

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow
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DTC	P0446	Evaporative Emission Control System Vent Control Circuit
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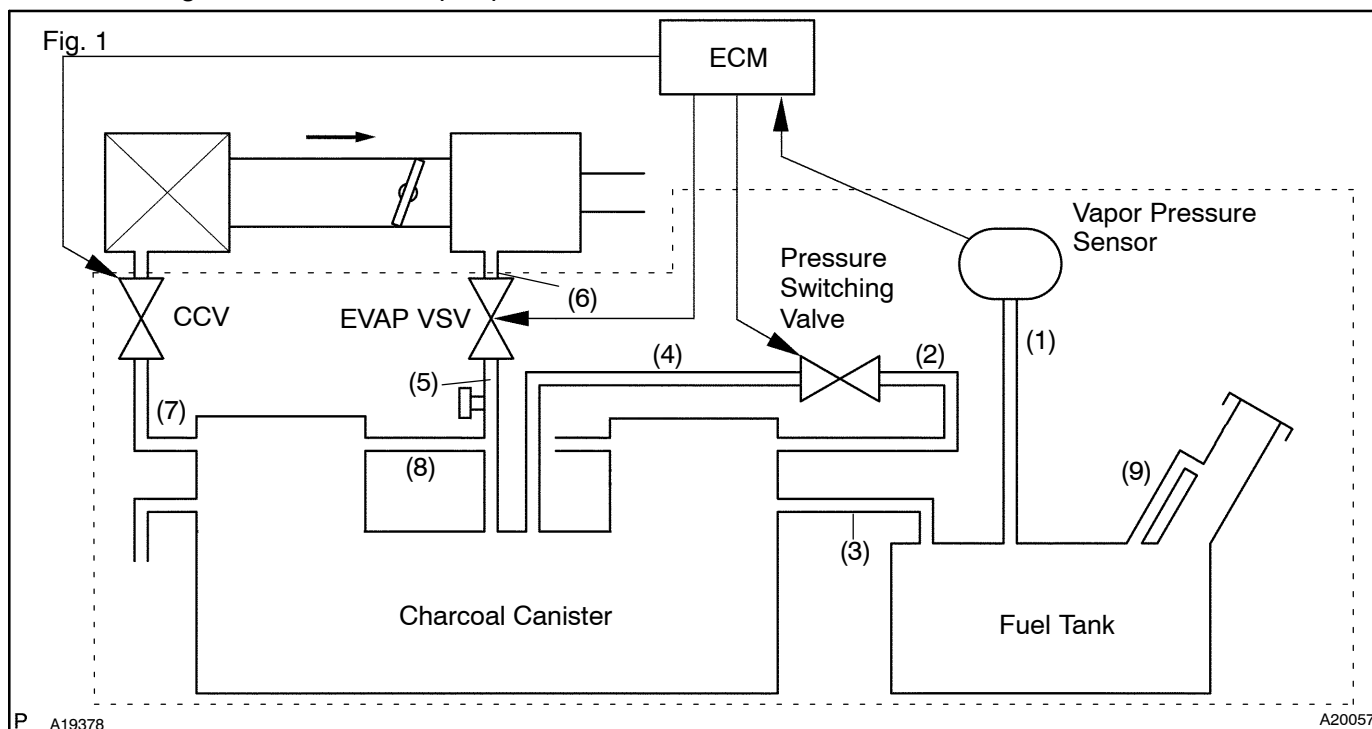
DTC	P2418	Evaporative Emission System Valve Control Circuit/Open
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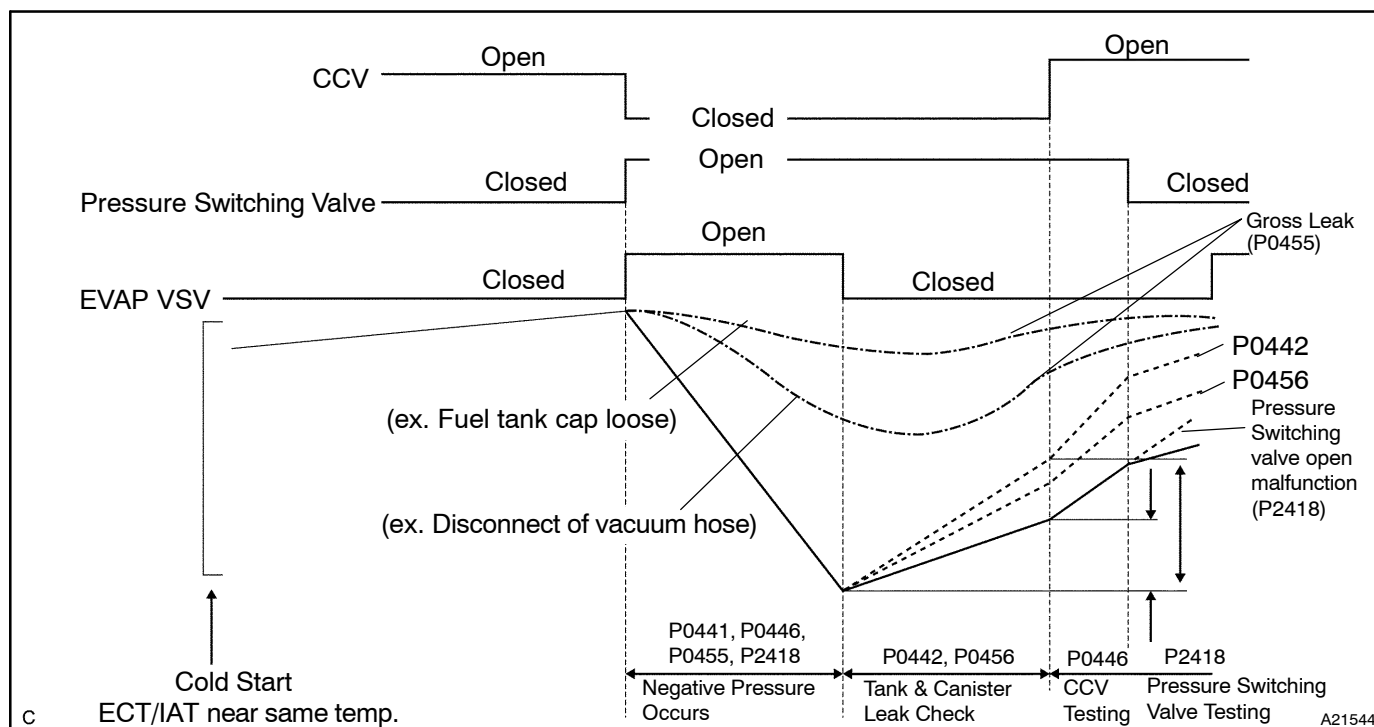
CIRCUIT DESCRIPTION

