Toyota
CODE BOOK

Produced by AAMCO Transmissions, Inc.
Technical Services Department

Every attempt has been made to ensure the accuracy of the information contained in this book. Due to variations in engine and transmission control systems from year to year, it is up to the technician using this book to verify the information is appropriate for the transmission he/she is working on.

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Theory of Operation

The Intake Air Temperature (IAT) sensor is a thermister that measures the temperature of the engine coolant. The PCM supplies a 5-volt reference signal through a current limiting resistor to the IAT sensor. When the engine coolant is cold the sensor resistance is high and the PCM will see a high voltage signal on IAT sensor signal circuit. When the engine coolant is warm the sensor resistance is lower and the PCM will a lower voltage signal. The PCM uses the sensor voltage values to calculate the engine intake air temperature.

Depending on the vehicle model and engine type, Toyota uses two types of IAT sensors. One is a stand-alone sensor located in the air cleaner duct work. This type is used when the engine is equipped with a Manifold Absolute Pressure (MAP) sensor. The other type is part of the Mass Air Flow (MAF) sensor.

Circuit Description

The sensor circuit consists of the sensor signal and signal return circuit wiring, ECT sensor and PCM.

Conditions for Setting the Code

- The PCM detects the sensor output voltage deviates from the normal operating range.
- The condition is present for 0.5 seconds or more during normal vehicle operation.

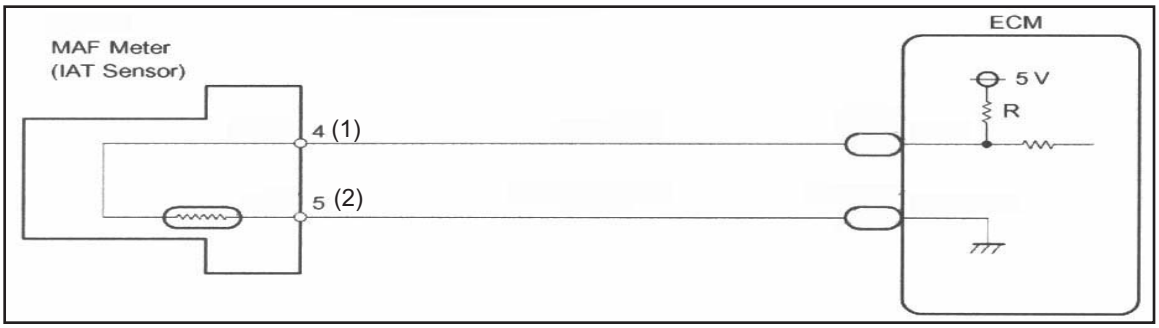
Action Taken when Code Sets

- The PCM will illuminate the malfunction indicator lamp immediately.
- The PCM will operate in a fail-safe mode where the IAT temperature is assumed to be 68°F.

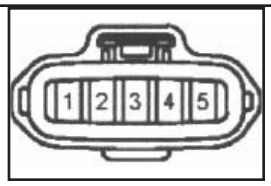
Possible Causes

- Damaged IAT sensor wiring or harness connectors.
- Defective IAT sensor.
- Defective PCM.

Wiring Diagrams



Models with intake air temperature sensor, part of Mass airflow sensor



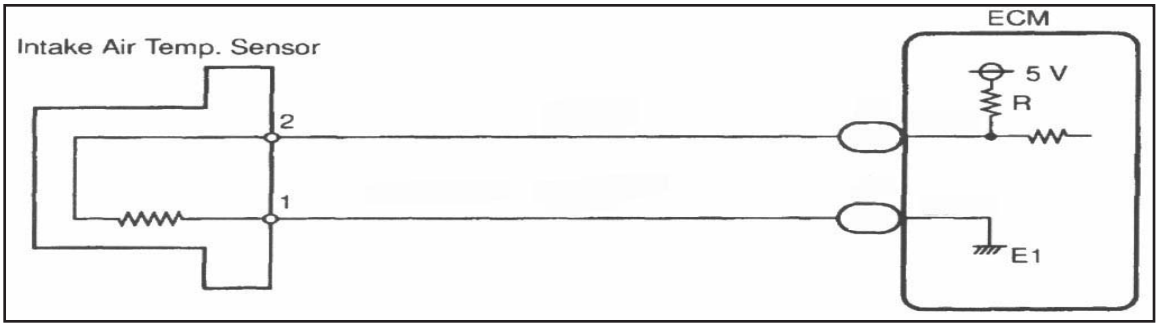
1999-2001

ID	Color	Description
1	L/Y	IAT Sensor Signal
2	BR	IAT Sensor Ground
3	R/B	MAF Sensor Ground
4	B/Y	Vehicle Power (B+)
5	P	MAF Sensor Signal

2002-2006

ID	Color	Description
1	B/W	Vehicle Power (B+)
2	L/W	MAF Sensor Ground
3	R	MAF Sensor Signal
4	L/B	IAT Sensor Signal
5	BR	IAT Sensor Ground

Figure 1



Models with intake air temperature sensor in the air cleaner ductwork

ID	Color	Description
1	Y/B	IAT Sensor Signal
2	BR	IAT Sensor Ground

Figure 2

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Turn the ignition on and observe the IAT sensor data parameter on your scan tool. Is the value shown the same as the actual engine intake air temperature?
If yes, go to step 2.
If no, go to step 3.

Step 2

With your scan tool connected to the vehicle, start the engine and duplicate the failure record conditions present when the code previously set.
Does the scanner indicate the code set during this ignition cycle?
If yes, go to step 3.
If no, the problem is intermittent. Try shaking the wiring and connectors while observing the IAT temperature on the scan data. A change in the temperature displayed can indicate the location of the malfunction.

Check for:

- Poor harness connections at the IAT sensor or PCM.
- Damaged IAT sensor wiring (intermittent open circuit).
- Defective IAT sensor.

Step 3

Connect your scan tool to the vehicle. Turn the ignition on and observe the ICT sensor data parameter on your scan tool. Is the Intake Air Temperature shown -40°F or less?
If yes, see diagnostics for code P0113.
If no, go to step 4.

Diagnosis

Step 4

Connect your scan tool to the vehicle. Turn the ignition on and observe the ECT sensor data parameter on your scan tool. Is the Intake Air Temperature shown 284°F or higher?
If yes, see diagnostics for code P0112.
If no, return to Step 1 and rerun diagnostics.

Code P0112
Intake Air Temperature Sensor
Low Input

Toyota Motor Company 2.2, 2.4 Liter L-4 and 3.0, 3.3 Liter V-6 Engines
Code P0112 Intake Air Temperature Sensor Low Input

Theory of Operation:

The Intake Air Temperature (IAT) sensor is a thermister that measures the temperature of the air entering the engine. The PCM supplies a 5-volt reference signal through a current limiting resistor to the IAT sensor. When the intake air is cold the sensor resistance is high and the PCM will see a high voltage signal on IAT sensor signal circuit. When the intake air is warm the sensor resistance is lower and the PCM will a lower voltage signal. The PCM uses the sensor voltage values to calculate the engine coolant temperature.

Depending on the vehicle model and engine type, Toyota uses two types of IAT sensors. One is a stand-alone sensor located in the air cleaner duct work. This type is used when the engine is equipped with a Manifold Absolute Pressure (MAP) sensor. The other type is part of the Mass Air Flow (MAF) sensor.

Circuit Description

The sensor circuit consists of the sensor signal and signal return circuit wiring, the IAT sensor and PCM.

Conditions for Setting the Code

- The PCM calculates the intake air temperature is greater than 284°F.
- The condition is present for 0.5 seconds or more during normal vehicle operation.

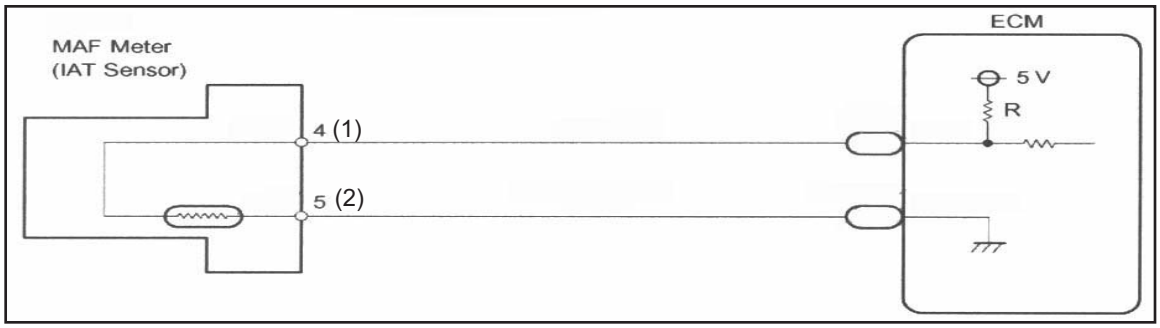
Action Taken when Code Sets

- The PCM will illuminate the malfunction indicator lamp immediately.
- The PCM will operate in a fail-safe mode where the IAT temperature is assumed to be 68°F.

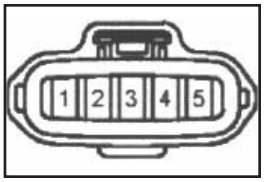
Possible Causes

- Damaged IAT sensor wiring or harness connectors.
- Defective IAT sensor.
- Defective PCM.

Wiring Diagrams



Models with intake air temperature sensor, part of Mass airflow sensor



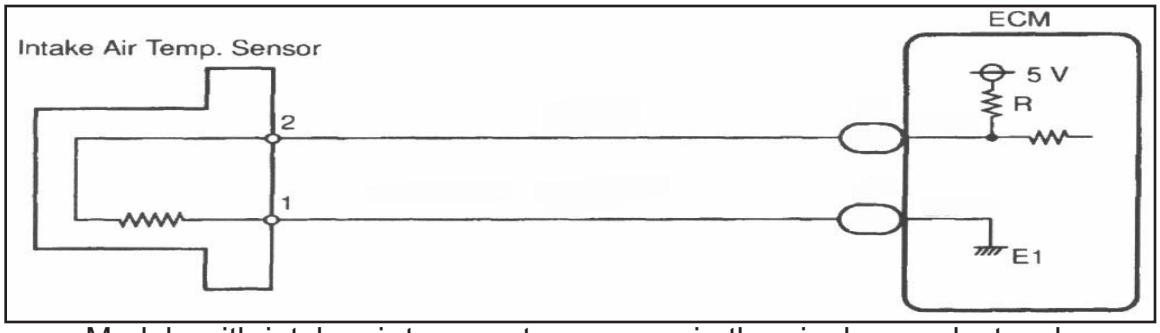
1999-2001

ID	Color	Description
1	L/Y	IAT Sensor Signal
2	BR	IAT Sensor Ground
3	R/B	MAF Sensor Ground
4	B/Y	Vehicle Power (B+)
5	P	MAF Sensor Signal

2002-2006

ID	Color	Description
1	B/W	Vehicle Power (B+)
2	L/W	MAF Sensor Ground
3	R	MAF Sensor Signal
4	L/B	IAT Sensor Signal
5	BR	IAT Sensor Ground

Figure 1



Models with intake air temperature sensor in the air cleaner ductwork

ID	Color	Description
1	Y/B	IAT Sensor Signal
2	BR	IAT Sensor Ground

Figure 2

Diagnosis

NOTE **Before starting your diagnosis determine which type of IAT sensor you have. Vehicles equipped with a MAF sensor will have an IAT sensor integral to the MAF sensor. Vehicles equipped with a MAP sensor will have a standalone IAT sensor located in the intake air cleaner ductwork.**

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Turn the ignition on and observe the IAT sensor data parameter on your scan tool. Is the Intake Air Temperature shown 284°F or more?
If yes, go to step 3.
If no, go to step 2.

Step 2

With your scan tool connected to the vehicle, start the engine and duplicate the failure record conditions present when the code previously set.
Does the scanner indicate the code set during this ignition cycle?
If yes, go to step 3.
If no, the problem is intermittent. Try shaking the wiring and connectors while observing the IAT voltage on the scan data. A change in the voltage displayed can indicate the location of the malfunction.

Check for:

- Damaged IAT sensor circuit wiring (intermittent short to ground).
- Defective IAT sensor.

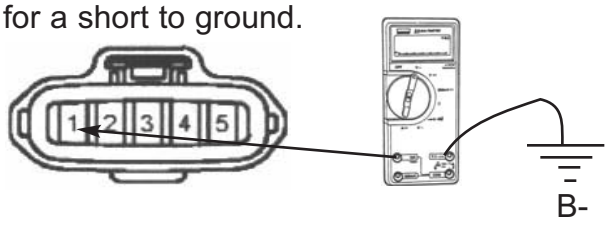
Step 3

Connect your scan tool to the vehicle. With the ignition key off, disconnect the IAT or MAF sensor harness connector. Inspect the sensor and harness connectors for corroded, damaged, or pushed out terminals. Turn the ignition on and observe the IAT sensor data parameter on your scan tool. Is the Intake Air Temperature shown -40°F or more?
If yes, replace the IAT sensor.
If no, go to step 4.

Diagnosis

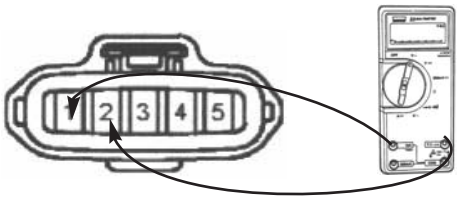
Step 4

With the ignition off, disconnect the PCM and IAT or MAF sensor harness connectors. Inspect the PCM, IAT or MAF sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the IAT sensor signal circuit terminal of the sensor harness connector and a good ground **(See Figures 1 or 2)**. Is the resistance greater than 10,000 ohms?
If yes, go to step 5.
If no, repair the IAT sensor signal circuit for a short to ground.



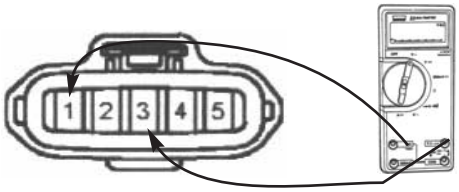
Step 5

With the ignition off, disconnect the PCM and IAT or MAF sensor harness connectors. Inspect the PCM, IAT or MAF sensor, and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the IAT sensor signal and ground circuit terminals of the sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, and you have an integrated MAF type sensor proceed to step 6.
If yes, and you have a stand-alone IAT sensor replace the PCM.
If no, repair the short between the IAT sensor signal and ground ciruits.



Step 6

With the ignition off, disconnect the PCM and MAF sensor harness connectors. Inspect the PCM, MAF sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the IAT sensor signal and MAF sensor ground circuit terminals of the MAF sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, replace the PCM.
If no, repair the short between the IAT sensor signal and MAF sensor ground circuits.



Code P0113
Intake Air Temperature Sensor
High Input

Toyota Motor Company 2.2, 2.4 Liter L-4 and 3.0, 3.3 Liter V-6 Engines
Code P0113 Intake Air Temperature Sensor High Input

Theory of Operation

The Intake Air Temperature (IAT) sensor is a thermister that measures the temperature of the air entering the engine. The PCM supplies a 5-volt reference signal through a current limiting resistor to the IAT sensor. When the intake air is cold the sensor resistance is high and the PCM will see a high voltage signal on IAT sensor signal circuit. When the intake air is warm the sensor resistance is lower and the PCM will a lower voltage signal. The PCM uses the sensor voltage values to calculate the engine coolant temperature.

Depending on the vehicle model and engine type Toyota uses two types of IAT sensors. One is a stand-alone sensor located in the air cleaner duct work. This type is used when the engine is equipped with a Manifold Absolute Pressure (MAP) sensor. The other type is part of the Mass Air Flow (MAF) sensor.

Circuit Description

The sensor circuit consists of the sensor signal and signal return circuit wiring, the IAT sensor and PCM.

Conditions for Setting the Code

- The PCM calculates the intake air temperature is less than -40°F.
- The condition is present for 0.5 seconds or more during normal vehicle operation.

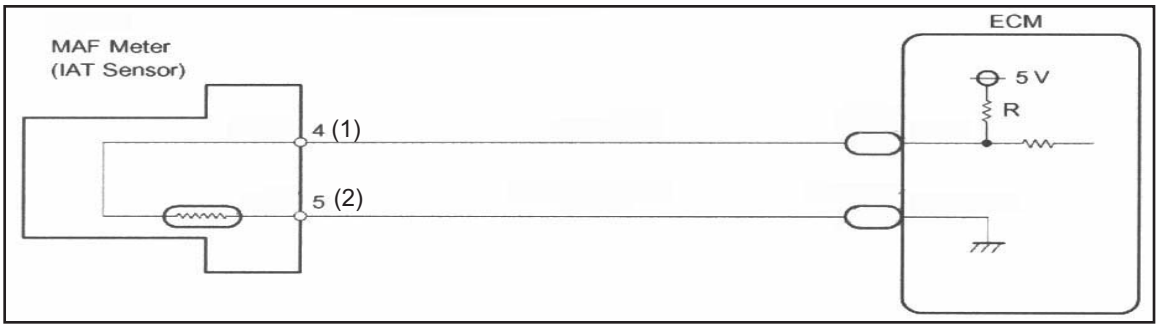
Action Taken when Code Sets

- The PCM will illuminate the malfunction indicator lamp immediately.
- The PCM will operate in a fail-safe mode where the IAT temperature is assumed to be 68°F.

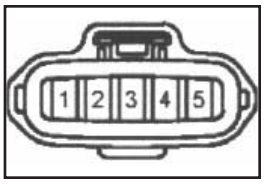
Possible Causes

- Damaged IAT sensor wiring or harness connectors.
- Defective IAT sensor.
- Defective PCM.

Wiring Diagrams



Models with intake air temperature sensor, part of Mass airflow sensor



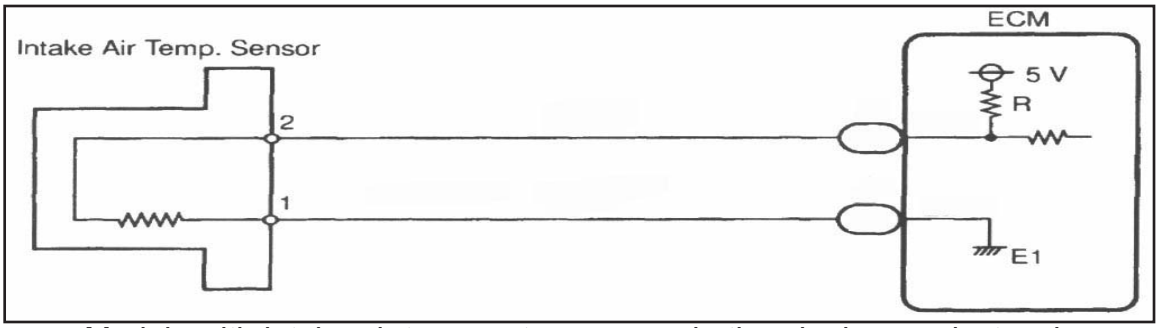
1999-2001

ID	Color	Description
1	L/Y	IAT Sensor Signal
2	BR	IAT Sensor Ground
3	R/B	MAF Sensor Ground
4	B/Y	Vehicle Power (B+)
5	P	MAF Sensor Signal

2002-2006

ID	Color	Description
1	B/W	Vehicle Power (B+)
2	L/W	MAF Sensor Ground
3	R	MAF Sensor Signal
4	L/B	IAT Sensor Signal
5	BR	IAT Sensor Ground

Figure 1



Models with intake air temperature sensor in the air cleaner ductwork

ID	Color	Description
1	Y/B	IAT Sensor Signal
2	BR	IAT Sensor Ground

Figure 2

Diagnosis

NOTE **Before starting your diagnosis determine which type of IAT sensor you have. Vehicles equipped with a MAF sensor will have an IAT sensor integral to the MAF sensor. Vehicles equipped with a MAP sensor will have a standalone IAT sensor located in the intake air cleaner ductwork.**

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Turn the ignition on and observe the IAT sensor data parameter on your scan tool. Is the Intake Air Temperature shown -40°F or less?
If yes, go to step 3.
If no, go to step 2.

Step 2

With your scan tool connected to the vehicle, start the engine and duplicate the failure record conditions present when the code previously set. Does the scanner indicate the code set during this ignition cycle?
If yes, go to step 3.
If no, the problem is intermittent. Try shaking the wiring and connectors while observing the IAT voltage on the scan data. A change in the voltage displayed can indicate the location of the malfunction.

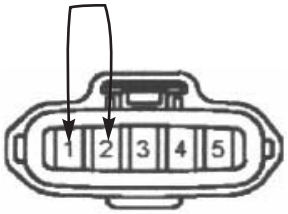
Check for:

- Damaged IAT sensor circuit wiring (intermittent short to power or open circuit).
- Defective IAT sensor.

IMPORTANT NOTE **If the fuse in the jumper wire blows during Step 3 the IAT sensor signal circuit is shorted to voltage. Make any necessary repairs and rerun diagnostics from the beginning.**

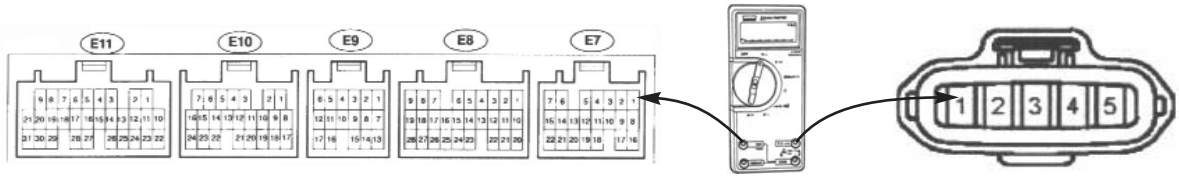
Step 3

Connect your scan tool to the vehicle. With the ignition key off, disconnect IAT or MAF sensor harness connector. Inspect the sensor and harness connectors for corroded, damaged or pushed out terminals. Connect a suitable 3 amp fused jumper wire between the IAT sensor signal and ground circuit terminals of the sensor harness connector **(See Figures 1 or 2)**.
Turn the ignition on and observe the IAT sensor data parameter on your scan tool.
Is the Intake Air Temperature shown 284°F or higher?
If yes, replace the IAT sensor.
If no, go to step 4.



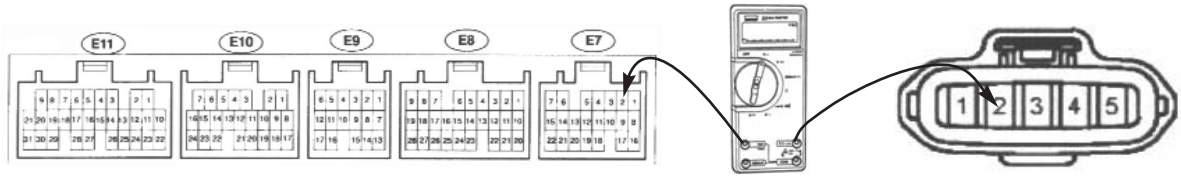
Step 4

With the ignition off, disconnect the PCM and IAT or MAF sensor harness connectors. Inspect the PCM, IAT or MAF sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the IAT sensor signal circuit terminals of the PCM and sensor harness connectors **(See Appendix, for PCM harness connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open IAT sensor signal circuit.



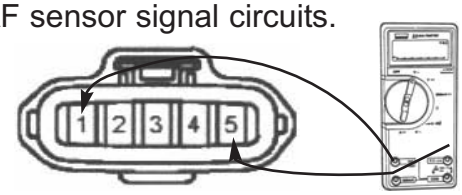
Step 5

With the ignition off, disconnect the PCM and IAT or MAF sensor harness connectors. Inspect the PCM, IAT or MAF sensor and harness connectors for corroded, damaged or pushed out terminals. Using your DVOM measure the resistance between the IAT sensor ground circuit terminals of the PCM and sensor harness connectors. Is the resistance 5 Ohms or less?
If yes, and you have an integrated MAF type sensor proceed to step 6.
If yes, and you have a stand-alone IAT sensor replace the PCM.
If no, repair the open IAT sensor ground circuit.



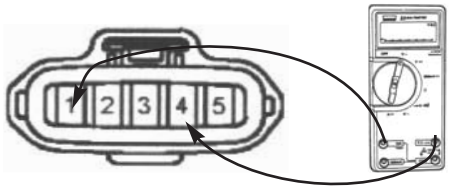
Step 6

With the ignition off, disconnect the PCM and MAF sensor harness connectors. Inspect the PCM, MAF sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the IAT and MAF sensor signal circuit terminals at the MAF sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the IAT and MAF sensor signal circuits.



Step 7

With the ignition off, disconnect the PCM and MAF sensor harness connectors. Inspect the PCM, MAF sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the IAT sensor signal and vehicle power circuit terminals of the MAF sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, replace the PCM.
If no, repair the short between the IAT sensor signal and vehicle power circuits.



Code P0115
Engine Coolant Temperature
Sensor Open or Short Circuit

Toyota Motor Company 2.2, 2.4 Liter L-4 and 3.0, 3.3 Liter V-6 Engines
Code P0115 Engine Coolant Temperature Sensor Open or Short Circuit

Theory of Operation

The Engine Coolant Temperature (ECT) sensor is a thermister that measures the temperature of the engine coolant. The PCM supplies a 5-volt reference signal through a current limiting resistor to the ECT sensor. When the engine coolant is cold the sensor resistance is high and the PCM will see a high voltage signal on ECT sensor signal circuit. When the engine coolant is warm the sensor resistance is lower and the PCM will a lower voltage signal. The PCM uses the sensor voltage values to calculate the engine coolant temperature.

Circuit Description

The sensor circuit consists of the sensor signal and signal return circuit wiring, the ECT sensor and PCM.

Conditions for Setting the Code

- The PCM detects the sensor output voltage deviates from the normal operating range.
- The condition is present for 0.5 seconds or more during normal vehicle operation.

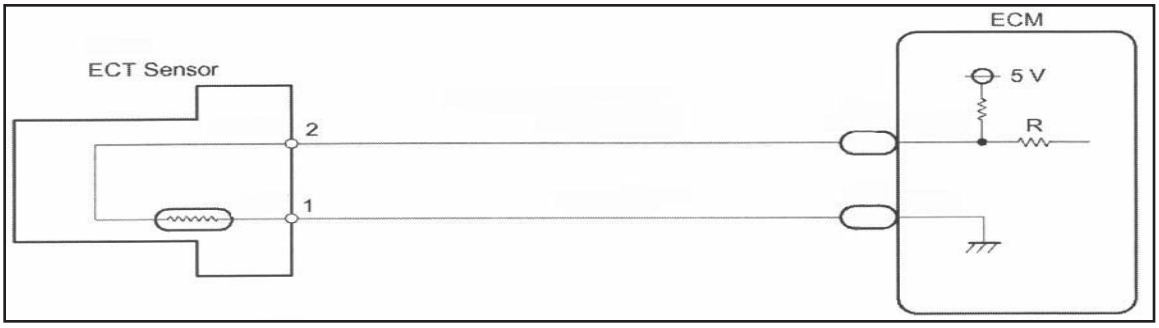
Action Taken when Code Sets

- The PCM will illuminate the malfunction indicator lamp immediately.
- The PCM will operate in a fail-safe mode where the ECT temperature is assumed to be 176°F.

Possible Causes

- Damaged ECT sensor wiring or harness connectors.
- Defective ECT sensor.
- Defective PCM.

Wiring Diagrams



ID	Color	Description
1	BR	ECT Sensor Ground
2	02-03 2.4 G/Y All Others G/B	ECT Sensor Signal

Figure 1

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Turn the ignition on and observe the ECT sensor data parameter on your scan tool. Is the value shown the same as the actual engine coolant temperature?
If yes, go to step 2.
If no, go to step 3.

Step 2

With your scan tool connected to the vehicle, start the engine and duplicate the failure record conditions present when the code previously set.
Does the scanner indicate the code set during this ignition cycle?
If yes, go to step 3.
If no, the problem is intermittent. Try shaking the wiring and connectors while observing the ECT temperature on the scan data. A change in the temperature displayed can indicate the location of the malfunction.

Check for:

- Poor harness connections at the ECT sensor or PCM.
- Damaged ECT sensor wiring (intermittent open circuit).
- Defective ECT sensor.

Step 3

Connect your scan tool to the vehicle. Turn the ignition on and observe the ECT sensor data parameter on your scan tool. Is the Engine Coolant Temperature shown -40°F or less?
If yes, see diagnostics for code P0118.
If no, go to step 4.

Step 4

Connect your scan tool to the vehicle. Turn the ignition on and observe the ECT sensor data parameter on your scan tool. Is the Engine Coolant Temperature shown -284°F or higher?
If yes, see diagnostics for code P0117.
If no, return to Step 1 and rerun diagnostics.

Code P0117
Engine Coolant Temperature
Sensor Low Input

Toyota Motor Company 2.2, 2.4 Liter L-4 and 3.0, 3.3 Liter V-6 Engines
Code P0117 Engine Coolant Temperature Sensor Low Input

Theory of Operation:

The Engine Coolant Temperature (ECT) sensor is a thermister that measures the temperature of the engine coolant. The PCM supplies a 5-volt reference signal through a current limiting resistor to the ECT sensor. When the engine coolant is cold the sensor resistance is high and the PCM will see a high voltage signal on ECT sensor signal circuit. When the engine coolant is warm the sensor resistance is lower and the PCM will see a lower voltage signal. The PCM uses the sensor voltage values to calculate the engine coolant temperature.

Circuit Description

The sensor circuit consists of the sensor signal and signal return circuit wiring, the ECT sensor and PCM.

Conditions for Setting the Trouble Code:

- The PCM calculates the engine coolant temperature is greater than 284°F.
- The condition is present for 0.5 seconds or more during normal vehicle operation.

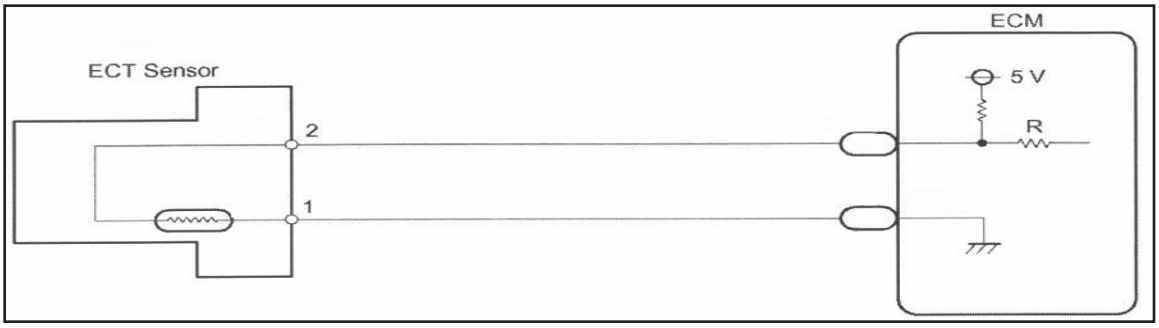
Action Taken When Code Sets:

- The PCM will illuminate the malfunction indicator lamp immediately.
- The PCM will operate in a fail-safe mode where the ECT temperature is assumed to be 176°F.

Possible Causes:

- Damaged ECT sensor wiring or harness connectors.
- Defective ECT sensor.
- Defective PCM.

Wiring Diagrams



ID	Color	Description
1	BR	ECT Sensor Ground
2	02-03 2.4 G/Y All Others G/B	ECT Sensor Signal

Figure 1

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Turn the ignition on and observe the ECT sensor data parameter on your scan tool. Is the Engine Coolant Temperature shown 284°F or more?
If yes, go to step 3.
If no, go to step 2.

Step 2

With your scan tool connected to the vehicle, start the engine and duplicate the failure record conditions present when the code previously set. Does the scanner indicate the code set during this ignition cycle?
If yes, go to step 3.
If no, the problem is intermittent. Try shaking the wiring and connectors while observing the ECT voltage on the scan data. A change in the voltage displayed can indicate the location of the malfunction.

Check for:

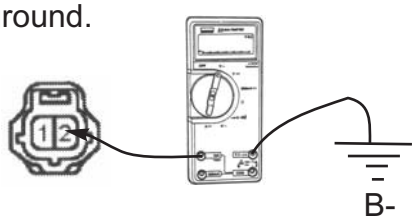
- Damaged ECT sensor circuit wiring (intermittent short to ground).
- Defective ECT sensor.

Step 3

Connect your scan tool to the vehicle. With the ignition key off, disconnect ECT sensor harness connector. Inspect the sensor and harness connectors for corroded, damaged, or pushed out terminals. Turn the ignition on and observe the ECT sensor data parameter on your scan tool. Is the Engine Coolant Temperature shown -40°F or less?
If yes, replace the ECT sensor.
If no, go to step 4.

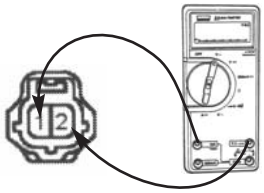
Step 4

With the ignition off, disconnect the PCM and ECT sensor harness connectors. Inspect the PCM, ECT sensor, and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the ECT sensor signal circuit terminal of the ECT sensor harness connector and a good ground **(See Figure 1)**. Is the resistance greater than 10,000 ohms?
If yes, go to step 5.
If no, repair the ECT sensor signal circuit for a short to ground.



Step 5

With the ignition off, disconnect the PCM and ECT sensor harness connectors. Inspect the PCM, ECT sensor, and harness connectors for corroded,
damaged, or pushed out terminals. Using your DVOM measure the resistance between the ECT sensor signal and ground circuit terminals of the ECT sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, replace the PCM.
If no, repair the short between the IAT sensor signal and ground circuits.



Code P0118
Engine Coolant Temperature
Sensor High Input

Toyota Motor Company 2.2, 2.4 Liter L-4 and 3.0, 3.3 Liter V-6 Engines
Code P0118 Engine Coolant Temperature Sensor High Input

Theory of Operation:

The Engine Coolant Temperature (ECT) sensor is a thermister that measures the temperature of the engine coolant. The PCM supplies a 5-volt reference signal through a current limiting resistor to the ECT sensor. When the engine coolant is cold the sensor resistance is high and the PCM will see a high voltage signal on ECT sensor signal circuit. When the engine coolant is warm the sensor resistance is lower and the PCM will a lower voltage signal. The PCM uses the sensor voltage values to calculate the engine coolant temperature.

Circuit Description:

The sensor circuit consists of the sensor signal and signal return circuit wiring, the ECT sensor and PCM.

Conditions for Setting the Trouble Code:

- The PCM calculates the engine coolant temperature is less than -40°F.
- The condition is present for 0.5 seconds or more during normal vehicle operation.

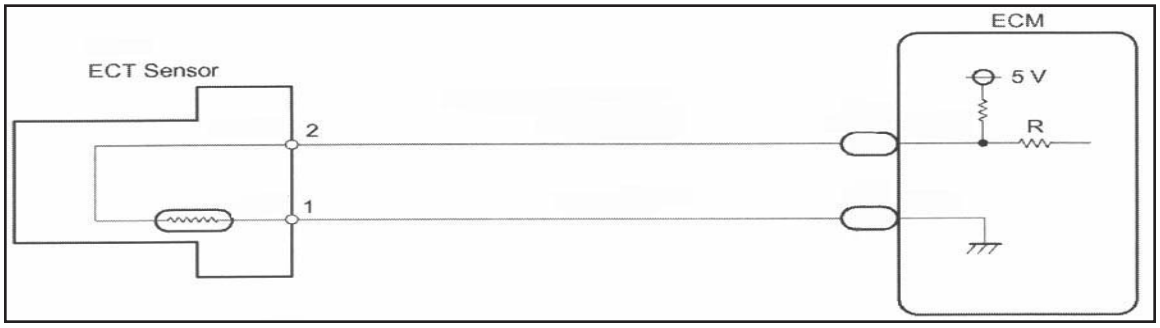
Action Taken When Code Sets:

- The PCM will illuminate the malfunction indicator lamp immediately.
- The PCM will operate in a fail-safe mode where the ECT temperature is assumed to be 176°F.

Possible Causes:

- Damaged ECT sensor wiring or harness connectors.
- Defective ECT sensor.
- Defective PCM.

Wiring Diagrams



ID	Color	Description
1	BR	ECT Sensor Ground
2	02-03 2.4 G/Y All Others G/B	ECT Sensor Signal

Figure 1

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Turn the ignition on and observe the ECT sensor data parameter on your scan tool. Is the Engine Coolant Temperature shown -40°F or less?
If yes, go to step 3.
If no, go to step 2.

Step 2

With your scan tool connected to the vehicle, start the engine and duplicate the failure record conditions present when the code previously set.
Does the scanner indicate the code set during this ignition cycle?
If yes, go to step 3.
If no, the problem is intermittent. Try shaking the wiring and connectors while observing the ECT temperature on the scan data. A change in the temperature displayed can indicate the location of the malfunction.

Check for:

- Poor harness connections at the ECT sensor or PCM.
- Damaged ECT sensor wiring (intermittent open circuit).
- Defective ECT sensor.

IMPORTANT NOTE

If the fuse in the jumper wire blows during Step 3 the ECT sensor signal circuit is shorted to voltage. Make any necessary repairs and rerun diagnostics from the beginning.

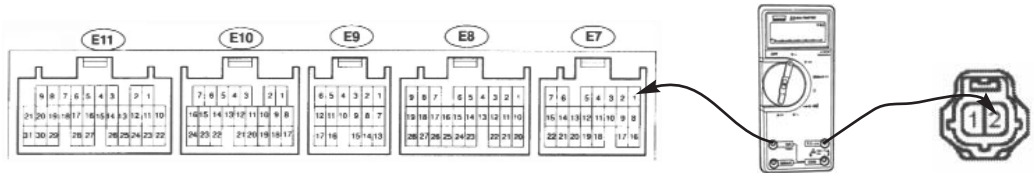
Step 3

Connect your scan tool to the vehicle. With the ignition key off, disconnect ECT sensor harness connector. Inspect the ECT sensor and harness connectors for corroded, damaged, or pushed out terminals. Connect a suitable 3 amp fused jumper wire between the ECT signal and ground circuit terminals of the ECT sensor harness connector **(See Figure 1)**. Turn the ignition on and observe the ECT sensor data parameter on your scan tool. Is the Engine Coolant Temperature shown 284°F or more?
If yes, replace the ECT sensor.
If no, go to step 4.

Diagnosis

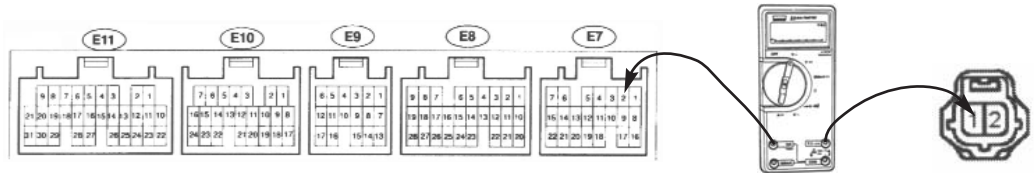
Step 4

With the ignition off, disconnect the PCM and ECT sensor harness connectors. Inspect the PCM, ECT sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the ECT signal circuit terminals of the PCM and ECT sensor harness connectors **(See Appendix for PCM Harness Connector)**.
Is the resistance 5 Ohms or less?
If yes, go to step 5.
If no, repair the open ECT sensor signal circuit.



Step 5

With the ignition off, disconnect the PCM and ECT sensor harness connectors. Inspect the PCM, ECT sensor, and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the ECT ground circuit terminals of PCM and ECT sensor harness connectors. Is the resistance 5 ohms or less?
If yes, replace the PCM.
If no, repair the open ECT sensor ground circuit.



Code P0335
Crankshaft Position Sensor Circuit Malfunction

Toyota Motor Company 2.2, 2.4 Liter L-4 and 3.0, 3.3 Liter V-6 Engines
Code P0335 Crankshaft Position Sensor Circuit Malfunction

Theory of Operation:

The Crankshaft Position Sensor (CKP) is a variable reluctance type sensor that monitors a crank angle sensor plate which is mounted on either the crankshaft or crankshaft timing pulley. The crank angle sensor plate has 34 teeth which make the CKP sensor generate 34 signals for every revolution of the engine. The CKP signal is used by Powertrain Control Module (PCM) to detect the actual crankshaft angle (position) and engine speed. The PCM uses this information to control fuel injection time and ignition timing.

Circuit Description

The CKP sensor circuit consists of the CKPs sensor; sensor signal and signal return circuit wiring and the PCM.

Conditions for Setting the Trouble Code:

- When the PCM no longer detects a signal from the CKP sensor during cranking.
- When the PCM no longer detects a signal from the CKP sensor with the engine speed of 600 RPM or more.

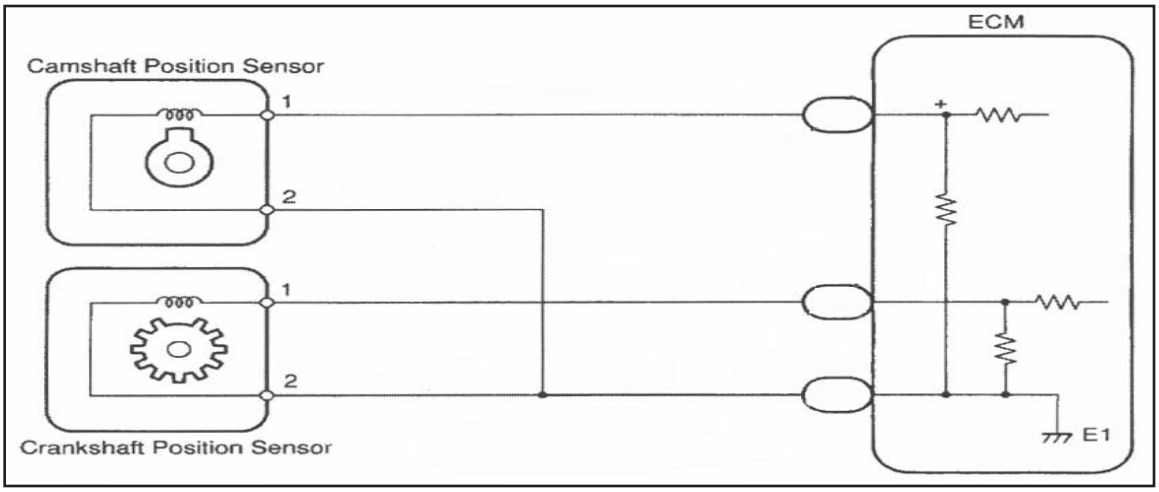
Action Taken When Code Sets:

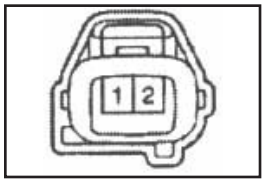
- The PCM will illuminate the malfunction indicator lamp during the second consecutive trip the conditions for setting the code have been met.
- The PCM will store the conditions that were present when the code sets in Freeze Frame and Failure Records.

Possible Causes:

- Wiring or connector problems in the CKP sensor signal and/or signal return circuit wiring.
- Defective CKP sensor.
- Damaged crank angle sensor plate.
- Defective PCM.

Wiring Diagrams





ID	Color	Description
1	99-01 B/R 02-06 R	CKP Sensor Signal
2	99-01 L 02-06 G	CKP Sensor Ground

Figure 1

Diagnosis

Step 1

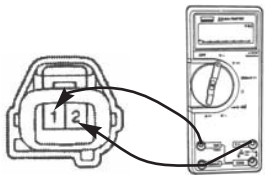
Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and start the engine. Increase the engine speed to greater than 600 RPM and hold for 10 seconds. Repeat this three times without clearing codes between engine restarts. Recheck codes. Did code P0335 return?
If yes, go to step 2.
If no, the problem is intermittent. Check for the following conditions:

- CKP sensor wiring harness for damaged insulation, broken, pinched or frayed wiring.
- Harness connectors for corroded, damaged, or pushed out terminals.
- Electromagnetic interference (defective alternator, improperly routed wiring harness).

Step 2

With the ignition key off, disconnect the CKP sensor harness connector. Inspect the CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CKP signal and ground circuit terminals of the CKP sensor. Is the resistance between 985 – 1,600 ohms cold or 1,265 – 1,890 ohms hot?
If yes, go to step 3.
If no, replace the CKP sensor and rerun diagnostics.

NOTE **“Cold” and “Hot” refer to the temperature of the sensor. Cold is 14-122 degrees F. Hot is 122-212 degrees F.**



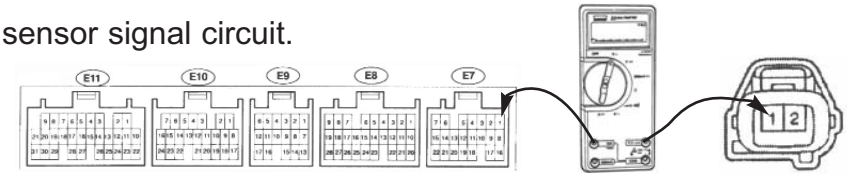
Step 3

With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. With the ignition key on, use your DVOM and measure the voltage between the CKP sensor signal circuit terminal of the CKP sensor harness connector and the battery negative post. Is there less than 1 volt present?
If yes, go to step 4.
If no, repair the CKP signal circuit for a short to voltage.

Diagnosis

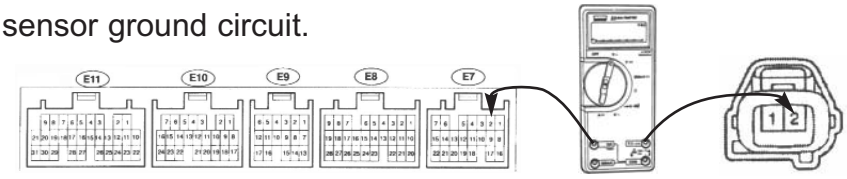
Step 4

With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CKP sensor signal circuit terminals of the PCM and CKP harness connectors **(See Appendix for PCM Harness Connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open CKP sensor signal circuit.



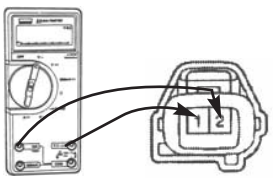
Step 5

With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CKP sensor ground circuit terminals of the PCM and CKP harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 6.
If no, repair the open CKP sensor ground circuit.



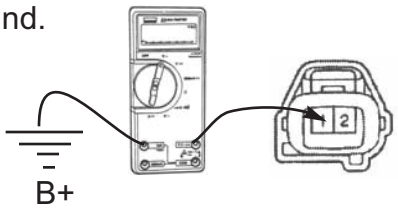
Step 6

With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CKP sensor signal and ground circuit terminals of the CKP sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the CKP sensor signal and ground circuits.



Step 7

With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CKP sensor signal circuit terminal of the CKP sensor harness connector and the battery negative post. Is the resistance greater than 10,000 ohms?
If yes, go to step 8.
If no, repair the CKP sensor signal circuit for a short to ground.

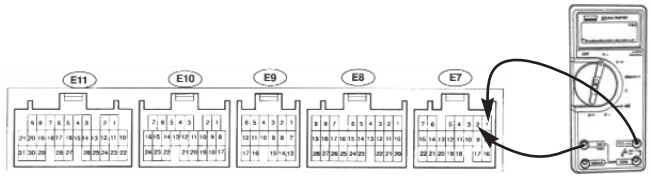


Step 8

Inspect the CKP sensor for proper installation and the crankshaft signal plate/teeth for damage. Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 9.

Step 9

Reconnect all harness connectors. Using your DVOM, set on a low AC voltage scale, back probe the CKP sensor signal and ground circuit terminals of the PCM harness connector. Start the engine and run it at 2500 RPM. Is there more than .25 volts AC present?
If yes, replace the PCM.
If no, replace the CKP sensor.



NOTE **The preferred method of observing the CKP sensor voltage is with an oscilloscope such as the Snap-On Modis. The voltage pulses per engine revolution give a much better indication of the sensors performance.**

Code P0339
Crankshaft Position Sensor
Circuit Intermittent

Toyota Motor Company 2.2, 2.4 Liter L-4 and 3.0, 3.3 Liter V-6 Engines
Code P0339 Crankshaft Position Sensor Circuit Intermittent

Theory of Operation:

The Crankshaft Position Sensor (CKP) is a variable reluctance type sensor that monitors a crank angle sensor plate which is mounted on either the crankshaft or crankshaft timing pulley. The crank angle sensor plate has 34 teeth which make the CKP sensor generate 34 signals for every revolution of the engine. The CKP signal is used by Powertrain Control Module (PCM) to detect the actual crankshaft angle (position) and engine speed. The PCM uses this information to control fuel injection time and ignition timing

Circuit Description:

The CKP sensor circuit consists of the CKPs sensor; sensor signal and signal return circuit wiring and the PCM.

Conditions for Setting the Trouble Code:

When the PCM no longer detects a signal from the CKP sensor for 5 seconds or more with

- The engine speed is at 1,000 RPM or more.
- The Park/ Neutral Position Switch signal is OFF.
- More than 3 seconds have elapsed since the Park/ Neutral Position Switch signal has switched from ON to OFF.

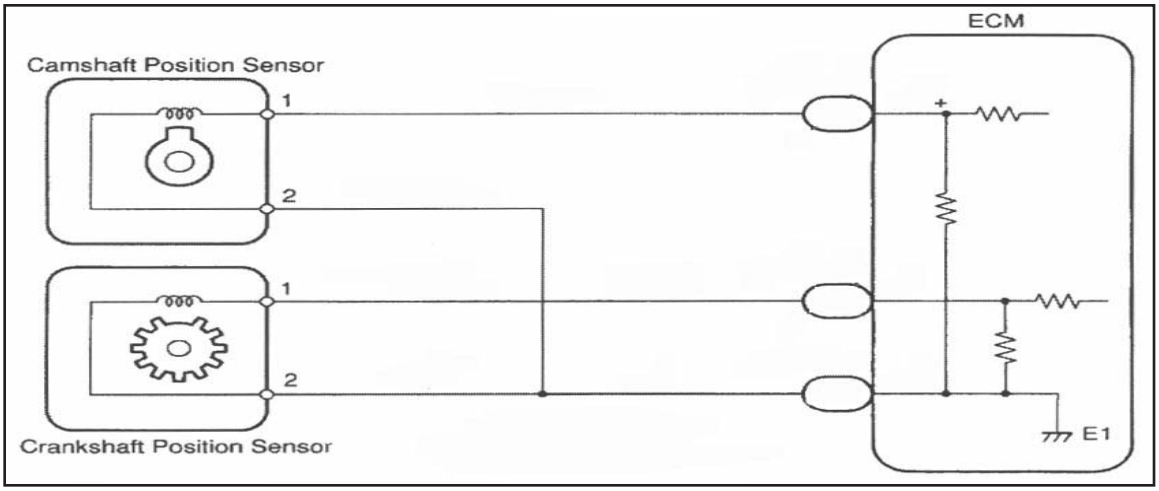
Action Taken When Code Sets:

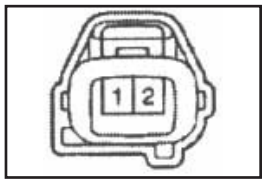
- The PCM will illuminate the malfunction indicator lamp during the second consecutive trip the conditions for setting the code have been met.
- The PCM will store the conditions that were present when the code sets in Freeze Frame and Failure Records.

Possible Causes:

- Wiring or connector problems in the CKP sensor signal and/or signal return circuit wiring.
- Defective CKP sensor.
- Damaged crank angle sensor plate.
- Defective PCM.

Wiring Diagrams





ID	Color	Description
1	99-01 B/R 02-06 R	CKP Sensor Signal
2	99-01 L 02-06 G	CKP Sensor Ground

Figure 1

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and start the engine. Increase the engine speed to greater than 600 RPM and hold for 10 seconds. Repeat this three times without clearing codes between engine restarts. Recheck codes. Did code P0339 return?
If yes, go to step 2.
If no, the problem is intermittent. Check for the following conditions:

- CKP sensor wiring harness for damaged insulation, broken, pinched or frayed wiring.
- Harness connectors for corroded, damaged, or pushed out terminals.
- Electromagnetic interference (defective alternator, improperly routed wiring harness).

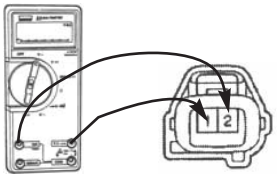
Step 2

With the ignition key off, disconnect the CKP sensor harness connector. Inspect the CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CKP signal and ground circuit terminals of the CKP sensor. Is the resistance between 985 – 1,600 ohms cold or 1,265 – 1,890 ohms hot?
If yes, go to step 3.
If no, replace the CKP sensor and rerun diagnostics.

NOTE **“Cold” and “Hot” refer to the temperature of the sensor. Cold is 14-122°F. Hot is 122-212°F.**

Step 3

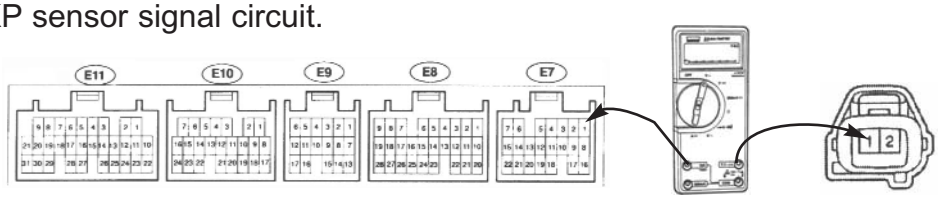
With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. With the ignition key on, use your DVOM and measure the voltage between the CKP sensor signal circuit terminal of the CKP sensor harness connector and the battery negative post. Is there less than 1 volt present?
If yes, go to step 4.
If no, repair the CKP signal circuit for a short to voltage.



Diagnosis

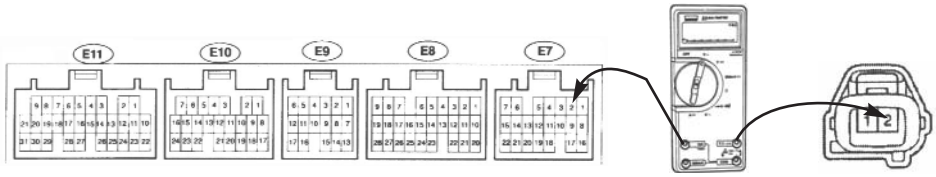
Step 4

With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CKP sensor signal circuit terminals of the PCM and CKP harness connectors **(See Appendix for PCM Harness Connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open CKP sensor signal circuit.



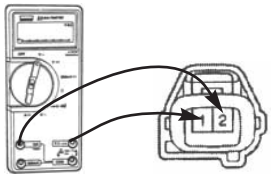
Step 5

With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CKP sensor ground circuit terminals of the PCM and CKP harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 6.
If no, repair the open CKP sensor ground circuit



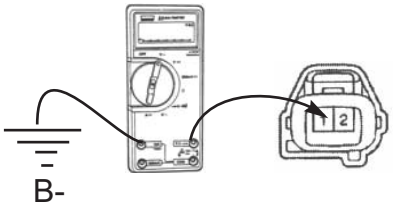
Step 6

With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CKP sensor signal and ground circuit terminals of the CKP sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the CKP sensor signal and ground circuits.



Step 7

With the ignition key off, disconnect the PCM and CKP sensor harness connectors. Inspect the PCM, CKP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CKP sensor signal circuit terminal of the CKP sensor harness connector and the battery negative post. Is the resistance greater than 10,000 ohms?
If yes, go to step 8.
If no, repair the CKP sensor signal circuit for a short to ground.

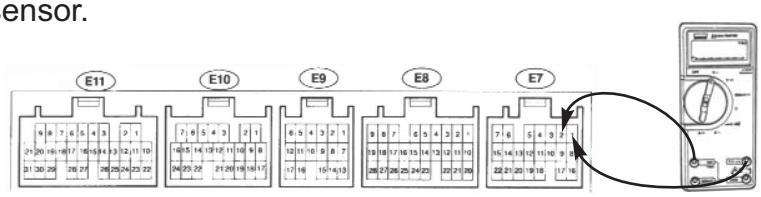


Step 8

Inspect the CKP sensor for proper installation and the crankshaft signal plate/teeth for damage. Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 9.

