DTC	P2419	Evaporative Emission System Switching Valve Control Circuit Low

DTC	P2420	Evaporative Emission System Switching Valve Control Circuit High

DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P2419	Vent valve stuck closed	Leak detection pump creates negative pressure through reference orifice and EVAP system pressure measured to determine leak criterion. If system pressure higher than -1.06 kPa (-7.95 mmHg)* 4 seconds after leak detection pump turned ON, ECM determines that vent valve stuck closed.	• Canister pump module • Connector/wire harness (Canister pump module - ECM) • ECM	While ignition switch OFF	2 trip
P2420	Vent valve stuck open (vent)	Leak detection pump creates negative pressure through reference orifice and EVAP system pressure measured to determine leak criterion. 0.02 inch leak criterion measured at start and at end of leak check. If system pressure does not increase by more than 0.3 kPa (2.25 mmHg) within 10 seconds when vent valve turned ON, ECM determines that vent valve stuck closed.	• Canister pump module • Connector/wire harness (Canister pump module - ECM) • ECM • Leakage from EVAP system	While ignition switch OFF	2 trip

*: The threshold value varies according to the atmospheric pressure measured in operation A. The value described above is based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.
HINT:
The vent valve is built into the canister pump module.

DESCRIPTION

The circuit description can be found in the EVAP System (See page ES-351).

Refer to the EVAP System (See page ES-351).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned 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 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

Sequence	Operations	Descriptions	Duration
B	First 0.02 inch leak criterion 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 measurement	After second 0.02 inch leak criterion measurement, leak check performed by comparing first and second 0.02 inch leak criterions. 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.	-

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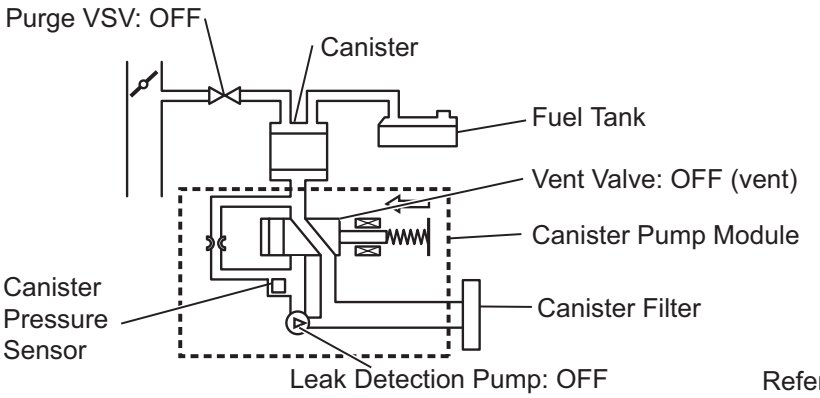
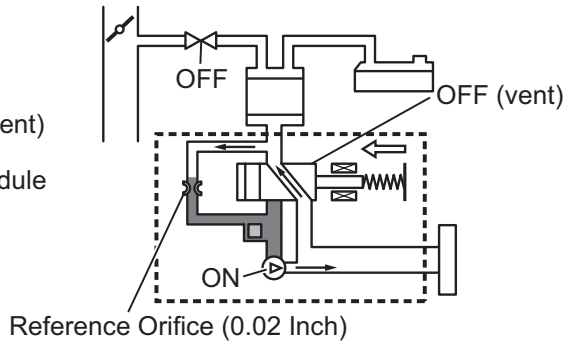
* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

Operation A: Atmospheric Pressure Measurement

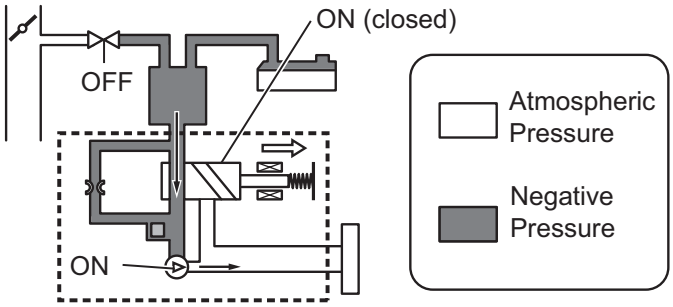


Operation B, E:

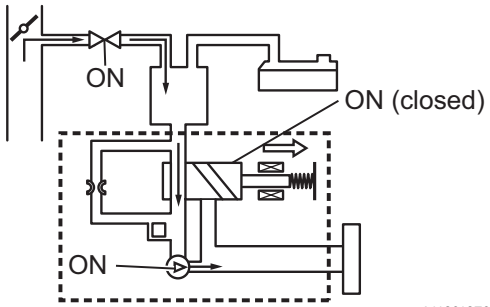
0.02 Inch Leak Criterion Measurement



Operation C: EVAP System Pressure Measurement



Operation D: Purge VSV Monitor



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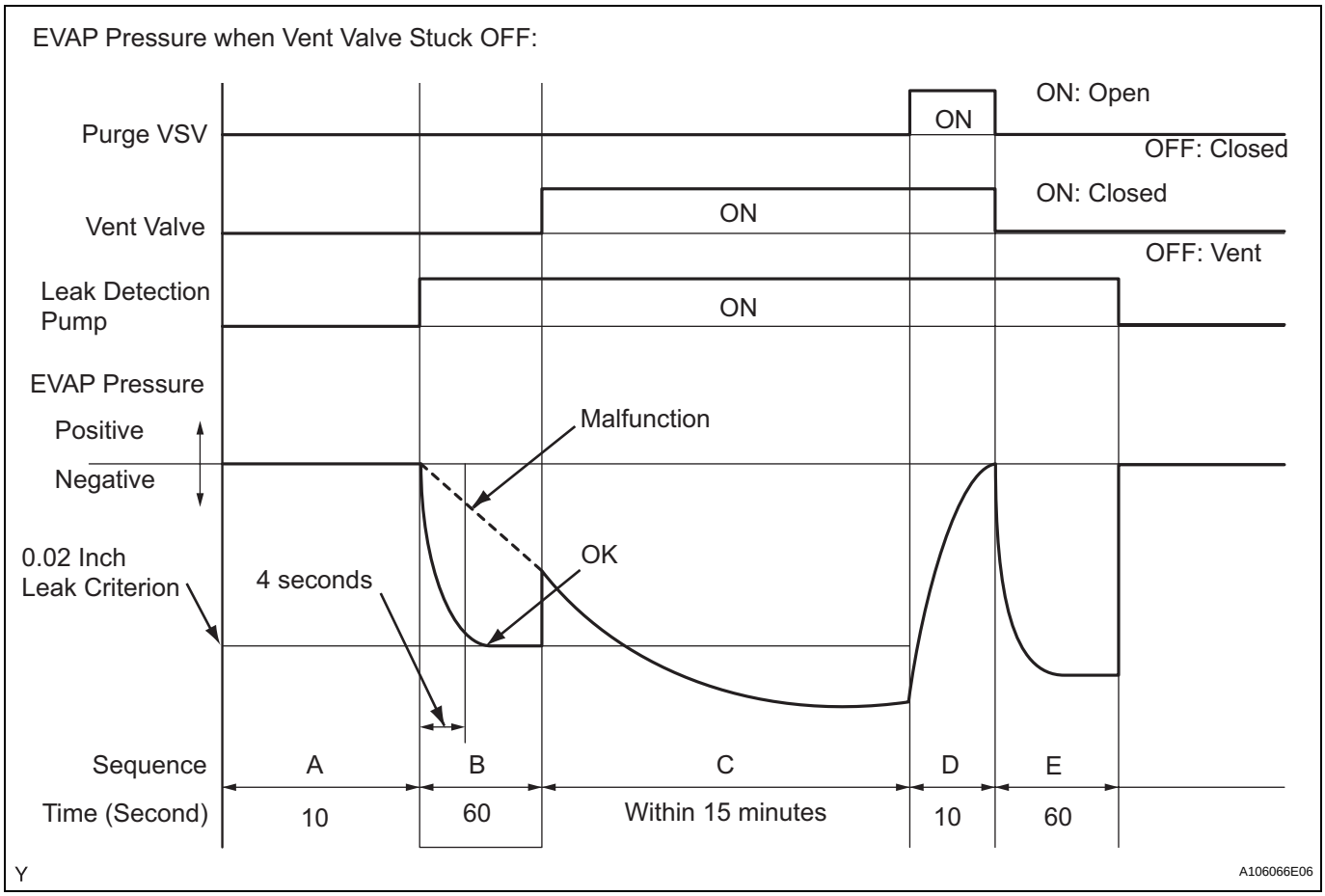
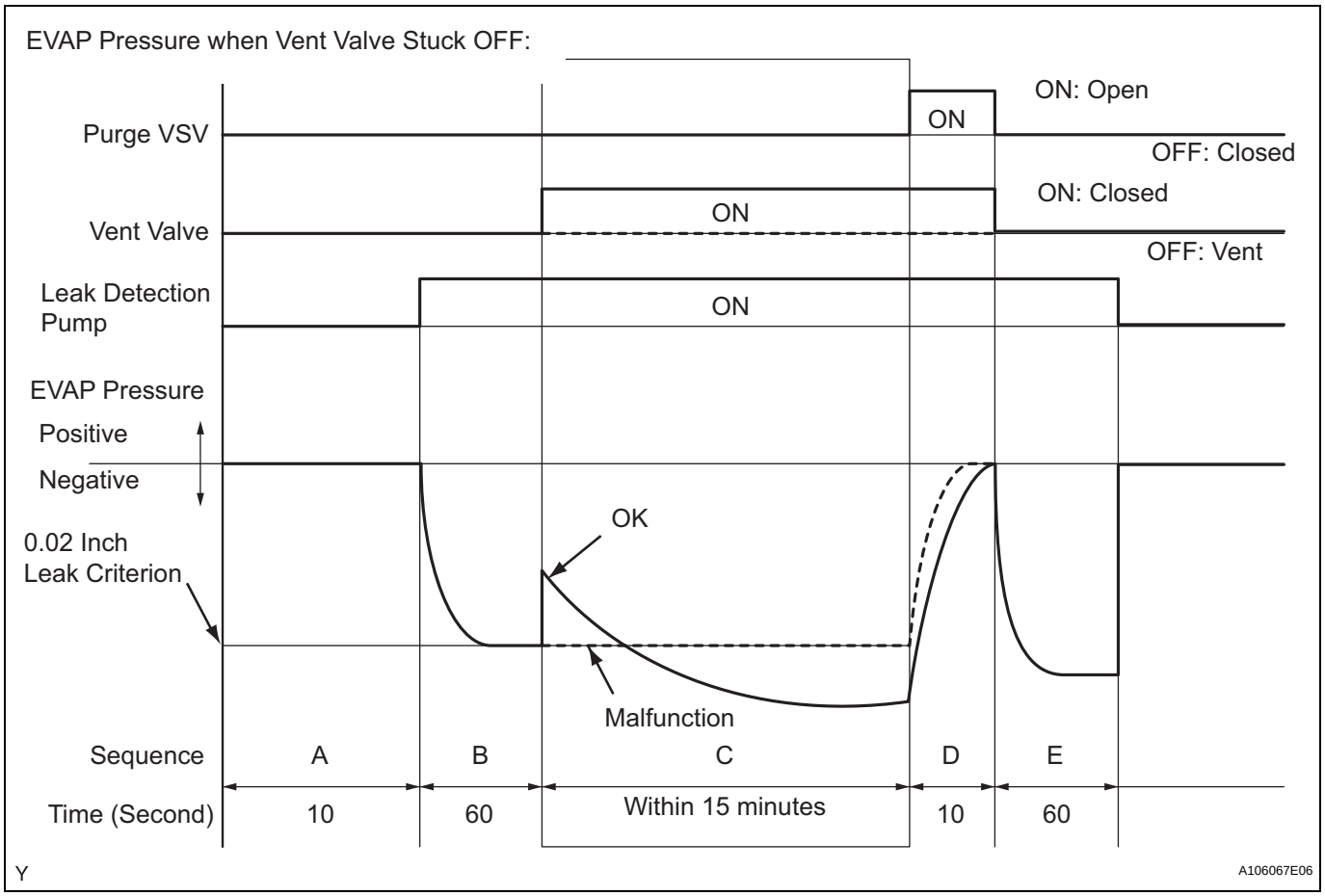
1. P2419: Vent valve stuck closed
   In operation B, the leak detection pump creates negative pressure (a vacuum) through the reference orifice. The EVAP (Evaporative Emission) system pressure is then measured by the ECM, using the canister pressure sensor, to determine the 0.02 inch leak criterion. If the pressure exceeds -1.06 kPa (-7.95 mmHg)* 4 seconds after the leak detection pump is turned ON, the ECM interprets this as the vent valve being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).
   *: The threshold varies according to the atmospheric pressure measured in operation A. The value described above is based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



2. P2420: Vent valve stuck open (vent)
   In operation C, the vent valve turns ON (closes) and the EVAP (Evaporative Emission) system pressure is then measured by the ECM, using the canister pressure sensor, to conduct an EVAP leak check. If the pressure does not increase when the vent valve is open, the ECM interprets this as the vent valve being stuck open. The ECM illuminates the MIL and sets the DTC.



