2) Remove all of the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)".

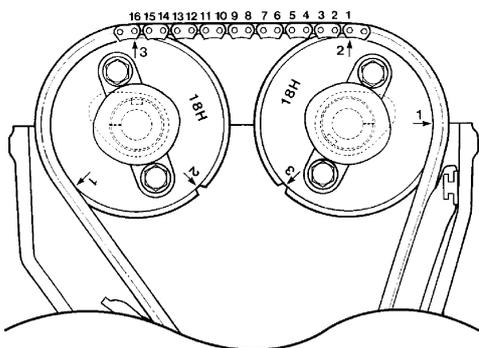
Special tool

 : 09930-10121 (Spark plug wrench set)

- 3) Turn the crankshaft clockwise and align the match mark "A" on the crankshaft with the mating surfaces "B" of the crankcases. Also position each of the camshaft as shown.

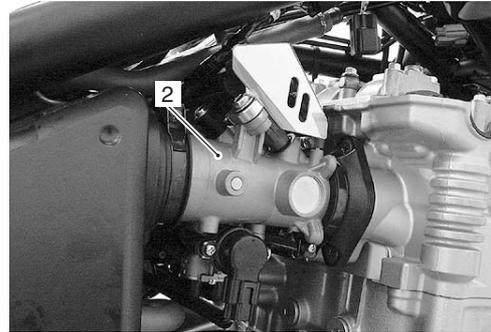


I718H1140012-02



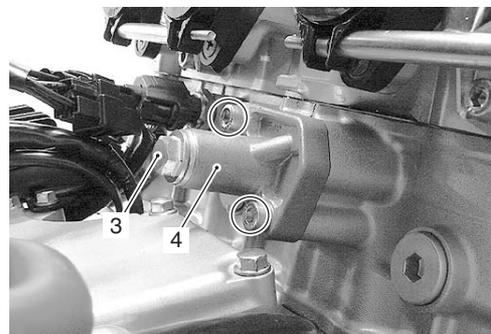
I718H1140394-01

- 4) Remove the throttle body (2). Refer to "Throttle Body Removal and Installation (Page 1D-9)".



I718H1140022-01

- 5) Remove the cam chain tension adjuster cap bolt (3) and spring.
- 6) Remove the cam chain tension adjuster (4).

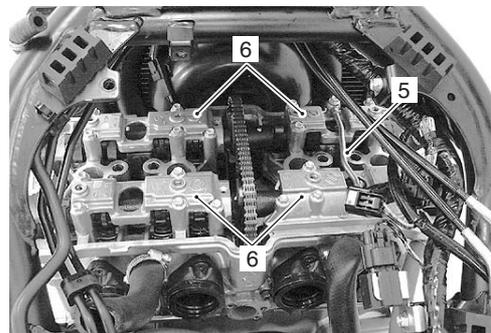


I718H1140033-01

- 7) Remove the oil pipe (5) and camshaft journal holders (6).

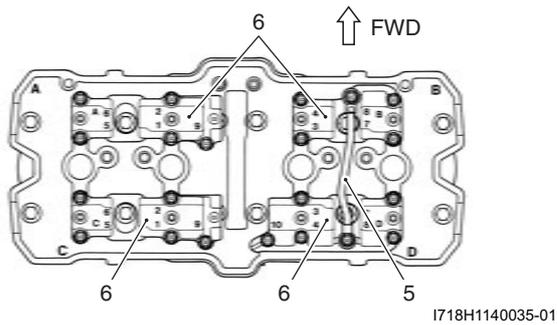
⚠ CAUTION

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

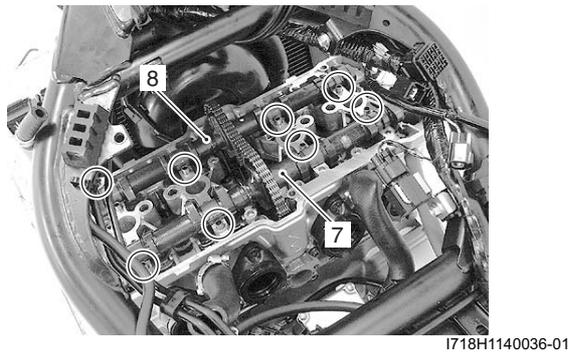


I718H1140034-01

1D-26 Engine Mechanical:

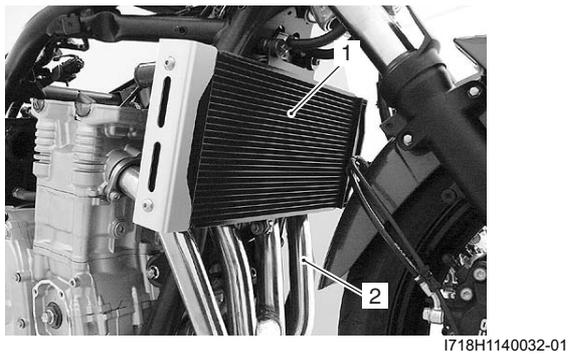


- 8) Remove the intake (7) and exhaust camshafts (8).
- 9) Remove the dowel pins.

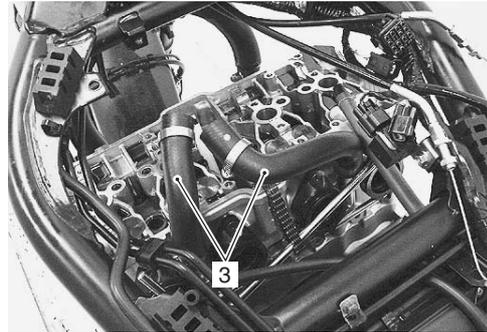


Cylinder Head

- 1) Remove the radiator (1). Refer to "Radiator / Cooling Fan Motor Removal and Installation in Section 1F (Page 1F-5)".
- 2) Remove the exhaust pipe assembly (2) and muffler. Refer to "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)".



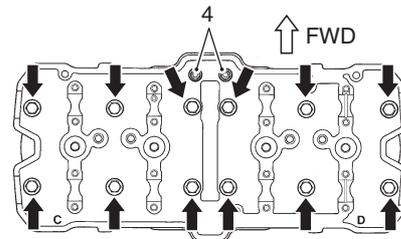
- 3) Remove the water hoses (3).



- 4) Remove the cylinder head bolts (L65) (4).
- 5) Remove the cylinder head bolts (L175) and washers.

NOTE

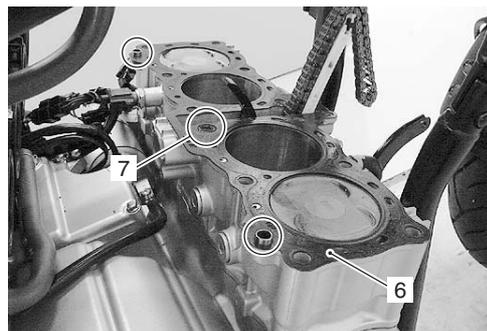
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.



- 6) Remove the cylinder head (5).

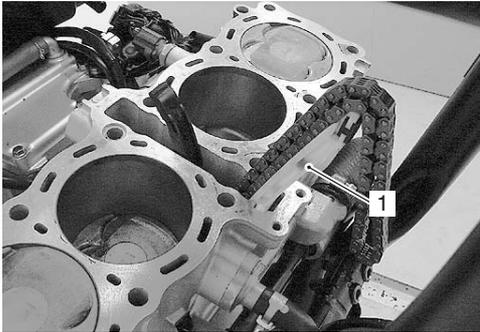


- 7) Remove the cylinder head gasket (6), O-ring (7) and dowel pins.



Cam Chain No.1 Guide

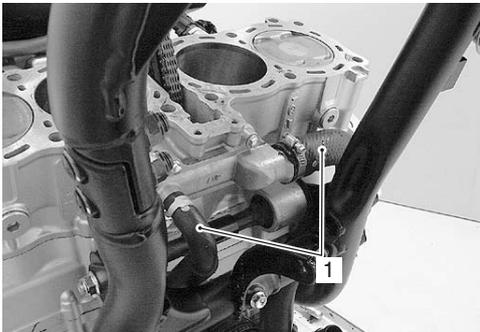
Remove the cam chain No.1 guide (1).



