ENGINE AND EMISSION CONTROL

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ENGINE CONTROL SYSTEM <MPI>

GENERAL

OUTLINE OF CHANGE

The following service procedures have been established to correspond to the addition of vehicles with 4G6-MPI engine. <SPACE WAGON>

SERVICE SPECIFICATION

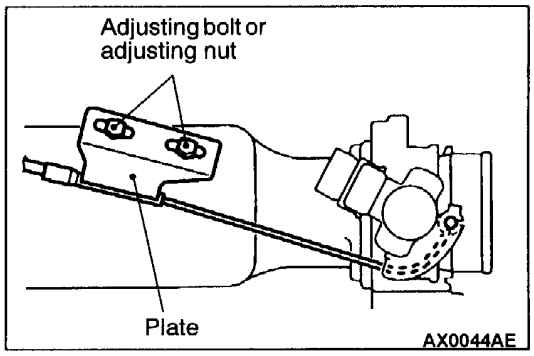
Items	Standard value
Accelerator cable play mm	1 - 2

ON-VEHICLE SERVICE

ACCELERATOR CABLE CHECK AND ADJUSTMENT

1. Turn A/C and lamps OFF.
   Inspect and adjust at no load.
2. Warm engine until stabilized at idle.
3. Confirm idle speed is at prescribed value. (Refer to GROUP 11C - On-vehicle Service.)
4. Stop engine (ignition switch OFF).
5. Confirm there are no sharp bends in accelerator cable.
6. Check inner cable for correct slack.

   Standard value: 1 - 2 mm



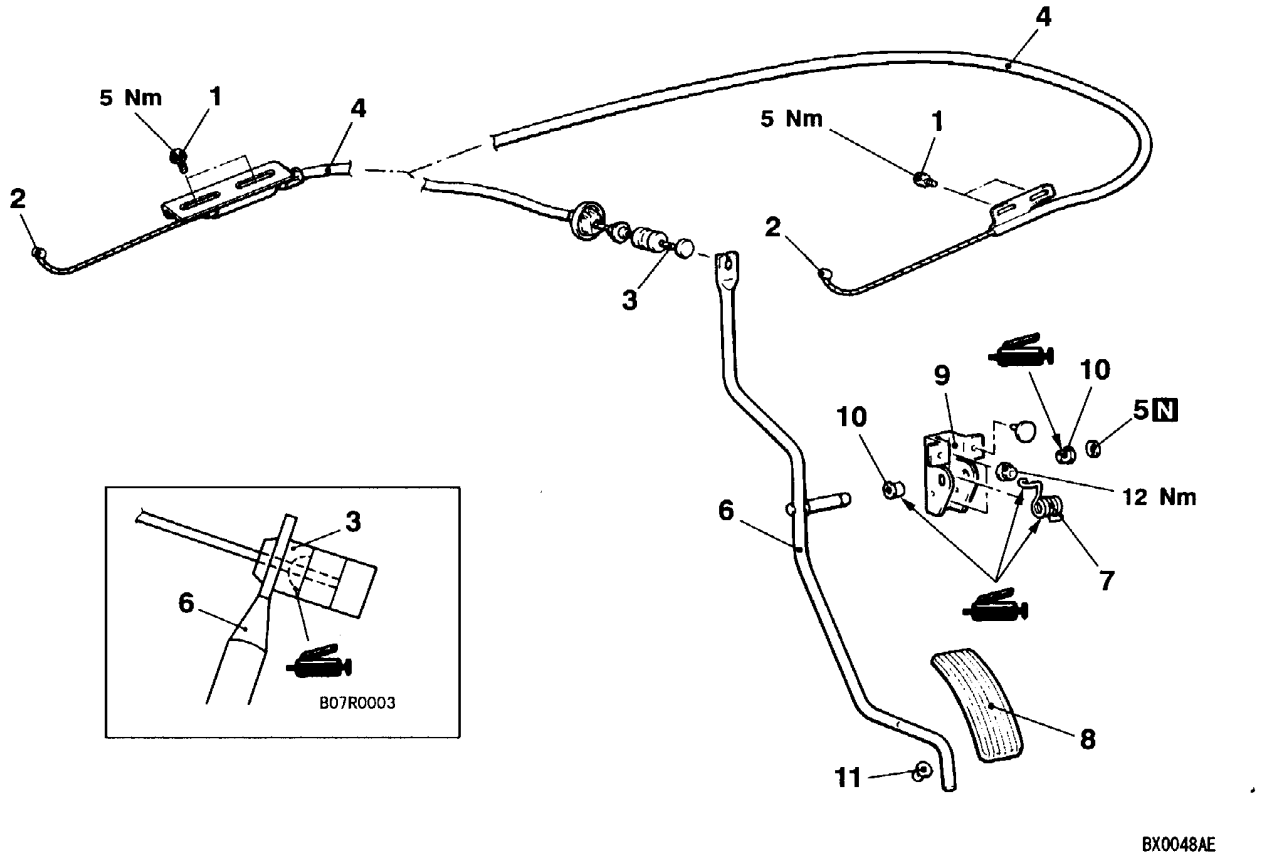
7. If there is too much slack or no slack, adjust play by the following procedures.
   (1) Loosen the adjusting bolt or adjusting nut to release the cable.
   (2) Move the plate until the inner cable play is at the standard value, and then tighten the adjusting bolt or adjusting nut.
   (3) After adjusting, check that the throttle lever is touching the stopper.

