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|---|---|---|
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| **Model Year Start:** 2023 | **Model:** Prius Prime | **Prod Date Range:** [03/2023 - ] |
| **Title:** M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P050500; Idle Control System; 2023 - 2024 MY Prius Prius Prime [03/2023 - ] | | |

| | | |
|---|---|---|
| **DTC** | **P050500** | **Idle Control System** |

# DESCRIPTION

The idle speed is controlled by the electronic throttle control system. The electronic throttle control system is comprised of: 1) one valve type throttle body with motor assembly; 2) the throttle actuator, which operates the throttle valve; 3) the throttle position sensor, which detects the opening angle of the throttle valve; 4) the accelerator pedal position sensor, which detects the accelerator pedal position; 5) the ECM, which controls the electronic throttle control system. Based on the target idle speed, the ECM controls the throttle actuator to provide the proper throttle valve opening angle.

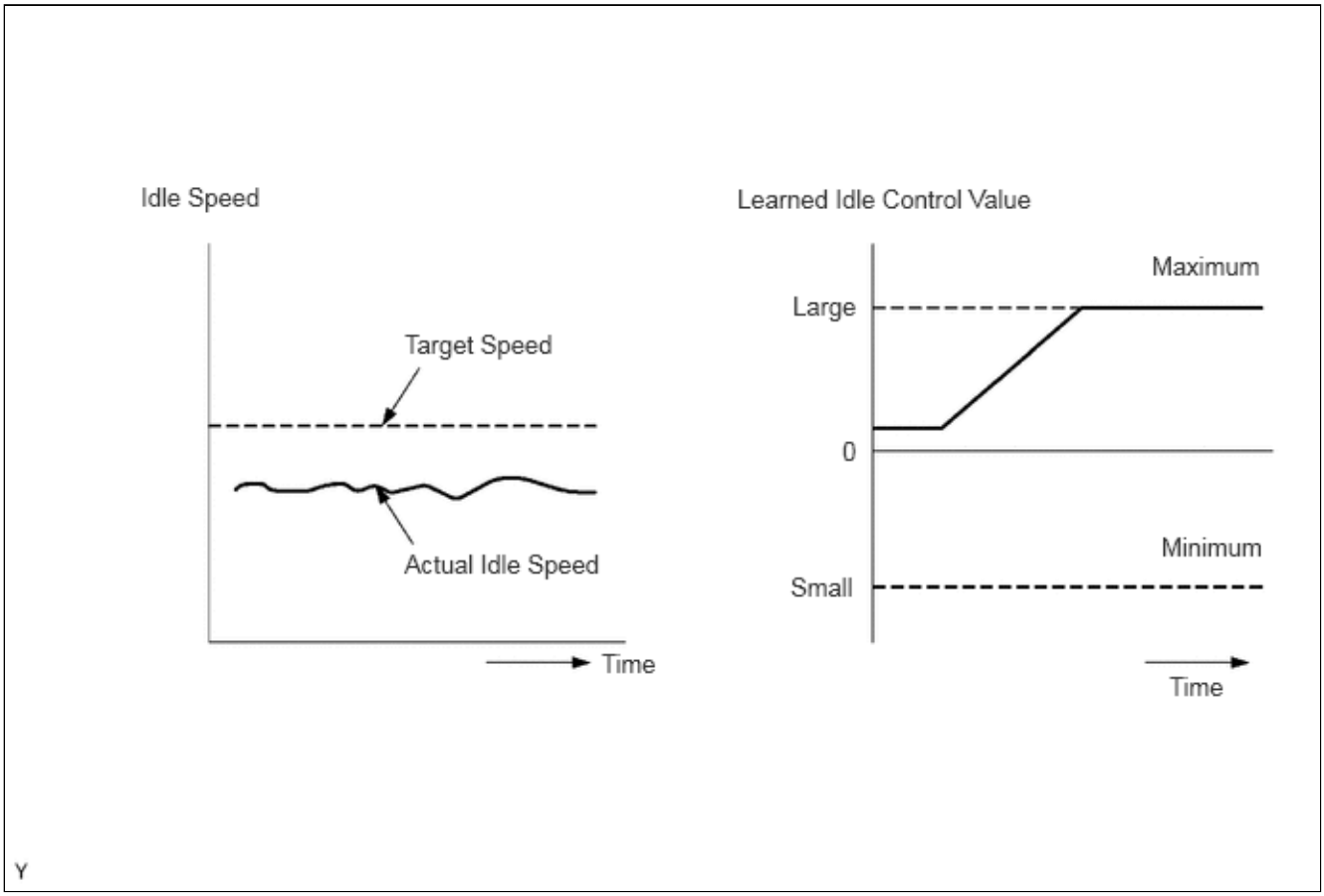
| DTC NO. | DETECTION ITEM | DTC DETECTION CONDITION | TROUBLE AREA | MIL | DTC OUTPUT FROM | PRIORITY | NOTE |
|---|---|---|---|---|---|---|---|
| P050500 | Idle Control System | The idle speed differs largely from the target idle speed (2 trip detection logic). | • Electronic throttle control system<br>• Intake system<br>• PCV hose connection<br>• EGR valve assembly<br>• ECM | Comes on | Engine | B | SAE Code: P0505 |

