EMISSION CONTROL SYSTEM <2.0L ENGINE (TURBO) AND 2.4L ENGINE>

17300010078

GENERAL INFORMATION

The emission control system consists of the following sub-systems:
- Positive crankcase ventilation system
- Evaporative emission control system
- Exhaust emission control system

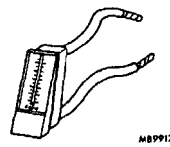
SERVICE SPECIFICATIONS

17300030050

Items	Standard value
Evaporative emission purge solenoid coil resistance [at 20°C (68°F)] Ω	36-44
EGR solenoid coil resistance [at 20°C (68°F)] Ω	36-44

SPECIAL TOOL

17300060028

Tool	Tool number and name	Supersession	Application
 MB991700	MB991700		Checking the purge control system

TROUBLESHOOTING

17300070021

Symptom	Probable cause	Remedy
Engine will not start or is 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.

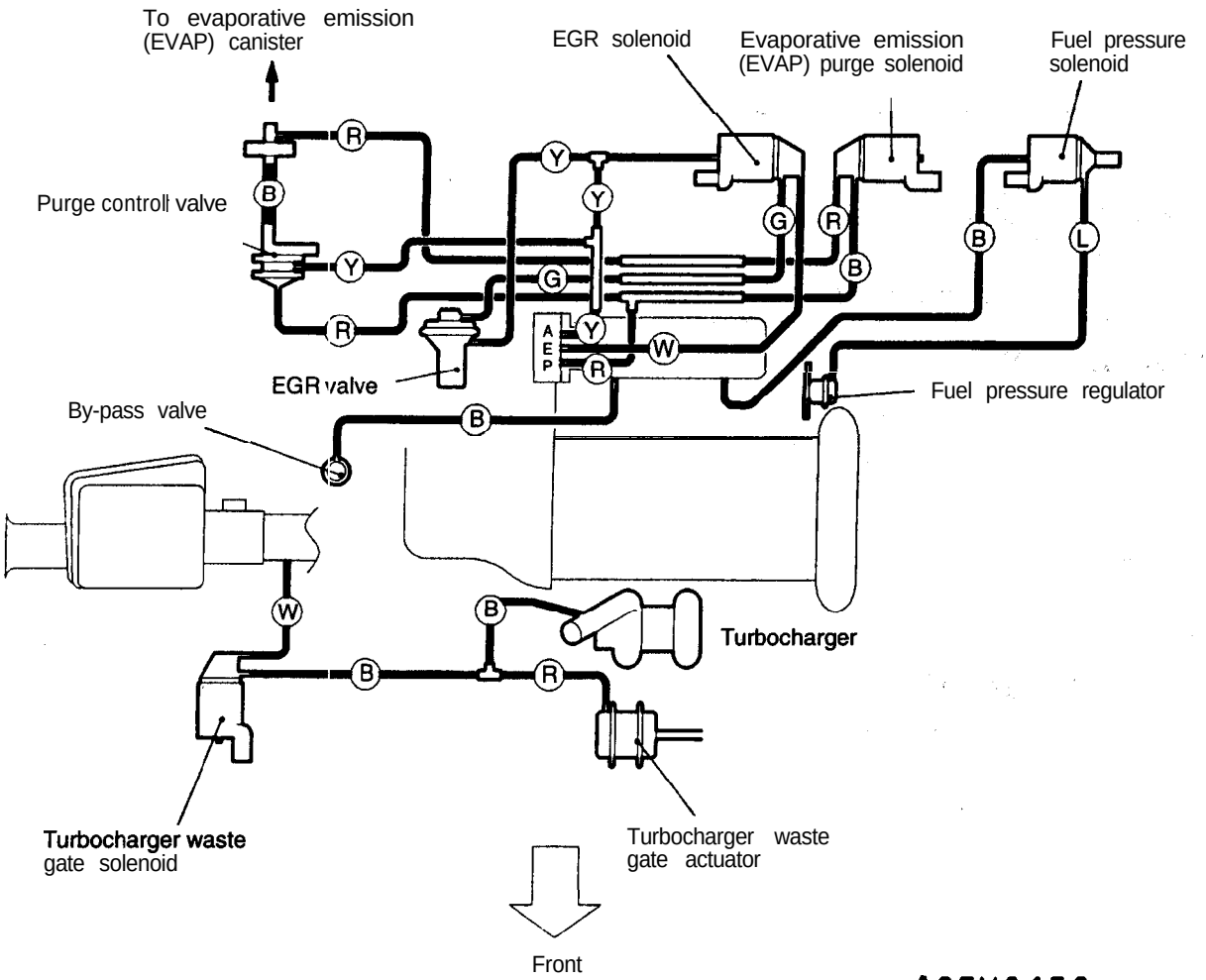
TSB Revision

VACUUM HOSES

17300090249

VACUUM HOSE ROUTING

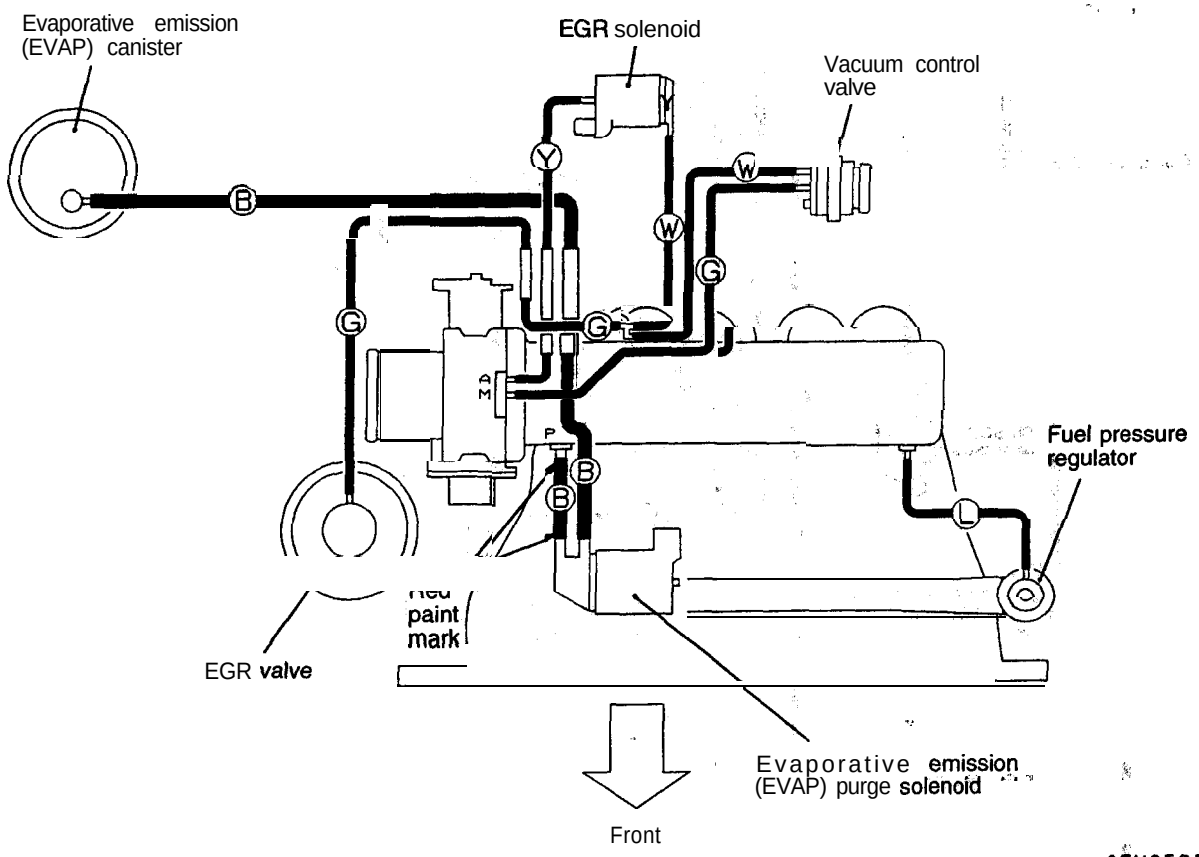
<2.0L Engine (Turbo)>



L: Light Blue
R: Red
B: Black
G: Green
Y: Yellow
W: White

TSB Revision

<2.4L Engine>

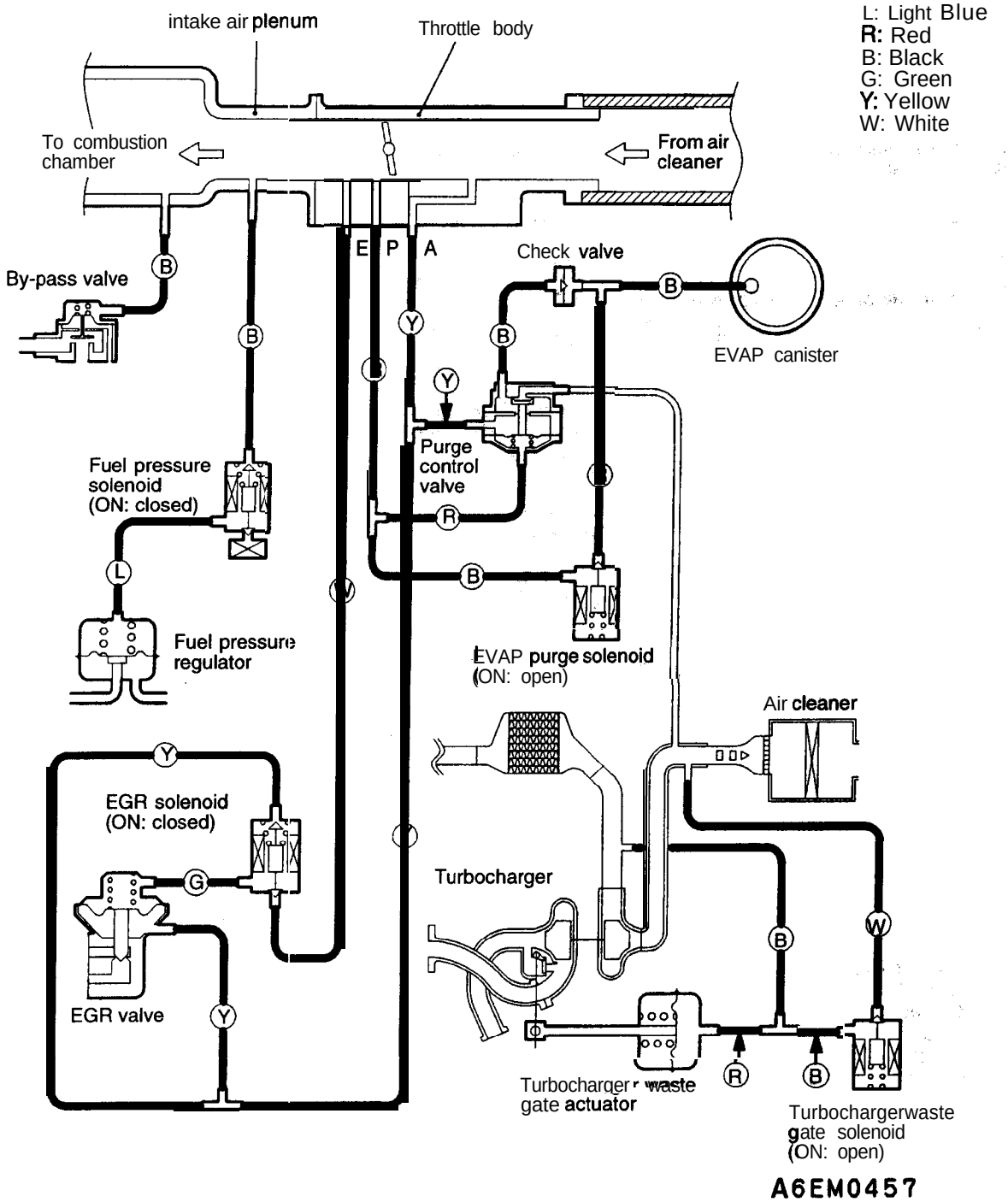


L: Light Blue
R Red
B: Black
G: Green
Y: Yellow
W: White

TSB Revision

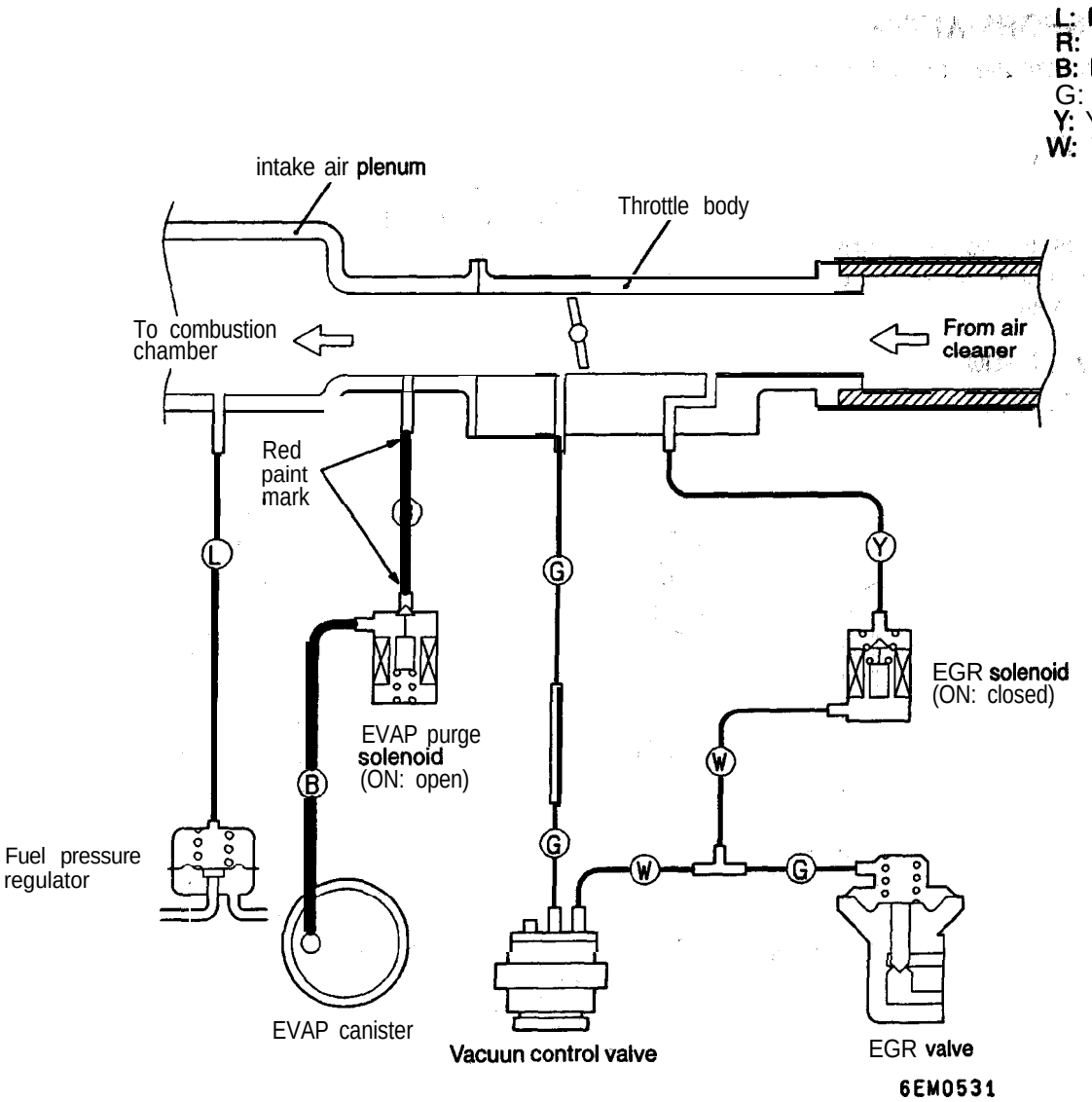
