

EVAP INSPECTION PROCEDURE

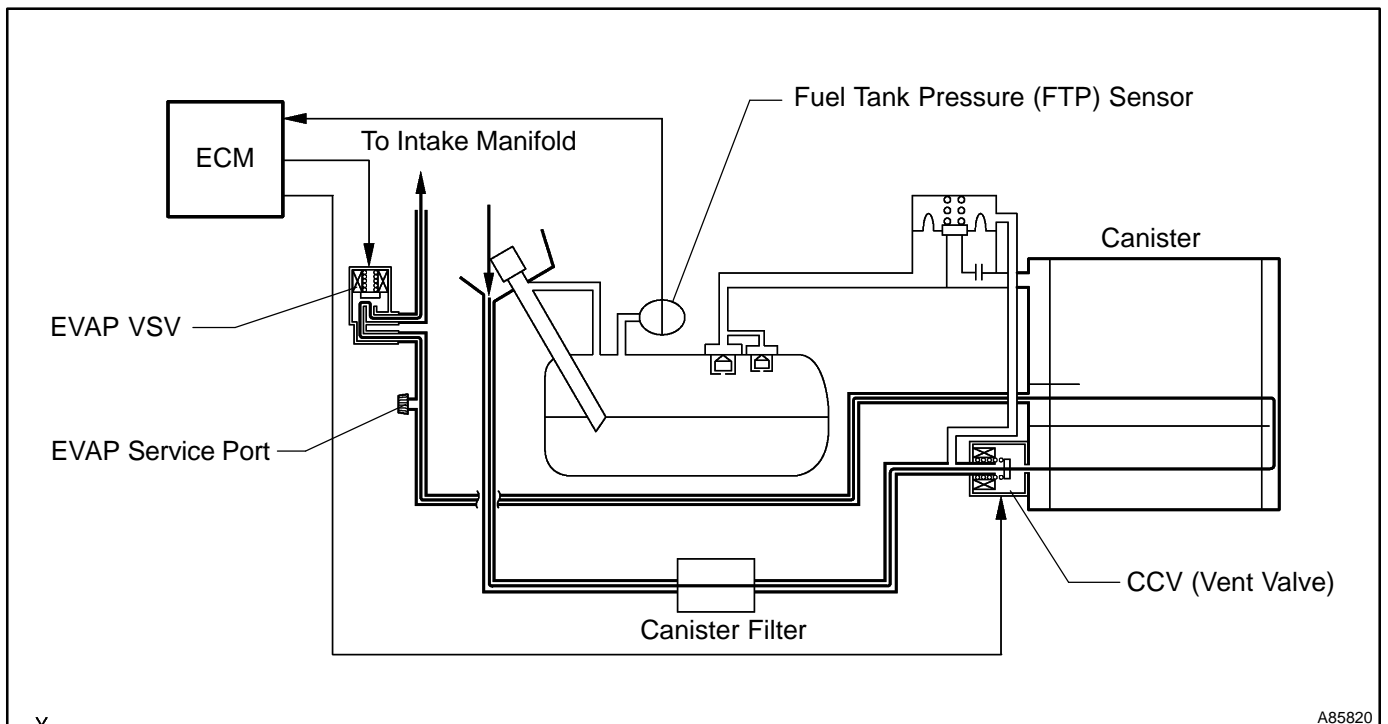
CIRCUIT DESCRIPTION

When predetermined conditions (closed loop, etc.) are met, the EVAP VSV is opened and stored fuel vapor in the canister is purged to the intake manifold. The ECM changes duty-cycle to the EVAP VSV to control purge flow volume. Purge flow volume is determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve (CCV) to ensure that purge flow is maintained when negative pressure (vacuum) is applied to the canister. This EVAP system contains following components:

Components

Components	Operation
Canister	Contains activated charcoal to absorb EVAP that is created in fuel tank.
EVAP VSV	Opens or closes line between canister and intake manifold to control EVAP purge flow. EVAP VSV is opened and purges fuel vapor absorbed by canister to intake manifold. ECM changes duty-cycle of purge VSV to control purge volume (ON is open, OFF is closed).
Refueling Valve	Controls EVAP pressure from fuel tank to canister. Valve has diaphragm, spring and restrictor. When fuel tank pressure increase, valve opens. When EVAP is purging, valve closes and restrictor prevents strong of vacuum from affecting pressure in fuel tank. When valve opens, refueling is possible.
Service Port	Used for connecting vacuum gauge for inspecting EVAP system.
Vent Valve (CCV)	Vents and seals EVAP system. When CCV is turned ON, EVAP system is closed. When CCV is turned OFF, EVAP system is vented. When vacuum introduction, EVAP VSV is opened and CCV is closed.
Fuel Tank Pressure (FTP) Sensor	Indicates pressure as voltage. 5 V is supplied by ECM. ECM detects EVAP system pressure using this voltage.

Diagram



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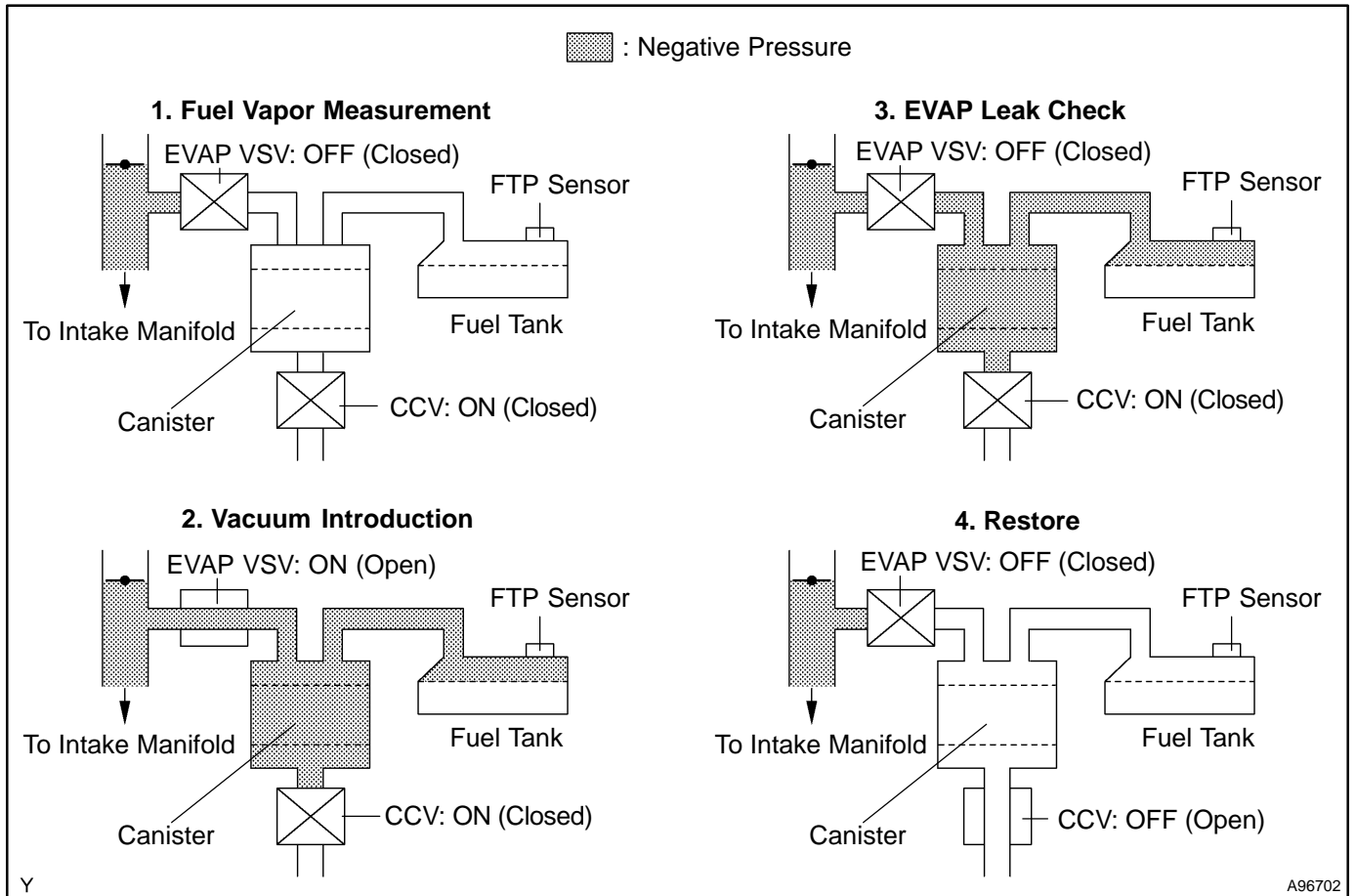
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MONITOR DESCRIPTION

The EVAP monitor's purpose is to check for EVAP leaks and EVAP VSV and CCV malfunctions. The monitor performs the check by first introducing the intake manifold's negative pressure (vacuum) to the EVAP system. Then, the monitor records change in the EVAP system's pressure levels. The monitor runs when the following conditions are met:

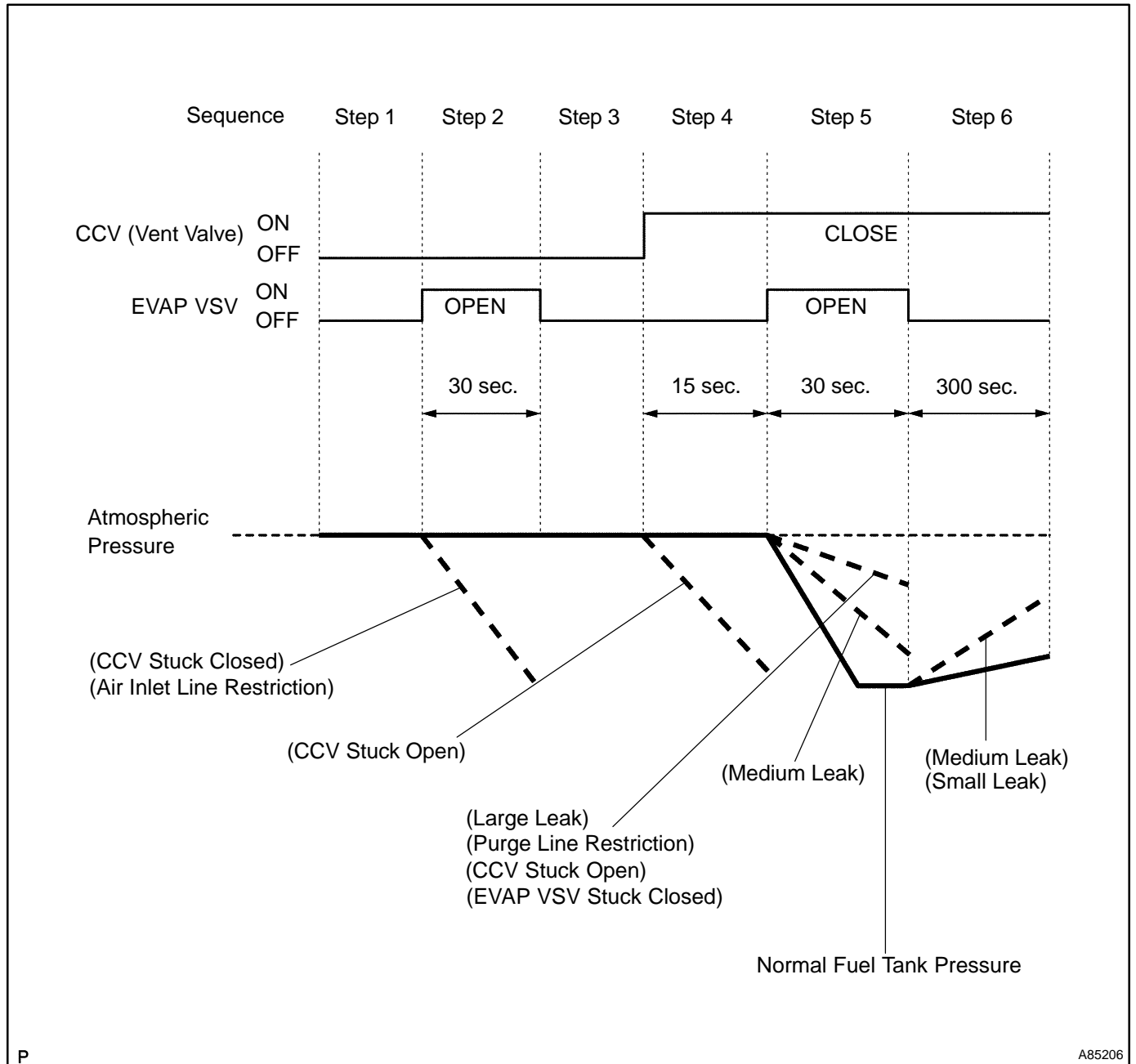
- The engine coolant and intake air temperatures are 4 to 35°C (40 to 90°F).
- The engine is idling or the vehicle is being driven at a steady speed.
- The fuel tank pressure is stabilized.

LEVII EVAP Monitor Process



Sequence	Operation	Description
1	Fuel vapor measurement	EVAP VSV is turned OFF (closed) and EVAP pressure is measured. If EVAP pressure is not stable, EVAP monitor is canceled to prevent inaccurate monitor.
2	Vacuum introduction	EVAP VSV is turned ON (open) and CCV is turned ON (closed). As a result, intake manifold pressure (vacuum) is introduced to EVAP system.
3	EVAP leak check	EVAP VSV is turned OFF (closed) to seal EVAP system. EVAP pressure increase is measured for 5 seconds when EVAP pressure is -20 mmHg and -17 mmHg. If increase is large, ECM concludes EVAP system has leak.
4	Restore	CCV is turned OFF (open) to finish EVAP monitor.

LEV II EVAP Monitor Sequence



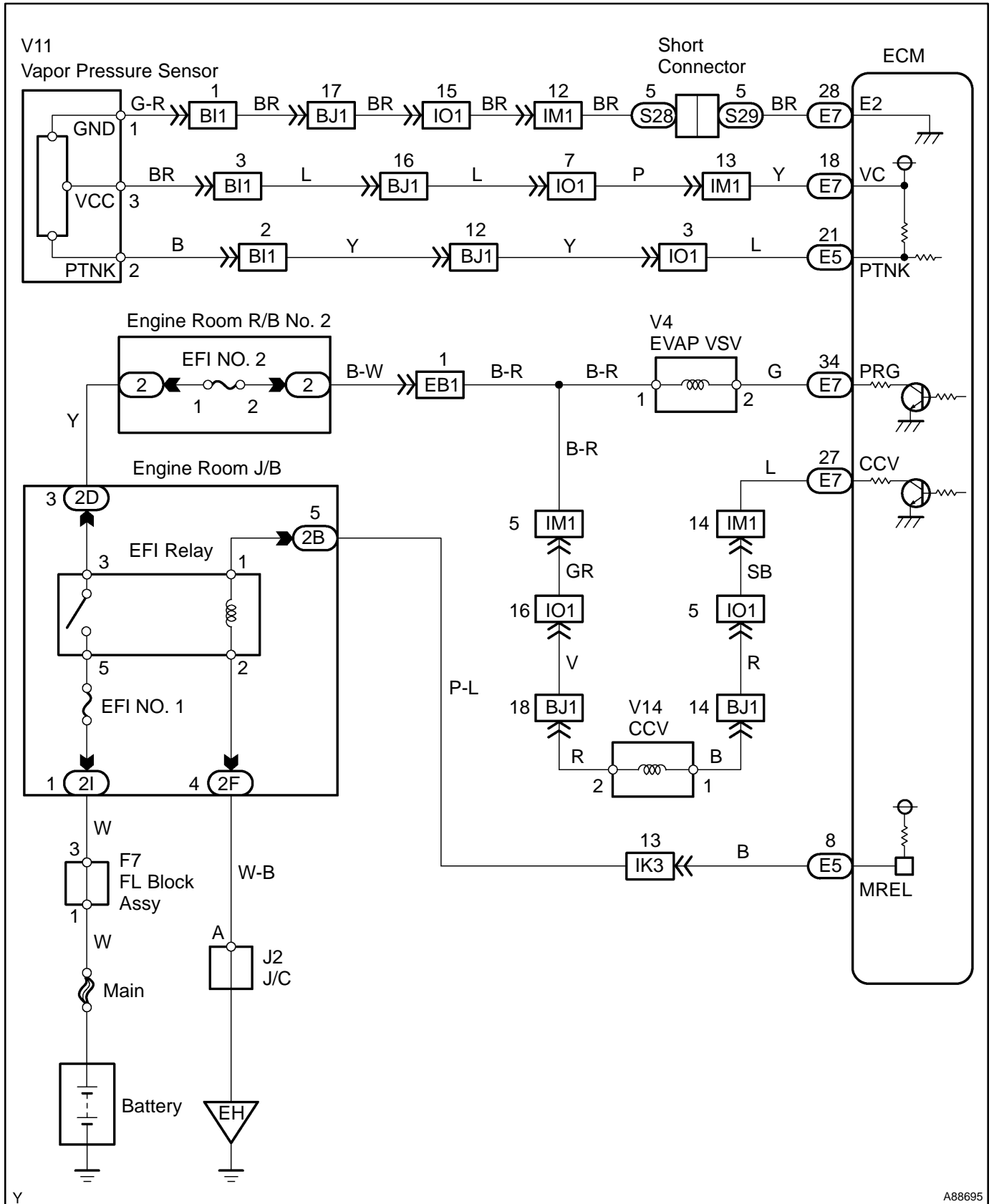
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Related DTCs

DTCs	Monitoring Item
P0441	EVAP VSV stuck closed EVAP VSV stuck open
P0442	EVAP small leak (0.04 inch)
P0446	Vent valve (CCV) stuck closed CCV stuck open
P0451	Fuel tank pressure (FTP) sensor malfunction
P0452	FTP sensor low output
P0453	FTP sensor high output
P0455	EVAP gross leak
P0456	EVAP small leak (0.02 inch)

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Read freeze frame data. Freeze frame data records 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.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0441, P0442, P0446 AND/OR P0456)
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Result

Display (DTC output)	Proceed to
Only P0441, P0442, P0446 and /or P0456 are output	A
P0451, P0452 and P453 are output	B

HINT:

If any other DTCs besides P0441, P0442, P0446 and/or P0456 are output, perform the troubleshooting for those DTCs first (reference: P0451, P0452, P0453 are vapor pressure sensor malfunctions).

B	Go to RELEVANT DTC CHART (See page 05-412)
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A

2	CHECK CURRENT AND PENDING DTC
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- (a) Check current DTCs. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBDII, DTC INFO and CURRENT DTCS.
- (b) Check pending DTCs. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBDII, DTC INFO and PENDING DTCS.

Result

Current DTC	Pending DTC	Conclusion
Set	Set	System has been malfunctioning. Problem can be specified.
Set	-	System was malfunctioning in previous driving cycle. Problem may be specified.
-	Set	System is malfunctioning. This is intermittent problem and caused by fuel tank cap loosening. Otherwise, this problem may be difficult to eliminate.

HINT:

The ECM stores the current DTC and illuminates the MIL when an emission-related component is malfunctioning in 2 consecutive driving cycles (2 trips). The MIL is turned OFF, if the component is functioning normally in 3 consecutive driving cycles. The ECM erases the current DTC, if the component is functioning normally in 40 consecutive driving cycles.

The ECM stores the pending DTC when If the component is malfunctioning in present driving cycle (1 trip). The ECM erases the pending DTC, if the component is functioning normally in the next driving cycle.

NEXT

3	PREDICT POSSIBLE MALFUNCTION AREA
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Predict possible malfunction area using the matrix below.

