Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BM20
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P319000,P319100; Poor Engine Power; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

DTC	**P319000**	**Poor Engine Power**

DTC	**P319100**	**Engine does not Start**

DESCRIPTION

The ECM receives signals from the hybrid vehicle control ECU such as the requested engine torque, target engine speed and engine cranking status, and controls the engine output based on the target engine speed and requested torque.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P319000	Poor Engine Power	When all of the following conditions are met (1 trip detection logic): • The engine speed is 650 rpm or more (varies depending on the engine coolant temperature). • Engine torque requested by the hybrid vehicle control ECU exceeds a certain value. • The hybrid vehicle control ECU judges that the engine has started. • The fuel tank is not empty. • Communication between the hybrid vehicle control ECU and ECM is normal. • The actual engine torque is less than 20% of the requested engine torque for 6	• Intake system • Throttle with motor body assembly • Fuel system • Engine assembly • Mass air flow meter sub-assembly • Out of fuel • Engine coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • EGR valve assembly • Fuel pump control circuit • PCV valve and hose	Comes on	Engine	B	SAE Code: P3190

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
		seconds, or until the crankshaft rotates 100 times (whichever takes longer, differs depending on the engine coolant temperature).	• PCV hose connections • ECM				
P319100	Engine does not Start	When all of the following conditions are met (1 trip detection logic): • The engine speed is 650 rpm or more (varies depending on the engine coolant temperature). • The fuel tank is not empty. • Communication between the hybrid vehicle control ECU and ECM is normal. • After the hybrid vehicle control ECU sends the engine start request signal, it does not detect engine start (generation of engine torque) for 6 seconds, or until the crankshaft rotates 100 times (whichever takes longer, differs depending on the engine coolant temperature).	• Intake system • Throttle with motor body assembly • Fuel system • Engine assembly • Mass air flow meter sub-assembly • Out of fuel • Engine coolant temperature sensor • Crankshaft position sensor • Camshaft position sensor • EGR valve assembly • Fuel pump control circuit • PCV valve and hose • PCV hose connections • ECM	Comes on	Engine	B	SAE Code: P3191

MONITOR DESCRIPTION

1. The ECM receives signals such as requested engine torque, target engine speed and engine cranking status from the hybrid vehicle control ECU.
2. The ECM controls engine start and stop and the throttle valve angle based on the signals received from the hybrid vehicle control ECU.
3. The ECM receives the actual engine torque calculated by the hybrid vehicle control ECU based on the generator torque.

4. When the actual engine torque is less than 20% of the requested engine torque*, the ECM judges that the engine output is abnormal and stores DTC P319000.

   (The engine may not have started in the above situation.)

   *: Requested torque = Requested Engine Torque (kW) / HV Target Engine Speed (rpm) x 9549
5. If the ECM does not detect the engine start torque (actual engine torque) even though it has received an engine start request and started the engine, it stores DTC P319100.

HINT:

- When DTCs P319000, P319100 and P319300 are output, the engine may be stopped due to the engine condition.

  At this time, after adding fuel or performing repairs, clear the DTCs. Then turn the ignition switch off to return to the normal condition.
- When this DTC is output and the engine is stopped, the HV battery cannot be charged since the vehicle is driven with the motor only. If the vehicle continues to be driven under this condition, the HV battery will become depleted and the ignition switch will not be able to be turned on (READY).
- When DTC P319000 or P319100 is stored, the engine torque has dropped by 80% or the engine cannot be started. If any DTCs that indicate malfunctioning of engine related parts are stored at the same time, repair the malfunctioning parts first.
- If engine knock is detected due to mechanical noise or a knock control sensor being loose, the ignition timing (Knock F/B Value, Knock Correct Learn Value) may be excessively retarded and DTC P319000 may be stored.

