Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BLWY
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P04417E,P04417F,P04419C; Evaporative Emission System Incorrect Purge Flow Actuator Stuck On; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

DTC	**P04417E**	**Evaporative Emission System Incorrect Purge Flow Actuator Stuck On**

DTC	**P04417F**	**Evaporative Emission System Incorrect Purge Flow Actuator Stuck Off**

DTC	**P04419C**	**Evaporative Emission System Incorrect Purge Flow Low/Insufficient Flow**

DTC SUMMARY

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P04417E	Evaporative Emission System Incorrect Purge Flow Actuator Stuck On	The stabilized EVAP system pressure is higher than [second reference pressure x 0.2] and the purge VSV is judged as stuck on.	• Purge VSV • Purge line • Connector/wire harness (Purge VSV - ECM) • Canister pump module • Canister (filter inside canister clogged) • Leak from EVAP system • ECM	Comes on	Engine	B	SAE Code: P0441
P04417F	Evaporative Emission System Incorrect Purge Flow Actuator Stuck Off	When the purge VSV is opened, the EVAP system pressure does not return to near atmospheric pressure and the purge VSV is judged as stuck off.	• Purge VSV • Purge line • Connector/wire harness (Purge VSV - ECM) • Canister pump module • Canister (filter inside canister clogged) • Leak from EVAP system • ECM	Comes on	Engine	B	SAE Code: P0441
P04419C	Evaporative Emission System Incorrect Purge Flow Low/Insufficient Flow	The following conditions are met successively while the engine is running: • Vacuum not created in EVAP system when purge VSV turned on (open).	• Purge VSV • Purge line • Connector/wire harness (Purge VSV - ECM) • Canister pump module • Canister (filter inside canister	Comes on	Engine	B	SAE Code: P0441

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
		• EVAP system pressure change is less than 0.396 kPa [0.0574 psi] when vent valve is turned on (closed). • Atmospheric pressure change before and after purge flow monitor is less than 0.1 kPa [0.01 psi].	clogged) • Leak from EVAP system • ECM				

DTC NO.	MONITORING ITEM	DETECTION TIMING	DETECTION LOGIC	SAE CODE
P04417E	Purge VSV (Vacuum Switching Valve) stuck on (open)	While ignition switch off	2 trip	P0441
P04417F	Purge VSV stuck off (closed)	While ignition switch off		
P04419C	Purge flow	While engine running		

DESCRIPTION

Refer to EVAP (Evaporative Emission) System.

Click here INFO

MONITOR DESCRIPTION

The 2 monitors, Key-off and Purge Flow, are used to detect malfunctions relating to DTCs P04417E, P04417F and P04419C. The key-off monitor is initiated by the ECM internal timer, known as the soak timer, 5 hours* after the ignition switch is turned off. The purge flow monitor runs while the engine is running.

HINT:

*: If the engine coolant temperature is not less than 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 less than 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

