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<b>Model Year Start:</b> 2023	<b>Model:</b> Prius Prime	<b>Prod Date Range:</b> [03/2023 - ]
<b>Title:</b> M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P12D501; Fuel Pump Control General Electrical Failure; 2023 - 2024 MY Prius Prime [03/2023 - ]		

<b>DTC</b>	<b>P12D501</b>	<b>Fuel Pump Control General Electrical Failure</b>
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## DESCRIPTION

Refer to DTC P062712.

Click here [INFO](#)

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P12D501	Fuel Pump Control General Electrical Failure	When the fuel pump control ECU operation duty ratio is 3 to 65%, the fuel pump control ECU detects a short in the fuel pump circuit for 3 seconds or more (2 trip detection logic).	<ul style="list-style-type: none"> <li>Short in fuel pump control ECU circuit</li> <li>Fuel pump (for low pressure side)</li> <li>Fuel pump control ECU</li> </ul>	Comes on	Engine	A	SAE Code: P12D5

### Related Data List

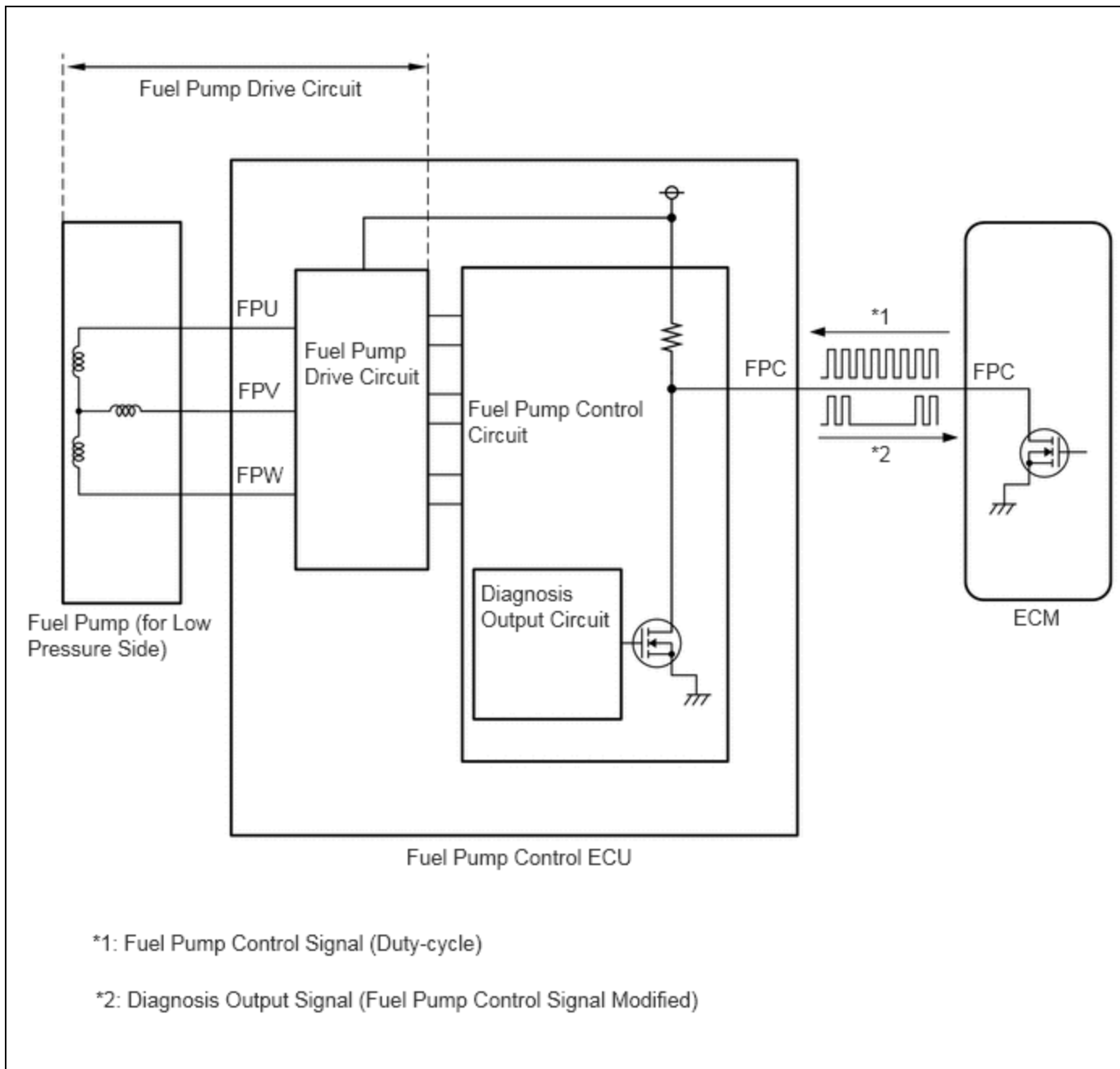
DTC NO.	DATA LIST
P12D501	Fuel Pump Control Duty Ratio

## MONITOR DESCRIPTION

The fuel pump control ECU monitors the fuel pump drive circuit.

