

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction
DTC	P0451	Evaporative Emission Control System Pressure Sensor Range / Performance
DTC	P0452	Evaporative Emission Control System Pressure Sensor / Switch Low Input
DTC	P0453	Evaporative Emission Control System Pressure Sensor / Switch High Input

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DTC SUMMARY

DTC No.	Monitoring Items	Malfunction Detection Conditions	Trouble Area	Detection Timing	Detection logic
P0450	Canister pressure sensor voltage abnormal fluctuation	Sensor output voltage rapidly fluctuates beyond upper and lower malfunction thresholds for 0.5 seconds.	<ul style="list-style-type: none"> Canister pump module ECM 	<ul style="list-style-type: none"> EVAP monitoring (power switch OFF) Power switch ON (IG) 	1 trip
P0451	Canister pressure sensor noisy	Sensor output voltage fluctuates frequently in certain time period.	<ul style="list-style-type: none"> Canister pump module EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) ECM 	<ul style="list-style-type: none"> EVAP monitoring (power switch OFF) Engine running 	2 trip
P0451	Canister pressure sensor stuck	Sensor output voltage does not vary in certain time period.	<ul style="list-style-type: none"> Canister pump module EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) ECM 	<ul style="list-style-type: none"> EVAP monitoring (power switch OFF) 	2 trip
P0452	Canister pressure sensor voltage low	Sensor output voltage less than 0.45 V for 0.5 seconds.	<ul style="list-style-type: none"> Canister pump module Connector/wire harness (canister pump module - ECM) ECM 	<ul style="list-style-type: none"> EVAP monitoring (power switch OFF) Power switch ON (IG) 	1 trip
P0453	Canister pressure sensor voltage high	Sensor output voltage more than 4.9 V for 0.5 seconds.	<ul style="list-style-type: none"> Canister pump module Connector/wire harness (canister pump module - ECM) ECM 	<ul style="list-style-type: none"> EVAP monitoring (power switch OFF) Power switch ON (IG) 	1 trip

HINT:

The canister pressure sensor is built into the canister pump module.

DESCRIPTION**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 to 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.

Key-off monitor

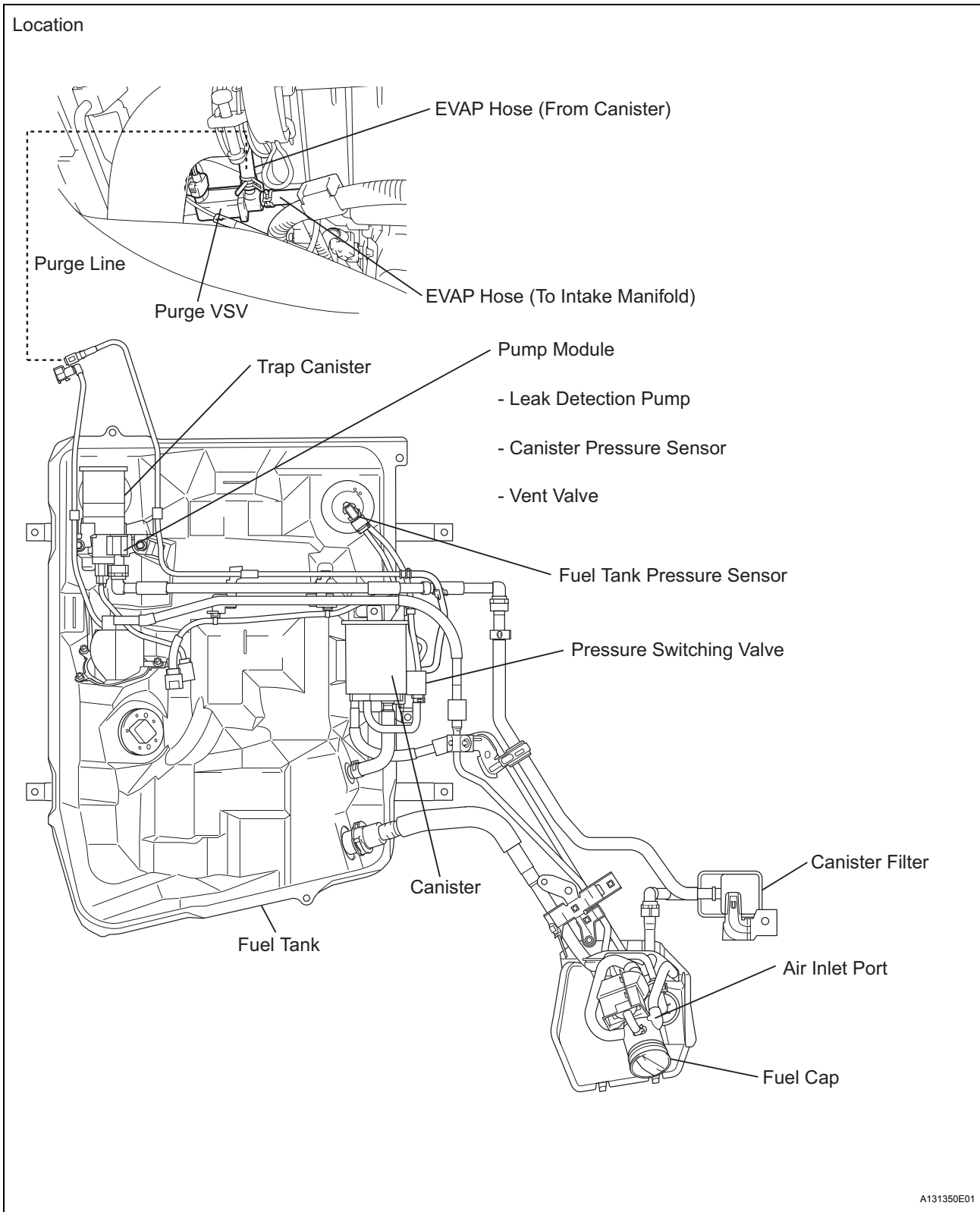
This monitor checks for Evaporative Emission (EVAP) system leaks and canister pump module malfunctions. The monitor starts 5 hours* after the power switch is turned OFF. More than 5 hours are required to allow the fuel to cool down to stabilize the Fuel Tank Pressure (FTP), thus making the EVAP system monitor more accurate.

