Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM1000000028W1S
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [12/2022 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P012500; Insufficient Coolant Temperature for Closed Loop Fuel Control; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

DTC	**P012500**	**Insufficient Coolant Temperature for Closed Loop Fuel Control**

DESCRIPTION

Refer to DTC P011511.

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DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P012500	Insufficient Coolant Temperature for Closed Loop Fuel Control	The engine coolant temperature does not reach the closed loop enabling temperature for 20 minutes (this period varies with the engine coolant temperature at engine start) (2 trip detection logic).	• Engine cooling system • Engine coolant temperature sensor • Water inlet with thermostat sub-assembly	Comes on	Engine	B	SAE Code: P0125

MONITOR DESCRIPTION

The resistance of the engine coolant temperature sensor varies in proportion to the actual engine coolant temperature. The ECM supplies a constant voltage to the sensor and monitors the signal output voltage of the sensor. The signal output voltage varies according to the changing resistance of the sensor. After the engine is started, the engine coolant temperature is monitored by this signal. If the engine coolant temperature sensor indicates that the engine is not yet warm enough for closed loop fuel control, despite a specified period of time having elapsed since the engine was started, the ECM interprets this as a malfunction in the sensor or engine cooling system, illuminates the MIL and stores this DTC.

MONITOR STRATEGY

Related DTCs	P0125: Insufficient engine coolant temperature for closed loop fuel control
Required Sensors/Components (Main)	Engine coolant temperature sensor Thermostat Engine cooling system
Required Sensors/Components (Related)	-
Frequency of Operation	Once per driving cycle

Duration	• 72 seconds: Engine coolant temperature at engine start is (closed-loop engine coolant temperature - 8.33°C [15°F]) or higher • 142 seconds: Engine coolant temperature at engine start is (closed-loop engine coolant temperature - 19.44°C [35°F]) or higher and less than (closed-loop engine coolant temperature - 8.33°C [15°F]) • 1200 seconds: Engine coolant temperature at engine start is less than (closed-loop engine coolant temperature - 19.44°C [35°F])
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All of the following conditions are met	-
Intake air temperature sensor circuit fail (P0112, P0113)	Not detected
Engine coolant temperature sensor circuit fail (P0117, P0118)	Not detected
Mass air flow meter circuit fail (P0102, P0103)	Not detected
Thermostat fail (P0128)	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Time until actual engine coolant temperature reaches closed loop fuel control enabling temperature	• 72 seconds: Engine coolant temperature at engine start is (closed-loop engine coolant temperature - 8.33°C [15°F]) or higher • 142 seconds: Engine coolant temperature at engine start is (closed-loop engine coolant temperature - 19.44°C [35°F]) or higher and less than (closed-loop engine coolant temperature - 8.33°C [15°F]) • 1200 seconds: Engine coolant temperature at engine start is less than (closed-loop engine coolant temperature - 19.44°C [35°F])

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.

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

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1. Leave the vehicle outside overnight.
2. Enter the following menus: Powertrain / Engine / Trouble Codes.
3. Read the DTC and record the Freeze Frame Data.
4. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
5. Enter the following menus: Powertrain / Engine / Data List / Coolant Temperature.
6. Check that Coolant Temperature is the same or less than Initial Engine Coolant Temperature in the Freeze Frame Data.
7. Turn the ignition switch off and wait for at least 30 seconds.

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

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9. Start the engine [A].
10. Wait 21 minutes or more [B].
11. Enter the following menus: Powertrain / Engine / Trouble Codes [C].
12. 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.

13. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
14. Input the DTC: P012500.
15. 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, let the engine cool down (engine coolant temperature is below 5°C (41°F)), and then perform steps [A] through [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

Refer to DTC P011511.

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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.

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  (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.

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HINT:

If DTC P011511, P011515 or P01152A is output simultaneously with DTC P012500, the engine coolant temperature sensor may have an open or a short circuit. Troubleshoot those DTCs first.

PROCEDURE

1.	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION DTC P012500)**

(a) Read the DTCs.

Powertrain > Engine > Trouble Codes

RESULT	PROCEED TO
P012500 and other DTCs are output	A
P012500 is output	B

HINT:

If any DTCs other than P012500 are output, troubleshoot those DTCs first.

A ▶ **GO TO DTC CHART**

B ▼

2.	**INSPECT WATER INLET WITH THERMOSTAT SUB-ASSEMBLY**

(a) Inspect the water inlet with thermostat sub-assembly (thermostat opening temperature).

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NG ▶ **REPLACE WATER INLET WITH THERMOSTAT SUB-ASSEMBLY**

OK ▼

3.	**CHECK ENGINE COOLING SYSTEM**

(a) Check for defects in the engine cooling system that might cause the system to be too cold, such as abnormal cooling fan operation or any modifications.

OK ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**
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NG ▶ **REPAIR OR REPLACE ENGINE COOLING SYSTEM**