ENGINE AND EMISSION CONTROL

CONTENTS

GENERAL <4D5-step III>

OUTLINE OF CHANGES

Some service procedures have been established as the following changes have been made due to the compliance with the Emission Regulation Step III.

- An electronic-controlled EGR valve and EGR cooler have been used.
- A catalytic converter has been added.

GENERAL INFORMATION <4D5-step III>

The electronically-controlled EGR system reduces the level of exhaust gases (NOx).

Items	Name	Specification
Exhaust emission control system	Exhaust gas recirculation system ● EGR valve ● EGR solenoid valve No.1 ● EGR solenoid valve No.2 ● EGR valve position sensor	Electronically-controlled EGR system Single type ON-OFF solenoid valve ON-OFF solenoid valve Variable resistor type

SERVICE SPECIFICATIONS <4D5-step III>

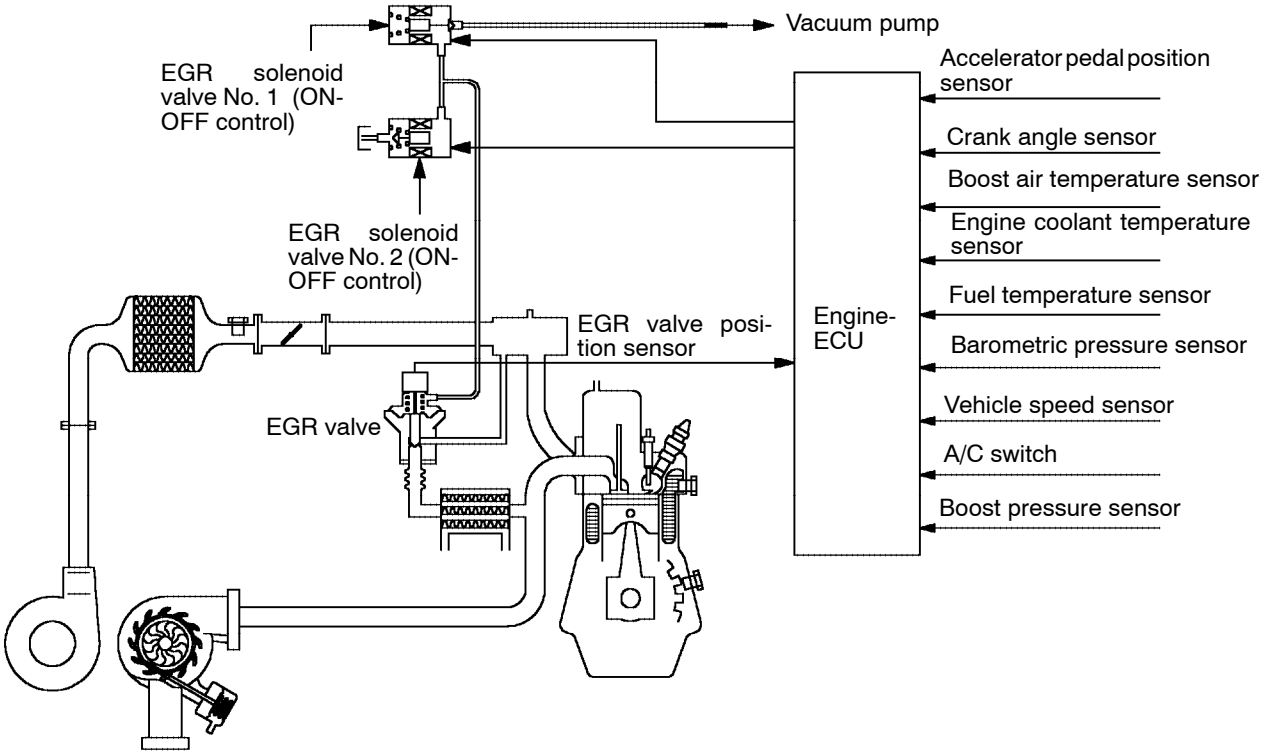
Items	Standard value
EGR solenoid valve Nos. 1 and 2 resistance (at 20°C) Ω	36 - 44

