

GROUP 16c

IGNITION SYSTEM

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GENERAL INFORMATION

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This system is provided with six ignition coils with built-in ignition power transistors for each of the cylinders.

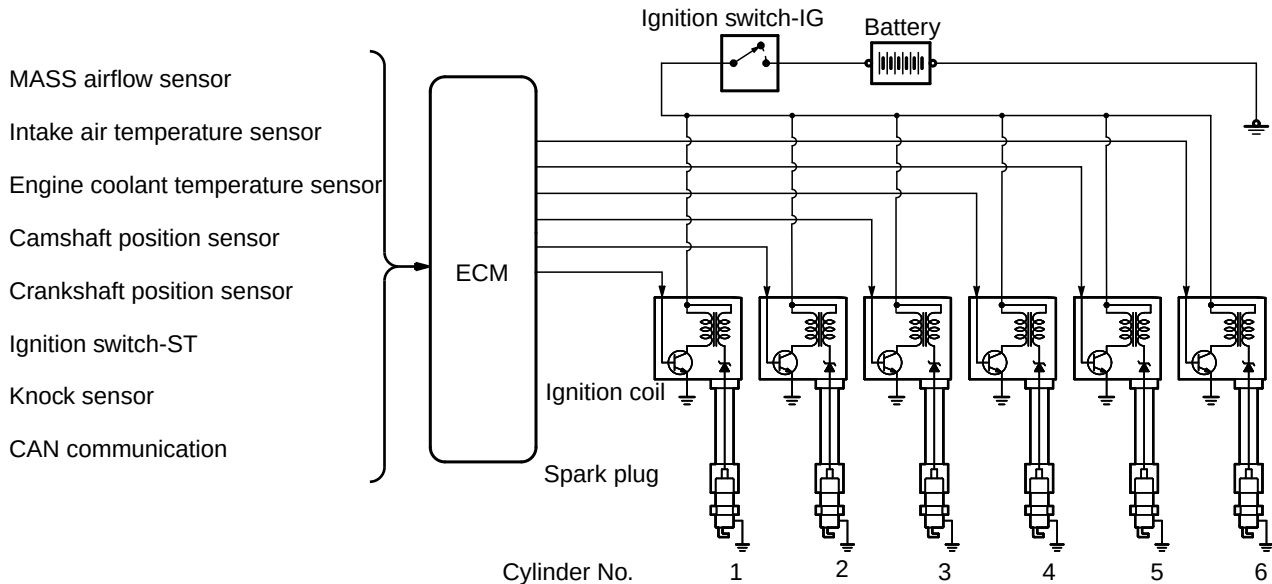
Interruption of the primary current flowing in the primary side of ignition coil generates a high voltage in the secondary side of ignition coil.

The engine control module (ECM) controls the three ignition power transistors to turn them alternately ON and OFF. This causes the primary currents in the ignition coils to be alternately interrupted and allowed to flow to fire the cylinders in the order 1-2-3-4-5-6.

The ECM determines which ignition coil should be controlled by means of the signals from the camshaft position sensor and from the crankshaft position sensor.

It also detects the crankshaft position to provide ignition at the most appropriate timing in response to the engine operation conditions.

When the engine is cold or operated at high altitudes, the ignition timing is slightly advanced to provide optimum performance.



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GENERAL SPECIFICATIONS

M11603000002USA0000010000

Item	Specification
Ignition Coil	
Type	Molded 6 coil
Spark Plugs	
DENSO	SXU22HDR8

SERVICE SPECIFICATIONS

M11603000003USA0000010000

Item	Standard value	Limit
Spark plug gap mm (in)	0.7 - 0.8 (0.028 - 0.031)	0.95 (0.037)

ON-VEHICLE SERVICE

KNOCK CONTROL SYSTEM CHECK

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Check the knock sensor circuit if diagnostic trouble code, No. P0326, P0327, P0328, P0331, P0332 or P0333 is shown. Refer to GROUP 13A, Multiport Fuel Injection (MFI) - Multiport Fuel Injection (MFI) Diagnosis - Diagnostic Trouble Code Chart P.13Ab-44.

