EMISSION CONTROL SYSTEMS

NOTE: TROUBLESHOOTING

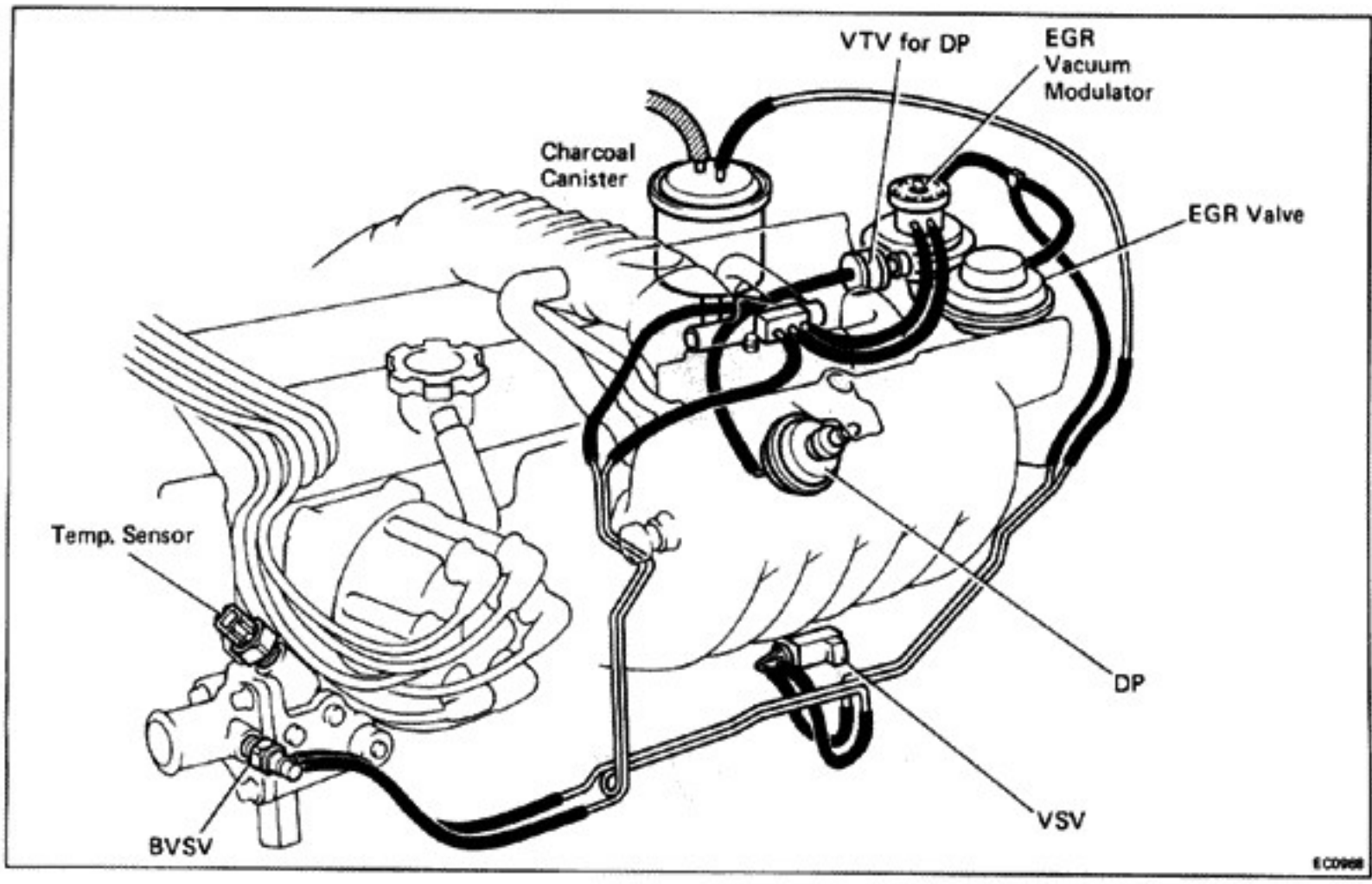
See page EM-2

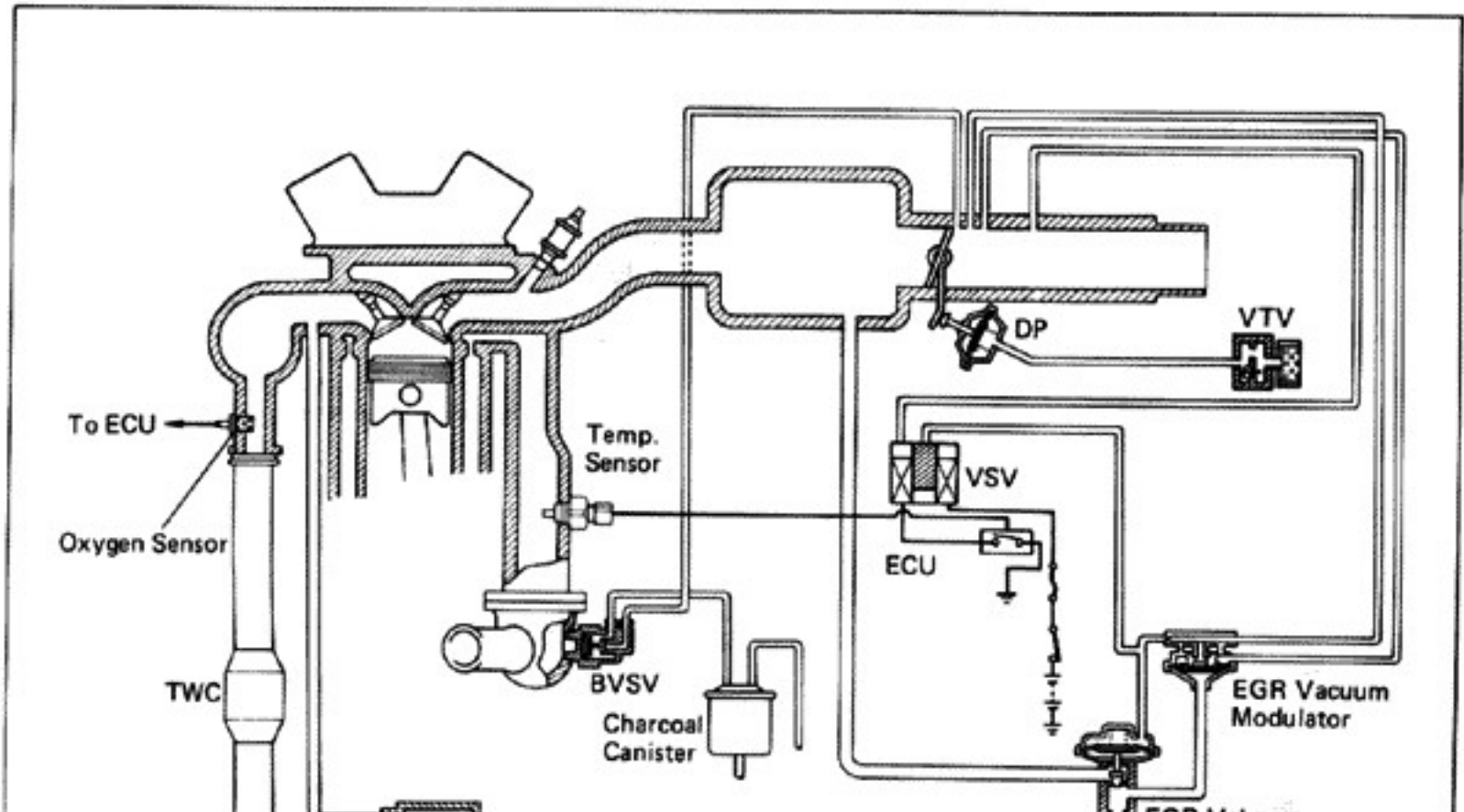
SYSTEM PURPOSE

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 NOx
Three-way catalyst	TWC	Reduces HC, CO and NOx
Electronic fuel injection*	EFI	Regulates all engine conditions for reduction of exhaust emissions