I718H1140041-01

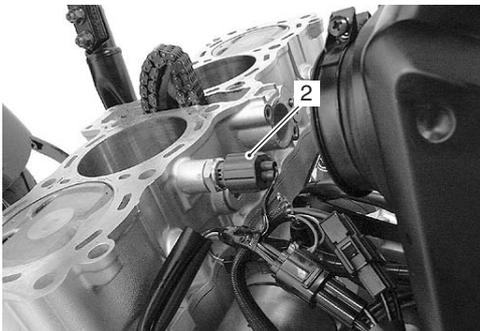
Cylinder

1) Disconnect the water hoses (1).



I718H1140042-01

2) Disconnect the ECT sensor coupler (2).

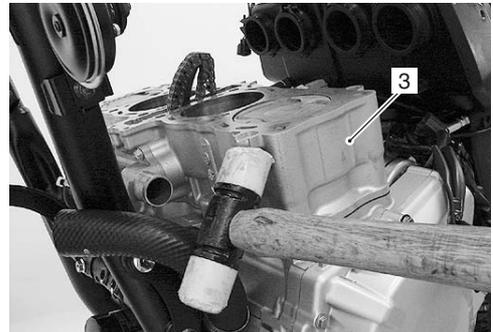


I718H1140043-02

3) Remove the cylinder (3).

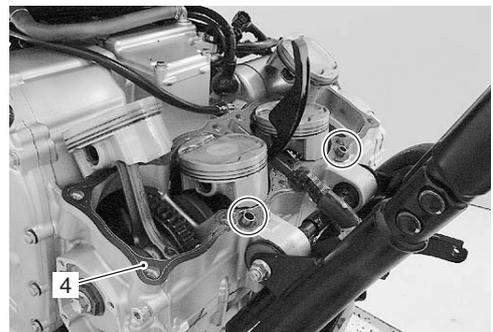
NOTE

If the cylinder does not come off easily, lightly tap it using a plastic hammer.



I718H1140044-02

4) Remove the cylinder gasket (4) and dowel pins.



I718H1140045-02

Piston

1) Place a clean rag over the cylinder base so as not to drop the piston pin circlips into the crankcase.

2) Remove each piston pin circlip (1).



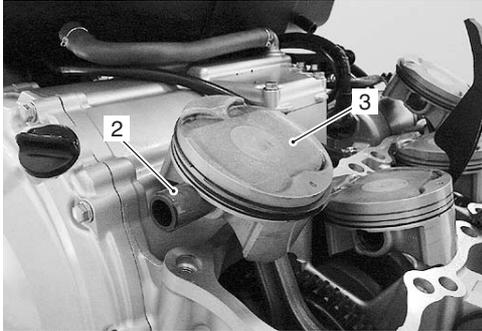
I718H1140046-02

1D-28 Engine Mechanical:

- 3) Draw out each piston pin (2) and remove the pistons (3).

NOTE

Scribe the cylinder number on the piston head.



I718H1140047-02

Engine Top Side Assembly

B718H11406007

Assemble the engine top side in the reverse order of disassembly. Pay attention to the following points:

Piston

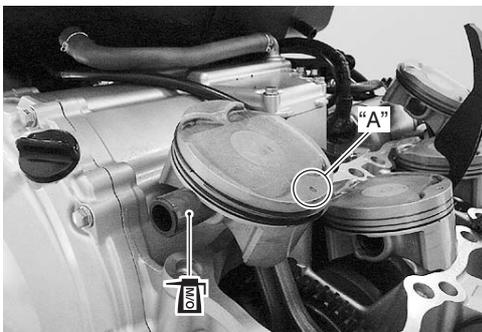
- When installing the piston pins, apply molybdenum oil solution onto each piston pin.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

- Install the pistons and piston pins.

NOTE

- Be sure to install the pistons in the cylinders from which they were removed in disassembly, refer to the cylinder numbers, #1 through #4, scribed on the piston.
- When installing the pistons, the indent "A" on the piston head must be faced to each exhaust side.



I718H1140048-01

- Place a clean rag over the cylinder base so as not to drop the piston pin circlips (1) into the crankcase.
- Install the piston pin circlips (1).

CAUTION

Use new piston pin circlips (1) to prevent circlip failure which will occur when it is bent.

NOTE

End gap of the circlip (1) should not be aligned with the cutaway in the piston pin bore.



I718H1140049-02

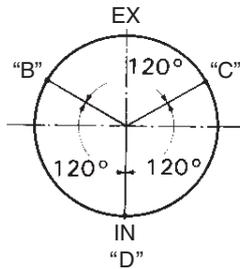
CAUTION

When turning the crankshaft, pull the cam chain upward, or the chain will be caught between the crankcase and the cam drive sprocket.



I718H1140050-01

- Position the piston ring gaps as shown. Before inserting each piston into its cylinder, check that the gaps are properly positioned.



I718H1140051-01

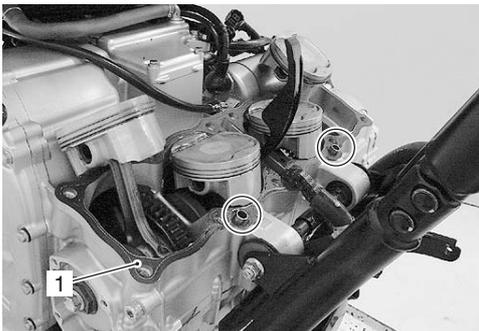
"B": 2nd ring and lower side rail
"C": Upper side rail
"D": 1st ring and spacer

Cylinder

- Install the dowel pins and cylinder gasket (1).

CAUTION

Replace the cylinder gasket (1) with a new one.



I718H1140052-03

- Apply molybdenum oil solution to the sliding surface of the pistons.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I718H1140053-02

- Install each special tool to the #2 and #3 pistons.

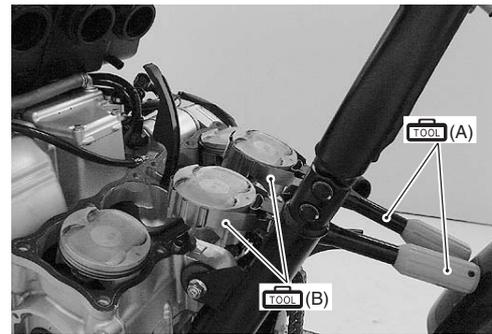
NOTE

Do not overtighten the bands, or piston installation into the cylinders will be difficult.

Special tool

TOOL (A): 09916-74521 (Holder body)

TOOL (B): 09916-74550 (Band (Piston diam.: 73 – 85 mm))



I718H1140054-02

- Apply engine oil to the sliding surface of the cylinder.
- Insert the #2 and #3 pistons into the cylinder.

NOTE

Some light resistance must be overcome to lower the cylinder.

- After inserting the #2 and #3 pistons in place, insert the #1 and #4 pistons in the same manner of the #2 and #3 pistons.

NOTE

When installing the cylinder, keep the cam chain taut. The cam chain must not be caught between cam drive sprocket and crankcase when turning the crankshaft.



I718H1140055-03

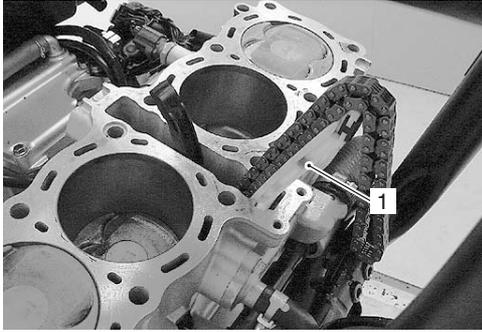
1D-30 Engine Mechanical:

Cam Chain No.1 Guide

- Pull the cam chain out of the cylinder and install the cam chain guide (1).

CAUTION

Be sure that the cam chain guide (1) is installed properly.



