

1974-79 EXHAUST EMISSION SYSTEMS

Toyota Fuel Evaporation

All Models

DESCRIPTION

The fuel evaporation control system used on Toyota models is designed to prevent the escape of raw fuel vapors to the atmosphere. System components include fuel tank, fuel filler cap, vapor separator (if equipped), charcoal canister, check valve (if equipped), Vacuum Switching Valve (VSV), and vacuum hoses connecting the various components.

OPERATION

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On models without a Vacuum Switching Valve, when the throttle plate is closed, a no vacuum condition allows a spring loaded ball in the check valve to close. This routes fuel vapors from fuel tank to charcoal canister where they are absorbed.

When engine speed increases the spring loaded ball opens and allows intake manifold vacuum to draw accumulated vapors from the charcoal canister and the fuel tank into the carburetor. The check valve also functions, along with the fuel tank safety cap, to balance fuel tank pressure and prevent fuel tank collapse.

On Vacuum Switching Valve (VSV) equipped models, the VSV opens or closes passage from intake manifold to charcoal canister. When vehicle is stopped or running at low speed, a computer interprets signals from speed sensor and acts on the VSV, closing passage to the intake manifold. This routes fuel vapors into the charcoal canister to be stored.

When vehicle speed reaches a specified value, the computer signals the VSV to open. This allows accumulated fuel vapors from the charcoal canister and fuel tank to be drawn into the intake manifold and be burned in the combustion chambers. A check valve in the charcoal canister is used to balance fuel tank pressure and prevent fuel tank collapse.

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On 4M and 2F engines, recycling of fuel vapors from the fuel tank and charcoal canister occurs through the action of the Bimetallic Vacuum Switch Valve (BVSV) and Vacuum Control Valve (VCV). At low temperature, all vacuum to the VCV is cut off and no fuel vapors are taken to the intake manifold. Once engine coolant warms up, the BVSV opens, vacuum reaches the vacuum control valve, and fuel vapors are drawn from the charcoal canister to the intake manifold.

When the throttle plate is closed (engine stopped or at idle), a no vacuum condition allows a spring loaded ball in the check valve to close,

routing fuel vapors from fuel tank to charcoal canister where they are absorbed.

When engine speed increases the spring loaded ball opens and allows intake manifold vacuum to draw accumulated vapors from the charcoal canister and the fuel tank into the carburetor. The check valve also functions (along with the fuel tank safety cap), to balance fuel tank pressure and prevent fuel tank collapse.

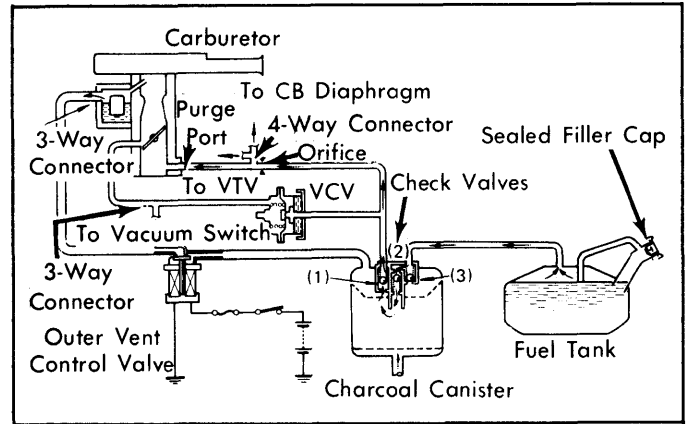


Fig. 2: 1979 Fuel Evaporation System (Corolla 3K-C)