  Relevant Data List Items:

ECM (POWERTRAIN / ENGINE / DATA LIST)			
HV Target Engine Speed	Engine Speed	Requested Engine Torque	Actual Engine Torque
Throttle Position Command	Throttle Position Sensor No.1 Voltage	Calculate Load	Coolant Temperature
Short FT B1S1	Long FT B1S1	Target EGR Valve Position No.1	Ignition Timing Cylinder #1
Knock F/B Value	Knock Correct Learn Value	-	-

HYBRID VEHICLE CONTROL ECU (POWERTRAIN / HYBRID CONTROL / DATA LIST)			
Target Engine Revolution	Engine Speed	Target Engine Power	Coolant Temperature
Engine Idling Request	-	-	-

MONITOR STRATEGY

Related DTCs	P3190: Poor engine power P3191: Engine does not start
Required Sensors/Components (Main)	Crankshaft position sensor
Required Sensors/Components (Related)	Hybrid vehicle control ECU
Frequency of Operation	Continuous
Duration	100 engine revolutions or 6 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P3190 and P3191

Monitor runs whenever the following DTCs are not stored	None
Fuel cut operation	Not operated
Engine speed	650 rpm or more (varies with engine coolant temperature)
Communication with hybrid vehicle control ECU	No malfunction

TYPICAL MALFUNCTION THRESHOLDS

P3190

Time for low engine torque	100 engine revolutions or more, and 6 seconds or more (varies with engine coolant temperature)
Fuel level	Not empty
Ratio of estimated torque against target torque	Less than 20%

P3191

Engine start no-determination time (receive from hybrid vehicle control ECU)	100 engine revolutions or more, and 6 seconds or more (varies with engine coolant temperature)
Fuel level	Not empty
Engine speed is a fixed value or more	-

CONFIRMATION DRIVING PATTERN

NOTICE:

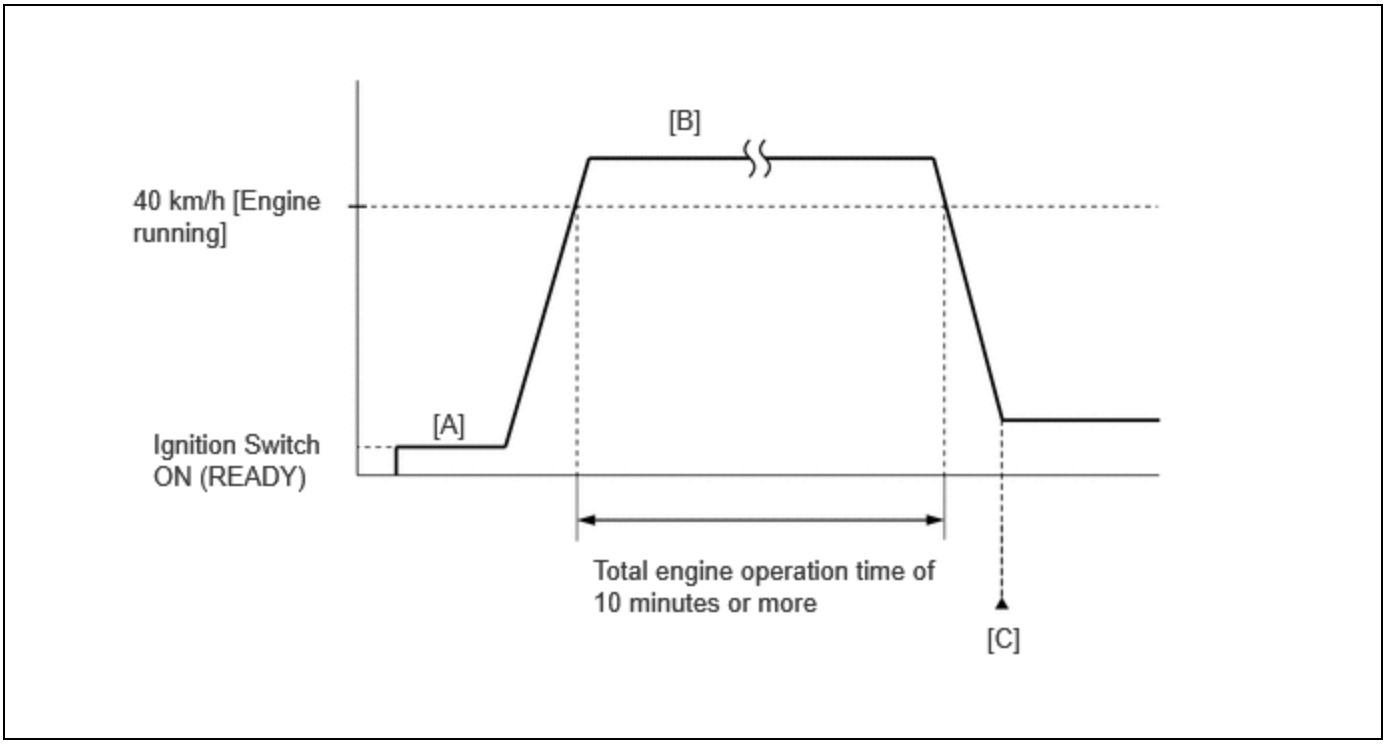
If the MIL or a master warning light illuminates, immediately end the confirmation driving pattern. If DTCs P319000, P319100 and P319300 are output and the engine is stopped, the HV battery will no longer be chargeable and the distance that the vehicle can be driven will be limited.

