EVAP System

RELATED DTCS

DTCs	Monitoring Items	See Page
P043E	Reference orifice clogged (built into canister pump module)	ES-218
P043F	Reference orifice high-flow (built into canister pump module)	
P0441	• Purge VSV (Vacuum Switching Valve) stuck closed • Purge VSV stuck open • Purge flow	ES-223
P0450	Canister pressure sensor (built into canister pump module) voltage abnormal fluctuation	ES-230
P0451	• 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-239
P0456	EVAP small leak	
P2401	Leak detection pump stuck OFF (built into canister pump module)	ES-329
P2402	Leak detection pump stuck ON (built into canister pump module)	
P2419	Vent valve stuck closed (built into canister pump module)	ES-335
P2420	Vent valve stuck open (vent) (built into canister pump module)	
P2610	Soak timer (built into ECM)	ES-341

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

DTCs / Malfunctioning Areas	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)											●

Y

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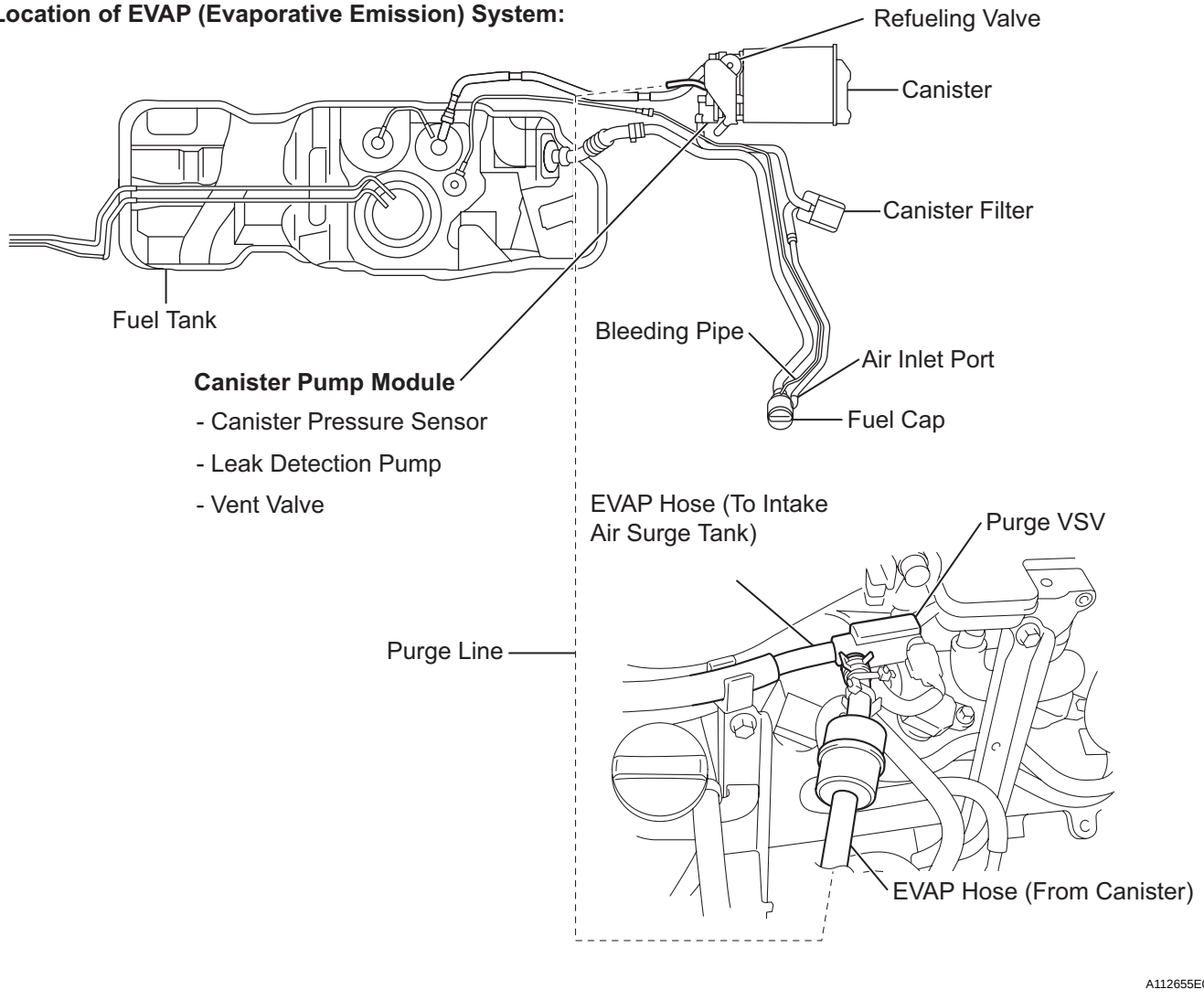
NOTICE:
If the reference pressure difference between the first and second checks is greater than the specification, all the DTCs relating to the reference pressure (P043E, P043F, P2401, P2402 and P2419) are stored.

DESCRIPTION

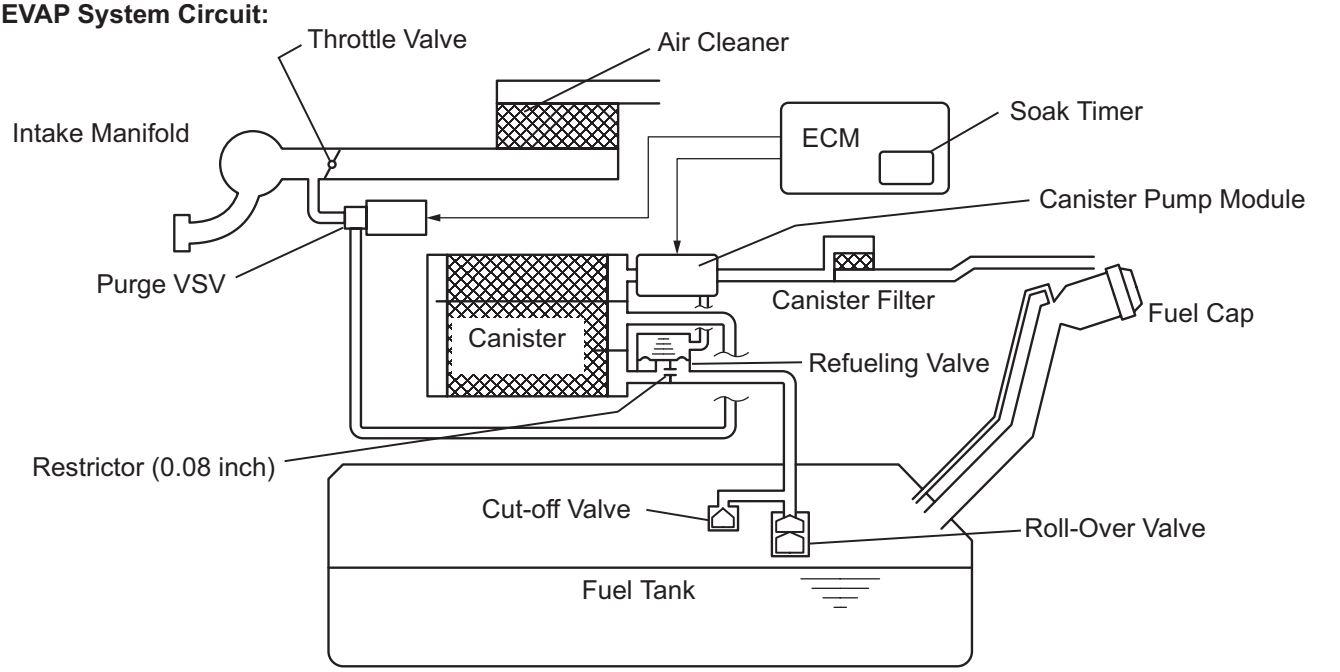
Location of EVAP (Evaporative Emission) System:



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

ES

EVAP System Circuit:



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 atmosphere 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 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. More than 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

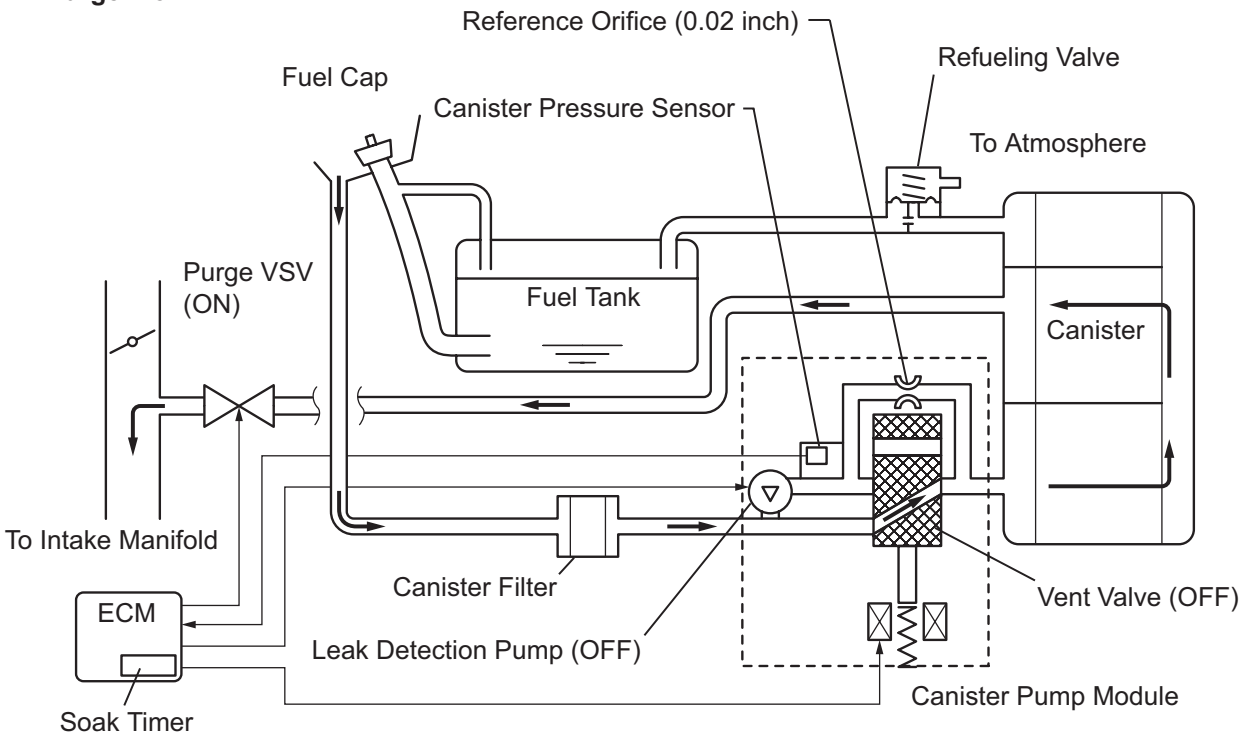
The purge flow monitor consists of the two monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- 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.

