

FUEL EVAPORATION SYSTEM

1988 Toyota Celica

1988 EXHAUST EMISSIONS SYSTEMS
Toyota Fuel Evaporation System

DESCRIPTION

The fuel evaporation system is designed to prevent the escape of raw fuel vapor into the atmosphere. Components include a sealed fuel tank with integral expansion chamber, vacuum relief filler cap, charcoal canister(s) with 2 or 3 integral check valves, bi-metallic vacuum switching valve (Camry, Celica, fuel injected Corolla, Cressida, Land Cruiser, MR2, and Supra), restrictor (Celica GT-S manual transaxle).

Carbureted Corolla, Pickup, 4Runner and all Tercel models also use an outer vent control valve, vacuum switching valve, emission computer and temperature switch. Additional components include a throttle position switch (carbureted Corolla), vapor separator (Land Cruiser and Tercel), vacuum control valve (Land Cruiser), vacuum switch (Tercel), speed sensor (carbureted Pickup and 4Runner) and check valve (Van). All models use connecting lines and hoses.

When fuel vapor pressure builds in tank, a check valve in canister opens and vapor flows into canister for storage. When vacuum forms in tank, a check valve in canister opens and stored vapor is drawn into fuel tank. If fuel tank vacuum should increase above a preset level, a vacuum relief valve opens in filler cap and fresh air flows into fuel tank to prevent tank collapse.

OPERATION

CARBURETED

Corolla, Pickup, 4Runner & Tercel

When engine is not running, fuel tank vapor flows through vent line into canister or storage. Float bowl vapor flows through outer vent control valve into canister for storage when ignition is off.

When engine is running at 1600-1900 RPM (speeds greater than 16 MPH on Pickup and 4Runner) with coolant temperature greater than 131°F (55°C), the vacuum switching valve (VSV) opens to allow canister vapor to be drawn into intake manifold for burning. The VSV is an electrically operated solenoid-type valve that is opened and closed by the emission computer. The computer opens and closes the valve based upon input signals from the speed sensor and/or temperature switch.

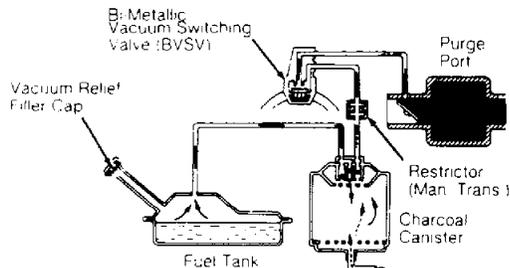


Fig. 1: Camry, Celica & Celica GT-S Fuel Evaporation System
Courtesy of Toyota Motor Sales, U.S.A., Inc.

FUEL INJECTED

Land Cruiser

Evaporation system is controlled by a bi-metallic vacuum switching valve (BVSV) and a vacuum control valve (VCV). At low engine temperature, ported vacuum to the VCV is cut off and no fuel vapor is drawn into intake manifold.

When the engine is warmed to normal operating temperature, BVSV opens and allows ported vacuum to reach the VCV. When engine is running at speeds greater than idle, the ported vacuum signal opens VCV and manifold vacuum purges canister, drawing vapor into combustion chambers for burning.