ACCELERATOR CABLE AND PEDAL

REMOVAL AND INSTALLATION

Post-Installation Operation
Adjusting the Accelerator Cable (Refer to P.17-2.)

<R.H. drive vehicles> <L.H. drive vehicles>



Removal steps

1. Adjusting bolt or adjusting nut
2. Inner cable connection (Engine side)
3. Inner cable connection (Pedal side)
4. Accelerator cable
5. Snap ring
6. Accelerator arm assembly
7. Spring
8. Pedal pad
9. Accelerator pedal bracket
10. Bushing
11. Accelerator pedal stopper

EMISSION CONTROL SYSTEM <MPI>

GENERAL

OUTLINE OF CHANGE

The following service procedures have been established to correspond to the addition of vehicles with 4G63-MPI engine. Items other than those given below are the same as for the 4G6-GDI engine mounted in the SPACE WAGON.

GENERAL INFORMATION

Items	Name	Specification
Exhaust emission control system	Air-fuel control device-MPI system	Oxygen sensor feedback type (Purpose: CO, HC, NOx reduction)
	Exhaust gas recirculation system • EGR valve • EGR control solenoid valve	Equipped Single type Duty cycle type solenoid valve (Purpose: NOx reduction)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)

EMISSION CONTROL DEVICE REFERENCE TABLE

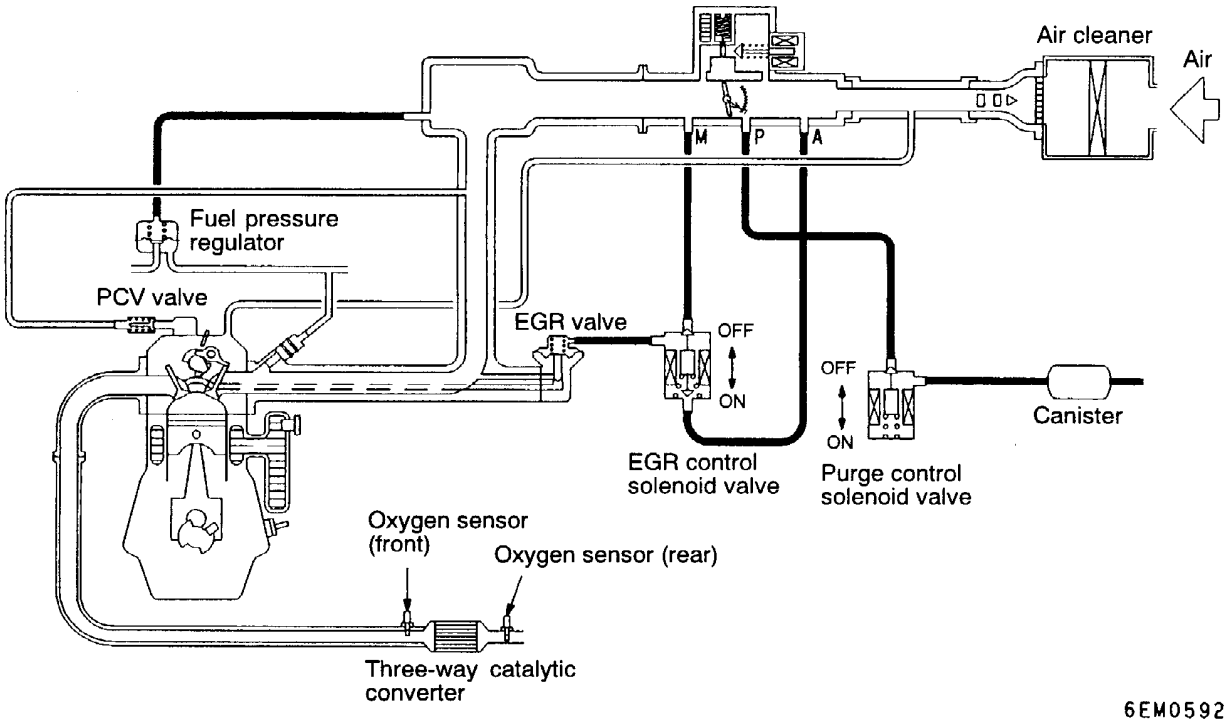
Related parts	Evaporative emission control system	Air-fuel ratio control system	Exhaust gas recirculation system	Reference page
MPI system component	×	×		GROUP 13A
EGR valve			×	17-10
EGR control solenoid valve			×	17-11

SERVICE SPECIFICATION

Items	Standard value
EGR control solenoid valve coil resistance (at 20 °C) Ω	36 – 44

VACUUM HOSE

VACUUM HOSE PIPING DIAGRAM



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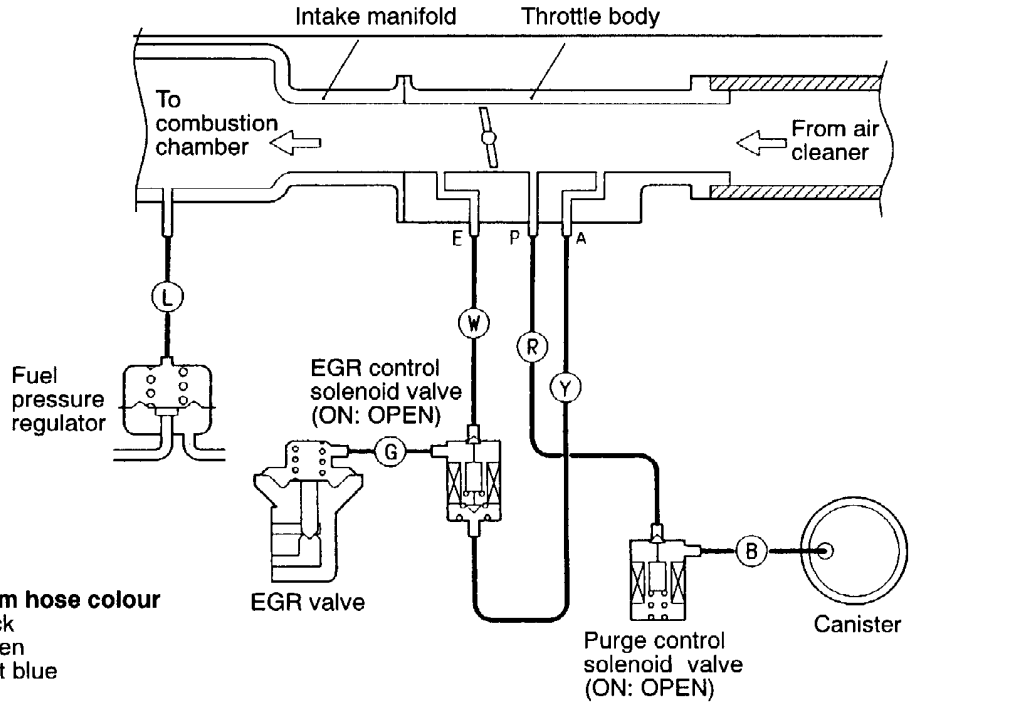
VACUUM CIRCUIT DIAGRAM