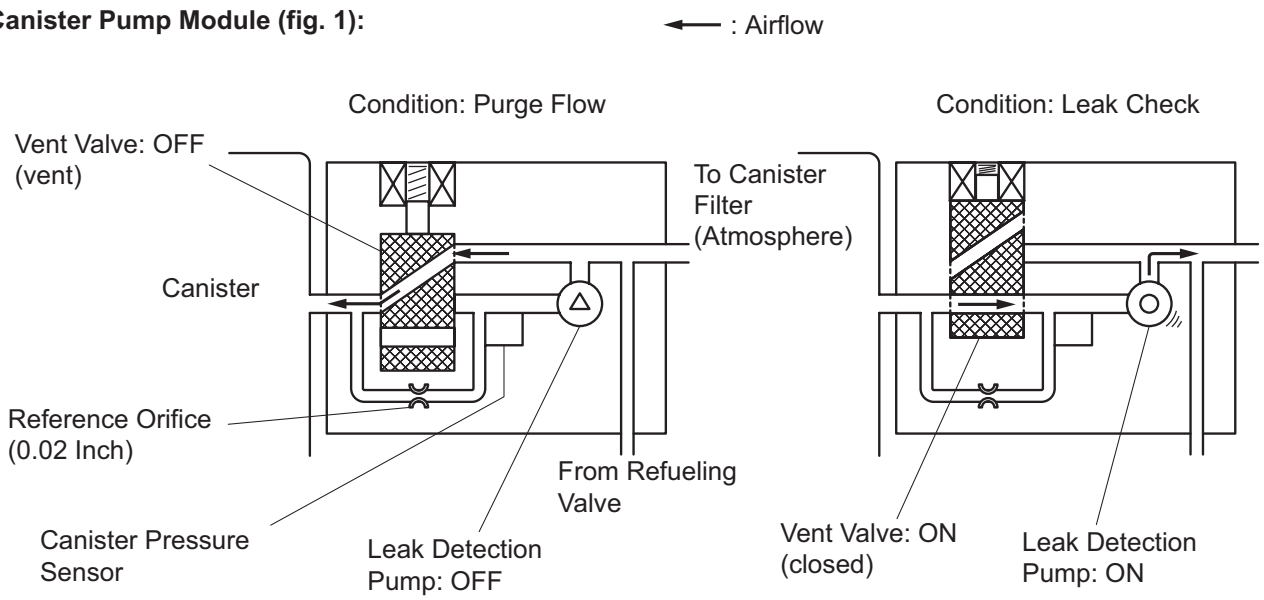
EVAP Purge Flow:



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 closes 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 minutes) 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):



Y

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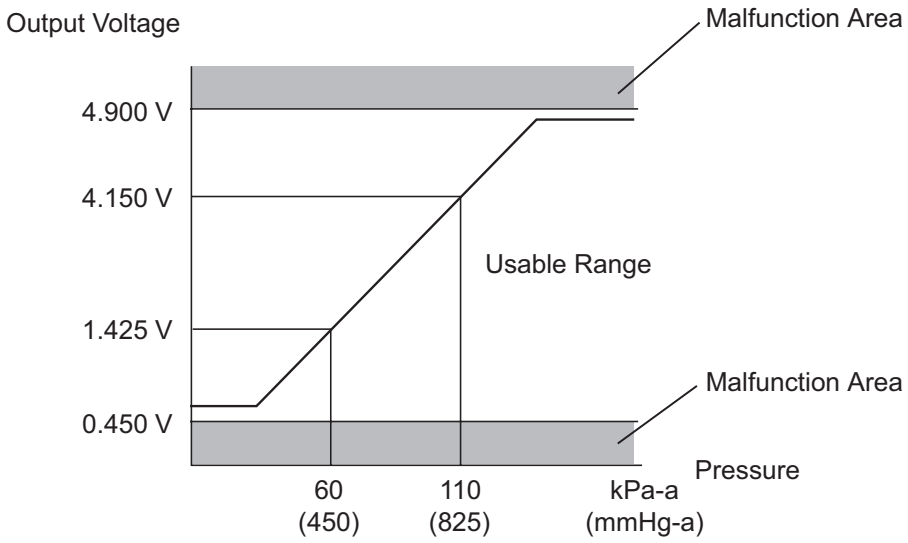
Canister Pressure Sensor Specification (fig. 2):



HINT:

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

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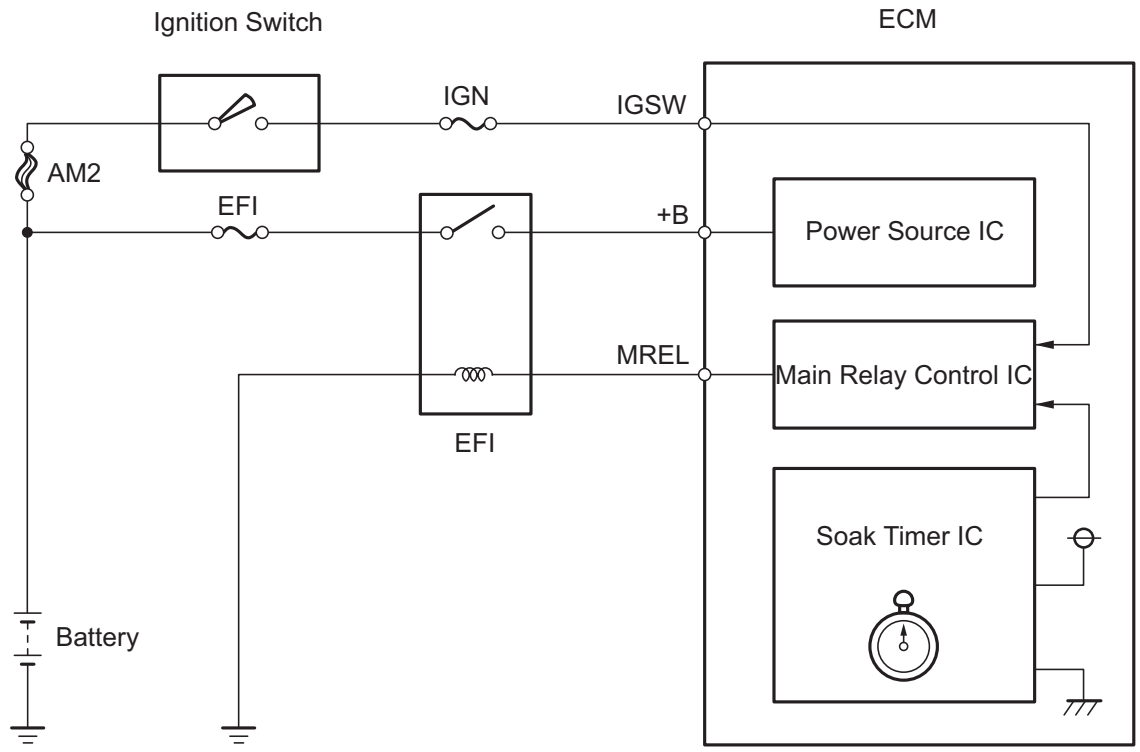
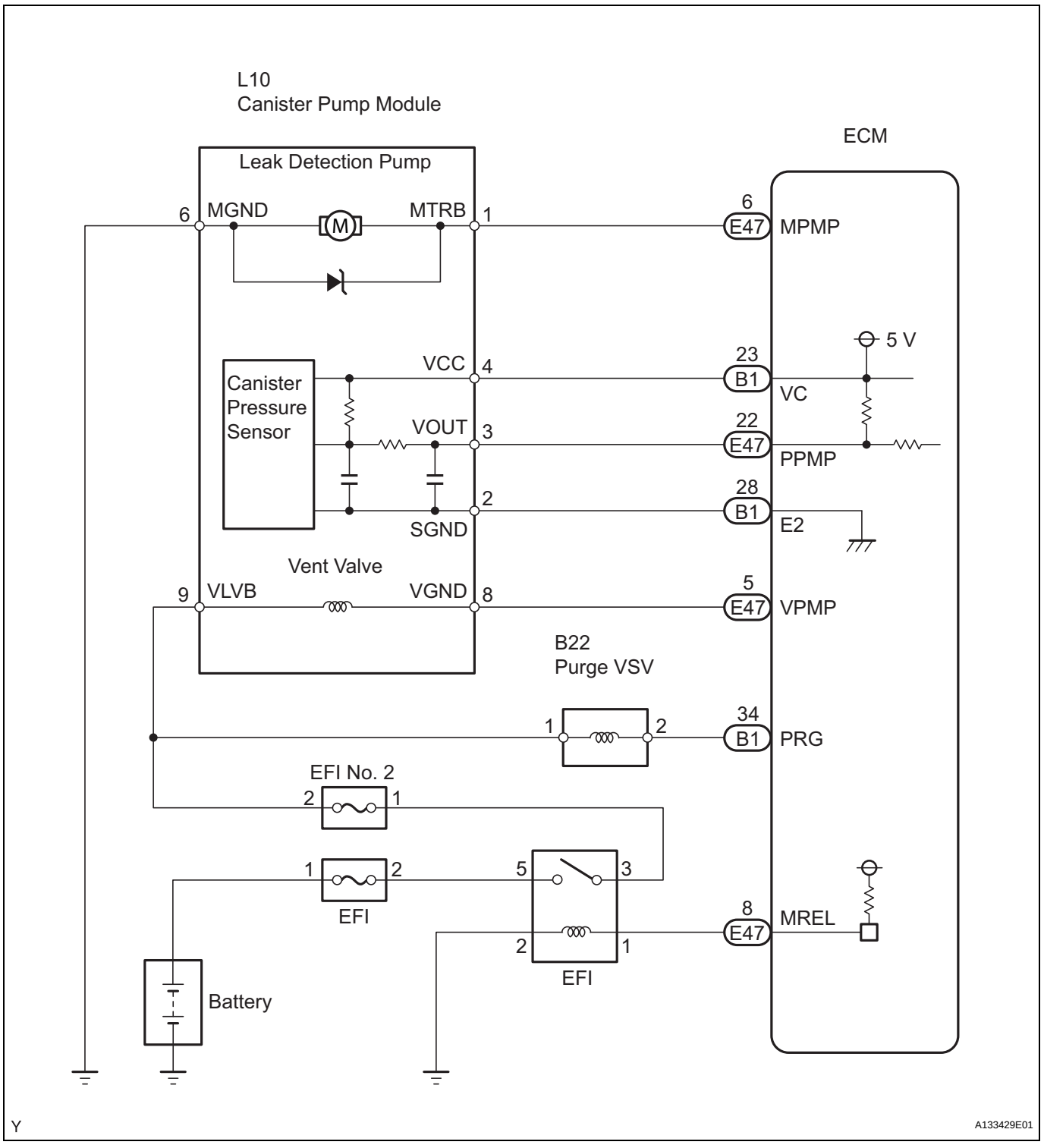
Soak Timer Circuit:



ES

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

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

HINT:

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

- 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	CONFIRM DTC

(a) Turn the ignition switch OFF and wait for 10 seconds.
(b) Turn the ignition switch ON.
(c) Turn the ignition switch OFF and wait for 10 seconds.
(d) Connect an intelligent tester to the DLC3.
(e) Turn the ignition switch ON and turn the tester ON.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Confirm DTCs and freeze frame data.
If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

ES

DTCs / Malfunctioning Areas	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)											●

Y

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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.