VACUUM CIRCUIT DIAGRAM

<2.0L Engine (Turbo)>



TSB Revision

<2.4L Engine>



VACUUM HOSE CHECK

Using the VACUUM HOSE ROUTING as a guide, check that the vacuum hoses are correctly connected, and that there are no bends or damage to the hoses.

VACUUM HOSE INSTALLATION

1. When connecting the vacuum hoses, they **should** be securely inserted onto the nipples.
2. To connect the hoses correctly, use the VACUUM HOSE ROUTING as a guide.

TSB Revision

POSITIVE CRANKCASE VENTILATION SYSTEM

17300500070

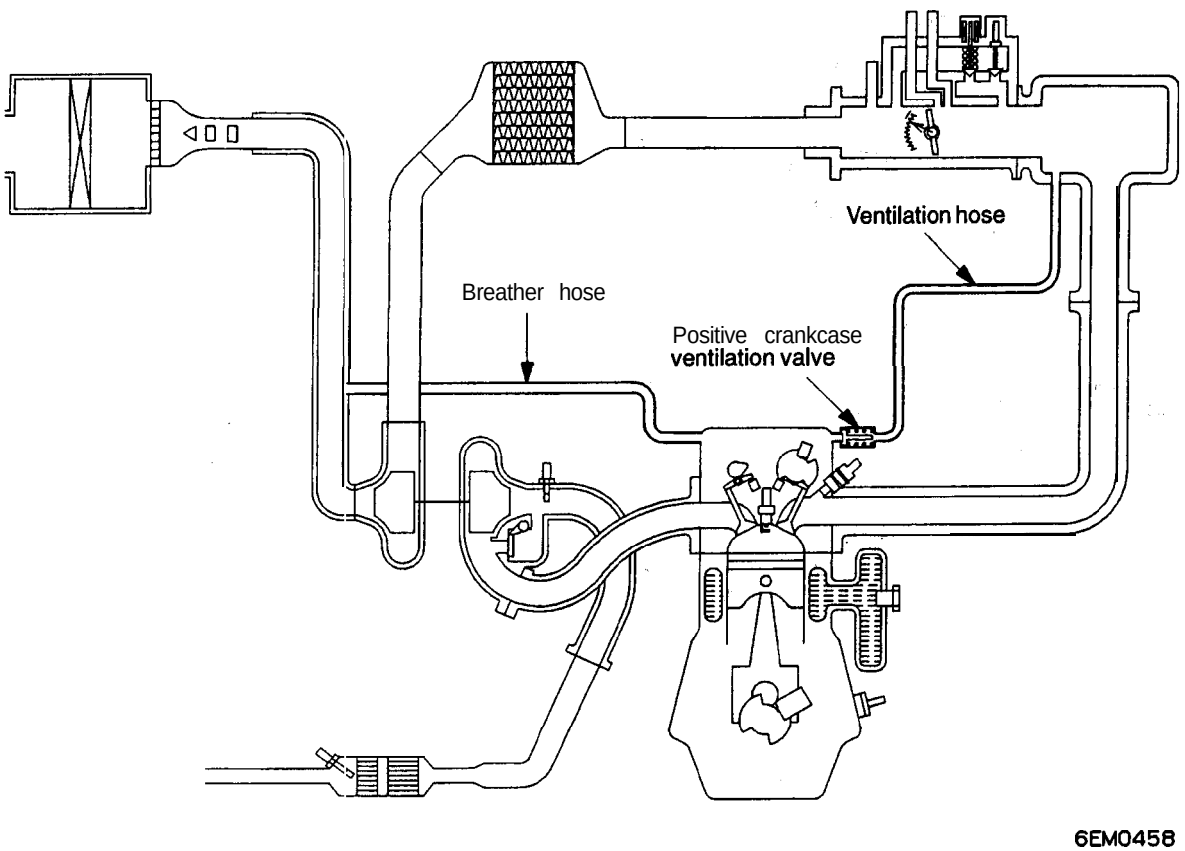
GENERAL INFORMATION

The positive crankcase ventilation system (PCV) prevents the escape of blow-by gases from inside the crankcase into the atmosphere.
Fresh air is sent from the air cleaner into the crankcase through the breather hose, to be 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 plunger inside the positive crankcase ventilation valve is designed to lift according to intake manifold vacuum, regulating the flow of blow-by.
The blow-by gas flow is decreased during low load engine operation to maintain engine stability, and is increased during high load operation to improve the ventilation performance.