EXHAUST GAS RECIRCULATION (EGR) SYSTEM <4D5-step III>

GENERAL INFORMATION

The electronically-controlled EGR system consists of an EGR valve, a vacuum pump, EGR solenoid valves Nos.1 and 2, EGR valve position sensor and engine-ECU and various sensors.
The EGR valve is controlled by the negative pressure inside the valve, which is controlled by EGR solenoid valves Nos.1 and 2.
In order to obtain EGR amount corresponding to each operating condition, the appropriate opening of the EGR valve is calculated based on the input signal from each sensor.
Feedback control of the EGR solenoid valves No. 1 and No. 2 operation is carried out based on the signal from EGR valve position sensor so that the opening of the EGR valve can be quickly adjusted to the target angle.
In this way, the EGR is controlled to reduce NOx emissions while maintaining good engine performance.

SYSTEM DIAGRAM



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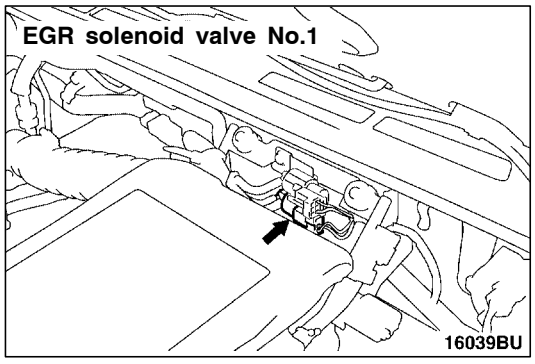
COMPONENT LOCATION



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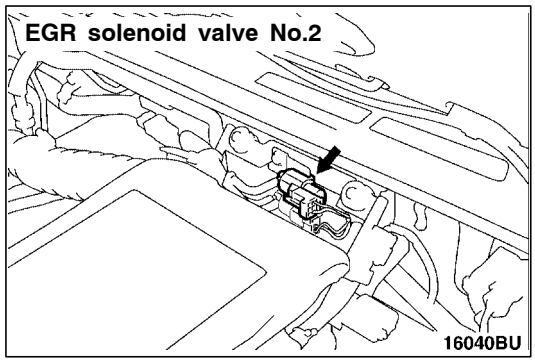

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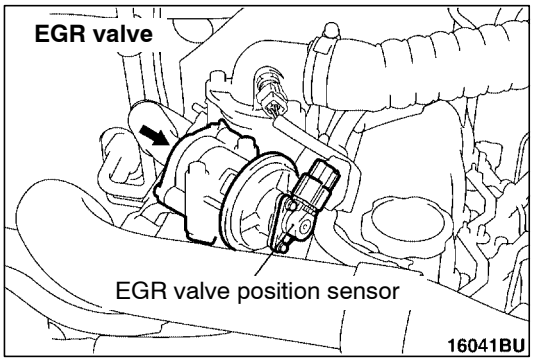
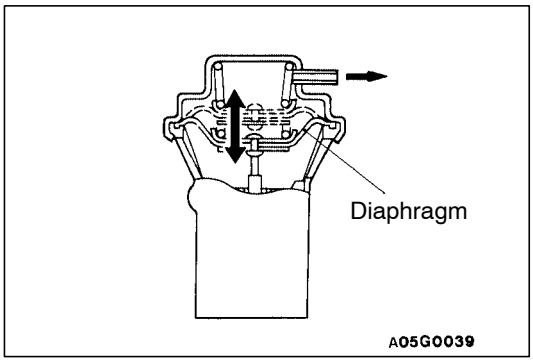


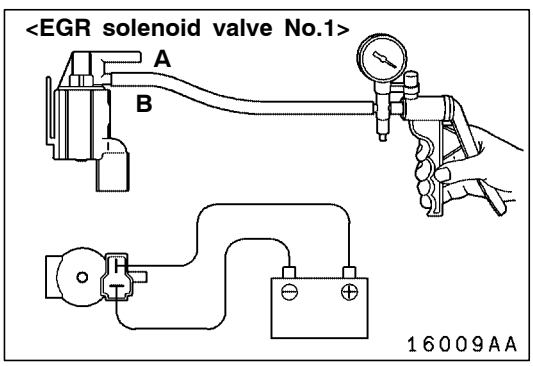


FUNCTION CHECK

1. Start the engine and warm it up until the engine coolant temperature reaches 65°C or above.
2. Race the engine by suddenly depressing the accelerator pedal, then check that the EGR valve diaphragm lifts.