The vapor pressure sensor, canister closed valve (CCV), and pressure switching valve 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, P0446 and P2418 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when there is a malfunction in either the EVAP VSV, the pressure switching valve, or in the vapor pressure sensor itself.





DTC No.	DTC Detecting Condition	Trouble Area
P0441	Pressure in charcoal canister and fuel tank does not drop during purge control (2 trip detection logic)	• Vacuum hose cracks, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8) and (9) in Fig. 1) • Fuel tank cap incorrectly installed • Fuel tank cap cracked or damaged
	During purge cut-off, pressure is very low compared with atmospheric pressure (2 trip detection logic)	
P0446	No fuel tank pressure rise when commanding the CCV open after an EVAP leak test	• Open or short in vapor pressure sensor circuit • Vapor pressure sensor • Open or short in VSV circuit for EVAP • EVAP VSV • Open or short in VSV circuit for CCV • CCV
	A high negative pressure (vacuum) does not occurs in the system when commanding the EVAP VSV open and CCV closed with the pressure switching valve open	
P2418	No fuel tank pressure change when commanding the pressure switching valve closed for the check after the EVAP leak test	• Open or short in VSV circuit for pressure switching valve • Pressure switching valve • Fuel tank cracked, holed or damaged • Charcoal canister cracked, holed or damaged • ECM
	A high negative pressure (vacuum) does not occurs in the system when commanding the EVAP VSV open and CCV closed with the pressure switching valve open	

HINT:**Typical DTC output of each trouble part**

Trouble part		Typical DTC output (*1)
Small Leak		P0442 and/or P0456
Medium Leak (ex.: Vacuum hose loose)		P0455
Large Leak (ex.: Fuel tank cap loose)		P0441, P0446, P0455 and P2418
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0441, P0446, P0455 and P2418
CCV	Open Malfunction	P0441, P0446, P0455 and P2418
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P2418
	Close Malfunction	P0441, P0446, P0455 and P2418

*1: ECM may output some other DTC combination.

MONITOR DESCRIPTION

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 is stuck OPEN.

The ECM will turn on the MIL and a DTC is set.

P0446

If there is a malfunction detected in the evaporative emission (EVAP) VSV, the canister closed valve (CCV) and the VSV for bypass 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 is stuck closed. The ECM will turn on the MIL and a DTC is set.

- (b) 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.

P2418

- (a) Pressure switching valve stuck open.

