

EMISSION CONTROL SYSTEMS

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EC

NOTE: TROUBLESHOOTING

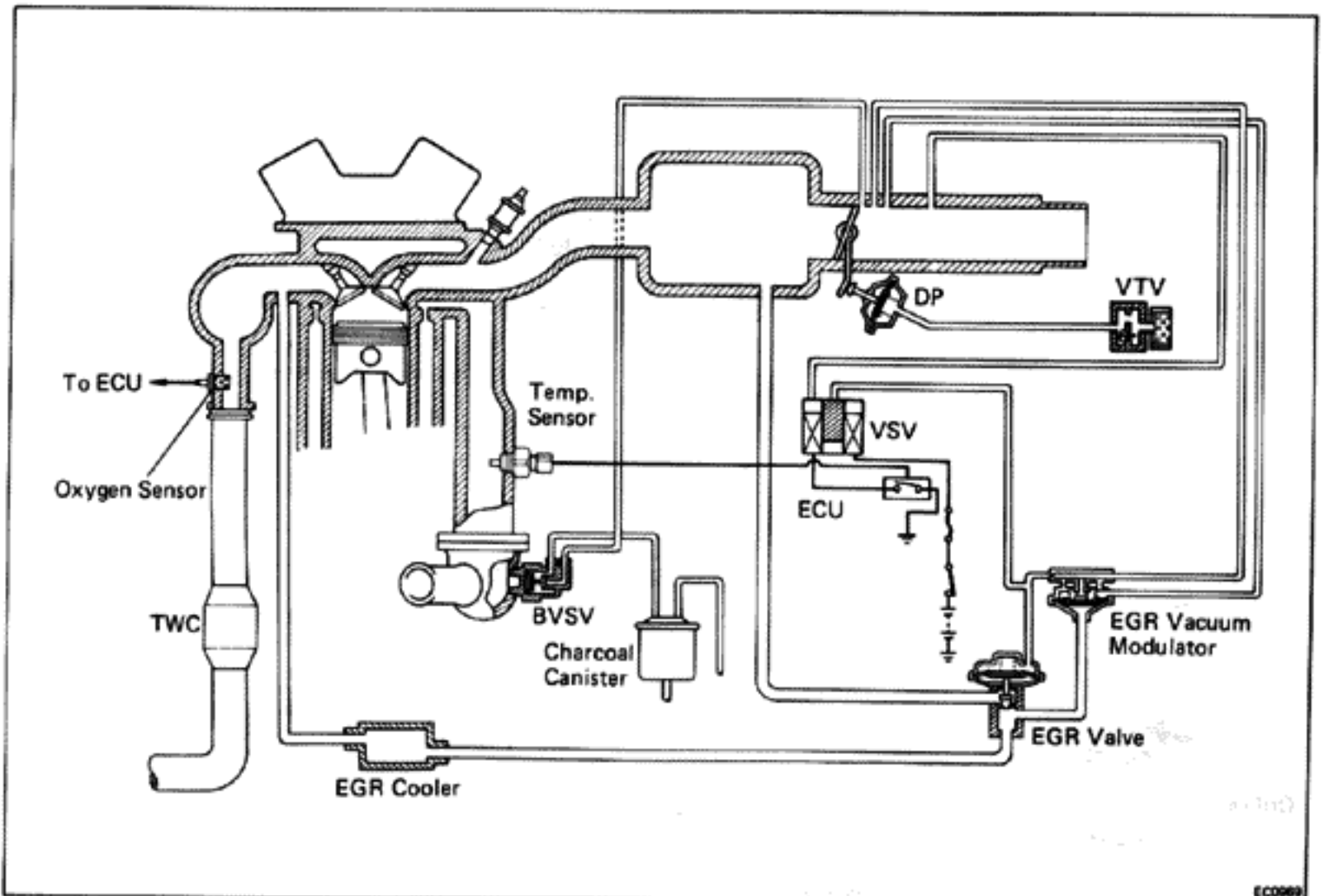
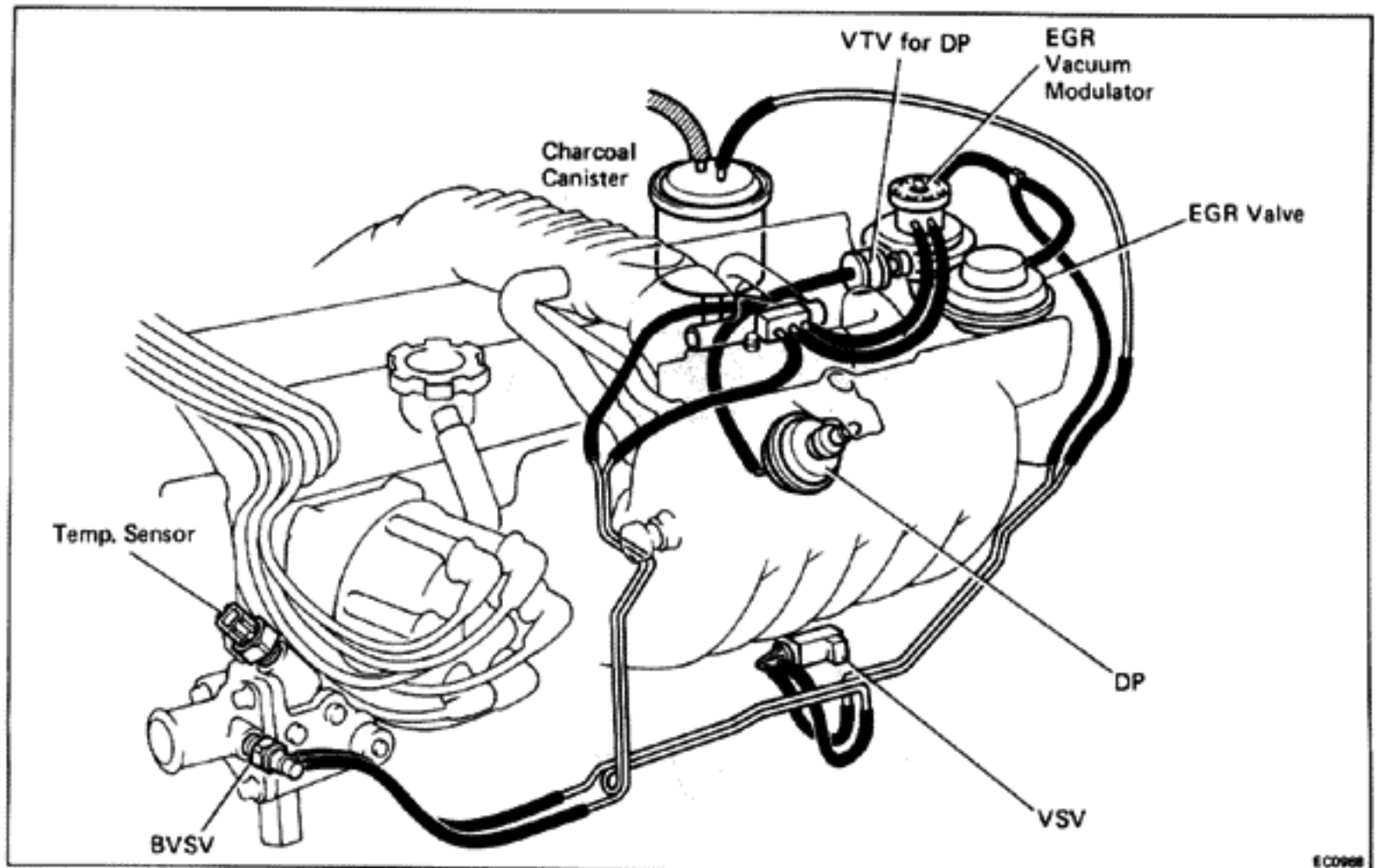
See page EM-2