Step 9

Reconnect all harness connectors. Using your DVOM, set on a low AC voltage scale, back probe the CKP sensor signal and ground circuit terminals of the PCM harness connector. Start the engine and run it at 2500 RPM. Is there more than .25 volts AC present?
If yes, replace the PCM.
If no, replace the CKP sensor.



NOTE **The preferred method of observing the CKP sensor voltage is with an oscilloscope such as the Snap-On Modis. The voltage pulses per engine revolution give a much better indication of the sensors performance.**

Code P0340
Camshaft Position Sensor
Circuit Malfunction
2.2, 2.4L I4

Toyota Motor Company 2.2, 2.4 Liter L-4
Code P0340 Camshaft Position Sensor Circuit Malfunction

Theory of Operation:

The Camshaft Position Sensor (CMP) is a variable reluctance type sensor that monitors a timing signal plate or rotor located on the camshaft. The CMP signal is used by Powertrain Control Module (PCM) to detect the standard crankshaft angle (when number one piston is on the compression stoke).The PCM uses this information to control fuel injection time and ignition timing.
2.2L engines use a signal plate with one tooth that is mounted on the camshaft timing pulley. 2.4L engines use a signal plate with 3 teeth that is mounted on the intake camshaft.

Circuit Description:

The CMP sensor circuit consists of the CMPs sensor; sensor signal and signal return circuit wiring and the PCM.

Conditions for Setting the Trouble Code:

- When the PCM no longer detects a signal from the CMP sensor even though the engine is turning.
- When the PCM detects the rotation of camshaft and crankshaft are not synchronized.

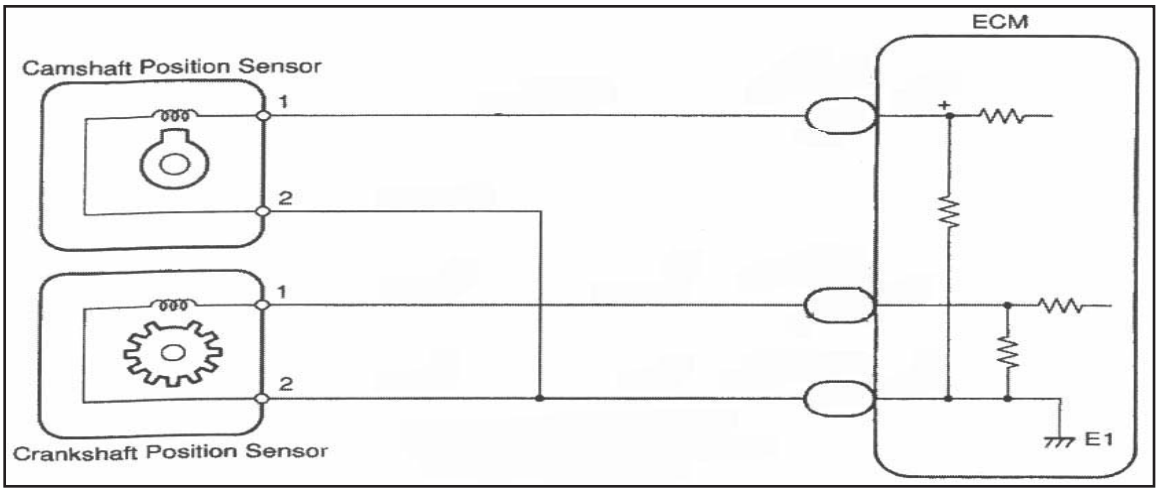
Action Taken When Code Sets:

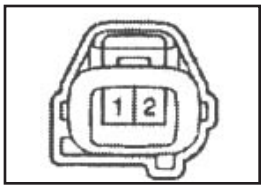
- The PCM will illuminate the malfunction indicator lamp during the second consecutive trip the conditions for setting the code have been met.
- The PCM will store the conditions that were present when the code sets in Freeze Frame and Failure Records.

Possible Causes:

- Wiring or connector problems in the CMP sensor signal and/or signal return circuit wiring.
- Defective CMP sensor.
- Damaged camshaft (2.4L) or camshaft timing pulley (2.2L).
- Defective PCM.

Wiring Diagrams





ID	Color	Description
1	99-03 B/W 04-Up O or L	CKP Sensor Signal
2	99-03 L 04-Up W or R	CKP Sensor Ground

Figure 1

Diagnosis

Step 1

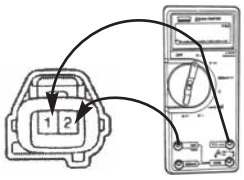
Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and start the engine. Increase the engine speed to greater than 600 RPM and hold for 10 seconds. Repeat this three times without clearing codes between engine restarts. Recheck codes. Did code P0340 return?
If yes, go to step 2.
If no, the problem is intermittent. Check for the following conditions:

- CMP sensor wiring harness for damaged insulation, broken, pinched or frayed wiring.
- Harness connectors for corroded, damaged, or pushed out terminals.
- Electromagnetic interference (defective alternator, improperly routed wiring harness).

Step 2

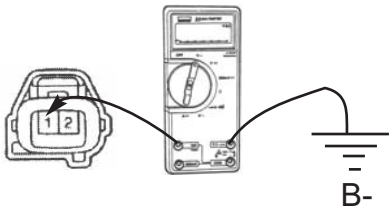
With the ignition key off, disconnect the CMP sensor harness connector. Inspect the CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CMP signal and ground circuit terminals of the CMP sensor. Is the resistance between 835 – 1,400 ohms cold or 1,060 – 1,645 ohms hot?
If yes, go to step 3.
If no, replace the CMP sensor and rerun diagnostics.

NOTE **“Cold” and “Hot” refer to the temperature of the sensor. Cold is 14-122°F. Hot is 122-212°F.**



Step 3

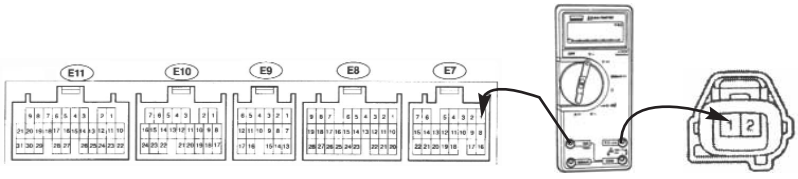
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. With the ignition key on, use your DVOM and measure the voltage between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post **(See Figure 1)**. Is there less than 1 volt present?
If yes, go to step 4.
If no, repair the CMP signal circuit for a short to voltage.



Diagnosis

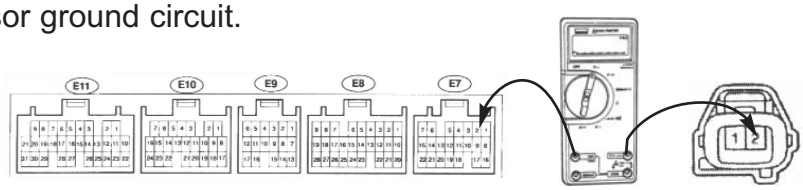
Step 4

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminals of the PCM and CMP harness connectors **(See Appendix for PCM Harness Connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open CMP sensor signal circuit.



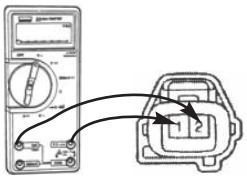
Step 5

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor ground circuit terminals of the PCM and CMP harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 6.
If no, repair the open CMP sensor ground circuit.



Step 6

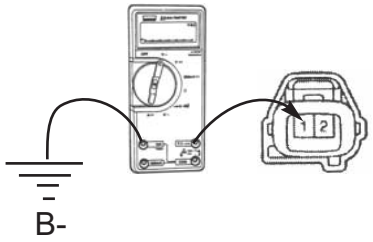
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, and measure the resistance between the CMP sensor signal and signal ground terminals of the CMP sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the CMP sensor signal and ground circuits.



Diagnosis

Step 7

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post. Is the resistance greater than 10,000 ohms?
If yes, go to step 8.
If no, repair the CMP sensor signal circuit for a short to ground.

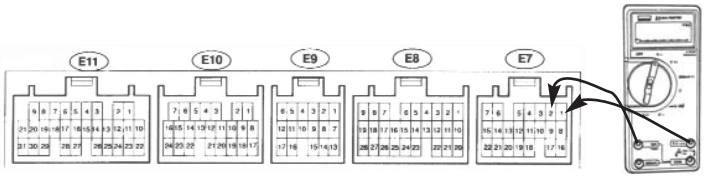


Step 8

On 2.2 L engines inspect the CMP sensor for proper installation and the signal plate tooth of camshaft timing pulley for damage. On 2.4 L engines inspect the CMP sensor for proper installation and the camshaft lobes for wear. Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 9.

Step 9

Reconnect all harness connectors. Using your DVOM, set on a low AC voltage scale, back probe the CMP sensor signal and ground circuit terminals of the PCM harness connector. Start the engine and run it at 2500 RPM. Is there more than .25 volts AC present?
If yes, replace the PCM.
If no, replace the CMP sensor.



NOTE **The preferred method of observing the CMP sensor voltage is with an oscilloscope such as the Snap-On Modis. The voltage pulses per engine revolution give a much better indication of the sensors performance.**

Code P0340
Camshaft Position Sensor
Circuit Malfunction
3.0L V6 1999-2003

Toyota Motor Company 3.0 Liter V-6 Engine (1999-2003)
Code P0340 Camshaft Position Sensor Circuit Malfunction (Bank 1)

Theory of Operation:

The Camshaft Position Sensor (CMP) is a variable reluctance type sensor that monitors a timing signal plate or rotor located on the camshaft. The CMP signal is used by Powertrain Control Module (PCM) to detect the standard crankshaft angle (when number one piston is on the compression stoke).The PCM uses this information to control fuel injection time and ignition timing.

NOTE **Toyota will sometimes call the CMP the Variable Valve Timing (VVT) sensor.**

Circuit Description:

The CMP sensor circuit consists of the CMPs sensor; sensor signal and signal return circuit wiring and the PCM.

Conditions for Setting the Trouble Code:

- When the PCM no longer detects a signal from the CMP sensor during cranking.
- When the PCM no longer detects a signal from the CMP sensor with the engine speed 600 RPM or more.

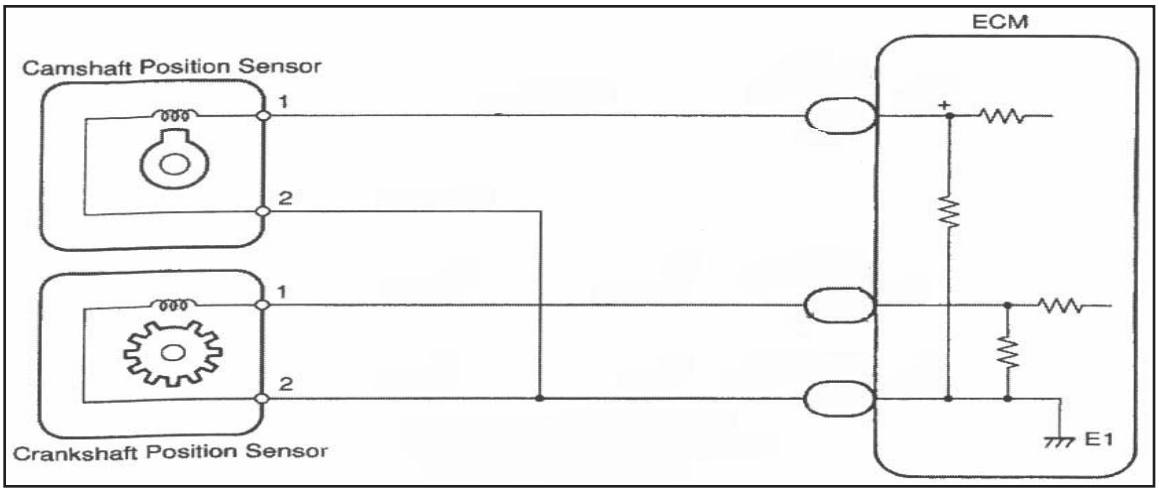
Action Taken When Code Sets:

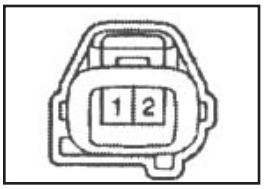
- The PCM will illuminate the malfunction indicator lamp during the second consecutive trip the conditions for setting the code have been met.
- The PCM will store the conditions that were present when the code sets in Freeze Frame and Failure Records.

Possible Causes:

- Wiring or connector problems in the CMP sensor signal and/or signal return circuit wiring.
- Defective CMP sensor.
- Damaged camshaft timing pulley
- Defective PCM.

Wiring Diagrams





ID	Color	Description
1	B/W	CKP Sensor Signal
2	L	CKP Sensor Ground

Figure 1

Diagnosis

Step 1

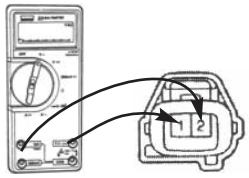
Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and start the engine. Increase the engine speed to greater than 600 RPM and hold for 10 seconds. Repeat this three times without clearing codes between engine restarts. Recheck codes. Did code P0340 return?
If yes, go to step 2.
If no, the problem is intermittent. Check for the following conditions:

- CMP sensor wiring harness for damaged insulation, broken, pinched or frayed wiring.
- Harness connectors for corroded, damaged, or pushed out terminals.
- Electromagnetic interference (defective alternator, improperly routed wiring harness).

Step 2

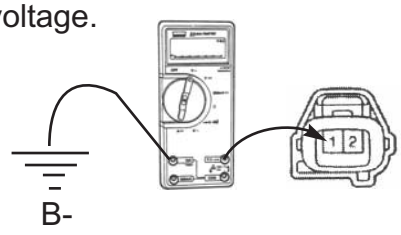
With the ignition key off, disconnect the CMP sensor harness connector. Inspect the CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP signal and ground circuit terminals of the CMP sensor. Is the resistance between 835 – 1,400 ohms cold or 1,060 – 1,645 ohms hot?
If yes, go to step 3.
If no, replace the CMP sensor and rerun diagnostics.

NOTE **“Cold” and “Hot” refer to the temperature of the sensor. Cold is 14-122°F. Hot is 122-212°F.**



Step 3

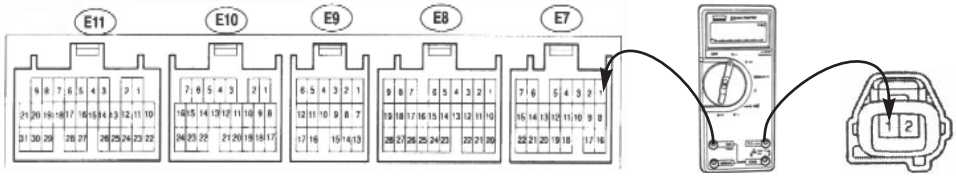
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. With the ignition key on, use your DVOM and measure the voltage between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post **(See Figure 1)**. Is there less than 1 volt present?
If yes, go to step 4.
If no, repair the CMP signal circuit for a short to voltage.



Diagnosis

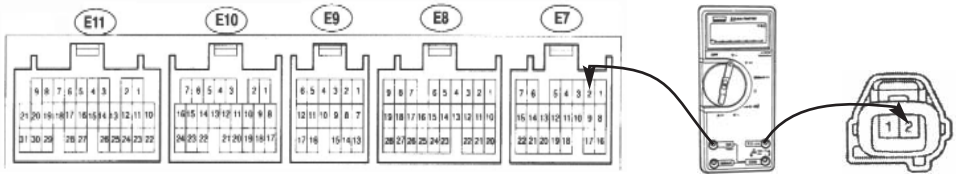
Step 4

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminals of the PCM and CMP harness connectors **(See Appendix for PCM Harness Connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open CMP sensor signal circuit.



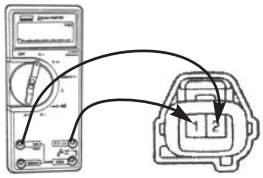
Step 5

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor ground circuit terminals of the PCM and CMP harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 6.
If no, repair the open CMP sensor ground circuit.



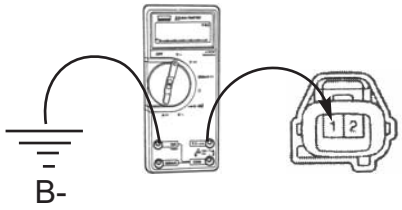
Step 6

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal and signal ground terminals of the CMP sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the CMP sensor signal and ground circuits.



Step 7

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post. Is the resistance greater than 10,000 ohms?
If yes, go to step 8.
If no, repair the CMP sensor signal circuit for a short to ground.

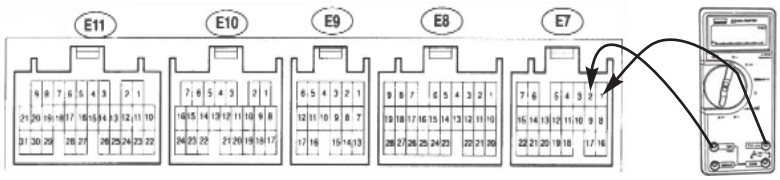


Step 8

Inspect the CMP sensor for proper installation. Also check the teeth on the camshaft timing pulley for any cracks or deformation. Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 9.

Step 9

Reconnect all harness connectors. Using your DVOM set on a low AC voltage scale, back probe the CMP sensor signal and ground circuit terminals of the PCM harness connector. Start the engine and run it at 2500 RPM. Is there more than .25 volts AC present?
If yes, replace the PCM.
If no, replace the CMP sensor.



NOTE **The preferred method of observing the CMP sensor voltage is with an oscilloscope such as the Snap-On Modis. The voltage pulses per engine revolution give a much better indication of the sensors performance.**

Code P0340
Camshaft Position Sensor
Circuit Malfunction (Bank 1)
3.0 & 3.3L V6 2004-2006

Toyota Motor Company 3.0, 3.3 Liter V-6 Engines (2004-2006)
Code P0340 Camshaft Position Sensor Circuit Malfunction (Bank 1)

Theory of Operation:

The Camshaft Position Sensor (CMP) is a variable reluctance type sensor that monitors a timing signal plate or rotor located on the camshaft. The CMP signal is used by Powertrain Control Module (PCM) to detect the standard crankshaft angle (when number one piston is on the compression stoke).The PCM uses this information to control fuel injection time and ignition timing.

NOTE **Toyota will sometimes call the CMP the Variable Valve Timing (VVT) sensor.**

Circuit Description:

The CMP sensor circuit consists of the CMPs sensor; sensor signal and signal return circuit wiring and the PCM.

Conditions for Setting the Trouble Code:

- When the PCM no longer detects a signal from the CMP sensor during cranking.
- When the PCM no longer detects a signal from the CMP sensor with the engine speed 600 RPM or more.

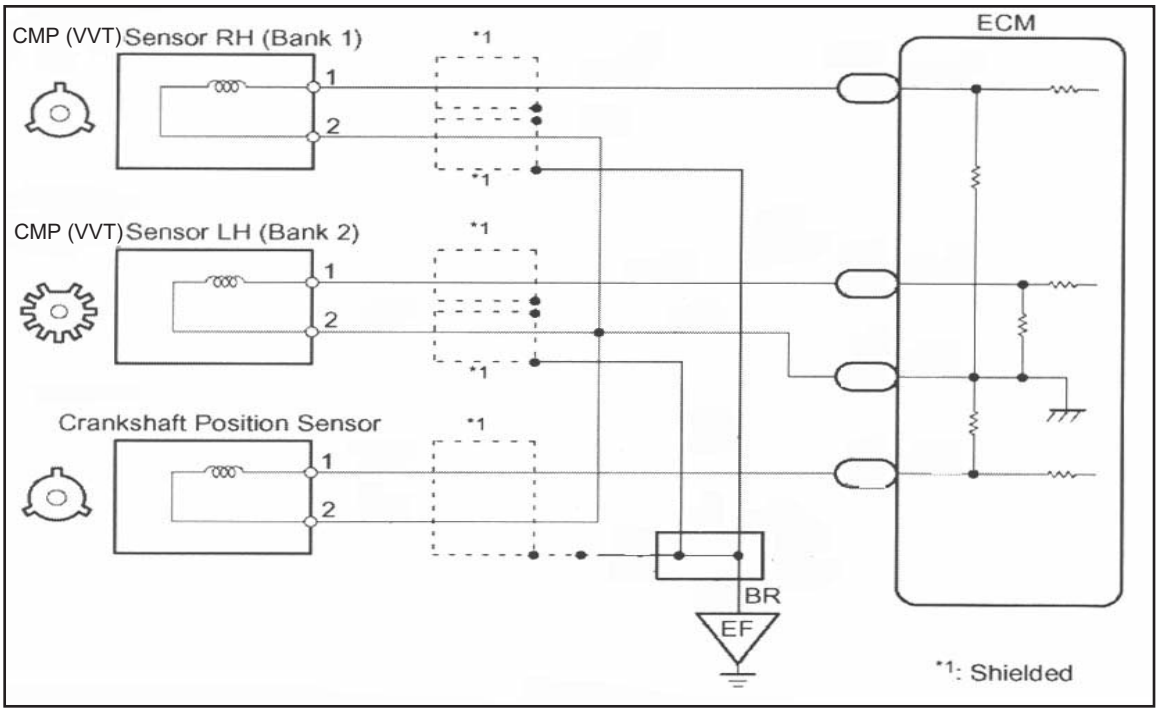
Action Taken When Code Sets:

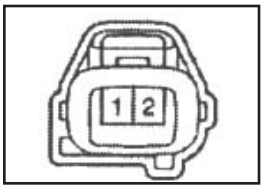
- The PCM will illuminate the malfunction indicator lamp during the second consecutive trip the conditions for setting the code have been met.
- The PCM will store the conditions that were present when the code sets in Freeze Frame and Failure Records.

Possible Causes:

- Wiring or connector problems in the CMP sensor signal and/or signal return circuit wiring.
- Defective CMP sensor.
- Damaged camshaft timing pulley
- Defective PCM.

Wiring Diagrams





ID	Color	Description
1	G/B	CMP Sensor Signal (Bank 1)
2	G/R	CMP Sensor Ground (Bank 1)

Figure 1

Diagnosis

Step 1

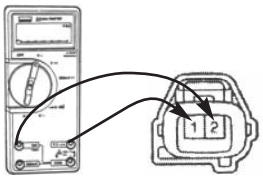
Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and start the engine. Increase the engine speed to greater than 600 RPM and hold for 10 seconds. Repeat this three times without clearing codes between engine restarts. Recheck codes. Did code P0340 return?
If yes, go to step 2.
If no, the problem is intermittent. Check for the following conditions:

- CMP sensor wiring harness for damaged insulation, broken, pinched or frayed wiring.
- Harness connectors for corroded, damaged, or pushed out terminals.
- Electromagnetic interference (defective alternator, improperly routed wiring harness).

Step 2

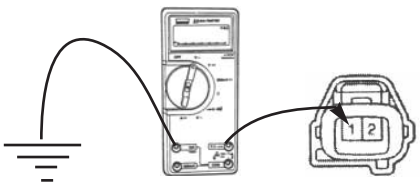
With the ignition key off, disconnect the CMP sensor harness connector. Inspect the CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP signal and ground circuit terminals of the CMP sensor. Is the resistance between 835 – 1,400 ohms cold or 1,060 – 1,645 ohms hot?
If yes, go to step 3.
If no, replace the CMP sensor and rerun diagnostics.

NOTE **“Cold” and “Hot” refer to the temperature of the sensor. Cold is 14-122°F. Hot is 122-212°F.**



Step 3

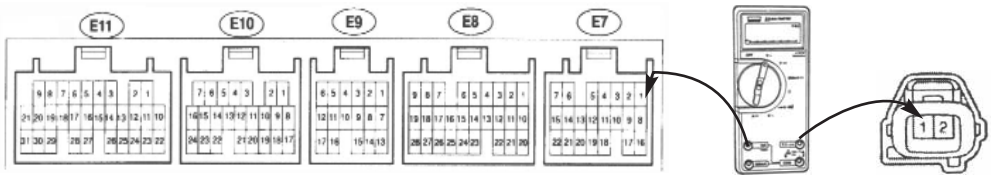
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. With the ignition key on, use your DVOM and measure the voltage between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post **(See Figure 1)**. Is there less than 1 volt present?
If yes, go to step 4.
If no, repair the CMP signal circuit for a short to voltage.



Diagnosis

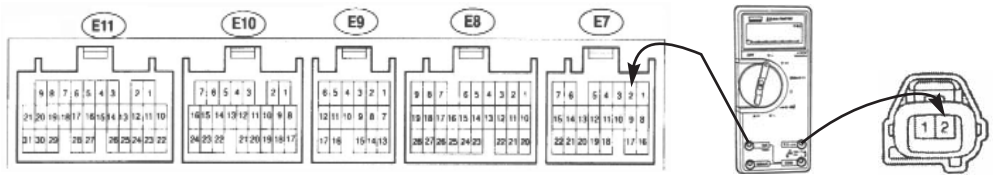
Step 4

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminals of the PCM and CMP harness connectors **(See Appendix for PCM Harness Connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open CMP sensor signal circuit.



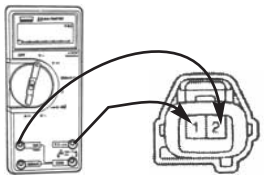
Step 5

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor ground circuit terminals of the PCM and CMP harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 6.
If no, repair the open CMP sensor ground circuit.



Step 6

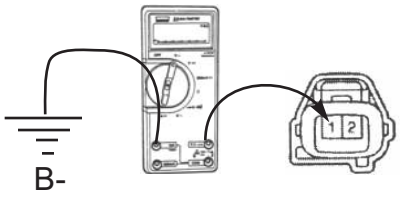
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal and signal ground terminals of the CMP sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the CMP sensor signal and ground circuits.



Diagnosis

Step 7

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post. Is the resistance greater than 10,000 ohms?
If yes, go to step 8.
If no, repair the CMP sensor signal circuit for a short to ground.

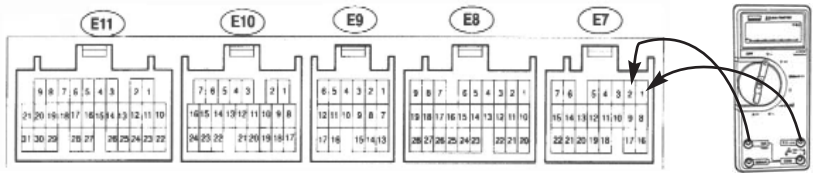


Step 8

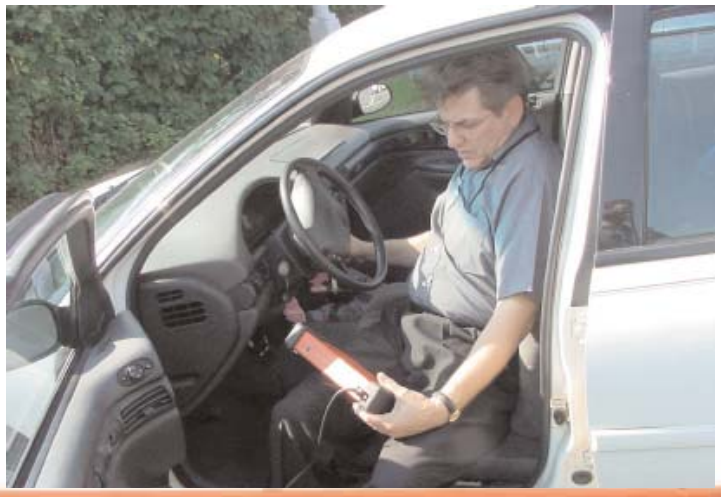
Inspect the CMP sensor for proper installation. Also check the teeth on the camshaft timing pulley for any cracks or deformation. Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 9.

Step 9

Reconnect all harness connectors. Using your DVOM set on a low AC voltage scale, back probe the CMP sensor signal and ground circuit terminals of the PCM harness connector. Start the engine and run it at 2500 RPM. Is there more than .25 volts AC present?
If yes, replace the PCM.
If no, replace the CMP sensor.



NOTE **The preferred method of observing the CMP sensor voltage is with an oscilloscope such as the Snap-On Modis. The voltage pulses per engine revolution give a much better indication of the sensors performance.**



Code P0341
Camshaft Position Sensor
Circuit Range/Performance
3.0L V6 1999-2003

Toyota Motor Company 3.0 V-6 Engine (1993-2003)
Code P0341 Camshaft Position Sensor Circuit Range/Performance (Bank 1)

Theory of Operation:

The Camshaft Position Sensor (CMP) is a variable reluctance type sensor that monitors a timing signal plate or rotor located on the camshaft. The CMP signal is used by Powertrain Control Module (PCM) to detect the standard crankshaft angle (when number one piston is on the compression stoke).The PCM uses this information to control fuel injection time and ignition timing.

NOTE **Toyota will sometimes call the CMP the Variable Valve Timing (VVT) sensor.**

Circuit Description:

The CMP sensor circuit consists of the CMPs sensor; sensor signal and signal return circuit wiring and the PCM.

Conditions for Setting the Trouble Code:

- When the crankshaft rotates twice and the CMP signal is input to the PCM 5 times or more.

NOTE **The CMP signal should input 3 times for every 2 engine revolutions.**

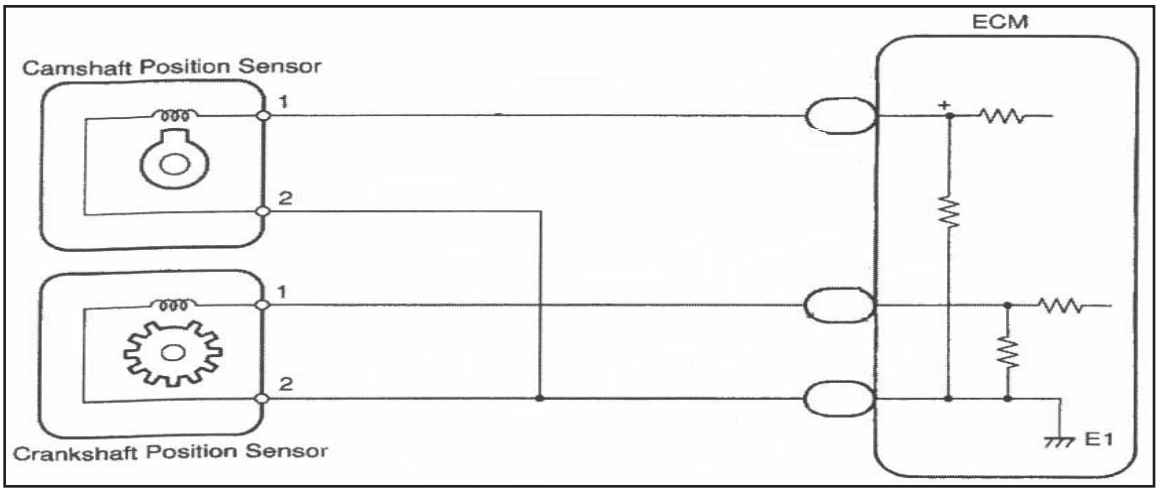
Action Taken When Code Sets:

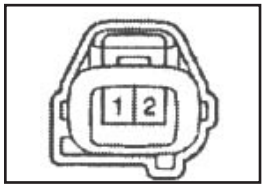
- The PCM will illuminate the malfunction indicator lamp the first time the conditions for setting the code have been met.
- The PCM will store the conditions that were present when the code sets in Freeze Frame and Failure Records

Possible Causes:

- Wiring or connector problems in the CMP sensor signal and/or signal return circuit wiring.
- Defective CMP sensor.
- Damaged camshaft timing pulley
- Defective PCM.

Wiring Diagrams





ID	Color	Description
1	B/W	CKP Sensor Signal
2	L	CKP Sensor Ground

Figure 1

Diagnosis

Step 1

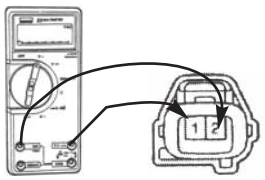
Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and start the engine. Increase the engine speed to greater than 600 RPM and hold for 10 seconds. Repeat this three times without clearing codes between engine restarts. Recheck codes. Did code P0341 return?
If yes, go to step 2.
If no, the problem is intermittent. Check for the following conditions:

- CMP sensor wiring harness for damaged insulation, broken, pinched or frayed wiring.
- Harness connectors for corroded, damaged, or pushed out terminals.
- Electromagnetic interference (defective alternator, improperly routed wiring harness).

Step 2

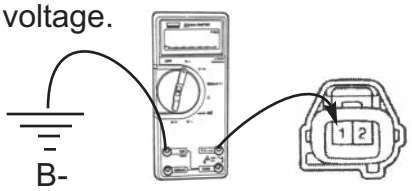
With the ignition key off, disconnect the CMP sensor harness connector. Inspect the CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP signal and ground circuit terminals of the CMP sensor. Is the resistance between 835 – 1,400 ohms cold or 1,060 – 1,645 ohms hot?
If yes, go to step 3.
If no, replace the CMP sensor and rerun diagnostics.

NOTE **“Cold” and “Hot” refer to the temperature of the sensor. Cold is 14-122°F. Hot is 122-212°F.**



Step 3

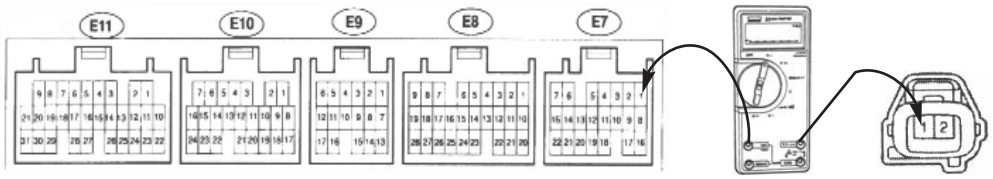
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. With the ignition key on, use your DVOM and measure the voltage between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post **(See Figure 1)**. Is there less than 1 volt present?
If yes, go to step 4.
If no, repair the CMP signal circuit for a short to voltage.



Diagnosis

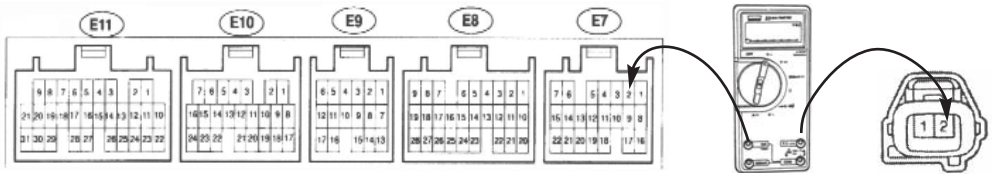
Step 4

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminals of the PCM and CMP harness connectors **(See Appendix for PCM Harness Connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open CMP sensor signal circuit.



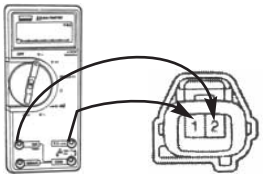
Step 5

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor ground circuit terminals of the PCM and CMP harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 6.
If no, repair the open CMP sensor ground circuit.



Step 6

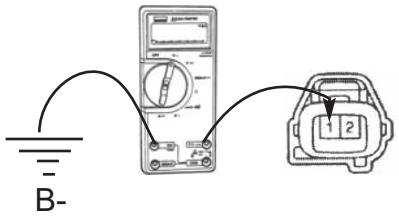
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal and ground circuit terminals of the CMP sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the CMP sensor signal and ground circuits.



Diagnosis

Step 7

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post. Is the resistance greater than 10,000 ohms?
If yes, go to step 8.
If no, repair the CMP sensor signal circuit for a short to ground.

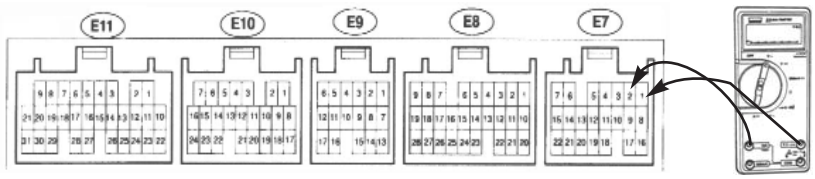


Step 8

Inspect the CMP sensor for proper installation. Also check the teeth on the camshaft timing pulley for any cracks or deformation. Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 9.

Step 9

Reconnect all harness connectors. Using your DVOM, set on a low AC voltage scale, back probe the CMP sensor signal and ground circuit terminals of the PCM harness connector. Start the engine and run it at 2500 RPM. Is there more than .25 volts AC present?
If yes, replace the PCM.
If no, replace the CMP sensor.



NOTE **The preferred method of observing the CMP sensor voltage is with an oscilloscope such as the Snap-On Modis. The voltage pulses per engine revolution give a much better indication of the sensors performance.**

Code P0341
Camshaft Position Sensor Circuit Range/Performance (Bank 1)
3.0 & 3.3L V6 2004-2006

Toyota Motor Company 3.0, 3.3 Liter V-6 Engine (2004-2006)
Code P0341 Camshaft Position Sensor Circuit Range/Performance (Bank 1)

Theory of Operation:

The Camshaft Position Sensor (CMP) is a variable reluctance type sensor that monitors a timing signal plate or rotor located on the camshaft. The CMP signal is used by Powertrain Control Module (PCM) to detect the standard crankshaft angle (when number one piston is on the compression stoke).The PCM uses this information to control fuel injection time and ignition timing.

NOTE **Toyota will sometimes call the CMP the Variable Valve Timing (VVT) sensor.**

Circuit Description:

The CMP sensor circuit consists of the CMPs sensor; sensor signal and signal return circuit wiring and the PCM.

Conditions for Setting the Trouble Code:

- When the crankshaft rotates twice and the CMP signal is input to the PCM 5 times or more.

NOTE **The CMP signal should input 3 times for every 2 engine revolutions.**

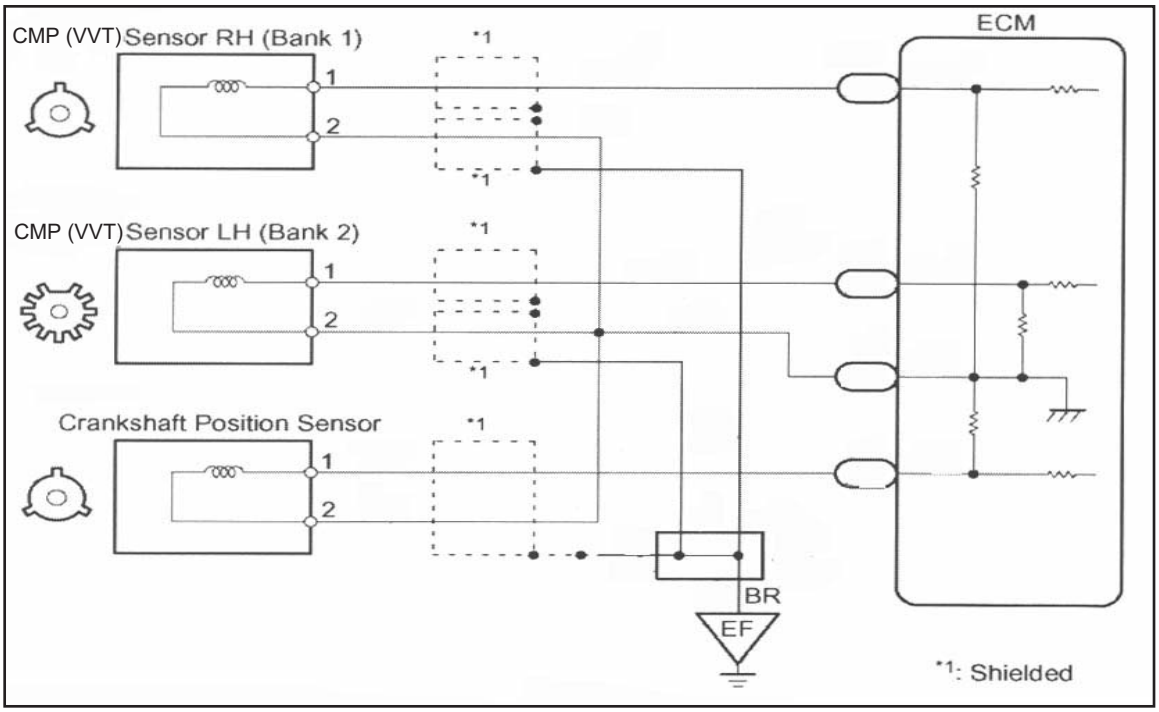
Action Taken When Code Sets:

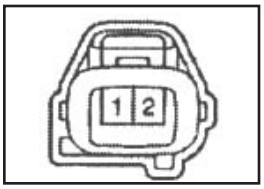
- The PCM will illuminate the malfunction indicator lamp the first time the conditions for setting the code have been met.
- The PCM will store the conditions that were present when the code sets in Freeze Frame and Failure Records

Possible Causes:

- Wiring or connector problems in the CMP sensor signal and/or signal return circuit wiring.
- Defective CMP sensor.
- Damaged camshaft timing pulley
- Defective PCM.

Wiring Diagrams





ID	Color	Description
1	G/B	CMP Sensor Signal (Bank 1)
2	G/R	CMP Sensor Ground (Bank 1)

Figure 1

Diagnosis

Step 1

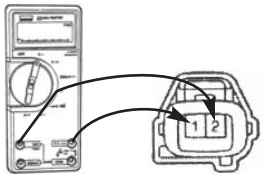
Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and start the engine. Increase the engine speed to greater than 600 RPM and hold for 10 seconds. Repeat this three times without clearing codes between engine restarts. Recheck codes. Did code P0341 return?
If yes, go to step 2.
If no, the problem is intermittent. Check for the following conditions:

- CMP sensor wiring harness for damaged insulation, broken, pinched or frayed wiring.
- Harness connectors for corroded, damaged, or pushed out terminals.
- Electromagnetic interference (defective alternator, improperly routed wiring harness).

Step 2

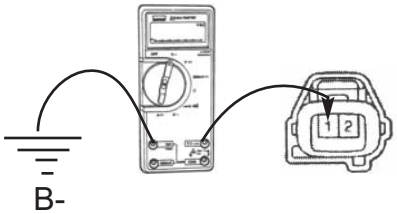
With the ignition key off, disconnect the CMP sensor harness connector. Inspect the CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP signal and ground circuit terminals of the CMP sensor. Is the resistance between 835 – 1,400 ohms cold or 1,060 – 1,645 ohms hot?
If yes, go to step 3.
If no, replace the CMP sensor and rerun diagnostics.

NOTE **"Cold" and "Hot" refer to the temperature of the sensor. Cold is 14-122°F. Hot is 122-212°F.**



Step 3

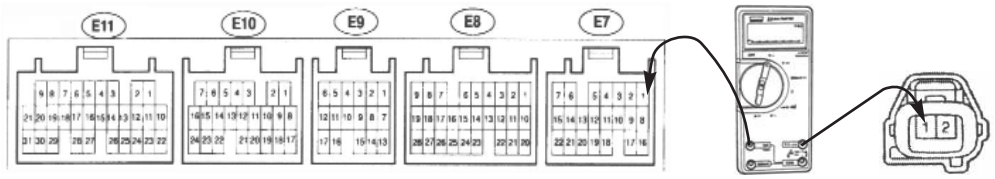
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. With the ignition key on, use your DVOM and measure the voltage between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post **(See Figure 1)**. Is there less than 1 volt present?
If yes, go to step 4.
If no, repair the CMP signal circuit for a short to voltage.



Diagnosis

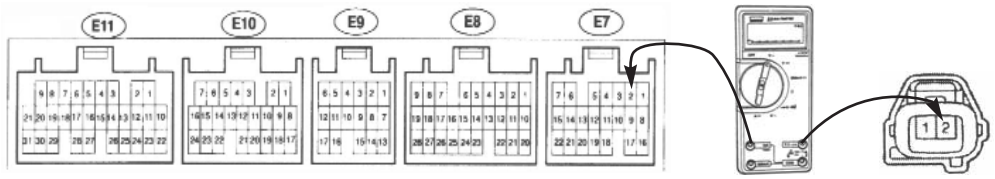
Step 4

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminals of the PCM and CMP harness connectors **(See Appendix for PCM Harness Connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open CMP sensor signal circuit.



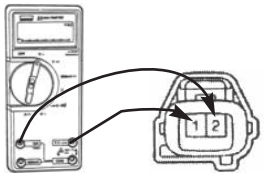
Step 5

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor ground circuit terminals of the PCM and CMP harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 6.
If no, repair the open CMP sensor ground circuit.



Step 6

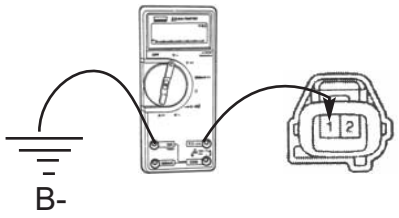
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal and ground circuit terminals of the CMP sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the CMP sensor signal and ground circuits.



Diagnosis

Step 7

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post. Is the resistance greater than 10,000 ohms?
If yes, go to step 8.
If no, repair the CMP sensor signal circuit for a short to ground.

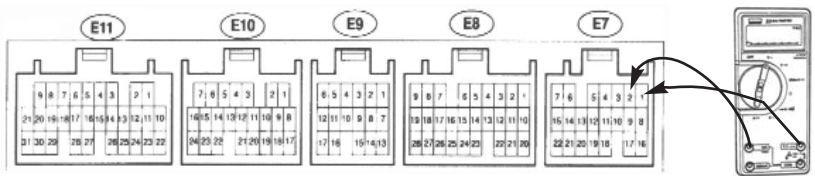


Step 8

Inspect the CMP sensor for proper installation. Also check the teeth on the camshaft timing pulley for any cracks or deformation. Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 9.

Step 9

Reconnect all harness connectors. Using your DVOM, set on a low AC voltage scale, back probe the CMP sensor signal and ground circuit terminals of the PCM harness connector. Start the engine and run it at 2500 RPM. Is there more than .25 volts AC present?
If yes, replace the PCM.
If no, replace the CMP sensor.



NOTE **The preferred method of observing the CMP sensor voltage is with an oscilloscope such as the Snap-On Modis. The voltage pulses per engine revolution give a much better indication of the sensors performance.**

Code P0345
Camshaft Position Sensor
Circuit Malfunction (Bank 2)
3.0 & 3.3L V6 2004-2006

Toyota Motor Company 3.0, 3.3 Liter V-6 Engines (2004-2006)
Code P0345 Camshaft Position Sensor Circuit Malfunction (Bank 2)

Theory of Operation:

The Camshaft Position Sensor (CMP) is a variable reluctance type sensor that monitors a timing signal plate or rotor located on the camshaft. The CMP signal is used by Powertrain Control Module (PCM) to detect the standard crankshaft angle (when number one piston is on the compression stoke).The PCM uses this information to control fuel injection time and ignition timing.

NOTE **Toyota will sometimes call the CMP the Variable Valve Timing (VVT) sensor.**

Circuit Description

The CMP sensor circuit consists of the CMPs sensor; sensor signal and signal return circuit wiring and the PCM.

Conditions for Setting the Trouble Code:

- When the PCM no longer detects a signal from the CMP sensor during cranking.
- When the PCM no longer detects a signal from the CMP sensor with the engine speed 600 RPM or more.

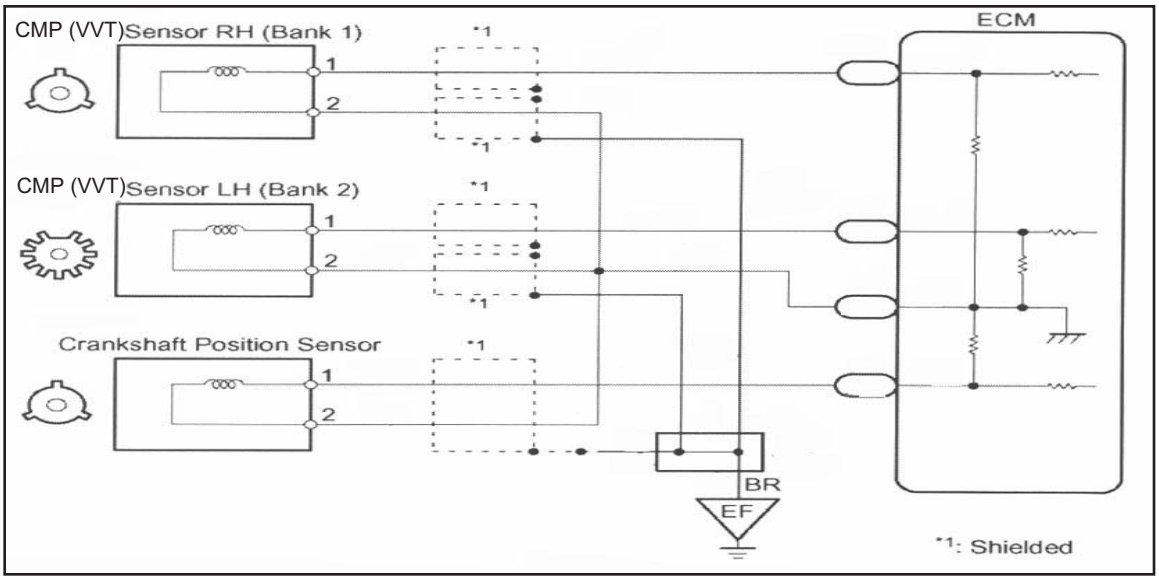
Action Taken When Code Sets:

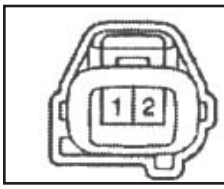
- The PCM will illuminate the malfunction indicator lamp during the second consecutive trip the conditions for setting the code have been met.
- The PCM will store the conditions that were present when the code sets in Freeze Frame and Failure Records.

Possible Causes:

- Wiring or connector problems in the CMP sensor signal and/or signal return circuit wiring.
- Defective CMP sensor.
- Damaged camshaft timing pulley
- Defective PCM.

Wiring Diagrams





ID	Color	Description
1	L/R	CMP Sensor Signal
2	L/W	CMP Sensor Ground

Figure 1

Diagnosis

Step 1

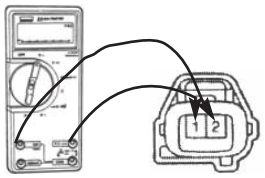
Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and start the engine. Increase the engine speed to greater than 600 RPM and hold for 10 seconds. Repeat this three times without clearing codes between engine restarts. Recheck codes. Did code P0345 return?
If yes, go to step 2.
If no, the problem is intermittent. Check for the following conditions:

- CMP sensor wiring harness for damaged insulation, broken, pinched or frayed wiring.
- Harness connectors for corroded damaged or pushed out terminals.
- Electromagnetic interference (defective alternator, improperly routed wiring harness).

Step 2

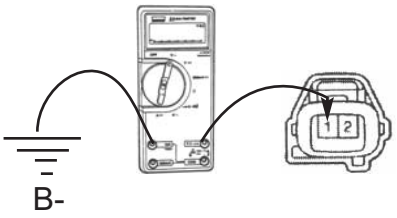
With the ignition key off, disconnect the CMP sensor harness connector. Inspect the CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CMP signal and ground circuit terminals of the CMP sensor. Is the resistance between 835 – 1,400 ohms cold or 1,060 – 1,645 ohms hot?
If yes, go to step 3.
If no, replace the CMP sensor and rerun diagnostics.

NOTE **“Cold” and “Hot” refer to the temperature of the sensor. Cold is 14-122°F. Hot is 122-212°F.**



Step 3

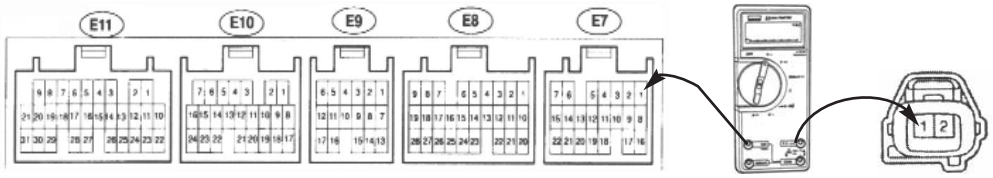
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. With the ignition key on, use your DVOM and measure the voltage between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post **(See Figure 1)**. Is there less than 1 volt present?
If yes, go to step 4.
If no, repair the CMP signal circuit for a short to voltage.



Diagnosis

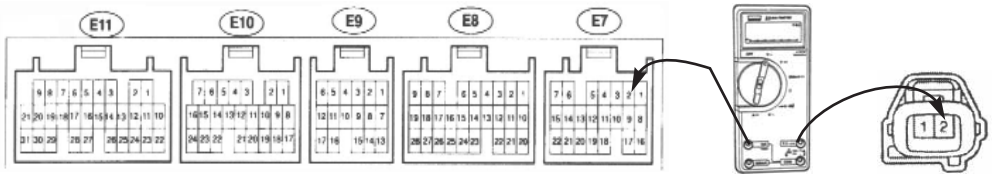
Step 4

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminals of the PCM and CMP harness connectors **(See Appendix for PCM Harness Connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open CMP sensor signal circuit.



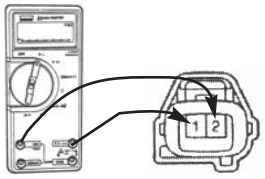
Step 5

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor ground circuit terminals of the PCM and CMP harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 6.
If no, repair the open CMP sensor ground circuit.



Step 6

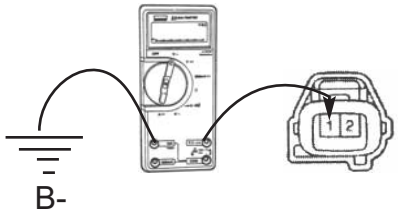
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal and ground circuit terminals of the CMP sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the CMP sensor signal and ground circuits.



Diagnosis

Step 7

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post. Is the resistance greater than 10,000 ohms?
If yes, go to step 8.
If no, repair the CMP sensor signal circuit for a short to ground.

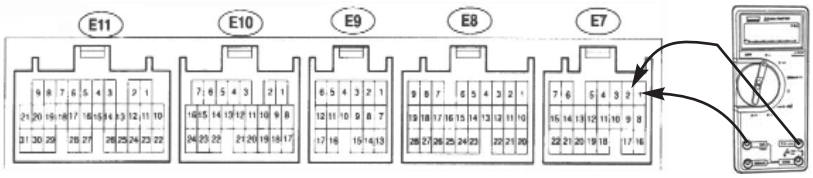


Step 8

Inspect the CMP sensor for proper installation. Also check the teeth on the camshaft timing pulley for any cracks or deformation. Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 9.

Step 9

Reconnect all harness connectors. Using your DVOM set on a low AC voltage scale, back probe the CMP sensor signal and ground circuit terminals of the PCM harness connector. Start the engine and run it at 2500 RPM. Is there more than .25 volts AC present?
If yes, replace the PCM.
If no, replace the CMP sensor.



NOTE **The preferred method of observing the CMP sensor voltage is with an oscilloscope such as the Snap-On Modis. The voltage pulses per engine revolution give a much better indication of the sensors performance.**

Code P0346
Camshaft Position Sensor
Circuit Range/Performance
(Bank 2)
3.0 & 3.3L V6 2004-2006

Toyota Motor Company 3.0, 3.3 Liter V-6 Engines (2004-2006)
Code P0346 Camshaft Position Sensor Circuit Range/Performance (Bank 2)

Theory of Operation:

The Camshaft Position Sensor (CMP) is a variable reluctance type sensor that monitors a timing signal plate or rotor located on the camshaft. The CMP signal is used by Powertrain Control Module (PCM) to detect the standard crankshaft angle (when number one piston is on the compression stoke).The PCM uses this information to control fuel injection time and ignition timing.

NOTE **Toyota will sometimes call the CMP the Variable Valve Timing (VVT) sensor.**

Circuit Description

The CMP sensor circuit consists of the CMPs sensor; sensor signal and signal return circuit wiring and the PCM.