I718H1140041-01

Cylinder Head

- Install the dowel pins, O-ring (1) and cylinder head gasket (2).

CAUTION

Replace the O-ring (1) and cylinder head gasket (2) with new ones.



I718H1140057-01

- Place the cylinder head on the cylinder (3).

NOTE

When installing the cylinder head (3), keep the cam chain taut.



I718H1140058-01

- Apply engine oil to the bolt threads and both sides of washers.
- Tighten the cylinder head bolts (L175) to the specified two-step torque with a torque wrench sequentially and diagonally.

Tightening torque

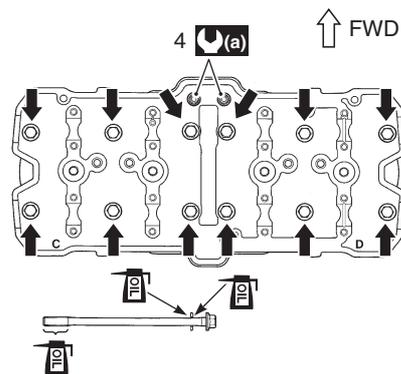
Cylinder head bolt (L175) (initial): 25 N·m (2.5 kgf-m, 18.0 lb-ft)

Cylinder head bolt (L175) (Final): 42 N·m (4.2 kgf-m, 30.5 lb-ft)

- After firmly tightening the cylinder head bolts (L175), install the cylinder head bolts (L65) (4).
- Tighten the cylinder head bolts (4) to the specified torque.

Tightening torque

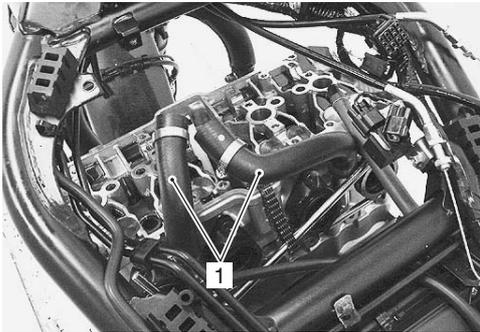
Cylinder head bolt (L65) (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I718H1140392-01

Water Hose

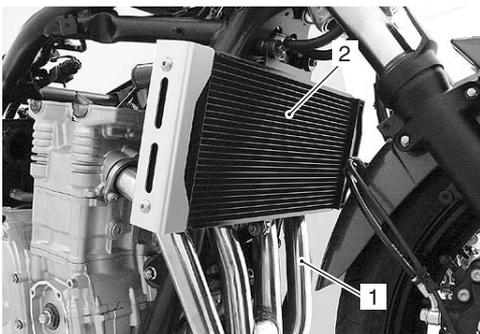
- Install the water hoses (1). Refer to "Water Hose Routing Diagram in Section 1F (Page 1F-3)".



I718H1140060-01

Exhaust Pipe / Muffler

- Install the exhaust pipe assembly (1), muffler and radiator (2). Refer to "Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-3)" and "Radiator / Cooling Fan Motor Removal and Installation in Section 1F (Page 1F-5)".



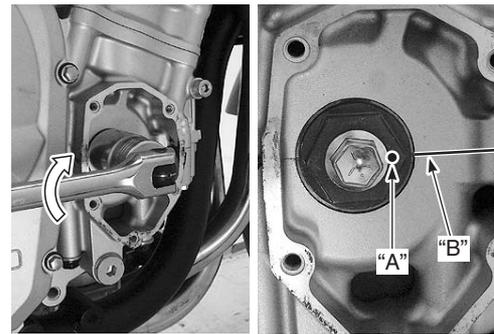
I718H1140061-01

Camshaft

- Turn the crankshaft clockwise and align the match mark "A" on the crankshaft with the mating surfaces "B" of crankcases.

⚠ CAUTION

- Pull the cam chain upward, or the chain will be caught between crankcase and cam drive sprocket.
- To adjust the camshaft timing correctly, be sure to align the match mark "A" with the mating surfaces "B" and hold this position when installing the camshafts.

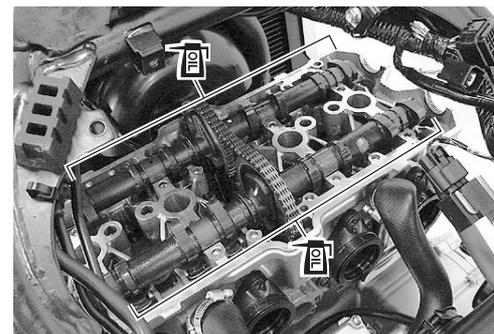


I718H1140062-02

- Before replacing the camshafts on cylinder head, apply engine oil to their journals and cam faces.
- Apply engine oil to the camshaft journal holders.

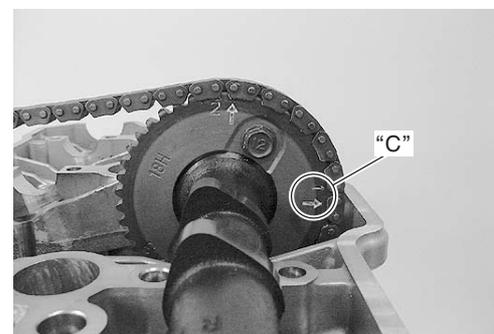
NOTE

- Before installing the camshaft, check that the tappets are installed correctly.
- The camshafts are identified by the embossed letters.



I718H1140063-01

- Pull the cam chain lightly.
- The exhaust camshaft sprocket has an arrow marked "1" "C". Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the exhaust camshaft sprocket.



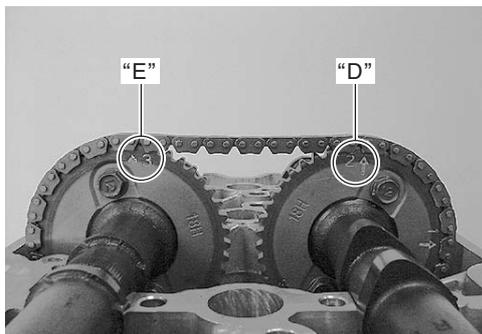
I718H1140064-01

1D-32 Engine Mechanical:

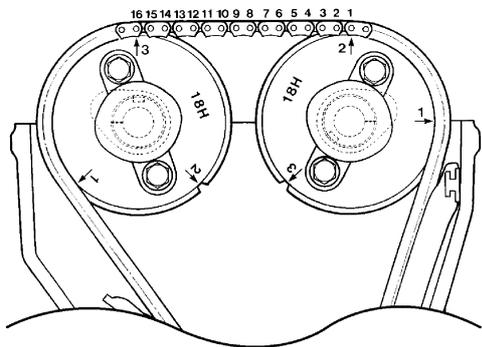
- The other arrow marked "2" "D" should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked "2" "D", count out 16 roller pins (from the exhaust camshaft side going towards the intake camshaft side).
- Engage the 16th roller pin "E" on the cam chain with the marked "3" on the intake sprocket.

NOTE

The cam chain should now be on all three sprockets. Be careful not to move the crankshaft until the camshaft journal holders and cam chain tension adjuster are secured.

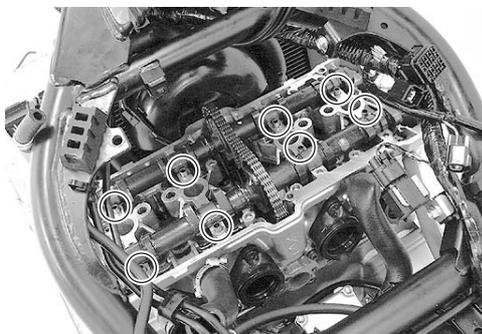


I718H1140065-01



I718H1140394-01

- Install the dowel pins.



I718H1140387-01

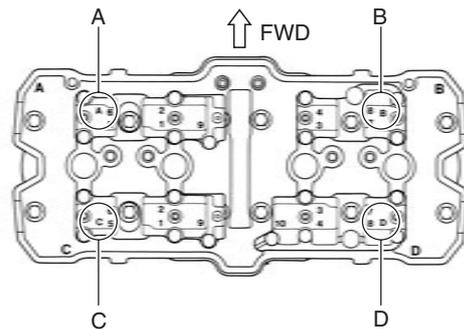
- Install the camshaft journal holders.

