Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BLUD
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P008700; Fuel Rail / System Pressure - Too Low; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

DTC	**P008700**	**Fuel Rail / System Pressure - Too Low**

DESCRIPTION

The high-pressure direct injection fuel system consists of a spill control valve, check valve, fuel relief valve, fuel pressure sensor (for high pressure side), fuel (engine room side) pump assembly (for high pressure side) and direct fuel injector assemblies. The spill control valve adjusts the return volume of high-pressure fuel. The check valve mechanically opens and closes the path to the fuel delivery pipe. The relief valve releases the fuel back to the fuel tank if there is a malfunction in the high-pressure fuel system. The fuel (engine room side) pump assembly (for high pressure side) is installed to the cylinder head cover and operated by a cam installed to the end of the exhaust camshaft. Rotation of the camshaft moves the pump plunger inside the fuel (engine room side) pump assembly (for high pressure side) up and down, pressurizing the fuel. The pressurized fuel opens the check valve and is pumped into the fuel delivery pipe. The ECM controls the spill control valve to adjust the fuel pressure between 3.0 and 25 MPa (31 and 254 kgf/cm ^{2} , 435 and 3625 psi) and monitors signals from the fuel pressure sensor (for high pressure side) to maintain the target fuel pressure.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P008700	Fuel Rail / System Pressure - Too Low	Although the ECM is not requesting the fuel (engine room side) pump assembly (for high pressure side) to open the spill control valve, fuel pressure decreases 5 MPa (51.0 kgf/cm ^{2} , 725 psi) from target pressure for about 10 seconds (1 trip detection logic).	• Leak of fuel • Fuel pipe (fuel tank - fuel (engine room side) pump assembly (for high pressure side)) • Fuel pipe (fuel (engine room side) pump assembly (for high pressure side) - direct fuel injector assembly) • Direct fuel injector assembly • Fuel (engine room side) pump assembly (for high pressure side) • Fuel pump (for low pressure	Comes on	Engine	B	SAE Code: P0087

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
			side) • Fuel pressure sensor (for high pressure side) • Fuel system • ECM				

MONITOR DESCRIPTION

If the fuel pressure (for high pressure side) decreases despite an increase request signal being sent to the fuel (engine room side) pump assembly (for high pressure side) by the ECM, the ECM will illuminate the MIL and store this DTC.

MONITOR STRATEGY

Related DTCs	P0087: Fuel pressure too low
Required Sensors/Components (Main)	Fuel pressure sensor (for high pressure side)
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	About 10 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Fuel pressure sensor (for high pressure side) malfunction (P0192, P0193)	Not detected
High pressure fuel pump malfunction (P1235)	Not detected
Fuel injector driver malfunction (P0201, P0202, P0203, P0204, P062D)	Not detected
Time after engine start	0.2 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

When Using Direct Injection	-
Duration that both of the following conditions (a) and (b) are met	10 seconds or more
(a) Difference in fuel pressure between actual and target	Less than -5 MPa (-51.0 kgf/cm ^{2} , -725 psi)
(b) Actual discharge rate of high pressure fuel pump	240 mm ^{3} /st or more
When Using Only Port Injection	-
Duration that both of the following conditions (a) and (b) are met	15 seconds or more
(a) Difference in fuel pressure between actual and target	Less than -2 MPa (-20.4 kgf/cm ^{2} , -290 psi)

(b) Actual discharge rate of high pressure fuel pump	125 mm ^{3} /st or more

CONFIRMATION DRIVING PATTERN

HINT:

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

  Click here INFO
- Permanent misfire and fuel system DTCs can only be cleared when performing the universal trip driving pattern when no malfunction is detected.

1. Record the Freeze Frame Data.
2. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
3. Turn the ignition switch off and wait for at least 30 seconds.
4. Put the engine in Inspection Mode (Maintenance Mode).

   Click here INFO
5. Start the engine.
6. Based on the engine speed, engine load, injection mode and other conditions displayed in the Freeze Frame Data, reproduce the conditions present when the DTC was stored.
7. Enter the following menus: Powertrain / Engine / Trouble Codes.
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: P008700.
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 has a malfunction.

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 FUEL LEAK**

(a) Check around and beneath the vehicle for fuel leaks, fumes, etc.

OK:

No fuel leaks present.

NG ▶ **REPAIR OR REPLACE FUEL LEAK POINT**

OK ▼

2.	**CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P008700)**

(a) Read the DTCs.