The ECM checks for a pressure switching valve "stuck open" malfunction by commanding the pressure switching valve to close after an EVAP leak test. If the fuel tank pressure does not change, the ECM determines that the pressure switching valve is malfunctioning. The ECM will turn on the MIL and a DTC is set.

And when EVAP VSV stuck closed malfunction is detected the ECM also store this DTC (P2418).

- (b) When EVAP VSV (Purge line to intake manifold) stuck closed is detected, the pressure switching valve malfunction DTC is also stored.

MONITOR STRATEGY

Related DTCs	P0441	EVAP VSV malfunction
	P0446	Canister close valve stuck closed EVAP VSV malfunction
	P2418	Pressure switching valve malfunction
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Engine coolant temperature sensor, Intake air temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Criteria	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List" of disable a monitor" (on page DI-3)	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0441 (Purge VSV stuck closed)	
FTP change during vacuum introduction	Less than 0.9 kPa (7.0 mmHg)
P0441 (Purge VSV stuck open)	
Either of the following conditions 1 or 2	
1. (Minimum FTR Before leak check) – (FTR when 14 seconds after leak check)	0.5 kPa (3.5 mmHg) or more
2. FTR when 14 seconds after leak check	Less than –3.7 kPa (–27.8 mmHg)
P0446 (CCV stuck open)	
Purge VSV stuck closed	Detected
P0446 (CCV stuck closed)	
FTR change when CCV is opened	No change
P2418 (bypass VSV malfunction)	
Either of the following conditions 1 or 2	
1. Purge VSV stuck closed	Detected
2. FTP change when bypass VSV	No change

MONITOR RESULT (MODE 06 DATA)

Refer to page [DI-3](#) for detailed information.

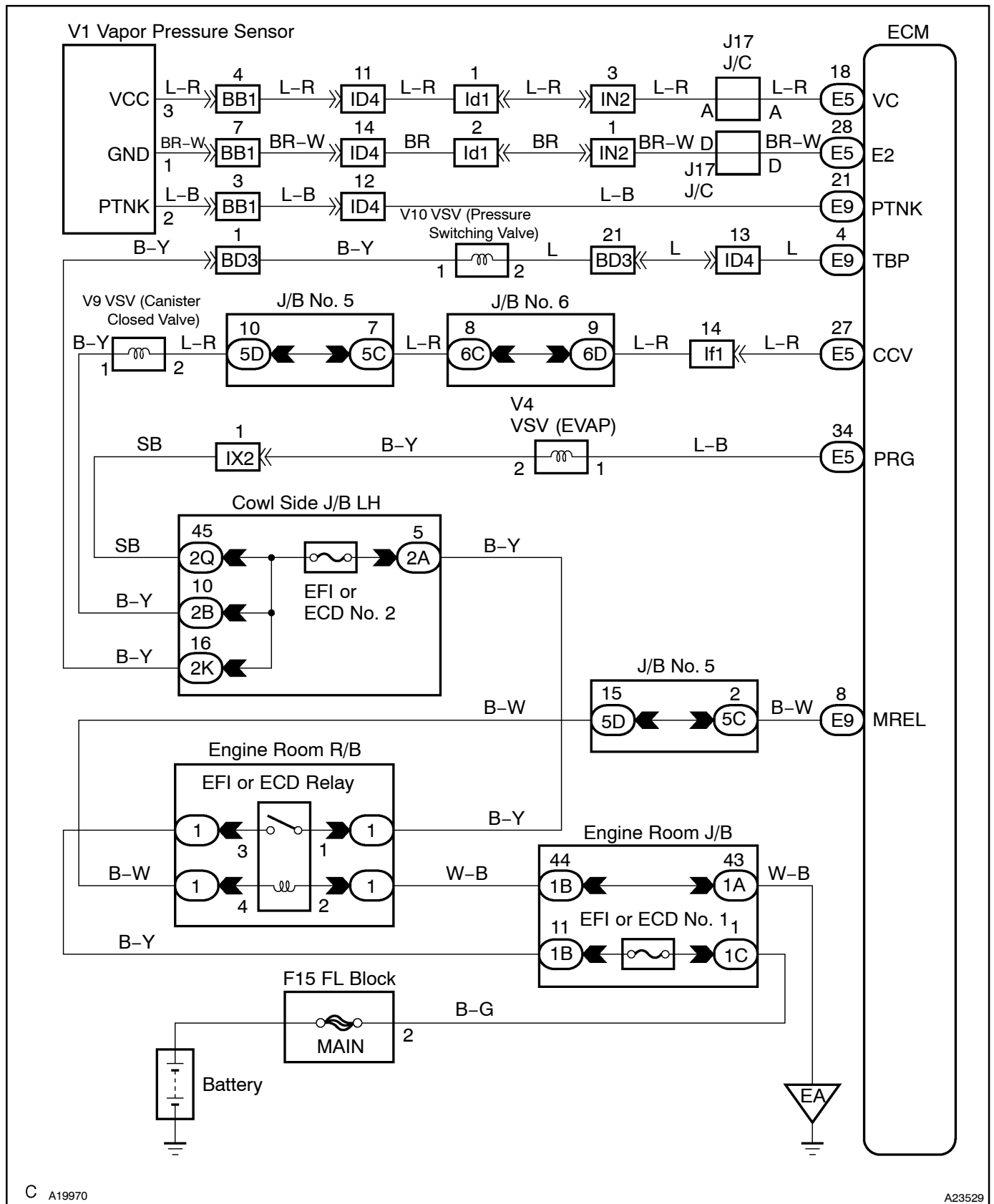
The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page [DI-34](#))