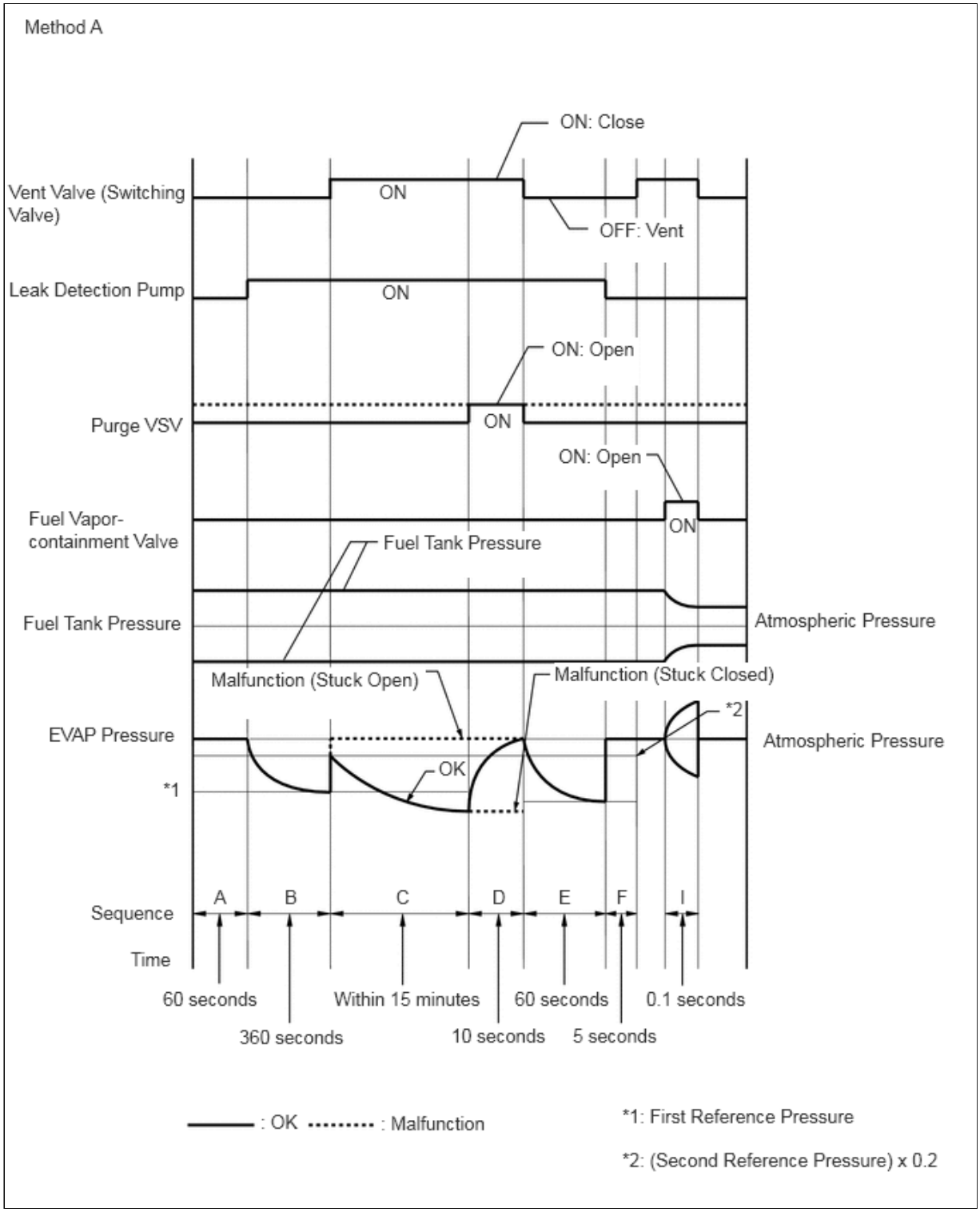
1. KEY-OFF MONITOR

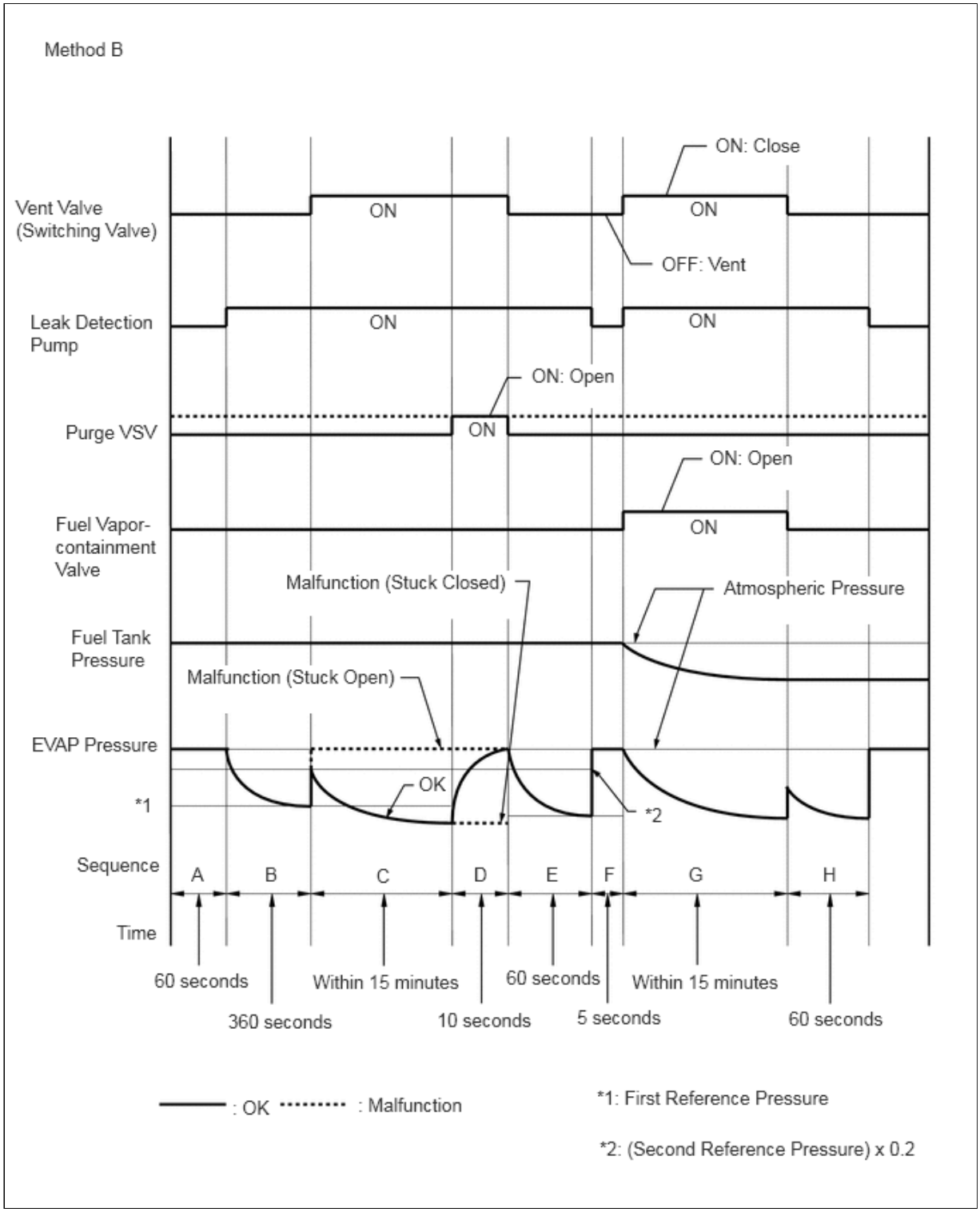
a. Purge VSV stuck open

In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The EVAP system pressure is then measured by the ECM using the canister pressure sensor. If the stabilized system pressure is higher than [second reference pressure x 0.2], the ECM interprets this as the purge VSV (Vacuum Switching Valve) being stuck open. The ECM illuminates the MIL and stores the DTC (2 trip detection logic).

b. Purge VSV stuck closed