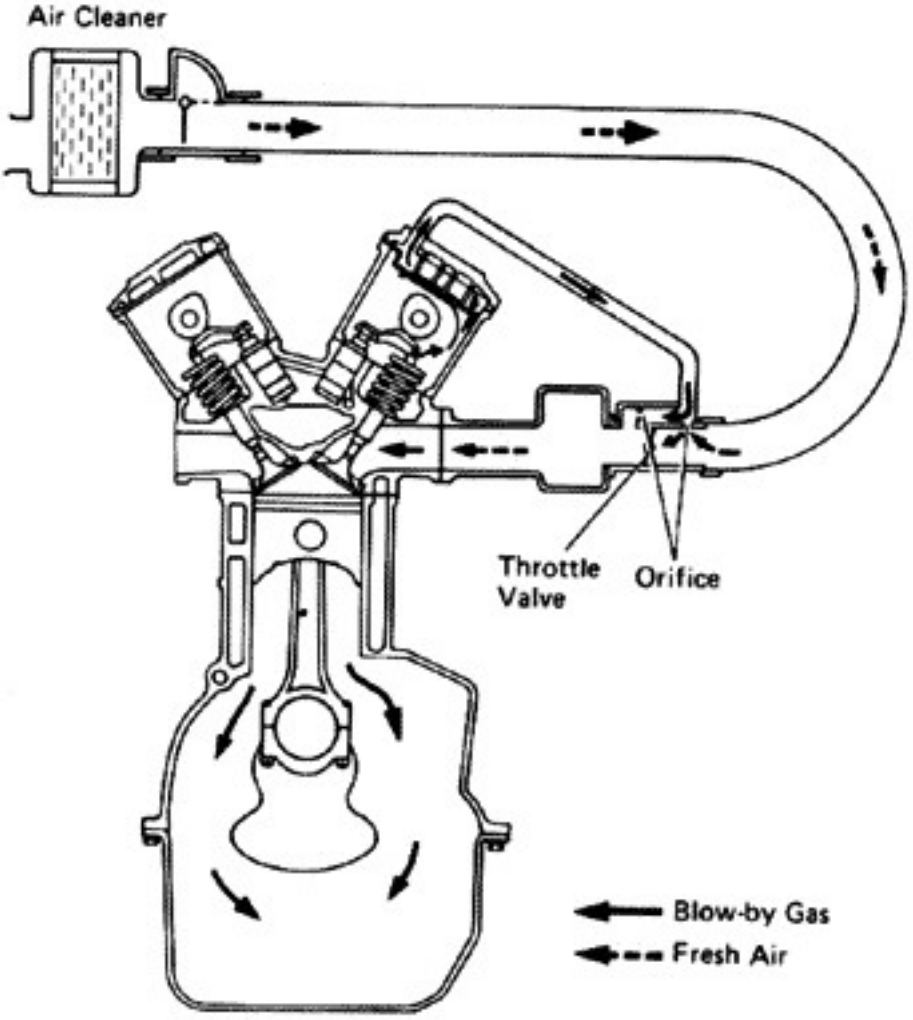
Remarks *For inspection and repair of the EFI system, refer to EFI section.

COMPONENT LAYOUT AND SCHEMATIC DRAWING

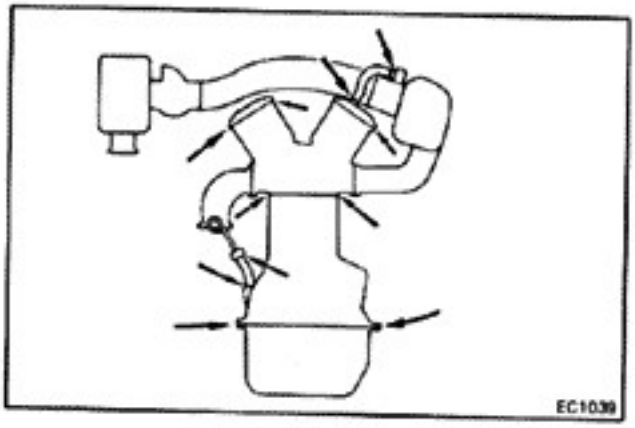




POSITIVE CRANKCASE VENTILATION (PCV) SYSTE



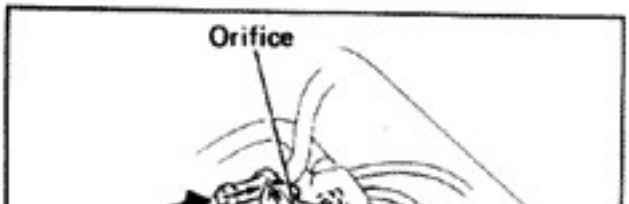
To reduce HC emission, crankcase blow-by gas (HC) is routed through two metering orifices to the intake manifold for combustion in the cylinders



INSPECTION OF PCV HOSES AND CONNECTIONS

1. **VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS**

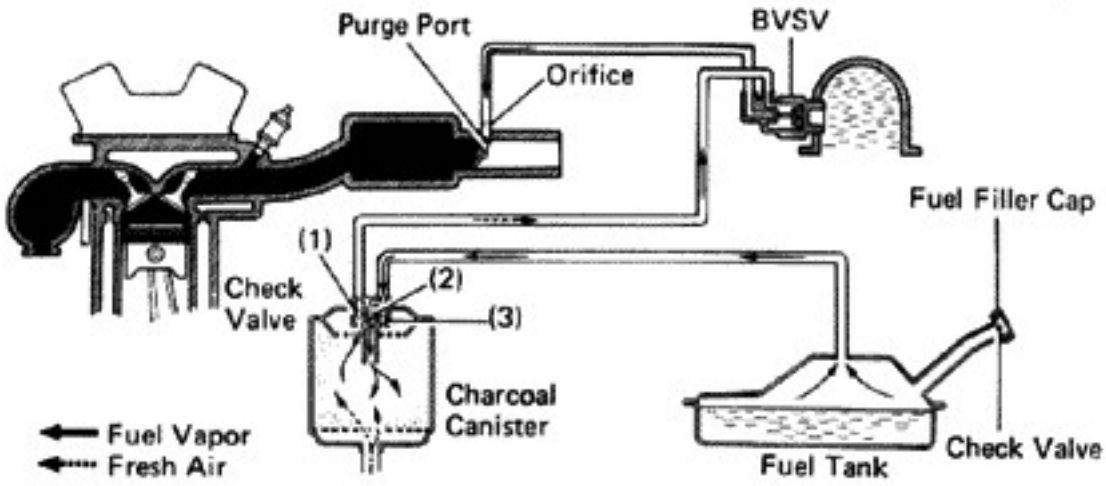
   Check for cracks, leaks or damage.



2. **CLEAN TWO ORIFICES**

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

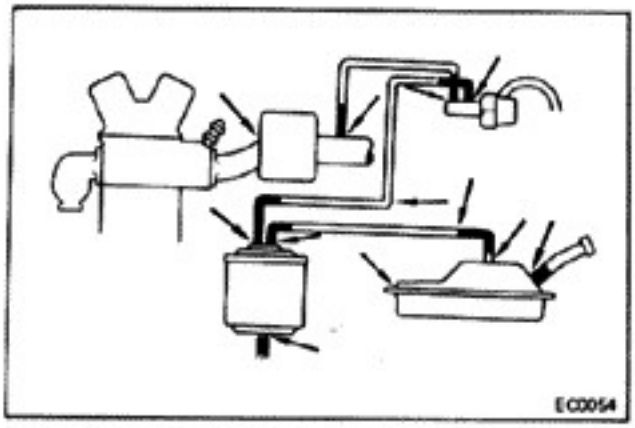
FUEL EVAPORATIVE EMISSION CONTROL (EVAP) SYSTE



EC00

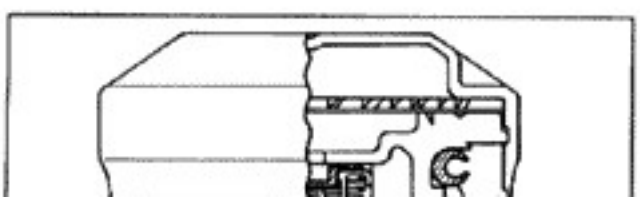
To reduce HC emission, evaporated fuel from the fuel tank is routed through the charcoal canister to the intake manifold for combustion in the cylinders

Coolant Temp.	BVSV	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 i 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 i the canister.
High vacuum in tank	—	—	—	CLOSED	OPEN	OPEN	(Air is led into the fuel tank

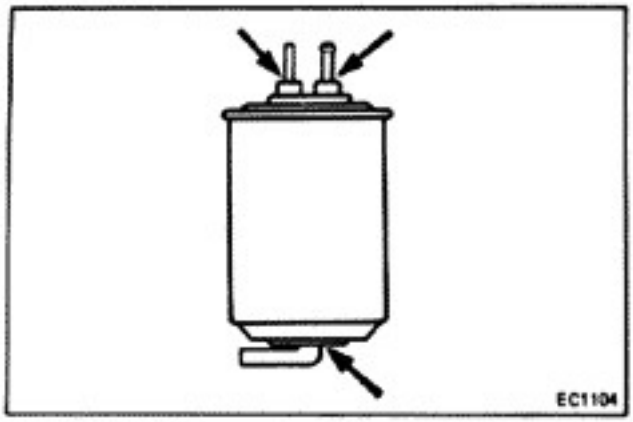


INSPECTION OF FUEL VAPOR LINES, FUEL TANK AND FILLER CAP

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.