Conditions for Setting the Trouble Code:

- When the crankshaft rotates twice and the CMP signal is input to the PCM 5 times or more.

NOTE **The CMP signal should input 3 times for every 2 engine revolutions.**

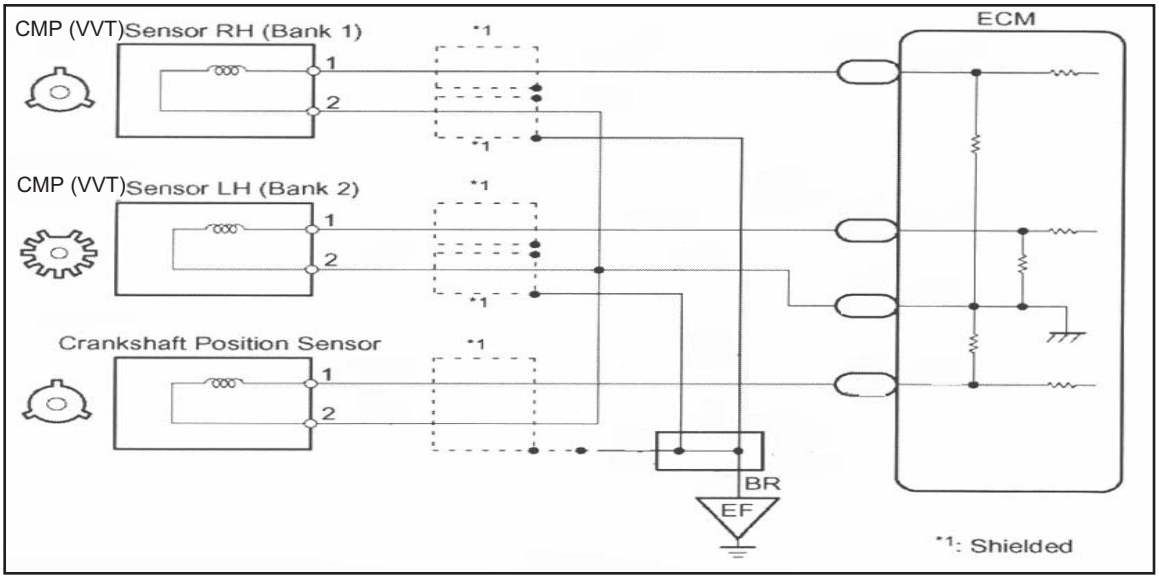
Action Taken When Code Sets:

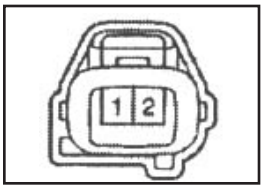
- The PCM will illuminate the malfunction indicator lamp the first time the conditions for setting the code have been met.
- The PCM will store the conditions that were present when the code sets in Freeze Frame and Failure Records.

Possible Causes:

- Wiring or connector problems in the CMP sensor signal and/or signal return circuit wiring.
- Defective CMP sensor.
- Damaged camshaft timing pulley
- Defective PCM.

Wiring Diagrams





ID	Color	Description
1	L/R	CMP Sensor Signal
2	L/W	CMP Sensor Ground

Figure 1

Diagnosis

Step 1

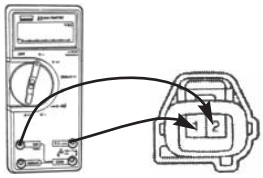
Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and start the engine. Increase the engine speed to greater than 600 RPM and hold for 10 seconds. Repeat this three times without clearing codes between engine restarts. Recheck codes. Did code P0346 return?
If yes, go to step 2.
If no, the problem is intermittent. Check for the following conditions:

- CMP sensor wiring harness for damaged insulation, broken, pinched or frayed wiring.
- Harness connectors for corroded damaged or pushed out terminals.
- Electromagnetic interference (defective alternator, improperly routed wiring harness).

Step 2

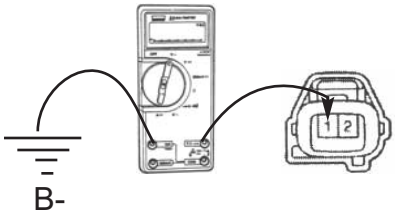
With the ignition key off, disconnect the CMP sensor harness connector. Inspect the CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP signal and ground circuit terminals of the CMP sensor. Is the resistance between 835 – 1,400 ohms cold or 1,060 – 1,645 ohms hot?
If yes, go to step 3.
If no, replace the CMP sensor and rerun diagnostics.

NOTE **“Cold” and “Hot” refer to the temperature of the sensor. Cold is 14-122°F. Hot is 122-212°F.**



Step 3

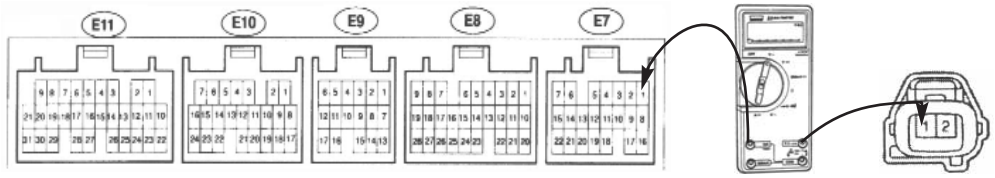
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. With the ignition key on, use your DVOM and measure the voltage between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post **(See Figure 1)**. Is there less than 1 volt present?
If yes, go to step 4.
If no, repair the CMP signal circuit for a short to voltage.



Diagnosis

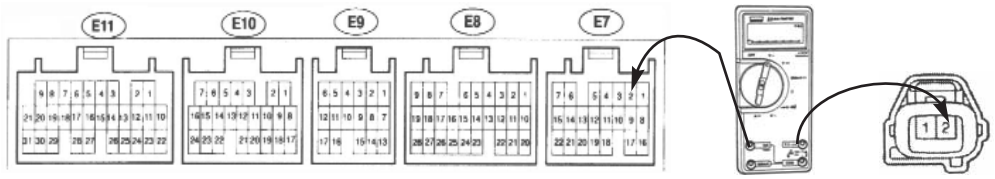
Step 4

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminals of the PCM and CMP harness connectors **(See Appendix for PCM Harness Connector)**. Is the resistance 5 ohms or less?
If yes, go to step 5.
If no, repair the open CMP sensor signal circuit.



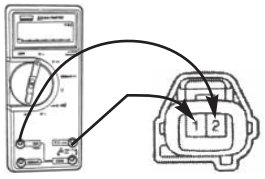
Step 5

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor ground circuit terminals of the PCM and CMP harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 6.
If no, repair the open CMP sensor ground circuit.



Step 6

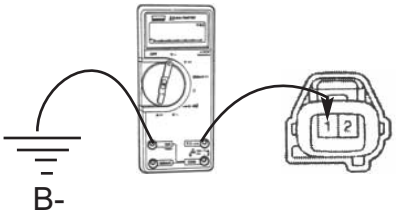
With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, and measure the resistance between the CMP sensor signal and ground circuit terminals of the CMP sensor harness connector. Is the resistance greater than 10,000 ohms?
If yes, go to step 7.
If no, repair the short between the CMP sensor signal and ground circuits.



Diagnosis

Step 7

With the ignition key off, disconnect the PCM and CMP sensor harness connectors. Inspect the PCM, CMP sensor and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the CMP sensor signal circuit terminal of the CMP sensor harness connector and the battery negative post. Is the resistance greater than 10,000 ohms?
If yes, go to step 8.
If no, repair the CMP sensor signal circuit for a short to ground.

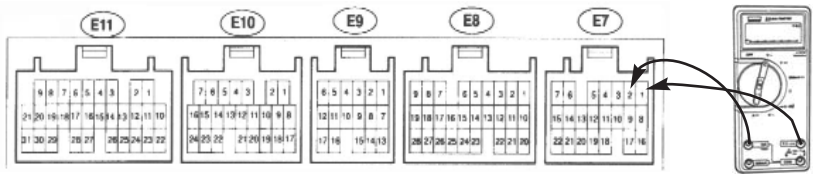


Step 8

Inspect the CMP sensor for proper installation. Also check the teeth on the camshaft timing pulley for any cracks or deformation. Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 9.

Step 9

Reconnect all harness connectors. Using your DVOM, set on a low AC voltage scale, back probe the CMP sensor signal and ground circuit terminals of the PCM harness connector. Start the engine and run it at 2500 RPM. Is there more than .25 volts AC present?
If yes, replace the PCM.
If no, replace the CMP sensor.



NOTE **The preferred method of observing the CMP sensor voltage is with an oscilloscope such as the Snap-On Modis. The voltage pulses per engine revolution give a much better indication of the sensors performance.**

P0440
Evaporative Emission Control System Malfunction (1999-2002)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
P0440 Evaporative Emission Control System Malfunction (1999-2002)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in EVAP Control System and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the system. As the EVAP System pressure increases the signal voltage increases.

EVAP Vapor Pressure Sensor Vacuum Switching Valve (VPS/VSV)

This valve is used during diagnostics to connect the VPS to either the canister or the fuel tank side of the system. The ECM compares the pressure in the side being tested to preprogrammed specifications. If the specifications are not met a code is set.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- After purge operation the ECM turns off the EVAP VSV valve sealing vacuum in the system The ECM then monitors for any pressure increase. Some increase is normal
- A very rapid, sharp increase in pressure it indicates a leak in the EVAP system and sets code P0440.
- A pressure rise just above normal indicates a very small leak and will set code P0442.

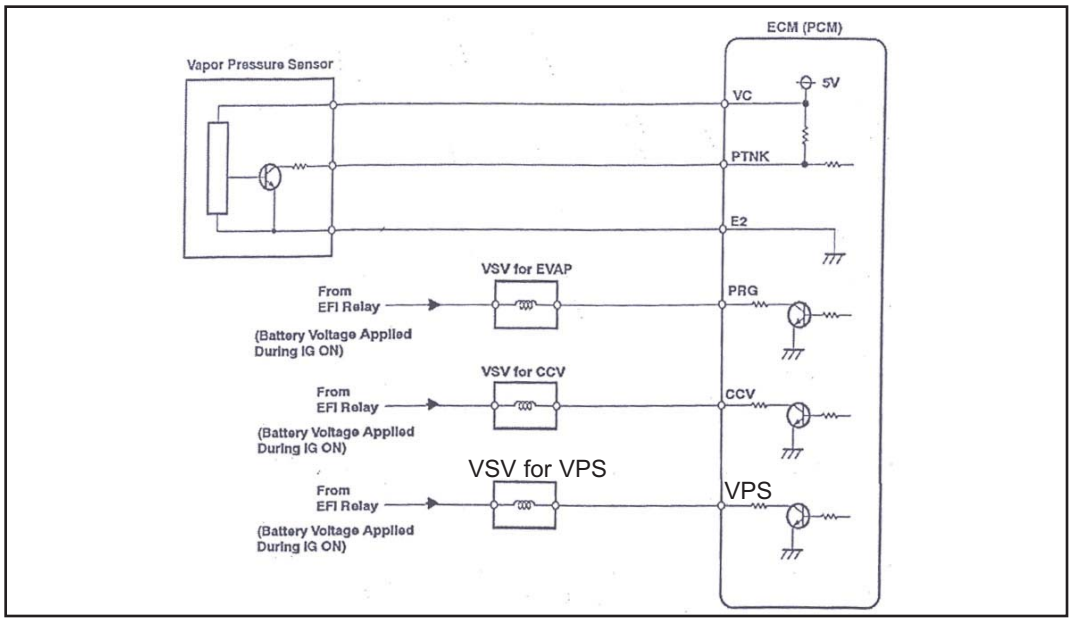
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

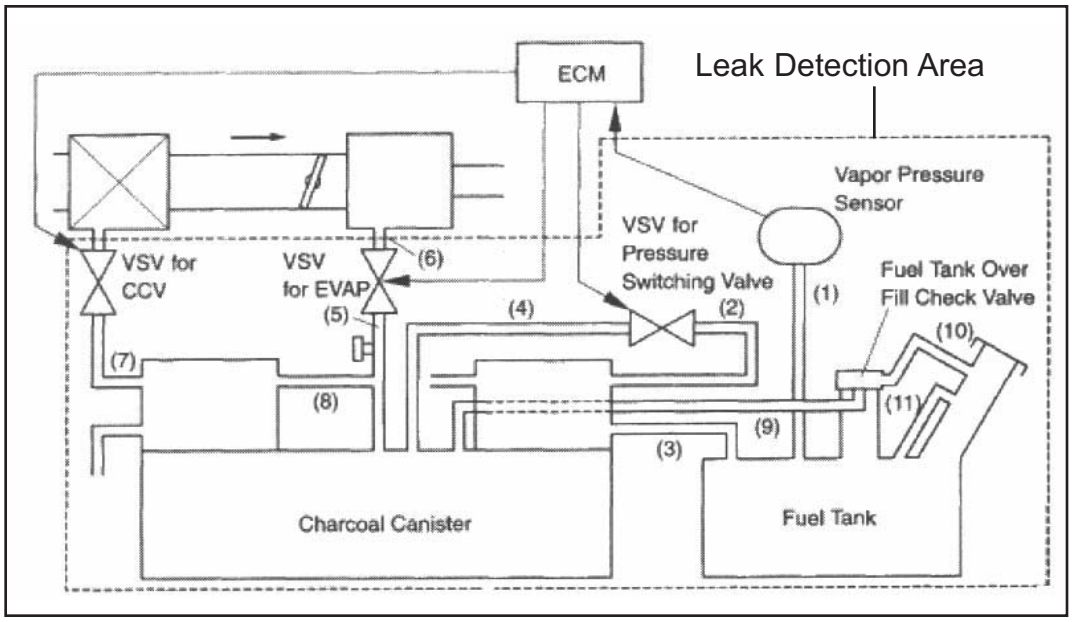
Possible Causes

- Cracked blocked, damaged or disconnected vacuum or fuel vapor hoses.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS Sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV.
- Open or short in CCV circuit.
- Faulty CCV.
- Faulty ECM.

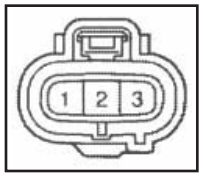
Wiring Diagrams



Wiring Diagram 1999-2003



System Diagram 1999-2003



VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and reset OBDII Readiness Tests by disconnecting the negative battery cable or removing the ECM power fuse. Perform an OBD II readiness test drive cycle.
To perform this test:

a) The vehicle must be cold, ambient air temperature between approximately 50 and 95°F.
b) The Intake Air Temperature (IAT) and Engine Coolant Temperature (ECT) sensor must be almost the same value.
c) Operate the vehicle to simulate urban driving conditions. Make several starts and stops accelerating from a stand-still to varying speeds up to 60 MPH **(see LA#4 drive cycle in appendix)**. This procedure may take 20 minutes or longer.
d) Without shutting the engine off, note if there are pending codes stored.
e) Shut the engine off and allow it to cool.
f) Repeat steps a, b and c.
g) Without shutting the engine off, note if the EVAP readiness test shows COMPL (complete) and if code P0440 or P0442 returned.

If yes, go to step 2.
If the EVAP readiness test did not show COMPL the vehicle will have to be driven further. If the readiness test shows COMPL and the codes did not return the condition is not present at this time. Ask the customer if they had any indication that the fuel cap may have been loose at any time.

Step 2

Was code P0440 accompanied by codes P0441, P0446, P0450 or P0451?
If yes, repair these codes first and rerun diagnostics.
If no, go to step 3.

Step 3

Visually inspect the EVAP system for gross leaks.

- Check the fuel filler cap for proper installation, physical damage and that it meets OE specifications.
- Check that the vacuum and return tubes are connected to the EVAP VSV valve.
- Check that the CCV valve is correctly attached to the charcoal canister.
- Check for any disconnected or cracked EVAP system fuel vapor hoses or tubes.
- Check for damaged fuel tank or filler pipe.

Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Diagnosis

Step 4

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

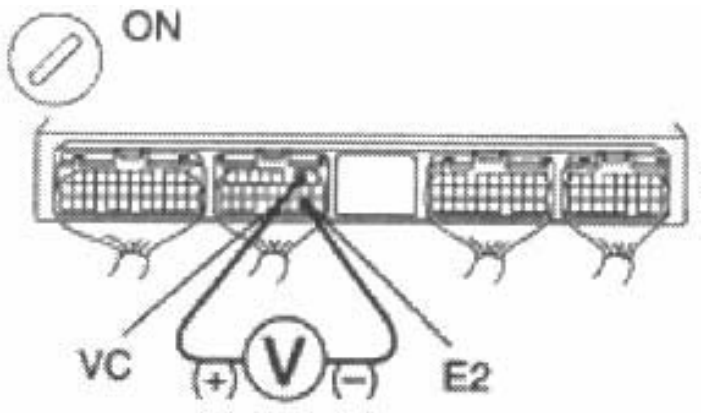
- Fuel filler cap.
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister.
- EVAP CCV valve.
- EVAP VSV valve.
- EVAP VPS sensor.
- VPS/VSV valve.
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 5.

Step 5

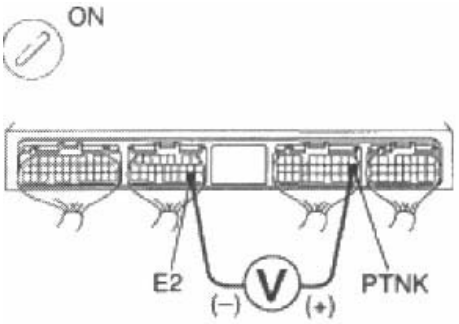
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 6,
If no, check and replace the ECM.

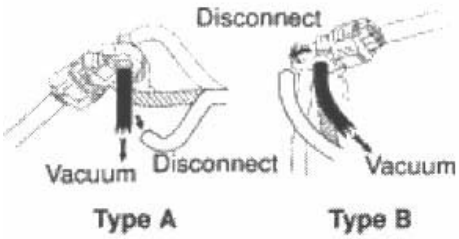


Diagnosis

Step 6

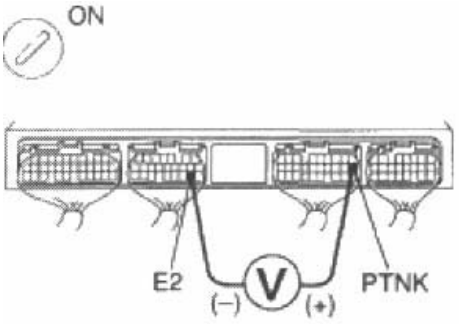
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 7.
If no, go to step 8.

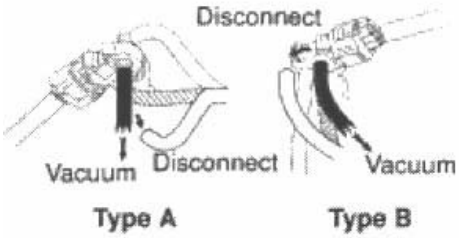




Step 7

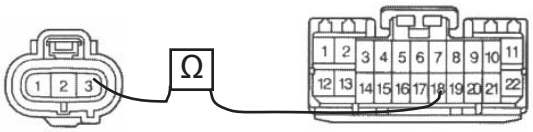
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, the condition is not present at this time. It is possible the fuel tank cap was not installed properly at some point.
If no, go to step 8.





Step 8

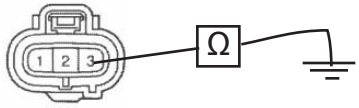
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 9.
If no, repair the open VPS sensor signal circuit.



Diagnosis

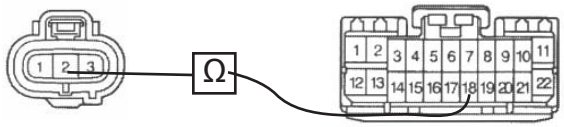
Step 9

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 10.
If no, repair the VPS sensor signal circuit for a short to ground.



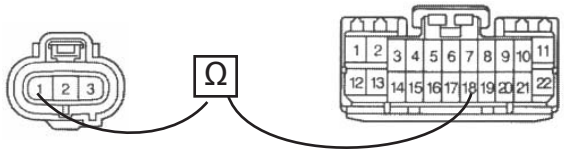
Step 10

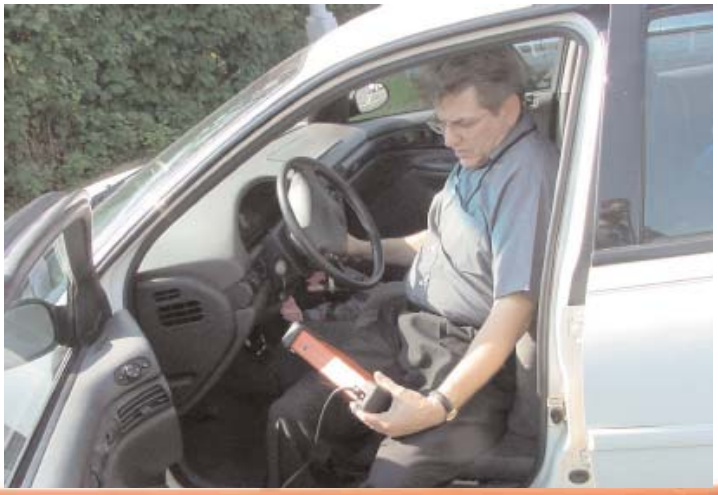
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 11.
If no, repair the open VPS sensor 5-volt reference circuit.

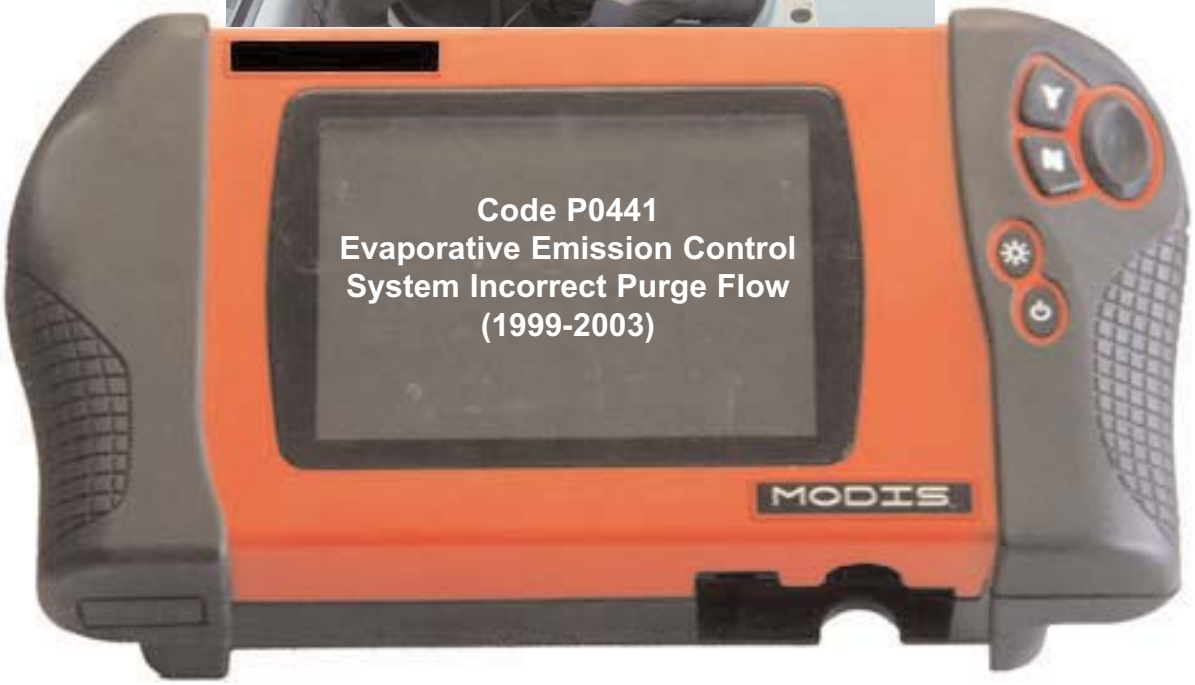


Step 11

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the VPS ground circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.







Code P0441
Evaporative Emission Control System Incorrect Purge Flow (1999-2003)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
Code P0441 Evaporative Emission Control System Incorrect Purge Flow (1999-2003)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in the EVAP control system and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the System. As the EVAP system pressure increases the signal voltage increases.

EVAP Vapor Pressure Sensor Vacuum Switching Valve (VPS/VSV)

This valve is used during diagnostics to connect the VPS to either the canister or the fuel tank side of the system. The ECM compares the pressure in the side being tested to preprogrammed specifications. If the specifications are not met a code is set.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- The ECM determines that the pressure in the charcoal canister and fuel tank does not drop during purge control.

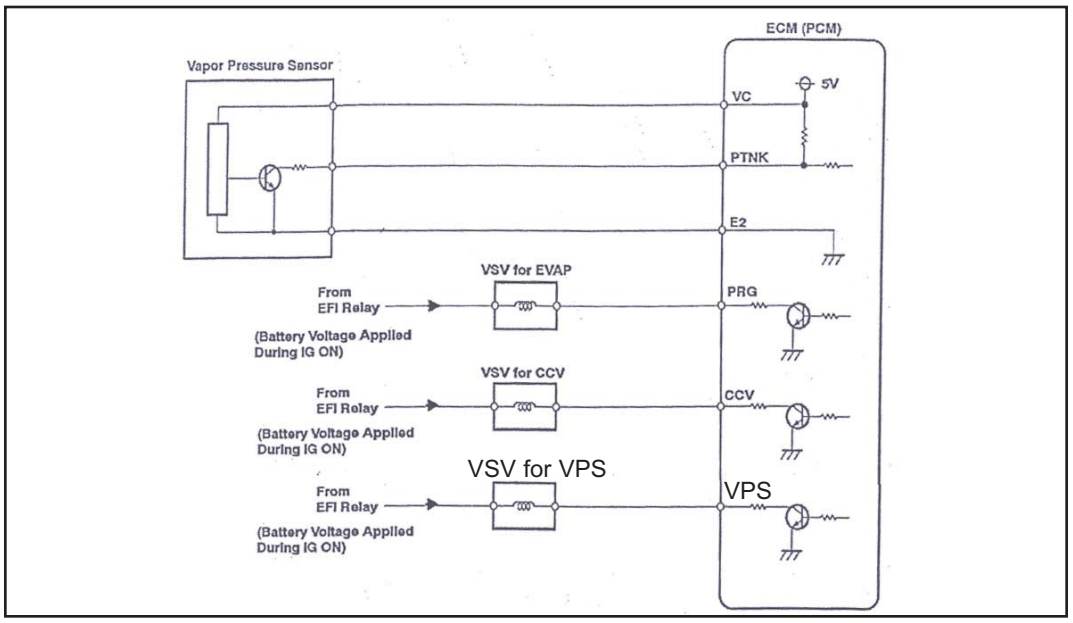
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data.

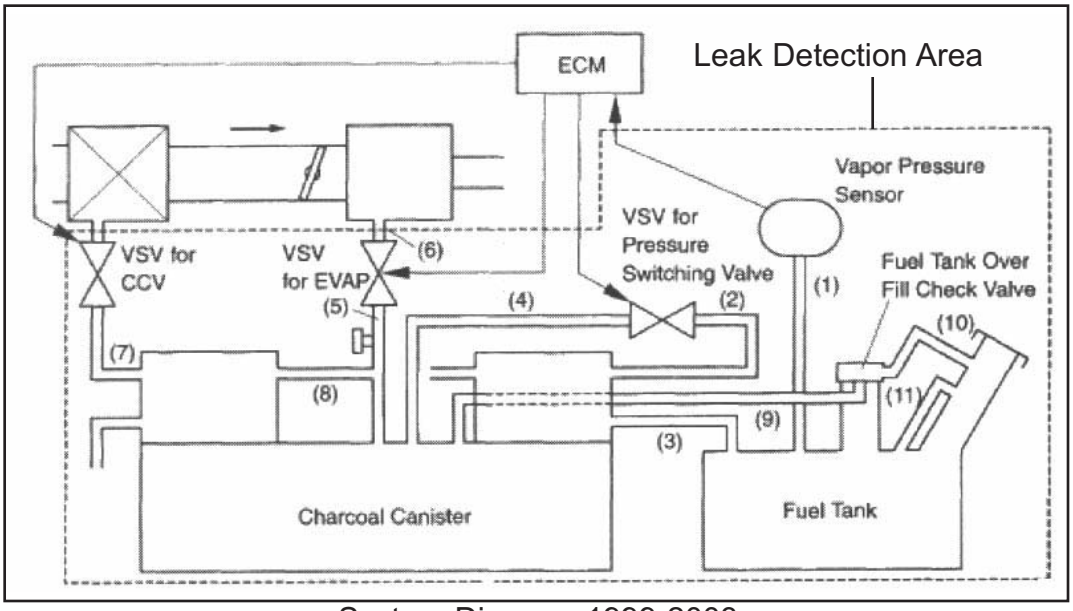
Possible Causes

- Vacuum hose has cracks, holes or is blocked, damaged or disconnected.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV.
- Open or short in CCV circuit.
- Faulty CCV.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Faulty ECM

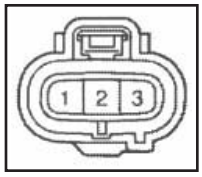
Wiring Diagrams



Wiring Diagram 1999-2003



System Diagram 1999-2003

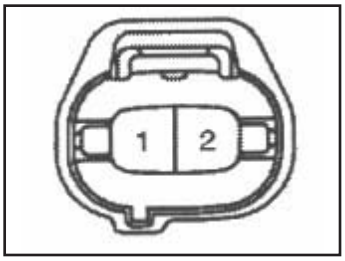


VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Wiring Diagrams - Continued



EVAP VSV Connector

1999-2000 2.2L		
1	Switched Battery	Black/Yellow (B/Y)
2	EVAP VSV Valve Control	Violet/White (V/W)

1999-2000 3.0L		
1	Switched Battery	Black/Yellow (B/Y)
2	EVAP VSV Valve Control	Light Green (LG)

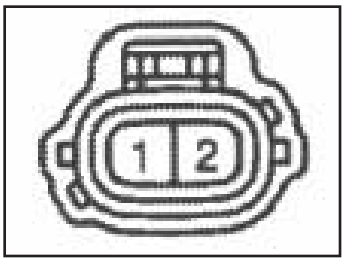
2001 All		
1	Switched Battery	Black/Yellow (B/Y)
2	EVAP VSV Valve Control	Violet/White (V/W)

2002-2003 2.4L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Black/Red (B/R)

2002-2003 3.0L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Light Green (LG)

Figure 2

Wiring Diagrams - Continued



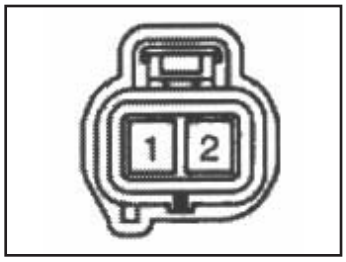
CCV Connector

1999-2001 All		
1	CCV Valve Control	Blue/Red (L/R)
2	Switched Battery	Black/Yellow (B/Y)

2002-2003 2.4L		
1	CCV Valve Control	Green (G)
2	Switched Battery	Black/White (B/W)

2002-2003 3.0L		
1	CCV Valve Control	Blue (L)
2	Switched Battery	Black/White (B/W)

Figure 3



VPS/VSV Connector

1999-2001 All		
1	VPS/VSV Control	Violet (V)
2	Switched Battery	Black/Yellow (B/Y)

2002-2003 All		
1	VPS/VSV Control	Violet (V)
2	Switched Battery	Black/White (B/W)

Figure 4

Diagnosis

Step 1

Visually inspect the EVAP system for gross leaks.

- Check the fuel filler cap for proper installation, physical damage and that it meets OE specifications.
- Check that the vacuum and return tubes are connected to the EVAP VSV valve.
- Check that the CCV valve is correctly attached to the charcoal canister.
- Check for any disconnected or cracked EVAP system fuel vapor hoses or tubes.
- Check for damaged fuel tank or filler pipe.

Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 2.

Step 2

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

- Fuel filler cap
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister
- EVAP CCV valve
- EVAP VSV valve
- EVAP VPS sensor
- VPS/VSV valve
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 3.

Diagnosis

Step 3

Inspect the EVAP vacuum hoses between the VPS sensor, fuel tank, charcoal canister and EVAP VSV for proper connections, cracks, holes or damage (See System Diagram). Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Step 4

Inspect the EVAP fuel vapor hoses and tubes between the fuel tank and charcoal canister for proper connections, cracks, holes or damage. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 5.

Step 5

Inspect the CCV, EVAP VSV and VPS sensor electrical connectors for damage, looseness or being unplugged. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 6.

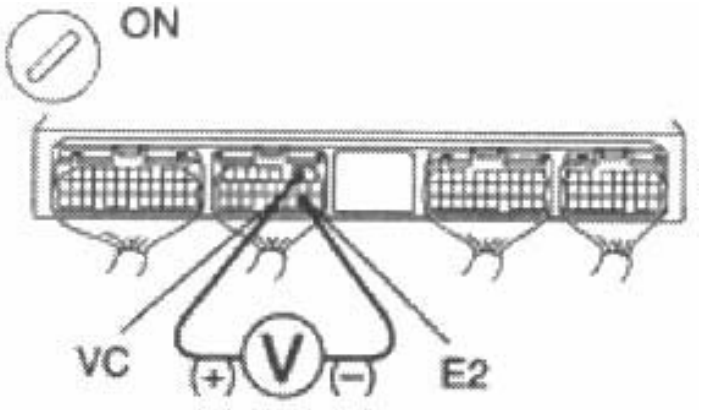
Step 6

Inspect EVAP vacuum hoses 5, 6, 7, 8 and 9 for proper connections, cracks, holes or damage (**See System Diagram**). Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to Step 7.

Diagnosis

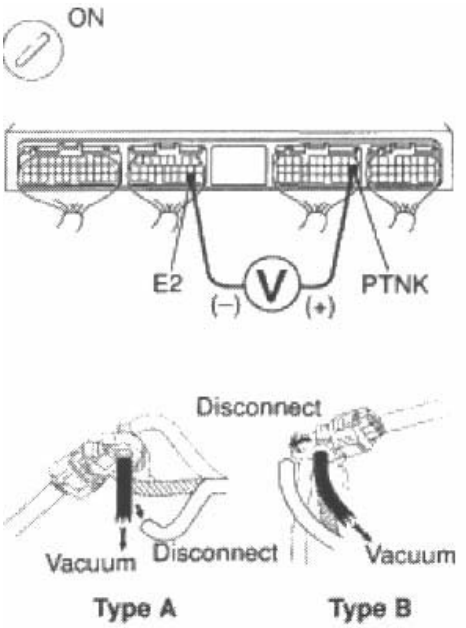
Step 7

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 8.
If no, check and replace the ECM.



Step 8

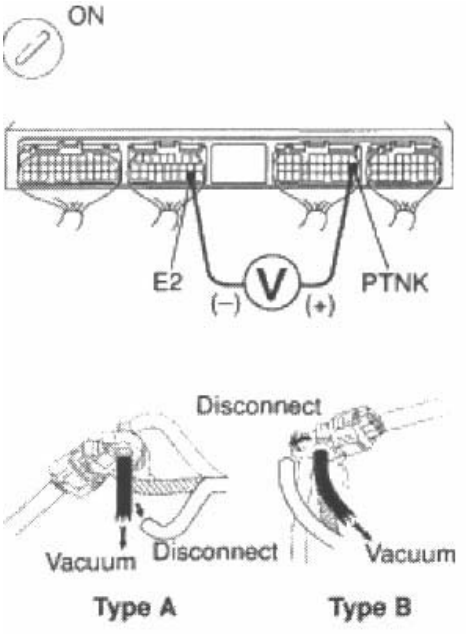
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 9.
If no, go to step 10.



Diagnosis

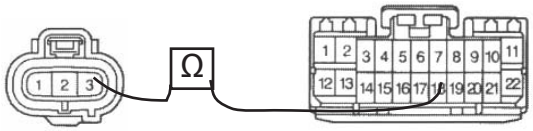
Step 9

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, go to step 14.
If no, go to step 10.



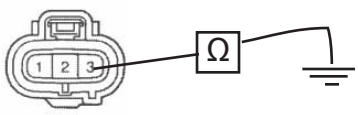
Step 10

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 11.
If no, repair the open VPS sensor signal circuit.



Step 11

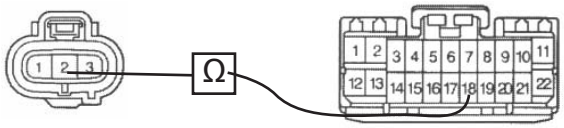
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 12.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

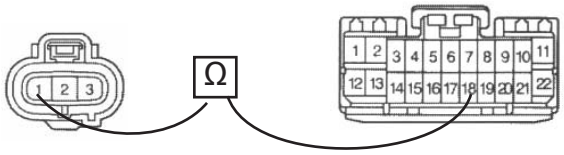
Step 12

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 13.
If no, repair the open VPS sensor 5-volt reference circuit.



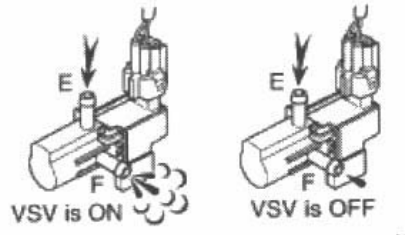
Step 13

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS ground return circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.



Step 14

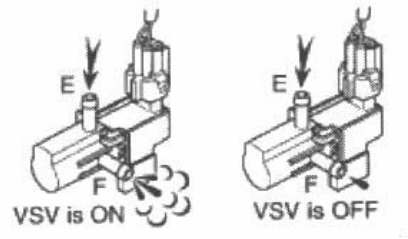
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. Does the EVAP VSV valve hold vacuum for at least 15 seconds?
If yes, go to step 15.
If no, replace the EVAP VSV valve, clean vacuum hoses and check the charcoal canister.

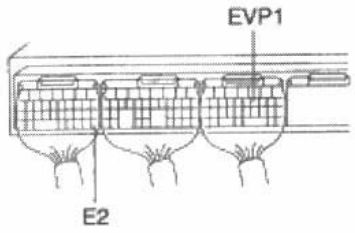


Diagnosis

Step 15

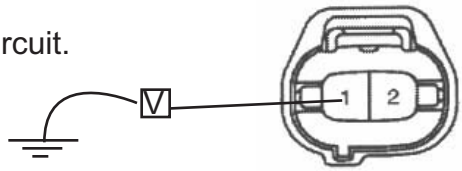
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. With the ignition key on back probe and ground the EVAP VSV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the vacuum drop with the EVAP VSV control circuit grounded?
If yes, go to step 19
If no, go to step 16.





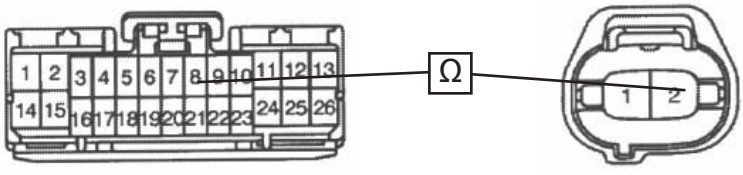
Step 16

With the ignition key off, disconnect EVAP VSV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP VSV vehicle power terminal of the EVAP VSV valve harness connector and a good ground **(See Figure 2)**. Is there 9-14 volts present?
If yes, go to step 17.
If no, repair the open EVAP VSV valve vehicle power circuit.



Step 17

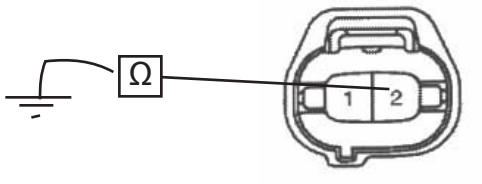
With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminals of the EVAP VSV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 18.
If no, repair the open EVAP VSV valve control circuit wiring.



Diagnosis

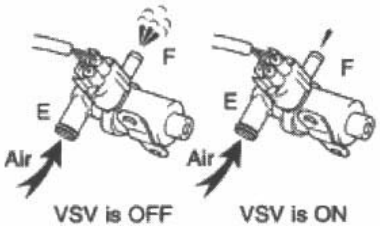
Step 18

With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminal of the EVAP VSV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP VSV valve.
If no, repair the EVAP VSV valve control circuit wiring for a short to ground.



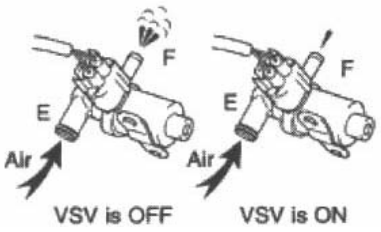
Step 19

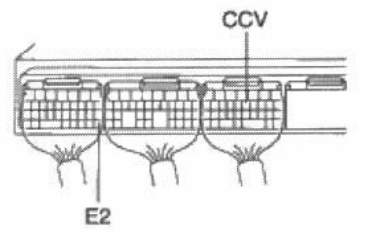
Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. Does the EVAP CCV valve hold vacuum?
If yes, replace the EVAP CCV valve
If no, go to step 20.



Step 20

Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. With the ignition key on back probe and ground the EVAP CCV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the EVAP CCV valve hold vacuum for at least 15 seconds with the control circuit grounded?
If yes, go to step 24
If no, go to step 21.

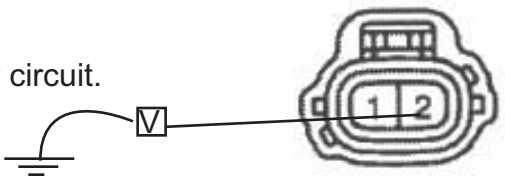




Diagnosis

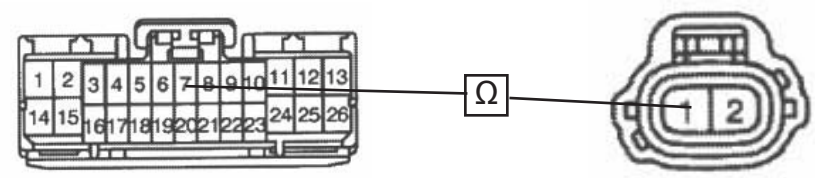
Step 21

With the ignition key off disconnect EVAP CCV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP CCV vehicle power terminal of the EVAP CCV valve harness connector and a good ground **(See Figure 3)**. Is there 9-14 volts present?
If yes, go to step 22.
If no, repair the open EVAP CCV valve vehicle power circuit.



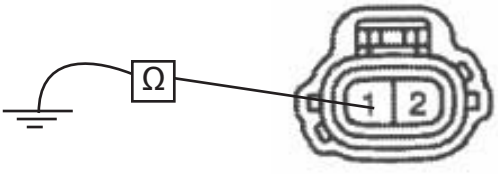
Step 22

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminals of the EVAP CCV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 23.
If no, repair the open EVAP CCV valve control circuit wiring.



Step 23

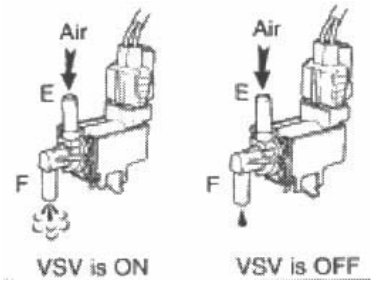
With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminal of the EVAP CCV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP CCV valve.
If no, repair the EVAP CCV valve control circuit wiring for a short to ground.



Diagnosis

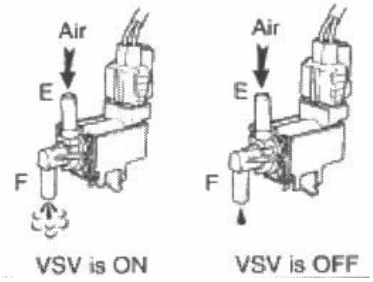
Step 24

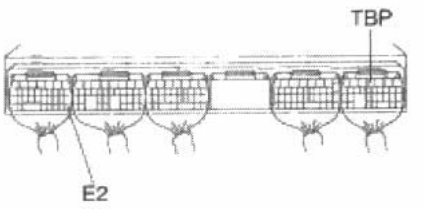
Disconnect the vacuum hoses from the VPS/VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the VPS/VSV valve vacuum source port. Does the VPS/VSV valve hold vacuum for at least 15 seconds?
If yes, go to step 25.
If no, replace the VPS/VSV valve, clean vacuum hoses and check the charcoal canister.



Step 25

Disconnect the vacuum hoses from the VPS/VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the VPS/VSV valve vacuum source port. With the ignition key on back probe and ground the VPS/VSV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the vacuum drop with the VPS/VSV control circuit grounded?
If yes, check and replace the ECM.
If no, go to step 26.

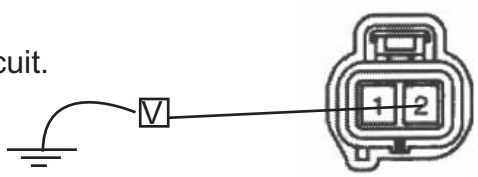




Diagnosis

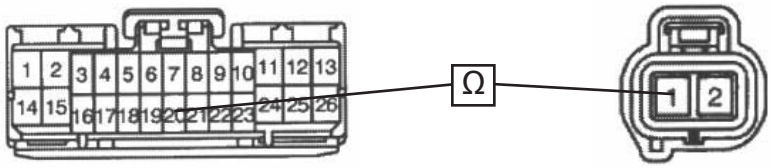
Step 26

With the ignition key off disconnect VPS/VSV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the VPS/VSV vehicle power terminal of the VPS/VSV valve harness connector and a good ground **(See Figure 4)**. Is there 9-14 volts present?
If yes, go to step 27.
If no, repair the open VPS/VSV valve vehicle power circuit.



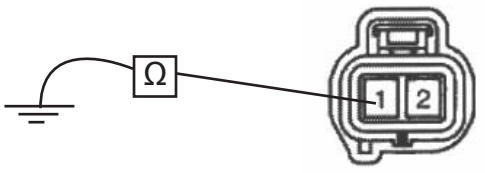
Step 27

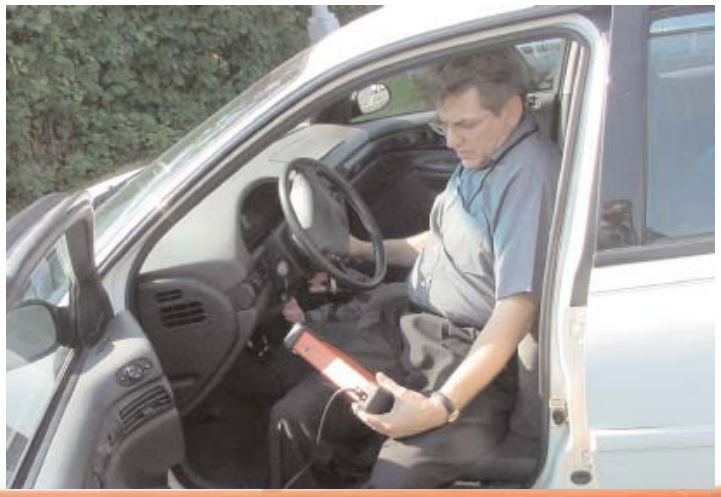
With the ignition key off disconnect the ECM and VPS/VSV valve harness connectors. Inspect the ECM, VPS/VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS/VSV valve control circuit terminals of the VPS/VSV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 18.
If no, repair the open VPS/VSV valve control circuit wiring.

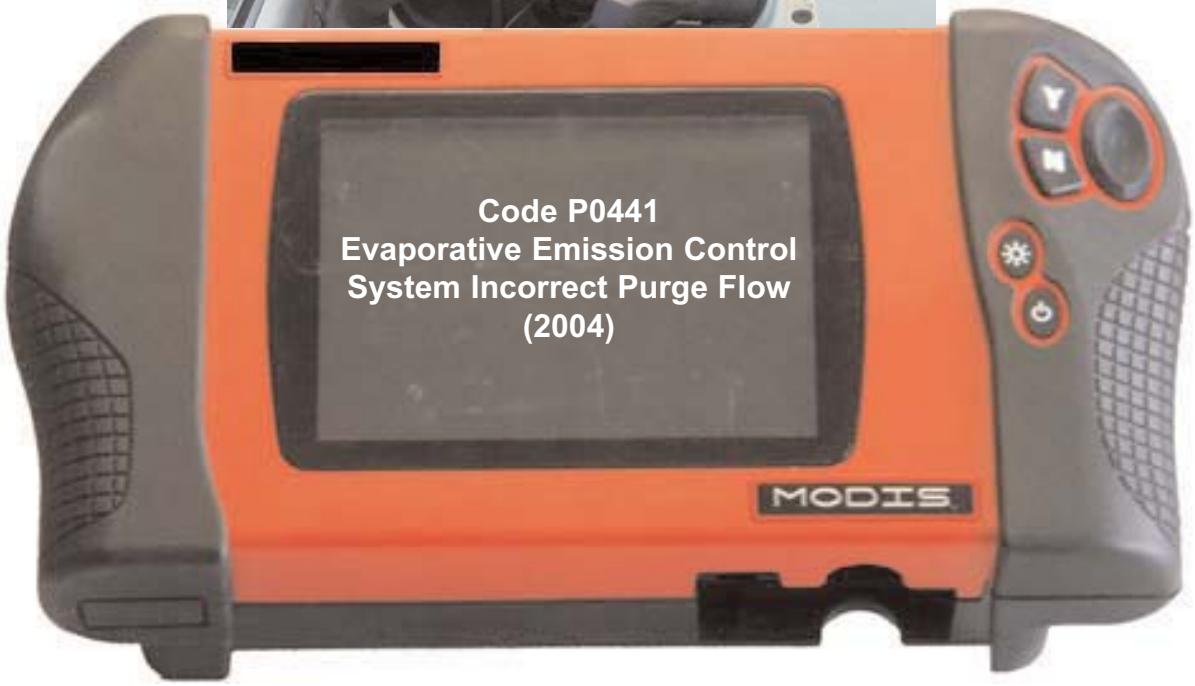


Step 28

With the ignition key off disconnect the ECM and VPS/VSV valve harness connectors. Inspect the ECM, VPS/VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS/VSV valve control circuit terminal of the VPS/VSV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the VPS/VSV valve.
If no, repair the VPS/VSV valve control circuit wiring for a short to ground.







Code P0441
Evaporative Emission Control System Incorrect Purge Flow (2004)

Toyota Motor Company 2.4 Liter L-4, 3.0 & 3.3 Liter V6
Code P0441 Evaporative Emission Control System Incorrect Purge Flow (2004)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure (EVAP VPS) Sensor

The EVAP VPS sensor measures the pressure levels in the fuel tank and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the fuel tank. As fuel tank pressure increases the signal voltage increases.

Refueling Valve

The refueling valve controls the pressure from the fuel tank to the EVAP canister during refueling. When fuel tank pressure increases the valve opens. When the EVAP system is purging the valve closes and a restrictor prevents strong vacuum from affecting pressure in the tank. When the valve opens the fuel tank is vented and refueling is possible.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- The ECM determines that the pressure in the charcoal canister and fuel tank does not drop during purge control.
- The ECM determines during purge cut-off negative pressure is entering the charcoal canister and fuel tank

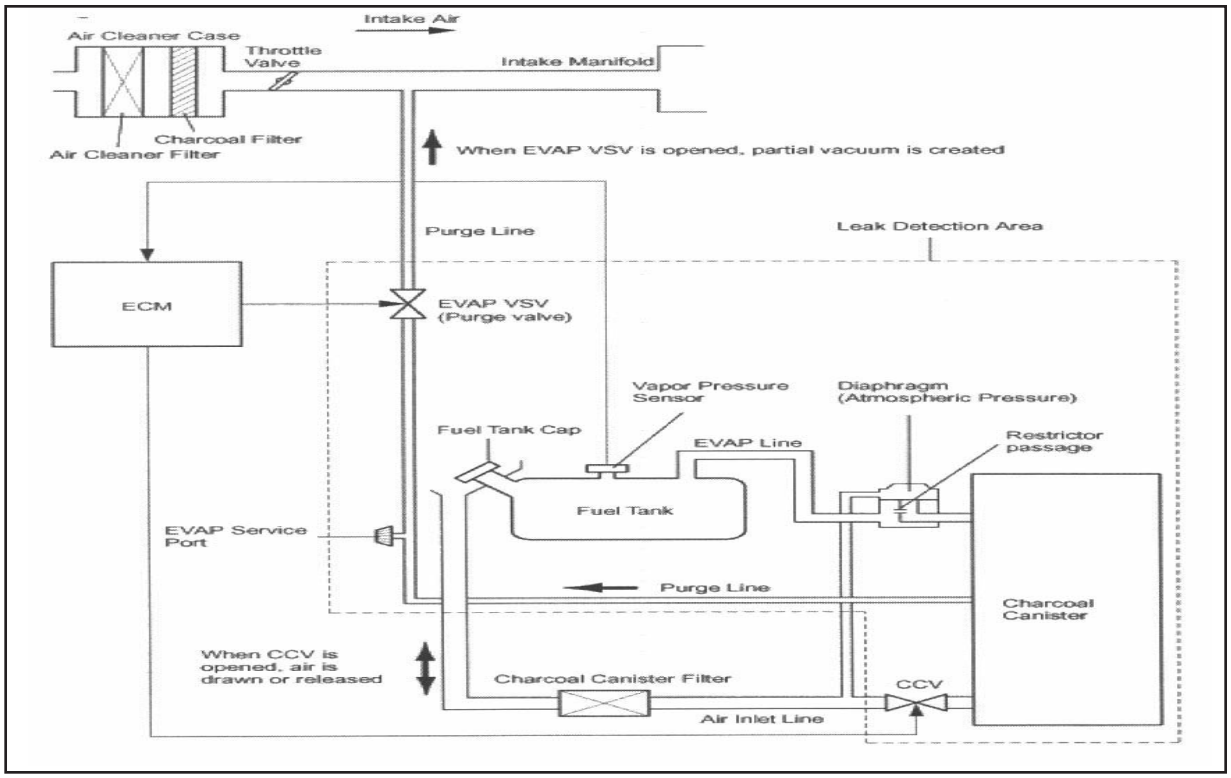
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

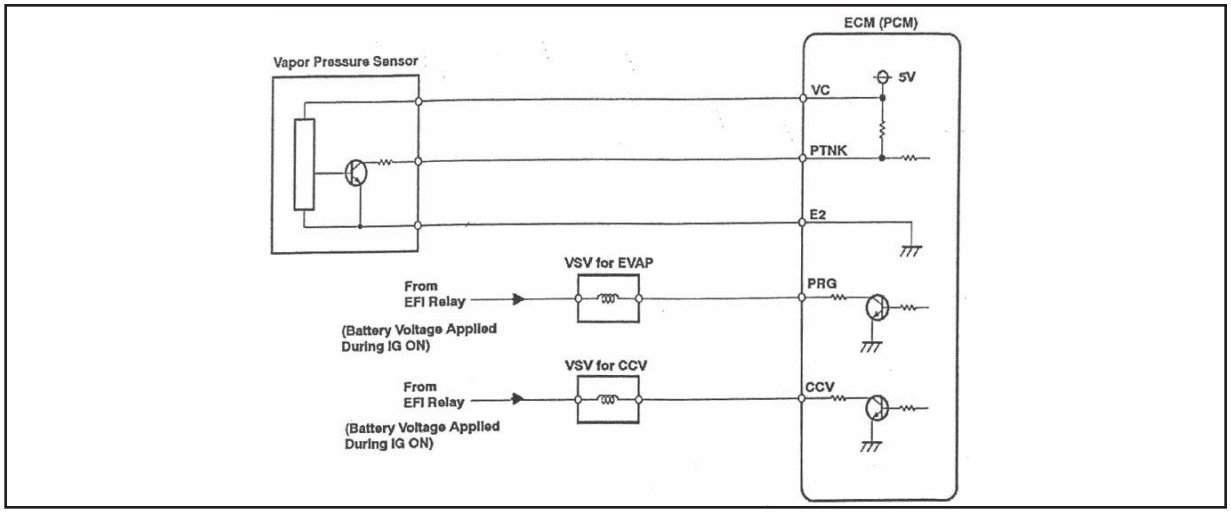
Possible Causes

- Vacuum hose has cracks, holes or is blocked, damaged or disconnected.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Open or short in the Vapor Pressure Sensor circuit.
- Faulty EVAP VPS sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV.
- Open or short in CCV circuit.
- Faulty CCV.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Faulty ECM

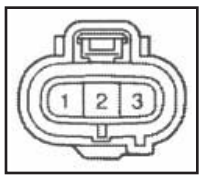
Wiring Diagrams



System Diagram 2004-Up



Wiring Diagram 2004-Up

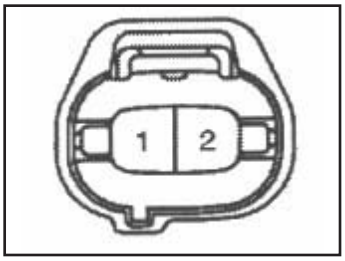


VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Wiring Diagrams - Continued

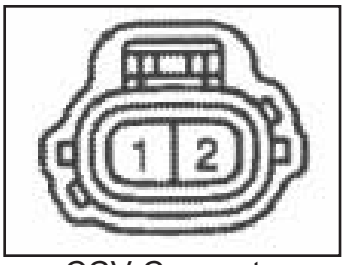


EVAP VSV Connector

2004 2.4L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Black/Red (B/R)

2004 3.0L/3.3L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Light Green (LG)

Figure 2



CCV Connector

2004 2.4L		
1	CCV Valve Control	Black/Red (B/R)
2	Switched Battery	Black/White (B/W)

2004 3.0L/3.3L		
1	CCV Valve Control	Violet (V)
2	Switched Battery	Black/Red (B/R)

Figure 3

Diagnosis

Step 1

Visually inspect the EVAP system for gross leaks.

