EMISSION CONTROL

CONTENTS

120002583

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EMISSION CONTROL <MPI>

120002584

GENERAL INFORMATION

The emission control system consists of the following sub-systems:
- Crankcase emission control system
- Evaporative emission control system
- Exhaust emission control system

Items	Name	Specification
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister Purge control solenoid valve	Equipped ON/OFF type solenoid valve (Purpose: HC reduction)
Exhaust emission control system	Air-fuel ratio 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

120002585

Related parts	Crankcase emission control system	Evaporative emission control system	Air/fuel ratio control system	Catalytic converter	Exhaust gas recirculation system	Reference page
PCV valve	×					17-7
Purge control solenoid valve		×				17-10
MPI system component		×	×			GROUP 13A
Catalytic converter				×		17-14
EGR valve					×	17-12
EGR control solenoid valve					×	17-13

SERVICE SPECIFICATIONS

120000838

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

SEALANT

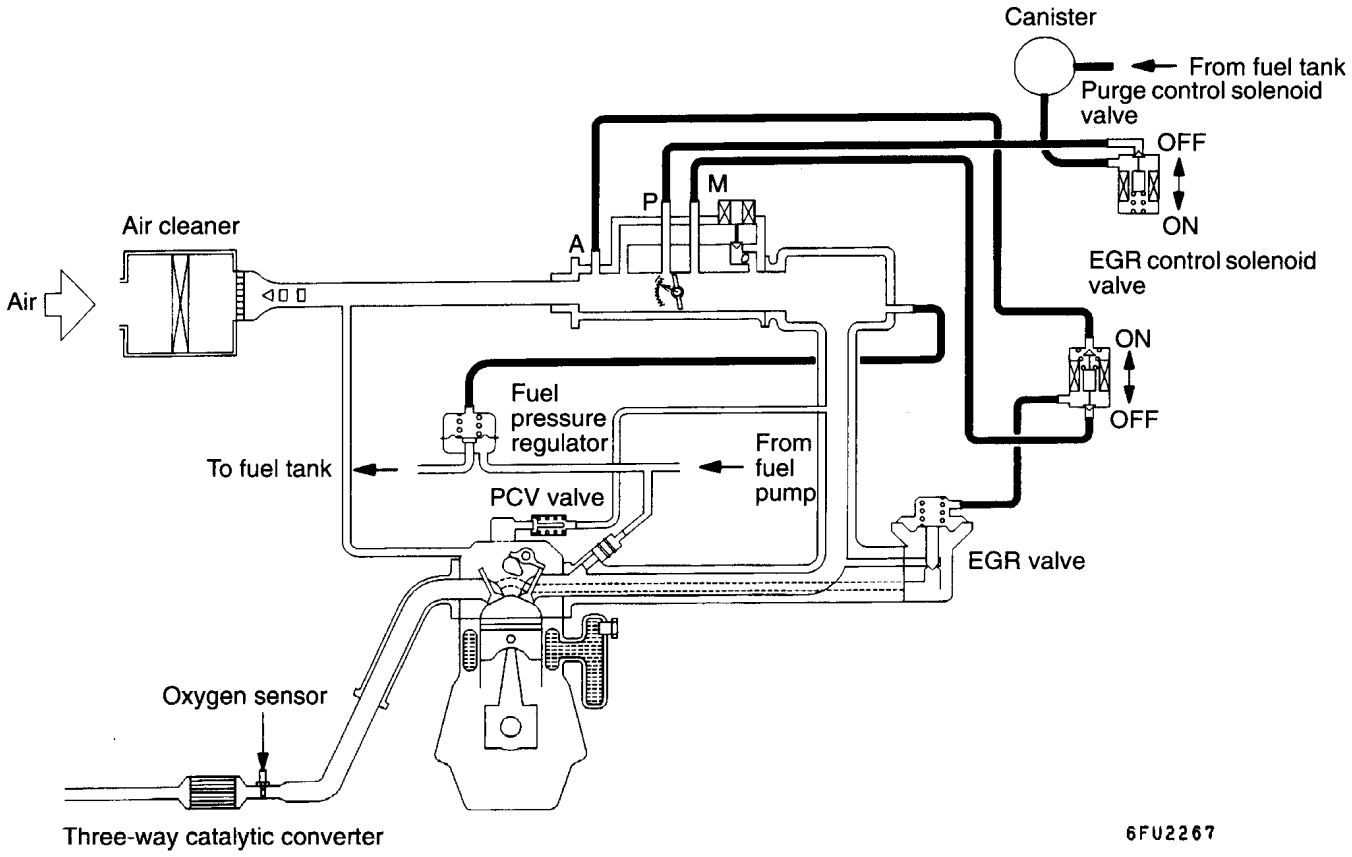
120000915

Item	Specified sealant	Remark
Thermo valve threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

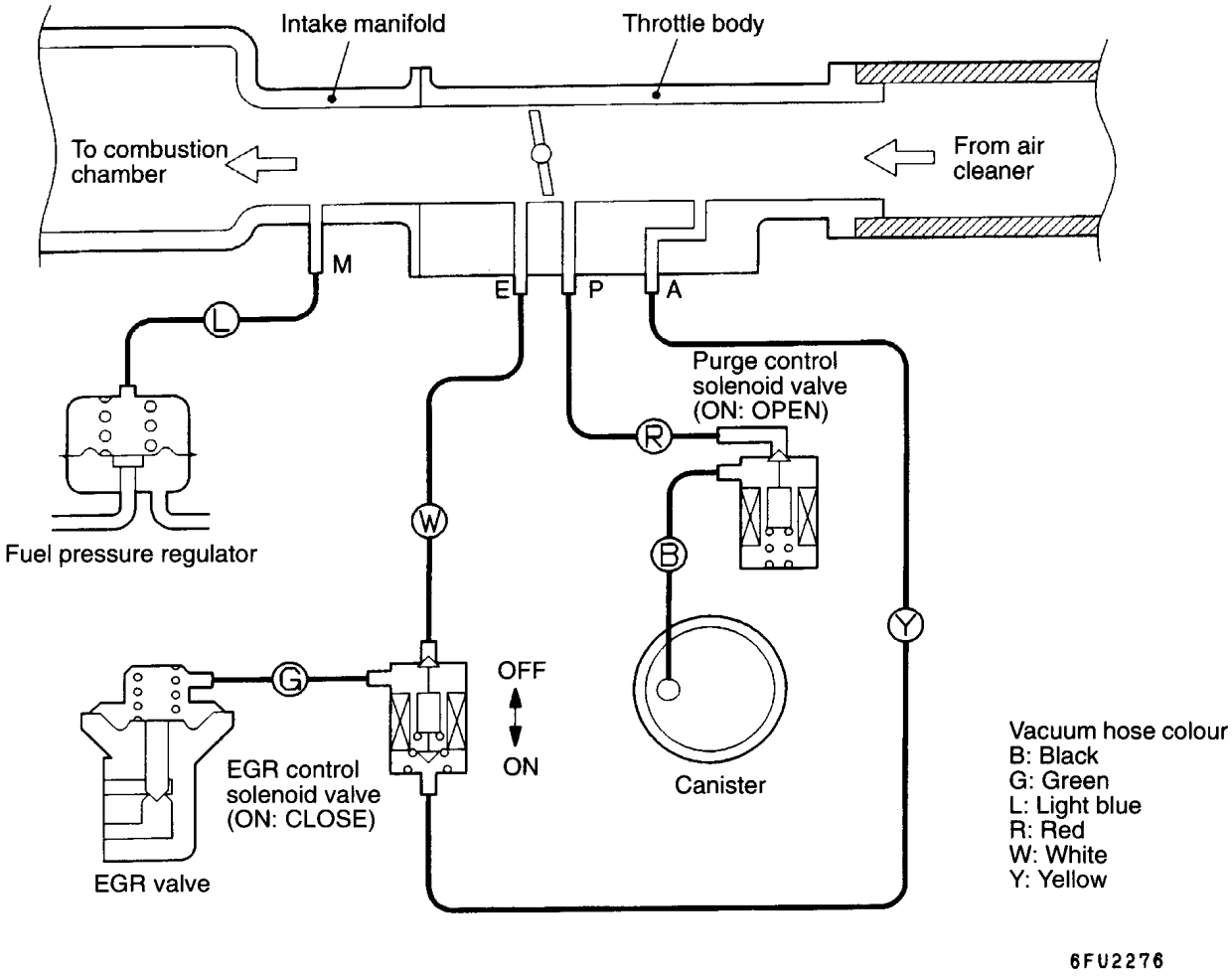
VACUUM HOSE

120002586

VACUUM HOSE PIPING DIAGRAM



VACUUM CIRCUIT DIAGRAM



VACUUM HOSE INSPECTION

1. Using the piping diagram as a guide, check to be sure that the vacuum hoses are correctly connected.
2. Check the connection condition of the vacuum hoses, (removed, loose, etc.) and check to be sure that there are no bends or damage.

VACUUM HOSE INSTALLATION

1. When connecting the vacuum hoses, they should be securely inserted onto the nipples.
2. Connect the hoses correctly, using the vacuum hose piping diagram as a guide.

CRANKCASE EMISSION CONTROL SYSTEM

120000840

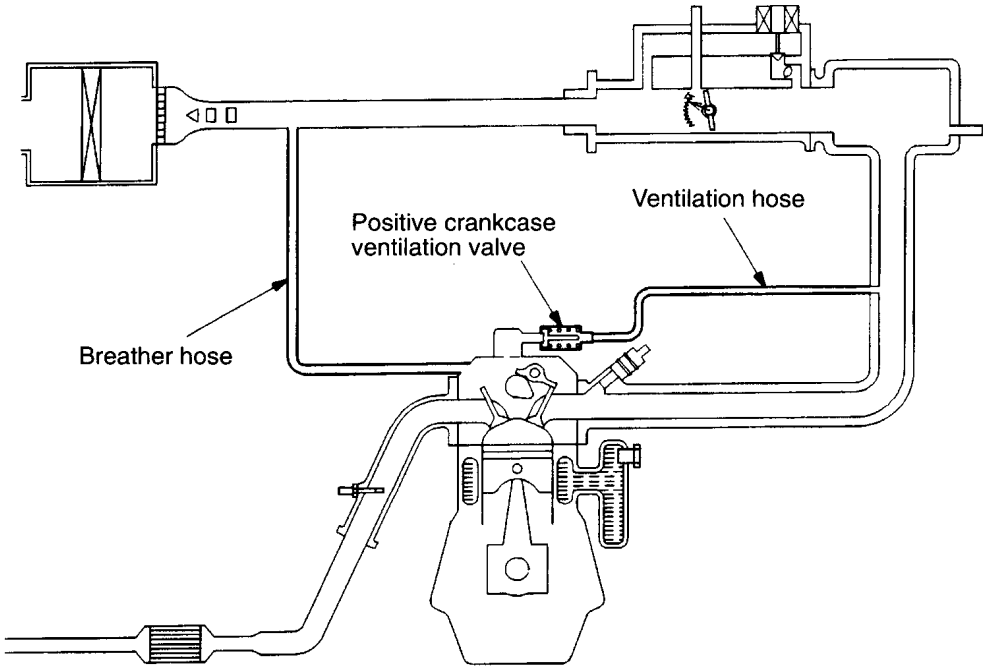
GENERAL INFORMATION

The crankcase emission control system prevents blow-by gases from escaping inside the crankcase into the atmosphere.
Fresh air is sent from the air cleaner into the crankcase through the breather hose. The air becomes mixed with the blow-by gases inside the crankcase.
The blow-by gas inside the crankcase is drawn into the intake manifold through the positive crankcase ventilation valve.

The positive crankcase ventilation valve lifts the plunger according to the intake manifold vacuum so as to regulate the flow of blow-by gas properly. In other words, the blow-by gas flow is regulated during low load engine operation to maintain engine stability, while the flow is increased during high load operation to improve the ventilation performance.

SYSTEM DIAGRAM

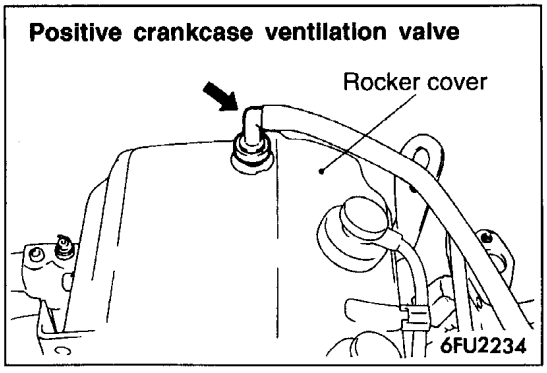
120000841



NOTE
The illustration shows the system for the 4G64 engine.

COMPONENT LOCATION

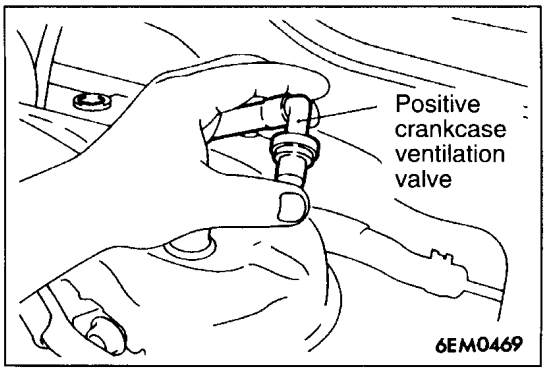
120002587



POSITIVE CRANKCASE VENTILATION SYSTEM INSPECTION

120000843

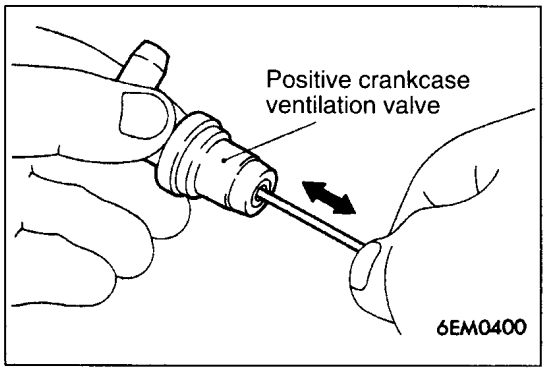
1. Remove the ventilation hose from the positive crankcase ventilation valve.
2. Remove the positive crankcase ventilation valve from the rocker cover.
3. Reinstall the positive crankcase ventilation valve at the ventilation hose.
4. Start the engine and run at idle.



5. Place a finger at the opening of the positive crankcase ventilation valve and check that vacuum of the intake manifold is felt.

   NOTE
   At this moment, the plunger in the positive crankcase ventilation valve moves back and forth.

6. If vacuum is not felt, clean the positive crankcase ventilation valve or replace it.



PCV VALVE INSPECTION

120000844

1. Insert a thin rod into the positive crankcase ventilation valve from the side shown in the illustration (rocker cover installation side), and move the rod back and forth to check that the plunger moves.
2. If the plunger does not move, there is a clogging in the positive crankcase ventilation valve. In this case, clean or replace the valve.

