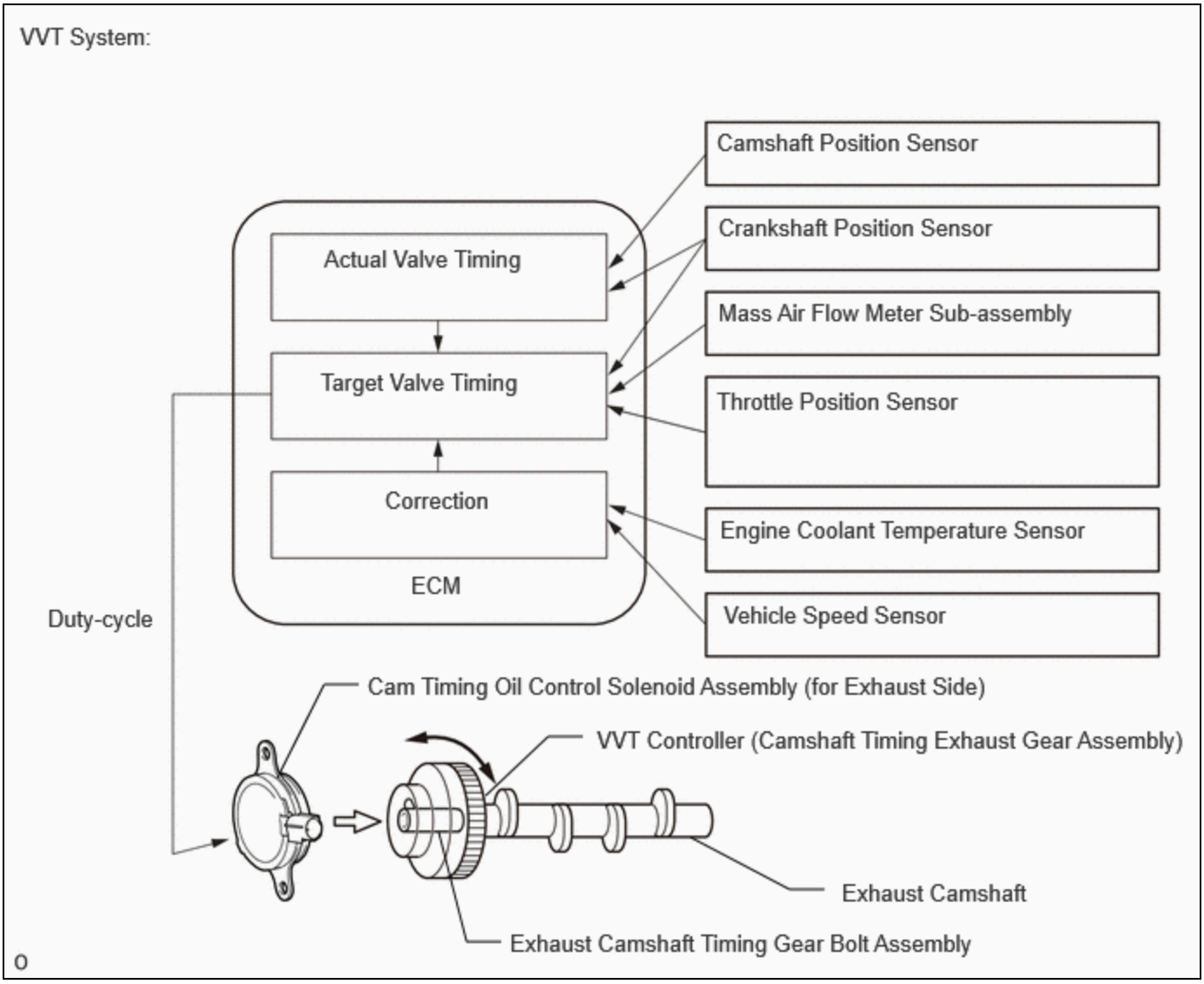
| | | |
|---|---|---|
| **Last Modified:** 12-04-2024 | 6.11:8.1.0 | **Doc ID:** RM100000002BLU4 |
| **Model Year Start:** 2023 | **Model:** Prius Prime | **Prod Date Range:** [03/2023 - ] |
| **Title:** M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P001313; Camshaft Position "B" - Actuator Bank 1 Circuit Open; 2023 - 2024 MY Prius Prius Prime [03/2023 - ] | | |

| | | |
|---|---|---|
| **DTC** | **P001313** | **Camshaft Position "B" - Actuator Bank 1 Circuit Open** |

