

<b>DTC</b>	<b>P2401</b>	<b>Evaporative Emission System Leak Detection Pump Control Circuit Low</b>
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<b>DTC</b>	<b>P2402</b>	<b>Evaporative Emission System Leak Detection Pump Control Circuit High</b>
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## CIRCUIT DESCRIPTION

Refer to EVAP Inspection Procedure (see page [DI-884](#)).

DTCs	Monitoring Item	DTC Detection Condition	Trouble Areas	Detection Timing	Detection Logic
P2401	Vacuum pump stuck OFF	One of following conditions are met: <ul style="list-style-type: none"> <li>• 0.02 inch orifice low-flow</li> <li>• 0.02 inch orifice high-low</li> <li>• Vacuum pump ON stuck</li> <li>• Vacuum pump OFF stuck</li> <li>• Vent valve ON (Closed) stuck</li> </ul>	<ul style="list-style-type: none"> <li>• Pump module</li> <li>• Connector / Wire harness (Pump module – ECM)</li> <li>• ECM</li> </ul>	While ignition switch OFF	2 trips
P2402	Vacuum pump stuck ON	NOTE: P043E, P043F, P2401, P2402 and P2419 have same DTC detection conditions.			

## WIRING DIAGRAM

Refer to EVAP Inspection Procedure (see page [DI-884](#)).

## MONITOR DESCRIPTION

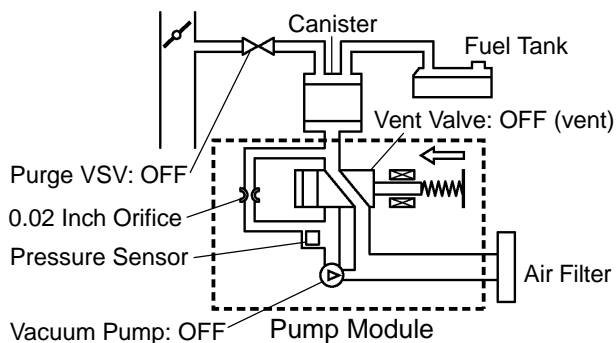
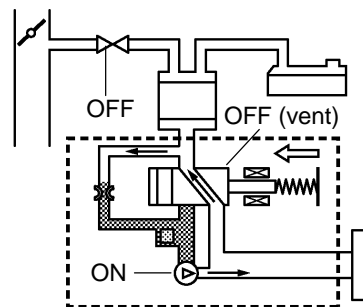
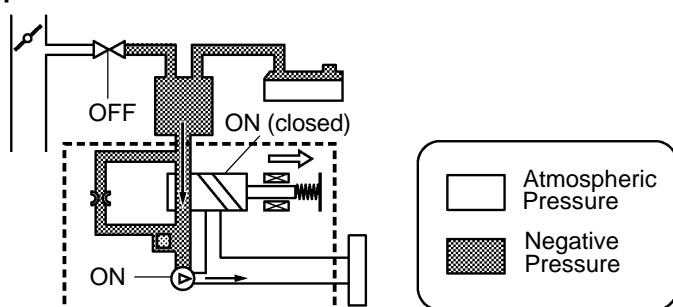
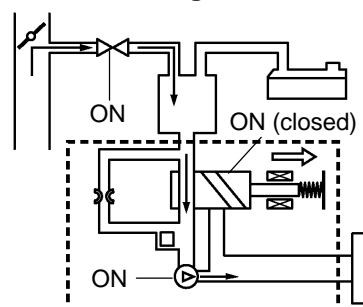
5 hours\* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

### HINT:

\*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
–	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	–
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	–

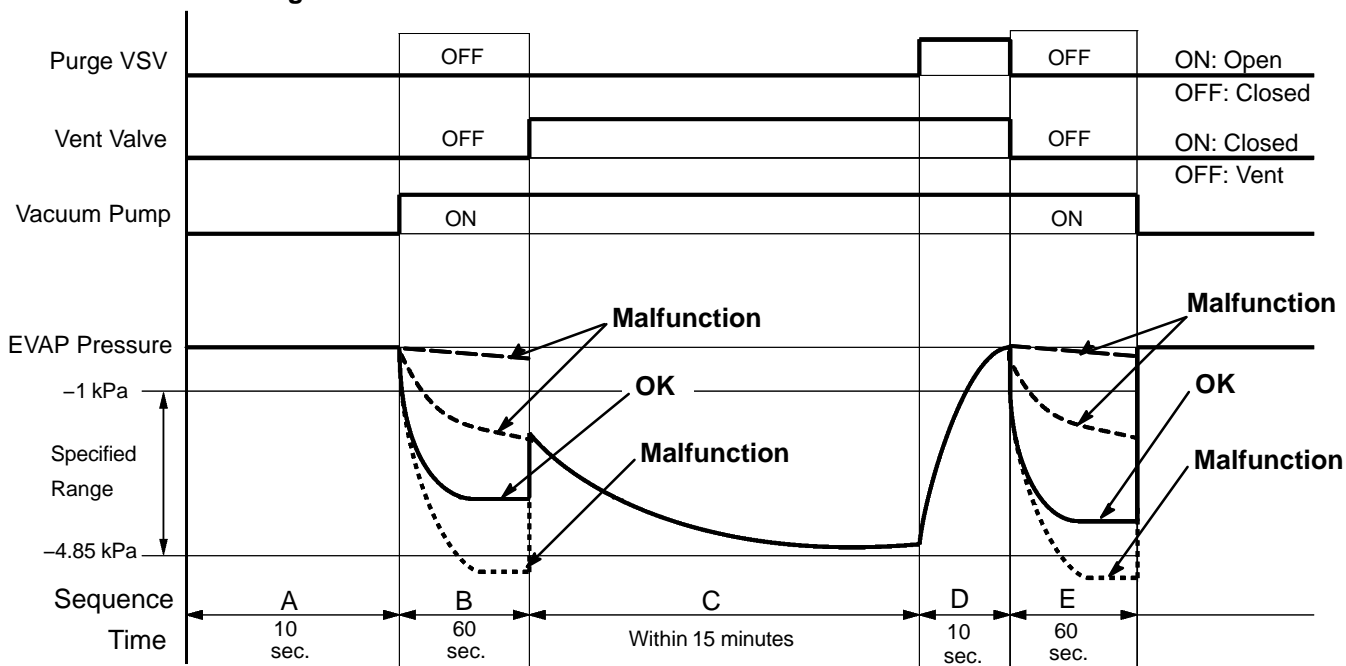
\* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