IGNITION COIL CHECK

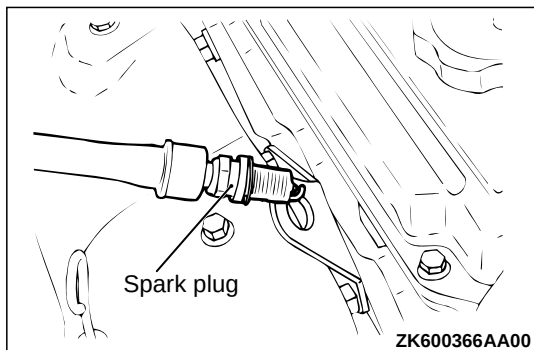
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NOTE: It is impossible to carry out an easy check using a circuit tester because a diode and so on are integrated into the inside circuit of this ignition coil. Accordingly, check the ignition coil in the following procedure.

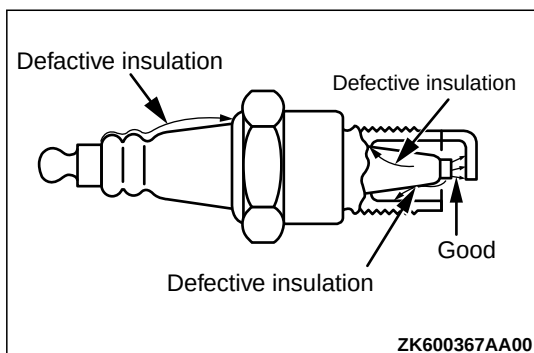
1. Make sure the diagnosis codes are not stored using M.U.T.-III. If stored, record the code No. Carry out the troubleshooting for the stored codes and solve the problems even if not related to the ignition.
2. Disconnect the injector connectors on all of the cylinders.
3. Disconnect the ignition coil connector.
4. Remove the ignition coil and install a new spark plug to the ignition coil.
5. Connect the ignition coil connector.
6. Ground the side electrode of the spark plug and crank the engine.
7. Check that spark is produced between the electrodes of the spark plug.
8. If the spark plug has weak spark or no spark, carry out the same check using a new ignition coil. If there are strong spark on this check with a new ignition coil, it becomes clear there is a problem with the ignition coil. Replace the ignition coil with a new one. If there is no spark on this check with a new ignition coil, there is probably a problem with the ignition circuit. Check the ignition circuit.
9. Using M.U.T.-III, make sure whether the diagnosis codes are stored due to the check, or not. Except the codes stored in Step 1, clear the codes all together if they are present. And then, carry out the troubleshooting about the codes recorded.

SPARK PLUG TEST

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1. Remove the spark plug and connect to the ignition coil.

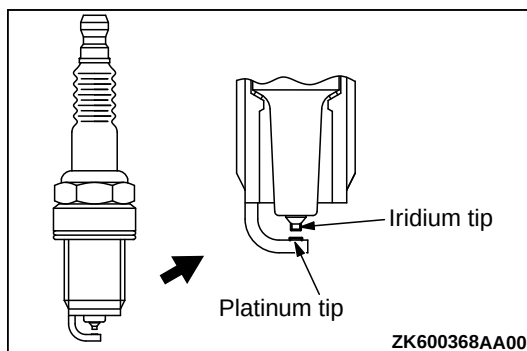


2. Ground the spark plug outer electrode (body), and crank the engine.

Check that there is an electrical discharge between the electrodes at this time.

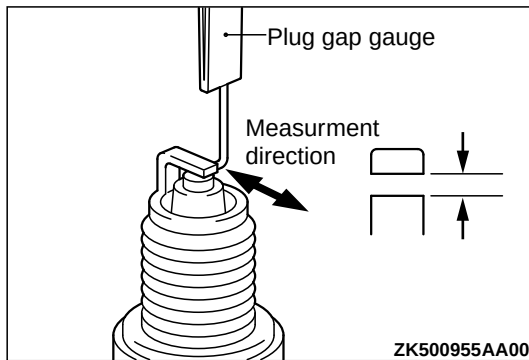
SPARK PLUG CHECK AND CLEANING

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**CAUTION**

- Never attempt to adjust the gap of the iridium plug.
- Do not attempt to clean the spark plug because it may result in damage to the electrode. However, if carbon deposits must be removed, using a plug cleaner, complete the cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

NOTE: As the prospective distance for this spark plug replacement is 100,000 km (62,000 mile). If the plug gap and insulation resistance are normal, check the plug state and clean it if necessary.