- TID (Test Identification Data) is assigned to each emissions-related component.
- TID (Test Limit Type):
If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBDII scan tools.

TID \$02: EVAP – Vacuum monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	\$01	Multiply by 0.0916 [mmHg]	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criteria for EVAP VSV
1	\$02	Multiply by 0.0458 subtract 2.93 [mmHg]	Test value of bypass VSV: Determined by fuel tank pressure change at switching over bypass VSV	Malfunction criteria for bypass VSV
0	\$03	Multiply by 0.0458 [mmHg]	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.04 inch leak
0	\$04	Multiply by 0.0458 [mmHg]	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.02 inch leak
1	\$05	Multiply by 0.0458 subtract 2.93 [mmHg]	Test value of canister closed valve (CCV): Determined by fuel tank pressure change at switching over CCV	Malfunction criteria for CCV

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0441 (Purge Flow), P0446 (CCV) or P2418 (Pressure switching valve) or P0451 (Evaporative Pressure Sensor) is output with DTC P0442, P0455 or P0456, first troubleshoot DTC P0441, P0446 or P0451. If no malfunction is detected, troubleshoot DTC P0442, P0455 or P0456 next.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a 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.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

Hand-held tester:

1	Check that fuel tank cap meets OEM specifications.
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NG

Replace with a cap that meets OEM specifications.

OK

2	Check that fuel tank cap is correctly installed.
---	--

NG

Correctly install fuel tank cap.

OK

3	Check fuel tank cap (See page EC-5).
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NG

Replace fuel tank cap.

OK

4 Check filler neck for damage.

PREPARATION:

Remove the fuel tank cap.

CHECK:

Visually inspect the filler neck for damage.

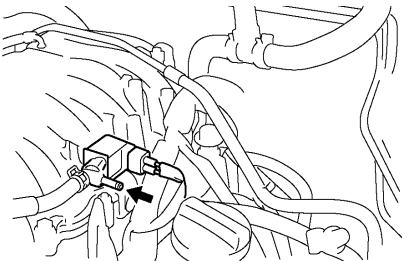
NG

Replace filler pipe.

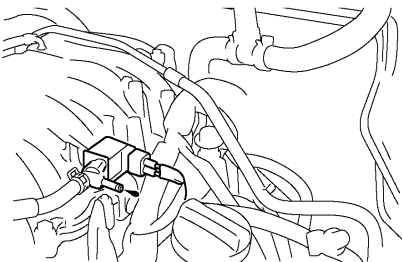
OK

5 Check purge flow.

VSV is ON



VSV is OFF



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PREPARATION:

- Connect the hand-held tester to the DLC3.
- Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
- Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.
- Start the engine.
- Select the item "EVAP (ALON) / ALL" in the ACTIVE TEST and operate EVAP VSV.

CHECK:

When the EVAP VSV is operated by the hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:

VSV is ON:

Disconnected hose applies suction to your finger.

VSV is OFF:

Disconnected hose applies no suction to your finger.

OK

Go to step 9.

NG

6	Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV and charcoal canister.
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CHECK:

- (a) Check that the vacuum hose is connected correctly.
- (b) Check the vacuum hose for looseness and disconnection.
- (c) Check the vacuum hose for cracks, hole, damage and blockage.