Vacuum hose colour
B: Black
G: Green
L: Light blue
R: Red
W: White
Y: Yellow

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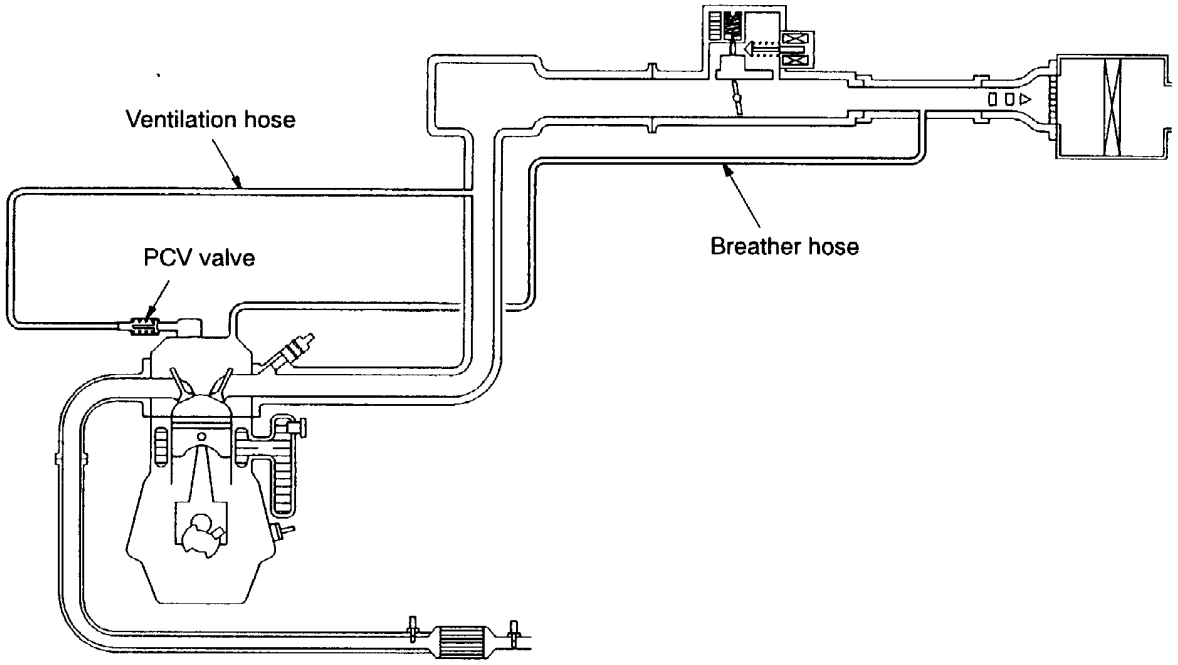
CRANKCASE EMISSION CONTROL SYSTEM