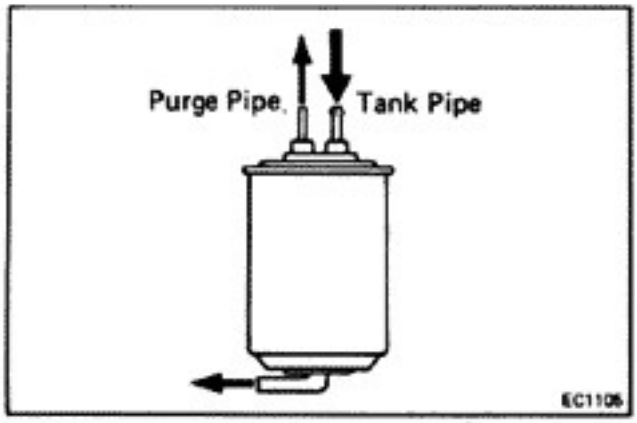


INSPECTION OF CHARCOAL CANISTER

1. **REMOVE CHARCOAL CANISTER**

2. **VISUALLY INSPECT CHARCOAL CANISTER CASE**

   Look for cracks or damage.

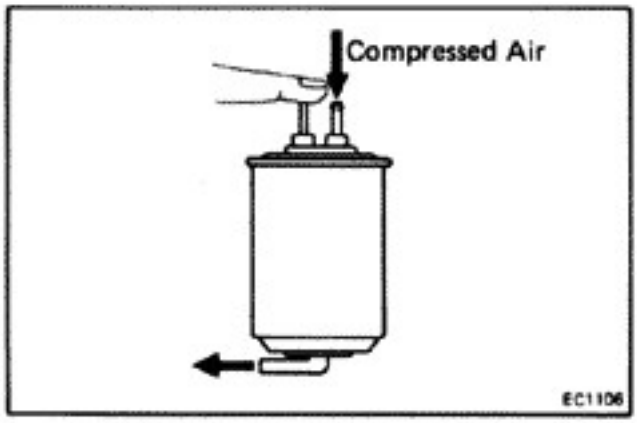


3. **CHECK FOR CLOGGED FILTER AND STUCK CHECK VALVE**

   (a) Using low pressure compressed air, blow into the ta pipe and check that the air flows without resistan from the other pipes.

   (b) Blow into the purge pipe and check that the air do not flow from the other pipes.

   If a problem is found replace the charcoal canister.

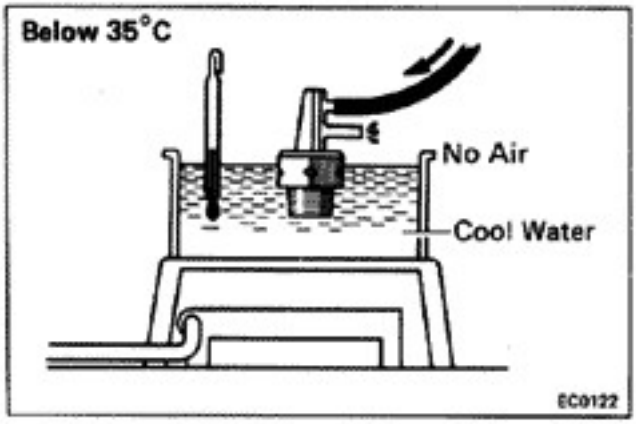


4. **CLEAN CANISTER FILTER**

   Clean the filter by blowing 3 kg/cm² (43 psi, 294 kPa) compressed air into the tank pipe, while holding the oth 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 co tainer.

(b) Remove the BVSV from the water outlet.

(c) Cool the BVSV to below 35°C (95°F) with cool wat

(d) Blow air into a pipe and check that the BVSV is close

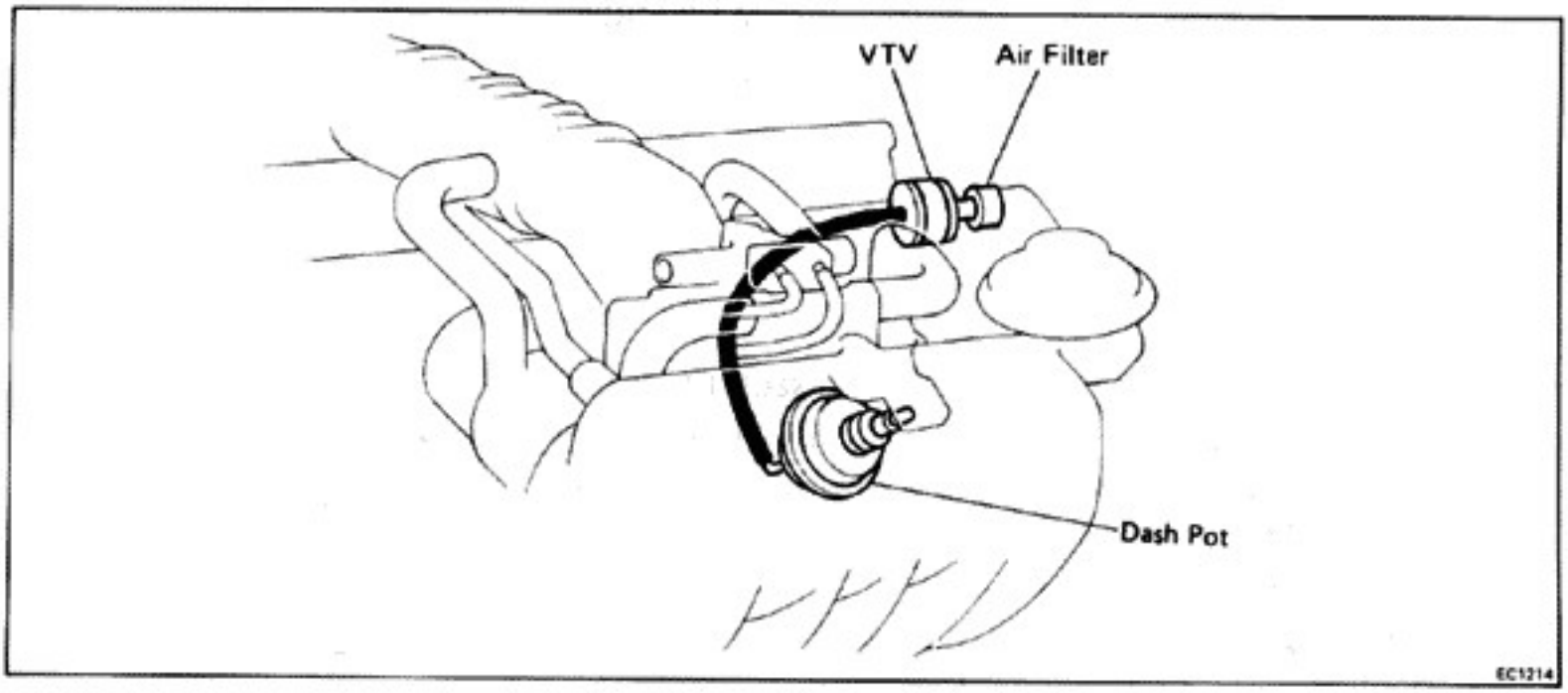
(e) Heat the BVSV to above 54°C (129°F) with h water.

