

EMISSION CONTROL

CONTENTS

E17AA--

SPECIFICATIONS	2	Cautions on Inspection	11
General Specifications	2	Crankcase Emission Control System <6G72 Engine>	11
Service Specifications	2-2	Crankcase Emission Control System <6G74 Engine>	11-1
Sealants	2-2	Crankcase Emission Control System <4G64 Engine>	12
SPECIAL TOOLS	2-2	Evaporative Emission Control System	13
SERVICE ADJUSTMENT PROCEDURES	3	Exhaust Emission Control System	15
Emission Control Device Reference Table	3	Catalytic Converter	16
Component Layout	4	Exhaust Gas Recirculation (EGR) System <4G64 Engine>	16
Vacuum Hose Piping Diagram	8	Exhaust Gas Recirculation (EGR) System <6G72 - 24 Valve Engine, 6G74 Engine>	18-1
Vacuum Hose Layout	9	Exhaust Gas Recirculation (EGR) System <4D56 Engine>	19
		Exhaust Gas Recirculation (EGR) System <4M40 Engine>	25

SPECIFICATIONS

GENERAL SPECIFICATIONS

E17CA--

6G72 Engine

Items	Name	Specifications
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister 2-way valve Purge control solenoid valve	Equipped Equipped ON-OFF 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)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)
	Exhaust gas recirculation system <24 valve engine> EGR valve EGR solenoid	Single type Duty cycle type solenoid valve (Purpose: NOx reduction)

6G74 Engine

Items	Name	Specifications
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister 2-way valve Purge control solenoid valve	Equipped Equipped ON-OFF solenoid valve (Purpose: CO, HC, NOx reduction)
Exhaust emission control system	Air-fuel ratio control device-MPI system	Oxygen sensor feedback type (Purpose: CO, HC, NOx reduction)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)
	Exhaust gas recirculation system EGR valve EGR solenoid	Single type Duty cycle type solenoid valve (Purpose: NOx reduction)

4G64 Engine

Items	Name	Specifications
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister 2-way valve Purge control solenoid valve	Equipped Equipped ON-OFF 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)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)
	Exhaust gas recirculation system EGR valve Thermo valve	Single type Bimetal type (Purpose: NOx reduction)

4D56 Engine

Item	Name	Specifications
Evaporative emission control system	2-way valve	Equipped
Exhaust emission control system <Vehicles for Switzerland>	Exhaust gas recirculation system EGR valve EGR control solenoid valve	Single type ON-OFF and duty solenoid valve (Purpose: NOx reduction)

4M40 Engine

Items	Name	Specifications
Exhaust emission control system	Exhaust gas recirculation system EGR valve EGR control solenoid valve	Single type ON-OFF and duty solenoid valve

SERVICE SPECIFICATIONS

E17CB--

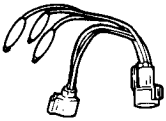

Items	Specifications
<6G72, 6G74 Engine>	
Purge control solenoid valve coil resistance [at 20°C (68°F)]	Ω 36 – 44
EGR solenoid valve coil resistance [at 20°C (68°F)]	Ω 36 – 44
<4G64 Engine>	
EGR valve opening vacuum	mmHg (in. Hg) 30 (1.2)
Thermo valve opening temperature	°C (°F) 65 (149)
<4D56, 4M40 Engine>	
EGR control solenoid valve	
No. 1 and No. 2 resistance [at 20°C (68°F)]	Ω 36 – 44
Lever position sensor output voltage	V
Idle position	0.3 – 1.5
Fully open	3.7 – 4.9
Speed sensor resistance	k Ω 1.3 – 1.9
Engine coolant temperature sensor resistance	k Ω
[at 20°C (68°F)]	3.3
[at 80°C (176°F)]	0.3

SEALANTS

E17CE--

Items	Specified sealant	Quantity
Thermo valve thread	3M Nut Locking Part No. 4171 or equivalent	As required

SPECIAL TOOLS

Tool	Number	Name	Use
	MD998478	Test harness	Lever position sensor check
			

SERVICE ADJUSTMENT PROCEDURES

E17FDAF

EMISSION CONTROL DEVICE REFERENCE TABLE

6G72 Engine

Emission control system Related parts	Crankcase emission control system	Evaporative emission control system	Air fuel ratio control system	Catalytic converter	Exhaust emission control system	Reference page for each part inspection
PCV valve	×					17-11
Purge control solenoid valve		×				17-14
2-way valve		×				17-15
MPI system component		×	×			Fuel (Group 13)
EGR control solenoid valve <24valve engine>					×	17-18-3
Catalytic converter				×		17-16

6G74 Engine

Emission control system Related parts	Crankcase emission control system	Evaporative emission control system	Air fuel ratio control system	Catalytic converter	Exhaust emission control system	Reference page for each part inspection
PCV valve	×					17-11-1
Purge control solenoid valve		×				17-14
2-way valve		×				17-15
MPI system component		×	×			Fuel (Group 13)
EGR control solenoid valve					×	17-18-3
Catalytic converter				×		17-16

4G64 Engine

Emission control system Related parts	Crankcase emission control system	Evaporative emission control system	Air fuel ratio control system	Catalytic converter	Exhaust emission control system	Reference page for each part inspection
PCV valve	×					17-12
Purge control solenoid valve		×				17-14
2-way valve		×				17-15
MPI system component		×	×			Fuel (Group 13)
Catalytic converter				×		17-16
EGR valve					×	17-17
Thermo valve					×	17-18

4D56 Engine

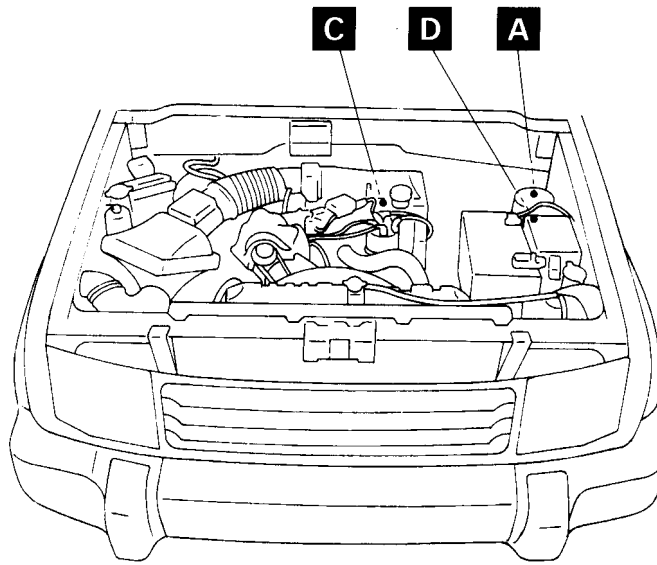
Emission Control system Related parts	Evaporative emission control system	Exhaust emission con- trol system	Reference page for each part inspection
2-way valve	×		17-15
EGR valve		×	17-19
EGR solenoid valve No. 1/No. 2		×	17-19
Lever position sensor		×	17-20
Engine speed sensor		×	17-21
Engine coolant temperature sen- sor		×	17-21

4M40 Engine

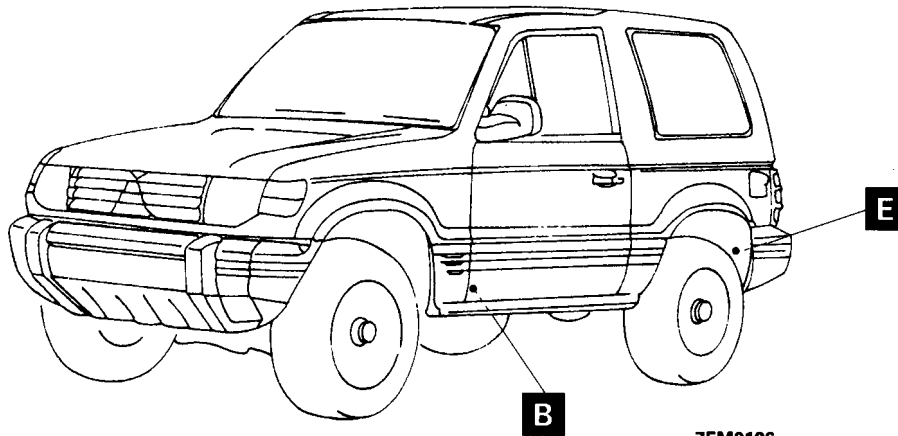
Emission control system Related parts	Evaporative emission control system	Exhaust emission control system	Reference page for each part inspection
2-way valve	×		17-15
EGR valve		×	17-25
EGR solenoid valve No. 1/No. 2		×	17-25
Lever position sensor		×	17-26
Engine speed sensor		×	17-27
Engine coolant temperature sensor		×	17-27

COMPONENT LAYOUT

6G72 – 12Valve Engine

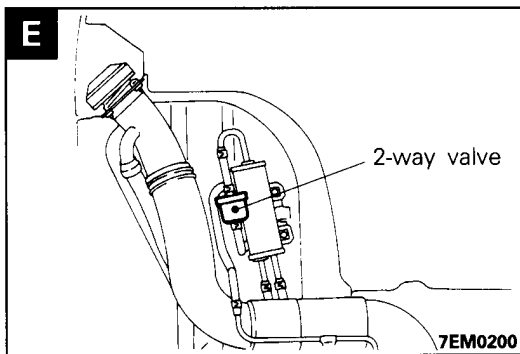
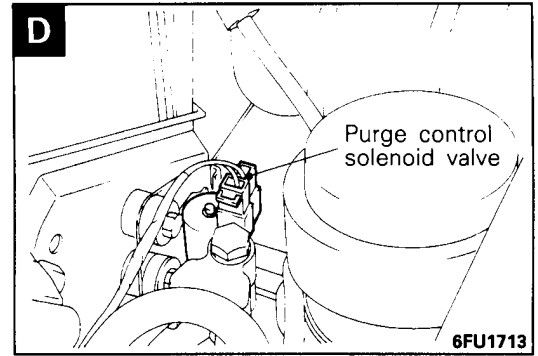
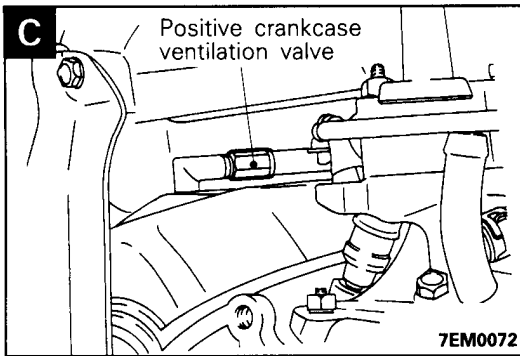
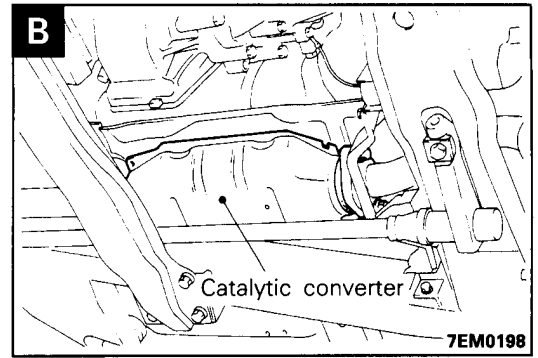
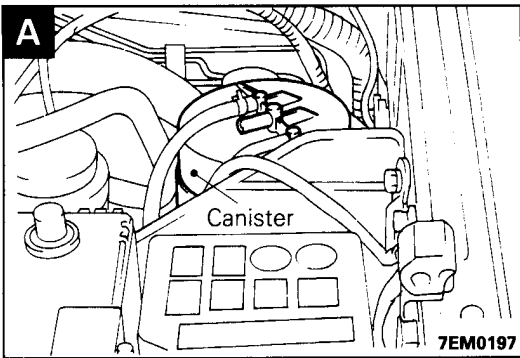


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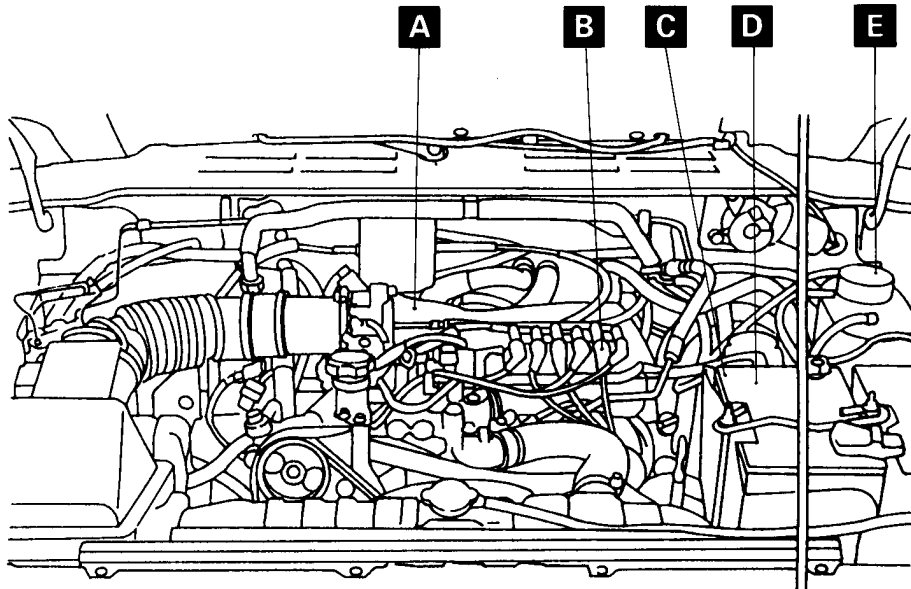


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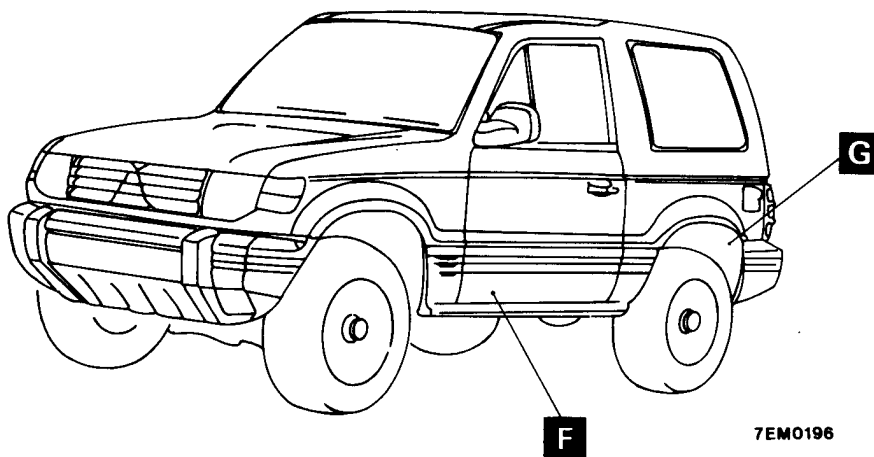
Parts name	Symbol
Canister	A
Catalytic converter	B
PCV valve	C
Purge control solenoid valve	D
2-way valve	E



6G72 – 24Valve Engine

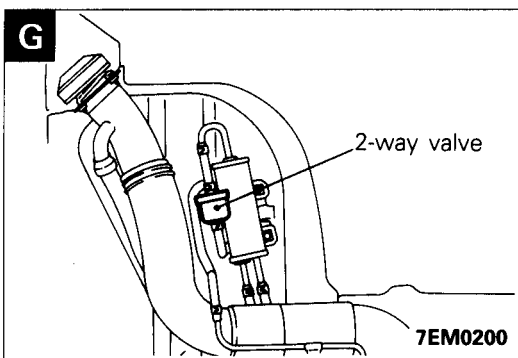
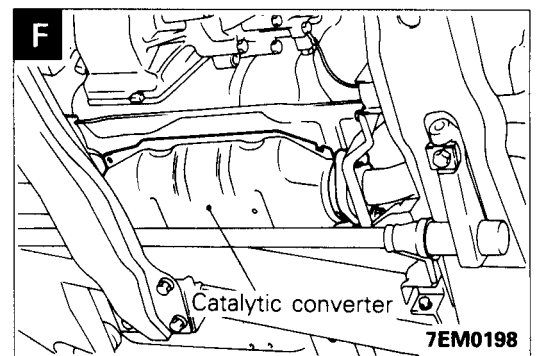
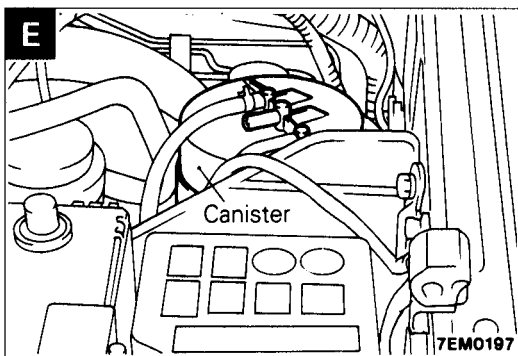
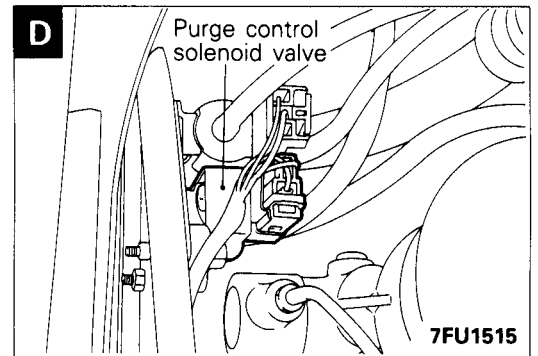
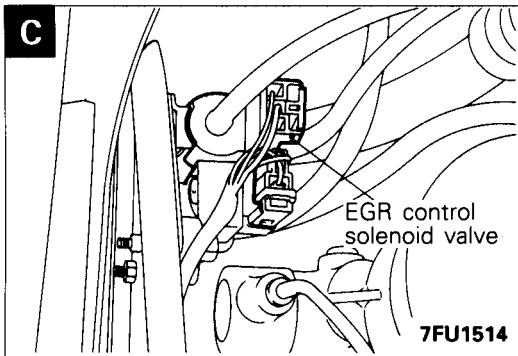
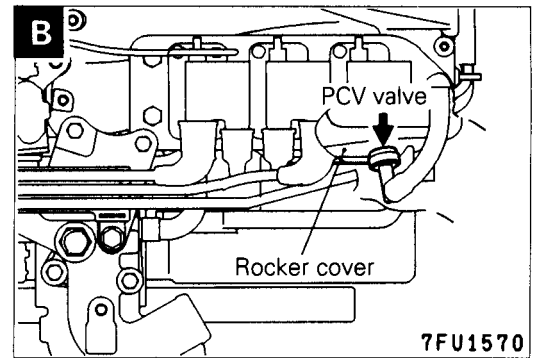
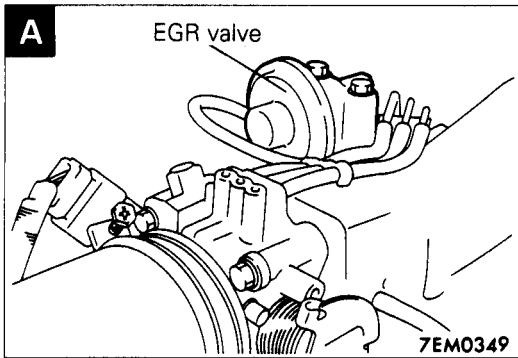