SYSTEM DIAGRAM

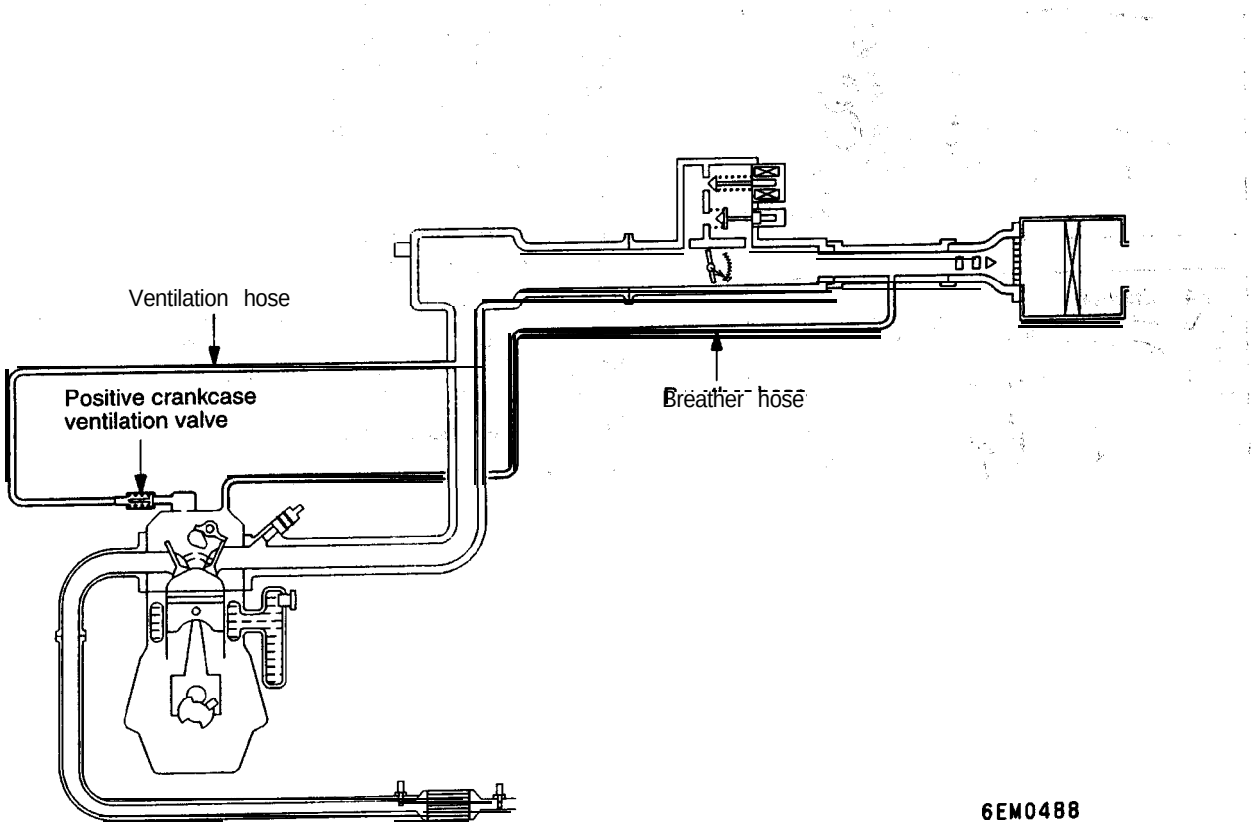
<2.0L Engine (Turbo)>



6EM0458

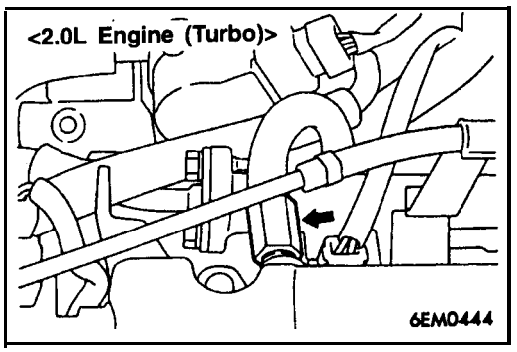
TSB Revision

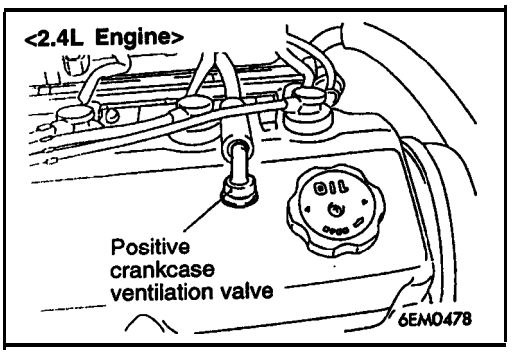
<2.4L Engine>



COMPONENT LOCATION

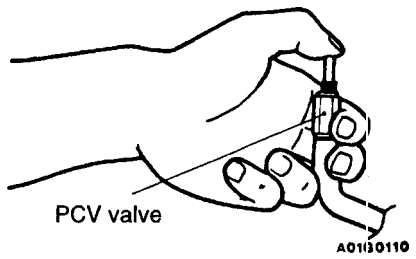
Positive crankcase ventilation valve



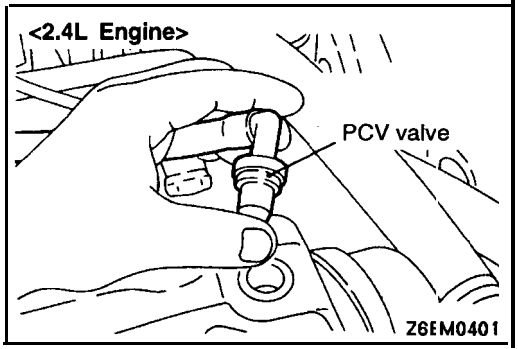


TSB Revision

<2.0L Engine (Turbo)>



<2.4L Engine>



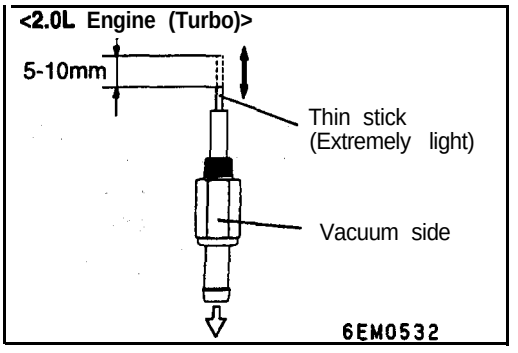
CRANKCASE VENTILATION SYSTEM CHECK

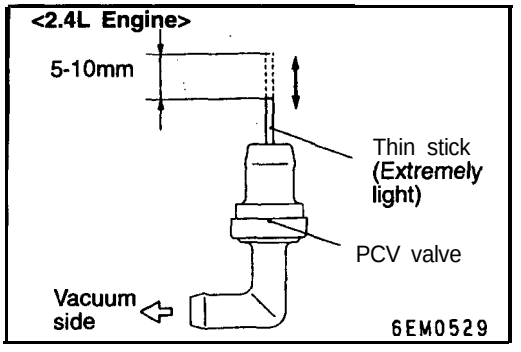
17900110198

1. Remove the positive crankcase ventilation (PCV) valve from the rocker cover, then reconnect the PCV valve to the vacuum supply hose (ventilation hose).
2. With the engine idling, put finger on the open end of the PCV valve, and check for negative pressure (vacuum) with finger.

   NOTE
   At this time, the plunger in the PCV valve should move back and forth as the open end is covered and uncovered.
3. If negative pressure is not felt, clean or replace the PCV valve. Inspect the vacuum supply hose and vacuum supply hose port for restriction or plugged condition.
4. Install the PCV valve.
5. Tighten it to the specified torque. <2.0L 'Engine (Turbo)>

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





POSITIVE CRANKCASE VENTILATION VALVE" CHECK

17300120177

1. Hold the PCV valve with the vacuum side facing down. Using light pressure depress the PCV valve spring with the thin stick 5-10 mm. Release pressure on the stick to see if the PCV valve spring will lift the stick to its original position.
2. If the stick returns quickly to its original position, the PCV valve is OK. If the stick does not return quickly, Clean or replace the PCV valve.

TSB Revision

EVAPORATIVE EMISSION CONTROL, SYSTEM

17300510080

GENERAL INFORMATION <2.0L Engine (Turbo)>

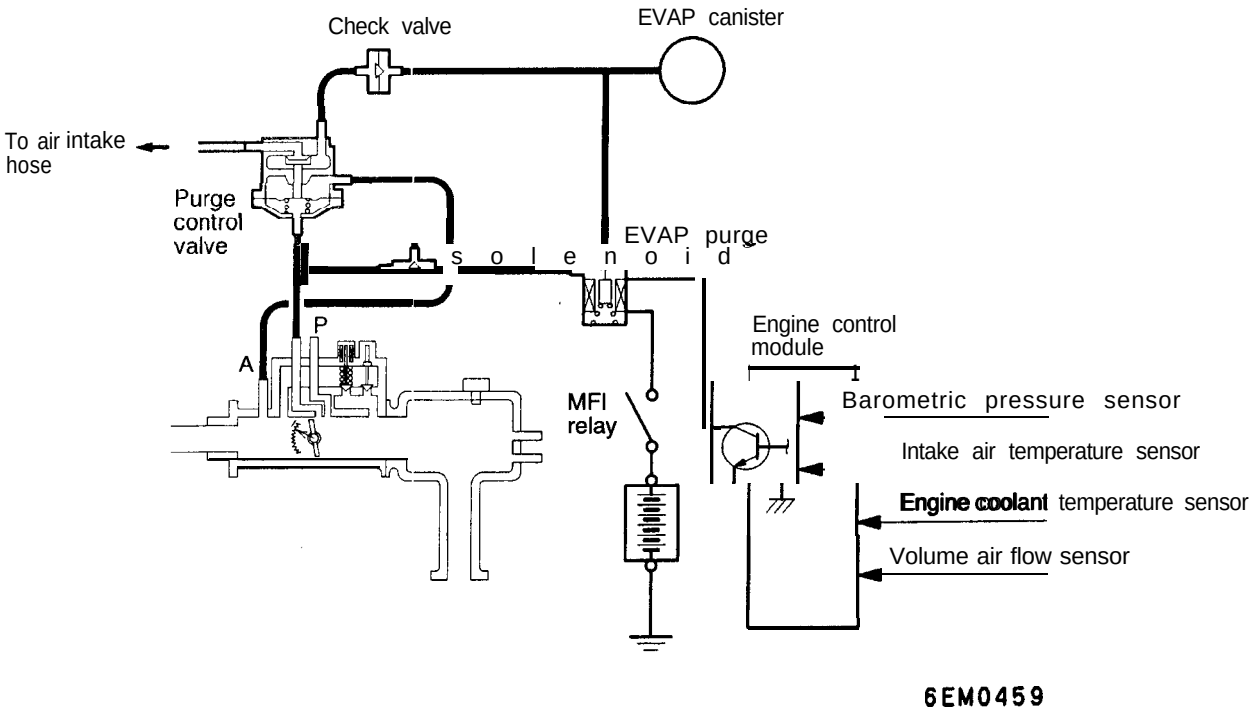
The evaporative emission control system prevents fuel vapors generated in the fuel tank from escaping into the atmosphere.

Fuel vapors from the fuel tank flow through the fuel tank pressure control valve and vapor pipe/hose to be stored temporarily in the EVAP canister.

When driving with a low to medium load on the engine, the fuel vapor absorbed by the EVAP canister is drawn into the P port of the throttle body.

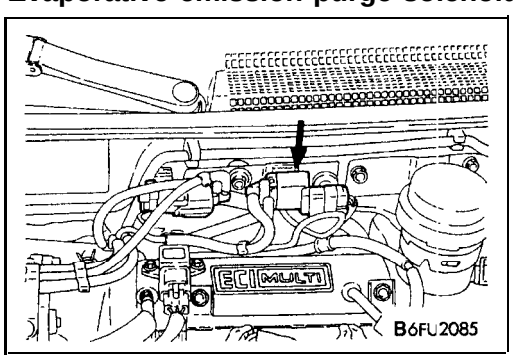
When driving with a high load on the engine, the purge control valve opens and the fuel vapor absorbed by the EVAP canister is drawn into the air intake hose.

SYSTEM DIAGRAM



COMPONENT LOCATION

Evaporative emission purge solenoid



TSB Revision

GENERAL INFORMATION <2.4L Engine>

17300510288

The evaporative emission control system prevents fuel vapors generated in the fuel tank from escaping into the atmosphere.

