DTC	P0441	EVAPORATIVE EMISSION CONTROL SYSTEM INCORRECT PURGE FLOW

DTC	P0446	EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT

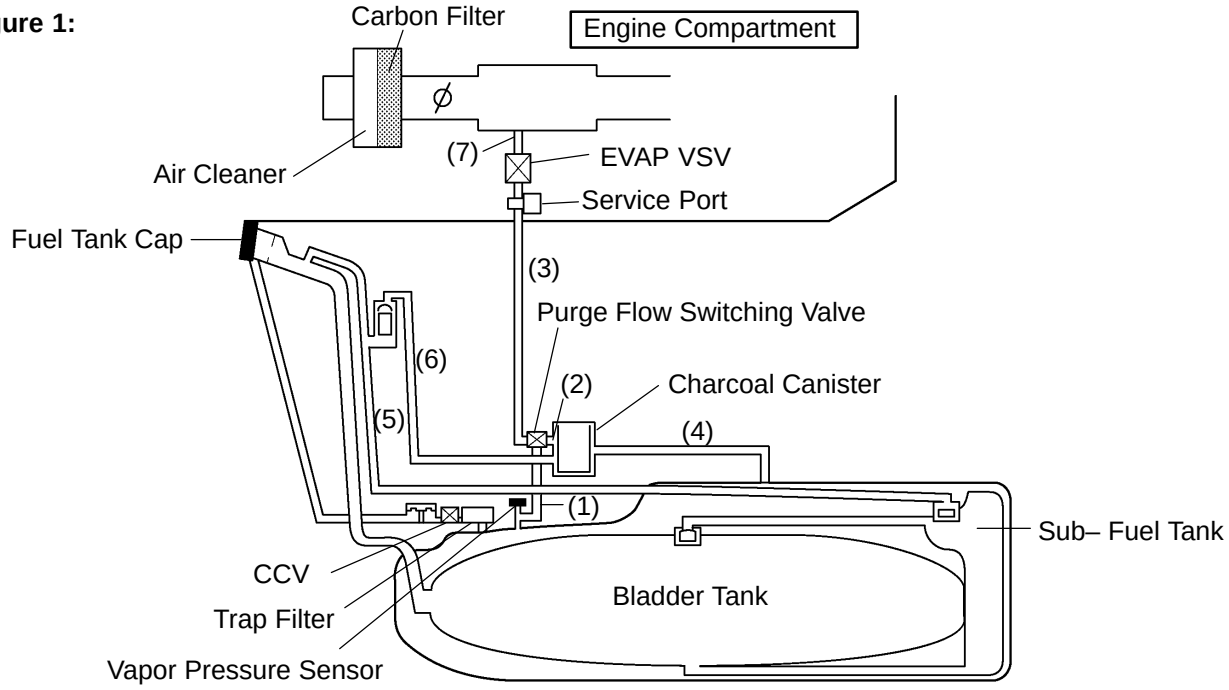
CIRCUIT DESCRIPTION

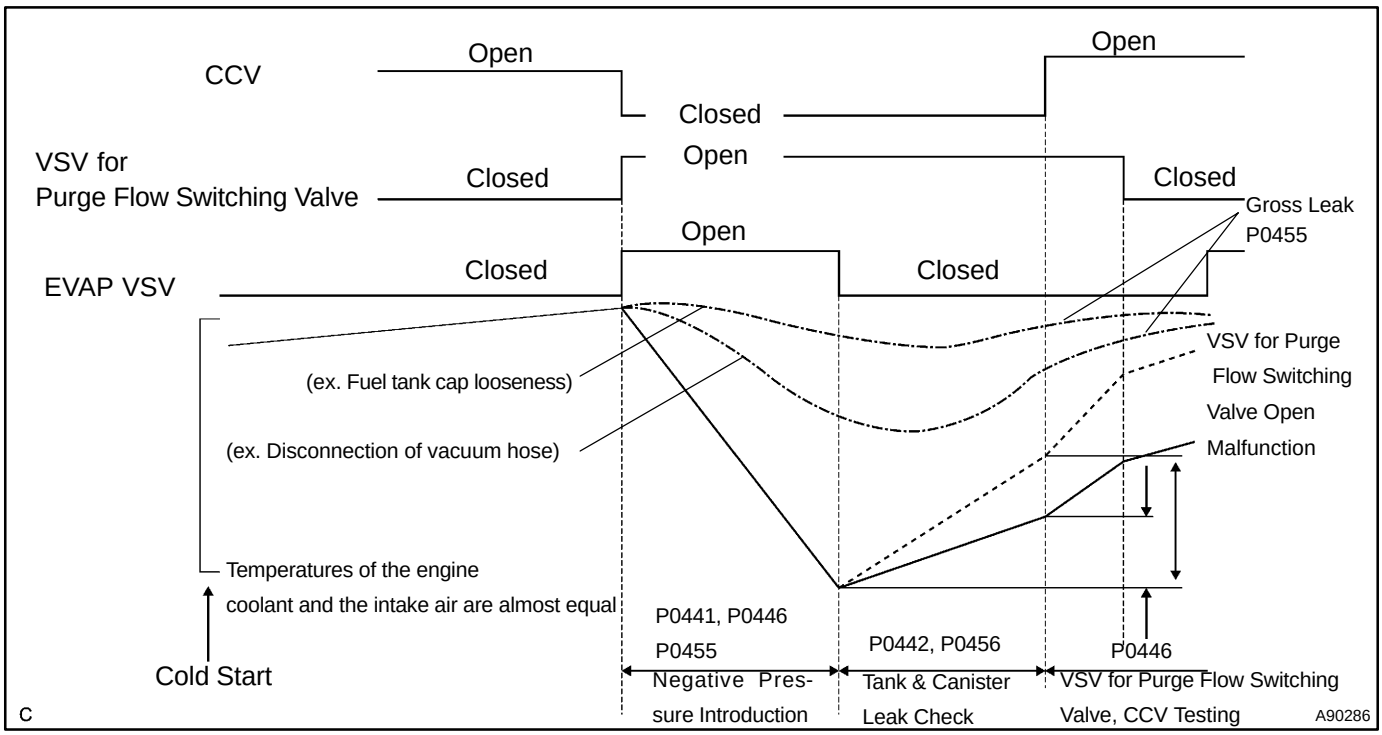
The vapor pressure sensor and VSV for canister closed valve (CCV) are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.

DTCs P0441 and P0446 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in figure 1 below, or when there is malfunction in either the EVAP VSV or the vapor pressure sensor itself.

Figure 1:





DTC No.	DTC Detection Condition	Trouble Area
P0441	• Pressure in charcoal canister and fuel tank does not drop during purge control (2 trip detection logic) • During purge cut–off, pressure is very low compared with atmospheric pressure (2 trip detection logic)	• Fuel tank cap is incorrectly installed • Fuel tank cap is cracked or damaged • Vacuum hose is cracked, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6) and (7) in fig. 1) • Open or short in vapor pressure sensor circuit • Vapor pressure sensor • Open or short in EVAP VSV circuit • EVAP VSV • Open or short in CCV circuit • CCV • Open or short in VSV for purge flow switching valve circuit • VSV for purge flow switching valve • Fuel tank is cracked or damaged • Charcoal canister is cracked or damaged • Fuel tank over fill check valve is cracked or damaged • ECM
P0446	• No rise in fuel tank pressure when commanding the CCV to open after an EVAP leak test • No change in fuel tank pressure when commanding the pressure switching valve to close after an EVAP leak test • A high negative pressure (vacuum) does not occur in the system when commanding the EVAP VSV to open with the CCV closed	• Fuel tank cap is incorrectly installed • Fuel tank cap is cracked or damaged • Vacuum hose is cracked, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6) and (7) in Fig. 1) • Open or short in vapor pressure sensor circuit • Vapor pressure sensor • Open or short in EVAP VSV circuit • EVAP VSV • Open or short in CCV circuit • CCV • Open or short in VSV for purge flow switching valve circuit • VSV for purge flow switching valve • Fuel tank is cracked or damaged • Charcoal canister is cracked or damaged • Fuel tank over fill check valve is cracked or damaged • ECM

HINT:
Typical DTC output of each trouble part.

Trouble Part	Trouble Condition	Typical DTC Output (*1)
—	Small Leak	P0442 and/or P0456 (*2)
—	Medium Leak (ex: Vacuum hose looseness)	P0455
—	Large Leak (ex: Fuel tank cap looseness)	P0441 and P0455 and P0446
EVAP VSV	Open Malfunction	P0441
EVAP VSV	Close Malfunction	P0441 and P0446 and P0455
CCV	Open Malfunction	P0441 and P0446 and P0455
CCV	Close Malfunction	P0446
VSV for Purge Flow Switching	Open Malfunction	P0446
VSV for Purge Flow Switching	Close Malfunction	P0441 and P0446 and P0455

*1: ECM may output some other DTCs combination.
*2: Refer to P0442 and P0456 on page 05–231.

MONITOR DESCRIPTION

The ECM tests the evaporative emissions (EVAP) system using the fuel tank pressure sensor, the canister close valve (CCV), and the EVAP VSV. The ECM closes the EVAP system and introduces negative pressure (vacuum) into it. The ECM then monitors the internal pressure using the fuel tank pressure sensor.

