Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BLV3
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P01201C; Throttle / Pedal Position Sensor / Switch "A" Circuit Voltage Out of Range; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

DTC	**P01201C**	**Throttle / Pedal Position Sensor / Switch "A" Circuit Voltage Out of Range**

DESCRIPTION

Refer to DTC P012011.

Click here INFO

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P01201C	Throttle / Pedal Position Sensor / Switch "A" Circuit Voltage Out of Range	The difference between the output voltage of VTA1 and VTA2 is less than 0.8 V, or higher than 1.6 V for less than 2 seconds (1 trip detection logic).	• Throttle position sensor (throttle body with motor assembly) • Throttle position sensor circuit • ECM	Comes on	Engine	A	SAE Code: P0121

MONITOR DESCRIPTION

The ECM uses the throttle position sensor to monitor the throttle valve opening angle. There are several checks that the ECM performs to confirm the proper operation of the throttle position sensor.

This sensor transmits two signals: VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. The ECM performs several checks to confirm the proper operation of the throttle position sensor and VTA1.

For each throttle opening angle, a specific voltage difference is expected between the outputs of VTA1 and VTA2. If the output voltage difference between the two signals deviates from the normal operating range, the ECM interprets this as a malfunction of the throttle position sensor, illuminates the MIL and stores a DTC.

MONITOR STRATEGY

Related DTCs	P0121: Throttle position sensor rationality
Required Sensors/Components (Main)	Throttle position sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	Within 2 seconds

MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Either of the following conditions is met	A or B
A. Ignition switch	ON
B. Throttle actuator power	On
Throttle position sensor circuit fail (P0122, P0123, P0222, P0223, P2135)	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met	A or B
A. Difference of learned throttle position sensor opener position voltage between VTA2 and VTA1	Higher than 1.6 V
B. Difference of learned throttle position sensor opener position voltage between VTA2 and VTA1	Less than 0.8 V

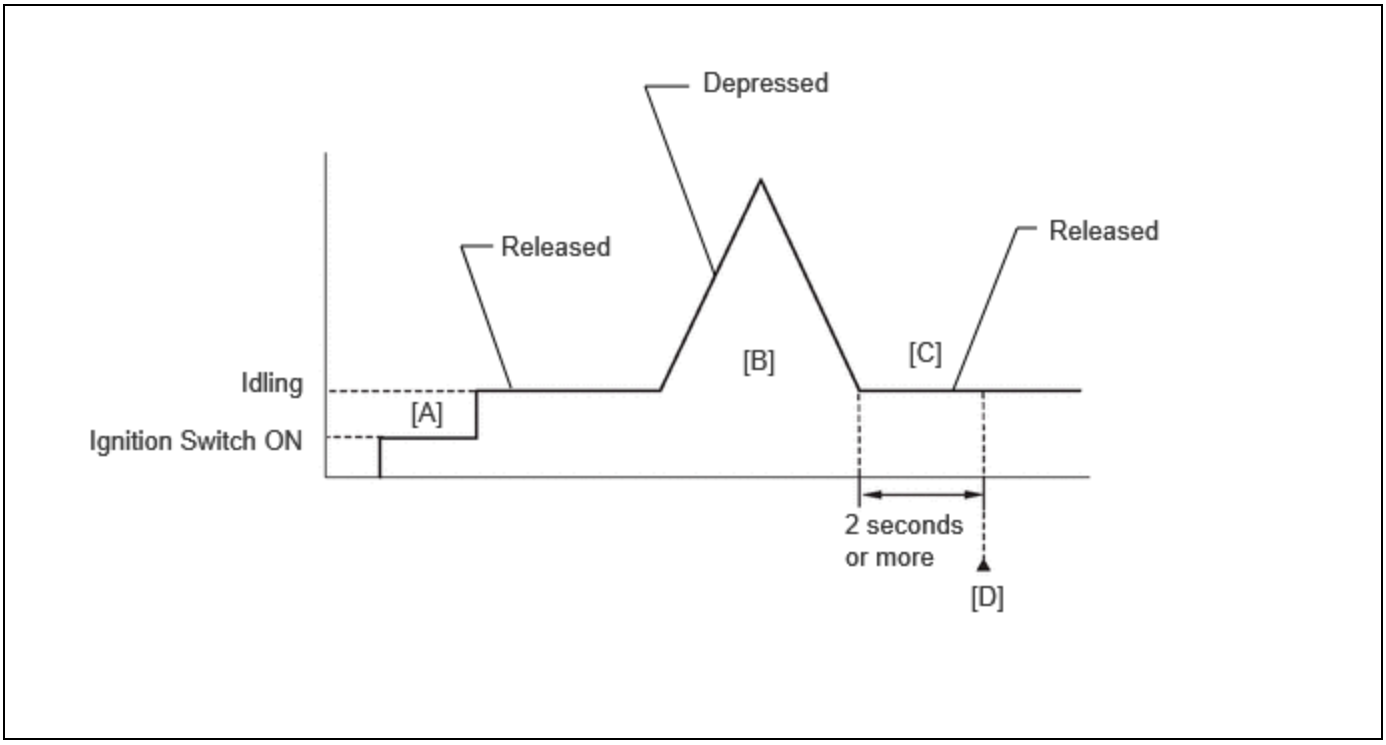
CONFIRMATION DRIVING PATTERN

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



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. Put the engine in Inspection Mode (Maintenance Mode).

