DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Circuit

DTC	P2418	Evaporative Emission System Valve Control Circuit/Open

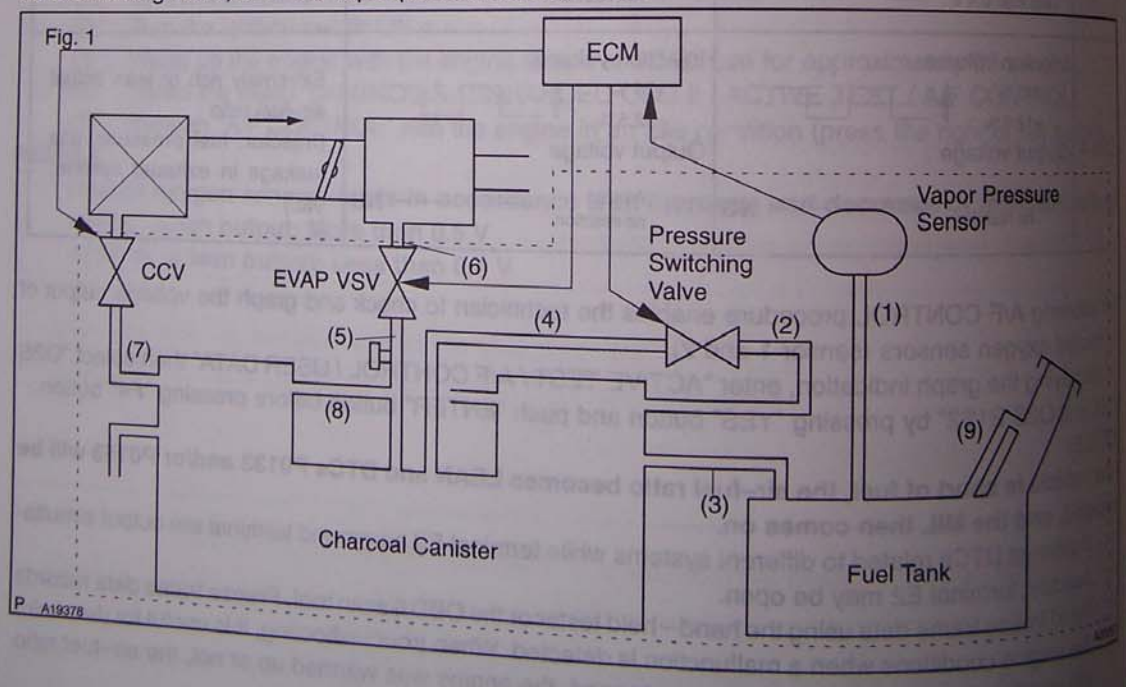
CIRCUIT DESCRIPTION

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.

Fig. 1



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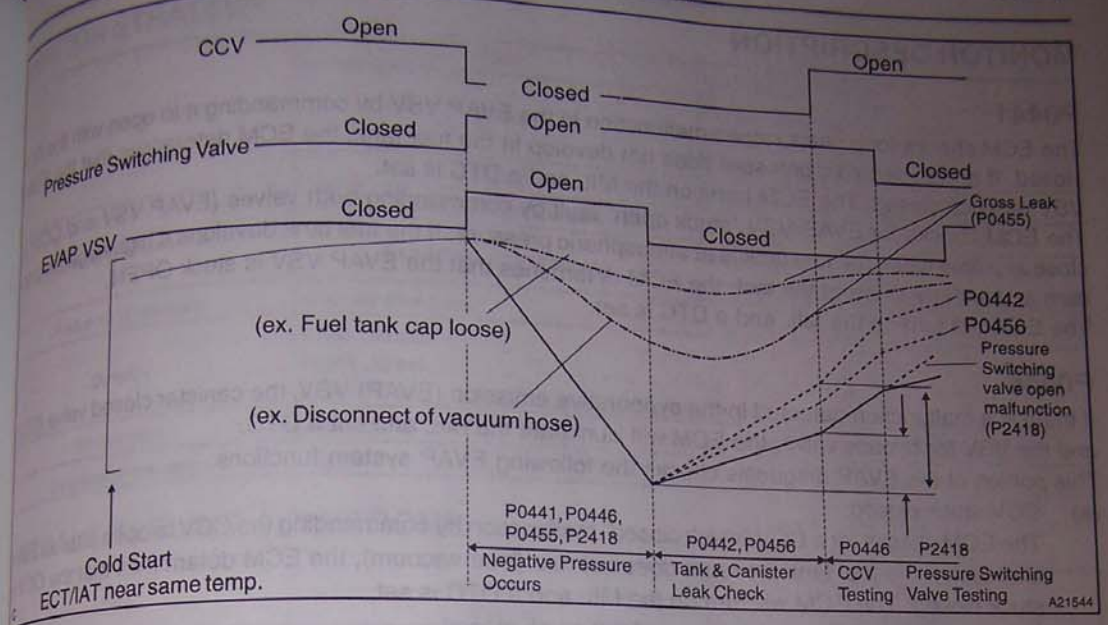

