

EMISSION CONTROL SYSTEMS

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SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Positive crankcase ventilation system	Closed type with positive crankcase ventilation valve
Evaporative emission control system Evaporative emission <EVAP> canister Evaporative emission <EVAP> purge solenoid	Canister storage type Charcoal type ON/OFF solenoid valve
Exhaust emission control system Exhaust gas recirculation system EG R valve EGR temperature sensor <California – Non Turbo, Turbo> EGR solenoid <California – Non Turbo, Turbo> Catalytic converter Location <Federal/Canada – Non Turbo> <California – Non Turbo, Turbo>	Vacuum-activated diaphragm type Thermistor type Duty cycle type solenoid valve Monolith type Under floor Right bank, left bank and under floor

SERVICE SPECIFICATIONS

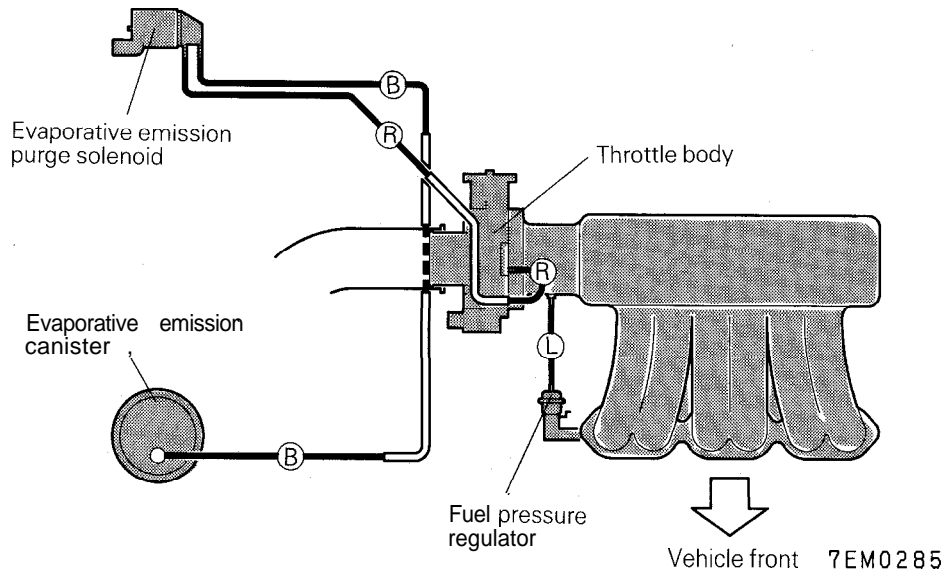
Items	Specifications
Evaporative emission purge solenoid coil resistance Ω EGR temperature sensor resistance $k\Omega$ EGR solenoid coil resistance Ω	36 – 44 [at 20°C (68°F)] 60 – 83 [at 50°C (122°F)] 11 – 14 [at 100°C (212°F)] 36 – 44 [at 20°C (68°F)]

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Engine will not start or hard to start	Vacuum hose disconnected or damaged	Repair or replace
	The EGR valve is not closed	Repair or replace
	Malfunction of the evaporative emission purge solenoid	Repair or replace
Rough idle or engine stalls	The EGR valve is not closed	Repair or replace
	Vacuum hose disconnected or damaged	Repair or replace
	Malfunction of the positive crankcase ventilation valve	Replace
	Malfunction of the purge control system	Check the system; if there is a problem, check its component parts
Engine hesitates or poor acceleration	Malfunction of the exhaust gas recirculation system	Check the system; if there is a problem, check its component parts
Excessive oil consumption	Positive crankcase ventilation line clogged	Check positive crankcase ventilation system
Poor fuel mileage	Malfunction of the exhaust gas recirculation system	Check the system; if there is a problem, check its component parts

