

EVAP System

RELATED DTCS

DTCs	Monitoring Items	See page
P043E	Reference orifice clogged (built into canister pump module)	ES-198
P043F	Reference orifice high-flow (built into canister pump module)	
P0441	<ul style="list-style-type: none"> Purge VSV (Vacuum Switching Valve) stuck closed Purge VSV stuck open Purge flow 	ES-203
P0450	Canister pressure sensor (built into canister pump module) voltage abnormal fluctuation	ES-210
P0451	<ul style="list-style-type: none"> Canister pressure sensor (built into canister pump module) noise Canister pressure sensor (built into canister pump module) signal becomes fixed/flat 	
P0452	Canister pressure sensor (built into canister pump module) voltage low	
P0453	Canister pressure sensor (built into canister pump module) voltage high	
P0455	EVAP gross leak	ES-220
P0456	EVAP small leak	
P2401	Leak detection pump stuck OFF (built into canister pump module)	ES-312
P2402	Leak detection pump stuck ON (built into canister pump module)	
P2419	Vent valve stuck closed (built into canister pump module)	ES-318
P2420	Vent valve stuck open (vent) (built into canister pump module)	
P2610	Soak timer (built into ECM)	ES-324

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

<div> <div></div> <div>DTCs</div> </div> <div>Malfunctioning Areas</div>	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
Reference orifice clogged	●								●	●	
Reference orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Canister pressure sensor fixed output				●							
Canister pressure sensor noise				●							
Canister pressure sensor low output			●		●						
Canister pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Leak detection pump stuck OFF	●								●	●	
Leak detection pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

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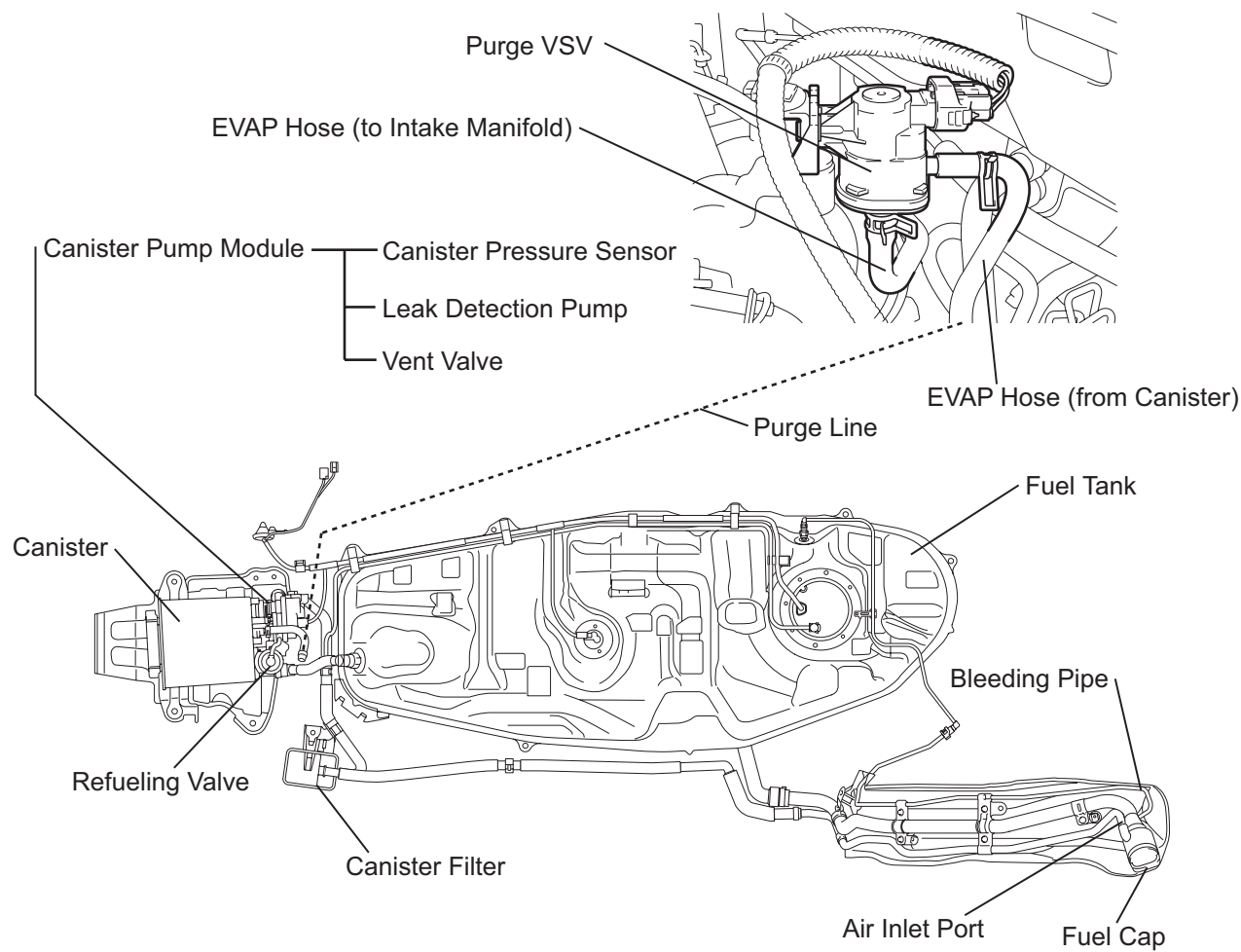
ES

NOTICE:

If the reference pressure difference between the first and second checks is greater than the specification, all the DTCs relating to the reference pressure (P043E, P043F, P2401, P2402 and P2419) are stored.

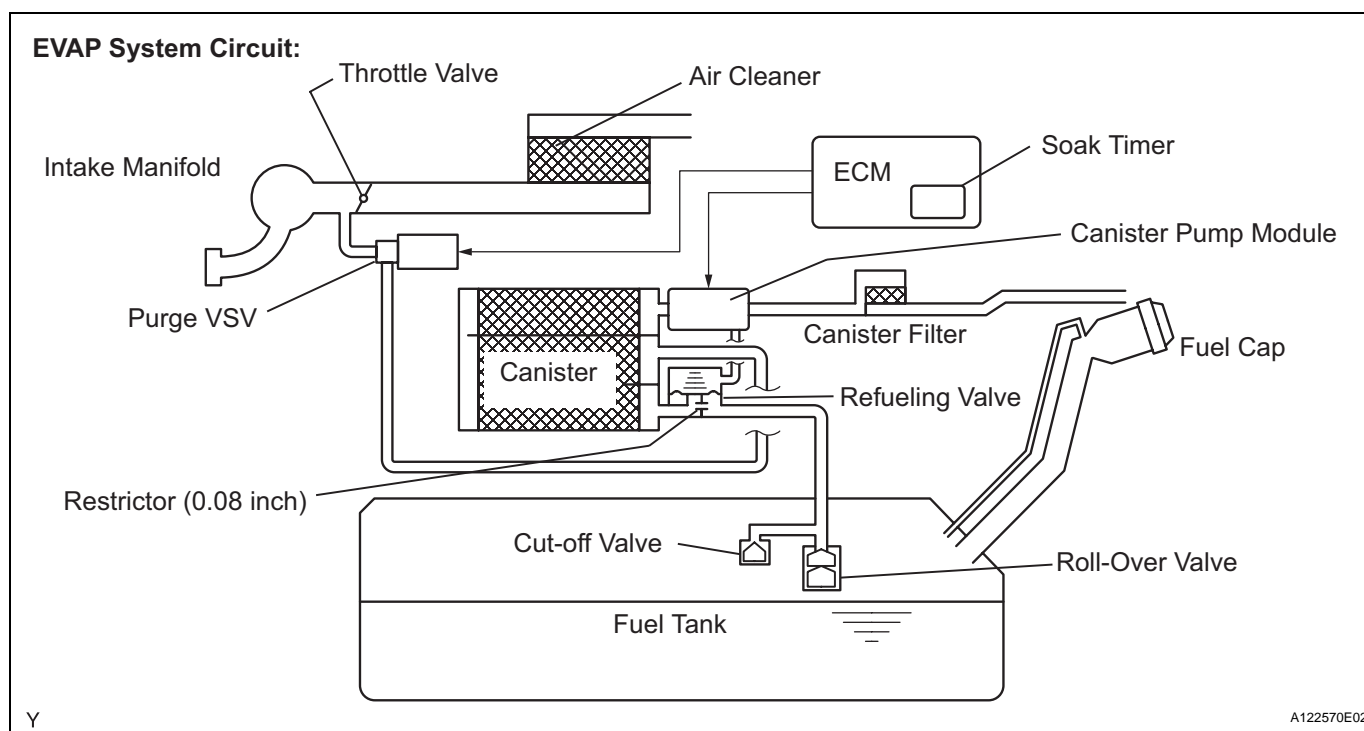
DESCRIPTION

Location of EVAP (Evaporative Emission) System:



NOTE:

The canister is located near the fuel tank, underneath the body.



NOTICE:

In this vehicle's EVAP system, turning ON the vent valve does not seal off the EVAP system. To check for leaks in the EVAP system, disconnect the air inlet vent hose and apply pressure from the atmospheric side of the canister.

While the engine is running, if a predetermined condition (closed-loop, etc.) is met, the purge VSV is opened by the ECM and stored fuel vapors in the canister are purged into the intake manifold. The ECM changes the duty cycle ratio of the purge VSV to control purge flow volume.

The purge flow volume is also determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve to ensure that the purge flow is maintained when the negative pressure (vacuum) is applied to the canister.

The following two monitors run to confirm the appropriate EVAP system operation.

1. Key-off monitor

This monitor checks for EVAP (Evaporative Emission) system leaks and canister pump module malfunctions. The monitor starts 5 hours* after the ignition switch is turned OFF. At least 5 hours are required for the fuel to cool down to stabilize the EVAP pressure, thus making the EVAP system monitor more accurate.

The leak detection pump creates negative pressure (vacuum) in the EVAP system and the pressure is measured. Finally, the ECM monitors for leaks from the EVAP system, and malfunctions in both the canister pump module and purge VSV, 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.

2. Purge flow monitor

The purge flow monitor consists of the two monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

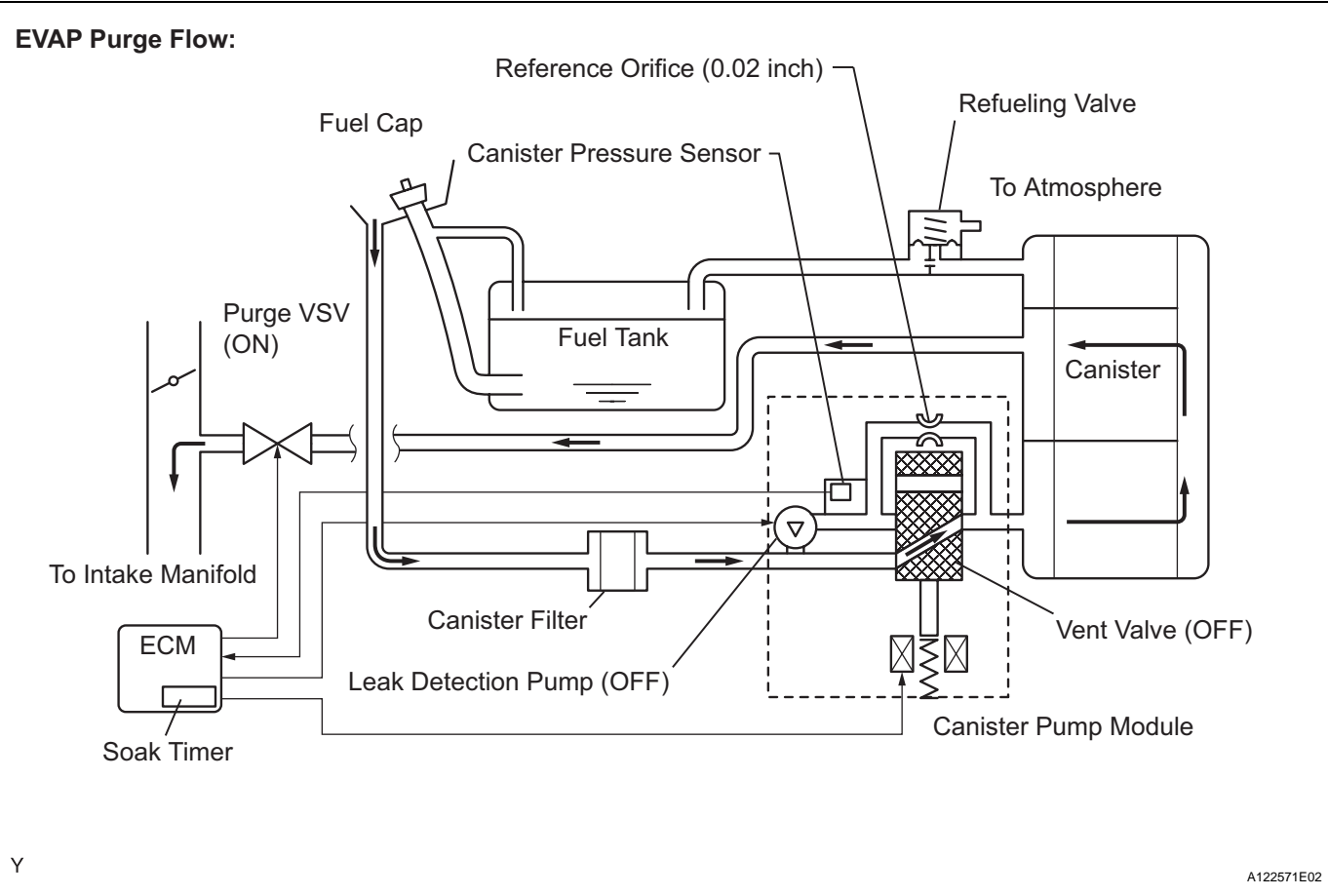
- The 1st monitor

While the engine is running and the purge VSV (Vacuum Switching Valve) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.