SYSTEM PURPOSE

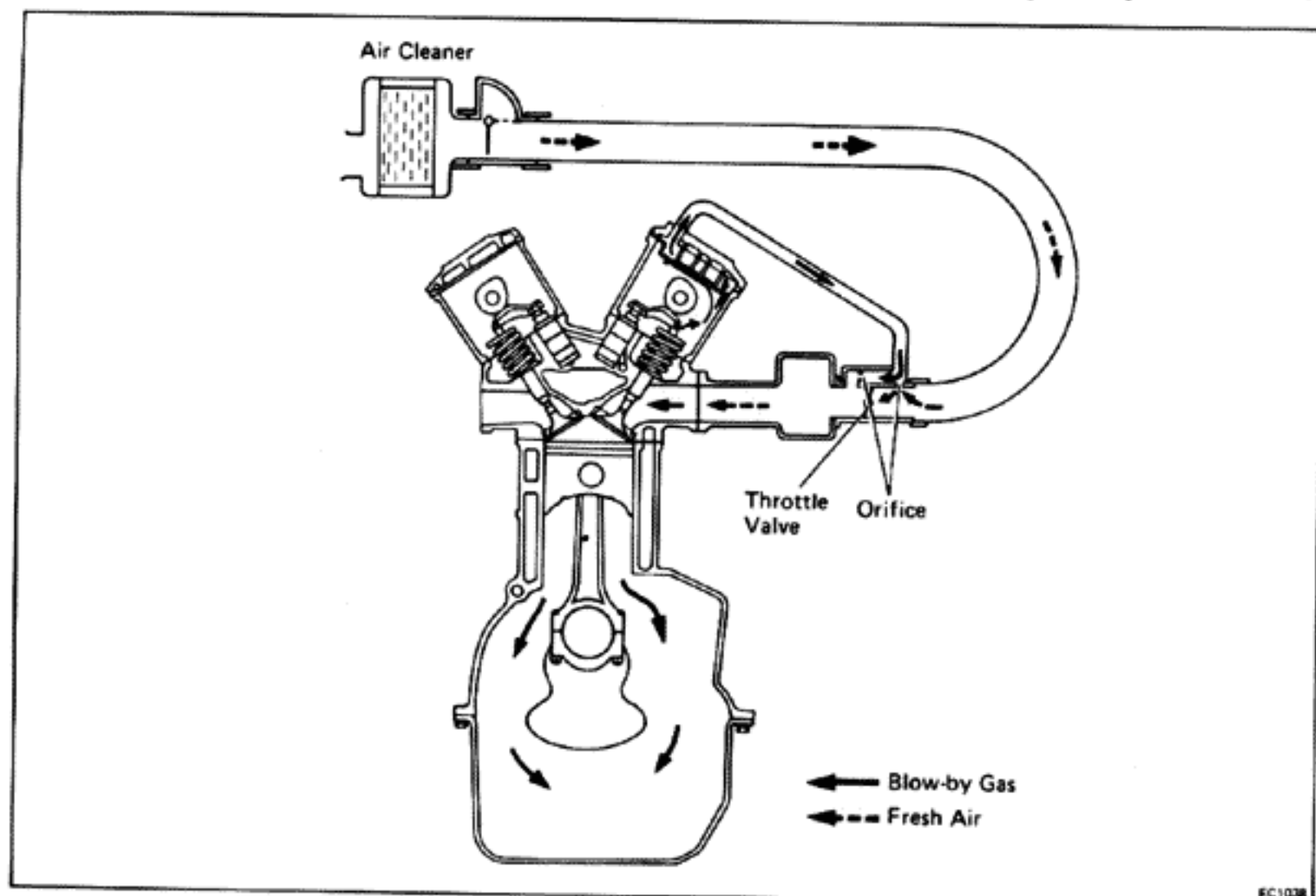
System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduces blow-by gas (HC)
Fuel evaporative emission control	EVAP	Reduces evaporative HC
Dash pot	DP	Reduces HC and CO
Exhaust gas recirculation	EGR	Reduces NO _x
Three-way catalyst	TWC	Reduces HC, CO and NO _x
Electronic fuel injection*	EFI	Regulates all engine conditions for reduction of exhaust emissions

Remarks *For inspection and repair of the EFI system, refer to EFI section.

COMPONENT LAYOUT AND SCHEMATIC DRAWING

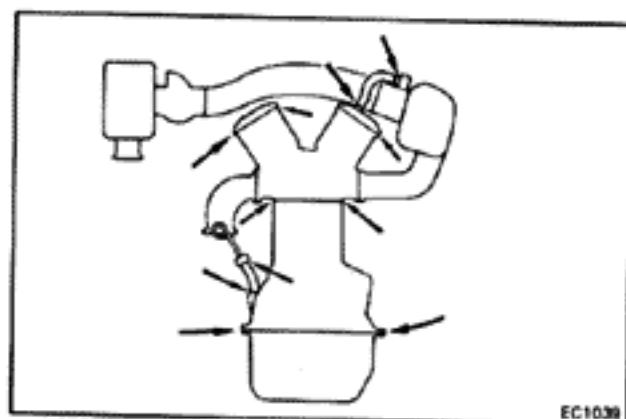


POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM



EC1038

To reduce HC emission, crankcase blow-by gas (HC) is routed through two metering orifices to the intake manifold for combustion in the cylinders

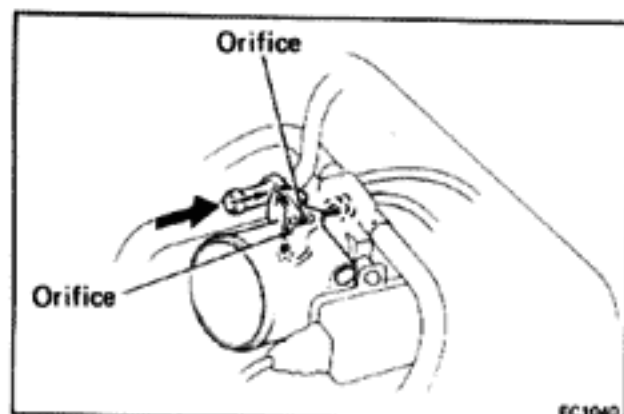


EC1039

INSPECTION OF PCV HOSES AND CONNECTIONS

1. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

Check for cracks, leaks or damage.

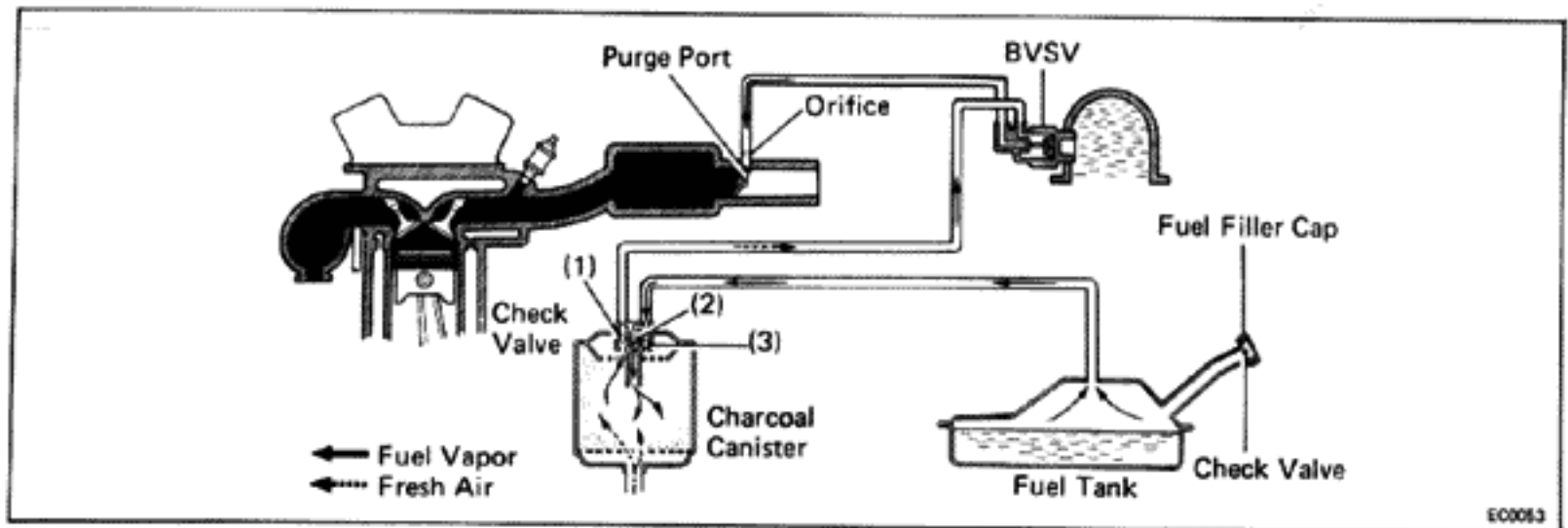


EC1040

2. CLEAN TWO ORIFICES

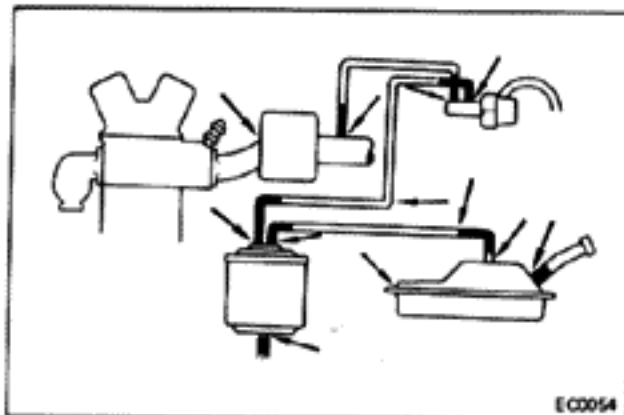
Clean off any gum deposits in the orifices with solvent and blow out with compressed air.