⚠ CAUTION

Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.

NOTE

Each camshaft journal holder is identified with an embossed letter.



I718H1140068-01

- Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts lightly, in the ascending order of numbers.

⚠ CAUTION

The camshaft journal holder bolts are made of a special material and much superior in strength, compared with other types of high strength bolts. Take special care not to use other types of bolts.

NOTE

The ascending order of numbers are indicated on the camshaft journal holders.

- Tighten the camshaft journal holder bolts in the ascending order of numbers to the specified torque.

Tightening torque

Camshaft journal holder bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

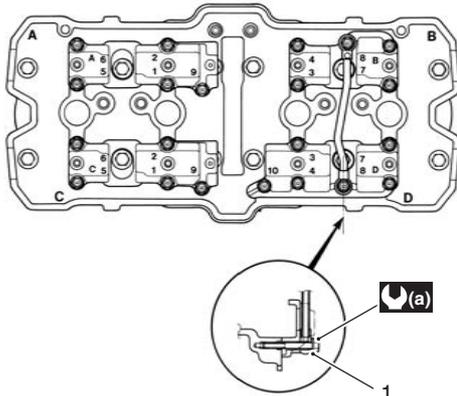
- Install the oil pipe and tighten the mounting bolts to specified torque.

NOTE

Fit the washer (1) to each oil pipe mounting bolt.

Tightening torque

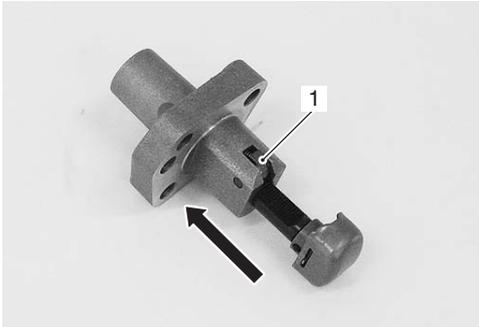
Oil pipe mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I718H1140069-01

Cam Chain Tension Adjuster

- Retract the push rod by pushing the stopper (1).



I718H1140070-03

- Install a new gasket (2).

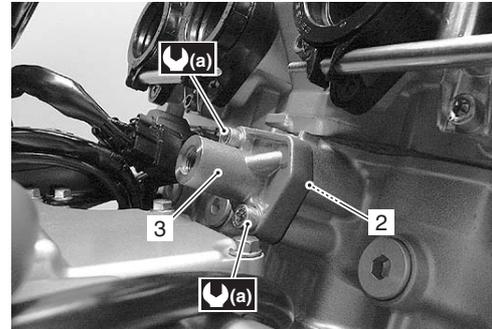
CAUTION

Use a new gasket to prevent oil leakage.

- Install the cam chain tension adjuster (3) and tighten its mounting bolts.

Tightening torque

Cam chain tension adjuster mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I718H1140071-03

- Install the spring (4).
- Install the gasket (5) and cam chain tension adjuster cap bolt (6).

NOTE

Click sound is heard when the cam chain tension adjuster cap bolt is installed.

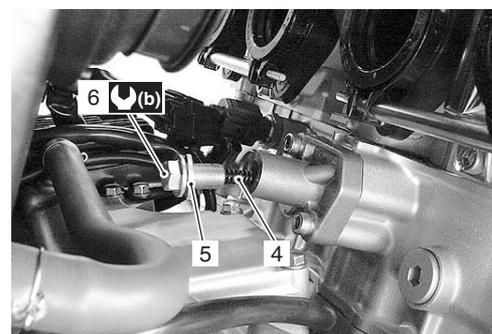
- Tighten the cam chain tension adjuster cap bolt (6) to the specified torque.

Tightening torque

Cam chain tension adjuster cap bolt (b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)

CAUTION

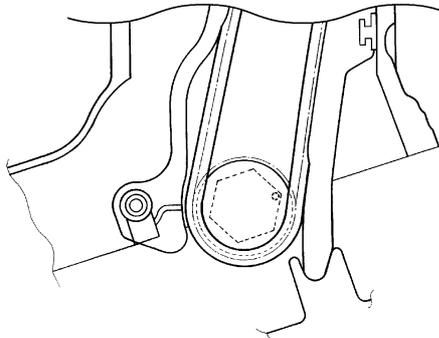
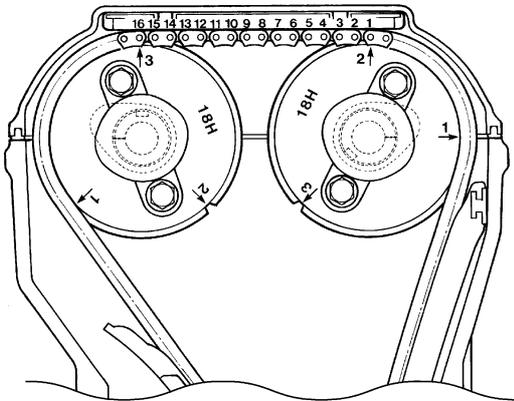
After installing the cam chain tension adjuster, check to be sure that the adjuster works properly by checking the slack of cam chain.



I718H1140072-03

1D-34 Engine Mechanical:

- After installing the cam chain tension adjuster, rotate the crankshaft (some turns), and recheck the positions of the camshafts.

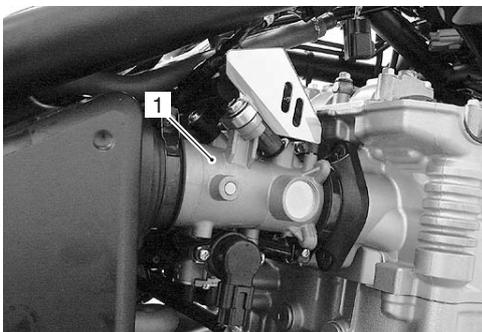


I718H1140396-01

- Be sure to check and adjust the valve clearance. Refer to "Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-5)".

Throttle Body

- Install the throttle body (1). Refer to "Throttle Body Removal and Installation (Page 1D-9)".

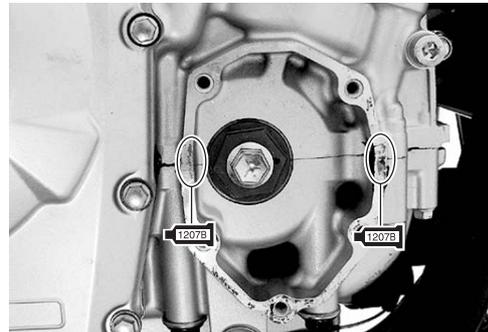


I718H1140074-02

Right Crankshaft Cover

- Apply SUZUKI BOND lightly to the mating surfaces at the parting line between the upper and lower crankcases as shown.

1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)

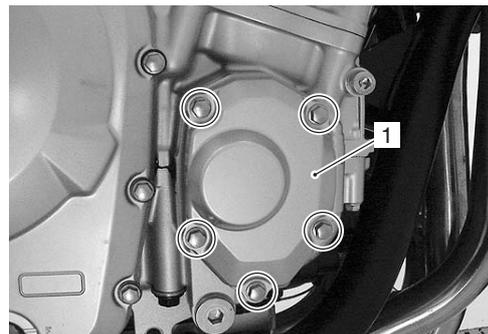


I718H1140075-03

- Install the gasket and right crankcase cover (1).

CAUTION

Use a new gasket to prevent oil leakage.



I718H1140077-01

Spark Plug

- Install the spark plugs. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)".

Cylinder Head Cover

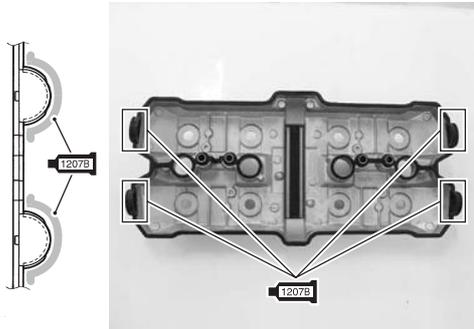
- Install a new gasket to the cylinder head cover.