EVAP DTC Matrix

DTCs	P0441	P0442	P0446	P0451	P0452	P0453	P0455	P0456
Malfunction Area								
EVAP VSV stuck closed	●		●				●	
EVAP VSV stuck open	●							
EVAP small leak (0.04 inch)		●						
CCV stuck closed			●					
CCV stuck open	●		●				●	
FTP sensor malfunction				●				
FTP sensor low output					●			
FTP sensor high output						●		
Gross leak	●						●	
EVAP small leak (0.02 inch)		●						●

DTCs	Suspected Malfunction Area
P0441 only	EVAP VSV stuck open
P0446 only	CCV (vent valve) stuck open
P0442 and/or P0456	Small leak

NEXT

4	PERFORM EVAP SYSTEM CHECK
----------	----------------------------------

NOTICE:

The EVAP system check can be used for confirmation after the EVAP system repair. Check DTCs after performing the EVAP system check. If no pending DTC is set, the EVAP system is functioning normally and the repair is complete.

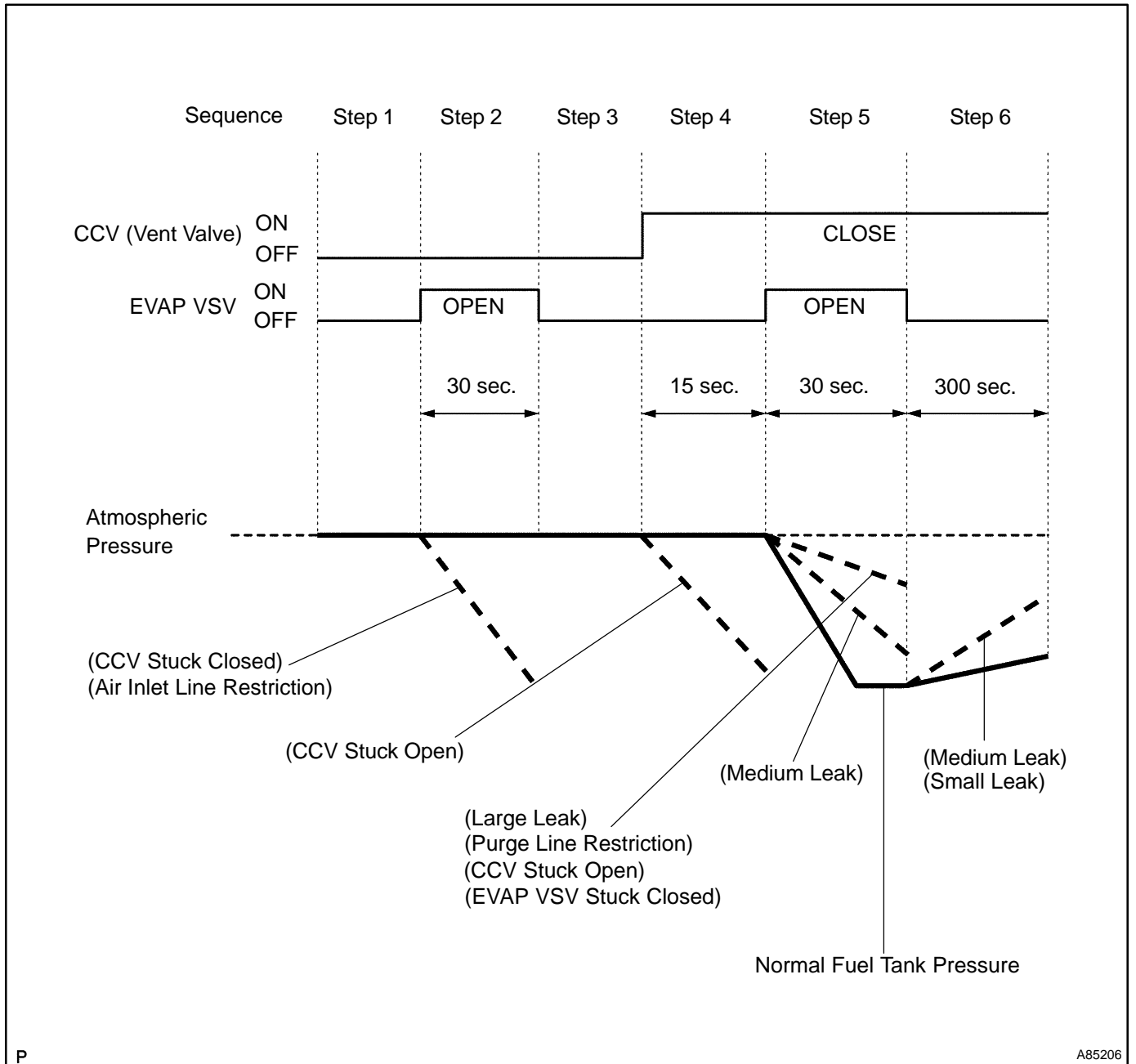
- (a) Select the "mmHg" unit. Select the hand-held tester menus: DIAGNOSIS, SETUP, UNIT CONVERSION and VAPOR PRESS.
- (b) Allow the engine to idle.
- (c) Perform the EVAP system check to find a malfunction area. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, SYSTEM CHECK and LEV II SYS CHECK.
- (d) Read NOTICE and press ENTER.

HINT:

The EVAP system check is most accurate when the following conditions are being set:

- Atmospheric pressure is 762 mmHg (sea level).
- The engine coolant and intake air temperatures are 4 to 35°C (40 to 90°F).
- The fuel tank level is 1/4 to 3/4.

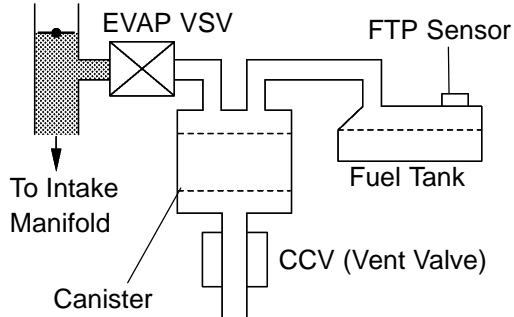
Diagram of LEVII EVAP System Check



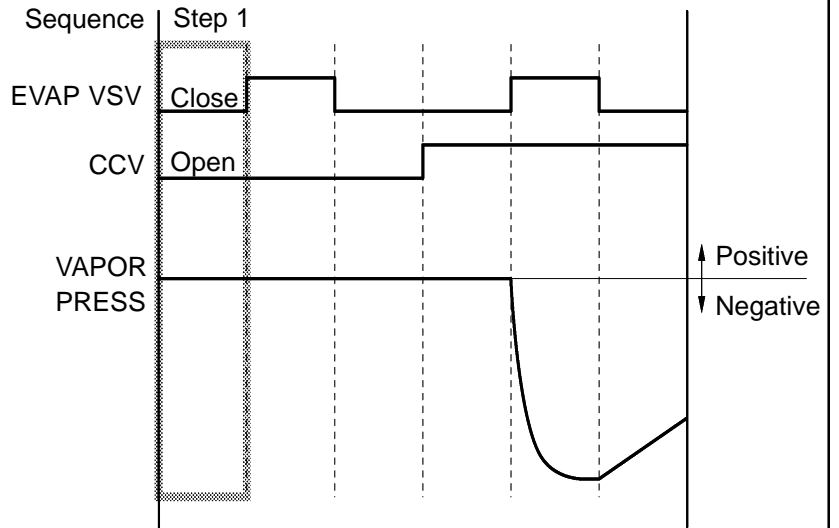
NEXT

5 EVAP SYSTEM CHECK STEP 1 (INITIALIZE SYSTEM)

Step 1. Initialize System



EVAP Pressure Change during System Check



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LEVII SYSTEM CHECK
Step 1. Initialize system

EVAP VSV.....CLOSE
CCV.....OPEN
VAPOR PRESS
.....762 mmHg-a
Time 030 seconds

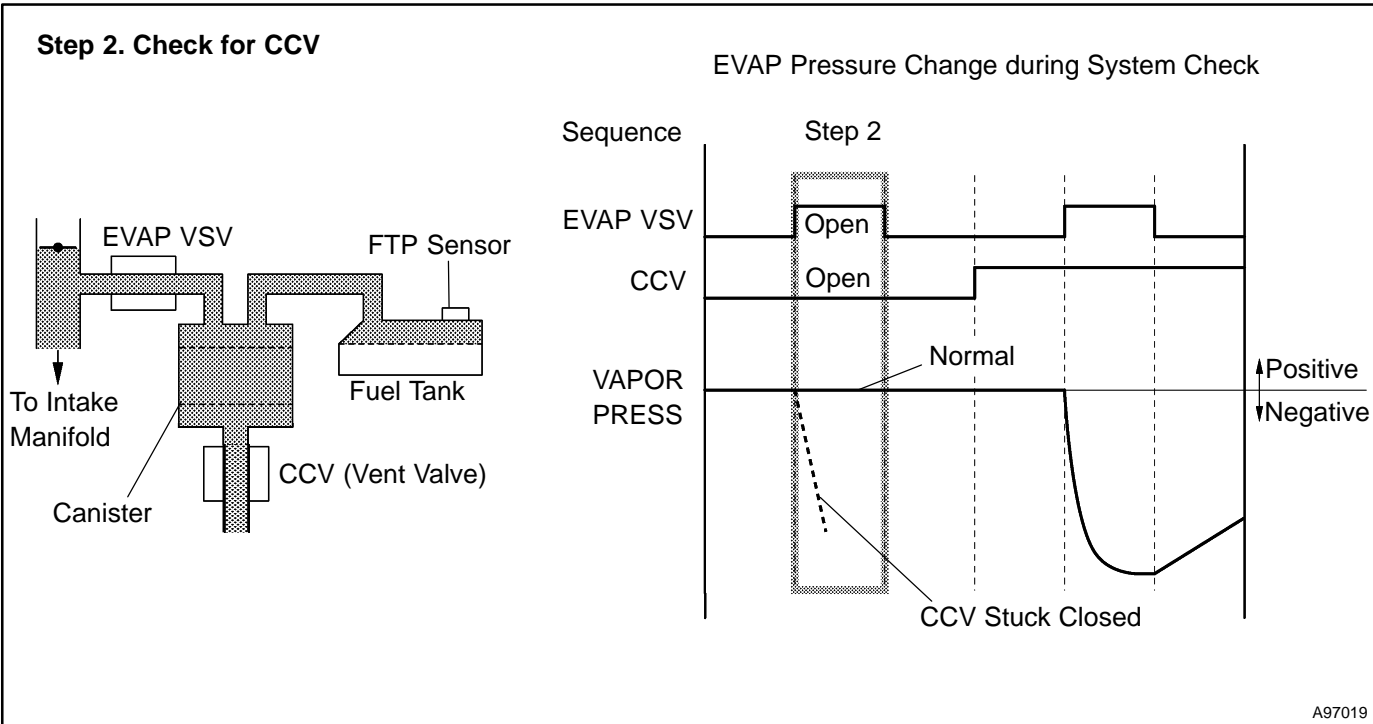
Press [RIGHT]

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Wait for 30 seconds.