Powertrain > Engine > Trouble Codes

RESULT	PROCEED TO
P008700 and other DTCs are output	A
P008700 is output	B

HINT:

If any DTCs other than P008700 are output, troubleshoot those DTCs first.

A ▶ **GO TO DTC CHART**

B ▼

3.	**CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST**

(a) Has the vehicle run out of fuel in the past?

YES ▶ **DTC CAUSED BY RUNNING OUT OF FUEL**

NO ▼

4.	**READ FREEZE FRAME DATA (TARGET FUEL PRESSURE (LOW) / TARGET FUEL PRESSURE 2 AND LOW FUEL PRESSURE SENSOR)**

Pre-procedure1

(a) Using the GTS, confirm the vehicle conditions recorded in the Freeze Frame Data which were present when the DTC was stored.

HINT:

- Check the Freeze Frame Data sets recorded the moment the DTC was stored and after the DTC was stored.
- Using the Freeze Frame Data, confirm the vehicle conditions when the DTC was stored, such as if the engine was idling with the shift state P, D or N or if the vehicle was being driven at a constant speed or accelerating.

Powertrain > Engine > DTC(P008700) > Freeze Frame Data

TESTER DISPLAY
Target Fuel Pressure (Low) / Target Fuel Pressure 2
Low Fuel Pressure Sensor

Procedure1

(b) Compare the difference in pressure between "Target Fuel Pressure (Low) / Target Fuel Pressure 2 and Low Fuel Pressure Sensor".

RESULT	PROCEED TO
Difference between Target Fuel Pressure (Low) / Target Fuel Pressure 2 and Low Fuel Pressure Sensor is within 200 kPa	A
Difference between Target Fuel Pressure (Low) / Target Fuel Pressure 2 and Low Fuel Pressure Sensor is more than 200 kPa	B

Post-procedure1

(c) None

B ▶ **GO TO FUEL PUMP CONTROL CIRCUIT**

A ▼

5.	**CHECK MISFIRE COUNT OF DIRECT INJECTION**

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 reaches 75°C (167°F) or higher.

Powertrain > Engine > Data List

TESTER DISPLAY
Coolant Temperature

Procedure1

(c) According to the display on the GTS, read the Data List with the Active Test "Control the Injection Mode" set to Direct.

Powertrain > Engine > Active Test

ACTIVE TEST DISPLAY
Control the Injection Mode

DATA LIST DISPLAY
Injection Mode
Misfire Count Cylinder #1
Misfire Count Cylinder #2
Misfire Count Cylinder #3
Misfire Count Cylinder #4

INJECTION MODE	MISFIRE COUNT	PROCEED TO
Direct	There are no misfire counts	A
	3 cylinders or more have misfire counts	
	1 or 2 cylinders have misfire counts	B

Post-procedure1

(d) None

B REPLACE DIRECT FUEL INJECTOR ASSEMBLY

A

6.	INSPECT FUEL PRESSURE SENSOR (FOR HIGH PRESSURE SIDE)

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) Check that the fuel pressure fluctuates when the engine condition changes from idling to racing.

Powertrain > Engine > Data List

TESTER DISPLAY
Fuel Pressure (High)

RESULT	PROCEED TO
Fuel pressure does not rise	A
Fuel pressure does not fluctuate	B
Fuel pressure fluctuates	C

Post-procedure1

(d) None

B REPLACE FUEL PRESSURE SENSOR (FOR HIGH PRESSURE SIDE)

C GO TO STEP 9

A

7.	**CHECK FUEL PUMP OPERATION (FOR LOW PRESSURE SIDE)**

Click here INFO

NG ▶ **GO TO FUEL PUMP CONTROL CIRCUIT**

OK

8.	**CHECK FUEL PRESSURE (FOR LOW PRESSURE SIDE)**

Click here INFO

NG ▶ **REPAIR OR REPLACE FUEL SYSTEM**

OK

9.	**REPLACE FUEL (ENGINE ROOM SIDE) PUMP ASSEMBLY (FOR HIGH PRESSURE SIDE)**

HINT:

Click here INFO

NEXT

10.	**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

11.	**CHECK IF DTC OUTPUT RECURS (SEE IF DTC P008700 IS OUTPUT AGAIN)**

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
P008700 is output	B

Post-procedure1

(c) None

A **END**

B **REPLACE ECM**