CAUTION

Use the new gasket to prevent oil leakage.

- Apply SUZUKI BOND to the cam end caps of the gasket as shown.

■ **1207B** : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)



I718H1140076-01

- Apply engine oil to both sides of the gaskets.

⚠ CAUTION

Use the gaskets with new ones to prevent oil leakage.

- Tighten the cylinder head cover bolts (4) to the specified torque.

Tightening torque

Cylinder head cover bolt: 14 N·m (1.4 kgf·m, 10.0 lb-ft)



I718H1140078-01

PAIR System

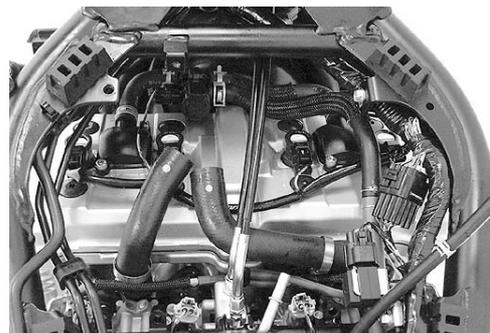
- Install the PAIR component parts. Refer to "PAIR Reed Valve Removal and Installation in Section 1B (Page 1B-6)".



I718H1140079-01

Ignition Coil / Plug Cap and Spark

- Install the ignition coil/plug caps. Refer to "Ignition Coil / Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)".



I718H1140080-01

Thermostat Inlet Connector

- Install the thermostat connector and pour engine coolant. Refer to "Thermostat Connector / Thermostat Removal and Installation in Section 1F (Page 1F-9)" and "Cooling System Inspection in Section 0B (Page 0B-12)".



I718H1140151-01

1D-36 Engine Mechanical:

Valve Clearance Inspection and Adjustment

B718H11406008

Refer to "Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-5)".

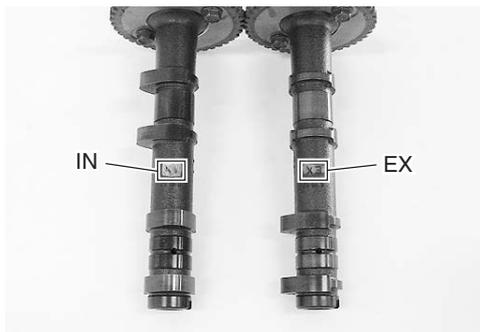
Camshaft Inspection

B718H11406009

Refer to "Engine Top Side Disassembly (Page 1D-24)".
Refer to "Engine Top Side Assembly (Page 1D-28)".

Camshaft Identification

The exhaust camshaft has the embossed letters "EX" and the intake camshaft has the embossed letters "IN".



I718H1140081-01

Cam Wear

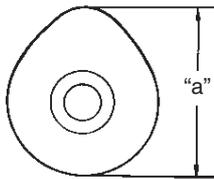
Check the camshaft for wear or damage.
Measure the cam height "a" with a micrometer.
Replace a camshaft if the cams are worn to the service limit.

Special tool

TOOL : 09900-20202 (Micrometer (1/100 mm, 25 – 50 mm))

Cam height "a"

Service limit: (IN) 34.98 mm (1.377 in)
Service limit: (EX) 33.88 mm (1.334 in)



I649G1140199-01

Camshaft Runout

Measure the runout using the dial gauge. Replace the camshaft if the runout exceeds the limit.

Special tool

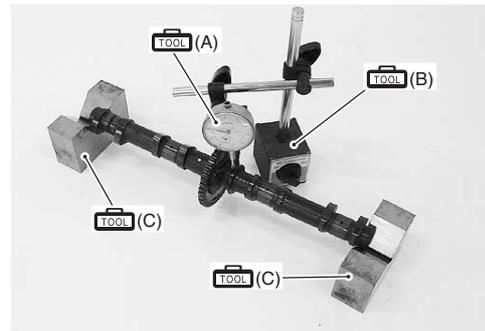
TOOL (A): 09900-20607 (Dial gauge (1/100 mm, 10 mm))

TOOL (B): 09900-20701 (Magnetic stand)

TOOL (C): 09900-21304 (V-block (100 mm))

Camshaft runout (IN & EX)

Service limit: 0.10 mm (0.004 in)



I718H1140082-01

Camshaft Journal Wear

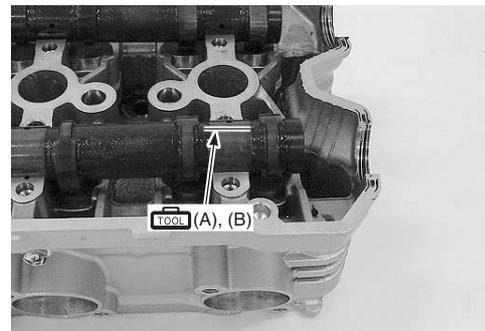
Inspect the camshaft journal wear in the following procedures:

- 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 plastigauge to read the clearance at the widest portion, which is specified as follows.

Special tool

TOOL (A): 09900-22301 (Plastigauge (0.025 - 0.076 mm))

TOOL (B): 09900-22302 (Plastigauge (0.051 - 0.152 mm))



I718H1140083-03

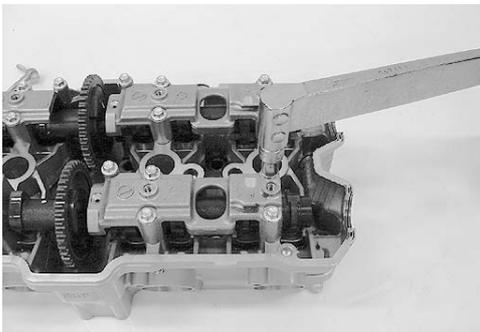
- 3) Install each camshaft journal holder to its original position. Refer to "Engine Top Side Assembly (Page 1D-28)".
- 4) Tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque. Refer to "Engine Top Side Assembly (Page 1D-28)".

NOTE

Do not rotate the camshafts with the plastigauge in place.

Tightening torque

Camshaft journal holder bolt: 10 N·m (1.0 kgf·m, 7.0 lb·ft)

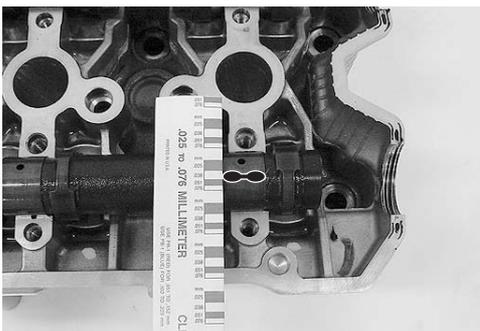


I718H1140084-01

- 5) Remove the camshaft journal holders and measure the width of the compressed plastigauge using the envelope scale.
- 6) This measurement should be taken at the widest part of the compressed plastigauge.

Camshaft journal oil clearance (IN & EX)

Service limit: 0.150 mm (0.0059 in)



I718H1140085-01

- 7) If the camshaft journal oil clearance exceeds the limit, measure the inside diameter of the camshaft journal holder and the outside diameter of the camshaft journal. Replace the camshaft or the cylinder head depending upon which one exceeds the specification.

