

DTC	P2401	Evaporative Emission Leak Detection Pump Stuck OFF
------------	--------------	---

DTC	P2402	Evaporative Emission Leak Detection Pump Stuck ON
------------	--------------	--

DTC SUMMARY

DTC No.	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P2401	Leak detection pump stuck OFF	Leak detection pump creates negative pressure through reference orifice, and EVAP system pressure measured to determine 0.02 inch leak criterion. 0.02 inch leak criterion measured at start and at end of leak check. If system pressure higher than -1.06 kPa (-7.95 mmHg)*, or lower than -4.85 kPa (-36.38 mmHg)*, ECM determines that leak detection pump stuck OFF.	<ul style="list-style-type: none"> • Canister pump module • Connector/wire harness (Canister pump module - ECM) • ECM • Leakage from EVAP system 	While ignition switch OFF	2 trip
P2402	Leak detection pump stuck ON	Leak detection pump creates negative pressure through reference orifice, and EVAP system pressure measured to determine 0.02 inch leak criterion. If system pressure higher than -1.06 kPa (-7.95 mmHg)*, or lower than -4.85 kPa (-36.38 mmHg)*, ECM determines that leak detection pump stuck ON.	<ul style="list-style-type: none"> • Canister pump module • Connector/wire harness (Canister pump module - ECM) • ECM 	While ignition switch OFF	2 trip

*: The threshold values vary according to the atmospheric pressure measured in operation A. The values described in the table above are based on an atmospheric pressure of 100 kPa (750.1 mmHg).

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-392](#)).

Refer to the EVAP System (see page [ES-397](#)).

MONITOR DESCRIPTION

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

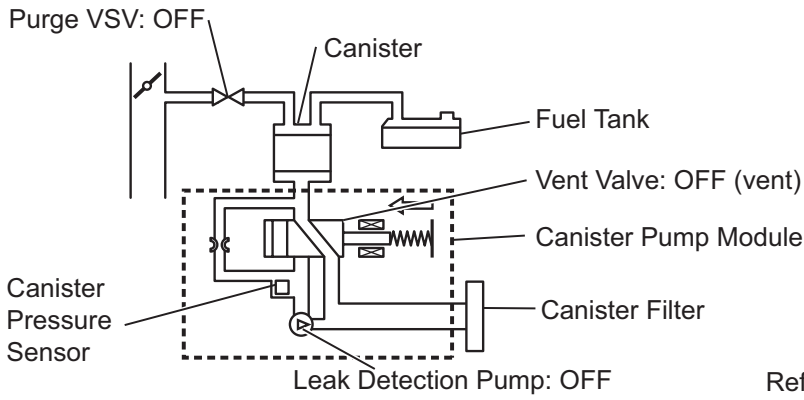
HINT:

*: 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 pressure in EVAP system 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 criterion (reference pressure) measurement	In order to determine 0.02 inch leak criterion, 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 they 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 normal.	10 seconds
E	Second 0.02 inch leak criterion (reference pressure) measurement	After second 0.02 inch leak criterion measurement, leak check performed by comparing first and second 0.02 inch leak criterion. If stabilized system pressure higher than second 0.02 inch leak criterion, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

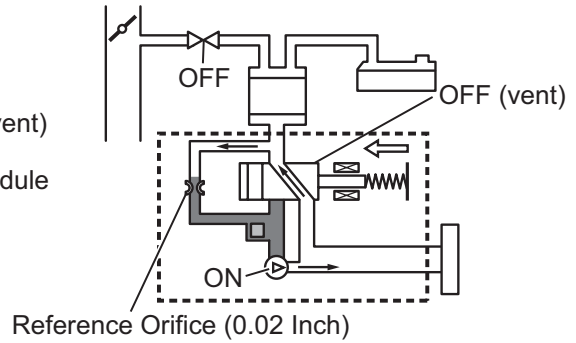
* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