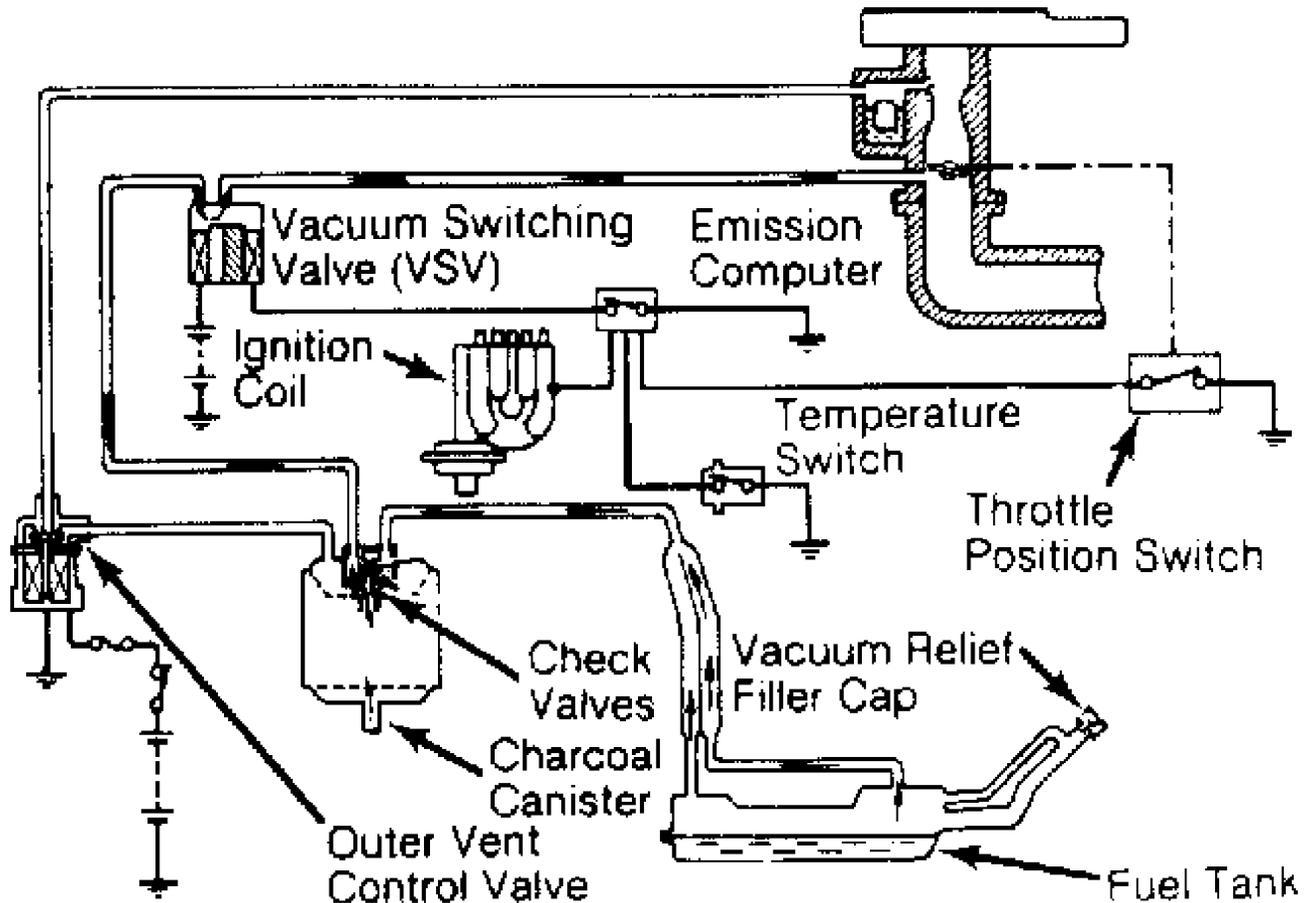


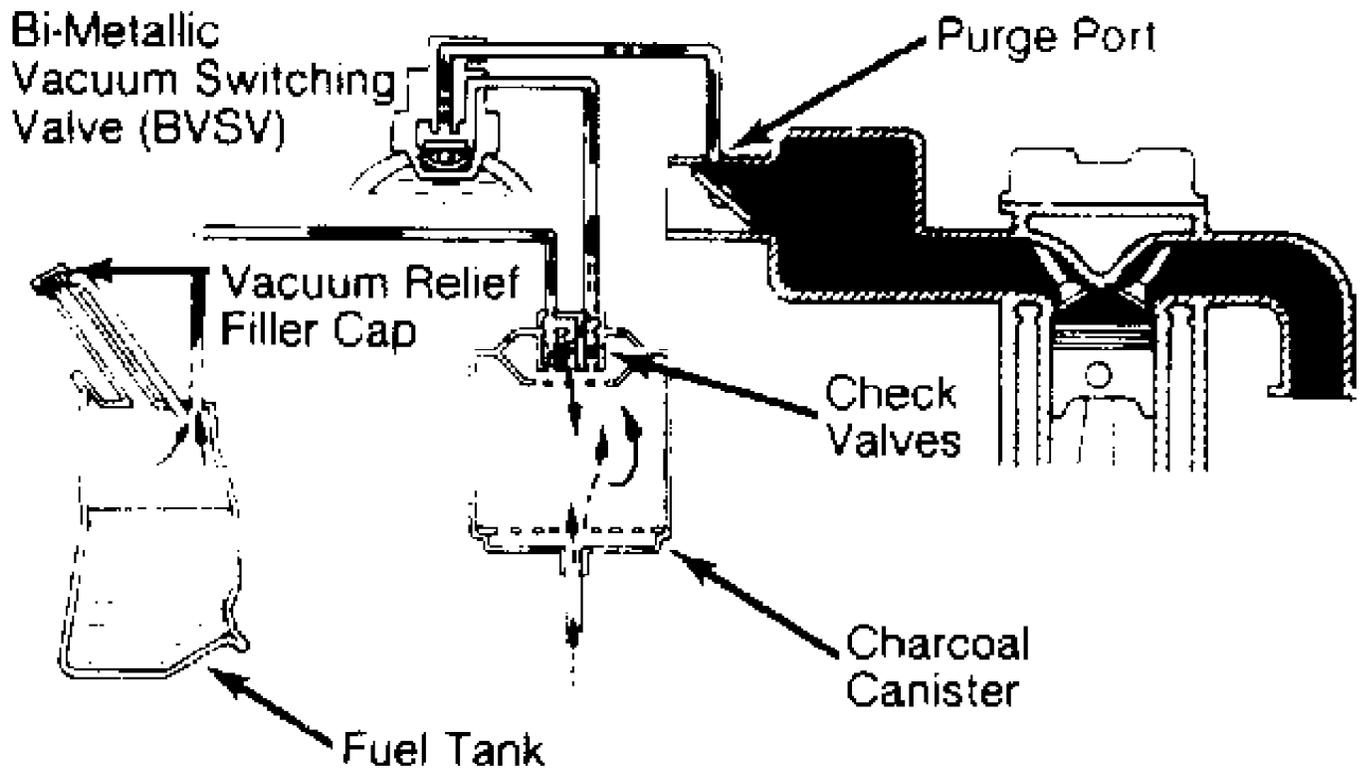
Fig. 2: Carbureted Corolla Fuel Evaporation System
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Pickup, Van & 4Runner

When the engine is not running, fuel tank vapor flows through vent line into canister for storage. A check valve in canister's purge port prevents vapor from flowing out of canister through purge line.

When engine speed increases to a moderate level, throttle valve opens purge port to manifold vacuum and canister vapor flows through purge line into combustion chambers for burning. When the throttle valve closes, it shuts off manifold vacuum to purge port and canister purging stops.

Van uses an additional check valve located in vent line between fuel tank and canister to prevent fuel leakage if van rolls over.



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Fig. 3: Fuel Injected Corolla & MR2 Fuel Evaporation System
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

Camry, Celica, Cressida, Corolla, MR2 & Supra

When engine coolant temperature is greater than 129°F (54°C), a bi-metallic vacuum switching valve (BVSV) opens purge line between canister and throttle purge port. As engine speed increases to a moderate level, throttle valve opens purge port to manifold vacuum, and canister vapor flows through purge line and into combustion chambers for burning. As engine speed drops to idle, the throttle valve closes off purge port to manifold vacuum and canister purging stops.

Celica GT-S uses a restrictor in the purge line to control the amount of vapor flow admitted to the combustion chambers.



NOTE: Relay positions may vary. Use code number

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Fig. 4: Cressida & Supra Fuel Evaporation System
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

TROUBLE SHOOTING

FUEL ODOR OR GAS LEAKS

Disconnected or cracked fuel vapor line or defective components in system. Check all lines and fittings. Check operation of system.

FUEL TANK OR EXPANSION TANK DEFORMED

Canister is clogged, vacuum relief filler cap is defective or hoses are clogged or kinked.

ROUGH ENGINE OPERATION

Check vacuum hose between vacuum solenoid valve (if equipped) and intake manifold for damage or loose connections. Check for malfunctions in all valves. Ensure all vacuum hoses are tight and in good condition.