SYSTEM DIAGRAM



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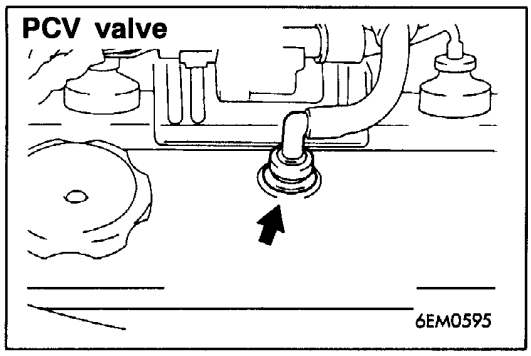
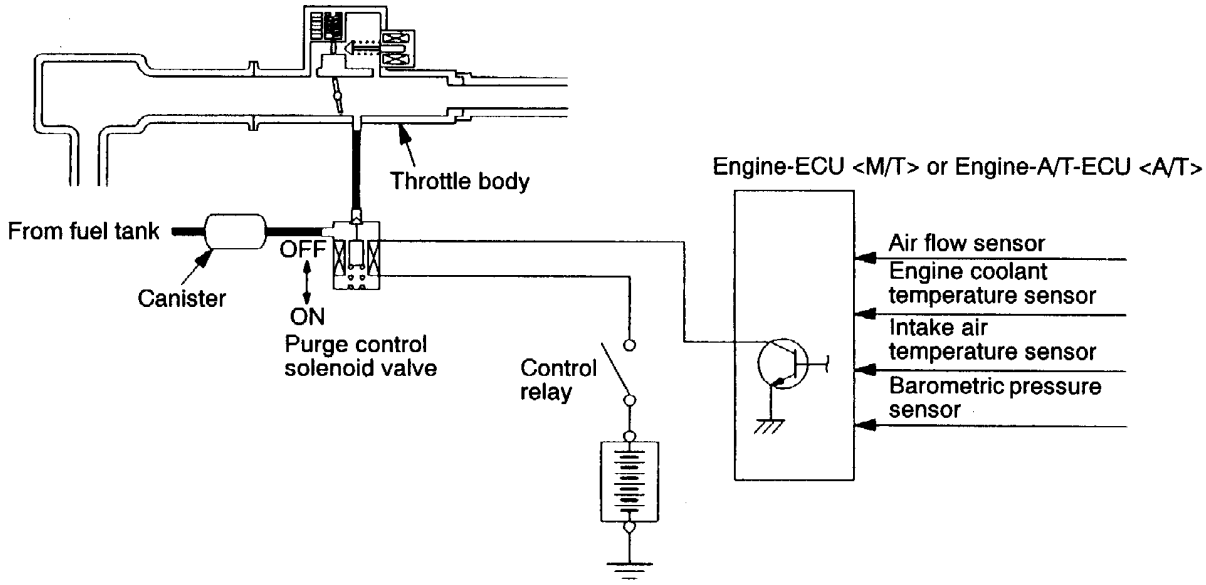
COMPONENT LOCATION

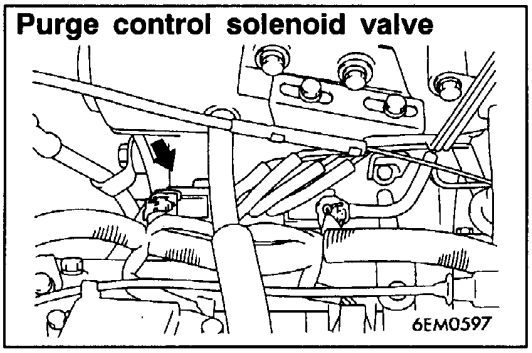


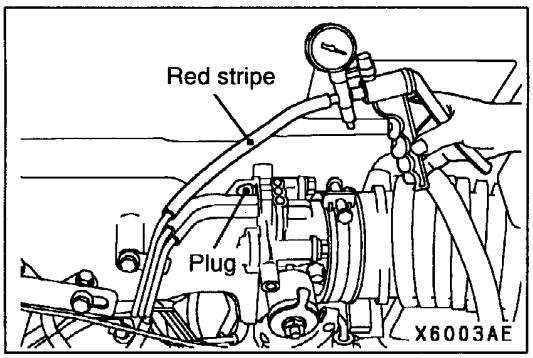
EVAPORATIVE EMISSION CONTROL SYSTEM

SYSTEM DIAGRAM



COMPONENT LOCATION





PURGE CONTROL SYSTEM CHECK

1. Disconnect the vacuum hose (red stripe) from the throttle body and connect it to a hand vacuum pump.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold or hot, apply a vacuum while the engine is idling, and check the condition of the engine and the vacuum.