When a malfunction is detected in the fuel pump drive circuit, the diagnosis output circuit in the fuel pump control ECU modifies the operation signal sent by the ECM to indicate that there is a malfunction.

When the fuel pump control ECU operation duty ratio is 3 to 65%, and short in the fuel pump circuit is detected for 3 seconds or more, the diagnosis output circuit in the fuel pump control ECU modifies the operation signal sent by the ECM to indicate that there is a malfunction and the ECM stores a DTC.



## MONITOR STRATEGY

Related DTCs	P12D5: Fuel pump circuit short
Required Sensors/Components (Main)	Fuel pump control ECU
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

## TYPICAL ENABLING CONDITIONS

Monitor runs whenever the following DTCs are not stored	None
All of the following conditions are met	-
Output duty cycle	3 to 65%
Auxiliary battery voltage	10.5 V or higher
Ignition switch	ON
Starter	Off

## TYPICAL MALFUNCTION THRESHOLDS

Fuel pump circuit short error from fuel pump control module	Received
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## 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

- Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
- Turn the ignition switch off and wait for at least 30 seconds.
- Put the engine in Inspection Mode (Maintenance Mode).

[Click here](#) INFO

- Start the engine and wait 10 seconds or more [A].
- Enter the following menus: Powertrain / Engine / Trouble Codes [B].
- 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.

- Enter the following menus: Powertrain / Engine / Utility / All Readiness.
- Input the DTC: P12D501.
- 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, run the engine at an engine speed of 2000 rpm or more for 10 seconds or more and check the DTC judgment result again.
- [A] to [B]: 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 P062712.

Click here [INFO](#)

## 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

<b>1.</b>	<b>INSPECT FUEL PUMP CONTROL ECU</b>
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Pre-procedure1

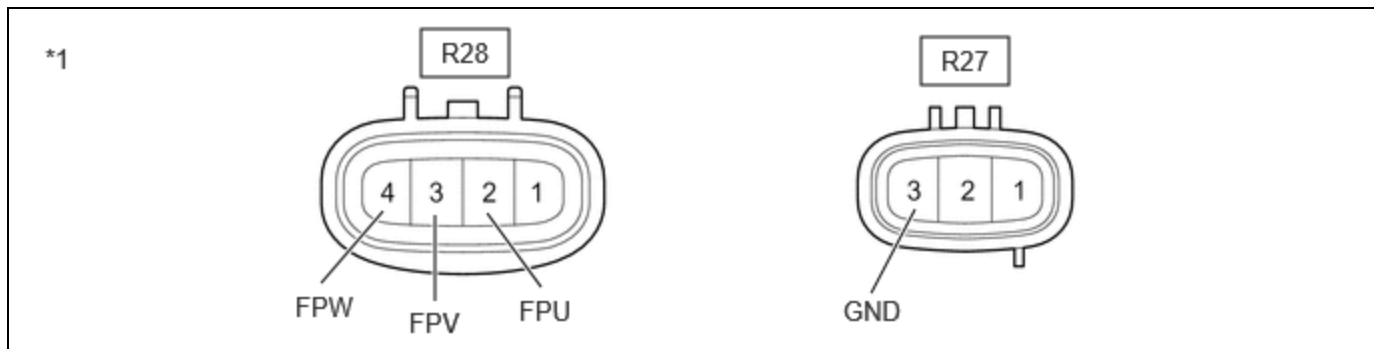
- (a) Remove the fuel pump control ECU.

### HINT:

Click here [INFO](#)

Procedure1

- (b) Measure the resistance according to the value(s) in the table below.



*1	Component without harness connected (Fuel Pump Control ECU)	-	-
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Standard Resistance:



[Click Location & Routing\(R28,R27\)](#)

[Click Connector\(R28\)](#)

[Click Connector\(R27\)](#)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
R28-2 (FPU) - R27-3 (GND)	Always	2 kΩ or higher	kΩ
R28-3 (FPV) - R27-3 (GND)	Always	2 kΩ or higher	kΩ
R28-4 (FPW) - R27-3 (GND)	Always	2 kΩ or higher	kΩ

**HINT:**

This procedure checks for an internal short of the fuel pump control ECU when its transistor is stuck on.