# MONITOR DESCRIPTION

The ECM monitors the idle speed and idling air flow volume to conduct idle speed control. The ECM determines that the idle speed control system is malfunctioning if either of the following conditions is met:

- The difference between the target engine idle speed and actual engine idle speed exceeds the threshold and the idle control correction value is stuck at the upper or lower limit for 5 seconds or more.
- After driving at a vehicle speed of 10 km/h (6 mph) or more, the difference between the target and actual engine idle speed exceeds the threshold 5 times or more during a driving cycle, and then the system determines that the idle control correction value is stuck at the upper or lower limit, or that the idle control correction value has been

changed by an amount that exceeds the threshold.




## MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0505: Idle speed control system functional check |
| Required Sensors/Components (Main) | Electronic throttle control system |
| Required Sensors/Components (Related) | Crankshaft position sensor<br>Engine coolant temperature sensor<br>Vehicle speed sensor |
| Frequency of Operation | Continuous |
| Duration | 5 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

## TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever the following DTCs are not stored | P0010, P1360, P1362, P1364, P1366, P2614 (Motor drive VVT system control module)<br>P0011 (VVT system - advance)<br>P0012 (VVT system - retard)<br>P0013 (Exhaust VVT oil control solenoid)<br>P0014 (Exhaust VVT system - advance)<br>P0015 (Exhaust VVT system - retard)<br>P0016 (VVT system - misalignment)<br>P0017 (Exhaust VVT system - misalignment) |

| | |
|---|---|
| | P0031, P0032, P101D (Air fuel ratio sensor (sensor 1) heater)<br>P0101, P0102, P0103 (Mass air flow meter)<br>P0107, P0108 (Manifold absolute pressure)<br>P0116, P0117, P0118 (Engine coolant temperature sensor)<br>P0121, P0122, P0123, P0222, P0223, P2135 (Throttle position sensor)<br>P0125 (Insufficient coolant temperature for closed loop fuel control)<br>P014C, P014D, P015A, P015B, P2195, P2196, P2237, P2238, P2239, P2252, P2253 (Air fuel ratio sensor (sensor 1))<br>P0171, P0172 (Fuel system)<br>P0300, P0301, P0302, P0303, P0304 (Misfire)<br>P0335, P0337, P0338 (Crankshaft position sensor)<br>P0340, P0342, P0343 (Camshaft position sensor)<br>P0365, P0367, P0368 (Exhaust camshaft position sensor)<br>P0401 (EGR system (closed))<br>P0657, P0658, P2102, P2103, P2111, P2112, P2119 (Throttle actuator)<br>P11EA, P11EC, P11ED, P11EE, P11EF, P219A, P219C, P219D, P219E, P219F (Air-fuel ratio imbalance)<br>P1452, P1453 (EVAP system)<br>P2228, P2229 (Atmospheric pressure sensor) |
| Engine | Running |

## TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Either of the following conditions is met | 1 or 2 |
| 1. Both of the following conditions A and B met | - |
| A. Engine speed - Target engine speed | Less than -100 rpm, or higher than 150 rpm |
| B. Idle control correction value | -7 Nm or less, or 20 Nm or more for 5 seconds or more |
| 2. Both of the following conditions C and D met | - |
| C. Frequency that all of following conditions (a), (b) and (c) met | 5 times or more |
| (a) Engine speed - Target engine speed | Less than -100 rpm, or higher than 150 rpm |
| (b) Idle control learning value (value when last idle) | -5 Nm or less, or 10 Nm or more |
| (c) Vehicle condition | Stopped after being driven at 10 km/h (6.25 mph) or more |
| D. Amount of change Idle control correction value | -14.84 Nm or less, or 9.91 Nm or more |

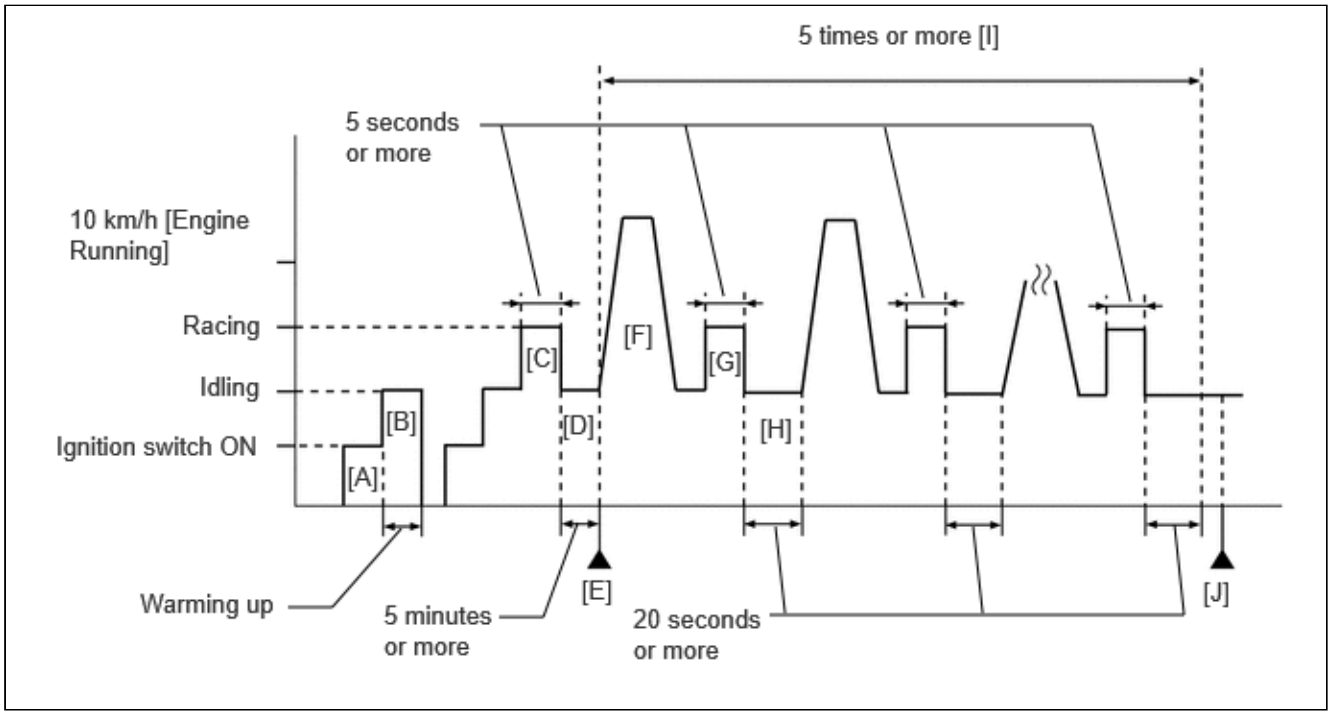
## CONFIRMATION DRIVING PATTERN

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

   Click here INFO
5. Start the engine and warm it up until the engine coolant temperature is 75°C (167°F) or higher with the A/C switch and all the accessories off [B].
6. Turn the ignition switch off and wait for at least 30 seconds.
7. Disconnect the cable from the negative (-) auxiliary battery terminal.

   **HINT:**

   When clearing permanent DTCs, proceed to the next step without disconnecting the cable from the auxiliary battery terminal.
8. Reconnect the cable to the negative (-) auxiliary battery terminal.
9. Put the engine in Inspection Mode (Maintenance Mode).