FUEL EVAPORATIVE EMISSION CONTROL (EVAP) SYSTEM



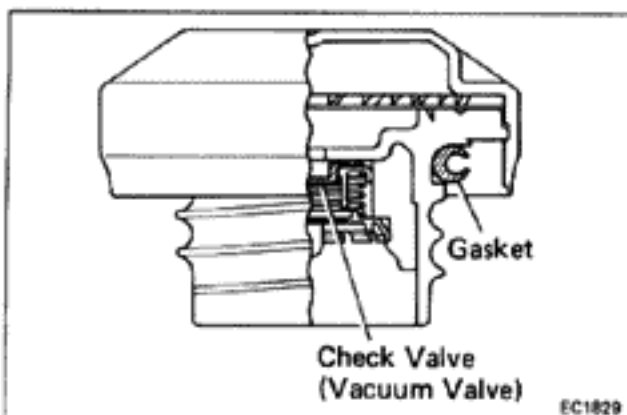
To reduce HC emission, evaporated fuel from the fuel tank is routed through the charcoal canister to the intake manifold for combustion in the cylinders

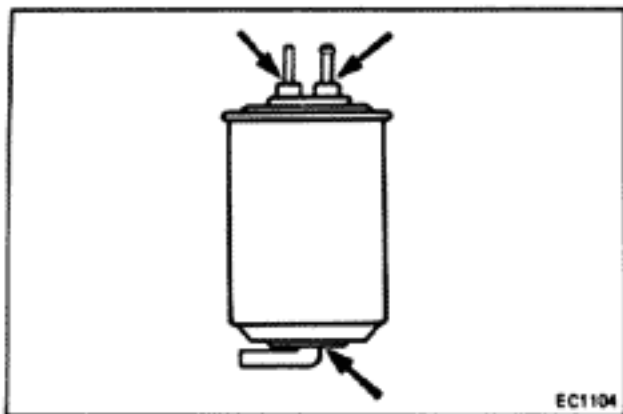
Coolant Temp.	BVS	Throttle Valve Opening	Canister Check Valve			Check Valve in Cap	Evaporated Fuel (HC)
			(1)	(2)	(3)		
Below 35°C (95°F)	CLOSED	—	—	—	—	—	HC from tank is absorbed in the canister.
Above 54°C (129°F)	OPEN	Positioned below purge port	CLOSED	—	—	—	
		Positioned above purge port	OPEN	—	—	—	HC from canister is led into air intake chamber.
High pressure in tank	—	—	—	OPEN	CLOSED	CLOSED	HC from tank is absorbed in the canister.
High vacuum in tank	—	—	—	CLOSED	OPEN	OPEN	(Air is led into the fuel tank.)



INSPECTION OF FUEL VAPOR LINES, FUEL TANK AND FILLER CAP

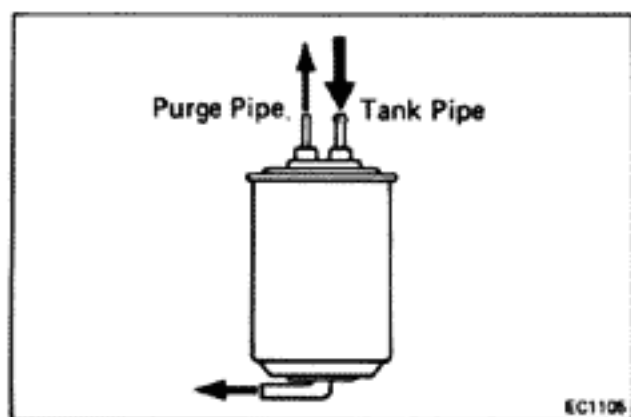
- 1. VISUALLY INSPECT LINES AND CONNECTIONS**
Look for loose connections, sharp bends or damage.
- 2. VISUALLY INSPECT FUEL TANK**
Look for deformation, cracks or fuel leakage.
- 3. VISUALLY INSPECT FUEL FILLER CAP**
Check condition of gasket and cap.
If necessary, repair or replace the cap.





INSPECTION OF CHARCOAL CANISTER

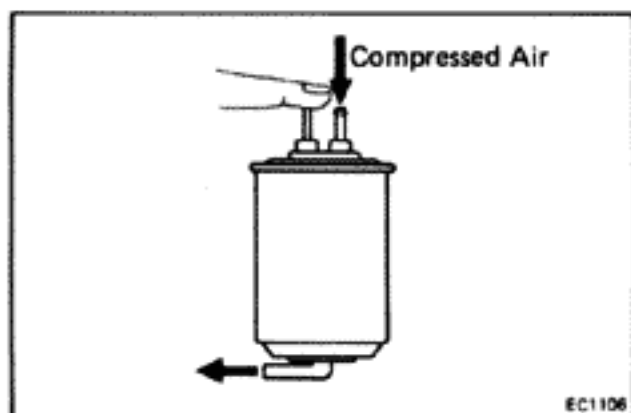
1. REMOVE CHARCOAL CANISTER
2. VISUALLY INSPECT CHARCOAL CANISTER CASE
Look for cracks or damage.



3. CHECK FOR CLOGGED FILTER AND STUCK CHECK VALVE

- (a) Using low pressure compressed air, blow into the tank pipe and check that the air flows without resistance from the other pipes.
- (b) Blow into the purge pipe and check that the air does not flow from the other pipes.

If a problem is found replace the charcoal canister.



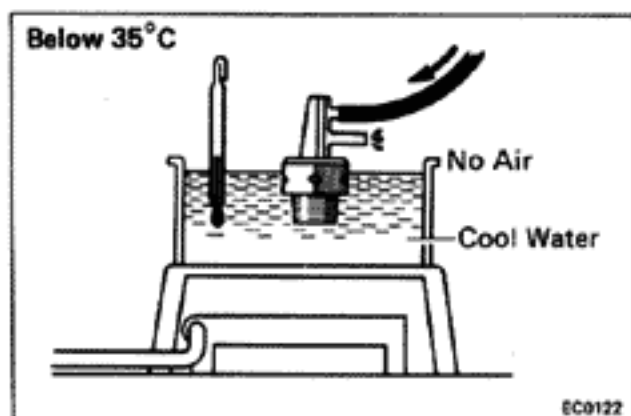
4. CLEAN CANISTER FILTER

Clean the filter by blowing 3 kg/cm² (43 psi, 294 kPa) of compressed air into the tank pipe, while holding the other upper canister pipe closed.

NOTE:

- Do not attempt to wash the canister.
- No activated carbon should come out.