EVAPORATIVE EMISSION CONTROL SYSTEM

120002588

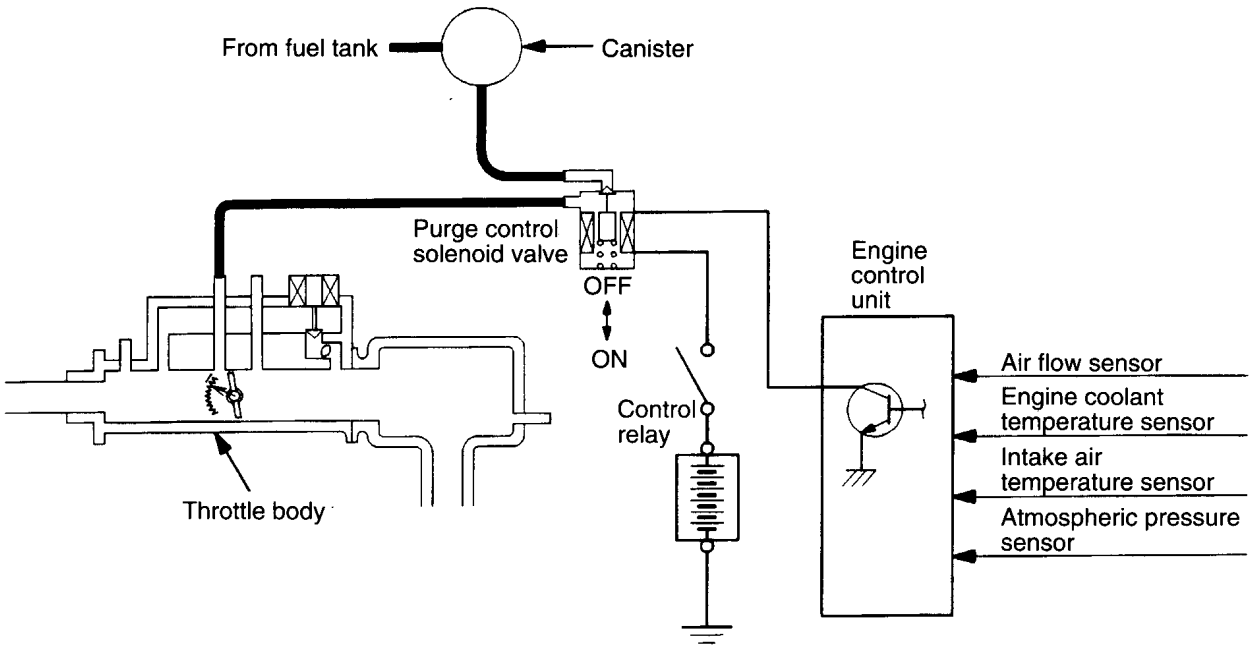
GENERAL INFORMATION

The evaporative emission control system prevents fuel vapours generated in the fuel tank from escaping into the atmosphere.
Fuel vapours from the fuel tank flow through the fuel tank pressure control valve and vapour pipe/hose to be stored temporarily in the canister. When driving the vehicle, fuel vapours stored in the canister flow through the purge solenoid and purge port and go into the intake manifold to be sent to the combustion chamber.

When the engine coolant temperature is low or when the intake air quantity is small (when the engine is at idle, for example), the engine control unit turns the purge solenoid off to shut off the fuel vapour flow to the intake manifold.
This does not only insure the driveability when the engine is cold or running under low load but also stabilize the emission level.

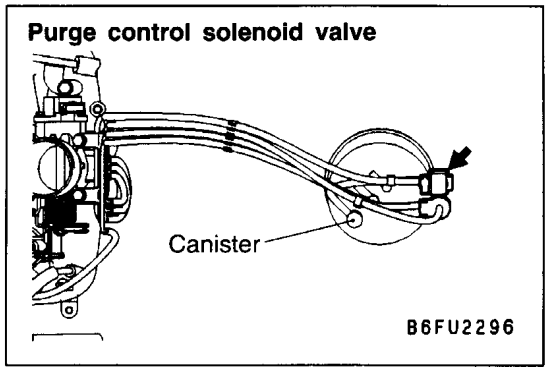
SYSTEM DIAGRAM

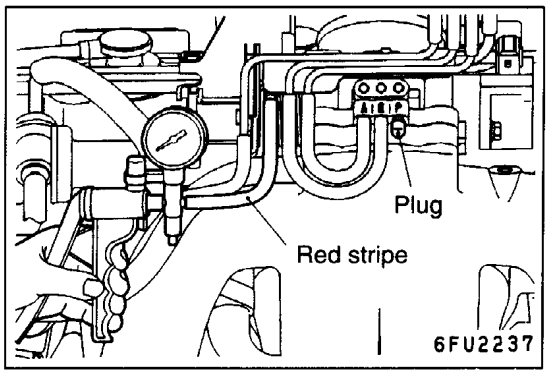
120000848



COMPONENT LOCATION

120000849





PURGE CONTROL SYSTEM INSPECTION

120000850

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.

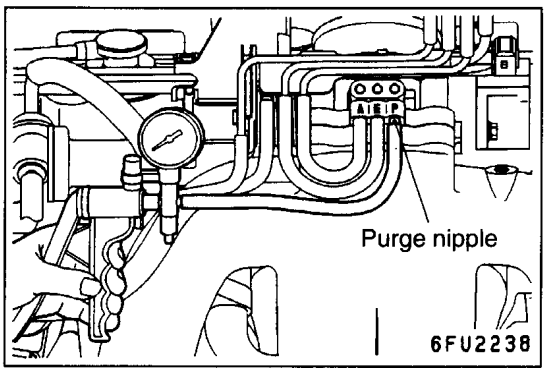
When engine is cold
(Engine coolant temperature: 40°C or less)

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.*

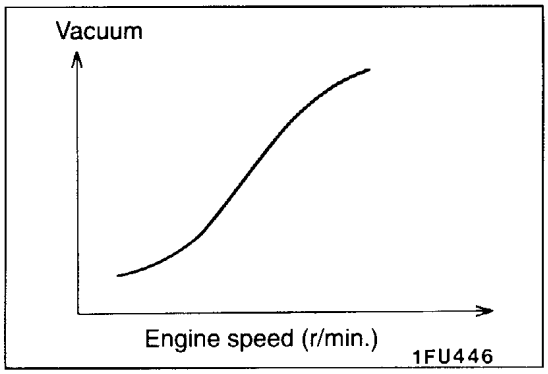
NOTE
* The vacuum will leak continuously if the atmospheric pressure is approximately 77 kPa or less, or the temperature of the intake air is approximately 50°C or higher.



PURGE PORT VACUUM INSPECTION

120000846

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



2. Start the engine and check that, after raising the engine speed by racing the engine, purge vacuum raises according to engine speed.

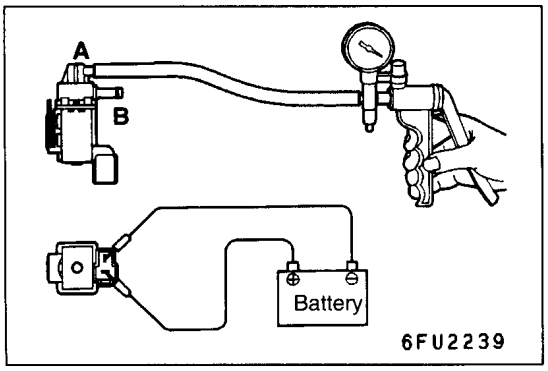
   NOTE
   If there is a problem with the change in vacuum, the throttle body purge port may be clogged and needs cleaning.

PURGE CONTROL SOLENOID VALVE INSPECTION

120000852

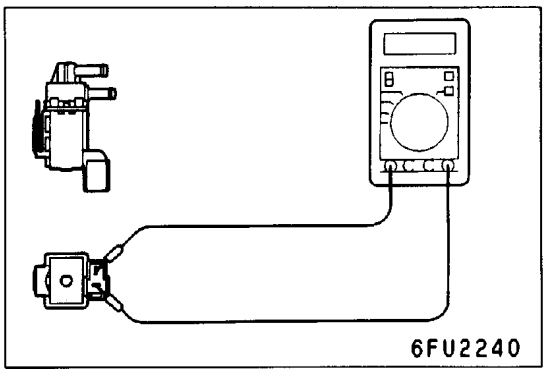
NOTE
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

1. Disconnect the vacuum hose (black stripe, red stripe) from the solenoid valve.
2. Disconnect the harness connector.



3. Connect a hand vacuum pump to nipple (A) of the solenoid valve (refer to the illustration at left).
4. Check air-tightness by applying a vacuum with voltage applied directly from the battery to the purge control solenoid valve and without applying voltage.

Battery voltage	Normal condition
Applied	Vacuum leaks
Not applied	Vacuum maintained



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

   Standard value: 36–44 Ω (at 20°C)

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

120002589

GENERAL INFORMATION

The exhaust gas recirculation (EGR) system lowers the nitrogen oxide (NOx) emission level. When the air/fuel mixture combustion temperature is high, a large quantity of nitrogen oxides (NOx) is generated in the combustion chamber. Therefore, this system recirculates part of emission gas from the exhaust port of the cylinder head to the combustion chamber through the intake manifold to decrease the air/fuel mixture combustion temperature, resulting in reduction of NOx.
The EGR flow rate is controlled by the EGR valve so as not to decrease the driveability.

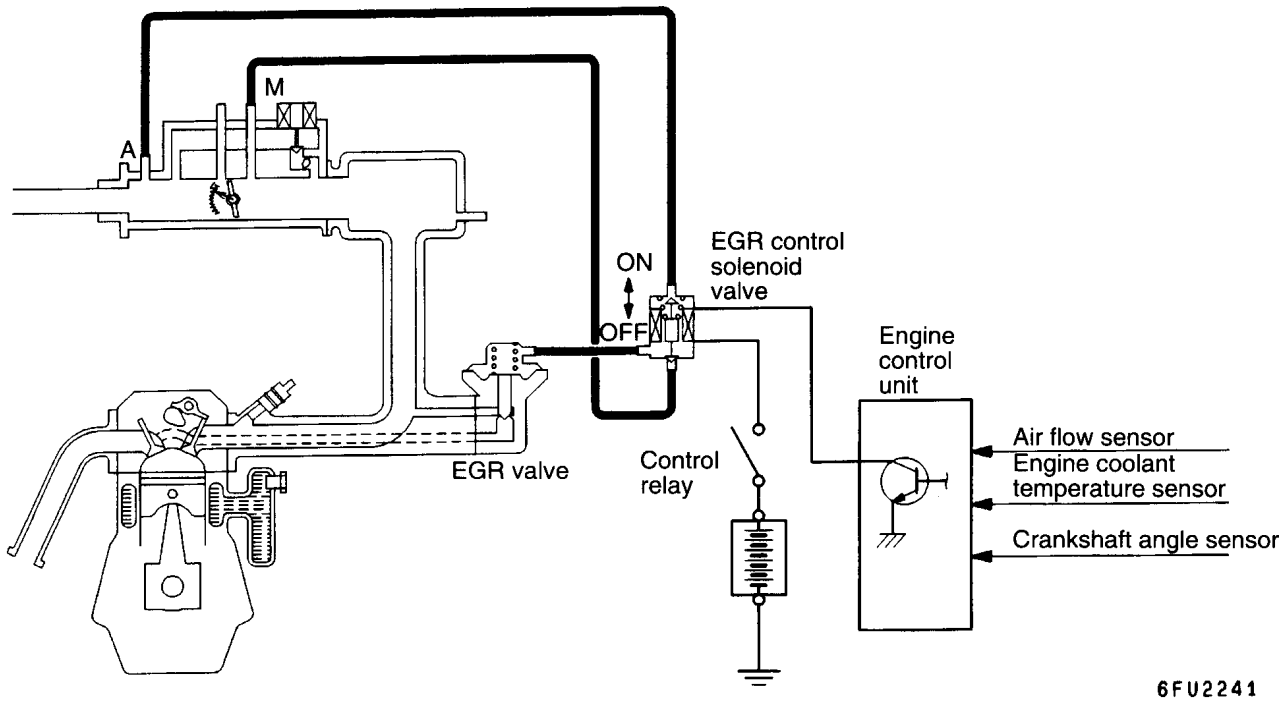
OPERATION

The EGR valve is being closed and does not recirculate exhaust gases under one of the following conditions. Otherwise, the EGR valve is opened and recirculates exhaust gases.

- The engine coolant temperature is low.
- The engine is at idle.
- The throttle valve is widely opened.

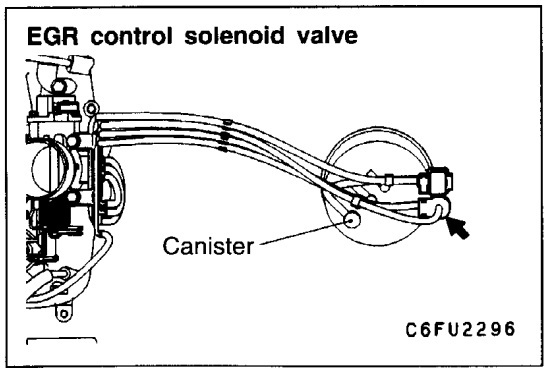
SYSTEM DIAGRAM

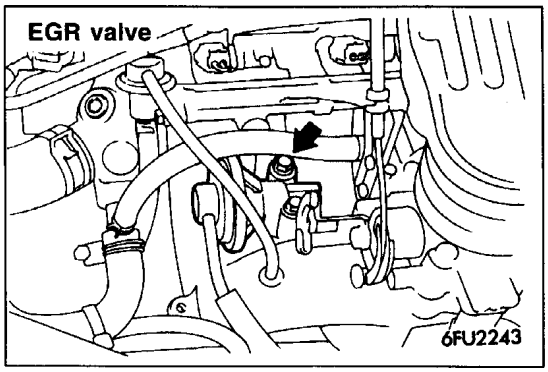
120000854

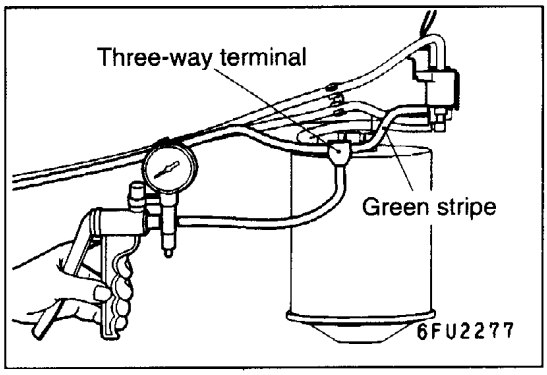


COMPONENT LOCATION

120002593





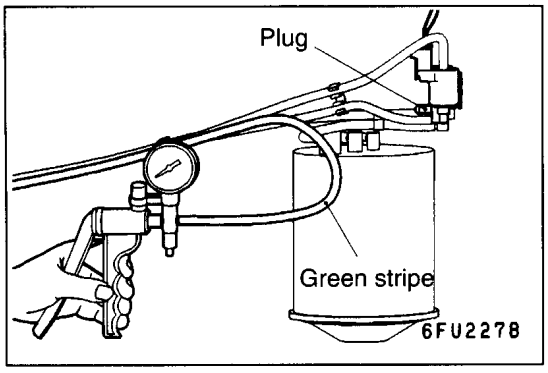


EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM INSPECTION 120000856

1. Disconnect the vacuum hose (green stripe) from the EGR control solenoid 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)

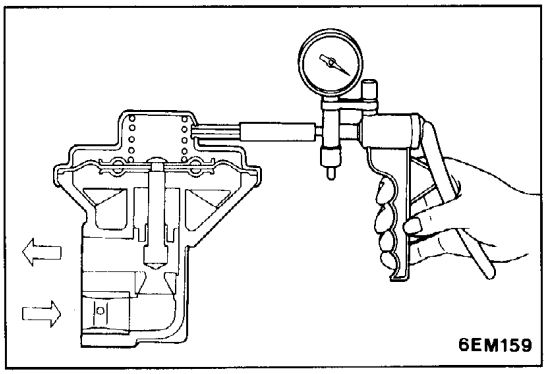
Throttle valve	Normal vacuum condition
Open quickly	No vacuum will generate (the same as barometric pressure.)



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 vacuum hose (green stripe).
5. Check whether the engine stalls or the idling is unstable when a vacuum of 30 kPa or higher is applied during idling.