NEXT

6 EVAP SYSTEM CHECK STEP 2 (CHECK FOR CCV)



LEVII SYSTEM CHECK
Step 2. Check for CCV

EVAP VSV.....OPEN
CCV.....OPEN
VAPOR PRESS
.....762 mmHg-a
Time 030 seconds

Press [RIGHT]

P A96683

- (a) Press RIGHT to go to step 2.
- (b) Wait for 30 seconds and check VAPOR PRESS (EVAP pressure).

Result

VAPOR PRESS	Conclusion	Proceed to
Higher than 752 mmHg-a (-10 mmHg-g)	Trouble area has not been found yet.	OK
Lower than 752 mmHg-a (-10 mmHg-g)	Following problems are suspected: • Air inlet line restriction • Canister filter restriction • CCV (vent valve) stuck closed	NG

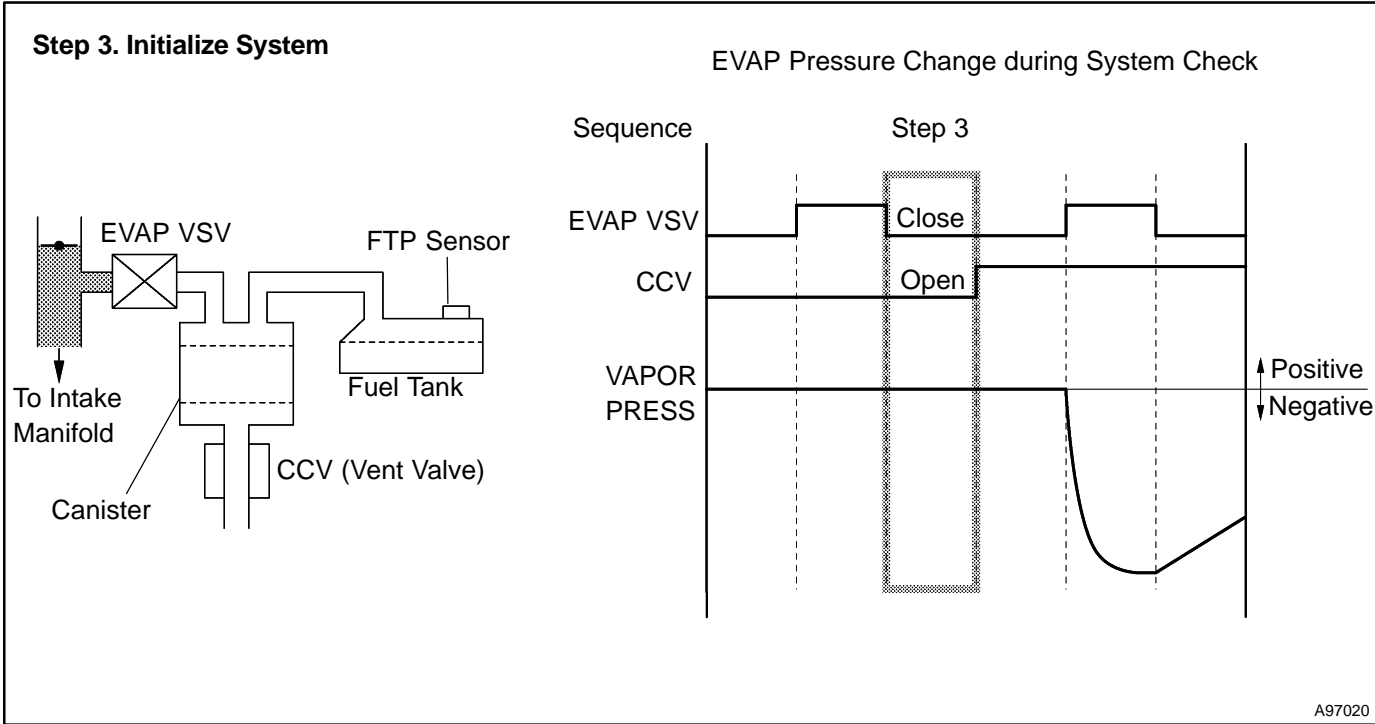
HINT:

In this step, the intake manifold pressure (vacuum) is applied to the EVAP system. However, the fuel tank pressure does not drop due to the CCV (vent valve) open.

NG → **Go to step 11**

OK

7 EVAP SYSTEM CHECK STEP 3 (INITIALIZE SYSTEM)



LEVII SYSTEM CHECK
Step 3. Initialize system

EVAP VSV.....CLOSE
 CCV.....OPEN
 VAPOR PRESS
762 mmHg-g
 Time 030 seconds

Press [RIGHT]

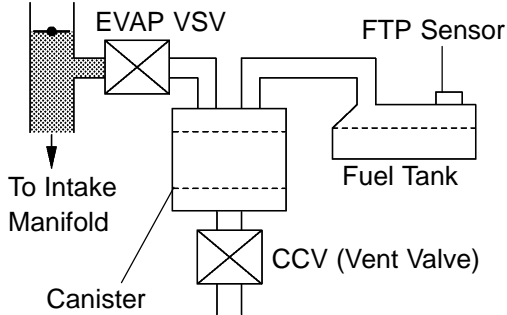
P A96684

- (a) Press RIGHT to go to step 3.
- (b) Wait for 30 seconds.

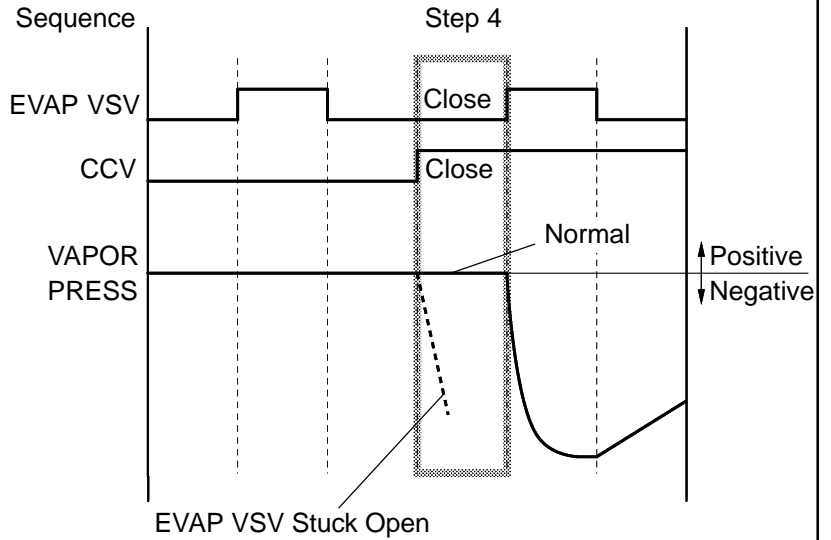
NEXT

8 EVAP SYSTEM CHECK STEP 4 (CHECK FOR EVAP VSV STUCK OPEN)

Step 4. Check for EVAP VSV



EVAP Pressure Change during System Check



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LEVII SYSTEM CHECK
Step 4. Check for EVAP VSV stuck open

EVAP VSV.....CLOSE
CCV.....CLOSE
VAPOR PRESS
.....762 mmHg-g
Time 015 seconds

Press [RIGHT]

P A96685

- (a) Press RIGHT to go to step 4.
- (b) Wait for 15 seconds and check VAPOR PRESS (EVAP pressure).

Result

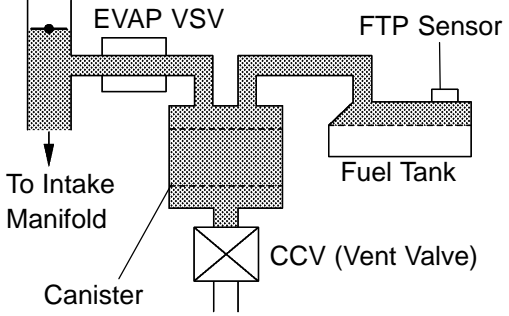
VAPOR PRESS	Conclusion	Proceed to
Higher than 758 mmHg-a (-4 mmHg-g)	Trouble area has not been found yet.	OK
Lower than 758 mmHg-a (-4 mmHg-g)	EVAP VSV stuck open	NG

NG → **Go to step 14**

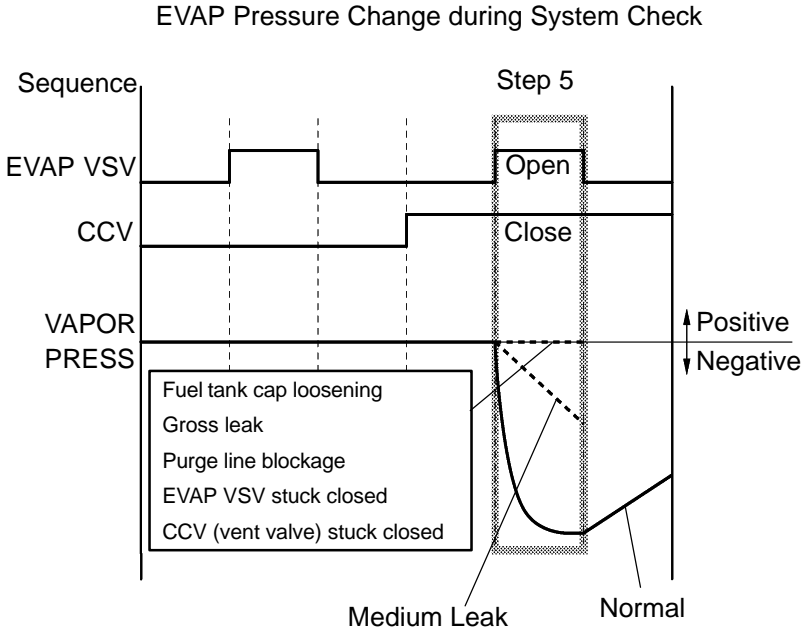
OK

9 EVAP SYSTEM CHECK STEP 5 (APPLYING VACUUM)

Step 5. Applying Vacuum



EVAP Pressure Change during System Check



Sequence

EVAP VSV: Open (during Step 5)

CCV: Close (during Step 5)

VAPOR PRESS: Positive (upward arrow), Negative (downward arrow)

Fuel tank cap loosening
Gross leak
Purge line blockage
EVAP VSV stuck closed
CCV (vent valve) stuck closed

Medium Leak

Normal

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LEVII SYSTEM CHECK
Step 5. Applying vacuum

EVAP VSV.....OPEN
CCV.....CLOSE
VAPOR PRESS
.....740 mmHg-a
Time 030 seconds

Press [RIGHT]

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- (a) Press RIGHT to go to step 5.
- (b) Wait for 30 seconds and check VAPOR PRESS (EVAP pressure).