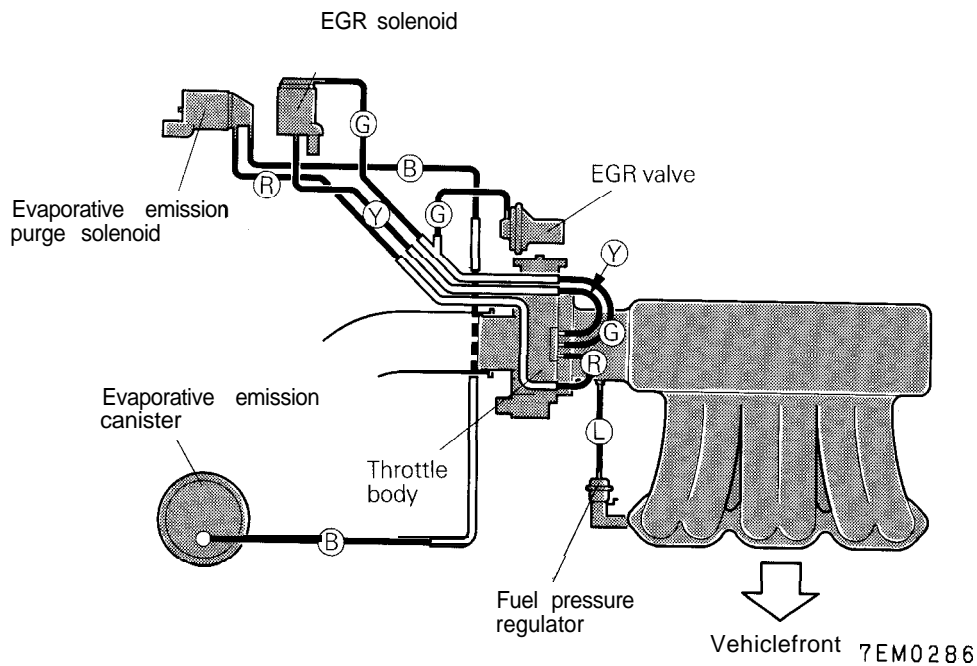
VACUUM HOSES**VACUUM HOSES ROUTING**

<Federal/Canada – Non Turbo>



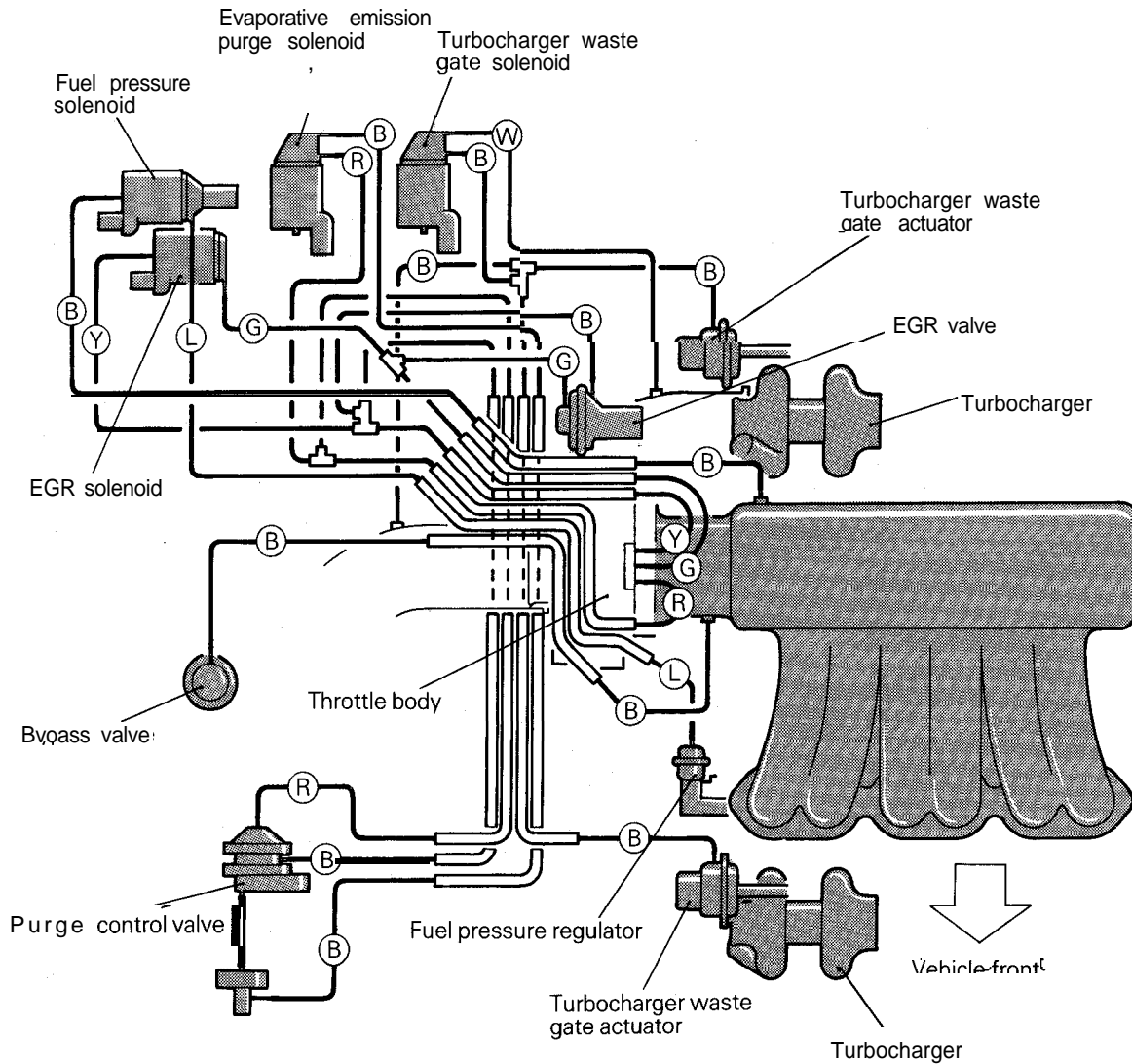
L: Light blue
 R: Red
 B: Black

<California – Non Turbo>



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

<Turbo>

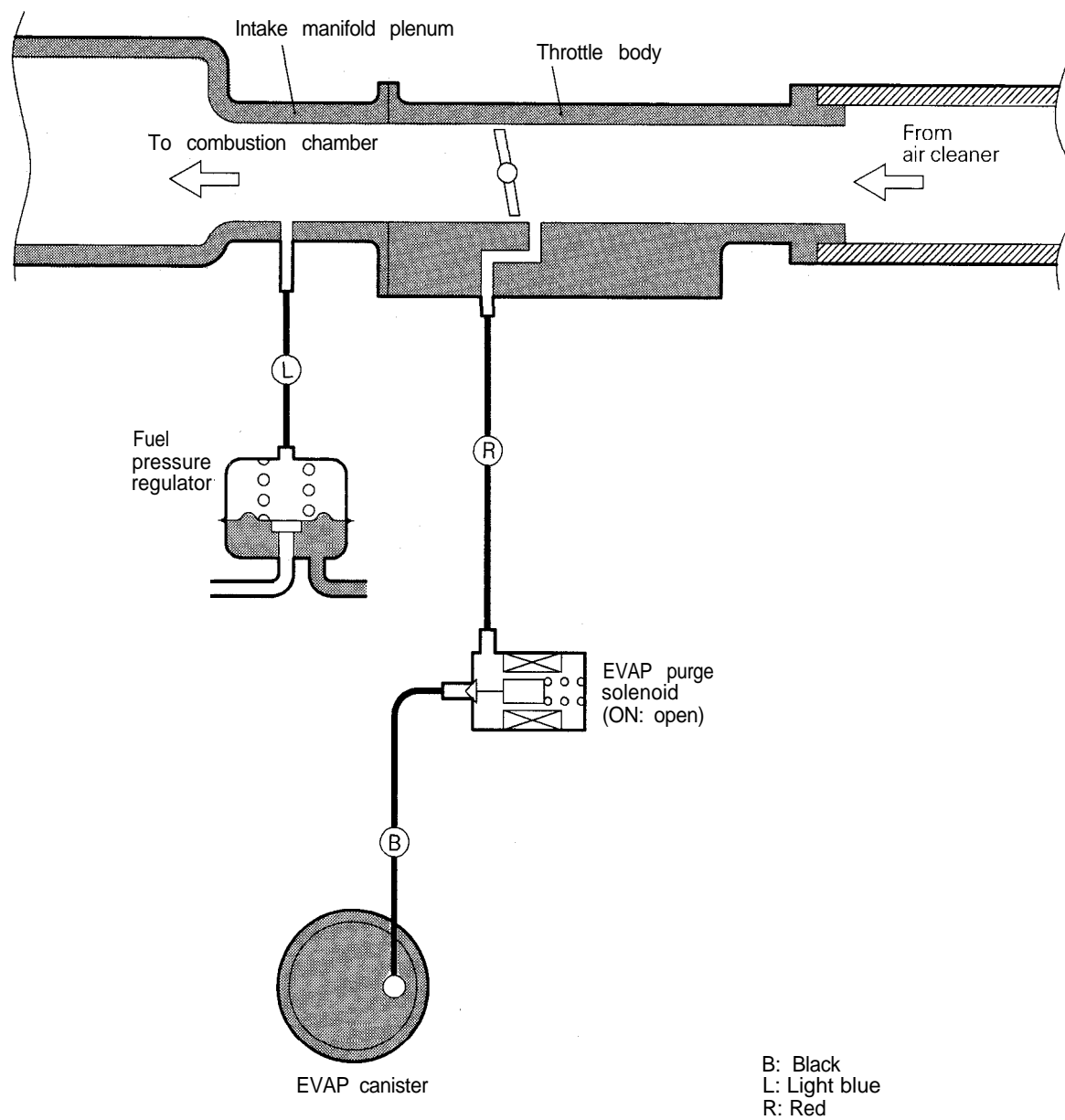


G: Green
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 R: Red
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 W: White