Special tool

TOOL (C): 09900-20602 (Dial gauge (1/1000 mm, 1 mm))

TOOL (D): 09900-22403 (Small bore gauge (18 – 35 mm))

Camshaft journal holder I.D. (IN & EX)

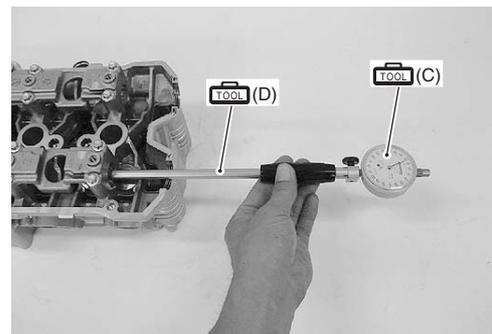
Standard: 24.012 – 24.025 mm (0.9454 – 0.9459 in)

Special tool

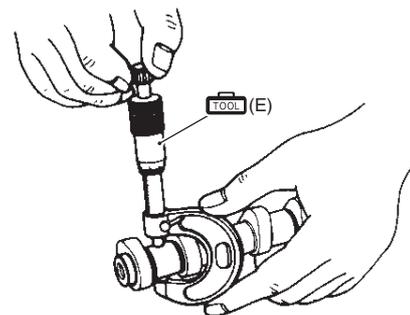
TOOL (E): 09900-20205 (Micrometer (0 – 25 mm))

Camshaft journal O.D. (IN & EX)

Standard: 23.959 – 23.980 mm (0.9433 – 0.9441 in)



I718H1140086-01



I649G1140204-02

1D-38 Engine Mechanical:

Camshaft Sprocket Inspection

B718H11406010

Inspect the camshaft sprocket in the following procedures:

- 1) Remove the intake and exhaust camshafts. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 2) Inspect the teeth of each camshaft sprocket for wear or damage.
If they are worn or damaged, replace the sprockets and cam chain as a set.



I718H1140087-01

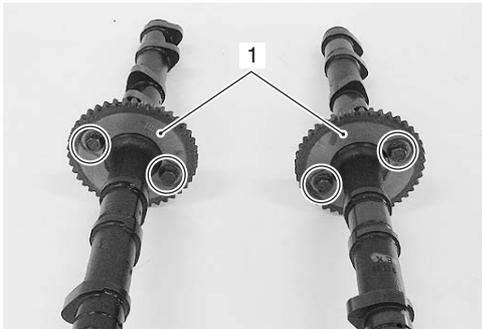
- 3) Install the camshafts. Refer to "Engine Top Side Assembly (Page 1D-28)".

Camshaft Sprocket Removal and Installation

B718H11406011

Removal

- 1) Remove the camshafts. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 2) Remove the camshaft sprockets (1).



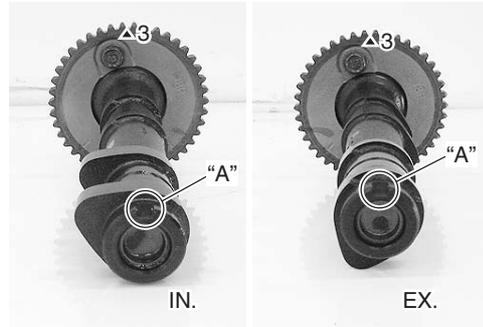
I718H1140088-02

Installation

- 1) Set the camshaft sprocket to the camshafts.

NOTE

Align the arrow mark "3" on camshaft sprocket with the notch "A" on the camshaft.



I718H1140089-02

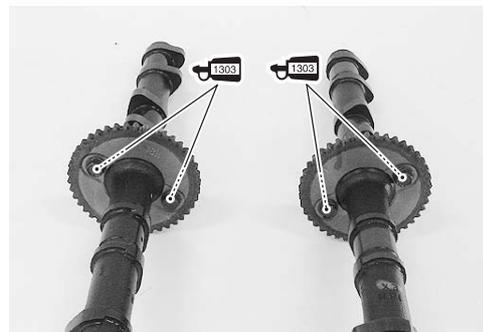
- 2) Apply THREAD LOCK SUPER to the threads of the camshaft sprocket bolts and then tighten them to the specified torque.

1303 : Thread lock cement 99000-32030 (Thread Lock Cement Super 1303 or equivalent)

Tightening torque

Camshaft sprocket bolt (Initial): 16 N·m (1.6 kgf-m, 11.5 lb-ft)

Camshaft sprocket bolt (Final): 25 N·m (2.5 kgf-m, 18.0 lb-ft)



I718H1140090-02

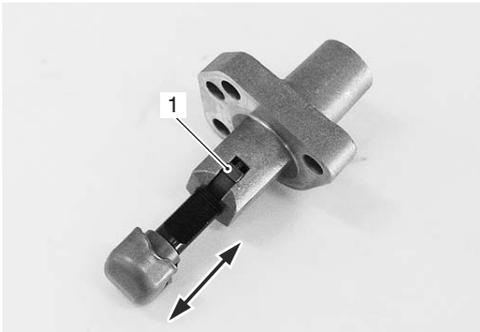
- 3) Install the camshafts. Refer to "Engine Top Side Assembly (Page 1D-28)".

Cam Chain Tension Adjuster Inspection

B718H11406012

The cam chain tension adjuster is maintained at the proper tension by an automatically adjusted.

- 1) Remove the cam chain tension adjuster. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 2) Check that the push rod slides smoothly when releasing stopper (1). If it does not slide smoothly, replace the cam chain tension adjuster with a new one.



I718H1140091-01

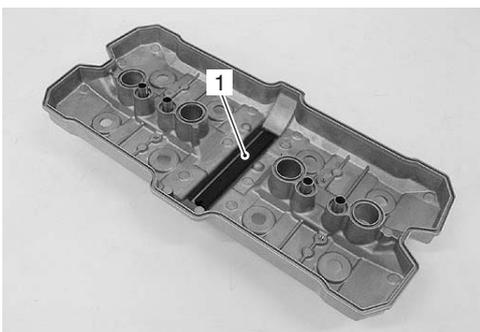
- 3) Install the cam chain tension adjuster. Refer to "Engine Top Side Assembly (Page 1D-28)".

Cam Chain Guide Removal and Installation

B718H11406013

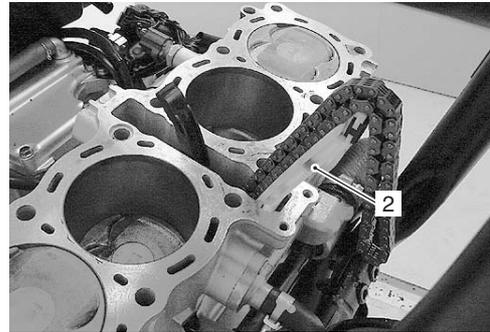
Removal

- 1) Remove the cylinder head cover. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 2) Remove the cam chain No.2 guide (1) from the cylinder head cover.



I718H1140092-01

- 3) Remove the cylinder head. Refer to "Engine Top Side Disassembly (Page 1D-24)".
- 4) Remove the cam chain No.1 guide (2).



I718H1140056-02

Installation

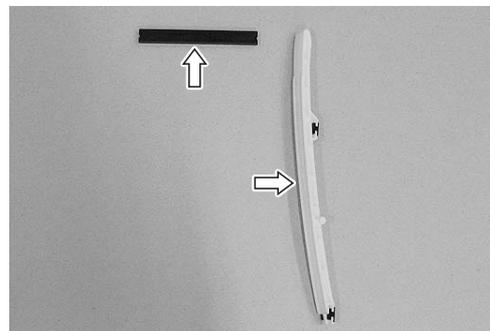
Install the cam chain guides in the reverse order of removal.

Cam Chain Guide Inspection

B718H11406014

Inspect the cam chain guide in the following procedures:

- 1) Remove the cam chain guides. Refer to "Cam Chain Guide Removal and Installation (Page 1D-39)".
- 2) Check the contacting surface of the cam chain guide. If it is worn or damaged, replace it with a new one.



I718H1140095-01

- 3) Install the cam chain guides. Refer to "Cam Chain Guide Removal and Installation (Page 1D-39)".

