

DTC	P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low
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DTC	P2402	Evaporative Emission System Leak Detection Pump Control Circuit High
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DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P2401	Leak detection pump stuck OFF	P043E, P043F, P2401, P2402 and P2419 present when one of following conditions met during key-off EVAP monitor: - EVAP pressure just after reference pressure measurement greater than -1 kPa-g (-7.5 mmHg-g) - Reference pressure less than -4.85 kPa-g (-36.4 mmHg-g)	- Canister pump module (Reference orifice, leak detection pump, vent valve) - Connector/wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM	While ignition switch OFF	2 trip
P2402	Leak detection pump stuck ON	- Reference pressure greater than -1.057 kPa-g (-7.93 mmHg-g) - Reference pressure not saturated - Reference pressure difference between first and second 0.7 kPa-g (5.25 mmHg-g) or more HINT: Typical example values	- Canister pump module (Reference orifice, leak detection pump, vent valve) - Connector/wire harness (Canister pump module - ECM) - EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) - ECM	While ignition switch OFF	2 trip

HINT:

The leak detection pump is built into the canister pump module.

DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System (See page [ES-341](#)).

INSPECTION PROCEDURE

Refer to the EVAP System (See page [ES-346](#)).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned to OFF, the leak detection pump creates negative pressure (vacuum) in the EVAP 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 to 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 to OFF, the monitor check starts 2.5 hours later.

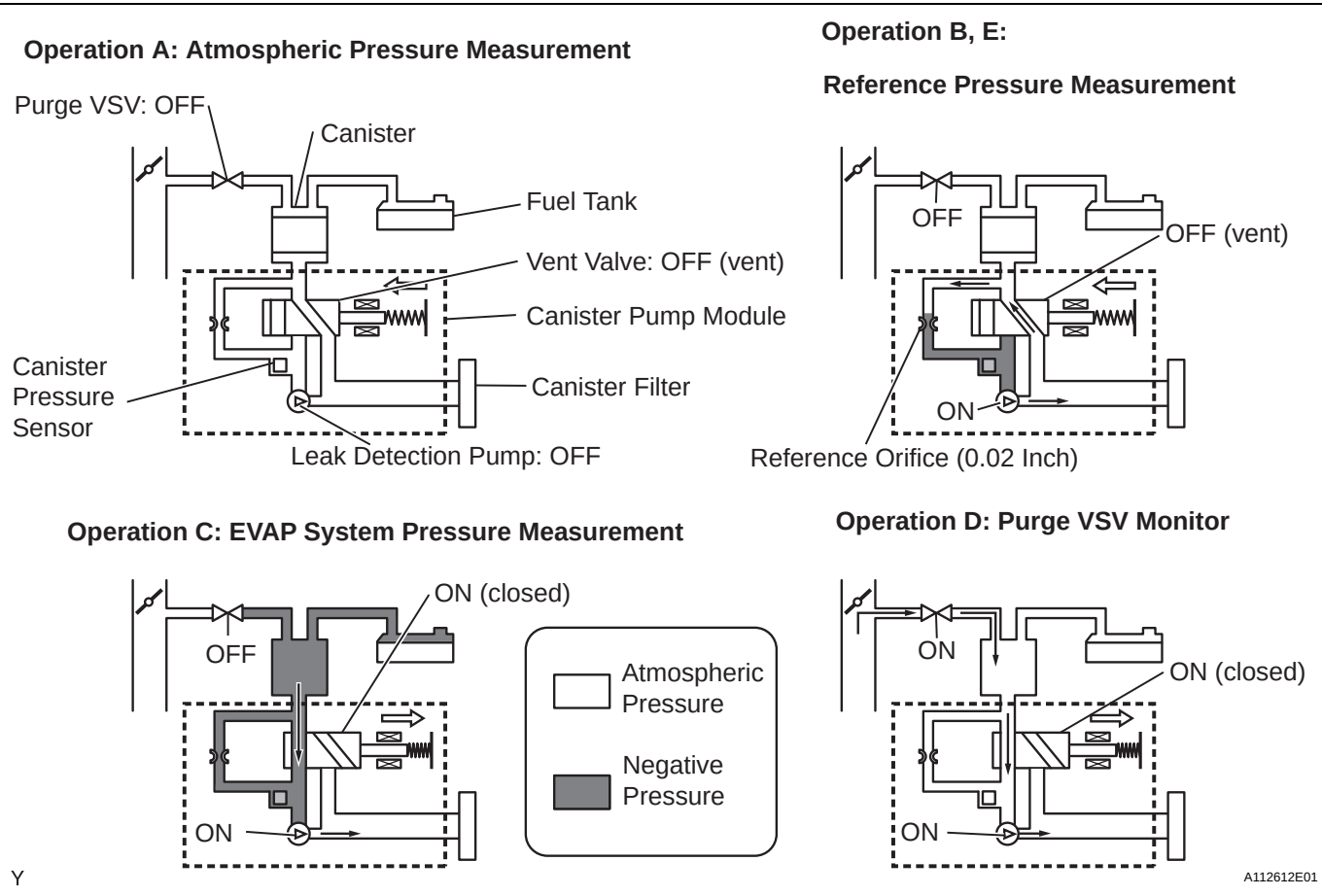
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	-