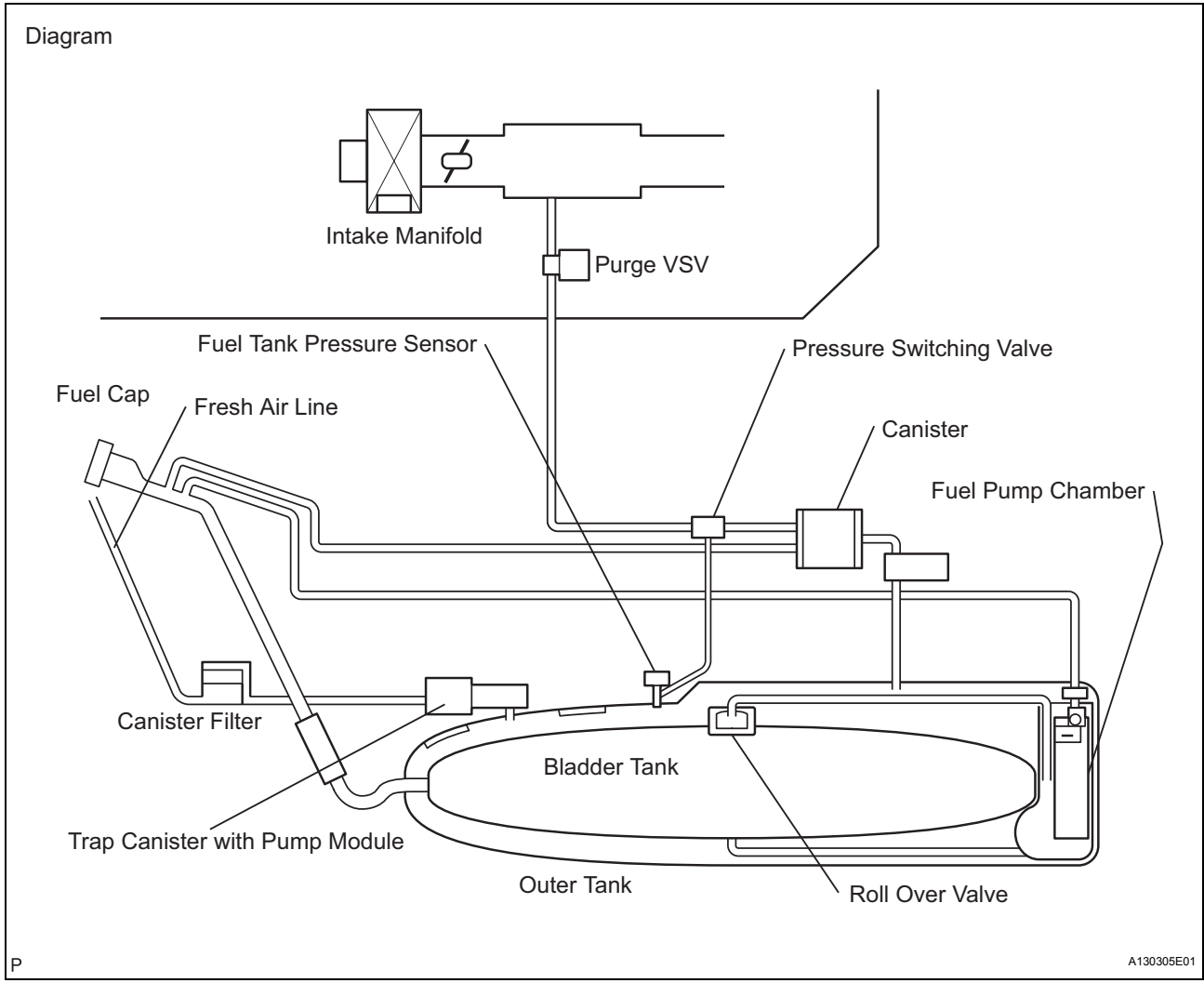
The leak detection pump creates negative pressure (vacuum) in the EVAP system and the pressure is measured. Finally, the ECM monitors for leaks from the EVAP system and malfunctions in both the canister pump module and purge VSV, based on the EVAP pressure.