DTC No.	DTC Detecting Condition	Trouble Area
P0441	Pressure in charcoal canister and fuel tank does not drop during purge control (2 trip detection logic)	• Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8) and (9) in Fig. 1) • Fuel tank cap incorrectly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

*1: ECM may output some other DTC combinations.

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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 stores 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

DTCs	P0441	EVAP VSV malfunction
	P0446	Canister close valve stuck closed Pressure switching valve malfunction 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	P0441 : 90 sec. P0446 : 10 sec. P2418 : 10 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–337)	
The same as that for DTC P0442		

TYPICAL MALFUNCTION THRESHOLDS

P0441

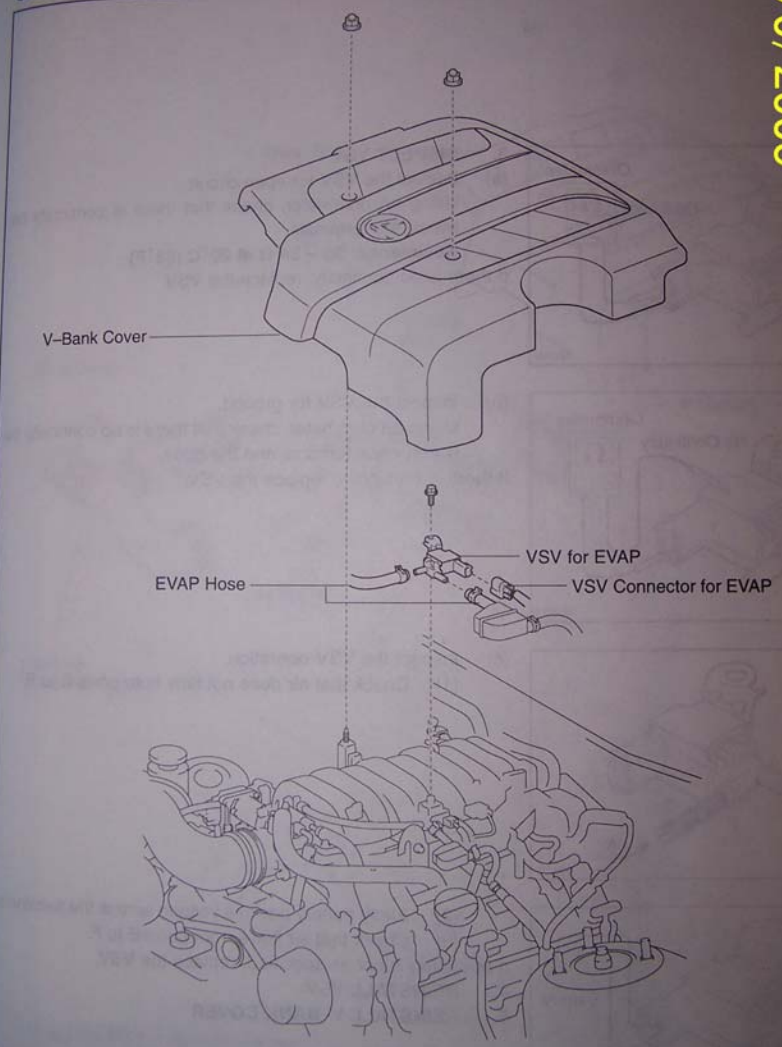
Detection Criteria	Threshold
Either the following condition is met:	A or B
A. Following conditions are met:	(a) and (b)
(a) Fuel tank pressure at the vacuum introduction start	–1.6 kPa (–12 mmHg, –0.47 in.Hg) or more
(b) Difference between the fuel tank pressure at the vacuum introduction start and completion	Less than 0.9 kPa (7 mmHg, 0.27 in.Hg)
B. Following conditions are met:	(a) and (b)
(a) Difference between "minimum" fuel tank pressure before the leak check and the fuel tank pressure at 14 sec. after the leak check	0.5 kPa or more (3.5 mmHg, 0.15 in.Hg)
(b) Fuel tank pressure at 14 sec. after the leak check	Less than –3.7 kPa (–28 mmHg, –1.1 in.Hg)