NEXT

2	PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)

NOTICE:

- **The EVAP SYSTEM CHECK (AUTO OPERATION) consists of five 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).**

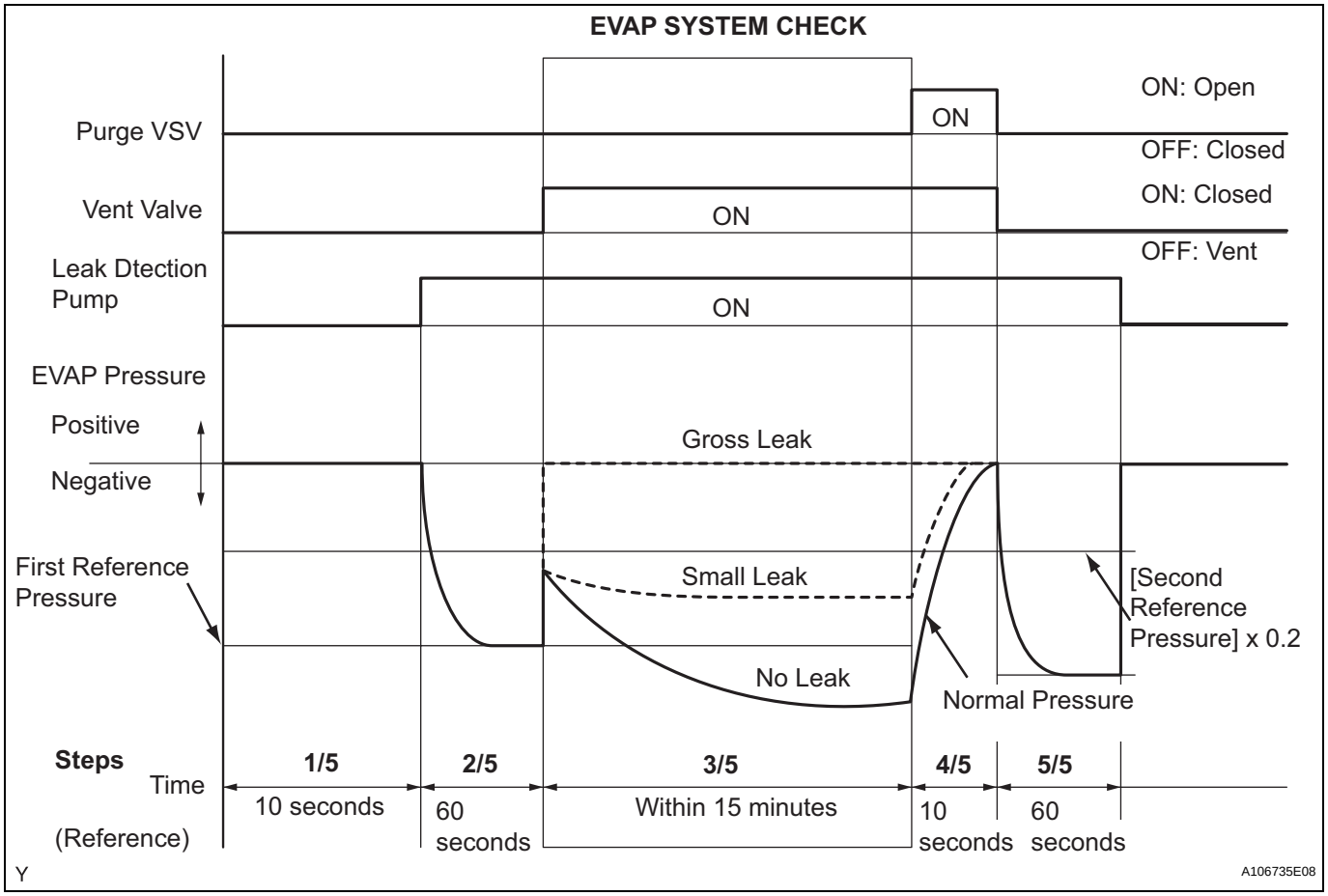
(a) Clear DTCs (See page ES-38).

(b) 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.

NEXT

3	PERFORM EVAP SYSTEM CHECK (MANUAL OPERATION)



NOTICE:

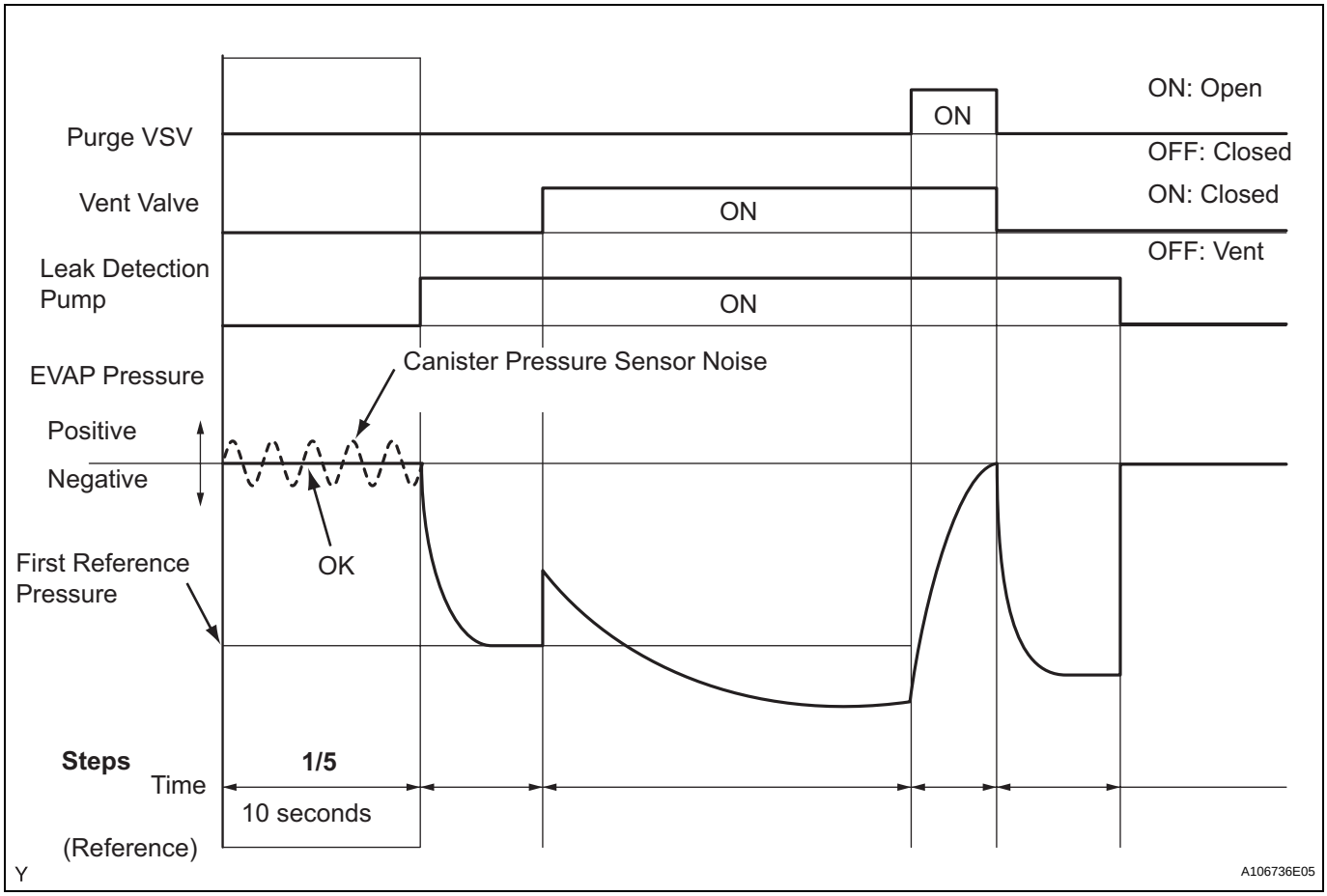
- **In the EVAP SYSTEM CHECK (MANUAL OPERATION), perform the series of 5 EVAP SYSTEM CHECK steps manually using the intelligent tester.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90 % full because the cut-off valve may be closed, making the fuel tank leak check unavailable.**
- **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-38).

(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)



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

Result

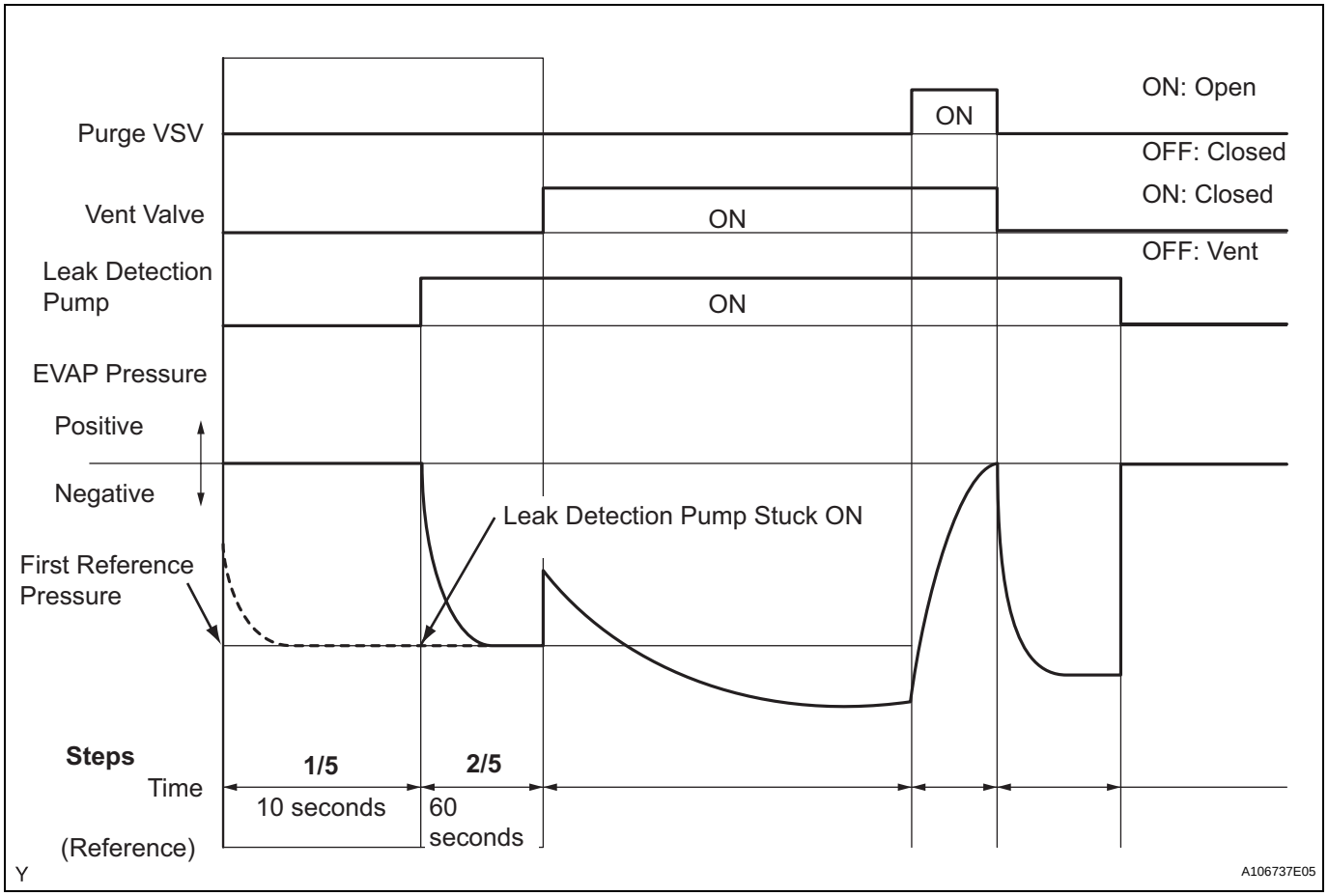
DTCs*	Test Results	Suspected Trouble Areas	Proceed To
-	Virtually no variation in EVAP pressure	Not yet determined	A
P0451	EVAP pressure fluctuates by +-0.3 kPa-g (2.25 mmHg-g) or more	Canister pressure sensor noise	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.