P0441

The ECM checks for a stuck closed malfunction in the EVAP VSV by commanding it to open with the CCV closed. If a high negative pressure does not develop in the fuel tank, the ECM determines that the EVAP VSV remains closed. The ECM turns on the MIL and a DTC is set.
The ECM checks for EVAP VSV ”stuck open” fault by commanding both valves (EVAP VSV and CCV) to close at a time when the fuel tank is at atmospheric pressure. If the fuel tank develops a high negative pressure at this early stage of the test, the ECM determines that the EVAP VSV has stuck OPEN.
The ECM will turn on the MIL and a DTC is set.

P0446

If there is malfunction detected in the VSV for evaporative emission (EVAP), the canister closed valve (CCV) and the VSV for purge flow switching valve; the ECM will illuminate the MIL and set a DTC.
This portion of the EVAP diagnosis checks the following EVAP system functions:

(a) CCV stuck closed.
The ECM checks for a CCV ”stuck closed” malfunction by commanding the CCV to open after an EVAP leak test. If the fuel tank pressure does not rise (lose vacuum), the ECM determines that the CCV has stuck closed. The ECM will turn on the MIL and a DTC is set.

(b) VSV for purge flow switching valve stuck closed.
The ECM checks for a VSV for purge flow switching valve ”stuck closed” malfunction by commanding the VSV for purge flow switching valve to close after an EVAP leak test. If the fuel tank pressure does not change, the ECM determines that the VSV for purge flow switching valve is malfunctioning. The ECM will turn on the MIL and a DTC is set.

(c) EVAP VSV (Purge line to intake manifold) stuck closed.
The ECM checks for a stuck closed malfunction in the EVAP VSV by commanding it to open with the CCV closed. If a high negative pressure does not develop in the fuel tank, the ECM determines that the EVAP VSV remains closed. The ECM turns on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0441: EVAP VSV malfunction P0446: Canister close valve stuck malfunction
Required sensors/components	Main: Vapor pressure sensor Related: Engine coolant temperature sensor, intake air temperature sensor, vehicle speed sensor
Frequency of operation	Once per driving cycle
Duration	90 seconds: EVAP VSV malfunction 10 seconds: Canister close valve malfunction
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0441: EVAP VSV malfunction

The monitor will run whenever the following DTCs are not present	See page 05–20
Battery voltage	11 V or more
Altitude	Less than 2,400 m (8,000 ft)
Intake air temperature (IAT)	10 °C (50 °F) or more
Intake air temperature (IAT) at engine start	Between 10 °C (50 °F) and 35 °C (92 °F)
Engine coolant temperature (ECT) at engine start	Between 10 °C (50 °F) and 35 °C (92 °F)
Intake air temperature at engine start compared with engine coolant temperature	Maximum of 7°C (12.6°F) lower or 11.1°C (19.9°F) higher
EVAP VSV and CCV malfunction	Not detected
Time after engine start	Less than 60 minutes
Vehicle speed	Less than 130 km/h
Fuel slosh	No sloshing, i.e. fairly smooth road
MAF	No great change
Fuel tank pressure change	Minimal change

P0446: Canister close valve stuck, Purge flow switching valve malfunction

The monitor will run whenever the following DTCs are not present	See page 05–20
Battery voltage	11 V or more
Altitude	Less than 2,400 m (8,000 ft)
Intake air temperature (IAT)	10 °C (50 °F) or more
Intake air temperature (IAT) at engine start	CCV stuck open malfunction: Between 10 °C (50 °F) and 35 °C (92 °F) CCV stuck close malfunction: 4.4 °C (39.9 °F) or more Purge flow switching valve malfunction: Between 10 °C (50 °F) and 35 °C (92 °F)
Engine coolant temperature (ECT) at engine start	CCV stuck open malfunction: Between 10 °C (50 °F) and 35 °C (92 °F) CCV stuck close malfunction: 4.4 °C (39.9 °F) or more Purge flow switching valve malfunction: Between 10 °C (50 °F) and 35 °C (92 °F)
Intake air temperature at engine start compared with engine coolant temperature	Maximum of 7°C (12.6°F) lower or 11.1°C (19.9°F) higher
EVAP VSV and CCV malfunction	Not detected
Time after engine start	Less than 60 minutes
Vehicle speed	Less than 130 km/h
Fuel slosh	No sloshing, i.e. fairly smooth road
MAF	No great change
Fuel tank pressure change	Minimal change

TYPICAL MALFUNCTION THRESHOLDS

P0441: EVAP VSV malfunction

A. Following conditions are met:	(a) and (b)
(a) Fuel tank pressure at the vacuum introduction start	Less than –2.66 kPa (–20 mmHg)
(b) Difference between the fuel tank pressure at the vacuum introduction start and completion	Less than 0.93 kPa (7 mmHg)
B. Following conditions are met:	(a) and (b)
(a) Time after fuel tank pressure measurement start	9 seconds
(b) Fuel tank pressure	Less than –1.3 kPa (–10 mmHg)

P0446: Canister close valve stuck malfunction

Either of following conditions is met:	1 or 2
1. EVAP VSV monitoring	Stuck close malfunction
2. Following conditions (a) and (b) are met:	4 seconds
(a) Accumulated purge volume	0.5 g or more
(b) Fuel tank pressure	Less than –1.4 kPa
3. Following conditions are met:	(a) and (b)
(a) Fuel tank pressure difference between before and after switching canister bypass valve	–0.267 kPa or more
(b) Fuel tank pressure	More than –2.667 kPa

P0446: Purge flow switching valve malfunction

1. Following conditions are met:	(a) and (b)
(a) Fuel tank pressure difference between before and after switching canister bypass valve	–0.267 kPa or more
(b) Fuel tank pressure	More than –2.667 kPa

MONITOR RESULT (MODE 06 DATA)

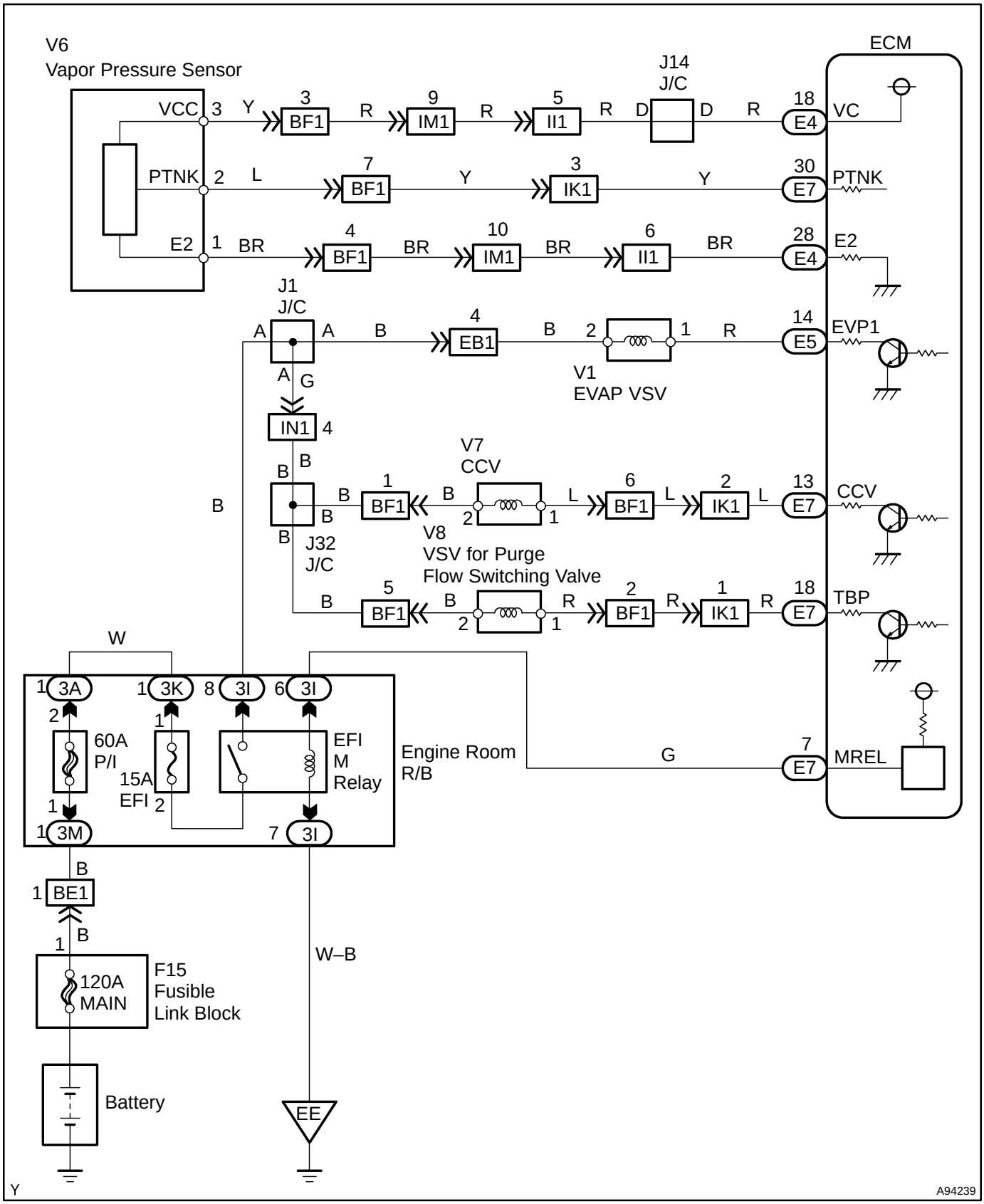
Test ID/Comp ID	Description of Test Data	Description of Test Limit	Conversion Factor (Unit)
$02/$81	Tank pressure change value during vacuum introduction of the EVAP system	Malfunction criteria for the EVAP VSV	Multiply by 0.001 (kPa)
$02/$82	Tank pressure change value at switching over the canister close valve	Malfunction criteria for canister close valve	Multiply by 100 (ms)
$02/$05	Pressure difference at switching over the canister bypass valve (open stuck is detected by the time threshold, but the time is converted to appropriate pressure value)	Malfunction criteria for the canister bypass valve	Multiply by 0.001 (kPa)

Refer to page 05–26 for detailed information on Checking Monitor Status.