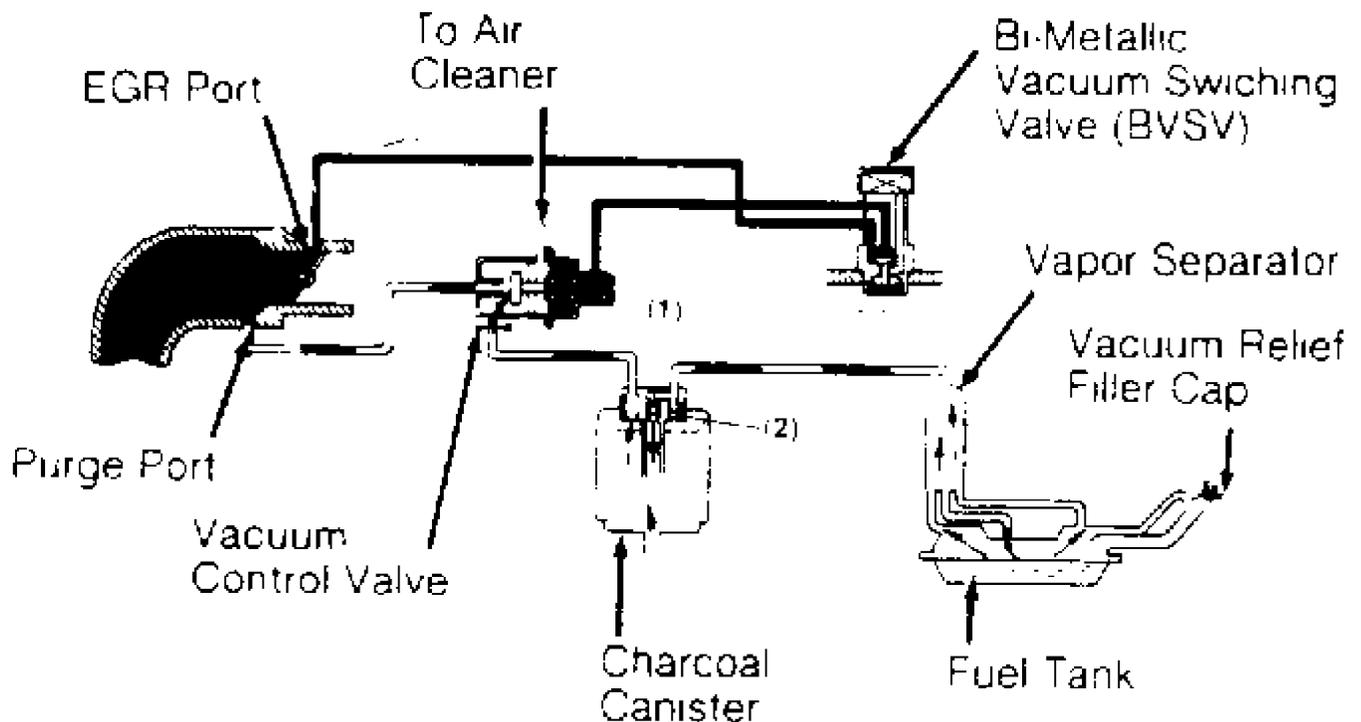


Fig. 5: Land Cruiser Fuel Evaporation System
Courtesy of Toyota Motor Sales, U.S.A., Inc.

TESTING

BI-METALLIC VACUUM SWITCHING VALVE (BVS)

1) Drain engine coolant. Remove valve. Connect hose to top port. Place valve in water that is less than 95°F (35°C). Blow air into hose. Ensure valve is closed.

2) Heat water to 129°F (54°C). Blow air into hose. Ensure valve is open. If not, replace valve. Apply liquid sealer to threads of valve before installing.