B → Go to step 30

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

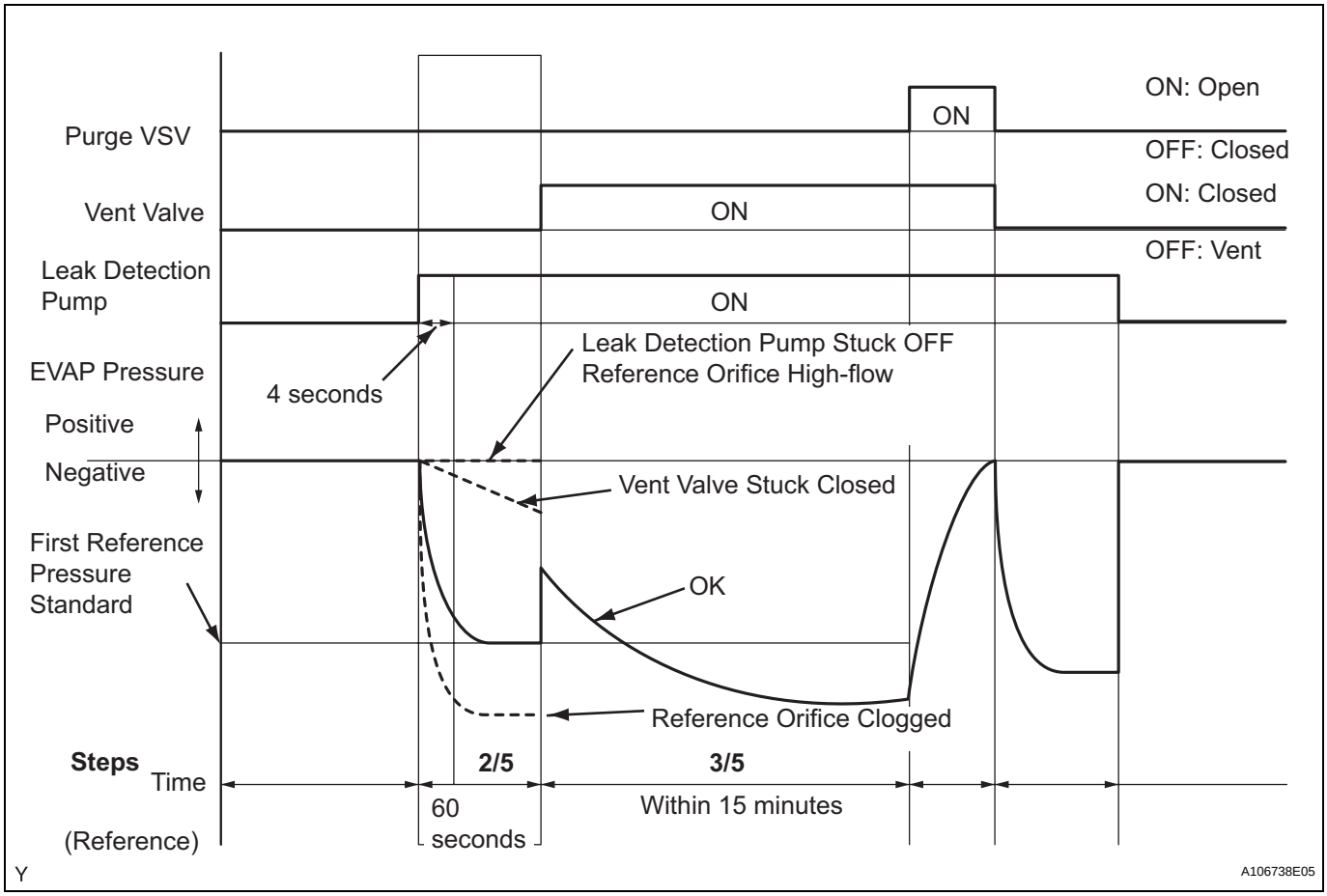
DTCs*	Test Results	Suspected Trouble Areas	Proceed To
-	Virtually no variation in EVAP pressure during step 1/5. Then decreases to reference pressure	Not yet determined	A
P2402	Small difference between EVAP pressures during steps 1/5 and 2/5	Leak detection pump stuck ON	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.
HINT:
The first reference pressure is the value determined in step 2/5.

B → Go to step 23

A

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

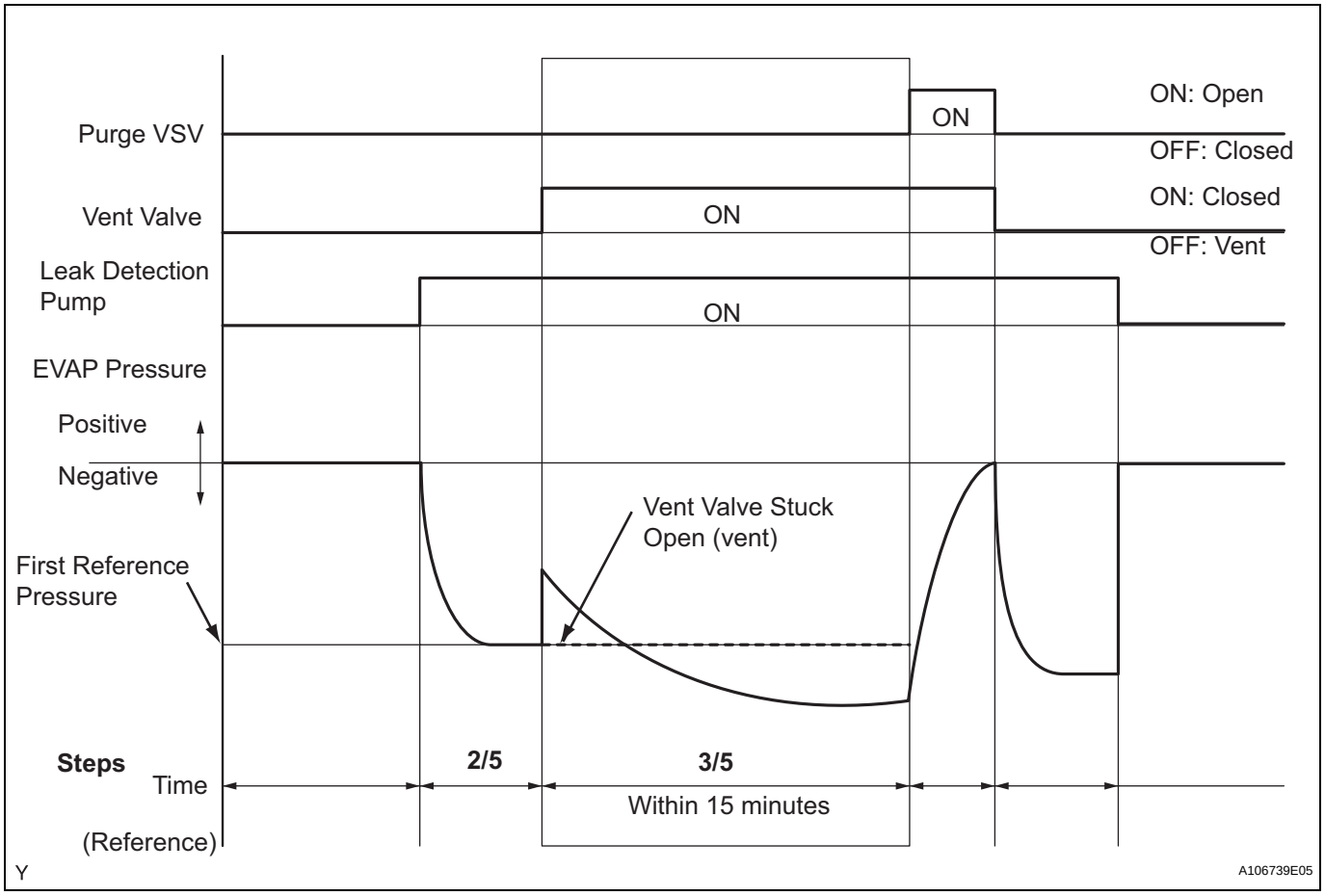
DTCs*	Test Results	Suspected Trouble Areas	Proceed To
-	EVAP pressure in step (b) between -4.85 kPa-g and -1.057 kPa-g (-36.4 mmHg-g and -7.93 mmHg-g)	Not yet determined	A
P043F and P2401	EVAP pressure in step (b) -1.057 kPa-g (-7.93 mmHg-g) or more	• Reference orifice high-flow • Leak detection pump 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 step 1.

B	Go to step 11
C	Go to step 30
D	Go to step 19

A

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

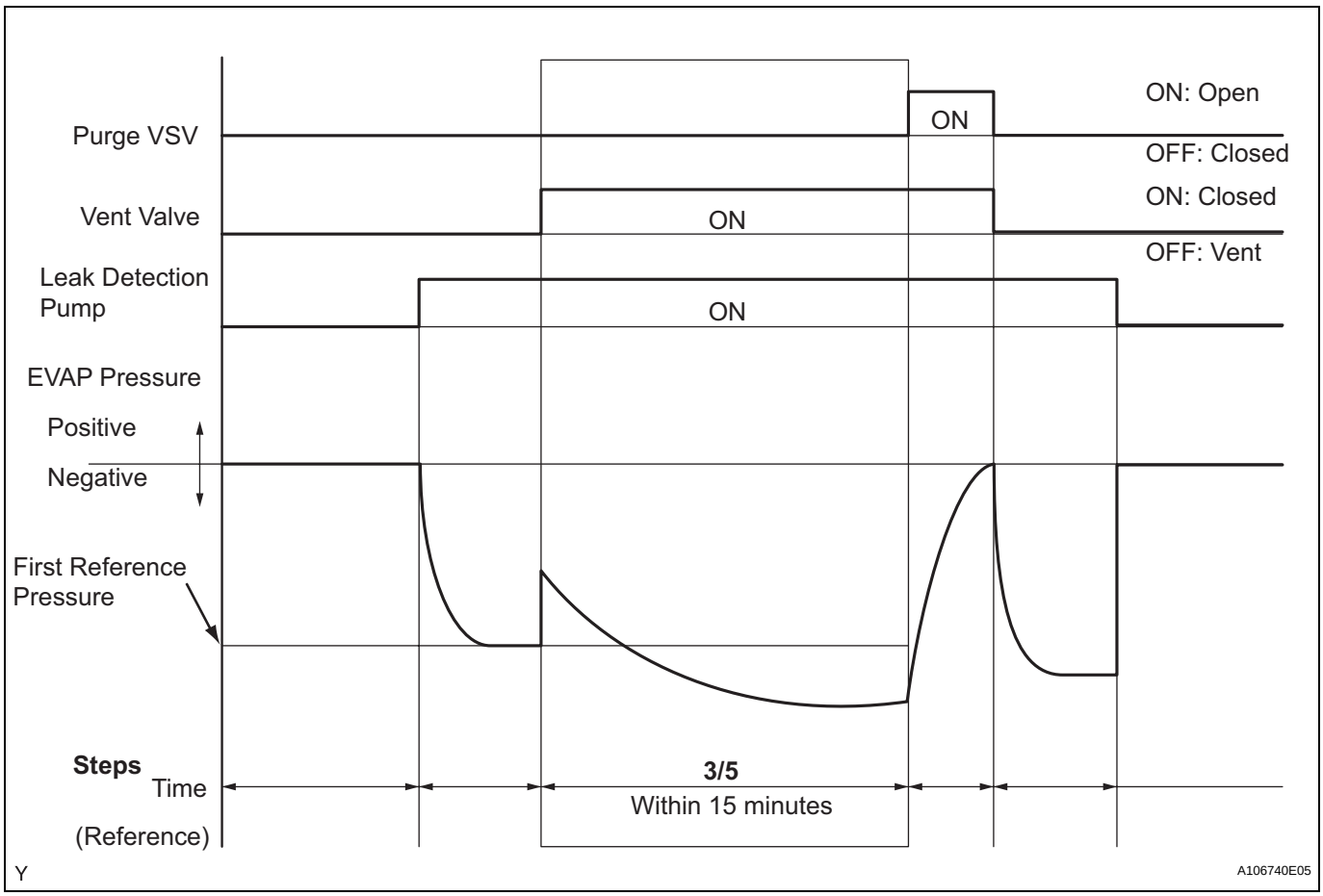
*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.