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Sequ ence	Operations	Descriptions	Duration
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 76 kPa-a and 110 kPa-a (570 mmHg-a and 825 mmHg-a), ECM cancels EVAP system monitor.	10 seconds
B	First reference pressure measurement	In order to determine reference pressure, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection 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 measured value as will be used in 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 normality.	10 seconds
E	Second reference pressure measurement	After second reference pressure measurement, leak check performed by comparing first and second reference pressure. If stabilized system pressure higher than second reference pressure, 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.

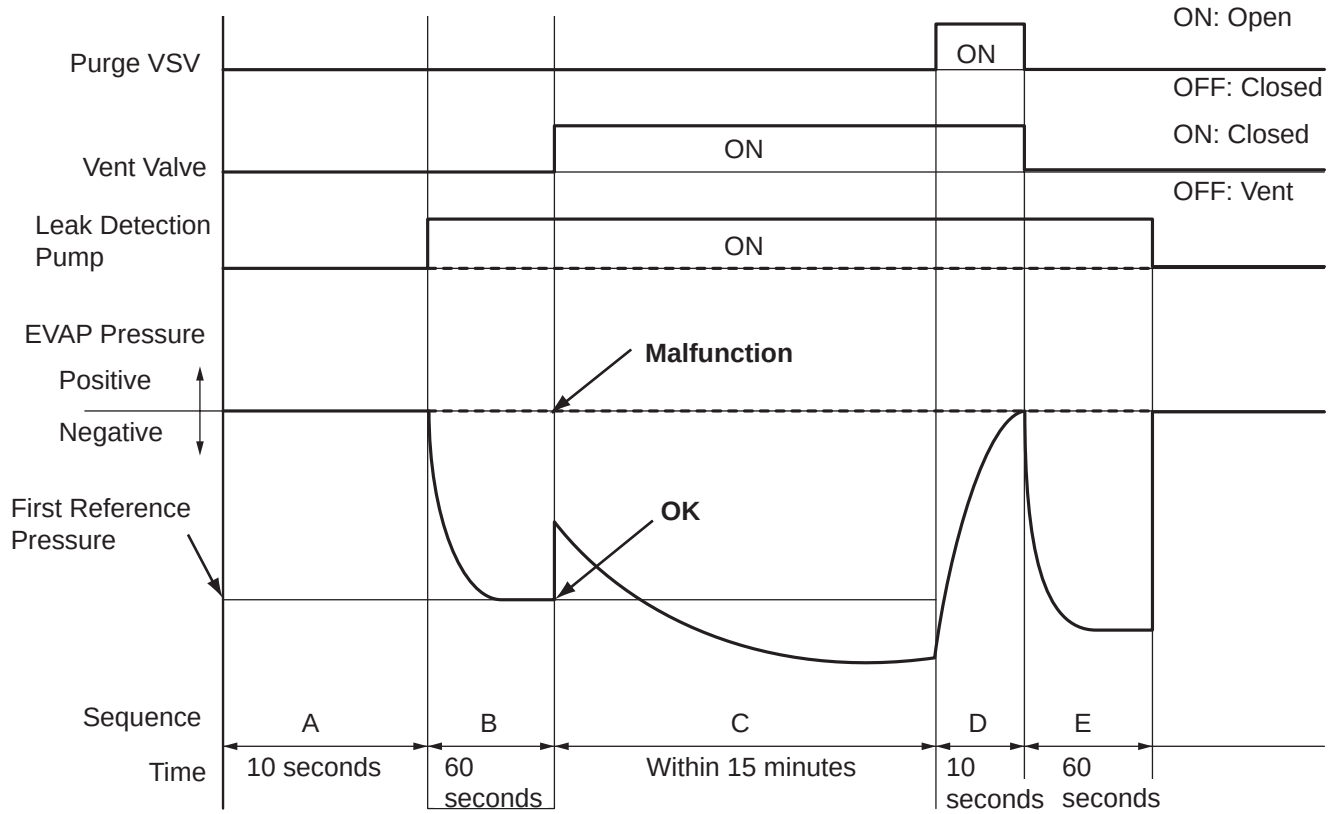


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1. P2401: Leak detection pump stuck OFF

In operation B, the leak detection pump creates negative pressure (a vacuum) through the reference orifice. The EVAP system pressure is then measured by the ECM, using the canister pressure sensor, to determine the reference pressure. If the pressure is higher than -1.057 kPa-g (-7.93 mmHg-g), or lower than -4.85 kPa-g (-36.4 mmHg-g), the ECM interprets this as the leak detection pump being stuck OFF (not operating). The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

EVAP Pressure when Leak Detection Pump Stuck OFF:

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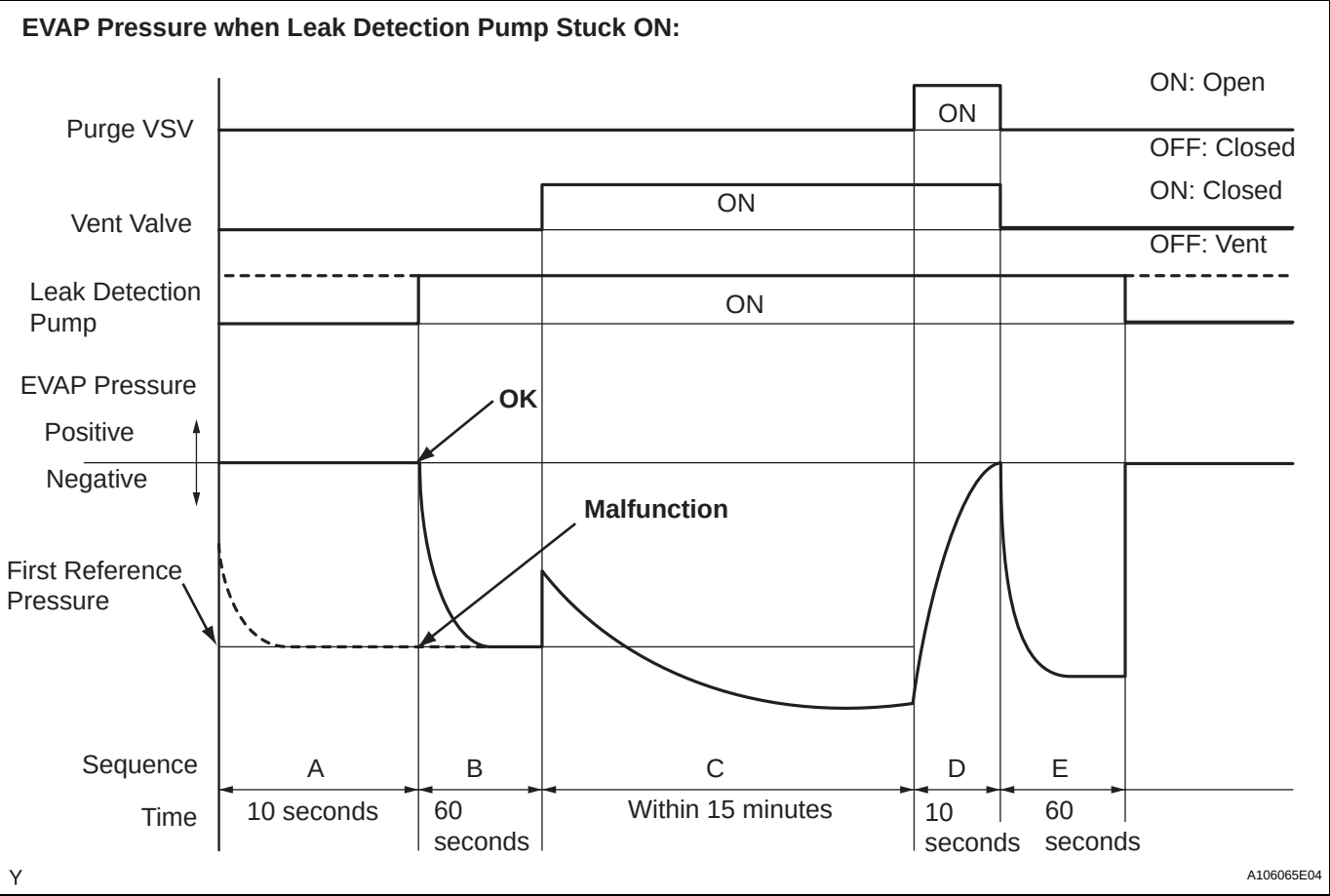
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2. P2402: Leak detection pump stuck ON