- The 2nd monitor
The vent valve is turned OFF (open) and the EVAP pressure is measured. If the variation in the pressure is less than 0.5 kPa-g (3.75 mmHg-g), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

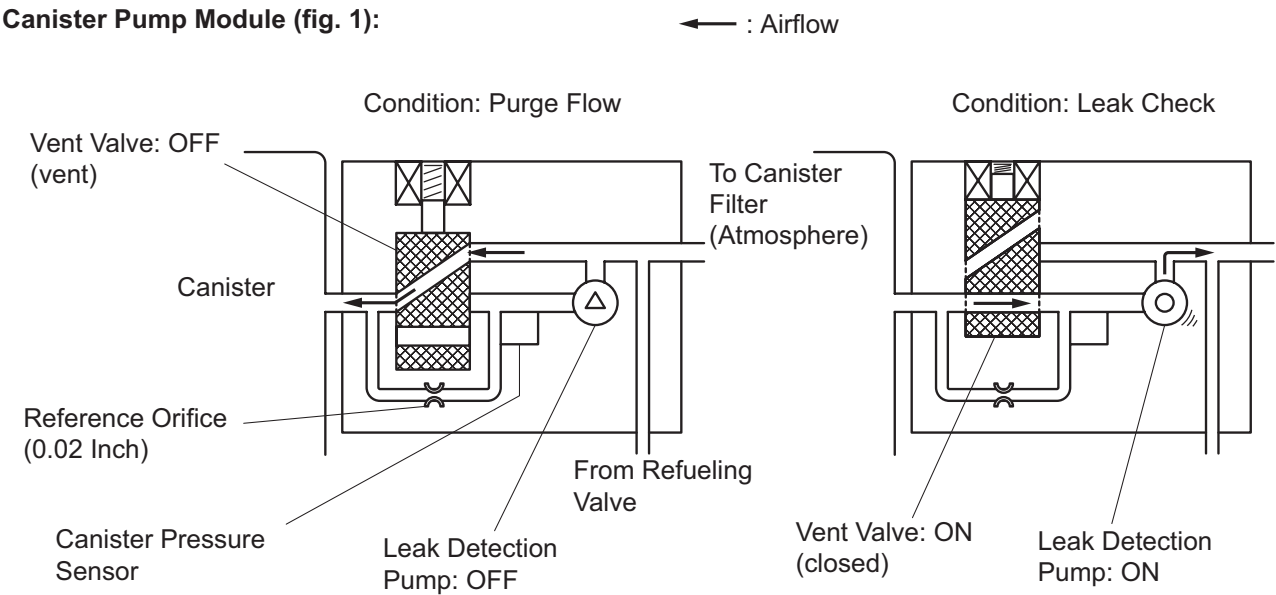
In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.



Components	Operations
Canister	Contains activated charcoal to absorb EVAP (Evaporative Emissions) generated in fuel tank.
Cut-off valve	Located in fuel tank. Valve floats and closes when fuel tank 100 % full.
Purge VSV (Vacuum Switching Valve)	Opens or closes line between canister and intake manifold. ECM uses purge VSV to control EVAP purge flow. In order to discharge EVAP absorbed by canister to intake manifold, ECM opens purge VSV. EVAP discharge volume to intake manifold controlled by purge VSV duty cycle ratio (current-carrying time) (Open: ON; Closed: OFF).
Refueling valve	Controls EVAP pressure from fuel tank to canister. Valve consists of diaphragm, spring and restrictor (diameter: 0.08 inch). When fuel vapor and pressure inside fuel tank increase, valve opens. While EVAP purged, valve closes and restrictor prevents large amount of vacuum from affecting pressure in fuel tank. Valve opened while refueling.
Roll-over valve	Located in fuel tank. Valve closed by its own weight when vehicle overturns to prevent fuel from spilling out.
Soak timer	Built into ECM. To ensure accurate EVAP monitor, measures 5 hours (+15 min) after ignition switch turned OFF. This allows fuel to cool down, stabilizing EVAP pressure. When approximately 5 hours elapsed, ECM activates (refer to fig. 3).
Canister pump module	Consists of (a) to (d) below. Canister pump module cannot be disassembled.
(a) Vent valve	Vents and closes EVAP system. When ECM turns valve ON, EVAP system closed. When ECM turns valve OFF, EVAP system vented. Negative pressure (vacuum) created in EVAP system to check for EVAP leaks by closing purge VSV, turning on vent valve (closed) and operating leak detection pump (refer to fig. 1).
(b) Canister pressure sensor	Indicates pressure as voltages. ECM supplies regulated 5 V to canister pressure sensor, and uses feedback from sensor to monitor EVAP system pressure (refer to fig. 2).

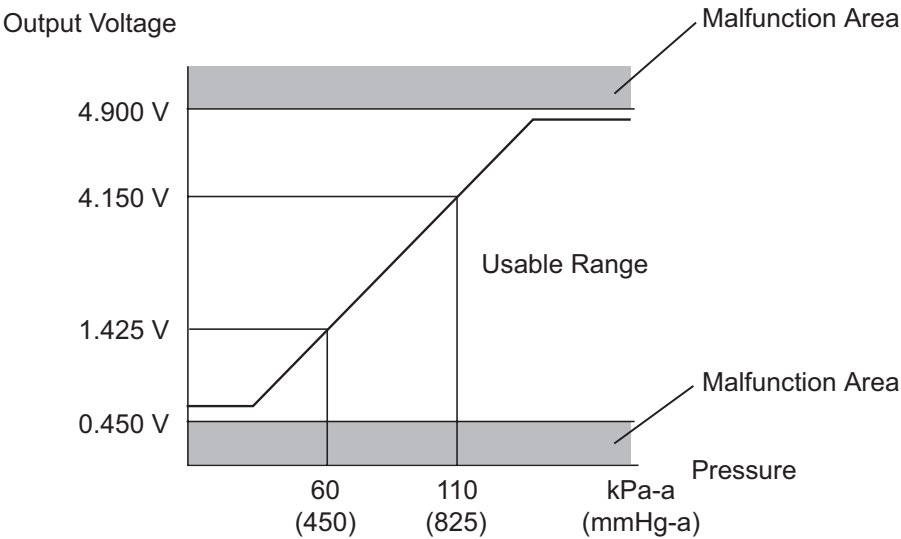
Components	Operations
(c) Leak detection pump	Creates negative pressure (vacuum) in EVAP system for leak check.
(d) Reference orifice	Has opening with 0.02 inch diameter. Vacuum produced through orifice by closing purge VSV, turning off vent valve and operating leak detection pump, to monitor reference pressure. Reference pressure indicates small leak of EVAP.

Canister Pump Module (fig. 1):



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Canister Pressure Sensor Specification (fig. 2):

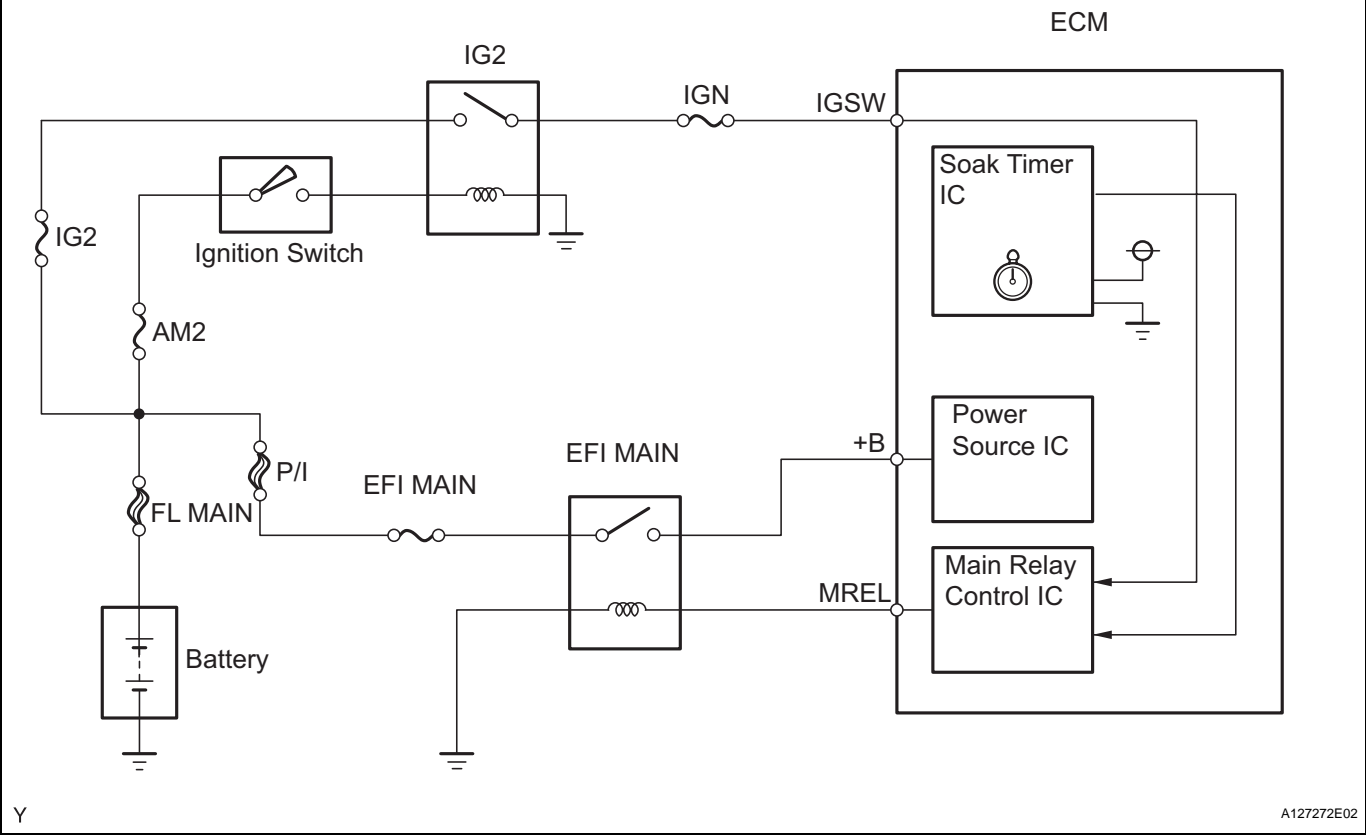


HINT:

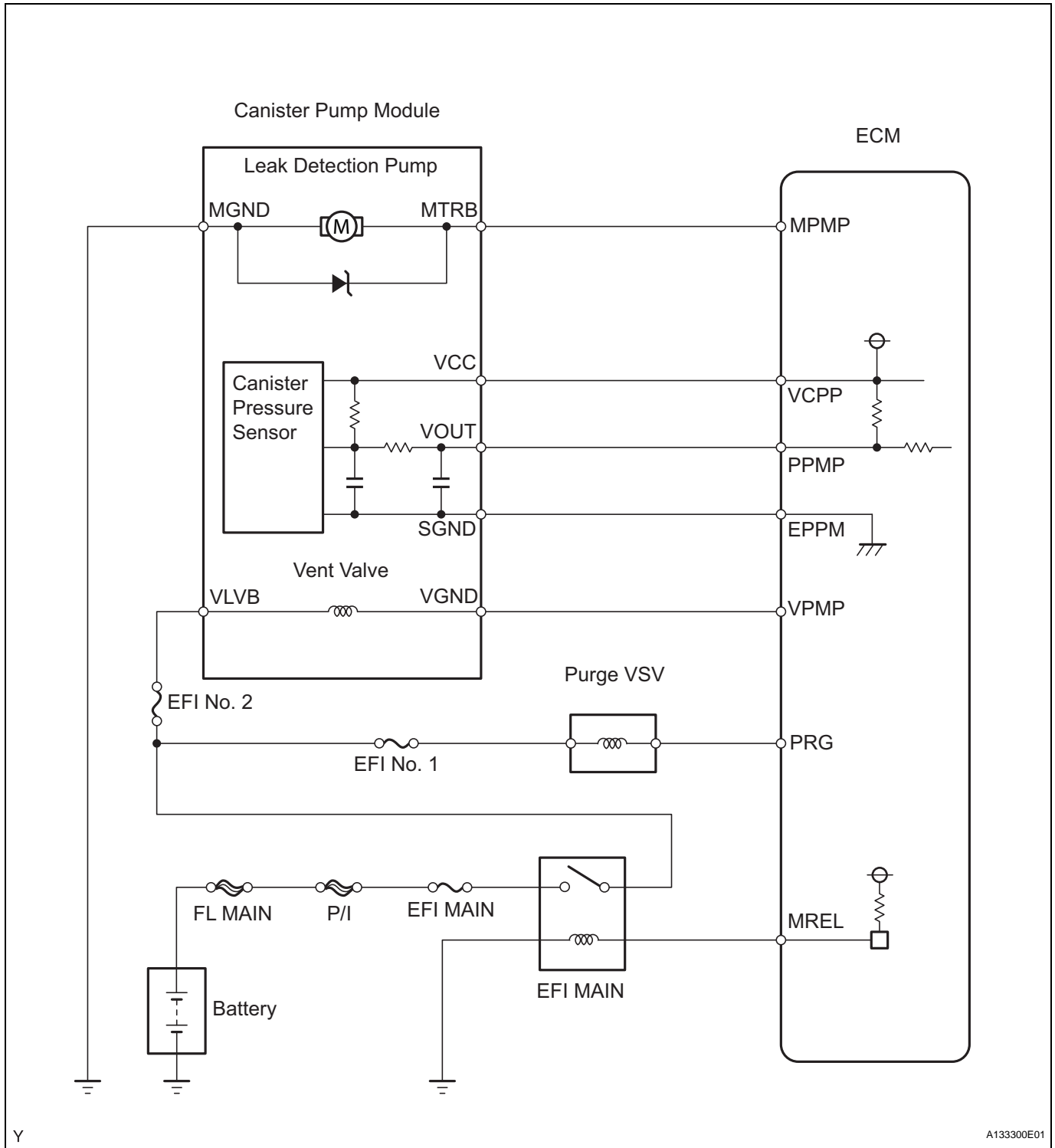
Standard atmospheric pressure is 101.3 kPa-a (760 mmHg-a)

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Soak Timer Circuit (fig. 3):



WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

The intelligent tester is required to conduct the following diagnostic troubleshooting procedure.

HINT:

- Using intelligent tester monitor results enables the EVAP (Evaporative Emission) system to be confirmed.

- Read freeze frame data using the intelligent tester. Freeze frame data records 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**CONFIRM DTC**

- Turn the ignition switch OFF and wait for 10 seconds.
- Turn the ignition switch ON.
- Turn the ignition switch OFF and wait for 10 seconds.
- Connect an intelligent tester to the DLC3.
- Turn the ignition switch ON and turn the tester ON.
- Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- Confirm DTCs and freeze frame data.

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

NOTICE:

If the reference pressure difference between the first and second checks is greater than the specification, all the DTCs relating to the reference pressure (P043E, P043F, P2401, P2402 and P2419) are stored.

Malfunctioning Areas \ DTCs	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
Reference orifice clogged	●								●	●	
Reference orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Canister pressure sensor fixed output				●							
Canister pressure sensor noise				●							
Canister pressure sensor low output			●		●						
Canister pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Leak detection pump stuck OFF	●								●	●	
Leak detection pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

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NEXT

2

PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)

NOTICE:

- The EVAP SYSTEM CHECK (AUTO OPERATION) consists of 5 steps performed automatically by the intelligent tester. It takes a maximum of approximately 18 minutes.
- Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
- Do not run the engine during this operation.
- When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).

(a) Clear DTCs (see page [ES-35](#)).

- (b) On the tester, select the following menu items:
DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK /
EVAP SYS CHECK / AUTO OPERATION.
- (c) After the EVAP SYSTEM CHECK is completed, check
for pending DTCs by selecting the following menu items:
DIAGNOSIS / ENHANCED OBD II / DTC INFO /
PENDING CODES.

HINT:

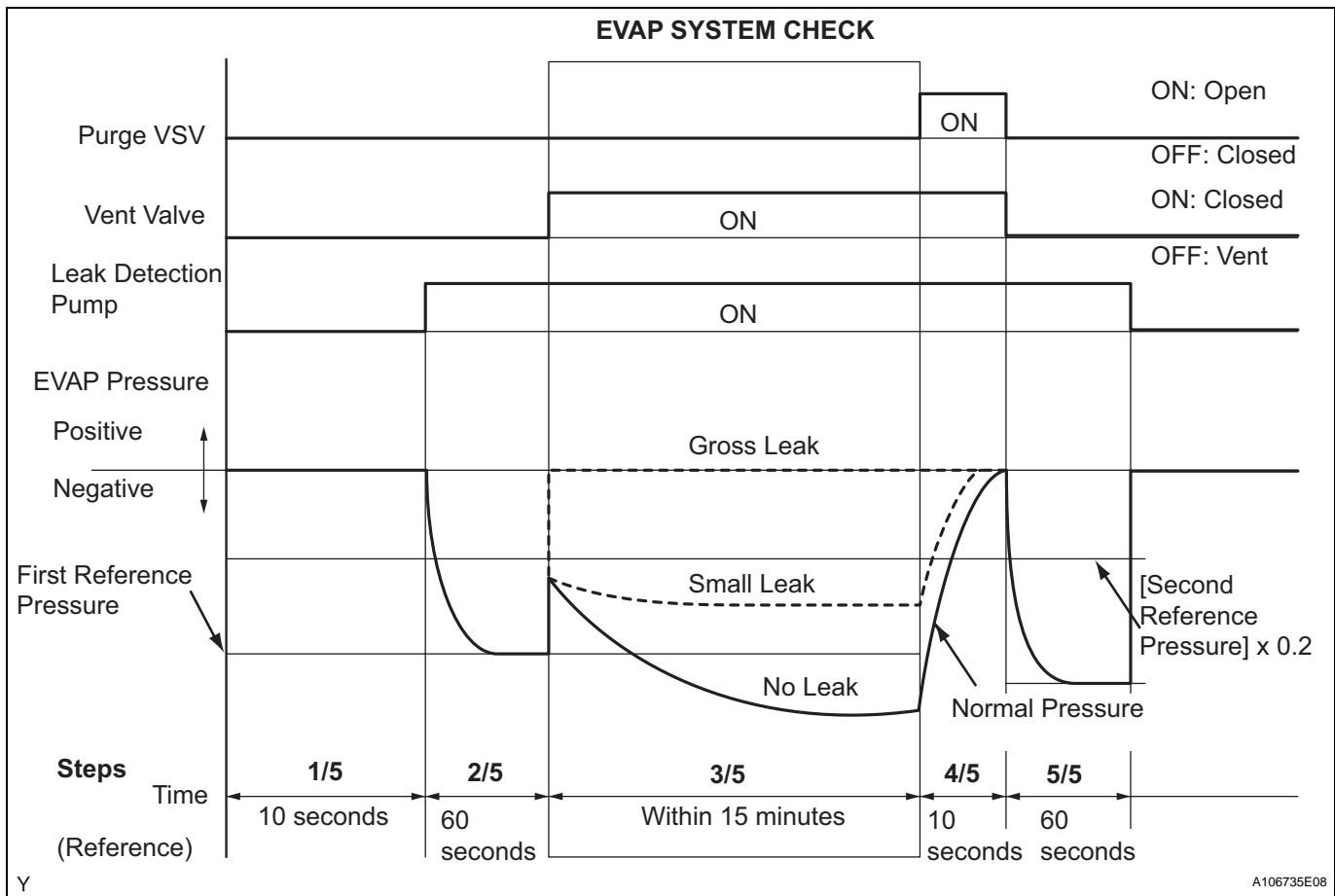
If no pending DTCs are displayed, perform the
MONITOR CONFIRMATION (see "Diagnostic Help"
menu). After this confirmation, check for pending DTCs.
If no DTCs are displayed, the EVAP system is normal.

ES

NEXT

3

PERFORM EVAP SYSTEM CHECK (MANUAL OPERATION)

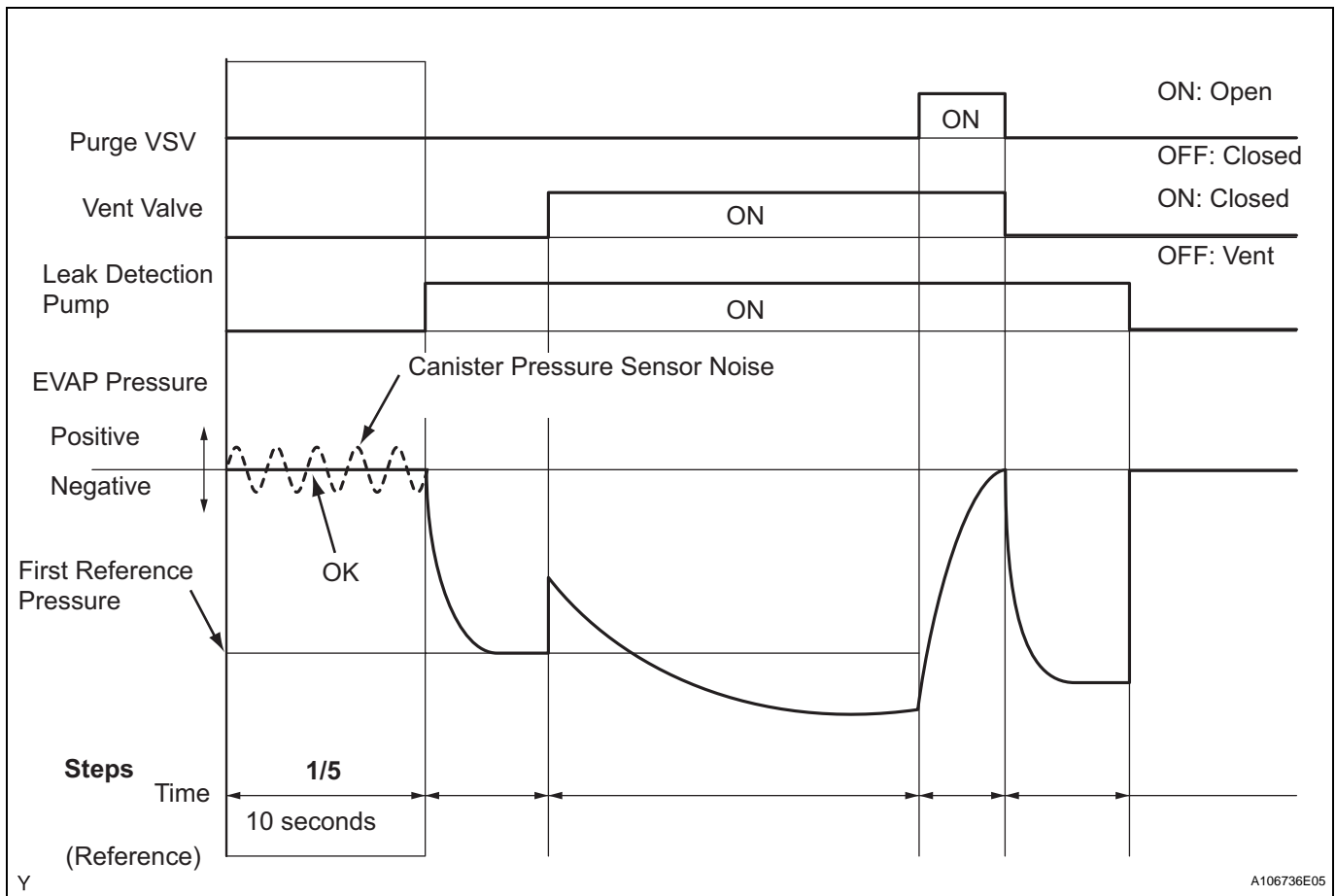


NOTICE:

- In the EVAP SYSTEM CHECK (MANUAL OPERATION), perform the series of 5 EVAP SYSTEM CHECK steps manually using the intelligent tester.
- Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
- Do not run the engine during this operation.