5. INSTALL CHARCOAL CANISTER

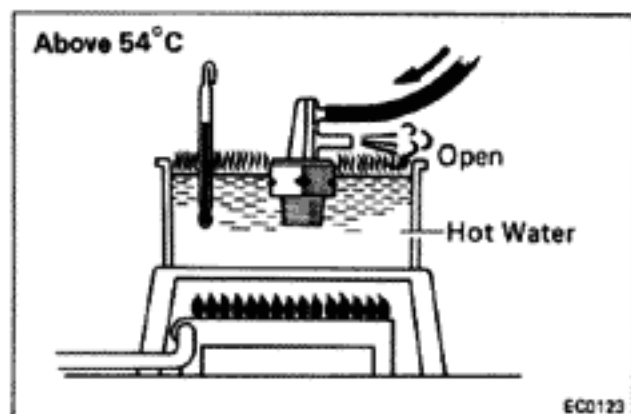


INSPECTION OF BVSV

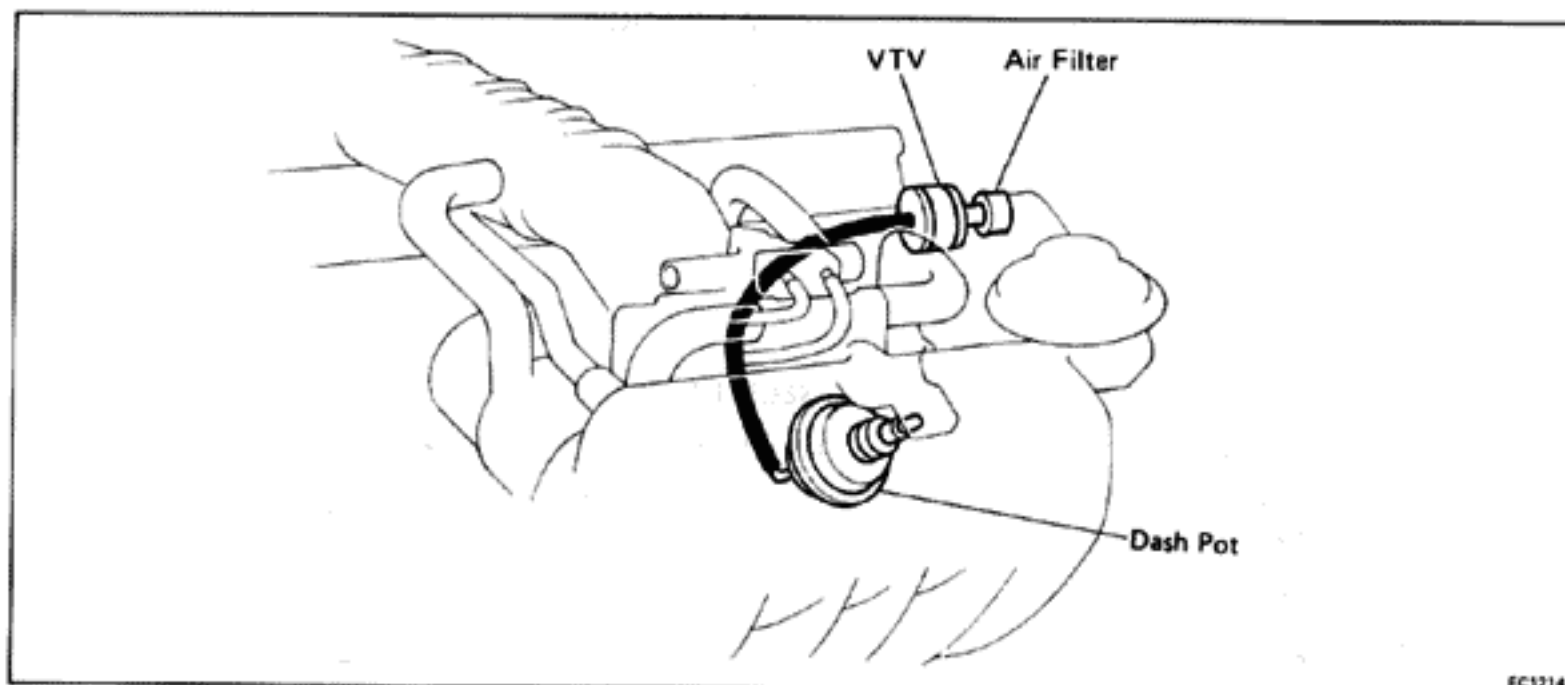
CHECK BVSV BY BLOWING AIR INTO PIPE

- (a) Drain the coolant from the radiator into a suitable container.
- (b) Remove the BVSV from the water outlet.
- (c) Cool the BVSV to below 35°C (95°F) with cool water.
- (d) Blow air into a pipe and check that the BVSV is closed.
- (e) Heat the BVSV to above 54°C (129°F) with hot water.
- (f) Blow air into a pipe and check that the BVSV is open.
- (g) Apply liquid sealer to the threads of the BVSV and install.
- (h) Fill the radiator with coolant.

If a problem is found, replace the BVSV.

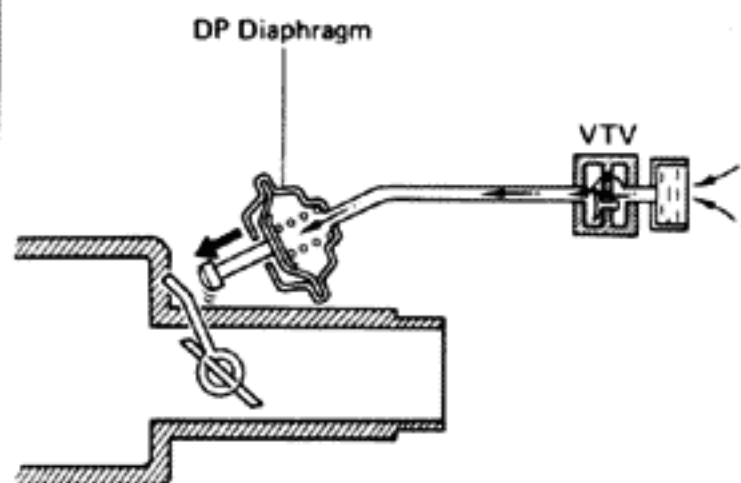


DASH POT (DP) SYSTEM



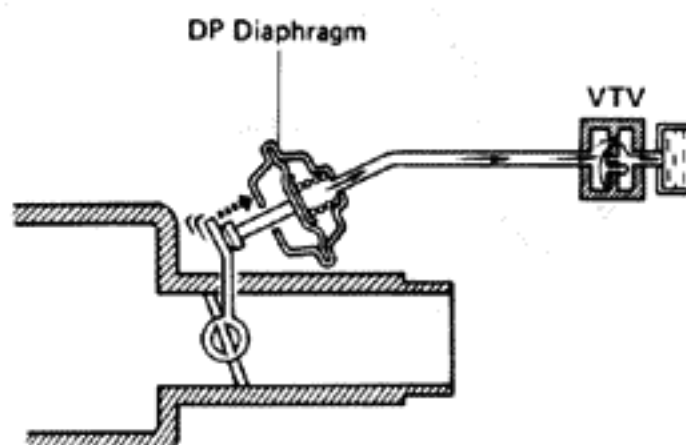
EC1214

Normal Driving



EC1215

Deceleration



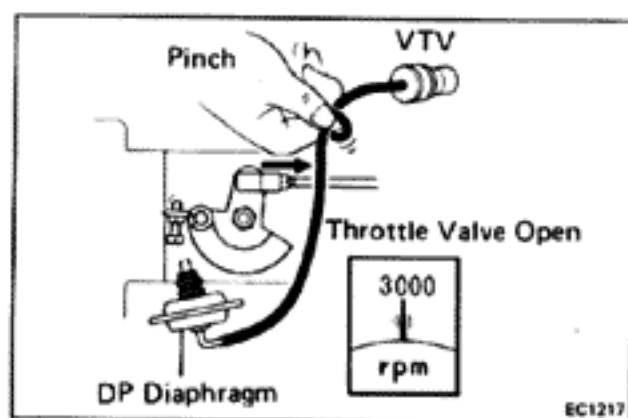
EC1216

To reduce HC and CO emissions, when decelerating the dash pot opens the throttle valve slightly more than at idle. This causes the air-fuel mixture to burn completely.

Condition	Diaphragm	VTV	Throttle Valve
Idling	Pushed in by return force of throttle valve	CLOSED	Idle speed position
Normal driving	Pushed out by diaphragm spring	OPEN	High speed position
Deceleration	Pushed in by return force of throttle valve	CLOSED	Slightly opens and then slowly closes to idle position

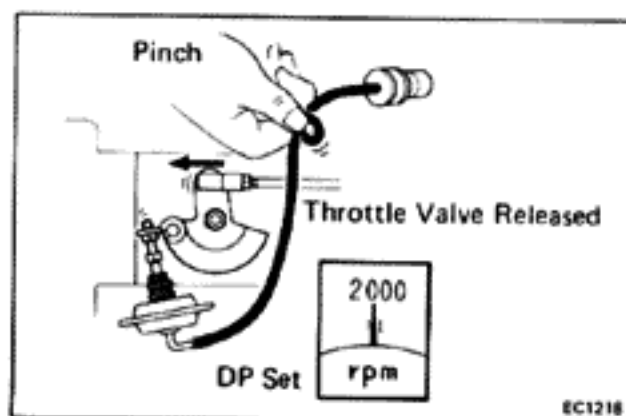
INSPECTION OF DP SYSTEM

1. WARM UP ENGINE
2. CHECK IDLE SPEED



3. CHECK DP SETTING SPEED

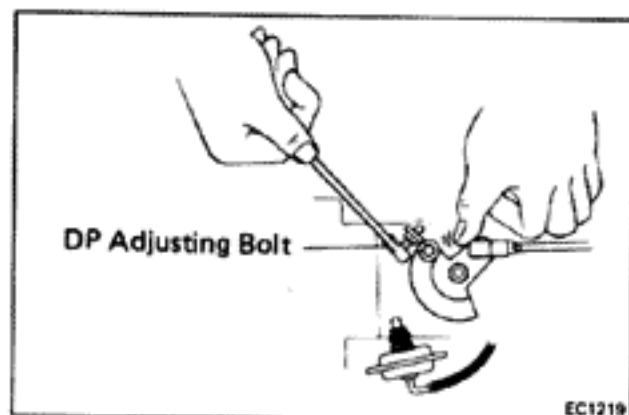
- (a) Maintain engine speed at 3,000 rpm.
- (b) Pinch the vacuum hose between DP and VTV.



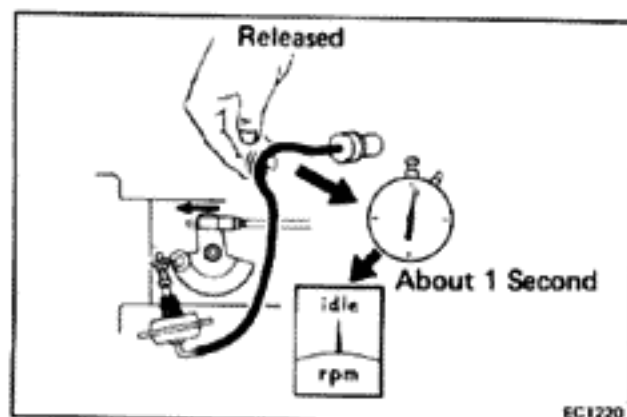
- (c) Release the throttle valve.

- (d) Check that the DP is set.

DP setting speed: 2,000 rpm



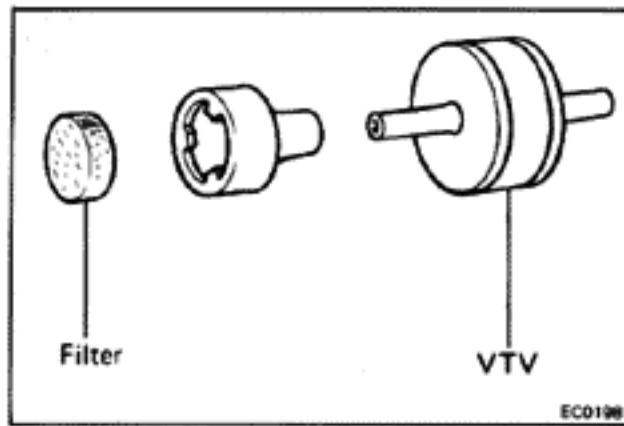
If not at specified speed, adjust with the DP adjusting bolt.