B	Go to step 20

C → Go to step 30

A

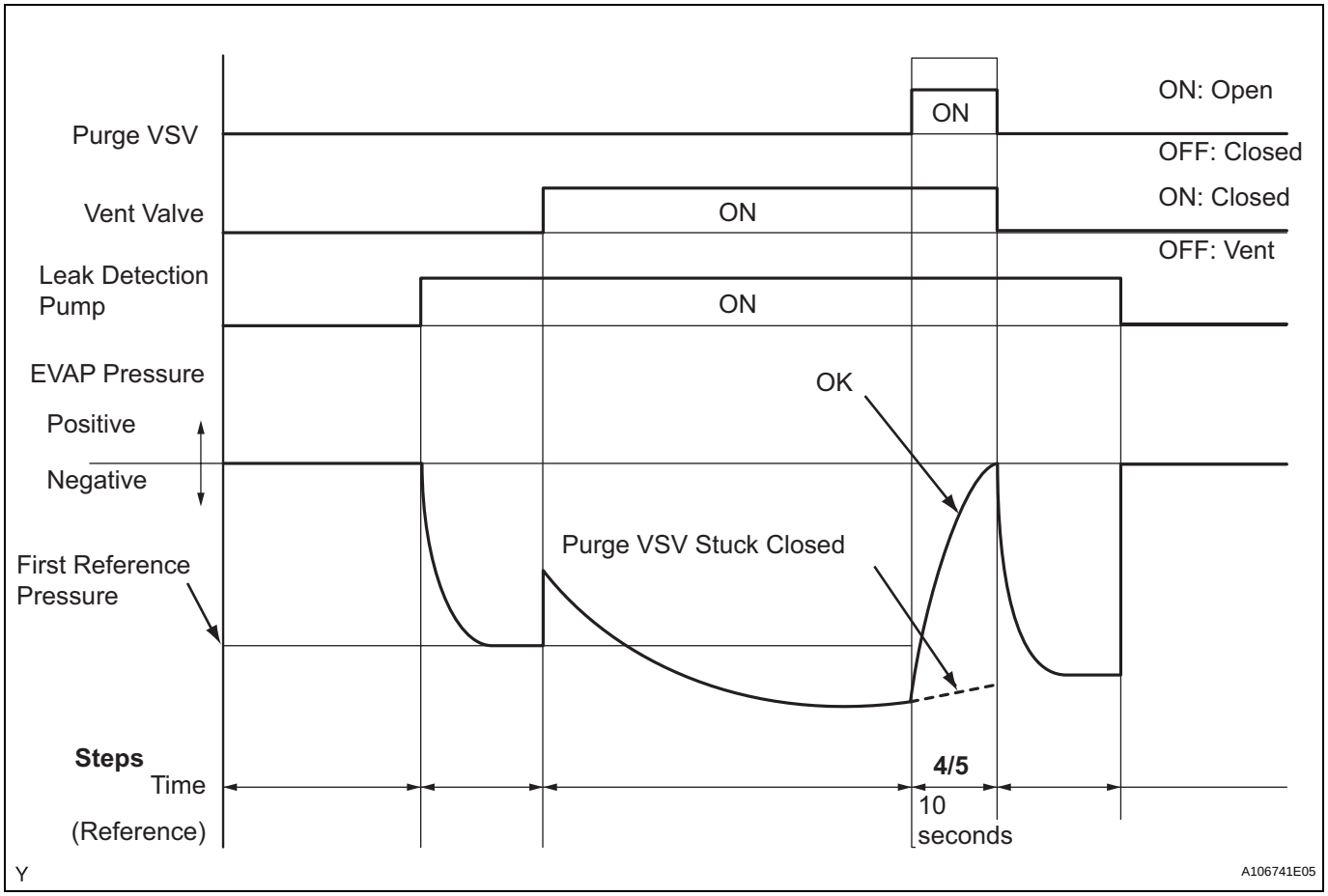
8	PERFORM EVAP SYSTEM CHECK (STEP 3/5)



(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

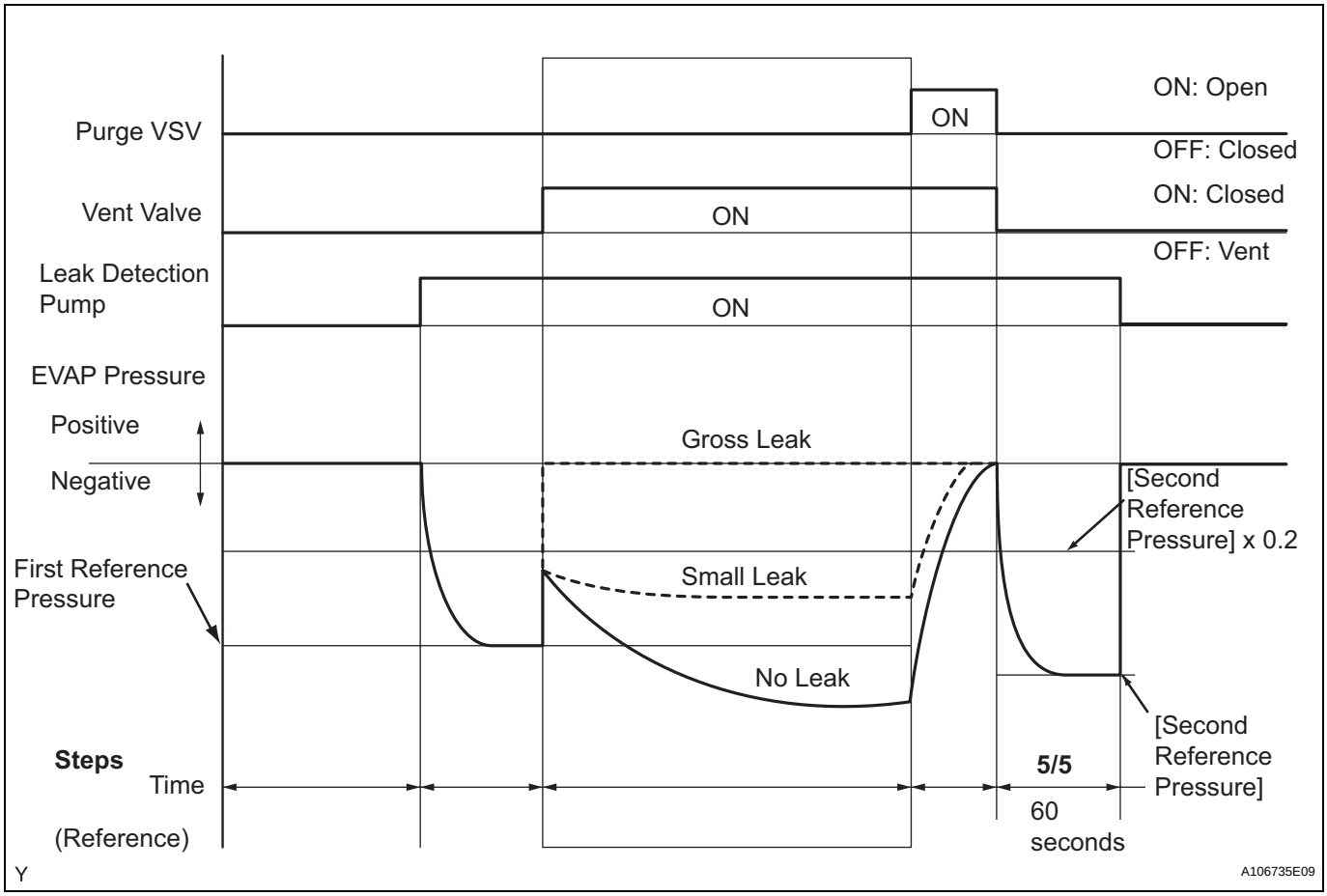
*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in step 1.

B → Go to step 15

C → Go to step 12

A

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).

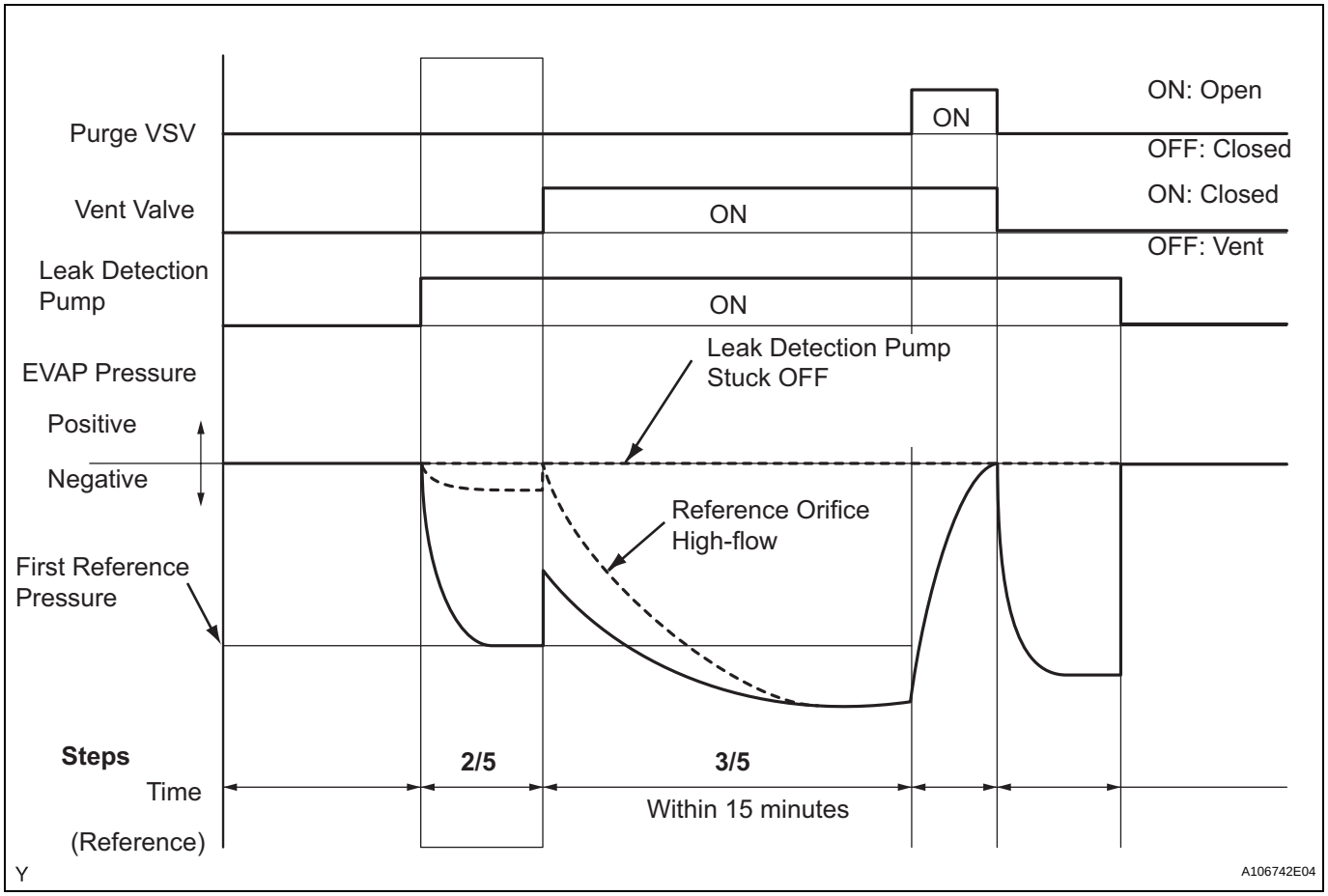
Result

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]	• 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 step 1.