- Check the fuel filler cap for proper installation, physical damage and that it meets OE specifications.
- Check that the vacuum and return tubes are connected to the EVAP VSV valve.
- Check that the CCV valve is correctly attached to the charcoal canister.
- Check for any disconnected or cracked EVAP system fuel vapor hoses or tubes.
- Check for damaged fuel tank or filler pipe.

Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 2.

Step 2

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

- Fuel filler cap
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister
- EVAP CCV valve
- EVAP VSV valve
- EVAP VPS sensor
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 3.

Diagnosis

Step 3

Inspect the EVAP fuel vapor hoses and tubes between the fuel tank and charcoal canister for proper connections, cracks, holes or damage **(See System Diagram).** Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Step 4

Inspect the CCV, EVAP VSV and VPS sensor electrical connectors for damage, looseness or being unplugged. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 5.

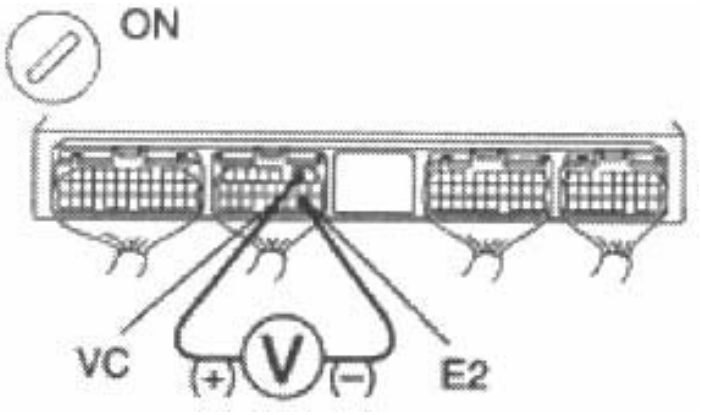
Step 5

Inspect the EVAP vacuum hoses between the intake manifold, EVAP VSV, EVAP VSV and charcoal canister for proper connections, cracks, holes or damage. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 6.

Diagnosis

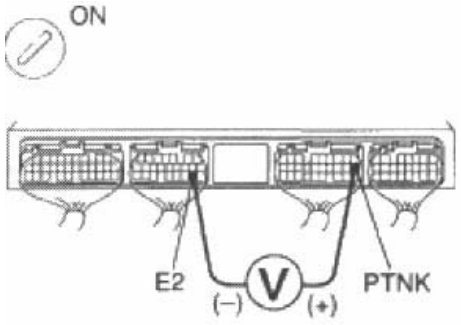
Step 6

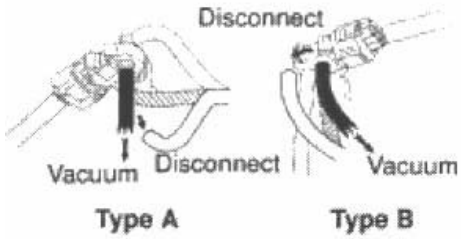
With the ignition key on, back probe the ECM harness connector and measure the voltage between the VPS sensor 5-volt reference and ground circuit terminals **(See Appendix)**. Is there 4.5 – 5.5 volts present?
If yes, go to step 7.
If no, check and replace the ECM.



Step 7

With the ignition key on, back probe the ECM harness connector and measure the voltage between the VPS sensor signal and ground circuit terminals. Disconnect the vacuum hose from the VPS sensor.
With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 8.
If no, go to step 9.

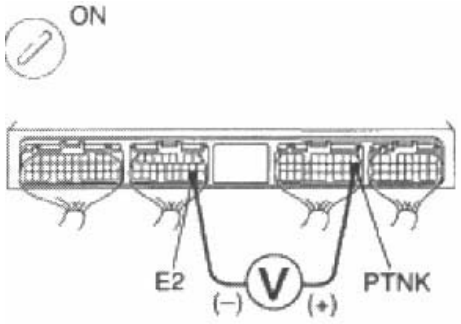


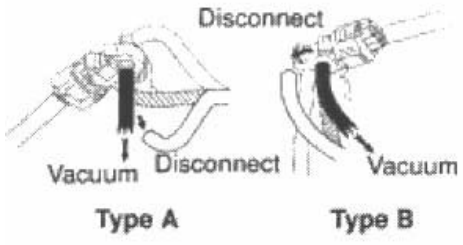


Diagnosis

Step 8

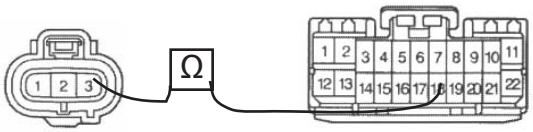
With the ignition key on back probe the ECM harness connector and measure the voltage between the VPS sensor signal and ground circuit terminals.
Disconnect the vacuum hose from the VPS sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the VPS sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, go to step 13.
If no, go to step 9.





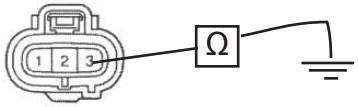
Step 9

With the ignition key off disconnect the ECM and VPS sensor harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS sensor signal circuit terminals of the ECM and VPS sensor harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 10.
If no, repair the open VPS sensor signal circuit.



Step 10

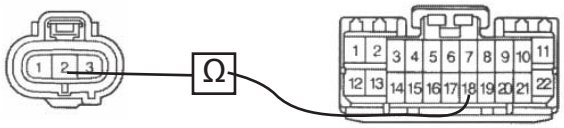
With the ignition key off disconnect the ECM and VPS sensor harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS sensor signal circuit terminal of the VPS sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 11.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

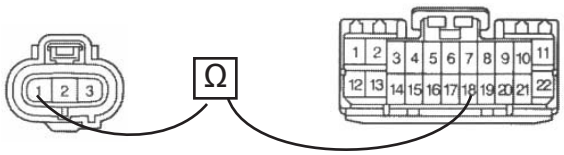
Step 11

With the ignition key off disconnect the ECM and VPS sensor harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS sensor 5-volt reference circuit terminals of the ECM and VPS sensor harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 12.
If no, repair the open VPS sensor 5-volt reference circuit.



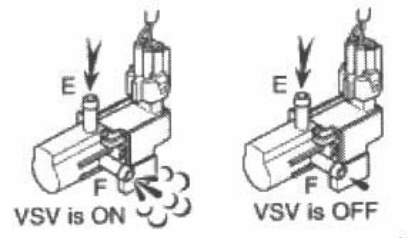
Step 12

With the ignition key off disconnect the ECM and VPS sensor harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS sensor ground circuit terminals of the ECM and VPS sensor harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS sensor.
If no, repair the open VPS sensor ground circuit.



Step 13

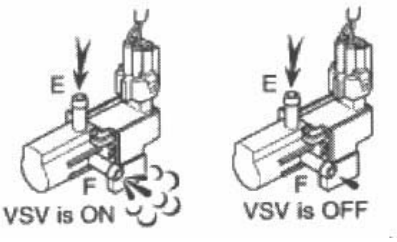
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. Does the EVAP VSV valve hold vacuum for at least 15 seconds?
If yes, go to step 14.
If no, replace the EVAP VSV valve, clean vacuum hoses and check the charcoal canister.

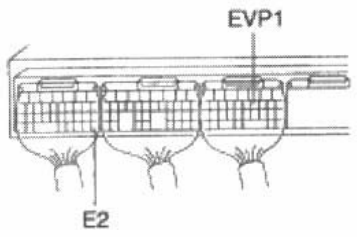


Diagnosis

Step 14

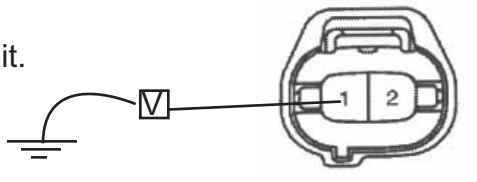
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. With the ignition key on back probe and ground the EVAP VSV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the vacuum drop with the EVAP VSV control circuit grounded?
If yes, go to step 18
If no, go to step 15.





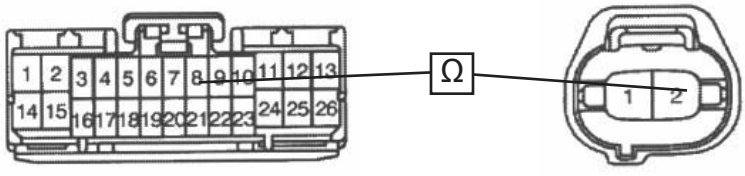
Step 15

With the ignition key off disconnect EVAP VSV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP VSV vehicle power terminal of the EVAP VSV valve harness connector and a good ground **(See Figure 2)**. Is there 9-14 volts present?
If yes, go to step 16.
If no, repair the open EVAP VSV valve vehicle power circuit.



Step 16

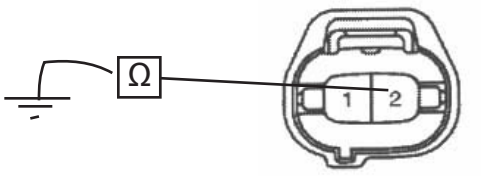
With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminals of the EVAP VSV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 17.
If no, repair the open EVAP VSV valve control circuit wiring.



Diagnosis

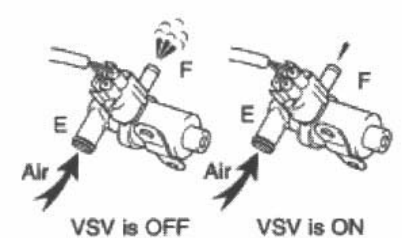
Step 17

With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminal of the EVAP VSV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP VSV valve.
If no, repair the EVAP VSV valve control circuit wiring for a short to ground.



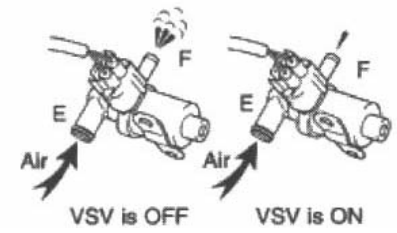
Step 18

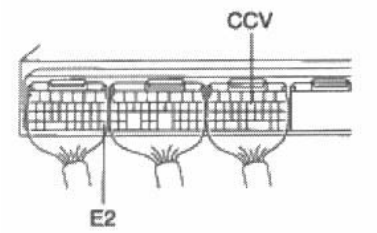
Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. Does the EVAP CCV valve hold vacuum?
If yes, replace the EVAP CCV valve
If no, go to step 19.



Step 19

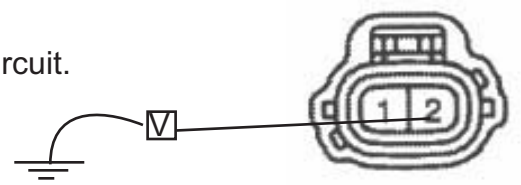
Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. With the ignition key on back probe and ground the EVAP CCV control circuit terminal at the ECM harness connector. Does the EVAP CCV valve hold vacuum for at least 15 seconds with the control circuit grounded?
If yes, go to step 23.
If no, go to step 20.





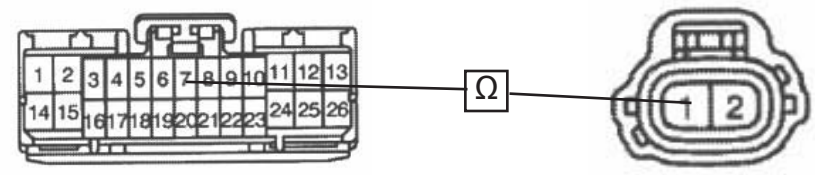
Step 20

With the ignition key off disconnect EVAP CCV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP CCV vehicle power terminal of the EVAP CCV valve harness connector and a good ground **(See Figure 3)**. Is there 9-14 volts present?
If yes, go to step 21.
If no, repair the open EVAP CCV valve vehicle power circuit.



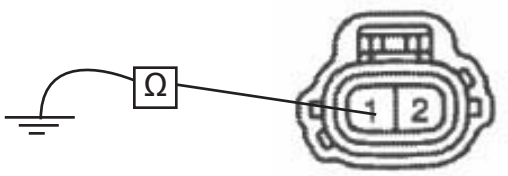
Step 21

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminals of the EVAP CCV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 22.
If no, repair the open EVAP CCV valve control circuit wiring.



Step 22

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminal of the EVAP CCV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP CCV valve.
If no, repair the EVAP CCV valve control circuit wiring for a short to ground.



P0442
Evaporative Emission System
Small Leak Detected (2000-2003)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
P0442 Evaporative Emission System Small Leak Detected (2000-2003)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in EVAP control system and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the system. As the EVAP system pressure increases the signal voltage increases.

EVAP Vapor Pressure Sensor Vacuum Switching Valve (VPS/VSV)

This valve is used during diagnostics to connect the VPS to either the canister or the fuel tank side of the system. The ECM compares the pressure in the side being tested to preprogrammed specifications. If the specifications are not met a code is set.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- After purge operation the ECM turns off the EVAP VSV valve sealing vacuum in the system The ECM then monitors for any pressure increase. Some increases is normal
- A very rapid, sharp increase in pressure it indicates a leak in the EVAP system and sets code P0440.
- A pressure rise just above normal indicates a very small leak and will set code P0442.

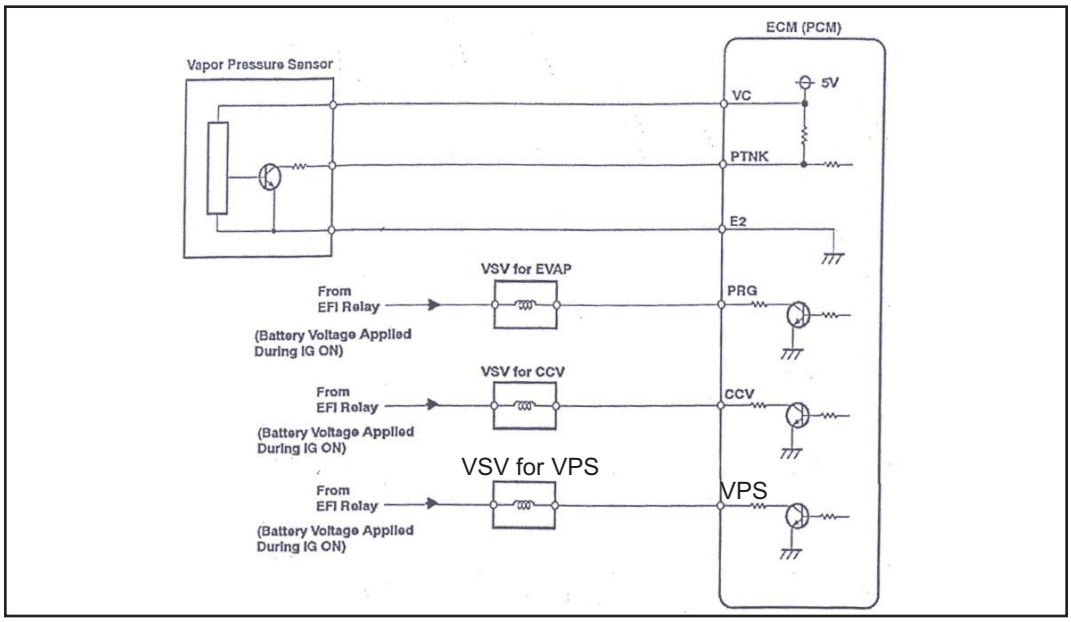
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

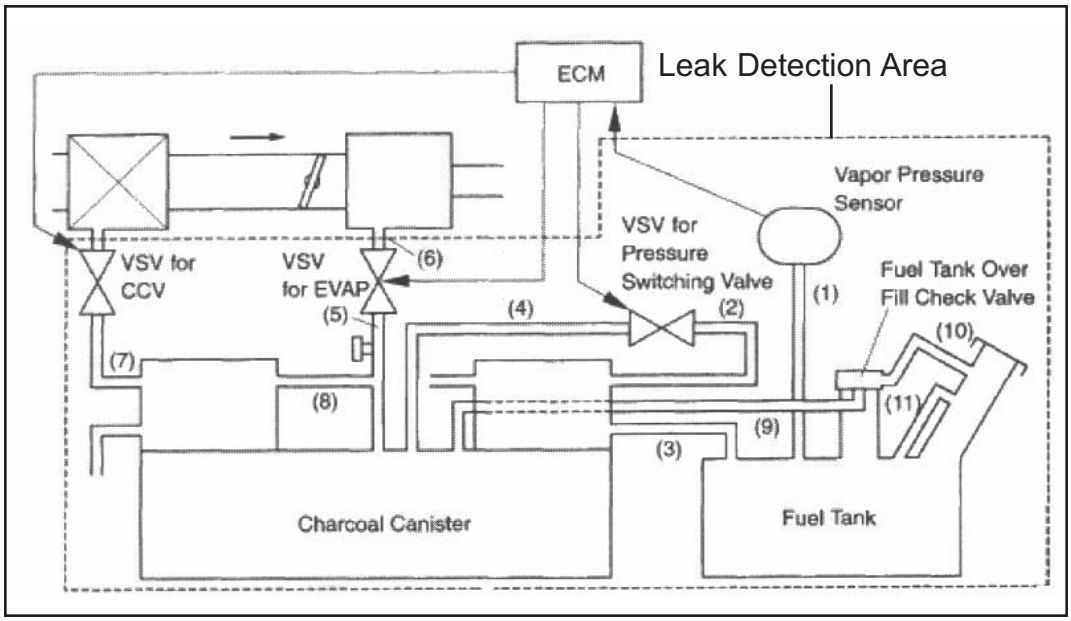
Possible Causes

- Cracked blocked, damaged or disconnected vacuum or fuel vapor hoses.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV sensor.
- Open or short in CCV circuit.
- Faulty CCV.
- Faulty ECM.

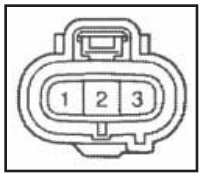
Wiring Diagrams



Wiring Diagram 1999-2003



System Diagram 1999-2003



VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and reset OBDII Readiness Tests by disconnecting the negative battery cable or removing the ECM power fuse. Perform an OBD II readiness test drive cycle.
To perform this test:

a) The vehicle must be cold, ambient air temperature between approximately 50 and 95°F.
b) The Intake Air Temperature (IAT) and Engine Coolant Temperature (ECT) sensor must be almost the same value.
c) Operate the vehicle to simulate urban driving conditions. Make several starts and stops accelerating from a stand-still to varying speeds up to 60 MPH **(see LA#4 drive cycle in appendix)**. This procedure may take 20 minutes or longer.
d) Without shutting the engine off, note if there are pending codes stored.
e) Shut the engine off and allow it to cool.
f) Repeat steps a, b and c.
g) Without shutting the engine off, note if the EVAP readiness test shows COMPL (complete) and if code P0440 or P0442 returned.

If yes, go to step 2.
If the EVAP readiness test did not show COMPL the vehicle will have to be driven further. If the readiness test shows COMPL and the codes did not return the condition is not present at this time. Ask the customer if they had any indication that the fuel cap may have been loose at any time.

Step 2

Was code P0442 accompanied by codes P0441, P0446, P0450, P0451, P0452, or P0453?
If yes, repair these codes first and rerun diagnostics.
If no, go to step 3.

Step 3

Visually inspect the EVAP system for gross leaks.

- Check the fuel filler cap for proper installation, physical damage and that it meets OE specifications.
- Check that the vacuum and return tubes are connected to the EVAP VSV valve.
- Check that the CCV valve is correctly attached to the charcoal canister.
- Check for any disconnected or cracked EVAP system fuel vapor hoses or tubes.
- Check for damaged fuel tank or filler pipe.

Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Diagnosis

Step 4

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

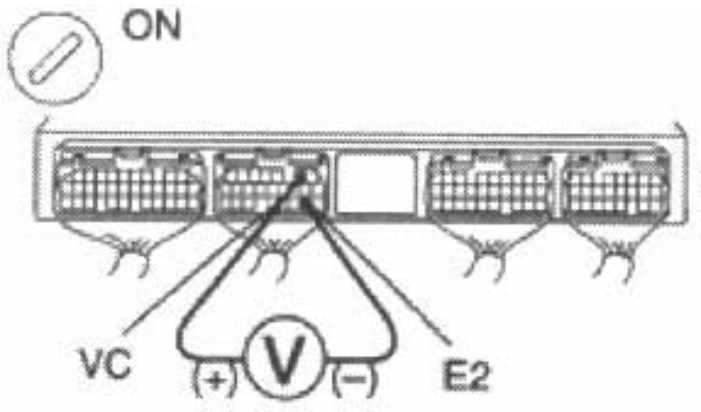
- Fuel filler cap.
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister.
- EVAP CCV valve.
- EVAP VSV valve.
- EVAP VPS sensor.
- VPS/VSV valve.
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 5.

Step 5

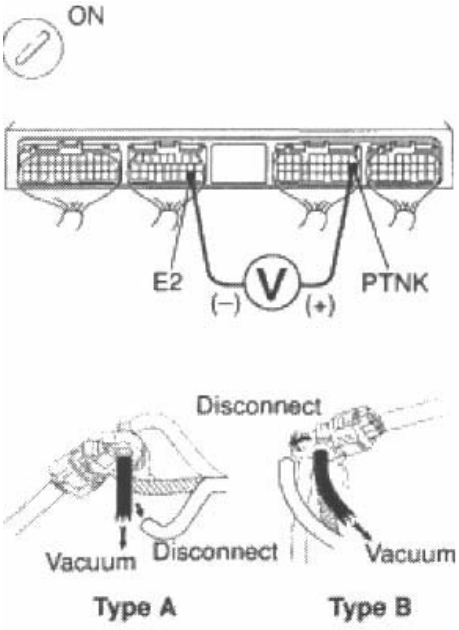
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 6,
If no, check and replace the ECM.



Diagnosis

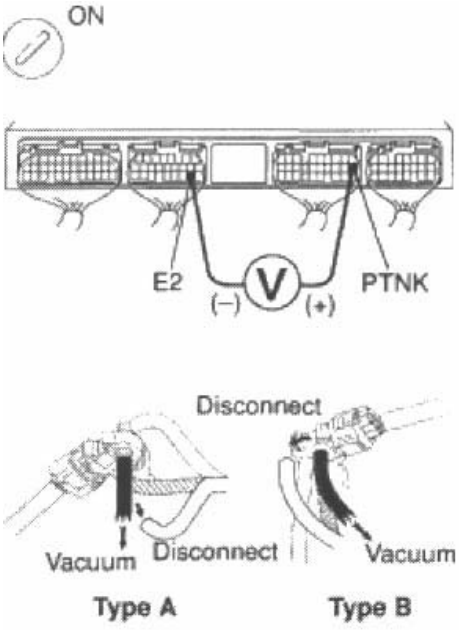
Step 6

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 7.
If no, go to step 8.



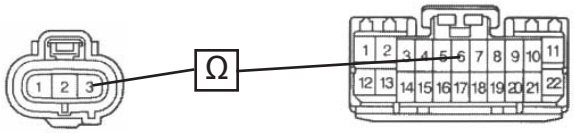
Step 7

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, the condition is not present at this time. It is possible the fuel tank cap was not installed properly at some point.
If no, go to step 8.



Step 8

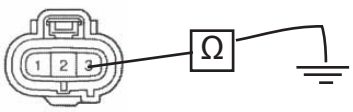
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 9.
If no, repair the open VPS sensor signal circuit.



Diagnosis

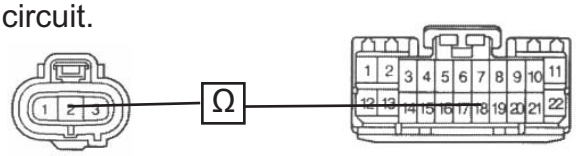
Step 9

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 10.
If no, repair the VPS sensor signal circuit for a short to ground.



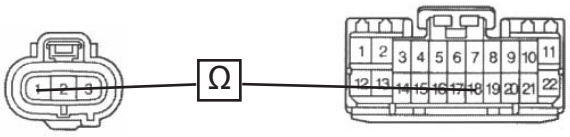
Step 10

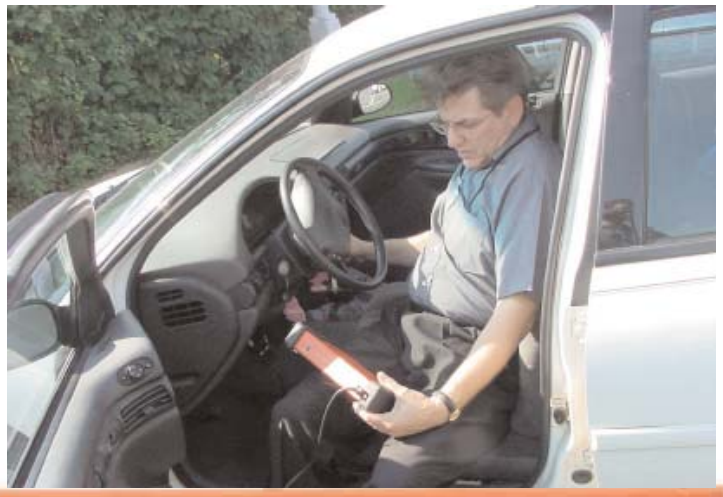
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 11.
If no, repair the open VPS sensor 5-volt reference circuit.

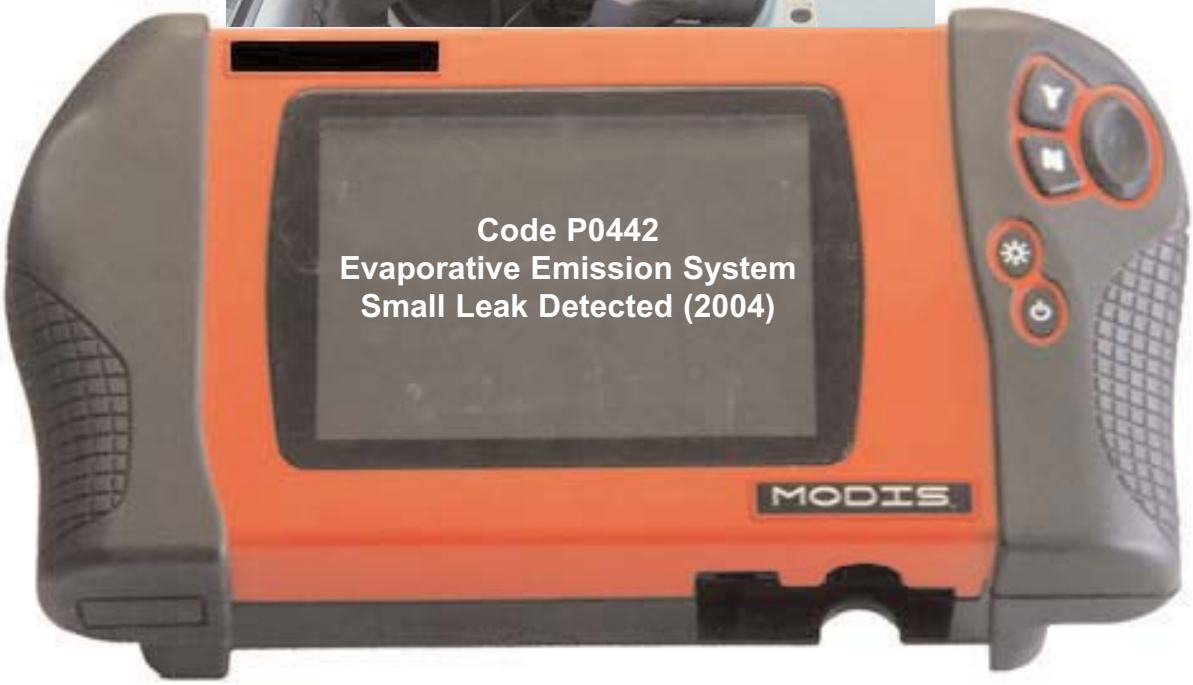


Step 11

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the VPS ground circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.







Code P0442
Evaporative Emission System
Small Leak Detected (2004)

Toyota Motor Company 2.4 Liter L-4 & 3.0, 3.3 Liter V6 (2004)
Code P0442 Evaporative Emission System Small Leak Detected

Theory of Operation
The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device EVAP canister. The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)
When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)
The CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure (EVAP VPS) Sensor
The EVAP VPS sensor measures the pressure levels in the fuel tank and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the fuel tank. As fuel tank pressure increases the signal voltage increases.

Refueling Valve
The refueling valve controls the pressure from the fuel tank to the EVAP canister during refueling. When fuel tank pressure increases the valve opens. When the EVAP system is purging the valve closes and a restrictor prevents strong vacuum from affecting pressure in the tank. When the valve opens the fuel tank is vented and refueling is possible.

EVAP Canister
The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- A rapid, sharp increase in the fuel tank pressure occurs indicating a small leak.

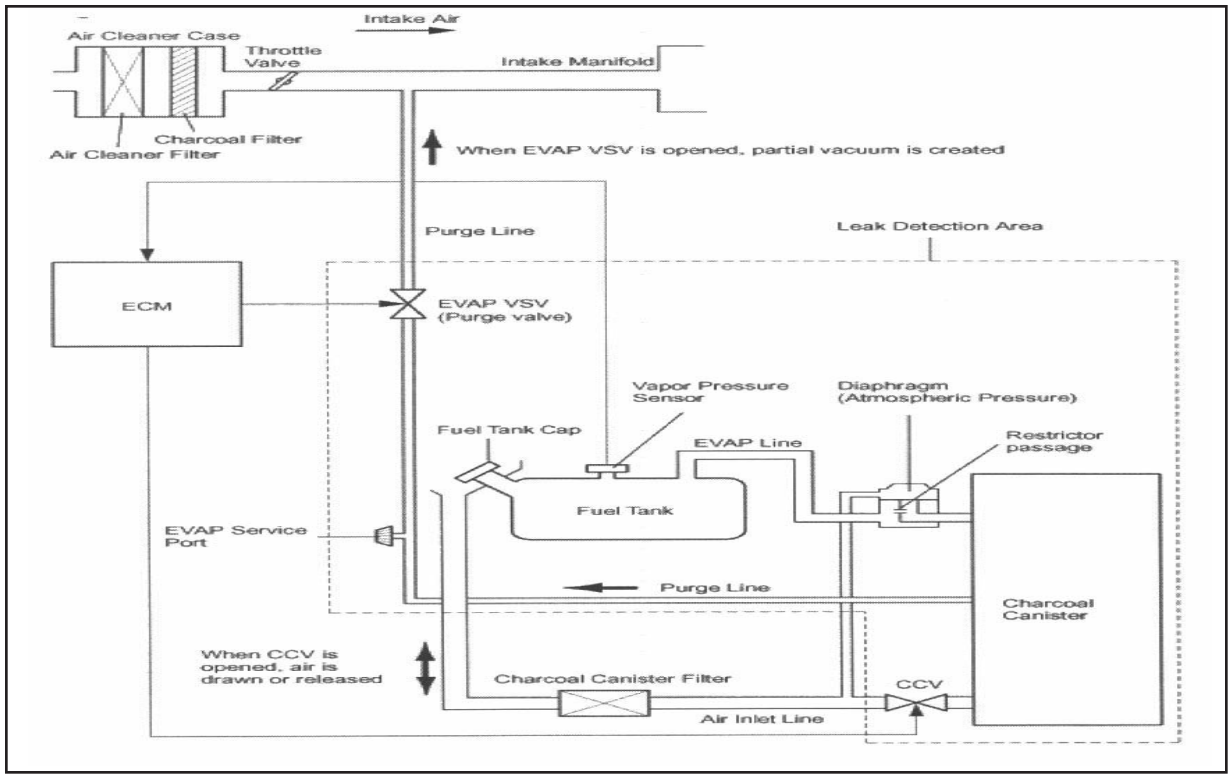
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

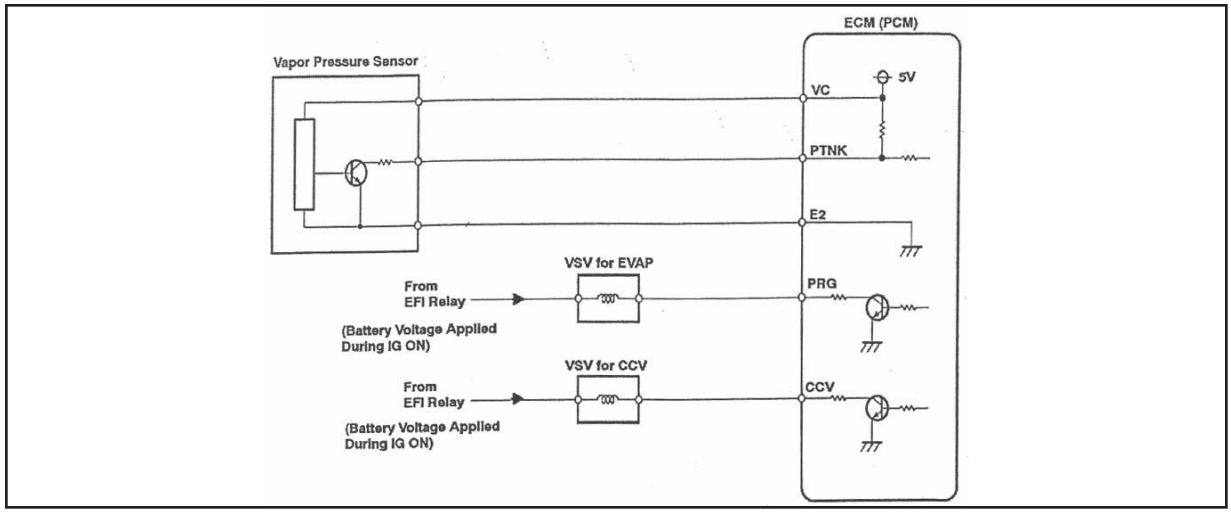
Possible Causes

- Vacuum hose has cracks, holes or is blocked, damaged or disconnected.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV.
- Open or short in CCV circuit.
- Faulty CCV.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Faulty ECM

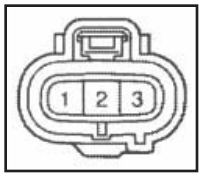
Wiring Diagrams



System Diagram 2004-Up



Wiring Diagram 2004-Up

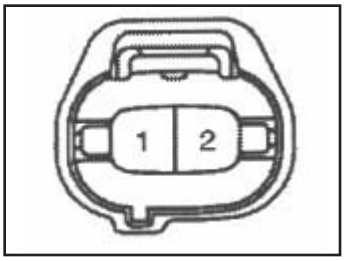


VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Wiring Diagrams - Continued

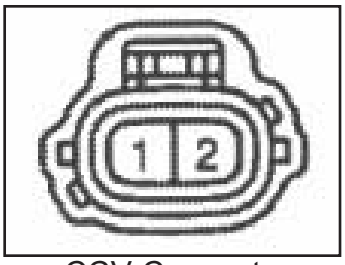


EVAP VSV Connector

2004 2.4L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Black/Red (B/R)

2004 3.0L/3.3L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Light Green (LG)

Figure 2



CCV Connector

2004 2.4L		
1	CCV Valve Control	Black/Red (B/R)
2	Switched Battery	Black/White (B/W)

2004 3.0L/3.3L		
1	CCV Valve Control	Violet (V)
2	Switched Battery	Black/Red (B/R)

Figure 3

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and reset OBDII Readiness Tests by disconnecting the negative battery cable or removing the ECM power fuse. Perform an OBD II readiness test drive cycle.
To perform this test:

a) The vehicle must be cold, ambient air temperature between approximately 50 and 95 F.
b) The Intake Air Temperature (IAT) and Engine Coolant Temperature (ECT) sensor must be almost the same value.
c) Operate the vehicle to simulate urban driving conditions. Make several starts and stops accelerating from a stand-still to varying speeds up to 60 MPH **(see LA#4 drive cycle in appendix)**. This procedure may take 20 minutes or longer.
d) Without shutting the engine off, note if there are pending codes stored.
e) Shut the engine off and allow it to cool.
f) Repeat steps a, b and c.
g) Without shutting the engine off, note if the EVAP readiness test shows COMPL (complete) and if code P0442 returned.

If yes, go to step 2.

If the EVAP readiness test did not show COMPL the vehicle will have to be driven further. If the readiness test shows COMPL and the codes did not return the condition is not present at this time. Ask the customer if they had any indication that the fuel cap may have been loose at any time.

Diagnosis

Step 2

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

- Fuel filler cap
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister
- CCV valve
- EVAP VSV valve
- EVAP VPS sensor
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 3.

Step 3

Inspect for pinched, plugged, improperly routed or broken vacuum hoses between the fuel tank, charcoal canister and VPS. Also check for a pinched or plugged vacuum hose from the EVAP VSV valve to the throttle body **(See system diagram)**. Inspect the vacuum nipple at the throttle body for any damage or plugging. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Step 4

Inspect for a pinched, plugged, improperly routed or broken fuel vapor tube between the fuel tank and charcoal canister. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 5

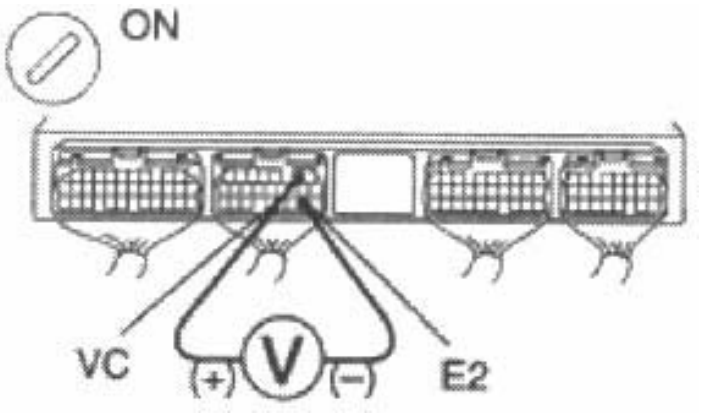
Diagnosis

Step 5

Inspect the VPS, CCV and EVAP VSV electrical connectors for damage, looseness or being unplugged. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 6.

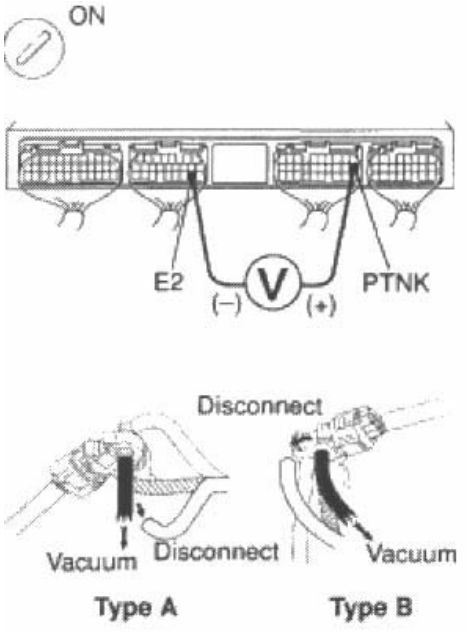
Step 6

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 7.
If no, check and replace the ECM.



Step 7

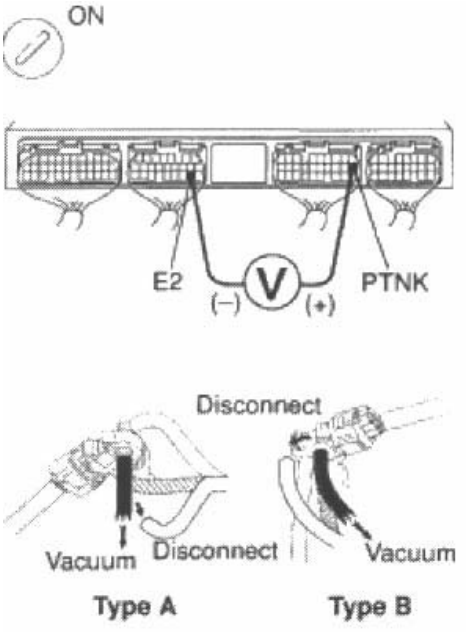
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 8.
If no, go to step 9.



Diagnosis

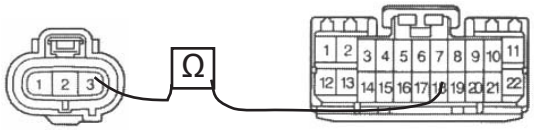
Step 8

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, go to step 13.
If no, go to step 9.



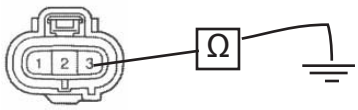
Step 9

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 10.
If no, repair the open VPS sensor signal circuit.



Step 10

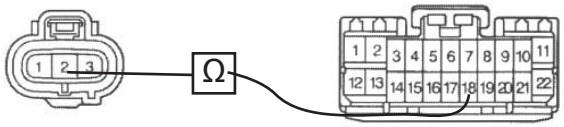
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 11.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

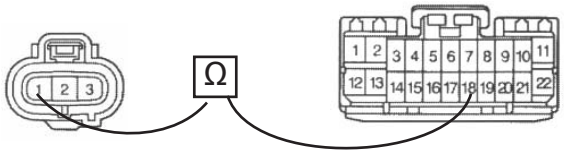
Step 11

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 12.
If no, repair the open VPS sensor 5-volt reference circuit.



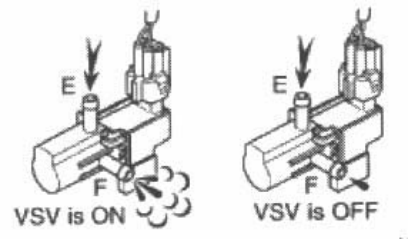
Step 12

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS ground return circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.



Step 13

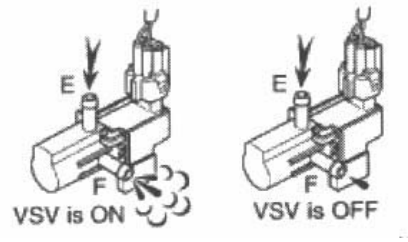
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. Does the EVAP VSV valve hold vacuum for at least 15 seconds?
If yes, go to step 14.
If no, replace the EVAP VSV valve, clean vacuum hoses and check the charcoal canister.

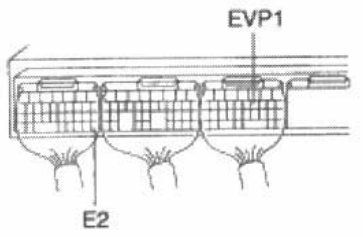


Diagnosis

Step 14

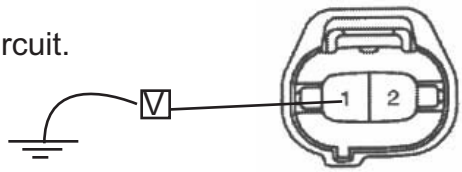
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. With the ignition key on back probe and ground the EVAP VSV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the vacuum drop with the EVAP VSV control circuit grounded?
If yes, go to step 18.
If no, go to step 15.





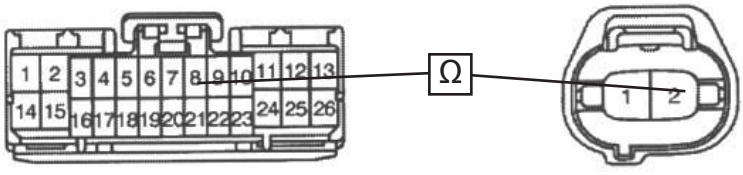
Step 15

With the ignition key off, disconnect EVAP VSV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP VSV vehicle power terminal of the EVAP VSV valve harness connector and a good ground **(See Figure 2)**. Is there 9-14 volts present?
If yes, go to step 16.
If no, repair the open EVAP VSV valve vehicle power circuit.



Step 16

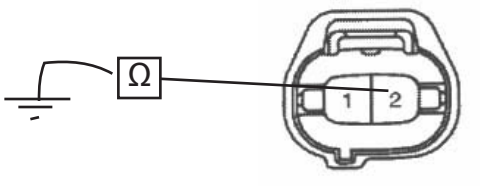
With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminals of the EVAP VSV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 17.
If no, repair the open EVAP VSV valve control circuit wiring.



Diagnosis

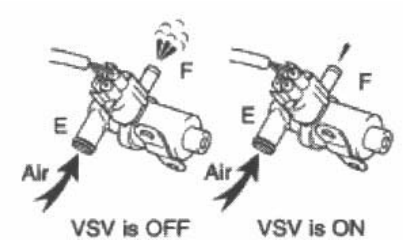
Step 17

With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminal of the EVAP VSV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP VSV valve.
If no, repair the EVAP VSV valve control circuit wiring for a short to ground.



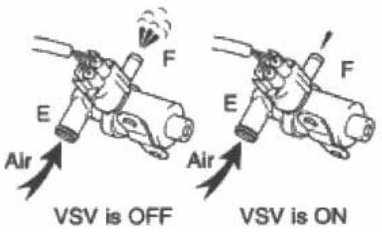
Step 18

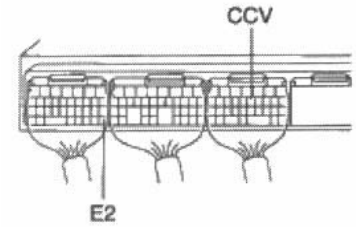
Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port.
Does the EVAP CCV valve hold vacuum?
If yes, replace the EVAP CCV valve
If no, go to step 19.



Step 19

Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. With the ignition key on back probe and ground the EVAP CCV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the EVAP CCV valve hold vacuum for at least 15 seconds with the control circuit grounded?
If yes, go to step 23.
If no, go to step 20.

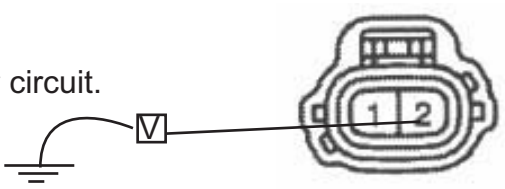




Diagnosis

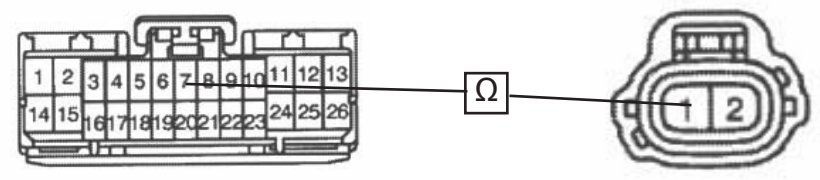
Step 20

With the ignition key off disconnect EVAP CCV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP CCV vehicle power terminal of the EVAP CCV valve harness connector and a good ground **(See Figure 3)**. Is there 9-14 volts present?
If yes, go to step 21.
If no, repair the open EVAP CCV valve vehicle power circuit.



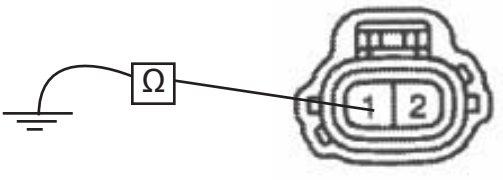
Step 21

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminals of the EVAP CCV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 22.
If no, repair the open EVAP CCV valve control circuit wiring.



Step 22

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminal of the EVAP CCV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP CCV valve.
If no, repair the EVAP CCV valve control circuit wiring for a short to ground.



P0446
Evaporative Emission Control System Vent Control Circuit (1999-2003)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
Code P0446 Evaporative Emission Control System Vent Control Circuit (1999-2003)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in the EVAP control system and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the System. As the EVAP system pressure increases the signal voltage increases.

EVAP Vapor Pressure Sensor Vacuum Switching Valve (VPS/VSV)

This valve is used during diagnostics to connect the VPS to either the canister or the fuel tank side of the system. The ECM compares the pressure in the side being tested to preprogrammed specifications. If the specifications are not met a code is set.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV Valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- With the VPS/VSV turned on the ECM determines that there is no system continuity between the VPS, fuel tank and charcoal canister.
- With the VPS/VSV turned off the ECM determines that the fuel tank pressure is maintained at atmospheric pressure.
- With the CCV valve turned on the ECM determines that the pressure in the charcoal canister and fuel tank is maintained at atmospheric pressure.

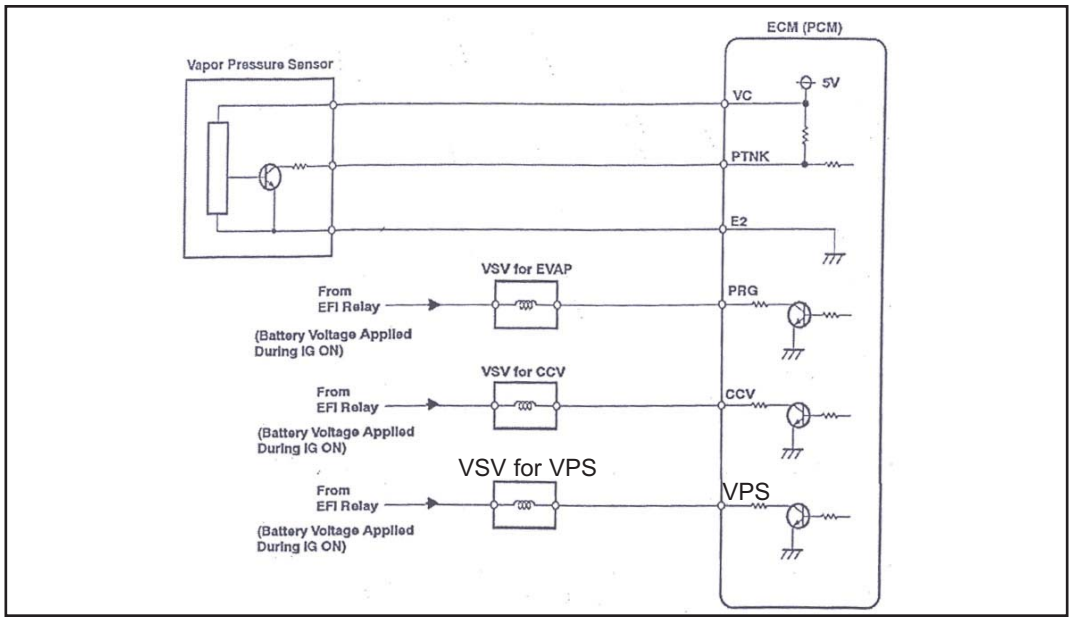
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

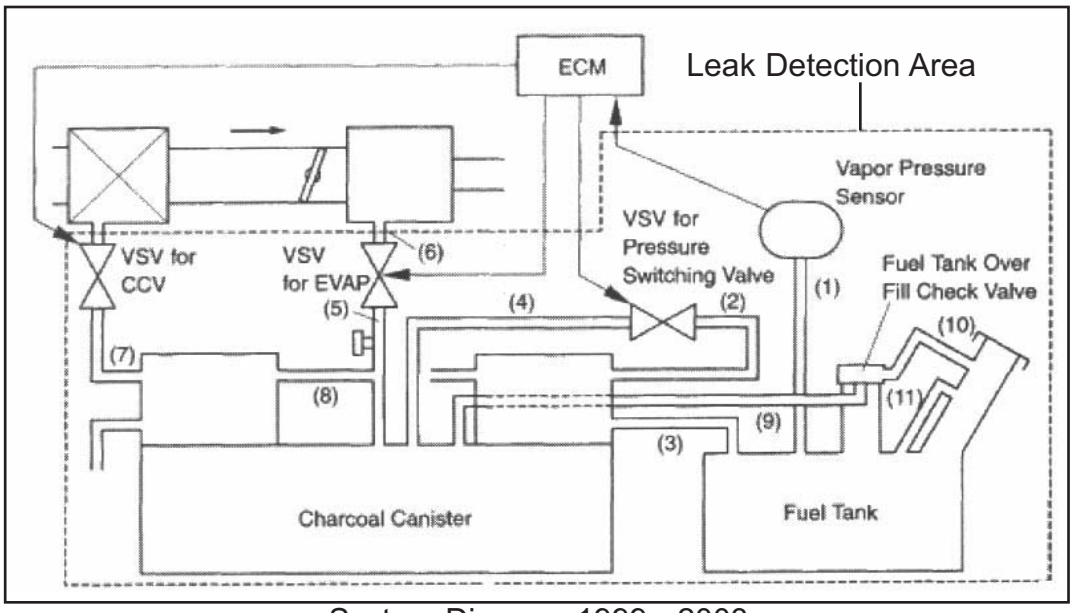
Possible Causes

- Vacuum hose has cracks, holes or is blocked, damaged or disconnected.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV.
- Open or short in CCV circuit.
- Faulty CCV.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Faulty ECM

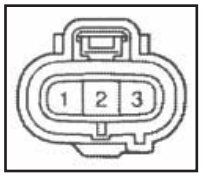
Wiring Diagrams



Wiring Diagram 1999-2003



System Diagram 1999 - 2003

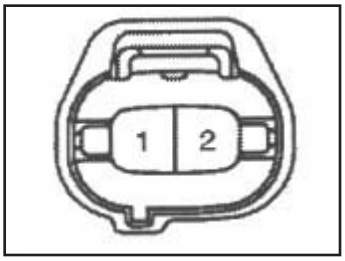


VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Wiring Diagrams - Continued



EVAP VSV Connector

1999-2000 2.2L		
1	Switched Battery	Black/Yellow (B/Y)
2	EVAP VSV Valve Control	Violet/White (V/W)

1999-2000 3.0L		
1	Switched Battery	Black/Yellow (B/Y)
2	EVAP VSV Valve Control	Light Green (LG)

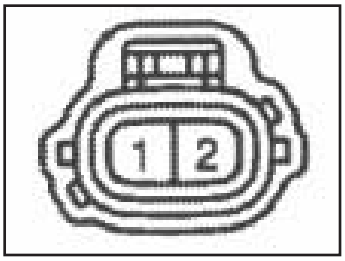
2001 All		
1	Switched Battery	Black/Yellow (B/Y)
2	EVAP VSV Valve Control	Violet/White (V/W)

2002-2003 2.4L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Black/Red (B/R)

2002-2003 3.0L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Light Green (LG)

Figure 2

Wiring Diagrams - Continued



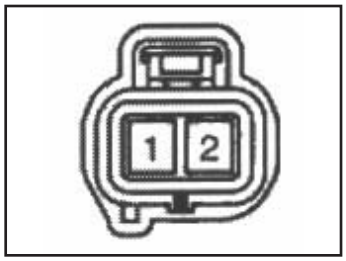
CCV Connector

1999-2001 All		
1	CCV Valve Control	Blue/Red (L/R)
2	Switched Battery	Black/Yellow (B/Y)

2002-2003 2.4L		
1	CCV Valve Control	Green (G)
2	Switched Battery	Black/White (B/W)

2002-2003 3.0L		
1	CCV Valve Control	Blue (L)
2	Switched Battery	Black/White (B/W)

Figure 3



VPS/VSV Connector

1999-2001 All		
1	VPS/VSV Control	Violet (V)
2	Switched Battery	Black/Yellow (B/Y)

2002-2003 All		
1	VPS/VSV Control	Violet (V)
2	Switched Battery	Black/White (B/W)

Figure 4

Diagnosis

Step 1

Visually inspect the EVAP system for gross leaks.