   Click here INFO
10. Start the engine and rev the engine for 5 seconds or more with the shift lever in P [C].

    **HINT:**

    During charge control, the engine speed is set at idle. Therefore, the engine speed will not increase when the accelerator pedal is depressed. In this case, perform step [C] after charge control has completed.
11. Idle the engine for 5 minutes or more [D].

    **HINT:**

    In order to keep the idling stable, turn off the A/C and all other electric loads and do not perform any shift operations.
12. Enter the following menus: Powertrain / Engine / Trouble Codes [E].
13. 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.
14. Enter the following menus: Powertrain / Engine / Utility / All Readiness.

15. Input the DTC: P050500.
16. Check the DTC judgment result.

**HINT:**

- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows ABNORMAL, the system is malfunctioning.
- If the judgment result shows INCOMPLETE, perform steps [F] through [J].
- [A] to [E]: 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.

17. Press the EV/HV mode selection switch to select HV mode. (for PHEV Model)
18. With the engine running, accelerate the vehicle to 10 km/h (6.25 mph) or more [F].

**CAUTION:**

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

**HINT:**

If the engine stops, further depress the accelerator pedal to restart the engine.

19. Stop the vehicle and rev the engine for 5 seconds or more with the shift lever in P [G].

**HINT:**

During charge control, the engine speed is set at idle. Therefore, the engine speed will not increase when the accelerator pedal is depressed. In this case, perform step [G] after charge control has completed.

20. Idle the engine for 20 seconds or more [H].
21. Repeat the steps [F] through [H] 10 times [I].
22. Enter the following menus: Powertrain / Engine / Trouble Codes [J].
23. 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.

24. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
25. Input the DTC: P050500.
26. Check the DTC judgment result.

**HINT:**

- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows ABNORMAL, the system is malfunctioning.
- [A] to [J]: 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

**HINT:**

- The following conditions may also cause DTC P050500 to be stored:

  a. If the floor carpet or floor mat is resting slightly on the accelerator pedal, causing the accelerator pedal to be slightly depressed and therefore the throttle valve position to be slightly open.
  b. The accelerator pedal is not fully released.

- Refer to "Data List / Active Test" [Engine Speed, Engine Speed and ISC Learning Value].

Click here INFO

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P050500)** |

(a) Read the DTCs.

**Powertrain > Engine > Trouble Codes**

| RESULT | PROCEED TO |
|---|---|
| P050500 and other DTCs are output | A |
| P050500 is output | B |

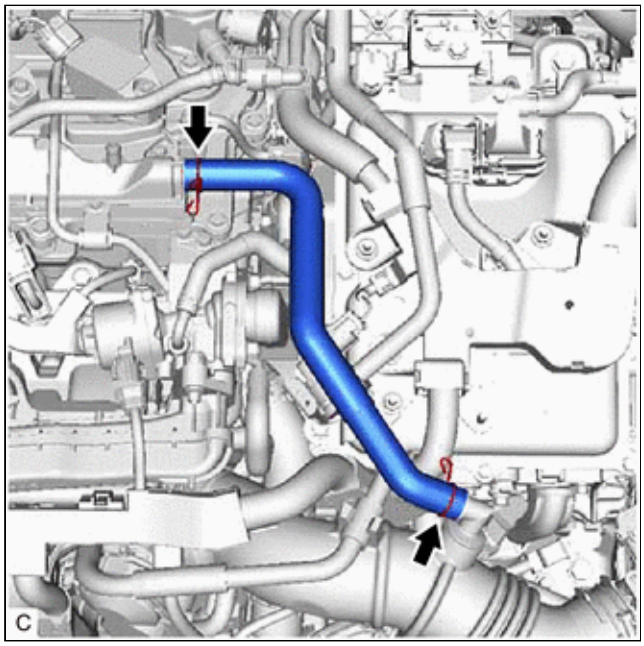
**HINT:**

If any DTCs other than P050500 are output, troubleshoot those DTCs first.

**A** ▶ **GO TO DTC CHART**

**B** ▼

| | |
|---|---|
| **2.** | **CHECK PCV VALVE AND HOSE CONNECTIONS** |




(a) Check the PCV hose connections.

(b) Check the PCV valve.