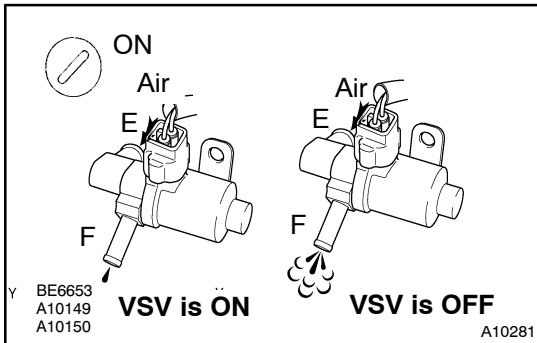
NG**Repair or replace vacuum hose.****OK**

7	Check operation of EVAP VSV (See page SF-44).
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NG**Replace EVAP VSV.****OK**

8	Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-36).
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NG**Repair or replace harness or connector.****OK****Replace ECM (See page [SF-60](#)).**

9**Check CCV.****PREPARATION:**

- Disconnect the vacuum hose for the CCV VSV from the charcoal canister.
- Turn the ignition switch ON and push the hand-held tester main switch ON.
- Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
- Select the item "CAN CTRL VSV / ALL" in the ACTIVE TEST and operate CCV.

CHECK:

Check the VSV operation when it is operated by the hand-held tester.

OK:

VSV is ON:

Air does not flow from port E to port F.

VSV is OFF:

Air from port E flows out through port F.

OK**Go to step 13.****NG****10****Check vacuum hose between CCV and charcoal canister.****CHECK:**

- Check that the vacuum hose is connected correctly.
- Check the vacuum hose for looseness and disconnection.
- Check the vacuum hose for cracks, hole damage, and blockage.

NG**Repair or replace vacuum hose.****OK****11****Check operation of CCV (See page [SF-48](#)).****NG****Replace CCV.****OK**

- 12** Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page [IN-36](#)).

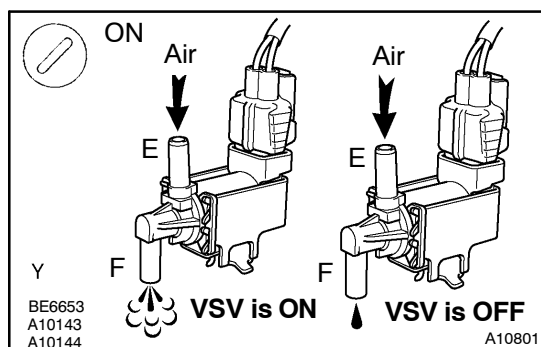
NG

Repair or replace harness or connector.

OK

Replace ECM (See page [SF-60](#)).

- 13** Check pressure switching valve.

**PREPARATION:**

- Turn the ignition switch ON and push the hand-held tester main switch ON.
- Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
- Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate pressure switching valve.

CHECK:

Check the VSV operation when it is operated by the hand-held tester.

OK:

VSV is ON:

Air from port E flows out through port F.

VSV is OFF:

Air does not flow from port E to port F.

OK

Go to step 16.

NG

- 14** Check operation of pressure switching valve (See page [SF-46](#)).

NG

Replace pressure switching valve.

OK

- | | |
|-----------|--|
| 15 | Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36). |
|-----------|--|

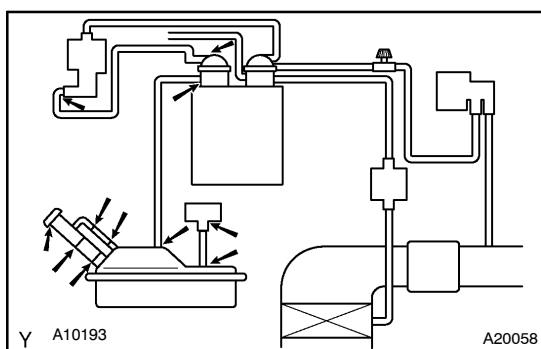
NG

Repair or replace harness or connector.

OK

Replace ECM (See page [SF-60](#)).

- | | |
|-----------|---|
| 16 | Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank. |
|-----------|---|



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Fuel tank filler pipe
- Hoses and tubes around fuel tank

NG

Repair or replace evaporative emission leak part.

OK

- | | |
|-----------|--|
| 17 | Check vacuum hoses between vapor pressure sensor and fuel tank, and charcoal canister and pressure switching valve. |
|-----------|--|

CHECK:

- (a) Check that the vacuum hose is connected correctly.
- (b) Check the vacuum hose for looseness and disconnection.
- (c) Check the vacuum hose for cracks, hole and damage.

NG

Repair or replace vacuum hose.

OK

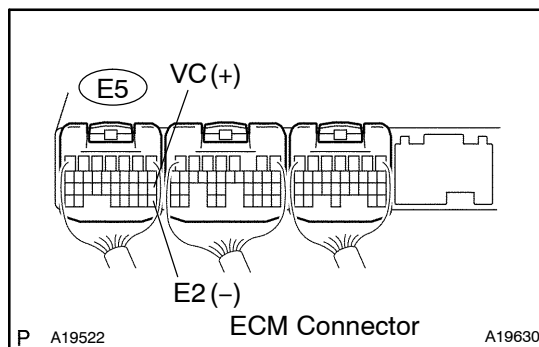
18 Check hose and tube between fuel tank and charcoal canister.