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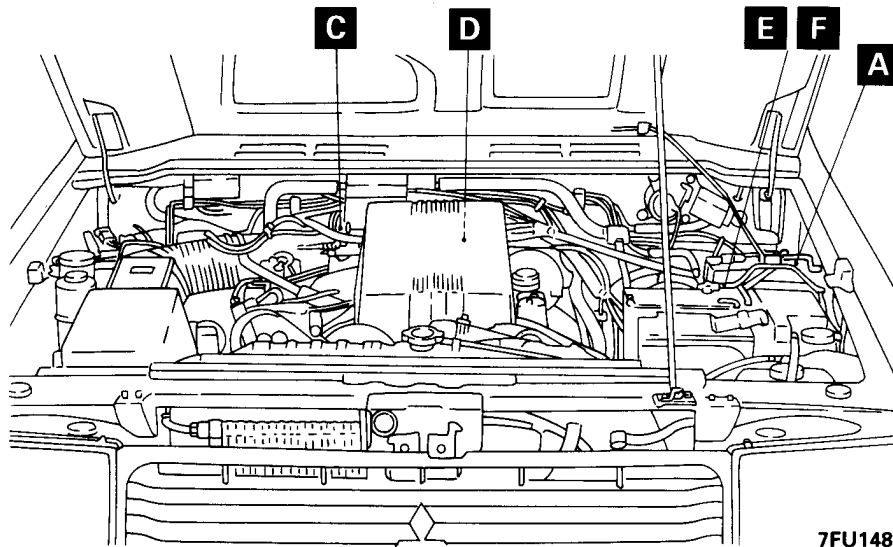


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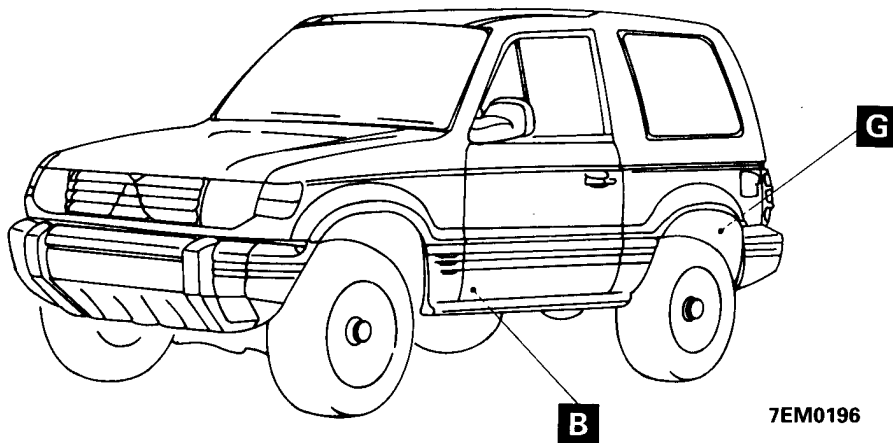
Parts name	Symbol
Canister	E
Catalytic converter	F
EGR valve	A
PCV valve	B
Purge control solenoid valve	D
EGR control solenoid valve	C
2-way valve	G



6G74 Engine

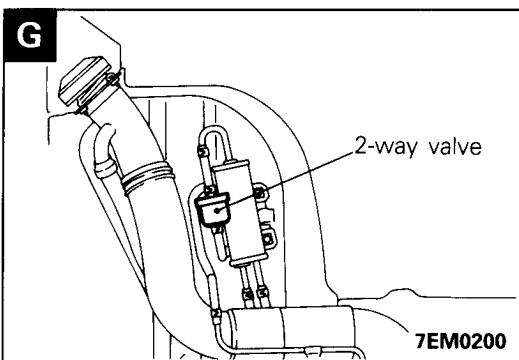
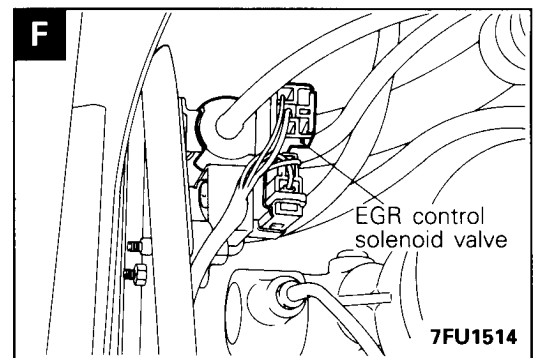
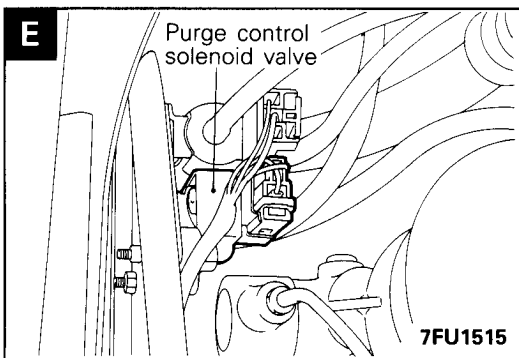
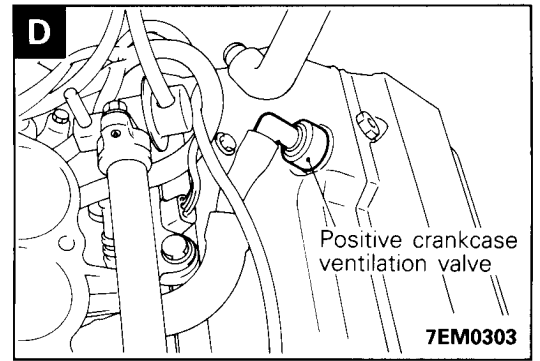
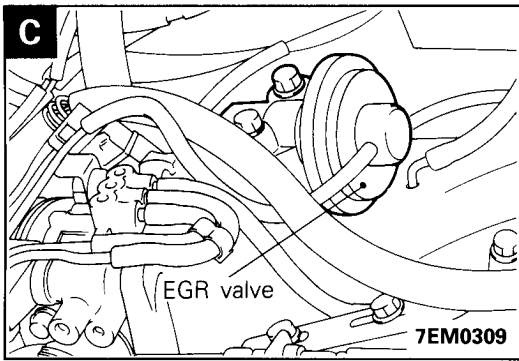
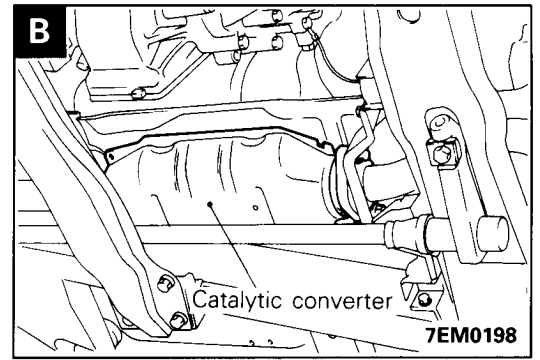
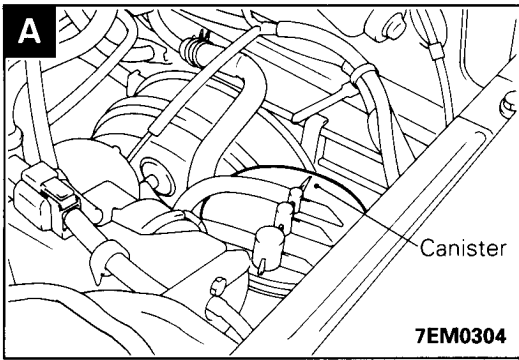


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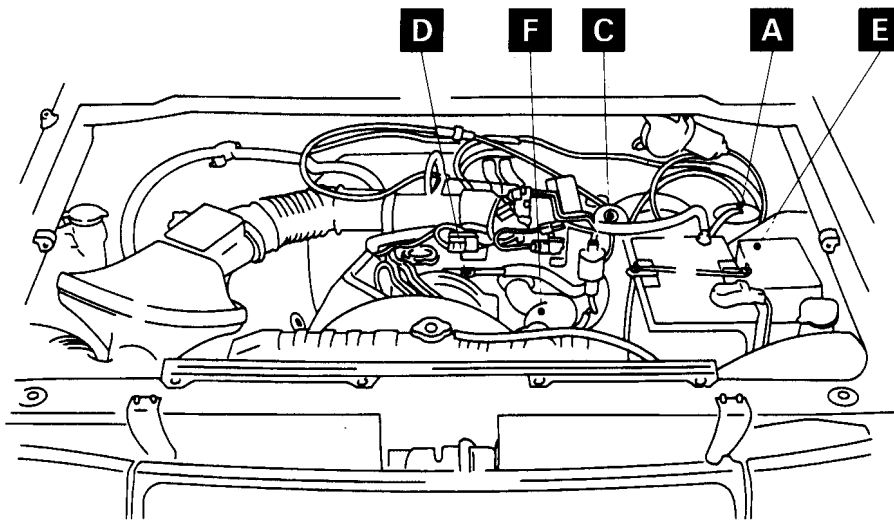


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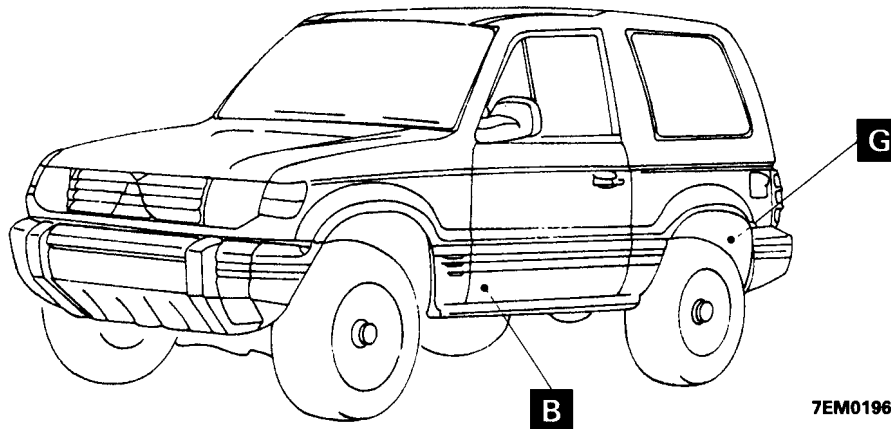
Parts name	Symbol
Canister	A
Catalytic converter	B
EGR valve	C
PCV valve	D
Purge control solenoid valve	E
EGR control solenoid valve	F
2-way valve	G



4G64 Engine

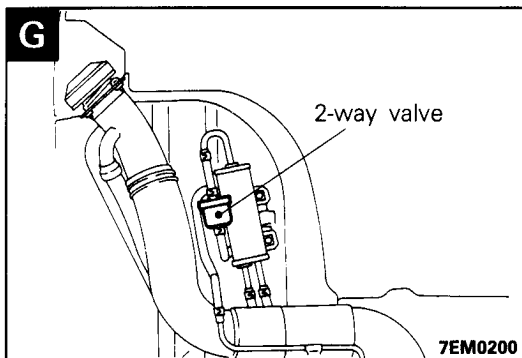
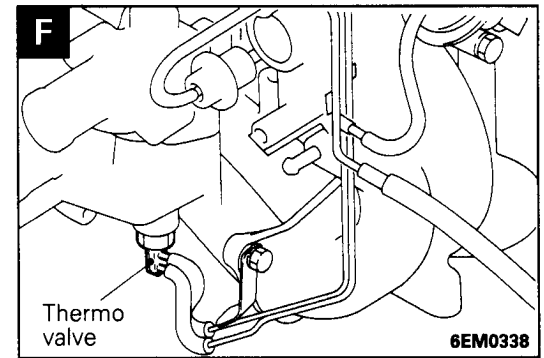
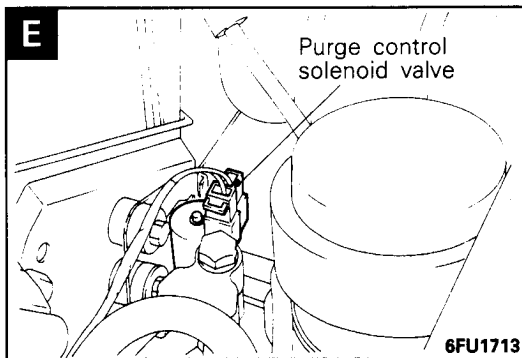
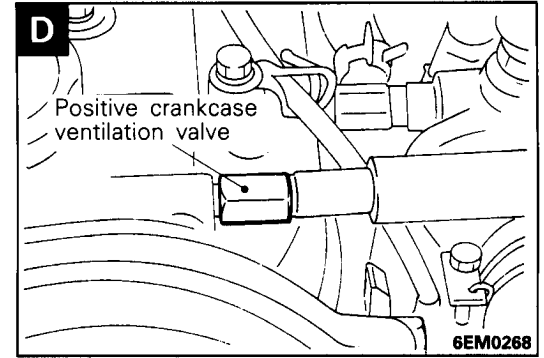
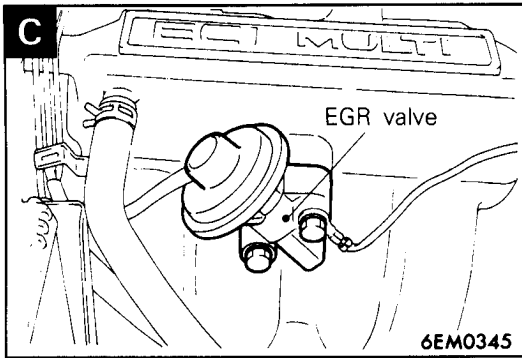
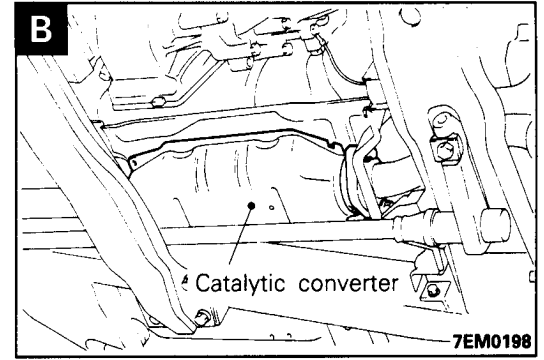
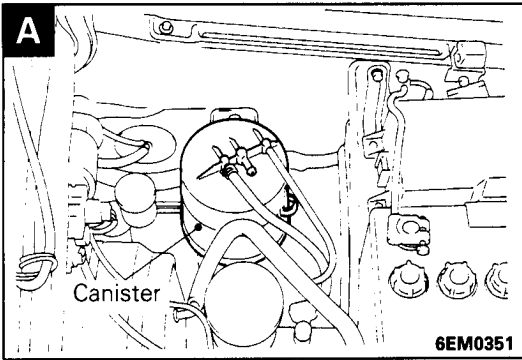


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Parts name	Symbol
Canister	A
Catalytic converter	B
EGR valve	C
PCV valve	D
Purge control solenoid valve	E
Thermo valve	F
2-way valve	G

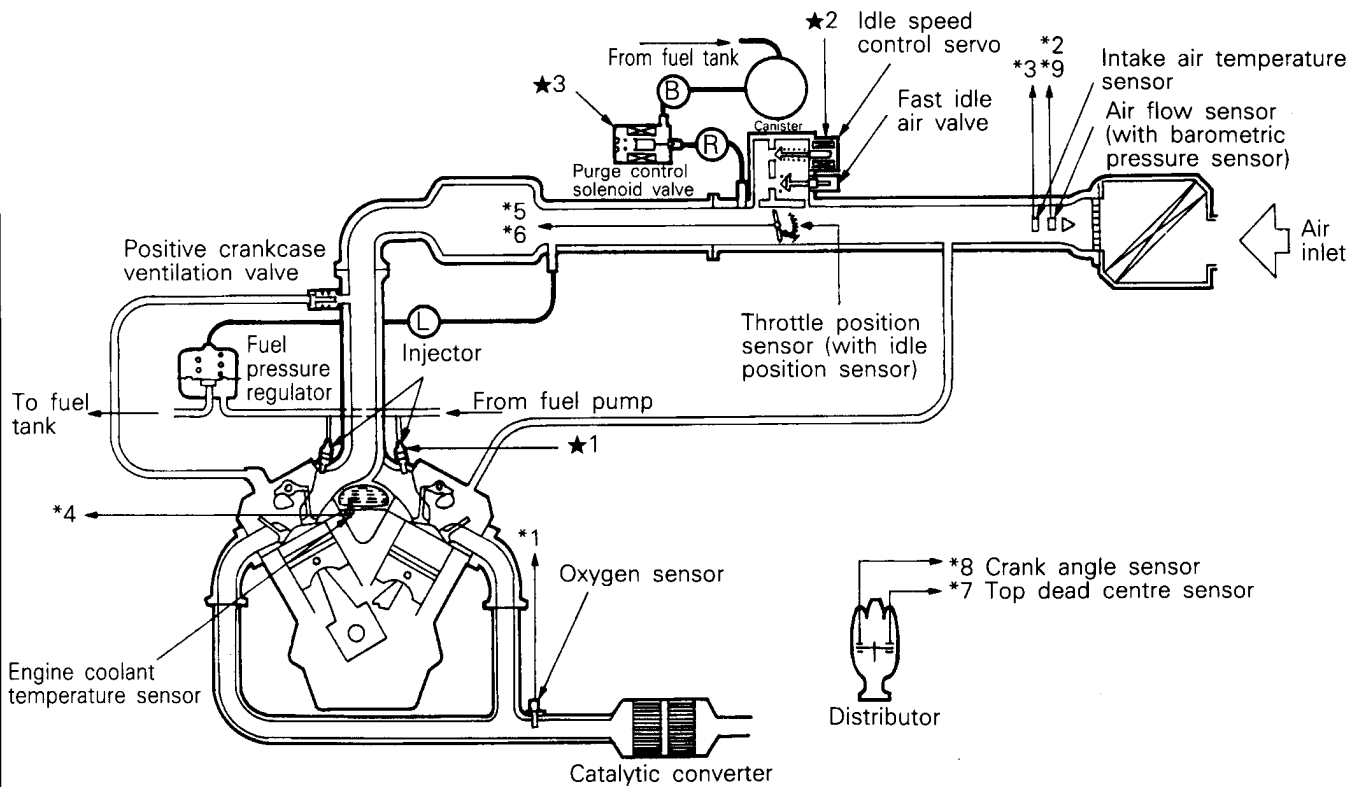


VACUUM HOSE PIPING DIAGRAM

E17FE--

6G72 – 12Valve Engine

<ul style="list-style-type: none"> *1 Oxygen sensor *2 Air-flow sensor *3 Intake air temperature sensor *4 Engine coolant temperature sensor *5 Throttle position sensor *6 Idle position switch *7 Top dead centre sensor *8 Crank angle sensor *9 Barometric pressure sensor 	<ul style="list-style-type: none"> ● Ignition switch – ST ● Ignition switch – IG1 ● Power supply ● Vehicle-speed sensor ● Air conditioner switch ● Inhibitor switch <A/T> 	<p>Engine control unit</p>	<ul style="list-style-type: none"> ★1 Injector ★2 Idle speed control servo ★3 Purge control solenoid valve ● Fuel pump control (control relay) ● Air conditioner power relay ● Ignition timing control ● Self-diagnosis circuit ● Engine warning lamp
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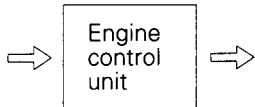
Vacuum hose colour
 R: Red
 B: Black
 L: Light blue