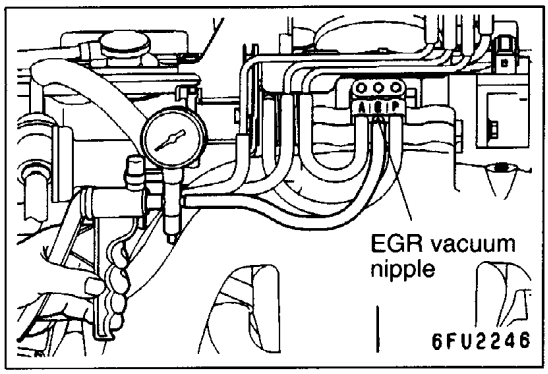
EGR VALVE INSPECTION 120000857

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
5.3 kPa or less	Air is not blown out
26 kPa or more	Air is blown out

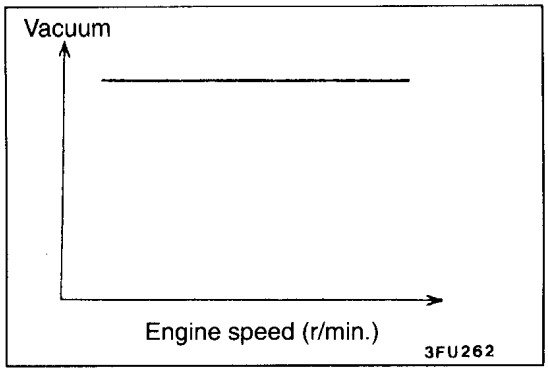
5. Replace the gasket, and tighten to the specified torque.

Specified torque: 22 Nm



EGR PORT VACUUM INSPECTION 120000858

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



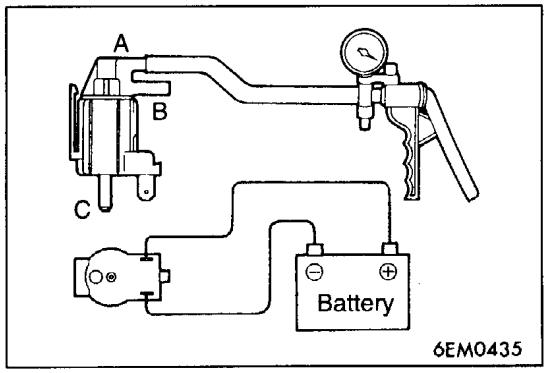
2. Start the engine and check vacuum remains fairly constant after racing the engine.

   NOTE
   If there is no vacuum created, it is possible that the throttle body EGR port may be clogged and needs cleaning.

EGR CONTROL SOLENOID VALVE INSPECTION 120000859

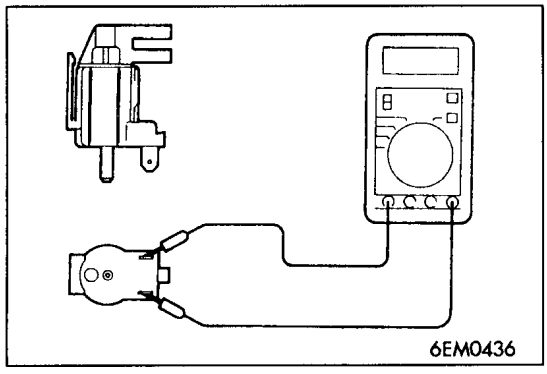
NOTE
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

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 air-tightness 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)

CATALYTIC CONVERTER

120000004

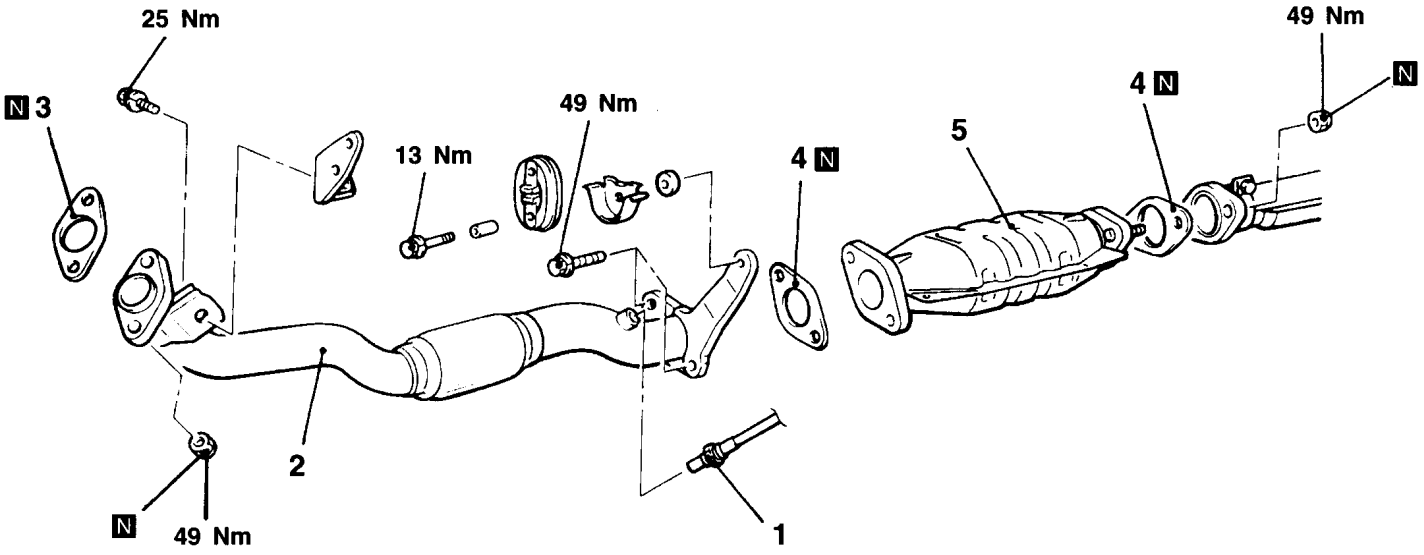
GENERAL INFORMATION

The three-way catalytic converter, together with the closed loop air-fuel ratio control based on the oxygen sensor signal, oxidizes carbon monoxides (CO) and hydrocarbons (HC) and reduces nitrogen oxides (NOx).

When the mixture is controlled at stoichiometric air-fuel ratio, the three-way catalytic converter provides the highest purification against the three constituents, namely, CO, HC and NOx.

REMOVAL AND INSTALLATION

120002177



A05W0052

Removal steps

1. Oxygen sensor
2. Front exhaust pipe
3. Gasket
4. Gasket
5. Catalytic converter

INSPECTION

Inspect for damage, cracking or deterioration. Replace if faulty.

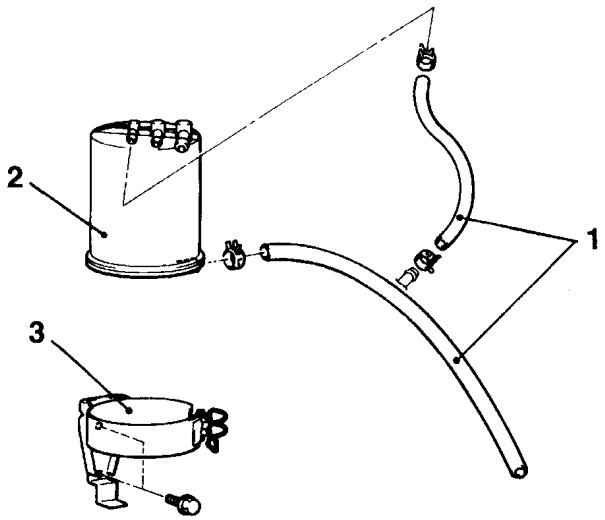
Caution

1. **Stop the engine immediately if engine misfiring occurs, otherwise an abnormally hot exhaust system will damage the catalytic converter or other under-body parts.**
2. **Correct and repair the ignition or fuel system if there are malfunctions, otherwise engine misfiring may occur which will damage the catalytic converter.**
3. **Observe manufacturer's specifications when doing service work.**

CANISTER

120000006

REMOVAL AND INSTALLATION



A03W0001

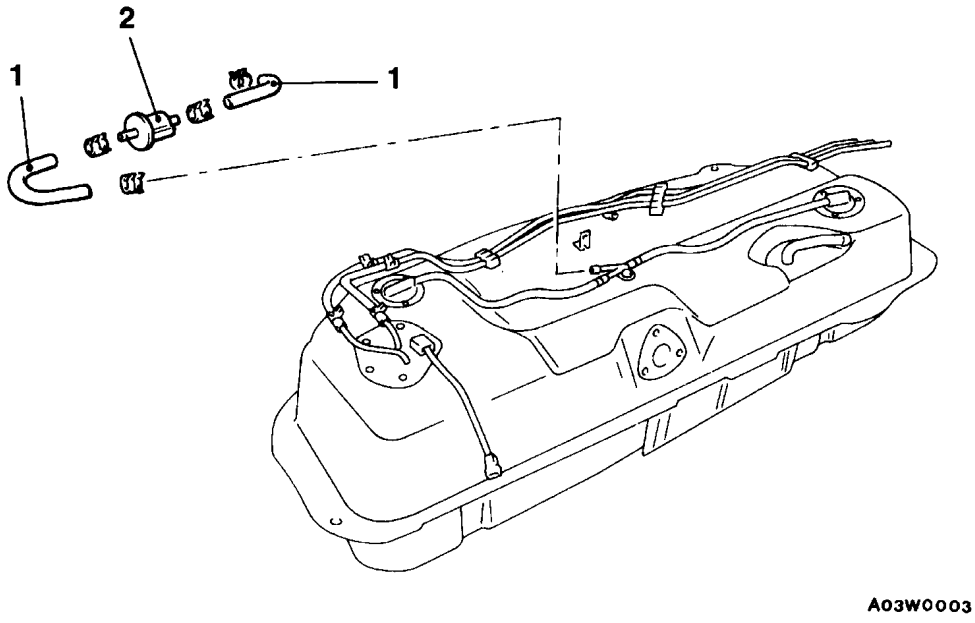
Removal steps

1. Vapour hose
2. Canister
3. Canister holder assembly

TWO-WAY VALVE

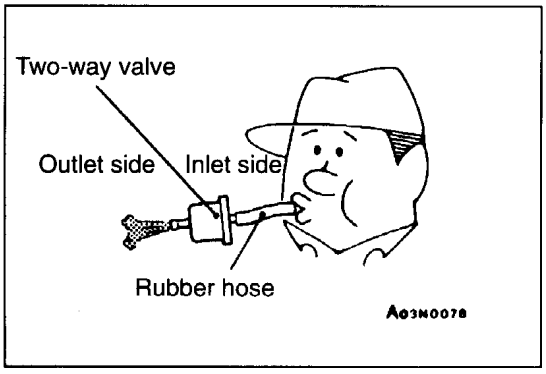
120000007

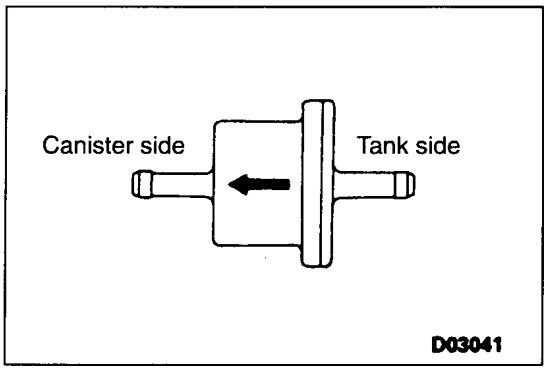
REMOVAL AND INSTALLATION



Removal steps

1. Vapour hose
▶A◀ 2. Two-way valve





INSPECTION

TWO-WAY VALVE SIMPLE CHECK

Attach a clean hose and check the operation of the two-way valve.

Inspection procedure	Normal condition
Lightly blow from inlet side (fuel tank side).	Air passes through with a slight feeling of resistance.
Lightly blow from outlet side.	Air passes through.

INSTALLATION SERVICE POINT

▶A◀ TWO-WAY VALVE INSTALLATION

Be careful about the installation direction of the two-way valve.

EMISSION CONTROL <ELECTRONIC CONTROLLED CARBURETTOR>

120002590

GENERAL INFORMATION

The emission control system consists of the following sub-systems:
- Crankcase emission control system
- Evaporative emission control system
- Exhaust emission control system

Items	Name	Specifications
Crankcase emission control system	Positive crankcase ventilation valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister Purge control valve Bowl vent valve	Equipped Single diaphragm type Vacuum type (Purpose: HC reduction)
Exhaust emission control system	Air-fuel ratio control device – Electronic control carburettor system	Oxygen sensor feedback type (Purpose: CO, HC, NOx reduction)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)
	Secondary air supply system • Reed valve • Secondary air control solenoid valve	Equipped With air control valve ON-OFF solenoid valve (Purpose: CO, HC reduction)
	Exhaust gas recirculation system • EGR valve • Vacuum regulator valve • Thermo valve	Equipped Single type With vacuum control Wax type (Purpose: NOx reduction)
	Intake air temperature control system	Vacuum control type (Purpose: CO, HC reduction)
	Mixture control valve (MCV)	Pressure differential type valve (Purpose: CO, HC reduction)

EMISSION CONTROL DEVICE REFERENCE TABLE

120002591

Items	Emission control system								
Related parts	Crank-case emis-sion control system	Evapo-rative emis-sion control system	Air-fuel ratio control system	Cata-lytic con-verter	Sec-ondary air supply system	Ex-haust gas re-circula-tion system	Intake air tem-pera-ture control system	Decel-erator	Reference page for each part inspection
Positive crankcase ventilation valve	×								17-7
Bowl vent valve		×							17-23
Purge control valve		×							17-21
Thermo valve		×				×			17-21
Electronic control carburettor system component			×		×				GROUP 13B
Catalytic converter				×					17-33
Secondary air control valve (with reed valve)					×				17-28
Secondary air control solenoid valve					×				17-29
Vacuum tank					×				–
EGR valve						×			17-12
Vacuum regulator valve						×			17-25
Air control valve							×		17-31
Thermo sensor							×		17-31
Mixture control valve								×	17-32

SERVICE SPECIFICATION

120001448

Item	Standard value
Secondary air control solenoid valve coil resistance (at 20°C) Ω	36–44

SEALANT

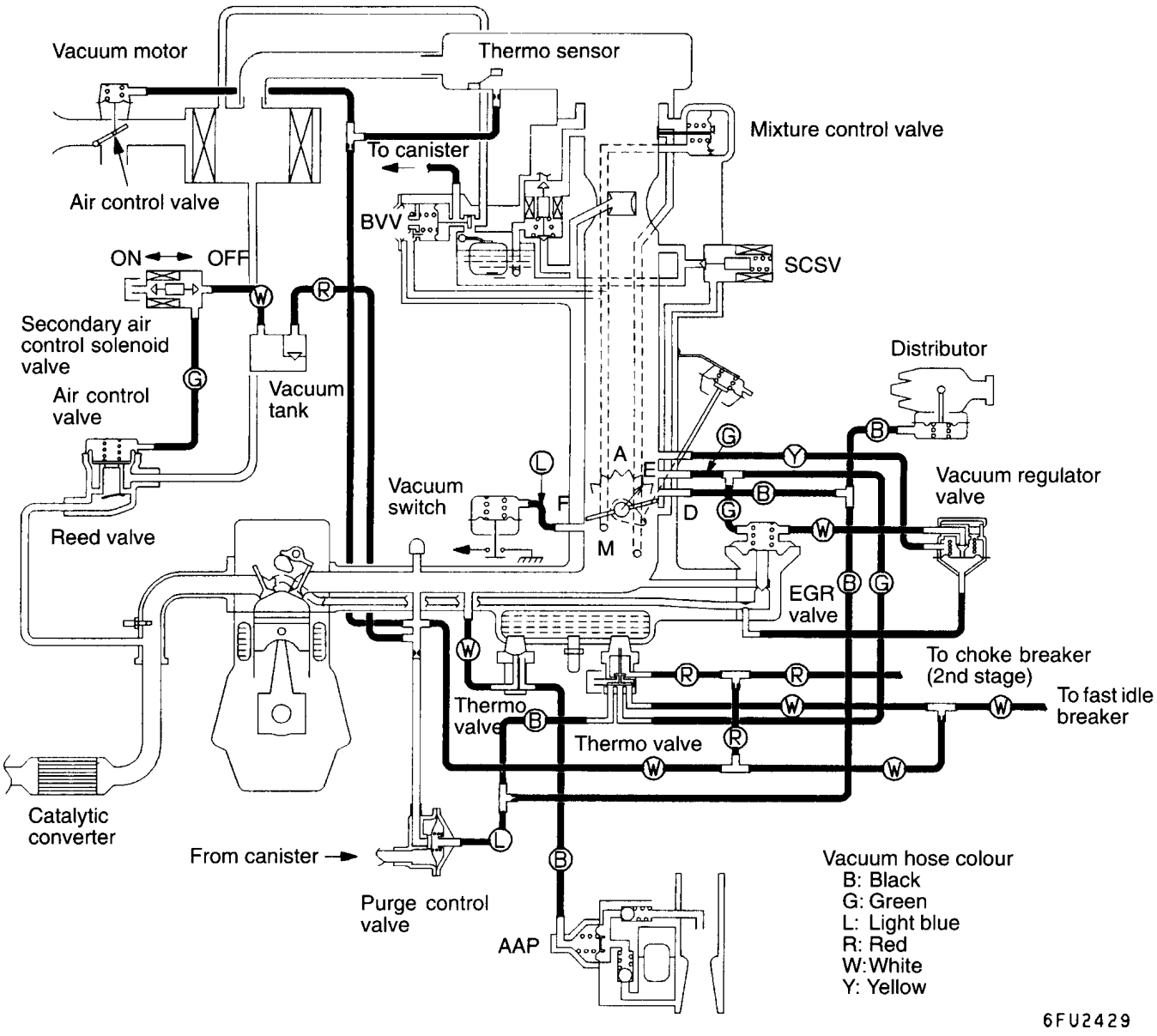
120001449

Item	Specified sealant	Remark
Thermo valve threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

VACUUM HOSE

120002592

VACUUM HOSE PIPING DIAGRAM



VACUUM HOSE INSPECTION

1. Using the piping diagram as a guide, check to be sure that the vacuum hoses are correctly connected.
2. Check the connection condition of the vacuum hoses, (removed, loose, etc.) and check to be sure that there are no bends or damage.