4. CHECK OPERATION OF VTV

- (a) Set the DP speed in the same procedure as above; (a) to (c).
- (b) Release the pinched hose and check that the engine returns to idle speed in about 1 second.

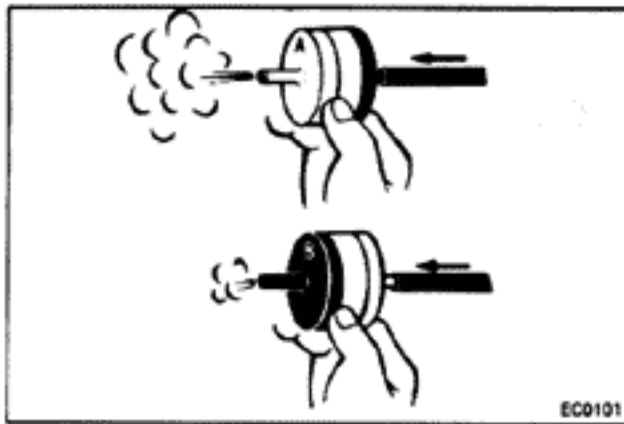
IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT VTV



INSPECTION OF VTV

1. CHECK AND CLEAN FILTER ON VTV

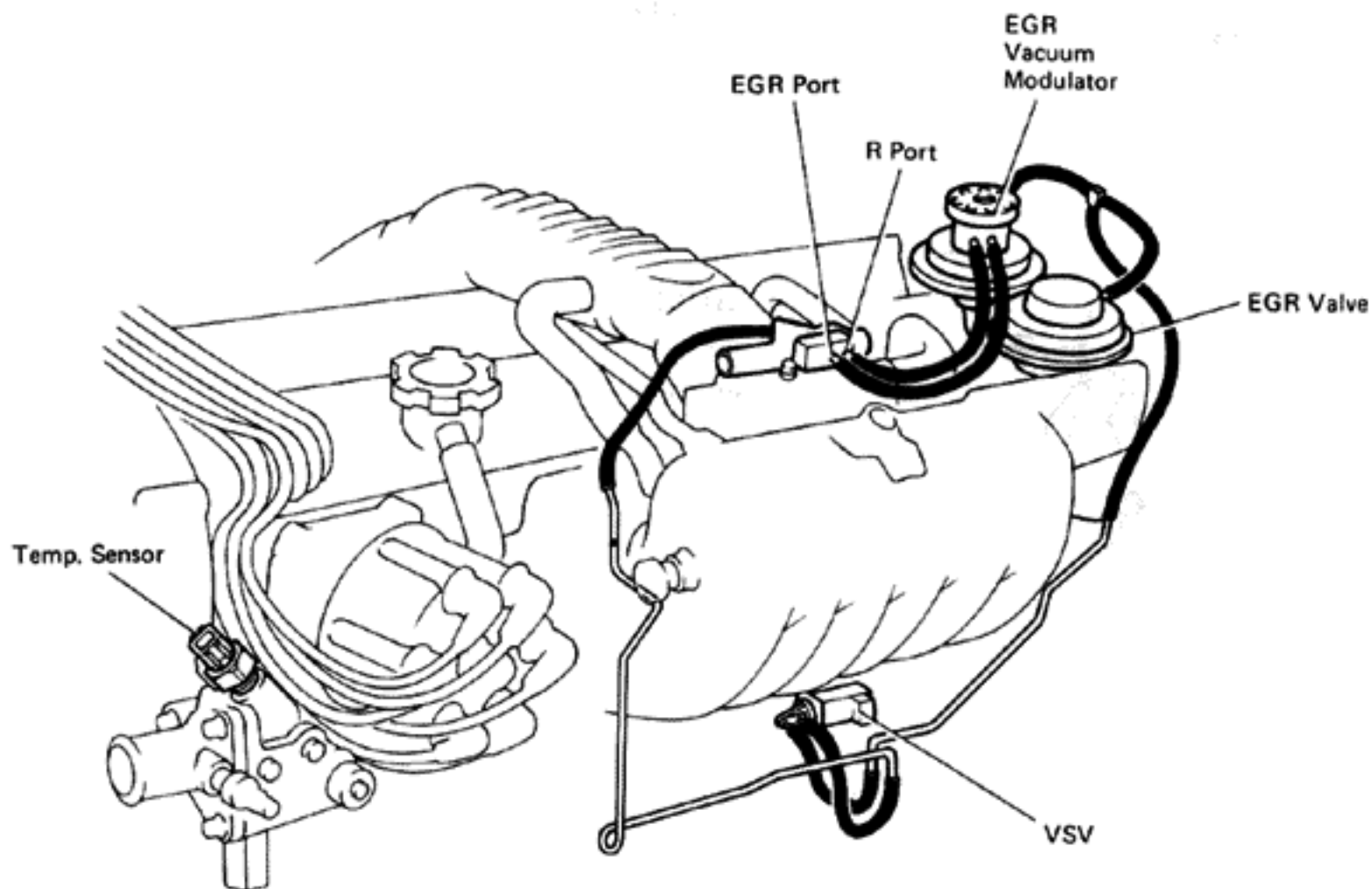
- Check the filter for contamination or damage.
- Using compressed air, clean the filter.



2. CHECK VTV BY BLOWING AIR INTO EACH SIDE

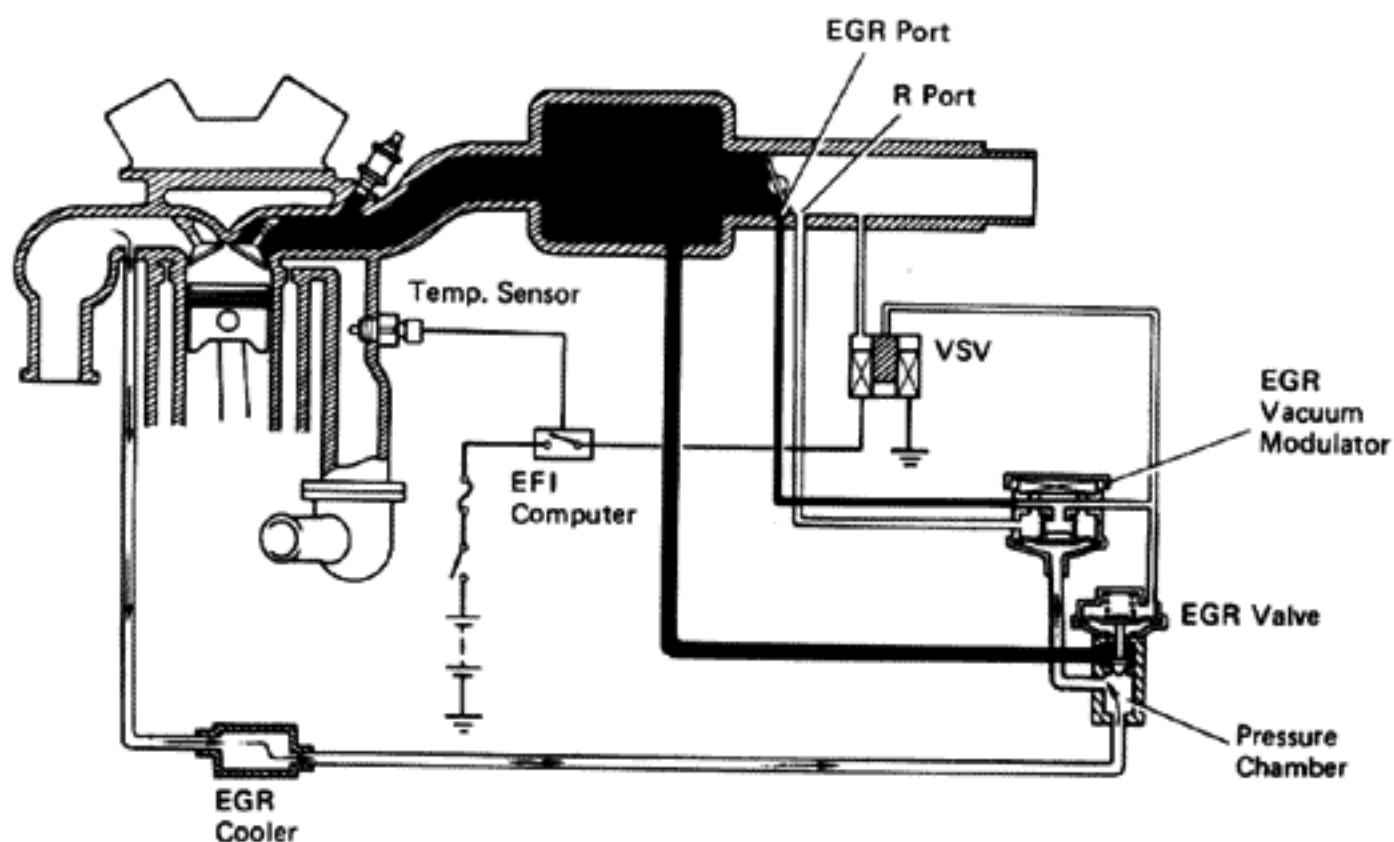
- Check that air flows without resistance from B to A.
- Check that air flows with difficulty from A to B.