Result

VAPOR PRESS	Conclusion	Proceed to
Lower than 748 mmHg-a (-14 mmHg-g)	Trouble area has not been found yet.	A
756 to 768 mmHg-a (-6 to 6 mmHg-g)	Following problems are suspected: <ul style="list-style-type: none"> • Fuel tank cap loosening • Gross leak • EVAP VSV stuck closed • CCV (vent valve) stuck open • Purge line blockage between fuel tank and canister 	B
748 to 755 mmHg-a (-14 to -7 mmHg-g)	Medium leak	C

LEVII SYSTEM CHECK
5. Applying vacuum
 To avoid the damage,
 EVAP VSV was closed.
 EVAP VSV.....CLOSE
 CCVCLOSE
 VAPOR PRESS
740 mmHg-a
 Time 030 seconds
 Press [RIGHT]

P A96687

NOTICE:

- If the pressure is lower than 740 mmHg- a (- 22 mmHg-g), the hand-held tester closes the EVAP VSV.

ERROR
 Scantool could not
 activate the VSV
 related to the EVAP
 system.
 Please check the
 vehicle condition
 and try again.

 Press [ENTER]

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- If the pressure is lower than 735 mmHg- a (- 27 mmHg-g), the hand-held tester cancels the EVAP system check.

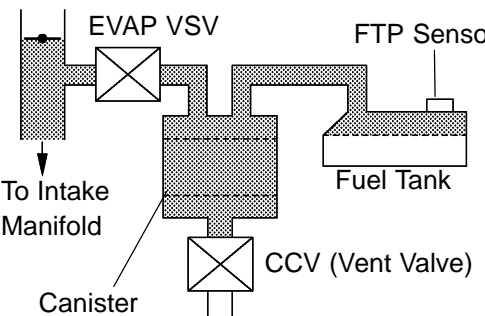
B Go to step 15

C Go to step 18

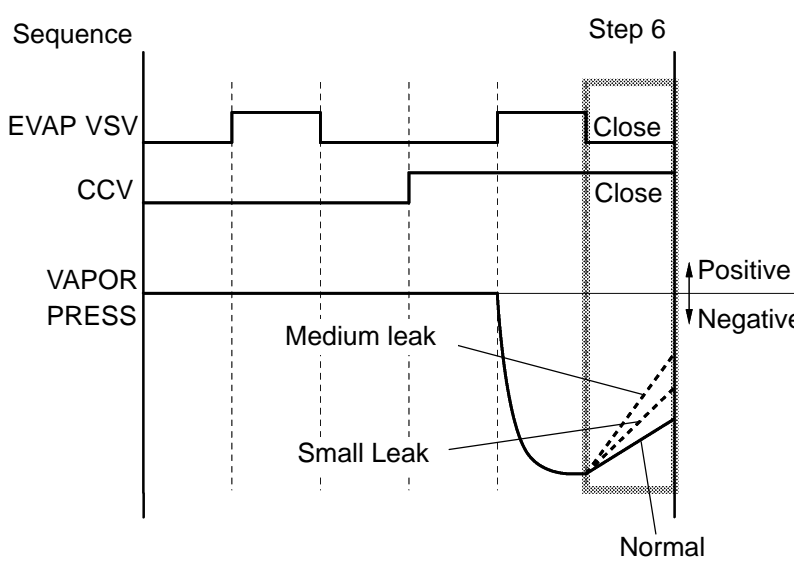
A

10 EVAP SYSTEM CHECK STEP 6 (LEAK CHECK FOR EVAP SYSTEM)

Step 6. Leak Check for EVAP System



EVAP Pressure Change during System Check



Sequence

EVAP VSV

CCV

VAPOR PRESS

Step 6

Close

Close

Positive

Negative

Medium leak

Small Leak

Normal

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LEVII SYSTEM CHECK
Step 6. Leak check for EVAP system
 EVAP VSV.....CLOSE
 CCV.....CLOSE
VAPOR PRESS
752 mmHg-g
Time 300 seconds
 Press [RIGHT]

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- (a) Press RIGHT to go to step 6 when the VAPOR PRESS (EVAP pressure) is lower than 742 mmHg-a (-20 mmHg-g).
- (b) Wait for 300 seconds and check VAPOR PRESS (EVAP pressure).

Result

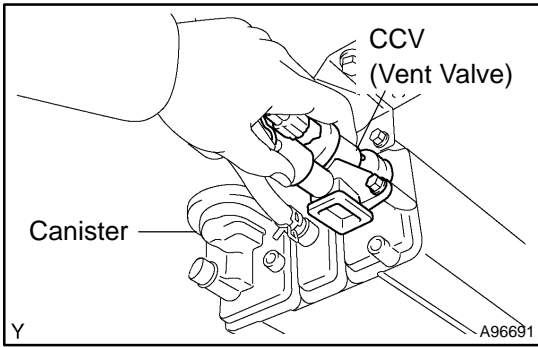
VAPOR PRESS	Conclusion	Proceed to
Less than 758 mmHg-a (-4 mmHg-g)	EVAP system is functioning normally.	OK
Higher than 758 mmHg-a (-4 mmHg-g)	Leakage	NG

NG → **Go to step 18**

OK

Go to step 40

11 | **CHECK CCV**



- (a) Turn the ignition switch OFF.
- (b) Turn the ignition switch ON.
- (c) Switch the CCV (vent valve) using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and CAN CTRL VSV.
- (d) Touch the CCV and check the operation during switching the CCV.

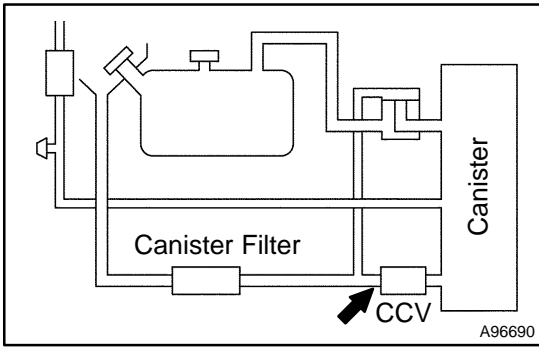
Result

CCV (Vent Valve)	Conclusion	Proceed to
CCV is operated	CCV is functioning normally.	OK
CCV is not operated	CCV is malfunctioning.	NG

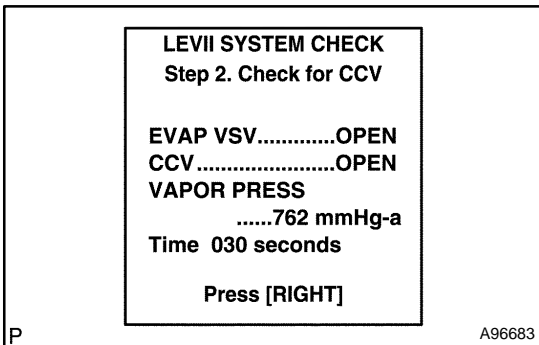
NG → **Go to step 25**

OK

12 CHECK AIR INLET LINE RESTRICTION



- (a) Disconnect the air inlet line from the CCV.
- (b) Remove and reinstall the fuel tank cap to release the fuel tank pressure.
- (c) Allow the engine to idle.



- (d) Perform step 2 of the EVAP system check.
- (e) Wait for 30 seconds and check VAPOR PRESS (EVAP pressure).

Result

VAPOR PRESS	Conclusion	Proceed to
Higher than 752 mmHg-a (-10 mmHg-g)	Blockage in canister filter	A
Lower than 752 mmHg-a (-10 mmHg-g)	Blockage in CCV (vent valve) or canister	B

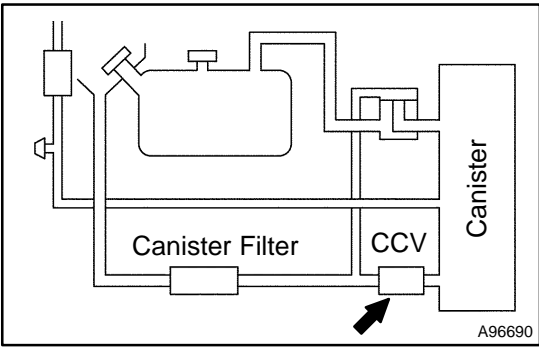
- (f) Reconnect the air inlet line to the CCV.

B Go to step 13

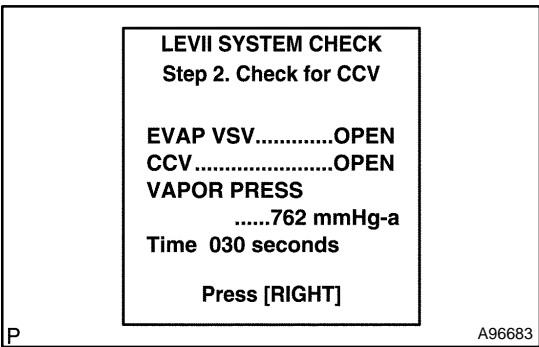
A

REPLACE CANISTER FILTER

13 CHECK CANISTER BLOCKAGE



- (a) Turn the ignition switch OFF.
- (b) Remove the CCV from the canister.
- (c) Remove and reinstall the fuel tank cap to release the fuel tank pressure.
- (d) Allow the engine to idle.