# DESCRIPTION

The Variable Valve Timing (VVT) system (for exhaust side) adjusts the exhaust valve timing to improve driveability. The engine oil pressure turns the VVT controller (camshaft timing exhaust gear assembly) to adjust the valve timing.

The cam timing oil control solenoid assembly operates according to signals received from the ECM to control the position of the camshaft timing oil control valve assembly (exhaust camshaft timing gear bolt assembly) and supply engine oil. The camshaft timing oil control valve assembly (exhaust camshaft timing gear bolt assembly) moves when the ECM applies 12 V to the cam timing oil control solenoid assembly. The ECM changes the energizing time of the cam timing oil control solenoid assembly (duty-cycle) in accordance with the camshaft position, crankshaft position, throttle position, etc.



| DTC NO. | DETECTION ITEM | DTC DETECTION CONDITION | TROUBLE AREA | MIL | DTC OUTPUT FROM | PRIORITY | NOTE |
|---|---|---|---|---|---|---|---|
| P001313 | Camshaft Position "B" - Actuator Bank 1 Circuit Open | Open or short in cam timing oil control solenoid assembly circuit (1 trip detection logic). | • Open or short in cam timing oil control solenoid assembly circuit<br>• Cam timing oil control solenoid assembly<br>• ECM | Comes on | Engine | A | SAE Code: P0013 |

## MONITOR DESCRIPTION

This DTC is designed to detect an open or short in the cam timing oil control solenoid assembly circuit. If the cam timing oil control solenoid assembly duty-cycle is excessively high or low while the ignition switch is ON or the engine is running, the ECM will illuminate the MIL and store this DTC.

## MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0013: Cam timing oil control solenoid assembly range check |
| Required Sensors/Components (Main) | Cam timing oil control solenoid assembly |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 1 second |
| MIL Operation | Immediate |
| Sequence of Operation | None |

## TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever the following DTCs are not stored | None |
| All of the following conditions are met | - |
| Auxiliary battery voltage | 8 V or higher |
| Ignition switch | ON |
| Time after ignition switch off to ON | 0.5 seconds or more |

**Case 1**

| | |
|---|---|
| Either of the following conditions is met | A or B |
| A. Both of the following conditions are met | - |
| Auxiliary battery voltage | 11 V or higher, and less than 13 V |

| | |
|---|---|
| Target duty cycle | Less than 70% |
| B. Both of the following conditions are met | - |
| Auxiliary battery voltage | 13 V or higher |
| Target duty cycle | Less than 80% |

**Case 2**

| | |
|---|---|
| Both of the following conditions are met | - |
| Current cut status | Not cut |
| Target duty cycle | 22.5% or higher |

## TYPICAL MALFUNCTION THRESHOLDS

**Case 1**

| | |
|---|---|
| Output duty cycle | 100% or higher |

**Case 2**

| | |
|---|---|
| Output duty cycle | 0% or less |

## 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 [A].
5. Wait 5 seconds or more [B].
6. Enter the following menus: Powertrain / Engine / Trouble Codes [C].
7. 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.
8. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
9. Input the DTC: P001313.
10. Check the DTC judgment result.