Fuel vapors from the fuel tank flow through the fuel tank pressure control valve and vapor pipe/hose to be stored temporarily in the EVAP canister.

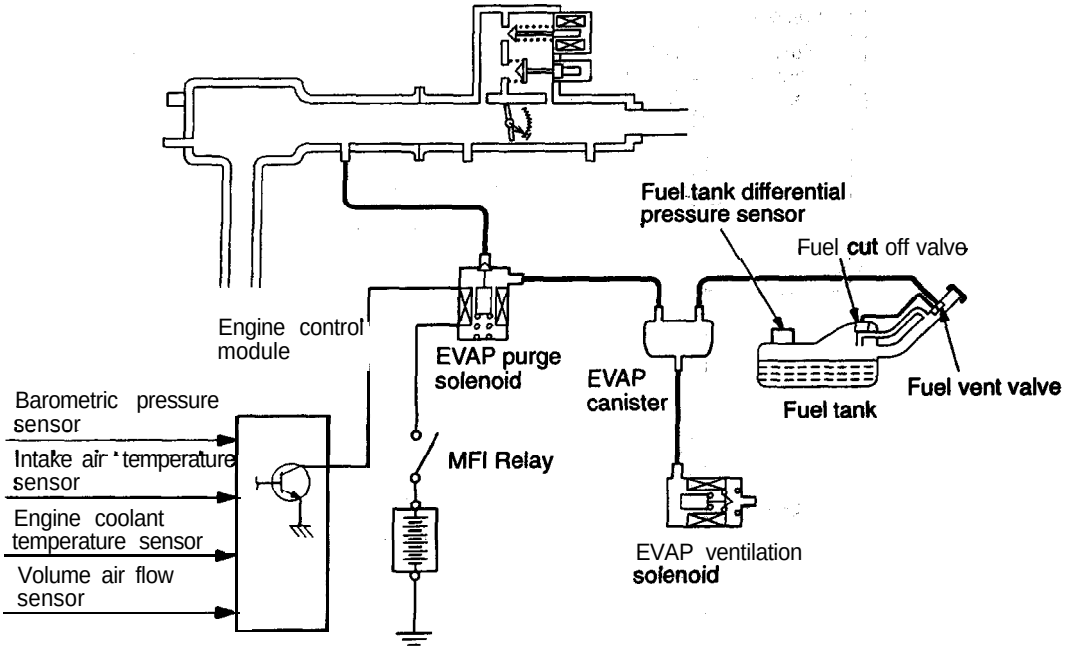
When the vehicle is in operation, fuel vapors stored in the EVAP canister flow through the EVAP purge solenoid and purge port and go into the intake manifold plenum to be sent to the combustion chamber.

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 module brings the EVAP purge solenoid into the OFF state to shut off the fuel vapor flow to the intake manifold plenum. This does not only insure the driveability when the engine is cold or running under low load but also stabilize the emission level.

Furthermore, an EVAP ventilation solenoid is locate between the EVAP canister and the atmosphere in order to carry out OBD-II EVAP leak monitoring. This solenoid is normally off, but turns on during OBD-II EVAP leak monitoring to shut off the flow of air into the EVAP canister from the atmosphere.

Also, fuel vent valve is provided at fuel filler tube to prevent fuel from being over-filling to a fuel tank.

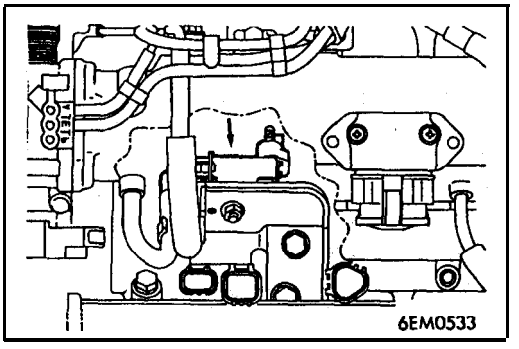
SYSTEM DIAGRAM



6EM0540

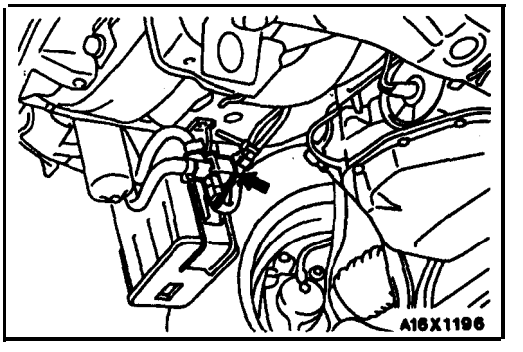
COMPONENT LOCATION

Evaporative emission purge solenoid



6EM0533

Evaporative emission ventilation solenoid



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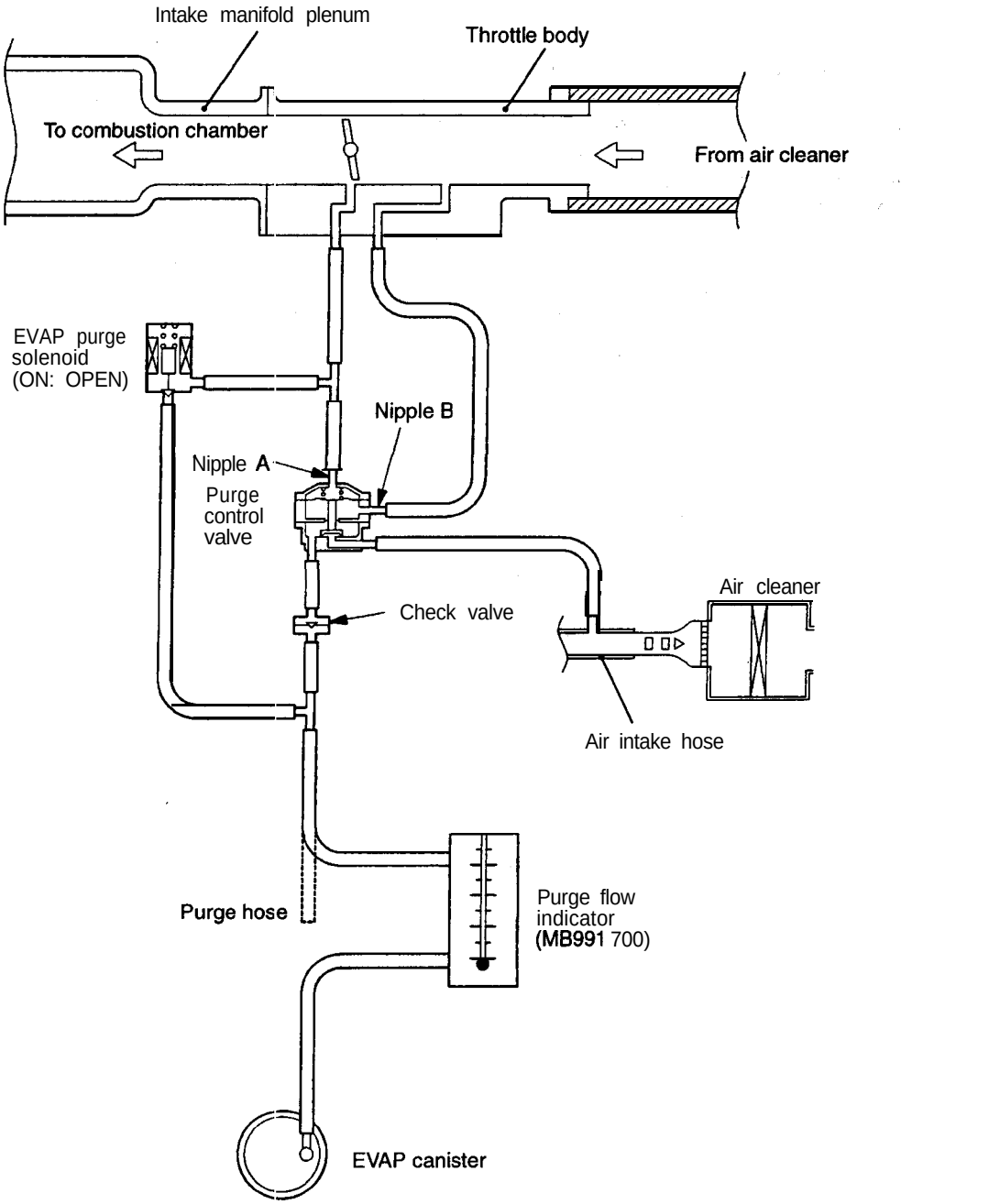
TSB Revision

PURGE CONTROL SYSTEM CHECK (PURGE FLOW CHECK) <2.0L ENGINE (TURBO)>

17300140265



6EM0555

1. Disconnect the purge hose from the evaporative emission (EVAP) canister, and connect the special tool (purge flow indicator) between the EVAP canister and the purge hose.
2. The vehicle should be prepared as follows before the inspection and adjustment.
   - Engine coolant temperature: 80–95°C (176–203° F)
   - Lights, cooling fan and accessories: OFF
   - Transaxle: Neutral (A/T for P range)
3. Run the engine at idle for 3 minutes or more.