VACUUM HOSE INSTALLATION

1. When connecting the vacuum hoses, they should be securely inserted onto the nipples.
2. Connect the hoses correctly, using the vacuum hose piping diagram as a guide.

CRANKCASE EMISSION CONTROL SYSTEM

120001451

Refer to P.17-6.

EVAPORATIVE EMISSION CONTROL SYSTEM

120001452

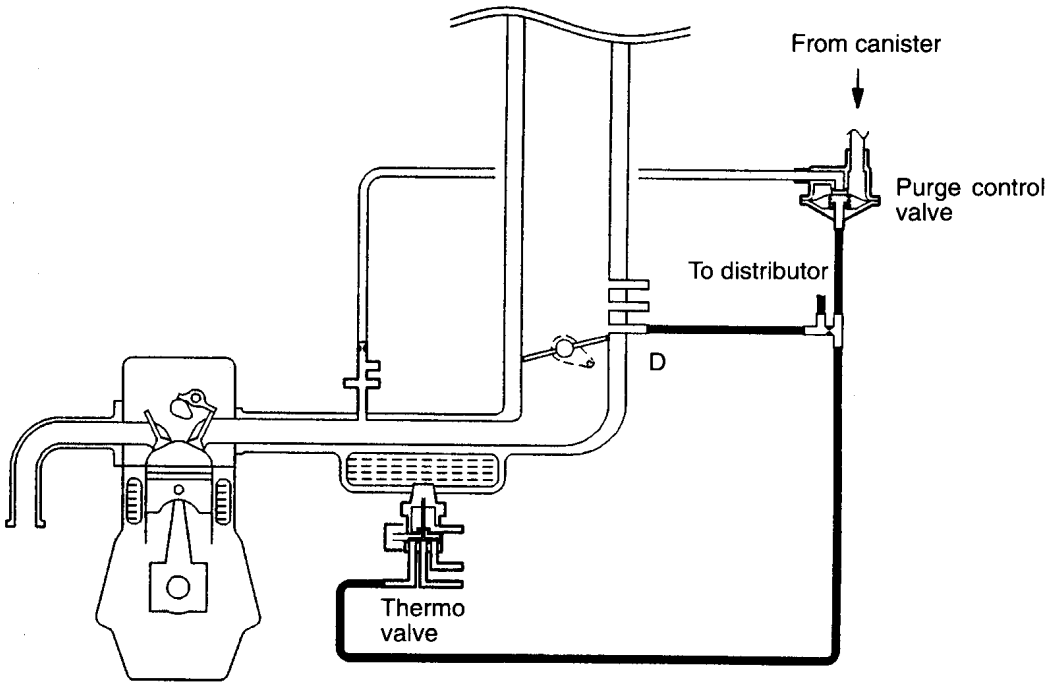
GENERAL INFORMATION

The evaporative emission control system prevents fuel vapors generated in the fuel tank from escaping into the atmosphere.
Fuel vapours from the fuel tank flow through the fuel tank pressure control valve and vapour pipe/hose to be stored temporarily in the canister. When the vehicle is in operation, fuel vapours stored in the canister flow through the purge control valve and purge port and go into the intake manifold to be sent to the combustion chamber.

When the engine coolant temperature is low or when the air intake quantity is small (when the engine is at idle, for example), the purge control valve shuts off the fuel vapour flow to the intake manifold. This does not only insure the driveability when the engine is cold or running under low load but also stabilities the emission level.
Furthermore, a bowl vent valve is installed to the carburettor to improve startability when the engine is warm.

SYSTEM DIAGRAM

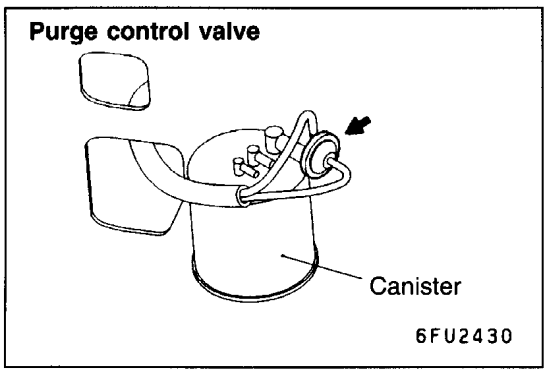
120001453

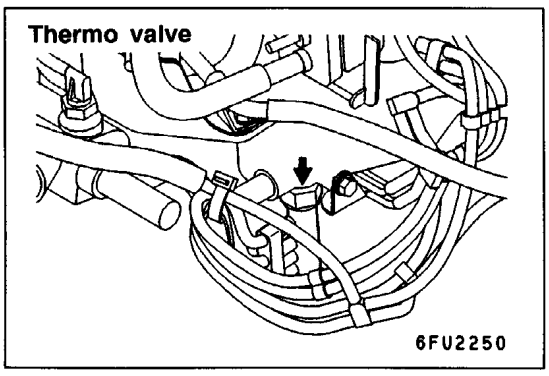


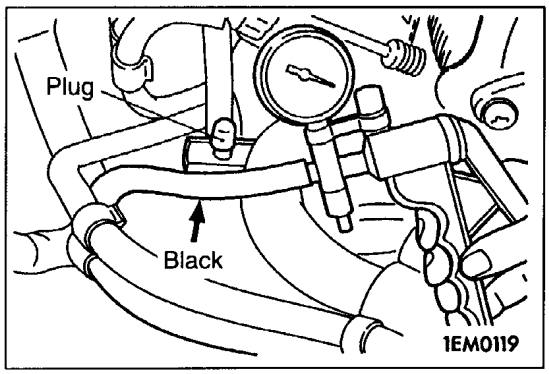
6FU2248

COMPONENT LOCATION

120002594







PURGE CONTROL SYSTEM INSPECTION 120001455

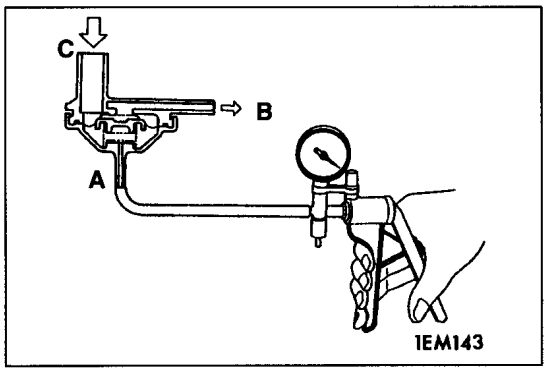
1. Disconnect the vacuum hose (Black) from the intake manifold and connect it to a hand vacuum pump.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold and hot, apply 53 kPa of vacuum, and check the condition of the vacuum.

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

Engine status	Normal condition
3,500 r/min.	Vacuum is maintained

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

Engine status	Normal condition
Idling	Vacuum is maintained
3,500 r/min.	Vacuum leaks



PURGE CONTROL VALVE INSPECTION 120001456

1. Remove the purge control valve.
2. Connect a hand vacuum pump to the nipple A of the purge control valve.
3. Apply 53 kPa of vacuum, and check to be sure that the vacuum is maintained.
4. Blow the air from the nipple C and check the air passage.

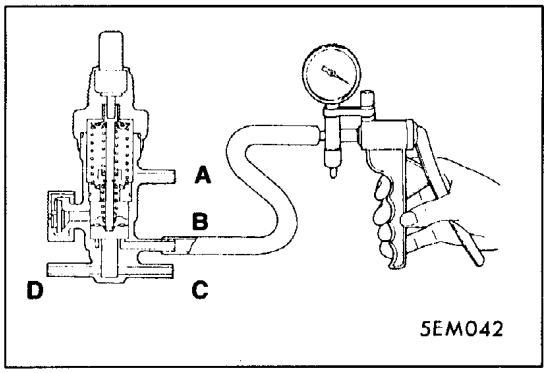
Vacuum	Passage of air
Not applied	Air is not blown out
5.3 kPa	Air is blown out

THERMO VALVE INSPECTION 120001457

NOTE
This thermo valve controls the choke breaker, EGR and fast idle breaker.

1. Remove the thermo valve.

Caution
1. **Do not apply spanners, etc. to the plastic parts of the thermo valve.**
2. **When disconnecting the vacuum hose, always make a mark so that the hose can be reconnected at its original position.**



2. Connect a hand vacuum pump to each of the nipples, apply a vacuum and check whether or not air passes through the thermo valve.

Caution
Plug all nipples except the one to which the vacuum pump is connected.

Nipple B, C, D

Engine coolant temperature	Normal condition
40°C or less	Vacuum leaks
80°C or more	Vacuum is maintained

Nipple A

Engine coolant temperature	Normal condition
10°C or less	Vacuum leaks
30°C or more	Vacuum is maintained

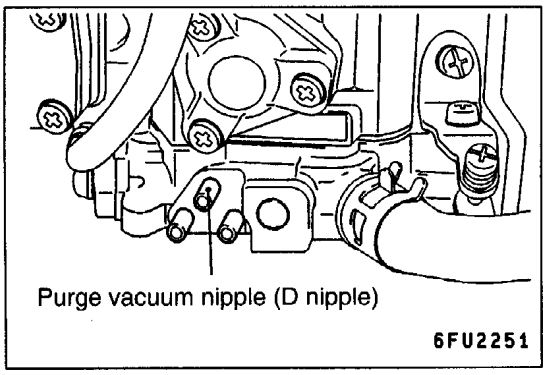
3. Apply sealant threaded portion.

Specified sealant: 3M NUT locking Part No. 4171 or equivalent

4. Install thermo valve and tighten it to the specified torque.

Sensor tightening torque: 29 Nm

Caution
Do not apply spanners, etc. to the plastic parts of the thermo valve.



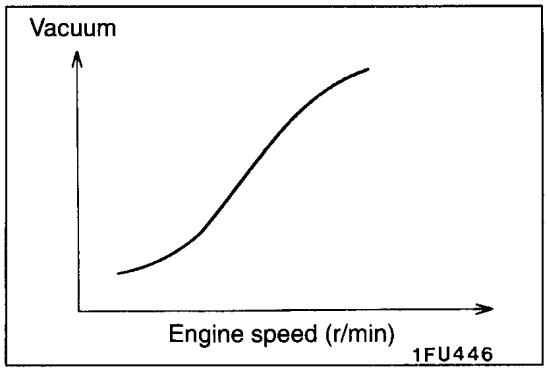
PURGE PORT (D NIPPLE) VACUUM INSPECTION

120001458

Check Condition

Engine coolant temperature: 80–95°C

1. Disconnect the vacuum hose (black) from the carburettor purge vacuum nipple (D nipple) and connect a hand vacuum pump to the nipple.

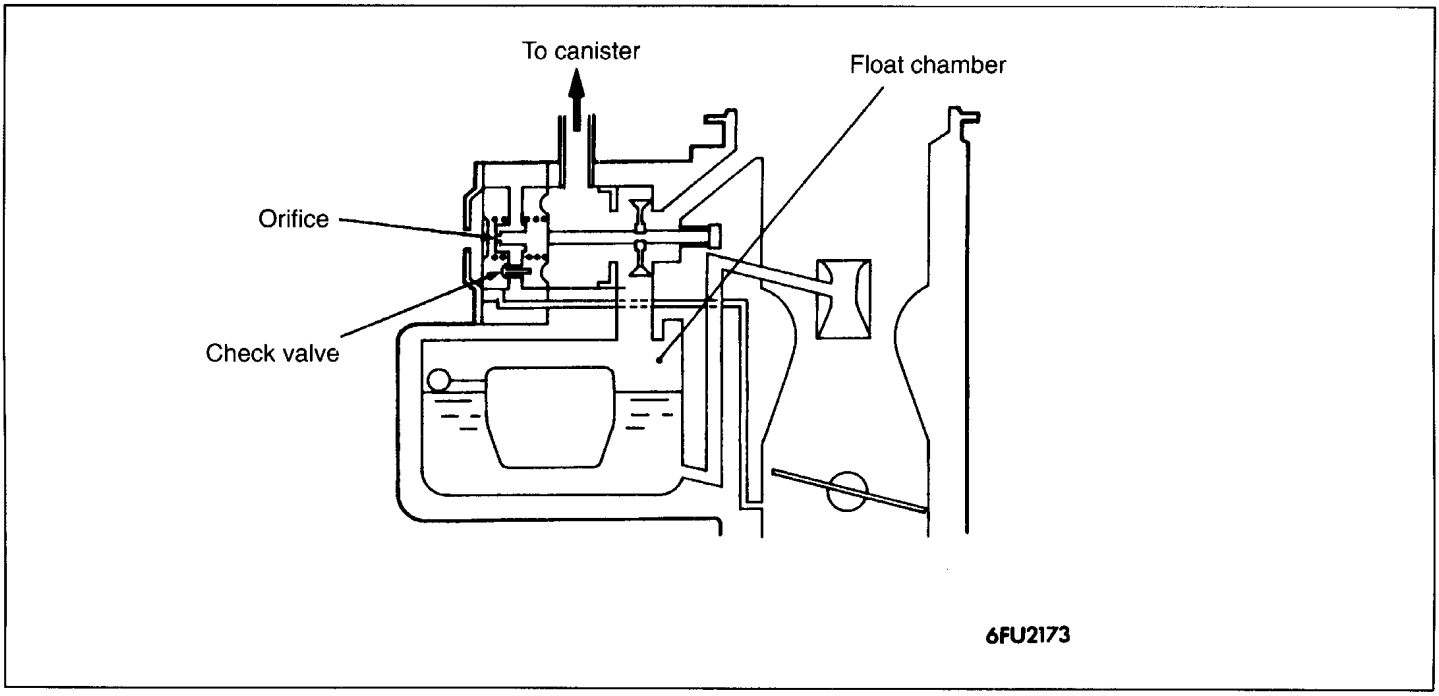


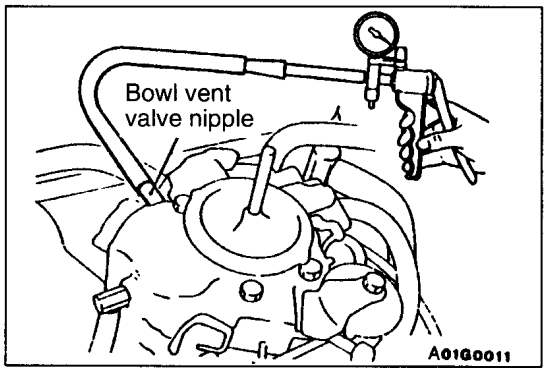
2. Start the engine and check to see that, after raising the engine speed by racing the engine, purge vacuum raises proportionally with the rise in engine speed.

