Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BLW0
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P032515; Knock Sensor 1 Bank 1 or Single Sensor Circuit Short to Battery or Open; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

DTC	**P032515**	**Knock Sensor 1 Bank 1 or Single Sensor Circuit Short to Battery or Open**

DESCRIPTION

Refer to DTC P032511.

Click here INFO

HINT:

When DTC P032515 is stored, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is delayed to its maximum retardation. Fail-safe mode continues until the ignition switch is turned off.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P032515	Knock Sensor 1 Bank 1 or Single Sensor Circuit Short to Battery or Open	The knock control sensor output voltage is higher than 4.5 V for 1 second or more (1 trip detection logic).	• Open or short in knock control sensor circuit • Knock control sensor • ECM	Comes on	Engine	A	SAE Code: P0328

Reference: Inspection using an oscilloscope.

Click here INFO

MONITOR DESCRIPTION

If the output voltage transmitted by the knock control sensor remains high for 1 second or more, the ECM interprets this as a malfunction in the sensor circuit, illuminates the MIL and stores this DTC.

MONITOR STRATEGY

Related DTCs	P0328: Knock control sensor range check (high voltage)
Required Sensors/Components (Main)	Knock control sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1 second

MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever the following DTCs are not stored	None
Both of the following conditions are met	-
Auxiliary battery voltage	10.5 V or higher
Time after engine start	5 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

Knock control sensor voltage	Higher than 4.5 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. Put the engine in Inspection Mode (Maintenance Mode).

   Click here INFO
4. Start the engine and wait 5 minutes [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: P032515.
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.
   - If the judgment result is INCOMPLETE, idle the engine for 5 minutes and check the DTC judgment result again.
   - [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.

WIRING DIAGRAM

Refer to DTC P032511.

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

PROCEDURE

1.	**CHECK TERMINAL VOLTAGE (POWER SOURCE OF KNOCK CONTROL SENSOR)**

Pre-procedure1

(a) Disconnect the knock control 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(T2)
Click Connector(T2)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
T2-2 (KNK1) - T2-1 (EKNK)	Ignition switch ON	4.5 to 5.5 V	V

Post-procedure1

(d) None

NG ▶ **GO TO STEP 3**

OK

2.	**INSPECT KNOCK CONTROL SENSOR**

Click here INFO

OK ▶ **GO TO STEP 4**

NG ▶ **REPLACE KNOCK CONTROL SENSOR**

3.	**CHECK HARNESS AND CONNECTOR (KNOCK CONTROL SENSOR - ECM)**

Pre-procedure1

(a) Disconnect the knock control 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(T2,C52)
Click Connector(T2)
Click Connector(C52)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
T2-2 (KNK1) - C52-111 (KNK1)	Always	Below 1 Ω	Ω
T2-1 (EKNK) - C52-112 (EKNK)	Always	Below 1 Ω	Ω
T2-2 (KNK1) - C52-111 (KNK1) - Other terminals	Always	10 kΩ or higher	kΩ

Post-procedure1

(d) None

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

OK

4.	**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

5.	**CHECK WHETHER DTC OUTPUT RECURS (DTC P032515)**

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
P032515 is output	B

Post-procedure1

(c) None

A **CHECK FOR INTERMITTENT PROBLEMS**

B **REPLACE ECM**