P0446

Detection Criteria	Threshold
Case 1: CCV stuck closed	
Fuel tank pressure when the CCV is opened after an EVAP leak check	Not changing
Case 2: EVAP VSV stuck closed	
Fuel tank pressure after the EVAP VSV is opened and manifold vacuum is introduced to the fuel tank	Not changing

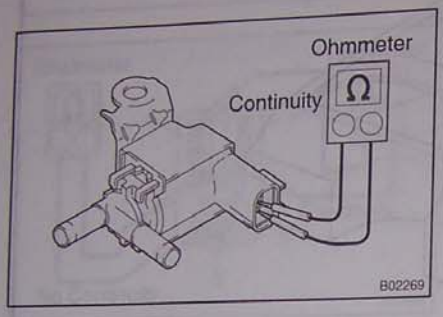
VSV FOR EVAPORATIVE EMISSION (EVAP)

COMPONENTS



INSPECTION

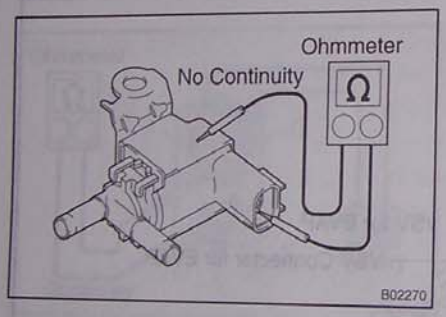
1. REMOVE V–BANK COVER
2. REMOVE VSV



3. INSPECT VSV

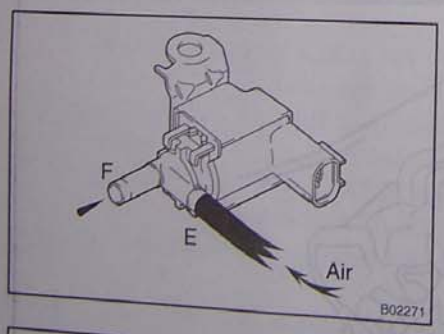
(a) Inspect the VSV for open circuit.
Using an ohmmeter, check that there is continuity between the terminals.
Resistance: 30 – 34 Ω at 20°C (68°F)

If there is no continuity, replace the VSV.

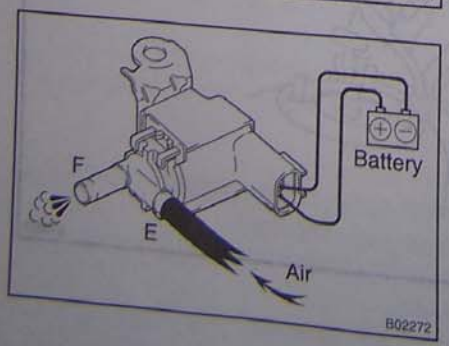


(b) Inspect the VSV for ground.
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.
(1) Check that air dose not flow from ports E to F.



(2) Apply battery positive voltage across the terminals.
(3) Check that air flows from ports E to F.

If operation is not as specified, replace the VSV.