- When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the **EVAP SYSTEM CHECK**, keep the temperature below 35°C (95°F).
- (a) Clear DTCs (See page [ES-35](#)).
- (b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / MANUAL OPERATION.

NEXT

4 PERFORM EVAP SYSTEM CHECK (STEP 1/5)**ES**

(a) Check the EVAP pressure in step 1/5.

Result

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
-	Virtually no variation in EVAP pressure	Not yet determined	A
P0451	EVAP pressure fluctuates by ± 0.3 kPa-g (2.25 mmHg-g) or more	Canister pressure sensor noise	B

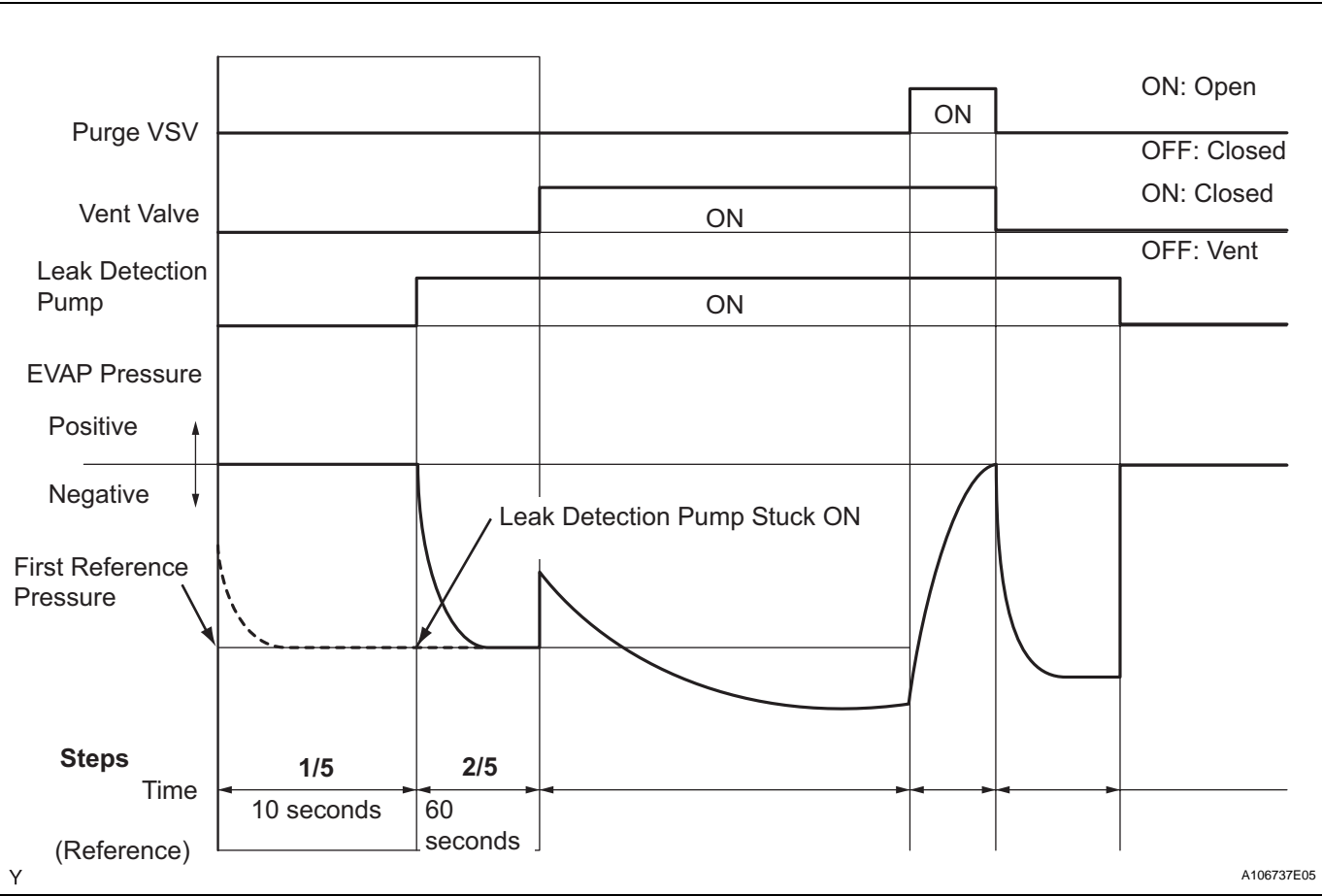
*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

B

Go to step 29

A

5 PERFORM EVAP SYSTEM CHECK (STEP 1/5 TO 2/5)



(a) Check the EVAP pressure in steps 1/5 and 2/5.

Result

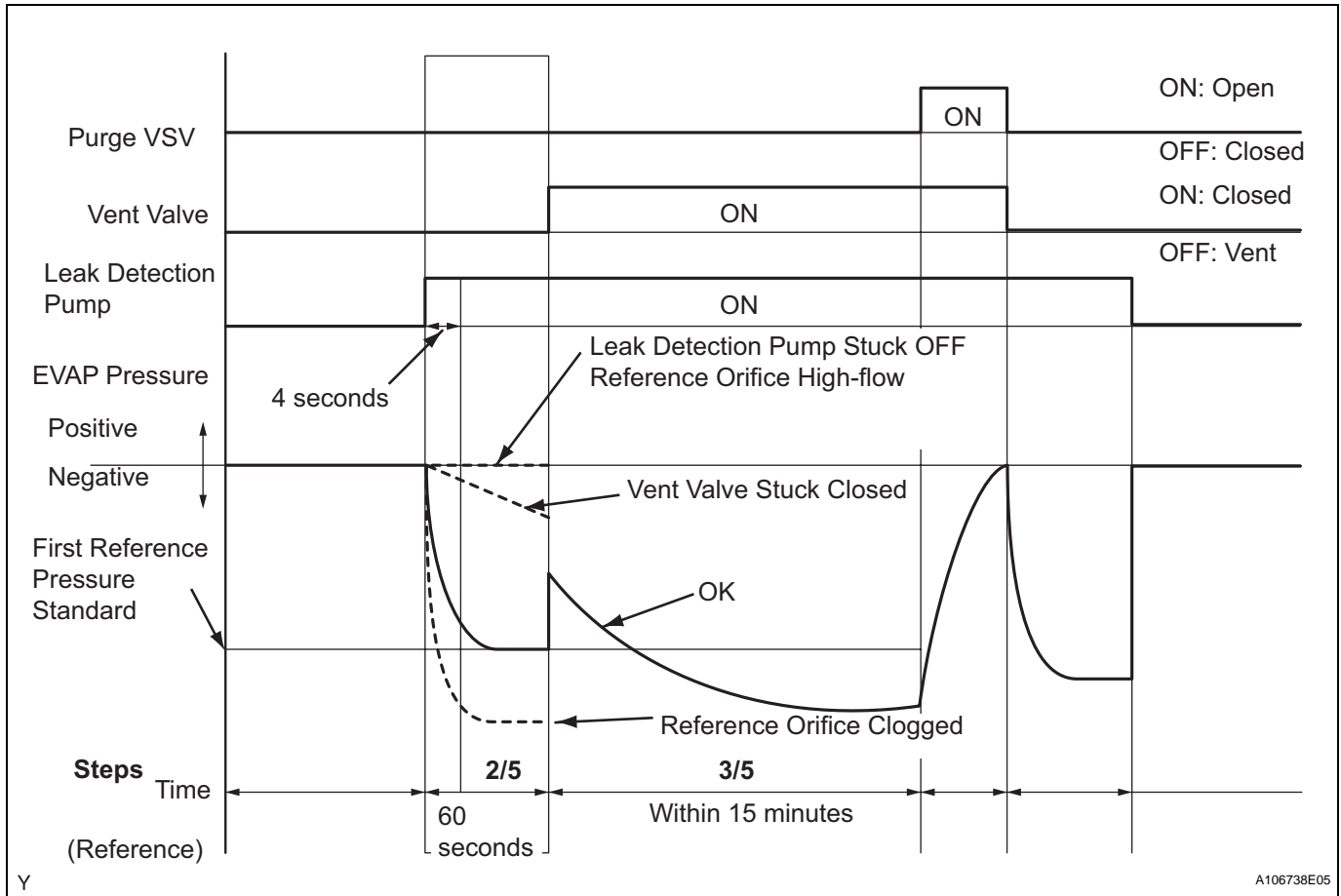
DTCs*	Test Results	Suspected Trouble Areas	Proceed To
-	Virtually no variation in EVAP pressure during step 1/5. Then decreases to reference pressure	Not yet determined	A
P2402	Small difference between EVAP pressures during steps 1/5 and 2/5	Leak detection pump stuck ON	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.
HINT:
The first reference pressure is the value determined in step 2/5.

A

B Go to step 22

6 PERFORM EVAP SYSTEM CHECK (STEP 2/5)



HINT:

Make a note of the pressures checked in steps (a) and (b) below.

(a) Check the EVAP pressure 4 seconds after the leak detection pump is activated*.

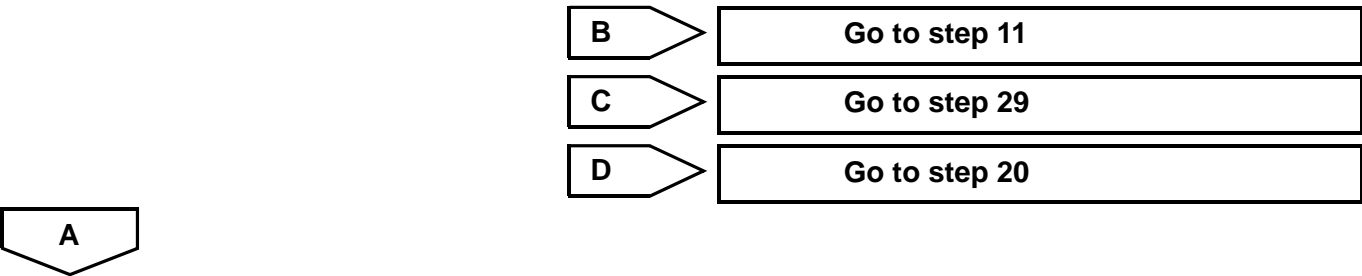
*: The leak detection pump begins to operate as step 1/5 finishes and step 2/5 starts.

(b) Check the EVAP pressure again when it has stabilized. This pressure is the reference pressure.