EXHAUST GAS RECIRCULATION (EGR) SYSTEM



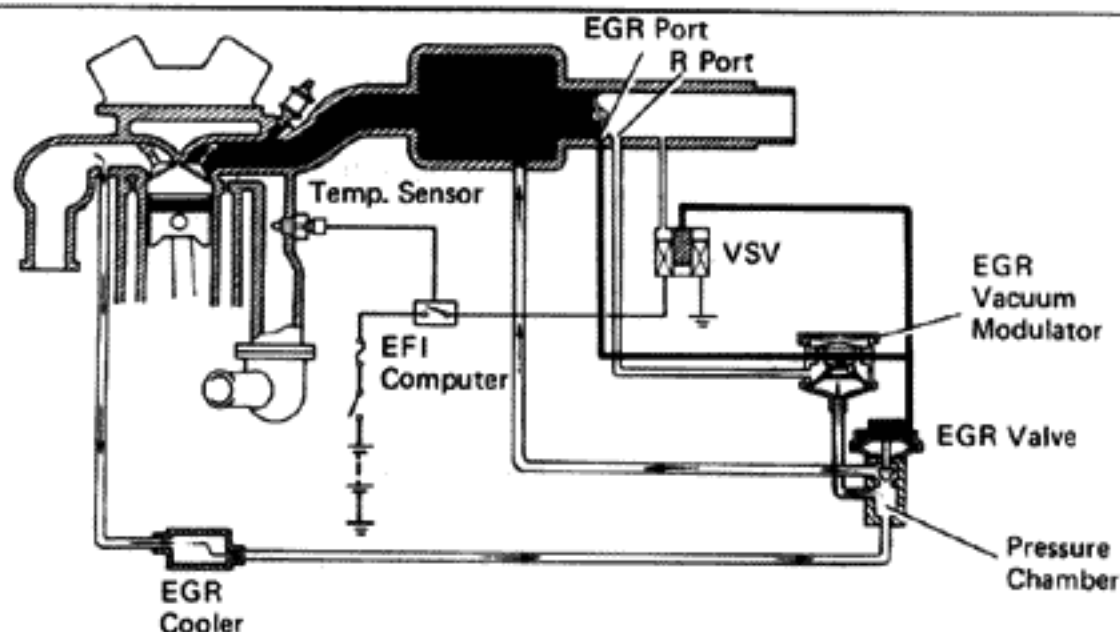
EC0970

(1)

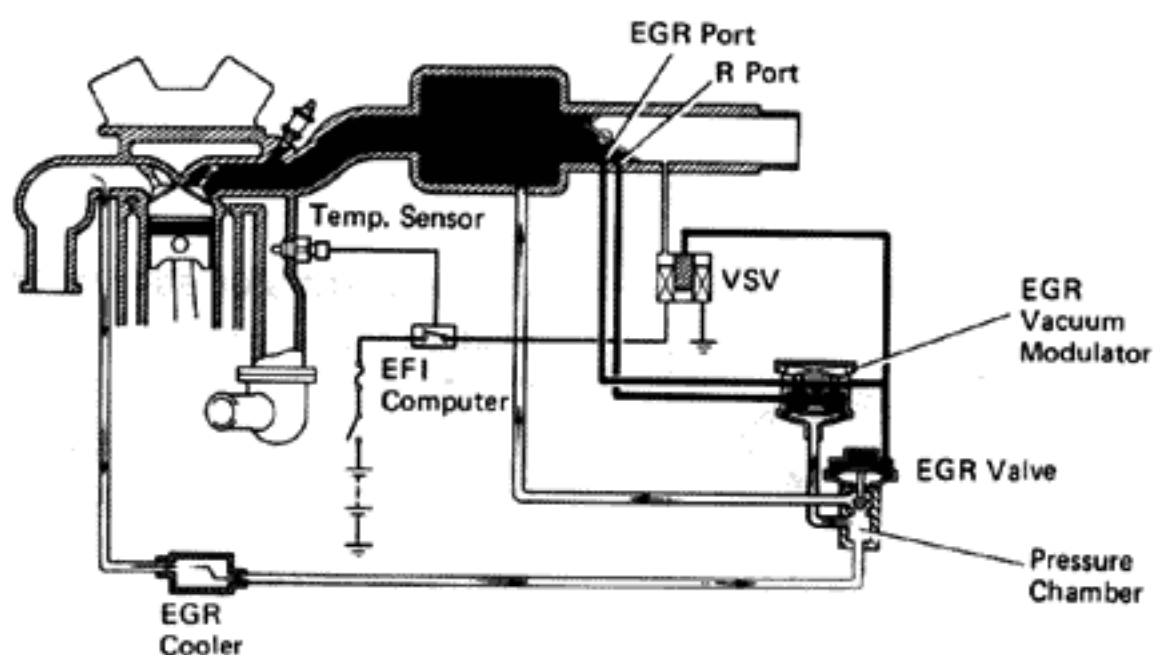


EC0971

(2)



(3)

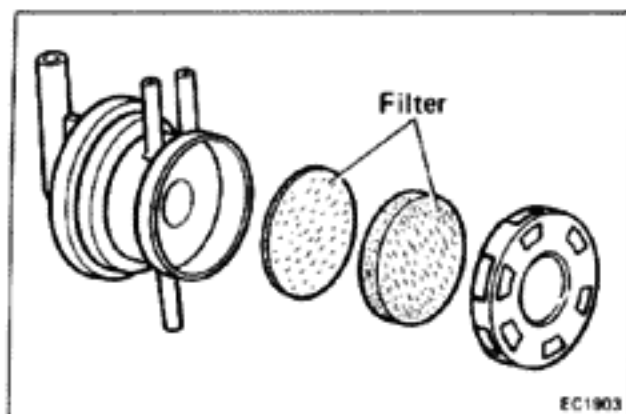
EC0972
EC0973

To reduce NO_x emission, part of the exhaust gases are recirculated through the EGR valve to the intake manifold to lower the maximum combustion temperature.

Coolant Temp.	VSV	Throttle Valve Opening Angle	Pressure in the EGR Valve Pressure Chamber		EGR Vacuum Modulator	EGR Valve	Exhaust Gas
Below 57°C (135°F)	OPEN	—	—		—	CLOSED	Not recirculated
Above 63°C (145°F)	CLOSE	Positioned below EGR port	—		—	CLOSED	Not recirculated
		Positioned between EGR port and R port	(1) LOW	*Pressure constantly alternating between low and high	OPENS passage to atmosphere	CLOSED	Not recirculated
			(2) HIGH		CLOSES passage to atmosphere	OPEN	Recirculated
		Positioned above R port	(3) HIGH	**	CLOSES passage to atmosphere	OPEN	Recirculated (increase)

Remarks: *Pressure increase → Modulator closes → EGR valve opens → Pressure drops
 ↑
 EGR valve closes ← Modulator opens ←

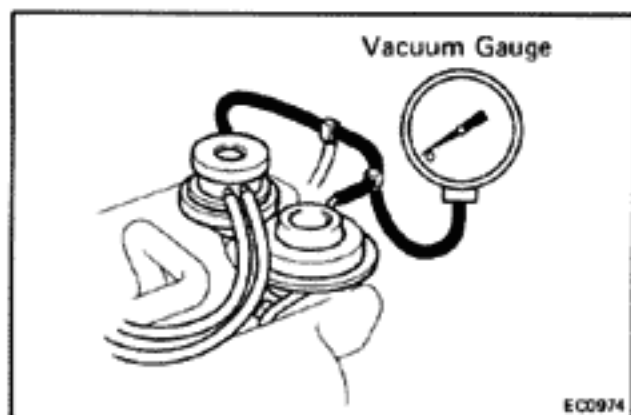
**When the throttle valve is positioned above the R port, the EGR vacuum modulator will close the atmosphere passage and open the EGR valve to increase the EGR gas, even if the exhaust pressure is insufficiently low.



INSPECTION OF EGR VALVE

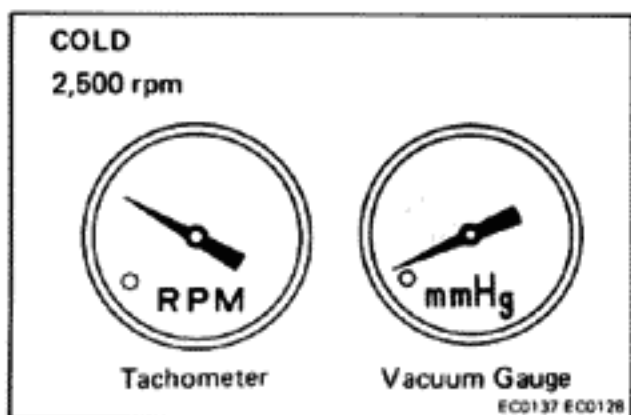
1. CHECK AND CLEAN FILTER IN EGR VACUUM MODULATOR

- Check the filter for contamination or damage.
- Using compressed air, clean the filter.



