

1982 Exhaust Emission Systems

TOYOTA EXHAUST GAS RECIRCULATION

Celica, Corolla, Corona, Cressida, Land Cruiser, Pickup, Starlet, Supra, Tercel

DESCRIPTION

The exhaust gas recirculation (EGR) system is used to reduce the formation of NO_x emissions. This is accomplished by recycling metered amounts of exhaust gas back into the intake system. This reduces combustion temperature and results in fewer NO_x emissions.

Each system has a vacuum operated EGR valve and a vacuum modulator. Vacuum control valves (VCV), vacuum switching valves (VSV), bimetal vacuum switching valves (BMSV), vacuum transmitting valves (VTV) and thermostatic vacuum switching valves (TVSV) are used on some models to control EGR operation.

OPERATION

Below a predetermined temperature, when engine coolant is not warm, no exhaust gas recirculation will occur since the thermal vacuum switch is closed. Once coolant warms up, the thermal vacuum switch opens and exhaust gas recirculation is then controlled by the other components of the system.

Vacuum modulator reacts to exhaust back pressure and balances atmospheric pressure and vacuum pressure to allow or stop EGR. Vacuum control valve senses changes in intake manifold vacuum levels and will bleed off or allow vacuum to the EGR valve. The EGR cooler assists in reducing exhaust gas temperature before it is cycled into combustion chamber. This helps further reduce high temperatures which cause NO_x formation.

TESTING

EGR SYSTEM

NOTE: Before testing, clean or replace filter in vacuum modulator. All tests of EGR systems begin with cold engine.

Celica, Corona, Land Cruiser & Pickup

1) Using a 3-way connector, connect a vacuum gauge to EGR vacuum hose. Start engine and run at idle speed.

2) With coolant temperature below 86°F (30°C), vacuum gauge should indicate zero at 2000 RPM. When engine is warm, low vacuum should be present.

3) On Federal Pickup (except Cab and Chassis) and Land Cruiser, disconnect vacuum hose from EGR vacuum modulator port "R". Using a jumper hose, connect port "R" to intake manifold vacuum. Vacuum gauge should indicate high vacuum at 2000 RPM.

NOTE: Engine will misfire slightly at this time, as a large amount of EGR gas enters.

4) Reconnect all hoses and remove vacuum gauge. Apply manifold vacuum directly to EGR valve with engine idling. Engine should run rough or die.

5) On Federal Pickup (except Cab and Chassis) and Land Cruiser, disconnect vacuum hoses from pipe "E" and "F" of VSV. Run engine at idle speed. Blow air into pipe "F" checking that VSV closes.

6) Increase engine speed to above 1700 RPM. Blow air into pipe "F" checking that VSV opens. Reconnect vacuum hoses.

7) If system performed as described, it is operating correctly. If not, test individual components and repair or replace as necessary.

