Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BLW2
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P033511,P033515; Crankshaft Position Sensor "A" Circuit Short to Ground; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

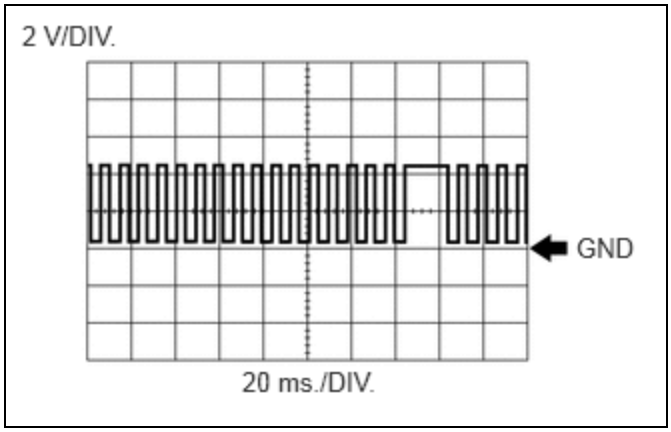
DTC	**P033511**	**Crankshaft Position Sensor "A" Circuit Short to Ground**

DTC	**P033515**	**Crankshaft Position Sensor "A" Circuit Short to Battery or Open**

DESCRIPTION

The crankshaft position sensor system consists of a No. 1 crankshaft position sensor plate and Magneto-Resistive Element (MRE) type sensor. The No. 1 crankshaft position sensor plate has 34 teeth at 10° intervals (2 teeth are missing for detecting top dead center), and is installed on the crankshaft. The crankshaft position sensor generates 34 signals per crankshaft revolution. The ECM uses the crankshaft position sensor signal (NE signal) to detect the crankshaft position and engine speed.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P033511	Crankshaft Position Sensor "A" Circuit Short to Ground	The crankshaft position sensor output voltage is less than 0.3 V for 4 seconds or more (1 trip detection logic).	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • ECM	Comes on	Engine	A	SAE Code: P0337
P033515	Crankshaft Position Sensor "A" Circuit Short to Battery or Open	The crankshaft position sensor output voltage is higher than 4.7 V for 4 seconds or more (1 trip detection logic).	• Open or short in crankshaft position sensor circuit • Crankshaft position sensor • ECM	Comes on	Engine	A	SAE Code: P0338



Reference: Inspection using an oscilloscope.

HINT:

The correct waveform is as shown.

ECM Terminal Name	Between NE+ and NE-
Tester Range	2 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

MONITOR DESCRIPTION

If the output voltage transmitted by the crankshaft position sensor remains low or high, the ECM interprets this as a malfunction in the sensor circuit, illuminates the MIL and stores a DTC.

MONITOR STRATEGY

Related DTCs	P0337: Crankshaft position sensor range check (Low voltage) P0338: Crankshaft position sensor range check (High voltage)
Required Sensors/Components (Main)	Crankshaft position sensor
Required Sensors/Components (Related)	Camshaft position sensor
Frequency of Operation	Continuous
Duration	4 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not stored	None
Both of the following conditions are met	-
Auxiliary battery voltage	8 V or higher
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

P0337: Range Check (Low Voltage)

Crankshaft position sensor voltage	Less than 0.3 V

P0338: Range Check (High Voltage)

Crankshaft position sensor voltage	Higher than 4.7 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. Wait 5 seconds or more [B].
5. Enter the following menus: Powertrain / Engine / Trouble Codes [C].
6. Read the pending DTCs.

   HINT:

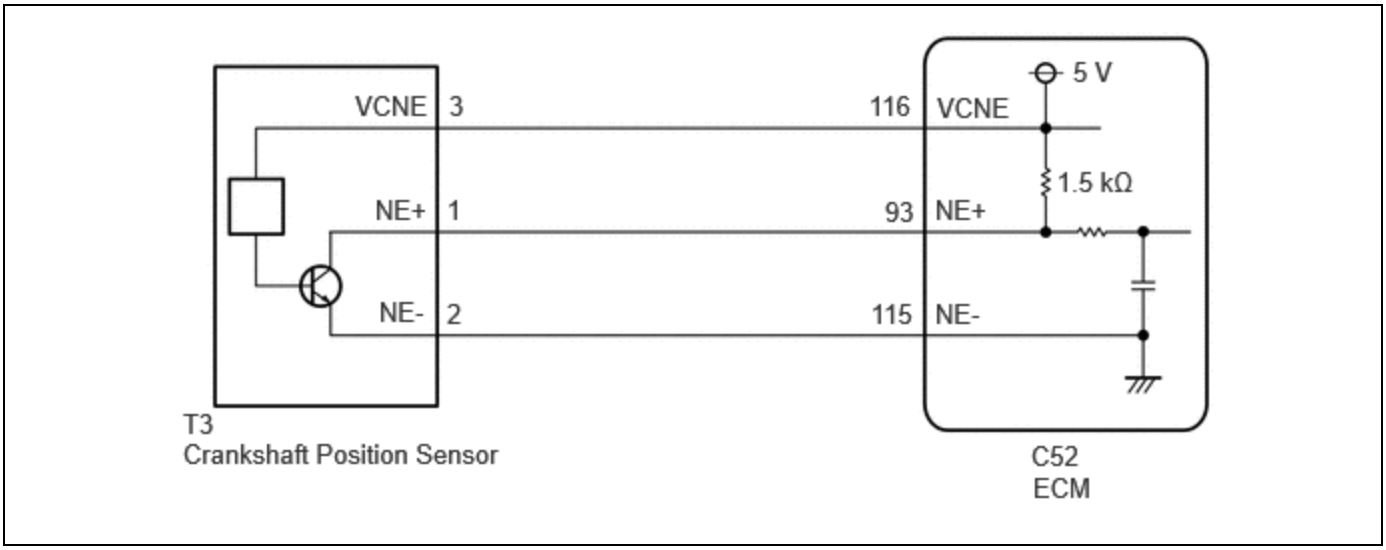
   - If a pending DTC is output, the system is malfunctioning.
   - If a pending DTC is not output, perform the following procedure.
7. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
8. Input the DTC: P033511 or P033515.
9. Check the DTC judgment result.

   HINT:

   - If the judgment result is NORMAL, the system is normal.
   - If the judgment result is ABNORMAL, the system has a malfunction.
   - [A] to [C]: 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.

WIRING DIAGRAM



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:

- The engine speed can be checked by using the GTS. To perform the check, follow the procedures below:

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

  Click here INFO

  b. Start the engine.

  c. Enter the following menus: Powertrain / Engine / Data List / Engine Speed.

  The engine speed may be indicated as zero despite the engine running normally. This is caused by a lack of NE signals from the crankshaft position sensor. Alternatively, the engine speed may be indicated as lower than the actual engine speed if the crankshaft position sensor output voltage is insufficient.

PROCEDURE

1.	**READ VALUE USING GTS (ENGINE SPEED)**

Pre-procedure1

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

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

(b) Start the engine.

Procedure1

(c) Read the values displayed on the GTS while the engine is running.

Powertrain > Engine > Data List

TESTER DISPLAY
Engine Speed

Standard:

Correct values are displayed.

HINT:

- To check the engine speed change, display the graph on the GTS.
- If the engine does not start, check the engine speed while cranking.
- If the engine speed indicated on the GTS remains at zero (0), there may be an open or short in the crankshaft position sensor circuit.

Post-procedure1

(d) None

OK ▶ **CHECK FOR INTERMITTENT PROBLEMS**

NG ▼

2.	CHECK HARNESS AND CONNECTOR

HINT:

Make sure that the connector is properly connected. If it is not, securely connect it and check for DTCs again.

Pre-procedure1

(a) Disconnect the crankshaft position sensor connector.

(b) Turn the ignition switch to ON.

Procedure1

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

Standard Voltage:

EWD INFO

Click Location & Routing(T3)
Click Connector(T3)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
T3-3 (VCNE) - Body ground	Ignition switch ON	4.5 to 5.5 V	V
T3-1 (NE+) - Body ground	Ignition switch ON	3.0 to 5.0 V	V

Post-procedure1

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

Pre-procedure2

(e) None

Procedure2

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

Standard Resistance:

EWD INFO

Click Location & Routing(T3)
Click Connector(T3)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
T3-3 (VCNE) - T3-1 (NE+)	Ignition switch off	1.425 to 1.575 kΩ	kΩ
T3-2 (NE-) - Body ground	Ignition switch off	Below 1 Ω	Ω

Post-procedure2

(g) None

OK ▶ **REPLACE CRANKSHAFT POSITION SENSOR**

NG ▼

3.	**CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM)**

Pre-procedure1

(a) Disconnect the crankshaft position sensor 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(T3,C52)
Click Connector(T3)
Click Connector(C52)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
T3-3 (VCNE) - C52-116 (VCNE)	Always	Below 1 Ω	Ω
T3-2 (NE-) - C52-115 (NE-)	Always	Below 1 Ω	Ω
T3-1 (NE+) - C52-93 (NE+)	Always	Below 1 Ω	Ω
T3-3 (VCNE) or C52-116 (VCNE) - Body ground and other terminals	Always	10 kΩ or higher	kΩ
T3-2 (NE-) or C52-115 (NE-) - Body ground and other terminals	Always	10 kΩ or higher	kΩ
T3-1 (NE+) or C52-93 (NE+) - Body ground and other terminals	Always	10 kΩ or higher	kΩ

Post-procedure1

(d) None

OK ▶ **REPLACE ECM**

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**