- (e) Perform step 2 of the EVAP system check.
- (f) Wait for 30 seconds and check VAPOR PRESS (EVAP pressure).

Result

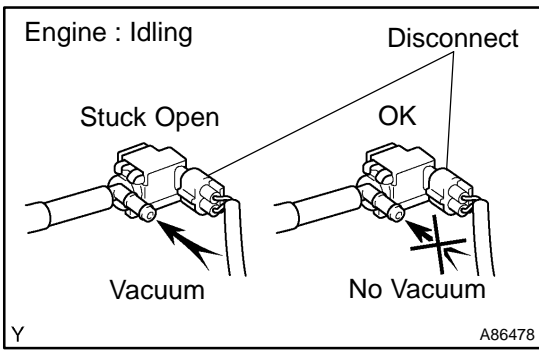
VAPOR PRESS	Conclusion	Proceed to
Higher than 752 mmHg-a (-10 mmHg-g)	CCV (vent valve) stuck closed	A
Lower than 752 mmHg-a (-10 mmHg-g)	Blockage in canister	B

B CHECK AND REPLACE CHARCOAL CANISTER (See page 12-28)

A

REPLACE CCV (VENT VALVE)

14 CHECK EVAP VSV (FOR EVAP VSV STUCK OPEN)



- (a) Turn the ignition switch OFF.
- (b) Disconnect the purge hose of the canister from the EVAP VSV.
- (c) Disconnect the EVAP VSV connector.
- (d) Allow the engine to idle.
- (e) Touch the EVAP VSV port to check the vacuum.

Result

EVAP VSV	Conclusion	Proceed to
Vacuum is applied.	EVAP VSV is malfunctioning.	A
No vacuum is applied.	Electrical circuit of EVAP VSV is malfunctioning.	B

B Go to step 29

A

REPLACE EVAP VSV

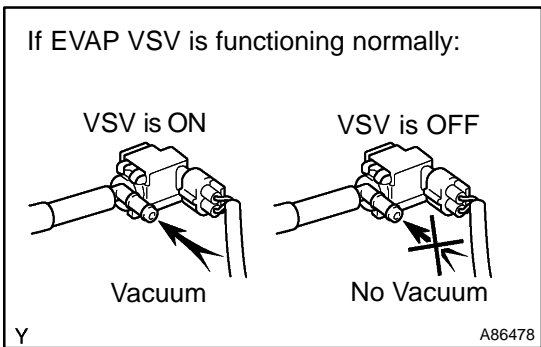
15 | **CHECK FUEL TANK CAP**

- (a) Remove the fuel tank cap and reinstall it until a few click sound is heard.
- (b) Clear the DTCs.
- (c) Check pending DTCs after the EVAP system check. If no pending DTC is set, the DTC(s) was set due to the fuel cap loosening.

If necessary, replace the fuel cap.

NG**Go to step 16****OK****REPAIR IS COMPLETE**

16 CHECK EVAP VSV (FOR EVAP VSV STUCK CLOSED)



- (a) Disconnect the purge hose of the canister from the EVAP VSV.
- (b) Allow the engine to idle.
- (c) Switch the EVAP VSV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and EVAP VSV.
- (d) Touch the EVAP VSV port to check the vacuum.

HINT:

The EVAP VSV can be tested with the EVAP Test Equipment (go to step 39).

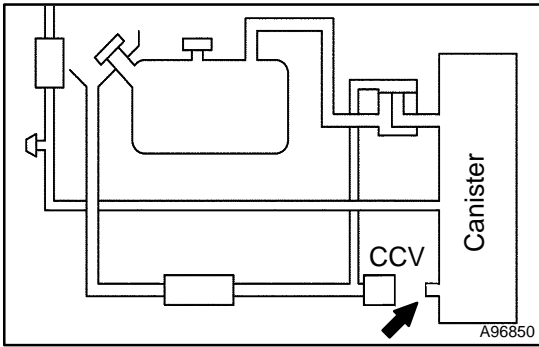
Result

EVAP VSV	Conclusion	Proceed to
Vacuum is applied when EVAP VSV is ON. No vacuum is applied when EVAP VSV is OFF.	EVAP VSV is functioning normally.	OK
No vacuum is applied when EVAP VSV is ON.	Electrical circuit of EVAP VSV is malfunctioning.	NG

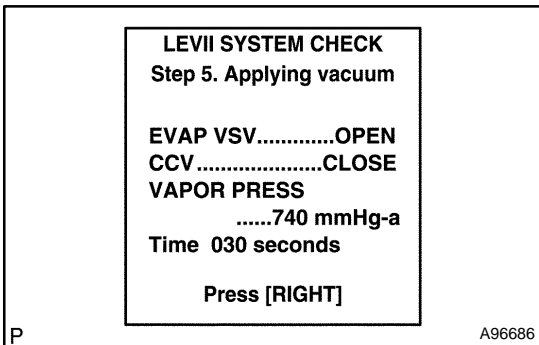
NG Go to step 31

OK

17 CHECK CCV (FOR CCV STUCK OPEN)



- (a) Turn the ignition switch OFF.
- (b) Remove the CCV (vent valve) and plug the canister.
- (c) Allow the engine to idle.



- (d) Apply vacuum to the EVAP system with the EVAP system check. Perform step 5 "Applying Vacuum".
- (e) Wait for 30 seconds and check the VAPOR PRESS (EVAP pressure).

Result

VAPOR PRESS	Conclusion	Proceed to
Lower than 747 mmHg-a (-15 mmHg-g)	CCV (vent valve) stuck open	A
Higher than 747 mmHg-a (-15 mmHg-g)	Blockage in canister Blockage in purge line (Fuel tank - Canister) Blockage in purge line (Fuel tank -EVAP VSV)	B

B Go to step 20

A

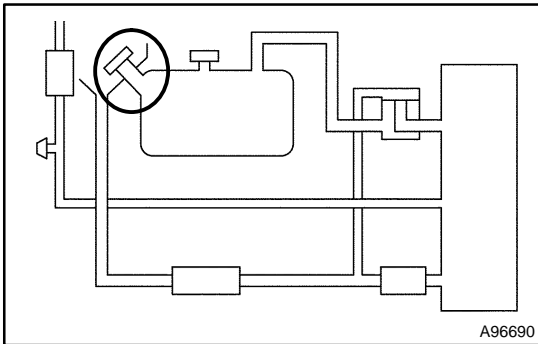
Go to step 24

18 | **CHECK FUEL TANK CAP**

- (a) Remove the fuel tank cap and reinstall it until a few click sound is heard.
- (b) Clear the DTCs.
- (c) Check pending DTCs after the EVAP system check. If no pending DTC is set, the DTC(s) was set due to the fuel cap loosening.

If necessary, replace the fuel cap.

NG**Go to step 19****OK****REPAIR IS COMPLETE**

19 CHECK FILLER NECK DAMAGE

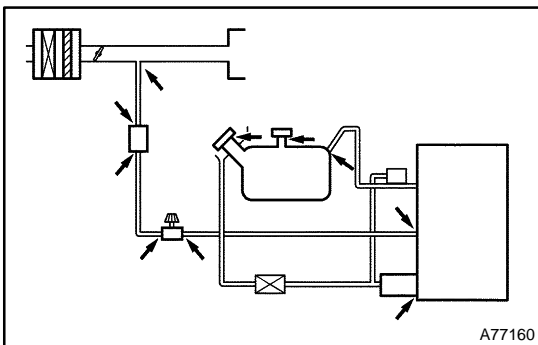
- Remove the fuel tank cap.
- Visually inspect the filler neck for damage.
- Reinstall the fuel tank cap.

HINT:

A leak point may be found with the EVAP Test Equipment (go to step 36).

NG → **REPLACE FUEL TANK INLET PIPE**

OK

20 CHECK PURGE LINE (CANISTER - FUEL TANK)

- Check that the pipes and hoses are connected correctly.
- Check that the pipes and hoses are not loose or disconnected.
- Check the pipes and hoses have no damage or blockage.

NG → **REPLACE PURGE HOSE**

OK

21 CHECK PURGE LINE (CANISTER - EVAP VSV)

- Check that the pipes and hoses are connected correctly.
- Check that the pipes and hoses are not loose or disconnected.
- Check the pipes and hoses have no damage or blockage.

NG → **REPLACE PURGE HOSE**

OK

22 INSPECT CANISTER (See page 12-23)

NG → **REPLACE CANISTER**

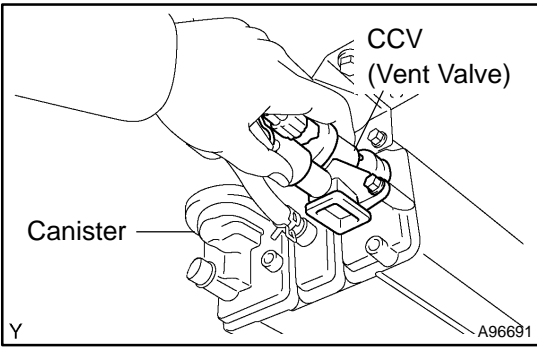
OK

23 INSPECT FUEL TANK

- (a) Check that the fuel tank has no damage.
- (b) Check the fuel inlet pipe has no damage.
- (c) Check leakage from the fuel pump unit.

NG**REPAIR OR REPLACE DEFFECTIVE OR DAMAGED PARTS****OK****Go to step 40**

24 CHECK CCV



- (a) Stop the engine and turn the ignition switch ON.
- (b) Switch the CCV (vent valve) using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and CAN CTRL VSV.
- (c) Touch the CCV and check the operation during switching the CCV.