HINT:

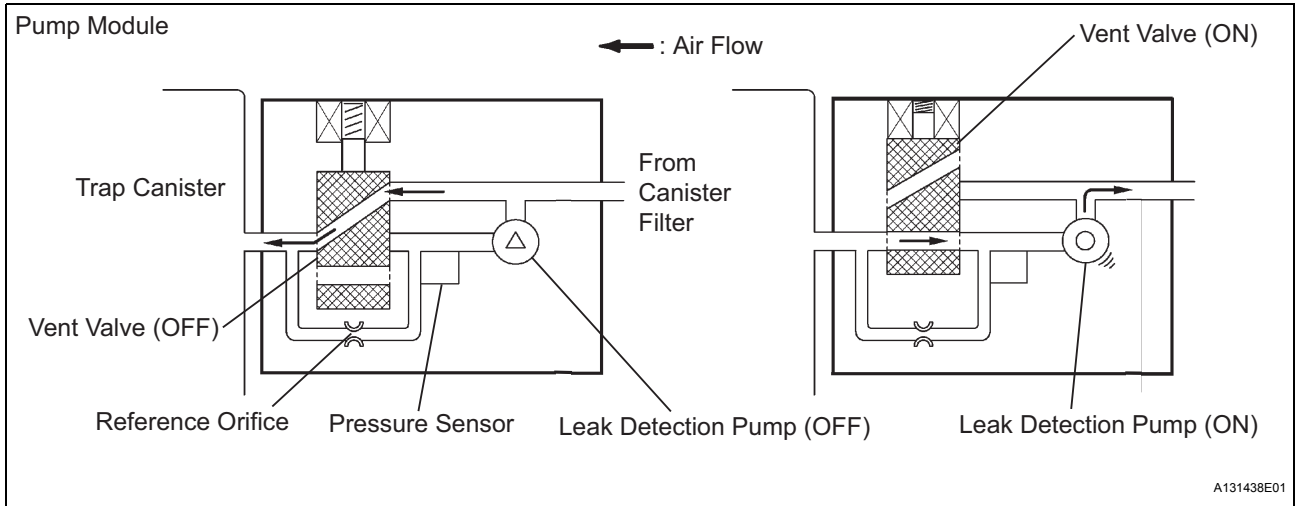
*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the power switch is turned OFF, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the power switch is turned OFF, the monitor check starts 2.5 hours later.

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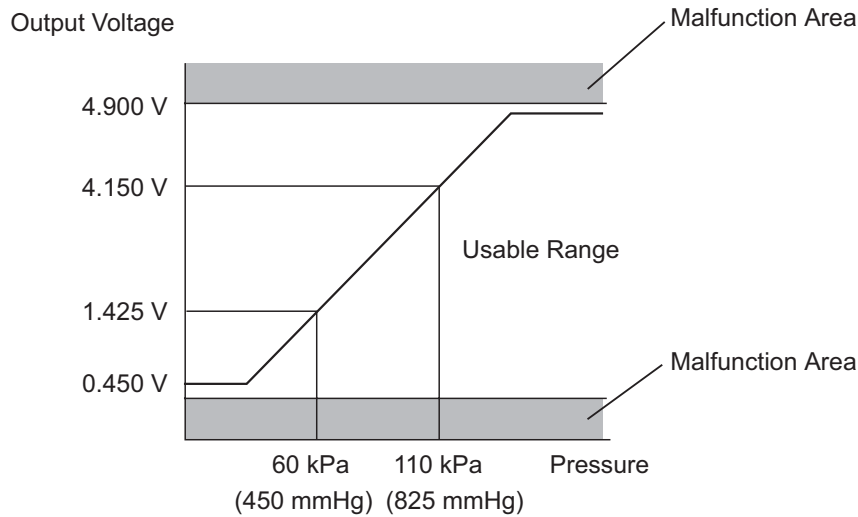