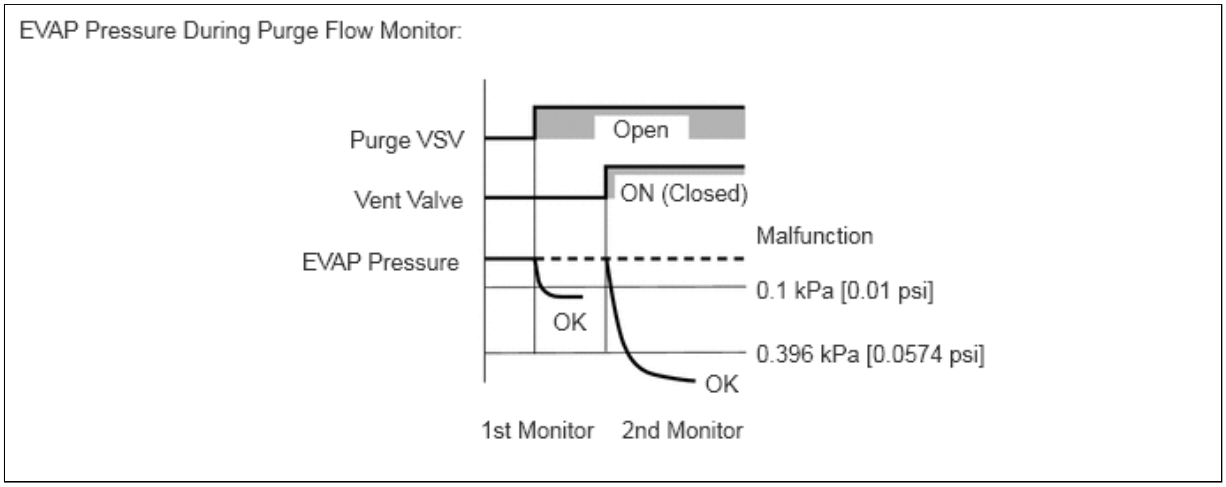
During sequence D, the canister pressure sensor measures the EVAP system pressure. The pressure measurement for purge VSV monitor is begun when the purge VSV is turned on (open) after the EVAP leak check. When the measured pressure indicates an increase of 0.3 kPa [0.04 psi] or higher, the purge VSV is functioning normally. If the pressure does not increase, the ECM interprets this as the purge VSV being stuck closed. The ECM illuminates the MIL and stores the DTC (2 trip detection logic).