TSB Revision

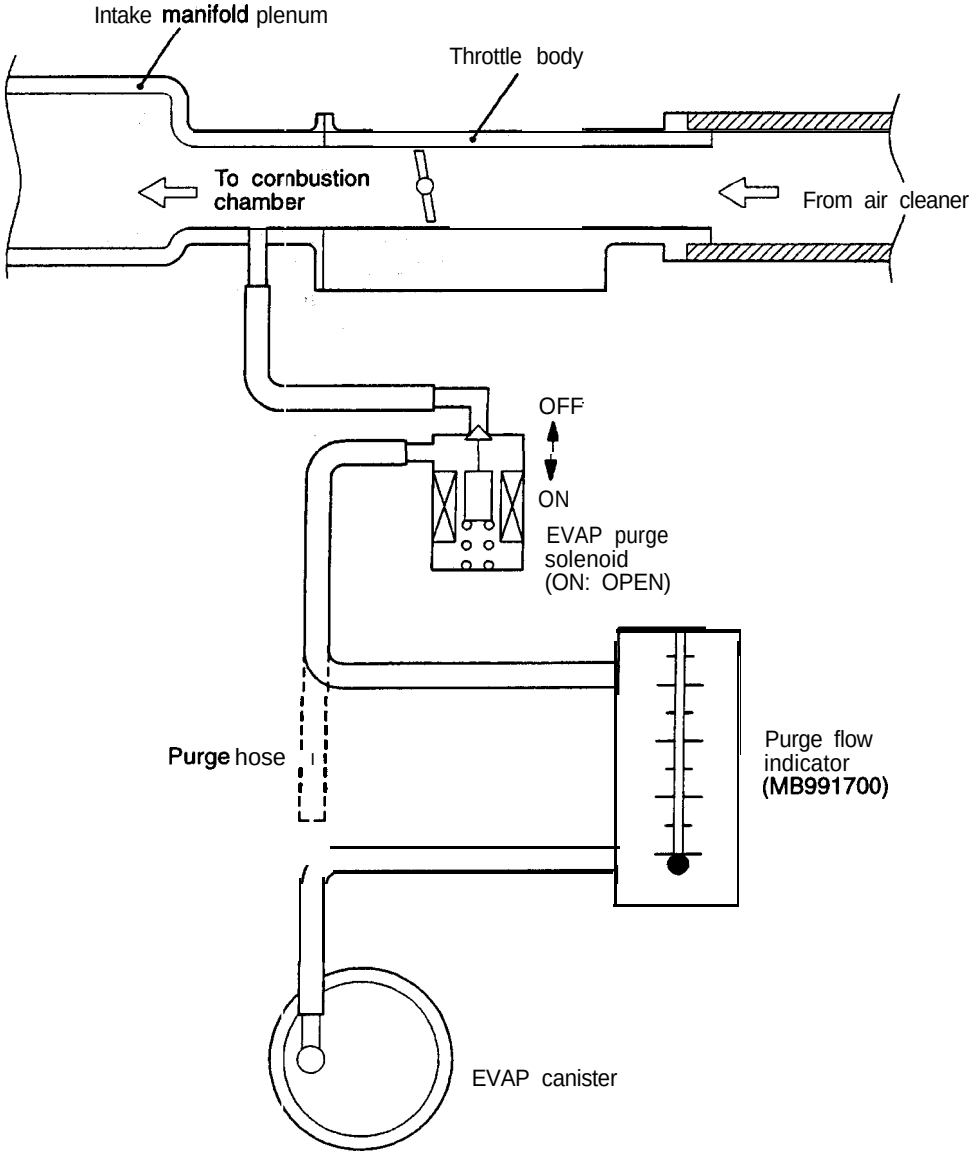
4. Check the purge flow volume when sudden braking is carried out several times.

   Standard value: Momentarily 20 $cm^3/sec.$ (2.5 SCFH) or more

5. If the purge flow volume is less thah the standard value, check it again with the vacuum hose disconnected from the EVAP canister.
   If the purge flow volume is below the standard values, check for blockages in the vacuum port and vacuum hose, and also check the evaporative emission purge solenoid and the purge control valve.
   If the purge flow volume is at the standard value, replace the EVAP canister.

PURGE CONTROL SYSTEM CHECK (PURGE FLOW CHECK) <2.4L ENGINE>

17300140272



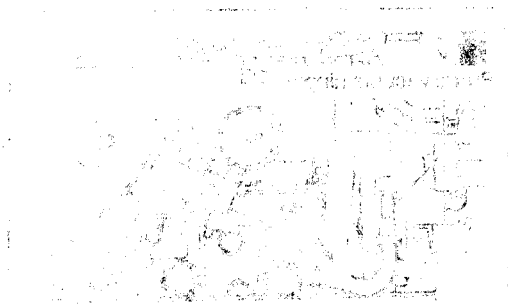
1. Disconnect the purge hose from the evaporative emission (EVAP) canister, and connect the special tool (purge flow indicator) between the EVAP canister and the purge hose.
2. The vehicle should be prepared as follows before the inspection and adjustment.
   - Engine coolant temperature: 80–95°C (176–203°F)
   - Lights, cooling fan and accessories: OFF
   - Transaxle: Neutral (A/T for P range)
3. Run the engine at idle for 4 minutes or more.

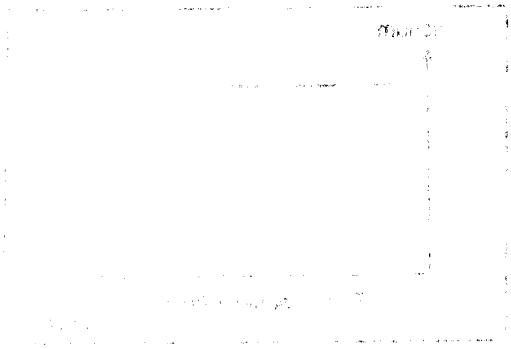
TSB Revision

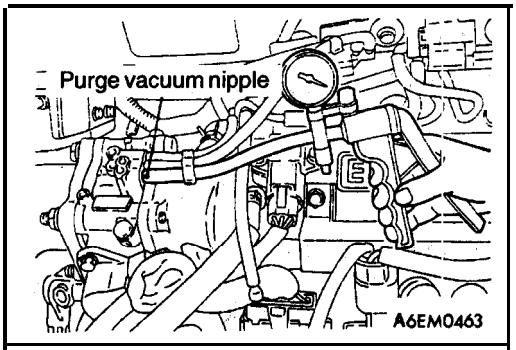
4. Check the purge flow volume when sudden braking is carried out several' times.

   Standard value: Momentarily 20 cm³/sec. (2.5 SCFH) or more

5. If the purge flow, volume 'is less than the standard value, check it again with the vacuum hose disconnected from the EVAP canister.
   If the purge flow volume is below the standard values, check for blockages in the vacuum port and vacuum hose, and also check the evaporative emission purge solenoid and the purge control valve.
   If the purge flow volume is at the standard value, replace the EVAP canister.





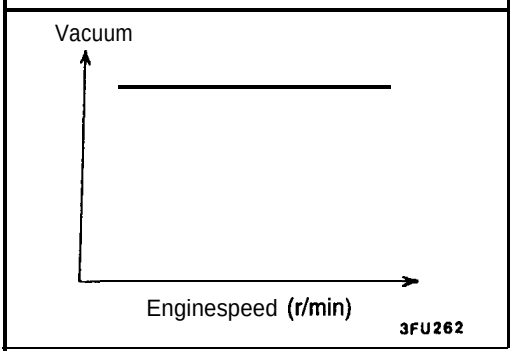


PURGE PORT VACUUM CHECK

17300150213

<2.0L Engine (Turbo)>

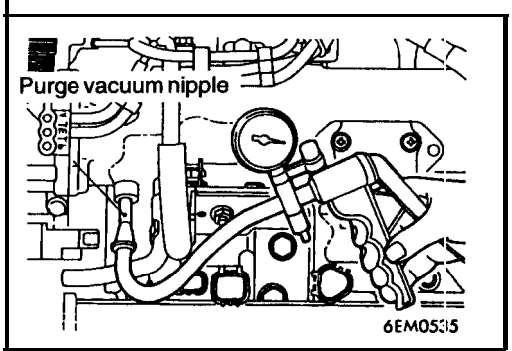
1. Disconnect the vacuum hose from the throttle body purge vacuum nipple and connect a hand vacuum pump to the nipple.



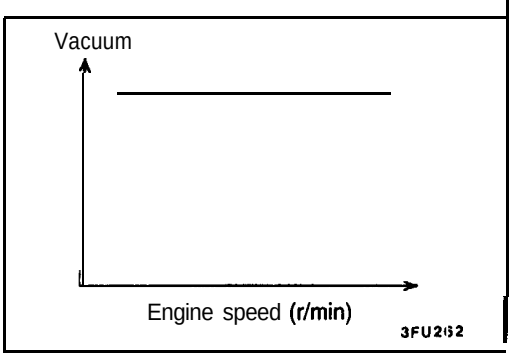
2. Vacuum is kept constant despite the increased engine speed.

   NOTE
   If no vacuum is generated, the throttle body purge port may be clogged.

<2.4L Engine (Turbo)>



1. Disconnect the vacuum hose from the intake manifold purge vacuum nipple and connect a hand vacuum pump to the nipple.

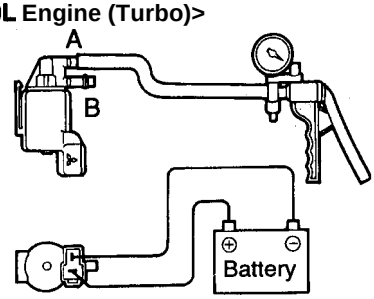


2. Vacuum is kept constant despite the increased engine speed.

   NOTE
   If no vacuum is generated, the intake manifold purge port may be clogged.

TSB Revision

<2.0L Engine (Turbo)>



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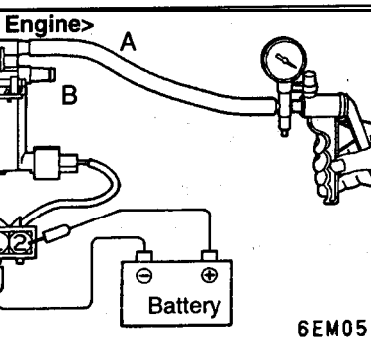
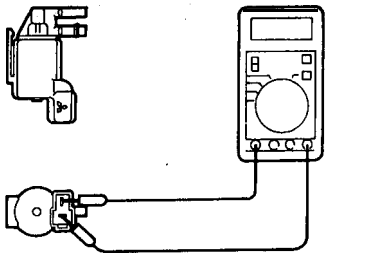
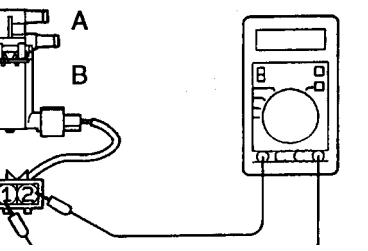


<2.0L Engine (Turbo)>



<2.4L Engine>



EVAPORATIVE EMISSION PURGE --SOLENOID CHECK

17300170202

NOTE
When disconnecting the vacuum hose, place an identification mark on it for proper reconnection.

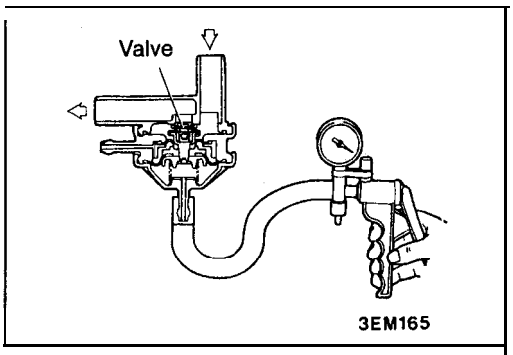
1. Disconnect the vacuum hose from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to nipple (A) of the solenoid' valve (refer to the illustration at left).
4. Check air-tightness by applying a vacuum with voltage applied directly from the battery to the purge control solenoid. valve.

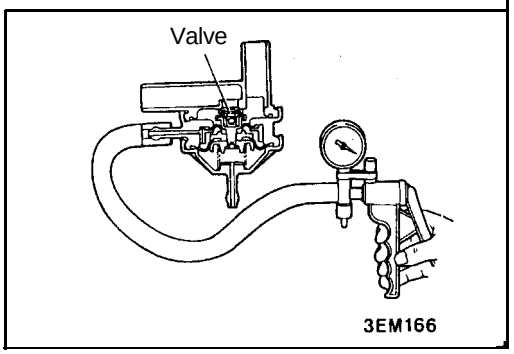
Battery voltage	Normal condition
Applied	Vacuum leaks
Not applied	Vacuum maintained

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

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

TSB Revision





PURGE CONTROL VALVE <2.0L Engine (Turbo)>

17300160025

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 53 kPa (16 in.Hg.) and check airtightness.
4. Blow in air lightly from the evaporative emission canister side nipple and check conditions as follows.