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Canister Pressure Sensor Specification



HINT:

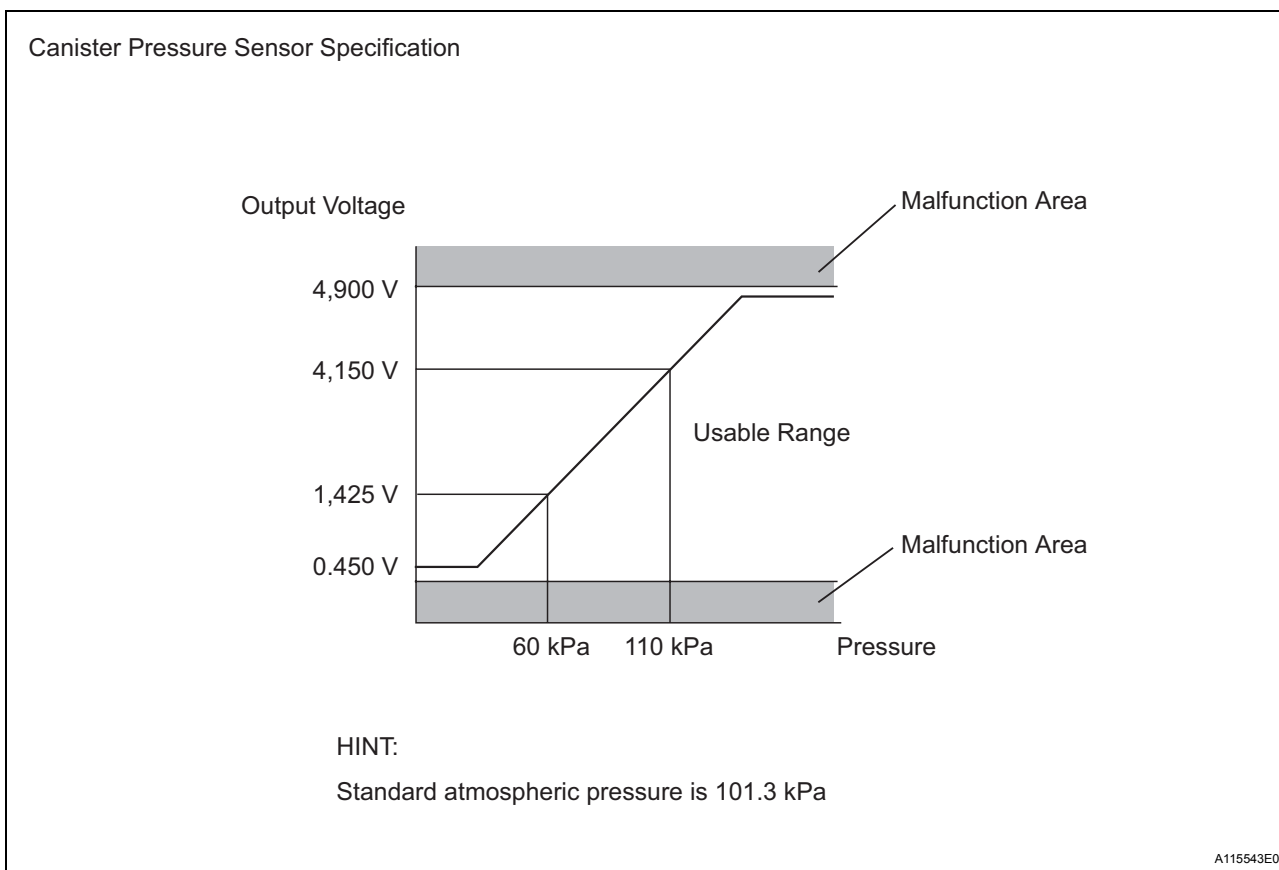
Standard atmospheric pressure is 101.3 kPa (760mmHg)

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Components	Operations
Canister, Trap canister	Contains activated charcoal to absorb EVAP generated in fuel tank.
Cut-off valve	Located in fuel tank. Valve floats and closes when fuel tank 100% full.
Purge Vacuum Switching Valve (VSV)	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).
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 min) after power switch OFF. This allows fuel to cool down, stabilizing Fuel Tank Pressure (FTP). When approximately 5 hours elapsed, ECM activates.
Pressure switching valve	The pressure switching valve located on the canister is used to detect leakage from the bladder tank into the fuel tank. The valve opens during the bladder tank leak check. Then, the fuel tank's fuel vapor flows to the intake manifold without passing the canister.
Pump module	Consists of (a) to (d) below. 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 vent valve ON (closed) and operating leak detection pump.
(b) Canister pressure sensor	Indicates pressure as voltage. ECM supplies regulated 5 V to canister pressure sensor, and uses feedback from sensor to monitor EVAP system pressure.
(c) Leak detection pump	Creates negative pressure (vacuum) in EVAP system for leak check.