In operation B, the leak detection pump creates negative pressure (a vacuum) through the reference orifice. The EVAP (Evaporative Emission) system pressure is then measured by the ECM, using the canister pressure sensor, to determine the reference pressure. If the pressure is higher than -1.057 kPa-g (-7.93 mmHg-g), or lower than -4.85 kPa-g (-36.4 mmHg-g), the ECM interprets this as the leak detection pump being stuck ON (remaining ON all the time). The ECM illuminates the MIL and sets the DTC (2 trip detection logic).



HINT:

The detection logic of DTCs P2401 and P2402 is the same because in both cases the reference pressure measured in operation B is compared to the atmospheric pressure registered in operation A. The ECM calculates the difference between these pressures by deducting [the reference pressure] from [the stored atmospheric pressure], and uses this to monitor the EVAP system pressure change.

OBD II MONITOR SPECIFICATIONS

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 cycle
Duration	Within 2 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever the following DTCs are not present	None
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Enable conditions of EVAP key-off monitor

Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg) [absolute pressure]
Battery voltage	10.5 V or more
Vehicle speed	2.5 mph (4 km/h) or less
Ignition switch	OFF
Time after key off	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 set before key off	Conditions 1 and 2
1. Duration that vehicle has been driven	5 minutes or more
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)

EVAP key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met:	-
Atmospheric pressure change for 10 seconds	Within 0.3 kPa (2.25 mmHg) in 1 second

2. Reference pressure measurement

Next sequence is run if the following conditions are met:	-
EVAP pressure just after reference pressure measurement start	-1 kPa (-7.5 mmHg) or less
Reference pressure	-4.5 to -1 kPa (-33.75 to -7.5 mmHg)
Reference pressure	Saturated within 60 seconds

3. EVAP canister vent valve close stuck check

Next sequence is run if the following condition is met:	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction and EVAP leak check

Next sequence is run if the following condition is met:	-
EVAP pressure	Saturated within 12 minutes

5. EVAP canister purge valve close stuck check

Next sequence is run if the following condition is met:	-
EVAP pressure change after purge valve is open	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence run if all of following conditions set:	Condition 1, 2, 3 and 4
1. EVAP pressure just after reference pressure	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds
4. Reference pressure difference between first and second	Less than 0.7 kPa-g (5.25 mmHg-g)

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7. Leak check

Next sequence run if following condition is met:	-
EVAP pressure when vacuum introduction complete	Second reference pressure or less

8. Atmospheric pressure measurement

EVAP monitor complete if following condition is met:	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa-g (2.25 mmHg-g)

TYPICAL MALFUNCTION THRESHOLDS

One of following conditions is met	-
EVAP pressure when reference pressure measurement started	-1 kPa (7.5 mmHg) or higher
Reference pressure (0.02 inch leak pressure)	Lower than -4.3 kPa (-32 mmHg)
Reference pressure (0.02 inch leak pressure)	-1.2 kPa (-9 mmHg) or higher
Reference pressure (0.02 inch leak pressure)	Not saturated for 60 seconds

MONITOR RESULT

Refer to EVAP System (See page [ES-339](#)).