NOTE
If there is a problem with the change in vacuum, it is possible that the carburettor purge port (D port) may be clogged and needs cleaning.

BOWL VENT VALVE INSPECTION

120001459





Caution
Inspect after the engine has cooled. Fuel may be discharged from the bowl vent valve nipple if the engine is still warm.

1. Disconnect the bowl vapour hose from the bowl vent valve nipple and connect a hand vacuum pump to the bowl vent valve nipple.
2. Apply a vacuum of 14 kPa to the bowl vent valve and inspect.

Engine status	Normal condition
STOP	Vacuum leaks
Idling	Vacuum is applied

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

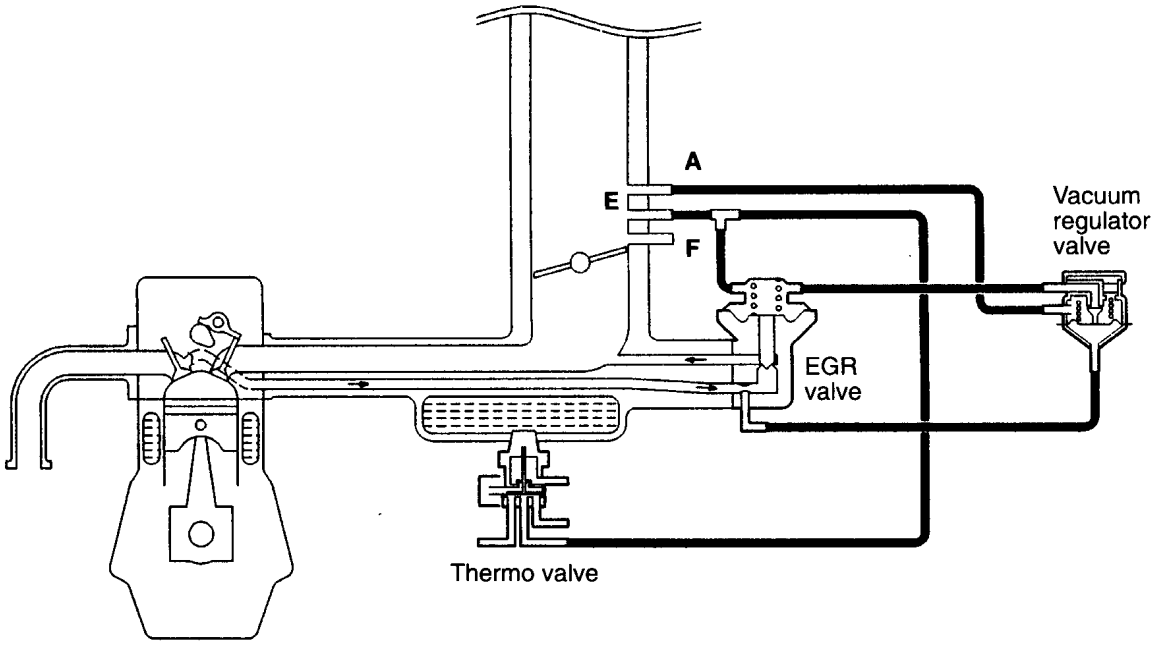
120002595

GENERAL INFORMATION

Refer to P.17-11.

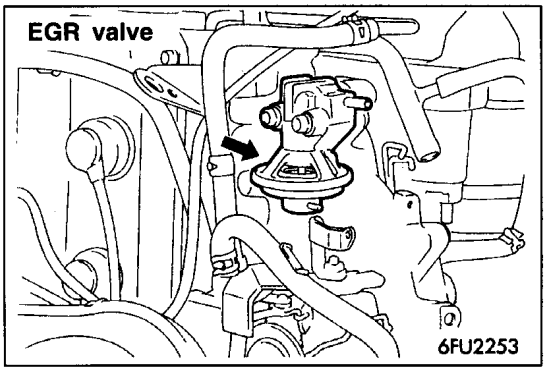
SYSTEM DIAGRAM

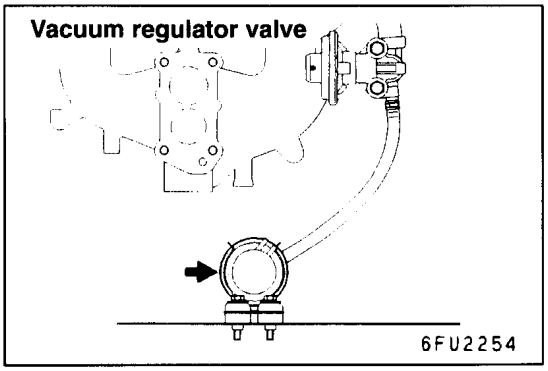
120001463

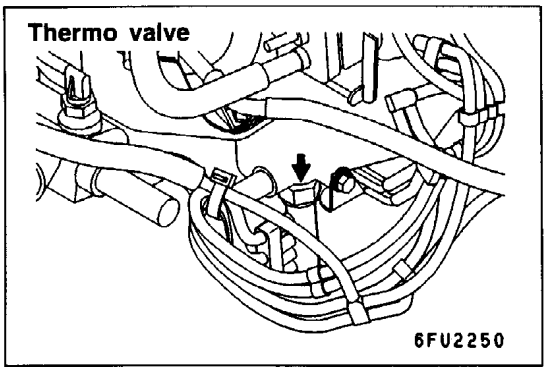


COMPONENT LOCATION

120001464







EXHAUST GAS RECIRCULATION (EGR) CONTRTOL SYSTEM INSPECTION

120001465

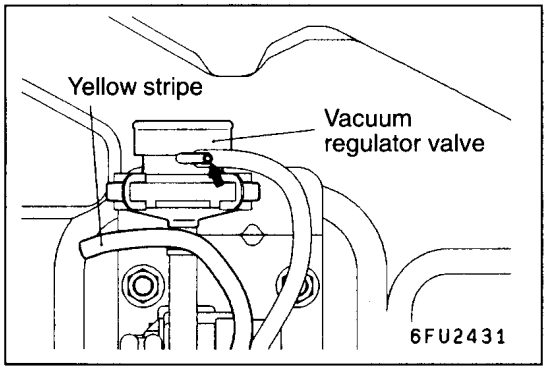
1. Disconnect the vacuum hose (green striped) from the carburettor throttle body and connect it to a hand vacuum pump.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold and hot, apply a vacuum, and check the condition of the vacuum.

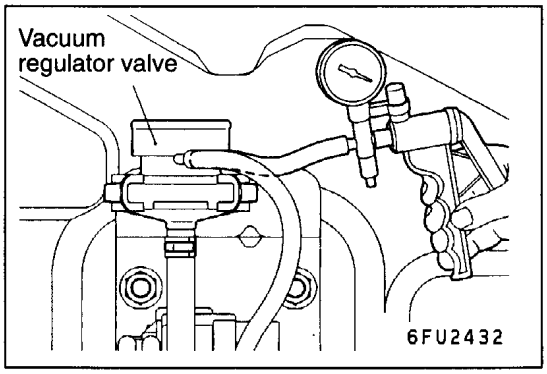
When engine is cold
(Engine coolant temperature: 40°C or less)

Engine status	Normal condition
3,500 r/min.	Vacuum leaks from the thermo valve

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

Engine status	Normal condition
Idling	Vacuum leaks
3,500 r/min.	Vacuum leaks until it is approx. 11 kPa





VACUUM REGULATOR VALVE INSPECTION

120002597

1. Check whether air is escaping from the vacuum regulator valve nipple when the vacuum hose (yellow stripe) is disconnected from the vacuum regulator valve while the engine is idling.

   NOTE
   If no air is escaping from the vacuum regulator valve nipple, it is probable that the exhaust pressure hose is blocked or that the vacuum regulator valve diaphragm is broken.
2. Connect the vacuum hose in the correct position again.
3. Disconnect the vacuum hose (white stripe) from the vacuum regulator valve, and then connect a hand vacuum pump to the vacuum regulator valve.
4. Apply 53 kPa of negative pressure and check the airtightness.

Engine condition	Normal condition
Idling	Negative pressure leaks
3,500 r/min.	Negative pressure is maintained

EGR VALVE INSPECTION

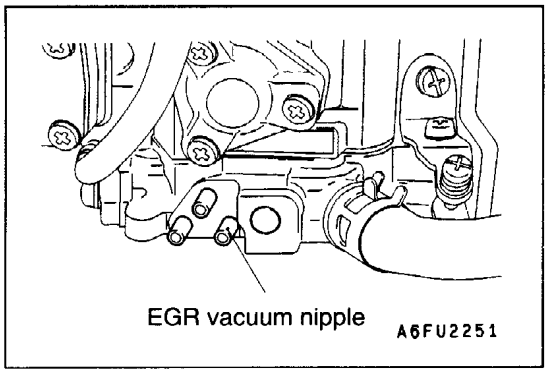
120002598

Refer to P.17-12.

THERMO VALVE INSPECTION

120001468

Refer to P.17-21.



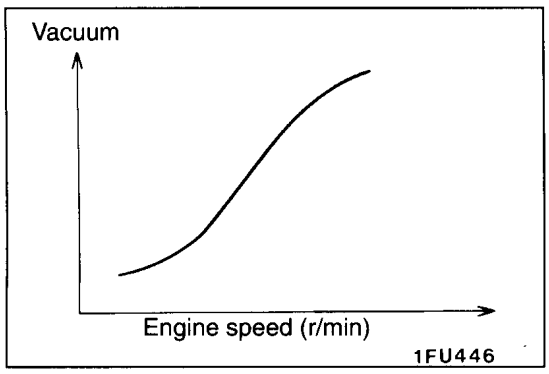
EGR PORT VACUUM INSPECTION

120001469

Check Condition

Engine coolant temperature: 80–95°C

1. Disconnect the vacuum hose (green stripe) from the carburettor EGR vacuum nipple and connect a hand vacuum pump to the nipple.



2. Start the engine and check to see that, after raising the engine speed by racing the engine, EGR vacuum raises proportionally with the rise in engine speed.

   NOTE
   If there is a problem with the change in vacuum, it is possible that the carburettor EGR port may be clogged and needs cleaning.

SECONDARY AIR SUPPLY SYSTEM

120001471

GENERAL INFORMATION

The reed valve supplies secondary air into the exhaust manifold for the purpose of promoting oxidation of exhaust emissions. The reed valve is actuated by exhaust vacuum being generated from pulsation in the exhaust manifold, and additional air is supplied into the exhaust manifold through the secondary air control valve.

OPERATION

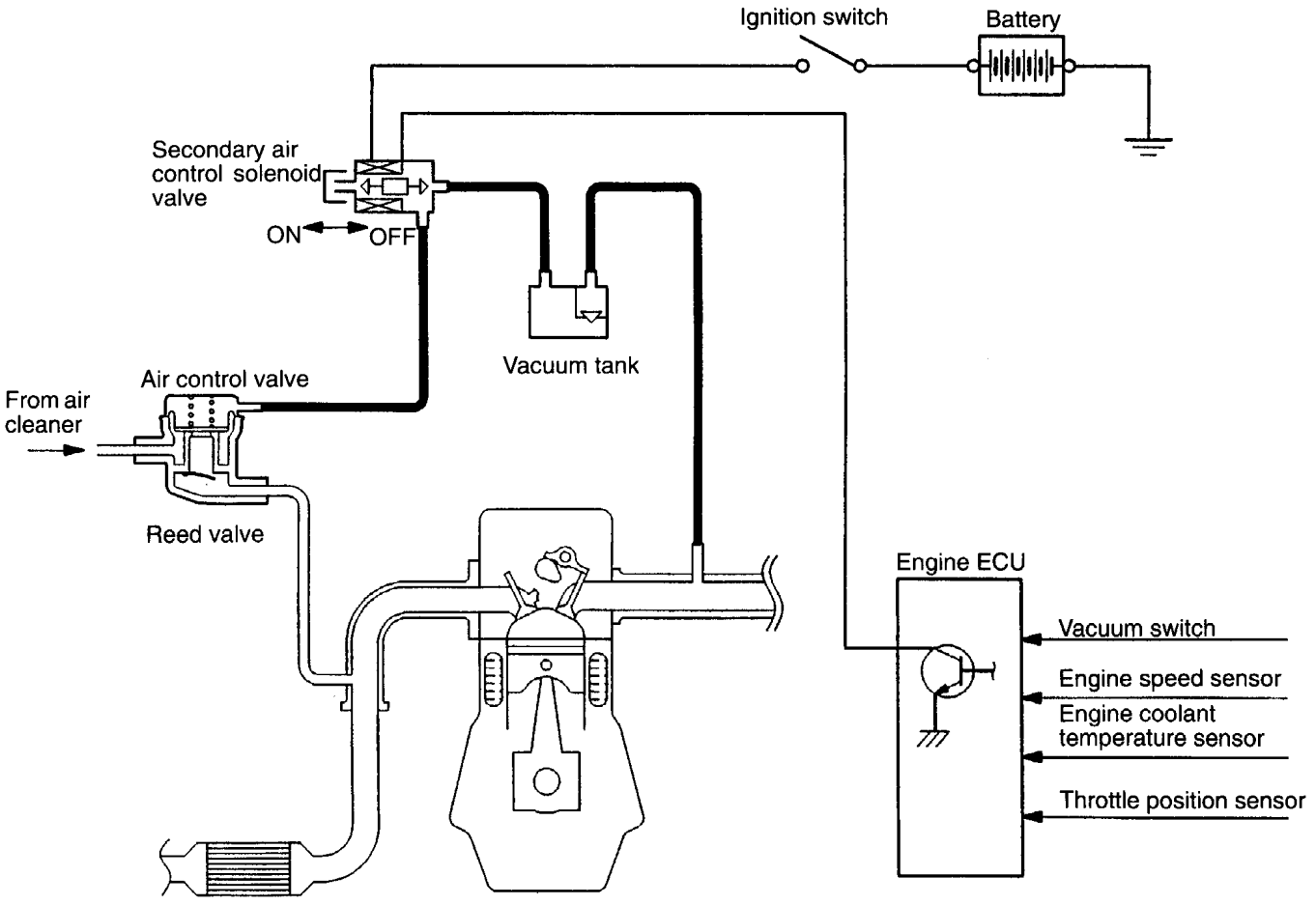
Current is caused to flow to the secondary air control solenoid valve as a result of the power transistor being switched ON by the engine ECU when, while the temperature of the coolant is 18°C (65°F) or higher, any of the following driving conditions is met.

- Deceleration (vacuum switch: ON; engine speed: 1,000 r/min. or higher)
- Cold engine (coolant temperature: 18–52°C)
- Engine: Idling
- Sudden acceleration
- For 1–3 minutes after the engine is started

As a result, the intake manifold negative pressure (vacuum) is introduced to the secondary air control valve, the valve opens, and the secondary air is supplied to the exhaust manifold.
Because negative pressure (vacuum) is stored in the vacuum tank, note that secondary air is supplied to the intake manifold even if the intake manifold negative pressure (vacuum) drops to about the level of atmospheric pressure when there is sudden acceleration.