Result

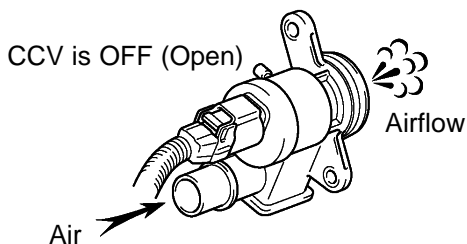
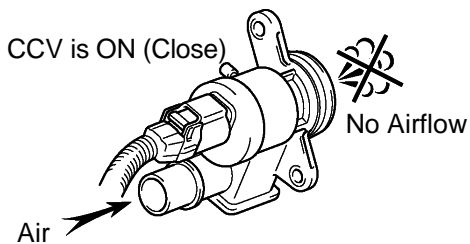
CCV (Vent Valve)	Conclusion	Proceed to
CCV is operated	Electrical circuit of CCV is functioning normally.	A
CCV is not operated	Electrical circuit of CCV is malfunctioning.	B

B Go to step 26

A

25 CHECK CCV

If CCV (vent valve) is functioning normally:



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- (a) Turn the ignition switch OFF.
- (b) Remove the CCV (vent valve).
- (c) Connect the CCV connector,
- (d) Turn the ignition switch ON.
- (e) Switch the CCV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and CAN CTRL VSV.
- (f) Apply air to the CCV port using an air gun and check the airflow.

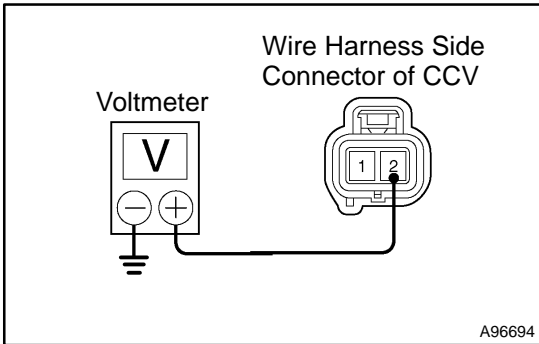
Result

CCV (Vent Valve)	Conclusion	Proceed to
Air flows when CCV is OFF (open). Air does not flows when CCV is ON (close).	CCV is functioning normally. Electrical circuit of CCV is malfunctioning.	A
Air flows when CCV is ON (close). Air does not flows when CCV is OFF (open).	CCV is malfunctioning.	B

B **REPLACE CCV (See page 12-28)**

A

26 CHECK WIRE HARNESS AND CONNECTOR (CCV - POWER SOURCE)



- (a) Turn the ignition switch OFF.
- (b) Disconnect the CCV connector.
- (c) Turn the ignition switch ON.
- (d) Measure the voltage between terminal 2 of the wire harness side connector and body ground.

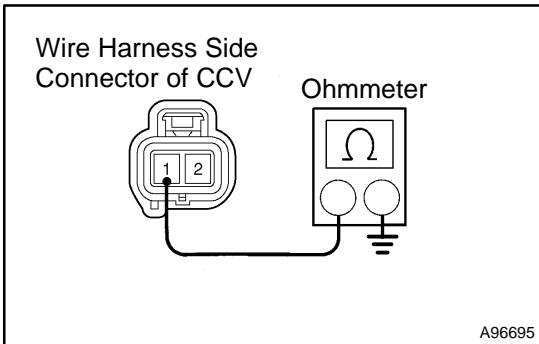
Result

Voltage	Conclusion	Proceed to
Battery voltage	Wire harness (CCV - Power source) is OK.	OK
0 to 3 V	Wire harness (CCV - Power source) is short circuit.	NG

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

27 CHECK WIRE HARNESS AND CONNECTOR (CCV - ECM)



- (a) Switch the CCV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and CAN CTRL VSV.
- (b) Measure the resistance between terminal 1 of the wire harness side connector and body ground.

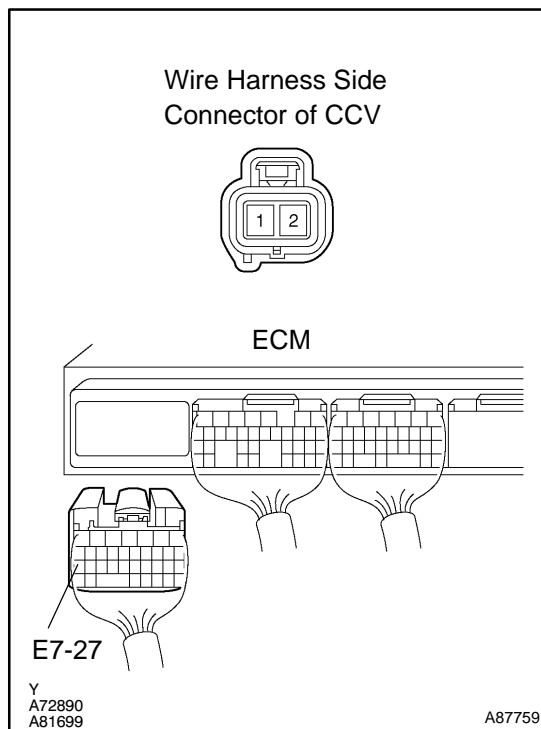
Result

Resistance	Conclusion	Proceed to
More than 10 kΩ when CCV is OFF. Less than 10 Ω when CCV is ON.	ECM and wire harness (CCV - ECM) are OK. CCV is malfunctioning.	OK
No change	Either of wire harness (CCV - ECM) or ECM is malfunctioning.	NG

NG → **Go to step 28**

OK

REPLACE CCV

28 CHECK WIRE HARNESS AND CONNECTOR (CCV - ECM)

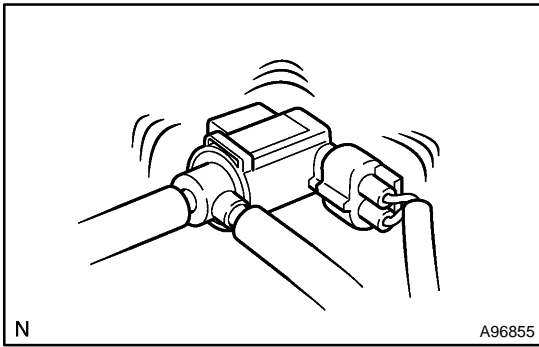
- Check the wire harness between the ECM and CCV.
- Turn the ignition switch OFF.
- Disconnect the E7 ECM connector.
- Measure the resistance between the CCV and ECM wire harness side connectors.

Standard

Tester Connection	Specified Condition
1 (CCV) - E7-27 (ECM)	Less than 10 Ω
1 (CCV) - Body ground	More than 10 k Ω

NG**REPAIR OR REPLACE HARNESS AND CONNECTOR****OK****CHECK AND REPLACE ECM**

29 | CHECK EVAP VSV



- (a) Turn the ignition switch ON.
- (b) Switch the EVAP VSV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and EVAP VSV (Alone).
- (c) Listen to click sounds to check the EVAP VSV operation.

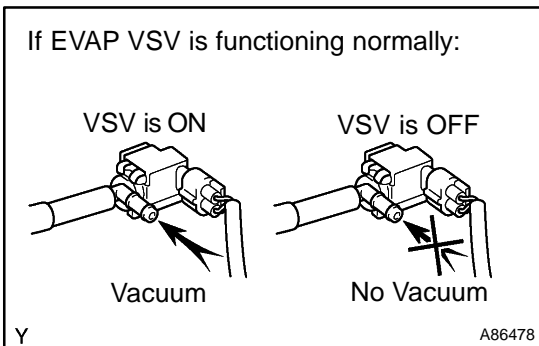
Result

EVAP VSV	Conclusion	Proceed to
Operated	Electrical circuit of EVAP VSV is functioning normally.	OK
Not operated	Electrical circuit of EVAP VSV is malfunctioning.	NG

NG → Go to step 32

OK

30 | CHECK EVAP VSV



- (a) Disconnect the purge hose of the canister from the EVAP VSV.
- (b) Start the engine.
- (c) Switch the EVAP VSV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and EVAP VSV.
- (d) Touch the EVAP VSV port to check the vacuum.

HINT:

The EVAP VSV can be tested with the EVAP Test Equipment (go to step 39).

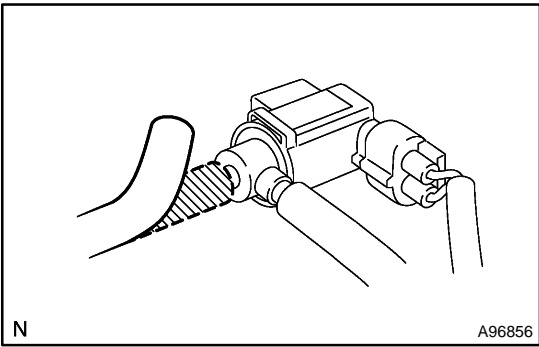
Result

EVAP VSV	Conclusion	Proceed to
Vacuum is applied when EVAP VSV is ON. No vacuum is applied when EVAP VSV is OFF.	EVAP VSV is functioning normally.	OK
No vacuum is applied when EVAP VSV is ON.	Electrical circuit of EVAP VSV is malfunctioning.	NG

NG → Go to step 32

OK

31 CHECK PURGE LINE (EVAP VSV - THROTTLE BODY)



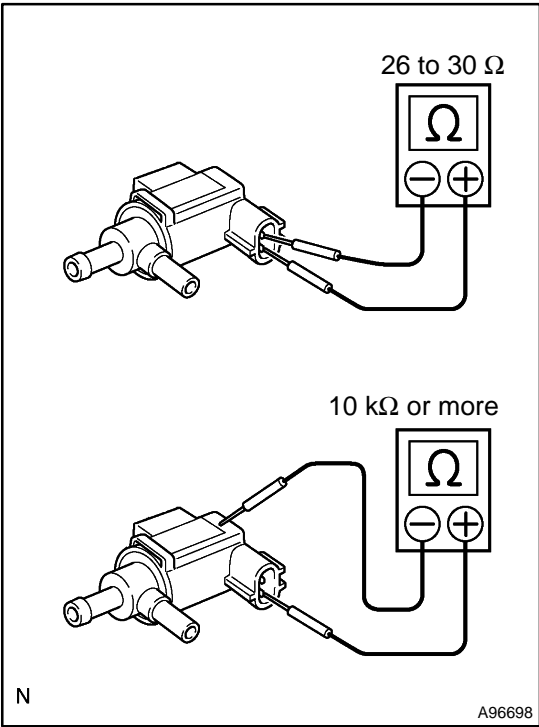
- (a) Check that the vacuum hoses are connected correctly.
- (b) Check that the vacuum hoses are not loose or disconnected.
- (c) Check the vacuum hoses and tubes for cracks, holes, damage, or blockage.