Operation A: Atmospheric Pressure Measurement

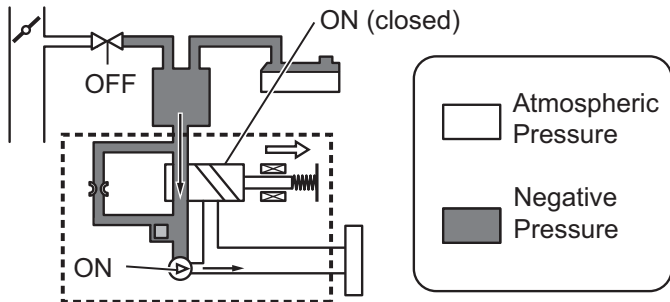


Operation B, E:

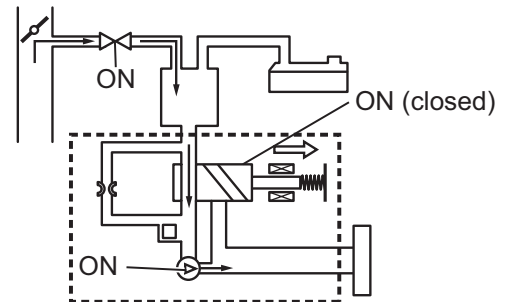
0.02 Inch Leak Criterion Measurement



Operation C: EVAP System Pressure Measurement



Operation D: Purge VSV Monitor



ES

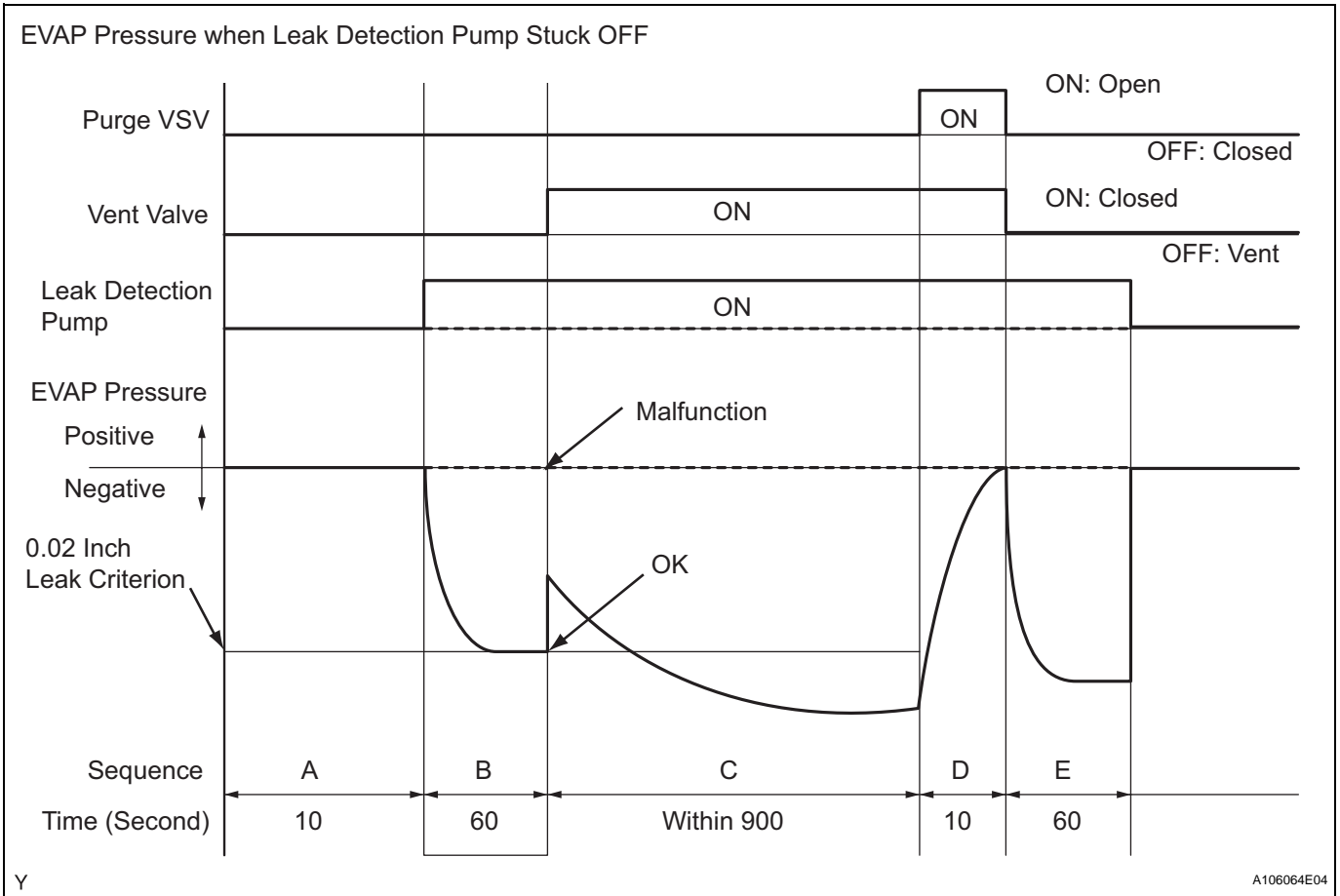
Y

A112612E02

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 (Evaporative Emission) system pressure is then measured by the