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. Apply the parking brake firmly.
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. Turn the ignition switch to ON (READY).
5. Fully depress the accelerator pedal for 10 seconds with the vehicle stopped, the shift lever in P and the brake pedal depressed [A].

NOTICE:

As soon as the engine starts, release the accelerator pedal.

6. Release the parking brake.
7. Press the EV/HV mode selection switch to select HV mode. (for PHEV Model)
8. Drive the vehicle at an average of approximately 40 km/h (25 mph) or more until the total engine operation time is 10 minutes or more [B].

CAUTION:

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

HINT:

- It is not necessary to maintain the vehicle speed at 40 km/h (25 mph) throughout the road test.
- If the engine stops, further depress the accelerator pedal to restart the engine.

9. Enter the following menus: Powertrain / Engine / Trouble Codes [C].
10. 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.

11. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
12. Input the DTC: P319000 or P319100.
13. 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 the Confirmation Driving Pattern and check the DTC judgment result 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.

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:

- Performing this diagnosis procedure repeatedly for symptom confirmation may cause the SOC to drop, preventing the system from entering the READY-on state. In this case, use the THS charger to charge the HV battery.
- Cranking the engine once causes the SOC to drop approximately 1%.
- Charging the HV battery once (10 minutes) using the THS charger restores the SOC approximately 2%.
- Charging the HV battery using the THS charger takes approximately 10 minutes when the HV battery temperature is 25°C (77°F) or approximately 30 minutes when the HV battery temperature is 0°C (32°F).
- The THS charger is a supplemental charging device that charges the HV battery enough to enable the engine to start (the vehicle can enter the READY-on state).

PROCEDURE

1.	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P319000, P319100 AND/OR P319300)**

(a) Check for DTCs and freeze frame data and write them down.

Powertrain > Engine > Trouble Codes

RESULT	PROCEED TO
P319000, P319100 or P319300 and other DTCs are output	A
P319300 is output	B

RESULT	PROCEED TO
P319000 or P319100 is output	C

HINT:

If any SFI system DTCs other than DTC P319000, P319100 or P319300 are output, perform troubleshooting for those DTCs first.

A ▶ **GO TO DTC CHART**

B ▶ **GO TO DTC P319300**

C ▼

2.	**CHECK SHORTAGE OF FUEL**

(a) Check the amount of fuel remaining.

OK:

There is enough fuel.

HINT:

- DTCs P319000, P319100 and/or P319300 may be output if the vehicle ran out of fuel in the past.
- If not enough fuel is added, DTC P319000, P319100 or P319300 may be output again. If the engine cannot be started because the vehicle is out of fuel, add fuel until the fuel level warning turns off.

NG ▶ **REFILL FUEL**

OK ▼

3.	**CLEAR DTC**

Pre-procedure1

(a) None

Procedure1

(b) Clear the DTCs.