NG → **REPLACE PURGE HOSE**

OK

REPLACE EVAP VSV

32 INSPECT EVAP VSV



- (a) Turn the ignition switch OFF.
- (b) Disconnect the EVAP VSV connector.
- (c) Measure the resistance of the EVAP VSV.

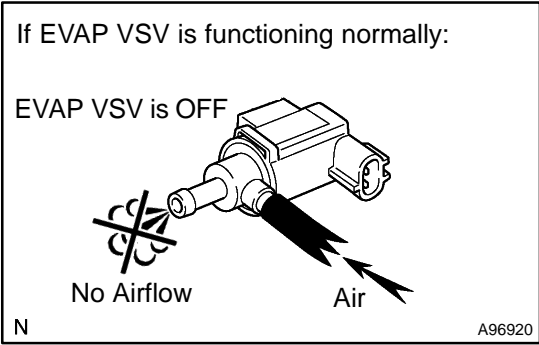
Standard

Tester Connection	Specified Condition
Between terminals	26 to 30 Ω at 20°C (68°F)
Each terminal - Body ground	10 kΩ or more

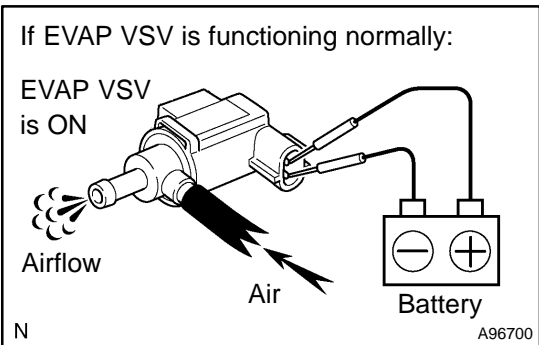
NG → **REPLACE EVAP VSV**

OK

33 INSPECT EVAP VSV



- (a) Remove the EVAP VSV.
- (b) Apply air to the EVAP VSV using an air gun, check the air-flow.



- (c) Apply battery positive voltage across the terminals.
- (d) Apply air to the EVAP VSV using an air gun, check the air-flow.

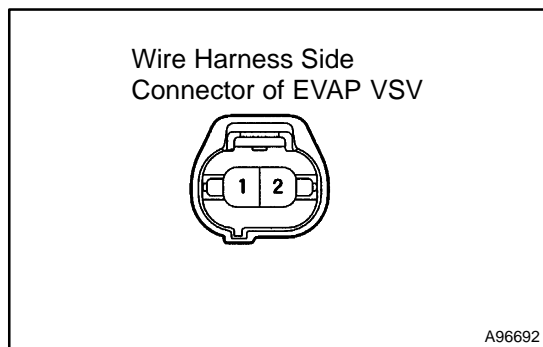
Result

EVAP VSV	Conclusion	Proceed to
Air does not flow when EVAP VSV is OFF. Air flows when EVAP VSV is ON.	EVAP VSV is functioning normally.	OK
Air flows when EVAP VSV is OFF. Air does not flow when EVAP VSV is ON.	EVAP VSV is malfunctioning.	NG

NG → **REPLACE EVAP VSV**

OK

34 CHECK WIRE HARNESS AND CONNECTOR (EVAP VSV - POWER SOURCE)



- (a) Turn the ignition switch ON.
- (b) Measure the voltage between the terminal 1 of the wire harness side and body ground.

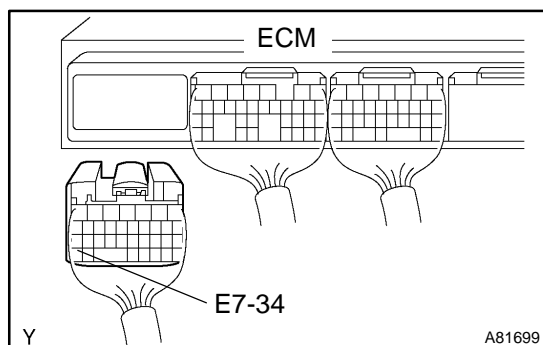
Result

Voltage	Conclusion	Proceed to
Battery voltage	Wire harness (EVAP VSV - Power source) is OK.	OK
0 to 3 V	Wire harness (EVAP VSV - Power source) is short circuit.	NG

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

35 CHECK WIRE HARNESS AND CONNECTOR (EVAP VSV - ECM)



- (a) Turn the ignition switch OFF.
- (b) Disconnect the E7 ECM connector.
- (c) Turn the ignition switch ON.
- (d) Measure the voltage between the terminal 34 of the wire harness side and body ground.

Result

Voltage	Conclusion	Proceed to
Battery voltage	Wire harness (EVAP VSV - ECM) is OK.	OK
0 to 3 V	Wire harness (EVAP VSV - ECM) is short circuit.	NG

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

CHECK AND REPLACE ECM

36	CHECK FUEL TANK CAP
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- (a) Connect the fuel tank cap to the gas cap adaptor.
- (b) Connect the pressure hose from the pump to the gas cap adaptor.
- (c) Plug the gas cap adaptor port.
- (d) Turn the pump ON and pressurize the gas cap adaptor by 24 - 28 mmHg. If the pressure does not reach to 24 mmHg within 45 seconds, stop the pump. The fuel tank cap is malfunctioning.
- (e) Turn the pump OFF and seal the pressure line to maintain the pressure.
- (f) Measure the pressure change for 2 minutes. If the pressure drops to lower than 15 mmHg, the fuel tank cap is malfunctioning.

Standard: The fuel tank cap keeps the pressure that is 15 mmHg or higher.

NG

REPLACE FUEL TANK CAP

OK

37	CHECK LEAK
-----------	-------------------

NOTICE:

DO NOT apply the EVAP system to the pressure that is higher than 35 mmHg. The EVAP system will be damaged.

- (a) Connect the pressure line from the pump to the EVAP service port.
- (b) Turn the ignition switch ON but the engine is not running.
- (c) Turn the CCV (vent valve) is ON (close) using the hand-held tester. Select the hand-held tester menu: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and CAN CTRL VSV.
- (d) Turn the pump ON and pressurize the EVAP system by 24 - 28 mmHg.
- (e) Turn the pump OFF and seal the pressure line to maintain the pressure. If the pressure does not reach to 24 mmHg within 45 seconds, stop the pump. A leakage is in the EVAP system. If the system has a small leak, a whistling sound may be heard.
- (f) Measure the pressure change for 2 minutes. If the pressure drops to lower than 15 mmHg, a leakage is in the EVAP system.

Standard: The EVAP system keeps the pressure that is 15 mmHg or higher.

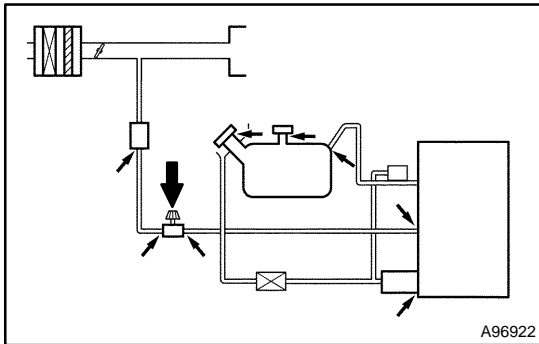
NG

Go to step 38

OK

NO LEAKAGE IN EVAP SYSTEM

38	LOOK FOR LEAK POINT
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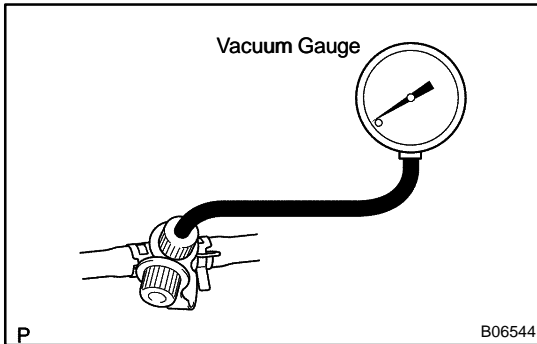


- (a) Apply the soapy water on suspected components.
- (b) Turn the CCV (vent valve) is ON (close) using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and CAN CTRL VSV.
- (c) Turn the pump ON and pressurize the EVAP system by 24 - 28 mmHg.
- (d) Turn the pump OFF and seal the pressure line to maintain the pressure. If the pressure does not reach to 24 mmHg within 45 seconds, stop the pump.
- (e) Check bubbles to find the leak point:
 - EVAP service port
 - Canister
 - Hose connections/Lines
 - Fuel cap
 - Fuel filler neck
 - Purge line
 - EVAP VSV
 - CCV (vent valve)
 - Fuel pump sending unit
- (f) Repair or replace the leak component.
- (g) Perform the EVAP system check to confirm no leak.

NEXT

Go to step 4

39	CHECK EVAP VSV
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- (a) Connect the vacuum gauge to the EVAP service port.
- (1) Start the engine.
 - (2) Switch the EVAP VSV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD II, ACTIVE TEST and EVAP VSV.
 - (3) Check the vacuum when switching the EVAP VSV. If the vacuum gauge indicates negative value when the EVAP VSV is ON, the EVAP VSV is functioning normally.

OK:

The vacuum gauge indicates negative value when the EVAP VSV is ON.

NG

Go to step 31

OK

Go to step 17

40 CHECK MONITOR STATUS AND DTC

- (a) Clear DTCs.
- (b) Perform a drive pattern test (see page [05-387](#)).
- (c) Check that the monitor result is PASS.
- (d) Confirm no pending DTC.

NEXT**REPAIR IS COMPLETE**