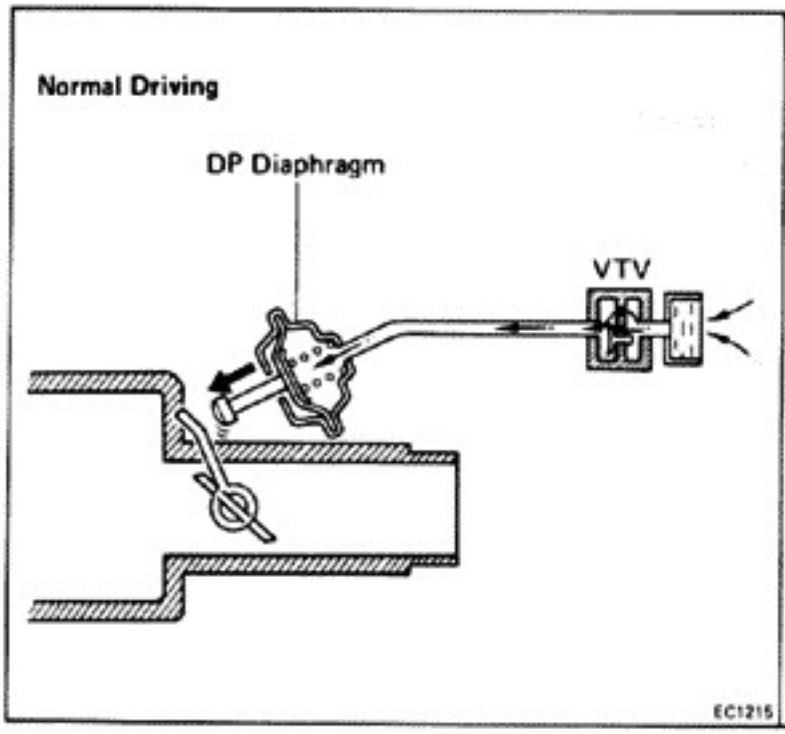
(f) Blow air into a pipe and check that the BVSV is ope

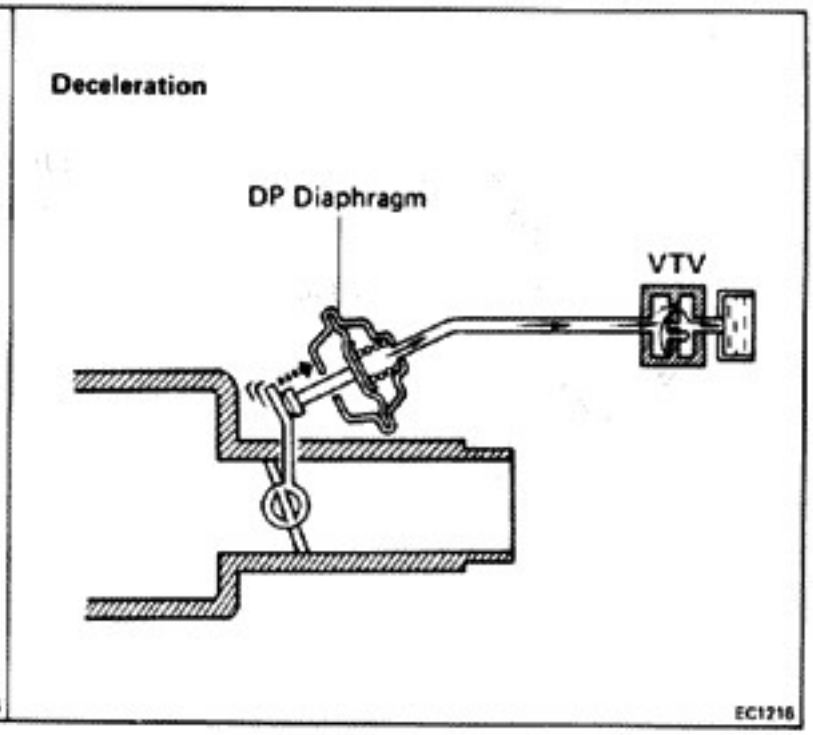
(g) Apply liquid sealer to the threads of the BVSV a install.

(h) Fill the radiator with coolant.

DASH POT (DP) SYSTEM







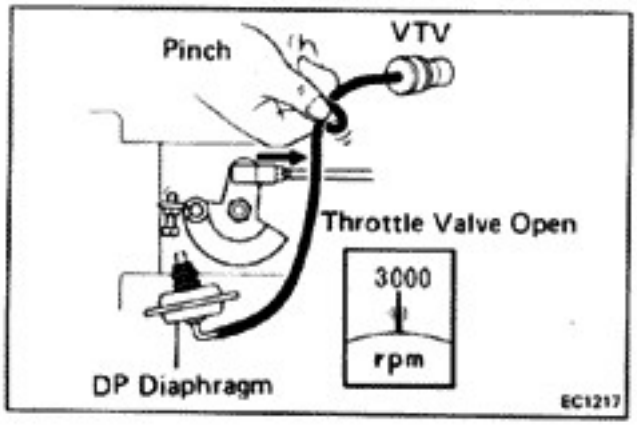
To reduce HC and CO emissions, when decelerating the dash pot opens the throttle valve slightly more than at idle. This causes the air-fuel mixture to burn completely.

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

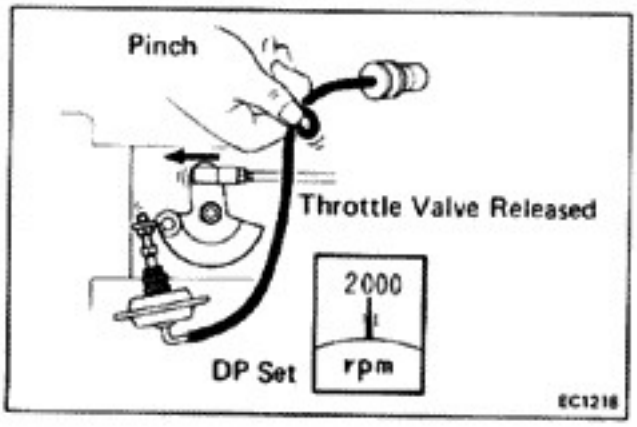
INSPECTION OF DP SYSTEM

1. **WARM UP ENGINE**

2. **CHECK IDLE SPEED**

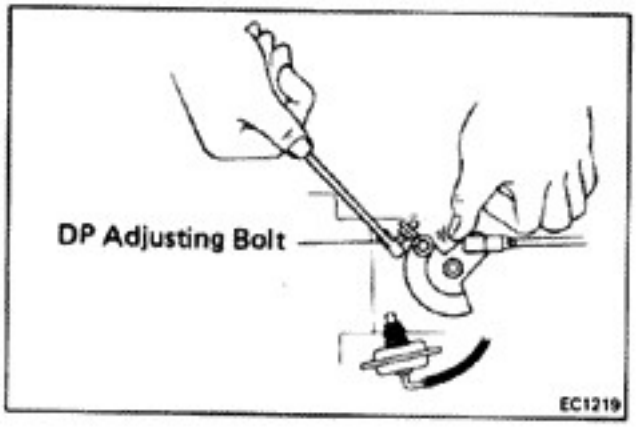


3. **CHECK DP SETTING SPEED**
   (a) Maintain engine speed at 3,000 rpm.
   (b) Pinch the vacuum hose between DP and VTV.



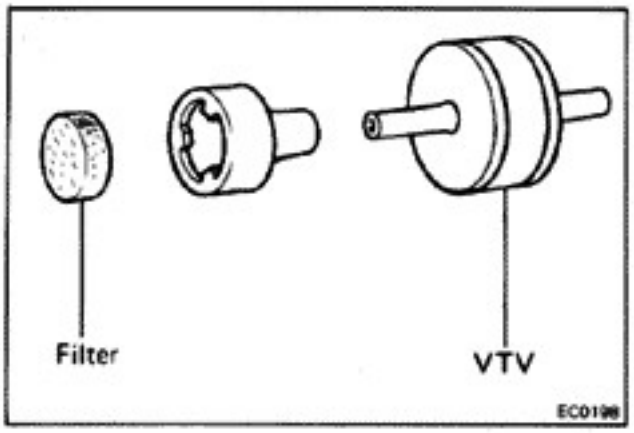
   (c) Release the throttle valve.
   (d) Check that the DP is set.