*The ECM operates the purge VSV and the CCV as the following chart when the EVAP system is being monitored.

EVAP system condition	Purge VSV	CCV	EVAP (FTP) pressure
Before negative pressure introduction	Closed (OFF)	Open (OFF)	Positive
During negative pressure introduction	Open (ON)	Closed (OFF)	Intake manifold pressure is applied to EVAP system
After negative pressure introduction	Closed (OFF)	Open (OFF)	Negative

WIRING DIAGRAM

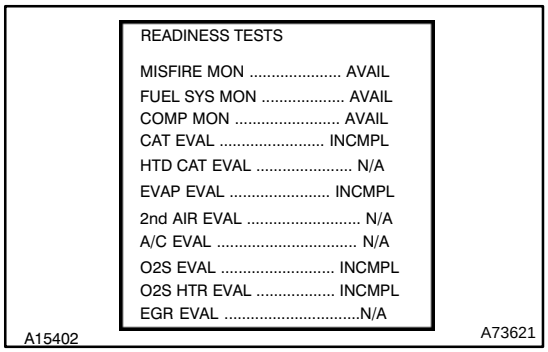


CONFIRMATION READINESS TEST

First Trip Procedure

(a) The vehicle must be cold and the ambient air temperature must be approximately 10° (50°) to 35°C (95°F).

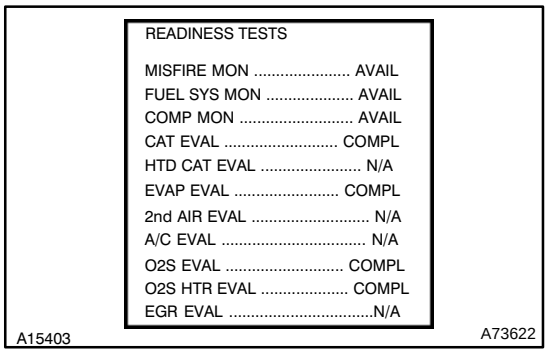
(b) The Intake Air Temperature (IAT) and the Engine Coolant Temperature (ECT) sensors indicate almost the same value.



(c) Clear the DTCs (see page 05–41).
- READINESS TESTS will show INCMPL (incomplete).

(d) Drive the vehicle on a freeway. Write down the initial status of the READINESS TESTS. As each Readiness Test passes EVAP evaluation monitors, its status will change to COMPL (complete). This procedure may take approximately 20 minutes or more.

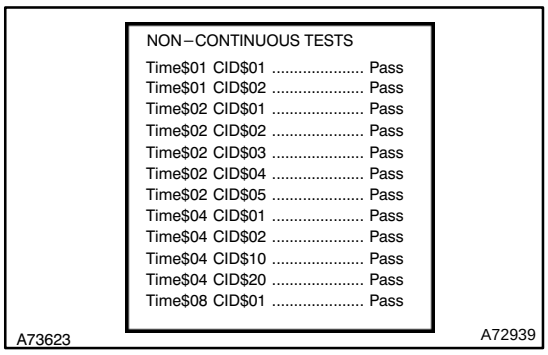
NOTICE:
Do not shut off the engine – the results will be invalid.



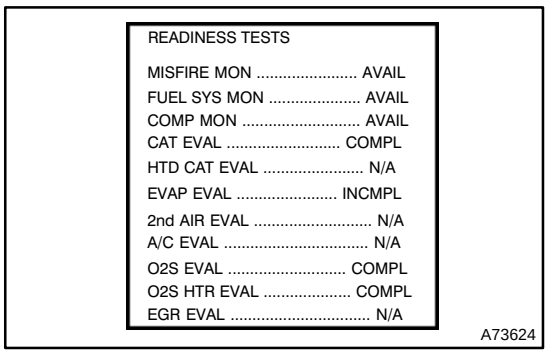
Pass Condition – No problem Found by the ECM

If the EVAP evaluation monitor shows COMPL, go to the NON–CONTINUOUS TESTS screen.
- Enter the following menus: ADVANCED OBD II / ONBOARD TESTS / NON–CONTINUOUS.

NOTICE:
Do not shut off the engine – the results will be invalid.

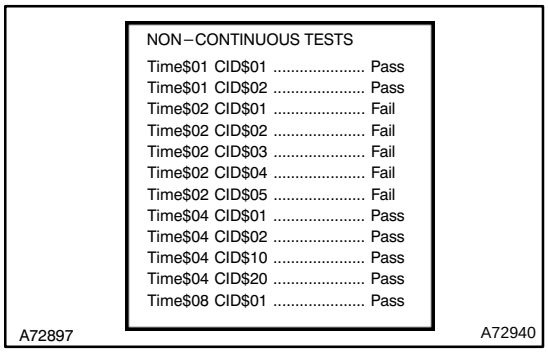


If all of the tests in the ”Time $02” category show ”Pass”, the EVAP evaluation monitor detected no problem.



Fail Condition – Problem Detected by the ECM

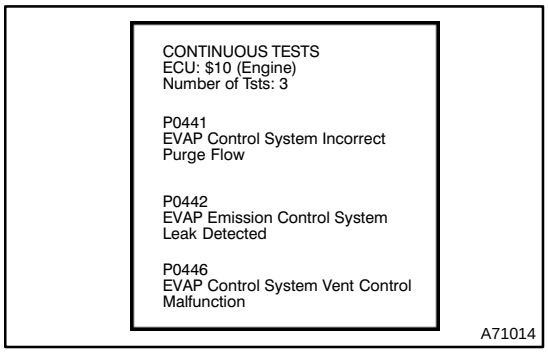
If the EVAP evaluation monitor shows COMPL, go to the NON–CONTINUOUS TESTS screen.



(1) If all tests show ”Pass”, one of the following may has occurred:
- The EVAP evaluation monitor did not operate.
- The EVAP evaluation monitor did not finish its tests.
- The ECM has withheld judgement.

(2) If one or more of the tests in the time $02 category show ”Fail”, the EVAP evaluation monitor did operate and the ECM detected a problem.

(3) Go to the CONTINUOUS TESTS screen. This is the only place DTCs are listed for the first trip.



NOTICE:

The listed DTCs may be invalid. A second trip is needed to confirm listed DTCs.

Second Trip Procedure

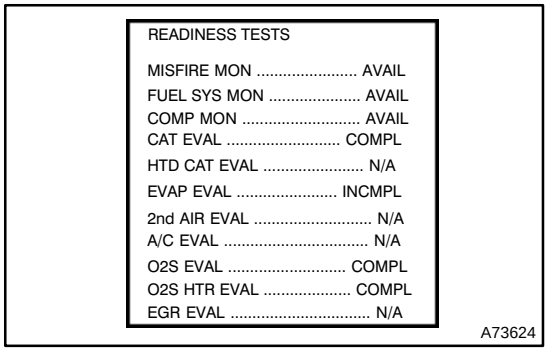
(e) The vehicle must be cold, and the ambient air temperature must be approximately 50 to 95˚F.

(f) Go to the READINESS TESTS screen.

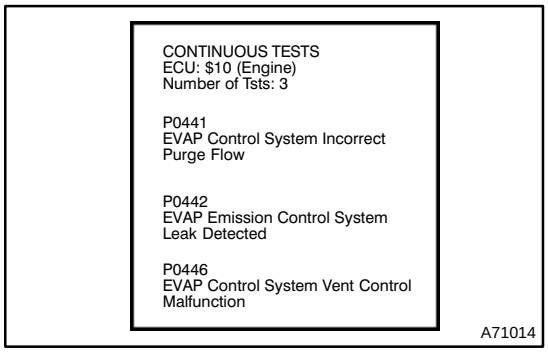
(g) Drive the vehicle on a freeway. Write down the initial status of the READINESS TESTS. This procedure may take approximately 20 minutes or more.

NOTICE:

Do not shut off the engine – the results will be invalid.



(h) If the READINESS TESTS change to COMPL, the EVAP evaluation monitor has operated. Check for any stored DTCs.
- If a DTC was stored, the problem has been detected and confirmed by the ECM.
- If no DTC was found, the EVAP monitor operated but no problem was detected.