Click here INFO

OK:

PCV hose and PCV valve are connected correctly and are not damaged.

**NG** ▶ **REPAIR OR REPLACE PCV VALVE OR HOSE**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK INTAKE SYSTEM** |

(a) Check the intake system for vacuum leaks.

Click here INFO

OK:

No leaks from the intake system.

**HINT:**

Perform "Inspection After Repair" after repairing or replacing the intake system.

Click here INFO

**NG** ▶ **REPAIR OR REPLACE INTAKE SYSTEM**

**OK** ▼

| 4. | PERFORM ACTIVE TEST USING GTS (CONTROL THE EGR STEP POSITION) |
|---|---|

Pre-procedure1

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

**Powertrain > Hybrid Control > Utility**

| TESTER DISPLAY |
|---|
| Inspection Mode |

(b) Start the engine and warm it up until the engine coolant temperature is 75°C (167°F) or higher.

**Powertrain > Engine > Data List**

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

**HINT:**

The A/C switch and all accessories should be off.

Procedure1

(c) Confirm that the value of Data List item Engine Independent is "Operate" then check the value of Intake Manifold Absolute Pressure while performing the Active Test.

**Powertrain > Engine > Active Test**

| ACTIVE TEST DISPLAY |
|---|
| Control the EGR Step Position |

| DATA LIST DISPLAY |
|---|
| Intake Manifold Absolute Pressure |
| Engine Independent |

**NOTICE:**

- Make sure that the value of Data List item Engine Independent is "Operate" while performing the Active Test.
- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

The value of Intake Manifold Absolute Pressure changes in response to the EGR step position when the value of Engine Independent is "Operate".

Standard:

| - | CONTROL THE EGR STEP POSITION (ACTIVE TEST) | |
|---|---|---|
| | 0 STEPS | 0 TO 30 STEPS |
| Intake Manifold Absolute Pressure (Data List) | (EGR valve is fully closed) | Intake Manifold Absolute Pressure value is at least +10 kPa (1.45 psi) higher than when EGR valve is fully closed |

**HINT:**

- If the value of Data List item Engine Independent is "Not Opr" when the engine is idling, charge control is being performed. Perform the Active Test after charge control is complete ("Operate" is displayed).
- While performing the Active Test, if the increase in the value of Intake Manifold Absolute Pressure is small, the EGR valve assembly may be malfunctioning.
- Even if the EGR valve assembly is malfunctioning, rough idling or an increase in the value of Intake Manifold Absolute Pressure may occur while performing the Active Test. However, the amount that the value of Intake Manifold Absolute Pressure increases will be smaller than normal.

| RESULT | PROCEED TO |
|---|---|
| Intake Manifold Absolute Pressure value is at least +10 kPa (1.45 psi) higher than when EGR valve is fully closed | A |
| None of the above conditions are met | B |

Post-procedure1

(d) None.

**A** ▶ **GO TO STEP 6**

**B** ▼

| 5. | **INSPECT EGR VALVE ASSEMBLY** |
|---|---|

Pre-procedure1

(a) Remove the EGR valve assembly.

**HINT:**

Click here INFO

Procedure1

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

Post-procedure1

(c) None.

**NG** ▶ **REPLACE EGR VALVE ASSEMBLY**

**OK**

| | |
|---|---|
| **6.** | **INSPECT THROTTLE BODY WITH MOTOR ASSEMBLY (THROTTLE VALVE)** |

(a) Check the throttle body with motor assembly condition.

OK:
Throttle valve is not contaminated with foreign matter and moves smoothly.

**NG** ▶ **REPLACE THROTTLE BODY WITH MOTOR ASSEMBLY**

**OK**

| | |
|---|---|
| **7.** | **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**

| | |
|---|---|
| **8.** | **CONFIRM WHETHER DTC OUTPUT RECURS (DTC P050500)** |

Pre-procedure1

(a) Drive the vehicle in accordance with the driving pattern described in Confirmation Driving Pattern.

Procedure1

(b) Read the pending DTCs.

**Powertrain > Engine > Trouble Codes**

| RESULT | PROCEED TO |
|---|---|
| DTCs are not output | A |
| P050500 is output | B |

Post-procedure1

(c) None.

**A** ▶ **END**

**B** ▶ **REPLACE ECM**