7FU1163

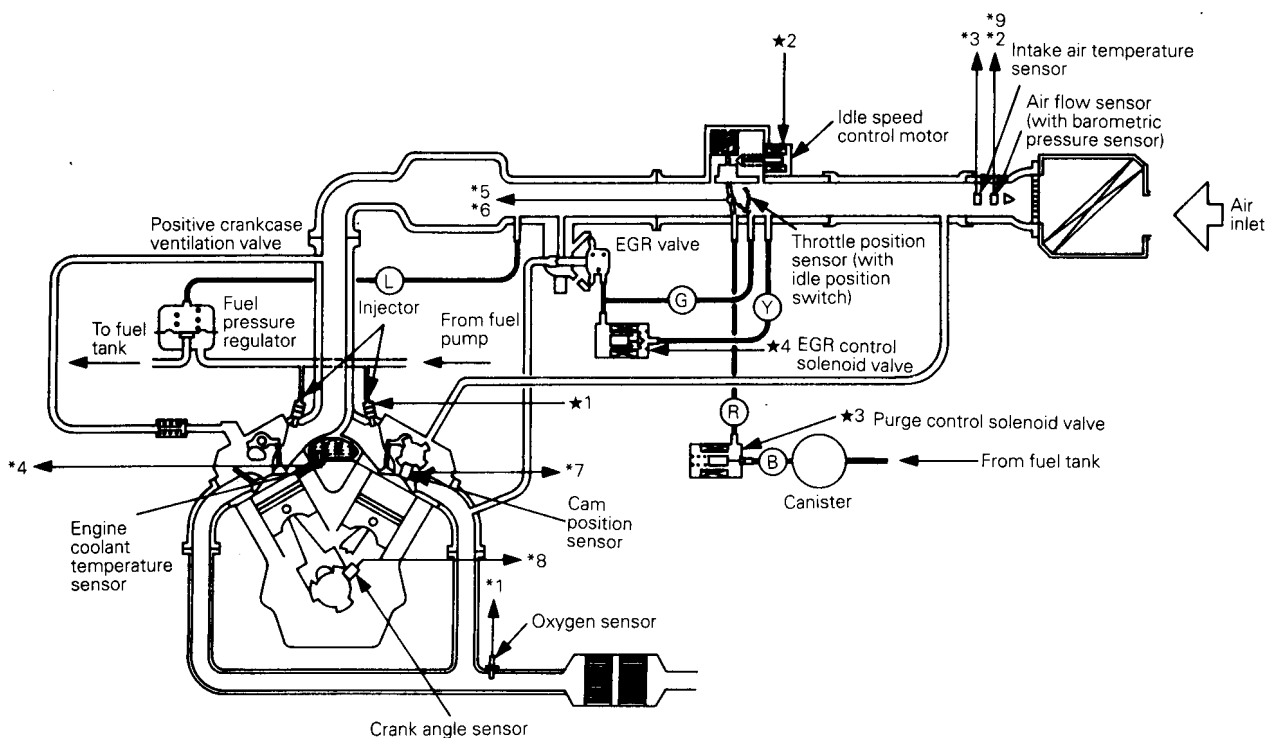
6G72 – 24Valve Engine

- *1 Oxygen sensor
- *2 Volume air flow sensor
- *3 Intake air temperature sensor
- *4 Engine coolant temperature sensor
- *5 Throttle position sensor
- *6 Idle position switch
- *7 Cam position sensor
- *8 Crank angle sensor
- *9 Barometric pressure sensor

- Ignition switch-ST
- Ignition switch-IG₁
- Power supply
- Vehicle speed sensor
- Air conditioner switch
- Power steering fluid pressure switch
- Inhibitor switch

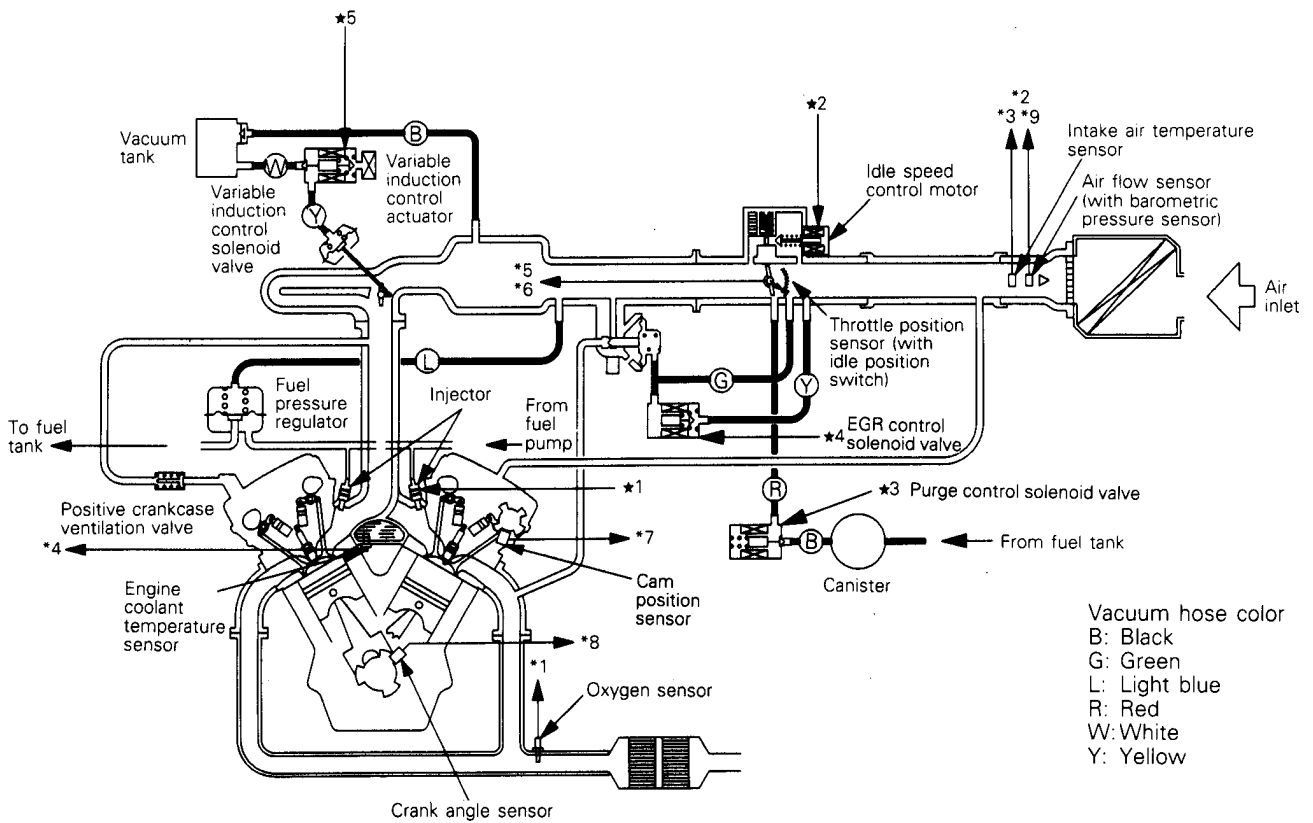
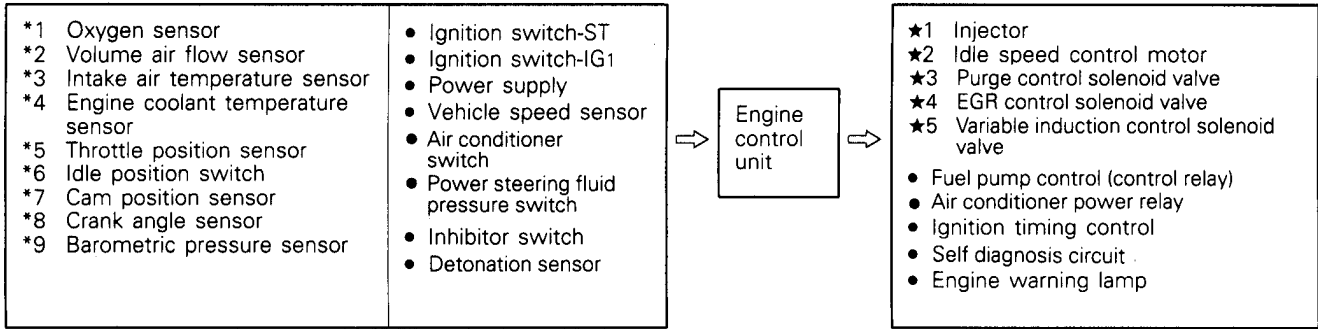


- ★1 Injector
- ★2 Idle speed control motor
- ★3 Purge control solenoid valve
- ★4 EGR control solenoid valve
- Fuel pump control (control relay)
- Air conditioner power relay
- Ignition timing control
- Self diagnosis circuit
- Engine warning lamp



Vacuum hose color
 B: Black
 G: Green
 L: Light blue
 R: Red
 Y: Yellow

6G74 Engine



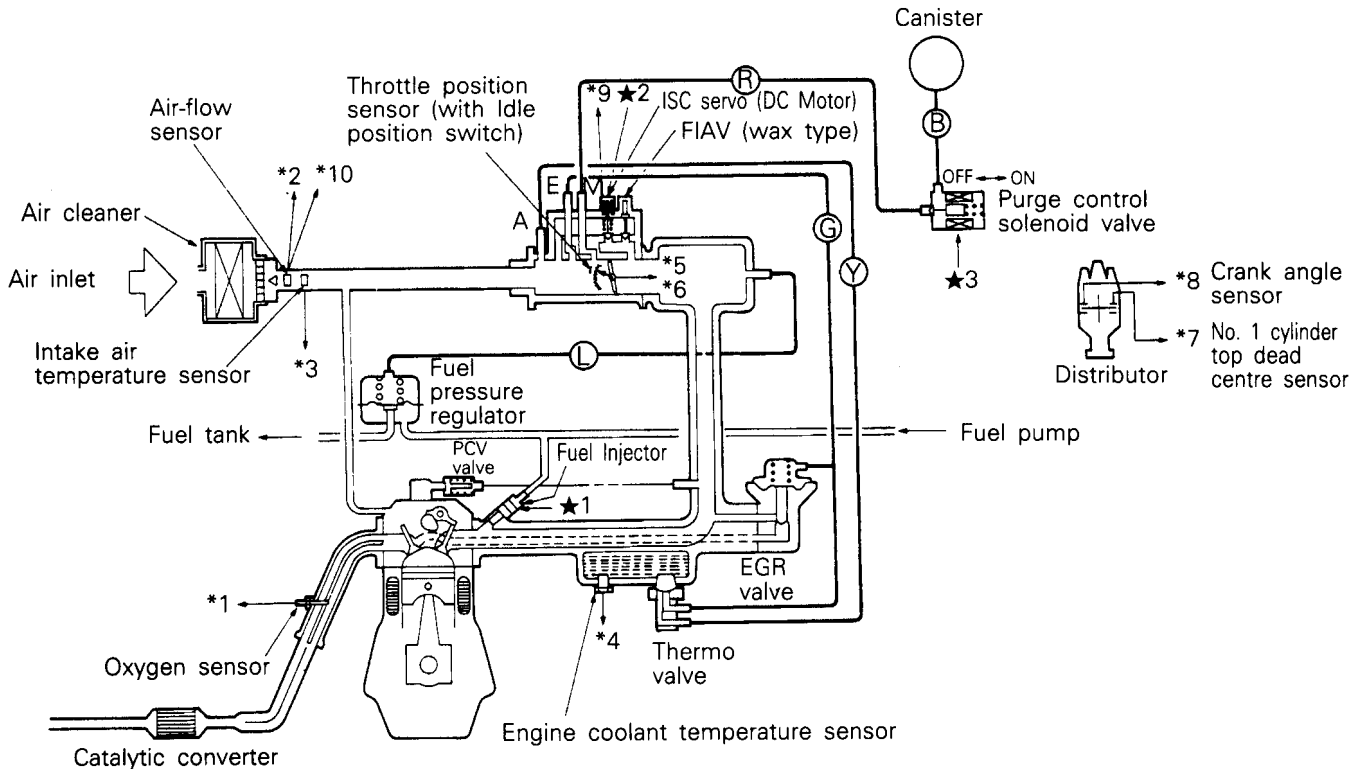
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4G64 Engine

- | | |
|--|--------------------------------|
| *1 Oxygen sensor | *10 Barometric pressure sensor |
| *2 Air-flow sensor | ● Ignition switch – ST |
| *3 Intake air temperature sensor | ● Power supply |
| *4 Engine coolant temperature sensor | ● Vehicle-speed sensor |
| *5 Throttle position sensor | ● Air conditioner switch |
| *6 Idle position switch | |
| *7 No. 1 cylinder top dead centre sensor | |
| *8 Crank angle sensor | |
| *9 Motor position sensor | |

Engine control unit

- | |
|-------------------------------------|
| ★1 Injector |
| ★2 Idle speed control servo |
| ★3 Purge control solenoid valve |
| ● Fuel pump control (control relay) |
| ● Air conditioner power relay |
| ● Ignition timing control |
| ● Self-diagnosis output |
| ● Engine warning lamp |