Components	Operations
(d) Reference orifice	Has opening with 0.02 inch diameter. Vacuum produced through orifice by closing purge VSV, turning vent valve OFF and operating leak detection pump to monitor 0.02 inch leak criterion. 0.02 inch leak criterion indicates small leak of EVAP.

MONITOR DESCRIPTION



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- (a) DTC P0450: Canister pressure sensor voltage abnormal fluctuation
If the canister pressure sensor voltage output rapidly fluctuates between less than 0.45 V and more than 4.9 V, the ECM interprets this as an open or short circuit malfunction in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).
- (b) DTC P0451: Canister pressure sensor noisy or stuck
If the canister pressure sensor voltage output fluctuates rapidly for 10 seconds, the ECM stops the EVAP system monitor. The ECM interprets this as noise from the canister pressure sensor, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC.
Alternatively, if the sensor voltage output does not change for 10 seconds, the ECM interprets this as the sensor being stuck, and stops the monitor. The ECM then illuminates the MIL and sets the DTC. (Both of the malfunctions are detected by 2 trip detection logic).
- (c) DTC P0452: Canister pressure sensor voltage low
If the canister pressure sensor voltage output is below 0.45 V, the ECM interprets this as an open or short circuit malfunction in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).
- (d) DTC P0453: Canister pressure sensor voltage high
If the canister pressure sensor voltage output is 4.9 V or more, the ECM interprets this as an open or short circuit malfunction in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	Canister pump module
Frequency of Operation	Continuous
Duration	Within 15 minutes
MIL Operation	Immediate: P0450, P0452, P0453 2 driving cycles: P0451
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P0451 (Noise Monitor):

Monitor runs whenever following DTCs are not present	None
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg) [absolute pressure]
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35 °C (40 to 95°F)
EVAP canister pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Either of following conditions is met	A or B
A. Engine	Running
B. Soak time (power switch OFF time)	5 hours

Example of restart time

First time	7 hours
Second time	9 hours and 30 minutes

P0451 (Stuck Monitor):

Monitor runs whenever following DTCs are not present	None
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)
EVAP pressure sensor malfunction	Not detected
Soak time (power switch OFF time)	5 hours

Example of restart time

First time	7 hours
Second time	9 hours and 30 minutes

P0450, P0452 and P0453:

Monitor runs whenever following DTCs are not present	None
When either of following condition is met	(a) or (b)
(a) Power switch	ON
(b) Soak timer	ON

TYPICAL MALFUNCTION THRESHOLDS

1. P0450: Canister pressure sensor chattering

EVAP pressure	Less than 42.1 kPa (315.9 mmHg) or more than 123.8 kPa (928.4 mmHg)
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2. P0451: Canister pressure sensor noise

Pressure variation indicated by canister pressure sensor in 10 seconds	More than +0.3 kPa (+2.25 mmHg) 10 times
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3. P0451: Canister pressure sensor stuck

EVAP pressure change during reference pressure in 10 seconds	Less than 1 kPa (7.5 mmHg)
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4. P0452: Canister pressure sensor low voltage