Post-procedure1

(c) None.

**NG** ▶ REPLACE FUEL PUMP CONTROL ECU

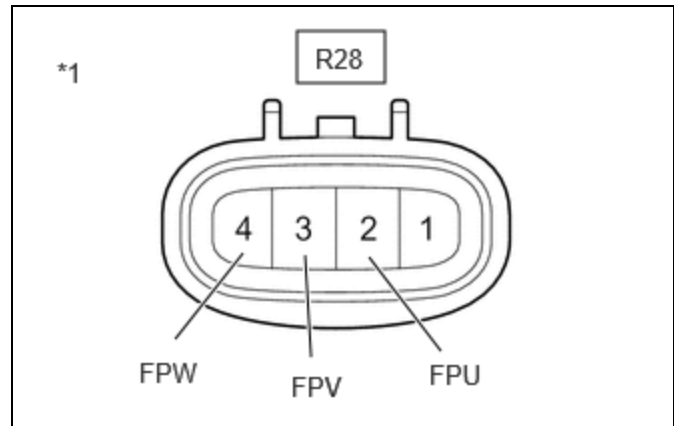
**OK**



**2. PERFORM ACTIVE TEST USING GTS (FUEL PUMP SINGLE PHASE ENERGIZATION)**

Pre-procedure1

(a) Disconnect the R28 fuel pump control ECU connector.



\*1 Component without harness connected (Fuel Pump Control ECU)

Procedure1

(b) Operate the fuel pump control ECU using the Active Test function and measure the voltage according to the value(s) in the table below.

**Powertrain > Engine > Active Test**

TESTER DISPLAY
Fuel Pump Single Phase Energization

Standard Voltage:



[Click Location & Routing\(R28\)](#)

[Click Connector\(R28\)](#)

TESTER CONNECTION	GTS OPERATION	SPECIFIED CONDITION
R28-2 (FPU) - Body ground	U Phase	4.4 to 8.4 V*
R28-3 (FPV) - Body ground		8 to 15.5 V
R28-4 (FPW) - Body ground		8 to 15.5 V
R28-3 (FPV) - Body ground	V Phase	4.4 to 8.4 V*
R28-2 (FPU) - Body ground		8 to 15.5 V
R28-4 (FPW) - Body ground		8 to 15.5 V
R28-4 (FPW) - Body ground	W Phase	4.4 to 8.4 V*
R28-2 (FPU) - Body ground		8 to 15.5 V
R28-3 (FPV) - Body ground		8 to 15.5 V

**HINT:**

- \*: This Active Test limits the fuel pump control ECU output duty cycle to 50%. Therefore, the output voltage of the fuel pump control ECU will be approximately 50% of the power source voltage (+B terminal).
- Before performing this inspection, check that the auxiliary battery voltage is between 11 and 14 V (not depleted).

Post-procedure1

(c) None.

**NG** **REPLACE FUEL PUMP CONTROL ECU**

**OK**



<b>3.</b>	<b>CHECK HARNESS AND CONNECTOR (FUEL PUMP CONTROL ECU - FUEL PUMP (FOR LOW PRESSURE SIDE))</b>
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Pre-procedure1

- (a) Disconnect the fuel pump control ECU connector.
- (b) Disconnect the fuel pump (for low pressure side) connector.

Procedure1

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



[Click Location & Routing\(R28,R50\).](#)

[Click Connector\(R28\).](#)

[Click Connector\(R50\).](#)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION	RESULT
R28-2 (FPU) or R50-3 (BLPU) - Body ground and other terminals	Always	10 kΩ or higher	kΩ
R28-3 (FPV) or R50-4 (BLPV) - Body ground and other terminals	Always	10 kΩ or higher	kΩ
R28-4 (FPW) or R50-2 (BLPW) - Body ground and other terminals	Always	10 kΩ or higher	kΩ

Post-procedure1

(d) None.

**NG** ► REPAIR OR REPLACE HARNESS OR CONNECTOR

**OK**



<b>4.</b>	<b>REPLACE FUEL PUMP (FOR LOW PRESSURE SIDE)</b>
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**HINT:**

for HEV Model: [Click here](#)

for PHEV Model: [Click here](#)

**NEXT** ► END