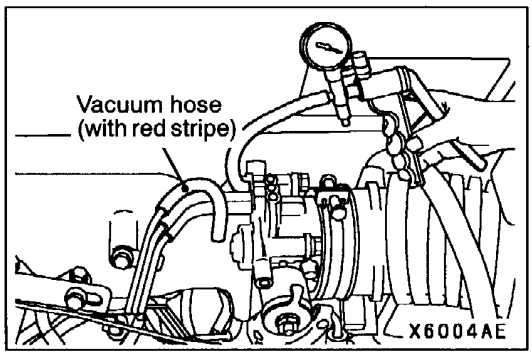
When engine is cold
(Engine coolant temperature: 40°C or less)

Vacuum	Engine condition	Normal condition
53 kPa	3,000 r/min	Vacuum is maintained

When engine is hot
(Engine coolant temperature: 80°C or higher)

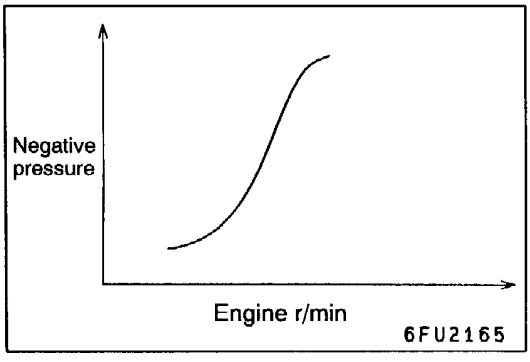
Vacuum	Engine condition	Normal condition
53 kPa	At idle	Vacuum is maintained
	3,000 r/min	Vacuum will leak for approximately 3 minutes after the engine is started. After 3 minutes have passed, the vacuum will be maintained momentarily, after which it will again leak.*

NOTE
*: The vacuum will leak continuously if the atmospheric pressure is approximately 77 kPa or less, or the temperature of the intake air is approximately 50°C or higher.



PURGE PORT VACUUM CHECK

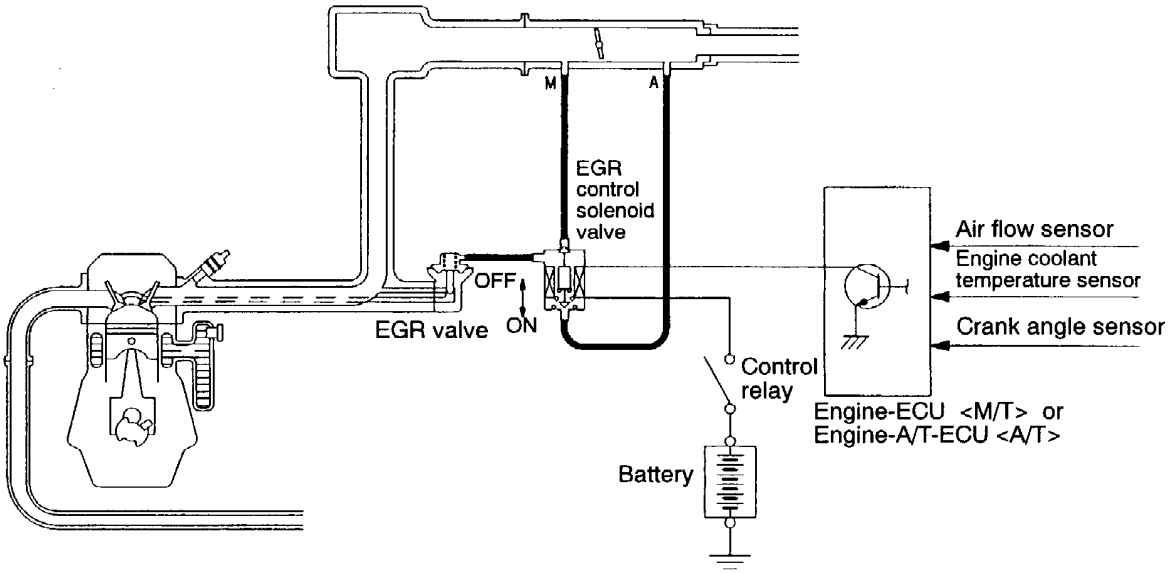
1. Disconnect the vacuum hose (with red stripe) from the throttle body purge nipple, and connect a hand vacuum pump to the nipple.