4. REINSTALL VSV
5. REINSTALL V–BANK COVER

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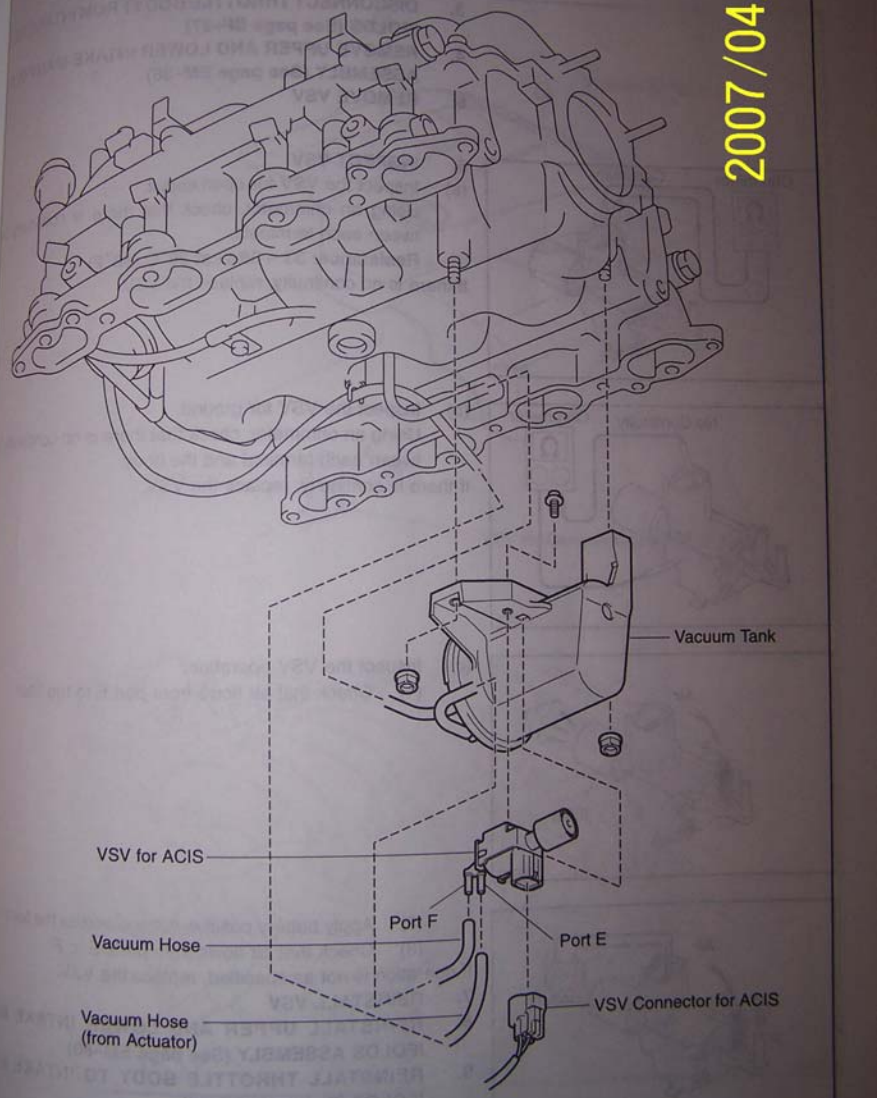
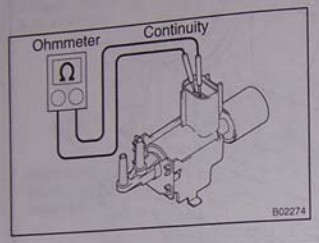

Vacuum Tank
VSV for ACIS
Port F
Port E
Vacuum Hose
VSV Connector for ACIS
Vacuum Hose
(from Actuator)

INSPECTION

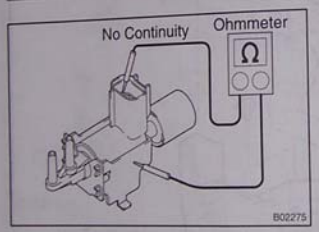
1. REMOVE V–BANK COVER
2. REMOVE INTAKE AIR CONNECTOR PIPE
3. DISCONNECT THROTTLE BODY FROM INTAKE MAN. IFOLDS (See page SF–37)
4. REMOVE UPPER AND LOWER INTAKE MANIFOLDS ASSEMBLY (See page EM–36)
5. REMOVE VSV



6. INSPECT VSV

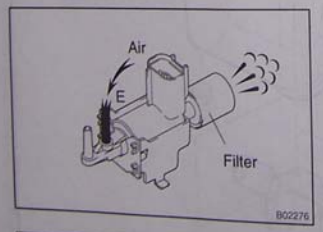
(a) Inspect the VSV for open circuit.
Using an ohmmeter, check that there is continuity between each terminals.
Resistance: 33 – 39 Ω at 20°C (68°F)

If there is no continuity, replace the VSV.