SYSTEM DIAGRAM

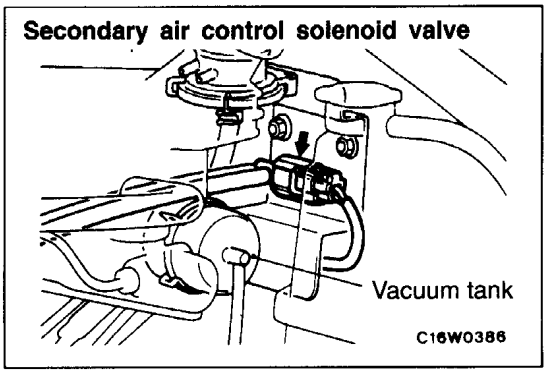
120001472

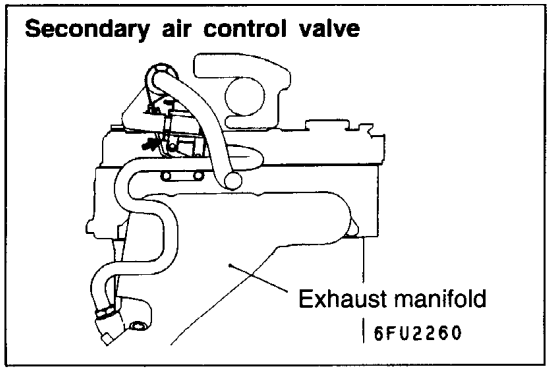


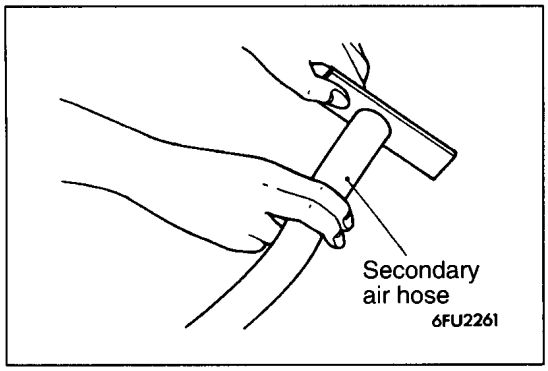
6FU2258

COMPONENT LOCATION

120002600







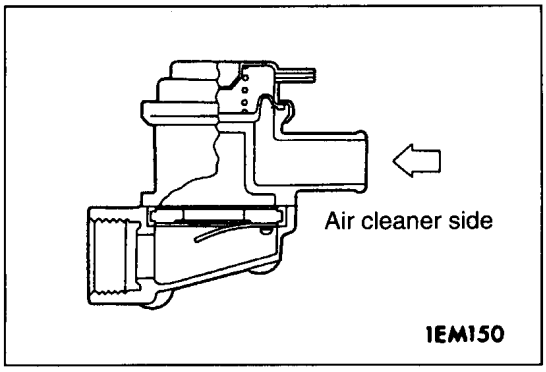
SECONDARY AIR SUPPLY SYSTEM INSPECTION

120001474

Caution
Note that exhaust blowback sometimes occurs if the secondary air control valve is faulty.

Disconnect the air supply hose from the air cleaner, place a small steel plate over the end of the hose and check the air intake.

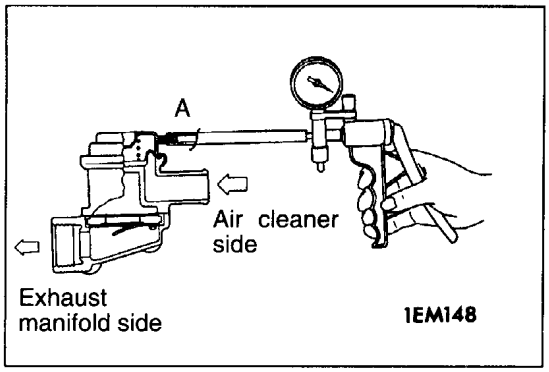
Engine coolant temperature	Engine status	Air suction
20–40°C	2,000 r/min.	Yes
70°C or higher	2,000 r/min.	Yes (within 70 sec. after starting the engine)
		No (70 sec. or more after starting the engine)
	Idling	Yes



SECONDARY AIR CONTROL VALVE INSPECTION

120001475

1. Remove the secondary air control valve.
2. Blow air from the air cleaner side and make sure that the air does not pass through.



3. Connect a hand vacuum pump to the nipple A of the secondary air control valve.
4. Apply a vacuum of 67 kPa and check that air-tightness is maintained.
5. Apply a vacuum of 15 kPa and check whether or not air passes through.

Direction of air	Normal condition
Air cleaner side → exhaust manifold side	Air passes through
Exhaust manifold side → air cleaner side	Air does not pass through

6. If inspection reveals any additional problems, replace the secondary air control valve.

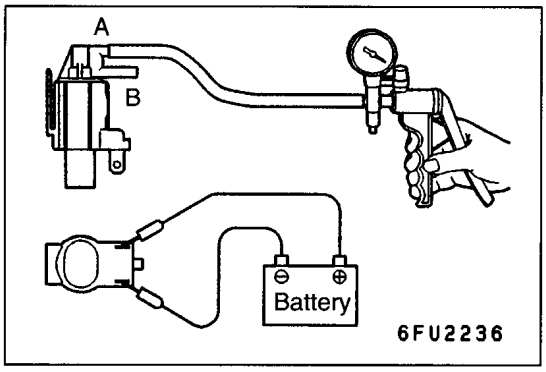
SECONDARY AIR CONTROL SOLENOID VALVE INSPECTION

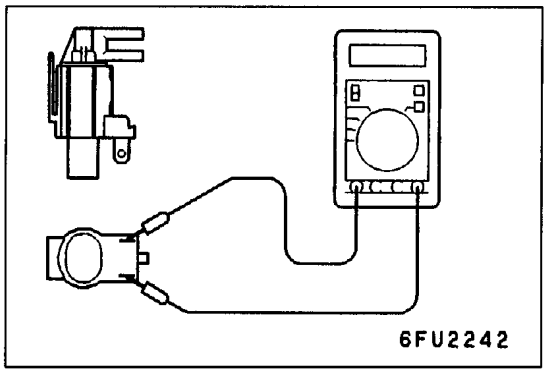
120001476

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

1. Disconnect the vacuum hose (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 air-tightness by applying a vacuum with voltage applied directly from the battery to the control solenoid valve and without applying voltage.

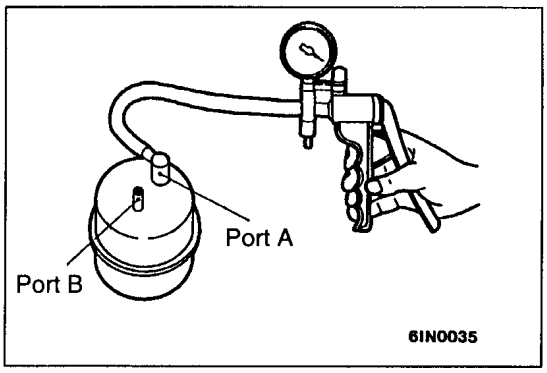
Battery voltage	B Nipple condition	Normal condition
Not applied	Open	Vacuum maintained
Applied	Open	Vacuum leaks
	Closed	Vacuum maintained





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

Standard value: 36–44Ω (at 20°C)



VACUUM TANK INSPECTION

120001477

1. Connect a hand vacuum pump to port A of the vacuum tank and apply a vacuum of 67 kPa. Make sure that the tank is completely air-tight with no vacuum leaks.
2. Connect a hand vacuum pump to port B and apply a vacuum. Make sure that the vacuum leaks.

INTAKE AIR TEMPERATURE CONTROL SYSTEM

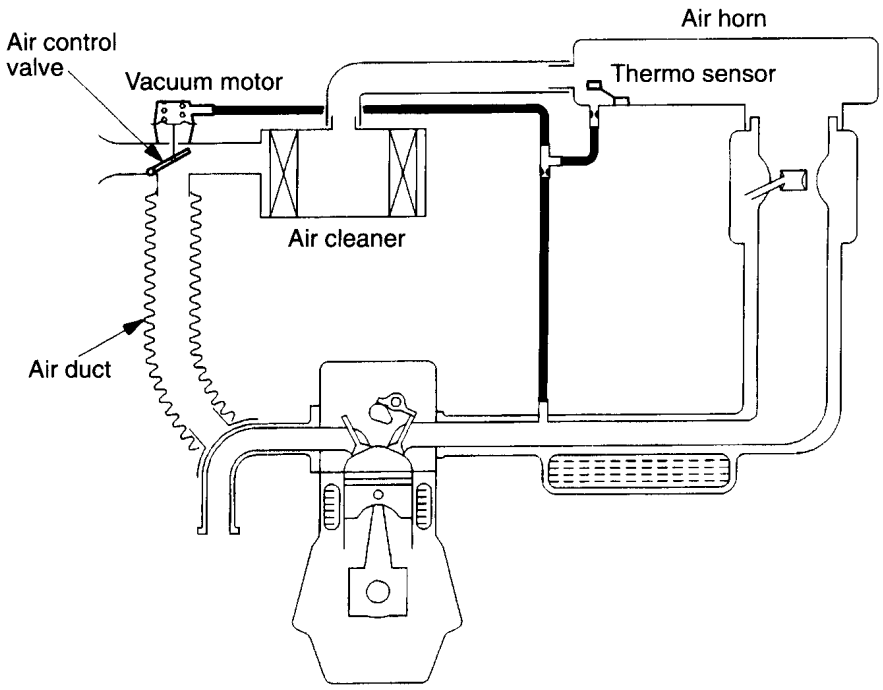
120000875

GENERAL INFORMATION

The air/fuel mixture ratio after being measured in the carburettor supplied to the engine is leaner when the air temperature is cold, because the density of the air is greater. Conversely, when the air temperature is warm, the air/fuel mixture ratio is richer because the density of the air is poorer. Thus, the intake air temperature control system maintains the temperature of the intake air at an almost constant level in order to provide a stable air/fuel mixture ratio. This provides improved stability of the exhaust gas level and also improves fuel consumption and driveability. In addition, the addition of warm air during cold weather prevents the carburettor from icing up.

SYSTEM DIAGRAM

120000876



6FU2255

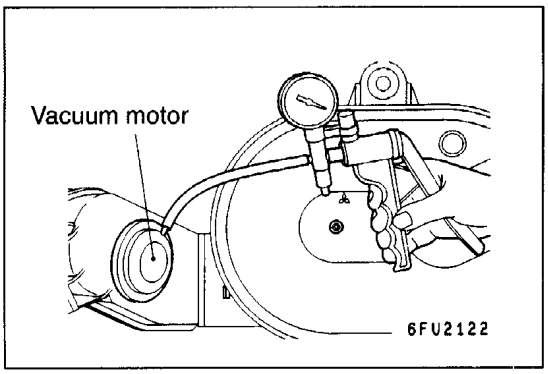
INTAKE AIR TEMPERATURE CONTROL SYSTEM INSPECTION

120000877

1. Start the engine.
2. Check the opening and closing of the air control valve while the engine is at idle.

Thermo sensor temperature	Normal condition
30°C or less	Cold air side inlet closes
45°C or more	Cold air side inlet opens

NOTE
If necessary, apply compressed air to cool or apply hot air using a hair dryer, etc. to heat.

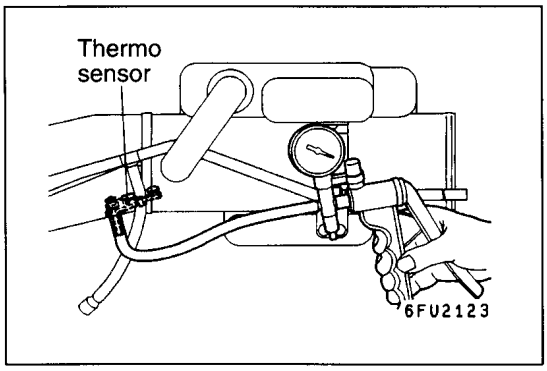


AIR CONTROL VALVE INSPECTION 120000878

1. Disconnect the vacuum hose from the vacuum motor and connect a hand vacuum pump to the valve nipple.
2. Apply a vacuum of 67 kPa and check air-tightness.
3. Check air control valve operation.

Vacuum	Normal condition
10 kPa or less	Cold air side inlet opens
33 kPa or more	Cold air side inlet closes

4. Connect the disconnected vacuum hose to the original position.



THERMO SENSOR INSPECTION 120000879

Connect a hand vacuum pump to the thermo sensor nipple and check air-tightness.

Thermo sensor temperature	Normal condition
30°C or less	Vacuum holds
45°C or more	Vacuum leaks

MIXTURE CONTROL VALVE (MCV)

120002601

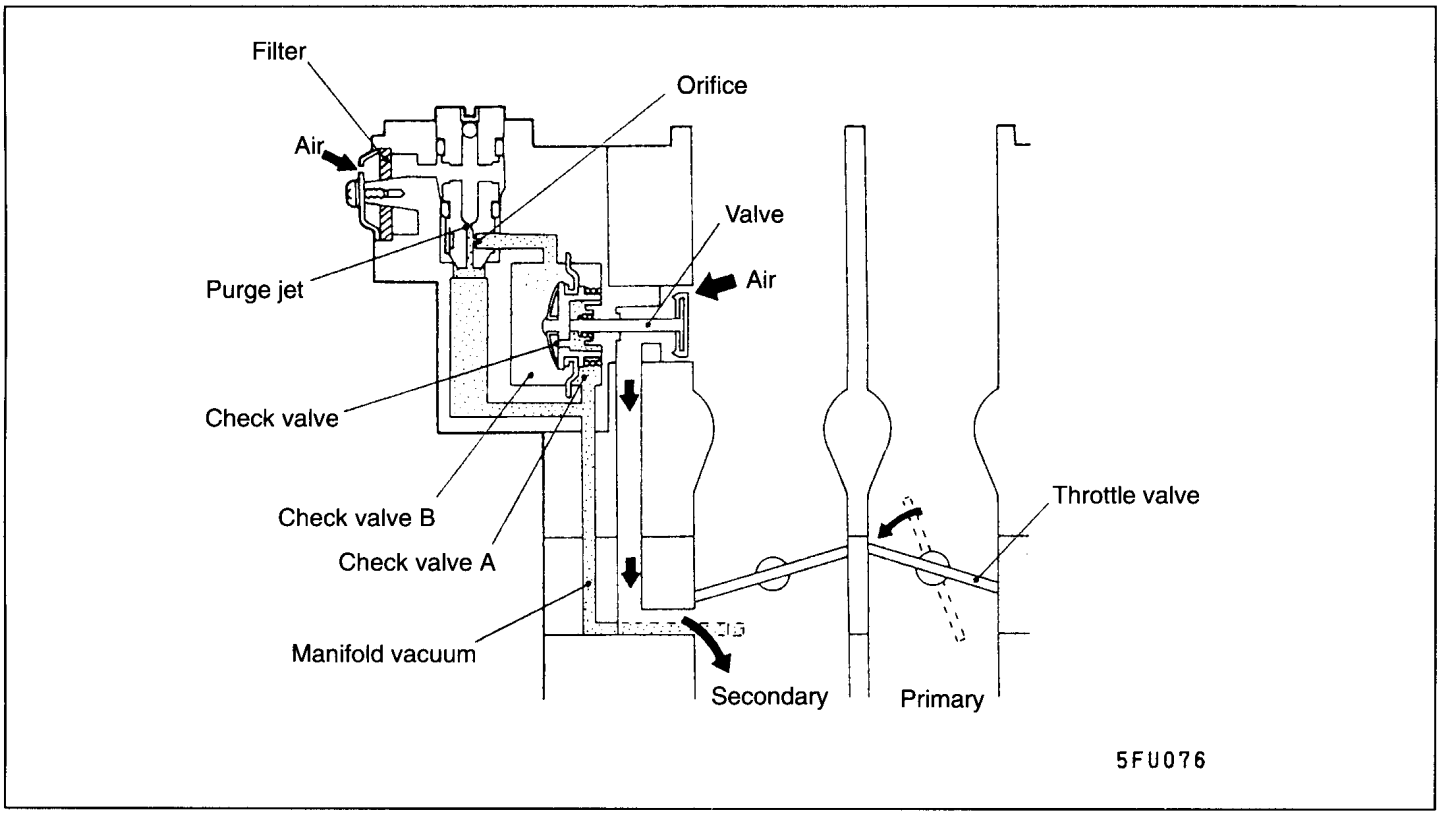
GENERAL INFORMATION

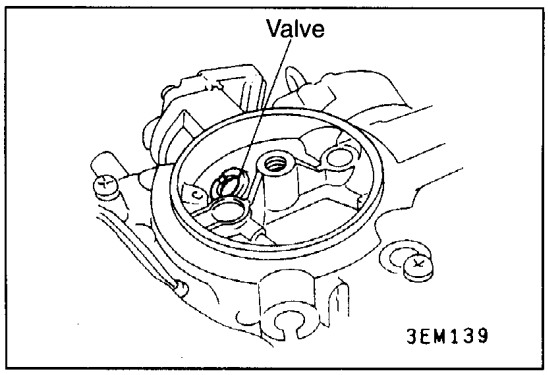
When the throttle is closed suddenly during deceleration or shifting, the fuel remaining in the inlet manifold causes an over-rich mixture temporarily.