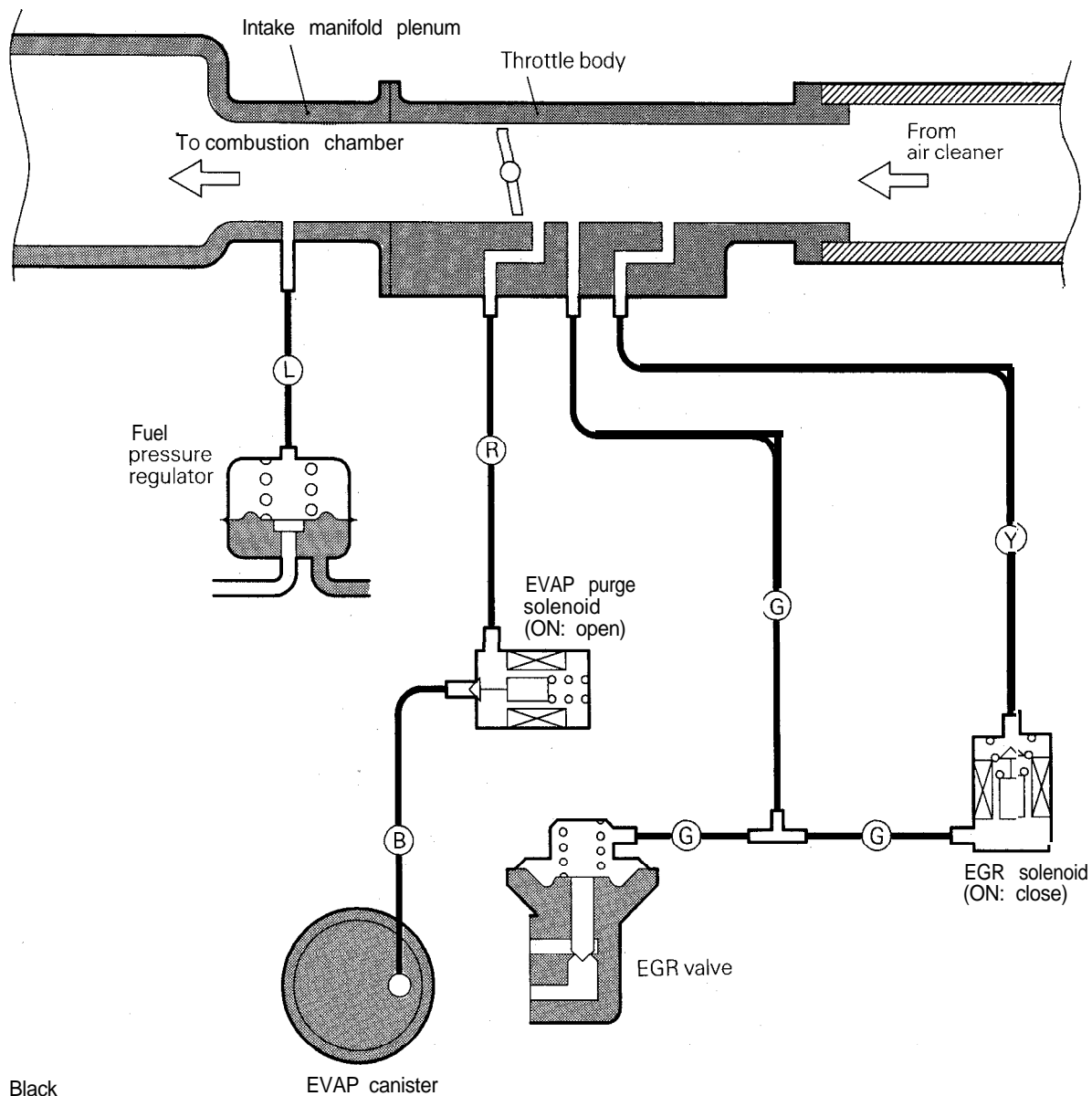
7EM0254

VACUUM CIRCUIT DIAGRAM

<Federal/Canada-Non turbo>

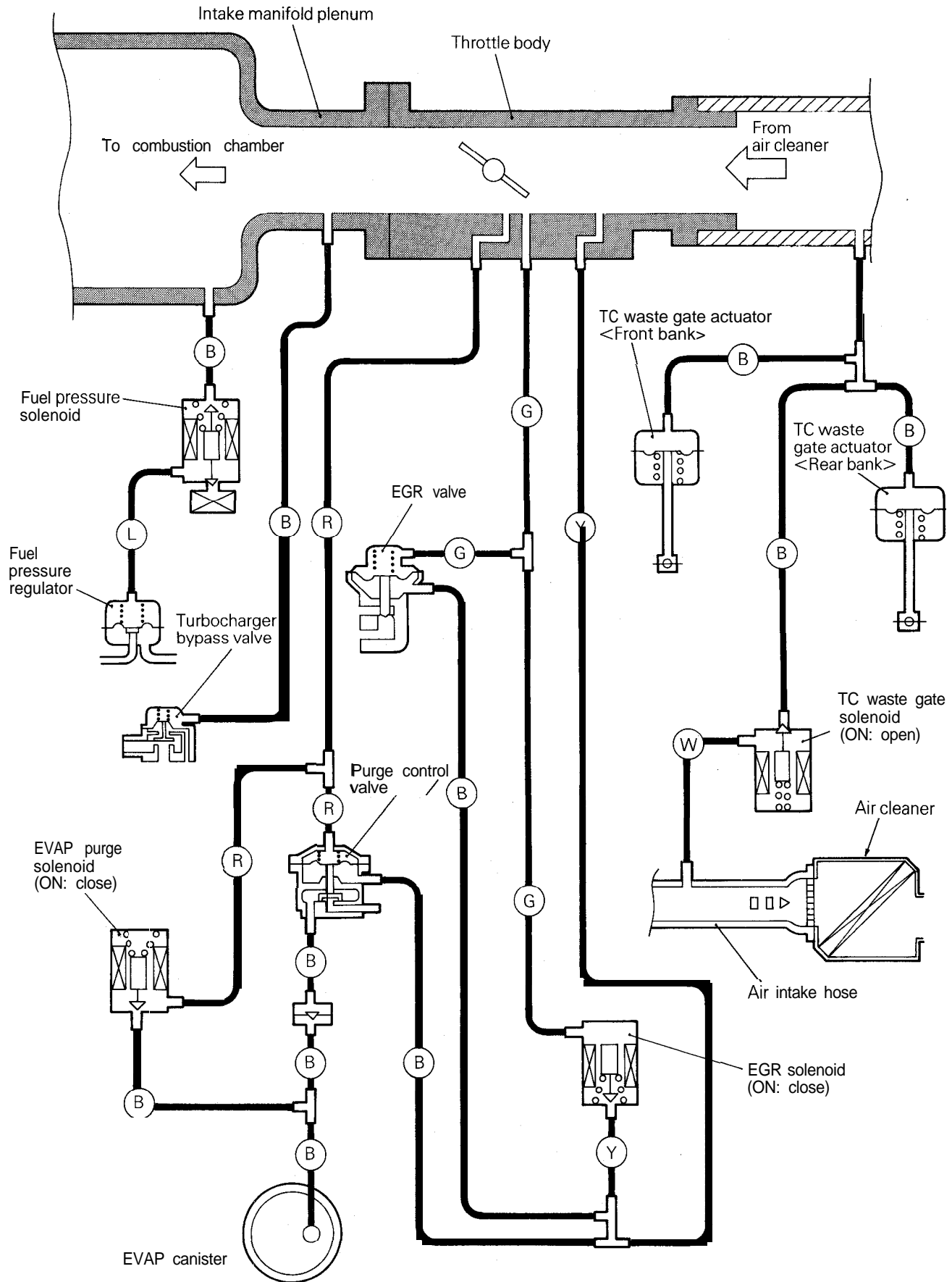


<California – Non turbo>



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

<Turbo>



INSPECTION

- (1) Referring to the VACUUM HOSES ROUTING, confirm that the vacuum hoses are properly connected.
- (2) Check the hoses for irregularities (disconnection, looseness, etc.) and confirm that there is no breakage or damage.

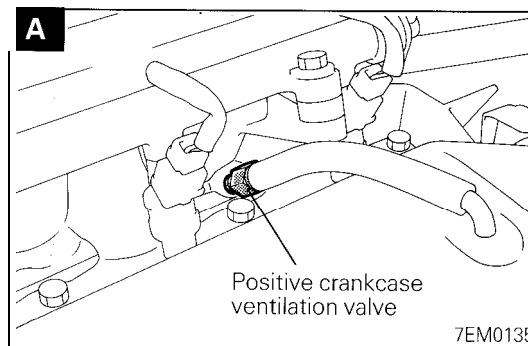
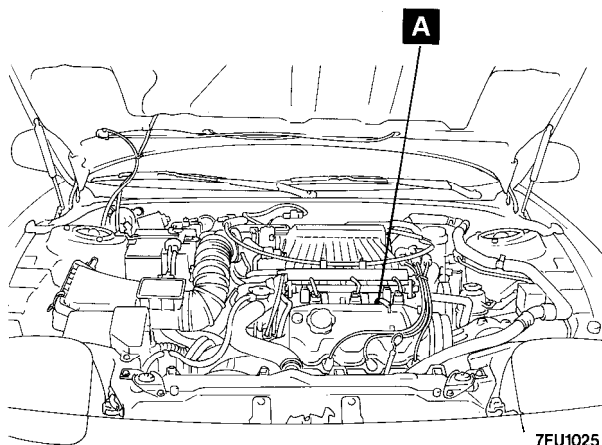
INSTALLATION

- (1) When connecting a hose, firmly press it onto the nipple.
- (2) Referring to the VACUUM HOSES ROUTING, connect the hoses correctly.

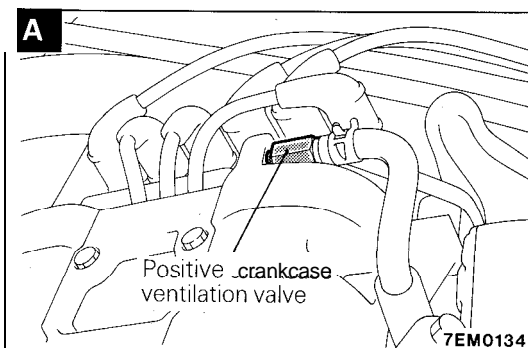
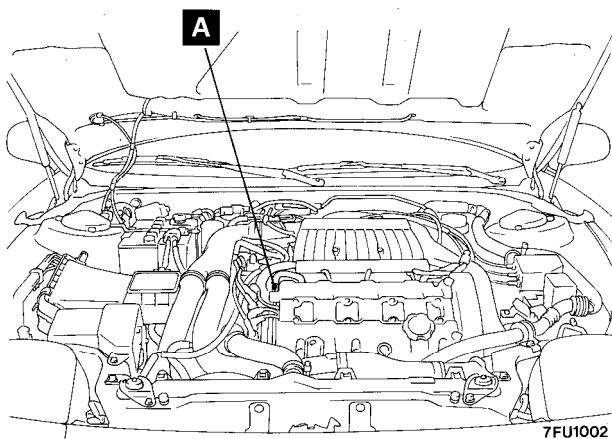
POSITIVE CRANKCASE VENTILATION SYSTEM

COMPONENT LOCATION

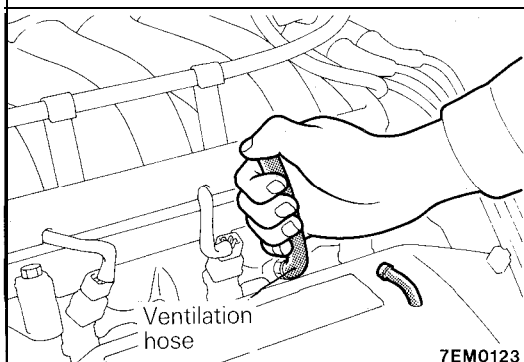
<SOHC>



<DOHC>

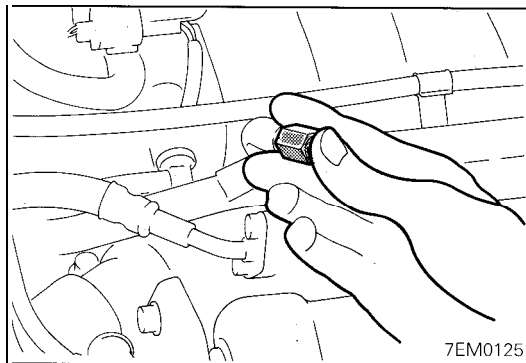


Name	Symbol
Positive crankcase ventilation valve	A



CRANKCASE VENTILATION SYSTEM INSPECTION <SOHC>

- (1) Remove the ventilation hose from the rocker cover.
- (2) Start the engine and run at idle.
- (3) Apply a finger to the end of the ventilation hose and check if the negative pressure of the intake manifold is felt.
NOTE
The plunger in the positive crankcase ventilation valve should move back and forth.
- (4) If negative pressure is not felt, clean or replace the positive crankcase ventilation valve.



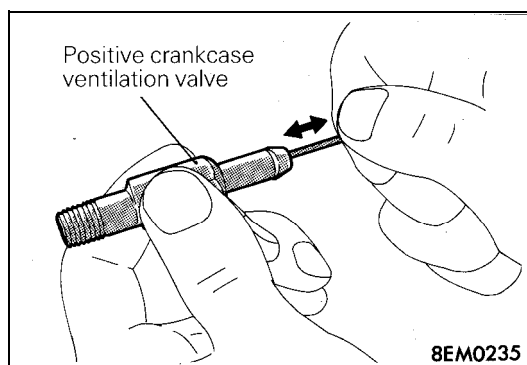
CRANKCASE VENTILATION SYSTEM INSPECTION <DOHC>

- (1) After disconnecting the ventilation hose from the positive crankcase ventilation valve, disconnect the positive crankcase ventilation valve from the rocker cover, and reconnect the positive crankcase ventilation valve to the ventilation hose.
- (2) Idle engine, put finger on the opening end of the positive crankcase ventilation valve, and check that the negative pressure of the intake manifold is felt with finger.

NOTE

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

- (3) If negative pressure is not felt, clean or replace the positive crankcase ventilation valve.