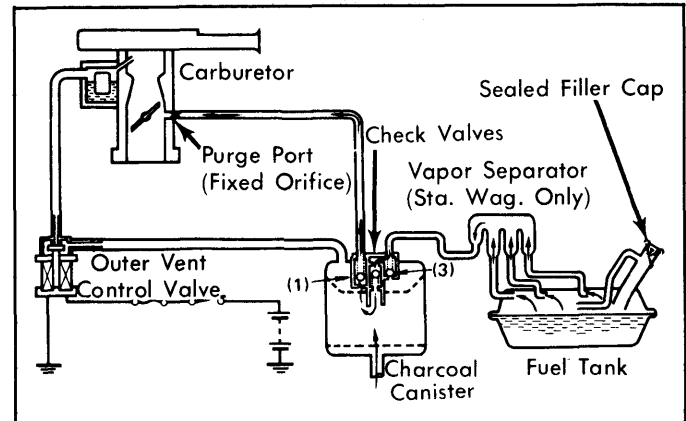


Fig. 3: 1979 Fuel Evaporation System (Corolla 2T-C)

On 20R engines, the fuel evaporation system is controlled partially by the computer and speed sensor. A check valve, integral with the charcoal canister, routes fuel vapors from fuel tank to either the carburetor or charcoal canister, depending on position of throttle plate. At idle and low speeds, the computer and Vacuum Switching Valve (VSV) are off and no fuel vapors are routed to the intake manifold. At higher speeds, the computer opens the VSV for recycling of vapors.

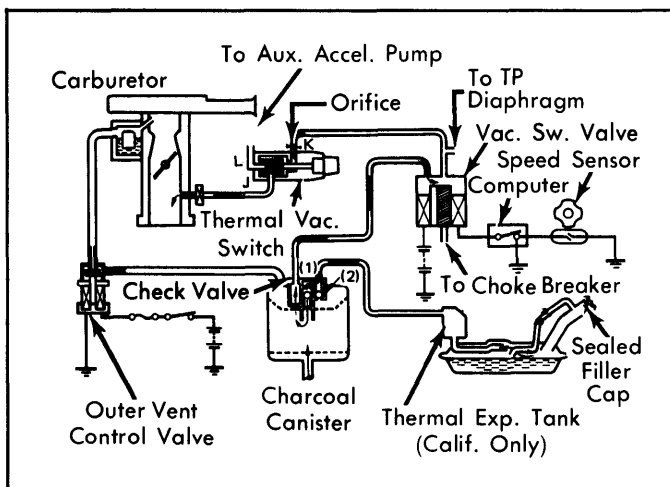


Fig. 1: 1978-79 Fuel Evaporation System (Celica, Corona & Pickup)

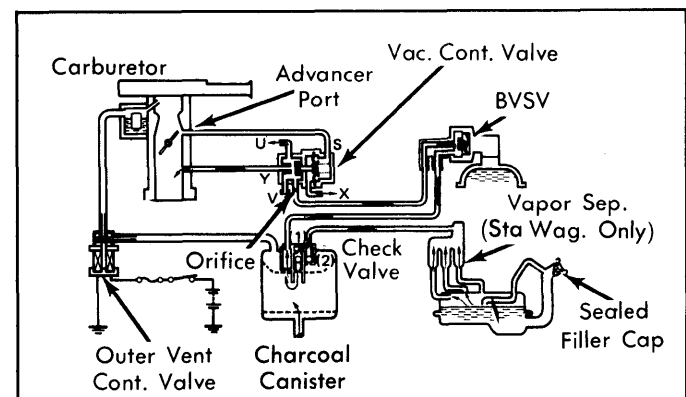


Fig. 4: 1978-79 Fuel Evaporation System (Cressida)

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Toyota Fuel Evaporation (Cont.)

When the vehicle is stopped or running at low speed, the computer interprets signals from the speed sensor and acts on the VSV, closing the passage to the intake manifold. This routes fuel vapors into the charcoal canister to be stored.

When vehicle reaches a specified speed, the computer signals the VSV to open. This allows accumulated fuel vapors from the charcoal canister and fuel tank to be drawn into the intake manifold and burned in the combustion chamber. A check valve in the charcoal canister is used to balance fuel tank pressure and prevent fuel tank collapse.