2. PREPARATION

Disconnect the vacuum hose from the EGR valve and, using a three way union, connect a vacuum gauge to it.

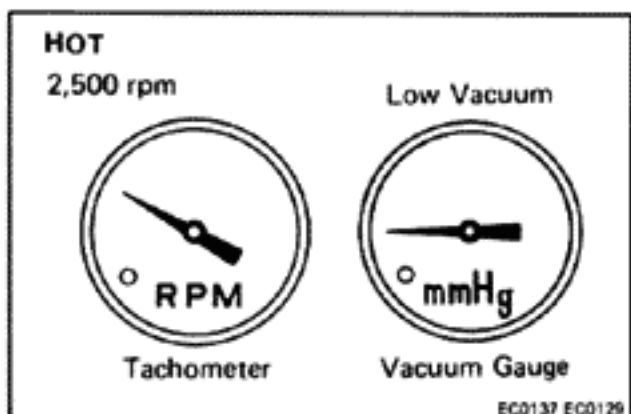


3. CHECK SEATING OF EGR VALVE

Start the engine and check that the engine starts and runs at idle.

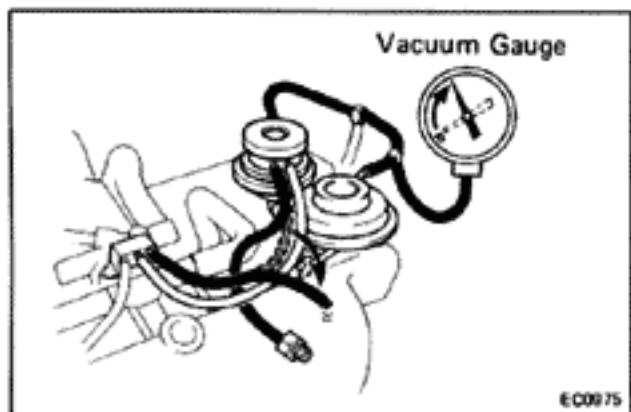
4. CHECK VSV WITH COLD ENGINE

- The coolant temperature should be below 57°C (135°F).
- Check that the vacuum gauge indicates zero at 2,500 rpm.



5. CHECK VSV AND EGR VACUUM MODULATOR WITH WARM ENGINE

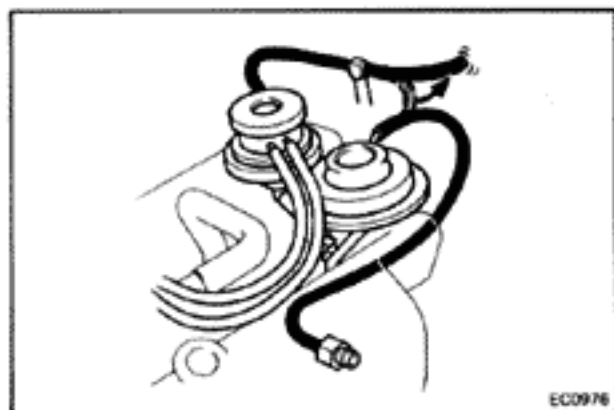
- Warm up the engine.
- Check that the vacuum gauge indicates about 70 mm Hg (2.76 in.Hg, 9.3 kPa) at 2,500 rpm.
- Check that the vacuum gauge indicates zero at idle.



- Disconnect the vacuum hose from R port of the EGR vacuum modulator and connect R port directly to the intake manifold with another hose.
- Check that the vacuum gauge indicates high vacuum at 2,500 rpm.

NOTE: As a large amount of EGR gas enters, the engine will misfire.

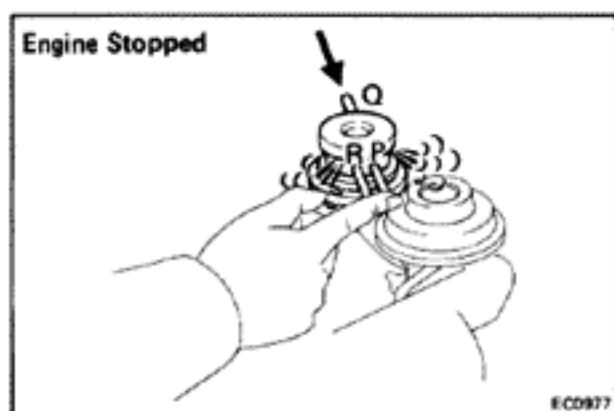
- Disconnect the vacuum gauge and reconnect the vacuum hoses to the proper locations.



6. CHECK EGR VALVE

- Apply vacuum directly to the EGR valve with the engine idling.
- Check that the engine runs rough or dies.
- Reconnect the vacuum hoses to the proper location.

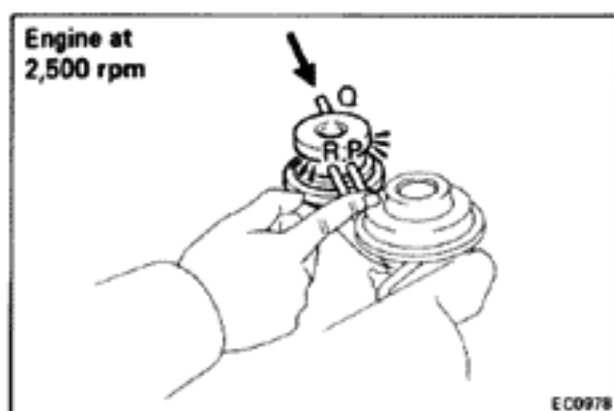
IF NO PROBLEM IS FOUND WITH THIS INSPECTION, THE SYSTEM IS OKAY; OTHERWISE INSPECT EACH PART



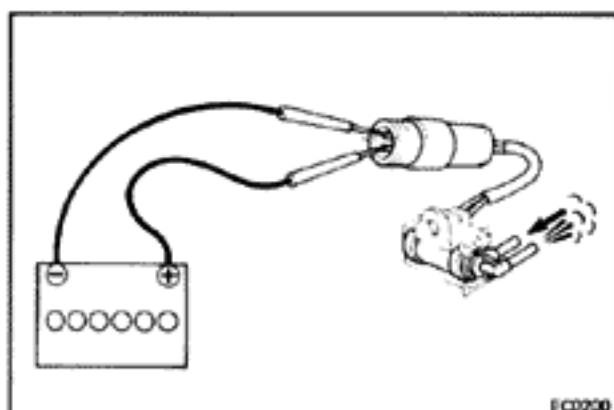
INSPECTION OF EGR VACUUM MODULATOR

CHECK EGR VACUUM MODULATOR OPERATION

- Disconnect the vacuum hoses from ports P, Q and R of the EGR vacuum modulator.
- Block ports P and R with your finger.
- Blow air into port Q. Check that the air passes through to the air filter side freely.



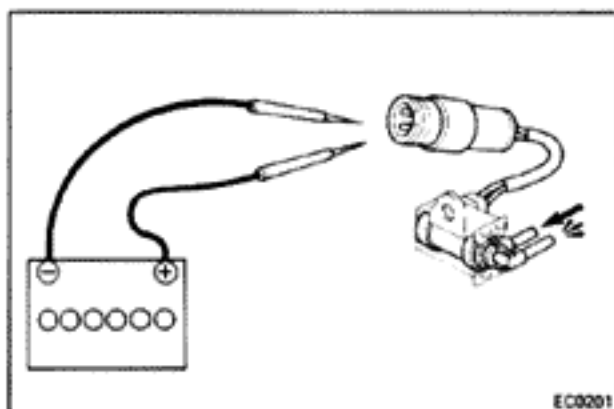
- Start the engine and maintain engine speed at 2,500 rpm.
 - Repeat the above test. Check that there is a strong resistance to air flow.
 - Disconnect the vacuum hoses to the proper locations.
- If a problem is found, replace the EGR vacuum modulator.



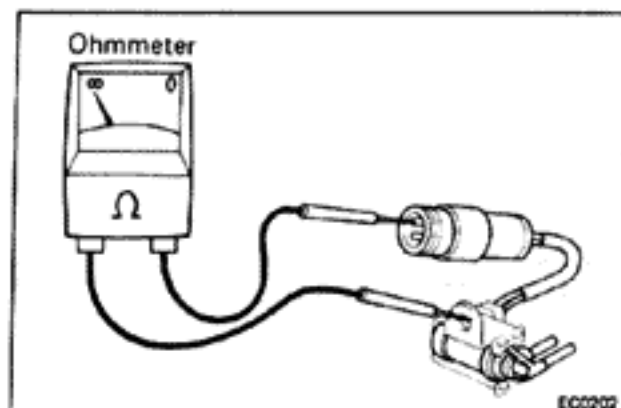
INSPECTION OF VSV

1. CHECK VACUUM CIRCUIT CONTINUITY IN THE VSV BY BLOWING AIR INTO PIPE

- Connect the VSV terminals to the battery terminals as illustrated.
- Blow air into a pipe and check that the VSV is open.