POSITIVE CRANKCASE VENTILATION VALVE <SOHC>

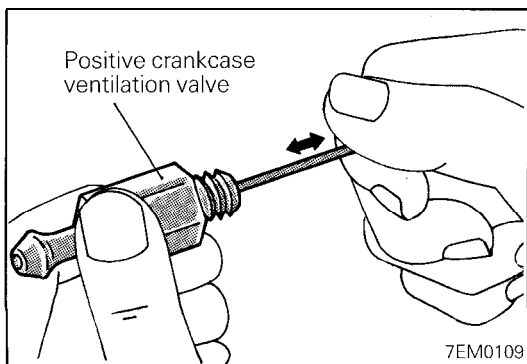
INSPECTION

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

INSTALLATION

Install the positive crankcase ventilation valve and tighten to specified torque.

Specified tightening torque: 10 Nm (7.2 ft.lbs.)



POSITIVE CRANKCASE VENTILATION VALVE <DOHC>

INSPECTION

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

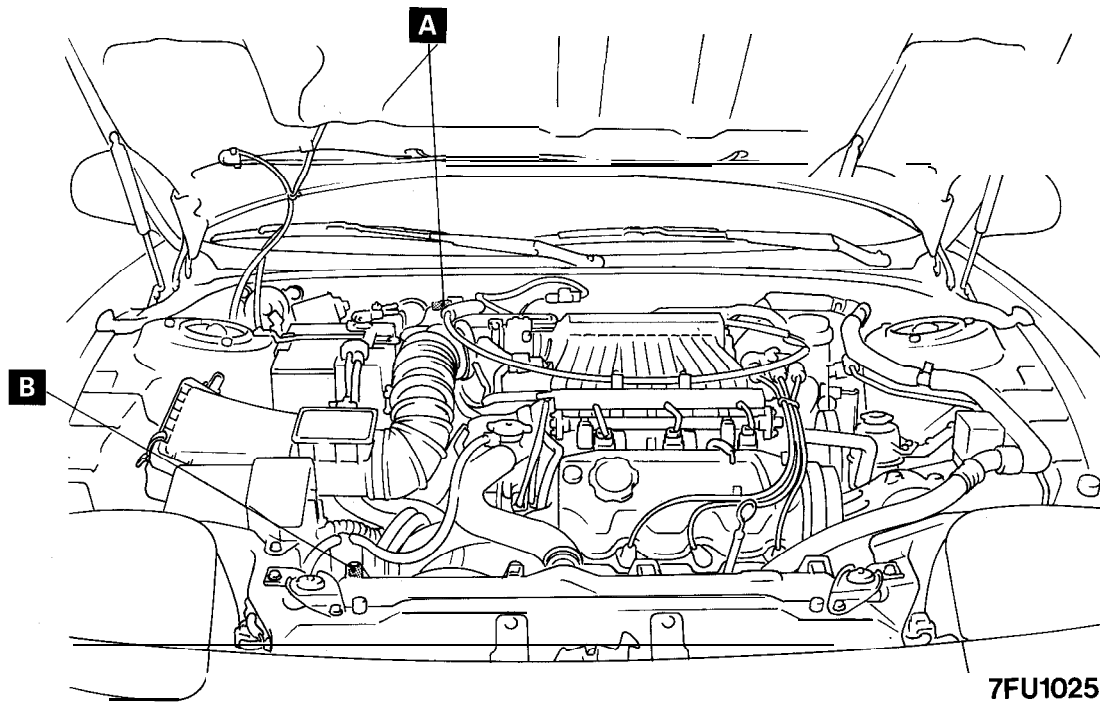
INSTALLATION

Install the positive crankcase ventilation valve and tighten to specified torque.

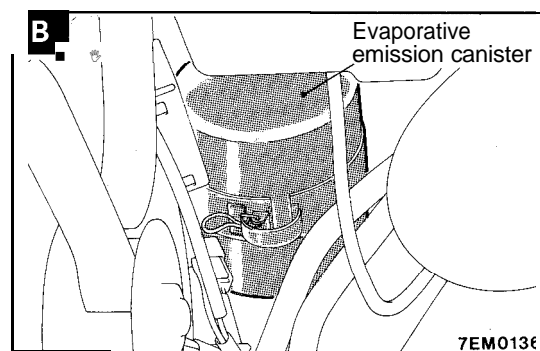
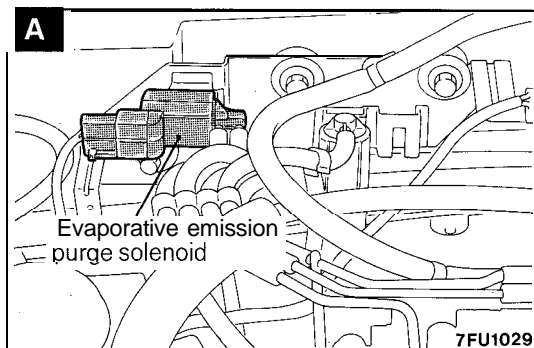
Specified tightening torque: 10 Nm (7.2 ft.lbs.)

EVAPORATIVE EMISSION CONTROL SYSTEM**COMPONENT LOCATION**

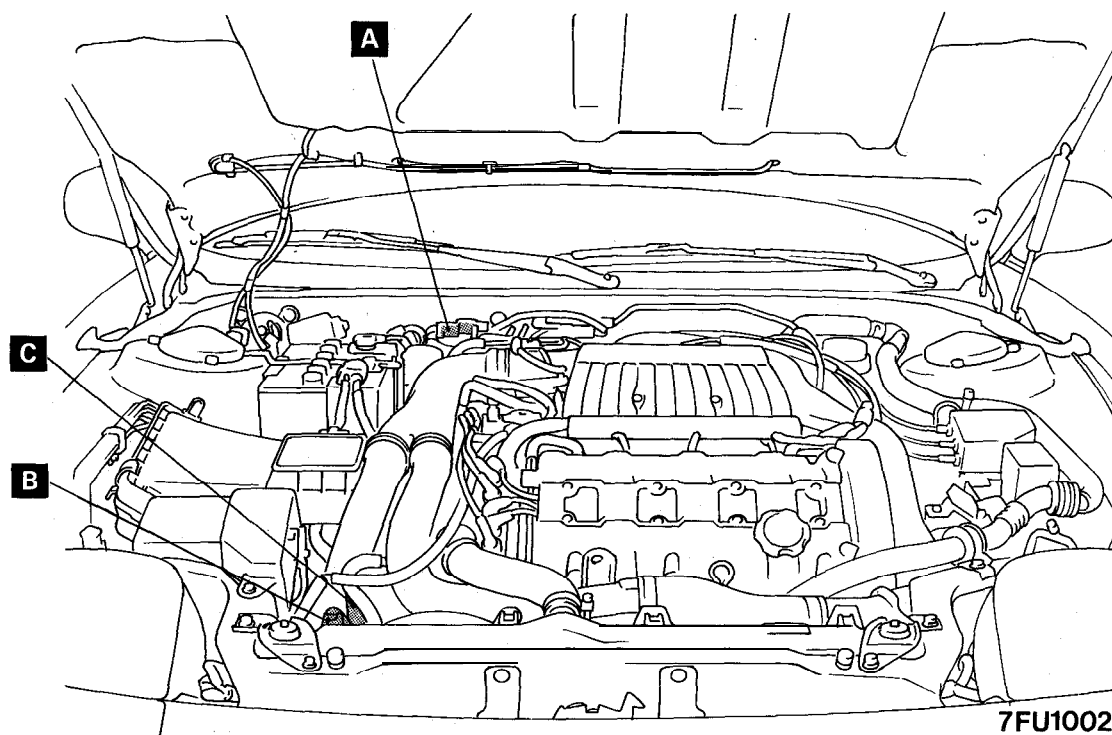
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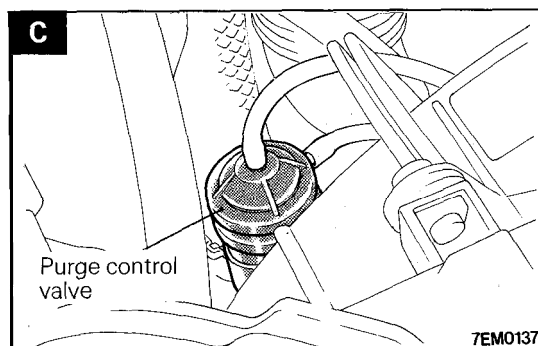
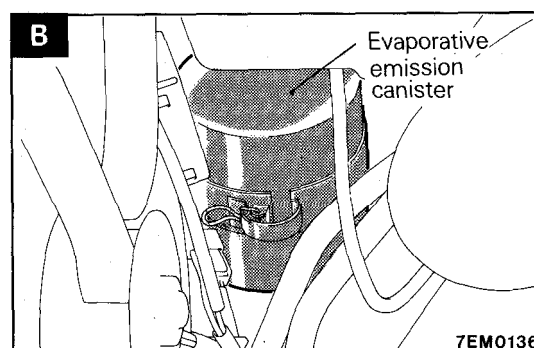
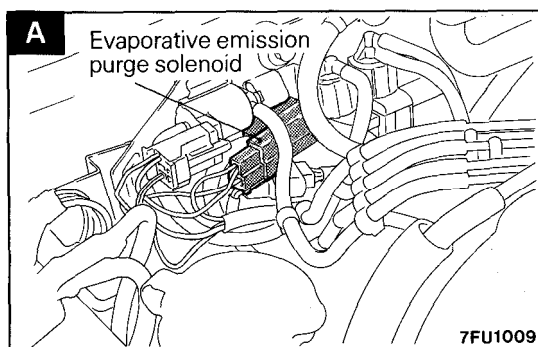
Name	Symbol
Evaporative emission canister	B
Evaporative emission purge solenoid	A