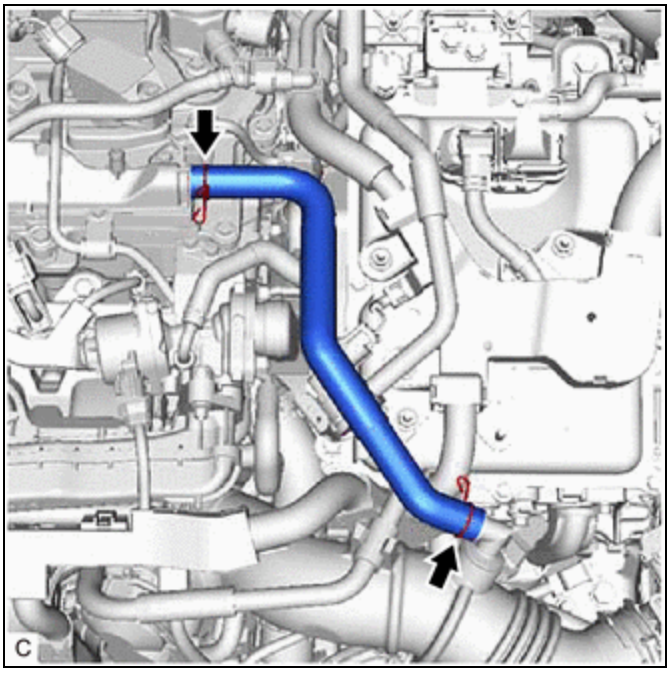
Powertrain > Engine > Clear DTCs

Post-procedure1

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

NEXT

4.	**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

5.	**CHECK INTAKE SYSTEM**

(a) Check the intake system for vacuum leaks.

Click here INFO

OK:
No leaks from intake system.

HINT:

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

Click here INFO

NG ▶ **REPAIR OR REPLACE INTAKE SYSTEM**

OK ▼

6.	**CHECK FOR UNUSUAL NOISE OR VIBRATION WHEN STARTING ENGINE OR REVVING**

OK:

Unusual noise and vibration do not occur.

NG ▶ **REPAIR OR REPLACE MALFUNCTIONING PARTS**

OK ▼

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

Click here INFO

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

OK ▼

8.	**INSPECT THROTTLE BODY WITH MOTOR ASSEMBLY**

Click here INFO

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

OK ▼

9.	**INSPECT MASS AIR FLOW METER SUB-ASSEMBLY**

(a) Inspect the mass air flow meter sub-assembly, referring to On-vehicle Inspection for Mass Air Flow Meter Sub-assembly.

Click here INFO

(b) Inspect the mass air flow meter sub-assembly, referring to Inspection for Mass Air Flow Meter Sub-assembly.

Click here INFO

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

OK ▼

10.	**INSPECT ENGINE COOLANT TEMPERATURE SENSOR**

Click here INFO

NG ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK ▼

11.	**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.
- If the Active Test cannot be performed due to a malfunction such as the engine not starting, perform the EGR valve assembly inspection the following step.

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 13**

B ▼

12.	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 ▼

13.	REPLACE CRANKSHAFT POSITION SENSOR

HINT:

Click here INFO

NEXT

14.	**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

15.	**CHECK WHETHER DTC OUTPUT RECURS (DTC P319000 OR P319100)**

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
P319000 or P319100 is output	B

Post-procedure1

(c) None

A **END**

B

16.	**REPLACE CAMSHAFT POSITION SENSOR (FOR INTAKE CAMSHAFT)**

HINT:

Click here INFO

NEXT

17.	**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

18.	**CHECK WHETHER DTC OUTPUT RECURS (DTC P319000 OR P319100)**

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
P319000 or P319100 is output	B

Post-procedure1

(c) None

A ▶ **END**

B

▼

19.	**REPLACE CAMSHAFT POSITION SENSOR (FOR EXHAUST CAMSHAFT)**

HINT:

Click here INFO

NEXT

▼

20.	**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

▼

21.	**CHECK WHETHER DTC OUTPUT RECURS (DTC P319000 OR P319100)**

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
P319000 or P319100 is output	B

Post-procedure1

(c) None

A ▶ **END**

B

22.	**REPLACE ECM**

HINT:

Click here INFO

NEXT

23.	**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

24.	**CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED**

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

Post-procedure1

(c) None

NEXT **END**