Method A
ON: Close
Vent Valve (Switching Valve)
ON
OFF: Vent
Leak Detection Pump
ON
ON: Open
Purge VSV
ON
ON: Open
Fuel Vapor-containment Valve
ON
Fuel Tank Pressure
Fuel Tank Pressure
Atmospheric Pressure
Malfunction (Stuck Open)
Malfunction (Stuck Closed)
*2
EVAP Pressure
Atmospheric Pressure
OK
*1
Sequence
A
B
C
D
E
F
I
Time
60 seconds
360 seconds
Within 15 minutes
10 seconds
60 seconds
5 seconds
0.1 seconds
: OK
: Malfunction
*1: First Reference Pressure
*2: (Second Reference Pressure) x 0.2



2. PURGE FLOW MONITOR

The purge flow monitor consists of 2 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 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 on (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.396 kPa [0.0574 psi], the ECM interprets this as the Purge VSV being stuck closed. The ECM illuminates the MIL and stores DTC P04419C (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation in atmospheric pressure, before and after performing the purge flow monitor, is measured by the ECM.

MONITOR STRATEGY

Required Sensors/Components (Main)	Purge VSV Canister pump module
Required Sensors/Components (Related)	-
Frequency of Operation	Once per driving cycle
Duration	Within 30 seconds: Purge flow Within 20 minutes: Purge VSV stuck open/closed
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Key-off Monitor (Purge VSV Stuck Open/Closed)

Key-off monitor runs when all of the following conditions are met	-
Atmospheric pressure	70 kPa(abs) [10.2 psi(abs)] or higher, and less than 110 kPa(abs) [16 psi(abs)]
Auxiliary battery voltage	10.5 V or higher
Vehicle speed	Less than 4 km/h (2.5 mph)
Ignition switch	Off
Engine condition	Not running
Key-OFF duration	5, 7 or 9.5 hours

Pressure sensor of canister pump module malfunction (P0451, P0452, P0453)	Not detected
Fuel tank pressure sensor malfunction (P1451, P1452, P1453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Fuel vapor-containment valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Purge flow before key-OFF	Performed
Engine coolant temperature	4.4°C (39.9°F) or higher, and less than 35°C (95°F)
Intake air temperature	4.4°C (39.9°F) or higher, and less than 35°C (95°F)

Purge Flow Monitor

Engine	Running
Engine coolant temperature	4.4°C (39.9°F) or higher
Intake air temperature	4.4°C (39.9°F) or higher
Pressure sensor of canister pump module malfunction (P0451, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
EVAP system check	Not operated by scan tool
Auxiliary battery voltage	10 V or higher (varies with intake air temperature)
Purge duty-cycle	8% or higher

TYPICAL MALFUNCTION THRESHOLDS

Purge VSV Stuck Open

EVAP pressure when vacuum introduction for canister was complete	Higher than [reference pressure x 0.2]

Purge VSV Stuck Closed

EVAP pressure change for 10 seconds after purge VSV on (open)	Less than 0.3 kPa [0.04 psi]

Purge Flow

Both of the following conditions are met	-
EVAP pressure change when purge flow is started	Less than 0.1 kPa [0.01 psi]
EVAP pressure change during purge flow when vent valve is on (closed)	Less than 0.396 kPa [0.0574 psi]

MONITOR RESULT

Refer to EVAP System.