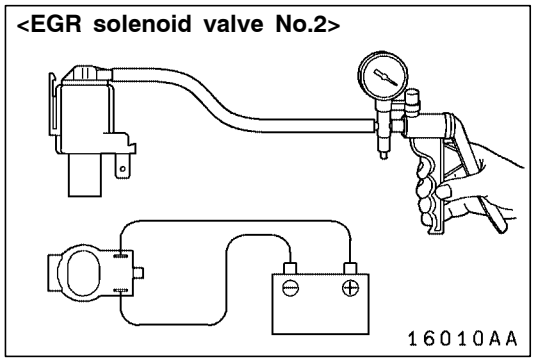
EGR SOLENOID VALVE OPERATION CHECK

1. Remove EGR solenoid valve Nos.1 and 2 connectors and vacuum hoses.
2. Attach a vacuum pump to each nipple of the EGR solenoid valve Nos. 1 and 2 and connect each connector of EGR solenoid valve to battery and apply negative pressure. Check that the valves are airtight both when voltage is applied to each terminal of the EGR solenoid valve Nos. 1 and 2 and when it is not applied.



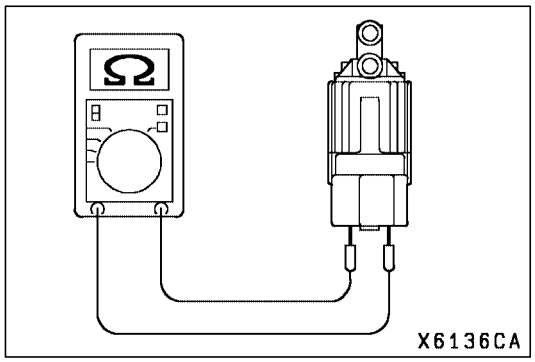
EGR solenoid valve No.1

Battery voltage	Normal condition
When current is flowing	Vacuum leaks (Vacuum is maintained when nipple B is plugged)
When current is not flowing	Vacuum is maintained



EGR solenoid valve No.2

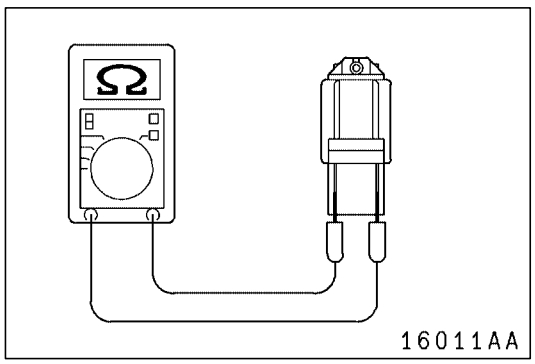
Battery voltage	Normal condition
When current is flowing	Vacuum is maintained
When current is not flowing	Vacuum leaks



EGR SOLENOID VALVE RESISTANCE CHECK

Measure terminal resistance of EGR solenoid valves Nos. 1 and 2 with a circuit tester.

Standard value: 36 - 44 Ω (at 20°C)



ACCELERATOR PEDAL POSITION SENSOR (APS), ENGINE COOLANT TEMPERATURE SENSOR, BOOST AIR TEMPERATURE SENSOR, FUEL TEMPERATURE SENSOR, EGR VALVE POSITION SENSOR CHECK

Refer to GROUP 13 - On-vehicle Service.

