| | | |
|---|---|---|
| **Last Modified:** 12-04-2024 | 6.11:8.1.0 | **Doc ID:** RM100000002BLUI |
| **Model Year Start:** 2023 | **Model:** Prius Prime | **Prod Date Range:** [03/2023 - ] |
| **Title:** M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P00B162; Radiator Coolant Temperature Sensor Signal Compare Failure; 2023 - 2024 MY Prius Prius Prime [03/2023 - ] | | |

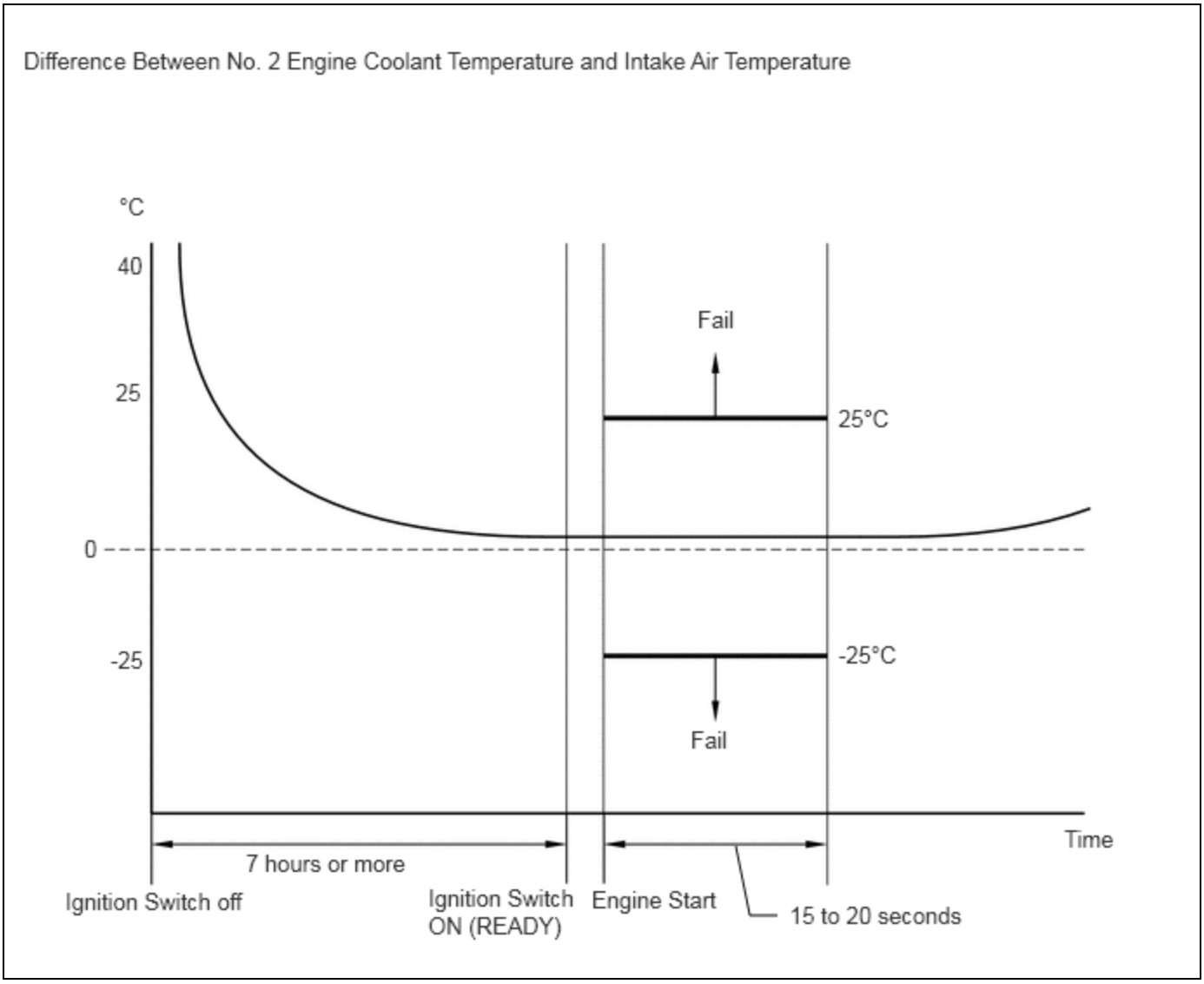
| | | |
|---|---|---|
| **DTC** | **P00B162** | **Radiator Coolant Temperature Sensor Signal Compare Failure** |