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

PCV: Positive Crankcase Ventilation
 ISC: Idle Speed Control

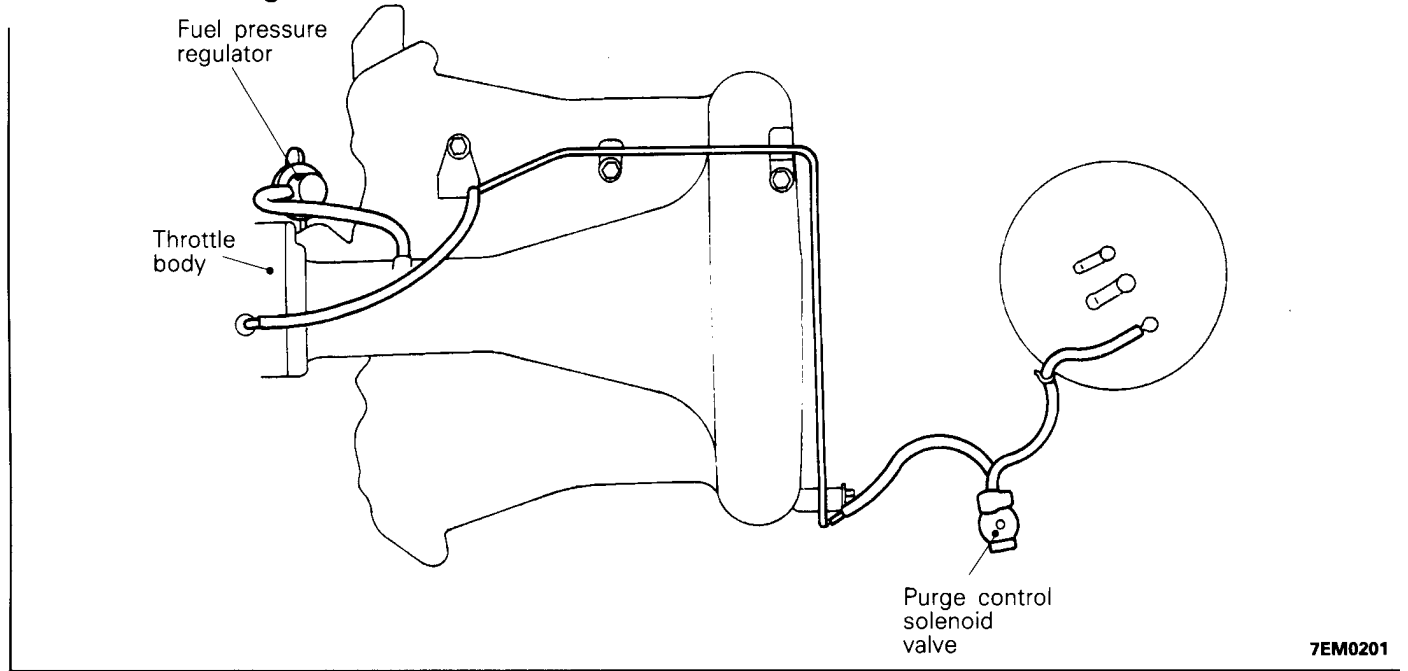
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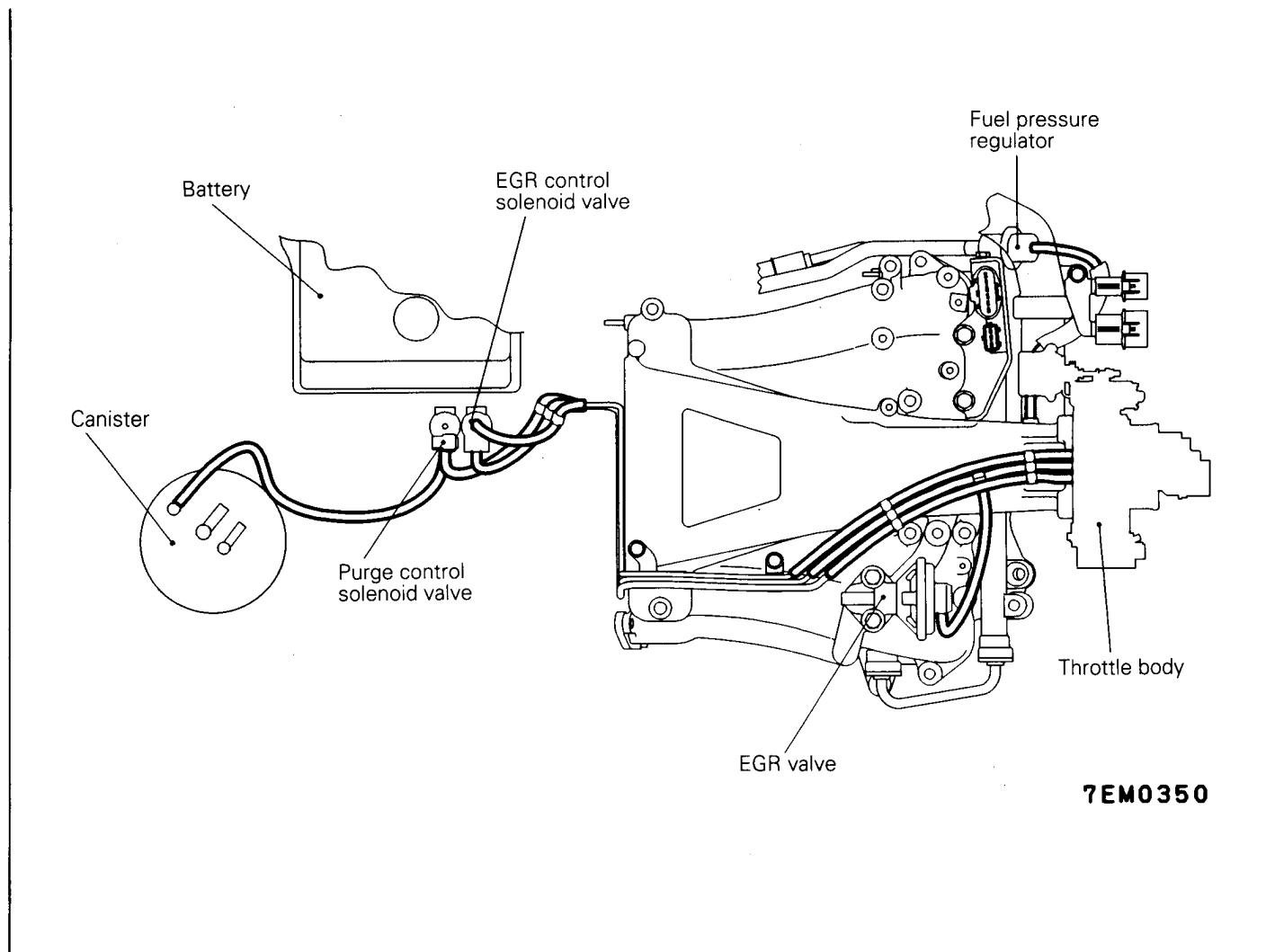
NOTES

VACUUM HOSE LAYOUT

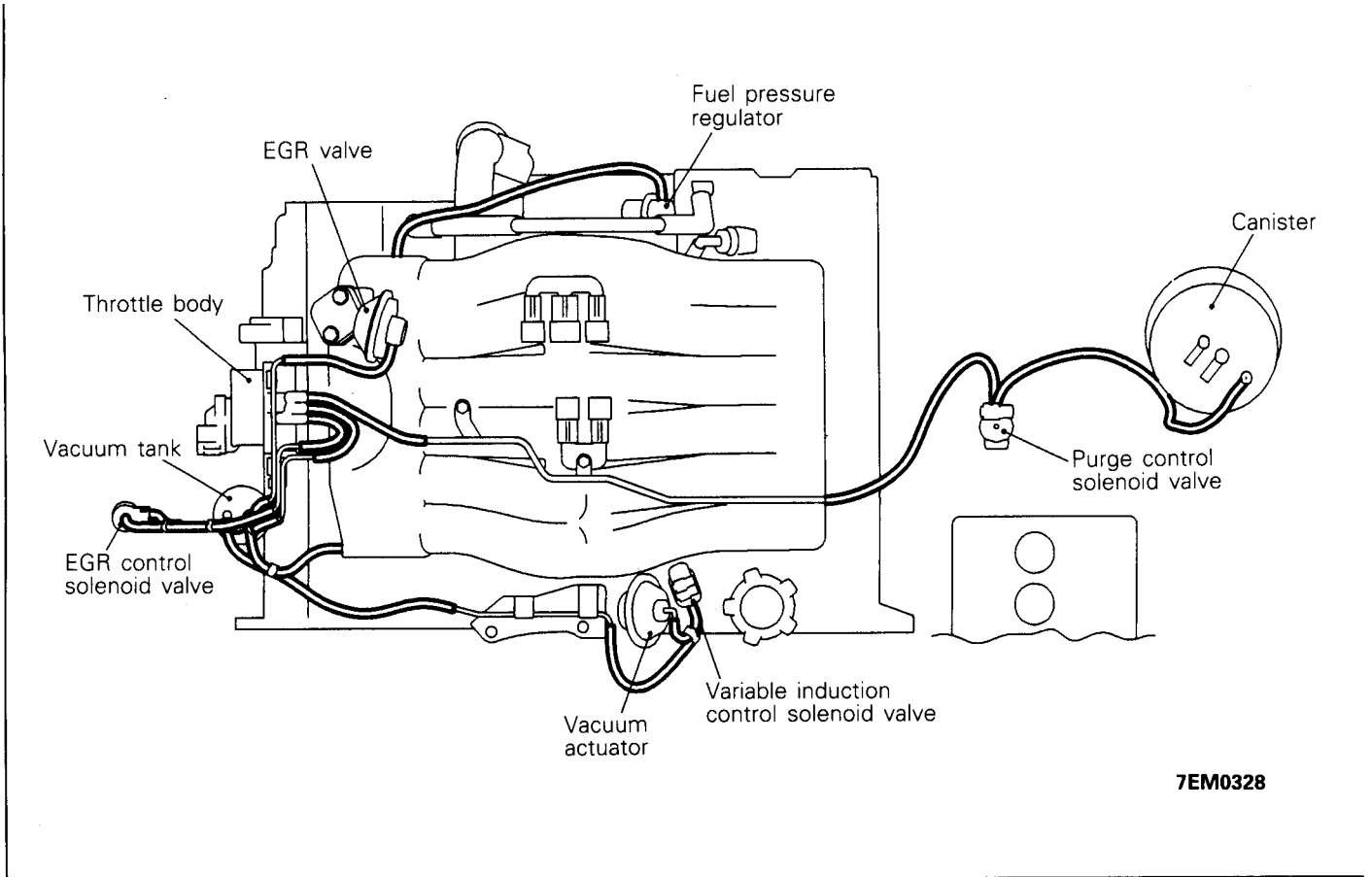
6G72 – 12Valve Engine



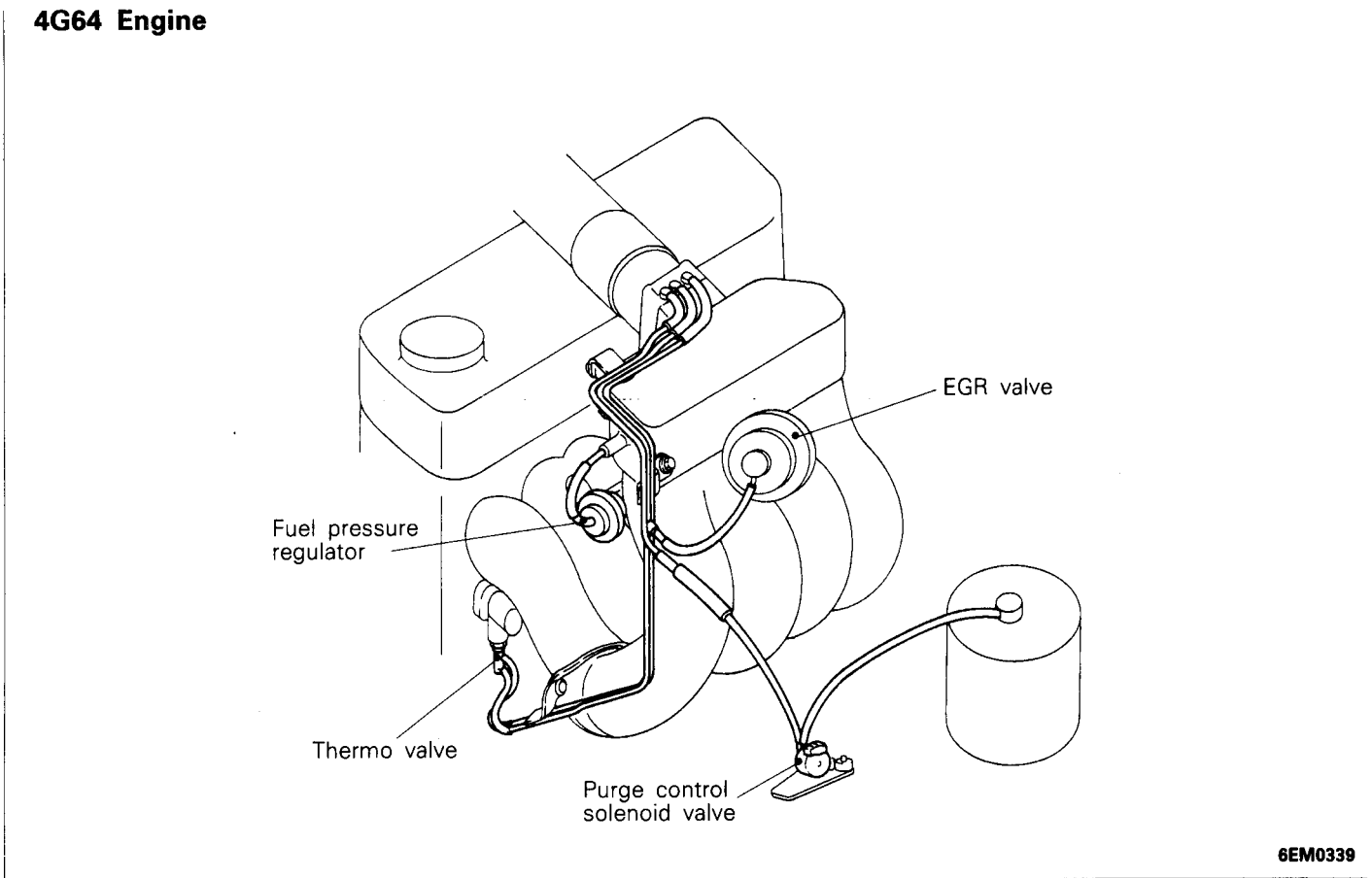
6G72 – 24Valve Engine



6G74 Engine



4G64 Engine



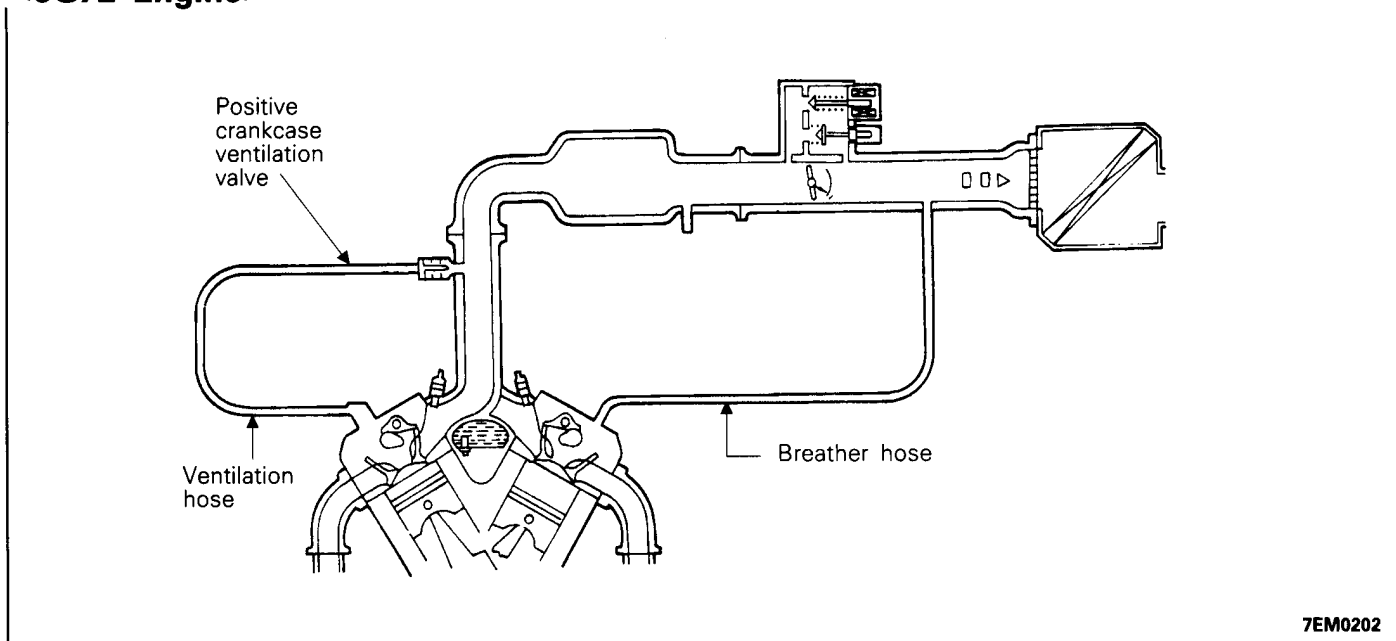
CAUTIONS ON INSPECTION

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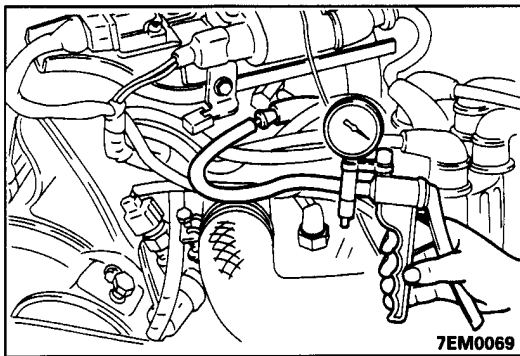
1. Inspect the various devices only after completing engine adjustment.
2. Inspect the hoses to make sure there are no disconnections, connection errors or damage.
3. Make sure there is no hose, pipe or port clogging, or cracks or damage in the hoses and pipes.
4. When replacing device hoses, always mount the replacement hose in the same position (direction) as the original.
5. When finished, check the connections as described in the service manual or service label.

**CRANKCASE EMISSION CONTROL SYSTEM
<6G72 Engine>**

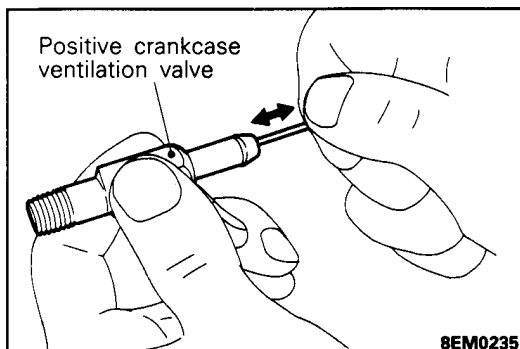
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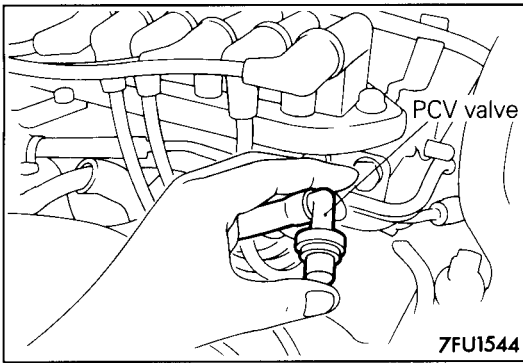
7EM0202

**POSITIVE CRANKCASE VENTILATION SYSTEM <12Valve Engine>****System Inspection**

- (1) Disconnect the ventilation hose from the air-intake plenum, and connect a hand vacuum pump to the ventilation hose.
- (2) At this time, make sure that there is leakage when vacuum is applied. If there is no leakage when vacuum is applied, either clean the positive crankcase ventilation valve or replace it.

**Positive Crankcase Ventilation (PCV) Valve Inspection**

- (1) Insert a thin rod from the nipple side of the positive crankcase ventilation valve, and move it back and forth to check that the plunger moves.
- (2) If the plunger does not move, there is a blockage inside the positive crankcase ventilation valve, so clean the valve or replace it.



POSITIVE CRANKCASE VENTILATION SYSTEM

<24Valve Engine>

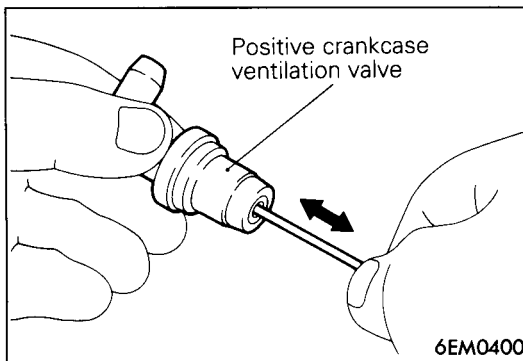
System Inspection

- (1) Disconnect the ventilation hose from the positive crankcase ventilation (PCV) valve.
- (2) Remove the PCV valve from the rocker cover.
- (3) Install the PCV valve to the ventilation valve again.
- (4) Start the engine and let it run at idle.
- (5) Plug the PCV valve by your finger and check that intake manifold vacuum can be felt.