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

Monitor runs whenever following DTCs not present	None
EVAP key-off monitor runs when all of following conditions met	-
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Ignition switch	OFF
Engine condition	Not running
Fuel tank pressure sensor malfunction (P0450, P0451, P0452 and/or 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)

1. Key-off monitor sequence 1to 8

1. Atmospheric pressure

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

2. First 0.02 inch leak criterion

Next sequence is run if all of following conditions set	Conditions 1, 2 and 3
1. Fuel tank pressure when 4 seconds after 0.02 inch leak criterion measurement	-7.5 mmHg (-1 kPa) or less
2. 0.02 inch leak criterion	-36.38 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. 0.02 inch leak criterion	Saturated within 55 seconds

3. Vent valve stuck closed check

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

4. Vacuum introduction and leak

Next sequence is run if both of following conditions set	-
1. Vacuum introduction time	Saturated within 55 seconds
2. Fuel tank pressure	Fuel tank pressure was standard

5. Purge VSV stuck closed check

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

6. Second 0.02 inch leak criterion measurement

Next sequence is run if all of following conditions set	Conditions 1, 2, 3 and 4
1. Fuel tank pressure when 4 seconds after 0.02 inch leak criterion measurement	-7.5 mmHg (-1 kPa) or less
2. 0.02 inch leak criterion	-36.4 to -7.92 mmHg (-4.85 to -1.057 kPa)
3. 0.02 inch leak criterion	Saturated within 55 seconds
4. 0.02 inch leak criterion difference between first and second	5.25 mmHg (0.7 kPa) or less

7. Leak check

Next sequence is run if following condition set	-
Fuel tank pressure when vacuum introduction was complete	Second 0.02 inch leak criterion or less

8. Atmospheric pressure

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

TYPICAL MALFUNCTION THRESHOLDS

1. P2419: Vent valve stuck closed. "Saturated" indicates that the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

One of following condition set	-
EVAP pressure just after 0.02 inch leak criterion measurement start	-1 kPa (-7.5 mmHg) or higher
0.02 inch leak criterion	Less than -4.85 kPa (-36.38 mmHg)

0.02 inch leak criterion	-1.1 kPa (-8.3 mmHg) or more
0.02 inch leak criterion	Not saturated within 55 seconds
Difference between first 0.02 inch leak criterion and second 0.02 inch leak criterion	0.7 kPa (5.25 mmHg) or more

2. P2420: Vent valve stuck open (vent)

EVAP pressure change after EVAP canister vent valve is ON	Less than 0.3 kPa (2.25 mmHg)

MONITOR RESULT

Detailed information on Checking Monitor Status (See page ES-19).