Fig. 1: Cab & Chassis & Calif. Pickup, Celica & Corona EGR System

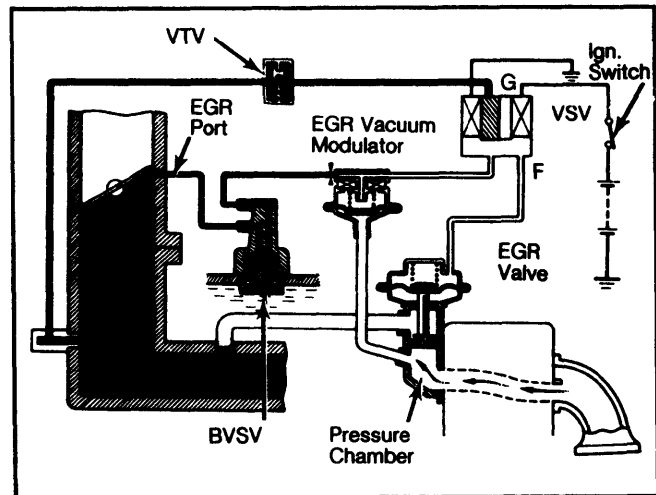


Fig. 2: Federal Pickup EGR System

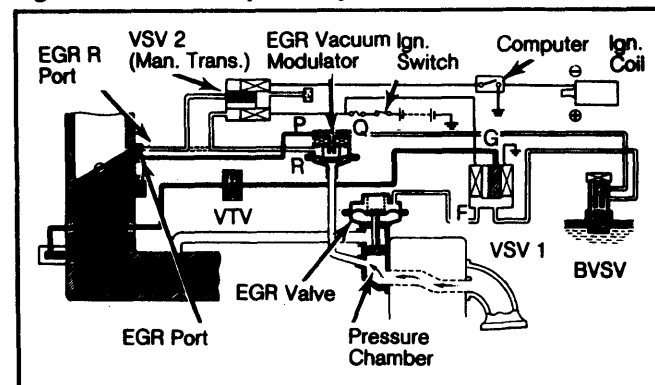
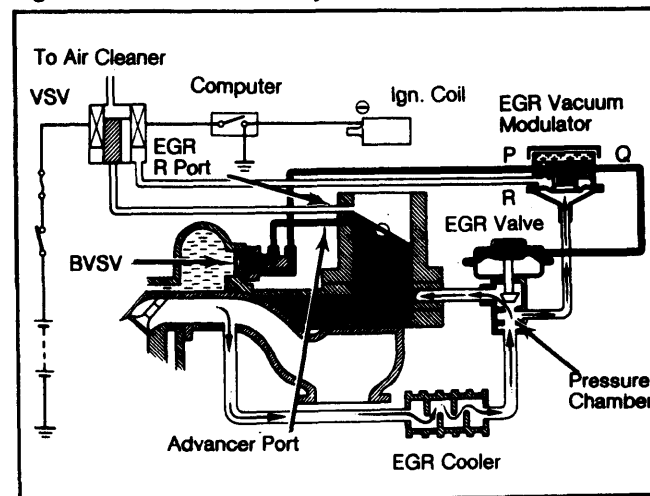


Fig. 3: Land Cruiser EGR System



TOYOTA EXHAUST GAS RECIRCULATION (Cont.)

Corolla

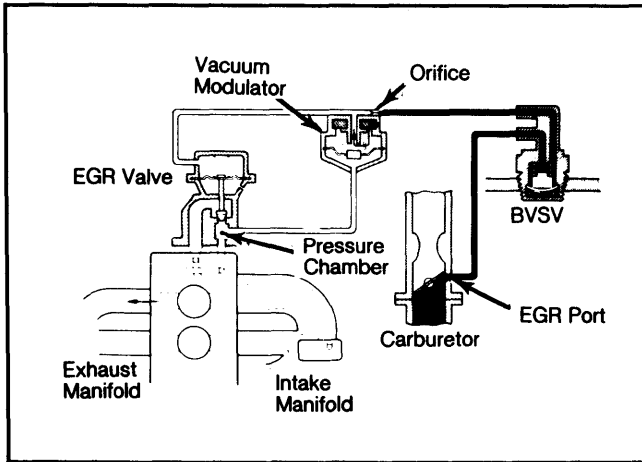
1) Using a 3-way connector, connect a vacuum gauge to vacuum hose between EGR valve and EGR vacuum modulator. Start engine and run at idle speed.

2) With coolant temperature below 104°F (40°C), increase engine speed to 3000 RPM. Vacuum gauge should indicate zero.

3) Warm up engine to normal operating temperature. Vacuum gauge should indicate low vacuum at 3000 RPM. Apply manifold vacuum directly to EGR valve with engine idling. Engine should run rough or die.

4) Remove gauge and reconnect hose. If system performed as described, it is operating correctly. If not, test individual components and repair or replace as necessary.