CHECK:

- (a) Check for proper connection of the fuel tank and fuel evap pipe (See page [EC-2](#)), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
- (b) Check the hose and tube for cracks, hole and damage.

NG**Repair or replace hose and tube.****OK**

19 Check voltage between terminals VC and E2 of ECM connector.

**CHECK:**

Turn the ignition switch ON.

CHECK:

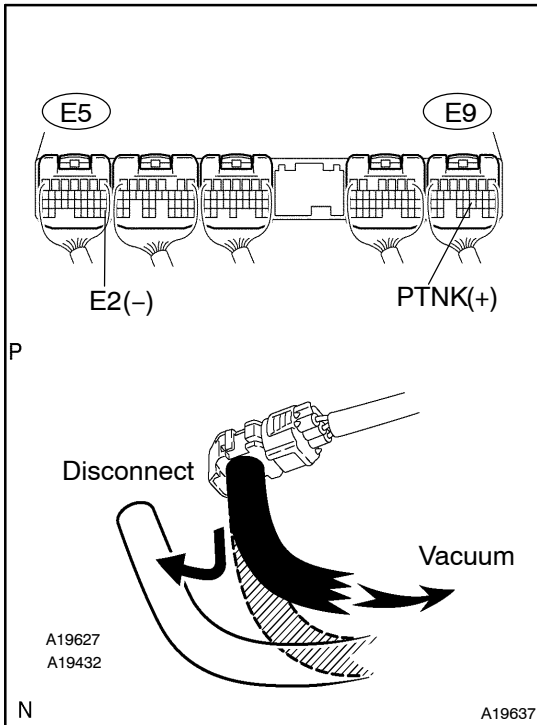
Measure the voltage between terminals the E5 ECM connector.

OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG**Replace ECM (See page [SF-60](#)).****OK**

20 Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

- (1) Disconnect the vacuum hose from the vapor pressure sensor.
- (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).

OK:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK

Go to step 22.

NG

21 Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-36).

NG

Repair or replace harness or connector.

OK

Replace ECM (See page SF-60).

22 Check fuel tank inlet valve.

NG

Replace fuel tank inlet valve.

OK

23	Check fuel tank.
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NG	Replace fuel tank.
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OK

24	Check charcoal canister for cracks, hole and damage.
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NG	Replace charcoal canister.
----	----------------------------

OK

Replace ECM (See page SF-60).
--

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

1	Check that fuel tank cap meets OEM specifications.
---	--

NG

Replace with a cap that meets OEM specifications.

OK

2	Check that fuel tank cap is correctly installed.
---	--

NG

Correctly install fuel tank cap.

OK

3	Check fuel tank cap (See page EC-5).
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NG

Replace fuel tank cap.

OK

4	Check filler neck for damage.
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PREPARATION:

Remove the fuel tank cap.

CHECK:

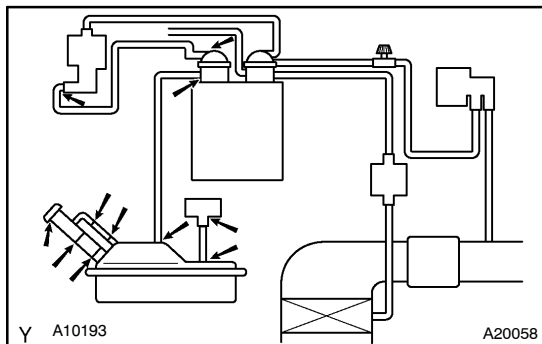
Visually inspect the filler neck for damage.

NG

Replace filler pipe.

OK

5 Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.

**CHECK:**

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG

Repair or replace evaporative emissions leak part.

OK

6 Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.

CHECK:

- (a) Check that the vacuum hose is connected correctly.
- (b) Check the vacuum hose for looseness and disconnection.
- (c) Check the vacuum hose for cracks, hole and damage.

NG

Repair or replace vacuum hose.

OK

7 Check hose and tube between fuel tank and charcoal canister.

CHECK:

- (a) Check for proper connection of the fuel tank and fuel evap pipe (See page [EC-2](#)), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
- (b) Check the hose and tube for cracks, hole and damage.

NG

Repair or replace hose and tube.

OK

8	Check vacuum hoses ((8) and (9) in Fig. 1 in circuit description).
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CHECK:

- (a) Check that the vacuum hose is connected correctly.
- (b) Check the vacuum hose for looseness and disconnection.
- (c) Check the vacuum hose for cracks, hole damage, and blockage.