   Click here INFO
5. Start the engine.
6. With the vehicle stationary, fully depress and release the accelerator pedal [B].

   HINT:

   During charge control, the engine speed is set at idle. Therefore, the engine speed will not increase when the accelerator pedal is depressed. In this case, perform step [B] after charge control has completed.
7. Idle the engine for 2 seconds or more [C].
8. Enter the following menus: Powertrain / Engine / Trouble Codes [D].
9. 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.
10. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
11. Input the DTC: P01201C.
12. 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.
    - If the judgment result is INCOMPLETE, perform steps [B] through [D] again.
    - [A] to [D]: 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.

FAIL-SAFE

When this DTC is stored, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator, and the throttle valve is returned to a 7.5° throttle valve opening angle by the return spring. The ECM then adjusts the engine output, by controlling the fuel injection (intermittent fuel cut) and ignition timing, in accordance with the engine torque request signal sent from the hybrid vehicle control ECU, to allow the vehicle to continue being driven at a minimal speed. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly.

Fail-safe mode continues until a pass condition is detected, and the ignition switch is turned off.

WIRING DIAGRAM

Refer to DTC P012011.

Click here INFO

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

HINT:

- DTC P01201C is stored when the VTA1 and VTA2 output voltages are not consistent with the sensor characteristics. Therefore, check the Freeze Frame Data for this DTC. Use the following formula to confirm the relative differences in voltage.

  Characteristic Sensor Output:
  VTA2 x 0.8 is approximately equal to VTA1 + 1.11 V

  VTA1: Throttle Position Sensor No.1 Voltage

  VTA2: Throttle Position Sensor No.2 Voltage

PROCEDURE

1.	**CHECK HARNESS AND CONNECTOR (THROTTLE POSITION SENSOR - ECM)**

Pre-procedure1

(a) Disconnect the throttle body with motor assembly connector.

(b) Disconnect the ECM connector.

Procedure1

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(C23,C52)
Click Connector(C23)
Click Connector(C52)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
C23-2 (VC) - C52-109 (VCTA)	Always	Below 1 Ω	Ω
C23-1 (VTA) - C52-108 (VTA1)	Always	Below 1 Ω	Ω
C23-3 (VTA2) - C52-87 (VTA2)	Always	Below 1 Ω	Ω
C23-4 (E2) - C52-110 (ETA)	Always	Below 1 Ω	Ω

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
C23-2 (VC) or C52-109 (VCTA) - Body ground and other terminals	Always	10 kΩ or higher	kΩ
C23-1 (VTA) or C52-108 (VTA1) - Body ground and other terminals	Always	10 kΩ or higher	kΩ
C23-3 (VTA2) or C52-87 (VTA2) - Body ground and other terminals	Always	10 kΩ or higher	kΩ

(d) Inspect the condition of the terminals of the connectors.

HINT:

Click here INFO

Post-procedure1

(e) None.

OK ▶ **GO TO STEP 5**

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▼

2.	**REPAIR OR REPLACE HARNESS OR CONNECTOR**

(a) Repair or replace the wire harness or connector.

NEXT

▼

3.	**CLEAR DTC**

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs.

Powertrain > Engine > Clear DTCs

Post-procedure1

(c) Turn the ignition switch off and wait for at least 30 seconds.

NEXT

▼

4.	**CHECK WHETHER DTC OUTPUT RECURS (DTC P01201C)**

Pre-procedure1

(a) Drive the vehicle in accordance with the driving pattern described in Confirmation Driving Pattern.

Procedure1

(b) Read the DTCs.

Powertrain > Engine > Trouble Codes

RESULT	PROCEED TO
DTCs are not output	A
P01201C is output	B

Post-procedure1

(c) None

A ▶ **END**

B ▼

5.	**CHECK HARNESS AND CONNECTOR (RESISTANCE OF ECM)**

Pre-procedure1

(a) Disconnect the throttle body with motor assembly connector.

Procedure1

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(C23)
Click Connector(C23)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
C23-2 (VC) - C23-1 (VTA)	Ignition switch off	190 to 210 kΩ	kΩ
C23-2 (VC) - C23-3 (VTA2)	Ignition switch off	190 to 210 kΩ	kΩ

Post-procedure1

(c) None

OK ▶ **REPLACE THROTTLE BODY WITH MOTOR ASSEMBLY**

NG ▶ **REPLACE ECM**