- Check the fuel filler cap for proper installation, physical damage and that it meets OE specifications.
- Check that the vacuum and return tubes are connected to the EVAP VSV valve.
- Check that the CCV valve is correctly attached to the charcoal canister.
- Check for any disconnected or cracked EVAP system fuel vapor hoses or tubes.
- Check for damaged fuel tank or filler pipe.

Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 2.

Step 2

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

- Fuel filler cap
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister
- EVAP CCV valve
- EVAP VSV valve
- EVAP VPS sensor
- VPS/VSV valve
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 3.

Diagnosis

Step 3

Inspect for pinched, plugged, improperly routed or broken vacuum hoses between the VPS and fuel tank, and charcoal canister and VPS/VSV, and VPS/VSV and charcoal canister. Also check for a pinched or plugged vacuum hose from the EVAP VSV valve to the throttle body **(See system diagram)**. Inspect the vacuum nipple at the throttle body for any damage or plugging. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Step 4

Inspect for a pinched, plugged, improperly routed or broken fuel vapor tube between the fuel tank and charcoal canister. Also, inspect the charcoal canister and canister filter for obstructions or damage. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 5

Step 5

Inspect the VPS/VSV, CCV VSV and EVAP VSV electrical connectors for damage, looseness or being unplugged. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 6.

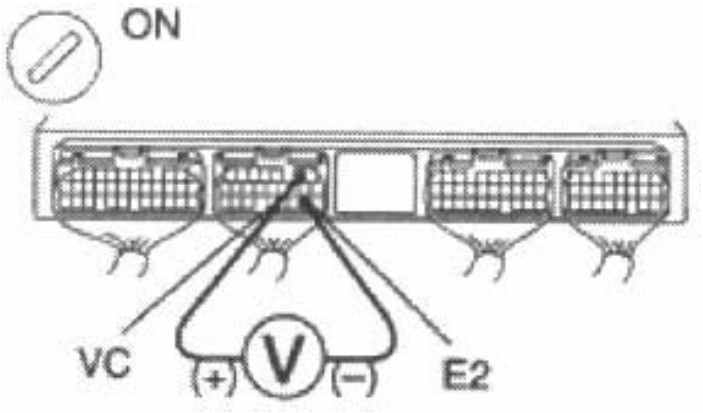
Step 6

Inspect vacuum hoses 5, 6, 7, 8, and 9 shown in the System Diagram for being pinched, plugged, improperly routed or broken. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 7.

Diagnosis

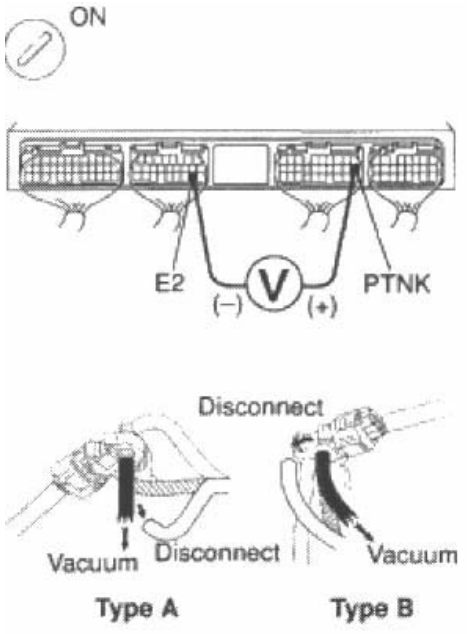
Step 7

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 8.
If no, check and replace the ECM.



Step 8

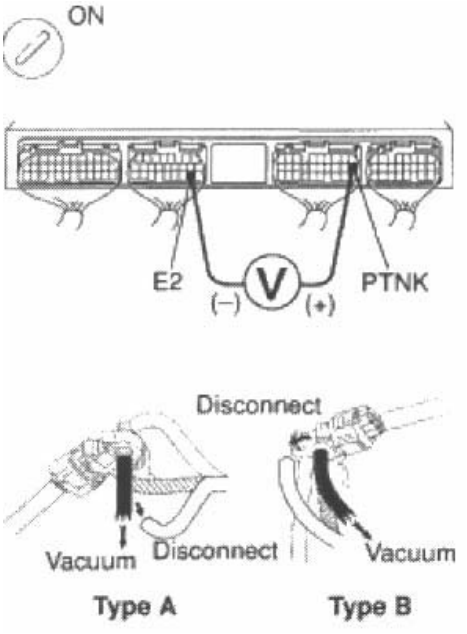
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 9.
If no, go to step 10.



Diagnosis

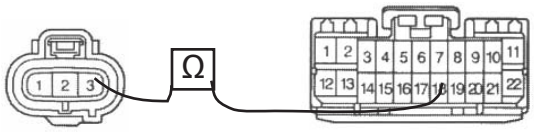
Step 9

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, go to step 14.
If no, go to step 10.



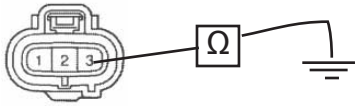
Step 10

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 11.
If no, repair the open VPS sensor signal circuit.



Step 11

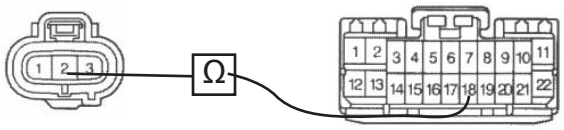
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 12.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

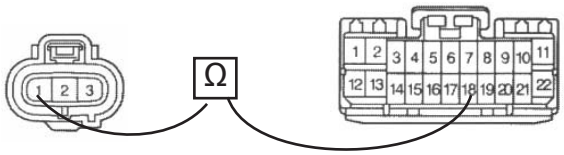
Step 12

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 13.
If no, repair the open VPS sensor 5-volt reference circuit.



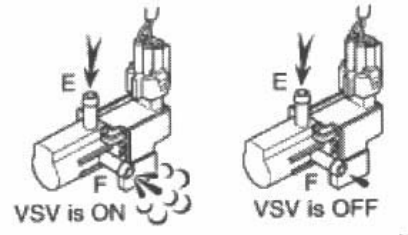
Step 13

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS ground return circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.



Step 14

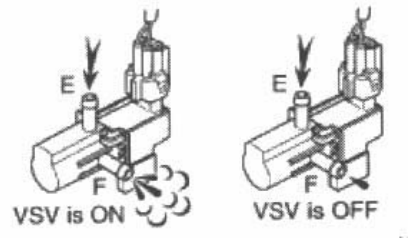
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. Does the EVAP VSV valve hold vacuum for at least 15 seconds?
If yes, go to step 15.
If no, replace the EVAP VSV valve, clean vacuum hoses and check the charcoal canister.

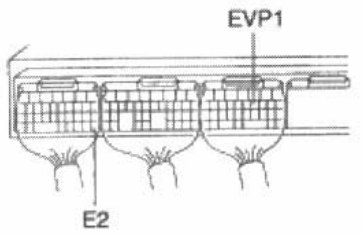


Diagnosis

Step 15

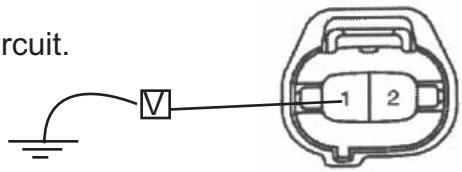
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. With the ignition key on back probe and ground the EVAP VSV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the vacuum drop with the EVAP VSV control circuit grounded?
If yes, go to step 19
If no, go to step 16.





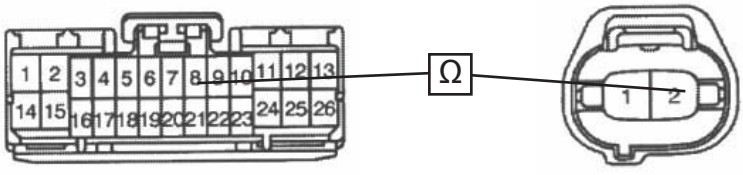
Step 16

With the ignition key off, disconnect EVAP VSV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP VSV vehicle power terminal of the EVAP VSV valve harness connector and a good ground **(See Figure 2)**. Is there 9-14 volts present?
If yes, go to step 17.
If no, repair the open EVAP VSV valve vehicle power circuit.



Step 17

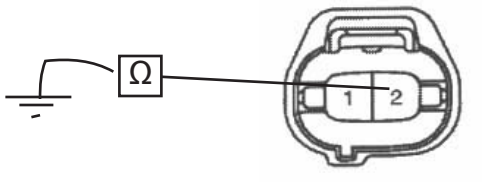
With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminals of the EVAP VSV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 18.
If no, repair the open EVAP VSV valve control circuit wiring.



Diagnosis

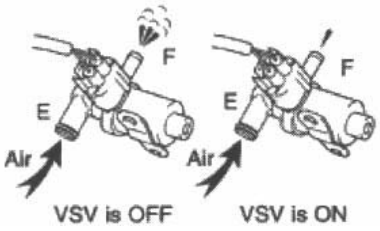
Step 18

With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminal of the EVAP VSV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP VSV valve.
If no, repair the EVAP VSV valve control circuit wiring for a short to ground.



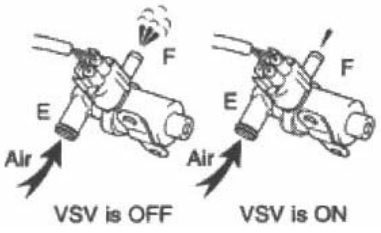
Step 19

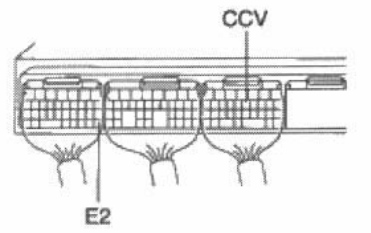
Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. Does the EVAP CCV valve hold vacuum?
If yes, replace the EVAP CCV valve
If no, go to step 20.



Step 20

Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. With the ignition key on back probe and ground the EVAP CCV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the EVAP CCV valve hold vacuum for at least 15 seconds with the control circuit grounded?
If yes, go to step 24
If no, go to step 21.

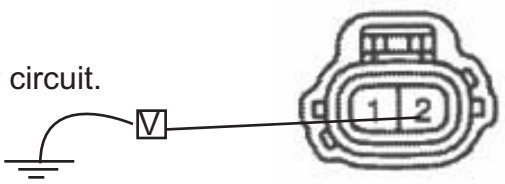




Diagnosis

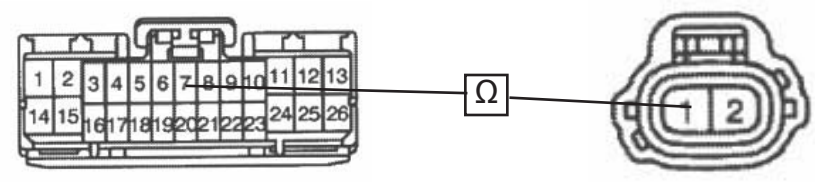
Step 21

With the ignition key off disconnect EVAP CCV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP CCV vehicle power terminal of the EVAP CCV valve harness connector and a good ground **(See Figure 3)**. Is there 9-14 volts present?
If yes, go to step 22.
If no, repair the open EVAP CCV valve vehicle power circuit.



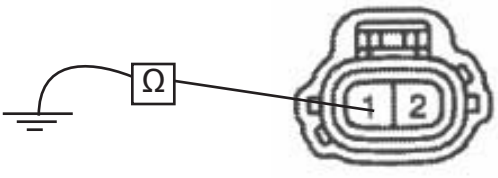
Step 22

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminals of the EVAP CCV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 23.
If no, repair the open EVAP CCV valve control circuit wiring.



Step 23

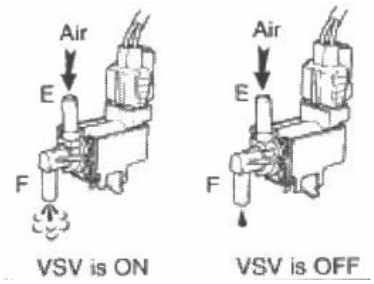
With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminal of the EVAP CCV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP CCV valve.
If no, repair the EVAP CCV valve control circuit wiring for a short to ground.



Diagnosis

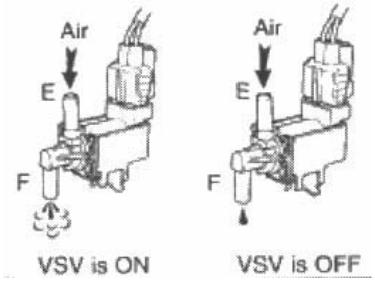
Step 24

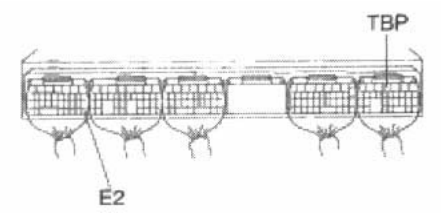
Disconnect the vacuum hoses from the VPS/VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the VPS/VSV valve vacuum source port. Does the VPS/VSV valve hold vacuum for at least 15 seconds?
If yes, go to step 25.
If no, replace the VPS/VSV valve, clean vacuum hoses and check the charcoal canister.



Step 25

Disconnect the vacuum hoses from the VPS/VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the VPS/VSV valve vacuum source port. With the ignition key on back probe and ground the VPS/VSV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the vacuum drop with the VPS/VSV control circuit grounded?
If yes, check and replace the ECM.
If no, go to step 26.

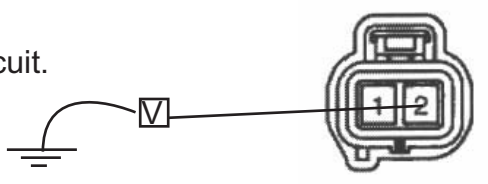




Diagnosis

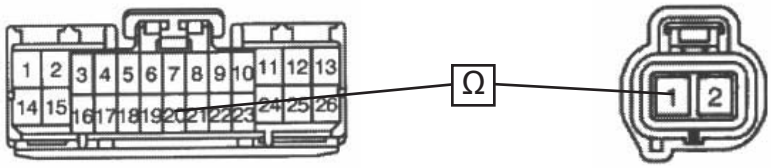
Step 26

With the ignition key off disconnect VPS/VSV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the VPS/VSV vehicle power terminal of the VPS/VSV valve harness connector and a good ground **(See Figure 4)**. Is there 9-14 volts present?
If yes, go to step 27.
If no, repair the open VPS/VSV valve vehicle power circuit.



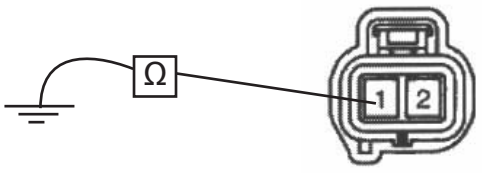
Step 27

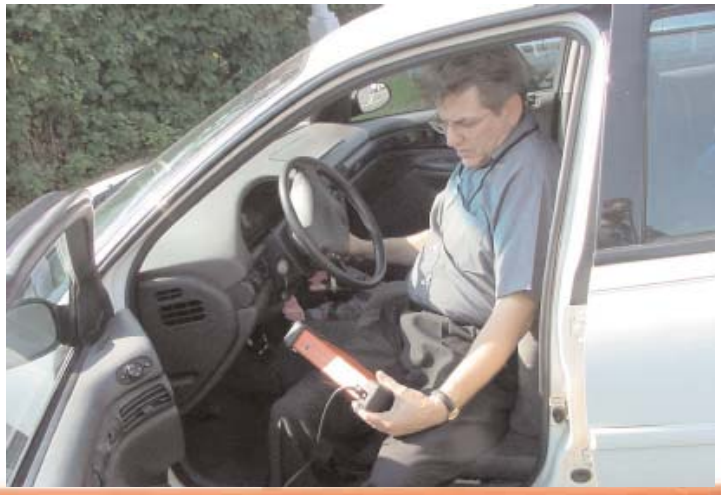
With the ignition key off disconnect the ECM and VPS/VSV valve harness connectors. Inspect the ECM, VPS/VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS/VSV valve control circuit terminals of the VPS/VSV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 18.
If no, repair the open VPS/VSV valve control circuit wiring.

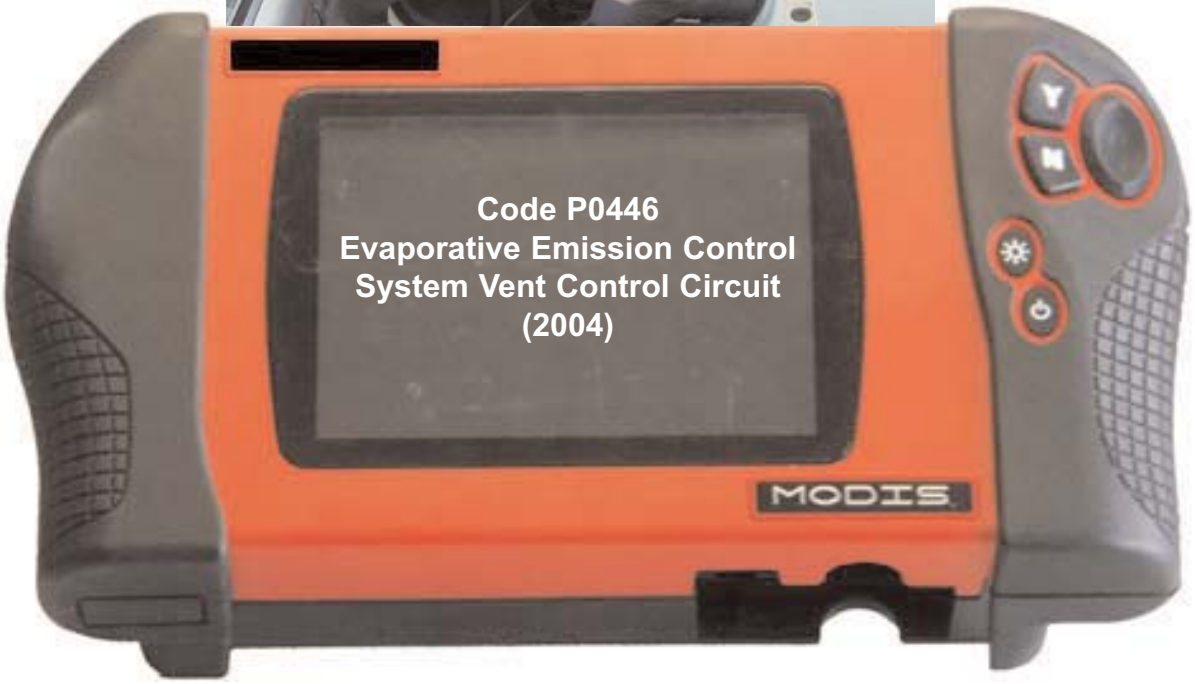


Step 28

With the ignition key off disconnect the ECM and VPS/VSV valve harness connectors. Inspect the ECM, VPS/VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS/VSV valve control circuit terminal of the VPS/VSV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the VPS/VSV valve.
If no, repair the VPS/VSV valve control circuit wiring for a short to ground.







Code P0446
Evaporative Emission Control System Vent Control Circuit (2004)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
Code P0446 Evaporative Emission Control System Vent Control Circuit (2004)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in the EVAP control system and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the System. As the EVAP system pressure increases the signal voltage increases.

Refueling Valve

The refueling valve controls the pressure from the fuel tank to the EVAP canister during refueling. When fuel tank pressure increases the valve opens. When the EVAP system is purging the valve closes and a restrictor prevents strong vacuum from affecting pressure in the tank. When the valve opens the fuel tank is vented and refueling is possible.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- When the ECM commands the EVAP VSV and CCV open at a time when the fuel tank is at atmospheric pressure and the fuel tank develops a high negative pressure (vacuum) the ECM determines the CCV is stuck closed.
- When the ECM commands the EVAP VSV valve open with the CCV closed the fuel tank should develop a high negative pressure (vacuum). If the fuel tank does not develop the high negative pressure the ECM determines the CCV is stuck open.

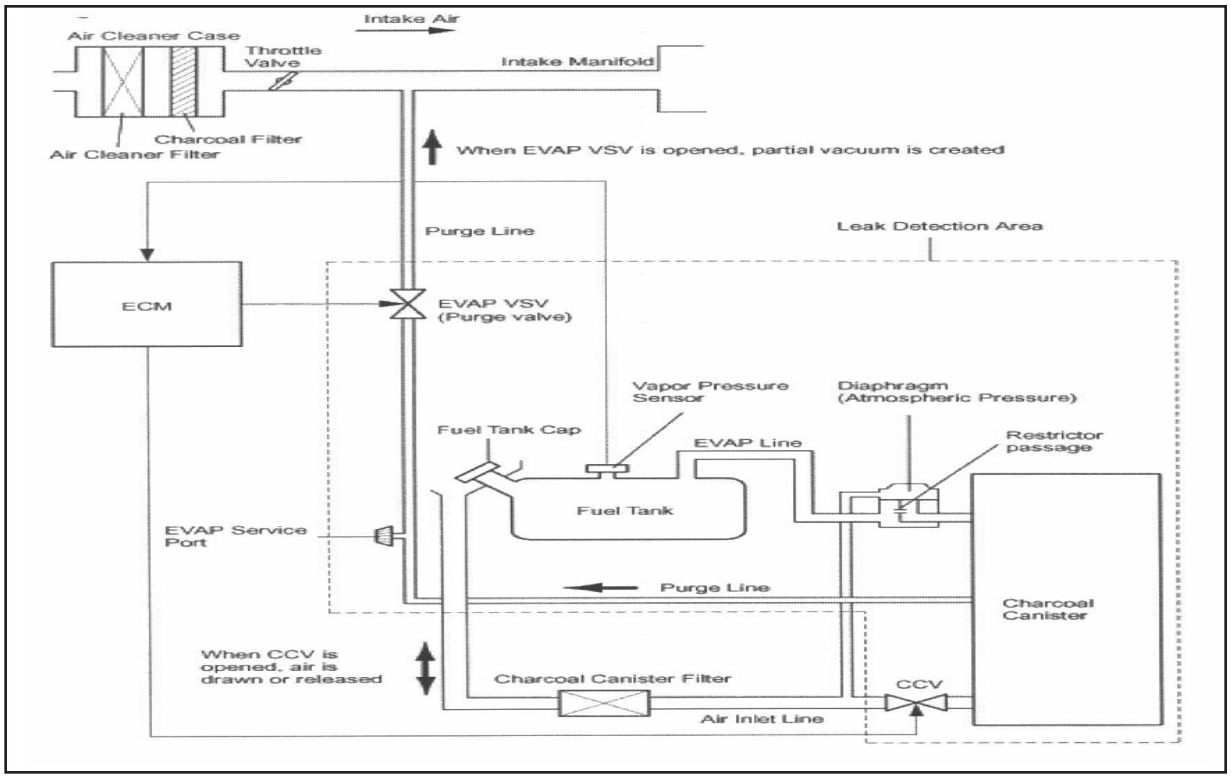
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data.

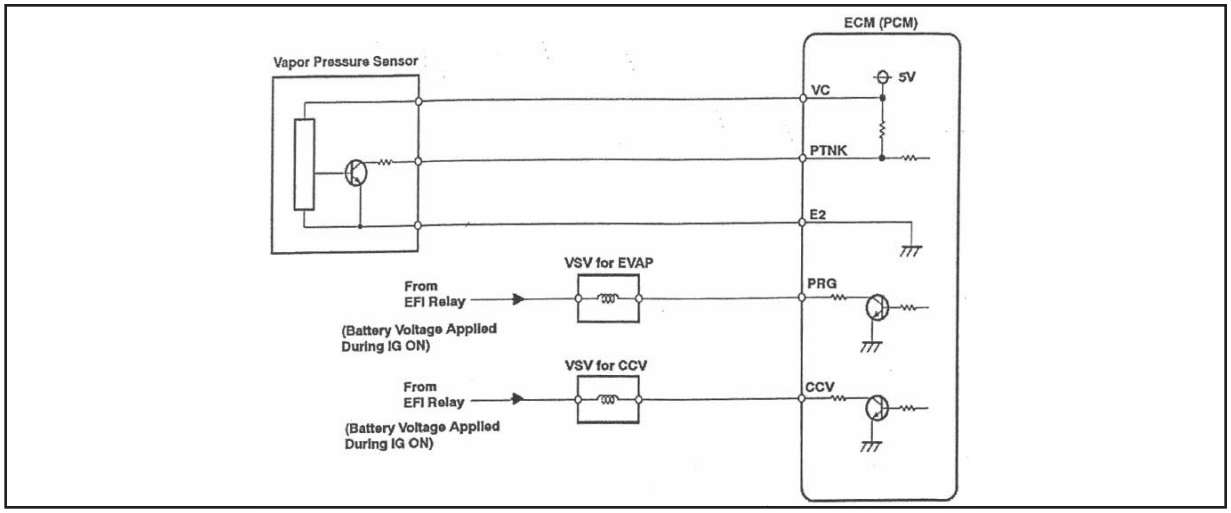
Possible Causes

- Vacuum hose has cracks, holes or is blocked, damaged or disconnected.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV.
- Open or short in CCV circuit.
- Faulty CCV.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Faulty ECM

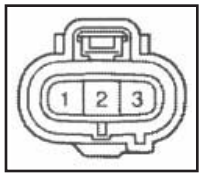
Wiring Diagrams



System Diagram 2004-Up



Wiring Diagram 2004-Up

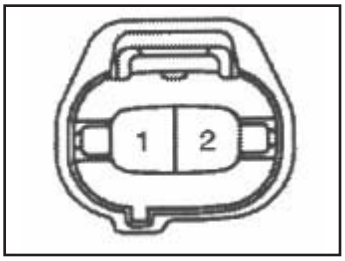


VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Wiring Diagrams - Continued

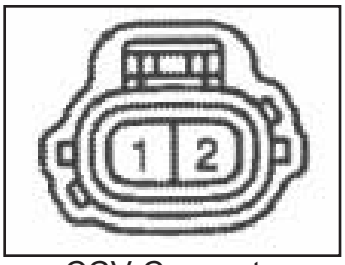


EVAP VSV Connector

2004 2.4L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Black/Red (B/R)

2004 3.0L/3.3L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Light Green (LG)

Figure 2



CCV Connector

2004 2.4L		
1	CCV Valve Control	Black/Red (B/R)
2	Switched Battery	Black/White (B/W)

2004 3.0L/3.3L		
1	CCV Valve Control	Violet (V)
2	Switched Battery	Black/Red (B/R)

Figure 3

Diagnosis

Step 1

Visually inspect the EVAP system for gross leaks.

- Check the fuel filler cap for proper installation, physical damage and that it meets OE specifications.
- Check that the vacuum and return tubes are connected to the EVAP VSV valve.
- Check that the CCV valve is correctly attached to the charcoal canister.
- Check for any disconnected or cracked EVAP system fuel vapor hoses or tubes.
- Check for damaged fuel tank or filler pipe.

Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 2.

Step 2

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

- Fuel filler cap
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister
- EVAP CCV valve
- EVAP VSV valve
- EVAP VPS sensor
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 3.

Diagnosis

Step 3

Inspect the EVAP fuel vapor hoses and tubes between the fuel tank and charcoal canister for proper connections, cracks, holes or damage **(See System Diagram)**. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Step 4

Inspect the CCV, EVAP VSV and VPS sensor electrical connectors for damage, looseness or being unplugged. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 5.

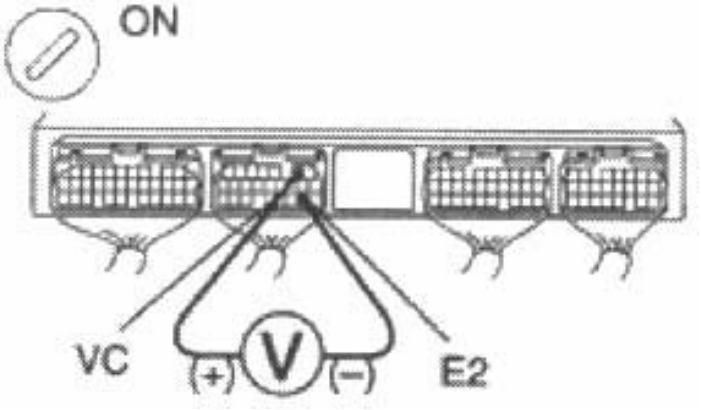
Step 5

Inspect the EVAP vacuum hoses between the intake manifold, EVAP VSV, EVAP VSV and charcoal canister for proper connections, cracks, holes or damage. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 6.

Diagnosis

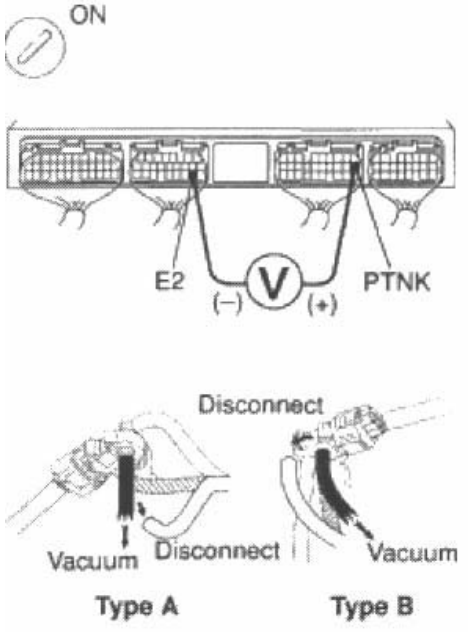
Step 6

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 7.
If no, check and replace the ECM.



Step 7

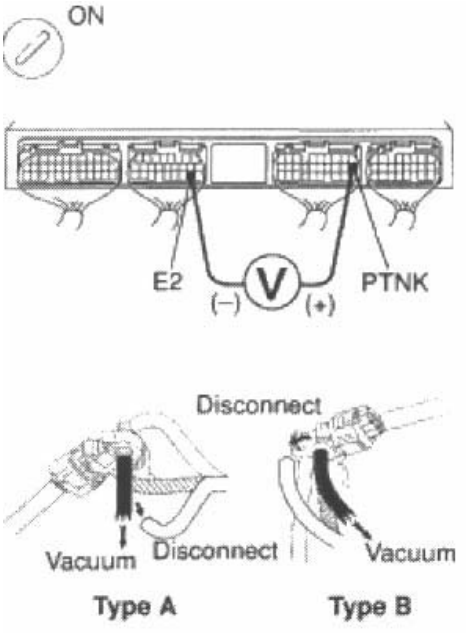
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 8.
If no, go to step 9.



Diagnosis

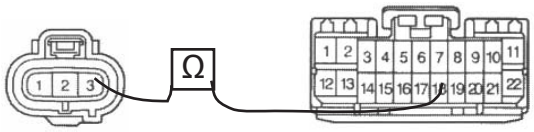
Step 8

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, go to step 13.
If no, go to step 9.



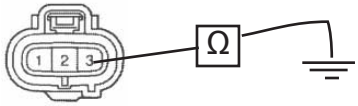
Step 9

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 10.
If no, repair the open VPS sensor signal circuit.



Step 10

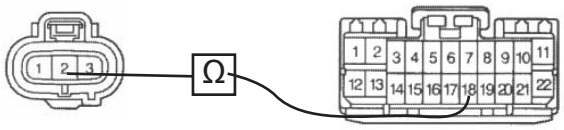
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 11.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

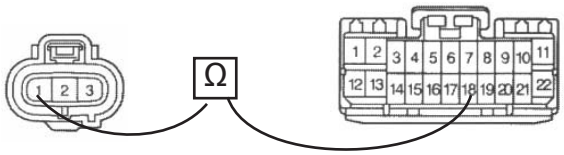
Step 11

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 12.
If no, repair the open VPS sensor 5-volt reference circuit.



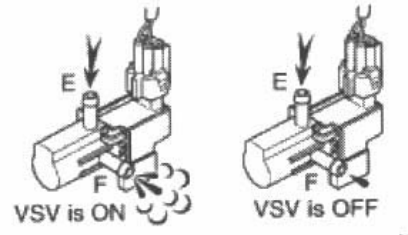
Step 12

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS ground return circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.



Step 13

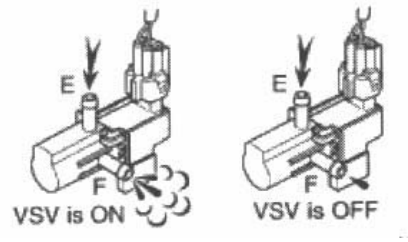
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. Does the EVAP VSV valve hold vacuum for at least 15 seconds?
If yes, go to step 14.
If no, replace the EVAP VSV valve, clean vacuum hoses and check the charcoal canister.

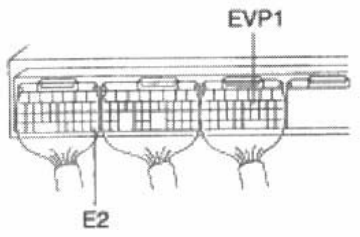


Diagnosis

Step 14

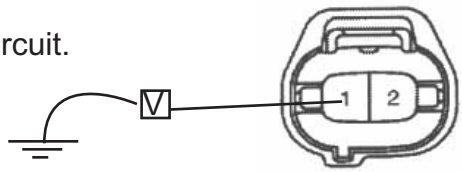
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. With the ignition key on back probe and ground the EVAP VSV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the vacuum drop with the EVAP VSV control circuit grounded?
If yes, go to step 18.
If no, go to step 15.





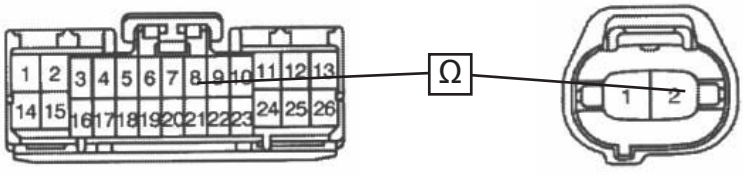
Step 15

With the ignition key off, disconnect EVAP VSV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP VSV vehicle power terminal of the EVAP VSV valve harness connector and a good ground **(See Figure 2)**. Is there 9-14 volts present?
If yes, go to step 16.
If no, repair the open EVAP VSV valve vehicle power circuit.



Step 16

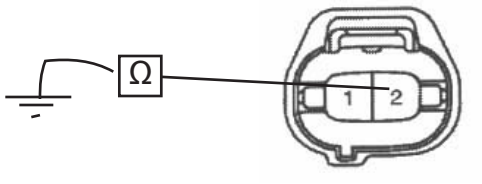
With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminals of the EVAP VSV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 17.
If no, repair the open EVAP VSV valve control circuit wiring.



Diagnosis

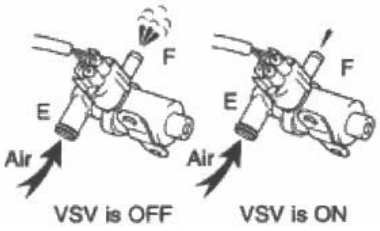
Step 17

With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminal of the EVAP VSV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP VSV valve.
If no, repair the EVAP VSV valve control circuit wiring for a short to ground.



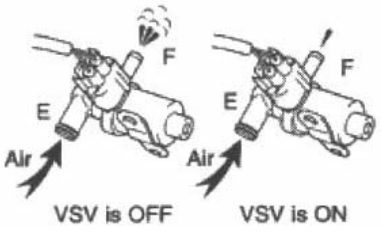
Step 18

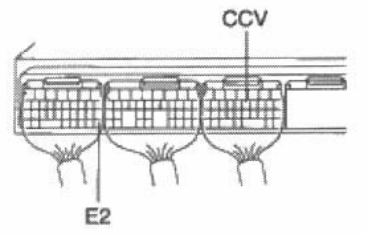
Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. Does the EVAP CCV valve hold vacuum?
If yes, replace the EVAP CCV valve
If no, go to step 19.



Step 19

Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. With the ignition key on back probe and ground the EVAP CCV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the EVAP CCV valve hold vacuum for at least 15 seconds with the control circuit grounded?
If yes, replace ECM.
If no, go to step 20.

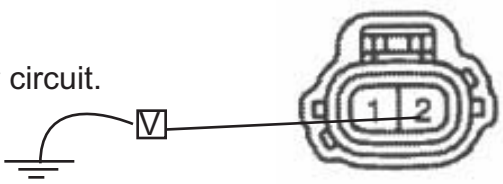




Diagnosis

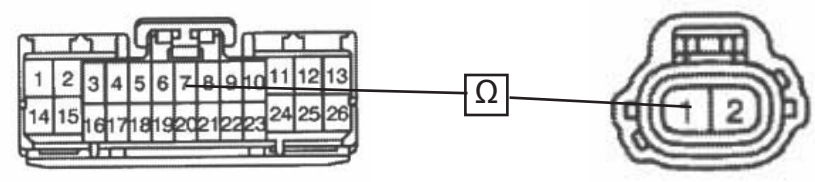
Step 20

With the ignition key off disconnect EVAP CCV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP CCV vehicle power terminal of the EVAP CCV valve harness connector and a good ground **(See Figure 3)**. Is there 9-14 volts present?
If yes, go to step 21.
If no, repair the open EVAP CCV valve vehicle power circuit.



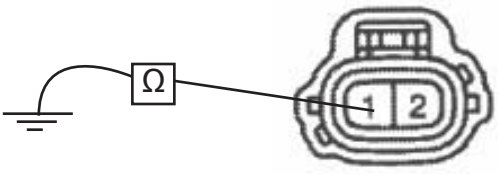
Step 21

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminals of the EVAP CCV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 22.
If no, repair the open EVAP CCV valve control circuit wiring.



Step 22

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminal of the EVAP CCV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP CCV valve.
If no, repair the EVAP CCV valve control circuit wiring for a short to ground.



Code P0450
Evaporative Emission Control System Pressure Sensor Malfunction (1999-2002)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
Code P0450 Evaporative Emission Control System Pressure Sensor Malfunction (1999-2002)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in the EVAP control system and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the System. As the EVAP system pressure increases the signal voltage increases.

EVAP Vapor Pressure Sensor Vacuum Switching Valve (VPS/VSV)

This valve is used during diagnostics to connect the VPS to either the canister or the fuel tank side of the system. The ECM compares the pressure in the side being tested to preprogrammed specifications. If the specifications are not met a code is set.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- After the engine is started the ECM determines that the vapor pressure sensor signal output remained at a fixed value for 10 seconds or less.

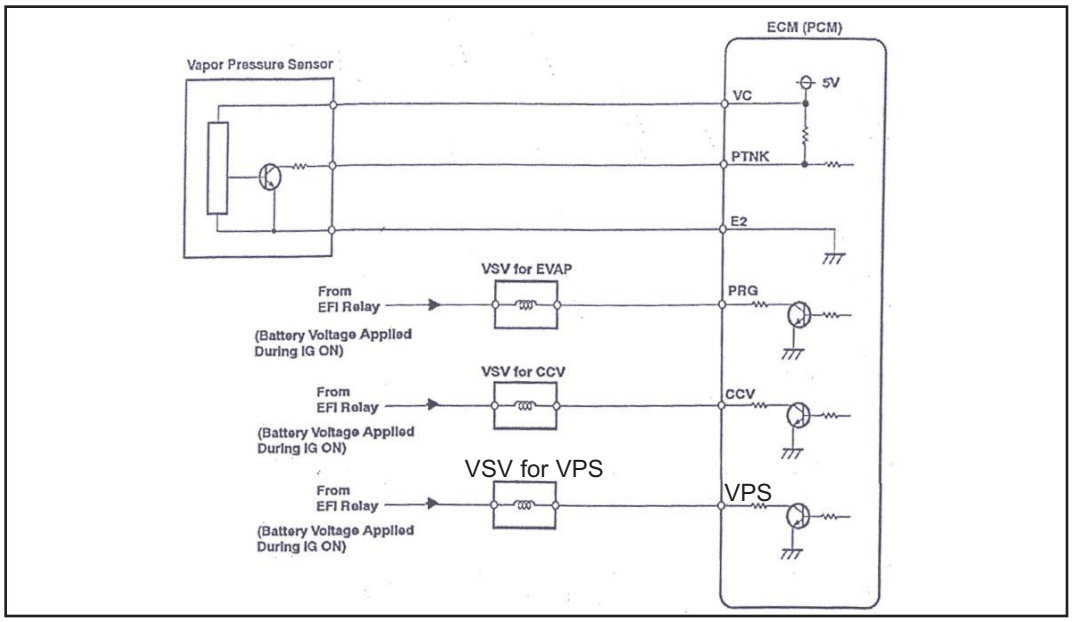
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

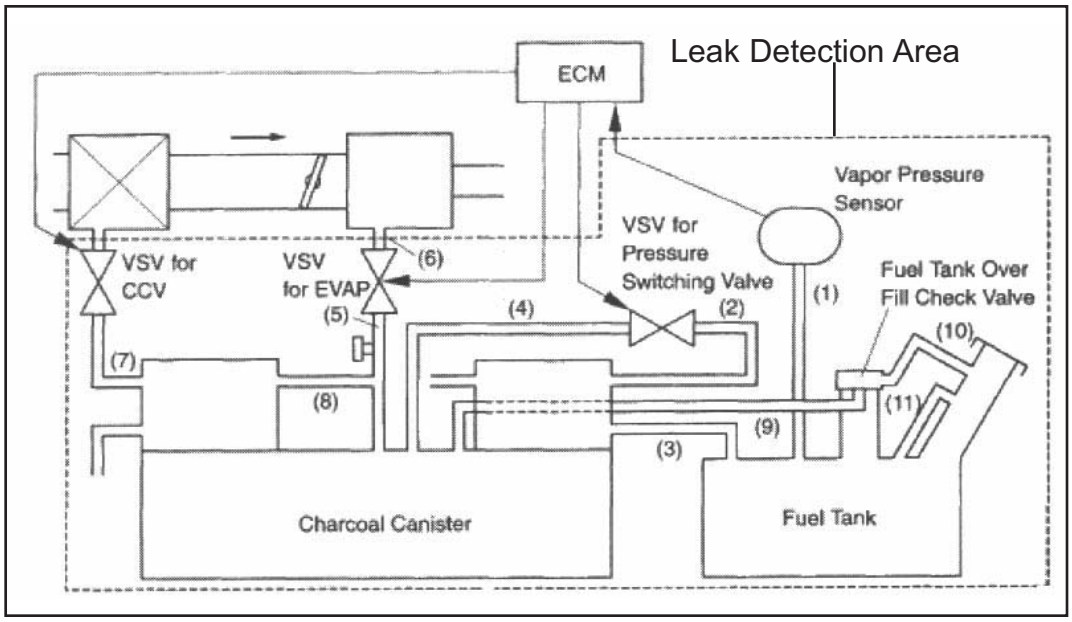
Possible Causes

- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Faulty ECM

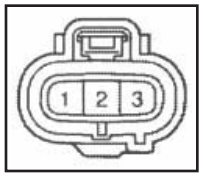
Wiring Diagrams



Wiring Diagram 1999-2003



System Diagram 1999-2003



VPS Connector

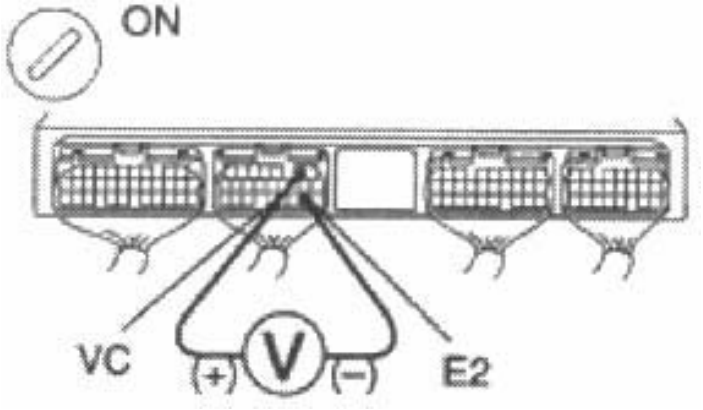
1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Diagnosis

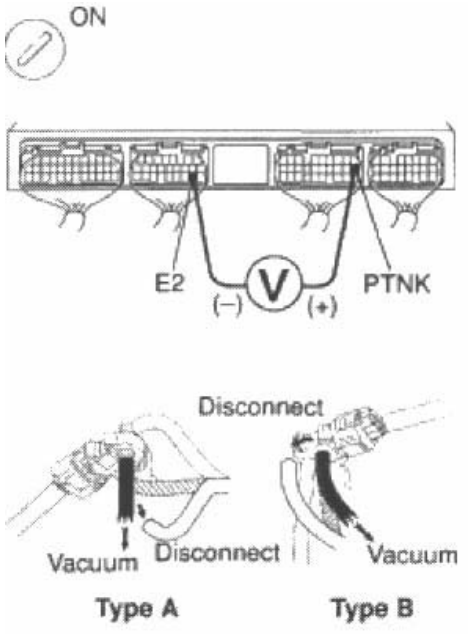
Step 1

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 8.
If no, check and replace the ECM.



Step 2

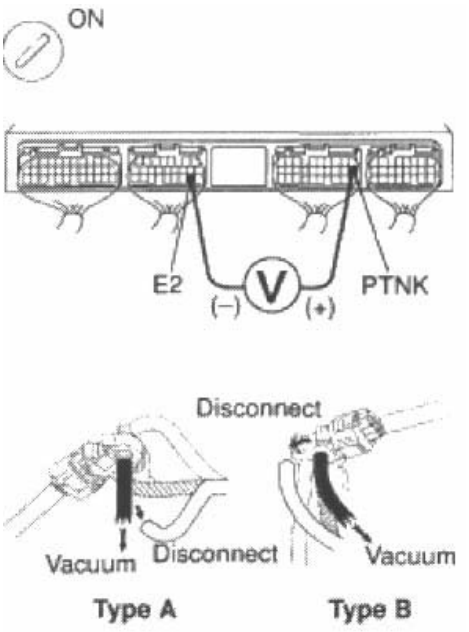
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 9.
If no, go to step 10.



Diagnosis

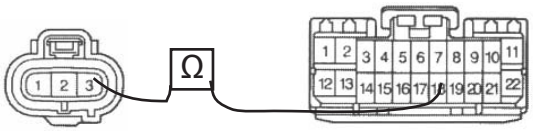
Step 3

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, go to step 14.
If no, go to step 10.



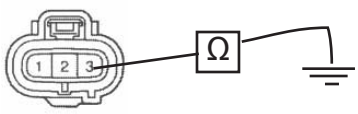
Step 4

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 11.
If no, repair the open VPS sensor signal circuit.



Step 5

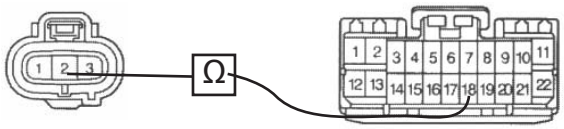
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 12.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

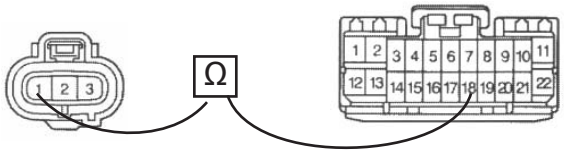
Step 6

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 13.
If no, repair the open VPS sensor 5-volt reference circuit.



Step 7

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS ground return circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.



Code P0451
Evaporative Emission Control System Pressure Sensor Range/Performance (1999-2003)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
Code P0451 Evaporative Emission Control System Pressure Sensor Range/Performance (1999-2003)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in the EVAP control system and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the System. As the EVAP system pressure increases the signal voltage increases.

EVAP Vapor Pressure Sensor Vacuum Switching Valve (VPS/VSV)

This valve is used during diagnostics to connect the VPS to either the canister or the fuel tank side of the system. The ECM compares the pressure in the side being tested to preprogrammed specifications. If the specifications are not met a code is set.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- The vapor pressure sensor output made an extreme change with the vehicle stopped and the engine idling with the vapor pressure sensor VSV valve turned OFF.
- The vapor pressure sensor value is more or less than the opening pressure value of the charcoal canister.

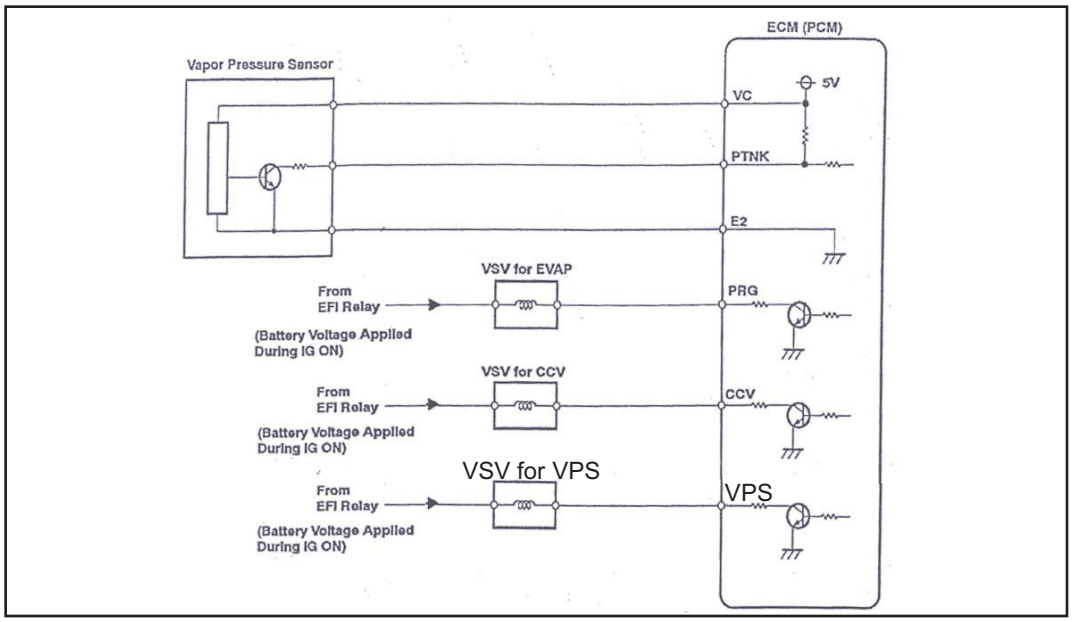
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

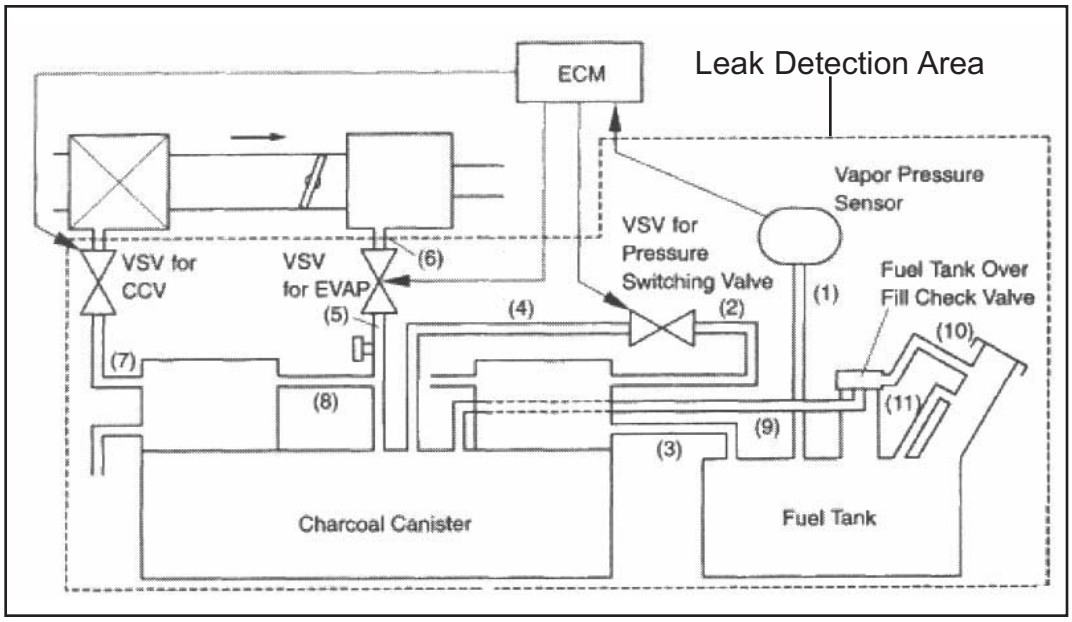
Possible Causes

- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Faulty ECM

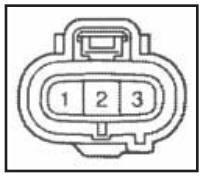
Wiring Diagrams



Wiring Diagram 1999-2003



System Diagram 1999-2003



VPS Connector

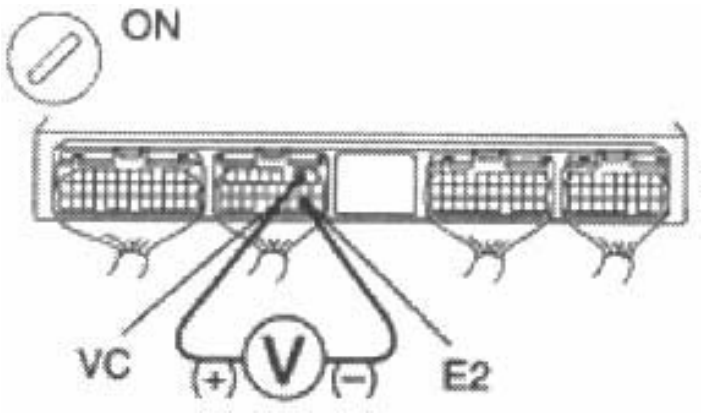
1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Diagnosis

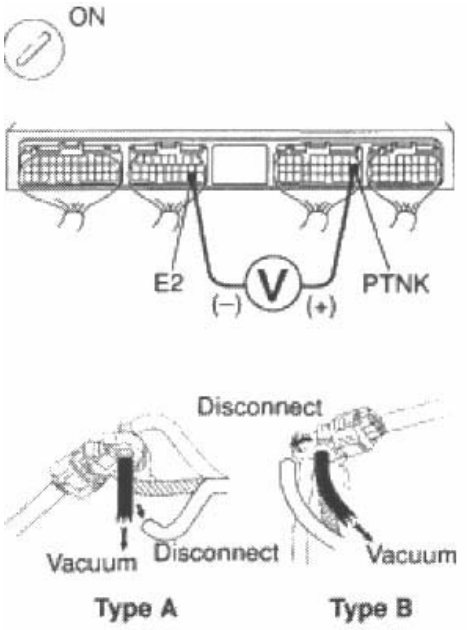
Step 1

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**. Is there 4.5 – 5.5 volts present?
If yes, go to step 2.
If no, check and replace the ECM.