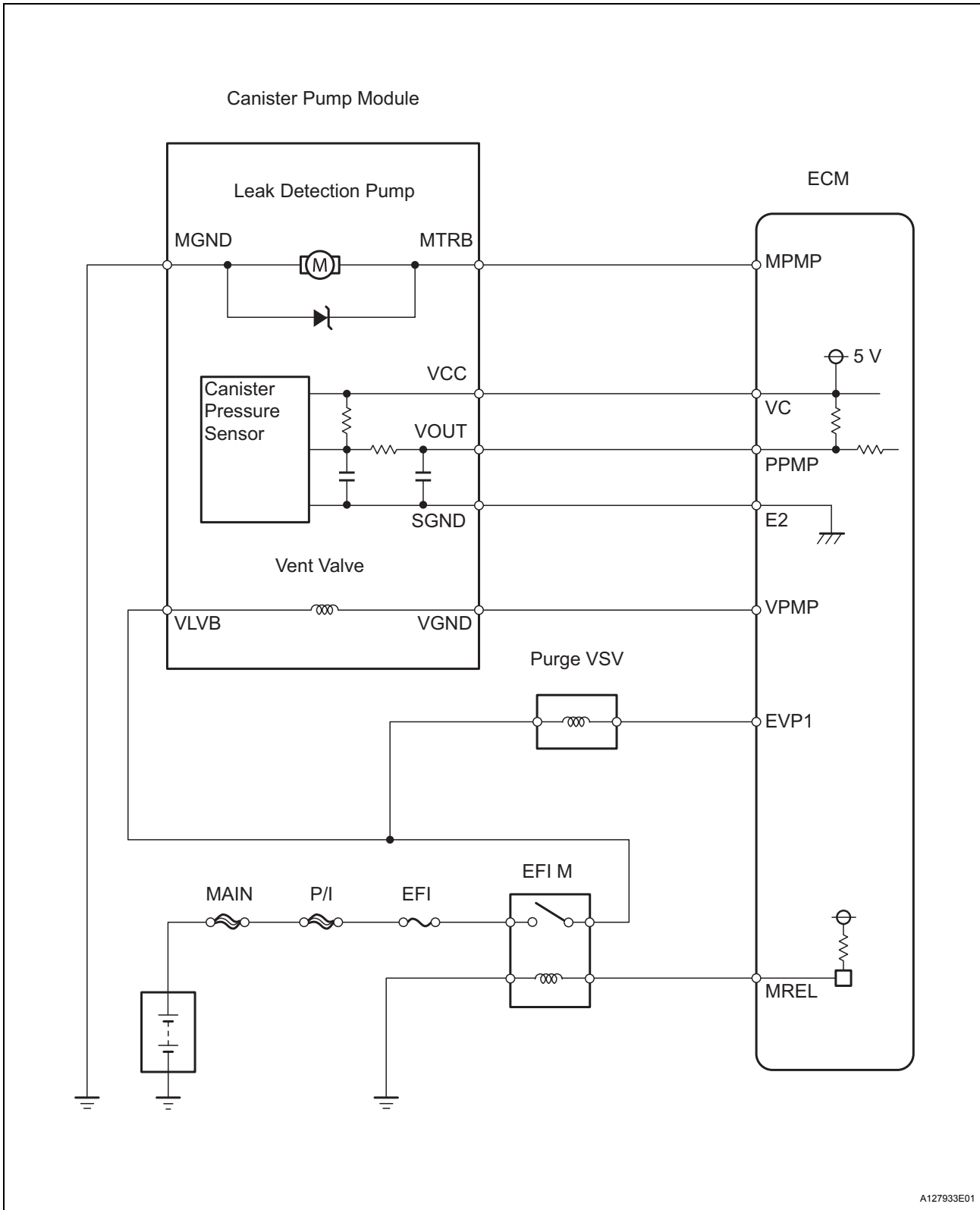
EVAP pressure	Less than 42.1 kPa (315.9 mmHg)
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5. P0453: Canister pressure sensor high voltage

EVAP pressure	More than 123.8 kPa (928.4 mmHg)
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WIRING DIAGRAM

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INSPECTION PROCEDURE

NOTICE:

- When a vehicle is brought into the workshop, leave it as it is. Do not change the vehicle condition. For example, do not tighten the fuel cap.
- Do not disassemble the canister pump module.
- The intelligent tester is required to conduct the following diagnostic troubleshooting procedure.

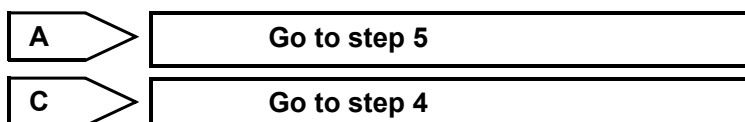
1 CONFIRM DTC AND EVAP PRESSURE

- Connect the intelligent tester to the DLC3.
- Turn the power switch ON (IG) and turn the intelligent tester ON.
- Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- Read the values.
- Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / EVAP / VAPOR PRESS.
- Read the EVAP pressure displayed on the intelligent tester.