   DP setting speed: 2,000 rpm



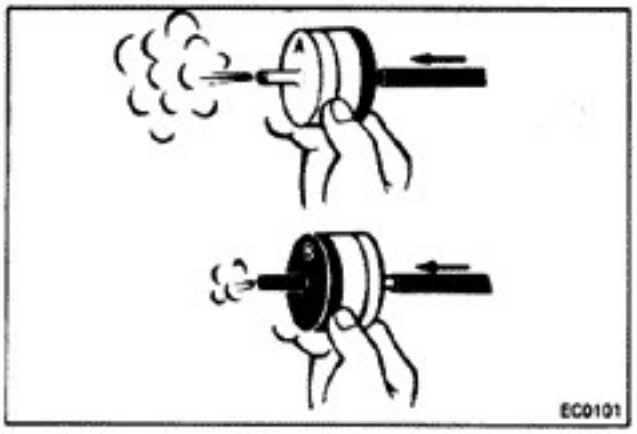
If not at specified speed, adjust with the DP adjusting bo

4. **CHECK OPERATION OF VTV**
   (a) Set the DP speed in the same procedure as above; (
   to (c).
   (b) Release the pinched hose and check that the engi
   returns to idle speed in about 1 second.



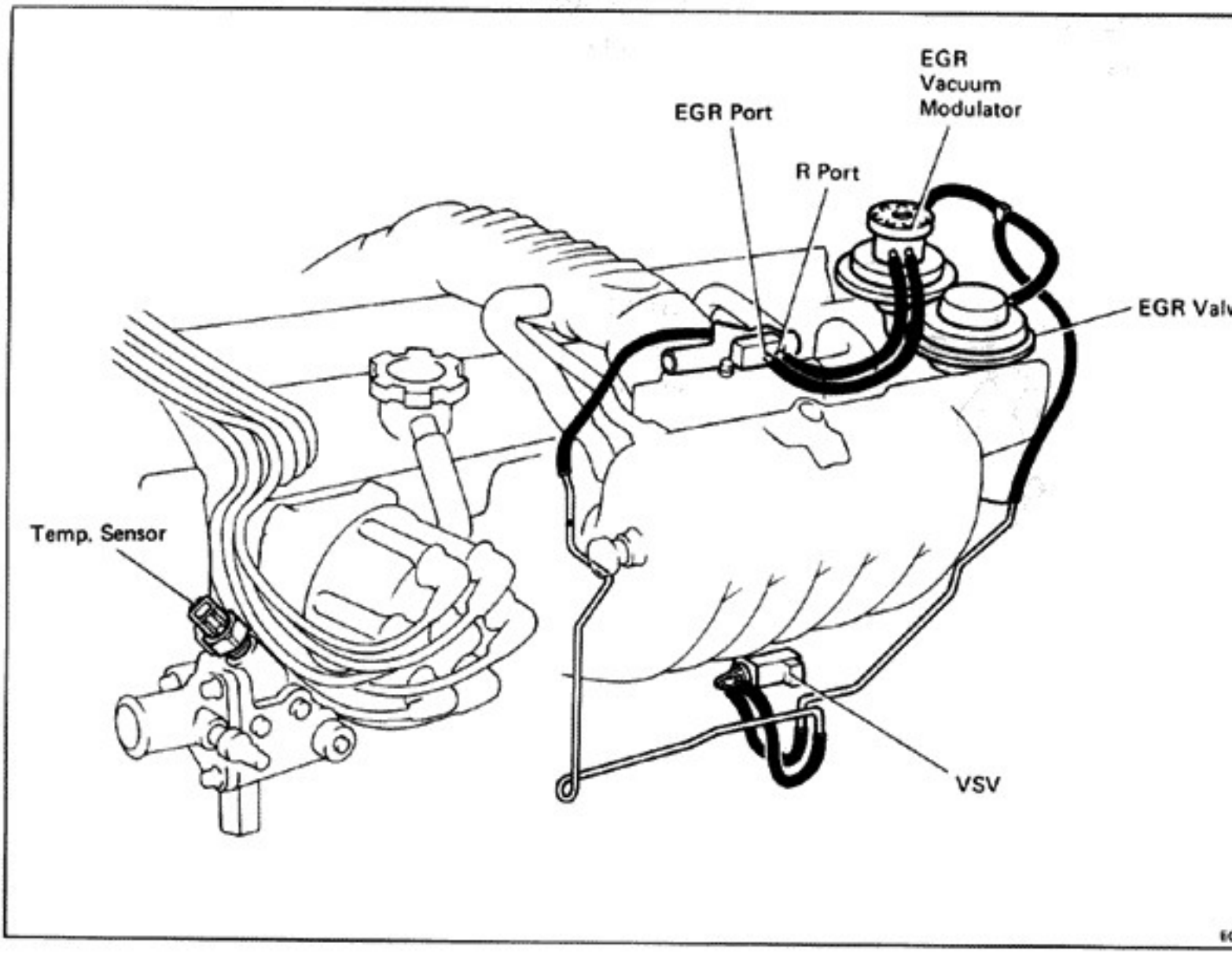
INSPECTION OF VTV

1. **CHECK AND CLEAN FILTER ON VTV**
   (a) Check the filter for contamination or damage.
   (b) Using compressed air, clean the filter.

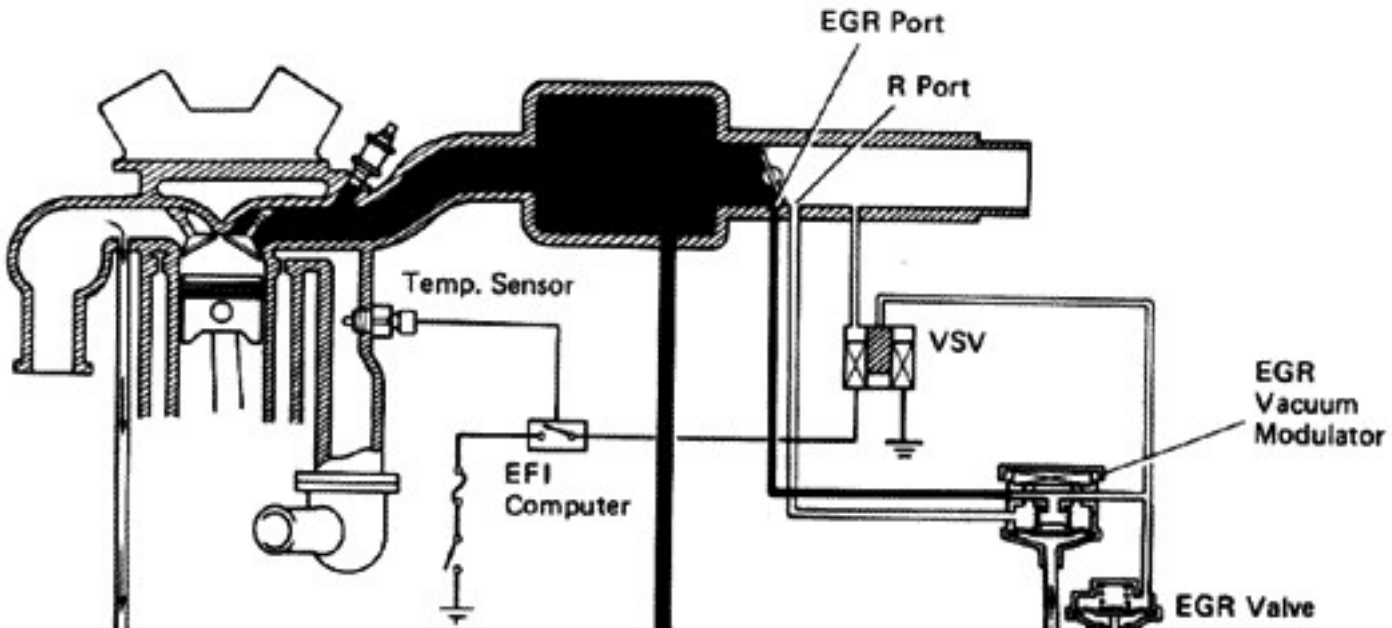


2. **CHECK VTV BY BLOWING AIR INTO EACH SIDE**
   (a) Check that air flows without resistance from B to
   (b) Check that air flows with difficulty from A to B