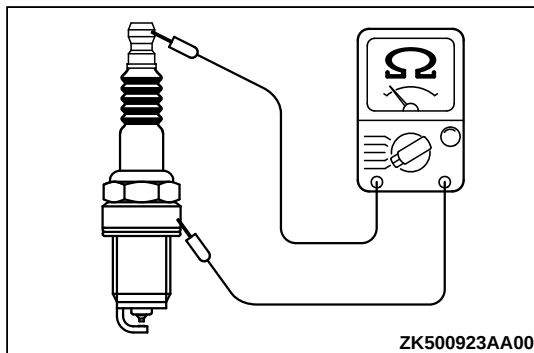


SPARK PLUG GAP CHECK

Check the plug gap with the wire type plug gauge. Replace it if the limit is exceeded.

Standard value: 0.7 - 0.8 mm (0.028 - 0.031 inch)

Limit: 0.95mm (0.037 inch)



SPARK PLUG INSULATION RESISTANCE CHECK

1. Measure the insulation resistance. If the insulation resistance of the spark plug is under the limited value, clean the plug within 20 seconds using a plug cleaner.
2. After cleaning, measure the insulation resistance again. Replace the plug unless it is within the limited value.

Limit: Minimum 10 MΩ

CAMSHAFT POSITION SENSOR CHECK

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Refer to GROUP 13A, Multiport Fuel Injection (MFI) - Multiport Fuel Injection (MFI) Diagnosis - Diagnostic Trouble Code Procedures - DTC P0340: Camshaft Position Sensor Circuit P. 13Ab-441.

CRANKSHAFT POSITION SENSOR CHECK

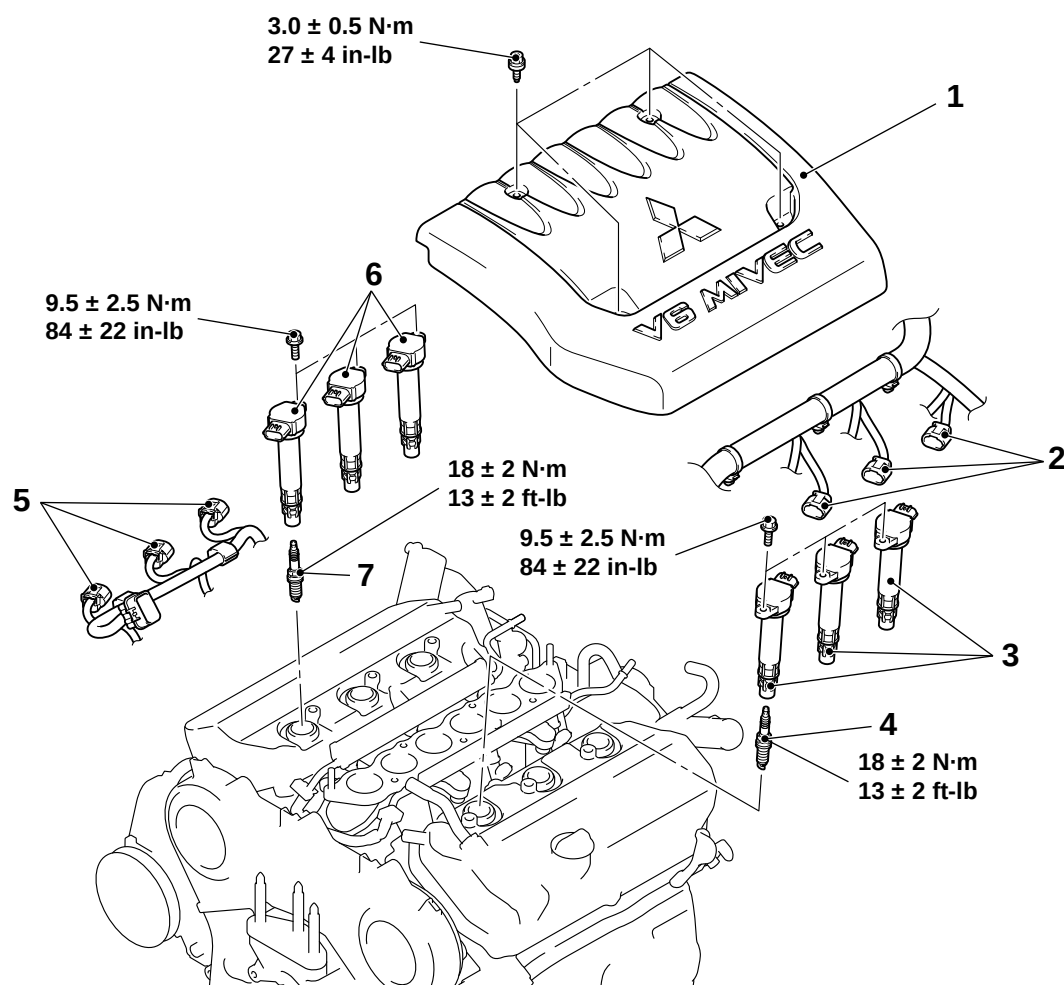
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Refer to GROUP 13A, Multiport Fuel Injection (MFI) - Multiport Fuel Injection (MFI) Diagnosis - Diagnostic Trouble Code Procedures - DTC P0335: Crankshaft Position Sensor Circuit P. 13Ab-433.