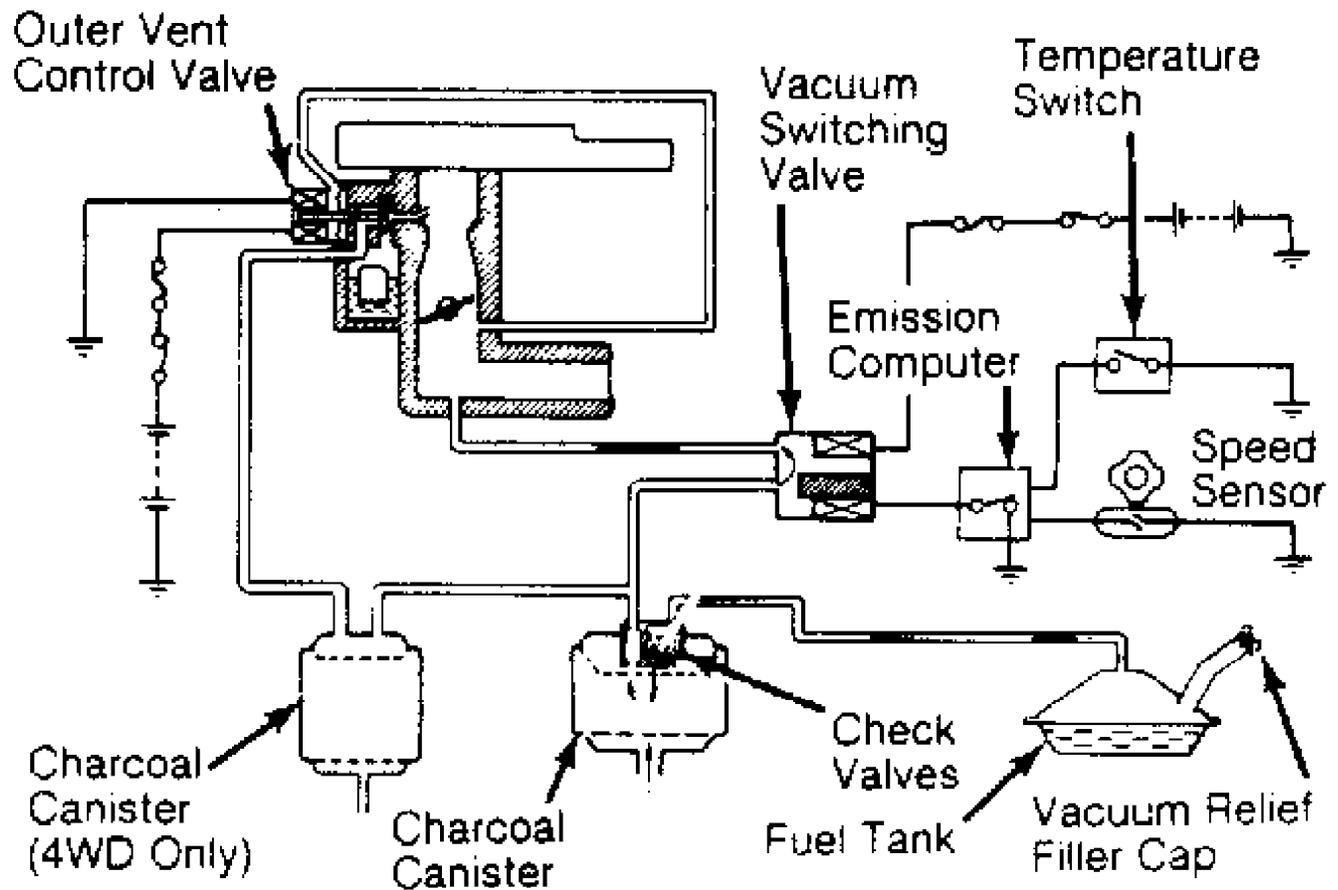


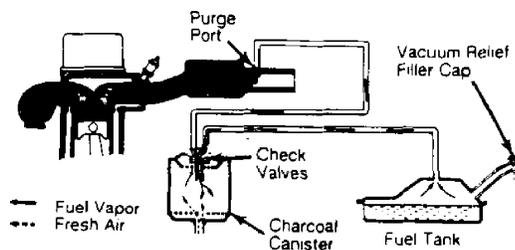
Fig. 6: Carbureted Pickup & 4Runner Fuel Evaporation System
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

CHECK VALVE

Van

Remove check valve. Mark ports for reinstallation. Blow air into fuel tank port. Check that valve opens with slight resistance. Blow air into canister port. Check that air flows through valve without resistance. If not, replace valve.

CAUTION: Do not inhale fuel vapors when blowing into valve.