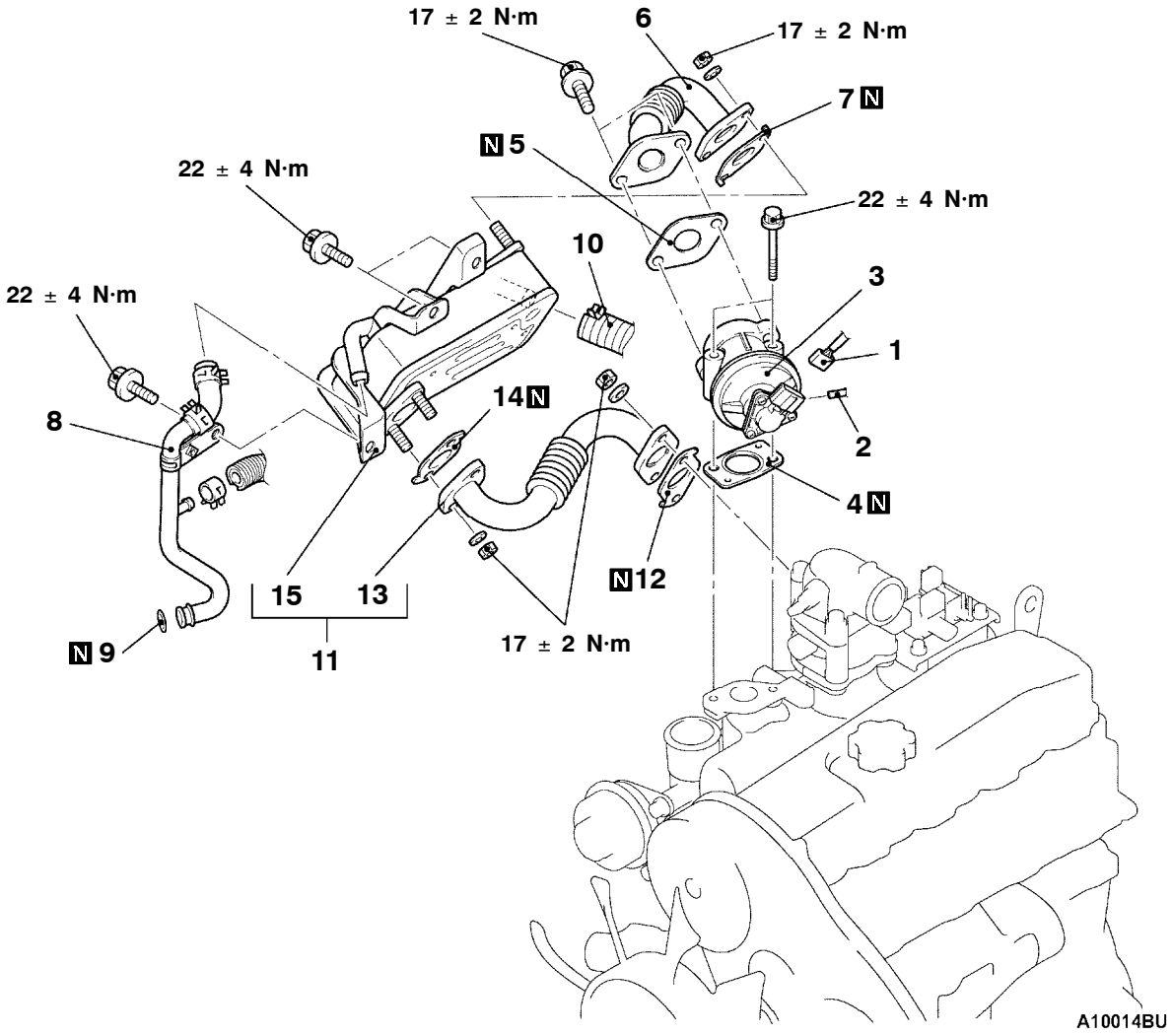
CHECK AT ENGINE-ECU TERMINALS

Refer to GROUP 13 - Troubleshooting.

EGR VALVE AND EGR COOLER <4D5-step III>

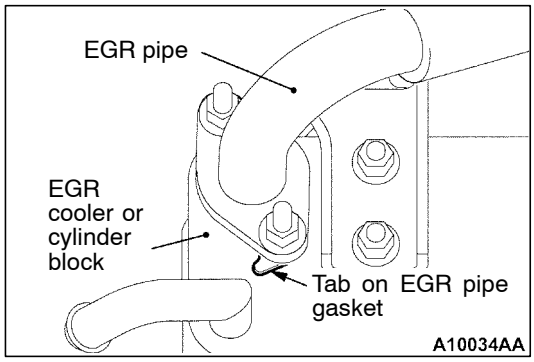
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Engine Coolant Draining and Supplying.