IGNITION COIL

REMOVAL AND INSTALLATION

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Removal steps

1. Engine cover
2. Ignition coil connectors (Left bank)
3. Ignition coils (Left bank)
4. Spark plugs (Left bank)
- Intake manifold plenum (Refer to GROUP 15, Intake Manifold Plenum P. 15-7).

Removal steps

5. Ignition coil connectors (Right bank)
6. Ignition coils (Right bank)
7. Spark plugs (Right bank)

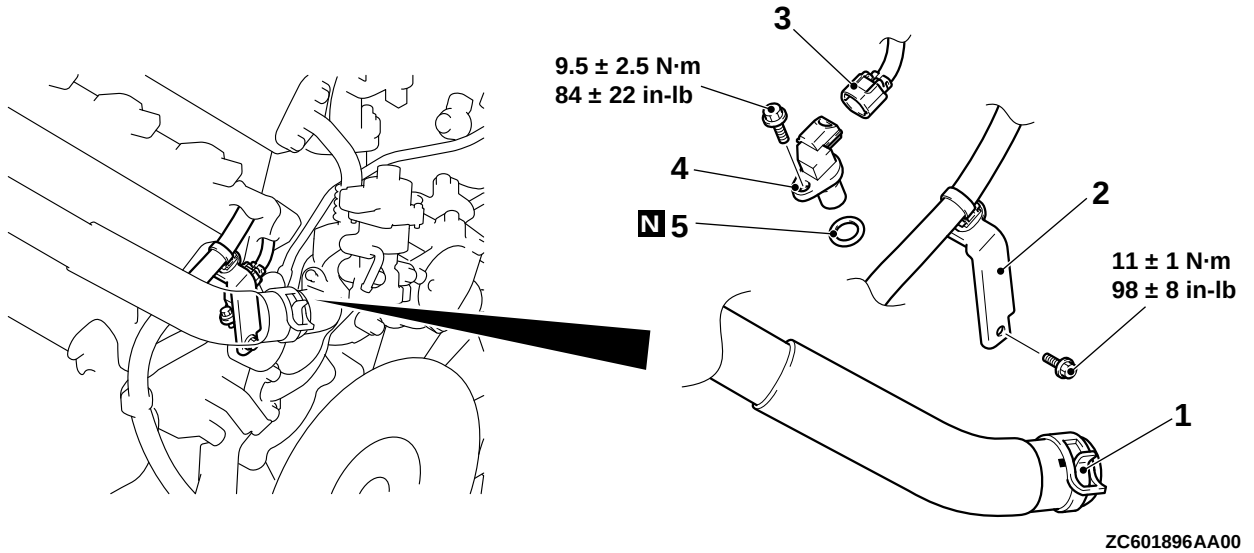
CAMSHAFT POSITION SENSOR

REMOVAL AND INSTALLATION

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Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to GROUP 14, On-vehicle Service - Engine Coolant Replacement P.14-15).
- Battery and Battery Tray Removal and Installation.