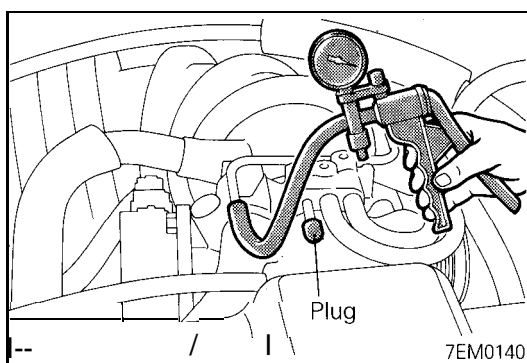
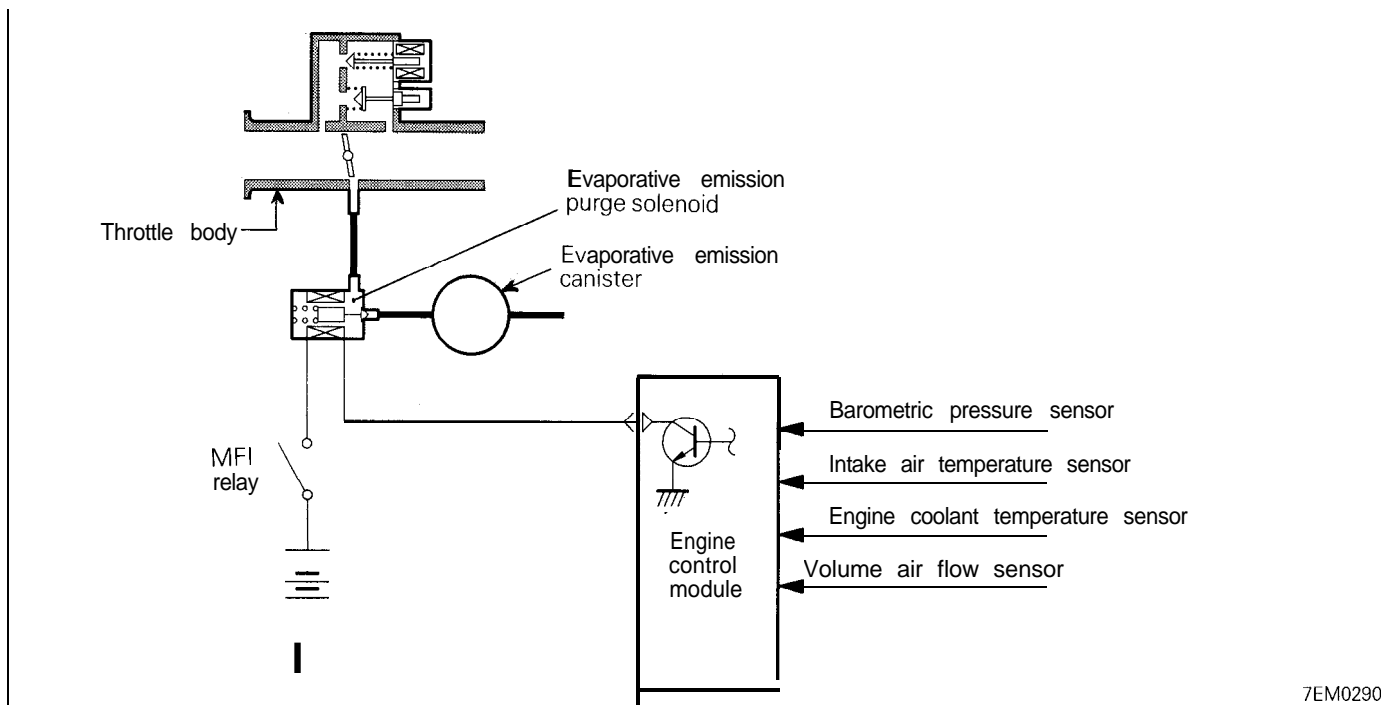
<DOHC>



Name	Symbol
Evaporative emission canister	B
Evaporative emission purge solenoid	A
Purge control valve <Turbo>	C



PURGE CONTROL SYSTEM INSPECTION <Non Turbo>



- (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 is disconnected.
- (3) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

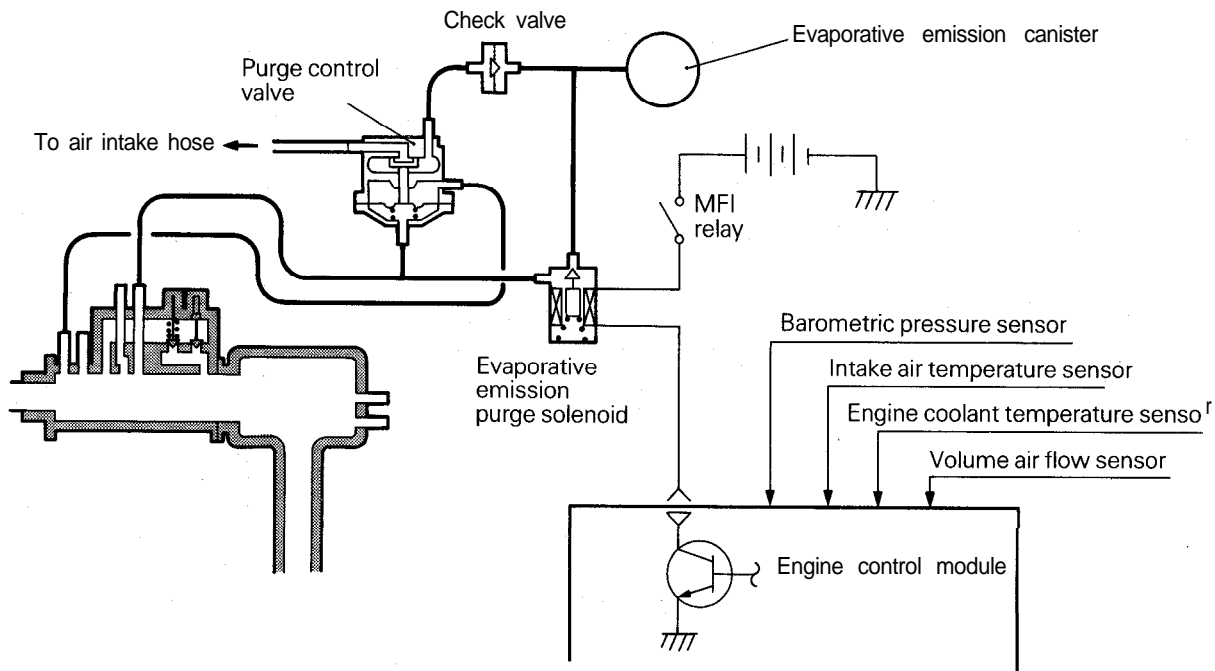
**When engine is cold – engine coolant temperature:
60°C (140°F) or less**

Engine operating condition	Applying vacuum	Result
Idling	375 mmHg (14.8 in.Hg)	Vacuum is maintained
3,000 rpm		

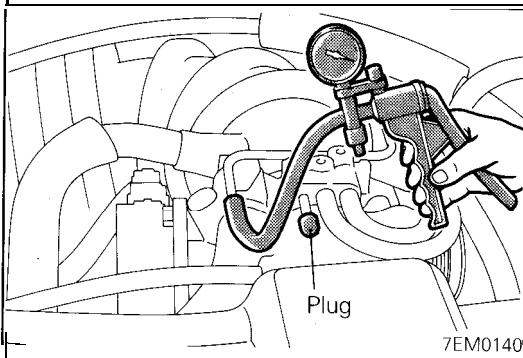
**When engine is hot – engine coolant temperature:
70°C (158°F) or higher**

Engine operating condition	Applying vacuum	Result
Idling	375 mmHg (14.8 in.Hg)	Vacuum is maintained
3,000 rpm within three minutes after starting engine	Try applying vacuum	Vacuum leaks
3,000 rpm after three minutes have elapsed after starting engine	375 mmHg (14.8 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 CONTROL SYSTEM INSPECTION <Turbo>



6FM0405



- (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 is disconnected.
- (3) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

**When engine is cold – engine coolant temperature:
60°C (140°F) or less**

Engine operating condition	Applying vacuum	Result
3,000 rpm	375 mmHg (14.8 in.Hg)	Vacuum is maintained

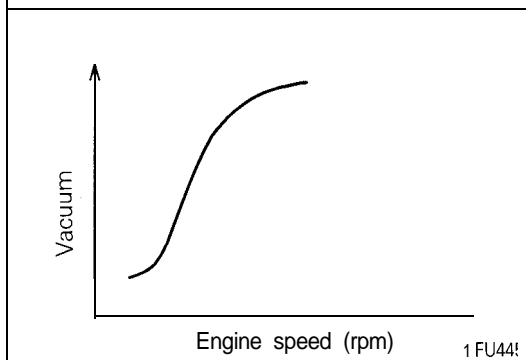
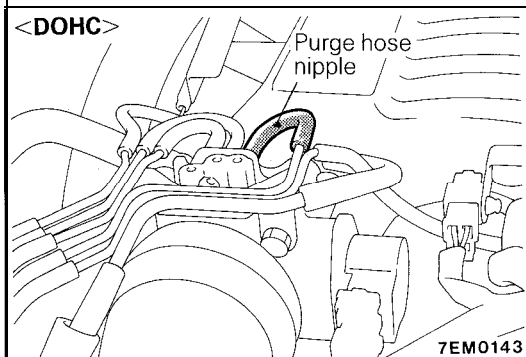
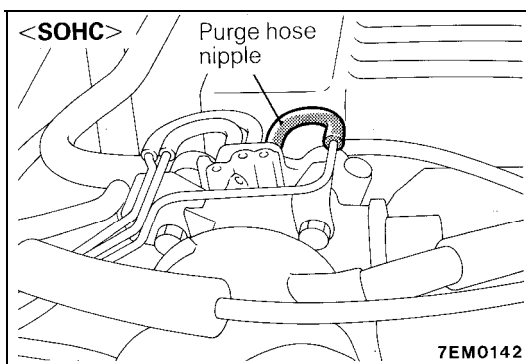
**When engine is hot – engine coolant temperature:
70°C (158°F) or higher**

Engine operating condition	Applying vacuum	Result
3,000 rpm within three minutes after starting engine	Try applying vacuum	Vacuum leaks
3,000 rpm after three minutes have elapsed after starting engine	375 mmHg (14.8 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.