INSPECTION PROCEDURE

HINT:

- When using the hand–held tester, follow the procedures under the title ”Hand–held tester ” (see next page).
- When using the OBD II scan tool, follow the procedures under the title ”OBD II scan tool (excluding hand–held tester)” (see the procedures after the hand–held tester procedures).
- Always troubleshoot DTCs P0441 (purge flow), P0446 (CCV), P0451, P0452 and P0453 (evaporative pressure sensor) before troubleshooting DTCs P0442 or P0456.
- Ask the customer the following questions:
  1) When the MIL came on, if the fuel tank cap was loose and if it was then tightened.
  2) When refueling, if the fuel tank cap was loose.
  If the fuel tank cap was loose, that is why the DTC was stored.
  If the fuel cap was not loose or if the customer cannot remember, troubleshoot according to the procedures on the following page.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- If the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

DTC Output	Malfunction Indicated	Troubleshooting Procedures	Operation
P0441 only	Open Malfunction of EVAP VSV	Execute steps from 13 to 16	Check and replace of EVAP VSV
P0446 only	Close Malfunction of CCV	Execute steps from 17	Check and replace of CCV
P0442 and/or P0456	Very small or small or medium leak	Refer to DTC P0442 (see page 05–202)	—
P0455 only	Medium leak (for example, vacuum hose is disconnected or hole is about ϕ 2.0)	Refer to DTC P0442 (see page 05–202)	—
P0441, P0455 and P0446	Large leak (for example, fuel tank cap is loose) or VSV malfunction (open malfunction of CCV or close malfunction of EVAP VSV)	Execute steps from 2* and refer to DTC P0442 (see page 05–202)	Inspect fuel tank cap

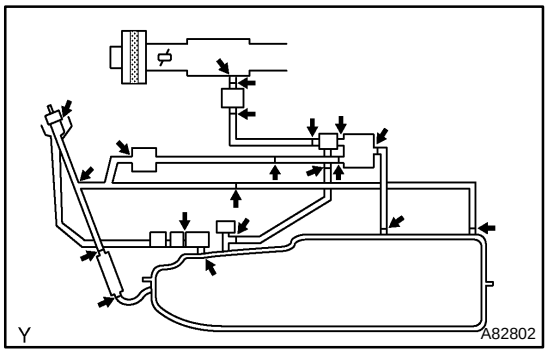
*: In most cases, troubleshooting can be completed by checking if the fuel tank cap was loose, or repairing the CCV or the EVAP VSV.

HINT:

Use the chart above to check the malfunction for each DTC output. Then perform the necessary repairs listed under ”Operation.”

Hand–held tester:

1	CHECK WHETHER THERE ARE SIGNS OF ANY ACCIDENT NEAR FUEL TANK OR CHARCOAL CANISTER



(a) Check if any hoses close to the fuel tank have been modified, and check if there are signs of any accident or damage near the fuel tank or the charcoal canister.
(1) Check the following parts for cracks, deformation or loose connections:
- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around the fuel tank and charcoal canister

NG → **REPAIR OR REPLACE**

OK

2	INSPECT FUEL TANK CAP ASSY(CHECK THAT FUEL TANK CAP MEETS SPECIFICATIONS)

OK: Tank cap meets specifications in the owner's manual.

NG → **REPLACE FUEL TANK CAP ASSY**

OK

3	CHECK THAT FUEL TANK CAP IS CORRECTLY INSTALLED

OK: Tank cap is correctly installed.

NG → **CORRECTLY REINSTALL FUEL TANK CAP**

OK

4	INSPECT FUEL TANK CAP ASSY (See page 12–9)

OK: No deformation on the fuel tank cap.

NG → **REPLACE FUEL TANK CAP ASSY**

OK

5	CHECK FILLER NECK FOR DAMAGE

OK: Filler neck has no damage.

NG → **REPLACE FUEL TANK INLET PIPE SUB–ASSY**

OK

6	CHECK HOSES AND TUBES(VAPOR PRESSURE SENSOR – VSV FOR PURGE FLOW SWITCHING VALVE, CHARCOAL CANISTER – EVAP VSV)

(a) Check that the vacuum hoses are connected correctly.
(b) Check that the vacuum hoses are not loose or disconnected.
(c) Check the vacuum hoses and tubes for cracks, holes, damage, or blockage.

NG → REPAIR OR CONNECT VSV AND SENSOR CONNECTORS

OK

7	CHECK HOSES AND TUBES(FUEL TANK – CHARCOAL CANISTER)

(a) Check the connection between the fuel tank and fuel EVAP pipe, fuel EVAP pipe and under–floor fuel tube, and under–floor fuel tube and charcoal canister.
(b) Check the hose and tube for cracks, holes and damage.

NG → REPAIR OR REPLACE HOSE AND TUBE

OK

8	CHECK EACH CONNECTOR FOR LOOSENESS AND DISCONNECTION(EVAP VSV, CCV, VSV FOR PURGE FLOW SWITCHING VALVE AND VAPOR PRESSURE SENSOR)

NG → REPAIR OR CONNECT VSV AND SENSOR CONNECTORS

OK

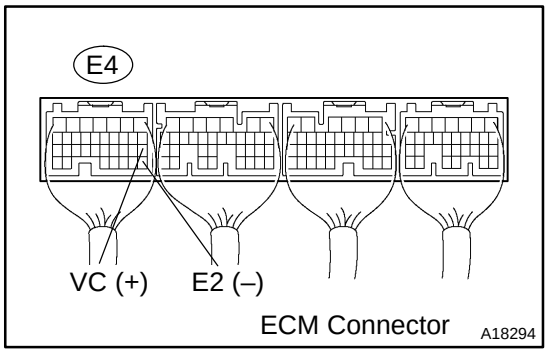
9	CHECK VACUUM HOSES((4), (5), (6) AND (7) IN FIG. 1 IN CIRCUIT DESCRIPTION)

(a) Check that the vacuum hoses are connected correctly.
(b) Check the vacuum hoses for looseness or disconnection.
(c) Check the vacuum hoses for cracks, holes, damage and blockages.

NG → REPAIR OR REPLACE VACUUM HOSES

OK

10 INSPECT ECM(VC VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the specified terminals of the E4 ECM connector.

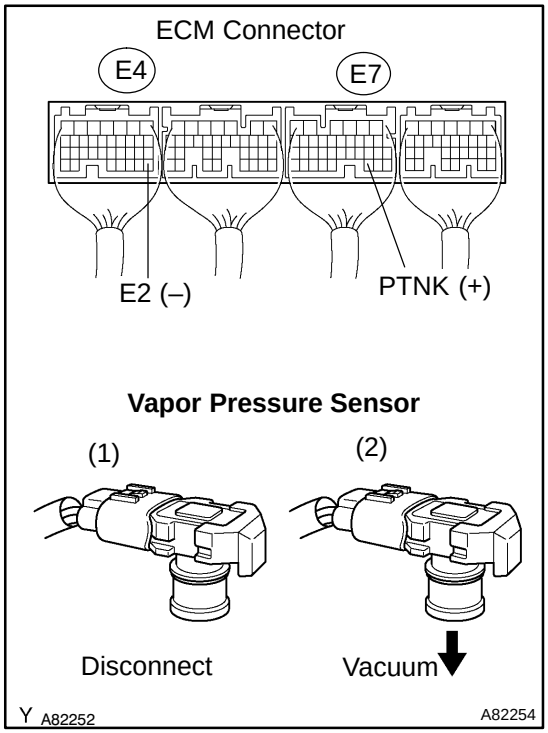
Standard:

Tester Connection	Specified Condition
VC (E4–18) – E2 (E4–28)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10–24)**

OK

11 INSPECT ECM(PTNK VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the specified terminals of the E4 and E7 ECM connectors.
(1) Remove the vapor pressure sensor.

Standard (1):

Tester Connection	Specified Condition
PTNK (E7–30) – E2 (E4–28)	2.9 to 3.7 V

(2) Using the MITYVAC (Hand–Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:
The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

Standard (2):

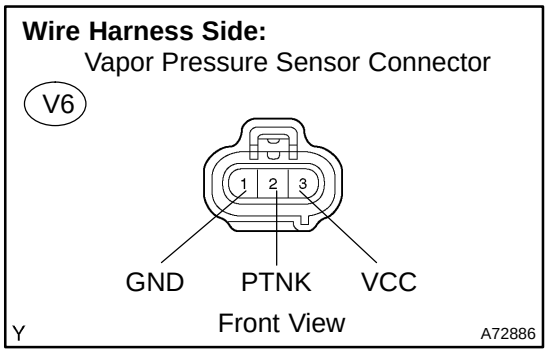
Tester Connection	Specified Condition
PTNK (E7–30) – E2 (E4–28)	0.5 V or less

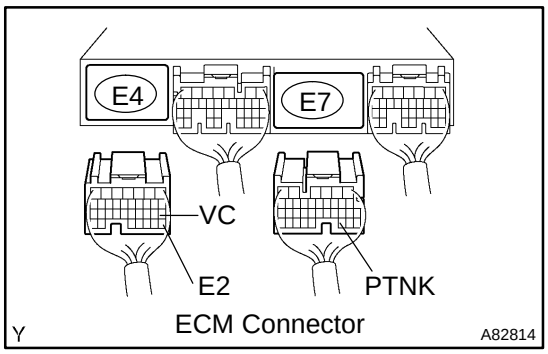
(3) Reinstall the vapor pressure sensor.