Result

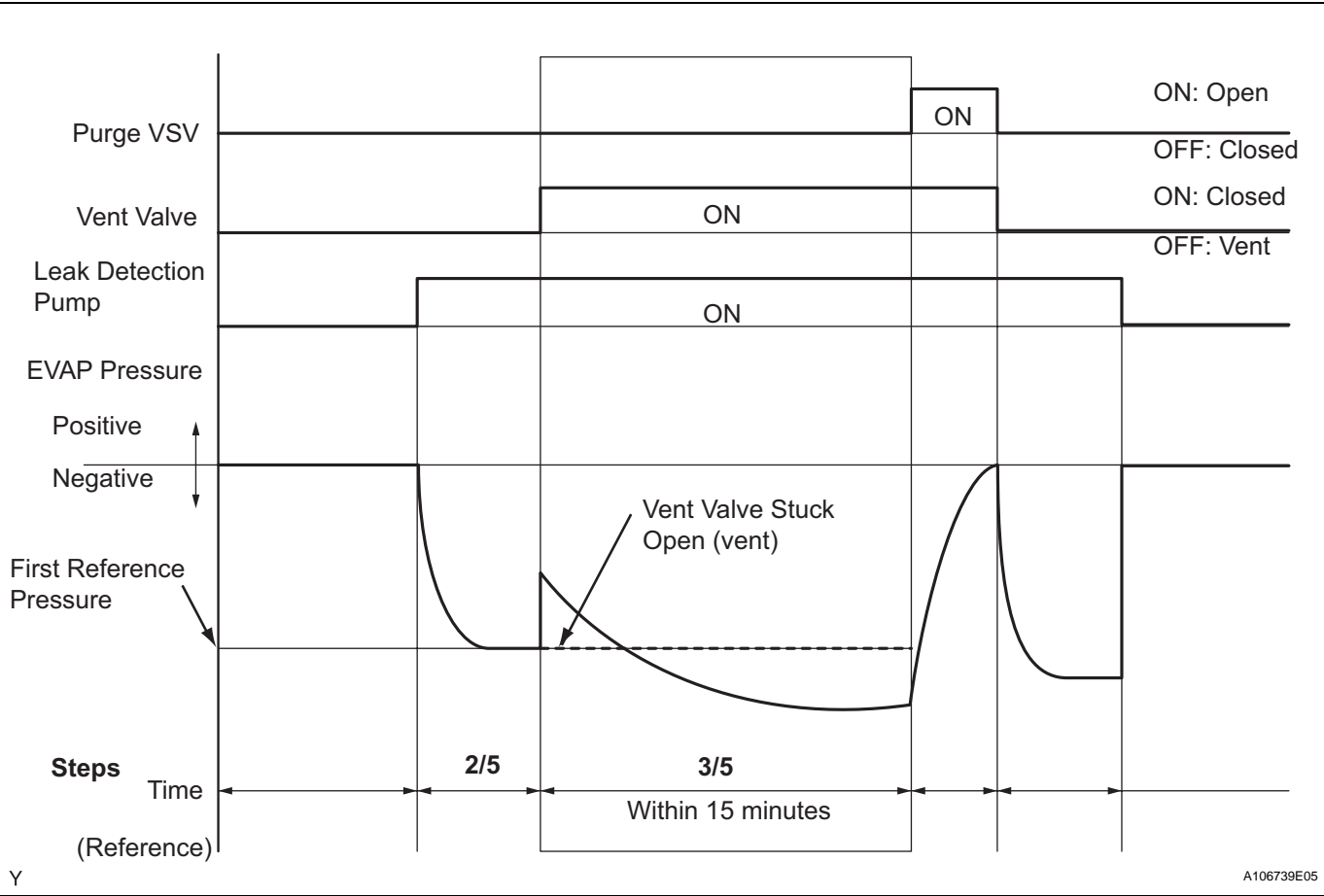
DTCs*	Test Results	Suspected Trouble Areas	Proceed To
-	EVAP pressure in step (b) between -4.85 kPa-g and -1.057 kPa-g (-36.4 mmHg-g and -7.93 mmHg-g)	Not yet determined	A
P043F and P2401	EVAP pressure in step (b) -1.057 kPa-g (-7.93 mmHg-g) or more	<ul style="list-style-type: none"> Reference orifice high-flow Leak detection pump stuck OFF 	B
P043E	EVAP pressure in step (b) below -4.85 kPa-g (-36.4 mmHg-g)	Reference orifice clogged	C
P2419	EVAP pressure in step (a) more than -1.057 kPa-g (-7.93 mmHg-g)	Vent valve stuck closed	D

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.



7

PERFORM EVAP SYSTEM CHECK (STEP 2/5 TO 3/5)



(a) Check the EVAP pressure increase in step 3/5.

Result

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
-	EVAP pressure increases by 0.3 kPa-g (2.25 mmHg-g) or more within 10 seconds of proceeding from step 2/5 to step 3/5	Not yet determined	A
P2420	No variation in EVAP pressure despite proceeding from step 2/5 to step 3/5	Vent valve stuck open (vent)	B
P0451	No variation in EVAP pressure during steps 1/5 through 3/5	Canister pressure sensor malfunction fixed	C

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.



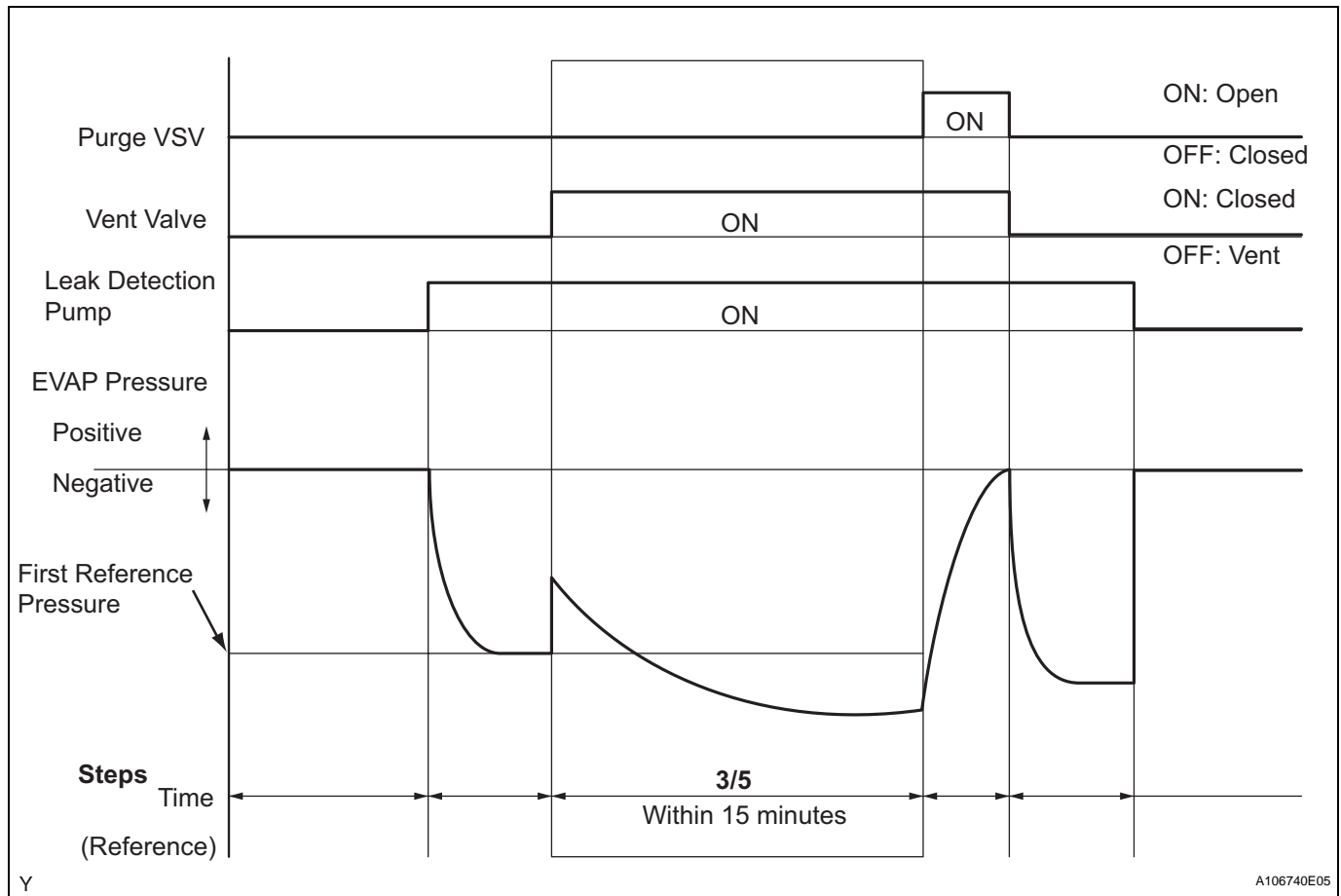
C

Go to step 29

A

8

PERFORM EVAP SYSTEM CHECK (STEP 3/5)



(a) Wait until the EVAP pressure change is less than 0.1 kPa-g (0.75 mmHg-g) for 30 seconds.

(b) Measure the EVAP pressure and record it.

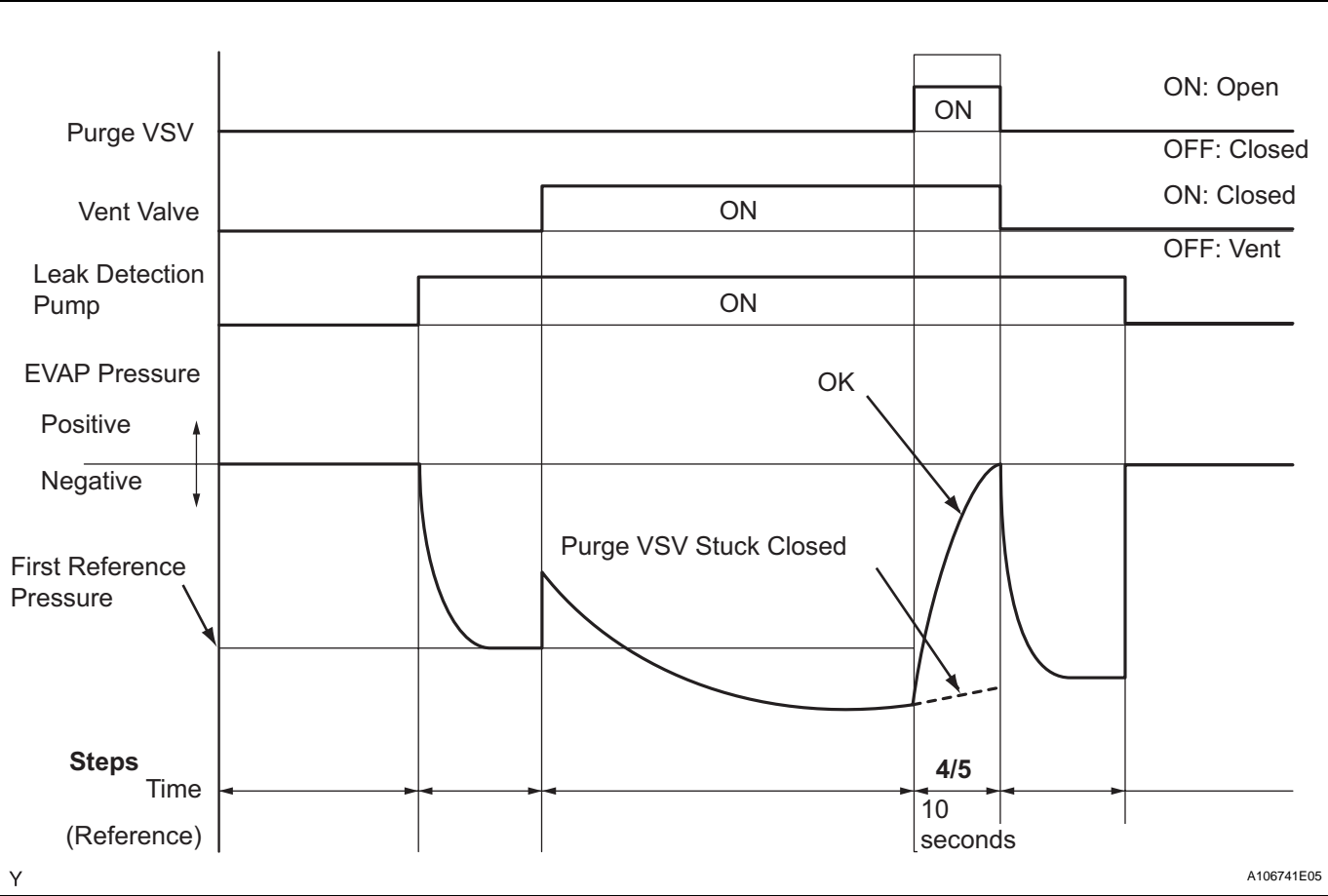
HINT:

A few minutes are required for the EVAP pressure to become saturated. When there is little fuel in the fuel tank, it takes up to 15 minutes.