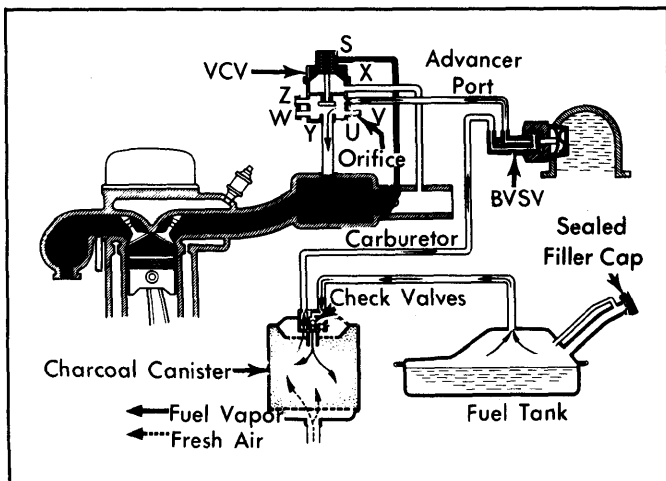


Fig. 5: 1979 Fuel Evaporation System (Celica Supra)

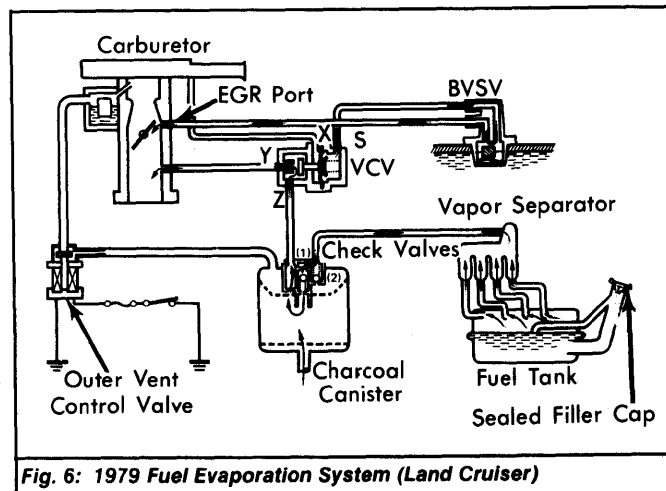


Fig. 6: 1979 Fuel Evaporation System (Land Cruiser)

On 2T-C and 3K-C engines, the fuel evaporation system is controlled by intake manifold vacuum. During engine off and deceleration modes, raw fuel vapors from the float chamber and fuel tank are led to the charcoal canister. When engine is at cruising speed, under normal loads, the No. 1 check valve opens to allow fuel vapors from the charcoal canister to reach the intake manifold for burning.

TROUBLE SHOOTING

FUEL ODOR OR GAS LEAKS

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

FUEL TANK OR EXPANSION TANK DEFORMED

Canister clogged, fuel filler cap defective (valve in cap inoperative), hoses clogged or kinked.

ROUGH ENGINE OPERATION

Check vacuum hose between vacuum solenoid valve and intake manifold for damage and proper connections. Check for malfunctions in other.

TESTING

CHECK VALVE

1975-77 Models – Visually inspect valve for damage. Blow into valve from both directions. Air should flow in both directions, showing slight resistance in one direction.

VACUUM SWITCHING VALVE (VSV)

NOTE: On 1974-77 models, see **TOYOTA VACUUM SWITCHING VALVES** article in this section.

1978 Models – 1) Connect vacuum switching valve terminals to battery power as shown. See Fig. 7.

2) On 20R engines, blow air into passage No. 1, air should come out passage "A". Disconnect battery. Blow air into passage "A", air should come out passage No. 8.

3) On 2T-C engines, blow air into each pipe. Air should come out of passages No. 1, 3, 4 and center canister pipe (indicating that all passages are connected). Disconnect battery. Passages No. 1 and 3, and passages No. 0 and 4 should be connected.

4) To test VSV continuity (all models), attach ohmmeter lead to VSV body and other lead to each terminal. There should be no continuity. To test VSV for an open circuit, measure resistance between the positive terminal of the VSV connector and other terminals. When cold, resistance should be 48-60 ohms.