NOTE

The plunger in the PCV valve moves back and forth at this time.

- (6) If vacuum can not be felt, clean or replace the PCV valve.

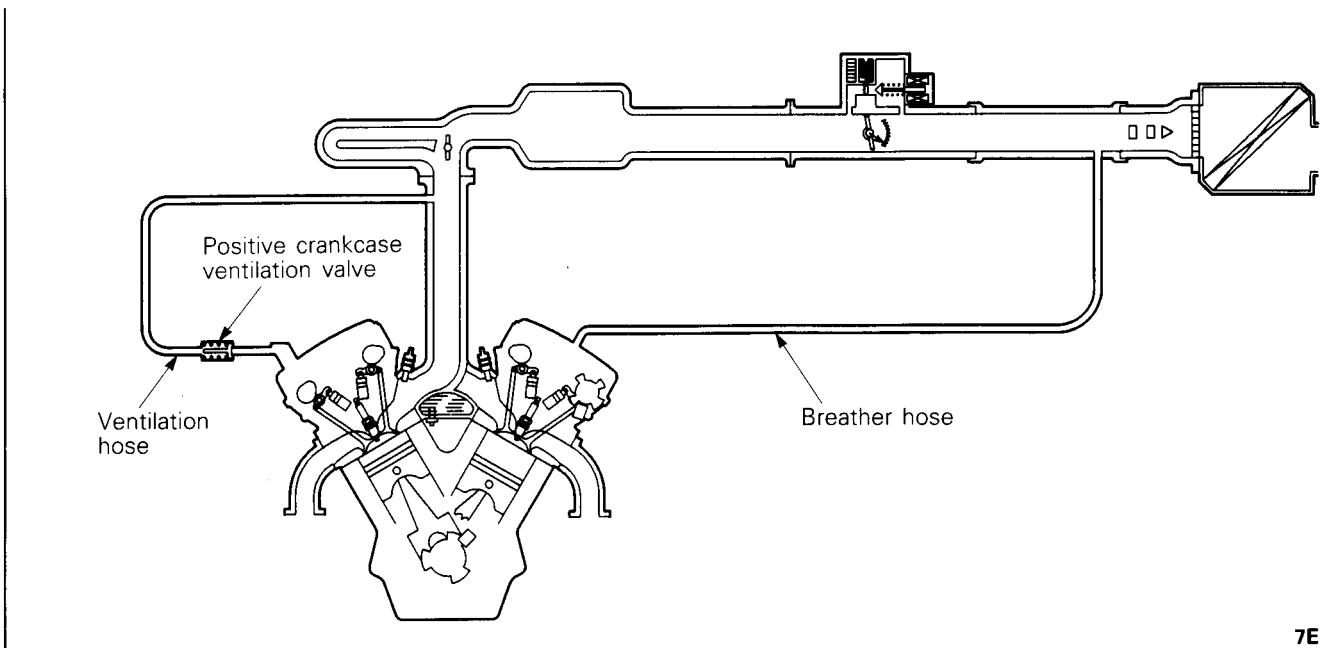


Positive Crankcase Ventilation (PCV) Valve Inspection

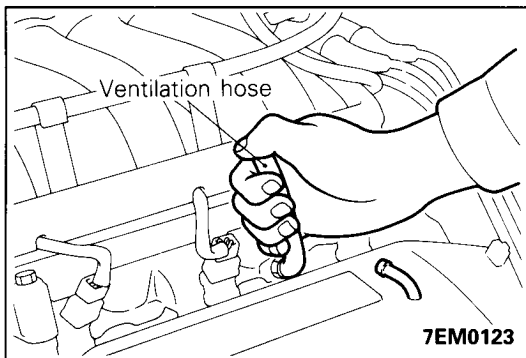
- (1) Remove the air intake plenum.
- (2) Remove the positive crankcase ventilation valve from the rocker cover.
- (3) Insert a thin rod from the threaded side of the positive crankcase ventilation valve, and move it back and forth to check that the plunger moves.
- (4) If the plunger does not move, there is a blockage inside the positive crankcase ventilation valve, so clean the valve or replace it.

CRANKCASE EMISSION CONTROL SYSTEM

<6G74 Engine>



7EM0326



POSITIVE CRANKCASE VENTILATION SYSTEM

System Inspection

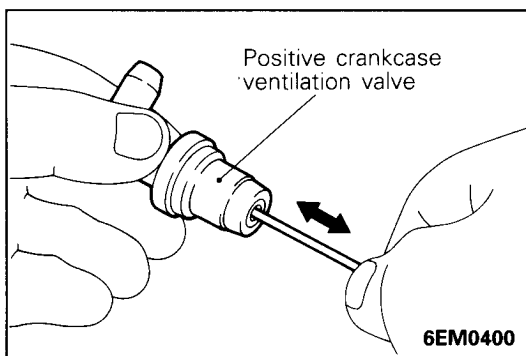
- (1) Disconnect the ventilation hose from the rocker cover.
- (2) Start the engine and run it at idle.
- (3) Put a finger to the ventilation hose to make sure that intake manifold vacuum is felt on the finger.

NOTE

At this time, the plunger inside the positive crankcase ventilation valve moves back and forth.

- (4) If vacuum is not felt on finger, clean the positive crankcase ventilation valve in cleaning solvent or replace if necessary.
- (5) Tighten the positive crankcase ventilation valve to the specified torque.

Tightening torque: 9.8 Nm (1.0 kgm, 7ft.lbs.)



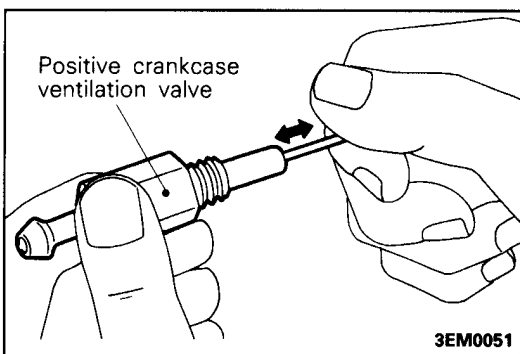
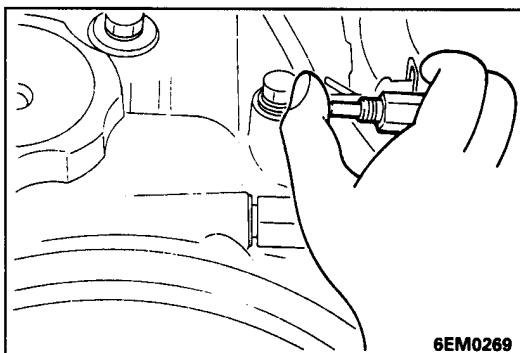
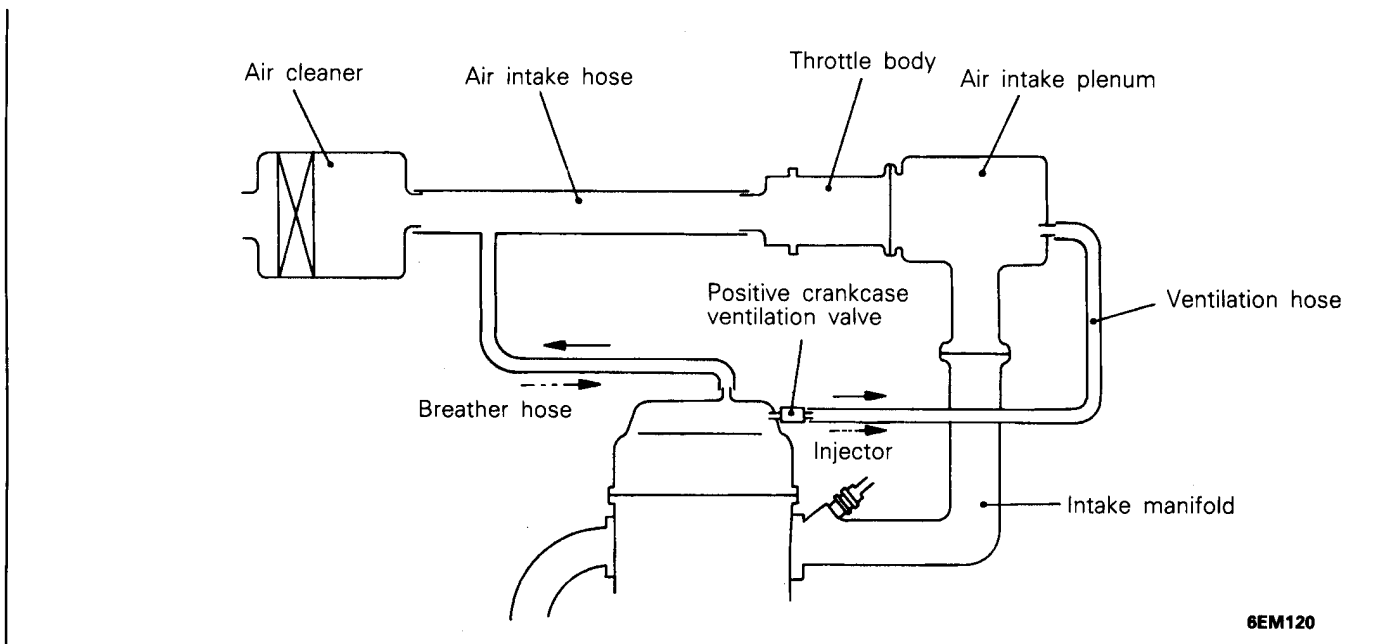
Positive Crankcase Ventilation (PCV) Valve Inspection

- (1) Remove the air intake plenum.
- (2) Remove the positive crankcase ventilation valve from the rocker cover.
- (3) Insert a thin rod from the threaded side of the positive crankcase ventilation valve, and move it back and forth to check that the plunger moves.
- (4) If the plunger does not move, there is a blockage inside the positive crankcase ventilation valve, so clean the valve or replace it.

CRANKCASE EMISSION CONTROL SYSTEM

<4G64 Engine>

E17FAAN2



POSITIVE CRANKCASE VENTILATION SYSTEM

System Inspection

- (1) Disconnect the ventilation hose from the positive crankcase ventilation valve. Then, remove the positive crankcase ventilation valve from the rocker cover and reconnect it to the ventilation hose.
- (2) Idle the engine and put a finger to the open end of positive crankcase ventilation valve to make sure that intake manifold vacuum is felt on the finger.

NOTE

At this time, the plunger inside the positive crankcase ventilation valve moves back and forth.

- (3) If vacuum is not felt on finger, clean the positive crankcase ventilation valve and ventilation hose in cleaning solvent or replace if necessary.

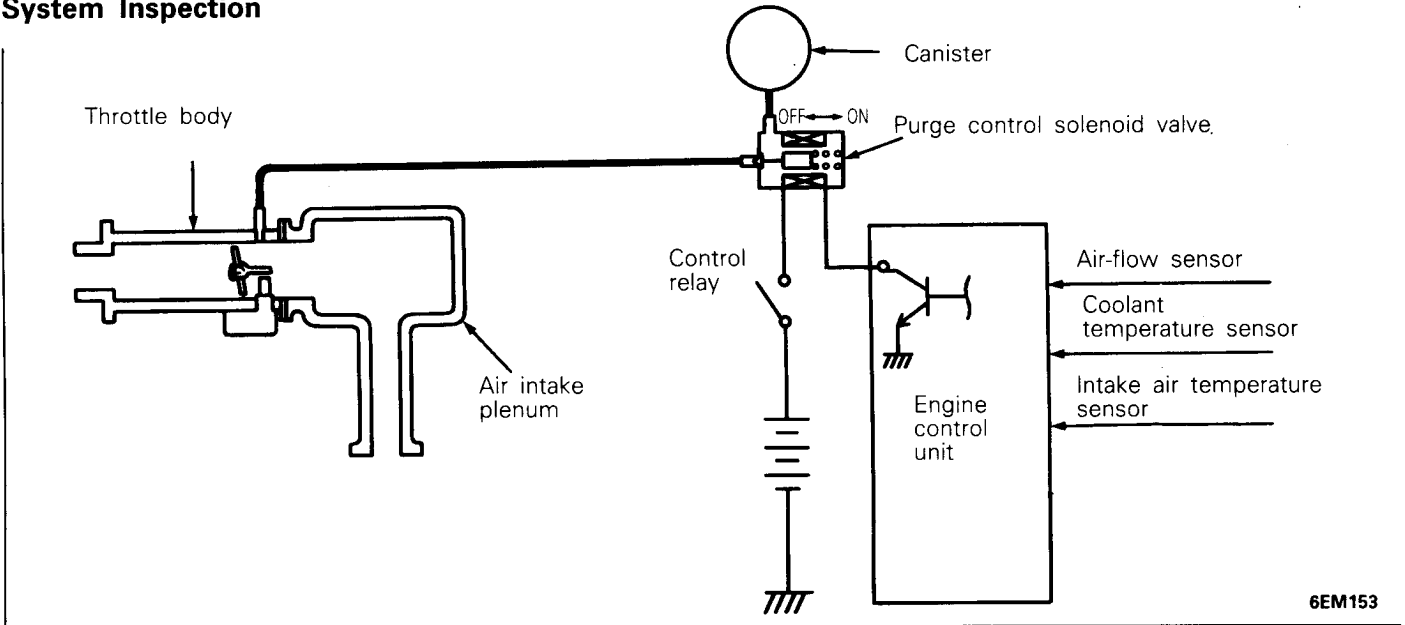
Positive Crankcase Ventilation (PCV) Valve Inspection

- (1) Insert a thin stick into the positive crankcase ventilation valve from the threaded side to check that the plunger moves.
- (2) If the plunger does not move, the positive crankcase ventilation valve is clogged. Clean it or replace.

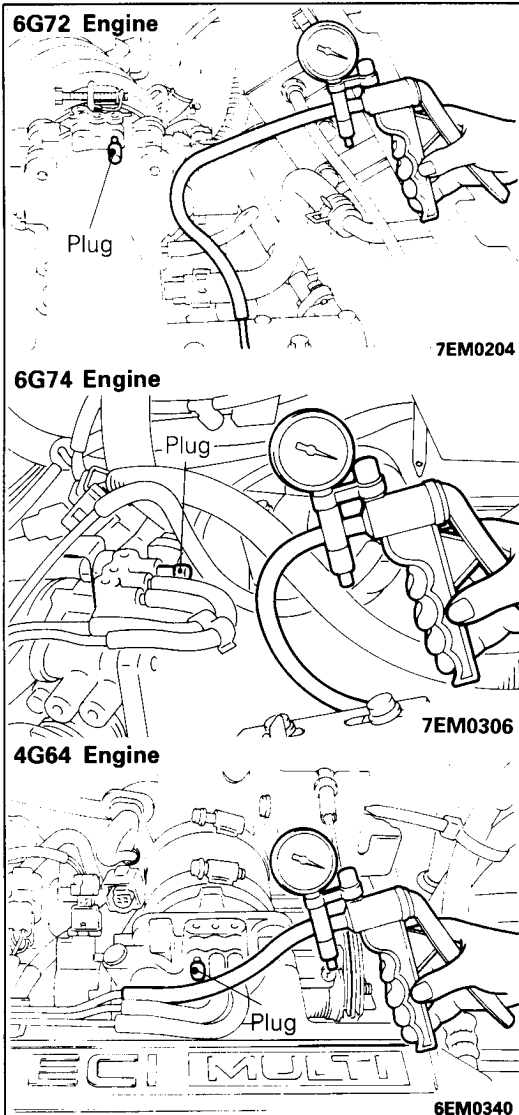
**EVAPORATIVE EMISSION CONTROL SYSTEM
PURGE CONTROL SYSTEM**

E17FBBA

System Inspection



6EM153



INSPECTION

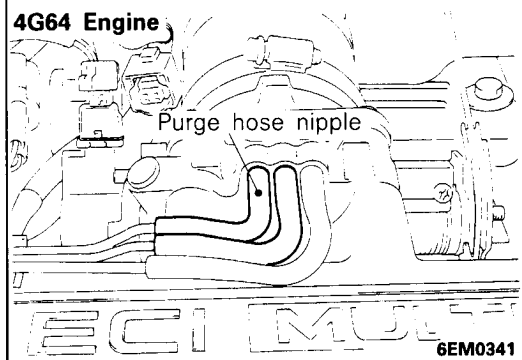
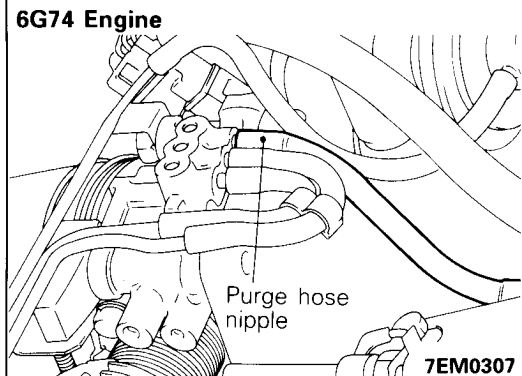
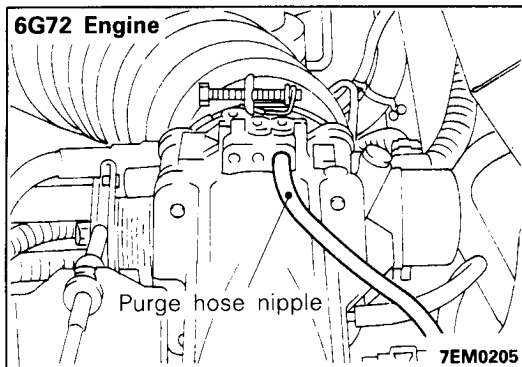
- (1) Disconnect the vacuum hose (red stripes) from the throttle body and connect it to a hand vacuum pump.
- (2) Plug the nipple from which the vacuum hose was removed.
- (3) Check the following points when the engine is cold [coolant temperature at 40°C (104°F) or below] and when it is warm [coolant temperature at 80°C (176°F) or higher].