NEXT

9

PERFORM EVAP SYSTEM CHECK (STEP 4/5)

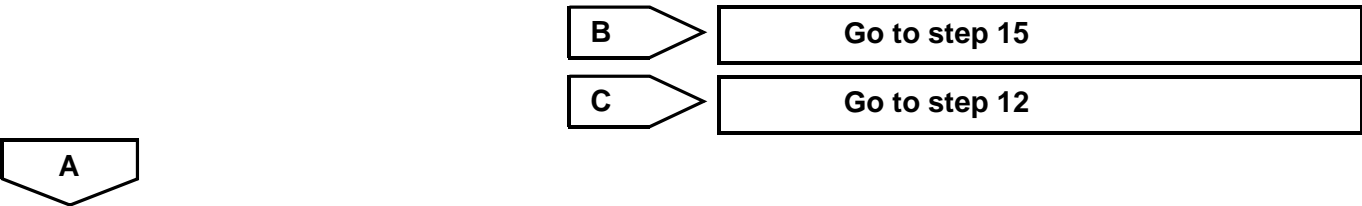


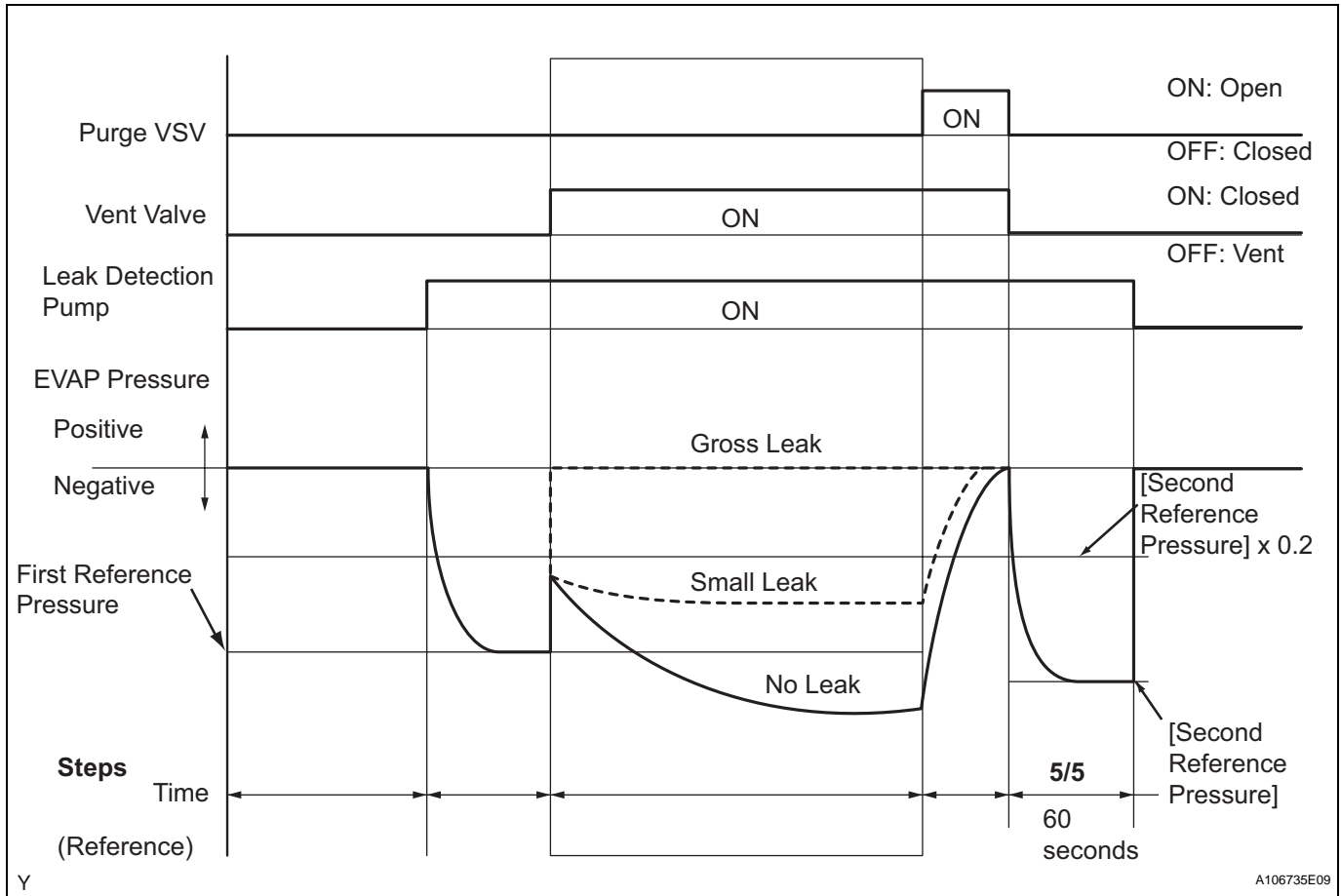
(a) Check the EVAP pressure in step 4/5.

Result

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
-	EVAP pressure increases by 0.3 kPa-g (2.25 mmHg-g) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Not yet determined	A
P0441	EVAP pressure increases by 0.3 kPa-g (2.25 mmHg-g) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Problems in EVAP hose between purge VSV and intake manifold	B
P0441	Variation in EVAP pressure less than 0.3 kPa-g (2.25 mmHg-g) for 10 seconds, after proceeding from step 3/5 to step 4/5	Purge VSV stuck closed	C

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.



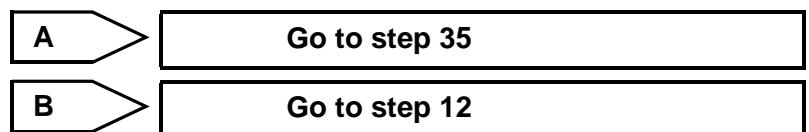
10 PERFORM EVAP SYSTEM CHECK (STEP 5/5)

- (a) Check the EVAP pressure in step 5/5.
(b) Compare the EVAP pressure in step 3/5 and the second reference pressure (step 5/5).

Result

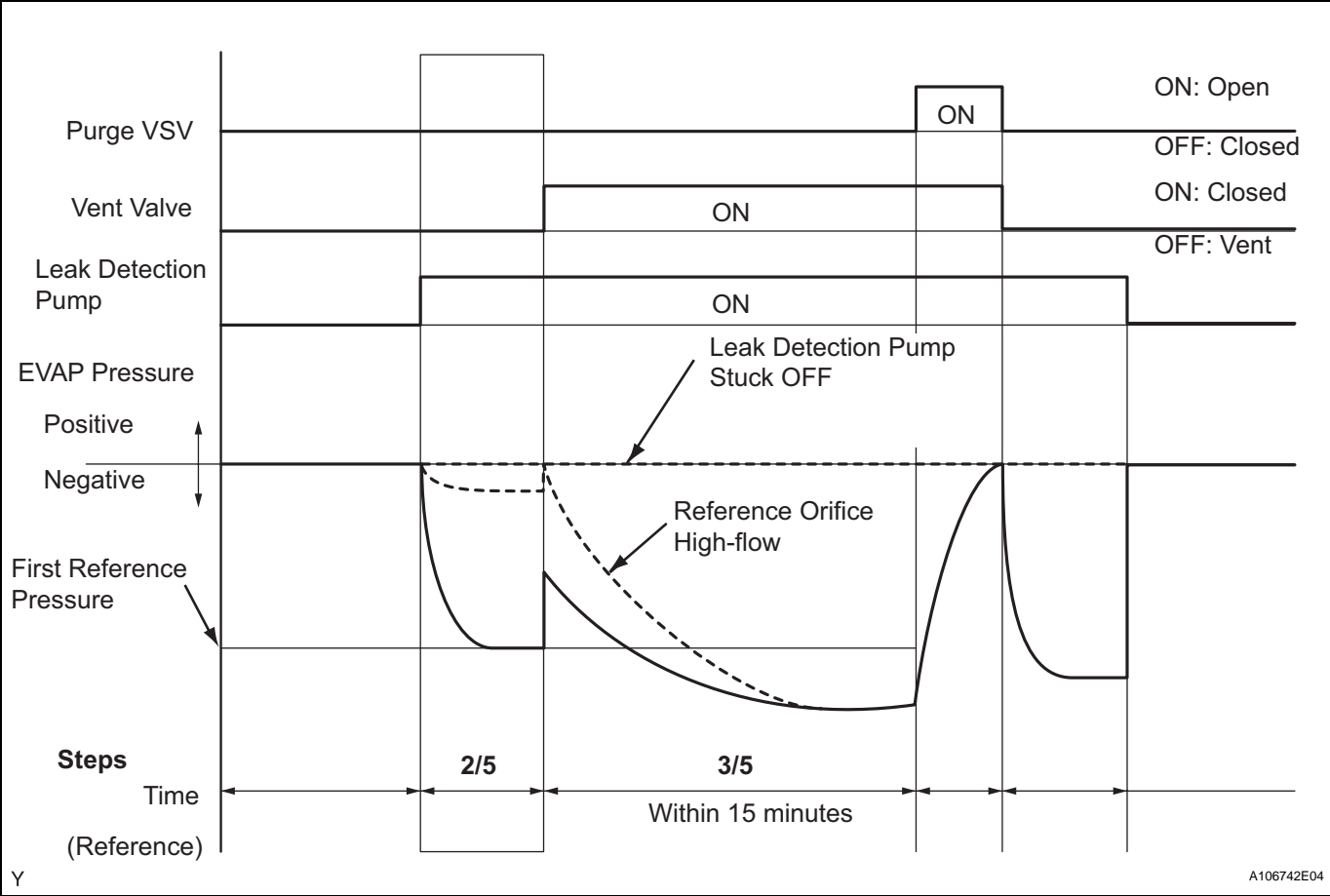
DTCs*	Test Results	Suspected Trouble Areas	Proceed To
-	EVAP pressure (step 3/5) lower than second reference pressure (step 5/5)	Not yet determined (no leakage from EVAP system)	A
P0441 and P0455	EVAP pressure (step 3/5) higher than [second reference pressure (step 5/5) x 0.2]	<ul style="list-style-type: none"> Purge VSV stuck open EVAP gross leak 	B
P0456	EVAP pressure (step 3/5) higher than second reference pressure (step 5/5)	EVAP small leak	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.



11

PERFORM EVAP SYSTEM CHECK (STEP 3/5)



(a) Check the EVAP pressure in step 3/5.

Result

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
P043F	EVAP pressure less than [reference pressure] measured at 2/5	Reference orifice high-flow	A
P2401	EVAP pressure almost same as [reference pressure] measured at 2/5	Leak detection pump stuck OFF	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

HINT:

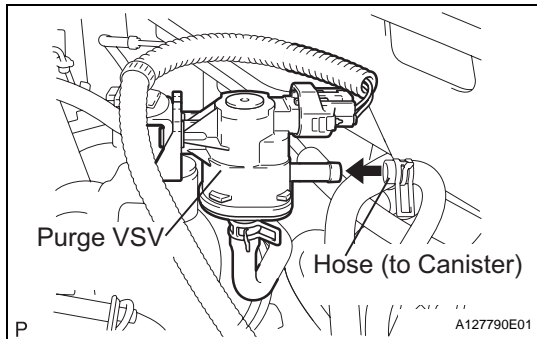
The first reference pressure is the value determined in step 2/5.

A

Go to step 29

B

Go to step 22

12 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (PURGE VSV)

- (a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / EVAP VSV (ALONE).
- (b) Disconnect the hose (connected to the canister) from the purge VSV.
- (c) Start the engine.
- (d) Using the tester, turn off the purge VSV (EVAP VSV: OFF).
- (e) Use your finger to confirm that the purge VSV has no suction.
- (f) Using the tester, turn on the purge VSV (EVAP VSV: ON).
- (g) Use your finger to confirm that the purge VSV has suction.

Result

Test Results	Suspected Trouble Areas	Proceed To
No suction when purge VSV turned OFF, and suction applied when turned ON	Purge VSV normal	A
Suction applied when purge VSV turned OFF	Purge VSV stuck open	B
No suction when purge VSV turned ON	<ul style="list-style-type: none"> Purge VSV stuck closed Problems with EVAP hose between purge VSV and intake manifold 	C

- (h) Reconnect the hose.

B	Go to step 14
C	Go to step 15

A**13 CHECK FUEL CAP ASSEMBLY**

- (a) Check that the fuel cap is correctly installed and confirm the fuel cap meets OEM specifications.
- (b) Tighten the fuel cap until a few click sounds are heard.
HINT:
If an EVAP tester is available, check the fuel cap using the tester.
 1. Remove the fuel cap and install it onto a fuel cap adapter.
 2. Connect an EVAP tester pump hose to the adapter, and pressurize the cap to 3.2 to 3.7 kPa (24 to 28 mmHg) using an EVAP tester pump.
 3. Seal the adapter and wait for 2 minutes.
 4. Check the pressure. If the pressure is 2 kPa (15 mmHg) or more, the fuel cap is normal.

Result

Test Results	Suspected Trouble Areas	Proceed To
Fuel cap correctly installed	-	A

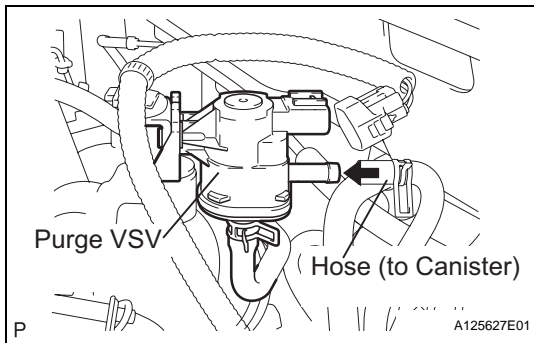
Test Results	Suspected Trouble Areas	Proceed To
Fuel cap loose	<ul style="list-style-type: none"> Fuel cap improperly installed Defective fuel cap Fuel cap does not meet OEM specifications 	B
Defective fuel cap	-	B
No fuel cap	-	C

(c) Reinstall the fuel cap.

A	Go to step 28
B	Go to step 26
C	Go to step 27

ES

14 INSPECT DUTY VACUUM SWITCHING VALVE (PURGE VSV)



- Turn the ignition switch OFF.
- Disconnect the B2 purge VSV connector.
- Disconnect the hose (connected to the canister) from the purge VSV.
- Start the engine.
- Use your finger to confirm that the purge VSV has no suction.