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Fig. 7: Fuel Injected 2.4L Pickup & 4Runner Fuel Evaporation System
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

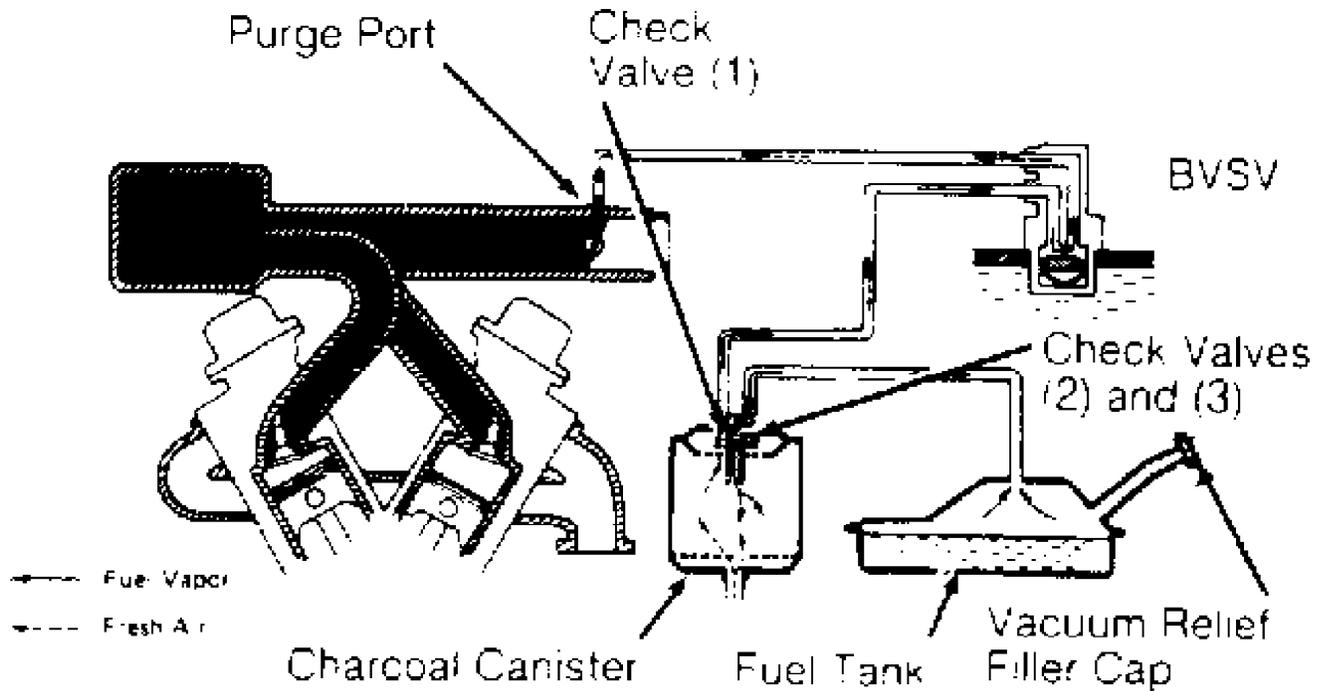


Fig. 8: Fuel Injected 3.0L Pickup & 4Runner Fuel Evaporation System
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

CHARCOAL CANISTER

1) On all models, check for clogged filter and/or stuck check valve by blowing low pressure compressed air into canister tank port. Check that air flows freely out of other canister ports.

2) On fuel injected models, blow air into canister purge port. Check that air does not flow out of any other port.

3) On carbureted models, blow air into the purge port. Check that air flows freely through other ports. On all models, replace canister if it does not operate as outlined.

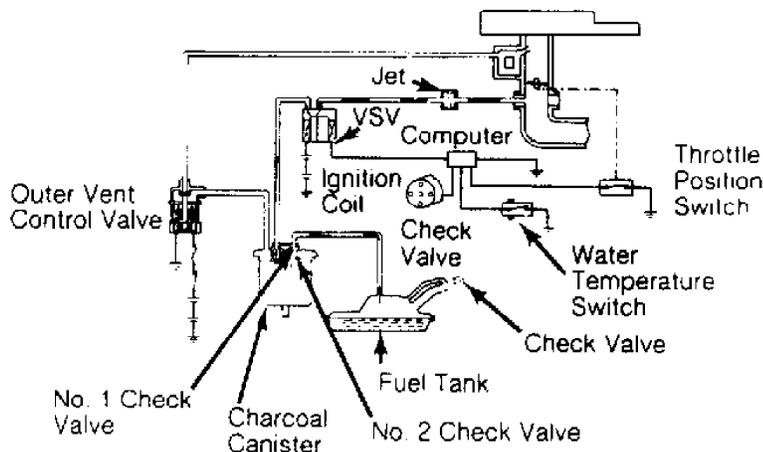


Fig. 9: Tercel Fuel Evaporation System
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

OUTER VENT CONTROL VALVE

Carbureted Corolla & Tercel

1) Disconnect hoses from valve. Turn ignition off. Blow air into valve. Ensure valve is open.