ECM, using the canister pressure sensor, to determine the 0.02 inch leak criterion. If the pressure is higher than -1.06 kPa (-7.95 mmHg)*, or lower than -4.85 kPa (-36.38 mmHg)*, 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).

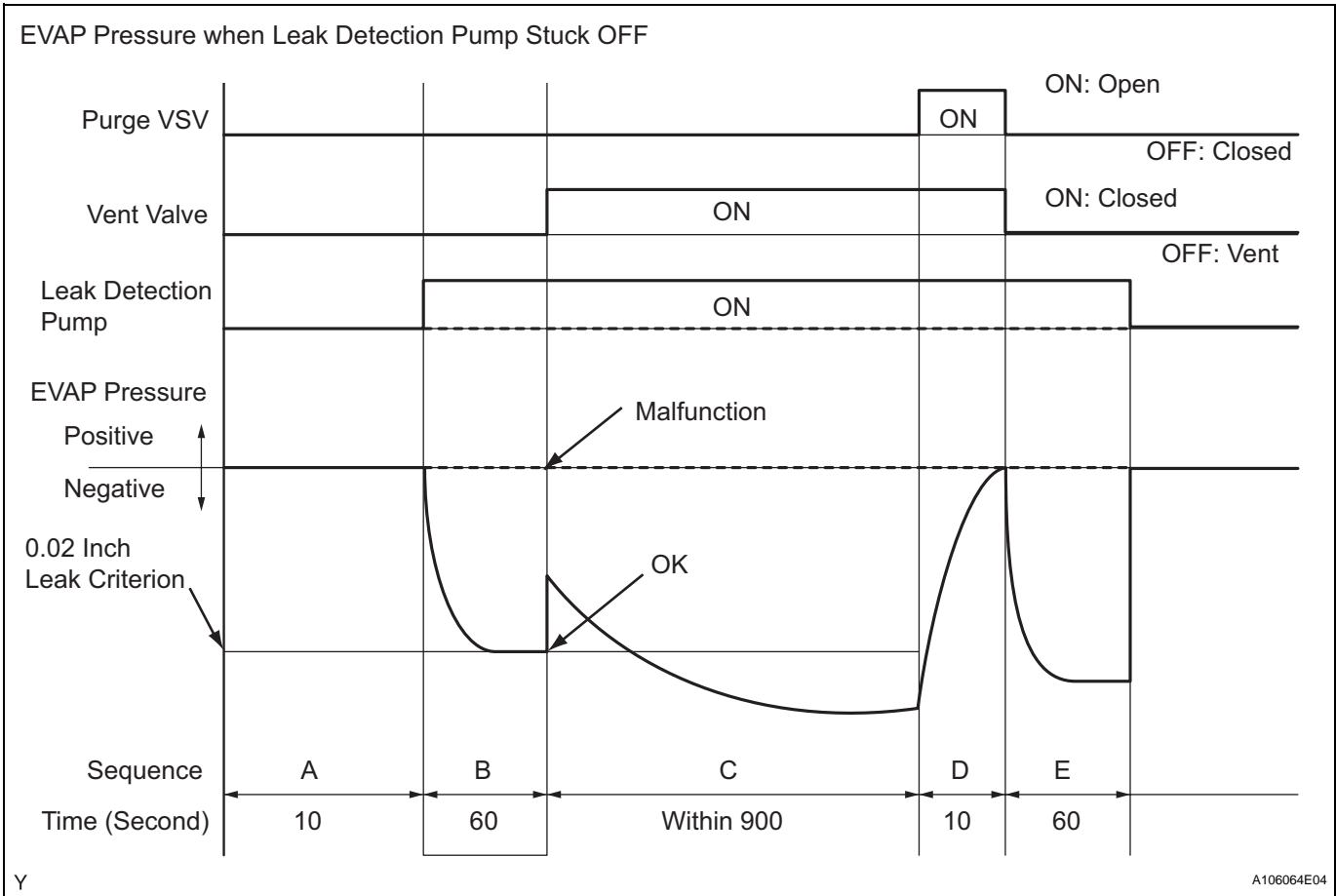
*: The thresholds vary according to the atmospheric pressure measured in operation A. The values described above are based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