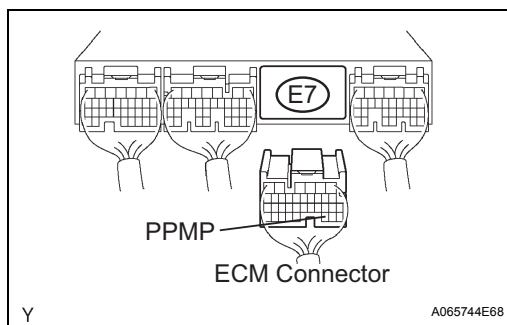
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Result

Display (DTC Output)	Test Result	Suspected Trouble Areas	Proceed to
P0451	-	• Canister pressure sensor	A
P0452	Less than 45 kPa (430 mmHg)	• Wire harness/connector (ECM - canister pressure sensor) • Canister pressure sensor • Short in ECM circuit	B
P0453	More than 120 kPa (900 mmHg)	• Wire harness/connector (ECM - canister pressure sensor) • Canister pressure sensor • Open in ECM circuit	C



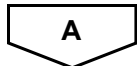
2 CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)



- Turn the power switch OFF.
- Disconnect the E7 ECM connector.
- Measure the resistance between the PPMP (E7-30) terminal of the ECM connector and the body ground.

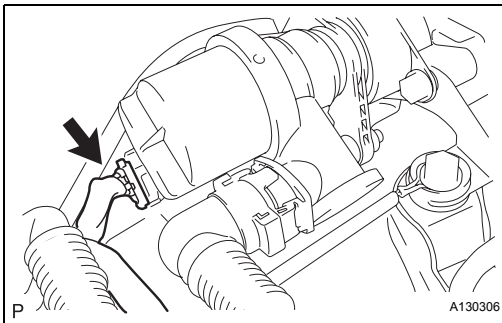
Result

Test Results	Suspected Trouble Areas	Proceed to
10 Ω or less	<ul style="list-style-type: none"> • Wire harness/connector (ECM - canister pressure sensor) • Short in canister pressure sensor circuit 	A
10 kΩ or more	<ul style="list-style-type: none"> • Wire harness/connector (ECM - canister pressure sensor) • Short in ECM circuit 	B

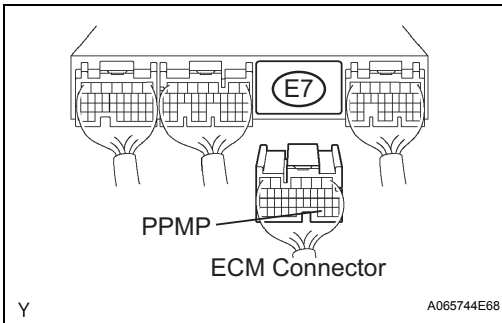


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3 CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)



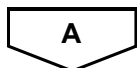
- (a) Disconnect the V7 canister connector.
- (b) Disconnect the E7 ECM connector.



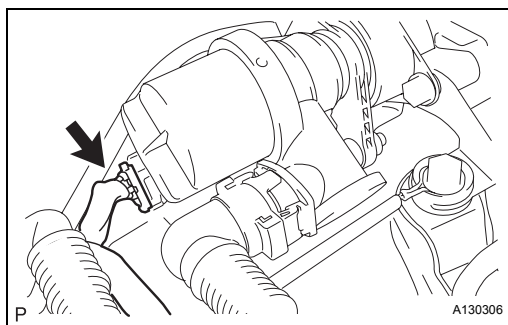
- (c) Measure the resistance between the PPMP (E7-30) terminal of the ECM connector and the body ground.

Result

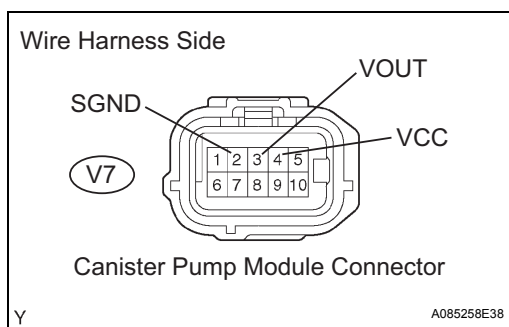
Test Results	Suspected Trouble Areas	Proceed to
10 kΩ or more	<ul style="list-style-type: none"> • Short in canister pressure sensor circuit 	A
10 kΩ or less	<ul style="list-style-type: none"> • Short in wire harness/connector (ECM - canister pressure sensor) 	B



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



(a) Disconnect the V7 canister connector.



(b) Turn the power switch ON (IG).
 (c) Measure the voltage and resistance of the canister pump module connector.