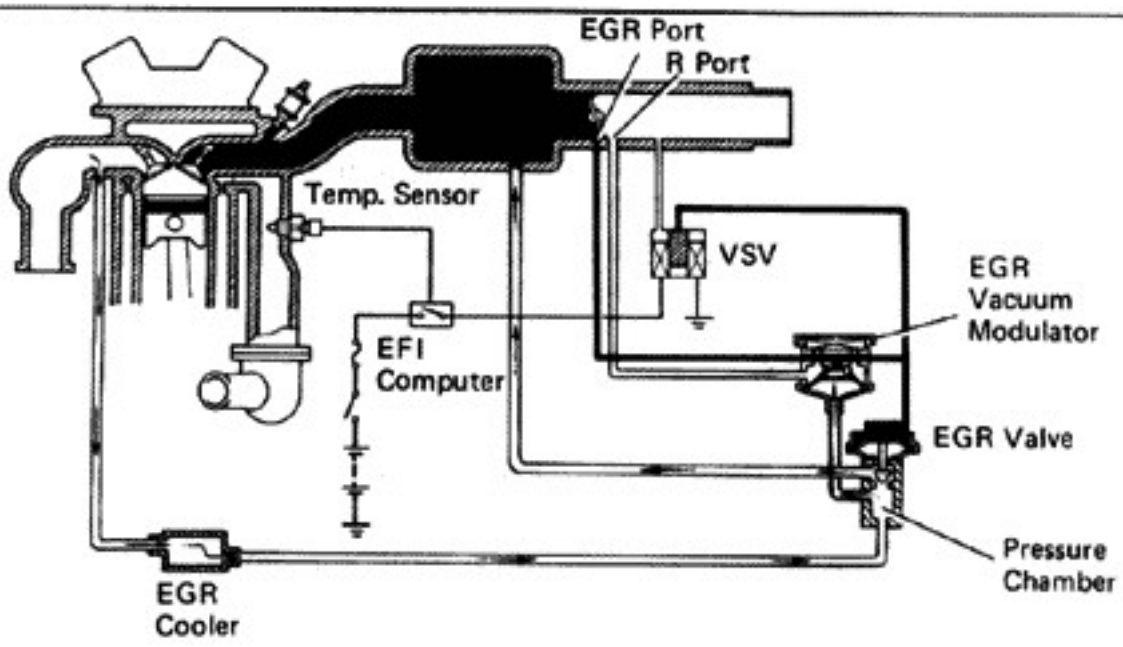
EXHAUST GAS RECIRCULATION (EGR) SYST



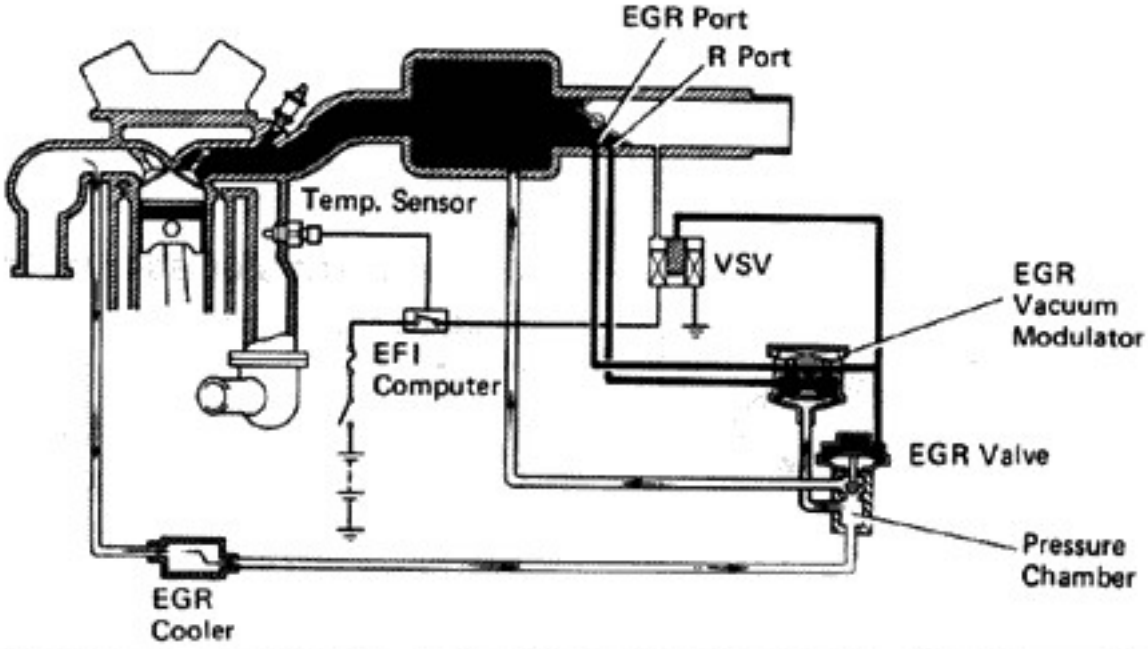
(1)



(2)



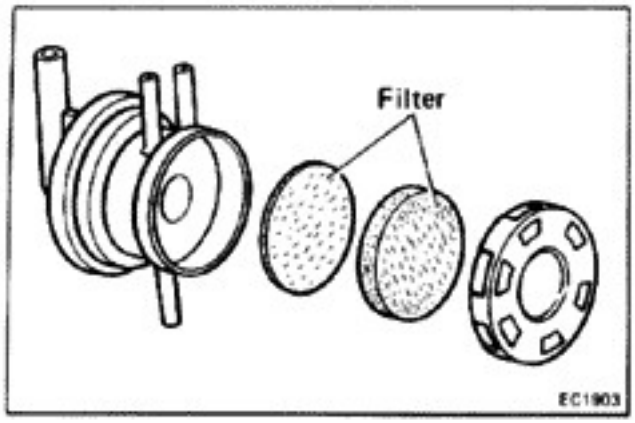
(3)



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

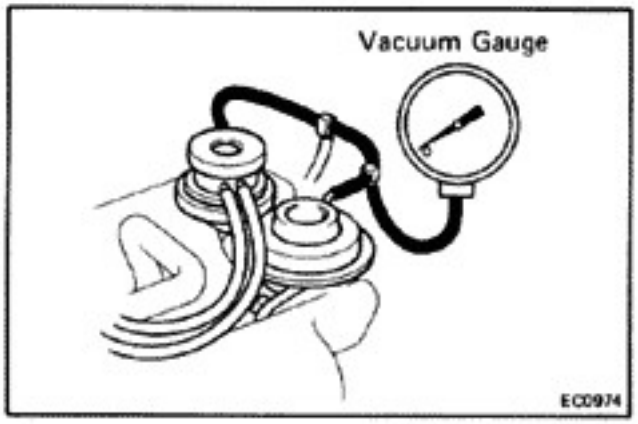
Coolant Temp.	VSV	Throttle Valve Opening Angle	Pressure in the EGR Valve Pressure Chamber		EGR Vacuum Modulator	EGR Valve	Exhaust Gas
Below 57°C (135°F)	OPEN	—	—		—	CLOSED	Not recirculated
Above 63°C (145°F)	CLOSE	Positioned below EGR port	—		—	CLOSED	Not recirculated
		Positioned between EGR port and 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 path is [illegible]

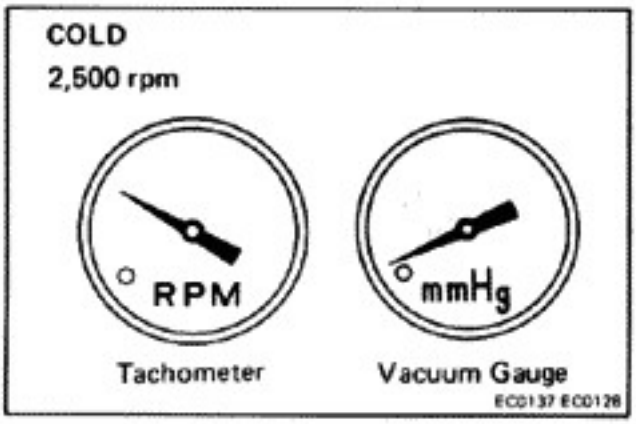


INSPECTION OF EGR VALVE

1. **CHECK AND CLEAN FILTER IN EGR VACUU MODULATOR**
   (a) Check the filter for contamination or damage.
   (b) Using compressed air, clean the filter.