- (4) Connect the vacuum hose (red stripes) removed in (1) above to P nipple of the throttle body as before.
- (5) Disconnect the purge air hose from the air intake hose, and plug the air intake hose. Then, connect the hand vacuum pump to the purge air hose.
- (6) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

**When engine is hot – engine coolant temperature:
70°C (158°F) or higher**

Applying vacuum	Engine operating condition	Result
375 mmHg (14.8 in.Hg.)	Idling	Vacuum is maintained
	Sudden racing	Vacuum leaks



PURGE PORT VACUUM CHECK

Check Condition

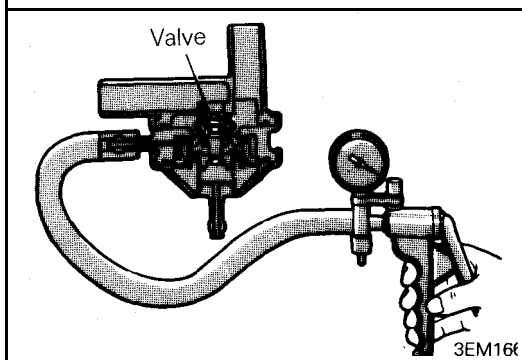
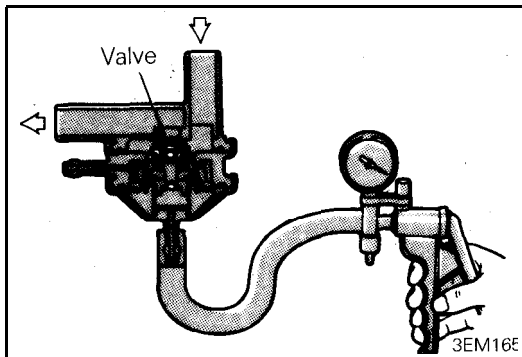
Engine coolant temperature: 80 – 95°C (176 – 205°F)

- (1) Disconnect the vacuum hose from the throttle body purge hose 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 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 purge port may be clogged and require cleaning.



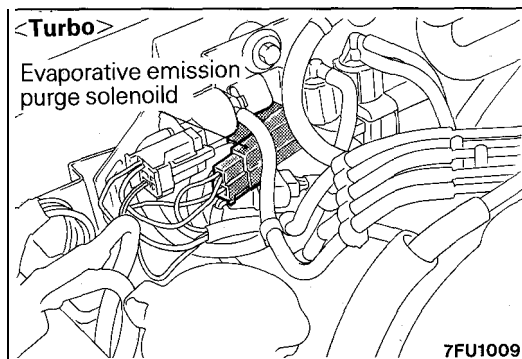
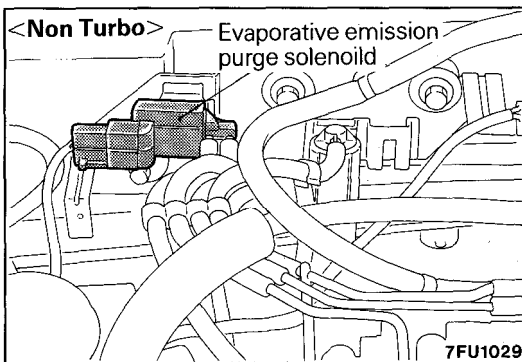
PURGE CONTROL VALVE <Turbo>

INSPECTION

- (1) Remove the purge control valve.
- (2) Connect a hand vacuum pump to the vacuum nipple of the purge control valve.
- (3) Apply a vacuum of 400 mmHg (15.7 in.Hg.) and check air-tightness.
- (4) Blow in air lightly from the canister side nipple and check conditions as follows.

Hand vacuum pump vacuum	Normal condition
0 mmHg (0 in.Hg.) (No vacuum is applied)	Air does not blow through
200 mmHg (8.0 in.Hg.) or more	Air blow through

- (5) Connect a hand vacuum pump to the positive pressure nipple of the purge control valve.
- (6) Apply a vacuum of 400 mmHg (15.7 in.Hg.) and check air-tightness.



EVAPORATIVE EMISSION PURGE SOLENOID

INSPECTION

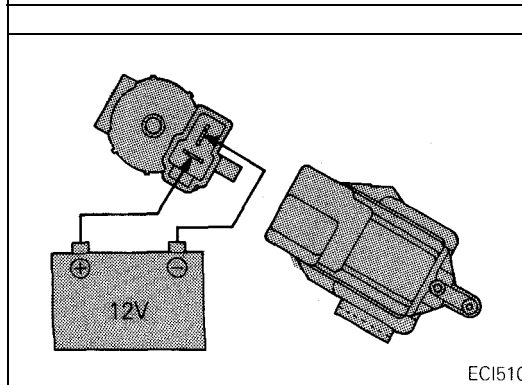
NOTE

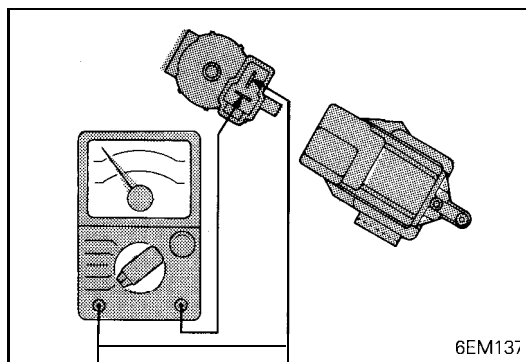
When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

- (1) Disconnect the vacuum hoses (non stripe and red stripe hose) from the solenoid.
- (2) Disconnect the harness connector from solenoid.
- (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 applied directly to the evaporative emission purge solenoid and when the voltage is discontinued.

Battery voltage	Result
When applied	Vacuum leaks
When discontinued	Vacuum is maintained





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

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

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

To inspect these parts, refer to GROUP 14A – MFI System Components.

AIR CONDITIONING SWITCH

To inspect the air conditioning switch, refer to GROUP 24 -Air Conditioning Switch.

FUEL TANK PRESSURE CONTROL VALVE

To inspect the fuel tank pressure control valve, refer to GROUP 14F – Fuel Tank.

EVAPORATIVE EMISSION CANISTER

To inspect the evaporative emission canister, refer to GROUP 14F – Fuel Line and Vapor Line.

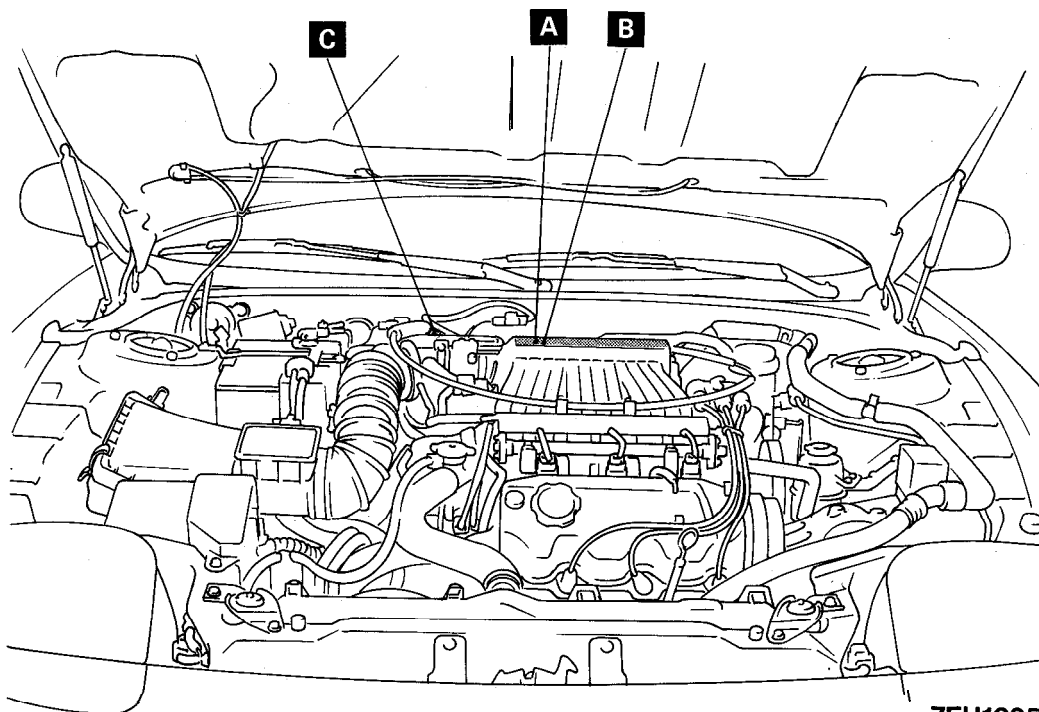
FUEL TANK FILLER CAP TUBE INSPECTION

Check the gasket of the fuel tank filler cap, and the fuel tank filler cap itself, for damage or deformation; replace the cap if necessary.