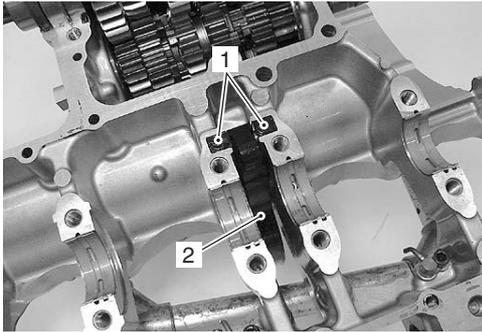
1D-40 Engine Mechanical:

Cam Chain Tensioner Inspection

B718H11406015

Inspect the cam chain tensioner in the following procedures:

- 1) Separate the crankcases, upper and lower. Refer to "Engine Bottom Side Disassembly (Page 1D-53)".
- 2) Remove the crankshaft assembly from the upper crankcase. Refer to "Engine Bottom Side Disassembly (Page 1D-53)".
- 3) Remove the dampers (1) of the cam chain tensioner.
- 4) Remove the cam chain tensioner (2) and pin.



I718H1140096-01

- 5) Check the contacting surface of the cam chain tensioner. If it is worn or damaged, replace it with a new one.



I718H1140097-01

- 6) Install the pin, cam chain tensioner and dampers.
- 7) Reinstall the crankshaft assembly. Refer to "Engine Bottom Side Assembly (Page 1D-61)".
- 8) Reassemble the crankcases, upper and lower. Refer to "Engine Bottom Side Assembly (Page 1D-61)".

Cylinder Head Disassembly and Assembly

B718H11406016

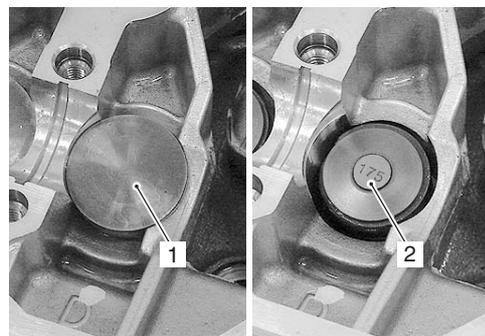
Refer to "Engine Top Side Disassembly (Page 1D-24)".
Refer to "Engine Top Side Assembly (Page 1D-28)".

⚠ CAUTION

**Identify the position of each removed part.
Organize the parts in their respective groups
(i.e., intake, exhaust, No.1 or No.2) so that
they can be installed in their original
locations.**

Disassembly

- 1) Remove the tappet (1) and shim (2) by fingers or magnetic hand.



I718H1140098-01

- 2) Using the special tools, compress the valve spring and remove the two cotter halves (3) from the valve stem.

⚠ CAUTION

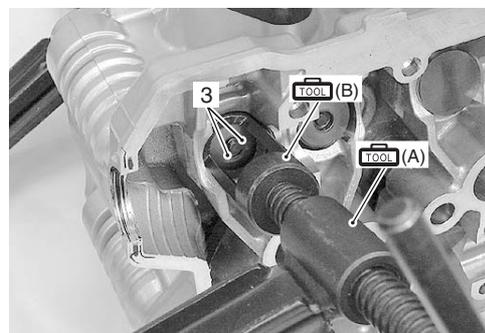
**Be careful not to damage of the tappet sliding
surface with the special tool.**

Special tool

 (A): 09916-14510 (Valve spring compressor)

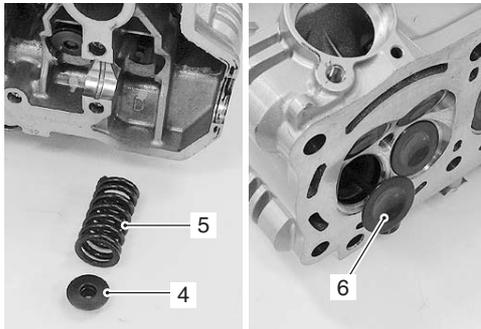
 (B): 09916-14521 (Valve spring compressor attachment)

 : 09916-84511 (Tweezers)



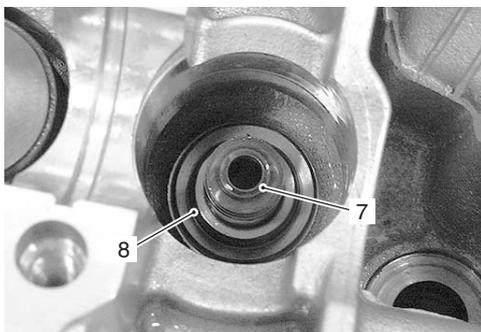
I718H1140100-01

- 3) Remove the valve spring retainer (4) and valve spring (5).
- 4) Pull out the valve (6) from the combustion chamber side.



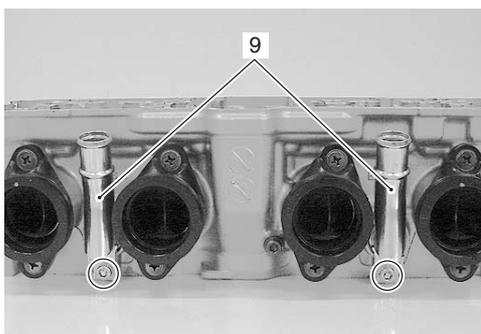
I718H1140101-01

- 5) Remove the oil seal (7) and spring seat (8).



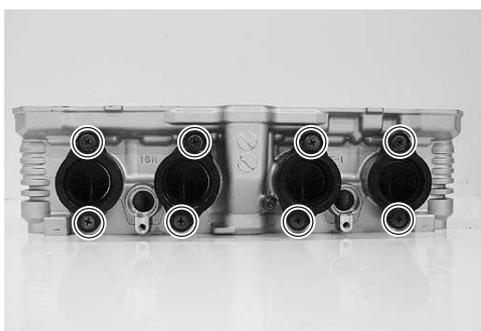
I718H1140102-01

- 6) Remove the other valves in the same manner as described previously.
- 7) Remove the water outlet pipes (9).



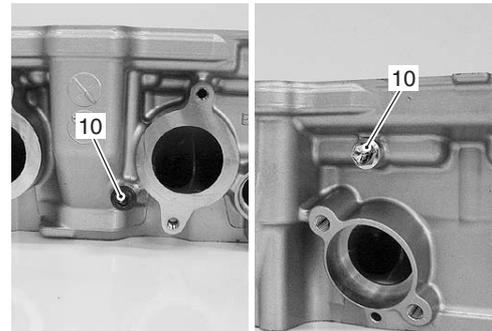
I718H1140103-01

- 8) Remove the intake pipes.



I718H1140105-01

- 9) Remove the oil gallery plugs (cylinder head) (10).



I718H1140106-01

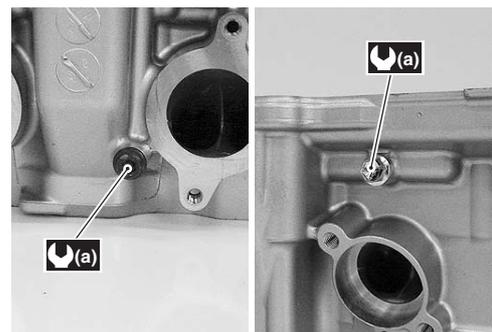
Assembly

Assembly is in the reverse order of disassembly. Pay attention to the following points:

- Tighten the oil gallery plugs (cylinder head) to the specified torque.

⚠ CAUTION

Replace the gasket with new ones.



I718H1140107-01

Tightening torque

Oil gallery plug (cylinder head) (a): 10 N·m (1.0 kgf·m, 7.0 lb·ft)

- Apply grease to O-ring of the intake pipe.

⚠ CAUTION

Replace the O-rings with new ones.

⚠ : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

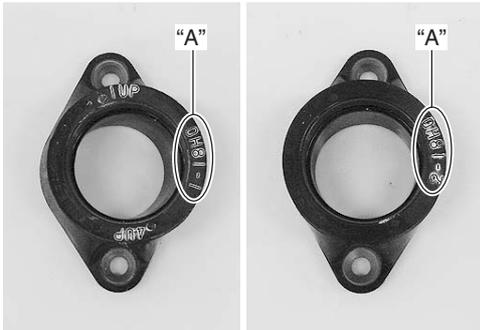


I718H1140109-01

1D-42 Engine Mechanical:

NOTE

- When replacing the intake pipes, identify the different intake pipes according to each I.D. code "A".
(1-18H0 for cylinder #1 and #4)
(2-18H0 for cylinder #2 and #3)
- Make sure that the "1 UP" mark faces up. (for cylinder #1)
- Make sure that the "4 UP" mark faces up. (for cylinder #4)



I718H1140112-04

- Apply engine coolant to O-rings of water outlet pipe.