OK → **Go to step 13**

NG

12 CHECK HARNESS AND CONNECTOR(VAPOR PRESSURE SENSOR – ECM)





(a) Disconnect the V6 vapor pressure sensor connector.
(b) Disconnect the E4 and E7 ECM connectors.
(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
PTNK (V6–2) – PTNK (E7–30)	Below 1 Ω
GND (V6–1) – E2 (E4–28)	Below 1 Ω
VCC (V6–3) – VC (E4–18)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
PTNK (V6–2) or PTNK (E7–30) – Body ground	10 kΩ or higher
VCC (V6–3) or VC (E4–18) – Body ground	10 kΩ or higher

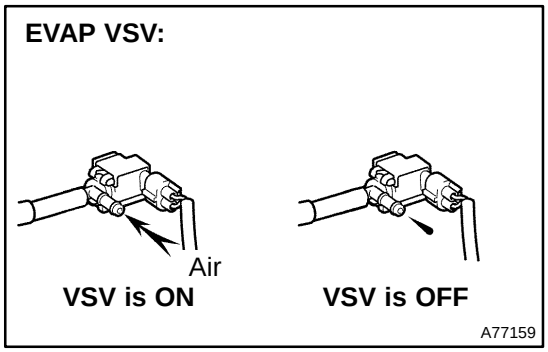
(d) Reconnect the vapor pressure sensor connector.
(e) Reconnect the ECM connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE VAPOR PRESSURE SENSOR ASSY

13 PERFORM ACTIVE TEST BY HAND–HELD TESTER(EVAP VSV PURGE FLOW)



(a) Disconnect the vacuum hose of the EVAP VSV from the charcoal canister.
(b) Put the engine in inspection mode (see page 05–1).
(c) Start the engine.
(d) Select the item: DIAGNOSIS / ENHANCED OBD II / ENGINE AND ECT / ACTIVE TEST / EVAP VSV (press the right or left button).
(e) When the EVAP VSV is operated using the hand–held tester, check whether the disconnected hose applies suction to your finger.

Standard:

Tester Operation	Specified Condition
VSV is ON	Disconnected hose applies suction to your finger
VSV is OFF	Disconnected hose applies no suction to your finger

(f) Reconnect the vacuum hose.

OK → **Go to step 17**

NG

14	CHECK VACUUM HOSES(INTAKE MANIFOLD – EVAP VSV, EVAP VSV – CHARCOAL CANISTER)

(a) Check that the vacuum hoses are connected correctly.
(b) Check that the vacuum hoses are not loose or disconnected.
(c) Check the vacuum hoses and tubes for cracks, holes, damage, or blockages.

NG → **REPAIR OR REPLACE VACUUM HOSES**

OK

15	CHECK OPERATION OF EVAP VSV (See page 12–9)

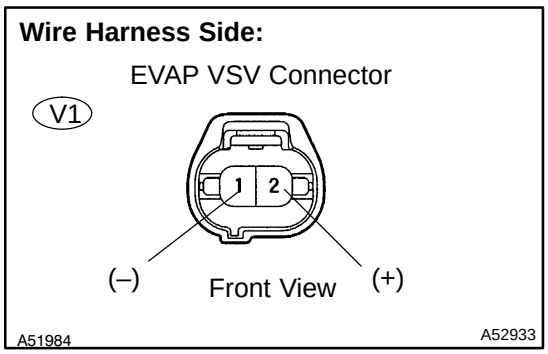
OK: Air from port E flows out through port F when applying the battery voltage.

OK → **Go to step 16**

NG

REPLACE VSV AND CHARCOAL CANISTER, AND THEN CLEAN VACUUM HOSE

16	CHECK HARNESS AND CONNECTOR(EVAP VSV – ECM, EVAP VSV – EFI M RELAY)



(a) Disconnect the V1 EVAP VSV connector.
(b) Turn the power switch ON (IG).
(c) Measure the voltage between the specified terminal of the V1 EVAP VSV connector and body ground.

Standard :

Tester Connection	Specified Condition
EVAP VSV (V1–2) – Body ground	9 to 14 V

(d) Select the item: DIAGNOSIS / ENHANCED OBD II / ENGINE AND ECT / ACTIVE TEST / EVAP VSV (press the right or left button).
(e) When the EVAP VSV is operated using the hand–held tester, measure the voltage between the specified terminals of the V1 EVAP VSV connector.

Standard :

Tester Operation	Tester Connection	Specified Condition
VSV is ON	EVAP VSV: (V1–1) – (V1–2)	9 to 14 V
VSV is OFF	EVAP VSV: (V1–1) – (V1–2)	0 V

(f) Turn the power switch OFF.
(g) Check the resistance in EVAP VSV wire harness.

Standard :

Tester Connection	Specified Condition
EVAP VSV (V1–1) – Body ground	10 Ω or higher
EVAP VSV (V1–2) – Body ground	10 Ω or higher

(h) Reconnect the EVAP VSV connector.

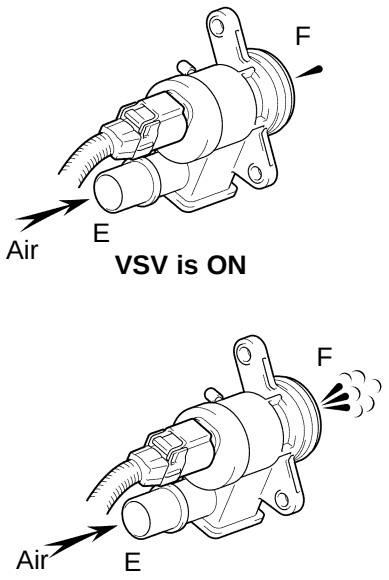
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page 10–24)

17	PERFORM ACTIVE TEST BY HAND–HELD TESTER(CCV)

CCV:



(a) Remove the CCV.
(b) Turn the power switch ON (IG).
(c) Select the item: DIAGNOSIS / ENHANCED OBD II / ENGINE AND ECT / ACTIVE TEST / CAN CTRL VSV (press the right or left button).
(d) Check the CCV operation while operating it with using hand–held tester.

Standard:

Tester Operation	Specified Condition
VSV is ON	Air does not flow from port E to F
VSV is OFF	Air from port E flows out through port F

(e) Reinstall the CCV.

OK → **Go to step 21**

NG

18	CHECK VACUUM HOSES(CCV – CHARCOAL CANISTER)

(a) Check that the vacuum hoses are connected correctly.
(b) Check that the vacuum hoses are not loose or disconnected.
(c) Check the vacuum hoses and tubes for cracks, holes, damage, or blockages.

NG → **REPAIR OR REPLACE VACUUM HOSE**

OK

19	CHECK OPERATION OF CCV (See page 12–9)

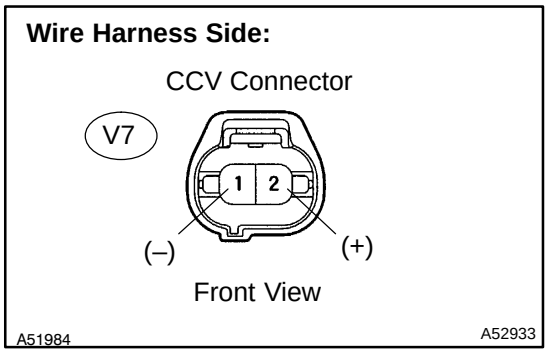
OK: Air does not flow from port E to F when applying the battery voltage.

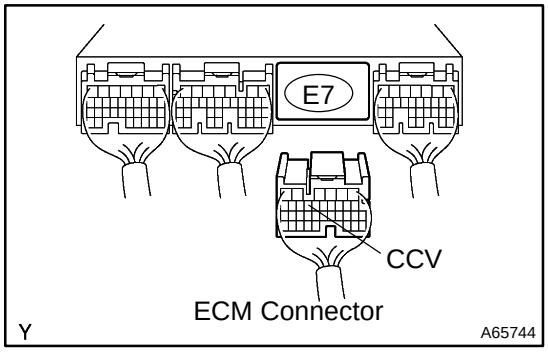
OK → **Go to step 20**

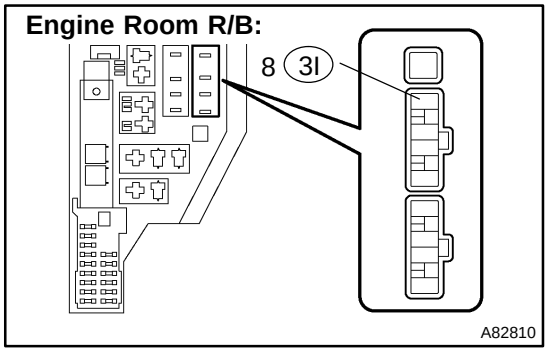
NG

REPLACE VSV AND CHARCOAL CANISTER, AND THEN CLEAN VACUUM HOSE

20	CHECK HARNESS AND CONNECTOR(CCV – ECM, CCV – EFI M RELAY)







(a) Check the harness and connectors between the CCV and ECM.
(1) Disconnect the V7 CCV connector.
(2) Disconnect the E7 ECM connector.
(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CCV (V7–1) – CCV (E7–13)	Below 1 Ω

Tester Connection	Specified Condition
CCV (V7–1) or CCV (E7–13) – Body ground	10 kΩ or higher

(4) Reconnect the CCV connector.
(5) Reconnect the ECM connector.