A	Go to step 36
B	Go to step 12

11	PERFORM EVAP SYSTEM CHECK (STEP 3/5)



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

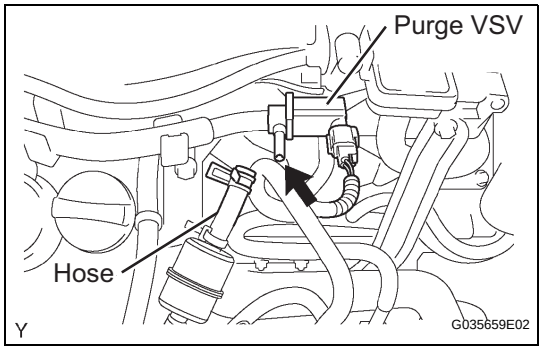
Result

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 step 1.
HINT:
The first reference pressure is the value determined in step 2/5.

A	Go to step 30
B	Go to step 23

12	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (PURGE VSV)



(a) Select the following menu items: DIAGNOSIS / ENHANCED OBD II/ ACTIVE TEST / EVAP VSV.
(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.

ES

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	• Purge VSV stuck closed • Problems with EVAP hose between purge VSV and intake air surge tank	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) Confirm that the fuel cap is tightened 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 adaptor.
(2) Connect an EVAP tester pump hose to the adaptor, and pressurize the cap to 3.2 to 3.7 kPa (24 to 28 mmHg) using an EVAP tester pump.
(3) Seal the adaptor 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

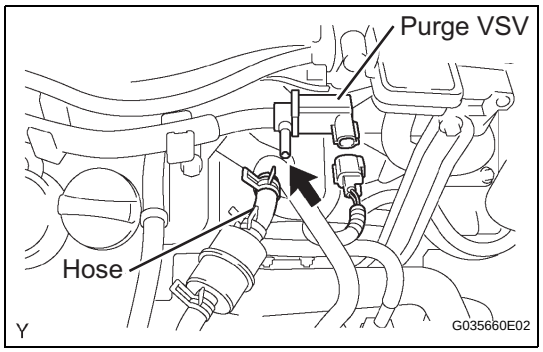
Test Results	Suspected Trouble Areas	Proceed To
Fuel cap loose	• Fuel cap improperly installed • Defective fuel cap • Fuel cap does not meet OEM specifications	B
No fuel cap	-	C

(5) Reinstall the fuel cap.

A	Go to step 29
B	Go to step 27
C	Go to step 28

ES

14 INSPECT VACUUM SWITCHING VALVE ASSEMBLY NO. 1 (PURGE VSV)



(a) Turn the ignition switch OFF.
(b) Disconnect the B22 purge VSV connector.
(c) Disconnect the hose (connected to the canister) from the purge VSV.
(d) Start the engine.
(e) Use your finger to confirm that the purge VSV has no suction.

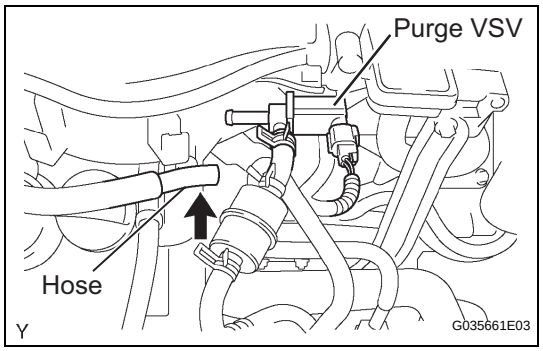
Result

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

(f) Reconnect the purge VSV connector.
(g) Reconnect the hose.

A	Go to step 35
B	Go to step 31

15 CHECK EVAP HOSE (PURGE VSV - INTAKE AIR SURGE TANK)



(a) Disconnect the hose (connected to the intake air surge tank) from the purge VSV.
(b) Start the engine.
(c) 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 air surge tank normal	A
No suction	• Intake air surge tank • EVAP hose between purge VSV and intake air surge tank	B

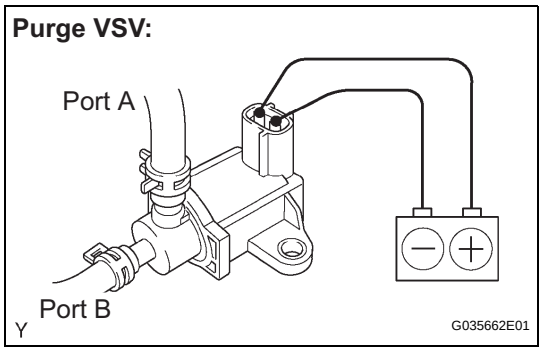
(d) Reconnect the hose.

B → Go to step 26

A

ES

16 INSPECT VACUUM SWITCHING VALVE ASSEMBLY NO. 1 (PURGE VSV)



(a) Remove the purge VSV.
(b) Apply the battery voltage to the terminals of the purge VSV.
(c) Using an air gun, confirm that air flows from port A to port B.

Result

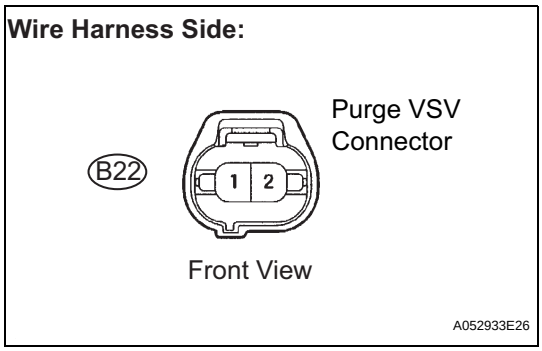
Test Results	Suspected Trouble Areas	Proceed To
Air flows	Purge VSV normal	A
No air flow	Purge VSV	B

(d) Reinstall the purge VSV.

B → Go to step 31

A

17 CHECK HARNESS AND CONNECTOR (POWER SOURCE OF PURGE VSV)



(a) Disconnect the B22 purge VSV connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between terminal 1 of the purge VSV connector and the body ground.

Result

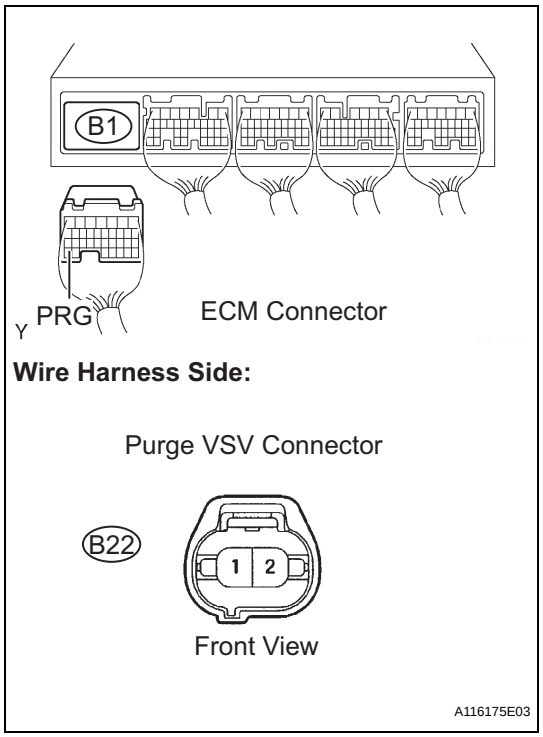
Test Results	Suspected Trouble Areas	Proceed To
11 to 14 V	Normal	A
Other than result above	Wire harness or connectors between purge VSV and ECM	B

(d) Reconnect the purge VSV connector.

B → Go to step 32

A

18 CHECK HARNESS AND CONNECTOR (PURGE VSV - ECM)



(a) Disconnect the B1 ECM connector and the B22 purge VSV connector.
(b) Check the resistance.

Standard Resistance

Tester Connections	Specified Conditions
PRG (B1-34) - Purge VSV (B22-2)	Below 1 Ω
PRG (B1-34) - Body ground	10 kΩ or higher
Purge VSV (B22-2) - Body ground	10 kΩ or higher

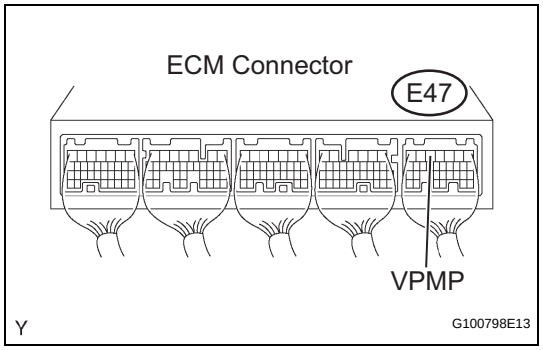
(c) Reconnect the purge VSV connector.
(d) Reconnect the ECM connector.

OK → Go to step 35

NG → Go to step 32

ES

19 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (FOR VENT VALVE)



(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VENT VALVE.
(d) Measure the voltage between terminal VPMP of the ECM connector and the body ground when the vent valve is turned ON (close) and OFF (vent) using the tester.

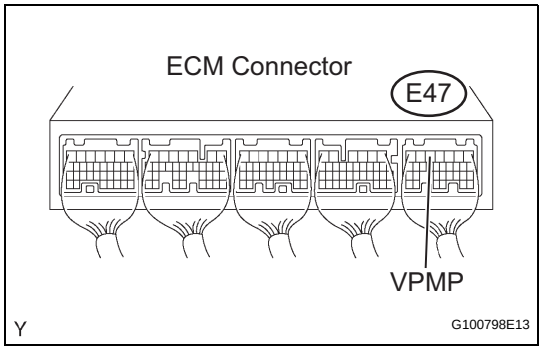
Result

Test Results	Suspected Trouble Areas	Proceed To
11 to 14 V when OFF Below 3 V when ON	Vent valve	A
Below 3 V when OFF and ON	ECM	B

A → Go to step 22

B → Go to step 35

20	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (FOR VENT VALVE)



(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VENT VALVE.
(d) Measure the voltage between terminal VPMP of the ECM connector and the body ground when the vent valve is turned ON (close) and OFF (vent) using the tester.

ES

Result

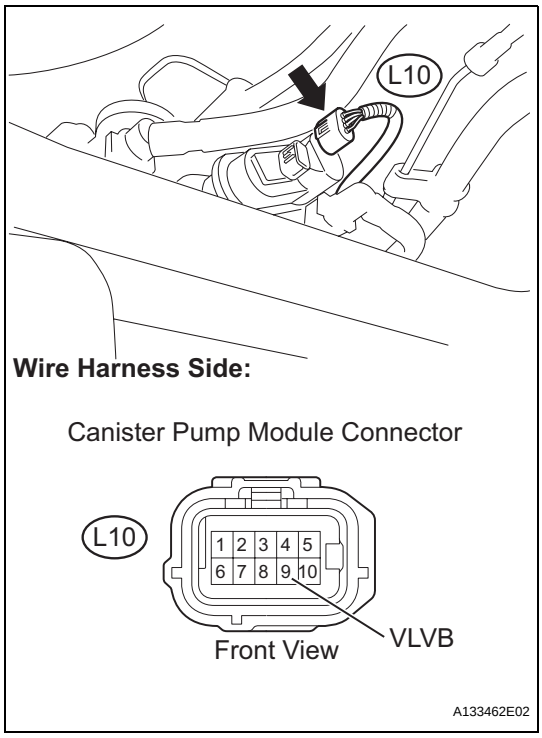
Test Results	Suspected Trouble Areas	Proceed To
Below 3 V when OFF and ON	Power source of vent valve	A
11 to 14 V when OFF Below 3 V when ON	Vent valve	B
11 to 14 V when OFF and ON	ECM	C

B → Go to step 22

C → Go to step 35

A

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



(a) Turn the ignition switch OFF.
(b) Disconnect the L10 canister connector.
(c) Turn the ignition switch ON.
(d) Measure the voltage between VLVB terminal of the canister pump module connector and the body ground.