Fig. 4: Corolla EGR System



Cressida

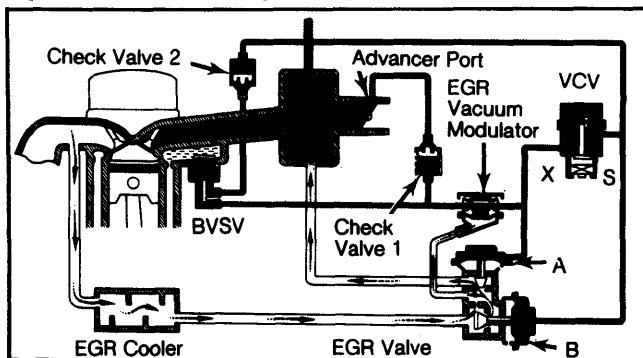
1) Disconnect vacuum hose from EGR valve "A" and connect a vacuum gauge to it. Disconnect and plug vacuum hose from VCV port "S".

2) Start engine and run at idle speed. With coolant temperature below 122°F (50°C), vacuum gauge should indicate zero at 2000 RPM. As engine warms up, vacuum gauge should indicate high vacuum. If not, check BSV and modulator.

3) Maintain engine speed at 2000 RPM. Reconnect hose to VCV port "S". Check that vacuum gauge indicates zero for 25-40 seconds. If not, check VCV. Remove gauge and reconnect hoses.

4) Stop engine and remove EGR modulator. Plug the gas hose from EGR valve to modulator. Start

Fig. 5: Cressida EGR System



engine and race it once, then apply vacuum directly to EGR valve with engine idling. Engine should idle rough or die. If not, check EGR valve or passage.

Starlet & Tercel

1) Using a 3-way connector, connect a vacuum gauge to EGR vacuum hose. Start engine and run at idle speed.

2) With coolant temperature below 106°F (41°C) on Starlet or 122°F (50°C) on Tercel, vacuum gauge should indicate zero at 2000 RPM on Starlet or 2500 RPM on Tercel. When engine is warm, low vacuum should be present.

3) Disconnect vacuum hose from EGR vacuum modulator port "R". Using a jumper hose, connect port "R" to intake manifold vacuum. Vacuum gauge should indicate high vacuum at 2000 RPM on Starlet or 2500 RPM on Tercel.

NOTE: Engine will misfire slightly at this time, as a large amount of EGR gas enters.

4) On Tercel, disconnect and plug vacuum hose from port "S" of EGR vacuum modulator. Using a jumper hose, connect port "S" to intake manifold vacuum. Vacuum gauge should indicate low vacuum at 2500 RPM.

5) On all models, remove gauge and reconnect hoses. If system performed as described, it is operating correctly. If not, test individual components and repair or replace as necessary.

Fig. 6: Starlet EGR System

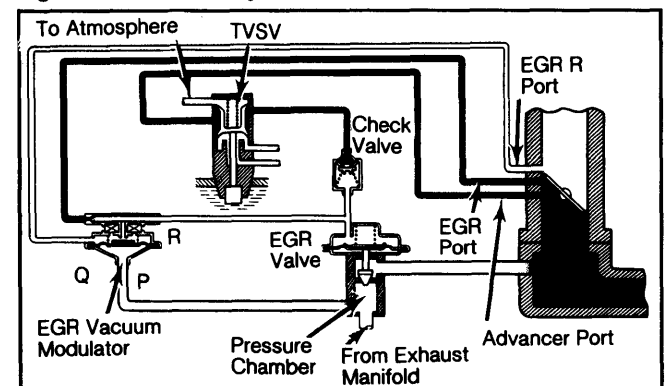
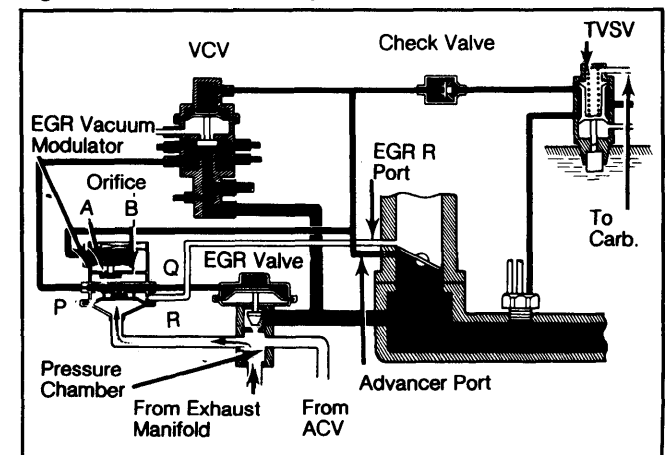


Fig. 7: Calif. Tercel EGR System



TOYOTA EXHAUST GAS RECIRCULATION (Cont.)