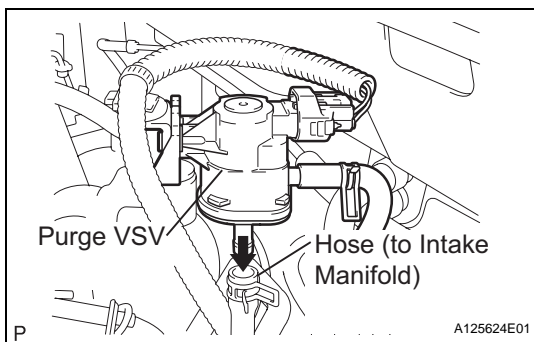
Result

Test Results	Suspected Trouble Areas	Proceed To
No suction	ECM	A
Suction applied	Purge VSV	B

- Reconnect the purge VSV connector.
- Reconnect the hose.

A	Go to step 34
B	Go to step 30

15 CHECK EVAP HOSE (PURGE VSV - INTAKE MANIFOLD)

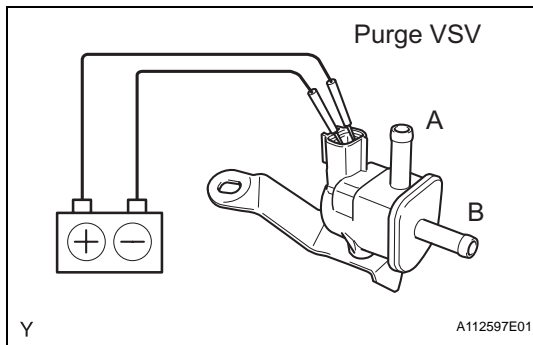


- Disconnect the hose (connected to the intake manifold) from the purge VSV.
- Start the engine.
- Use your finger to confirm that the hose has suction.

Result

Test Results	Suspected Trouble Areas	Proceed To
Suction applied	EVAP hose between purge VSV and intake manifold normal	A
No suction	<ul style="list-style-type: none"> Intake manifold port EVAP hose between purge VSV and intake manifold 	B

(d) Reconnect the hose.

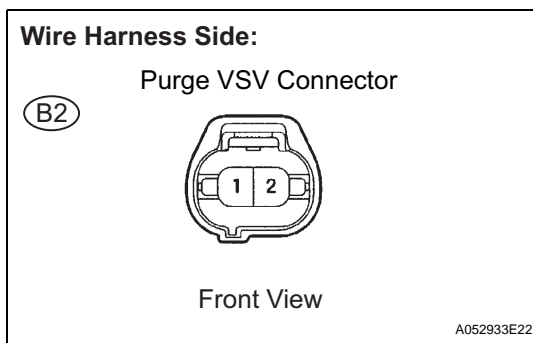
B**Go to step 25****A****16 INSPECT DUTY VACUUM SWITCHING VALVE (PURGE VSV)****ES**

- Remove the purge VSV.
- Apply the battery voltage to the terminals of the purge VSV.
- Using an air gun, confirm that air flows from port A to port B.

Result

Test Results	Suspected Trouble Areas	Proceed To
Air flows	Purge VSV normal	A
No air flow	Purge VSV	B

(d) Install the purge VSV.

B**Go to step 30****A****17 CHECK HARNESS AND CONNECTOR (POWER SOURCE OF PURGE VSV)**

- Disconnect the B2 purge VSV connector.
- Turn the ignition switch ON.
- Measure the voltage between terminal 2 of the purge VSV connector and the body ground.

Result

Test Results	Suspected Trouble Areas	Proceed To
9 to 14 V	Normal	A
Other than result above	Wire harness or connectors between purge VSV and ECM	B

(d) Reconnect the purge VSV connector.

B

Go to step 31

A

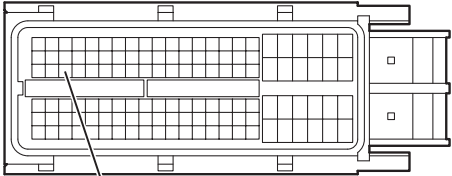
18

CHECK HARNESS AND CONNECTOR (PURGE VSV - ECM)

Wire Harness Side:

B30

 ECM Connector




PRG

 Front View

B2

 Purge VSV Connector



1 2

 Front View

A112616E02

- (a) Disconnect the B30 ECM connector and the B2 purge VSV connector.
- (b) Measure the resistance.

Standard resistance

Tester Connections	Specified Conditions
B30-49 (PRG) - B2-2 (Purge VSV)	Below 1 Ω
B30-49 (PRG) - Body ground	10 k Ω or higher
B2-2 (Purge VSV) - Body ground	10 k Ω or higher

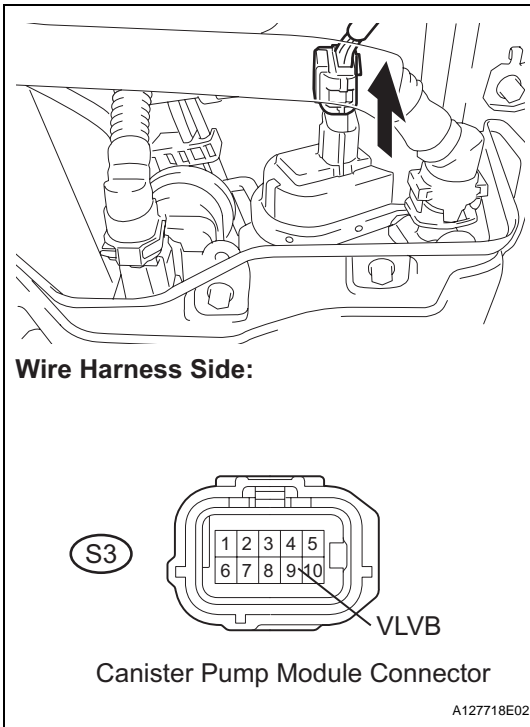
- (c) Reconnect the purge VSV connector.
- (d) Reconnect the ECM connector.

OK

Go to step 34

NG

Go to step 31

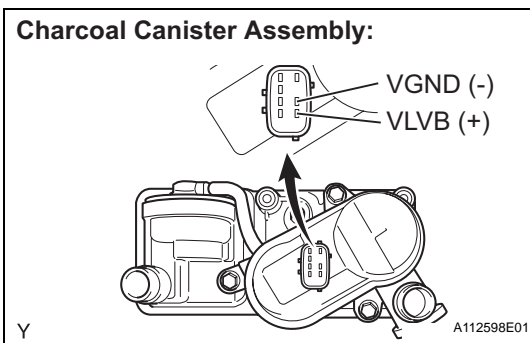
19 INSPECT CANISTER PUMP MODULE (POWER SOURCE FOR VENT VALVE)

- Turn the ignition switch OFF.
- Disconnect the S3 canister pump module connector.
- Turn the ignition switch ON.
- Measure the voltage between VLVB terminal of the canister pump module connector and the body ground.

ES**Result**

Test Results	Suspected Trouble Areas	Proceed To
9 to 14 V	1. Wire harness between vent valve and ECM 2. Vent valve 3. ECM	A
Below 3 V	Power source wire harness of vent valve	B

- Reconnect the canister pump module connector.

B**Go to step 31****A****20 INSPECT CANISTER PUMP MODULE (VENT VALVE OPERATION)**

- Turn the ignition switch OFF.
- Disconnect the S3 canister pump module connector.
- Apply the battery voltage to VLVB and VGND terminals of the canister pump module.
- Touch the canister pump module to confirm the vent valve operation.

Result

Test Results	Suspected Trouble Areas	Proceed To
Operating	1. Wire harness between vent valve and ECM 2. ECM	A

Test Results	Suspected Trouble Areas	Proceed To
Not operating	Vent valve	B

(e) Reconnect the canister connector.

B

Go to step 29

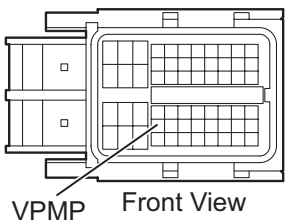
A

21

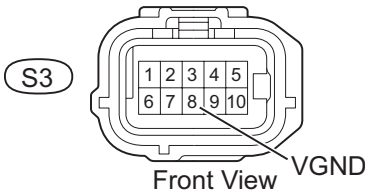
CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE)

Wire Harness Side:

A9 ECM Connector



Canister Pump Module Connector



A112621E03

- (a) Disconnect the A9 ECM connector.
- (b) Disconnect the S3 canister pump module connector.
- (c) Measure the resistance between VPMP terminal of the ECM connector and VGND terminal of the canister pump module connector.

Result

Test Results	Suspected Trouble Areas	Proceed To
Below 1 Ω	ECM	A
10 k Ω or higher	Wire harness between ECM and canister pump module	B

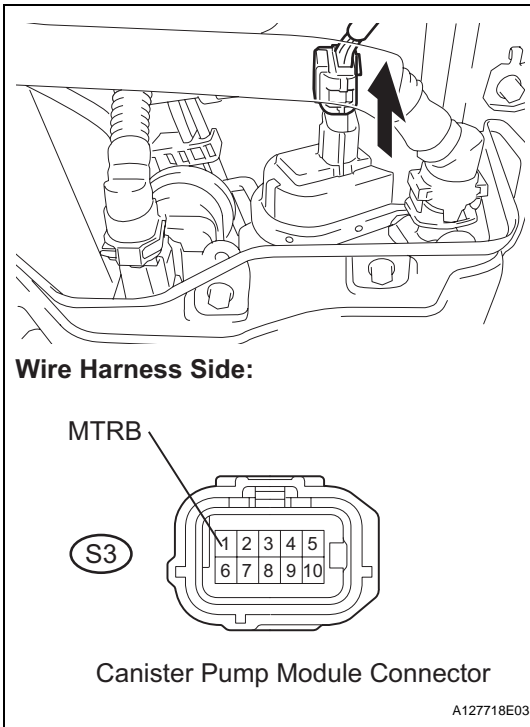
- (d) Reconnect the ECM connector.
- (e) Reconnect the canister pump module connector.

A

Go to step 34

B

Go to step 31

22 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (VACUUM PUMP (ALONE))

- Turn the ignition switch OFF.
- Disconnect the S3 canister pump module connector.
- Turn the ignition switch ON.
- On the intelligent tester, select the following menu items:
DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST /
VACUUM PUMP.
- Measure the voltage between MTRB terminal 1 of the
canister pump module connector and the body ground
when the leak detection pump is turned ON and OFF
using the tester.

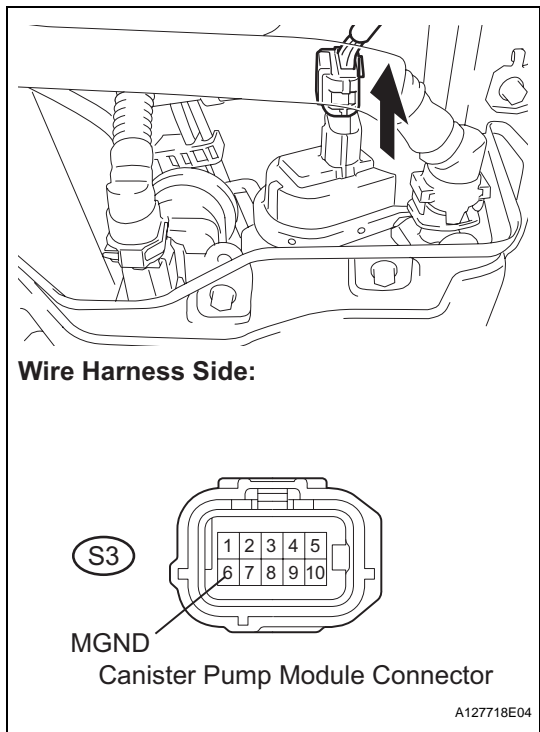
ES**Result**

Test Results	Suspected Trouble Areas	Proceed To
Below 3 V when OFF 9 to 14 V when ON	1. Wire harness between leak detection pump and body ground 2. Leak detection pump	A
Below 3 V when OFF and ON	1. Wire harness between leak detection pump and ECM 2. ECM	B

B**Go to step 24****A**

23

CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - BODY GROUND)



- (a) Turn the ignition switch OFF.
- (b) Disconnect the S3 canister pump module connector.
- (c) Check the resistance between MGND terminal of the canister pump module connector and the body ground.

Result

Test Results	Suspected Trouble Areas	Proceed To
Below 1 Ω	Leak detection pump	A
10 k Ω or higher	Wire harness between canister pump module and body ground	B

- (d) Reconnect the canister pump module connector.