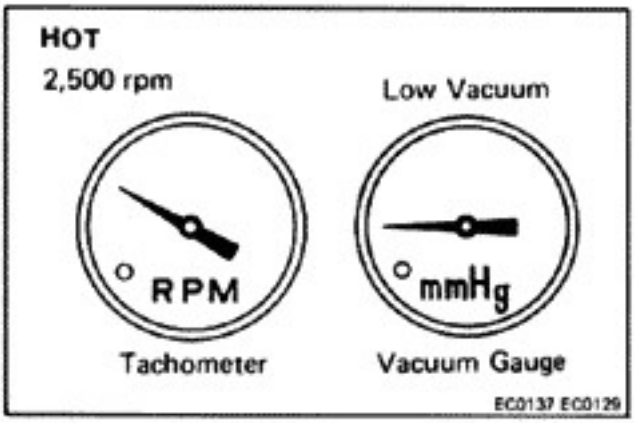


2. **PREPARATION**
   Disconnect the vacuum hose from the EGR valve and, u ing a three way union, connect a vacuum gauge to it

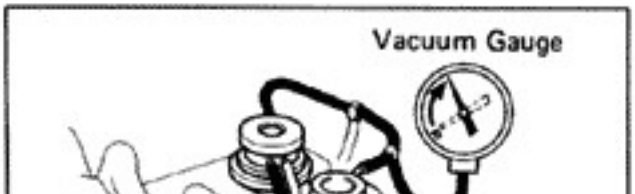


3. **CHECK SEATING OF EGR VALVE**
   Start the engine and check that the engine starts and ru at idle.

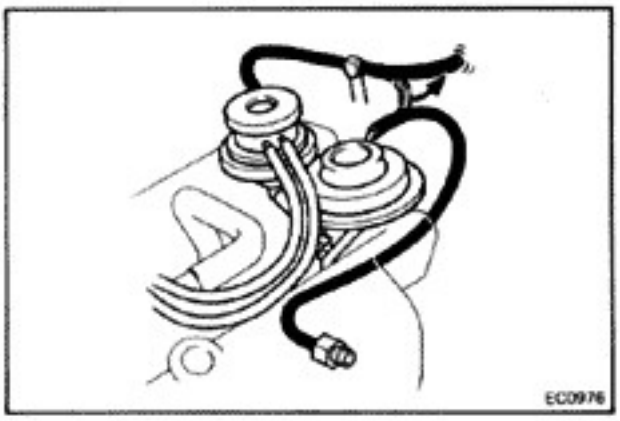
4. **CHECK VSV WITH COLD ENGINE**
   (a) The coolant temperature should be below 57 (135°F).
   (b) Check that the vacuum gauge indicates zero at 2,5 rpm.



5. **CHECK VSV AND EGR VACUUM MODULATOR WI WARM ENGINE**
   (a) Warm up the engine.
   (b) Check that the vacuum gauge indicates about 70 m Hg (2.76 in.Hg, 9.3 kPa) at 2,500 rpm.
   (c) Check that the vacuum gauge indicates zero at id



   (d) Disconnect the vacuum hose from R port of the EC vacuum modulator and connect R port directly to t intake manifold with another hose.
   (e) Check that the vacuum gauge indicates high vacuu at 2,500 rpm.



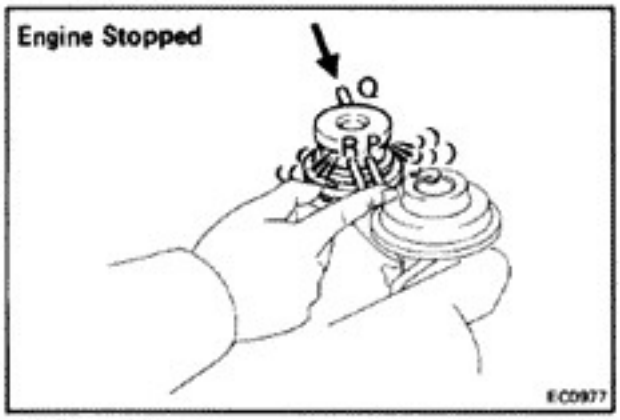
6. **CHECK EGR VALVE**

   (a) Apply vacuum directly to the EGR valve with the en gine idling.

   (b) Check that the engine runs rough or dies.

   (c) Reconnect the vacuum hoses to the proper location

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



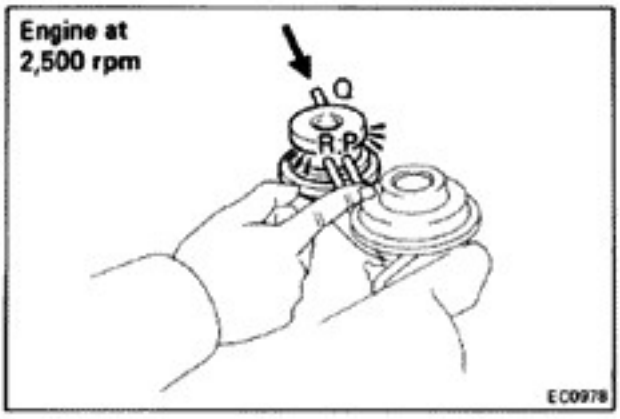
INSPECTION OF EGR VACUUM MODULATOR

CHECK EGR VACUUM MODULATOR OPERATION

(a) Disconnect the vacuum hoses from ports P, Q and of the EGR vacuum modulator.

(b) Block ports P and R with your finger.

(c) Blow air into port Q. Check that the air passes throug to the air filter side freely.

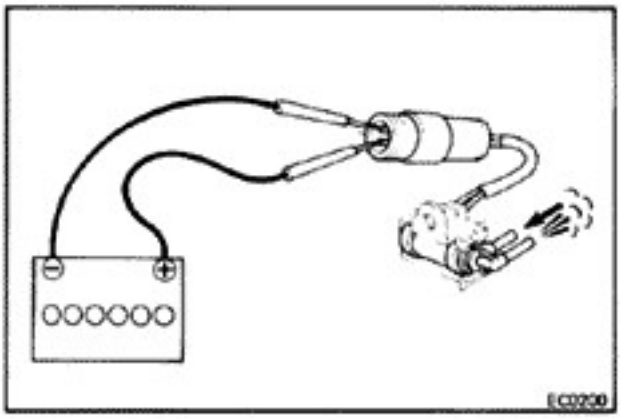


(d) Start the engine and maintain engine speed at 2,50 rpm.

(e) Repeat the above test. Check that there is a stron resistance to air flow.

(f) Disconnect the vacuum hoses to the proper location

If a problem is found, replace the EGR vacuum modulato

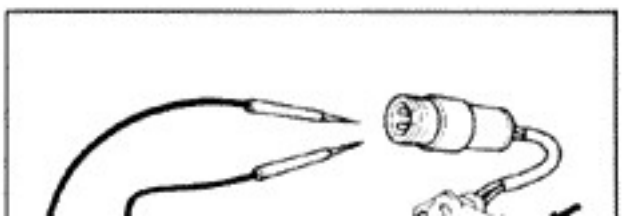


INSPECTION OF VSV

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

   (a) Connect the VSV terminals to the battery termina as illustrated.

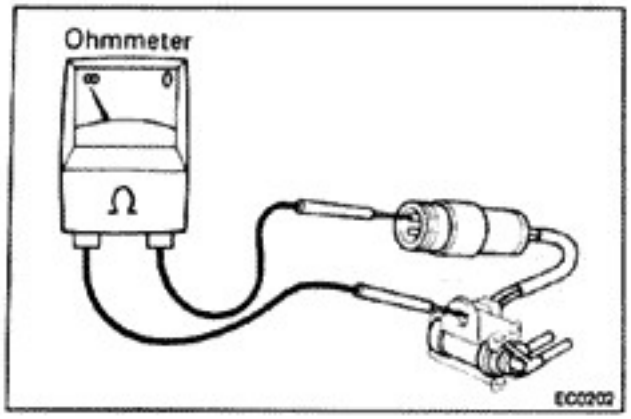
   (b) Blow air into a pipe and check that the VSV is ope



(c) Disconnect the battery.