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

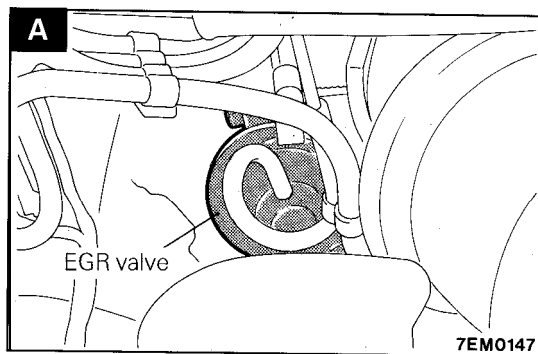
COMPONENTS LOCATION

<SOHC>

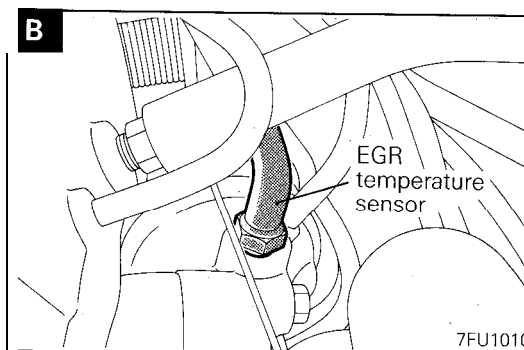


7FU1025

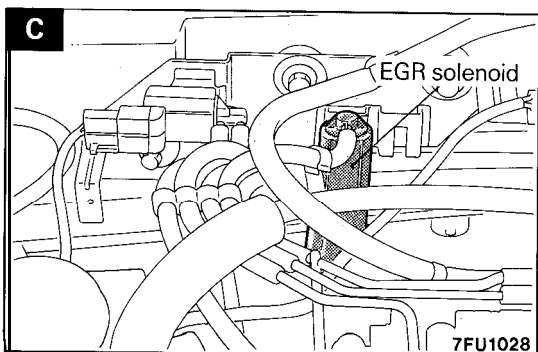
Name	Symbol
EGR solenoid <California>	C
	B
EGR valve <California>	A



7EM0147

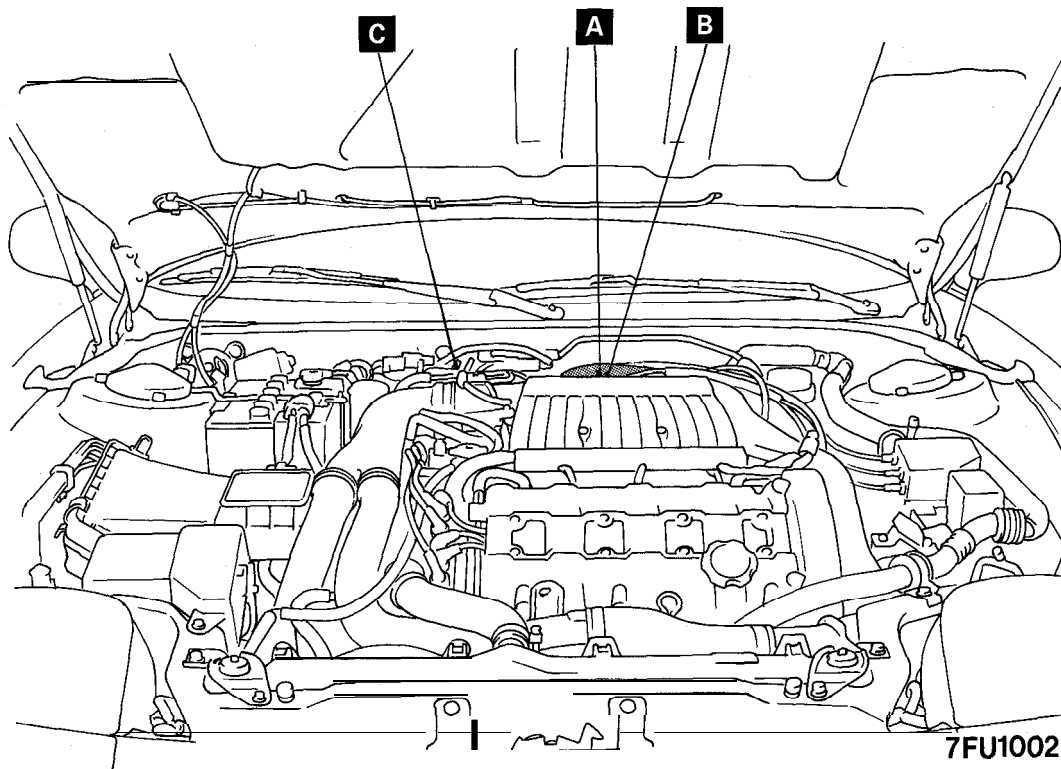


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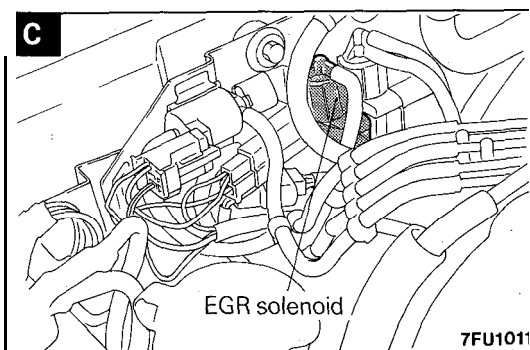
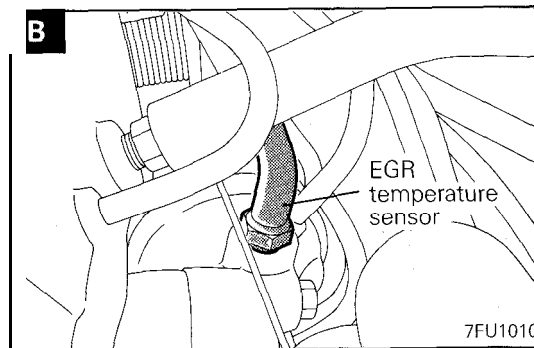
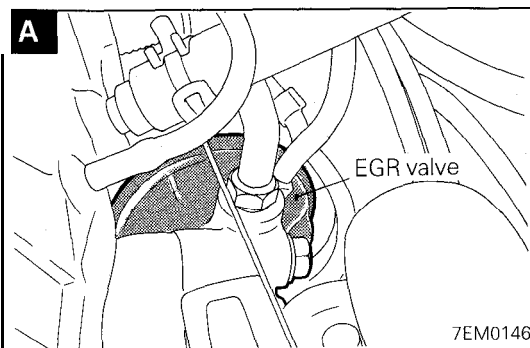


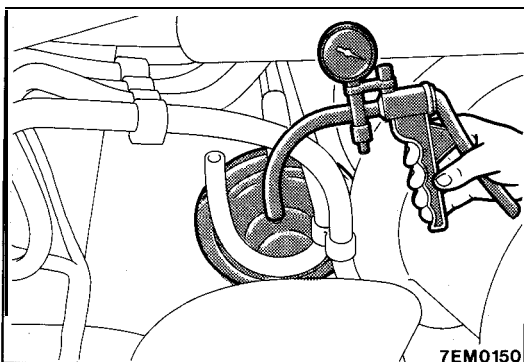
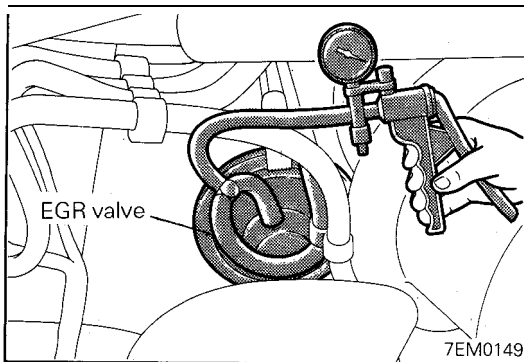
7FU1028

<DOHC>



Name	Symbol
EGR solenoid <California – Non Turbo, Turbo>	C
EGR temperature sensor <California – Non Turbo, Turbo>	B
EGR valve <California – Non Turbo, Turbo>	A





EGR SYSTEM INSPECTION <California – Non Turbo, Turbo>

- (1) Disconnect the vacuum hose (green stripe) from the EGR valve, and connect a hand vacuum pump through the three-way terminal.
- (2) Regarding cold condition [coolant temperature: 20°C (68°F) or less] and warm condition [coolant temperature: 70°C (158°F) or more] of the engine, check the following two points:

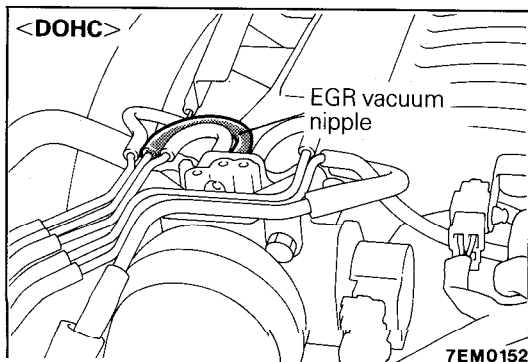
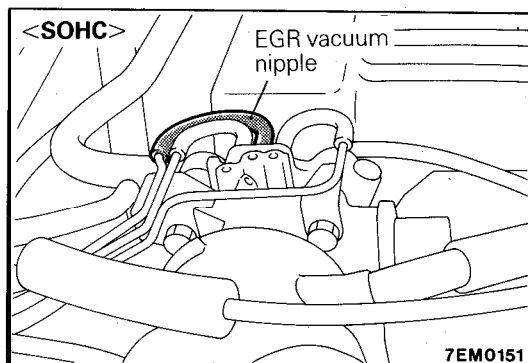
<Cold condition of engine>

Engine operation	Normal state
Race the engine by rapidly press in the accelerator pedal.	The negative pressure does not vary. (Atmospheric pressure)

<Warm condition of engine>

Engine operation	Normal state
Race the engine by rapidly press in the accelerator pedal.	The negative pressure rises to 100 mmHg (3.9 in.Hg) or more.

- (3) Disconnect the three-way terminal, and connect the hand vacuum pump to the EGR valve.
- (4) When a negative pressure of 230 mmHg (9.1 in.Hg.) is applied during idling, check that the engine stops or idles unstably.

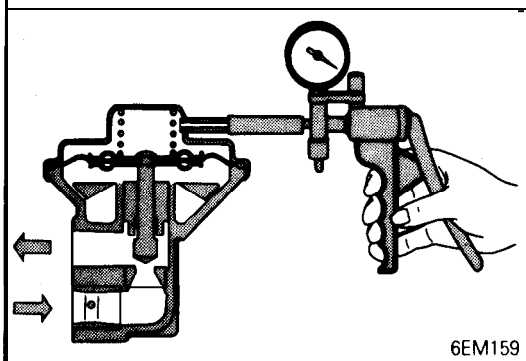
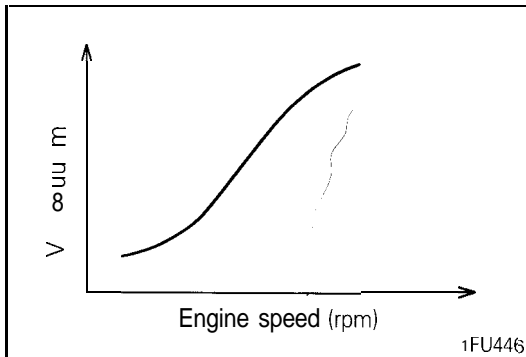


EGR VALVE CONTROL VACUUM CHECK <California – Non Turbo, Turbo>

Check Condition

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

- (1) Disconnect the vacuum hose 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, 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.

EGR VALVE <California – Non Turbo, Turbo> 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 (19.8 in.Hg.) and check airtightness.
- (4) Blow in air from one passage of the EGR to check condition as follows.

Applying vacuum	Result
45 mmHg (1.8 in.Hg.) or less	Air does not blow through
230 mmHg (9.1 in.Hg.) or more	Air blows through

INSTALLATION

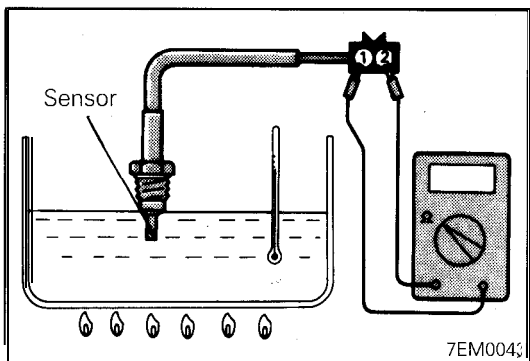
Install a new gasket and EGR valve, tighten bolts to specified torque.

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

EGR TEMPERATURE SENSOR <California – Non Turbo, Turbo>

INSPECTION

- (1) Remove the EGR temperature sensor.
- (2) Place the EGR temperature sensor in water, and then measure the resistance value between terminals 1 and 2 while increasing the water's temperature.
Replace the EGR temperature sensor if there is a significant deviation from the standard value.

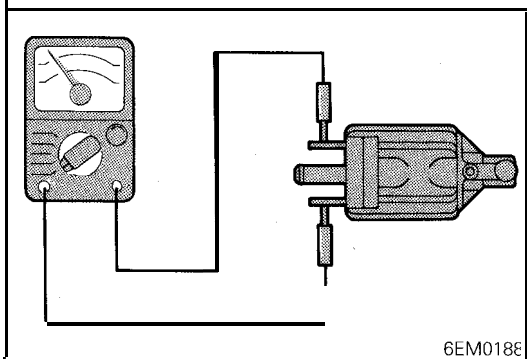
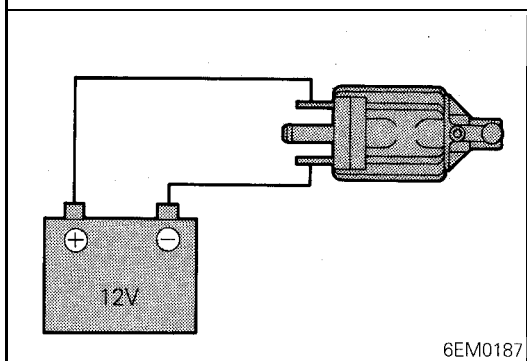
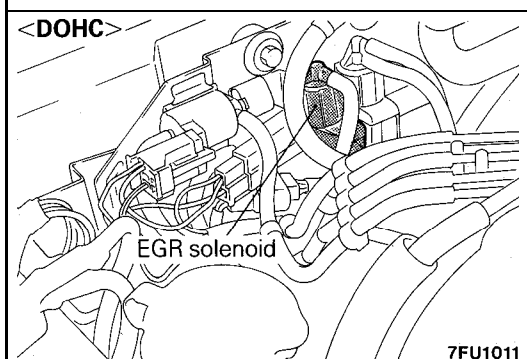
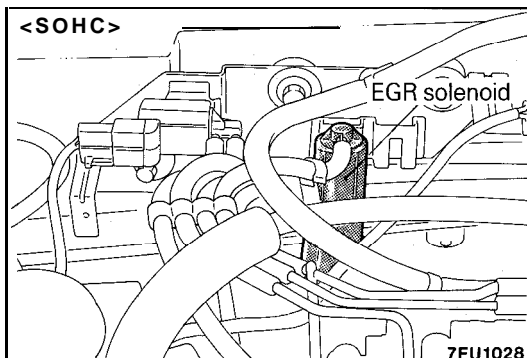


Temperature °C(°F)	Resistance kΩ
50 (122)	60-83
100 (212)	11 – 14

INSTALLATION

Install the EGR temperature sensor tighten to specified torque.

Specified tightening torque: 11 Nm (8 ft.lbs.)



EGR SOLENOID <California – Non Turbo, Turbo> 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 (yellow and green stripe) from the solenoid.
- (2) Disconnect the harness connector.
- (3) Connect a hand vacuum pump to the nipple to which the green-striped vacuum hose was connected.

- (4) Apply a vacuum and check for air-tightness when voltage applied directly to the EGR solenoid and when the voltage is discontinued.

Battery voltage	Result
When applied	Vacuum is maintained
When discontinued	Vacuum leaks

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

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

MIXTURE CONTROL (MFI) SYSTEM

- To inspect the mixture control (MFI) system, refer to GROUP 14A – Service Adjustment Procedures.
- For detailed information concerning the illumination pattern of the check engine/malfunction indicator lamp and other aspects of the on-board diagnostic, refer to GROUP 14A – On-board Diagnostic.

CATALYTIC CONVERTER

REMOVAL AND INSTALLATION

Refer to GROUP 11 – Exhaust Pipe, Main Muffler and Catalytic Converter.

INSPECTION

Inspect for damage, cracking or deterioration. 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 catalyst or underbody parts of the vehicle.
2. Alteration or deterioration of ignition or fuel system, or any type of operating condition which results 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.



UNITED STATES



The special service tools referred to herein are required for certain service operations. These special service tools or their equivalent, if not obtainable through a local source are available through the following outlet.

12842 Farmington Road, Livonia, Michigan 48150, U.S.A.

MILLER SPECIAL TOOLS **SPX Corporation**

Telephone (313) 522-6717

FAX (313) 522-6505

CANADA



The special service tools referred to herein are required for certain service operations. These special service tools or their equivalent, if not obtainable through a local source are available through the following outlet.

C & D Riley Enterprises Ltd., P.O. Box 243, Amherstburg, Ontario N9V 2Z4

Telephone (519) 736-4600

FAX (519) 736-8433

INTERNATIONAL



The special service tools referred to herein are required for certain service operations. These special service tools or their equivalent, if not obtainable through a local source are available through the following outlet.

12842 Fannington Road, Livonia, Michigan 48150, U.S.A.

MILLER SPECIAL TOOLS **SPX Corporation**

Telephone (313) 522-6717

FAX (313) 522-6505