Hand vacuum pump vacuum	Normal condition
0 kPa (0 in.Hg.) (No vacuum is applied)	Air does not blow through
27 kPa (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 53 kPa (16 in.Hg) and check airtightness.

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

17300180120

Refer to GROUP 13A – Troubleshooting.

AIR CONDITIONING SWITCH

17300200048

Refer to GROUP 55 – Air Conditioning Switch.

TSB Revision

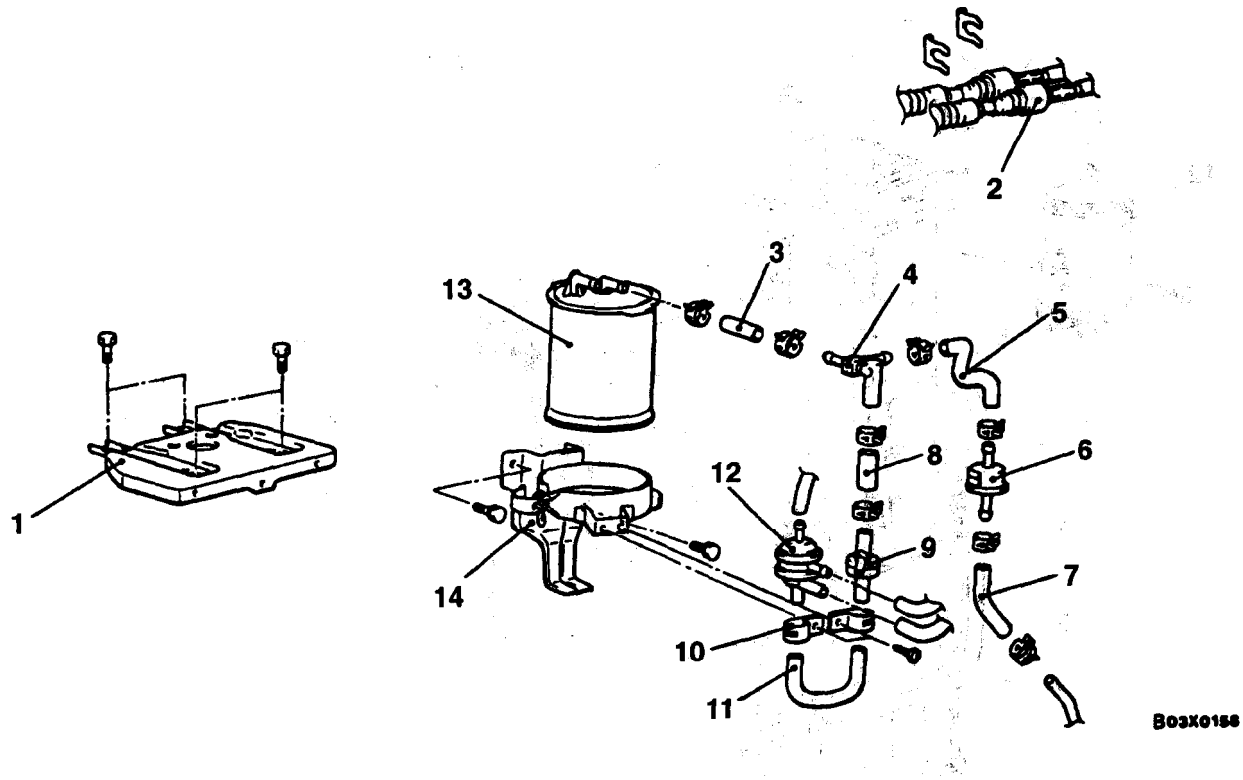
EVAPORATIVE EMISSION CANISTER/FUEL TANK PRESSURE RELIEF VALVE/PURGE CONTROL VALVE

17300480138

REMOVAL AND INSTALLATION

<2.0L Engine (Turbo)>

Pre-removal and Post-installation Operation
Battery Removal and Installation



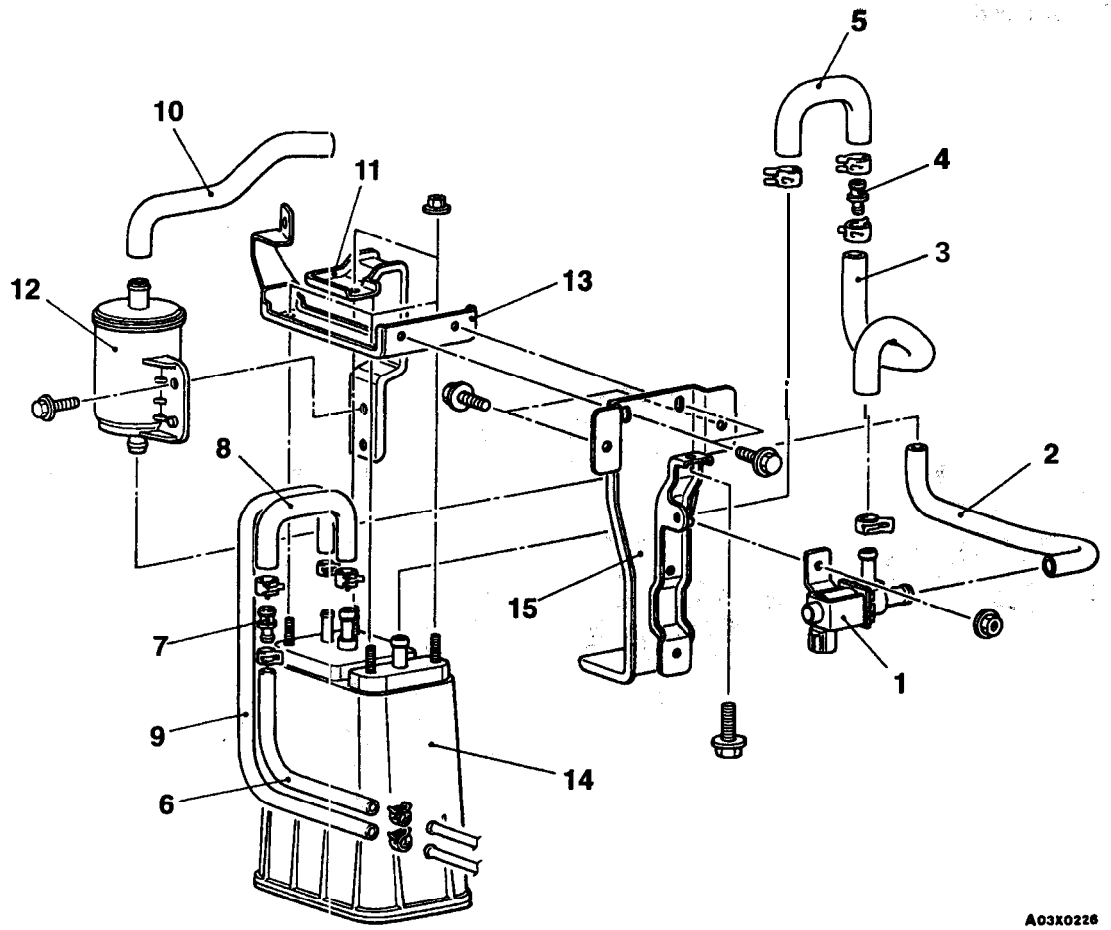
Removal steps

1. Battery bracket
2. Shift cable and select cable connection
3. Vapor hose
4. Connector
5. Vapor hose
▶A◀ 6. Fuel tank pressure relief valve
7. Vapor hose
8. Vapor hose
9. Check valve
10. Clamp'
11. Purge hose
12. Purge control valve
13. Evaporative emission canister
14. Evaporative emission canister holder assembly

TSB Revision

<2.4L Engine>

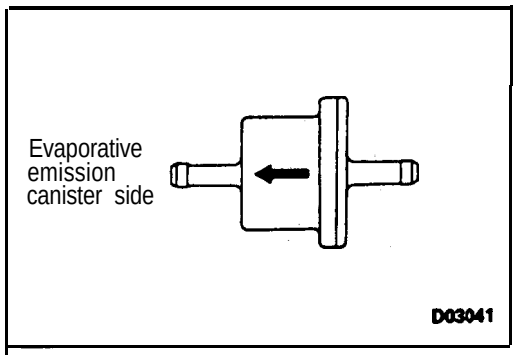
Pre-removal and Post-installation Operation
Splash Shield (R.H.) Removal and installation (Refer to GROUP 42 – Fender)

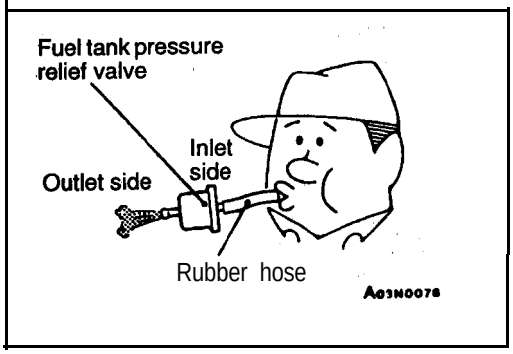


Removal steps

1. Evaporative emission ventilation
2. Vent hose
3. Vent hose
4. Connector
5. Vent hose
6. Vapor hose
7. Connector
8. Evaporative emission purge hose
9. Vapor hose
10. Vent hose
11. Filter bracket
12. Air filter
13. Evaporative emission canister upper bracket
14. Evaporative emission canister
15. Evaporative emission canister bracket

TSB Revision





INSTALLATION SERVICE POINT

▶A◀ FUEL TANK PRESSURE RELIEF VALVE INSTALLATION

Install the fuel tank pressure relief valve in the direction shown on the left.

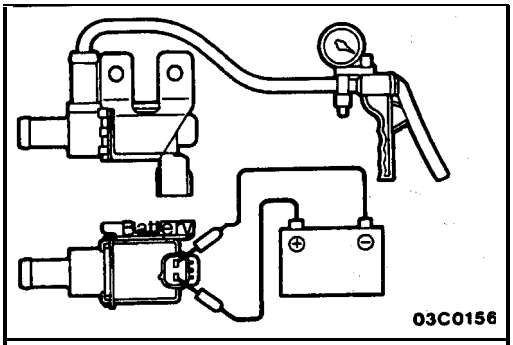
INSPECTION

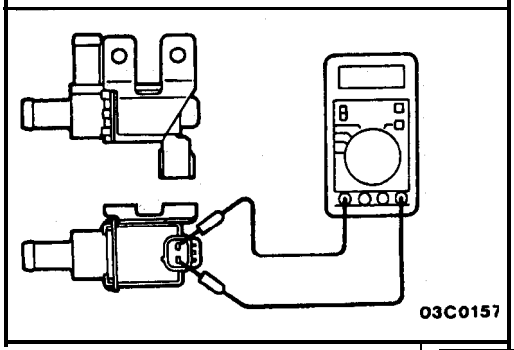
17300460057

FUEL TANK PRESSURE RELIEF VALVE SIMPLE CHECK

WARNING
To avoid bodily injury, do not breathe fuel vapors.
Attach a clean hose and check the operation of the fuel tank pressure relief 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 with no resistance,





EVAPORATIVE EMISSION VENTILATION SOLENOID CHECK

(1) Connect a hand vacuum pump to nipple (A) of the solenoid.
(2) Check airtightness by applying a vacuum with voltage applied directly from the 'battery to the evaporative emission ventilation solenoid. and 'without applying voltage.