Step 2

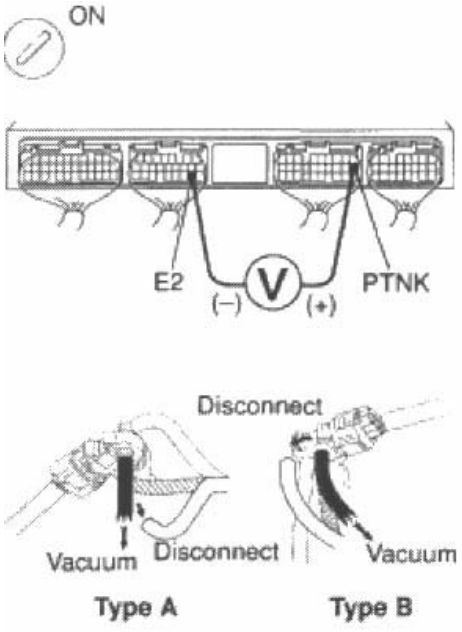
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor.
With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 3.
If no, go to step 4.



Diagnosis

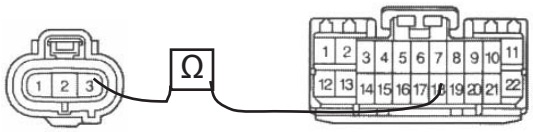
Step 3

With the ignition key on back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, check and replace the ECM..
If no, go to step 4.



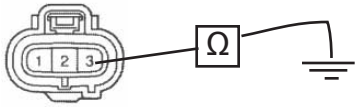
Step 4

With the ignition key off disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 5.
If no, repair the open VPS sensor signal circuit.



Step 5

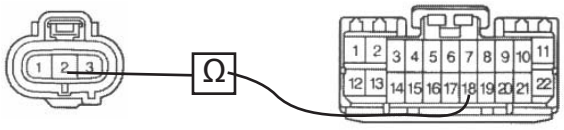
With the ignition key off disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 6.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

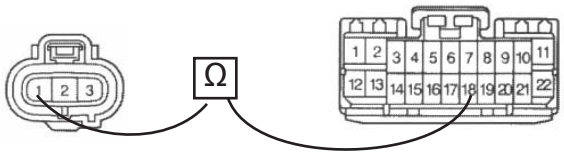
Step 6

With the ignition key off disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 7.
If no, repair the open VPS sensor 5-volt reference circuit.



Step 7

With the ignition key off disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS ground return circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.



Code P0452
Evaporative Emission Control System Pressure Sensor Low Input (2003)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
Code P0452 Evaporative Emission Control System Pressure Sensor Low Input (2003)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in the EVAP control system and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the System. As the EVAP system pressure increases the signal voltage increases.

EVAP Vapor Pressure Sensor Vacuum Switching Valve (VPS/VSV)

This valve is used during diagnostics to connect the VPS to either the canister or the fuel tank side of the system. The ECM compares the pressure in the side being tested to preprogrammed specifications. If the specifications are not met a code is set.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- The ECM determines that there is an open in the EVAP system vapor pressure sensor circuit.

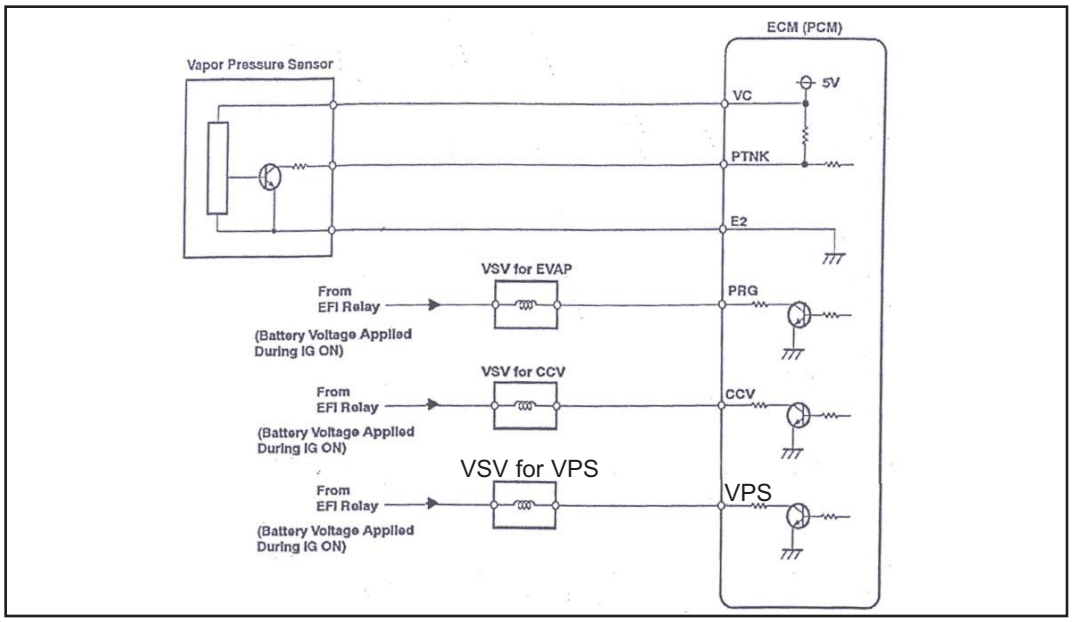
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

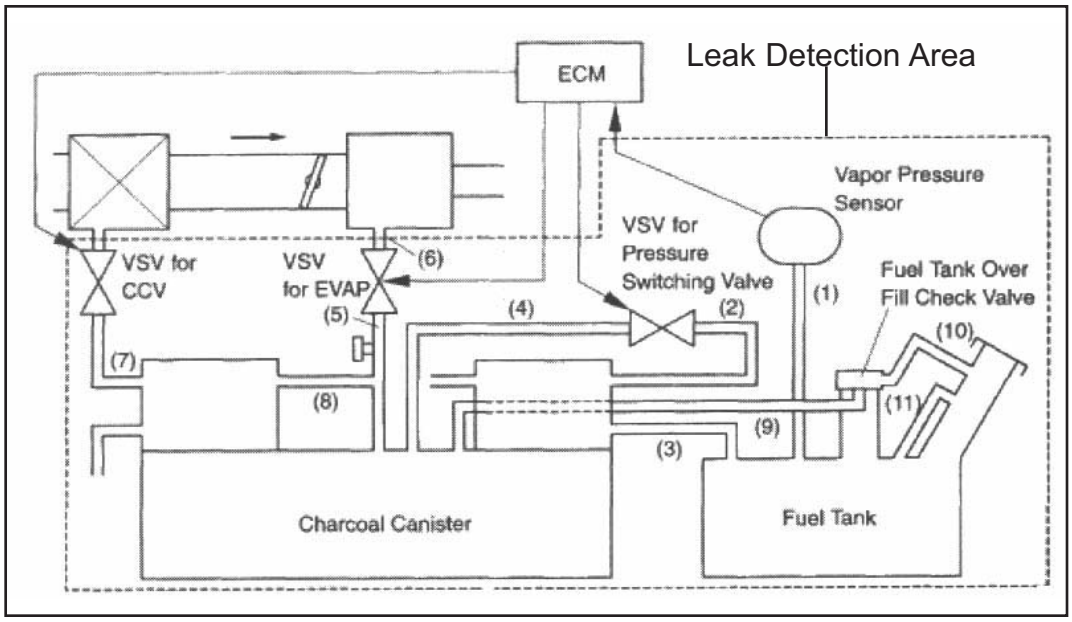
Possible Causes

- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Faulty ECM

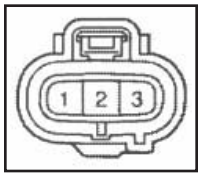
Wiring Diagrams



Wiring Diagram 1999-2003



System Diagram 1999-2003



VPS Connector

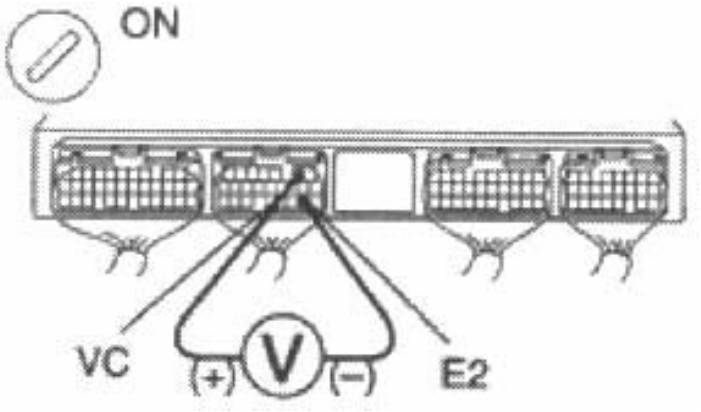
1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Diagnosis

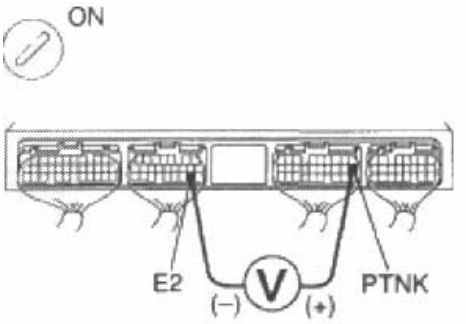
Step 1

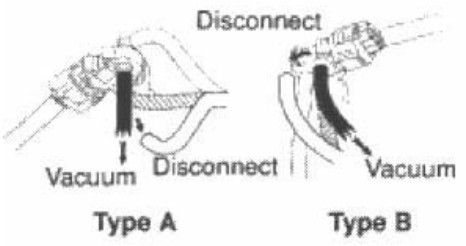
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 2.
If no, check and replace the ECM.



Step 2

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 3.
If no, go to step 4.

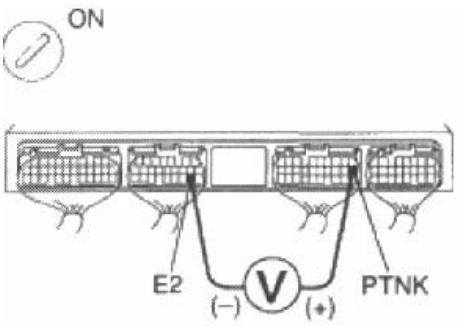


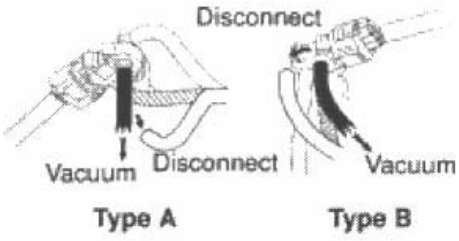


Diagnosis

Step 3

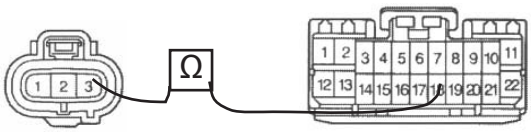
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, check and replace the ECM
If no, go to step 4.





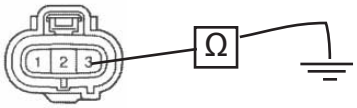
Step 4

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 5.
If no, repair the open VPS sensor signal circuit.



Step 5

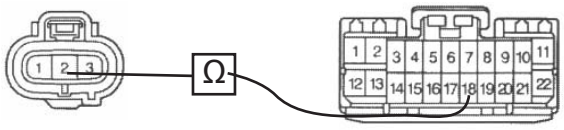
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 6.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

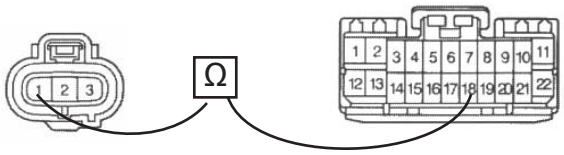
Step 6

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 7.
If no, repair the open VPS sensor 5-volt reference circuit.



Step 7

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS ground return circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.



Code P0453
Evaporative Emission Control System Pressure Sensor High Input (2003)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
Code P0453 Evaporative Emission Control System Pressure Sensor High Input (2003)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in the EVAP control system and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the System. As the EVAP system pressure increases the signal voltage increases.

EVAP Vapor Pressure Sensor Vacuum Switching Valve (VPS/VSV)

This valve is used during diagnostics to connect the VPS to either the canister or the fuel tank side of the system. The ECM compares the pressure in the side being tested to preprogrammed specifications. If the specifications are not met a code is set.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- The ECM determines that there is an open in the EVAP VPS sensor circuit.

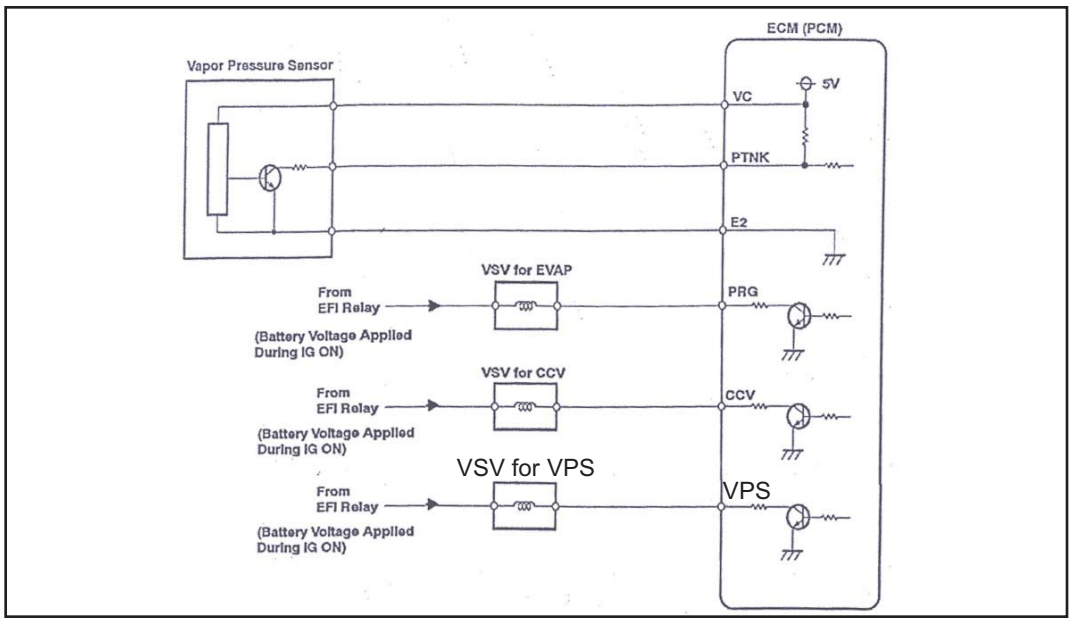
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

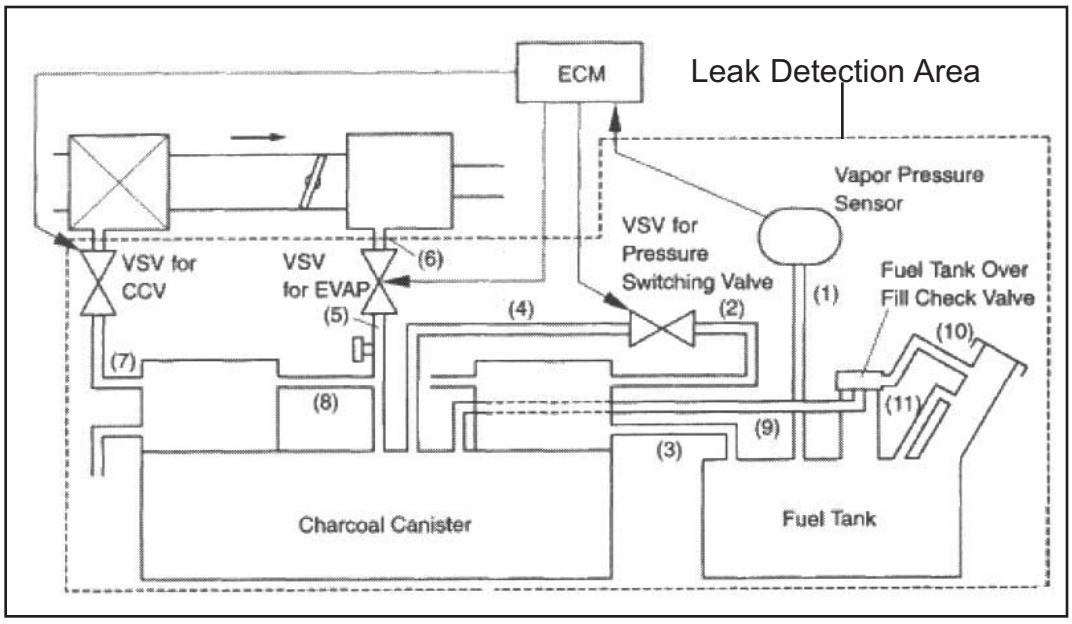
Possible Causes

- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Faulty ECM

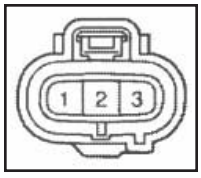
Wiring Diagrams



Wiring Diagram 1999-2003



System Diagram 1999-2003



VPS Connector

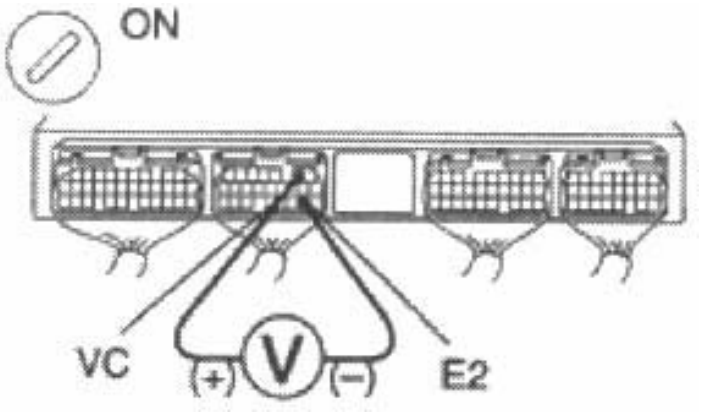
1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Diagnosis

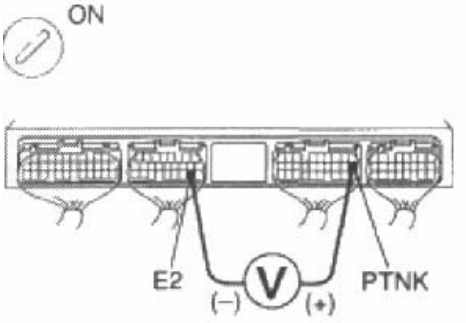
Step 1

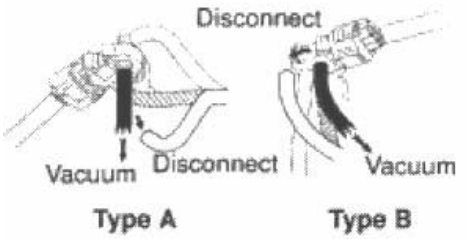
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 2.
If no, check and replace the ECM.



Step 2

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 3.
If no, go to step 4.

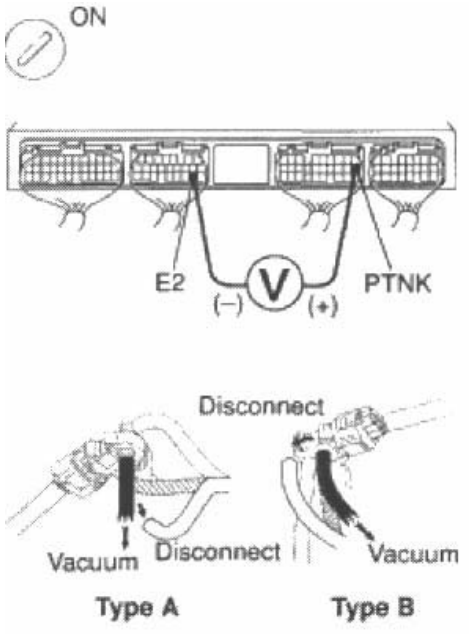




Diagnosis

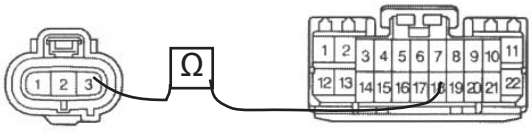
Step 3

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, check and replace the ECM
If no, go to step 4.



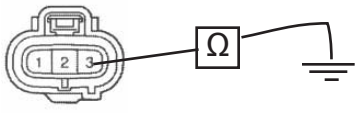
Step 4

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 5.
If no, repair the open VPS sensor signal circuit.



Step 5

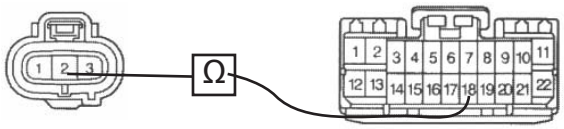
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 6.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

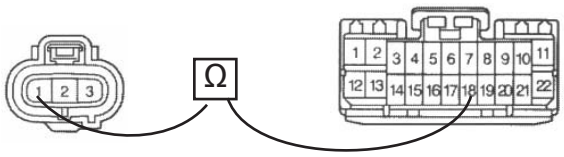
Step 6

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 7.
If no, repair the open VPS sensor 5-volt reference circuit.



Step 7

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS ground return circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.



Code P0455
Evaporative Emission System
Large Leak Detected
(2004)

Toyota Motor Company 2.4 Liter L-4 & 3.0, 3.3 Liter V6 (2004)
Code P0455 Evaporative Emission System Large Leak Detected

Theory of Operation
The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device EVAP canister. The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)
When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)
The CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure (EVAP VPS) Sensor
The EVAP VPS sensor measures the pressure levels in the fuel tank and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the fuel tank. As fuel tank pressure increases the signal voltage increases.

Refueling Valve
The refueling valve controls the pressure from the fuel tank to the EVAP canister during refueling. When fuel tank pressure increases the valve opens. When the EVAP system is purging the valve closes and a restrictor prevents strong vacuum from affecting pressure in the tank. When the valve opens the fuel tank is vented and refueling is possible.

EVAP Canister
The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- If the ECM determines that the vacuum in the fuel tank is not strong enough it assumes the EVAP system has a large leak.

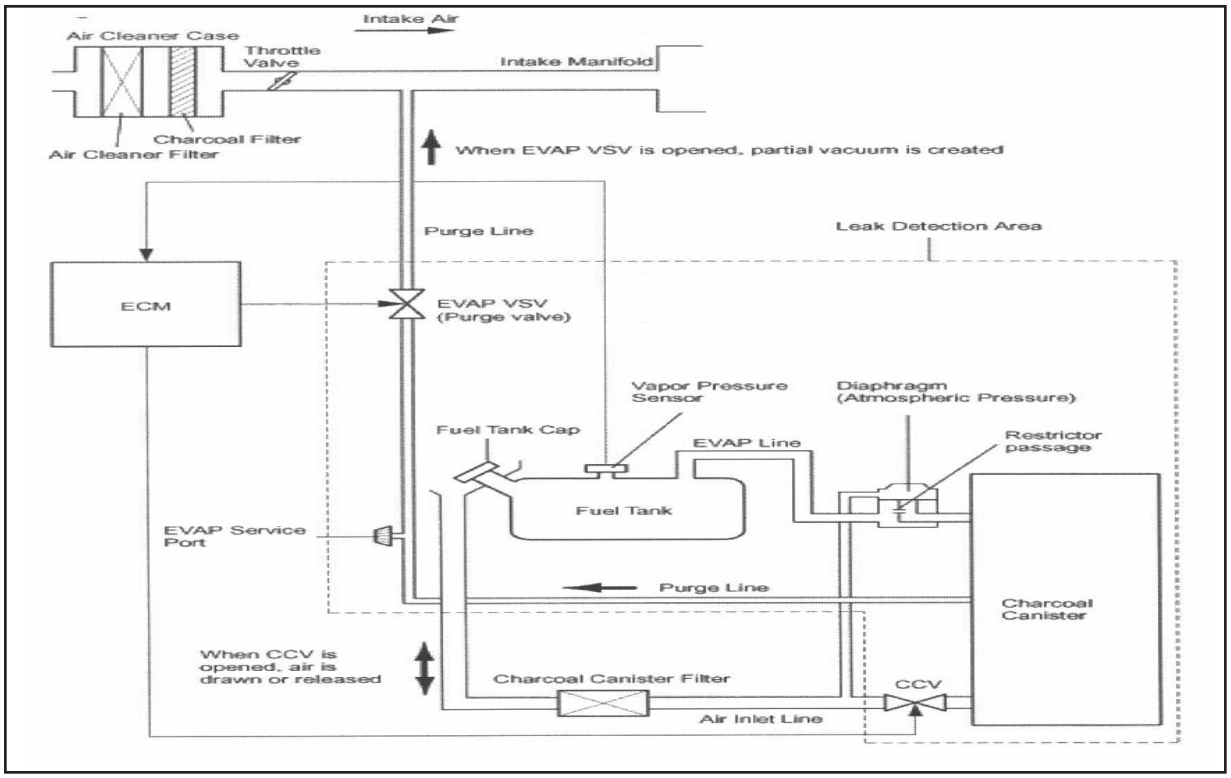
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

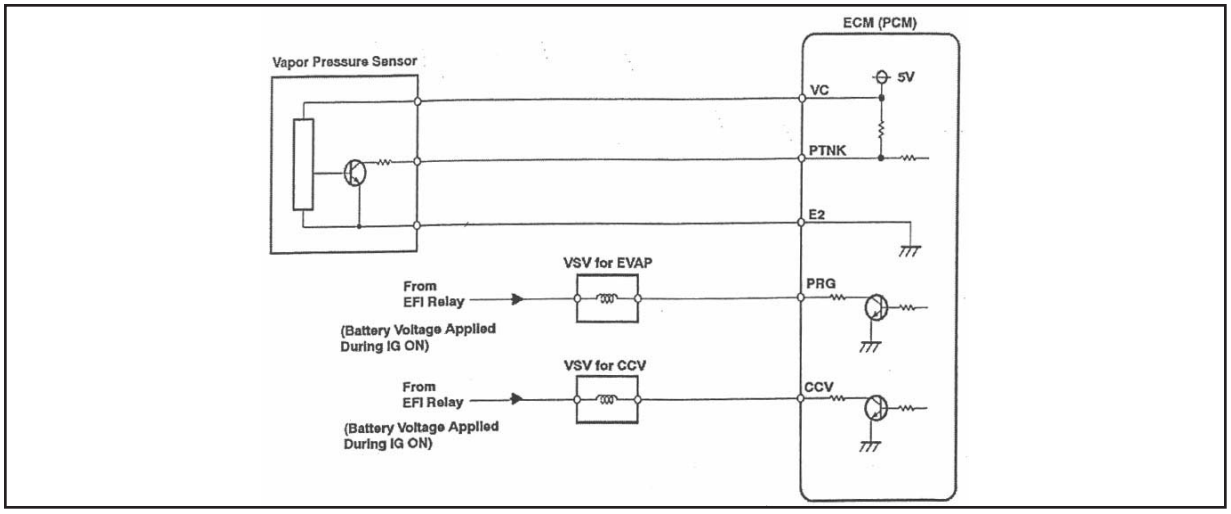
Possible Causes

- Vacuum hose has cracks, holes or is blocked, damaged or disconnected.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV.
- Open or short in CCV circuit.
- Faulty CCV.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Faulty ECM

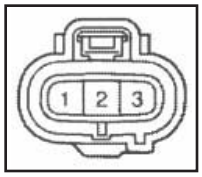
Wiring Diagrams



System Diagram 2004-Up



Wiring Diagram 2004-Up

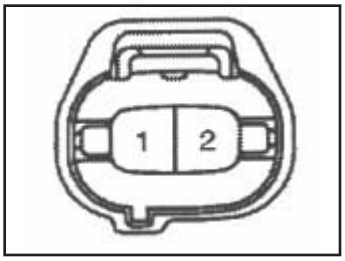


VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Wiring Diagrams - Continued

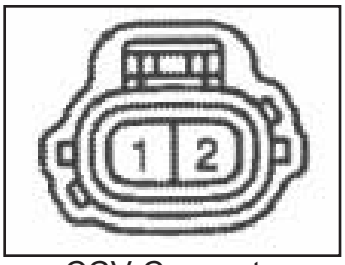


EVAP VSV Connector

2004 2.4L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Black/Red (B/R)

2004 3.0L/3.3L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Light Green (LG)

Figure 2



CCV Connector

2004 2.4L		
1	CCV Valve Control	Black/Red (B/R)
2	Switched Battery	Black/White (B/W)

2004 3.0L/3.3L		
1	CCV Valve Control	Violet (V)
2	Switched Battery	Black/Red (B/R)

Figure 3

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and reset OBDII Readiness Tests by disconnecting the negative battery cable or removing the ECM power fuse. Perform an OBD II readiness test drive cycle.
To perform this test:

a) The vehicle must be cold, ambient air temperature between approximately 50 and 95 F.
b) The Intake Air Temperature (IAT) and Engine Coolant Temperature (ECT) sensor must be almost the same value.
c) Operate the vehicle to simulate urban driving conditions. Make several starts and stops accelerating from a stand-still to varying speeds up to 60 MPH **(see LA#4 drive cycle in appendix)**. This procedure may take 20 minutes or longer.
d) Without shutting the engine off, note if there are pending codes stored.
e) Shut the engine off and allow it to cool.
f) Repeat steps a, b and c.
g) Without shutting the engine off, note if the EVAP readiness test shows COMPL (complete) and if code P0442 returned.

If yes, go to step 2.

If the EVAP readiness test did not show COMPL the vehicle will have to be driven further. If the readiness test shows COMPL and the codes did not return the condition is not present at this time. Ask the customer if they had any indication that the fuel cap may have been loose at any time.

Diagnosis

Step 2

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

- Fuel filler cap
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister
- CCV valve
- EVAP VSV valve
- EVAP VPS sensor
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 3.

Step 3

Inspect for pinched, plugged, improperly routed or broken vacuum hoses between the fuel tank, charcoal canister and VPS. Also check for a pinched or plugged vacuum hose from the EVAP VSV valve to the throttle body **(See system diagram)**. Inspect the vacuum nipple at the throttle body for any damage or plugging. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Step 4

Inspect for a pinched, plugged, improperly routed or broken fuel vapor tube between the fuel tank and charcoal canister. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 5

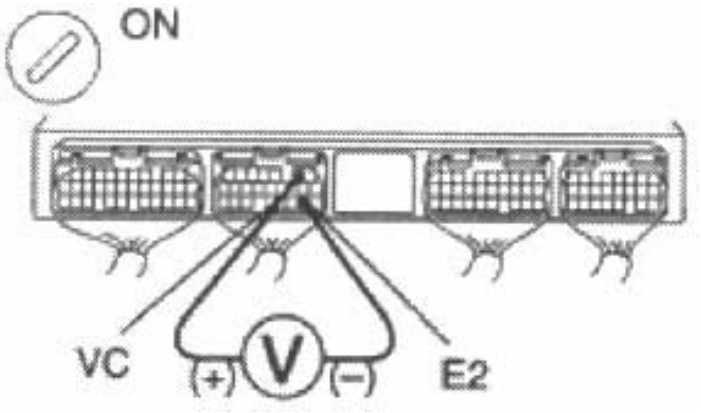
Diagnosis

Step 5

Inspect the VPS, CCV and EVAP VSV electrical connectors for damage, looseness or being unplugged. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 6.

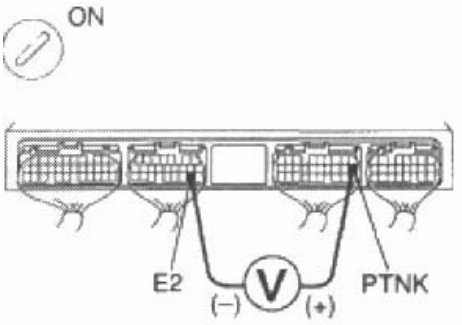
Step 6

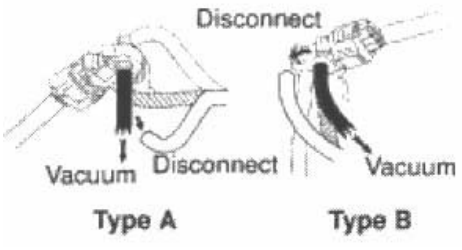
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 7.
If no, check and replace the ECM.



Step 7

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 8.
If no, go to step 9.

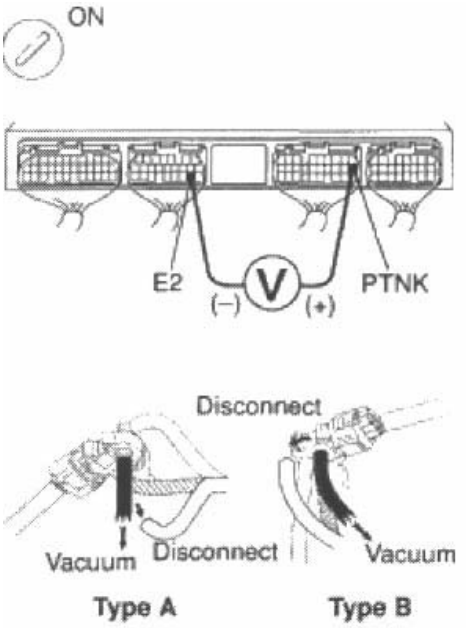




Diagnosis

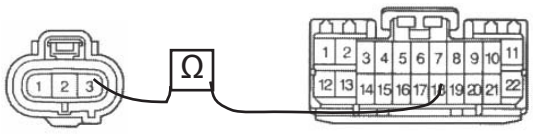
Step 8

With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, go to step 13.
If no, go to step 9.



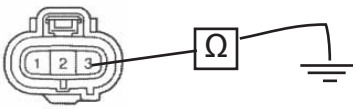
Step 9

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 10.
If no, repair the open VPS sensor signal circuit.



Step 10

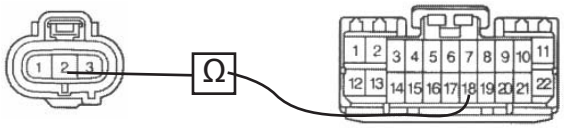
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 11.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

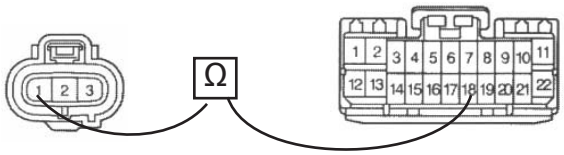
Step 11

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 12.
If no, repair the open VPS sensor 5-volt reference circuit.



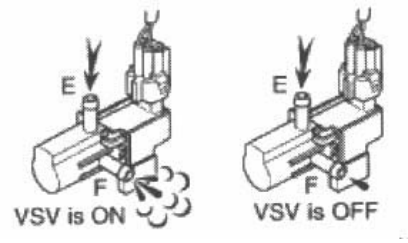
Step 12

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS ground return circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.



Step 13

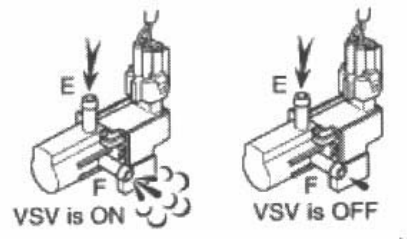
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. Does the EVAP VSV valve hold vacuum for at least 15 seconds?
If yes, go to step 14.
If no, replace the EVAP VSV valve, clean vacuum hoses and check the charcoal canister.

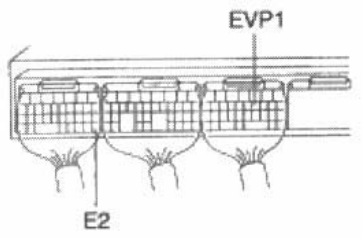


Diagnosis

Step 14

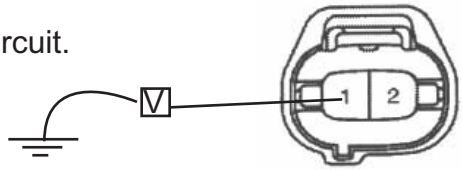
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. With the ignition key on back probe and ground the EVAP VSV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the vacuum drop with the EVAP VSV control circuit grounded?
If yes, go to step 18
If no, go to step 15.





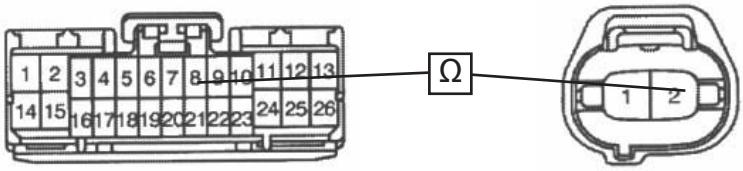
Step 15

With the ignition key off, disconnect EVAP VSV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP VSV vehicle power terminal of the EVAP VSV valve harness connector and a good ground **(See Figure 2)**. Is there 9-14 volts present?
If yes, go to step 16.
If no, repair the open EVAP VSV valve vehicle power circuit.



Step 16

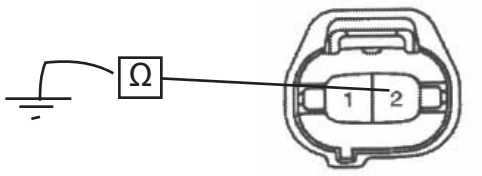
With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminals of the EVAP VSV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 17.
If no, repair the open EVAP VSV valve control circuit wiring.



Diagnosis

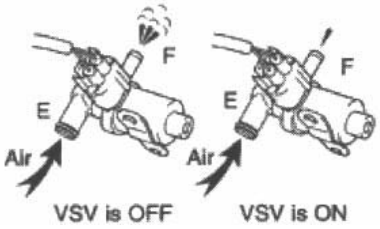
Step 17

With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminal of the EVAP VSV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP VSV valve.
If no, repair the EVAP VSV valve control circuit wiring for a short to ground.



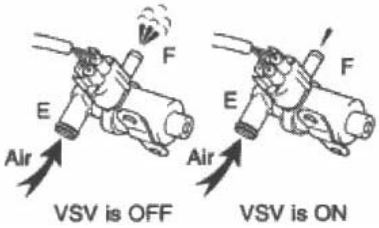
Step 18

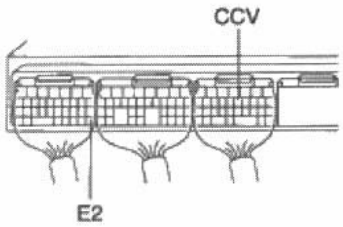
Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. Does the EVAP CCV valve hold vacuum?
If yes, replace the EVAP CCV valve
If no, go to step 19.



Step 19

Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. With the ignition key on back probe and ground the EVAP CCV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the EVAP CCV valve hold vacuum for at least 15 seconds with the control circuit grounded?
If yes, check and replace the ECM
If no, go to step 20.

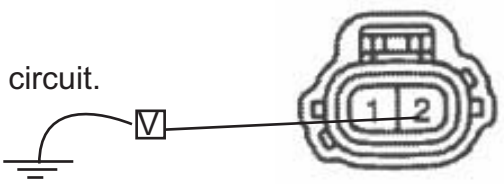




Diagnosis

Step 20

With the ignition key off disconnect EVAP CCV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP CCV vehicle power terminal of the EVAP CCV valve harness connector and a good ground **(See Figure 3)**. Is there 9-14 volts present?
If yes, go to step 21.
If no, repair the open EVAP CCV valve vehicle power circuit.



Step 21

With the ignition key off, disconnect the ECM and CCV valve harness connectors. Inspect the ECM, CCV and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CCV valve control circuit terminals of the CCV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 22.
If no, repair the open CCV valve control circuit wiring.

Step 22

With the ignition key off disconnect the ECM and CCV valve harness connectors. Inspect the ECM, CCV and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the CCV valve control circuit terminal of the CCV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the CCV valve.
If no, repair the CCV valve control circuit wiring for a short to ground.

P0456
Evaporative Emission System
Very Small Leak Detected (2003)

Toyota Motor Company 2.2, 2.4 Liter L-4 & 3.0 Liter V6
P0456 Evaporative Emission System Very Small Leak Detected (2003)

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device (EVAP canister).The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The EVAP CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure Sensor (EVAP VPS)

The EVAP VPS measures the pressure levels in EVAP control system and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the system. As the EVAP system pressure increases the signal voltage increases.

EVAP Vapor Pressure Sensor Vacuum Switching Valve (VPS/VSV)

This valve is used during diagnostics to connect the VPS to either the canister or the fuel tank side of the system. The ECM compares the pressure in the side being tested to preprogrammed specifications. If the specifications are not met a code is set.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- After purge operation the ECM turns off the EVAP VSV valve sealing vacuum in the system The ECM then monitors for any pressure increase. Some increases is normal
- A pressure rise just above normal indicates a very small leak.

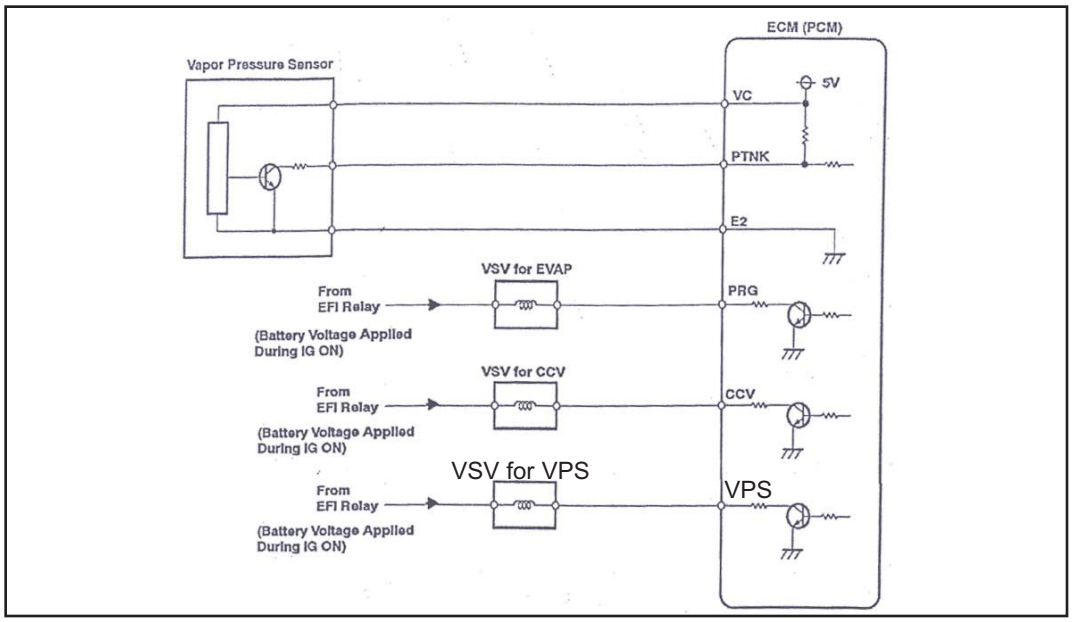
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

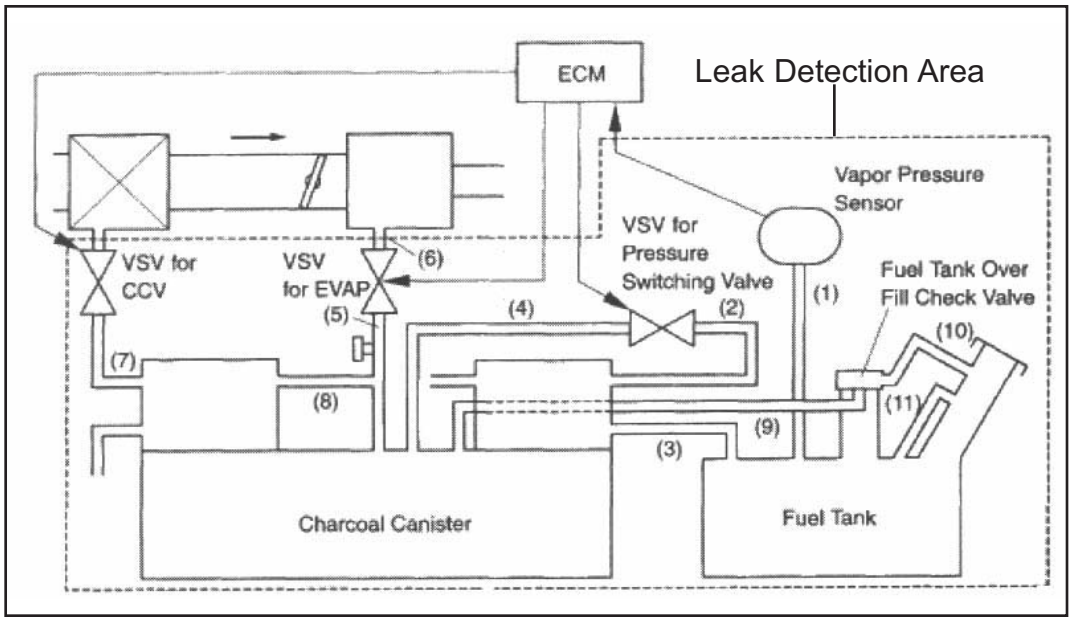
Possible Causes

- Cracked blocked, damaged or disconnected vacuum or fuel vapor hoses.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV.
- Open or short in CCV circuit.
- Faulty CCV.
- Faulty ECM.

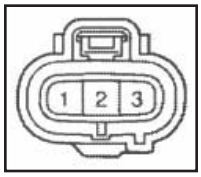
Wiring Diagrams



Wiring Diagram 1999-2003



System Diagram 1999-2003



VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and reset OBDII Readiness Tests by disconnecting the negative battery cable or removing the ECM power fuse. Perform an OBD II readiness test drive cycle.
To perform this test:

a) The vehicle must be cold, ambient air temperature between approximately 50 and 95°F.
b) The Intake Air Temperature (IAT) and Engine Coolant Temperature (ECT) sensor must be almost the same value.
c) Operate the vehicle to simulate urban driving conditions. Make several starts and stops accelerating from a stand-still to varying speeds up to 60 MPH **(see LA#4 drive cycle in appendix)**. This procedure may take 20 minutes or longer.
d) Without shutting the engine off, note if there are pending codes stored.
e) Shut the engine off and allow it to cool.
f) Repeat steps a, b and c.
g) Without shutting the engine off, note if the EVAP readiness test shows COMPL (complete) and if code P0440 or P0442 returned.

If yes, go to step 2.
If the EVAP readiness test did not show COMPL the vehicle will have to be driven further. If the readiness test shows COMPL and the codes did not return the condition is not present at this time. Ask the customer if they had any indication that the fuel cap may have been loose at any time.

Step 2

Was code P0446 accompanied by codes P0441, P0451, P0452 or P0453?
If yes, repair these codes first and rerun diagnostics.
If no, go to step 3.

Step 3

Visually inspect the EVAP system for gross leaks.

- Check the fuel filler cap for proper installation, physical damage and that it meets OE specifications.
- Check that the vacuum and return tubes are connected to the EVAP VSV valve.
- Check that the CCV valve is correctly attached to the charcoal canister.
- Check for any disconnected or cracked EVAP system fuel vapor hoses or tubes.
- Check for damaged fuel tank or filler pipe.

Was any problem found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Diagnosis

Step 4

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

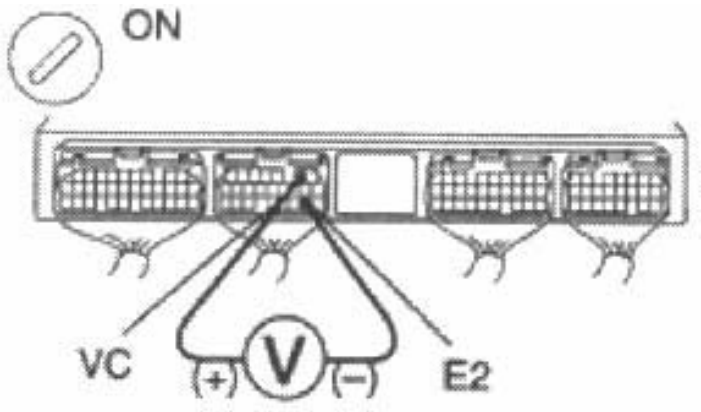
- Fuel filler cap.
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister.
- EVAP CCV valve.
- EVAP VSV valve.
- EVAP VPS sensor.
- VPS/VSV valve.
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 5.

Step 5

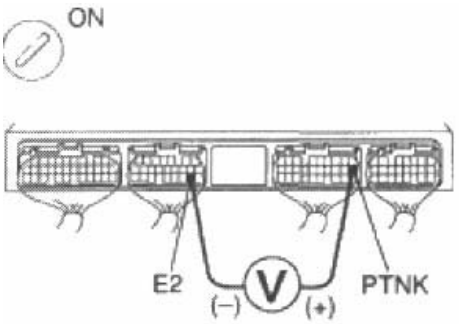
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS 5-volt reference and ground circuit terminals **(See Appendix)**.
Is there 4.5 – 5.5 volts present?
If yes, go to step 6,
If no, check and replace the ECM.

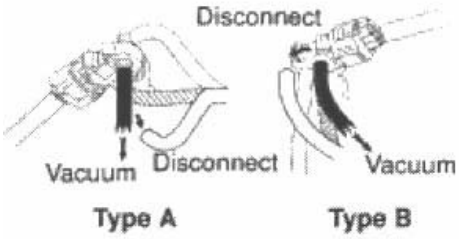


Diagnosis

Step 6

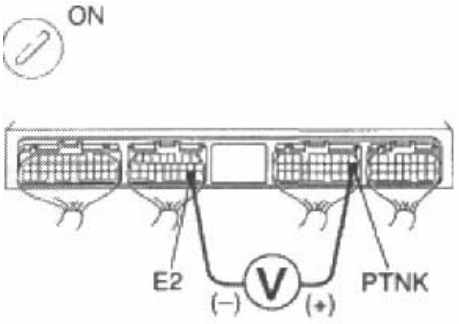
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 7.
If no, go to step 8.

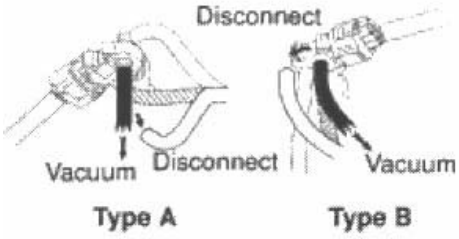




Step 7

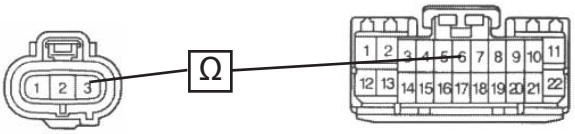
With the ignition key on, back probe the ECM harness connector and measure the voltage between the EVAP VPS signal and ground circuit terminals. Disconnect the vacuum hose from the vapor pressure sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the vapor pressure sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, the condition is not present at this time. It is possible the fuel tank cap was not installed properly at some point.
If no, go to step 8.





Step 8

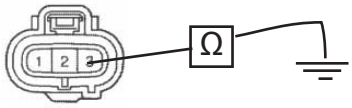
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS, and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM measure the resistance between the VPS signal circuit terminals of the ECM and VPS harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 9.
If no, repair the open VPS sensor signal circuit.



Diagnosis

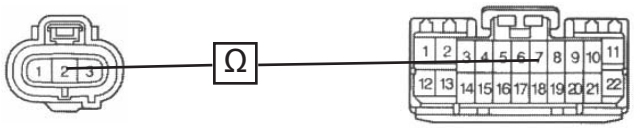
Step 9

With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the VPS signal circuit terminal of the sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 10.
If no, repair the VPS sensor signal circuit for a short to ground.



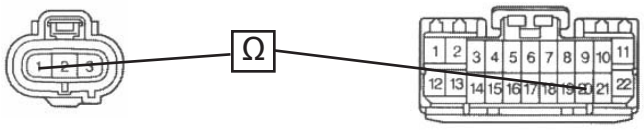
Step 10

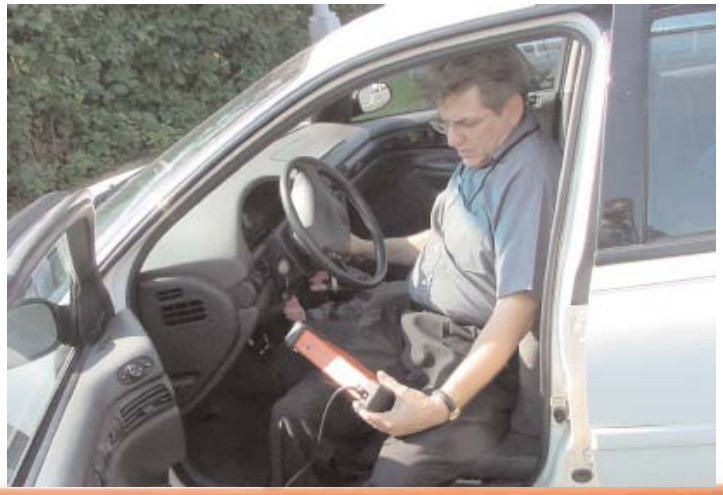
With the ignition key off, disconnect the ECM and EVAP VPS harness connectors. Inspect the ECM, VPS and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the VPS 5-volt reference circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 11.
If no, repair the open VPS sensor 5-volt reference circuit.

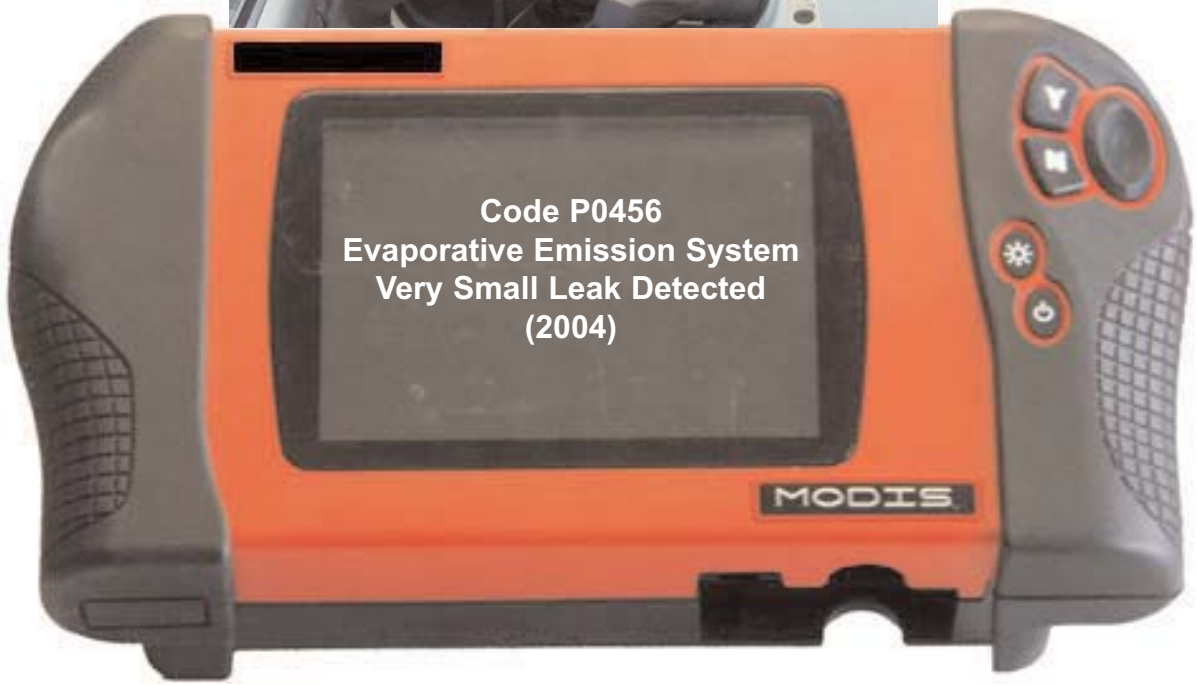


Step 11

With the ignition key off, disconnect the ECM and EVAP VPS connectors. Inspect the ECM, VPS, and harness connectors for corroded, damaged, or pushed out terminals. Using your DVOM, measure the resistance between the VPS ground circuit terminals of the ECM and VPS harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS.
If no, repair the open VPS sensor ground circuit.