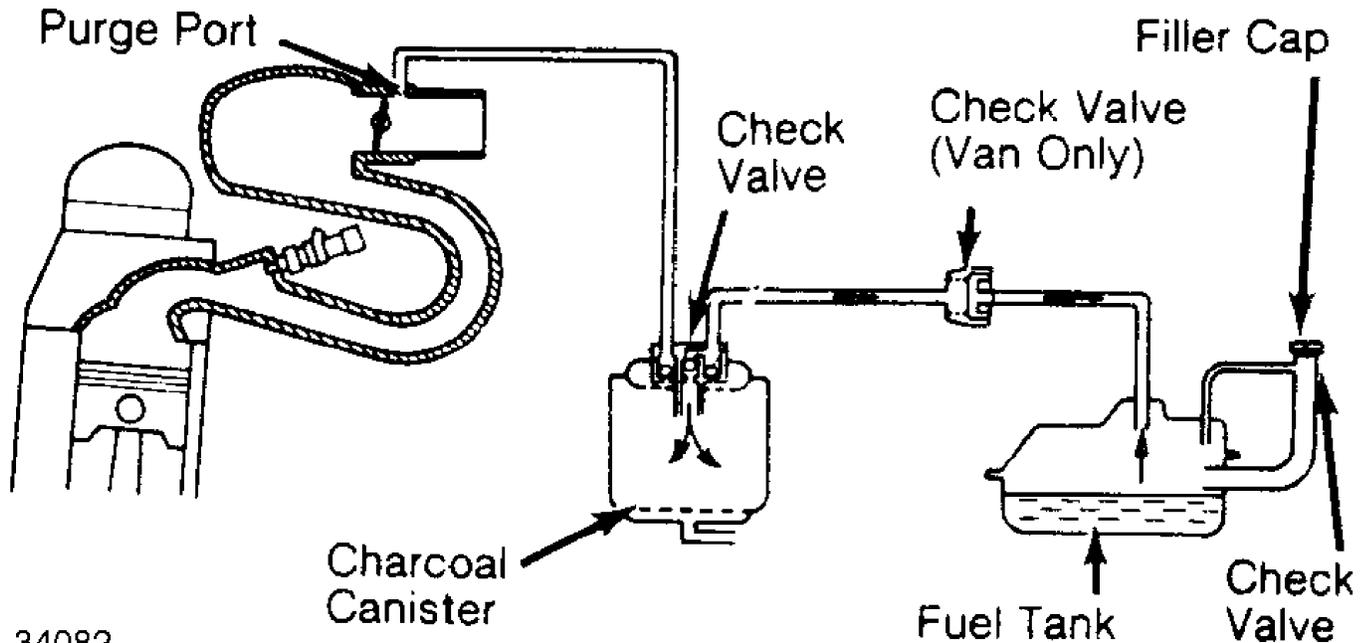
2) Turn ignition on. Blow air into valve. Ensure valve is closed. If not, check fuse and wiring connections.

Carbureted Pickup & 4Runner

When testing outer vent control valve, note that valve is moved by manifold vacuum and held by the solenoid. The solenoid cannot move the valve.

1) Disconnect outer vent hose from carburetor. Blow air into outer vent pipe. Check that valve is open. Start engine and let idle. Blow air into outer vent pipe. Check that valve is closed.

2) Unplug harness connector from solenoid. Using an ohmmeter, check the valve's resistance between the positive terminal and solenoid body. Resistance should be 63-73 ohms at 68°F (20°C).



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Fig. 10: Van Fuel Evaporation System
Courtesy of Toyota Motor Sales, U.S.A., Inc.

RESTRICTOR

Celica GT-S (M/T)

Remove hoses from restrictor and remove restrictor from vehicle. Blow air through both sides to ensure there is no blockage. Replace restrictor if air flow is blocked in either direction.

SPEED SENSOR TO VSV

Carbureted Pickup & 4Runner

1) Using 3-way connector, connect a vacuum gauge in the hose between VSV and canister. Place gauge near driver's seat. Warm engine to normal operating temperature.