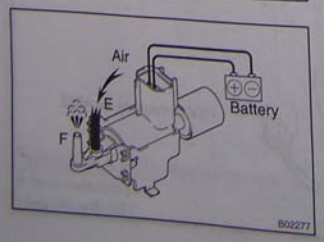


(b) Inspect the VSV for ground.
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.
(1) Check that air flows from port E to the filter.



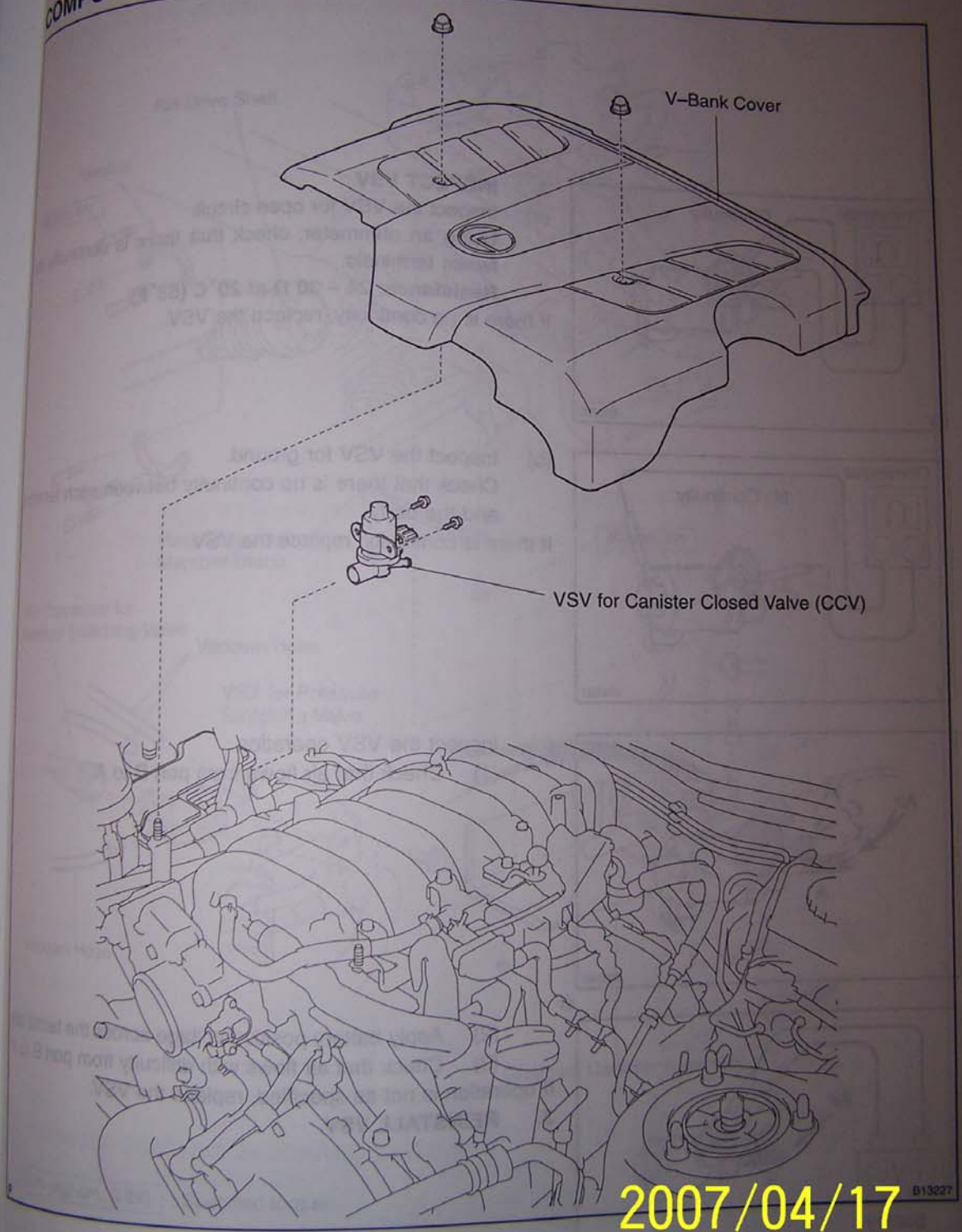
(2) Apply battery positive voltage across the terminals.
(3) Check that air flows from ports E to F.