In order to prevent this, air is supplied temporarily from another passage so as to keep correct air fuel ratio and reduce emission (HC).

MIXTURE CONTROL VALVE (MCV) INSPECTION

120002602





Caution

Inspect with the engine warm.

1. Remove the air horn.
2. Start the engine and check the operation of the MCV valve and sound of the intake air when the throttle valve is rapidly opened and closed.

Engine condition	Normal condition	
Throttle lever operated	Valve opens and quickly closes.	Intake air sound is audible.
Idling	Valve closes.	Intake air sound is not audible.

CATALYTIC CONVERTER

120000012

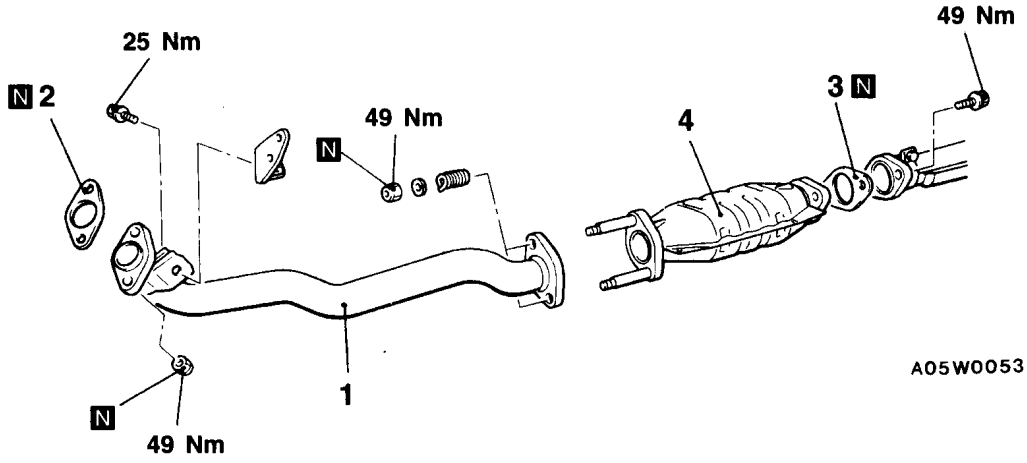
GENERAL INFORMATION

The three-way catalytic converter, together with the closed loop air-fuel ratio control based on the oxygen sensor signal, oxidizes carbon monoxides (CO) and hydrocarbons (HC) and reduces nitrogen oxides (NOx).

When the mixture is controlled at stoichiometric air-fuel ratio, the three-way catalytic converter provides the highest purification against the three constituents, namely, CO, HC and NOx.

REMOVAL AND INSTALLATION

120002178



Removal steps

1. Front exhaust pipe
2. Gasket
3. Gasket
4. Catalytic converter

INSPECTION

Inspect for damage, cracking or deterioration. Replace if faulty.

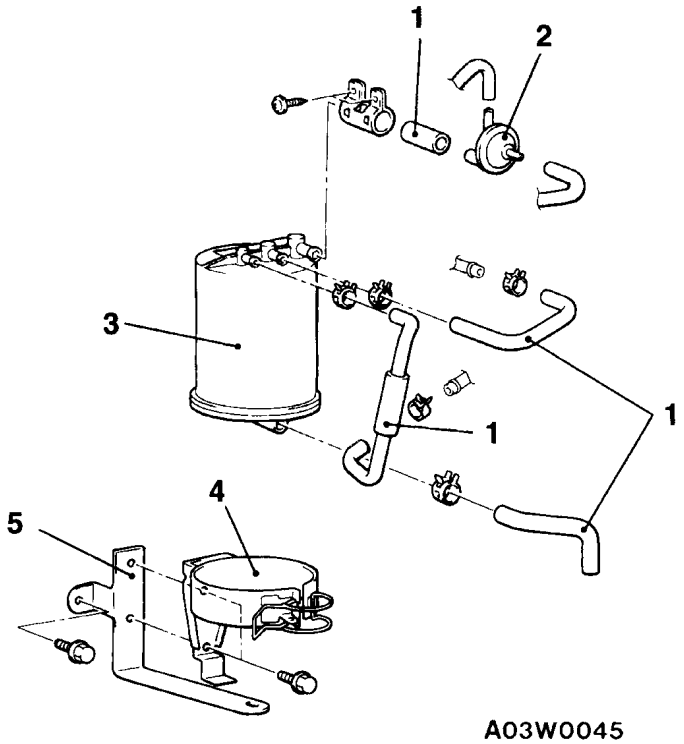
Caution

1. **Stop the engine immediately if engine misfiring occurs, otherwise an abnormally hot exhaust system will damage the catalytic converter or other under-body parts.**
2. **Correct and repair the ignition or fuel system if there are malfunctions, otherwise engine misfiring may occur which will damage the catalytic converter.**
3. **Observe manufacturer's specifications when doing service work.**

CANISTER

120002179

REMOVAL AND INSTALLATION



A03W0045

Removal steps

- Front bumper
  (Refer to GROUP 51 – Front Bumper.)

1. Vapour hose
2. Purge control valve
3. Canister
4. Canister holder assembly
5. Canister holder bracket

TWO-WAY VALVE

120002180

Refer to P.17-16.

EMISSION CONTROL <DIESEL>

120001483

GENERAL INFORMATION

The electronically-controlled EGR system and the fuel injection timing control system (load timer) reduce 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	Electronically-controlled EGR system Single type Duty cycle solenoid valve ON-OFF solenoid valve

SERVICE SPECIFICATIONS

120001484

Item		Standard value
EGR solenoid valve No.1/No. 2 resistance (at 20°C) Ω		36–44
Lever position sensor output voltage V	Idle position	0.8–1.0
	Fully open	3.5–5.0
Engine speed sensor resistance kΩ		1.3–1.9
Engine coolant temperature sensor resistance kΩ	At 20°C	2.9–3.6
	At 80°C	0.26–0.35

SEALANT

120002603

Item	Specified sealant	Remark
Engine coolant temperature gauge unit (built in engine coolant temperature sensor) threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

SPECIAL TOOL

120001485

Tool	Number	Name	Use
	MD998478	Test harness (3P, square)	Inspection of lever position sensor

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

120001487

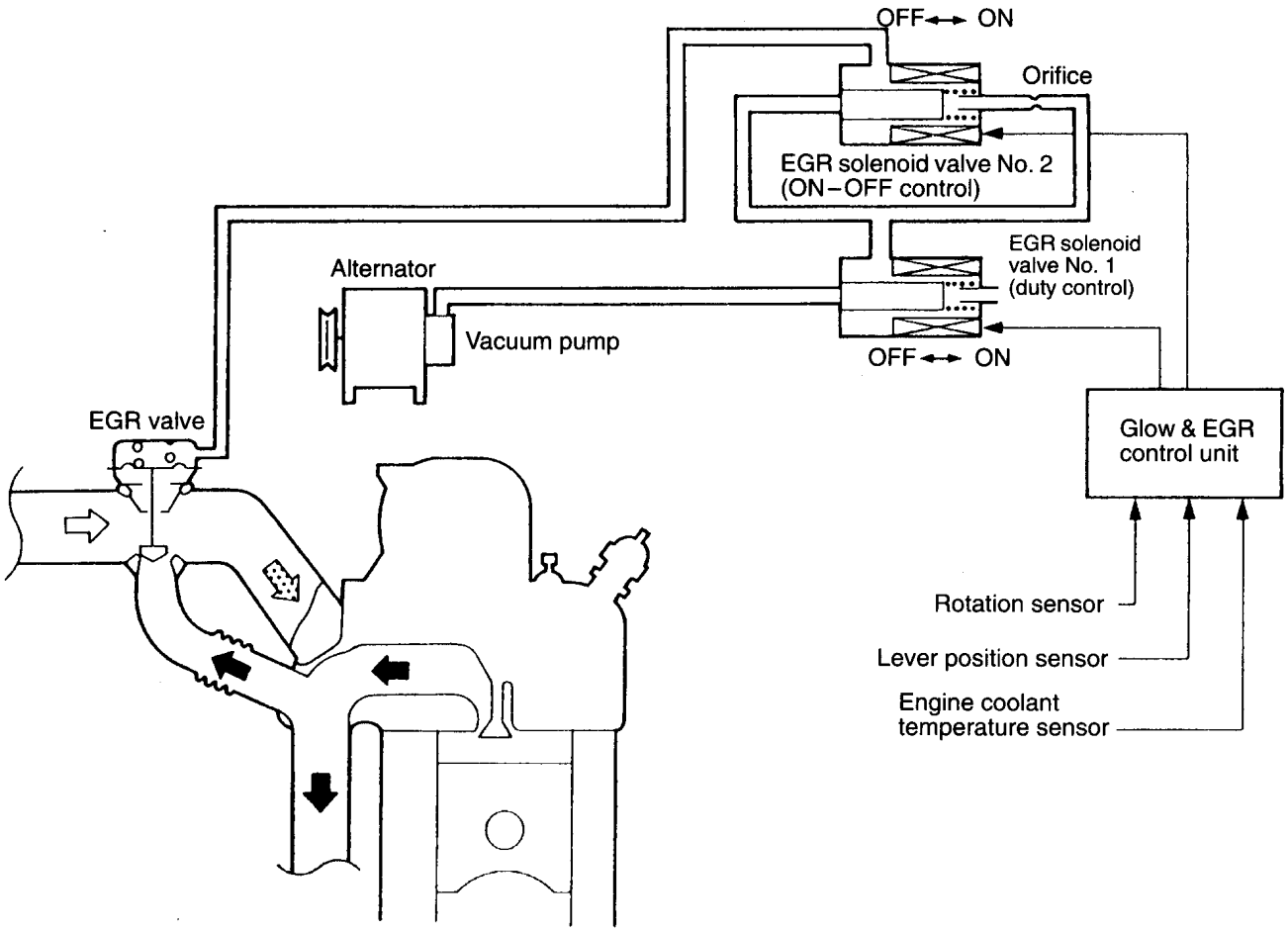
GENERAL INFORMATION

The electronically-controlled EGR system consists of an EGR valve, vacuum pump, EGR solenoid valves No. 1 and No. 2, glow & EGR control unit and various sensors.
The EGR valve is controlled by the negative pressure inside the valve, which is controlled by EGR solenoid valves No. 1 and No. 2.

The EGR solenoid valves No. 1 and No. 2 are optimally controlled by the glow & EGR control unit in response to the engine operation conditions, based on data input from each of the sensors. In this way, the EGR is controlled to reduce NOx emissions while maintaining good engine performance.

SYSTEM DIAGRAM

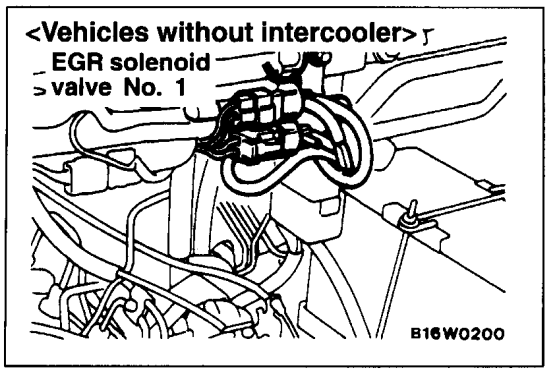
120002604

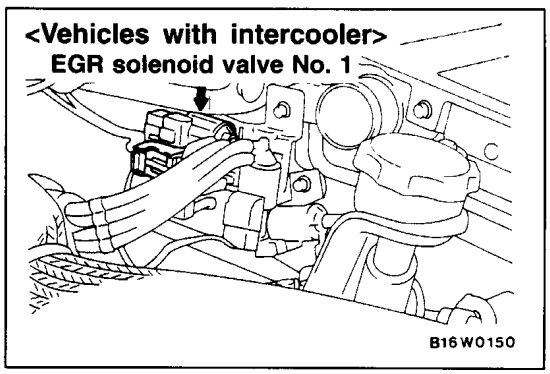


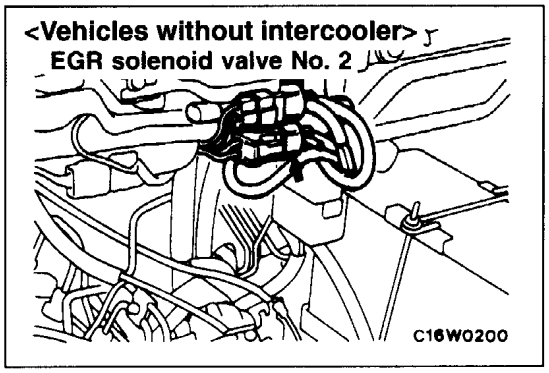
DEM0652

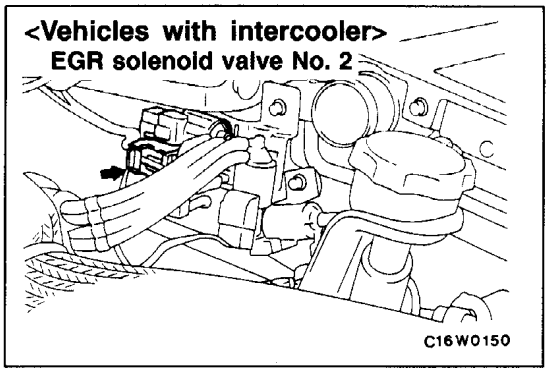
COMPONENT LOCATION

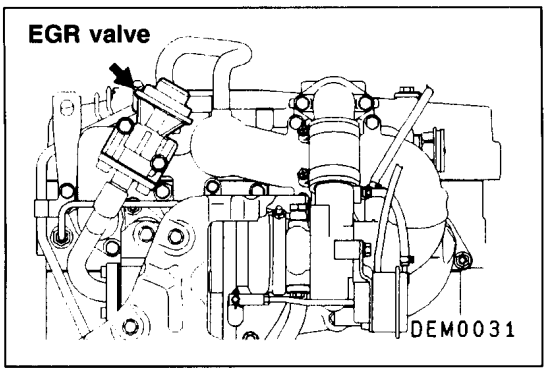
120002605

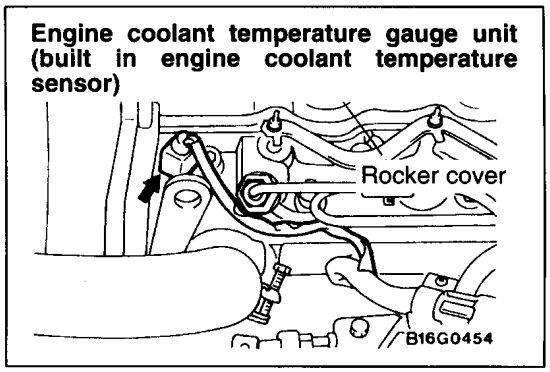


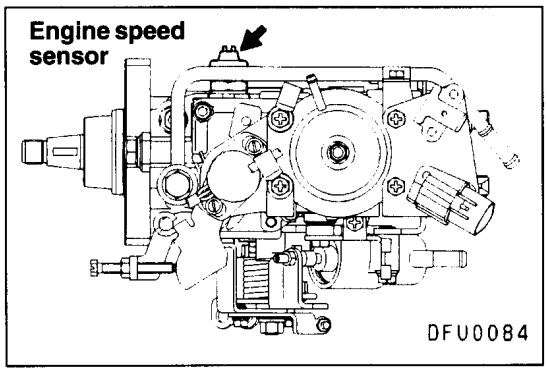


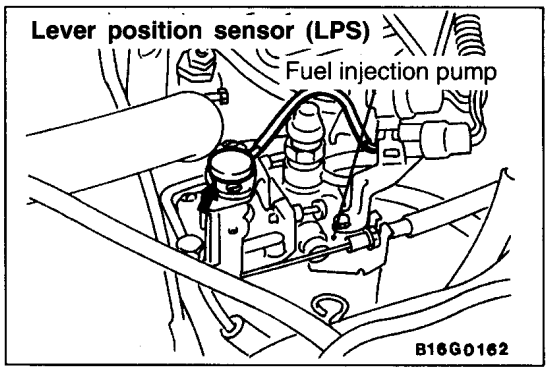


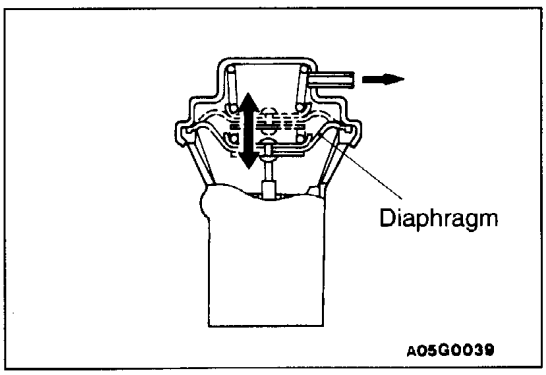












FUNCTION INSPECTION

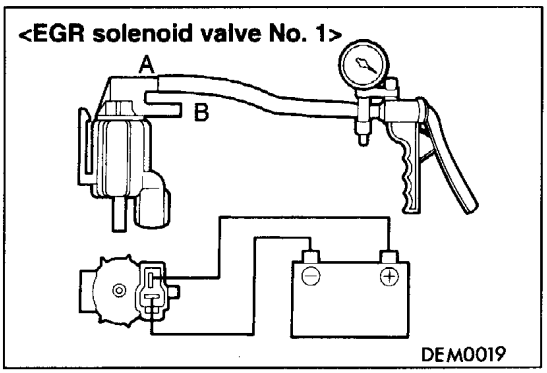
120001490

1. Start the engine and let it warm up until the engine coolant temperature is 65°C or above.
2. When the engine is raced by suddenly depressing the accelerator pedal, check to be sure that the diaphragm of the EGR valve lifts.