When engine is cold

Engine operating condition	Applying vacuum	Result
Idling 3,000 r/min.	400 mmHg (15.7 in.Hg.)	Vacuum is maintained

When engine is warm

Engine operating condition	Applying vacuum	Result
Idling	400 mmHg (15.7 in.Hg.)	Vacuum is maintained
Within 3 minutes after engine start 3,000 r/min.	Try applying vacuum	Vacuum leaks
After 3 minutes have passed after engine start 3,000 r/min.	400 mmHg (15.7 in.Hg.)	Vacuum will be maintained momentarily, after which it will leak. NOTE The vacuum will leak continuously if the altitude is 2,200 m (7,200 ft.) or higher, or the intake air temperature is 50°C (122°F) or higher.

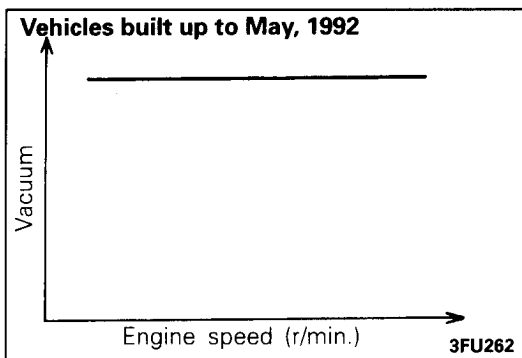


Purge Port Vacuum Inspection

Check Condition

Engine coolant temperature: 80–95°C (176–205°F)

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

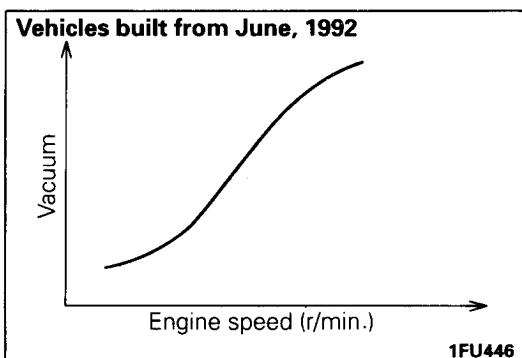


(2) Vehicles built up to May, 1992

Start the engine and check to see that, after raising the engine speed by racing the engine, vacuum remains fairly constant.

NOTE

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

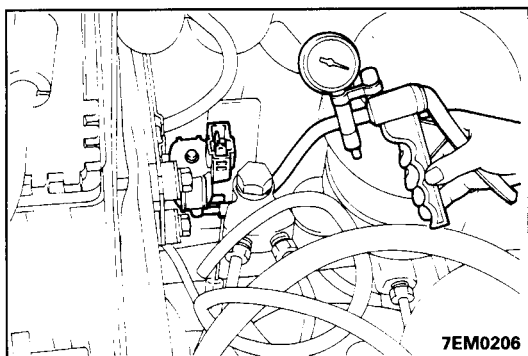


Vehicles built from June, 1992

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

NOTE

If there is a problem with the change in vacuum, it is possible that the throttle body port may be clogged and require cleaning.

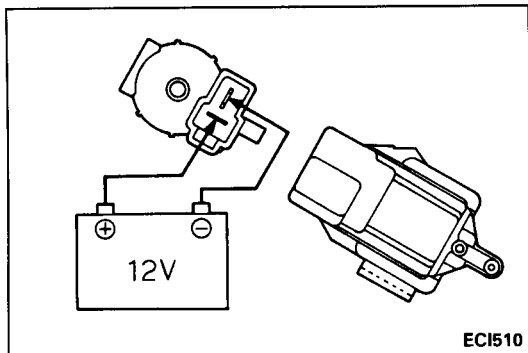


Purge Control Solenoid Valve Inspection

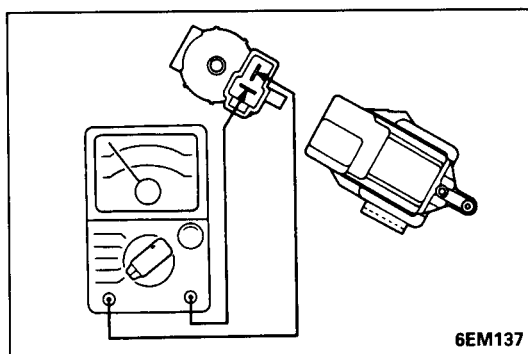
NOTE

When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

- (1) Disconnect the vacuum hose (black with red stripe) from the solenoid valve.
- (2) Disconnect the harness connector.
- (3) Connect a hand vacuum pump to the nipple to which the red-striped vacuum hose was connected.
- (4) Apply a vacuum and check for air-tightness when voltage is applied directly to the purge-control solenoid valve and when the voltage is discontinued.



Battery voltage	Normal condition
When applied	Vacuum leaks
When discontinued	Vacuum is maintained

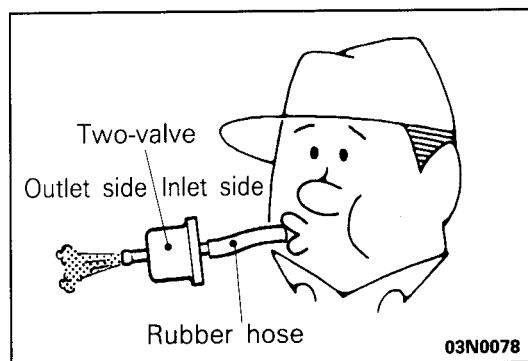


- (5) Measure the resistance between the terminals of the solenoid valve.

Standard value: 36–44 Ω [at 20°C (68°F)]

SIMPLE CHECKING OF THE TWO-WAY VALVE

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 (canister side).	Air passes through.

AIR FLOW SENSOR, ENGINE COOLANT TEMPERATURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR INSPECTION

Refer to GROUP 13.

CANISTER INSPECTION

Refer to GROUP 13.

EXHAUST EMISSION CONTROL SYSTEM

E17FCBL

AIR FUEL RATIO CONTROL SYSTEM

- To inspect the air-fuel ratio control system, refer to GROUP 13.
- For detailed information concerning the illumination pattern of the malfunction-indicator light and other aspects of the self-diagnosis function, refer to GROUP 13

CATALYTIC CONVERTER REMOVAL AND INSTALLATION

E17YA--

For removal and installation procedures, refer to GROUP 15.

INSPECTION

E17YCAC

Check for damage, cracks or fusion and replace if faulty.

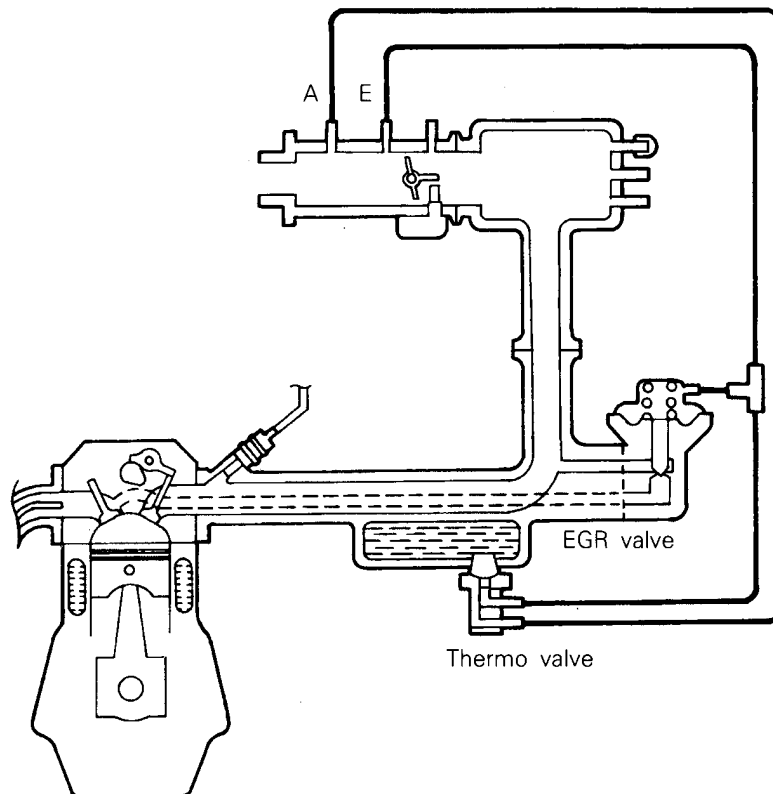
Caution

1. Operation of any type, including idling, should be avoided if engine misfiring occurs. Under this condition the exhaust system will operate at abnormally high temperature, which may cause damage to the catalytic converter or under-body parts of the vehicle.
2. Alteration or deterioration of ignition or fuel system, or any type of operating condition which result in engine misfiring must be corrected to avoid overheating the catalytic converters.
3. Proper maintenance and tune-up according to manufacturer's specifications should be made to correct the conditions as soon as possible.

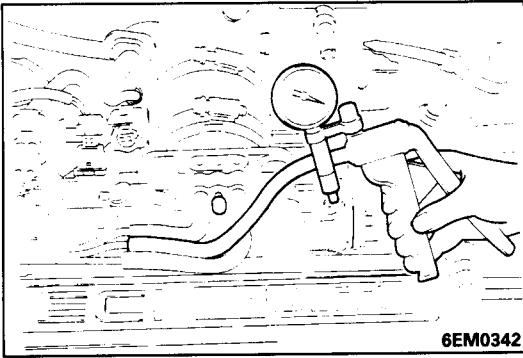
EXHAUST GAS RECIRCULATION (EGR) SYSTEM <4G64 Engine>

E17QAAD

System Inspection



6EM0159



- (1) Disconnect the vacuum hose (green stripe) from the throttle body, and connect a hand vacuum pump to the vacuum hose.
- (2) Under the engine conditions described below, provide a vacuum by using the hand vacuum pump, and then check.

When Engine is Cold–

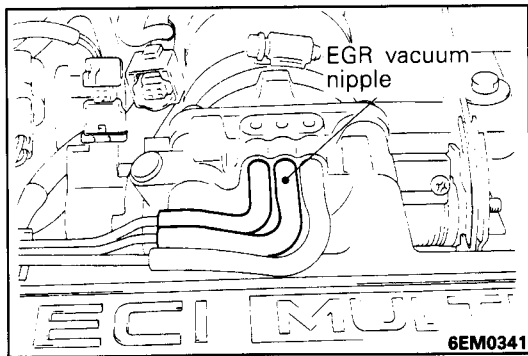
Coolant temperature at 40°C (104°F) or below

Engine operating condition	Applying vacuum	Result
Idling	Try applying vacuum	Vacuum leaks

When Engine is Hot–

Coolant temperature at 80°C (176°F) or higher

Engine operating condition	Applying vacuum	Result
Idling	30 mmHg (1.2 in.Hg.)	Vacuum is maintained
Changes from idling to slightly unstable	195 mmHg (7.7 in.Hg.)	Vacuum is maintained



EGR Valve Control Vacuum Inspection

Check Condition

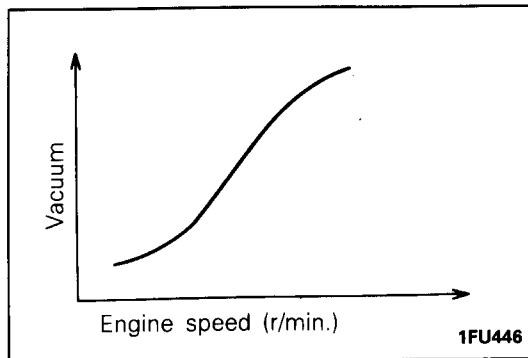
Engine coolant temperature: 80–95°C (176–205°F)

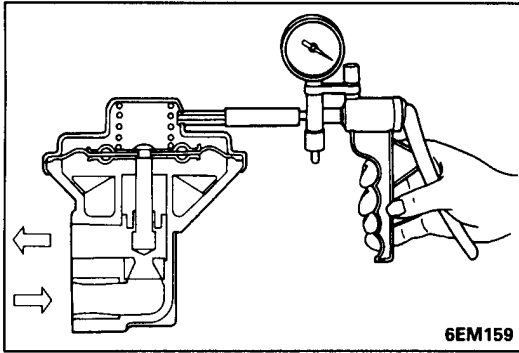
- (1) Disconnect the vacuum hose (green) from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.

- (2) Start the engine and check to see that, after raising the engine speed by racing the engine, the vacuum raises proportionately with the rise in engine speed.

NOTE

If there is a problem with the change in vacuum, it is possible that the throttle body vacuum port may be clogged and require cleaning.





EGR Valve Inspection

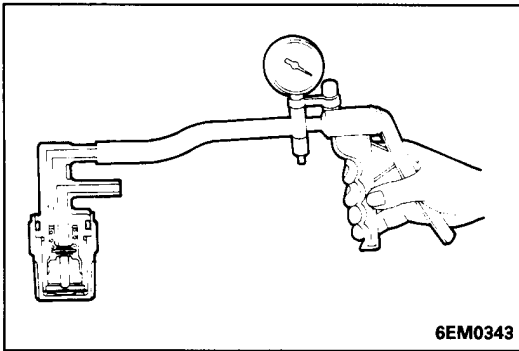
- (1) Remove the EGR valve and check it for sticking, deposit of carbon, etc.
If such condition exists, clean with adequate solvent to ensure tight valve seat contact.
- (2) Connect a hand vacuum pump to the EGR valve.
- (3) Apply a vacuum of 500 mmHg (19.6 in.Hg.) and check air tightness.
- (4) Blow in air from one passage of the EGR to check condition as follows.

Applying vacuum	Result
30 mmHg (1.2 in.Hg.)	Air does not blow through
195 mmHg (7.7 in.Hg.)	Air blows through

INSTALLATION

- (1) Install a new gasket and EGR valve, tighten bolts to specified torque.

Specified tightening torque: 22 Nm (2.2 kgm, 16 ft.lbs.)



Thermo Valve Inspection

- (1) Disconnect the vacuum hoses from the thermo valve, and connect a hand vacuum pump to nipple of the thermo valve.
- (2) Apply a vacuum and check the air passage through the thermo valve.

Engine coolant temperature	Result
50°C (122°F) or less	Vacuum leaks.
80°C (176°F) or more	Vacuum is maintained.

REMOVAL

- (1) When removing the thermo valve, do not use wrenches or other tools on the resin part.
- (2) When disconnecting the vacuum hose, put a mark on the hose so that it may be reconnected at original position.

INSTALLATION

- (1) Apply specified sealant to the threads of thermo valve and tighten to the specified torque. When installing the thermo valve, do not use wrenches or other tools on the resin part.

Specified sealant:

3M NUT Locking No. 4171 or equivalent

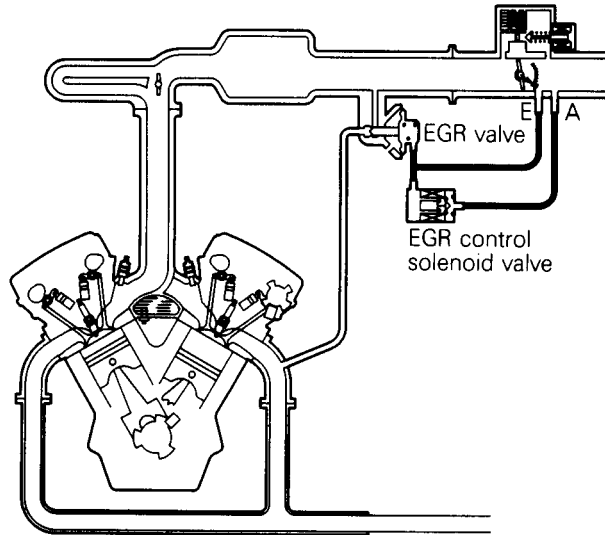
Specified torque: 30 Nm (3.0 kgm, 22 ft.lbs.)

- (2) Reconnect the vacuum, hose as it was before.

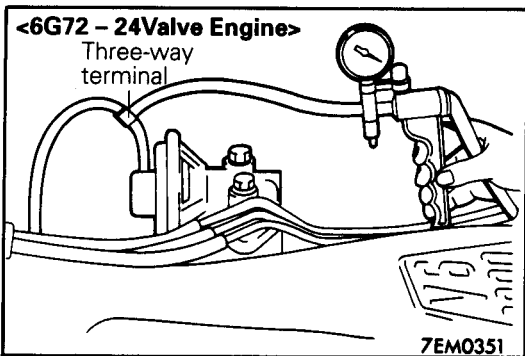
EXHAUST GAS RECIRCULATION (EGR) SYSTEM

<6G72 – 24Valve Engine, 6G74 Engine>

System Inspection



7EM0327



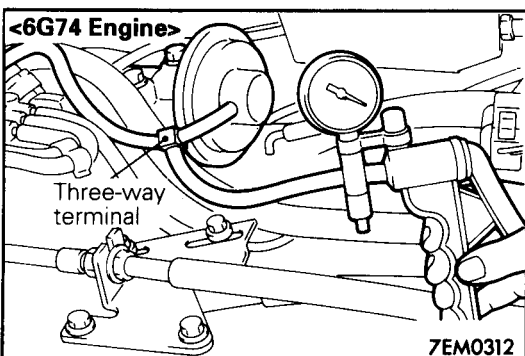
- (1) Disconnect the vacuum hose (green stripe) from the exhaust gas recirculation (EGR) valve, and then connect a hand vacuum pump via the three-way terminal.
- (2) Check the following points when the engine is cold [engine coolant temperature is 40°C (104°F) or below] and when the engine is warm [engine coolant temperature is 80°C (176°F) or higher].