BVSV SWITCHING TEMPERATURES

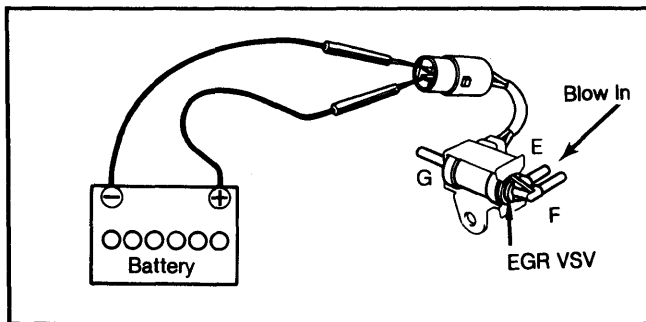
Application	Closed Below °F (°C)	Open Above °F (°C)
Celica, Corona, Land Cruiser & Pickup	86 (30)	111 (44)
Corolla	104 (40)	129 (54)
Cressida	122 (50)	147 (64)
Supra	113 (45)	147 (64)

VACUUM SWITCHING VALVE (VSV)

Celica, Corona, Land Cruiser & Pickup

1) Connect battery voltage to VSV terminals as shown in Fig. 11. Blow air into port "E" checking that air comes out port "F". Disconnect battery and repeat test. Air should come out port "G".

Fig. 11: Vacuum Switching Valve (VSV) Test Connections



2) Using an ohmmeter, check that there is no continuity between positive terminal and body of VSV. Resistance between terminals where voltage was applied should measure 38-43 ohms at room temperature.

THERMOSTATIC VACUUM SWITCHING VALVE (TVSV)

Starlet

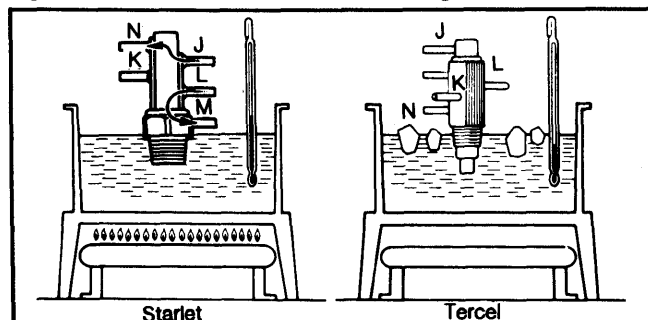
1) Drain coolant from radiator and remove TVSV. Place threaded end of valve in container of water with thermometer. With temperature below 106°F (41°C), check that air flows from port "J" to port "N" and does not flow from port "L" to port "N". See Fig. 12.

2) Heat water to above 131°F (55°). Check that air flows from port "J" to port "K" and from port "L" to port "M". If TVSV does not operate as described, replace it.

Tercel

1) Drain coolant from radiator and remove TVSV. Place threaded end of valve in container of ice

Fig. 12: Thermostatic Vacuum Switching Valve (TVSV) Test



Starlet and Tercel models.

water with thermometer. With temperature below 45°F (7°C), check that air flows from port "J" to port "M" and "L" and from port "K" to port "N". See Fig. 12.

2) Heat water to 63-122°F (17-50°C). Check that air flows from port "K" to port "N" and "L" and from port "J" to port "M".

3) Continue heating water to above 154°F (68°C). Check that air flows from port "K" to port "M" and "L" and does not flow from port "J" to any other port. If TVSV does not operate as described, replace it.