If operation is not as specified, replace the VSV.

7. REINSTALL VSV
8. REINSTALL UPPER AND LOWER INTAKE MANIFOLDS ASSEMBLY (See page EM–60)
9. REINSTALL THROTTLE BODY TO INTAKE MANIFOLDS (See page SF–40)
10. REINSTALL INTAKE AIR CONNECTOR PIPE
11. REINSTALL V–BANK COVER

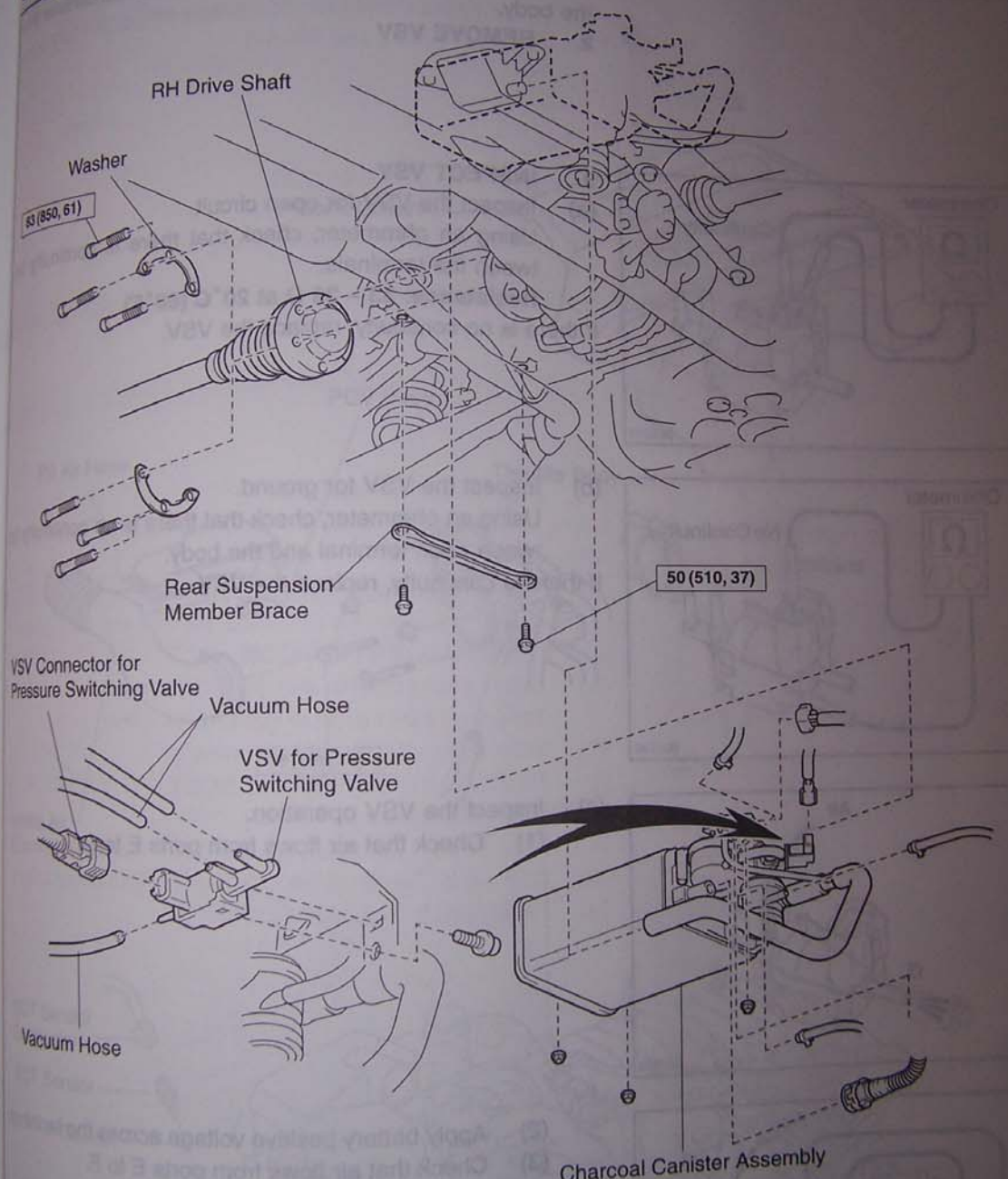
VSV FOR CANISTER CLOSED VALVE (CCV)