**Operation A: Atmospheric Pressure Measurement****Operation B: 0.02 Inch Leak Pressure Measurement****Operation C: EVAP Leak Check****Operation D: Purge VSV monitor**

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In sequence B and E, to determine the leak criterion, the vacuum pump creates negative pressure in the canister pump module through the 0.02 inch orifice. If the pressure is out of specified range or is not saturated, the ECM illuminates the MIL and sets DTCs P043E, P043F, P2401, P2402 and P2419 (2-trip detection logic).

**EVAP Pressure during EVAP Monitor**

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## MONITOR STRATEGY

Related DTCs	P2401	Vacuum pump stuck OFF
	P2402	Vacuum pump stuck ON
Required sensors/components	Purge VSV and pump module	
Frequency of operation	Once per driving cycles	
Duration	Within 2 minutes (varies with amount of fuel in tank)	
MIL operation	2 driving cycles	
Sequence of operation	None	

## TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page <a href="#">DI-437</a>	
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)	
Battery voltage	10.5 V	–
Vehicle speed	–	2.5 mph (4 km/h)
Ignition switch	OFF	
Time after key off	5 or 7 or 9.5 hours	
EVAP pressure sensor malfunction (P0450, P0452, P0453)	Not detected	
EVAP canister purge valve	Not operated by scan tool	
EVAP canister vent valve	Not operated by scan tool	
EVAP leak detection pump	Not operated by scan tool	
Both of the following conditions 1 and 2 set before key off	–	
1. Duration that vehicle has been driven	5 min.	–
2. EVAP purge operation	Performed	
ECT	4.4 to 35°C (40 to 95°F)	
IAT	4.4 to 35°C (40 to 95°F)	
<b>Key-off monitor sequence</b>	1 to 8	
<b>1. Atmospheric pressure</b>	–	
Next sequence is run if the following condition is set	–	
Atmospheric pressure change	–	0.3 kPa (2.25 mmHg)
<b>2. First reference pressure measurement</b>	–	
Next sequence is run if the following conditions are set	Condition 1, 2 and 3	
1. EVAP pressure just after reference pressure measurement start	–	–1 kPa (–7.5 mmHg)
2. Reference pressure	–4.85 to –1.057 kPa (–36.38 to –7.93 mmHg)	
3. Reference pressure	Saturated within 60 seconds	

<b>3. EVAP canister vent valve close stuck check</b>	–	
Next sequence is run if the following condition is set	–	
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg)	–
<b>4. Vacuum introduction</b>	–	
Next sequence is run if the following condition is set	–	
EVAP pressure	Saturated within 15 minutes	
<b>5. EVAP canister purge valve close stuck check</b>	–	
Next sequence is run if the following condition is set	–	
EVAP pressure change after purge valve is open	0.3 kPa (2.25 mmHg)	–
<b>6. Second reference pressure measurement</b>	–	
Next sequence is run if the following conditions are set	Condition 1, 2, 3 and 4	
1. EVAP pressure just after reference pressure	–	–1 kPa (–7.5 mmHg)
2. Reference pressure	–4.85 to –1.057 kPa (–36.38 to –7.93 mmHg)	
3. Reference pressure	Saturated within 60 seconds	
4. Difference between first reference pressure and second reference pressure	–	0.7 kPa (5.25 mmHg)
<b>7. Leak check</b>	–	
Next sequence is run if the following condition is set	–	
EVAP pressure when vacuum introduction is complete	–	Second reference pressure
<b>8. Atmospheric pressure measurement</b>	–	
EVAP monitor is complete if the following condition is set	–	
Atmospheric pressure difference between sequence 1 and 8	–	0.3 kPa (2.25 mmHg)

## TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
One of the following conditions is set:	Condition 1, 2, 3, 4 or 5
1. EVAP pressure just after reference pressure measurement start	More than –1 kPa (–7.5 mmHg)
2. Reference pressure	Less than –4.85 kPa (–36.38 mmHg)
3. Reference pressure	–1.057 kPa (–7.93 mmHg) or more
4. Reference pressure	Not saturated
5. Difference between first reference pressure and second reference pressure	5.25 mmHg (0.7 kPa) or more

**MONITOR RESULT (MODE 06 DATA)**

Refer to page [DI-445](#) for detailed information.

**INSPECTION PROCEDURE**

Refer to the EVAP Inspection Procedure (see page [DI-884](#)).