Standard voltage

Tester Connection	Specified Condition
V7-4 (VCC) - Body ground	4.5 to 5.0 V
V7-3 (VOUT) - Body ground	4.5 to 5.0 V

Standard resistance

Tester Connection	Specified Condition
V7-2 (SGND) - Body ground	100 Ω or less

Result

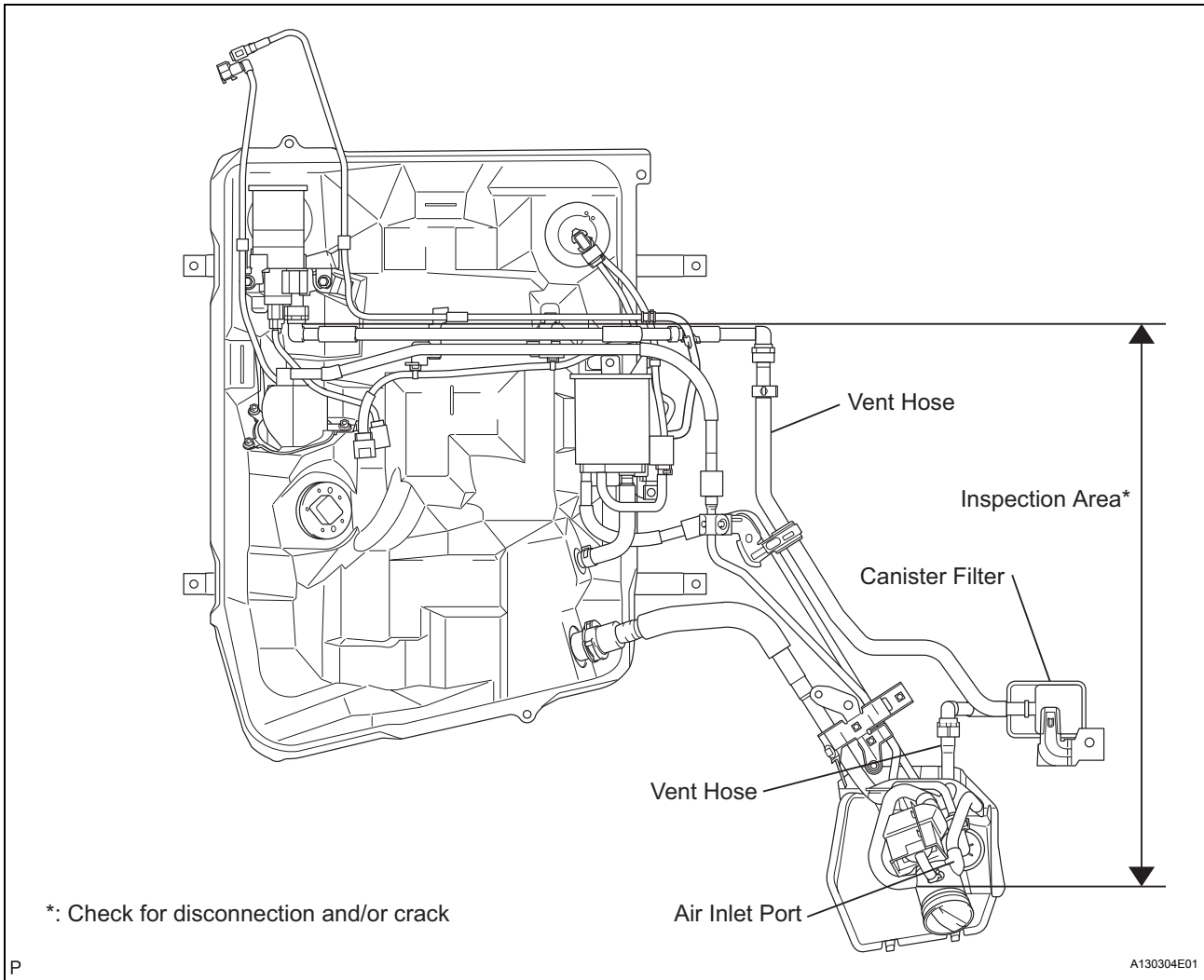
Test Results	Suspected Trouble Areas	Proceed to
Voltage and resistance within standard ranges	<ul style="list-style-type: none"> Open in canister pressure sensor circuit 	A
Voltage and resistance outside standard ranges	<ul style="list-style-type: none"> Open in wire harness/connector (ECM - canister pressure sensor) 	B



5 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 or 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.

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NEXT Go to step 8

6 REPAIR OR REPLACE HARNESS OR CONNECTOR

HINT:
If the exhaust tailpipe has been removed, go to the next step before reinstalling it.

NEXT Go to step 8

7 REPLACE ECM

(a) Replace the ECM (see page [ES-469](#)).

NEXT Go to step 8

8 CHECK WHETHER DTC OUTPUT RECURS (AFTER REPAIR)

(a) Connect the intelligent tester to the DLC3.

- (b) Turn the power switch ON (IG) and turn the intelligent tester ON.
- (c) Wait for at least 60 seconds.
- (d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

HINT:

If no pending DTC is displayed on the intelligent tester, the repair has been successfully completed.

NEXT

COMPLETED

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