A

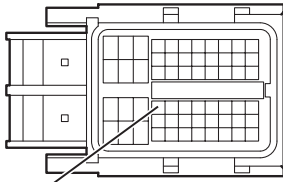
Go to step 29

B

Go to step 31

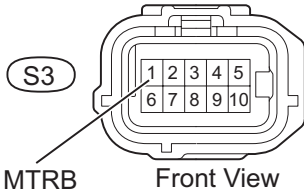
24 CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE)**ES****Wire Harness Side:**

(A9) ECM Connector



MPMP Front View

Canister Pump Module Connector



MTRB Front View

A112621E04

- (a) Turn the ignition switch OFF.
- (b) Disconnect the S3 canister pump module connector.
- (c) Disconnect the A9 ECM connector.
- (d) Measure the resistance between MPMP terminal of the ECM connector and MTRB terminal of the canister pump module connector.

Result

Test Results	Suspected Trouble Areas	Proceed To
Below 1 Ω	ECM	A
10 k Ω or higher	Wire harness between ECM and canister pump module	B

- (e) Reconnect the canister pump module connector.
- (f) Reconnect the ECM connector.

**Go to step 34****Go to step 31****25 INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)**

- (a) Stop the engine.
- (b) Disconnect the EVAP hose from the intake manifold.
- (c) Start the engine.
- (d) Use your finger to confirm that the port of the intake manifold has suction.

Result

Test Results	Suspected Trouble Areas	Proceed To
Suction applied	EVAP hose between intake manifold and purge VSV	A
No suction	Intake manifold	B

- (e) Reconnect the EVAP hose.

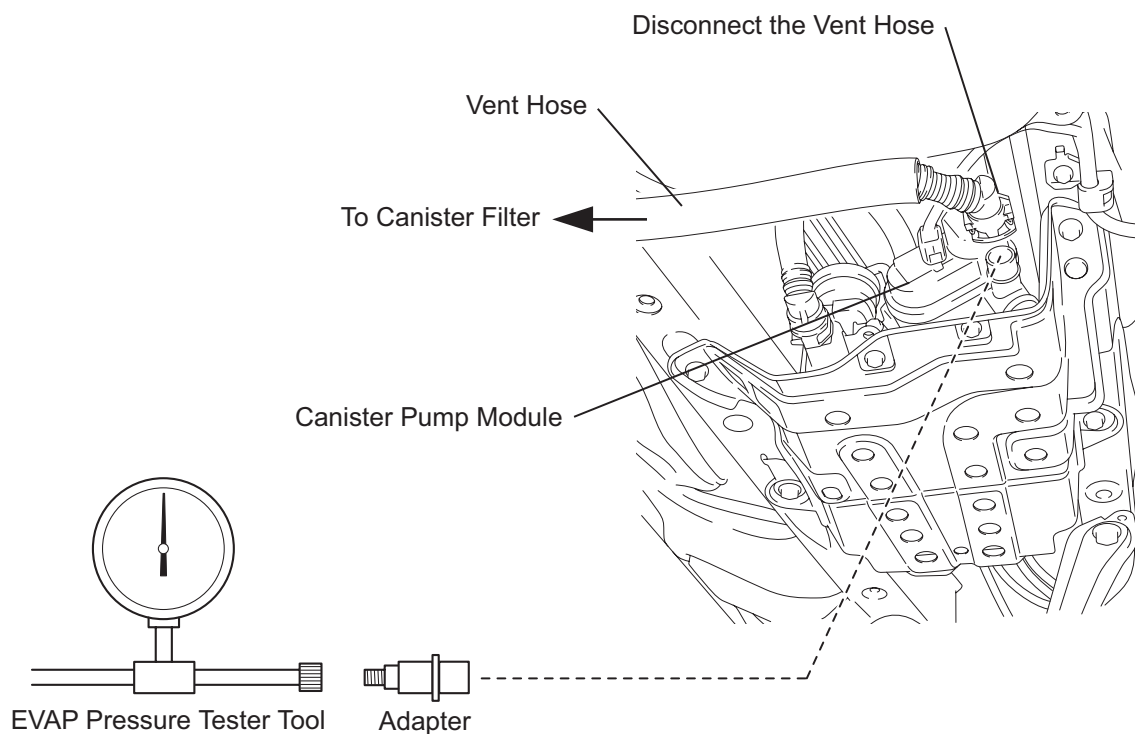
**Go to step 32****Go to step 33**

26 CORRECTLY REINSTALL OR REPLACE FUEL CAP**HINT:**

- When reinstalling the fuel cap, tighten it until a few click sounds are heard.
- When replacing the fuel cap, use a fuel cap that meets OEM specifications, and install it until a few click sounds are heard.

NEXT**Go to step 36****ES****27 REPLACE FUEL CAP****HINT:**

When installing the fuel cap, tighten it until a few click sounds are heard.

NEXT**Go to step 36****28 LOCATE EVAP LEAK PART**

Y

A127963E01

- (a) Disconnect the vent hose.
- (b) Connect the EVAP pressure tester tool to the canister pump module with the adapter.

- (c) Pressurize the EVAP system to 3.2 to 3.7 kPa (24 to 28 mmHg).
- (d) Apply soapy water to the piping and connecting parts of the EVAP system.
- (e) Look for areas where bubbles appear. This indicates the leak point.
- (f) Repair or replace the leak point.

HINT:

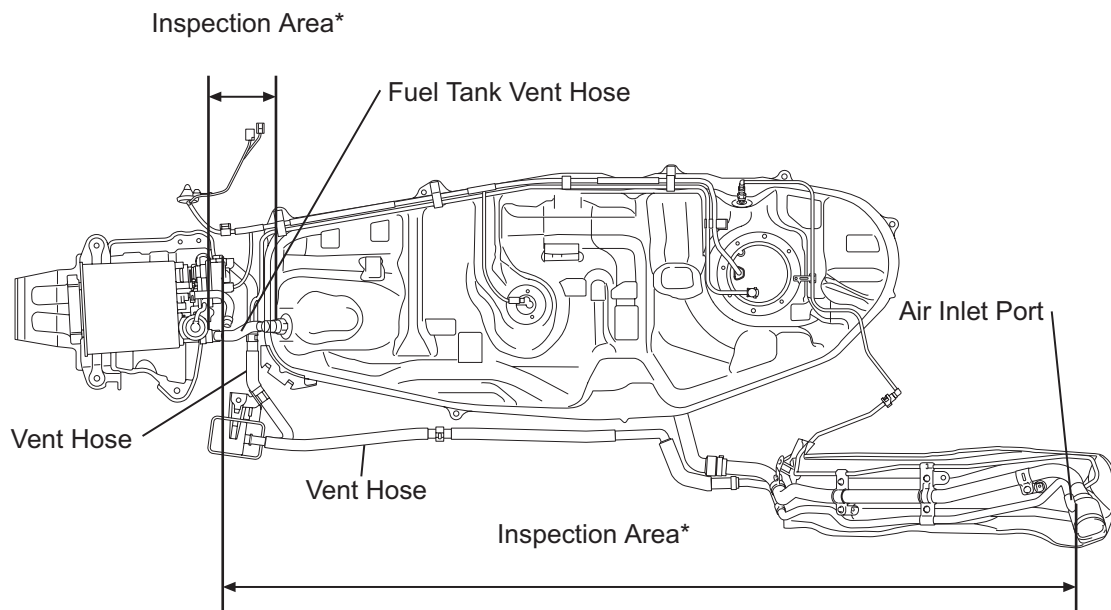
Disconnect the hose between the canister and the fuel tank from the canister. Block the canister side and conduct an inspection. In this way, the fuel tank can be excluded as an area suspected of causing fuel leaks.

NEXT**Go to step 36****ES****29****REPLACE CHARCOAL CANISTER ASSEMBLY**

- (a) Replace the canister assembly (see page [EC-10](#)).

NOTICE:

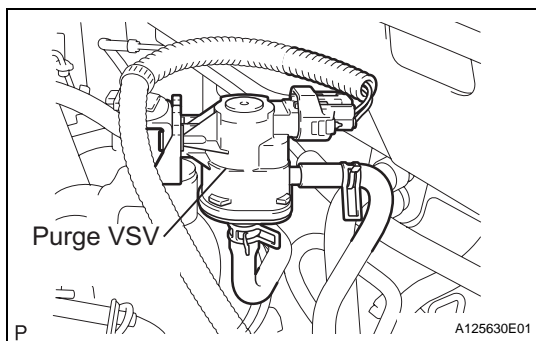
When replacing the canister, check the canister pump module interior and related pipes for water, fuel and other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the fuel tank vent hose.



*: Check for disconnection and/or cracks

NEXT

Go to step 36

30 REPLACE DUTY VACUUM SWITCHING VALVE (PURGE VSV)

- (a) Disconnect the connector and the hoses from the purge VSV.
- (b) Remove the purge VSV.
- (c) Install a new purge VSV.
- (d) Reconnect the connector and hoses.

NEXT

Go to step 36

31 REPAIR OR REPLACE HARNESS OR CONNECTOR

NEXT

Go to step 36

32 REPLACE EVAP HOSE (INTAKE MANIFOLD - PURGE VSV)

NEXT

Go to step 36

33 INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)

- (a) Check that the EVAP purge port of the intake manifold is not clogged. If necessary, replace the intake manifold.

NEXT

Go to step 36

34 REPLACE ECM

- (a) Replace the ECM (see page [ES-429](#)).

NEXT

Go to step 36

35 REPAIR OR REPLACE PARTS AND COMPONENTS INDICATED BY OUTPUT DTCS

- (a) Repair the malfunctioning areas indicated by the DTCS that had been confirmed when the vehicle was brought in.

NEXT

Go to step 36

36	PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)
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NOTICE:

- The **EVAP SYSTEM CHECK (AUTO OPERATION)** consists of 5 steps performed automatically by the intelligent tester. It takes a maximum of approximately 18 minutes.
 - Do not perform the **EVAP SYSTEM CHECK** when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
 - Do not run the engine in this step.
 - When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing an **EVAP SYSTEM CHECK**, keep the temperature below 35°C (95°F).
- (a) Clear DTCs (see page [ES-35](#)).
 - (b) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.
 - (c) After the SYSTEM CHECK is completed, check for pending DTCs by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

HINT:

If no pending DTCs are found, the repair has been successfully completed.

NEXT

COMPLETED

CONFIRMATION DRIVING PATTERN**HINT:**

After a repair, check Monitor Status by performing the Key-Off Monitor Confirmation and Purge Flow Monitor Confirmation described below.

1. KEY-OFF MONITOR CONFIRMATION**(a) Preconditions**

The monitor will not run unless:

- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway)
- The fuel tank is less than 90 % full
- The altitude is less than 8,000 ft (2,400 m)
- The Engine Coolant Temperature (ECT) is between 4.4°C and 35°C (40°F and 95°F)
- The Intake Air Temperature (IAT) is between 4.4°C and 35°C (40°F and 95°F)
- The vehicle remains stationary (the vehicle speed is 0 km/h [0 mph])

(b) Monitor Conditions

1. Allow the engine to idle for at least 5 minutes.
2. Turn the ignition switch OFF and wait for 6 hours (8 or 10.5 hours).

HINT:

Do not start the engine until checking MONITOR STATUS. If the engine is started, the steps described above must be repeated.

ES

- (c) Monitor Status
1. Connect the intelligent tester to the DLC3.
 2. Turn the ignition switch ON and turn the tester ON.
 3. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
 4. Check the Monitor Status displayed on the tester.

HINT:

If INCMP is displayed, the monitor is not complete. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

2. PURGE FLOW MONITOR CONFIRMATION (P0441)

HINT:

Perform this monitor confirmation after the Key-Off Monitor Confirmation shows COMPL (complete).

(a) Preconditions

The monitor will not run unless:

- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway)
- The ECT is between 4.4°C and 35°C (40°F and 95°F)
- The IAT is between 4.4°C and 35°C (40°F and 95°F)

(b) Monitor Conditions

1. Release the pressure from the fuel tank by removing and reinstalling the fuel cap.
2. Warm the engine up until the ECT reaches more than 75°C (167°F).
3. Increase the engine speed to 3,000 rpm once.
4. Allow the engine to idle and turn A/C ON for 1 minute.

(c) Monitor Status

1. Turn the ignition switch OFF (if ON or the engine is running).
2. Connect the intelligent tester to the DLC3.
3. Turn the ignition switch ON and turn the tester ON.
4. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
5. Check the Monitor Status displayed on the tester.

HINT:

If INCMP is displayed, the monitor is not complete. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page [ES-17](#)).