Result

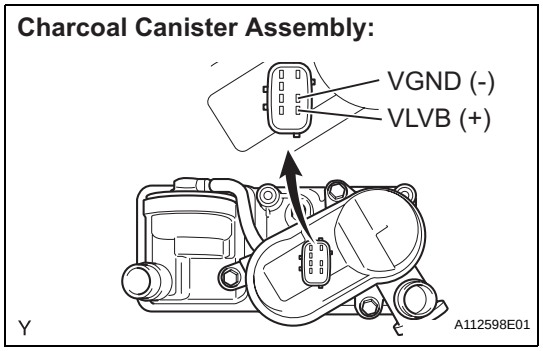
Test Results	Suspected Trouble Areas	Proceed To
11 to 14 V	Normal	A
Below 3 V	Power source wire harness of vent valve	B

(e) Reconnect the canister pump module connector.

B → **Go to step 32**

A

22 INSPECT CANISTER PUMP MODULE (VENT VALVE OPERATION)



(a) Turn the ignition switch OFF.
(b) Disconnect the L10 canister pump module connector.
(c) Apply the battery voltage to VLVB and VGND terminals of the canister pump module.
(d) Touch the canister pump module to confirm the vent valve operation.

Result

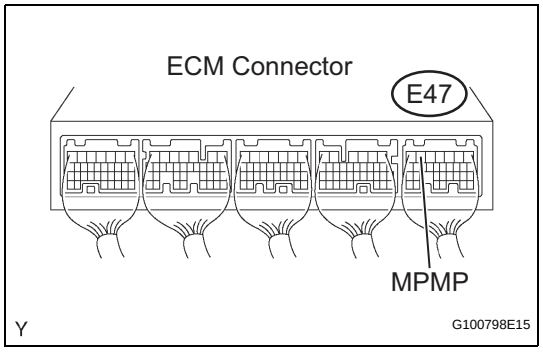
Test Results	Suspected Trouble Areas	Proceed To
Operating	Wire harness between vent valve and ECM	A
Not operating	Vent valve	B

(e) Reconnect the canister pump module connector.

A → **Go to step 32**

B → **Go to step 30**

23 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (FOR LEAK DETECTION PUMP)



(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP.
(d) Measure the voltage between terminal MPMP of the ECM connector and the body ground when the leak detection pump is turned ON and OFF using the tester.

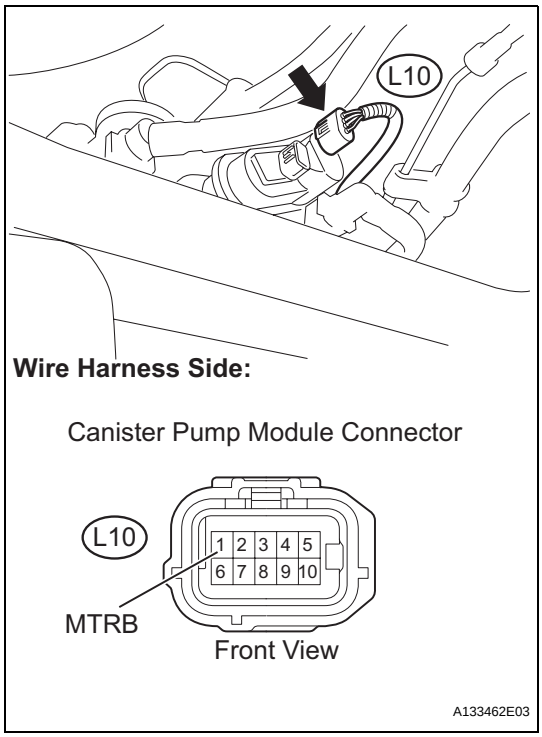
Result

Test Results	Suspected Trouble Areas	Proceed To
Below 3 V when OFF 11 to 14 V when ON	ECM normal	A
11 to 14 V when OFF Below 3 V when ON	ECM	B

B → Go to step 35

A

24	CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)



(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch OFF.
(c) Disconnect the L10 canister pump module connector.
(d) Turn the ignition switch ON and turn the tester ON.
(e) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP.
(f) Turn the leak detection pump ON.
(g) Measure the voltage between MTRB terminal of the canister pump module connector and the body ground.

Result

Test Results	Suspected Trouble Areas	Proceed To
11 to 14 V	Normal	A
Below 3 V	Wire harness between ECM and leak detection pump	B

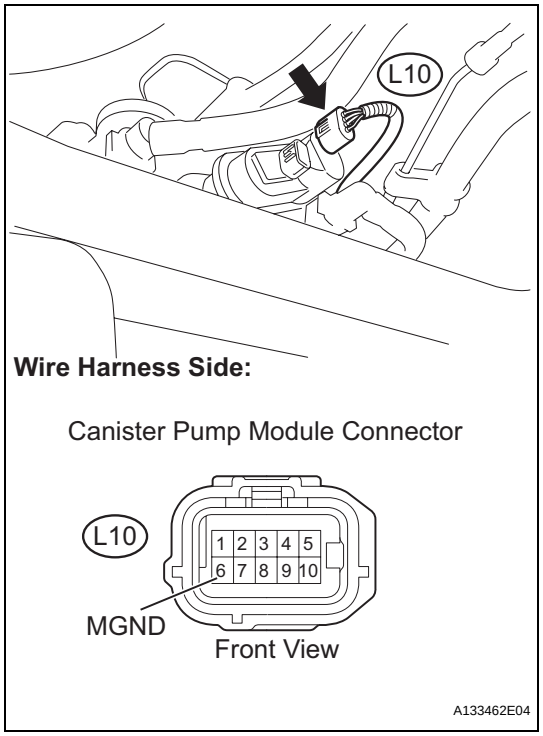
(h) Reconnect the canister pump module connector.

B → Go to step 32

A

ES

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



(a) Disconnect the L10 canister pump module connector.
(b) Turn the ignition switch OFF.
(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 kΩ or more	Wire harness between leak detection pump and body ground	B

(d) Reconnect the canister pump module connector.

A	Go to step 30
B	Go to step 32

26 INSPECT INTAKE AIR SURGE TANK (EVAP PURGE PORT)

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

Result

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

(e) Reconnect the EVAP hose.

A	Go to step 33

B	Go to step 34

27	CORRECTLY REINSTALL OR REPLACE FUEL CAP ASSEMBLY

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.

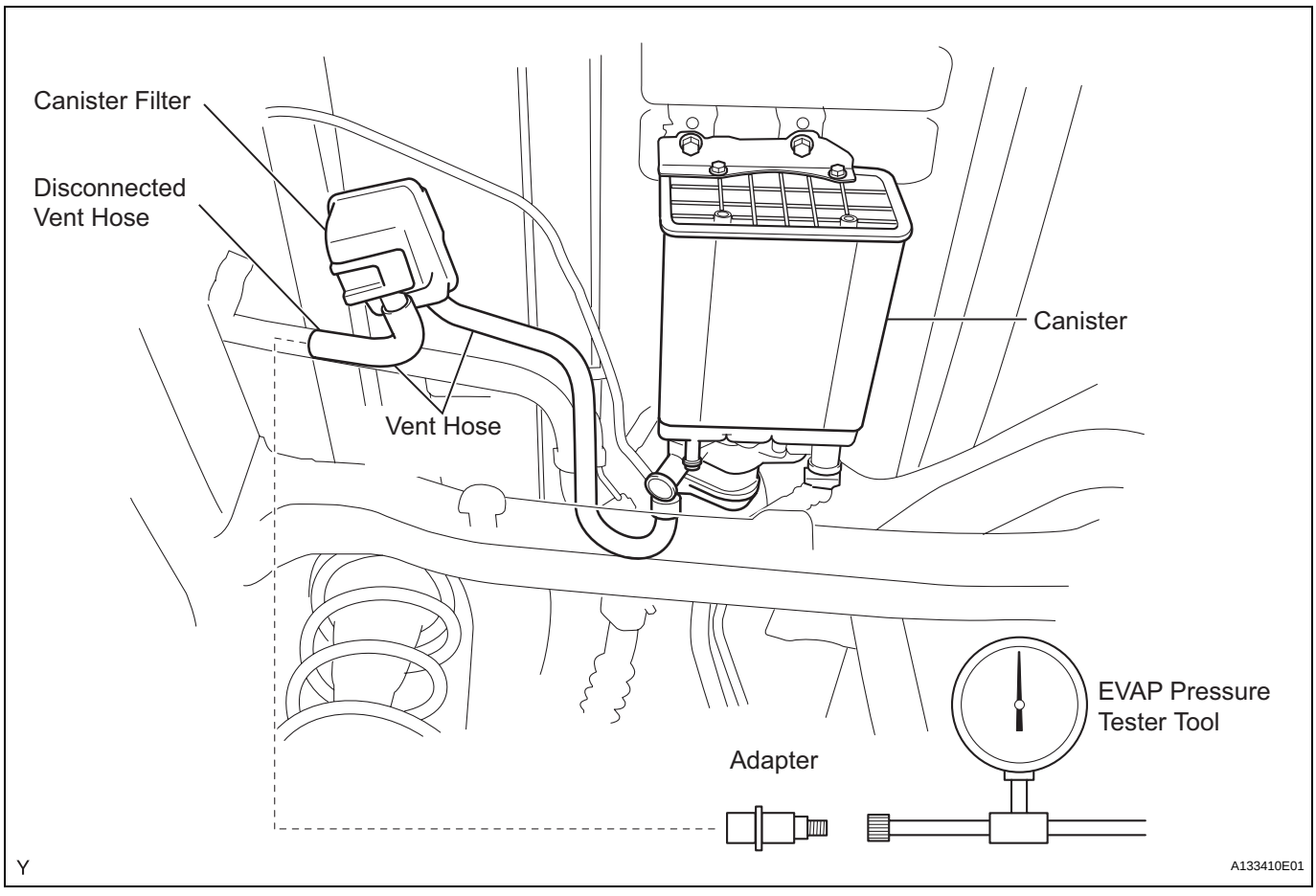
NEXT	Go to step 37

28	REPLACE FUEL CAP ASSEMBLY

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

NEXT	Go to step 37

29	LOCATE EVAP LEAK PART



(a) Disconnect the vent hose.

(b) Connect the EVAP pressure tester tool to the canister 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.