(b) Check the harness and the connectors between the CCV and the EFI M relay.
(1) Disconnect the V7 CCV connector.
(2) Remove the integration relay from the engine room R/B.
(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CCV (V7–2) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CCV (V7–2) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

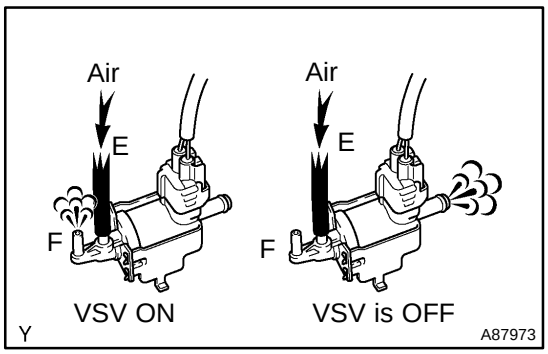
(4) Reconnect the CCV connector.
(5) Reinstall the integration relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page 10–24)

21	PERFORM ACTIVE TEST BY HAND–HELD TESTER(VSV FOR PURGE FLOW SWITCHING VALVE)



(a) Remove the VSV for purge flow switching valve.
(b) Turn the power switch ON (IG).
(c) Select the item: DIAGNOSIS / ENHANCED OBD II / ENGINE AND ECT / ACTIVE TEST / TANK BYPASS VSV (press the right or left button).
(d) Check the VSV for purge flow switching valve operation while operating it using the hand–held tester.

Standard:

Tester Operation	Specified Condition
VSV is ON	Air from port E flows out through port F
VSV is OFF	Air does not flow from port E to F

(e) Reinstall the VSV for purge flow switching valve.

OK → **Go to step 24**

NG

22	INSPECT VSV FOR PURGE FLOW SWITCHING VALVE(OPERATION) (See page 12–9)

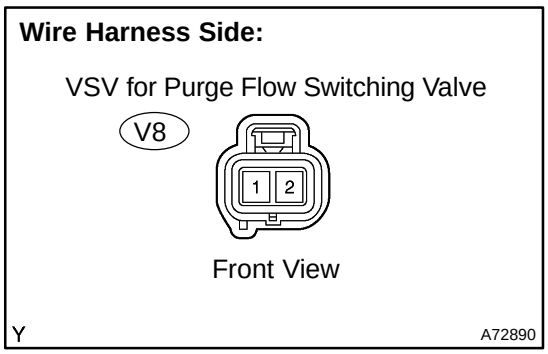
OK: Air from port E flows out through port F when applying the battery voltage.

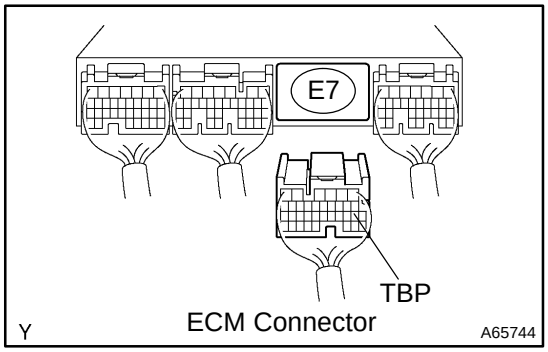
NG → **Go to step 23**

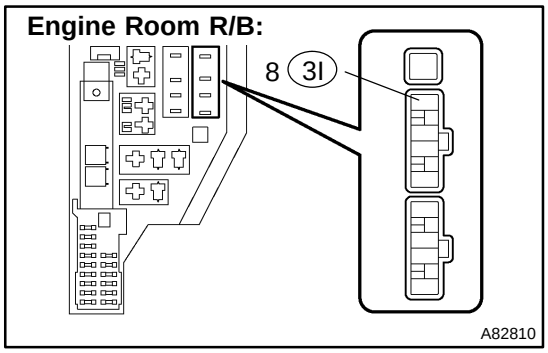
OK

REPLACE VSV AND CHARCOAL CANISTER, AND THEN CLEAN VACUUM HOSE

23	CHECK HARNESS AND CONNECTOR(VSV FOR PURGE FLOW SWITCHING VALVE – EFI M RELAY, VSV FOR PURGE FLOW SWITCHING VALVE – ECM)







(a) Check the harness and the connectors between the VSV for purge flow switching valve and the ECM.
  (1) Disconnect the V8 VSV for purge flow switching valve connector.
  (2) Disconnect the E7 ECM connector.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VSV for purge flow switching valve (V8–1) – TBP (E7–18)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VSV for purge flow switching valve (V8–1) or TBP (E7–18) – Body ground	10 kΩ or higher

  (4) Reconnect the VSV for purge flow switching valve connector.
  (5) Reconnect the ECM connector.

(b) Check the harness and the connectors between the VSV for purge flow switching valve and the EFI M relay.
  (1) Disconnect the V8 VSV for purge flow switching valve connector.
  (2) Remove the integration relay from the engine room R/B.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VSV for purge flow switching valve (V8–2) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VSV for purge flow switching valve (V8–2) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

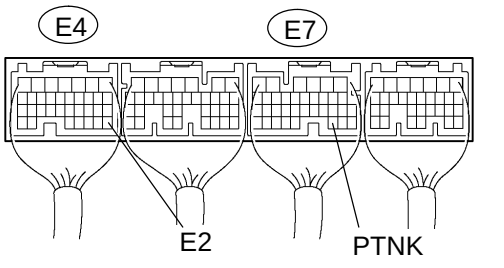
  (4) Reconnect the VSV for purge flow switching valve connector.
  (5) Reinstall the integration relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page 10–24)

24	PERFORM ACTIVE TEST BY HAND–HELD TESTER(CHARCOAL CANISTER AND FUEL TANK)



(a) Connect the hand–held tester to the DLC3.
(b) Put the engine in inspection mode (see page 05–1).
(c) Start the engine.
(d) Select the item: DIAGNOSIS / ENHANCED OBD II / ENGINE AND ECT / ACTIVE TEST / CAN CTRL VSV, and turn ON the CCV.
(e) Select the item: DIAGNOSIS / ENHANCED OBD II / ENGINE AND ECT / ACTIVE TEST / EVAP VSV.
(f) Turn ON the EVAP VSV until voltage between terminals PTNK and E2 becomes 1.2 V.
(g) Turn EVAP VSV OFF.
(h) Measure the voltage between terminals PTNK and E2 of the ECM connector for 30 seconds after switching the VSV for EVAP from ON to OFF

Standard:

Tester Connection	Specified Condition
PTNK (E7–30) – E2 (E4–28)	2.3 V or less

OK → **REPLACE ECM (See page 10–24)**

NG

25	INSPECT FUEL TANK ASSY

OK: Fuel tank has no damage (crack or hole).

NG → **REPLACE FUEL TANK ASSY**

OK

26	INSPECT CHARCOAL CANISTER ASSY (See page 12–9)

OK: Canister has no crack or hole.

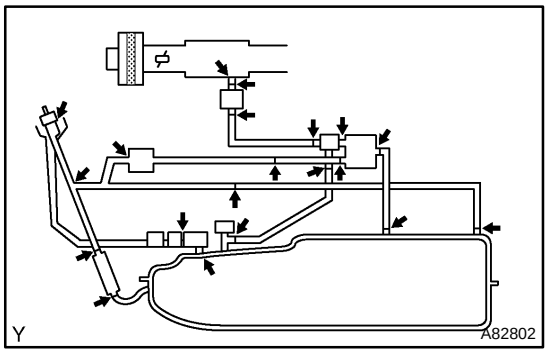
NG → **REPLACE CHARCOAL CANISTER ASSY**

OK

REPLACE ECM (See page 10–24)

OBD II scan tool (excluding hand–held tester):

1	CHECK WHETHER THERE ARE SIGNS OF ANY ACCIDENT NEAR FUEL TANK OR CHARCOAL CANISTER(OR ANY MODIFICATION)



(a) Check whether hoses close to the fuel tank have been modified, and check if there are signs of any accident near the fuel tank.
  (1) Check the following parts for cracks, deformation or loose connections:
    - Fuel tank
    - Fuel tank filler pipe
    - Hoses and tubes around fuel tank

NG → REPAIR OR REPLACE

OK

2	INSPECT FUEL TANK CAP ASSY(CHECK THAT FUEL TANK CAP MEETS SPECIFICATIONS)

NG → REPLACE CAP ASSY, FUEL TANK

OK

3	CHECK THAT FUEL TANK CAP IS CORRECTLY INSTALLED

NG → CORRECTLY REINSTALL FUEL TANK CAP

OK

4	CHECK FUEL TANK CAP ASSY (See page 12–9)

NG → REPLACE FUEL TANK CAP ASSY

OK

5	CHECK FILLER NECK FOR DAMAGE

NG → REPLACE FUEL TANK INLET PIPE SUB–ASSY

OK

6	CHECK EACH VSV CONNECTOR FOR LOOSENESS AND DISCONNECTION(EVAP VSV, CCV, VSV FOR PURGE FLOW SWITCHING VALVE AND VAPOR PRESSURE SENSOR)

(a) Check that the vacuum hoses are connected correctly.
(b) Check the vacuum hoses for looseness or disconnection.
(c) Check the vacuum hoses for cracks, holes or damage.

NG → **REPAIR OR CONNECT VSV AND SENSOR CONNECTOR**

OK

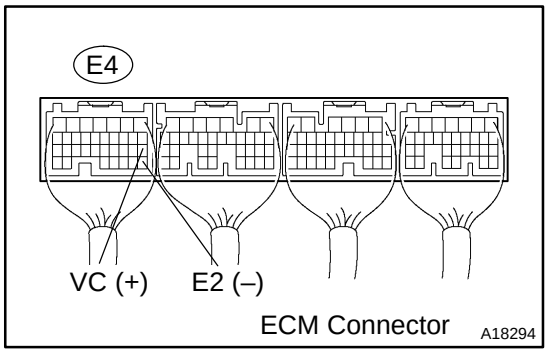
7	CHECK VACUUM HOSES

(a) Check the connection between the fuel tank and fuel EVAP pipe, the fuel EVAP pipe and under–floor fuel tube, the under–floor fuel tube and charcoal canister.
(b) Check the hose and the tube for cracks, holes or damage.