NG**Repair or replace vacuum hose.****OK**

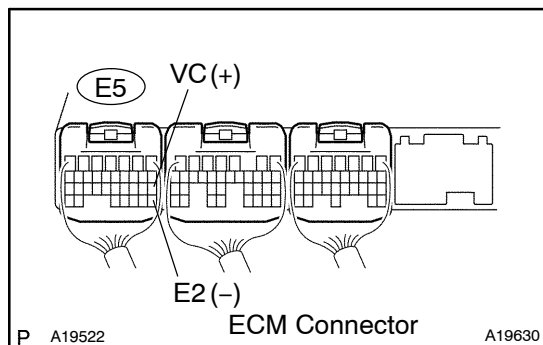
9	Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.
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NG**Repair or connect VSV or sensor connector.****OK**

10	Check charcoal canister for cracks, hole and damage.
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NG**Replace charcoal canister.****OK**

11 Check voltage between terminals VC and E2 of ECM connector.

**CHECK:**

Turn the ignition switch ON.

CHECK:

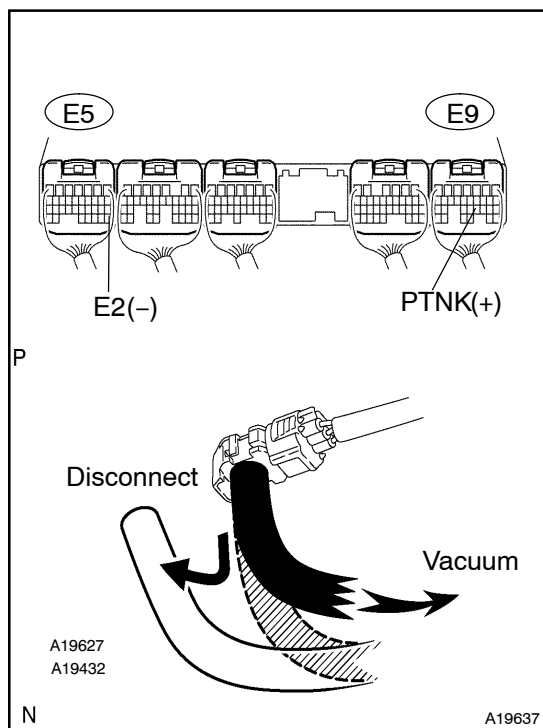
Measure the voltage between terminals the E5 ECM connector.

OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG**Replace ECM (See page SF-60).****OK**

12 Check voltage between terminals PTNK and E2 of ECM connectors.

**PREPARATION:**

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

- (1) Disconnect the vacuum hose from the vapor pressure sensor.
- (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).

OK:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK**Go to step 14.****NG**

- 13** Check for open and short in harness and connector between vapor pressure sensor and ECM (See page [IN-36](#)).

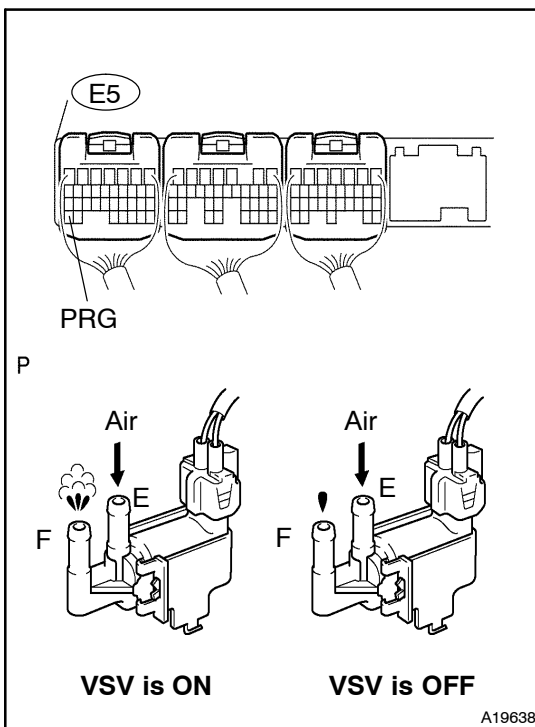
NG

Repair or replace harness or connector.

OK

Replace ECM (See page [SF-60](#)).

- 14** Check EVAP VSV.

**PREPARATION:**

- Remove the glove compartment door (See page [SF-60](#)).
- Turn the ignition switch ON.

CHECK:

Check the VSV function.

- Connect between terminal PRG of the ECM connector and body ground (ON).
- Disconnect between terminal PRG of the ECM connector and body ground (OFF).

OK:

- VSV is ON:**
Air from port E flows out through port F.
- VSV is OFF:**
Air does not flow from port E to port F.