# DESCRIPTION

This engine uses a No. 2 engine coolant temperature sensor and an intake air temperature sensor to detect temperatures related to engine operation. A thermistor, whose resistance value varies according to the temperature, is built into each sensor. When the temperature becomes low, the resistance of the thermistor increases. When the temperature becomes high, the resistance decreases. These variations in resistance are transmitted to the ECM as voltage changes.

| DTC NO. | DETECTION ITEM | DTC DETECTION CONDITION | TROUBLE AREA | MIL | DTC OUTPUT FROM | PRIORITY | NOTE |
|---|---|---|---|---|---|---|---|
| P00B162 | Radiator Coolant Temperature Sensor Signal Compare Failure | All of the following conditions are met (2 trip detection logic):<br>1. The auxiliary battery voltage is 10.5 V or higher.<br>2. 7 hours or more have elapsed since the ignition switch was turned off in the previous trip.<br>3. Less than 20 seconds since a cold engine start was performed.<br>4. The intake air temperature is -10°C (14°F) or higher.<br>5. The difference between the readings of the No. 2 engine coolant temperature and intake air temperature is | • Intake air temperature sensor (mass air flow meter sub-assembly)<br>• No. 2 engine coolant temperature sensor<br>• ECM | Comes on | Engine | B | SAE Code: P00B2 |

| DTC NO. | DETECTION ITEM | DTC DETECTION CONDITION | TROUBLE AREA | MIL | DTC OUTPUT FROM | PRIORITY | NOTE |
|---|---|---|---|---|---|---|---|
| | | higher than 25°C (45°F). | | | | | |




## MONITOR DESCRIPTION

The ECM monitors the difference between the No. 2 engine coolant temperature and the intake air temperature when the engine is started cold to accurately detect the engine temperature conditions. The monitor runs when the engine is started after 7 hours or more have elapsed since the ignition switch was turned off in the previous trip. If the difference between the engine coolant temperature and the intake air temperature on a cold start exceeds 25°C (45°F), the ECM interprets this as a malfunction in the No. 2 engine coolant temperature sensor circuit or intake air temperature sensor circuit, illuminates the MIL and stores this DTC.

## MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P00B2: No. 2 engine coolant temperature sensor rationality |
| Required Sensors/Components (Main) | No. 2 engine coolant temperature sensor<br>Intake air temperature sensor (mass air flow meter sub-assembly) |

| | |
|---|---|
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Once per driving cycle |
| Duration | 15 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

## TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| All of the following conditions are met | - |
| Soak time | 7 hours or more |
| Auxiliary battery voltage | 10.5 V or higher |
| Time after engine start | Less than 20 seconds |
| Intake air temperature at hybrid system ready-to-drive | -10°C (14°F) or higher |
| Intake air temperature sensor circuit fail (P0112, P0113) | Not detected |
| No. 2 engine coolant temperature sensor circuit fail (P00B3, P00B4) | Not detected |
| Soak timer fail (P2610) | Not detected |

## TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Deviated No. 2 engine coolant temperature and intake air temperature | Less than -25°C (-45°F), or higher than 25°C (45°F) |