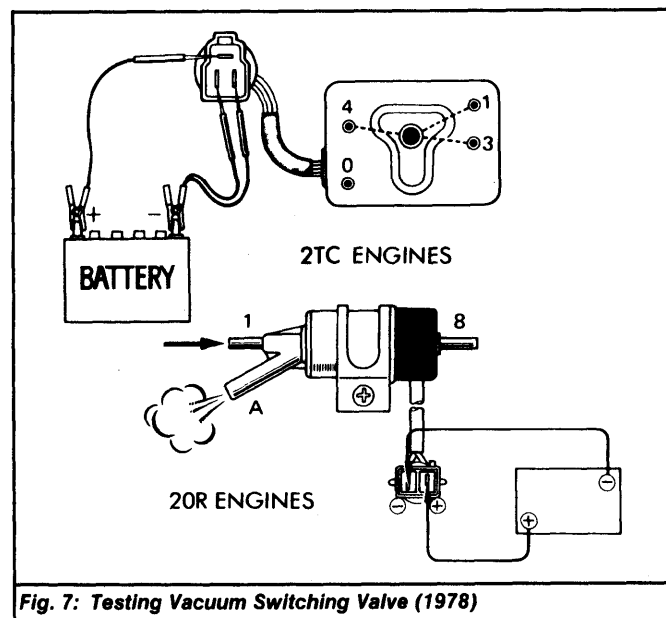


Fig. 7: Testing Vacuum Switching Valve (1978)

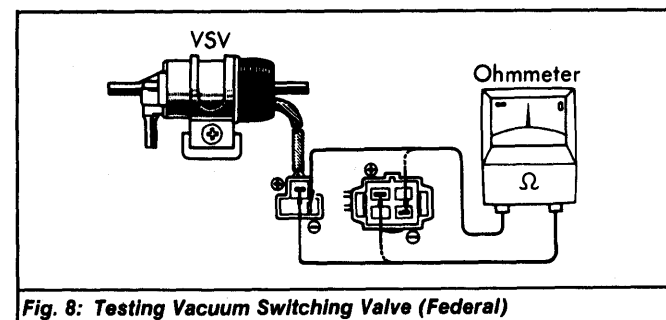


Fig. 8: Testing Vacuum Switching Valve (Federal)

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Toyota Fuel Evaporation (Cont.)

1979 Models (Federal) - 1) Connect vacuum switching valve terminals to battery power as shown. See Fig. 8.

2) On 20R engines, blow air into passage No. 2, air should come out passage No. 3. Blow air into passage No. 4, air should come out passage No. 5. Disconnect battery. Blow air into passage No. 4, air should go to atmosphere.

3) To test VSV continuity, attach ohmmeter lead to VSV body and other lead to each terminal. There should be no continuity. To test VSV for an open circuit, measure resistance between the positive terminal of the VSV connector and other terminals. When cold, resistance should be 48-60 ohms.

1979 Models (Calif.) - 1) Connect vacuum switching valve terminals to battery power as shown. See Fig. 9.

2) On 20R engines, blow air into passage No. 2, air should come out passage No. 3. Blow air into passage No. 1, air should come out passage No. 6. Blow air into passage No. 4, air should come out passage No. 5.

3) Disconnect battery. Blow air into passage No. 1, air should go to atmosphere. Blow air into passage No. 4, air should go to atmosphere. To test VSV continuity (all models), attach ohmmeter lead to VSV body and other lead to each terminal. There should be no continuity.

4) To test VSV for an open circuit, measure resistance between the positive terminal of the VSV connector and other terminals. When cold, resistance should be as specified in VACUUM SWITCHING VALVE SPECIFICATIONS table.