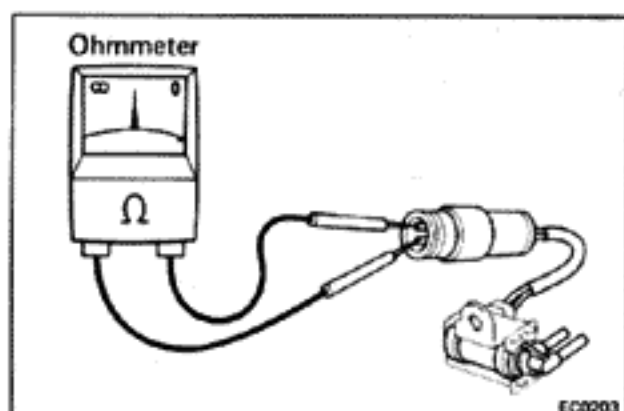
- Disconnect the battery.
 - Blow air into a pipe and check that the VSV is closed.
- If a problem is found, replace the VSV.



2. CHECK FOR SHORT CIRCUIT

Using an ohmmeter, check that there is no continuity between the terminals and the VSV body.

If there is continuity, replace the VSV.



3. CHECK FOR OPEN CIRCUIT

Using an ohmmeter, measure the resistance between the terminals.

Specified resistance: 38 — 44 Ω at 20°C (68°F)

If the resistance is not within specification, replace the VSV.

INSPECTION OF EGR VALVE

1. REMOVE EGR VALVE

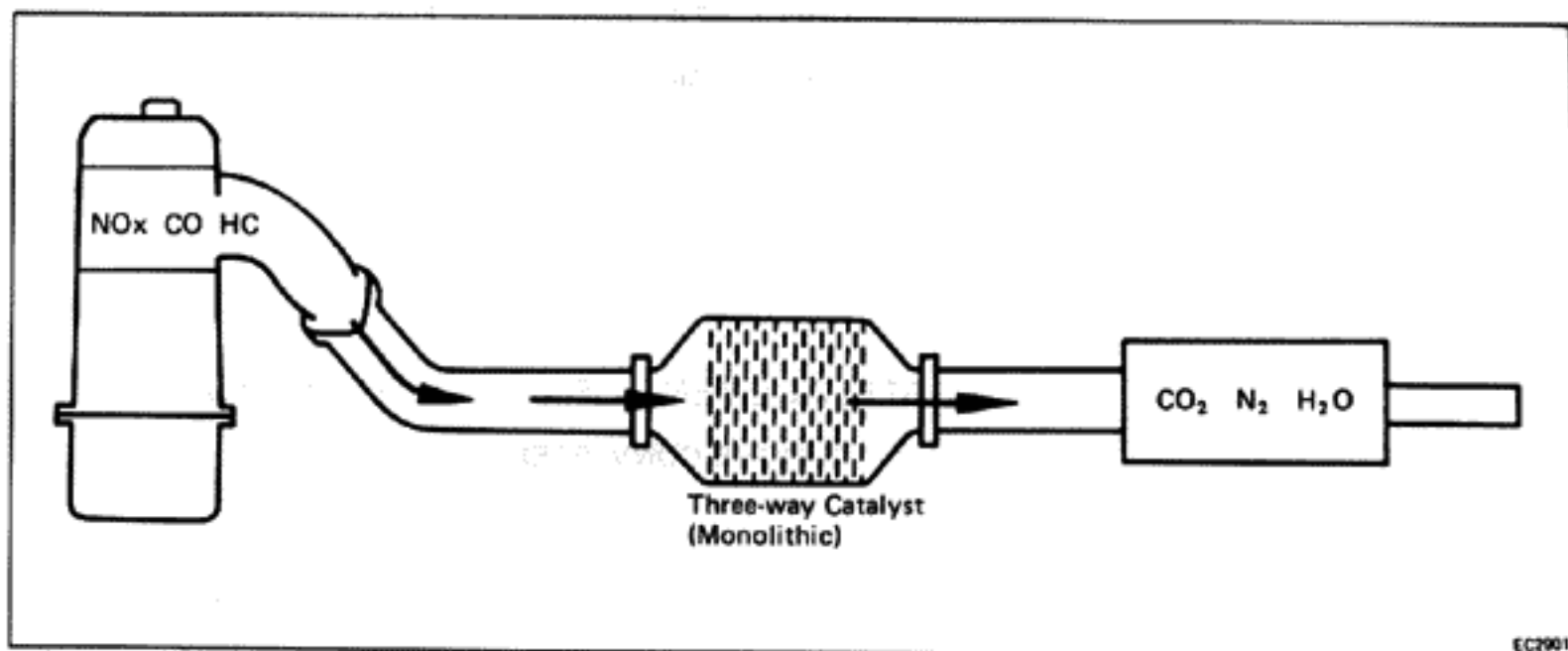
Check the valve for sticking and heavy carbon deposits. If a problem is found, replace it.

2. INSTALL EGR VALVE WITH NEW GASKET

INSPECTION OF WATER TEMP. SENSOR

(See page FI-73)

THREE-WAY CATALYST (TWC) SYSTEM



To reduce HC, CO and NO_x emissions, they are oxidized, reduced and converted to nitrogen (N₂), carbon dioxide (CO₂) and water (H₂O) by the catalyst.

Exhaust port		TWC		Exhaust Gas
HC, CO, AND NO _x	→	OXIDATION AND REDUCTION	→	CO ₂ H ₂ O N ₂

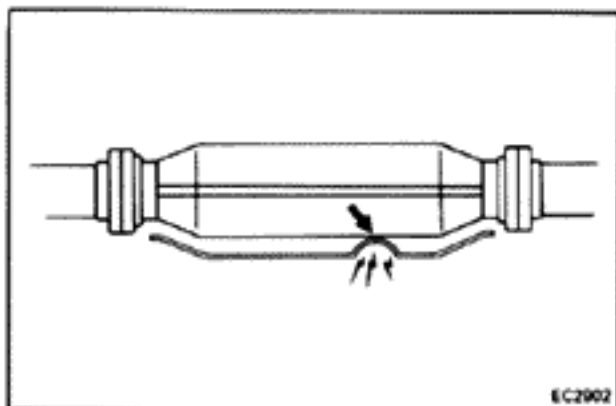
INSPECTION OF EXHAUST PIPE ASSEMBLY

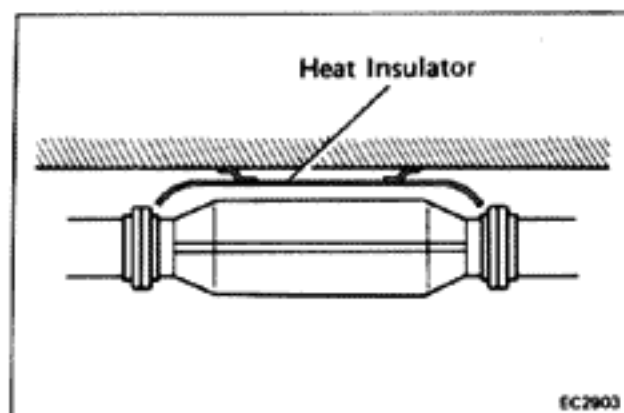
1. CHECK CONNECTIONS FOR LOOSENESS OR DAMAGE
2. CHECK CLAMPS FOR WEAKNESS, CRACKS OR DAMAGE

INSPECTION OF CATALYTIC CONVERTER

CHECK FOR DENTS OR DAMAGE

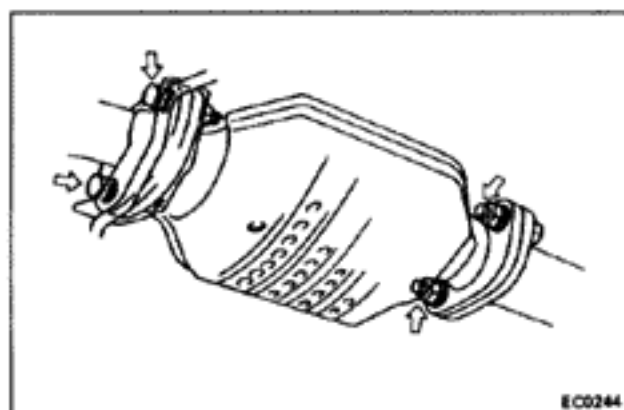
If any part of protector is damaged or dented to the extent that it contacts the catalyst, repair or replace.





INSPECTION OF HEAT INSULATOR

1. CHECK HEAT INSULATOR FOR DAMAGE
2. CHECK FOR ADEQUATE CLEARANCE BETWEEN CATALYTIC CONVERTER AND HEAT INSULATOR



REPLACEMENT OF CATALYTIC CONVERTER

1. REMOVE CONVERTER
 - (a) Jack up the vehicle.
 - (b) Check that the converter is cool.
 - (c) Remove the bolts at the front and rear of the converter.
 - (d) Remove the converter and gaskets.
2. INSTALL CONVERTER
 - (a) Place new gaskets on the converter front and rear pipes, and connect the converter to the exhaust pipes.
 - (b) Tighten the bolts.

Torque: Catalyst — Exhaust pipe
440 kg-cm (32 ft-lb, 43 N·m)

 - (c) Reinstall the bracket bolts and tighten them.