DTC	P2610	ECM / PCM Internal Engine Off Timer Performance

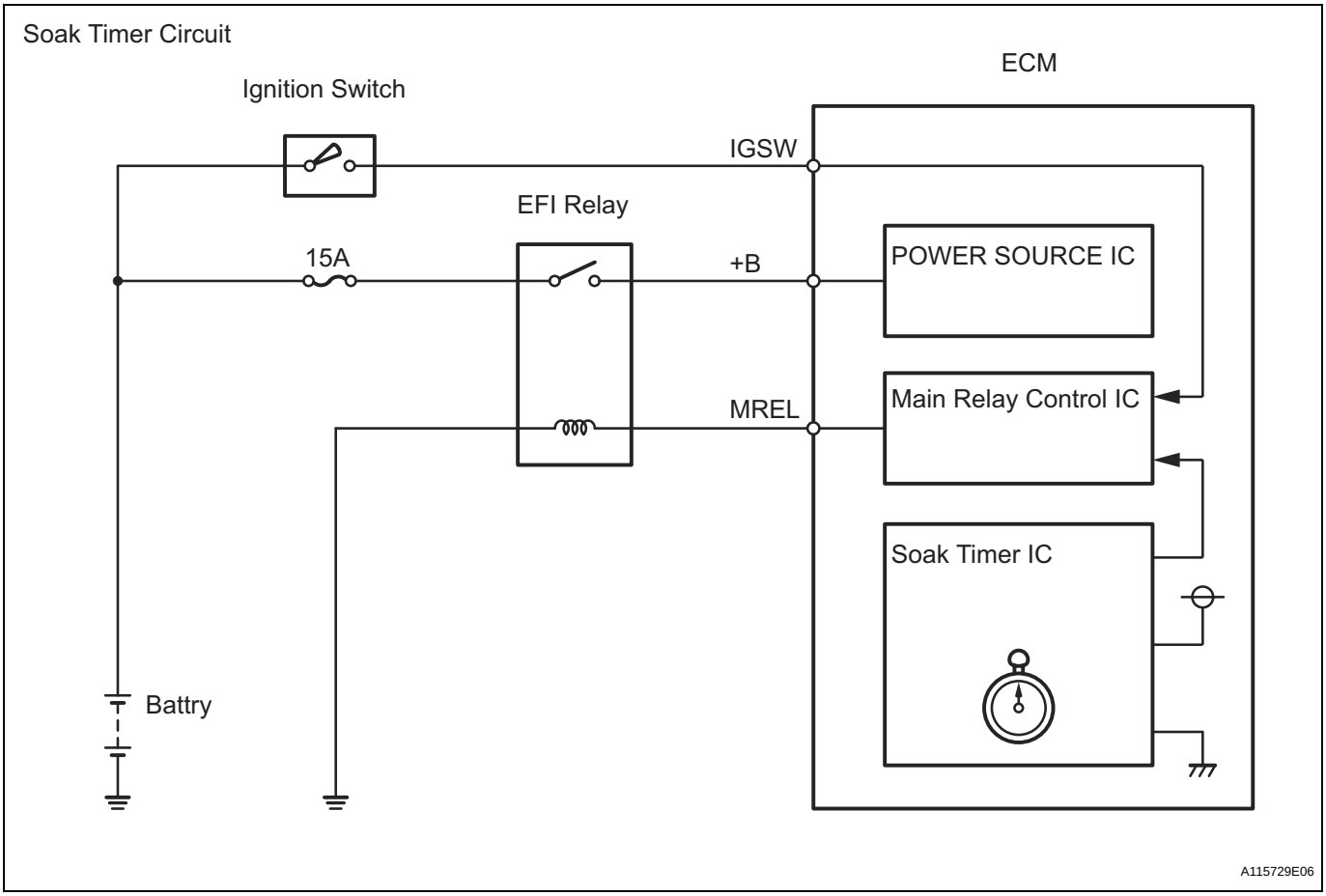
DTC SUMMARY

DTC	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P2610	Soak timer (built into ECM)	ECM internal malfunction	ECM	Engine running	2 trip

DESCRIPTION

ES

To ensure the accuracy of the EVAP (Evaporative Emission) monitor values, the soak timer, which is built into the ECM, measures 5 hours (+-15 minutes) from when the ignition switch is turned OFF, before the monitor is run. This allows the fuel to cool down, which stabilizes the fuel tank pressure. When 5 hours have elapsed, the ECM turns on.



MONITOR DESCRIPTION

5 hours after the ignition switch is turned OFF, the soak timer activates the ECM to begin the EVAP system monitor. While the engine is running, the ECM monitors the synchronization of the soak timer and the CPU clock. If these two are not synchronized, the ECM interprets this as a malfunction, illuminates the MIL and sets the DTC (2 trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	ECM
Frequency of Operation	Once per driving cycle

Duration	10 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTC not present	None
Ignition switch	ON
Engine	Running
Battery voltage	8 V or more
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Soak timer measurement when ECM CPU clock counts 10 minutes	Less than 7 minutes, or more than 13 minutes

HINT:
- DTC P2610 is set if an internal ECM problem is detected. Diagnostic procedures are not required. ECM replacement is required.
- Read freeze frame data using an intelligent tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, 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	**REPLACE ECM**

NEXT

2	**CHECK WHETHER DTC OUTPUT RECURS**

(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch ON.
(c) Clear DTCs (See page ES-38).
(d) Start the engine and wait for 10 minutes or more.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC / INFO / PENDING CODEs.
(f) If no pending DTC is displayed, the repair has been successfully completed.

NEXT

END