VACUUM SWITCHING VALVE SPECIFICATIONS

Terminals	Resistance (Ohms)
+ to A	48-60
+ to B	24-30
+ to C	0
+ to D	24-30
B to D	0

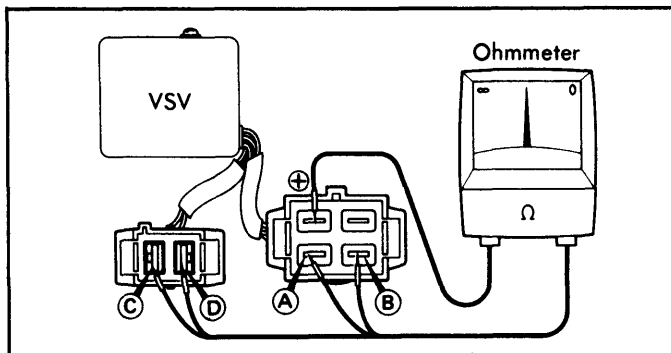


Fig. 9: Testing Vacuum Switching Valve (Calif.)

BIMETALLIC VACUUM SWITCHING VALVE (BVSV)

NOTE: On 1974-77 models, see TOYOTA VACUUM SWITCHING VALVES article in this section.

1978-79 Models - Dip sensing portion of switch into cold water. See Fig. 10. Check to make sure that BVSV closes passage "B" below 86°F (30°C). Blow into pipe "A". No air should pass through. Heat water to above 109°F (43°C). Blow into pipe "A", air should pass through passage "B".

THERMOSTATIC VACUUM SWITCHING VALVE (TVSV)

NOTE: On 1974-77 models, see TOYOTA VACUUM SWITCHING VALVES article in this section.

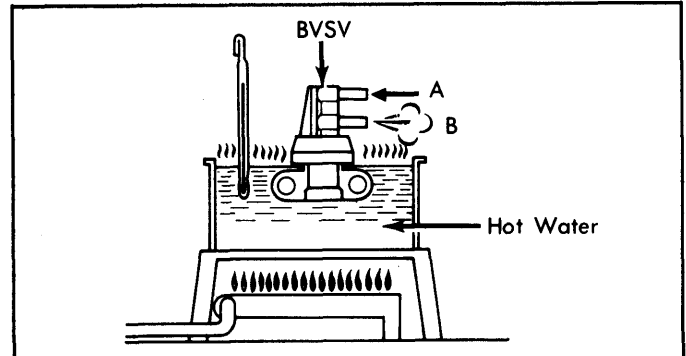


Fig. 10: Testing Bimetallic Vacuum Switching Valve

1978-79 Models - Dip sensing portion of switch into cold water. See Fig. 11. Check to make sure that TVSV closes passage "C" below 140°F (60°C). Blow into pipe "B", air should pass through "A" but not "C". Heat water to above 167°F (75°C). Blow into pipe "B", air should pass through "C" but not "A".

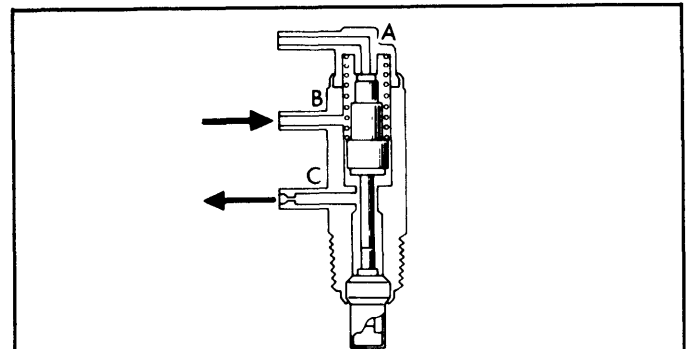


Fig. 11: Testing Thermostatic Vacuum Switching Valve

VACUUM CONTROL VALVE (VCV)

1978-79 3K-C Engines - 1) If equipped with a filter, remove valve from vehicle, then remove and inspect filter. See Fig. 12. Clean filter with compressed air or replace. Reinstall valve in vehicle.

2) Attach a vacuum gauge in-line between the VCV and carburetor. Disconnect hose from filter side of VCV. Check that VCV is closed (no vacuum passage) when engine vacuum is below 21.3 in. Hg. Race engine and release throttle. Check that VCV is open when engine vacuum is above 22 in. Hg.