Code P0456
Evaporative Emission System
Very Small Leak Detected
(2004)

Toyota Motor Company 2.4 Liter L-4 & 3.0, 3.3 Liter V6 (2004)
Code P0456 Evaporative Emission System Very Small Leak Detected

Theory of Operation

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP system transfers vapors from the sealed fuel tank to a charcoal filled storage device EVAP canister. The EVAP canister stores the fuel vapor until the engine is able to use it. When the engine is running intake manifold vacuum purges the fuel vapor from the canister to the engine for burning during the normal combustion process.

The system is required to be able to detect a leak between the fuel filler cap and the canister purge valve. The Electronic Control Module (ECM) relies on individual components of the system to apply vacuum to the fuel tank and seal the entire system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost over a set period of time.

Evaporative Emission System Components

EVAP Vacuum Switching Valve (EVAP VSV)

When energized the EVAP VSV valve allows the fuel vapor to flow from the EVAP canister to the engine. The normally closed valve is duty cycle controlled by the ECM to precisely control the vapor flow.

EVAP Canister Close Valve (CCV)

The CCV is a normally open valve that allows outside air to enter the EVAP canister during the purge modes. The ECM closes the CCV valve in order to pull a vacuum on the fuel tank during diagnostics.

EVAP Vapor Pressure (EVAP VPS) Sensor

The EVAP VPS sensor measures the pressure levels in the fuel tank and communicates that pressure reading to the ECM during the OBD-II leak test. The sensor provides a signal voltage to the ECM between 0.1– 4.9 volts. A low signal voltage indicates a negative pressure (vacuum) in the fuel tank. As fuel tank pressure increases the signal voltage increases.

Refueling Valve

The refueling valve controls the pressure from the fuel tank to the EVAP canister during refueling. When fuel tank pressure increases the valve opens. When the EVAP system is purging the valve closes and a restrictor prevents strong vacuum from affecting pressure in the tank. When the valve opens the fuel tank is vented and refueling is possible.

EVAP Canister

The EVAP canister is filled with charcoal pellets and is used to store fuel vapors from the fuel tank. Vacuum is pulled from the fuel tank through the vapor pipe into the EVAP canister. Fresh air is mixed with the vapors in the canister and then pulled from the canister to the intake manifold through the purge line. Engine vacuum purges the EVAP canister during normal driving.

Evaporative Emission System Components - Continued

EVAP Service Port

The EVAP service port is located in the EVAP purge tube near the EVAP VSV valve. The service port is identified by a green colored cap.

Conditions for Setting Code

- The pressure in the fuel tank has risen above the expected amount preprogrammed into the ECM's memory.

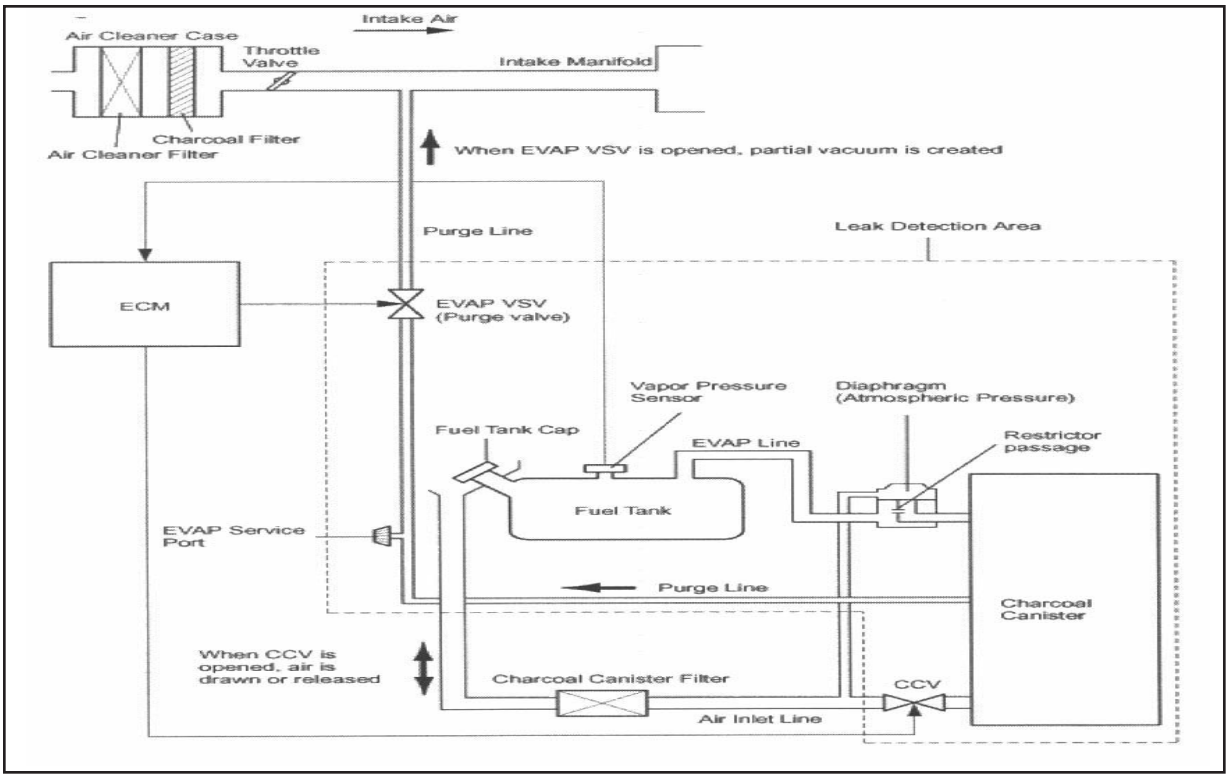
Action Taken When Code Sets

- The ECM will illuminate the malfunction indicator light on the second consecutive trip that the on board diagnostic test has been run and failed.
- The ECM will store the conditions under which the code set in Freeze Frame and Failure Records data

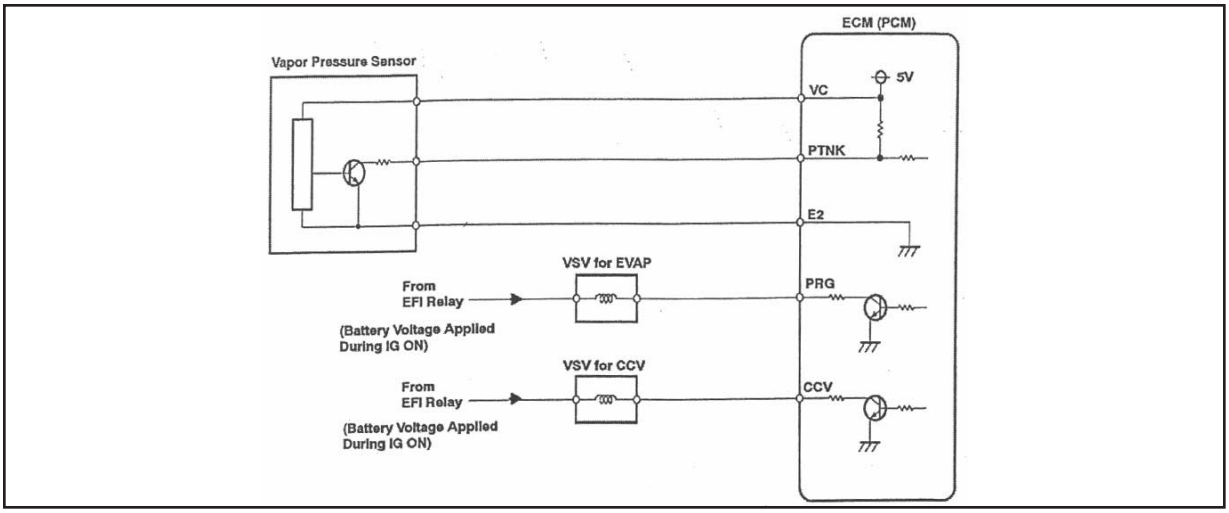
Possible Causes

- Vacuum hose has cracks, holes or is blocked, damaged or disconnected.
- Fuel tank cap incorrectly installed.
- Fuel tank cap has cracks or is damaged.
- Open or short in the vapor pressure sensor circuit.
- Faulty EVAP VPS sensor.
- Open or short in the EVAP VSV circuit.
- Faulty EVAP VSV.
- Open or short in CCV circuit.
- Faulty CCV.
- Fuel tank has cracks, holes or is damaged.
- Charcoal canister has cracks, holes or is damaged.
- Fuel tank overfill check valve has cracks or is damaged.
- Faulty ECM

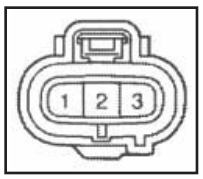
Wiring Diagrams



System Diagram 2004-Up



Wiring Diagram 2004-Up

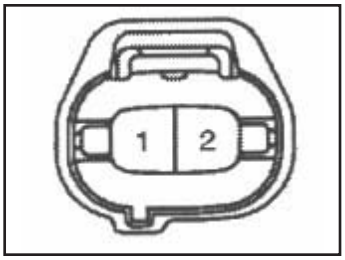


VPS Connector

1	Ground	Brown (BR)
2	5- Volt Reference	Yellow (Y)
3	Signal	Pink (P)

Figure 1

Wiring Diagrams - Continued

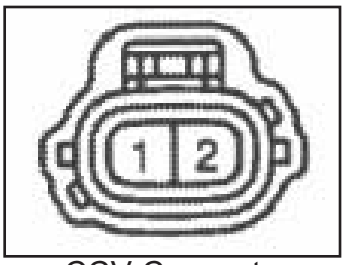


EVAP VSV Connector

2004 2.4L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Black/Red (B/R)

2004 3.0L/3.3L		
1	Switched Battery	Black/White (B/W)
2	EVAP VSV Valve Control	Light Green (LG)

Figure 2



CCV Connector

2004 2.4L		
1	CCV Valve Control	Black/Red (B/R)
2	Switched Battery	Black/White (B/W)

2004 3.0L/3.3L		
1	CCV Valve Control	Violet (V)
2	Switched Battery	Black/Red (B/R)

Figure 3

Diagnosis

Step 1

Connect your scan tool to the vehicle. Check and record all diagnostic trouble codes, failure records and freeze frame data. Clear codes and reset OBDII Readiness Tests by disconnecting the negative battery cable or removing the ECM power fuse. Perform an OBD II readiness test drive cycle.
To perform this test:

a) The vehicle must be cold, ambient air temperature between approximately 50 and 95 F.
b) The Intake Air Temperature (IAT) and Engine Coolant Temperature (ECT) sensor must be almost the same value.
c) Operate the vehicle to simulate urban driving conditions. Make several starts and stops accelerating from a stand-still to varying speeds up to 60 MPH **(see LA#4 drive cycle in appendix)**. This procedure may take 20 minutes or longer.
d) Without shutting the engine off, note if there are pending codes stored.
e) Shut the engine off and allow it to cool.
f) Repeat steps a, b and c.
g) Without shutting the engine off, note if the EVAP readiness test shows COMPL (complete) and if code P0456 returned.

If yes, go to step 2.

If the EVAP readiness test did not show COMPL the vehicle will have to be driven further. If the readiness test shows COMPL and the codes did not return the condition is not present at this time. Ask the customer if they had any indication that the fuel cap may have been loose at any time.

Diagnosis

Step 2

Follow the manufactures instructions and connect the Redline Smoke Pro machine to the vehicle EVAP test port. Use the Redline Smoke Pro to pressurize the EVAP system to test for possible leaks. Do not use smoke when performing this test. Does the test indicate there is a leak in the EVAP system?
If yes, use the Redline Smoke Pro to pressurize and fill the EVAP system with smoke to test for leaks. Look for escaping smoke using a bright halogen lamp. Areas to check are:

- Fuel filler cap
- Fuel filler pipe/hose.
- EVAP system fuel vapor and vacuum hoses.
- EVAP canister
- CCV valve
- EVAP VSV valve
- EVAP VPS sensor
- Fuel tank sender assembly and overfill check valve.

NOTE **It may be necessary to lower the fuel tank to check components located on the upper side of the tank.**

If no, go to step 3.

Step 3

Inspect for pinched, plugged, improperly routed or broken vacuum hoses between the fuel tank, charcoal canister and VPS. Also check for a pinched or plugged vacuum hose from the EVAP VSV valve to the throttle body **(See system diagram)**. Inspect the vacuum nipple at the throttle body for any damage or plugging. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 4.

Step 4

Inspect for a pinched, plugged, improperly routed or broken fuel vapor tube between the fuel tank and charcoal canister. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 5

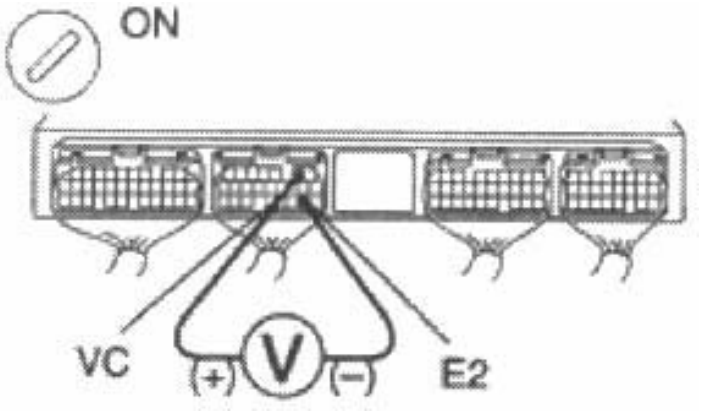
Diagnosis

Step 5

Inspect the VPS, CCV and EVAP VSV electrical connectors for damage, looseness or being unplugged. Were any problems found?
If yes, make necessary repairs and rerun diagnostics.
If no, go to step 6.

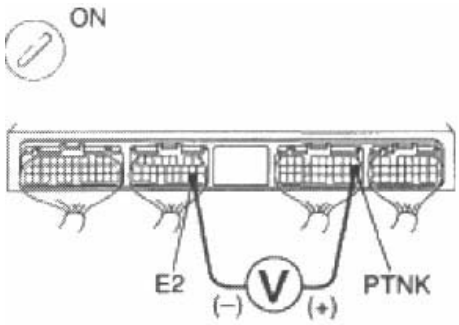
Step 6

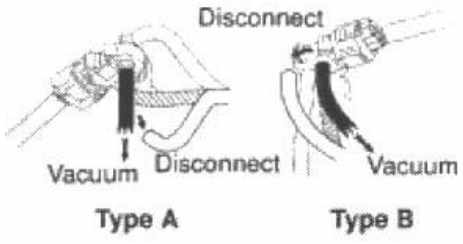
With the ignition key on, back probe the ECM harness connector and measure the voltage between the VPS sensor 5-volt reference and ground circuit terminals **(See Appendix)**. Is there 4.5 – 5.5 volts present?
If yes, go to step 7.
If no, check and replace the ECM.



Step 7

With the ignition key on, back probe the ECM harness connector and measure the voltage between the VPS sensor signal and ground circuit terminals. Disconnect the vacuum hose from the VPS sensor.
With the vacuum hose disconnected is there 2.9 – 3.7 volts present?
If yes, go to step 8.
If no, go to step 9.

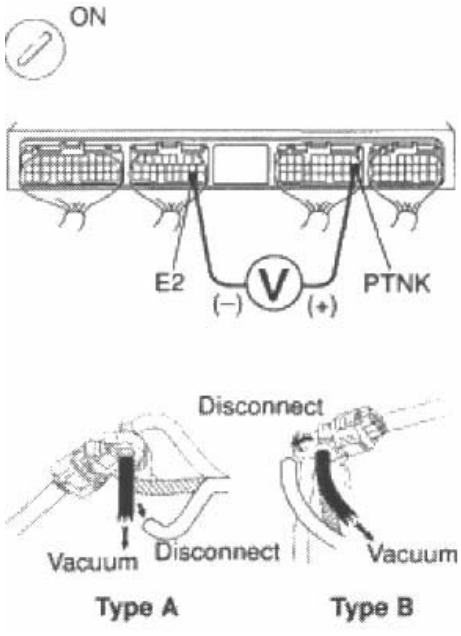




Diagnosis

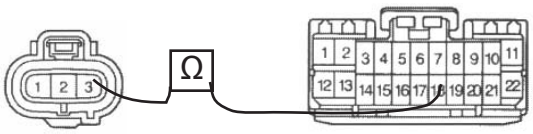
Step 8

With the ignition key on back probe the ECM harness connector and measure the voltage between the VPS sensor signal and ground circuit terminals.
Disconnect the vacuum hose from the VPS sensor. Using a hand vacuum pump apply approximately 1.18 inches of vacuum to the VPS sensor. With the vacuum applied is there 0.5 volts or less present?
If yes, go to step 13.
If no, go to step 9.



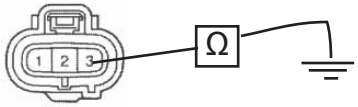
Step 9

With the ignition key off disconnect the ECM and VPS sensor harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS sensor signal circuit terminals of the ECM and VPS sensor harness connectors **(See Figure 1)**. Is the resistance 5 Ohms or less?
If yes, go to step 10.
If no, repair the open VPS sensor signal circuit.



Step 10

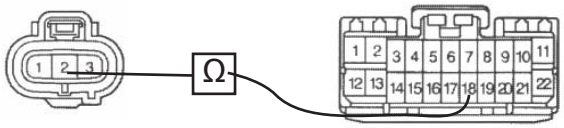
With the ignition key off disconnect the ECM and VPS sensor harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS sensor signal circuit terminal of the VPS sensor harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, go to step 11.
If no, repair the VPS sensor signal circuit for a short to ground.



Diagnosis

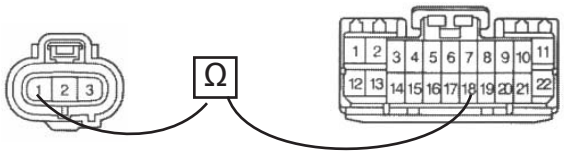
Step 11

With the ignition key off disconnect the ECM and VPS sensor harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS sensor 5-volt reference circuit terminals of the ECM and VPS sensor harness connectors. Is the resistance 5 Ohms or less?
If yes, go to step 12.
If no, repair the open VPS sensor 5-volt reference circuit.



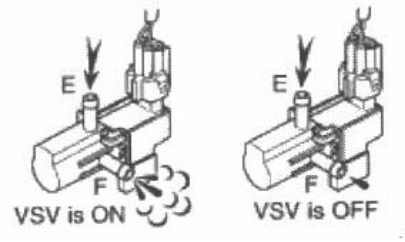
Step 12

With the ignition key off disconnect the ECM and VPS sensor harness connectors. Inspect the ECM, VPS and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the VPS sensor ground circuit terminals of the ECM and VPS sensor harness connectors. Is the resistance 5 Ohms or less?
If yes, replace the VPS sensor.
If no, repair the open VPS sensor ground circuit.



Step 13

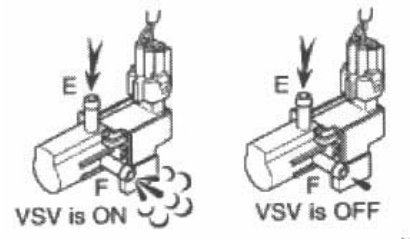
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. Does the EVAP VSV valve hold vacuum for at least 15 seconds?
If yes, go to step 15.
If no, replace the EVAP VSV valve, clean vacuum hoses and check the charcoal canister.

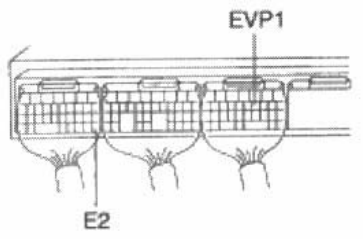


Diagnosis

Step 14

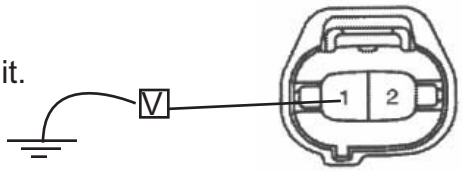
Disconnect the vacuum hoses from the EVAP VSV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP VSV valve vacuum source port. With the ignition key on back probe and ground the EVAP VSV control circuit terminal at the ECM harness connector **(See Appendix)**. Does the vacuum drop with the EVAP VSV control circuit grounded?
If yes, go to step 18
If no, go to step 15.





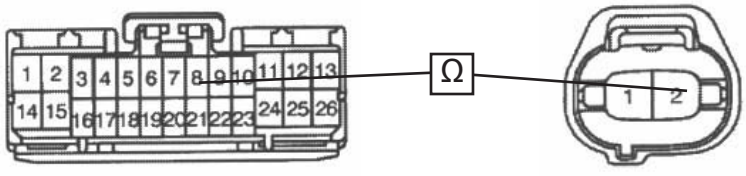
Step 15

With the ignition key off disconnect EVAP VSV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP VSV vehicle power terminal of the EVAP VSV valve harness connector and a good ground **(See Figure 2)**. Is there 9-14 volts present?
If yes, go to step 16.
If no, repair the open EVAP VSV valve vehicle power circuit.



Step 16

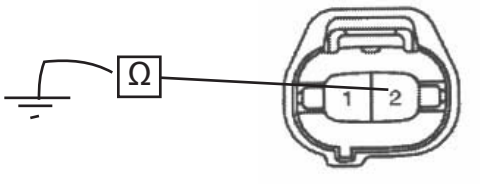
With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminals of the EVAP VSV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 17.
If no, repair the open EVAP VSV valve control circuit wiring.



Diagnosis

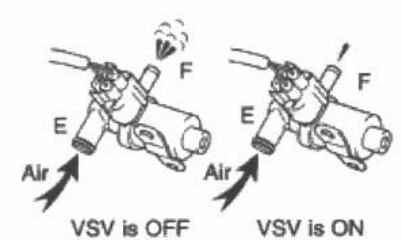
Step 17

With the ignition key off disconnect the ECM and EVAP VSV valve harness connectors. Inspect the ECM, EVAP VSV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP VSV valve control circuit terminal of the EVAP VSV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP VSV valve.
If no, repair the EVAP VSV valve control circuit wiring for a short to ground.



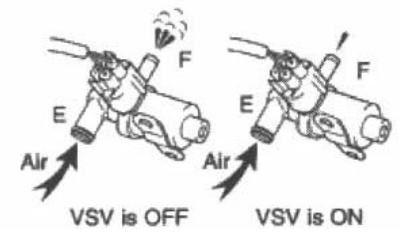
Step 18

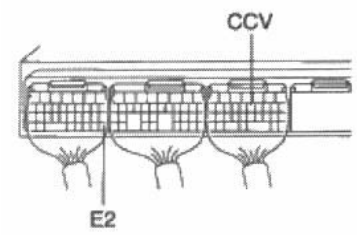
Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. Does the EVAP CCV valve hold vacuum?
If yes, replace the EVAP CCV valve
If no, go to step 19.



Step 19

Disconnect the vacuum hoses from the EVAP CCV valve. Inspect the lines and solenoid for any signs of fuel contamination from the EVAP canister. Using a hand vacuum pump apply 10 inches of vacuum to the EVAP CCV valve vacuum source port. With the ignition key on back probe and ground the EVAP CCV control circuit terminal at the ECM harness connector. Does the EVAP CCV valve hold vacuum for at least 15 seconds with the control circuit grounded?
If yes, check and replace the ECM.
If no, go to step 20.

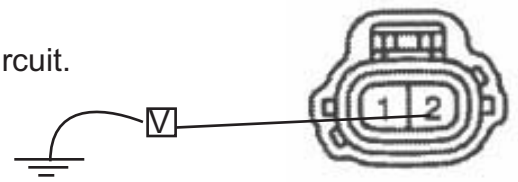




Diagnosis

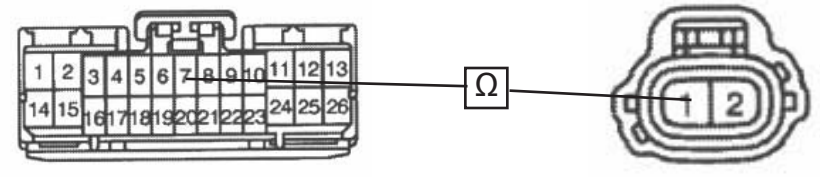
Step 20

With the ignition key off disconnect EVAP CCV valve harness connector. Inspect the valve and harness connectors for corroded damaged or pushed out terminals. With the ignition key on use your DVOM and measure the voltage between the EVAP CCV vehicle power terminal of the EVAP CCV valve harness connector and a good ground **(See Figure 3)**. Is there 9-14 volts present?
If yes, go to step 21.
If no, repair the open EVAP CCV valve vehicle power circuit.



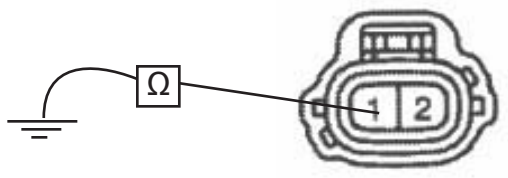
Step 21

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminals of the EVAP CCV valve and ECM harness connectors. Is the resistance 5 ohms or less?
If yes, go to step 22.
If no, repair the open EVAP CCV valve control circuit wiring.



Step 22

With the ignition key off disconnect the ECM and EVAP CCV valve harness connectors. Inspect the ECM, EVAP CCV and harness connectors for corroded damaged or pushed out terminals. Using your DVOM measure the resistance between the EVAP CCV valve control circuit terminal of the EVAP CCV valve harness connector and a good ground. Is the resistance 10,000 ohms or more?
If yes, replace the EVAP CCV valve.
If no, repair the EVAP CCV valve control circuit wiring for a short to ground.

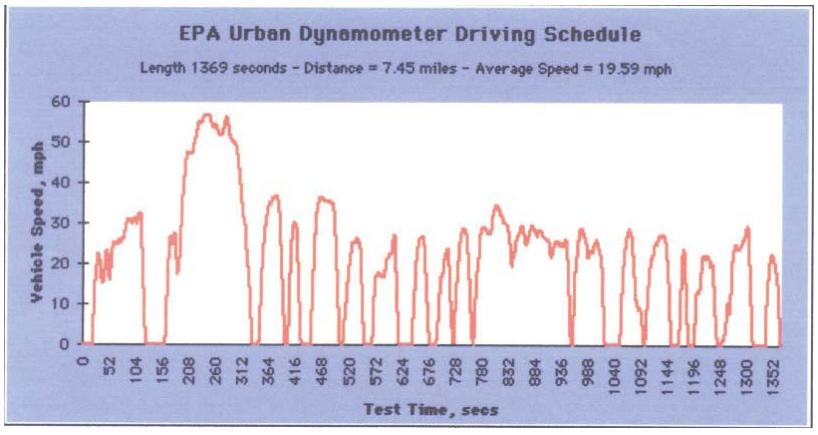


Color Abbreviations

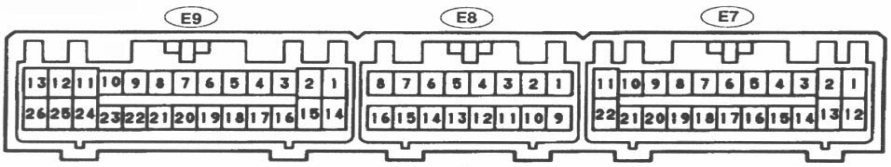
B	=	Black
L	=	Blue
R	=	Red
P	=	Pink
O	=	Orange
W	=	White
V	=	Violet
G	=	Green
Y	=	Yellow
BR	=	Brown
SB	=	Sky Blue
LG	=	Light Green
GR	=	Gray

Abbreviations

VSV = Vacuum Switch Valve

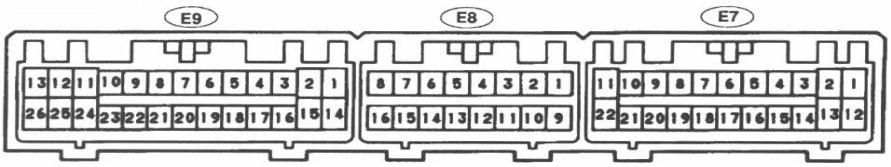


LA # 4 Drive Cycle



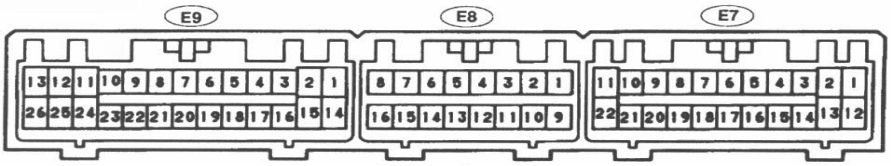
1999 Toyota Camry I-4 2.2L (5S-FE) W/O Immobilizer

Connector E7		
Cav	***Color***	***Function***
1	B/Y	Battery Power (Hot all times)
2	B/R	Defogger and Tail Light Switch Input
3	L/R	Cruise Control System
4	G/W	Stop Light Switch Input
5	G/R	MIL
6	-	-
7	G/O	OD OFF Switch
8	B/O	Tachometer
9	V/W	Speedometer
10	R/B	A/C Switch
11	B/O or GY	Starter Relay Control
12	B/Y	Switched Battery (EFI Relay)
13	G	A/C System
14	G/R	Fuel Pump Relay Control
15	R/W	A/C System
16	W	Data Link Connector Pin 7
17	R/B	Reverse Input (MLP)
18	L/W or O	Drive 2 Input (MLP)
19	Y	Manual Low Input (MLP)
20	Y/B	Cruise Control System
21	L/Y	A/C System
22	B/W	Starting and Charging System



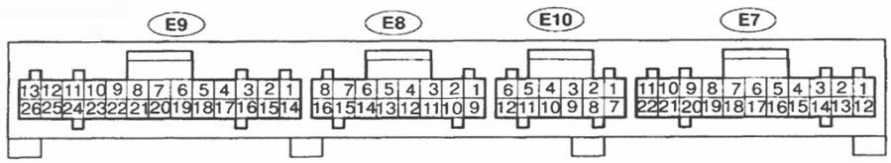
1999 Toyota Camry I-4 2.2L (5S-FE) W/O Immobilizer

Connector E8		
Cav	***Color***	***Function***
1	Y	MAP/TPS/VPS Sensor Reference Voltage
2	B/Y	MAP Sensor Signal
3	Y/B	IAT Sensor Signal
4	G/B	ECT Sensor Signal
5	B	HO2S Bank 1 Sensor 2 Signal (+)
6	W or L	Air Fuel Ratio (A/F) Sensor Signal (+) (California Only)
6	W or L	HO2S Bank 1 Sensor 1 Signal (Except California)
7	P	Vapor Pressure Sensor (VPS) (AT Only)
8	V	Vapor Pressure Vacuum Solenoid Valve (VSV) Control
9	BR	MAP/TPS/VPS/IAT/ECT/A/C Pressure Sensor Ground
10	L/W	A/C Evaporator Pressure Sensor Signal
11	LG	Throttle Position Sensor (TPS) Signal
12	B/L	Power Steering Pressure Switch (PSP) Signal
13	W	Knock Sensor Signal
14	O or B/W	Air Fuel Ratio (A/R) Sensor Signal (-) (California Only)
15	L/W	Data Link Connector Pin 8
16	BR	Ground



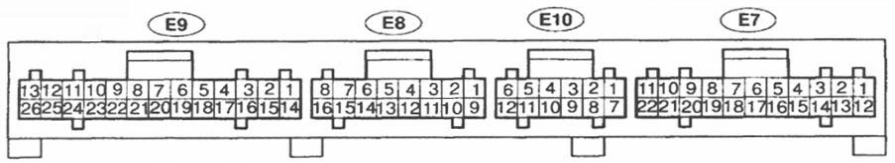
1999 Toyota Camry I-4 2.2L (5S-FE) W/O Immobilizer

Connector E9		
Cav	***Color***	***Function***
1	P	Torque Converter Clutch (TCC) Solenoid
2	G	Air Fuel Ratio (A/R) Sensor Heater Control (California Only)
3	W/R	Ignition Feed
4	B/R	Crankshaft Position (CKP) Sensor Signal
5	B/W	Camshaft Position (CMP) Sensor Signal
6	L/B	Shift Solenoid 2
7	V	Shift Solenoid 1
8	L/Y	HO2S Bank 1 Sensor 1 Heater Control (Except California)
9	B/O	Idle Air Control Solenoid
10	W	Idle Air Control Solenoid
11	R	Fuel Injector #20 Control
12	L	Fuel Injector #10 Control
13	BR	Ground
14	BR	Ground
15	BR	Ground (California Only)
16	-	-
17	L	Crankshaft & Camshaft Position Sensor (-)
18	W/L	A/C System
19	Y/R	Ignition Coil Igniter #2
20	B	Ignition Coil Igniter #1
21	P/B	HO2S Bank 1 Sensor 2 Heater Control
22	V/W	EVAP Vacuum Solenoid Valve (VSV) Control
23	P/B	EGR Vacuum Solenoid Valve (VSV) Control
24	W	Fuel Injector #40 Control
25	Y	Fuel Injector #30 Control
26	BR	Ground



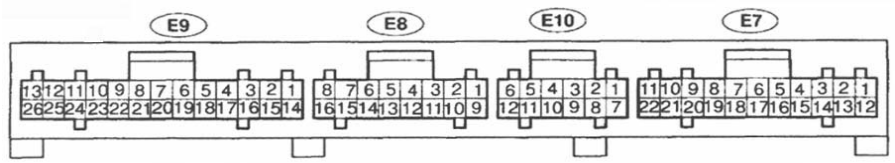
1999 Toyota Camry I-4 2.2L (5S-FE) W/Immobilizer

Connector E7		
Cav	***Color***	***Function***
1	B/R	Switched Battery (Ignition Switch)
2	B/Y	Battery Power (Hot All Times)
3	L/R	Cruise Control System
4	G/R	MIL
5	G/O	OD OFF Switch
6	W	Data Link Connector Pin 7
7	B/O	Tachometer
8	V/W	Speedometer
9	G/W	Stop Light Switch Input
10	R/B	A/C Switch
11	B/O or GY	Starter Relay Control
12	B/Y	Switched Battery (EFI Relay)
13	BR	Defogger and Tail Light Switch Input
14	G/R	Fuel Pump Relay Control
15	Y	Manual Low Input (MLP)
16	L/W or O	Drive 2 Input (MLP)
17	R/B	Reverse Input (MLP)
18	Y/B	Cruise Control System
19	G	A/C System
20	R/W	A/C System
21	L/Y	A/C System
22	B/W	Starting and Charging System



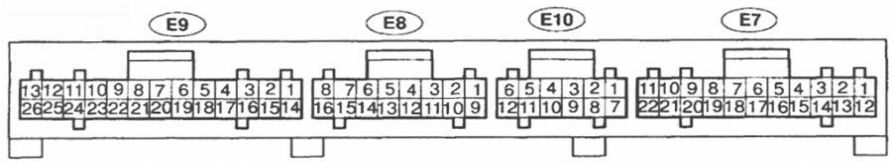
1999 Toyota Camry I-4 2.2L (5S-FE) W/Immobilizer

Connector E8		
Cav	***Color***	***Function***
1	Y	MAP/TPS/VPS Sensor Reference Voltage
2	B/Y	MAP Sensor Signal
3	Y/B	IAT Sensor Signal
4	G/B	ECT Sensor Signal
5	W	HO2S Bank 1 Sensor 1 Signal (+) (Except California)
6	W or L	Air Fuel Ratio (A/F) Sensor Signal (+) (California Only)
7	L/W	Data Link Connector Pin 8
8	P	Vapor Pressure Sensor (VPS) (AT Only)
9	BR	MAP/TPS/VPS/IAT/ECT/A/C Pressure Sensor Ground
10	LG	Throttle Position Sensor (TPS) Signal
11	L/W	A/C Evaporator Temperature Sensor
12	W	Knock Sensor Signal
13	B	HO2S Bank 1 Sensor 2 Signal (+)
14	O or B/W	Air Fuel Ratio (A/F) Sensor Signal (-) (California Only)
15	P/B	EGR Vacuum Solenoid Valve (VSV) Control
16	V	Vapor Pressure Sensor Vacuum Solenoid Valve (VSV) Control



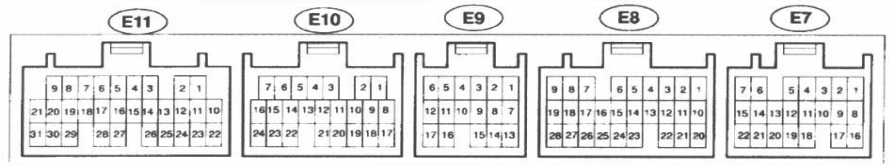
1999 Toyota Camry I-4 2.2L (5S-FE) W/Immobilizer

Connector E9		
Cav	***Color***	***Function***
1	L/Y	HO2S Bank 1 Sensor 1 Heater Control (Except California)
2	G	Air Fuel Ratio (A/F) Sensor Heater Control (California Only)
3	V/W	EVAP Vacuum Solenoid Valve Control (EVAP VSV)
4	B/L	Power Steering Pressure Switch
5	-	-
6	B/O	Idle Air Control Solenoid
7	W	Idle Air Control Solenoid
8	V	Shift Solenoid 1
9	W	Fuel Injector #40 Control
10	Y	Fuel Injector #30 Control
11	R	Fuel Injector #20 Control
12	L	Fuel Injector #10 Control
13	BR	Ground
14	P/B	HO2S Bank 1 Sensor 2 Heater Control
15	BR	Ground (California Only)
16	-	-
17	W/R	Ignition Coil Igniter
18	-	-
19	W/L	A/C System
20	P	Torque Converter Clutch (TCC) Solenoid
21	L/B	Shift Solenoid 2
22	Y/R	Ignition Coil Igniter #2
23	B	Ignition Coil Igniter #1
24	BR	Ground
25	BR	Ground
26	BR	Ground



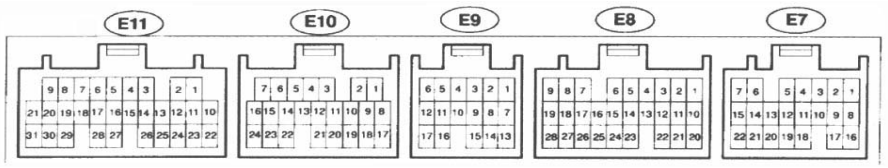
1999 Toyota Camry 1-4 2.2L (5S-FE) w/Immobilizer

Connector E10		
Cav	***Color***	***Function***
1	R/Y	Anti-Theft System
2	BR	Ground
3	R/L	Key Amplifier Transponder (RXCK)
4	L/B	Anit-Theft System (Unlock Warning Switch)
5	-	-
6	L	Camshaft & Crankshaft Position Sensor Ground
7	B/W	-
8	G/W	Key Amplifier Transponder (CODE)
9	L/Y	Key Amplifier Transponder (TXCT)
10	-	-
11	B/W	Camshaft Position Sensor Signal
12	B/R	Crankshaft Position Sensor Signal



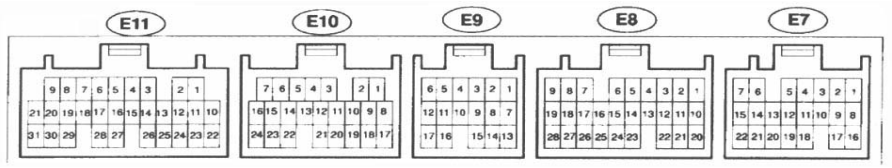
1999 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E7		
Cav	***Color***	***Function***
1	B/Y	Battery Power (Hot All Times)
2	B/R	Ignition Switch (Switched Voltage)
3	G/R	Fuel Pump Relay (Control)
4	-	-
5	-	-
6	G/R	MIL
7	GR or B/O	Clutch Start Switch (Manual Transmission)
8	B/W	EFI Relay/(Control)
9	V	Vapor Pressure Sensor VSV (Control)
10	-	-
11	W	Data Link Connector SIL (Pin 7)
12	-	-
13	LG	TRC + (Skid Control ECU to Engine Control ECM Signal)
14	W	Eng + (Engine ECM to Skid Control ECU Signal)
15	G/W	Stop Light Switch
16	B/Y	Power Source of ECM (From Relay)
17	P	Vapor Pressure Sensor (VPS) Signal
18	B/Y	Electric Load 2 (Mirror Heater)
19	G/O	Electric Load (Tail Light Switch)
20	L	TRC - (Skid Control ECU to Engine Control ECM Signal)
21	B	Eng - (Engine ECM to Skid Control ECU Signal)
22	-	-



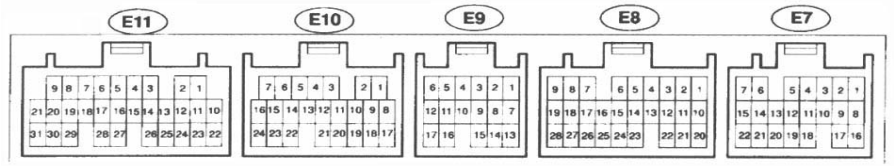
1999 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E8		
Cav	***Color***	***Function***
1	-	-
2	R/B	Reverse Input (MLP)
3	L/W or O	Drive 2 Input (MLP)
4	L/R	Cruise Control ECU
5	L/R	VSV Canister Close Valve (CCV) Control
6	-	-
7	-	-
8	B	HO2S Bank 1 Sensor 2 Signal (+)
9	P/B	HO2S Heater Control Bank 1 Sensor 2
10	G/O	OD Switch (Input)
11	-	-
12	Y	Manual Low Input (MLP)
13	LG/B	A/C Control Assembly
14	V	A/C Control Assembly
15	-	-
16	BR/W	Skid Control ECU
17	-	-
18	-	-
19	-	-
20	B/W	Starter Input During Cranking (Automatic Transmission)
21	-	-
22	V/W	Speed Signal from Combination Meter
23	-	-
24	Y/B	Cruise Control ECU
25	B/Y	A/C Control Assembly
26	-	-
27	B/O	Tachometer
28	-	-



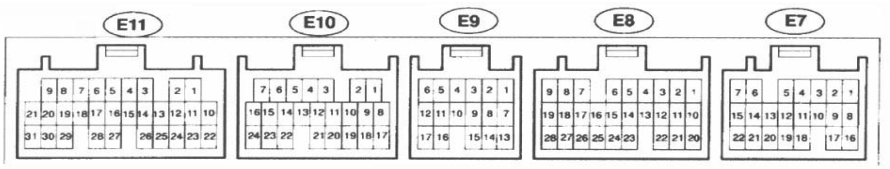
1999 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E9		
Cav	***Color***	***Function***
1	-	-
2	-	-
3	-	-
4	G/W	Anti-Theft System
5	R/L	Anti-Theft System
6	-	-
7	-	-
8	-	-
9	-	-
10	L/Y	Anti-Theft System
11	L/B	Key Unlock Warning Switch
12	-	-
13	BR	Ground
14	-	-
15	-	-
16	R/Y	Theft Deterrent ECU
17	-	-



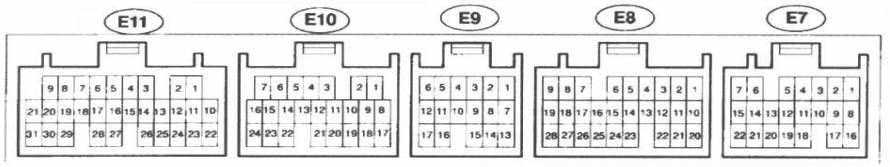
1999 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E10		
Cav	***Color***	***Function***
1	-	-
2	Y	EGR, TPS, VPS Sensor (5-Volt Power Source)
3	L/B	HO2S (A/F Sensor) Heater Control Bank 1 Sensor 1
4	Y/R	HO2S Heater Control Bank 2 Sensor 1
5	L	Fuel Injector #10 Control
6	R	Fuel Injector #20 Control
7	LG	EVAP VSV Control (EVAP VSV)
8	-	-
9	B/L	Power Steering Pressure Switch
10	P	Mass Air Flow Sensor Signal
11	W	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (+)
12	B	HO2S Bank 2 Sensor 1 Signal (+)
13	G/Y	EGR Gas Temperature Sensor Signal
14	G/B	Engine Coolant Temperature Sensor (ECT) Signal
15	-	-
16	B/R	Crankshaft Position Sensor Signal (+)
17	BR	Ground
18	BR	Intake Air Temperature Sensor Ground
19	R/B	Mass Air Flow Sensor (-)
20	-	-
21	-	-
22	L/Y	Intake Air Temperature Sensor Signal
23	L	Throttle Position Sensor (TPS) Signal
24	L	Crankshaft/Camshaft Position Sensor Signal (-)



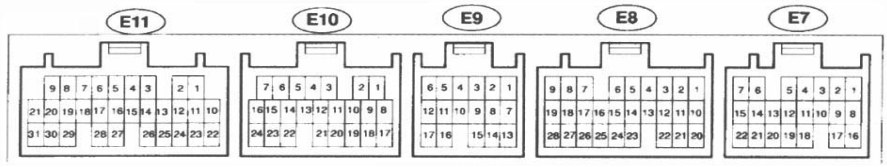
1999 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E11		
Cav	***Color***	***Function***
1	Y	Fuel Injector #30 Control
2	W	Fuel Injector #40 Control
3	R/L	Fuel Injector #50 Control
4	G	Fuel Injector #60 Control
5	-	-
6	L/W	DLC Terminal #8
7	V	Transmission Solenoid #1
8	L/B	Transmission Solenoid #2
9	P/L	Transmission Solenoid SL
10	B/W	Camshaft Position Sensor Signal (+)
11	GR	Ignition Igniter #1
12	BR/Y	Ignition Igniter #2
13	LG/B	Ignition Igniter #3
14	R	Vehicle Speed Sensor Signal (+)
15	Y/B	Idle Air Control Valve
16	R/W	Idle Air Control Valve
17	R/Y	Intake Air Control VSV Valve
18	Y/G	EGR VSV Valve
19	B/Y	Transmission Solenoid SLN (-)
20	W/L	Transmission Solenoid SLN (+)
21	BR	Ground
22	W/G	EGR Valve Position Sensor Signal
23	BR	Ground (A/T Only)
24	-	-
25	W/R	Ignition Igniter
26	G	Vehicle Speed Sensor Signal (-)
27	W	Knock Sensor #1
28	W	Knock Sensor #2
29	G/W	Cooling Fan System
30	BR	Ground
31	BR	Ground



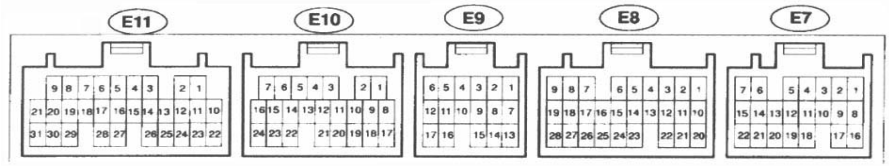
2000 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E7		
Cav	***Color***	***Function***
1	B/Y	Battery Power (Hot All Times)
2	B/R	Ignition Switch (Switched Voltage)
3	G/R	Fuel Pump Relay (Control)
4	-	-
5	-	-
6	G/R	MIL
7	GR or B/O	Clutch Start Switch (Manual Transmission)
8	B/W	EFI Relay/(Control)
9	P	OD OFF Light Control
10	-	-
11	W	Data Link Connector SIL (Pin 7)
12	-	-
13	LG	TRC + (Skid Control ECU to Engine Control ECM Signal)
14	W	Eng + (Engine ECM to Skid Control ECU Signal)
15	G/W	Stop Light Switch
16	B/Y	Power Source of ECM (From Relay)
17	P	Vapor Pressure (FTP) Sensor (VPS) Signal
18	B/Y	Electric Load 2 (Mirror Heater)
19	G/O	Electric Load (Tail Light Switch)
20	L	TRC - (Skid Control ECU to Engine Control ECM Signal)
21	B	Eng - (Engine ECM to Skid Control ECU Signal)
22	-	-



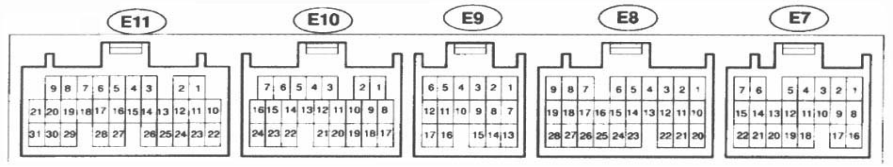
2000 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E8		
Cav	***Color***	***Function***
1	V	Vapor Pressure Switching VSV Valve
2	R/B	Reverse Input (MLP)
3	L/W or O	Drive 2 Input (MLP)
4	L/R	Cruise Control ECU
5	L/R	VSV Canister Close Valve (CCV) Control
6	-	-
7	-	-
8	B	HO2S Bank 1 Sensor 2 Signal (+)
9	P/B	HO2S Heater Control Bank 1 Sensor 2
10	G/O	OD Switch (Input)
11	-	-
12	Y	Manual Low Input (MLP)
13	LG/B	A/C Control Assembly
14	V	A/C Control Assembly
15	-	-
16	BR/W	Skid Control ECU
17	-	-
18	-	-
19	-	-
20	B/W	Starter Input During Cranking (Automatic Transmission)
21	-	-
22	V/W	Speed Signal from Combination Meter
23	-	-
24	Y/B	Cruise Control ECU
25	B/Y	A/C Control Assembly
26	-	-
27	B/O	Tachometer
28	-	-



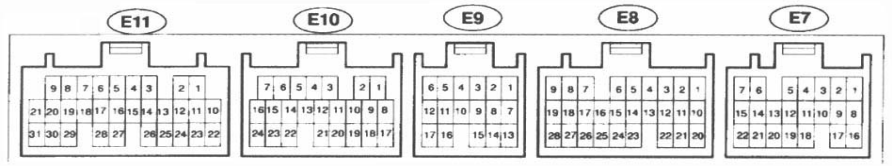
2000 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E9		
Cav	***Color***	***Function***
1	-	-
2	-	-
3	-	-
4	G/W	Anti-Theft System
5	R/L	Anti-Theft System
6	-	-
7	-	-
8	-	-
9	-	-
10	L/Y	Anti-Theft System
11	L/B	Key Unlock Warning Switch
12	-	-
13	BR	Ground
14	-	-
15	-	-
16	R/Y	Theft Deterrent ECU
17	-	-



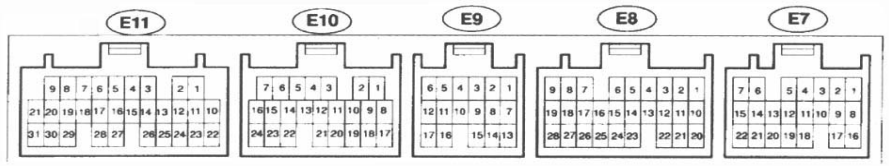
2000 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E10		
Cav	***Color***	***Function***
1	-	-
2	Y	EGR, TPS, VPS Sensor (5-Volt Power Source)
3	L/B	HO2S (A/F Sensor) Heater Control Bank 1 Sensor 1
4	Y/R	HO2S Heater Control Bank 2 Sensor 1
5	L	Fuel Injector #10 Control
6	R	Fuel Injector #20 Control
7	LG	EVAP VSV Control (EVAP VSV)
8	-	-
9	B/L	Power Steering Pressure Switch
10	P	Mass Air Flow Sensor Signal
11	W	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (+)
12	B	HO2S Bank 2 Sensor 1 Signal (+)
13	G/Y	EGR Gas Temperature Sensor Signal
14	G/B	Engine Coolant Temperature Sensor (ECT) Signal
15	-	-
16	B/R	Crankshaft Position Sensor Signal (+)
17	BR	Ground
18	BR	Intake Air Temperature Sensor Ground
19	R/B	Mass Air Flow Sensor (-)
20	-	-
21	-	-
22	L/Y	Intake Air Temperature Sensor Signal
23	L	Throttle Position Sensor (TPS) Signal
24	L	Crankshaft/Camshaft Position Sensor Signal (-)



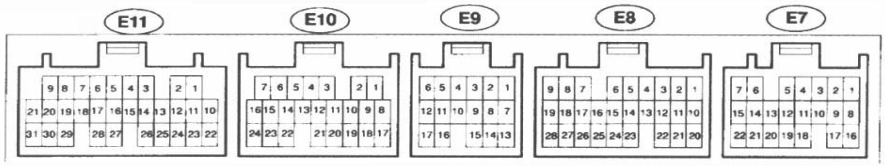
2000 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E11		
Cav	***Color***	***Function***
1	Y	Fuel Injector #30 Control
2	W	Fuel Injector #40 Control
3	R/L	Fuel Injector #50 Control
4	G	Fuel Injector #60 Control
5	-	-
6	L/W	DLC Terminal #8
7	V	Transmission Solenoid #1
8	L/B	Transmission Solenoid #2
9	P/L	Transmission Solenoid SL
10	B/W	Camshaft Position Sensor Signal (+)
11	GR	Ignition Igniter #1
12	BR/Y	Ignition Igniter #2
13	LG/B	Ignition Igniter #3
14	R	Vehicle Speed Sensor Signal (+)
15	Y/B	Idle Air Control Valve
16	R/W	Idle Air Control Valve
17	R/Y	Intake Air Control VSV Valve
18	Y/G	EGR VSV Valve
19	B/Y	Transmission Solenoid SLN (-)
20	W/L	Transmission Solenoid SLN (+)
21	BR	Ground
22	W/G	EGR Valve Position Sensor Signal
23	G/O	O/D Switch
24	BR	Ground
25	W/R	Ignition Igniter
26	G	Vehicle Speed Sensor Signal (-)
27	W	Knock Sensor #1
28	W	Knock Sensor #2
29	G/W	Cooling Fan System
30	BR	Ground
31	BR	Ground



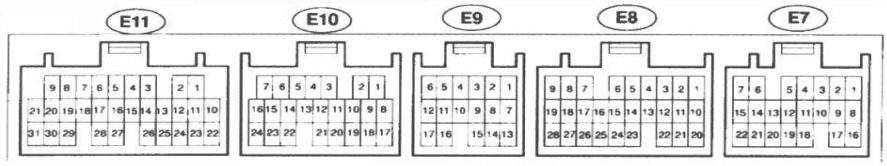
2001 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E7		
Cav	***Color***	***Function***
1	B/Y	Battery Power (Hot All Times)
2	B/R	Ignition Switch (Switched Voltage)
3	G/R	Fuel Pump Relay (Control)
4	-	-
5	-	-
6	G/R	MIL
7	GR or B/O	Clutch Start Switch (Manual Transmission)
8	B/W	EFI Relay/(Control)
9	V	Vapor Pressure Sensor VSV (Control)
10	-	-
11	W	Data Link Connector SIL (Pin 7)
12	-	-
13	LG	TRC + (Skid Control ECU to Engine Control ECM Signal)
14	W	Eng + (Engine ECM to Skid Control ECU Signal)
15	G/W	Stop Light Switch
16	B/Y	Power Source of ECM (From Relay)
17	P	Vapor Pressure Sensor (VPS) Signal
18	B/Y	Electric Load 2 (Mirror Heater)
19	G/O	Electric Load (Tail Light Switch)
20	L	TRC - (Skid Control ECU to Engine Control ECM Signal)
21	B	Eng - (Engine ECM to Skid Control ECU Signal)
22	-	-



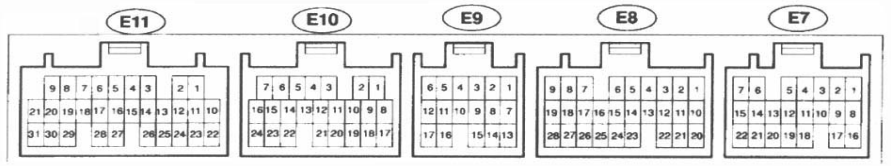
2001 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E8		
Cav	***Color***	***Function***
1	V	Vapor Pressure Switching VSV Valve
2	R/B	Reverse Input (MLP)
3	L/W or O	Drive 2 Input (MLP)
4	L/R	Cruise Control ECU
5	L/R	VSV Canister Close Valve (CCV) Control
6	-	-
7	-	-
8	B	HO2S Bank 1 Sensor 2 Signal (+)
9	P/B	HO2S Heater Control Bank 1 Sensor 2
10	G/O	OD Switch (Input)
11	-	-
12	Y	Manual Low Input (MLP)
13	LG/B	A/C Control Assembly
14	V	A/C Control Assembly
15	-	-
16	BR/W	Skid Control ECU
17	-	-
18	-	-
19	-	-
20	B/W	Starter Input During Cranking (Automatic Transmission)
21	-	-
22	V/W	Speed Signal from Combination Meter
23	-	-
24	Y/B	Cruise Control ECU
25	B/Y	A/C Control Assembly
26	-	-
27	B/O	Tachometer
28	-	-