NG → **REPAIR OR REPLACE VACUUM HOSES**

OK

8	INSPECT ECM(VC – E2 VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the specified terminals of the E4 ECM connector.

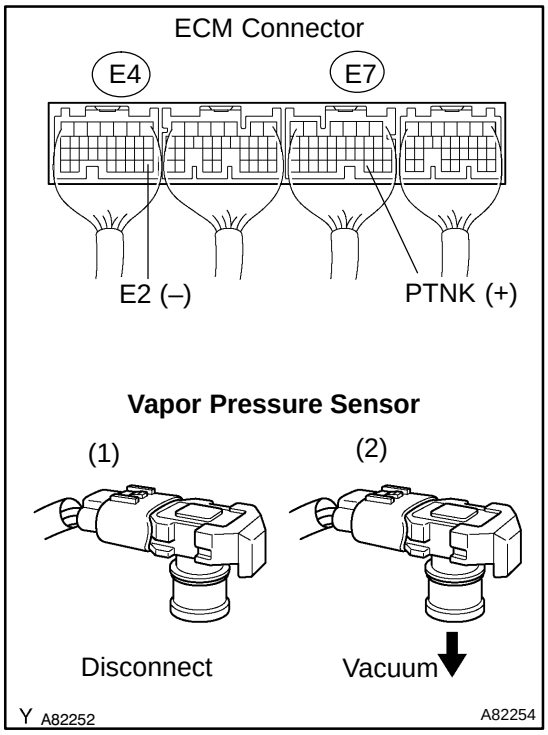
Standard:

Tester Connection	Specified Condition
VC (E4–18) – E2 (E4–28)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10–24)**

OK

9 INSPECT ECM(PTNK – E2 VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the specified terminals of the E4 and E7 ECM connectors.
(1) Remove the vapor pressure sensor.
Standard (1):

Tester Connection	Specified Condition
PTNK (E7–30) – E2 (E4–28)	2.9 to 3.7 V

(2) Using the MITYVAC (Hand–Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:
The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

Standard (2):

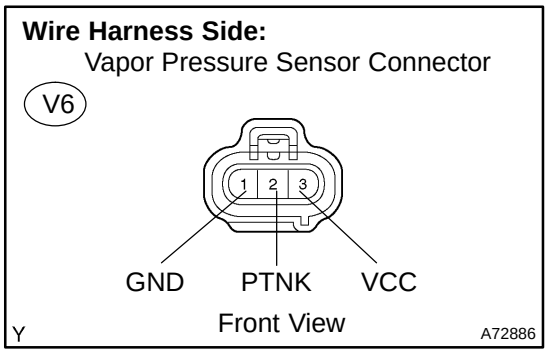
Tester Connection	Specified Condition
PTNK (E7–30) – E2 (E4–28)	0.5 V or less

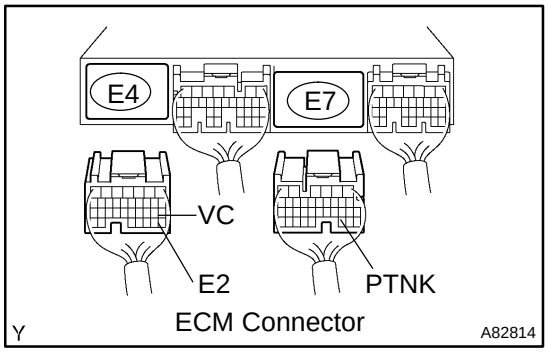
(3) Reinstall the vapor pressure sensor.

NG → **Go to step 11**

OK

10 CHECK HARNESS AND CONNECTOR(VAPOR PRESSURE SENSOR – ECM)





(a) Disconnect the V6 vapor pressure sensor connector.
(b) Disconnect the E4 and E7 ECM connectors.
(c) Check the resistance between the wire harness side connectors.
Standard (Check for open):

Tester Connection	Specified Condition
PTNK (V6–2) – PTNK (E7–30)	Below 1 Ω
GND (V6–1) – E2 (E4–28)	Below 1 Ω
VCC (V6–3) – VC (E4–18)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
PTNK (V6–2) or PTNK (E7–30) – Body ground	10 kΩ or higher
VCC (V6–3) or VC (E4–18) – Body ground	10 kΩ or higher

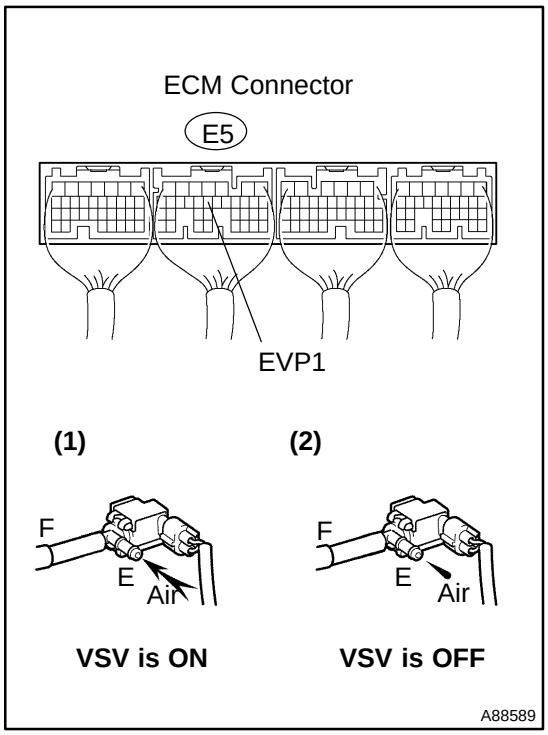
(d) Reconnect the vapor pressure sensor connector.
(e) Reconnect the ECM connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE VAPOR PRESSURE SENSOR ASSY

11	INSPECT EVAP VSV



(a) Remove the EVAP VSV.
(b) Turn the power switch ON (IG).
(c) Check the VSV function.
  (1) Connect terminal EVP1 (E5–14) of the ECM connector and the body ground (EVAP VSV should be OPEN, i.e. ON).
  Standard (1):
  Air from port E flows out through port F.
  (2) Disconnect between terminal EVP1 of the ECM connector and the body ground (EVAP VSV should CLOSED, i.e. OFF).
  Standard (2):
  Air does not flow from port E to port F.
(d) Reinstall the EVAP VSV.

OK → **Go to step 14**

NG

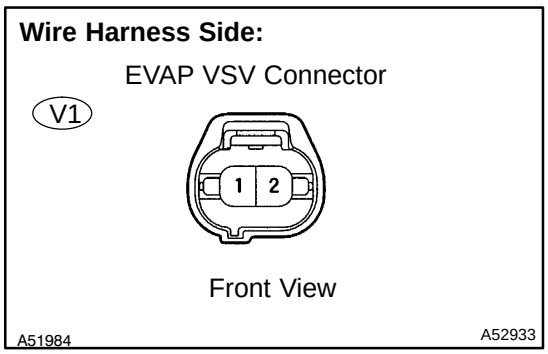
12	CHECK OPERATION OF EVAP VSV (See page 12–9)

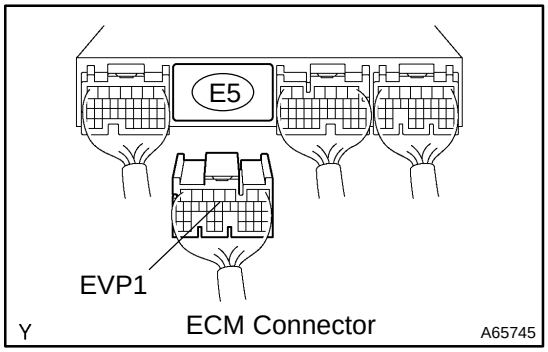
OK → **Go to step 13**

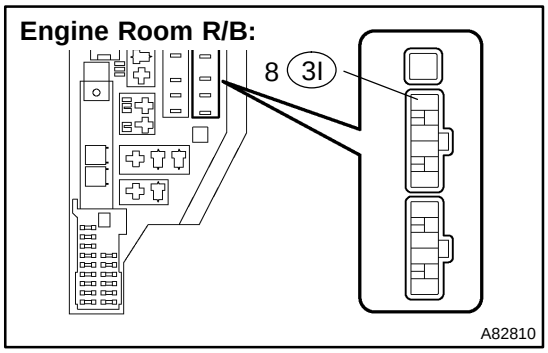
NG

REPLACE VSV AND CLEAN VACUUM HOSES, AND THEN CHECK CHARCOAL CANISTER

13	CHECK HARNESS AND CONNECTOR(EFI M RELAY – EVAP VSV, EVAP VSV – ECM)







(a) Check the harness and the connectors between the EVAP VSV and the ECM connectors.
  (1) Disconnect the V1 VSV for EVAP connector.
  (2) Disconnect the E5 ECM connector.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
EVAP VSV (V1–1) – EVP1 (E5–14)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
EVAP VSV (V1–1) or EVP1 (E5–14) – Body ground	10 kΩ or higher

  (4) Reconnect the EVAP VSV connector.
  (5) Reconnect the ECM connector.