COMPONENTS



VSV FOR PRESSURE SWITCHING VALVE

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

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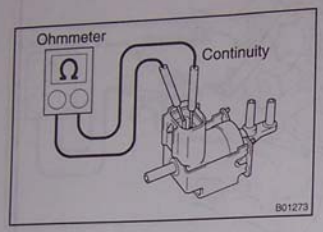
INSPECTION

1. **DISCONNECT CHARCOAL CANISTER ASSEMBLY FROM BODY**

Remove the 3 nuts, and disconnect the charcoal canister from the body.

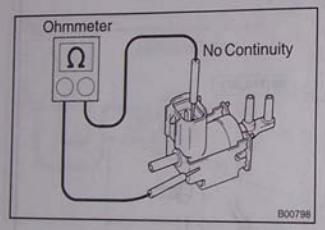
2. **REMOVE VSV**



3. **INSPECT VSV**

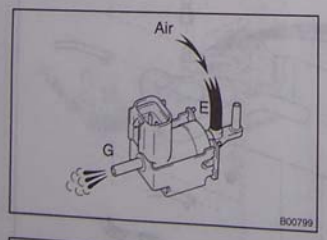
(a) Inspect the VSV for open circuit.
Using an ohmmeter, check that there is continuity between the terminals.
Resistance: 33 – 39 Ω at 20°C (68°F)

If there is no continuity, replace the VSV.

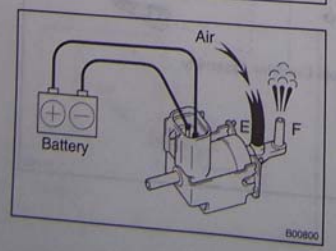


(b) Inspect the VSV for ground.
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.
(1) Check that air flows from ports E to G.



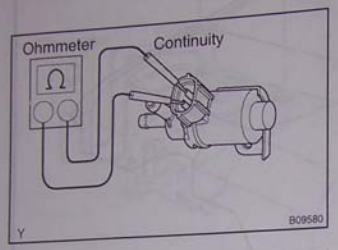
(2) Apply battery positive voltage across the terminals.
(3) Check that air flows from ports E to F.

If operation is not as specified, replace the VSV.

4. **REINSTALL VSV**
5. **REINSTALL CHARCOAL CANISTER ASSEMBLY**

INSPECTION

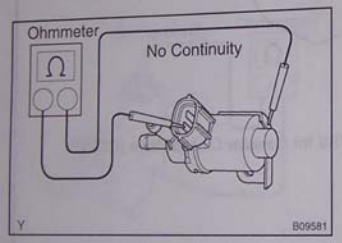
1. **REMOVE VSV**



2. **INSPECT VSV**

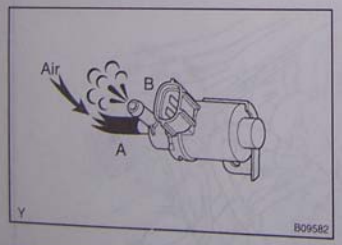
(a) Inspect the VSV for open circuit.
Using an ohmmeter, check that there is continuity between terminals.
Resistance: 24 – 30 Ω at 20°C (68°F)

If there is no continuity, replace the VSV.

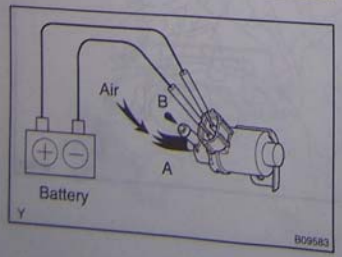


(b) Inspect the VSV for ground.
Check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.
(1) Check that air flows from port B to A.



(2) Apply battery positive voltage across the terminals.
(3) Check that air flows with difficulty from port B to A.

If operation is not as specified, replace the VSV.

3. **REINSTALL VSV**