(d) Blow air into a pipe and check that the VSV is close

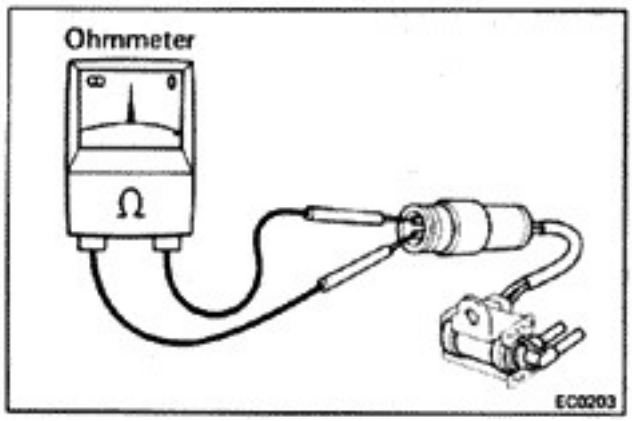
If a problem is found, replace the VSV.



2. CHECK FOR SHORT CIRCUIT

Using an ohmmeter, check that there is no continuity tween 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 terminals.

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

If the resistance is not within specification, replace VSV.

INSPECTION OF EGR VALVE

1. REMOVE EGR VALVE

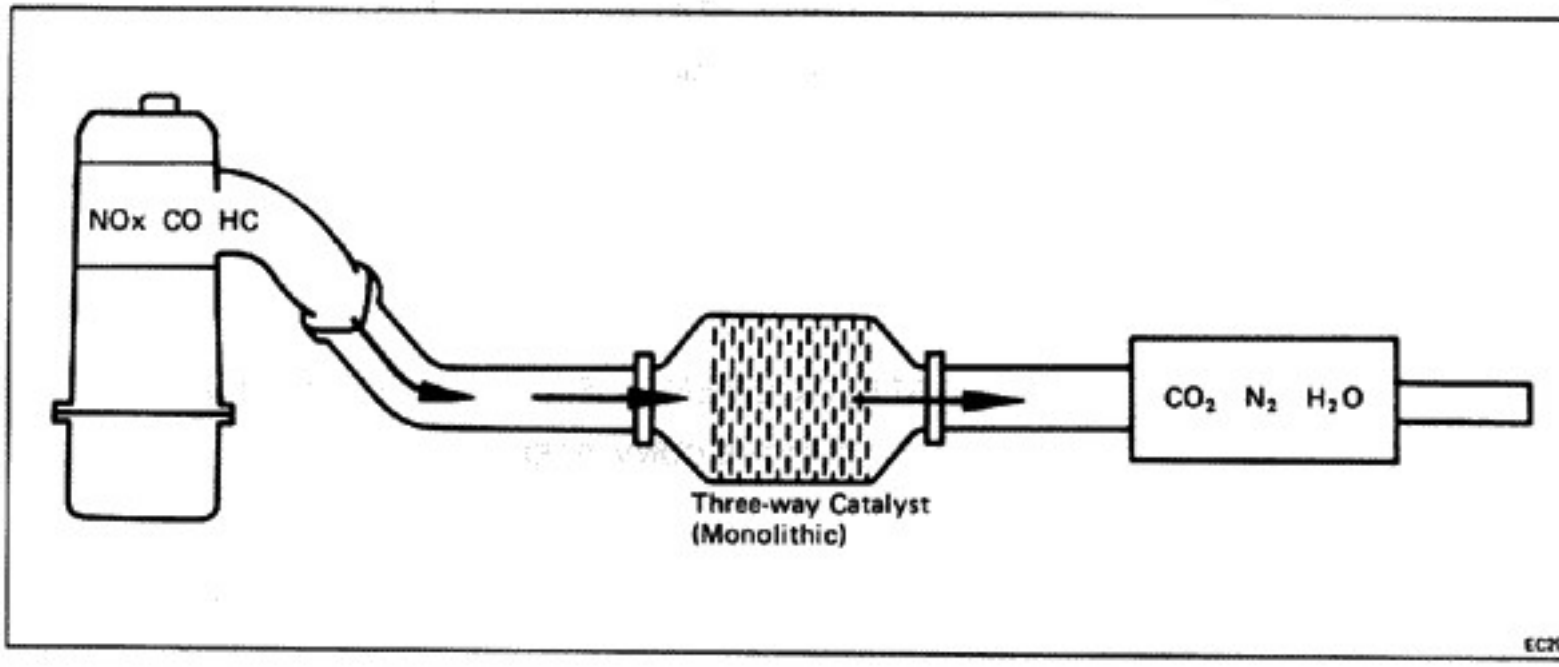
Check the valve for sticking and heavy carbon deposi
If a problem is found, replace it.

2. INSTALL EGR VALVE WITH NEW GASKET

INSPECTION OF WATER TEMP. SENSOR

(See page FI-73)

THREE-WAY CATALYST (TWC) SYSTEM

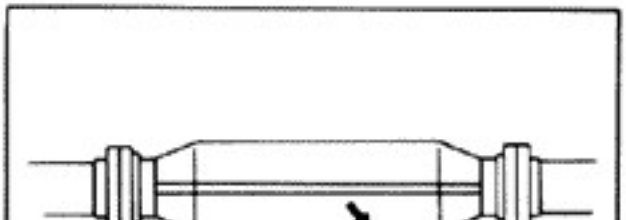


To reduce HC, CO and NOx emissions, they are oxidized, reduced and converted to nitrogen (N_2), carbon dioxide (CO_2) and water (H_2O) by the catalyst.

Exhaust port		TWC		Exhaust Gas
HC,CO, AND NOx	→	OXIDATION AND REDUCTION	→	CO_2 H_2O N_2

INSPECTION OF EXHAUST PIPE ASSEMBLY

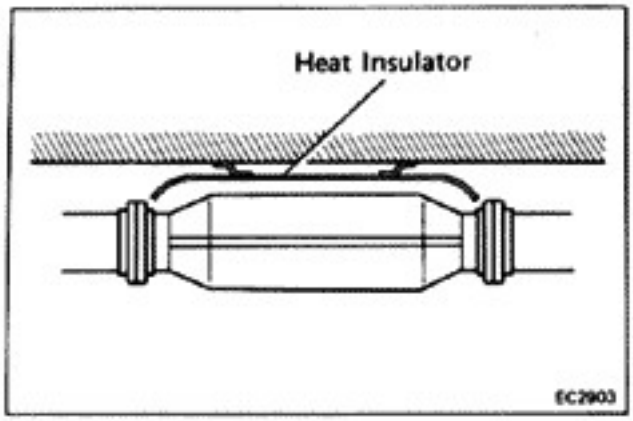
1. CHECK CONNECTIONS FOR LOOSENESS OR DAMAG
2. CHECK CLAMPS FOR WEAKNESS, CRACKS OR DAMAG



INSPECTION OF CATALYTIC CONVERTER

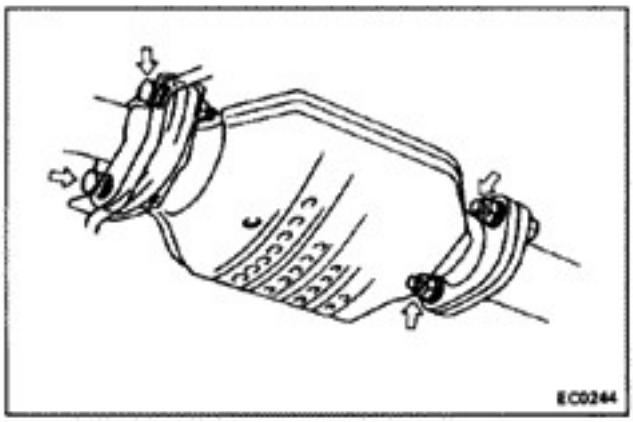
CHECK FOR DENTS OR DAMAGE

If any part of protector is damaged or dented to the exte
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 c
   verter.
   (d) Remove the converter and gaskets.
2. **INSTALL CONVERTER**
   (a) Place new gaskets on the converter front and r
   pipes, and connect the converter to the exhaust pip
   (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.