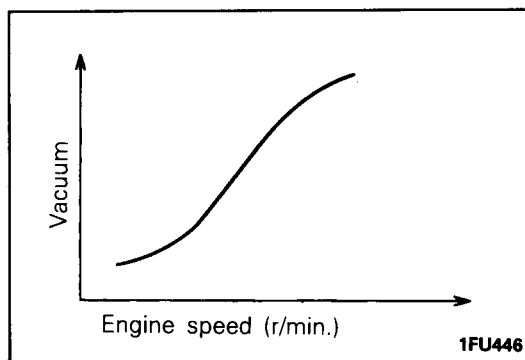
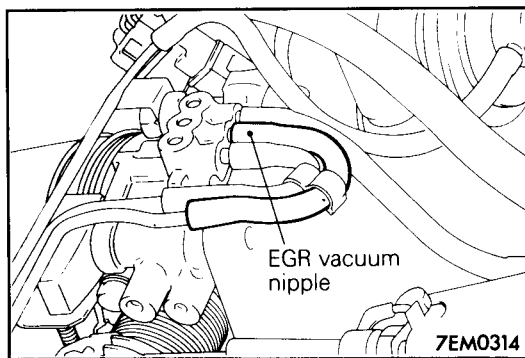
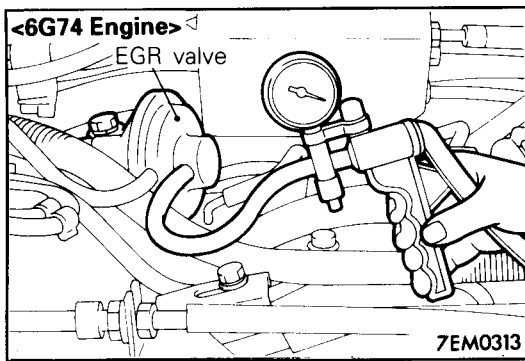
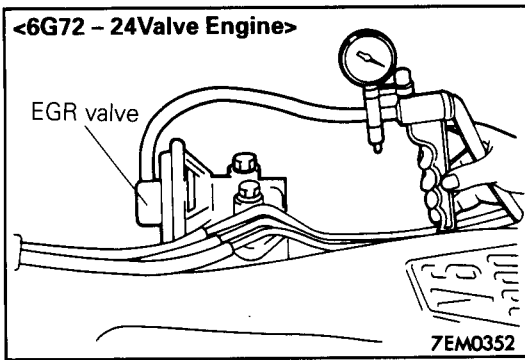
When engine is cold

Engine condition	Normal condition
Press the accelerator pedal suddenly and race the engine.	Vacuum: no change (atmospheric pressure)

When engine is warm

Engine condition	Normal condition
Press the accelerator pedal suddenly and race the engine.	Vacuum rises temporarily to 100 mmHg (3.9 in. Hg)





- (3) Disconnect the three-way terminal and connect the hand vacuum pump directly to the EGR valve.
- (4) Check whether or not the engine stalls or shows idling instability when a negative pressure (vacuum) of 230 mmHg (9.1 in. Hg) or higher is applied during idling.

EGR Valve Control Vacuum Inspection

Check Condition

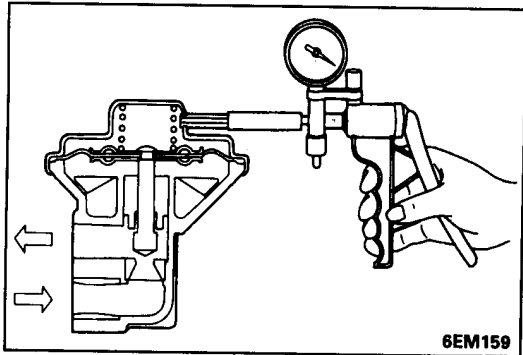
Engine coolant temperature: 80–95°C (176–205°F)

- (1) Disconnect the vacuum hose (green) from the throttle body 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, the vacuum raises proportionately with the rise in engine speed.

NOTE

If there is a problem with the change in vacuum, it is possible that the throttle body vacuum port may be clogged and require cleaning.



EGR Valve Inspection

- (1) Remove the EGR valve and check if for sticking, deposit of carbon, etc.
If such condition exists, clean with adequate solvent to ensure tight valve seat contact.
- (2) Connect a hand vacuum pump to the EGR valve.
- (3) Apply a vacuum of 500 mmHg (19.7 in. Hg) and check air tightness.
- (4) Blow in air from one passage of the EGR to check condition as follows:

Applying vacuum	Result
30 mmHg (1.2 in. Hg) or less	Air does not blow through
230 mmHg (9.1 in. Hg) or more	Air blows through

INSTALLATION

- (1) Install a new gasket and EGR valve, tighten bolts to specified torque.

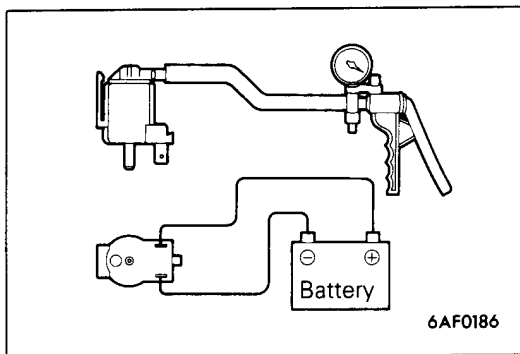
**Specified tightening torque:
22 Nm (2.2 kgm, 16ft.lbs.)**

EGR Control Solenoid Valve Inspection

NOTE

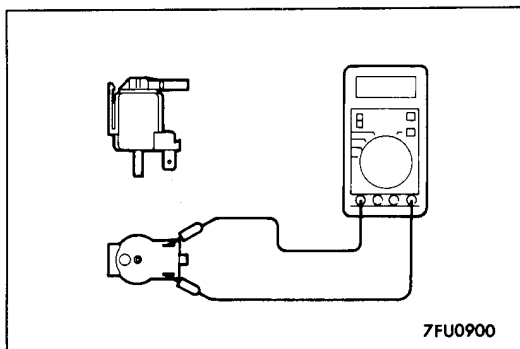
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

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



3. Connect a hand vacuum pump to the nipple to which the green-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	Normal condition
Not applied	Vacuum leaks
Applied	Vacuum maintained

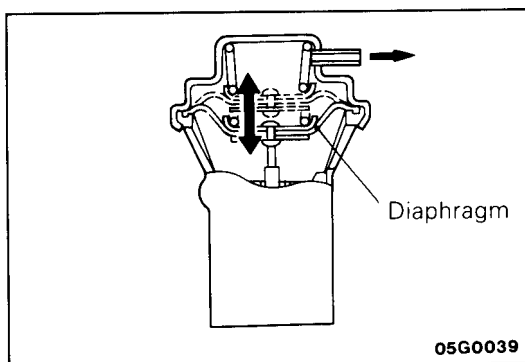
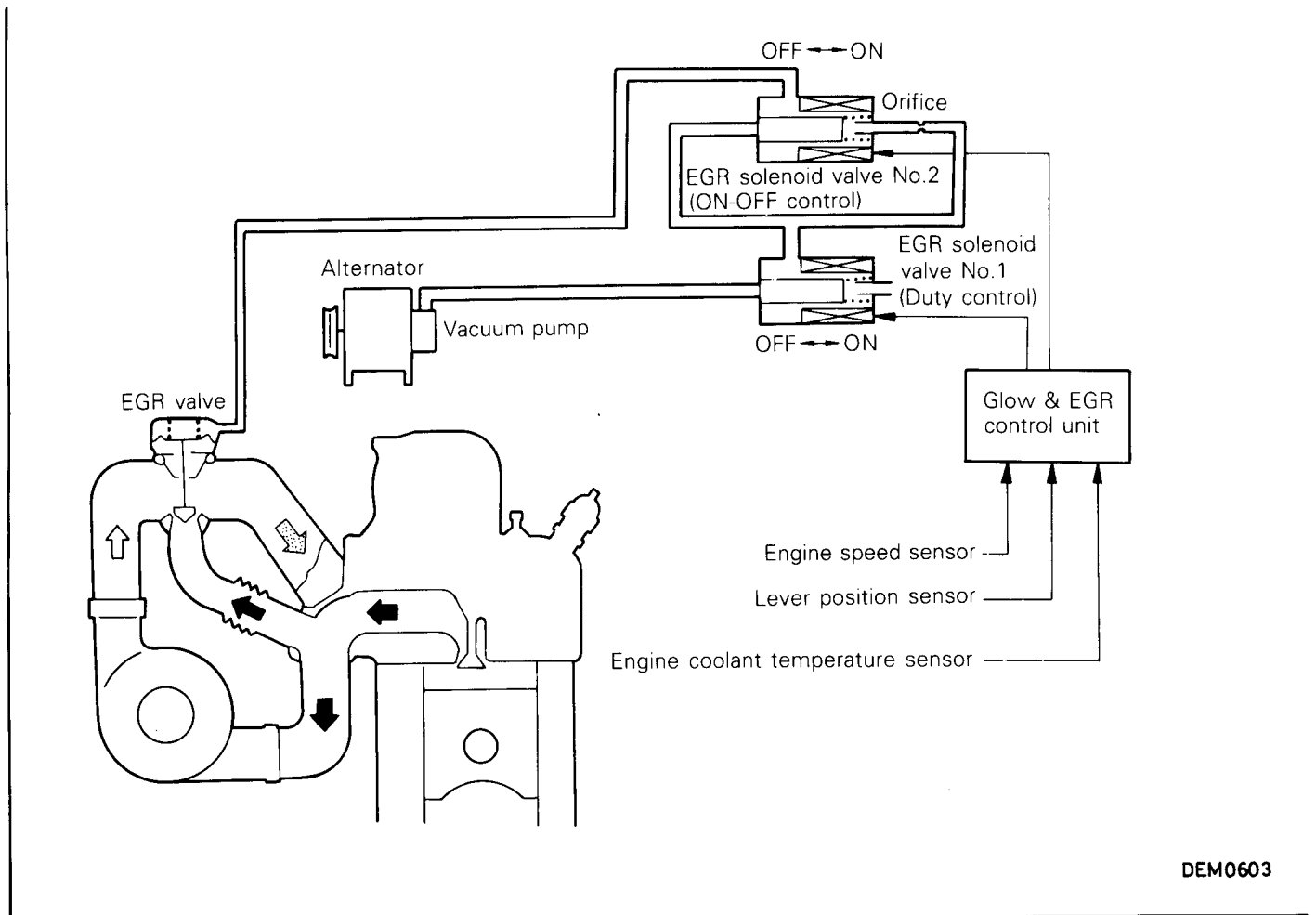


5. Measure the resistance between the terminals of the solenoid valve.

Standard value: 36–44Ω (at 20°C)

17-18-4

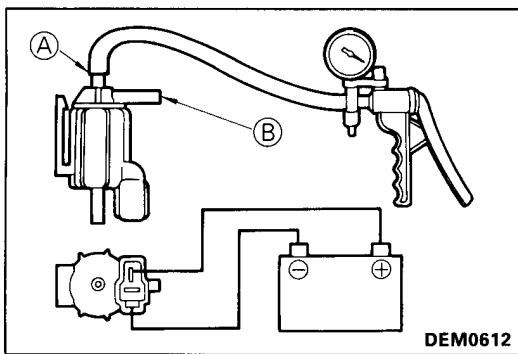
NOTES

EXHAUST GAS RECIRCULATION (EGR) SYSTEM**<4D56 Engine>****System Inspection****FUNCTION INSPECTION**

- (1) Start the engine and let it warm up until the engine coolant temperature is 65°C (149°F) 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.

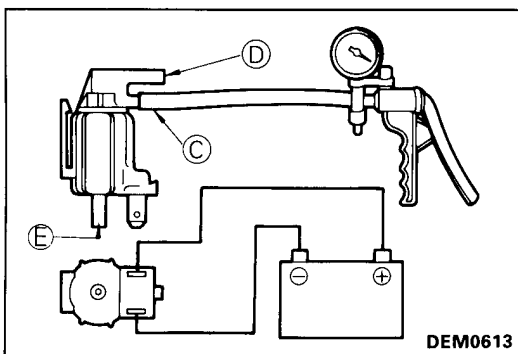
EGR SOLENOID VALVE NO.1/NO.2 OPERATION INSPECTION

- (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 a vacuum. Check that the valves are airtight both when voltage is applied to each terminal of the EGR solenoid valves and when it is not applied.



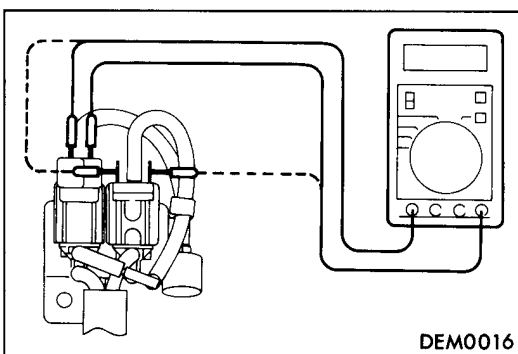
EGR SOLENOID VALVE No.1

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

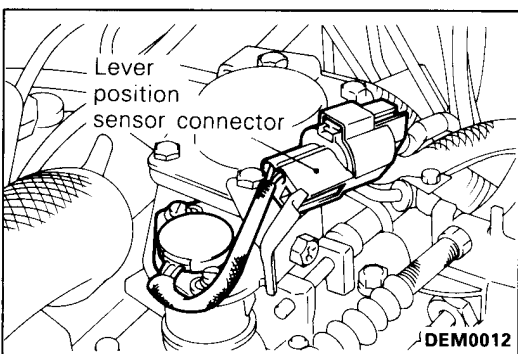
Battery voltage	Normal condition
When current is flowing	Vacuum leaks (Vacuum is maintained when nipple (D) is covered)
When current is not flowing	Vacuum leaks (Vacuum is maintained when nipple (E) is covered)



EGR SOLENOID VALVE NO.1/NO.2 RESISTANCE INSPECTION

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

Standard value [At 20°C (68°F)]: **36–44Ω**

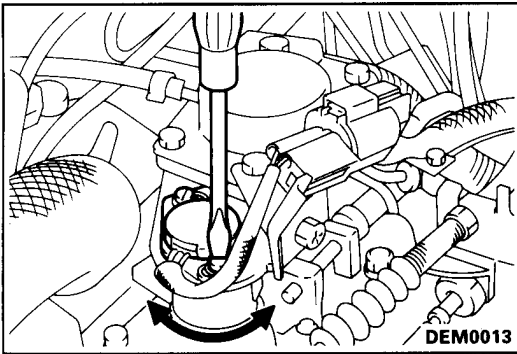


LEVER POSITION SENSOR (LPS) ADJUSTMENT [Condition before adjustment]

- Engine coolant temperature 80–95°C (176–203°F)
- (1) Loosen the accelerator cable tension sufficiently.
- (2) Connect the special tool (MD998478) to the lever position sensor connector as shown in the illustration.
- (3) Connect a digital-type voltmeter between the red clip (output) and blue clip (earth) of the connected special tool.
- (4) Turn the ignition switch to ON. (Do not start the engine.)
- (5) Measure the output voltage of the lever position sensor.

Standard value:

Lever condition	Voltage V
Idle position	0.3 – 1.5
Fully open	3.7 – 4.9



- (6) 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 adjusting, securely tighten the screw.

NOTE

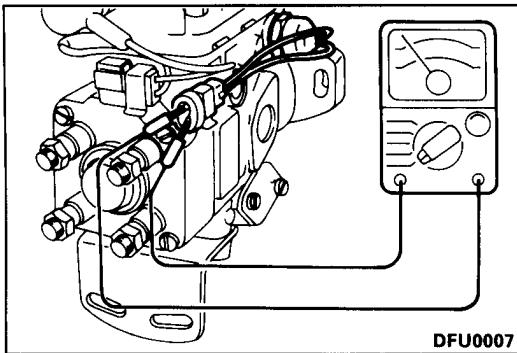
The output voltage will increase if the lever position sensor body is turned in an anti-clockwise direction.

- (7) Turn the ignition switch to "OFF".
- (8) Adjust the accelerator cable play.

ENGINE SPEED SENSOR INSPECTION

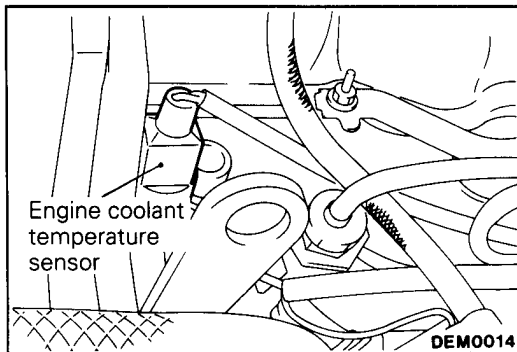
- (1) Disconnect the engine speed sensor connectors.
- (2) Measure the resistance between the engine speed sensor terminals.

Standard value: 1.3 - 1.9 kΩ



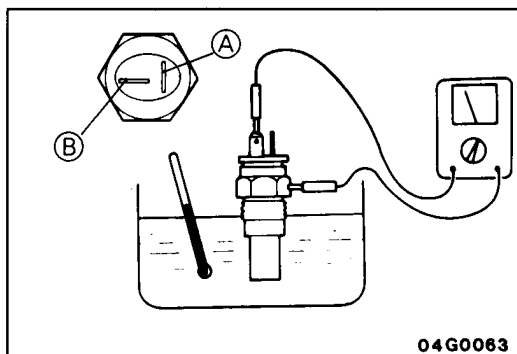
ENGINE COOLANT TEMPERATURE SENSOR INSPECTION

- (1) Remove the engine coolant temperature sensor.



- (2) While the sensor section of the engine coolant temperature sensor is submerged, measure the resistance between (B) terminal and the body.