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 0.02 inch leak criterion. If the pressure is higher than -1.06 kPa (-7.95 mmHg)*, or lower than -4.85 kPa (-36.38 mmHg)*, 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).

*: The thresholds vary according to the atmospheric pressure measured in operation A. The values described above are based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



HINT:

The detection logic of DTCs P2401 and P2402 is the same because in both cases the 0.02 inch leak criterion 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 0.02 inch leak criterion] from [the stored atmospheric pressure], and uses this to monitor the EVAP system pressure change.

MONITOR STRATEGY

Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Typical Enabling Conditions

Monitor runs whenever following DTCs not present	None
--	------

EVAP key-off monitor runs when all of following conditions met	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Ignition switch	OFF
FTP sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of following conditions met before IG switch OFF	Conditions 1 and 2
1. Duration that vehicle driven	5 minutes or more
2. Purge flow	Executed
ECT	4.4° to 35°C (40° to 95°F)
IAT	4.4° to 35°C (40° to 95°F)
Time after engine stopped	5 hours

Example of restart time

First time	7 hours
Second time	9 hours and 30 minutes

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure

Next sequence is run if following condition set	-
Atmospheric pressure change for 10 second	Less than 0.3 kPa (2.25 mmHg) for 1 second

2. First reference pressure

Next sequence is run if all of following conditions set	Condition 1, 2 and 3
1. FTP when 4 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-33.38 to -7.93 mmHg)
3. Reference pressure	Saturated within 60 seconds

3. Vent valve stuck closed check

Next sequence is run if following condition set	-
FTP change for 10 seconds after vent valve ON (closed)	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction and leak

Next sequence is run if both of following conditions set	Condition 1 and 2
1. Vacuum introduction time	12 minutes or less
2. FTP	Saturated within 12 minutes

5. Purge VSV stuck closed check

Next sequence is run if following condition set	-
FTP change for 10 seconds after purge VSV ON (open)	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of following conditions set	Condition 1, 2, 3 and 4
1. FTP when 4 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.4 to -7.92 mmHg)
3. Reference pressure	Saturated within 60 seconds
4. Reference pressure difference between first and second	0.7 kPa (5.25 mmHg) or less

7. Leak check

Next sequence is run if following condition set	-
FTP when vacuum introduction was complete	Second reference pressure or less

8. Atmospheric pressure

Monitor is complete if following condition set	-
Atmospheric pressure difference between sequence 1 and 8	0.3 kPa (2.25 mmHg) or less

TYPICAL MALFUNCTION THRESHOLDS

One of following conditions met	-
FTP when 4 seconds after reference pressure measurement began	More than -1 kPa (-7.5 mmHg)
Reference pressure	Less than -4.85 kPa (-36.4 mmHg)
Reference pressure	-1.057 kPa (-7.9 mmHg) or more
Reference pressure	Not saturated within 60 seconds
Reference pressure difference between first and second	0.7 kPa (5.2 mmHg) or more

"Saturated" indicates that the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

ES**MONITOR RESULT**

Refer to Checking Monitor Status (See page [ES-21](#)) or (See page [ES-422](#)).