Removal steps

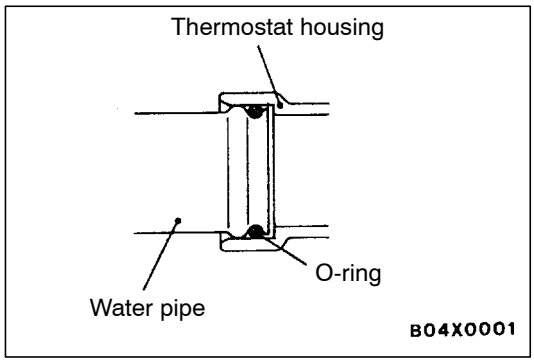
1. EGR valve connector
2. Vacuum hose connection
3. EGR valve
4. EGR gasket
5. EGR pipe gasket
6. EGR upper pipe
▶A◀ 7. EGR pipe gasket
▶C◀ 8. Water pipe and hose assembly
▶B◀ 9. O-ring
10. Water hose connection
11. EGR cooler and EGR lower pipe assembly
▶A◀ 12. EGR pipe gasket
13. EGR lower pipe
▶A◀ 14. EGR pipe gasket
15. EGR cooler



INSTALLATION SERVICE POINT

▶A◀ EGR PIPE GASKET INSTALLATION

The tab on the EGR pipe gasket should be positioned as shown.

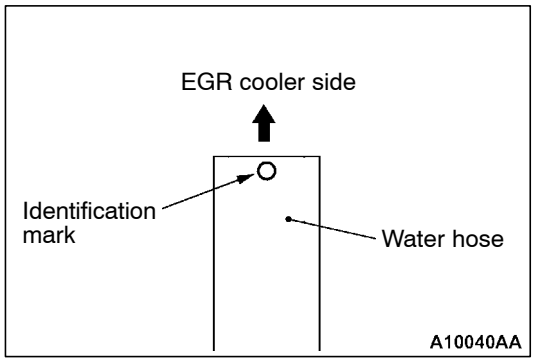


▶B◀ O-RING INSTALLATION

Rinse the mounting location of the O-ring and water pipe with water, and install the O-ring and water pipe.

Caution

1. **Care must be taken not to permit engine oil or other greases to adhere to the O-ring.**
2. **When inserting the pipe, check to be sure that there is no sand, dirt, etc. on its inner surface.**



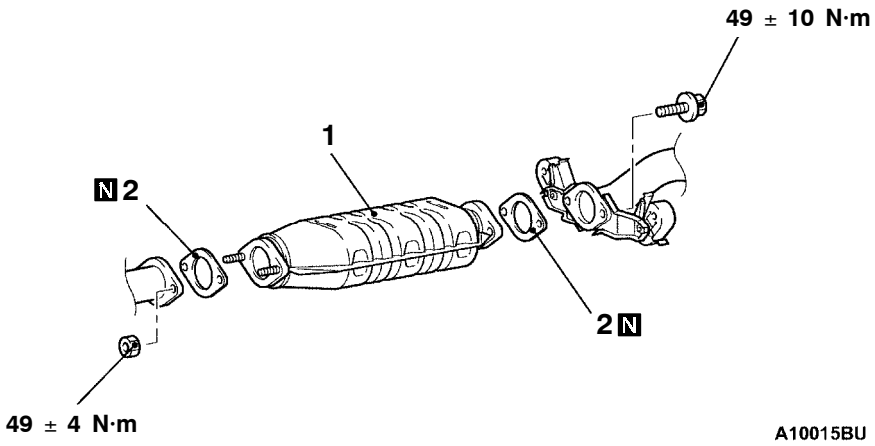
▶C◀ WATER PIPE AND HOSE ASSEMBLY INSTALLATION

If the water hose is separated from the water pipe for any reason, the identification mark on the water hose end should face towards the EGR cooler.

CATALYTIC CONVERTER <4D5-step III>

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
Under Cover Removal and Installation



Removal steps

1. Catalytic converter
2. Gasket