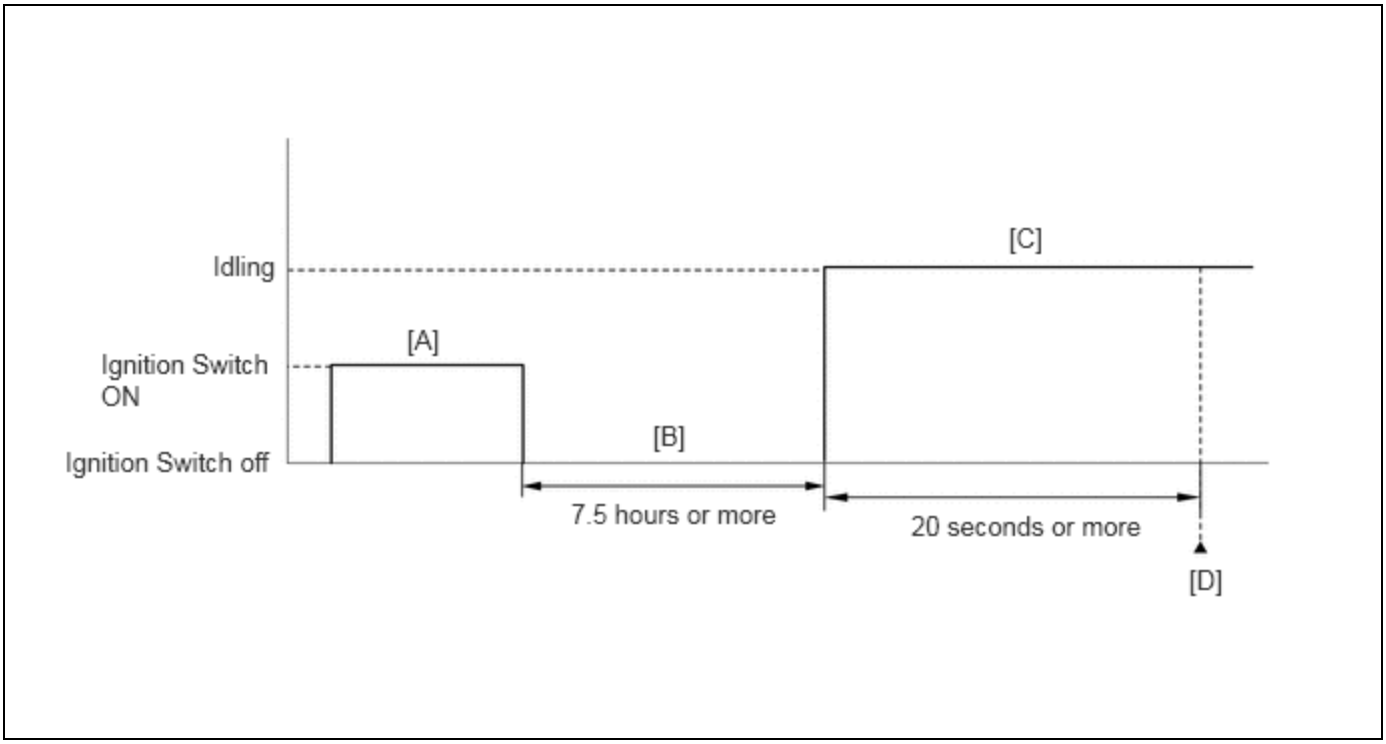
## CONFIRMATION DRIVING PATTERN

**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.

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

  Click here INFO




1. Turn the ignition switch to ON [A].
2. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
3. Turn the ignition switch off.
4. With the engine stopped, leave the vehicle as is for 7.5 hours or more [B].
5. Put the engine in Inspection Mode (Maintenance Mode).

   Click here INFO
6. Start the engine and wait 20 seconds or more [C].
7. Enter the following menus: Powertrain / Engine / Trouble Codes [D].
8. 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.

9. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
10. Input the DTC: P00B162.
11. 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.
- [B] 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.

## 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 P00B162)** |

(a) Read the DTCs and record the Freeze Frame Data.

**Powertrain > Engine > Trouble Codes**

| RESULT | PROCEED TO |
|---|---|
| P00B162 and other DTCs are output | A |
| P00B162 is output | B |

**HINT:**

If any DTCs other than P00B162 are output, troubleshoot those DTCs first.

**A** ▶ **GO TO DTC CHART**

**B** ▼

| | |
|---|---|
| 2. | **CHECK FREEZE FRAME DATA (COOLANT TEMPERATURE AND RADIATOR COOLANT TEMPERATURE)** |

Pre-procedure1

(a) Using the GTS, read the values displayed in the freeze frame data recorded in step 1.

**Powertrain > Engine > DTC(P00B162) > Freeze Frame Data**

| TESTER DISPLAY |
| --- |
| Coolant Temperature |
| Radiator Coolant Temperature |

Procedure1

(b) Read the value displayed on the GTS.

Standard:

| GTS DISPLAY | SPECIFIED CONDITION |
| --- | --- |
| Difference between the Coolant Temperature and the Radiator Coolant Temperature | Within 15°C (27°F) |

**HINT:**

When the engine is cold, the value of the intake air temperature, ECM internal temperature and ambient temperature should be approximately the same.

Post-procedure1

(c) None.

**NG** ▶ **REPLACE NO. 2 ENGINE COOLANT TEMPERATURE SENSOR**

**OK** ▼

| 3. | CHECK FREEZE FRAME DATA (COOLANT TEMPERATURE AND INTAKE AIR TEMPERATURE) |
| --- | --- |

Pre-procedure1

(a) Using the GTS, read the values displayed in the freeze frame data recorded in step 1.

**Powertrain > Engine > DTC(P00B162) > Freeze Frame Data**

| TESTER DISPLAY |
| --- |
| Coolant Temperature |
| Intake Air Temperature |

Procedure1

(b) Read the value displayed on the GTS.

Standard:

| GTS DISPLAY | SPECIFIED CONDITION |
|---|---|
| Difference between the Coolant Temperature and the Intake Air Temperature | Within 15°C (27°F) |

**HINT:**

When the engine is cold, the value of the intake air temperature, ECM internal temperature and ambient temperature should be approximately the same.

Post-procedure1

(c) None.

**OK** ▶ **REPLACE ECM**

**NG** ▶ **REPLACE MASS AIR FLOW METER SUB-ASSEMBLY**