Click here INFO

CONFIRMATION DRIVING PATTERN

NOTICE:

- The Evaporative System Check (Automatic Mode) consists of 9 steps performed automatically by the GTS. It takes a maximum of approximately 40 minutes.
- Do not perform the Evaporative 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 start the engine during this operation.

- When the temperature of the fuel is 35°C (95°F) or higher, a large amount of vapor will form and any check result will be inaccurate. When performing the Evaporative System Check, keep the fuel temperature less than 35°C (95°F).

HINT:

- After repair has been completed, clear the DTC and then check that the vehicle has returned to normal by performing the following All Readiness check procedure.

  Click here INFO
- When clearing the permanent DTCs, refer to the "CLEAR PERMANENT DTC" procedure.

  Click here INFO

P04417E and P04417F

1. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
2. Turn the ignition switch off and wait for at least 30 seconds.
3. Turn the ignition switch to ON [A].
4. Enter the following menus: Powertrain / Engine / Utility / Evaporative System Check / Automatic Mode [B].
5. After the Evaporative System Check is completed, check for All Readiness by entering the following menus: Powertrain / Engine / Utility / All Readiness.
6. Input the DTC: P04417E or P04417F.
7. Check the DTC judgment result.

HINT:

- If the judgment result is NORMAL, the system is normal.
- If the judgment result is ABNORMAL, the system is malfunctioning.
- [A] to [B]: Normal judgment procedure.

  The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.
- When clearing the permanent DTCs, do not disconnect the cable from the auxiliary battery terminal or attempt to clear the DTCs during this procedure, as doing so will clear the universal trip and normal judgment histories.

P04419C

1. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
2. Turn the ignition switch off and wait for at least 30 seconds.
3. Put the engine in Inspection Mode (Maintenance Mode).

   Click here INFO
4. Start the engine and wait 15 minutes or more [A].
5. Enter the following menus: Powertrain / Engine / Trouble Codes [B].
6. Read the pending DTCs.

HINT:

- If a pending DTC is output, the system is malfunctioning.
- If a pending DTC is not output, perform the following procedure.

7. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
8. Input the DTC: P04419C.
9. Check the DTC judgment result.

HINT:

- If the judgment result is NORMAL, the system is normal.
- If the judgment result is ABNORMAL, the system is malfunctioning.
- [A] to [B]: Normal judgment procedure.

  The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.
- When clearing the permanent DTCs, do not disconnect the cable from the auxiliary battery terminal or attempt to clear the DTCs during this procedure, as doing so will clear the universal trip and normal judgment histories.

CAUTION / NOTICE / HINT

NOTICE:

- Vehicle Control History may be stored in the hybrid vehicle control ECU if the engine is malfunctioning. Certain vehicle condition information is recorded when Vehicle Control History is stored. Reading the vehicle conditions recorded in both the Freeze Frame Data and Vehicle Control History can be useful for troubleshooting.

for HEV Model: Click here INFO

for PHEV Model: Click here INFO

(Select Powertrain in Health Check and then check the time stamp data.)

- If any "Engine Malfunction" Vehicle Control History item has been stored in the hybrid vehicle control ECU, make sure to clear it. However, as all Vehicle Control History items are cleared simultaneously, if any Vehicle Control History items other than "Engine Malfunction" are stored, make sure to perform any troubleshooting for them before clearing Vehicle Control History.

for HEV Model: Click here INFO

for PHEV Model: Click here INFO

PROCEDURE

1.	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P04417E, P04417F AND/OR P04419C)**

(a) Read the DTCs.

Powertrain > Engine > Trouble Codes

RESULT	PROCEED TO
P04417E, P04417F or P04419C and other DTCs are output	A
P04417E, P04417F or P04419C is output	B

HINT:

If any DTCs other than DTC P04417E, P04417F or P04419C are output, troubleshoot those DTCs first.

A ▶ **GO TO DTC CHART**

B ▶ **GO TO EVAP SYSTEM**