Removal steps

1. Radiator upper hose connection
2. Harness bracket
3. Camshaft position sensor connector

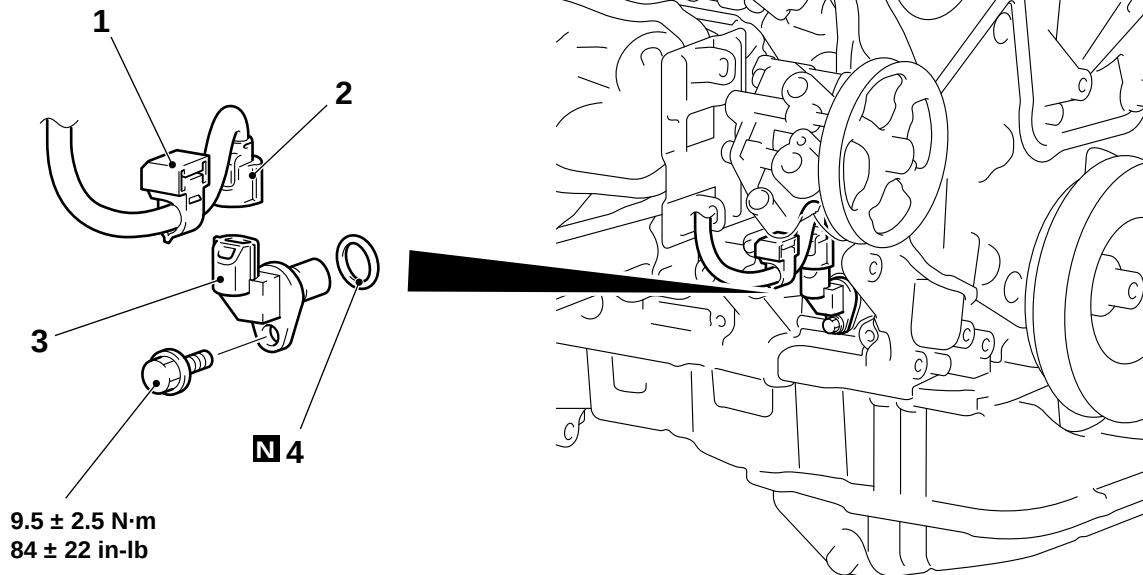
Removal steps

4. Camshaft position sensor
5. O-ring

CRANKSHAFT POSITION SENSOR

REMOVAL AND INSTALLATION

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Removal steps

1. Harness clamp
2. Crankshaft position sensor connector
3. Crankshaft position sensor

Removal steps

4. O-ring

KNOCK SENSOR

REMOVAL AND INSTALLATION

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CAUTION

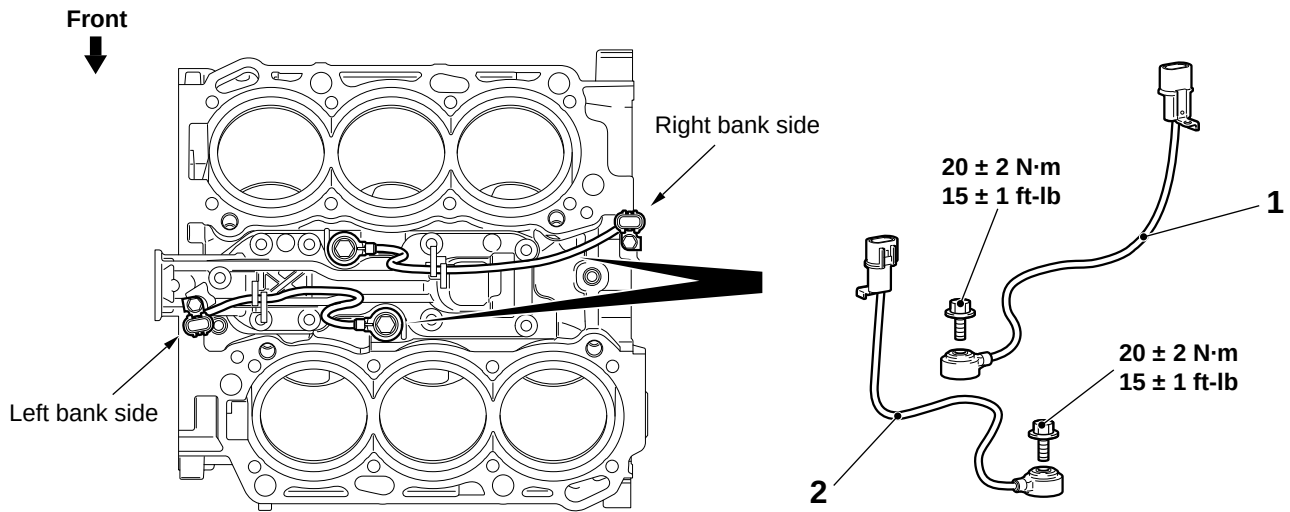
When the knock sensor replacement is performed, use scan tool MB991958 to initialize the learning value (Refer to GROUP 00, Precautions Before Service - Initialization

Procedure for Learning Value in MFI Engine P. 00-30).

Do not drop or hit the knock sensor against other components. Internal damage may result, and the knock sensor will need to be replaced.

Pre-removal and Post-installation Operation

Intake Manifold Removal and Installation (Refer to GROUP 15, Intake Manifold P.15-8).



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Removal steps

1. Right bank knock sensor

Removal steps

2. Left bank knock sensor

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