⚠ CAUTION

Replace the O-rings with new ones.

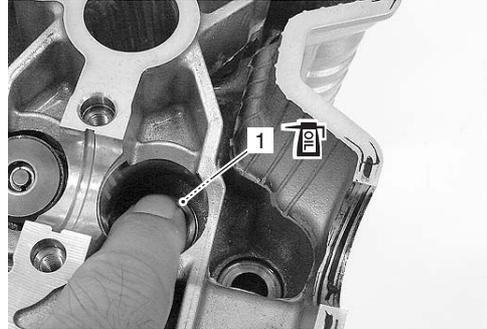


I718H1140114-01

- Install the valve spring seat.
- Apply engine oil to the oil seal (1), and press-fit it into position.

⚠ CAUTION

Do not reuse the removed oil seal.



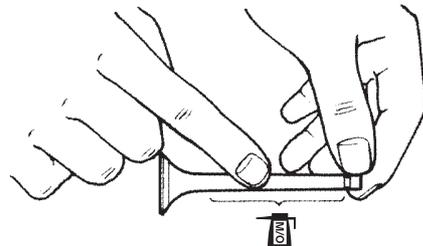
I718H1140113-03

- Insert the valve, with its stem coated with MOLYBDENUM OIL SOLUTION all around and along the full stem length without any break.

⚠ CAUTION

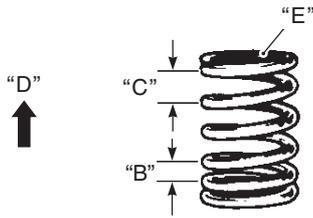
When inserting the valve, take care not to damage the lip of the oil seal.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I705H1140165-01

- Install the valve spring with the small-pitch portion “B” facing cylinder head.



I718H1140004-01

“B”: Small-pitch portion	“D”: UPWARD
“C”: Large-pitch portion	“E”: Paint

- Put on the valve spring retainer (2), and using the special tools, press down the spring, fit the cotter halves to the stem end, and release the lifter to allow the cotter halves to wedge in between retainer and stem.

CAUTION

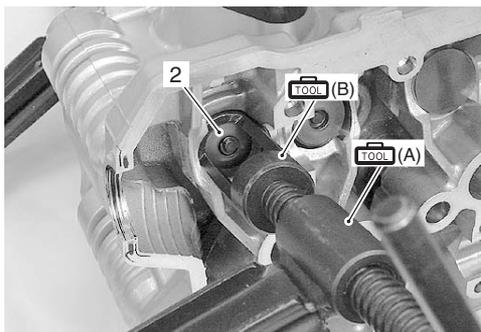
- Be sure to restore each spring and valve to their original positions.
- Be careful not to damage the valve and valve stem when handling them.
- Be careful to damage of the tappet sliding surface with the special tool.

Special tool

TOOL (A): 09916-14510 (Valve spring compressor)

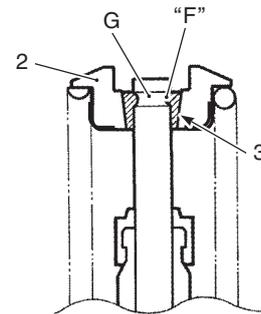
TOOL (B): 09916-14521 (Valve spring compressor attachment)

TOOL : 09916-84511 (Tweezers)



I718H1140116-02

- Be sure that the rounded lip “F” of the cotter fits snugly into the groove “G” in the stem end.



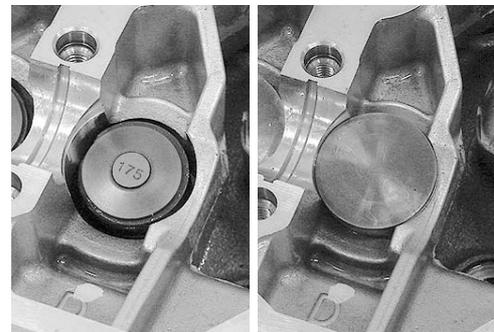
I718H1140117-02

2. Valve spring retainer	3. Cotter
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- Install the other valves and springs in the same manner as described previously.
- Install the tappet shims and the tappets to their original positions.

NOTE

- Apply engine oil to the stem end, shim and tappet before fitting them.
- When seating the tappet shim, be sure the figure printed surface faces the tappet.



I718H1140118-01

1D-44 Engine Mechanical:

Cylinder Head Related Parts Inspection

B718H11406017

Refer to "Cylinder Head Disassembly and Assembly (Page 1D-40)".

Cylinder Head Distortion

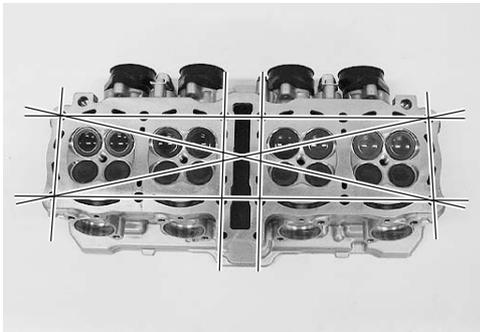
- 1) Decarbonize the combustion chambers.
- 2) Check the gasket surface of the cylinder head for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If readings exceed the service limit, replace the cylinder head.

Special tool

TOOL : 09900-20803 (Thickness gauge)

Cylinder head distortion

Service limit: 0.20 mm (0.008 in)



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Valve Stem Runout

Support the valve using V-blocks, as shown, and check its runout using the dial gauge. If the runout exceeds the service limit, replace the valve.

Special tool

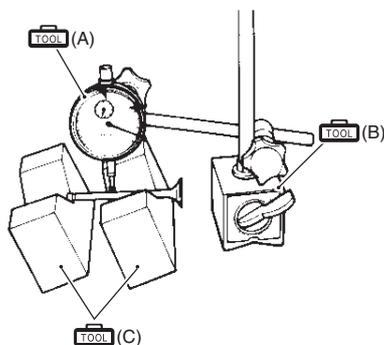
TOOL (A): 09900-20607 (Dial gauge (1/100 mm, 10 mm))

TOOL (B): 09900-20701 (Magnetic stand)

TOOL (C): 09900-21304 (V-block (100 mm))

Valve stem runout (IN. & EX.)

Service limit: 0.05 mm (0.002 in)



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Valve Head Radial Runout

Place the dial gauge at a right angle to the valve head face and measure the valve head radial runout. If it measures more than the service limit, replace the valve.

Special tool

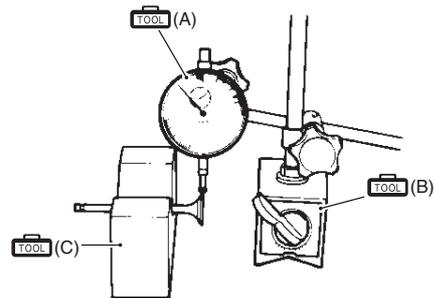
TOOL (A): 09900-20607 (Dial gauge (1/100 mm, 10 mm))

TOOL (B): 09900-20701 (Magnetic stand)

TOOL (C): 09900-21304 (V-block (100 mm))

Valve head radial runout (IN. & EX.)

Service limit: 0.03 mm (0.001 in)



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Valve Face Wear

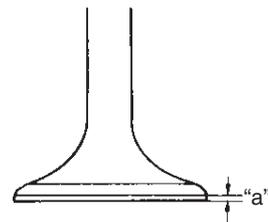
Visually inspect each valve face for wear. Replace any valve with an abnormally worn face. The thickness of the valve face decreases as the face wears. Measure the valve head "a". If it is out of specification replace the valve with a new one.

Special tool

TOOL : 09900-20102 (Vernier calipers (1/20 mm, 200 mm))

Valve head thickness "a" (IN. & EX.)

Service limit: 0.5 mm (0.02 in)



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