Battery voltage	Normal condition
Applied	Vacuum maintained
Not applied	Vacuum leaks

(3) Measure the resistance between the terminals of the solenoid.

Standard value: 17-21 Ω (at 20°C (68°F))

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EXHAUST GAS RECIRCULATION (EGR) SYSTEM

17300520205

GENERAL INFORMATION

The exhaust gas recirculation (EG R) 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

When the engine coolant temperature is low, when the engine is at idle or when a wide open throttle operation is performed, the EGR valve is kept closed, achieving no EGR.

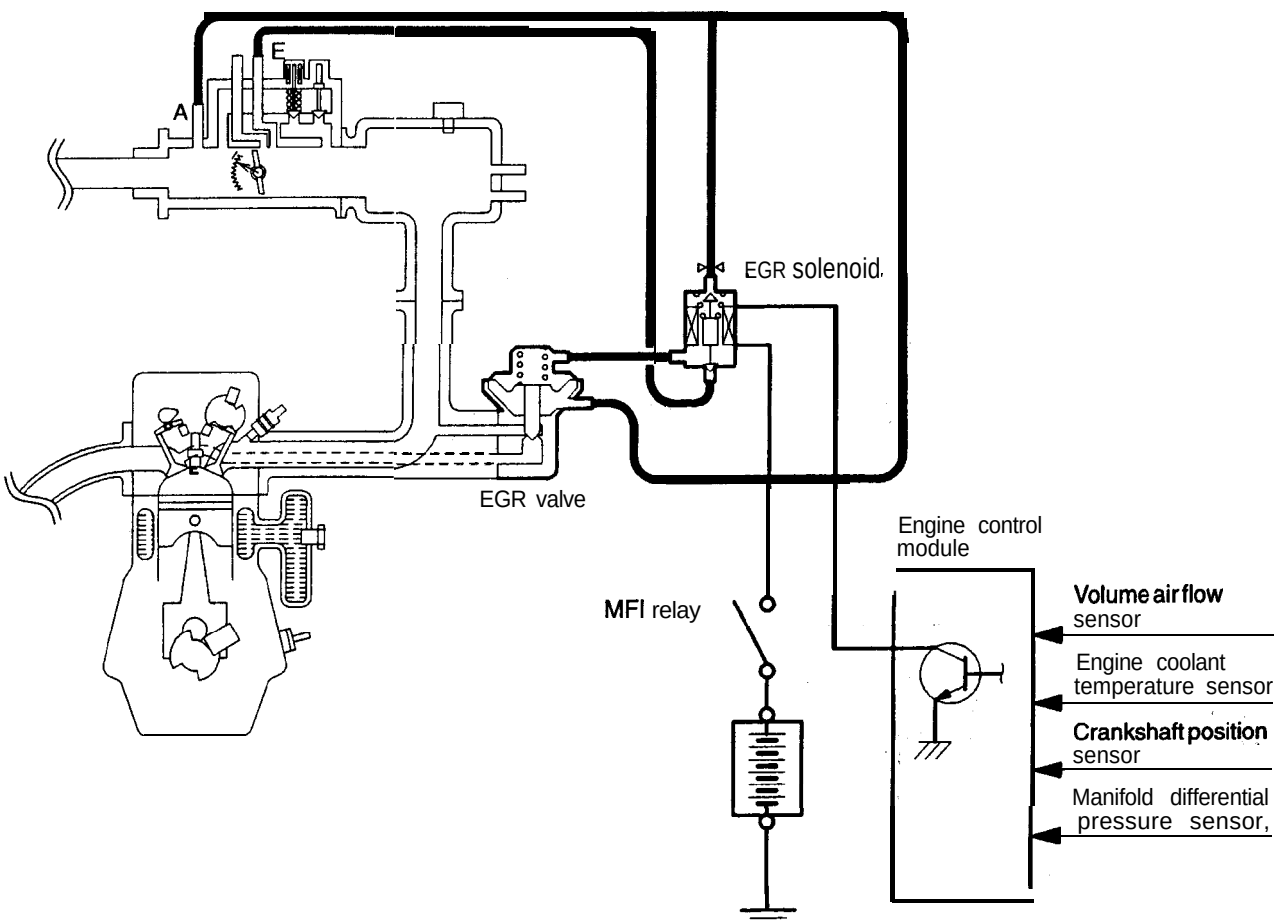
In normal vehicle operation performed after warming up of the engine, the EGR valve is opened to carry out EGR.

The manifold differential pressure sensor is located in the intake manifold plenum. This sensor detects variations in the manifold negative pressure when the EGR solenoid is momentarily operated. If the manifold negative pressure changes, the EGR system is normal.

The ECM uses this to check the operation of the, EGR system. If a problem is found, the check engine/malfunction indicator light illuminates to warn the driver that a problem has occurred.

SYSTEM DIAGRAM

<2.0L Engine (Turbo)>



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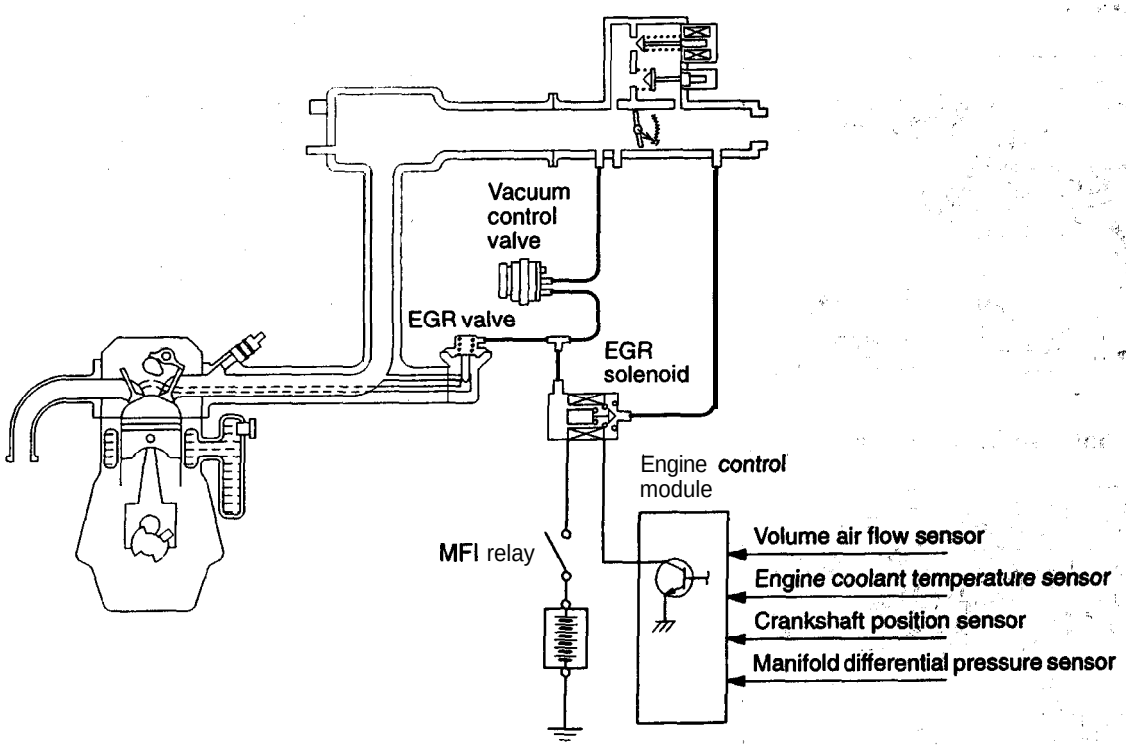
<2.4L Engine>



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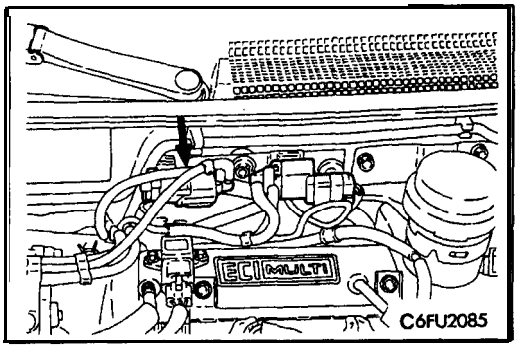
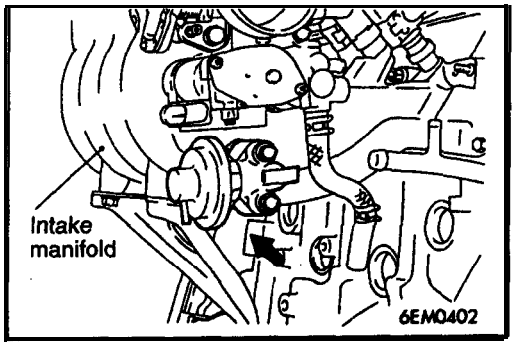
COMPONENT LOCATION
<2.0L Engine (Turbo)>

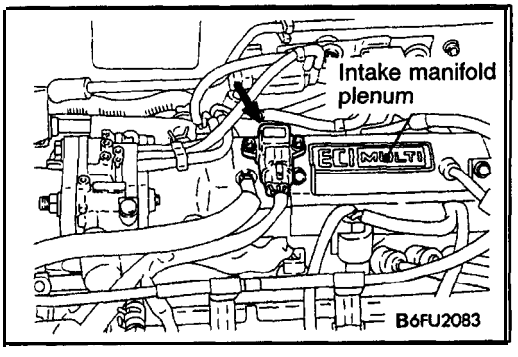
EGR solenoid



EGR valve



Manifold differential pressure sensor



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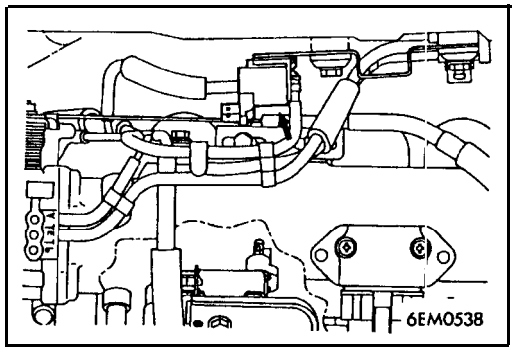
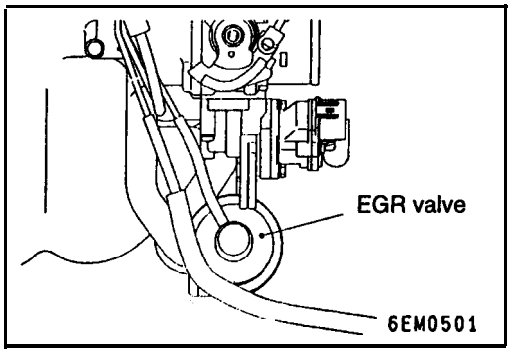
<2.4L Engine>