2. Start the engine.
3. Check that the negative pressure increases in proportion to the engine speed when the engine speed is increased.
4. If the negative pressure does not increase, the port is probably blocked and should be cleaned.

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

SYSTEM DIAGRAM



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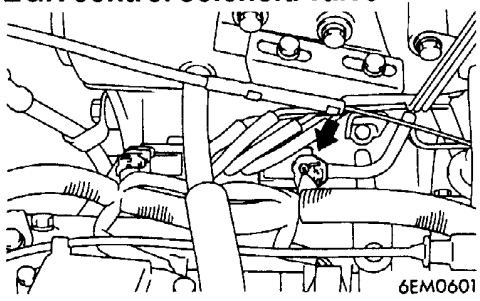
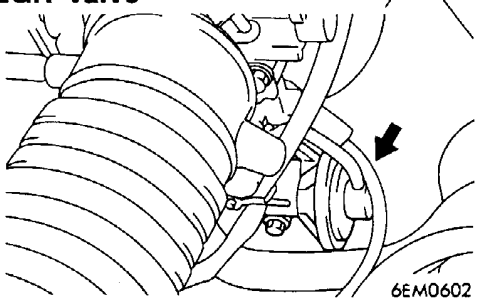
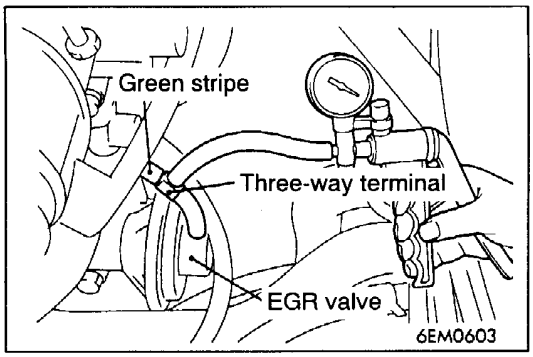
COMPONENT LOCATION

EGR control solenoid valve



EGR valve





EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM CHECK

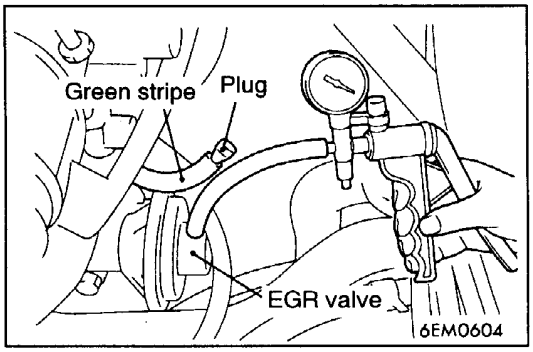
1. Disconnect the vacuum hose (green stripe) from the EGR valve, and then connect a hand vacuum pump via the three-way terminal.
2. When the engine is hot or cold, check the condition of vacuum by racing the engine.

When engine is cold
(Engine coolant temperature: 20°C or less)

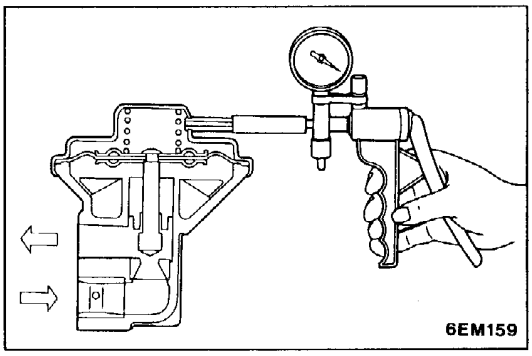
Throttle valve	Normal vacuum condition
Open quickly	No vacuum will generate (the same as barometric pressure.)

When engine is hot
(Engine coolant temperature: 80°C or higher)

Throttle valve	Normal vacuum condition
Open quickly	It will momentarily rise over 13 kPa



3. Disconnect the three-way terminal.
4. Connect the hand vacuum pump to the EGR valve.
5. Check whether the engine stalls or the idling is unstable when a vacuum of 30 kPa or higher is applied during idling.