2) Test drive vehicle. Ensure vacuum gauge indicates zero at speeds less than 7 MPH. Check that vacuum gauge indicates manifold vacuum at speeds greater than 16 MPH. If problem is found, inspect speed sensor and VSV.

SPEED SENSOR

Carbureted Pickup & 4Runner

1) Jack up and support one rear wheel off ground. Release parking brake. Place shift lever in Neutral. On 4WD models, ensure transfer case lever is in "2H" position.

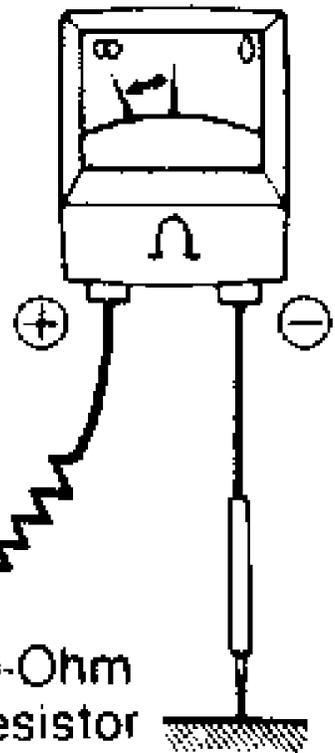
2) Unplug wiring connector from computer. Computer is located at left kick panel. Using ohmmeter, test "ON-OFF" cycles of speed sensor. See Fig. 11. Insert a 10-ohm resistor in series with positive ohmmeter lead. Insert lead in rear of connector. Ground ohmmeter negative terminal.

3) Slowly turn wheel. Check to see that ohmmeter needle deflects consistently. If ohmmeter needle does not deflect, check that sensor leads are firmly connected to rear of speedometer. If connections are okay, replace speedometer assembly.

California Models



Ohmmeter



All Other Models



10-Ohm
Resistor

Fig. 11: Testing Speed Sensor on Carbureted Pickup & 4Runner
Courtesy of Toyota Motor Sales, U.S.A., Inc.

TEMPERATURE SWITCH

Carbureted Corolla, Pickup, 4Runner & Tercel

1) Drain engine coolant. Remove switch from intake manifold. Cool switch to less than 109°F (43°C). Using an ohmmeter, check for continuity between switch terminal and body.

2) Heat switch in hot water to temperature greater than 131°F (55°C). Check that there is no continuity. If either function tests incorrectly, replace switch. Apply liquid sealer to threads before installation.

THROTTLE POSITION SWITCH

Carbureted Corolla

1) Connect tachometer to engine. Start and warm engine to normal operating temperature. Disconnect electrical connector at throttle position switch. Using an ohmmeter, connect one lead to switch connector and other lead to carburetor body.

2) Slowly increase engine speed. Continuity should register on ohmmeter when engine reaches 1800 RPM. If not, adjust throttle position switch by turning throttle position adjusting screw.

NOTE: Ensure cooling fan is off when performing this test (if equipped).

VACUUM SWITCH

Tercel

Disconnect electrical connector at switch. Ensure there is continuity between switch terminal and switch body. Start and warm engine to normal operating temperature. There should be no continuity between switch terminal and switch body. If there is continuity, replace switch.

VACUUM SWITCHING VALVE (VSV)

Carbureted Corolla, Pickup, 4Runner & Tercel

1) Disconnect VSV connector. Connect battery voltage to VSV terminals. Air should pass through valve with voltage applied. Remove battery voltage. Check that air flow is blocked.

2) Using ohmmeter, ensure there is no continuity between positive terminal of VSV and valve body.

3) Using ohmmeter, check resistance between VSV terminals. Resistance at 68°F (20°C) should be 38-44 ohms. If readings are incorrect, replace VSV.

MAINTENANCE

Inspect fuel tank, canister, vacuum relief filler cap, lines and hoses for damage, leaks, and deterioration every 60,000 miles or every 6 years. Replace gasket in vacuum relief filler cap.

To clean charcoal canister filter, remove hoses from canister and apply 43 psi (3 kg/cm²) air pressure to the following port:

- * Outer vent control valve port on Corolla and Tercel.
- * Fuel tank port on all other models.

Hold other top ports closed. Ensure that no carbon comes out of bottom port of canister.