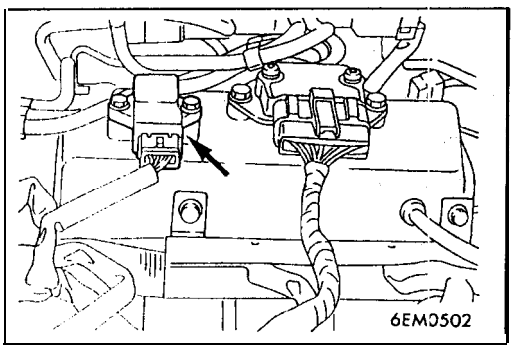
EGR solenoid



EGR valve



Manifold differential pressure sensor



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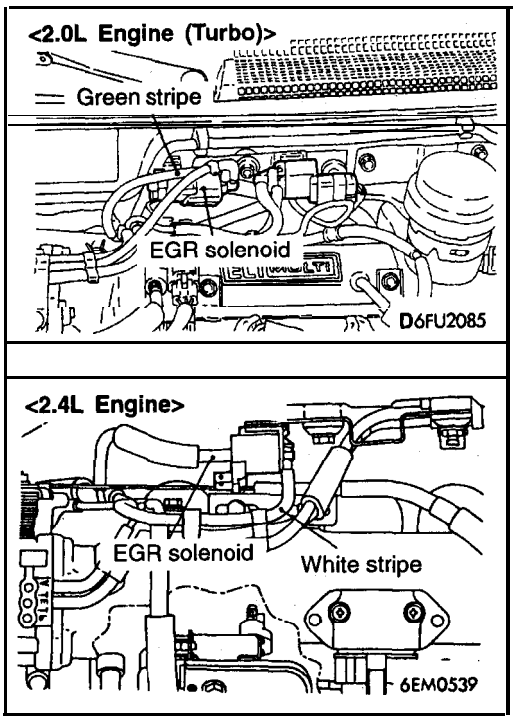


EGR SYSTEM CHECK

17300260220

1. Disconnect the vacuum hose (green stripe <2.0L Engine (Turbo)>, white stripe <2.4L Engine>) from the EGR solenoid, and then connect a hand vacuum pump via the three-way terminal.
2. Regarding the engine in cold and hot conditions, check the condition of vacuum when a rapid racing has been performed by opening the throttle valve quickly.

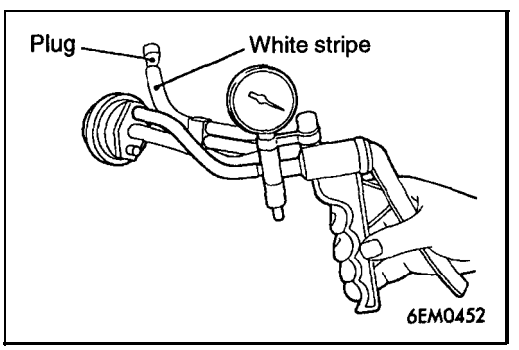
When engine is cold
[Engine coolant temperature: 20°C (68°F) or less]

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

When engine is hot
[Engine coolant temperature: 80°C (176°F) or higher]

Throttle valve	Normal vacuum condition
Open quickly	It will momentarily *rise over* 13 kPa (3.9 in.Hg)

3. Disconnect the three-way terminal.
4. Connect the hand vacuum pump directly to the EGR valve.
5. Check whether the engine stalls or if the idle is unstable when a vacuum of 27 kPa (7.9 in.Hg) or higher is applied while idling.



VACUUM CONTROL VALVE CHECK <2.4L Engine>

17300270025

1. Disconnect the vacuum hose (white stripe) from the vacuum control valve and connect the hand vacuum pump to the vacuum control valve.
2. Put the blind plug to the removed vacuum hose.
3. Start the engine and run at idle.
4. Check the vacuum condition.

Engine condition	Normal vacuum condition
Idling	Approx. 23 kPa (6.7 in.Hg)

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EGR VALVE CHECK

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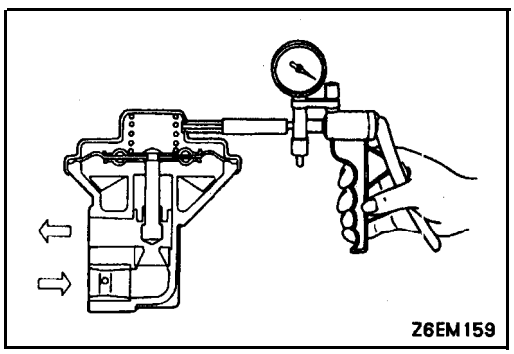
1. Remove the EGR valve and inspect for sticking, carbon deposits, etc. If contaminants are found, clean the valve with a suitable solvent so it will seat correctly.



2. Connect a hand vacuum pump to the EGR valve.
3. Apply 67 kPa (20 in.Hg) of vacuum, and check to be sure that the vacuum is maintained.
4. Apply vacuum according to the cahrt below and check the passage of air by blowing through either side of the EG R passages.

Vacuum	Passage of air
5.3 kPa (1.6 in.Hg) or less	Air does not blow out of opposite passage.
27 kPa (7.9 in.Hg) or more	Air blows out of opposite passage.,

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

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

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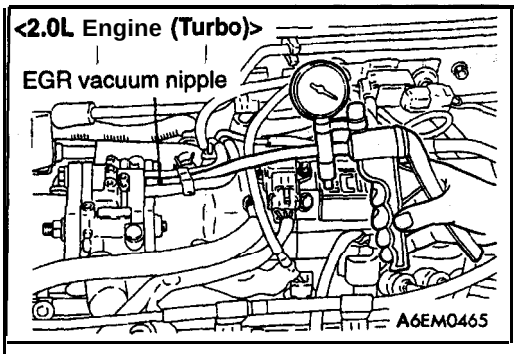
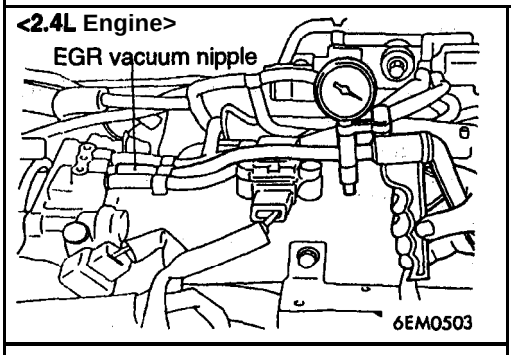
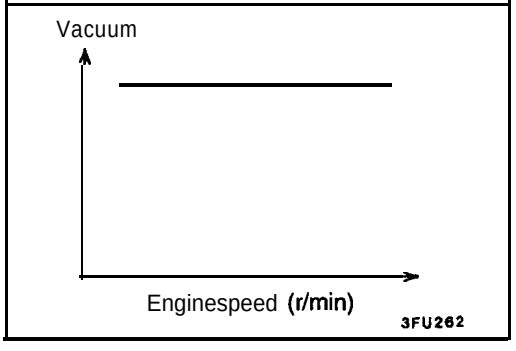






EGR PORT VACUUM CHECK

17300290076

1. Disconnect the vacuum hose (white stripe <2.0L Engine (Turbo)>, green stripe <2.4L Engine>) from the throttle body EGR vacuum nipple. Connect a hand vacuum pump to the nipple.

2. Start the engine and gradually raise the speed.' The vacuum reading on the pump should remain **constant.**

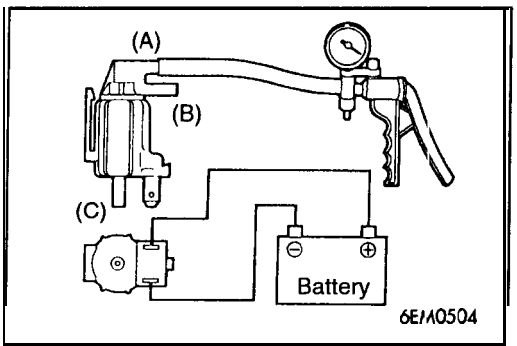
   NOTE
   If no vacuum is generated, the throttle body purge port may be clogged.

EGR SOLENOID CHECK <2.0L Engine (Turbo)>

17300310032

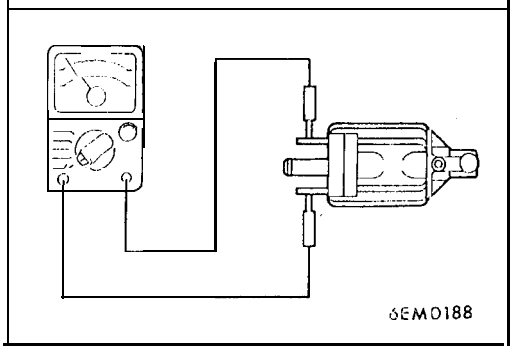
NOTE
When disconnecting the vacuum' hose, place an identification mark on it for proper reconnection.

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



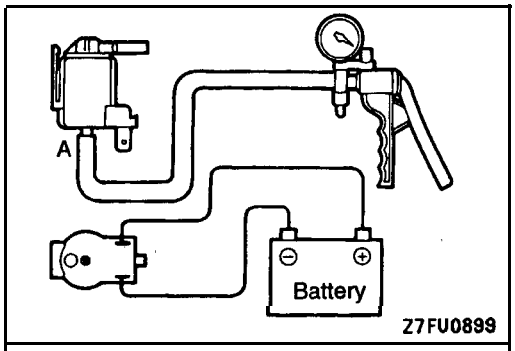
5. Measure the resistance between the solenoid valve terminals.

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

EGR SOLENOID CHECK <2.4L Engine> 17300310079

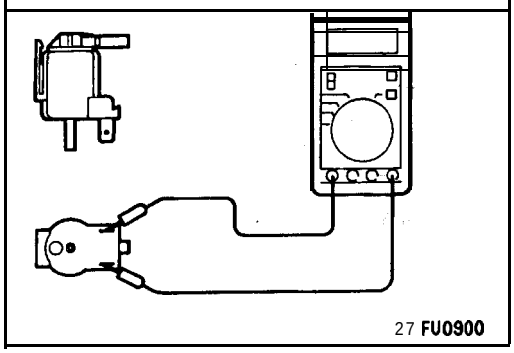
NOTE
When disconnecting the vacuum hose, place an identification mark on it for proper re-connection.

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



3. Connect a hand vacuum pump to the A nipple.
4. Check air tightness by applying a vacuum with voltage applied directly from the battery to the EGR solenoid and without applying voltage

Battery voltage	Normal condition
Applied	Vacuum maintained
Not applied	Vacuum leaks



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

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

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