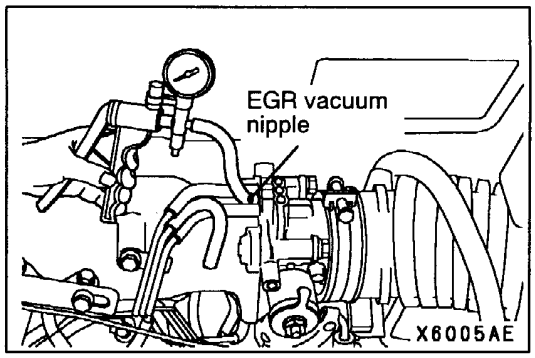
EGR VALVE CHECK

1. Remove the EGR valve and inspect for sticking, carbon deposits, etc. If found, clean with a suitable solvent so that the valve seats correctly.
2. Connect a hand vacuum pump to the EGR valve.
3. Apply 67 kPa of vacuum, and check that the vacuum is maintained.
4. Apply a vacuum and check the passage of air by blowing through one side of the EGR passage.

Vacuum	Passage of air
3.3 kPa or less	Air is not blown out
28 kPa or more	Air is blown out

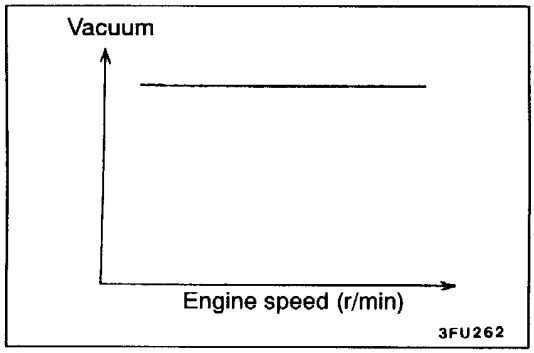
5. Replace the gasket, and tighten to the specified torque.

Tightening torque: 22 Nm



EGR PORT VACUUM CHECK

1. Disconnect the vacuum hose (white stripe) from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.



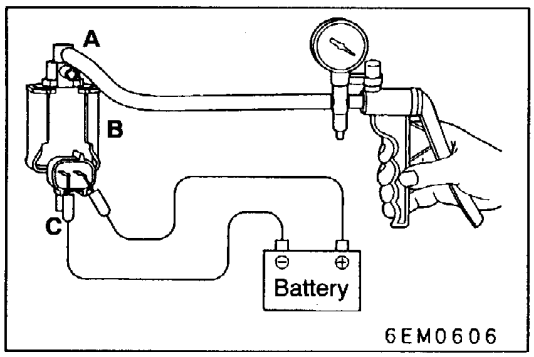
2. Start the engine and check that the vacuum remains fairly constant after racing the engine.

   NOTE
   If vacuum changes, it is possible that the throttle body EGR port may be clogged and require cleaning.

EGR CONTROL SOLENOID VALVE CHECK

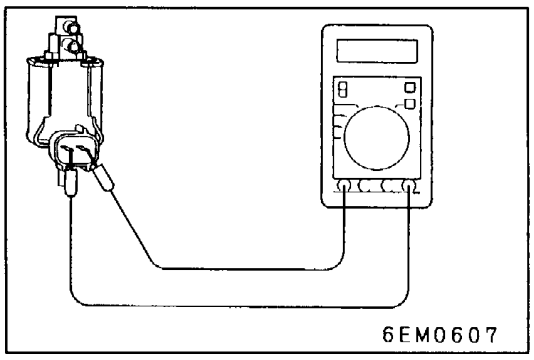
NOTE
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

1. Disconnect the vacuum hose (yellow stripe, white stripe, green stripe) from the solenoid valve.
2. Disconnect the harness connector.



3. Connect a hand vacuum pump to the nipple to which the white-striped vacuum hose was connected.
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the EGR control solenoid valve and without applying voltage.

Battery voltage	B nipple condition	Normal condition
Not applied	Open	Vacuum maintained
Applied	Open	Vacuum leaks
	Closed	Vacuum maintained



5. Measure the resistance between the terminals of the solenoid valve.

   Standard value: 36 – 44 Ω (at 20°C)