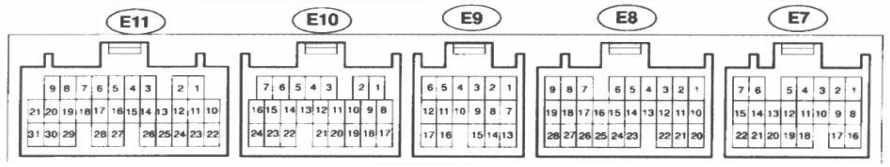
2001 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E9		
Cav	***Color***	***Function***
1	-	-
2	-	-
3	-	-
4	G/W	Anti-Theft System
5	R/L	Anti-Theft System
6	-	-
7	-	-
8	-	-
9	-	-
10	L/Y	Anti-Theft System
11	L/B	Key Unlock Warning Switch
12	-	-
13	BR	Ground
14	-	-
15	-	-
16	R/Y	Theft Deterrent ECU
17	-	-



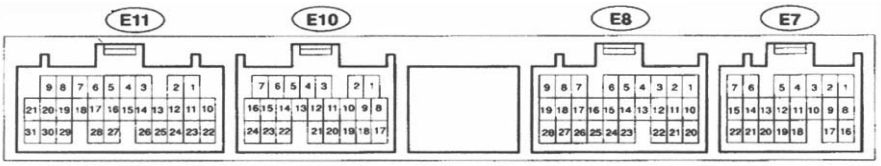
2001 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E10		
Cav	***Color***	***Function***
1	BR	Ground
2	Y	EGR, TPS, VPS Sensor (5-Volt Power Source)
3	B/R	HO2S (A/F Sensor) Heater Control Bank 1 Sensor 1
4	B/W	HO2S Heater Control Bank 2 Sensor 1
5	L	Fuel Injector #10 Control
6	R	Fuel Injector #20 Control
7	LG	EVAP VSV Control (EVAP VSV)
8	BR	Ground
9	B/L	Power Steering Pressure Switch
10	P	Mass Air Flow Sensor Signal
11	G or BR	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (+)
12	L	HO2S (A/F Sensor) Bank 2 Sensor 1 Signal (+)
13	G/Y	EGR Gas Temperature Sensor Signal
14	G/B	Engine Coolant Temperature Sensor (ECT) Signal
15	-	-
16	B/R	Crankshaft Position Sensor Signal (+)
17	BR	Ground
18	R/B	Intake Air Temperature Sensor Ground
19	B/R	Mass Air Flow Sensor (-)
20	R or R/B	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (-)
21	B/W	HO2S (A/F Sensor) Bank 2 Sensor 1 Signal (-)
22	L/Y	Intake Air Temperature Sensor Signal
23	L	Throttle Position Sensor (TPS) Signal
24	L	Crankshaft/Camshaft Position Sensor Signal (-)



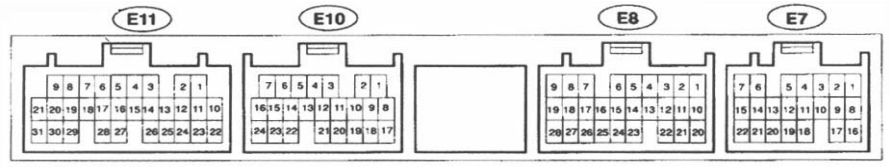
2001 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E11		
Cav	***Color***	***Function***
1	Y	Fuel Injector #30 Control
2	W	Fuel Injector #40 Control
3	R/L	Fuel Injector #50 Control
4	G	Fuel Injector #60 Control
5	-	-
6	L/W	DLC Terminal #8
7	V	Transmission Solenoid #1
8	L/B	Transmission Solenoid #2
9	P/L	Transmission Solenoid SL
10	B/W	Camshaft Position Sensor Signal (+)
11	GR	Ignition Igniter #1
12	BR/Y	Ignition Igniter #2
13	LG/B	Ignition Igniter #3
14	R	Vehicle Speed Sensor Signal (+)
15	Y/B	Idle Air Control Valve
16	R/W	Idle Air Control Valve
17	R/Y	Intake Air Control VSV Valve
18	Y/G	EGR VSV Valve
19	B/Y	Transmission Solenoid SLN (-)
20	W/L	Transmission Solenoid SLN (+)
21	BR	Ground
22	W/G	EGR Valve Position Sensor Signal
23	G/O	O/D Switch
24	BR	Ground
25	W/R	Ignition Igniter
26	G	Vehicle Speed Sensor Signal (-)
27	W	Knock Sensor #1
28	W	Knock Sensor #2
29	G/W	Cooling Fan System
30	BR	Ground
31	BR	Ground



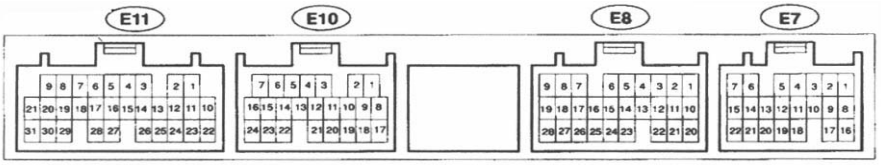
2000-2001 Toyota Camry I-4 2.2L (5S-FE) W/Immobilizer

Connector E7		
Cav	***Color***	***Function***
1	B/Y	Battery Power (Hot all times)
2	B/R	Ignition Switch (Switched Voltage)
3	G/R	Fuel Pump Relay (Control)
4	W	Data Link Connector SIL (Pin 7)
5	P	OD OFF Light
6	G/R	MIL
7	B/O or GR	Starter Relay (Control)
8	B/W	EFI Relay/ (Control)
9	Y/B	Cruise Control System
10	L/R	Cruise Control System
11	-	-
12	-	-
13	-	-
14	-	-
15	G/W	Stop Light Switch
16	B/Y	Power Source of ECM (From Relay)
17	-	-
18	B/R	Electric Load Sense Exterior Lights and Defogger
19	-	-
20	-	-
21	-	-
22	BR	Ground



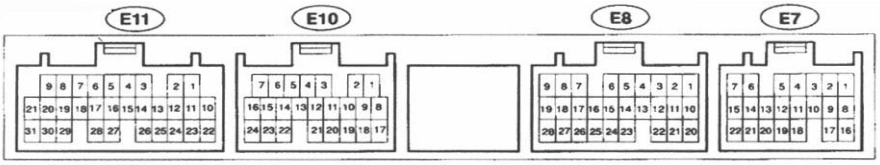
2000-2001 Toyota Camry I-4 2.2L (5S-FE) W/Immobilizer

Connector E8		
Cav	***Color***	***Function***
1	-	-
2	R/B	Reverse Input (MLP)
3	L/W or O	Drive 2 Input (MLP)
4	B/Y	A/C System
5	L/W	Data Link Connector Pin 8
6	R/B	A/C System
7	G/O	OD OFF Switch
8	R/W	A/C System
9	-	-
10	P	Vapor Pressure Sensor (VPS) Signal
11	-	-
12	Y	Manual Low Input (MLP)
13	LG/B	A/C Control Assembly
14	V	A/C Control Assembly
15	-	-
16	-	-
17	G	A/C System
18	L/Y	Transponder Key Amplifier
19	R/L	Transponder Key Amplifier
20	B/W	Starter Input During Cranking (Automatic Transmission)
21	-	-
22	V/W	Speed Signal from Combination Meter
23	-	-
24	-	-
25	L/B	Anti-Theft System
26	R/Y	Anti-Theft System
27	B/O	Tachometer
28	G/W	Transponder Key Amplifier



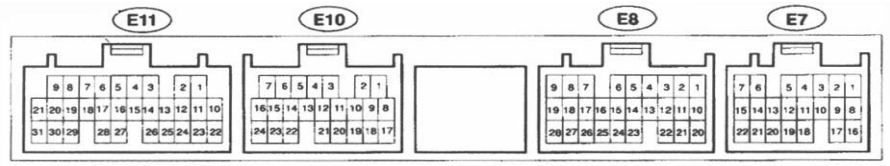
2000-2001 Toyota Camry I-4 2.2L (5S-FE) W/Immobilizer

Connector E10		
Cav	***Color***	***Function***
1	P/B	EGR Vacuum Solenoid Valve (VSV)
2	Y	TPS, MAP, VPS Sensor (5-Volt Reference)
3	L/R	Canister Closed Vacuum Solenoid Valve (VSV)
4	V	Vapor Pressure Switching Vacuum Solenoid Valve (VSV)
5	P/B	HO2S Heater Control Bank 1 Sensor 2
6	L/Y or G	HO2S/AFR Heater Control Bank 1 Sensor 1
7	V/W	EVAP Vacuum Solenoid Valve (VSV) Control
8	BR	Ground
9	-	-
10	-	-
11	B/L	Power Steering Pressrue Switch
12	-	-
13	B	HO2S Bank 1 Sensor 2 Signal (+)
14	L or W	HO2S Bank 1 Sensor 1 Signal (+)
15	B/W	Camshaft Position (CMP) Sensor Signal (+)
16	B/R	Crankshaft Position (CKP) Sensor Signal (+)
17	BR	Ground
18	BR	TPS, ECT, IAT, MAP, A/C Temp, VPS Sensor (Ground)
19	L/Y	A/C System
20	G/B	Engine Coolant Temperature Sensor (ECT) Signal
21	L/Y	MAP Sensor Signal
22	-	-
23	B/W	Fuel Ratio Sensor Signal (California 2000-2001)
24	L	Crankshaft/Camshaft Position Sensor Signal (-)



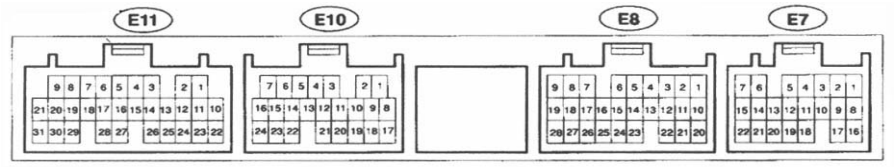
2000-2001 Toyota Camry I-4 2.2L (5S-FE) W/Immobilizer

Connector E11		
Cav	***Color***	***Function***
1	L	Fuel Injector #10 Control
2	R	Fuel Injector #20 Control
3	Y	Fuel Injector #30 Control
4	W	Fuel Injector #40 Control
5	-	-
6	P	Torque Converter Clutch (TCC) Solenoid
7	V	Shift Solenoid 1
8	L/B	Shift Solenoid 2
9	-	-
10	B	Ignition Coil Igniter #1
11	Y/R	Ignition Coil Igniter #2
12	W/R	Ignition Coil Igniter
13	L/R	A/C Evaporator Temperature Sensor Signal
14	-	-
15	-	-
16	-	-
17	B/O	Idle Air Control Valve
18	W	Idle Air Control Valve
19	-	-
20	-	-
21	B	Ground
22	G/W	Engine Coolant Temperature (ECT) Sensor Signal
23	Y/B	Intake Air Temperature (IAT) Sensor Signal
24	LG	Throttle Position Sensor (TPS) Signal
25	W/L	A/C System
26	-	-
27	W	Knock Sensor Signal
28	-	-
29	-	-
30	BR	Ground
31	BR	Ground



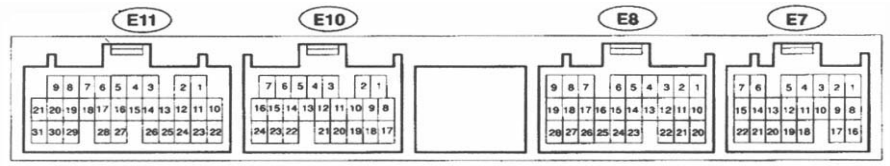
2000-2001 Toyota Camry I-4 2.2L (5S-FE) W/O Immobilizer

Connector E7		
Cav	***Color***	***Function***
1	B/Y	Battery Power (Hot All Times)
2	-	-
3	G/R	Fuel Pump Relay (Control)
4	W	Data Link Connector SIL (Pin 7)
5	P	OD OFF Light
6	G/R	MIL
7	B/O or GR	Starter Relay (Control)
8	-	-
9	Y/B	Cruise Control System
10	L/R	Cruise Control System
11	-	-
12	-	-
13	-	-
14	-	-
15	G/W	Stop Light Switch
16	B/Y	Power Source of ECM (From Relay)
17	-	-
18	B/R	Electric Load Sense Exterior Lights and Defogger
19	-	-
20	-	-
21	-	-
22	-	-



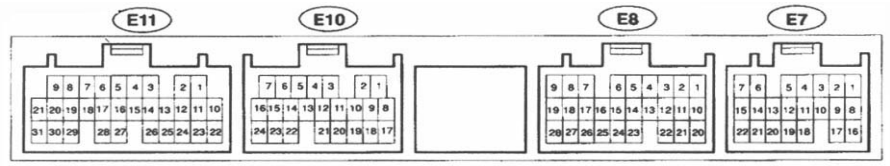
2000-2001 Toyota Camry I-4 2.2L (5S-FE) W/O Immobilizer

Connector E8		
Cav	***Color***	***Function***
1	-	-
2	R/B	Reverse Input (MLP)
3	L/W or O	Drive 2 Input (MLP)
4	B/Y	A/C System
5	L/W	Data Link Connector Pin 8
6	R/B	A/C System
7	G/O	OD OFF Switch
8	R/W	A/C System
9	-	-
10	P	Vapor Pressure Sensor (VPS) Signal
11	-	-
12	Y	Manual Low Input (MLP)
13	LG/B	A/C Control Assembly
14	V	A/C Control Assembly
15	-	-
16	-	-
17	G	A/C System
18	-	-
19	-	-
20	B/W	Starter Input During Cranking (Automatic Transmission)
21	-	-
22	V/W	Speed Signal from Combination Meter
23	-	-
24	-	-
25	-	-
26	-	-
27	B/O	Tachometer
28	-	-



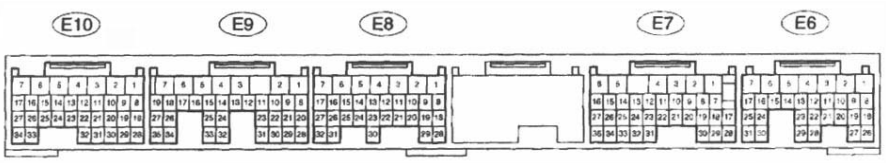
2000-2001 Toyota Camry I-4 2.2L (5S-FE) W/O Immobilizer

Connector E10		
Cav	***Color***	***Function***
1	-	-
2	Y	TPS, MAP, VPS Sensor (5-Volt Reference)
3	P/B	HO2S Heater Control Bank 1 Sensor 2
4	L/Y or G	HO2S/AFR Heater Control Bank 1 Sensor 1
5	L/Y	A/C System
6	P/B	EGR Vacuum Solenoid Valve (VSV)
7	L/R	Canister Closed Vacuum Solenoid Valve (VSV)
8	BR	Ground
9	B/Y	MAP Sensor Signal
10	-	-
11	-	-
12	B/L	Power Steering Pressure Switch
13	B	HO2S Bank 1 Sensor 2 Signal (+)
14	L or W	HO2S Bank 1 Sensor 1 Signal (+)
15	-	-
16	B/W	Camshaft Position (CMP) Sensor Signal (+)
17	BR	Ground
18	BR	TPS, ECT, IAT, MAP, A/C Temp, VPS Sensor (Ground)
19	-	-
20	-	-
21	-	-
22	B/W	Fuel Ratio Sensor Signal (California 2000-2001)
23	L	Crankshaft/Camshaft Position Sensor Signal (-)
24	B/R	Crankshaft Position (CKP) Sensor Signal (+)



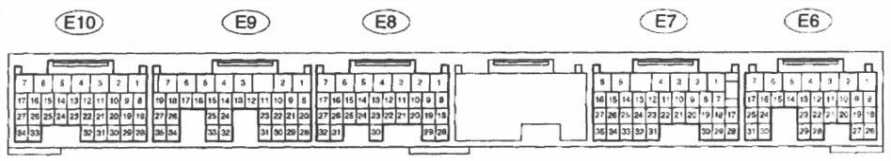
2000-2001 Toyota Camry I-4 2.2L (5S-FE) W/O Immobilizer

Connector E11		
Cav	***Color***	***Function***
1	V	Vapor Pressure Switching Vacuum Solenoid Valve (VSV)
2	V/W	EVAP Vacuum Solenoid Valve (VSV) Control
3	L	Fuel Injector #10 Control
4	R	Fuel Injector #20 Control
5	Y	Fuel Injector #30 Control
6	W	Fuel Injector #40 Control
7	P	Torque Converter Clutch (TCC) Solenoid
8	L/B	Shift Solenoid 2
9	V	Shift Solenoid 1
10	W/R	Ignition Coil Igniter
11	Y/R	Ignition Coil Igniter #2
12	B	Ignition Coil Igniter #1
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	-	-
19	B/O	Idle Air Control Valve
20	W	Idle Air Control Valve
21	B	Ground
22	Y/B	Intake Air Temperature (IAT) Sensor Signal
23	LG	Throttle Position Sensor (TPS) Signal
24	G/B	Engine Coolant Temperature (ECT) Sensor Signal
25	L/R	A/C Evaporator Temperature Sensor Signal
26	W/L	A/C System
27	-	-
28	W	Knock Sensor Signal
29	-	-
30	BR	Ground
31	BR	Ground



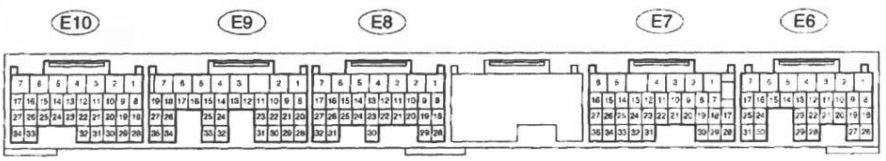
2002-2003 Toyota Camry I-4 2.4L (2AZ-FE)

Connector E6		
Cav	***Color***	***Function***
1	B/R	Power Source (From C/OPN Relay)
2	L/R	Battery Power (Hot All Times)
3	B/Y	Battery Power (Hot All Times)
4	V	EVAP Vacuum Switch Valve (Pressure Switching Valve)
5	B/O	Tachometer
6	-	-
7	-	-
8	B/W	EFI Relay/O2 Sensor Heater Relay (Control)
9	B/O	Ignition Switch (Switched Voltage)
10	G/R	Fuel Pump Control Relay Control
11	W	Data Link Connector (Pin #7)
12	G	Electric Load (Tail Light Switch)
13	B/Y	Electric Load 2 (Heater Switch)
14	-	Data Link Connector (Pin #13)
15	BR	Ground
16	-	-
17	BR/W	Skid Control ECU Engine RPM Signal
18	G/R	MIL
19	R	Data Link Connector WFSE (Pin 15)
20	-	-
21	P	Vapor Pressure Sensor (VPS) Signal
22	L/Y	Accelerator Pedal Position Sensor (Engine Control Signal)
23	W/R	Accelerator Pedal Position Sensor 2 (Fault Detection Signal)
24	W	Eng + (Engine ECM to Skid Control ECU Signal)
25	G	TRC + (Skid Control ECU to Engine Control ECM Signal)
26	R	Accelerator Pedal Position Sensor 2 (5-Volt Power Source)
27	B/R	Accelerator Pedal Position Sensor (5-Volt Power Source)
28	LG/B	Accelerator Pedal Position Sensor 2 (Ground)
29	L/G	Accelerator Pedal Position Sensor (Ground)
30	B	Eng - (Engine ECM to Skid Control ECU Signal)
31	L	TRC - (Skid Control ECU to Engine Control ECM Signal)



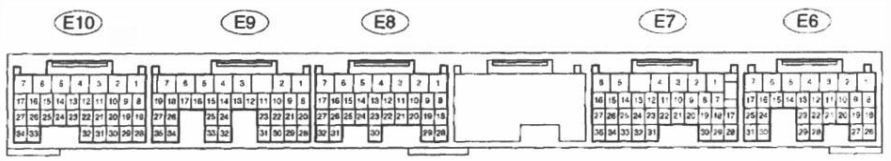
2002-2003 Toyota Camry I-4 2.4L (2AZ-FE)

Connector E7		
Cav	***Color***	***Function***
1	B/R or L/B	A/C System
2	-	-
3	-	-
4	L	HO2S (A/F Sensor) Heater Control Bank 1 Sensor 1
5	-	-
6	-	-
7	O	OD Light
8	Y	Manual Low Input (MLP)
9	L/W	Drive 2 Input (MLP)
10	W/L	Drive Input (MLP)
11	R/B	Reverse Input (MLP)
12	-	-
13	P/L	Cruise Control
14	Y/G	Instrument Cluster (THWO)
15	G/W	Anti-Theft System
16	V	A/C System
17	V/W	Speed Signal from Combination Meter
18	-	-
19	G/W	Stop Light Switch
20	R/B	Cruise Control System
21	-	-
22	B	HO2S Bank 1 Sensor 1 Signal (+)
23	-	-
24	W	Cruise Control
25	-	-
26	L/Y	Anti-Theft System
27	R/L	Anti-Theft System
28	-	-
29	G/O	OD Switch
30	-	-
31	P/L or W	A/C System
32	Y/B or L/W	A/C System
33	B or Y/B	A/C System
34	L	Key Unlock Warning Switch
35	-	-



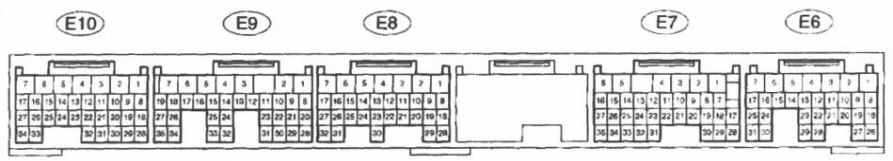
2002-2003 Toyota Camry I-4 2.4L (2AZ-FE)

Connector E8		
Cav	***Color***	***Function***
1	B/R	Ground
2	L/W	A/C System
3	-	-
4	W	Throttle Position Sensor (M-)
5	B	Throttle Position Sensor (M+)
6	W/B	Ground
7	W/B	Ground
8	-	-
9	G/W	Cooling Fans
10	R/W	Power Steering Pressure Switch
11	B/R	EVAP System Vacuum Solenoid Valve
12	G	EVAP Canister Closed Vacuum Solenoid Valve
13	-	-
14	-	-
15	Y	Variable Valve Timing Solenoid (-)
16	B/W	Variable Valve Timing Solenoid (+)
17	Braided	Shield (M+&M-)
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-
23	W/L	A/C System
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	Y/B	Cooling Fans
31	-	-
32	-	-



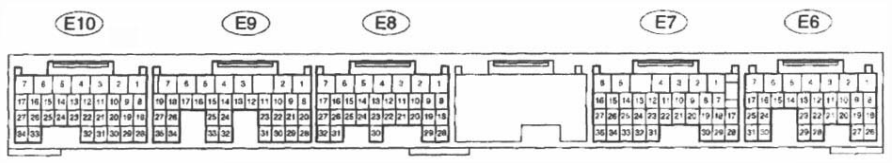
2002-2003 Toyota Camry I-4 2.4L (2AZ-FE)

Connector E9		
Cav	***Color***	***Function***
1	W	Knock Sensor
2	-	-
3	-	-
4	B/R	HO2S (A/F Sensor) Heater Control Bank 1 Sensor 1
5	-	-
6	-	-
7	W/B	Ground
8	B/Y	Ignition Switch (Hot in Start Position)
9	B/W	Park/Neutral Position Switch (Hot in Start Position)
10	-	-
11	Y	Transmission Solenoid DSL
12	-	-
13	L	Transmission Solenoid S4
14	-	-
15	-	-
16	L/R	Transmission Solenoid SL2 (-)
17	L/Y	Transmission Solenoid SL2 (+)
18	P	Transmission Solenoid SL1 (-)
19	R/B	Transmission Solenoid SL1 (+)
20	-	-
21	-	-
22	-	-
23	O	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (+)
24	R	Mass Airflow (MAF) Sensor
25	-	-
26	R	Counter Shaft Speed Sensor (+)
27	L	Turbine Shaft Speed Sensor (+)
28	-	-
29	-	-
30	W	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (-)
31	-	-
32	L/W	Mass Airflow (MAF) Sensor
33	-	-
34	G	Counter Shaft Speed Sensor (-)
35	LG	Turbine Shaft Speed Sensor (-)



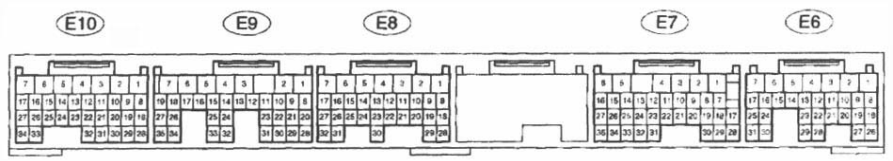
2002-2003 Toyota Camry I-4 2.4L (2AZ-FE)

Connector E10		
Cav	***Color***	***Function***
1	L	Fuel Injector #10 Control
2	R	Fuel Injector #20 Control
3	Y	Fuel Injector #30 Control
4	W	Fuel Injector #40 Control
5	-	-
6	W/B	Ground
7	W/B	Ground
8	R/W	Ignition Coil #1 Control
9	P	Ignition Coil #2 Control
10	LG/B	Ignition Coil #3 Control
11	L/Y	Ignition Coil #4 Control
12	-	-
13	-	-
14	-	-
15	-	-
16	Y/B	Transmission Solenoid SLT (-)
17	Y/R	Transmission Solenoid SLT (+)
18	Y	TPS, VPS Sensor (5-Volt Power Source)
19	G/Y	Engine Coolant Temperature Sensor (ECT) Signal
20	L/B	Intake Air Temperature Sensor (IAT) Signal
21	LG	Throttle Position Sensor (TPS) Signal
22	-	-
23	W/R	Ignition Confirmation Signal (IGF)
24	-	-
25	-	-
26	B/W	Camshaft Position Sensor (+)
27	R	Crankshaft Position Sensor Signal (+)
28	BR	TPS, ECT, IAT, TFT Sensor (Ground)
29	-	-
30	G or G/R	Transmission Fluid Temperature Sensor Signal
31	B/R	Throttle Position Sensor 2 Fault Detection
32	-	-
33	-	-
34	G	Crankshaft/Camshaft Position Sensor Signal (-)



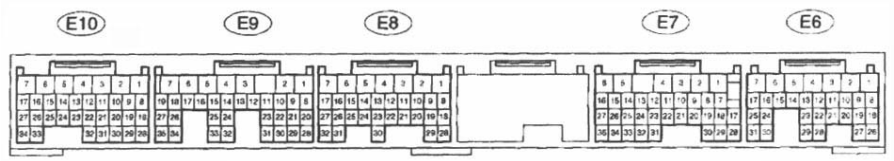
2002-2003 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E6		
Cav	***Color***	***Function***
1	B/R	Power Source of ECM (From Relay)
2	-	-
3	-	-
4	V	EVAP Vacuum Switch Valve (Pressure Switching Valve)
5	B/O	Tachometer
6	-	-
7	-	-
8	B/W	EFI Relay/O2 Sensor Heater Relay (Control)
9	B/O	Ignition Switch (Switched Voltage)
10	G/R	Fuel Pump Control Relay Control
11	P/B	Data Link Connector TC (Pin 13)
12	G/R	MIL
13	G	Electric Load (Tail Light Switch)
14	B/Y	Electric Load 2 (Heater Switch)
15	BR	Ground
16	G/O	Transmission Control Switch
17	BR/W	Skid Control ECU Engine RPM Signal
18	W	Data Link Connector SIL (Pin 7)
19	R	Data Link Connector WFSE (Pin 15)
20	-	-
21	P	Vapor Pressure Sensor (VPS) Signal
22	L/Y	Accelerator Pedal Position Sensor (Engine Control Signal)
23	W/R	Accelerator Pedal Position Sensor 2 (Fault Detection Signal)
24	W	Eng + (Engine ECM to Skid Control ECU Signal)
25	G	TRC + (Skid Control ECU to Engine Control ECM Signal)
26	R	Accelerator Pedal Position Sensor 2 (5-Volt Power Source)
27	B/R	Accelerator Pedal Position Sensor (5-Volt Power Source)
28	LG/B	Accelerator Pedal Position Sensor 2 (Ground)
29	L/G	Accelerator Pedal Position Sensor (Ground)
30	B	Eng - (Engine ECM to Skid Control ECU Signal)
31	L	TRC - (Skid Control ECU to Engine Control ECM Signal)



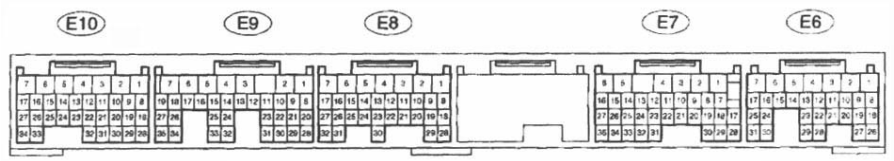
2002-2003 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E7		
Cav	***Color***	***Function***
1	BR or L/B	A/C System
2	B/Y	Battery (Hot All Times)
3	L/W	A/C System
4	-	-
5	-	-
6	L/R	Battery Voltage (Hot All Times)
7	O	OD Light
8	Y	Manual Low Input (MLP)
9	L/W	Drive 2 Input (MLP)
10	W/L	Drive Input (MLP)
11	R/B	Reverse Input (MLP)
12	R/B	Cruise Control (Stop Light Switch Opposite of Stop)
13	P/L	Cruise Control
14	Y/G	Instrument Cluster (THWO)
15	G/W	Anti-Theft System
16		A/C System
17	V/W	Speed Signal from Combination Meter
18	-	-
19	G/W	Stop Light Switch
20	-	-
21	-	-
22	-	-
23	-	-
24	W	Cruise Control
25	-	-
26	L/Y	Anti-Theft System
27	R/L	Anti-Theft System
28	-	-
29	-	-
30	-	-
31	P/L or W	A/C System
32	Y/B or L/W	A/C System
33	B or Y/B	A/C System
34	L	Key Unlock Warning Switch
35	-	-



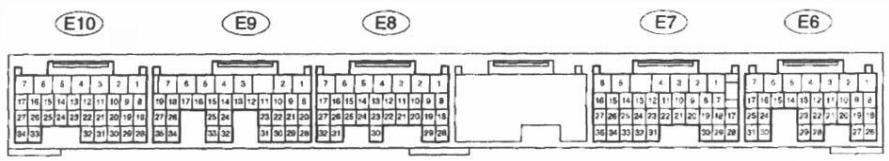
2002-2003 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E8		
Cav	***Color***	***Function***
1	BR	Ground
2	W	Throttle Motor (-)
3	B	Throttle Motor (+)
4	W/B	Ground
5	Y	HO2S Heater Control Bank 2 Sensor 2
6	L	HO2S Heater Control Bank 1 Sensor 2
7	W/B	Ground
8	G/W	Cooling Fan System
9	-	-
10	R/W	Power Steering Pressure Switch
11	LG	EVAP Vacuum Switch Valve (EVAP Purge)
12	L	EVAP Vacuum Switch Valve (Canister Closed Valve)
13	-	-
14	-	-
15	-	-
16	-	-
17	-	Braided Shield (Throttle Motor Wiring)
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-
23	W/L	A/C Clutch Lock Sensor
24	-	-
25	-	-
26	-	-
27	B/W	Camshaft Position Sensor (+)
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-



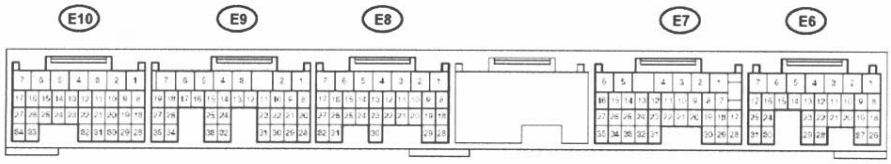
2002-2003 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E9		
Cav	***Color***	***Function***
1	B	Knock Sensor #1 Signal
2	W	Knock Sensor #2 Signal
3	B/R	HO2S Heater Control Bank 2 Sensor 1
4	B/W	HO2S (A/F Sensor) Heater Control Bank 1 Sensor 1
5	G	Fuel Injector #60 Control
6	W/B	Ground
7	W/B	Ground
8	B/Y	Park/Neutral Position Switch
9	B/W	Park/Neutral Position Switch
10	-	-
11	Y	Transmission Solenoid DSL
12	-	-
13	L	Transmission Solenoid S4
14	-	-
15	-	-
16	L/R	Transmission Solenoid SL2 (-)
17	L/Y	Transmission Solenoid SL2 (+)
18	P	Transmission Solenoid SL1 (-)
19	R/B	Transmission Solenoid SL1 (+)
20	Y/G	EGR Vacuum Switch Valve
21	W	HO2S Bank 1 Sensor 2 Signal (+)
22	BR	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (+)
23	O	HO2S Bank 2 Sensor 1 Signal (+)
24	R	Mass Airflow Sensor Signal
25	-	-
26	R	Counter Shaft Speed Sensor (NC+)
27	L	Turbine Shaft Speed Sensor (NT+)
28	W/G	EGR Valve Position Sensor Signal
29	B	HO2S Bank 2 Sensor 2 Signal (+)
30	B/R	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (-)
31	W	HO2S Bank 2 Sensor 1 Signal (-)
32	L/W	Mass Airflow Sensor Ground
33	-	-
34	G	Counter Shaft Speed Sensor (NC-)
35	LG	Turbine Shaft Speed Sensor (NT-)



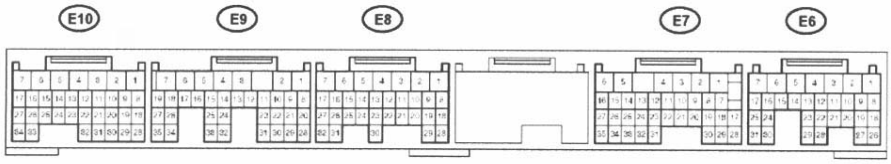
2002-2003 Toyota Camry V-6 3.0L (1MZ-FE)

Connector E10		
Cav	***Color***	***Function***
1	L	Fuel Injector #10 Control
2	R	Fuel Injector #20 Control
3	Y	Fuel Injector #30 Control
4	W	Fuel Injector #40 Control
5	R/L	Fuel Injector #50 Control
6	W/B	Ground
7	W/B	Ground
8	R/W	Ignition Coil #1 Control
9	P	Ignition Coil #2 Control
10	LG/B	Ignition Coil #3 Control
11	L/Y	Ignition Coil #4 Control
12	G/R	Ignition Coil #5 Control
13	L	Ignition Coil #6 Control
14	-	-
15	R/Y	Intake Air Control Vacuum Switch Valve (ACIS)
16	Y/B	Transmission Solenoid SLT (-)
17	Y/R	Transmission Solenoid SLT (+)
18	Y	EGR, TPS, VPS Sensor (5-volt Power Source)
19	G/B	Engine Coolant Temperature Sensor (ECT) Signal
20	L/B	Intake Air Temperature Sensor (IAT) Signal
21	LG	Throttle Position Sensor (TPS) Signal
22	-	-
23	W/R	Ignition Confirmation Signal (IGF)
24	-	-
25	W	Intake Air Control Vacuum Switch Valve #2 (AICV)
26	-	-
27	R	Crankshaft Position Sensor Signal (+)
28	BR	TPS, ECT, IAT, EGR, TFT Sensor (Ground)
29	GR/Y	EGR Gas Temperature Sensor Signal
30	G or G/R	Transmission Fluid Temperature Sensor Signal
31	B/R	Throttle Position Sensor 2 Fault Detection
32	-	-
33	-	-
34	G	Crankshaft/Camshaft Position Sensor Signal (-)



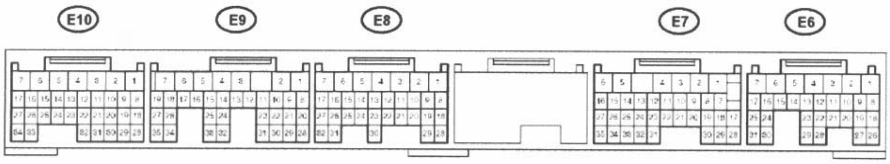
2004-2005 Toyota Camry I-4 2.4L (2AZ-FE)

Connector E6		
Cav	***Color***	***Function***
1	B/R	Switched Power Source of ECM (From C/OPN Relay)
2	L/R	Battery Voltage (Hot All Times)
3	B/Y	Battery Voltage (Hot All Times)
4	-	-
5	B/O	Tachometer
6	B/R	Switched Power Source of ECM (From C/OPN Relay)
7	-	-
8	B/W	EFI Relay (Control)
9	B/O	Ignition Switch (Switched Voltage)
10	G/R	Fuel Pump Relay Control
11	W	Data Link Connector SIL (Pin #7)
12	G	Electric Load (Tail Light Switch)
13	B/Y	Electric Load 2 (Defroster Relay)
14	P/B	Data Link Connector TC (Pin #13)
15	BR	Ground
16	G/O	Transmission Control Switch
17	BR/W	Skid Control ECU
18	G/R	MIL
19	R	Data Link Connector WFSE (Pin 15)
20	-	-
21	P	Fuel Tank Pressure (FTP) Sensor (Signal)
22	L/Y	Accelerator Pedal Position Sensor (Engine Control Signal)
23	W/R	Accelerator Pedal Postion Sensor 2 (Fault Detection Signal)
24	W	Eng + (Engine ECM to Skid Control ECU Signal)
25	G	TRC + (Skid Control ECU to Engine Control ECM Signal)
26	R	Accelerator Pedal Position Sensor 2 (5-Volt Power Source)
27	B/R	Accelerator Pedal Position Sensor (5-Volt Power Source)
28	LG/B	Accelerator Pedal Position Sensor 2 (Ground)
29	L/G	Accelerator Pedal Position Sensor (Ground)
30	B	Eng - (Engine ECM to Skid Control ECU Signal)
31	L	TRC - (Skid Control ECU to Engine Control ECM Signal)



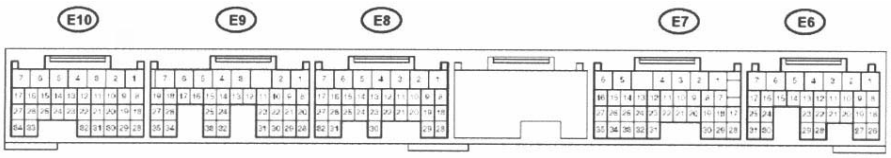
2004-2005 Toyota Camry I-4, 2.4L (2AZ-FE)

Connector E7		
Cav	***Color***	***Function***
1	BR or L/B	A/C Pressure Switch
2	-	-
3	L	HO2S (A/F Sensor) Heater Control Bank 1 Sensor 1
4	L	HO2S Heater Control Bank 1 Sensor 1
5	-	-
6	-	-
7	O	OD Light
8	Y	Manual Low Input (MLP)
9	L/W	Drive 2 Input (MLP)
10	W/L	Drive Input (MLP)
11	R/B	Reverse Input (MLP)
12	-	-
13	P/L	Cruise Control
14	Y/G	THWO
15	-	xxxx
16	-	-
17	V/W	Speed Signal from Combination Meter
18	-	-
19	G/W	Stop Light Switch
20	L/W	Drive 2 Input (MLP)
21	-	-
22	-	-
23	-	-
24	W	Cruise Control
25	-	-
26	L/B	Anti-Theft System
27	R/L	Anti-Theft System
28	-	-
29	-	-
30	-	-
31	P/L or W	A/C System
32	Y/B or L/W	A/C System
33	B or Y/B	A/C System
34	-	-
35	-	-



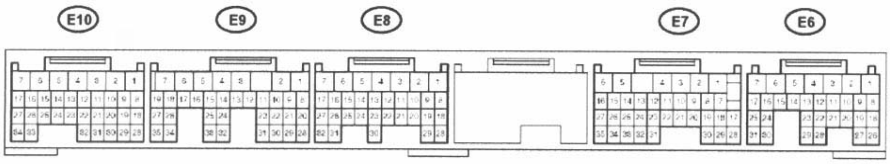
2004-2005 Toyota Camry I-4, 2.4L (2AZ-FE)

Connector E8		
Cav	***Color***	***Function***
1	BR	Ground
2	W	Throttle Motor (-)
3	B	Throttle Motor (+)
4	W/B	Ground
5	-	-
6	B/L	Vacuum Switch Valve for Active Control Engine Mount
7	W/B	Ground
8	G/W	Cooling Fan System
9	-	-
10	R/W	Power Steering Pressure Switch
11	-	-
12	-	-
13	L/W	Camshaft Timing Oil Control Valve #2 (-)
14	L/R	Camshaft Timing Oil Control Valve #2 (+)
15	G/R	Camshaft Timing Oil Control Valve #1 (-)
16	G/B	Camshaft Timing Oil Control Valve #1 (+)
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-
23	W/L	A/C Clutch Lock Sensor
24	G	Crankshaft/Camshaft Position Sensor (-)
25	R	Crankshaft Position Sensor (+)
26	W/R or W/B	Camshaft Position Sensor #2 (+)
27	Y	Camshaft Position Sensor #1 (+)
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-



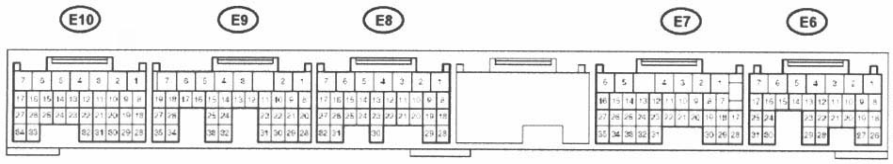
2004-2005 Toyota Camry I-4, 2.4L (2AZ-FE)

Connector E9		
Cav	***Color***	***Function***
1	B	Knock Sensor #1 Signal (3.0L & 3.3L Engine)
2	W	Knock Sensor #2 Signal (3.0L Engine)
2	R	Knock Sensor #2 Signal (3.3L Engine)
3	G	Fuel Injector #60 Control
4	B/R	HO2S Heater Control Bank 2 Sensor 1
5	-	-
6	W/B	Ground
7	W/B	Ground
8	-	-
9	GR	Transmission Solenoid SR
10	L	Transmission Solenoid S4
11	Y	Transmission Solenoid DSL
12	Y/B	Transmission Solenoid SLT (-)
13	Y/R	Transmission Solenoid SLT (+)
14	L/R	Transmission Solenoid SL2 (-)
15	L/Y	Transmission Solenoid SL2 (+)
16	G/R	Transmission Solenoid SL3 (-)
17	G/B	Transmission Solenoid SL3 (+)
18	B/W	Transmission Solenoid SL1 (-)
19	R/B	Transmission Solenoid SL1 (+)
20	G	Knock Sensor #2 Ground (3.3L Engine)
21	W	HO2S Bank 1 Sensor 2 Signal (+)
22	BR	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (+)
23	O	HO2S Bank 2 Sensor 1 Signal (+)
24	-	-
25	L	HO2S Bank 1 Sensor 2 Heater Control
26	R	Counter Shaft Speed Sensor (NC+)
27	L	Turbine Shaft Speed Sensor (NT+)
28	W	Knock Sensor #1 Ground (3.3L Engine)
29	B	HO2S Bank 2 Sensor 2 Signal (+)
30	B/R	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (-)
31	W	HO2S Bank 2 Sensor 1 Signal (-)
32	G	Transmission Fluid Temperature Sensor (Signal)
33	Y	HO2S Bank 2 Sensor 2 Heater Control
34	G	Counter Shaft Speed Sensor (NC-)
35	LG	Turbine Shaft Speed Sensor (NT-)



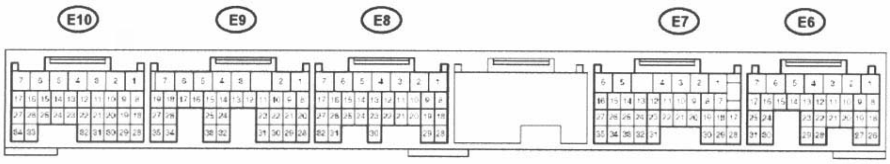
2004-2005 Toyota Camry I-4, 2.4L (2AZ-FE)

Connector E10		
Cav	***Color***	***Function***
1	L	Fuel Injector #10 Control
2	R	Fuel Injector #20 Control
3	Y	Fuel Injector #30 Control
4	W	Fuel Injector #40 Control
5	R/L	Fuel Injector #50 Control
6	W/B	Ground
7	W/B	Ground
8	R/W	Ignition Coil #1 Control
9	P	Ignition Coil #2 Control
10	LG/B	Ignition Coil #3 Control
11	L/Y	Ignition Coil #4 Control
12	G/R	Ignition Coil #5 Control
13	L	Ignition Coil #6 Control
14	Y/G	Intake Air Control Vacuum Switch Valve #2 (AICV 3.0L)
15	R/Y	Intake Air Control Vacuum Switch Valve (ACIS 3.0 & 3.3L)
16	B/Y	Park/Neutral Position Switch Input
17	B/W	Starter Signal
18	Y	TPS, FTP Sensor (5 Volt Power Source)
19	G/B	Engine Coolant Temperature Sensor (ECT) Signal
20	L/B	Intake Air Temperature Sensor (IAT) Signal
21	LG	Throttle Position Sensor (TPS) Signal
22	-	-
23	W/R	Ignition Confirmation Signal (IGF)
24	-	-
25	-	-
26	-	-
27	L	EVAP Vacuum Switch Valve (Canister Vent Valve)
28	BR	TPS, ECT, IAT Sensor (Ground)
29	L/W	Mass Air Flow (MAF) Sensor (Ground)
30	R	Mass Air Flow (MAF) Sensor (Signal)
31	B/R	Throttle Position Sensor (TPS) Fault Detection
32	-	-
33	W	Air Intake Control Vacuum Switch Valve
34	LG	EVAP Vacuum Switch Valve (Canister Purge Valve)



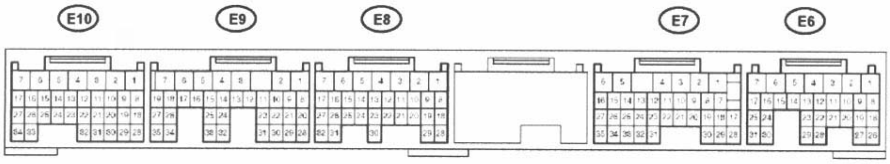
2004-2006 Toyota Camry V-6 3.0L (1MZ-FE) and 3.3L (3MZ-FE)

Connector E6		
Cav	***Color***	***Function***
1	B/R	Power Source of ECM (From Relay)
2	B/R	Power Source of ECM (From Relay)
3	B/Y	Battery Voltage (Keep Alive Memory)
4	-	-
5	B/O	Tachometer
6	-	-
7	-	-
8	B/W	EFI Relay (Control)
9	B/O	Ignition Switch (Switched Voltage)
10	G/R	Fuel Pump Control
11	G/R	MIL
12	G	Electric Load (Tail Light Switch)
13	B/Y	Electric Load 2 (Defroster Relay)
14	B or L	Supplemental Restraint System
15	BR	Ground
16	G/O	Transmission Control Switch
17	BR/W	Skid Control ECU
18	W	Data Link Connector SIL (Pin 7)
19	R	Data Link Connector WFSE (Pin 15)
20	P/B	Data Link Connector TC (Pin 13)
21	P	Fuel Tank Vapor Pressure (FTP) Sensor (Signal)
22	L/Y	Accelerator Pedal Position Sensor (Engine Control Signal)
23	W/R	Accelerator Pedal Position Sensor 2 (Fault Detection Signal)
24	W	Eng + (Engine ECM to Skid Control ECU Signal)
25	G	TRC + (Skid Control ECU to Engine Control ECM Signal)
26	R	Accelerator Pedal Position Sensor 2 (5-Volt Power Source)
27	B/R	Accelerator Pedal Position Sensor (5-Volt Power Source)
28	LG/B	Accelerator Pedal Position Sensor 2 (Ground)
29	L/G	Accelerator Pedal Position Sensor (Ground)
30	B	Eng - (Engine ECM to Skid Control ECU Signal)
31	L	TRC - (Skid Control ECU To Engine Control ECM Signal)



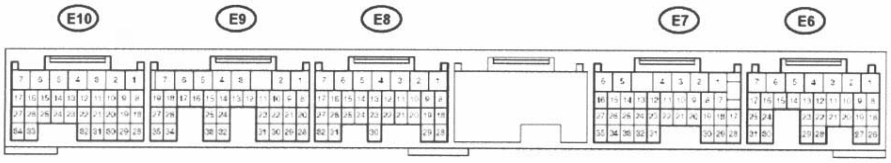
2004-2006 Toyota Camry V-6 3.0L (1MZ-FE) and 3.3L (3MZ-FE)

Connector E7		
Cav	***Color***	***Function***
1	BR or L/B	A/C Pressure Switch
2	L/W	A/C System
3	-	-
4	-	-
5	-	-
6	L/R	Battery Voltage (Hot All Times)
7	O	OD Light
8	L/B	Manual Low Dash Board Indicator
9	Y	Manual Low Input (MLP)
10	W/L	Drive Input (MLP)
11	R/B	Reverse Input (MLP)
12	R/B	Cruise Control (Stop Light Switch Opposite of Stop)
13	P/L	Cruise Control
14	Y/G	THWO
15	-	-
16	-	-
17	V/W	Speed Signal from Combination Meter
18	-	-
19	G/W	Stop Light Switch
20	L/W	Drive 2 Input (MLP)
21	-	-
22	-	-
23	-	-
24	W	Cruise Control
25	-	-
26	L/B	Anti-Theft System
27	R/L	Anti-Theft System
28	-	-
29	-	-
30	-	-
31	P/L or W	A/C System
32	Y/B or L/W	A/C System
33	B or Y/B	A/C System
34	-	-
35	-	-



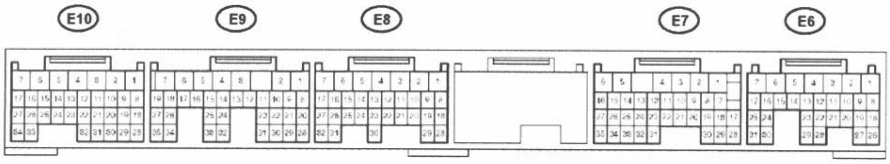
2004-2006 Toyota Camry V-6 3.0L (1MZ-FE) and 3.3L (3MZ-FE)

Connector E8		
Cav	***Color***	***Function***
1	BR	Ground
2	W	Throttle Motor (-)
3	B	Throttle Motor (+)
4	W/B	Ground
5	-	-
6	B/L	Vacuum Switch Valve for Active Control Engine Mount
7	W/B	Ground
8	G/W	Cooling Fan System
9	-	-
10	R/W	Power Steering Pressure Switch
11	-	-
12	-	-
13	L/W	Camshaft Timing Oil Control Valve #2 (-)
14	L/R	Camshaft Timing Oil Control Valve #2 (+)
15	G/R	Camshaft Timing Oil Control Valve #1 (-)
16	G/B	Camshaft Timing Oil Control Valve #1 (+)
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-
23	W/L	A/C Clutch Lock Sensor
24	G	Crankshaft/Camshaft Position Sensor (-)
25	R	Crankshaft Position Sensor (+)
26	W/R or W/B	Camshaft Position Sensor #2 (+)
27	Y	Camshaft Position Sensor #1 (+)
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-



2004-2006 Toyota Camry V-6 3.0L (1MZ-FE) and 3.3L (3MZ-FE)

Connector E9		
Cav	***Color***	***Function***
1	B	Knock Sensor #1 Signal (3.0L & 3.3L Engine)
2	W	Knock Sensor #2 Signal (3.0L Engine)
2	R	Knock Sensor #2 Signal (3.3L Engine)
3	G	Fuel Injector #60 Control
4	B/R	HO2S Heater Control Bank 2 Sensor 1
5	B/W	HO2S (A/F Sensor) Heater Control Bank 1 Sensor 1
6	W/B	Ground
7	W/B	Ground
8	-	-
9	GR	Transmission Solenoid SR
10	L	Transmission Solenoid S4
11	Y	Transmission Solenoid DSL
12	Y/B	Transmission Solenoid SLT (-)
13	Y/R	Transmission Solenoid SLT (+)
14	L/R	Transmission Solenoid SL2 (-)
15	L/Y	Transmission Solenoid SL2 (+)
16	G/R	Transmission Solenoid SL3 (-)
17	G/B	Transmission Solenoid SL3 (+)
18	B/W	Transmission Solenoid SL1 (-)
19	R/B	Transmission Solenoid SL1 (+)
20	G	Knock Sensor #2 Ground (3.3L Engine)
21	W	HO2S Bank 1 Sensor 2 Signal (+)
22	BR	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (+)
23	O	HO2S Bank 2 Sensor 1 Signal (+)
24	-	-
25	L	HO2S Bank 1 Sensor 2 Heater Control
26	R	Counter Shaft Speed Sensor (NC+)
27	L	Turbine Shaft Speed Sensor (NT+)
28	W	Knock Sensor #1 Ground (3.3L Engine)
29	B	HO2S Bank 2 Sensor 2 Signal (+)
30	B/R	HO2S (A/F Sensor) Bank 1 Sensor 1 Signal (-)
31	W	HO2S Bank 2 Sensor 1 Signal (-)
32	G	Transmission Fluid Temperature Sensor (Signal)
33	Y	HO2S Bank 2 Sensor 2 Heater Control
34	G	Counter Shaft Speed Sensor (NC-)
35	LG	Turbine Shaft Speed Sensor (NT-)



2004-2006 Toyota Camry V-6 3.0L (1MZ-FE) and 3.3L (3MZ-FE)

Connector E10		
Cav	***Color***	***Function***
1	L	Fuel Injector #10 Control
2	R	Fuel Injector #20 Control
3	Y	Fuel Injector #30 Control
4	W	Fuel Injector #40 Control
5	R/L	Fuel Injector #50 Control
6	W/B	Ground
7	W/B	Ground
8	R/W	Ignition Coil #1 Control
9	P	Ignition Coil #2 Control
10	LG/B	Ignition Coil #3 Control
11	L/Y	Ignition Coil #4 Control
12	G/R	Ignition Coil #5 Control
13	L	Ignition Coil #6 Control
14	Y/G	Intake Air Control Vacuum Switch Valve #2 (AICV 3.0L)
15	R/Y	Intake Air Control Vacuum Switch Valve (ACIS 3.0 & 3.3L)
16	B/Y	Park/Neutral Position Switch Input
17	B/W	Starter Signal
18	Y	TPS, FTP Sensor (5 Volt Power Source)
19	G/B	Engine Coolant Temperature Sensor (ECT) Signal
20	L/B	Intake Air Temperature Sensor (IAT) Signal
21	LG	Throttle Position Sensor (TPS) Signal
22	-	-
23	W/R	Ignition Confirmation Signal (IGF)
24	-	-
25	-	-
26	-	-
27	L	EVAP Vacuum Switch Valve (Canister Closed Valve)
28	BR	TPS, ECT, IAT Sensor (Ground)
29	L/W	Mass Air Flow (MAF) Sensor (Ground)
30	R	Mass Air Flow (MAF) Sensor (Signal)
31	B/R	Throttle Position Sensor (TPS) Fault Detection
32	-	-
33	W	Air Intake Control Vacuum Switch Valve
34	LG	EVAP Vacuum Switch Valve (Canister Purge Valve)