OK

Go to step 17.

NG

- 15** Check operation of EVAP VSV (See page [SF-44](#)).

NG

Replace EVAP VSV.

OK

- 16** Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page [IN-36](#)).

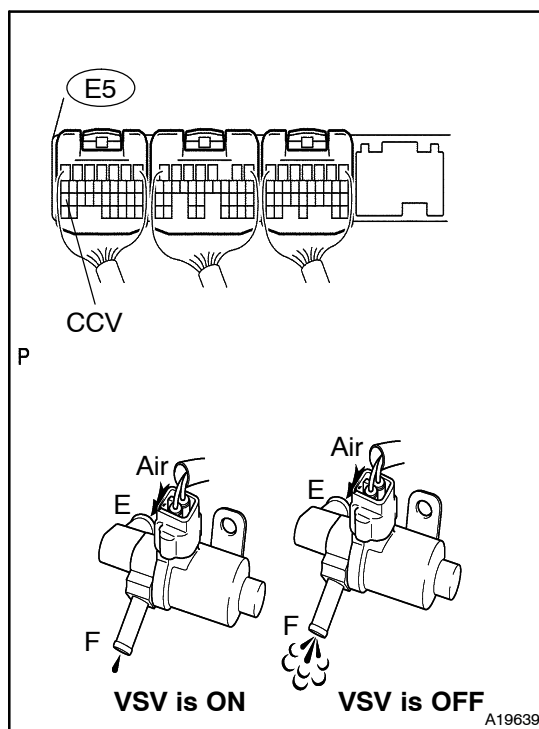
NG

Repair or replace harness or connector.

OK

Replace ECM (See page [SF-60](#)).

- 17** Check CCV.

**PREPARATION:**

Turn the ignition switch ON.

CHECK:

Check the VSV function.

- (1) Connect the terminal CCV of the ECM connector and body ground (ON).
- (2) Disconnect the terminal CCV of the ECM connector and body ground (OFF).

OK:

- (1) VSV is ON:
Air does not flow from port E to port F.
- (2) VSV is OFF:
Air from port E flows out through port F.

OK

Go to step 20.

NG

- 18** Check operation of CCV (See page [SF-48](#)).

NG

Replace CCV.

OK

- 19** Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page [IN-36](#)).

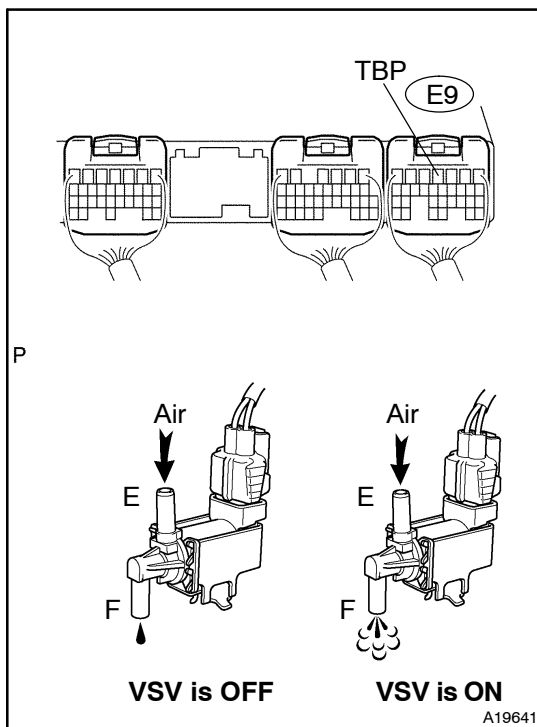
NG

Repair or replace harness or connector.

OK

Replace ECM (See page [SF-60](#)).

- 20** Check pressure switching valve.

**PREPARATION:**

Turn the ignition switch ON.

CHECK:

Check the VSV function.

- (1) Connect the terminal TBP of the ECM connector and body ground (ON).
- (2) Disconnect the terminal TBP of the ECM connector and body ground (OFF).

OK:

- (1) VSV is ON:
Air does not flow from port E to port F.
- (2) VSV is OFF:
Air from port E flows out through port F.

OK

Go to step 23.

NG

- 21** Check operation of pressure switching valve (See page [SF-46](#)).

NG

Replace pressure switching valve.

OK

22	Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36).
----	--

NG

Repair or replace harness or connector.

OK

Replace ECM (See page [SF-60](#)).

23	Check fuel tank inlet valve.
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NG

Replace fuel tank inlet valve.

OK

24	Check fuel tank.
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NG

Replace fuel tank.

OK

It is likely that vehicle user did not properly close fuel tank cap.