(b) Check the harness and the connectors between the EVAP VSV connector and the EFI M relay.
  (1) Disconnect the V1 EVAP VSV connector.
  (2) Remove the integration relay from the engine room R/B.
  (3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
EVAP VSV (V1–2) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
EVAP VSV (V1–2) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

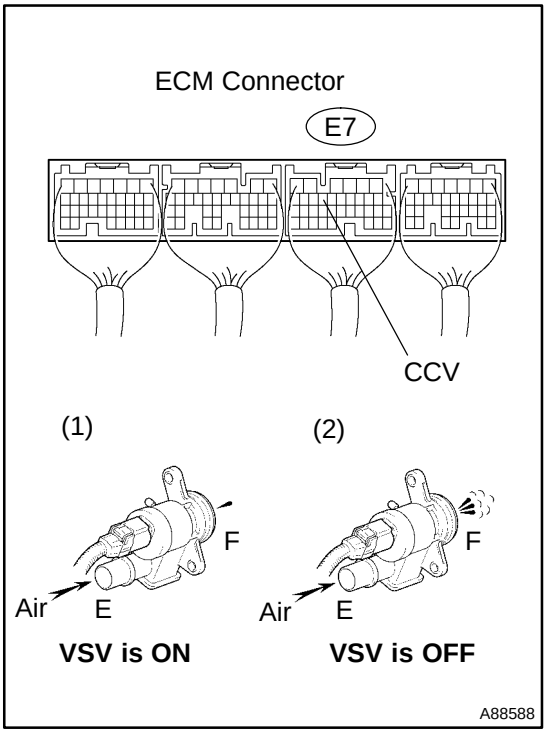
  (4) Reconnect the EVAP VSV connector.
  (5) Reinstall the integration relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page 10–24)

14	INSPECT CCV



(a) Remove the CCV.
(b) Turn the power switch ON (IG).
(c) Check the VSV function.
  (1) Connect terminal CCV (E7–13) of the ECM connector and the body ground (CCV should be CLOSED, i.e. ON).
  Standard (1):
  Air does not flow from port E to port F.
  (2) Disconnect between terminal CCV of the ECM connector and the body ground (CCV should be OPEN, i.e. OFF).
  Standard (2):
  Air from port E flows out through port F.
(d) Reinstall the CCV.

OK	Go to step 17

NG

15	CHECK OPERATION OF CCV (See page 12–9)

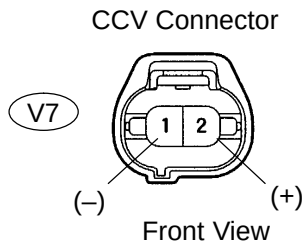
OK	Go to step 16

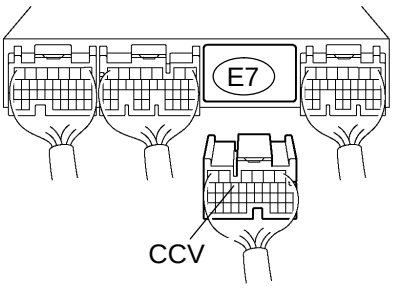
NG

REPLACE VSV AND CHARCOAL CANISTER, AND THEN CLEAN VACUUM HOSE (VACUUM HOSE BETWEEN CHARCOAL CANISTER AND CCV)

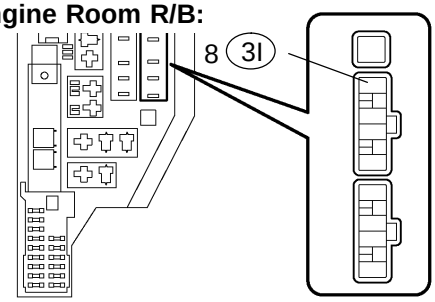
16 CHECK HARNESS AND CONNECTOR(EFI M RELAY – CCV, CCV – ECM)

Wire Harness Side:





Engine Room R/B:



(a) Check the harness and the connectors between the CCV connector and the ECM connectors.
(1) Disconnect the V7 CCV connector.
(2) Disconnect the E7 ECM connector.
(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CCV (V7–1) – CCV (E7–13)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CCV (V7–1) or CCV (E7–13) – Body ground	10 kΩ or higher

(4) Reconnect the CCV connector.
(5) Reconnect the ECM connector.

(b) Check the harness and the connectors between the CCV connector and the EFI M relay.
(1) Disconnect the V7 CCV connector.
(2) Remove the integration relay from the engine room R/B.
(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
CCV (V7–2) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
CCV (V7–2) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

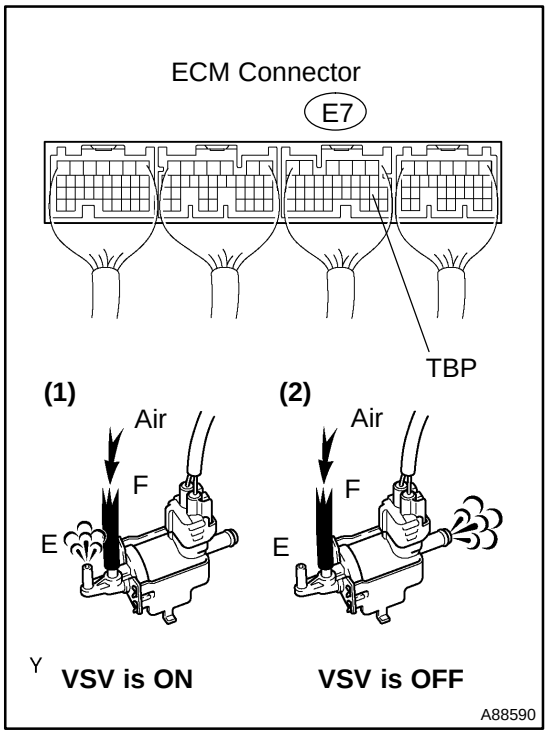
(4) Reconnect the CCV connector.
(5) Reinstall the integration relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page 10–24)

17	INSPECT VSV FOR PURGE FLOW SWITCHING VALVE



(a) Remove the VSV for purge flow switching valve.
(b) Turn the power switch ON (IG).
(c) Check the VSV function.
(1) Connect terminal TBP (E7–18) of the ECM connector and the body ground (VSV for purge flow switching valve should be OPEN, i.e. ON).

Standard (1):

Air from port E flows out through port F.

(2) Disconnect between terminal TBP of the ECM connector and the body ground (VSV for purge flow switching valve should be CLOSED, i.e. OFF).

Standard (2):

Air does not flow from port E to port F.

(d) Reinstall the VSV for purge flow switching valve.

OK → **REPLACE CHARCOAL CANISTER ASSY**

NG

18	CHECK OPERATION OF VSV(FOR PURGE FLOW SWITCHING VALVE) (See page 12–9)

OK → **Go to step 19**

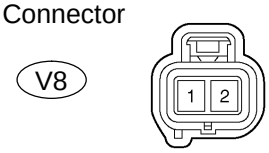
NG

REPLACE VSV AND CHARCOAL CANISTER, AND THEN CLEAN VACUUM HOSE

19	CHECK HARNESS AND CONNECTOR(EFI M RELAY – VSV FOR PURGE FLOW SWITCHING VALVE, VSV FOR PURGE FLOW SWITCHING VALVE – ECM)

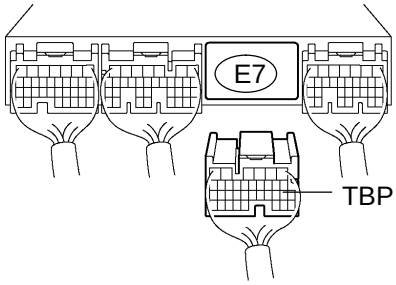
Wire Harness Side:

VSV for Purge Flow Switching Valve Connector



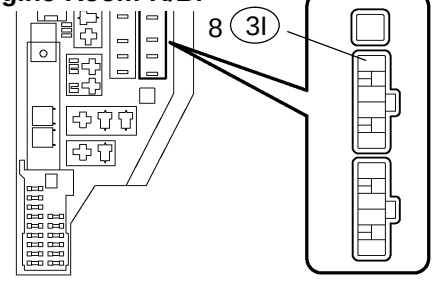
Front View

Y A72890



Y ECM Connector A65744

Engine Room R/B:



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(a) Check the harness and the connectors between the VSV connector for purge flow switching valve and the ECM connectors.

(1) Disconnect the V8 VSV for purge flow switching valve connector.

(2) Disconnect the E7 ECM connector.

(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VSV for purge flow switching valve (V8–1) – TBP (E7–18)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VSV for purge flow switching valve (V8–1) or TBP (E7–18) – Body ground	10 kΩ or higher

(4) Reconnect the VSV for purge flow switching valve connector.

(5) Reconnect the ECM connector.

(b) Check the harness and the connectors between the VSV for purge flow switching valve connector and the EFI M relay.

(1) Disconnect the V8 VSV for purge flow switching valve connector.

(2) Remove the integration relay from the engine room R/B.

(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VSV for purge flow switching valve (V8–2) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VSV for purge flow switching valve (V8–2) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

(4) Reconnect the VSV for purge flow switching valve connector.

(5) Reinstall the integration relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page 10–24)