EGR SOLENOID VALVE OPERATION INSPECTION

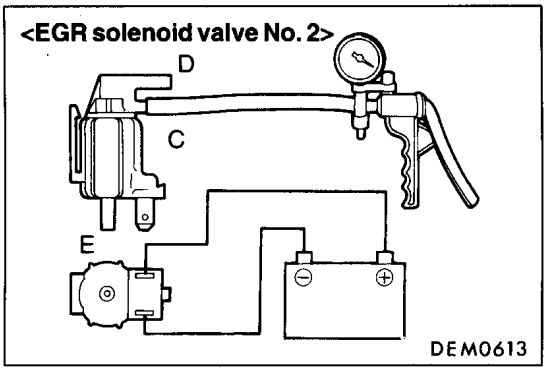
120001491

1. Remove the EGR solenoid valve No. 1/No. 2 connectors and vacuum hoses.
2. Attach a vacuum pump to each nipple of the EGR solenoid valve No. 1/No. 2 and apply negative pressure. Check that the valves are air-tight both when voltage is applied to each terminal of the EGR solenoid valves and when it is not applied.



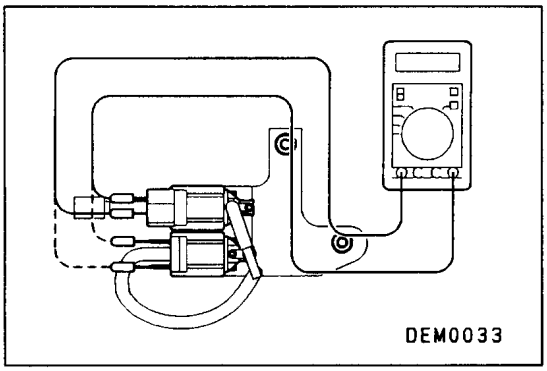
EGR solenoid valve No. 1

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



EGR solenoid valve No. 2

Battery voltage	Normal condition
When current is flowing	Vacuum leaks (Vacuum is maintained when nipple D is covered)
When current is not flowing	Vacuum leaks (Vacuum is maintained when nipple E is covered)

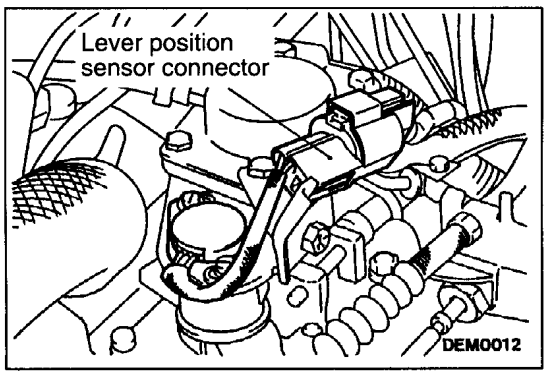


EGR SOLENOID VALVE RESISTANCE INSPECTION

120002606

Measure the coil resistances of the EGR solenoid valve No. 1/No. 2 with a circuit tester.

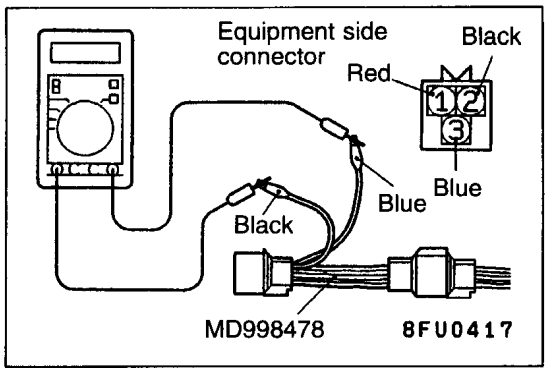
	Solenoid valve No. 1/No. 2 resistance Ω
Standard value (at 20°C)	36–44



LEVER POSITION SENSOR (LPS) ADJUSTMENT

120001493

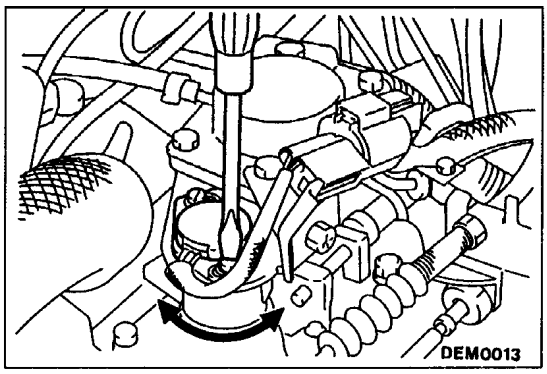
1. Run the engine until the engine coolant temperature rises to 80°C or above, and then release the fast idle.
2. Loosen the accelerator cable tension sufficiently.
3. Connect the special tool (test harness) to the lever position sensor connector shown in the illustration.



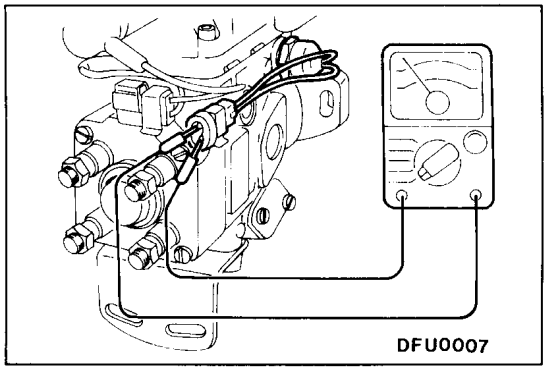
4. Connect a digital-type voltmeter between terminal 1 (red clip) and terminal 3 (blue clip) of the lever position sensor.
5. Turn the ignition switch to ON. (Do not start the engine.)
6. Measure the output voltage of the lever position sensor.

Standard value:

Lever condition	Voltage V
Idle position	0.8–1.0
Fully open	3.5–5.0



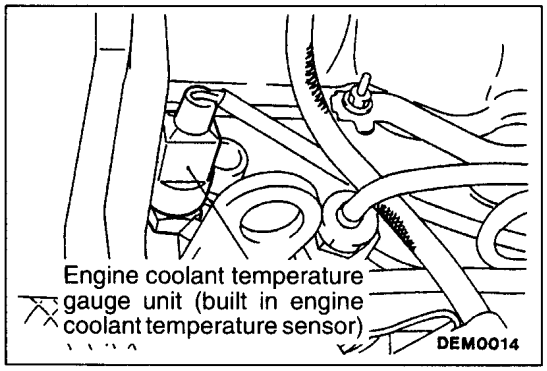
7. If the voltage is outside the standard value, adjust by loosening the lever position sensor mounting screw and turning the lever position sensor body. After adjustment, securely tighten the screw.
8. Turn the ignition switch to OFF.
9. Adjust the accelerator cable play.



ENGINE SPEED SENSOR INSPECTION 120001494

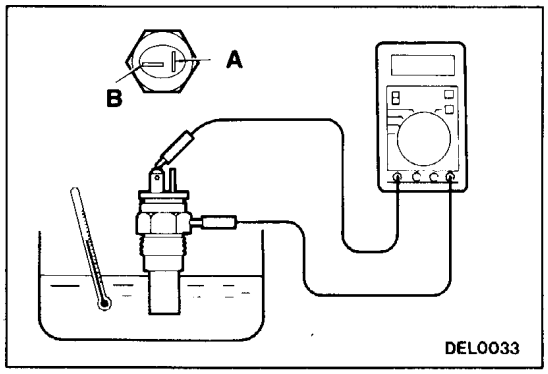
1. Disconnect the engine speed sensor connector.
2. Measure the resistance between the engine speed sensor terminals.

   Standard value: 1.3–1.9 kΩ



ENGINE COOLANT TEMPERATURE SENSOR INSPECTION 120002607

1. Remove the engine coolant temperature gauge unit.



2. Measure the resistance between terminal (B) and the body earth when the temperature sensing portion of the engine coolant temperature sensor is immersed in hot water.

Temperature (°C)	Resistance (kΩ)
0	7.7–9.5
20	2.9–3.6
40	1.3–1.7
80	0.26–0.35

3. If the resistance deviates from the standard value greatly, replace the sensor.
4. Apply sealant threaded portion.

   Specified sealant: 3M NUT Locking Part No. 4171 or equivalent

5. Install engine coolant temperature gauge unit and tighten it to the specified torque.

   Sensor tightening torque: 35 Nm

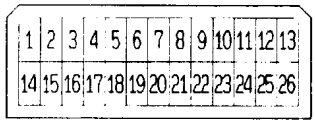
6. Connect the harness connectors securely.

CHECK AT THE GLOW AND EGR CONTROL UNIT

120001495

TERMINAL VOLTAGE CHECK CHART

Glow and EGR Control Unit Connector Terminal Arrangement

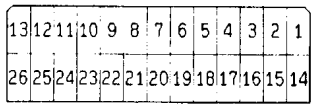


DEM0029

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
3	EGR solenoid valve No. 1	Ignition switch: ON		SV
		While engine is idle after having warmed up, suddenly depress the accelerator pedal.		Momentarily increases
6	Lever position sensor	Ignition switch: ON	Set throttle lever to idle position	0.8–1.0V
			Fully open throttle lever	3.5–5.0V
7	Sensor impressed voltage	Ignition switch: ON		4.5–5.5V
16	EGR solenoid valve No. 2	Ignition switch: ON		SV
		While engine is idle after having warmed up, suddenly depress the accelerator pedal.		Momentarily decreases

HARNESS-SIDE CONNECTOR TERMINAL RESISTANCE AND CONTINUITY CHECK CHART

Glow and EGR Control Unit Harness Side Connector Terminal Arrangement



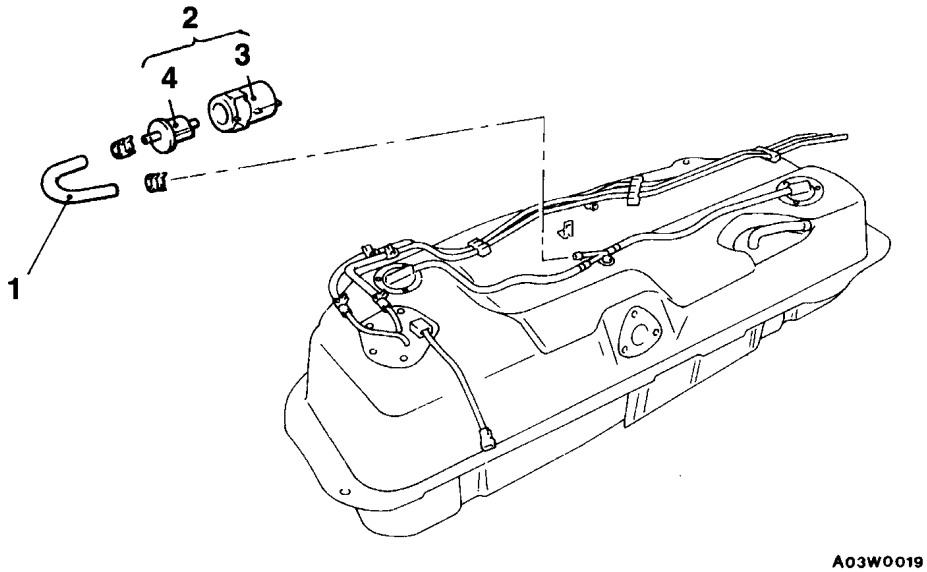
DEM0026

Terminal No.	Check item	Normal condition (Check condition)
3 – 1	EGR solenoid valve No. 1	36–44 Ω (At 20°C)
5–Body earth	Engine coolant temperature sensor	7.7–9.5 kΩ (When coolant temperature is 0°C)
		2.9–3.6 kΩ (When coolant temperature is 20°C)
		1.3–1.7 kΩ (When coolant temperature is 40°C)
		0.26–0.35 kΩ (When coolant temperature is 80°C)
11 – 24	Engine speed sensor	1.3–1.9 kΩ
16 – 1	EGR solenoid valve No. 2	36–44 Ω (At 20°C)

TWO-WAY VALVE

120002608

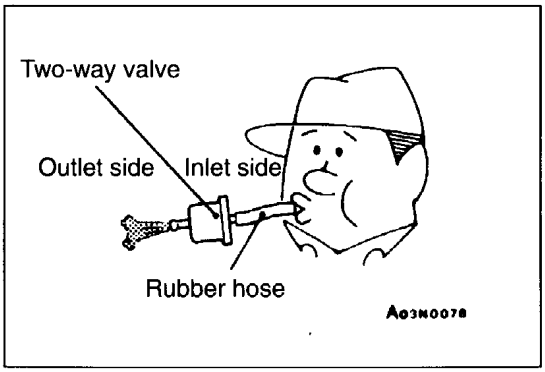
REMOVAL AND INSTALLATION



Removal steps

1. Vapour hose
2. Breather case and two-way valve assembly
3. Breather case

▶A◀ 4. Two-way valve

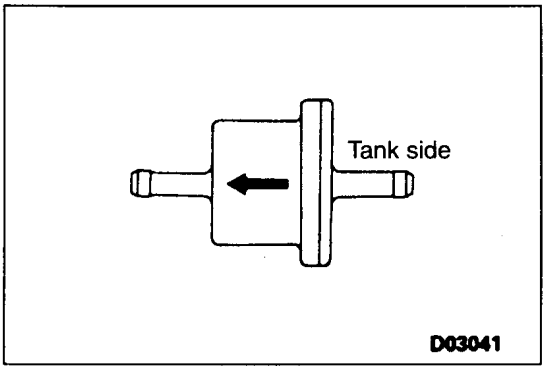


INSPECTION

TWO-WAY VALVE SIMPLE CHECK

Attach a clean hose and check the operation of the two-way valve.

Inspection procedure	Normal condition
Lightly blow from inlet side (fuel tank side).	Air passes through with a slight feeling of resistance.
Lightly blow from outlet side.	Air passes through.



INSTALLATION SERVICE POINT

▶A◀ TWO-WAY VALVE INSTALLATION

Install so that the installation direction of the two-way valve is correct.