Standard value:



Temperature [°C (°F)]	Resistance value (k Ω)
0 (32)	8.6
20 (68)	3.3
40 (104)	1.5
80 (176)	0.3

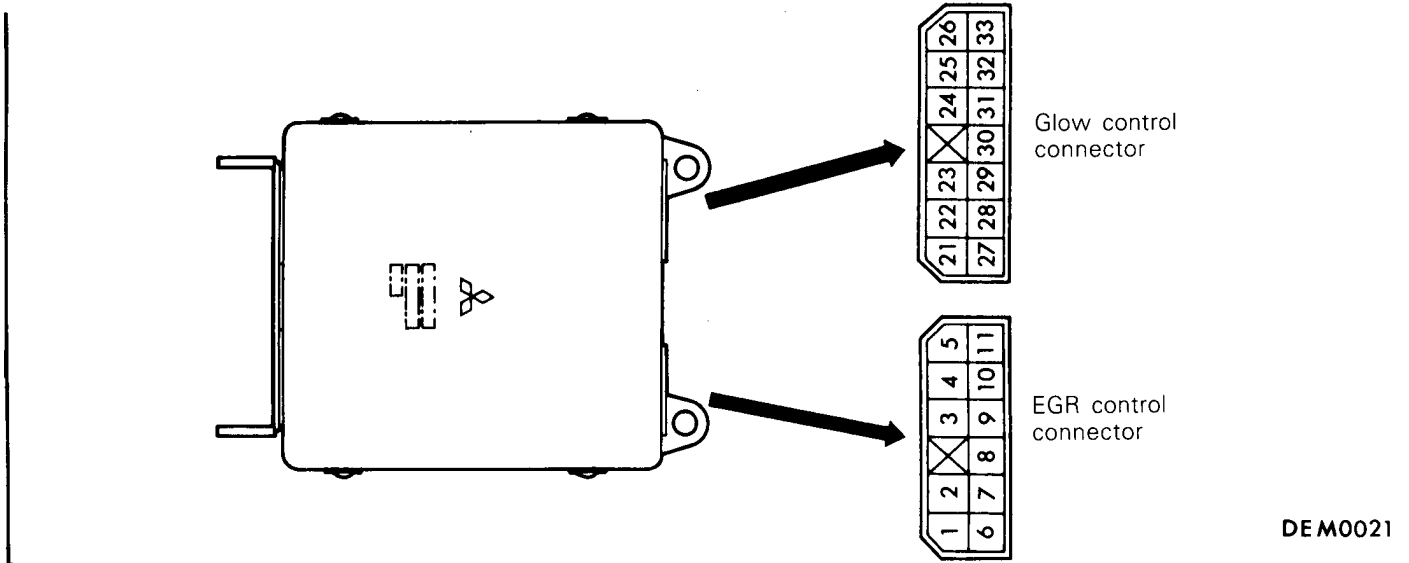
If the resistance differs largely from the standard value, replace the engine coolant temperature sensor.

- (3) After applying specified sealant to the thread, tighten to the specified torque.

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

Tightening torque: 10–12 Nm (1.0–1.2 kgm, 7–9 ft.lbs.)

GLOW AND EGR CONTROL UNIT <SUPER QUICK GLOW SYSTEM>



DE M0021

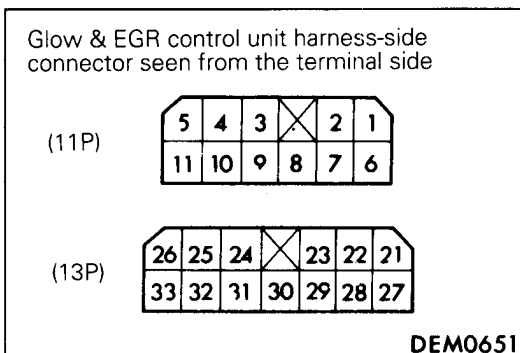
TERMINAL VOLTAGE MEASUREMENT

NOTE

- (1) Inspect with the glow & EGR control unit connectors still connected.
- (2) When measuring the voltage, the earth will be the glow & EGR unit terminal no. 30.

Terminal Voltage Reference Table

Glow & EGR control unit inspection terminal	Inspection item	Inspection conditions	Standard value
2	EGR solenoid valve No.1	Ignition switch: OFF → ON	11 – 13V
		While engine is idling after having warmed up, suddenly race the engine.	Momentarily increases
3	Lever position sensor	Ignition switch: OFF → ON	0.3 – 1.5V
		Throttle lever idle position Throttle lever fully open position	3.7 – 4.9V
5	Sensor power supply <M/T only>	Ignition switch: OFF → ON	4.5 – 5.5V
8	EGR solenoid valve No.2	Ignition switch: OFF → ON	11 – 13V
		While engine is idling after having warmed up, suddenly race the engine.	Momentarily decreases

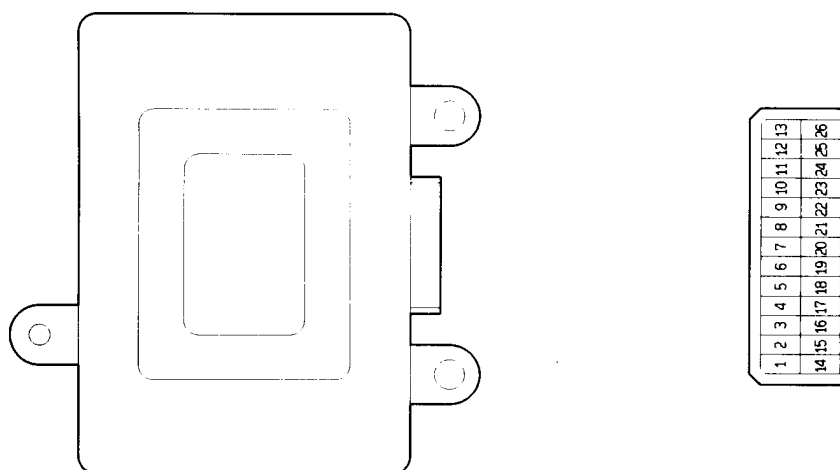


HARNES CONTINUITY INSPECTION

- (1) Disconnect the glow & EGR control unit connector.
- (2) Check to be sure that there is continuity (1.3 – 1.9 kΩ) between the harness-side connector terminals 10 – 11.

GLOW AND EGR CONTROL UNIT <SELF-REGULATING GLOW SYSTEM>

<From 1994 models>



DEM0025

TERMINAL VOLTAGE MEASUREMENT

NOTE

- (1) Inspect with the glow and EGR control unit connectors still connected.
- (2) Connect the earth to terminal No. 26 of the glow and EGR control terminal when measuring the voltage.

Terminal Voltage Table

Glow and EGR control unit inspection terminal	Inspection item	Inspection condition	Standard value
3	EGR solenoid valve No.1	Ignition switch: OFF → ON	11 – 13V
		While engine is idling after having warmed up, suddenly depress the accelerator pedal.	Momentarily increases
6	Lever position sensor	Ignition switch OFF → ON	Throttle lever idle position 0.3 – 1.5V
			Throttle lever fully open position 3.7 – 4.9V
7	Sensor power supply	Ignition switch: OFF → ON	4.5 – 5.5V
16	EGR solenoid valve No. 2	Ignition switch: OFF → ON	11 – 13V
		While engine is idling after having warmed up, suddenly depress the accelerator pedal.	Momentarily decreases

Harness side connector

13	12	11	10	9	8	7	6	5	4	3	2	1
26	25	24	23	22	21	20	19	18	17	16	15	14

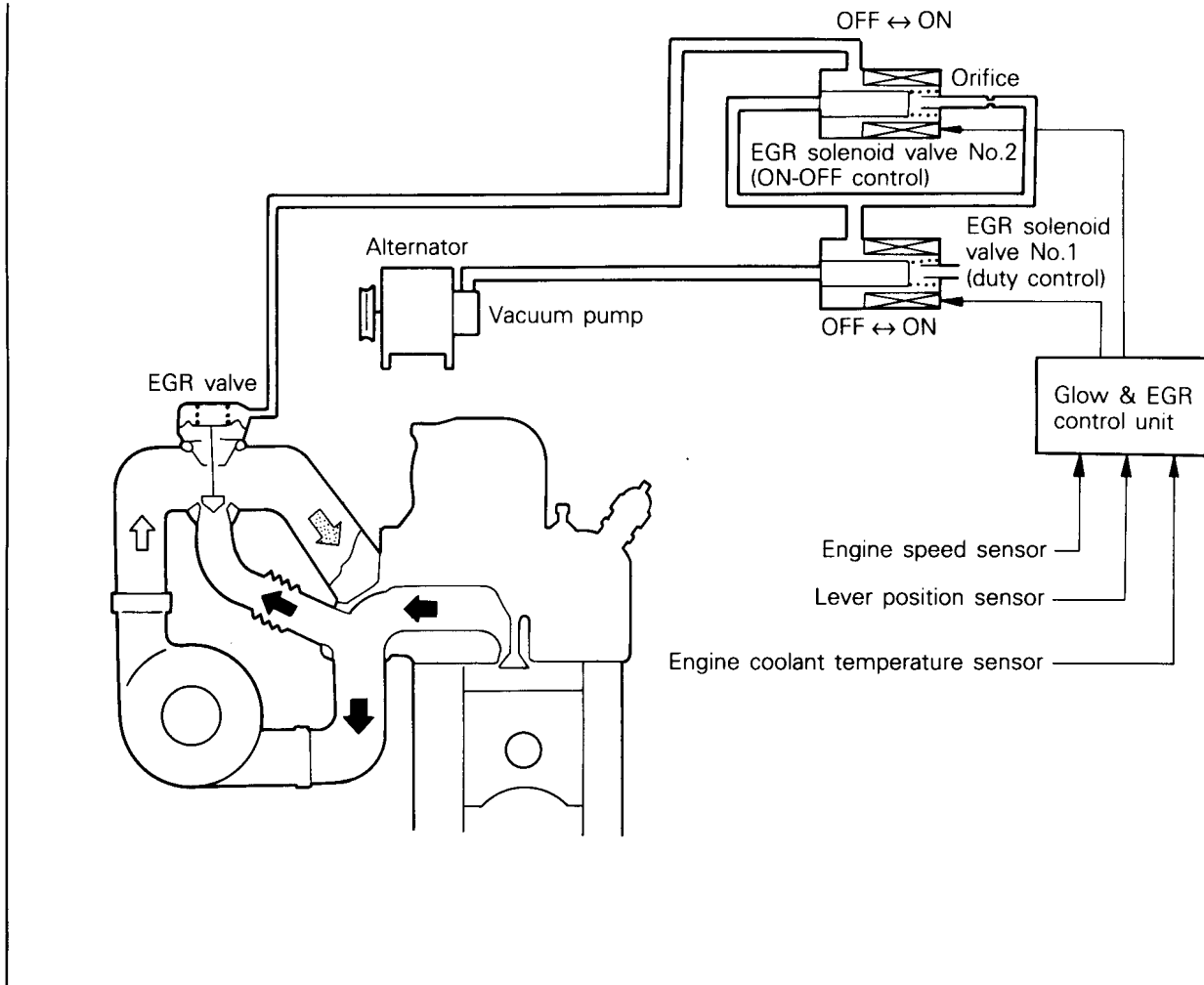
DEM0026

HARNES CONTINUITY INSPECTION

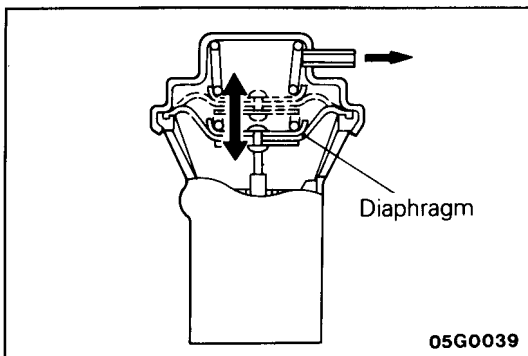
- (1) Disconnect the glow and EGR control unit connectors.
- (2) Check to be sure that there is continuity (1.3–1.9 Ω) between the harness side connector terminals (11)–(24).

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

<4M40 Engine>

System Inspection

DEM0603



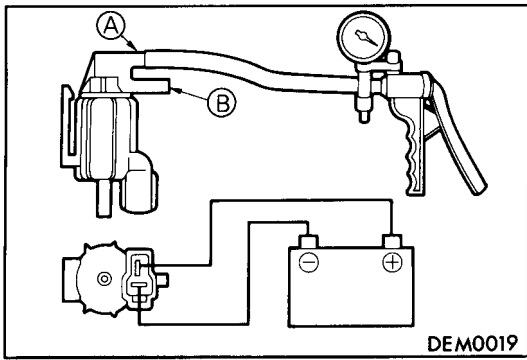
05G0039

FUNCTION INSPECTION

- (1) Start the engine and let it warm up until the engine coolant temperature is 65°C (149°F) 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.

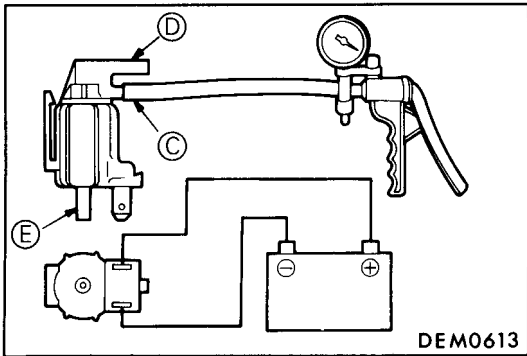
EGR SOLENOID VALVE NO. 1/NO. 2 OPERATION INSPECTION

- (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 a vacuum. Check that the valves are airtight both when voltage is applied to each terminal of the EGR solenoid valves and when it is not applied.



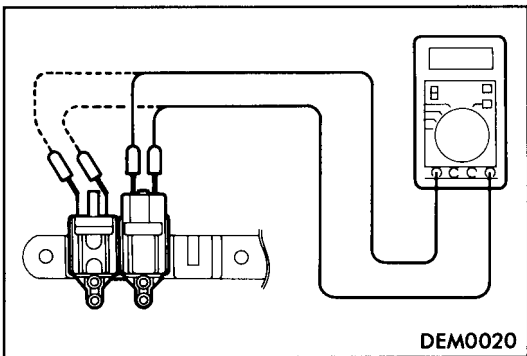
EGR SOLENOID VALVE NO. 1

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

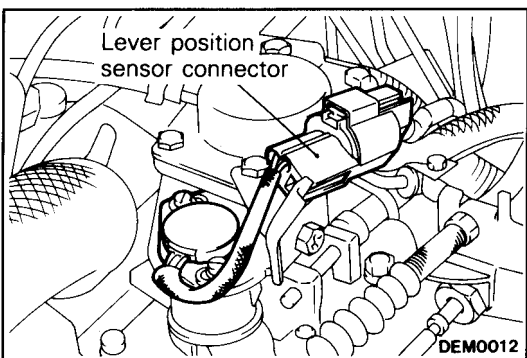
Battery voltage	Normal condition
When current is flowing	Vacuum leaks (Vacuum is maintained when nipple D is covered)
When current is not flowing	Vacuum leaks (Vacuum is maintained when nipple E is covered)



EGR SOLENOID VALVE NO. 1/NO. 2 RESISTANCE INSPECTION

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

	Solenoid valve No.1/No.2 resistance
Standard value [At 20°C (68°F)]	36–44Ω



LEVER POSITION SENSOR (LPS) ADJUSTMENT

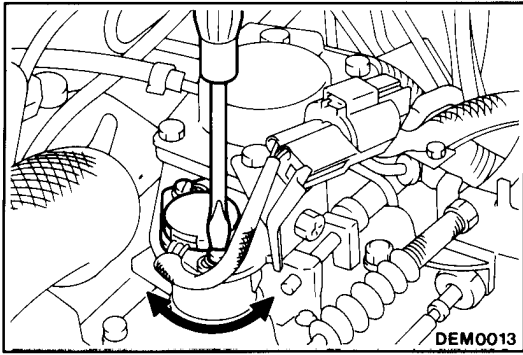
[Condition before adjustment]

- Engine coolant temperature 80–95°C (176–203°F)
- (1) Loosen the accelerator cable tension sufficiently.
 - (2) Connect the special tool (MD998478) to the lever position sensor connector shown in the illustration.
 - (3) Connect a digital-type voltmeter between the red clip (output) and blue clip (earth) to which the special tool has been connected.

- (4) Turn the ignition switch to ON. (Do not start the engine.)
- (5) Measure the output voltage of the lever position sensor.

Standard value:

Lever condition	Voltage V
Idle position	0.3–1.5
Fully open	3.7–4.9

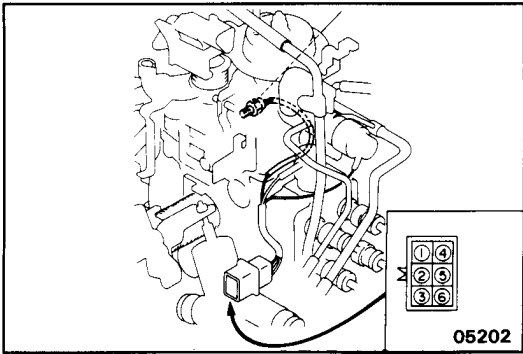


- (6) If the voltage is outside the standard value, adjust by loosening the lever position sensor mounting screw and turning the lever position sensor. After adjustment, securely tighten the screw.

NOTE

If the lever position sensor is turned clockwise, the output voltage will be increased.

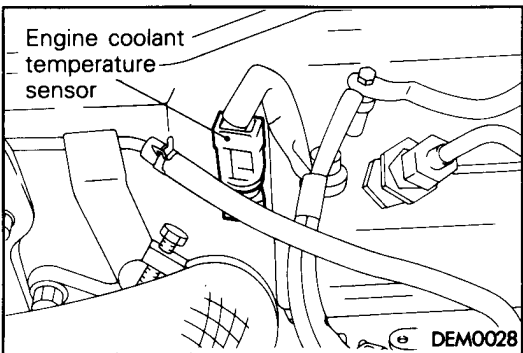
- (7) Turn the ignition switch to OFF.
- (8) Adjust the accelerator cable play.



ENGINE SPEED SENSOR INSPECTION

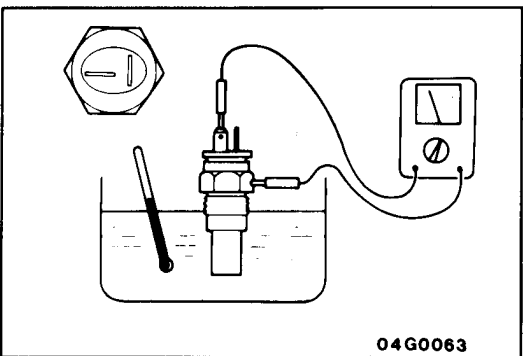
- (1) Disconnect the engine speed sensor connectors.
- (2) Measure the resistance between the engine speed sensor terminals ③ – ⑥.

Standard value: 1.3–1.9 kΩ



ENGINE COOLANT TEMPERATURE SENSOR INSPECTION

- (1) Remove the engine coolant temperature sensor.



- (2) Dip the sensing section of the engine coolant temperature sensor in oil and measure the resistance value.

Standard value:

Temperature [°C (°F)]	Resistance value (kΩ)
0 (32)	8.6
20 (68)	3.3
40 (104)	1.5
80 (176)	0.3

If the resistance differs largely from the standard value, replace the engine coolant temperature sensor.

GLOW AND EGR CONTROL UNIT**TERMINAL VOLTAGE MEASUREMENT**

Refer to P.17-23

HARNES CONTINUITY INSPECTION

Refer to P.17-24