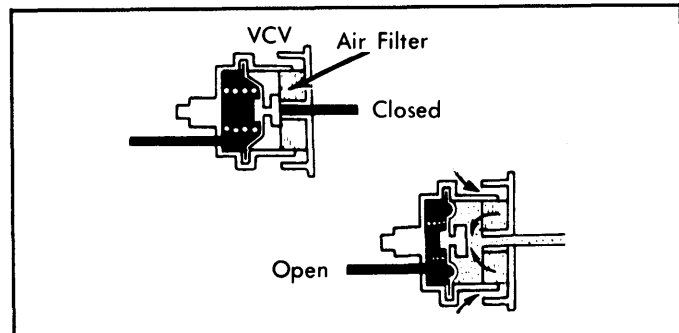


Fig. 12: Testing Vacuum Control Valve (Corolla 3K-C)

1978-79 4M & 2F Engines - 1) Remove VCV from vehicle. Attach a vacuum source to connector "S" on end of VCV away from fittings. See Fig. 13.

2) Blow air into VCV through fitting "Y" on opposite end of valve while applying vacuum from source. Air should come out of all fittings. Stop vacuum application. While blowing air into "Y", no air should come out of any fitting.

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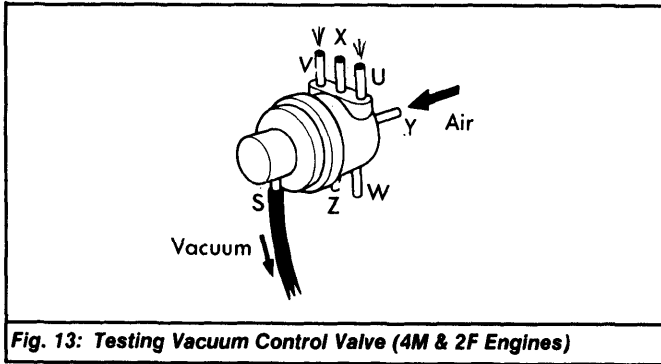


Fig. 13: Testing Vacuum Control Valve (4M & 2F Engines)

OUTER VENT CONTROL VALVE

1978-79 Models – With valve installed, remove hoses. Turn ignition switch off. Blow air through one side of valve. Air should pass through. Turn ignition on. Repeat air application. Air should not pass through valve. Visually check wiring and fuse condition.

SPEED SENSOR

1) Jack up one rear wheel and support off ground. Release parking brake. Place transmission in Neutral. Unplug wiring connector from computer. See Fig. 14. Computer is located on right side or left side cowl.

2) Connecting ohmmeter positive terminal to wiring connector terminal and connect ohmmeter negative terminal to a known good ground. Turn wheel slowly, checking to see that ohmmeter needle deflects consistently. Plug in wiring connector back into computer.

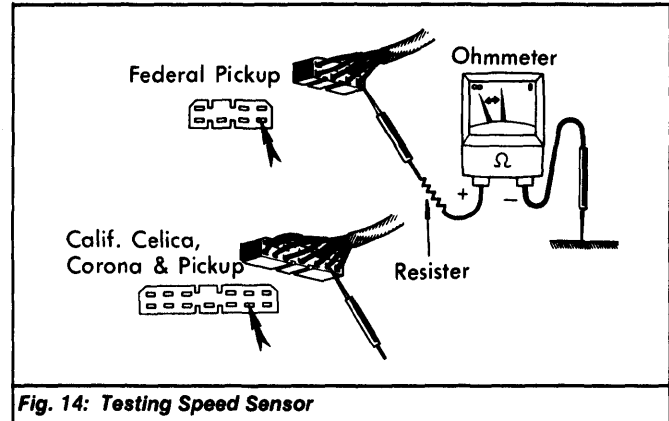


Fig. 14: Testing Speed Sensor

MAINTENANCE

Check vacuum hose and charcoal canister for damage and replace fuel filler cap gasket every 25,000 miles.