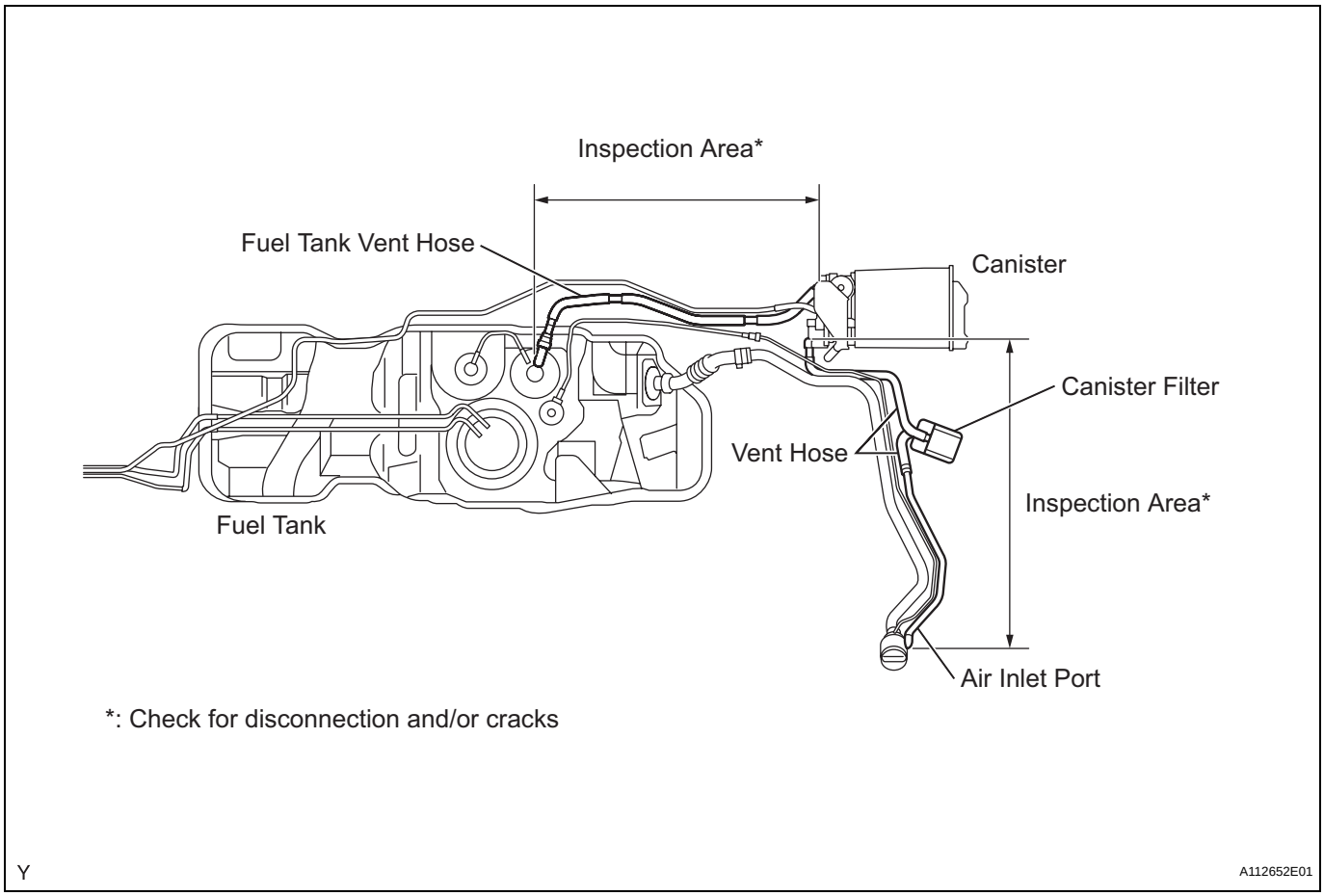
HINT:
Disconnect the hose between the canister and the fuel tank from the canister. Block the canister side and conduct an inspection. In this way, the fuel tank can be excluded as an area suspected of causing fuel leaks.

ES

NEXT	Go to step 37

30	REPLACE CANISTER ASSEMBLY

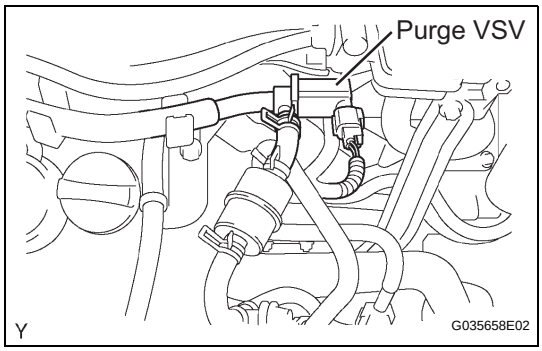
(a) Replace the canister assembly (See page EC-9).



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.

NEXT → **Go to step 37**

31	REPLACE VACUUM SWITCHING VALVE ASSEMBLY NO. 1 (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 37**

32	REPAIR OR REPLACE HARNESS OR CONNECTOR

NEXT → **Go to step 37**

33	REPLACE EVAP HOSE (INTAKE AIR SURGE TANK - PURGE VSV)

NEXT → **Go to step 37**

34	INSPECT INTAKE AIR SURGE TANK

(a) Check that the EVAP purge port of the intake air surge tank is not clogged. If necessary, replace the intake air surge tank.

NEXT → **Go to step 37**

35	REPLACE ECM

(a) Replace the ECM (See page ES-446).

NEXT → **Go to step 37**

36	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 37

37	PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)

NOTICE:

- **The EVAP SYSTEM CHECK (AUTO OPERATION) consists of five 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 an EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear DTCs (See page ES-38).

(b) 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 the 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 free way)
- 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 mph [0 km/h])

(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.

(c) Monitor Status
1. Connect an 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 completed. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

ES

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 free way)
- 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 (where ON or the engine is running).
2. Connect an 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 completed. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-20).
The test value and test limit information are described in the following table. This information is included under MONITOR RESULT in the emissions-related DTC sections:
- MID (Monitor Identification Data) is assigned to each emissions-related component.
- TID (Test Identification Data) is assigned to each test value.
- Scaling is used to calculate the test value indicated on generic OBD II scan tools.

EVAP - Key-off Type

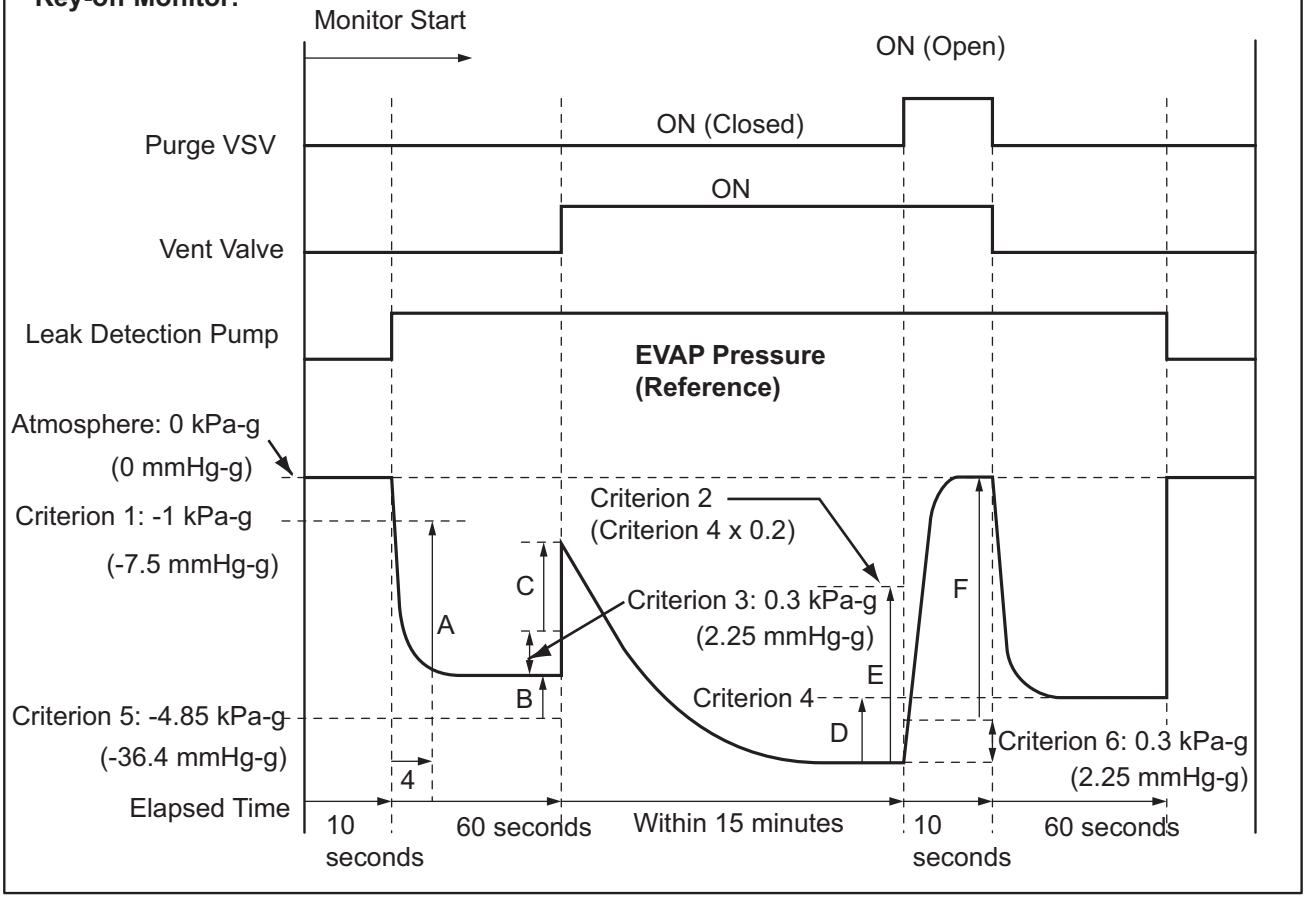
MID	TID	Scaling	Unit	Description
$3D	$C9	Multiply by 0.001	kPa	Test value for small leak (P0456) Refer to pressure D*
$3D	$CA	Multiply by 0.001	kPa	Test value for gross leak (P0455) Refer to pressure E*
$3D	$CB	Multiply by 0.001	kPa	Test value for leak detection pump stuck OFF (P2401) Refer to pressure A*

MID	TID	Scaling	Unit	Description
$3D	$CD	Multiply by 0.001	kPa	Test value for leak detection pump stuck ON (P2402) Refer to pressure A*
$3D	$CE	Multiply by 0.001	kPa	Test value for vent valve stuck OFF (vent) (P2420) Refer to pressure C*
$3D	$CF	Multiply by 0.001	kPa	Test value for vent valve stuck ON (P2419) Refer to pressure A*
$3D	$D0	Multiply by 0.001	kPa	Test value for reference orifice low flow (P043E) Refer to pressure B*
$3D	$D1	Multiply by 0.001	kPa	Test value for reference orifice high flow (P043F) Refer to pressure A*
$3D	$D4	Multiply by 0.001	kPa	Test value for purge VSV stuck closed (P0441) Refer to pressure F*
$3D	$D5	Multiply by 0.001	kPa	Test value for purge VSV stuck open (P0441) Refer to pressure E*
$3D	$D7	Multiply by 0.001	kPa	Test value for purge flow insufficient (P0441) Refer to pressure G*

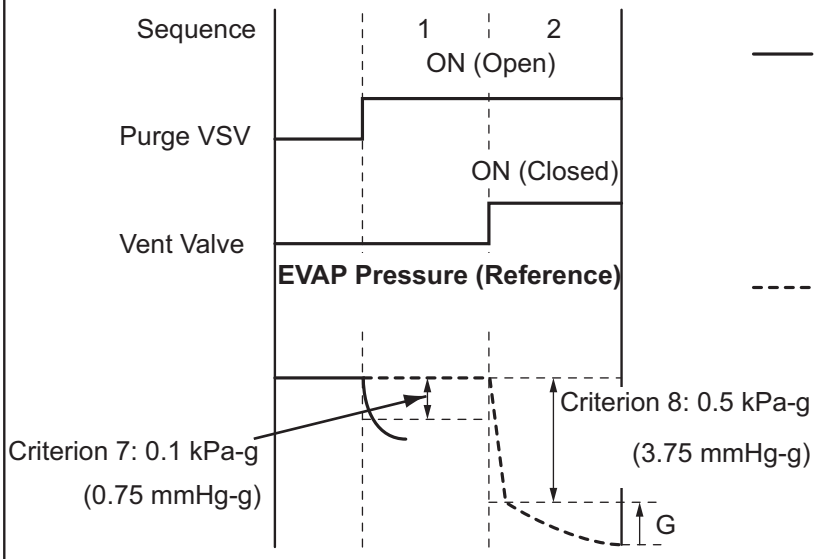
* Pressures A to G are indicated in the diagram below.

ES

Key-off Monitor:



Purge Flow Monitor:



——— If pressure change in sequence 1 is greater than criterion 7, purge flow monitor is completed (functioning normally).

- - - - If pressure change in sequence 1 is smaller than criterion 7 and pressure change in sequence 2 is smaller than criterion 8, purge flow is insufficient.

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