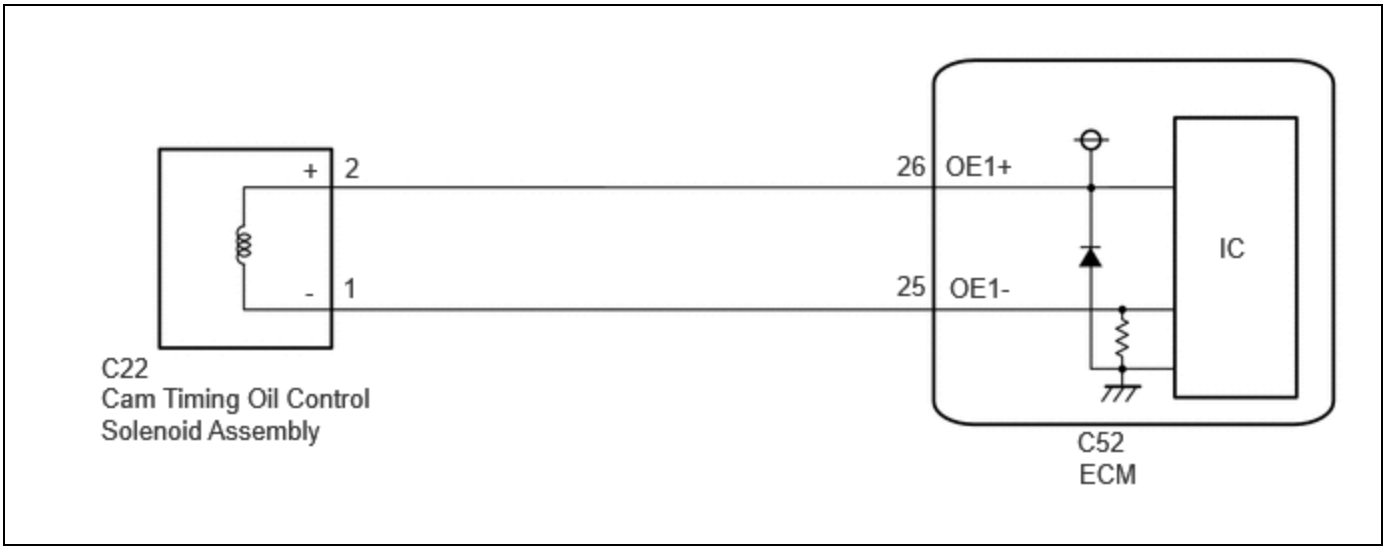
    **HINT:**

    - If the judgment result is NORMAL, the system is normal.
    - If the judgment result is ABNORMAL, the system has a malfunction.

- If the judgment result is INCOMPLETE, perform steps [A] through [C] again.
- [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

## PROCEDURE

| | |
|---|---|
| **1.** | **CLEAR DTC** |

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTC after recording the Freeze Frame Data and DTC.

**Powertrain > Engine > Clear DTCs**

Post-procedure1

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

**NEXT**

| | |
|---|---|
| **2.** | **READ OUTPUT DTC (DTC P001313)** |

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 DTCs.

**Powertrain > Engine > Trouble Codes**

| RESULT | PROCEED TO |
|---|---|
| DTCs are not output | A |
| P001313 is output | B |

Post-procedure1

(d) None

**A** **CHECK FOR INTERMITTENT PROBLEMS**

**B**

| | |
|---|---|
| **3.** | **INSPECT CAM TIMING OIL CONTROL SOLENOID ASSEMBLY** |

Click here INFO

**NG** ▶ **REPLACE CAM TIMING OIL CONTROL SOLENOID ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (CAM TIMING OIL CONTROL SOLENOID ASSEMBLY - ECM)** |

Pre-procedure1

(a) Disconnect the cam timing oil control solenoid 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(C22,C52)**
**Click Connector(C22)**
**Click Connector(C52)**

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION | RESULT |
|---|---|---|---|
| C22-2 (+) - C52-26 (OE1+) | Always | Below 1 Ω | Ω |
| C22-1 (-) - C52-25 (OE1-) | Always | Below 1 Ω | Ω |
| C22-2 (+) or C52-26 (OE1+) - Body ground and other terminals | Always | 10 kΩ or higher | kΩ |
| C22-1 (-) or C52-25 (OE1-) - 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**