Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BM0N
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P11EA00,P11EC00-P11EF00,P219A00,P219C00-P219F00; Bank 1 Air-Fuel Ratio Imbalance (Port); 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

DTC	**P11EA00**	**Bank 1 Air-Fuel Ratio Imbalance (Port)**

DTC	**P11EC00**	**Cylinder #1 Air-Fuel Ratio Imbalance (Port)**

DTC	**P11ED00**	**Cylinder #2 Air-Fuel Ratio Imbalance (Port)**

DTC	**P11EE00**	**Cylinder #3 Air-Fuel Ratio Imbalance (Port)**

DTC	**P11EF00**	**Cylinder #4 Air-Fuel Ratio Imbalance (Port)**

DTC	**P219A00**	**Bank 1 Air-Fuel Ratio Imbalance**

DTC	**P219C00**	**Cylinder 1 Air-Fuel Ratio Imbalance**

DTC	**P219D00**	**Cylinder 2 Air-Fuel Ratio Imbalance**

DTC	**P219E00**	**Cylinder 3 Air-Fuel Ratio Imbalance**

DTC	**P219F00**	**Cylinder 4 Air-Fuel Ratio Imbalance**

DESCRIPTION

Refer to DTC P003012.

Click here INFO

Refer to DTC P030000.

Click here INFO

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P11EA00	Bank 1 Air-Fuel Ratio Imbalance (Port)	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system • Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM	Comes on	Engine	B	SAE Code: P11EA
P11EC00	Cylinder #1 Air-Fuel Ratio Imbalance (Port)	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system • Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM	Comes on	Engine	B	SAE Code: P11EC
P11ED00	Cylinder #2 Air-Fuel Ratio Imbalance (Port)	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system	Comes on	Engine	B	SAE Code: P11ED

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
			• Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM				
P11EE00	Cylinder #3 Air-Fuel Ratio Imbalance (Port)	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system • Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM	Comes on	Engine	B	SAE Code: P11EE
P11EF00	Cylinder #4 Air-Fuel Ratio Imbalance (Port)	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system • Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM	Comes on	Engine	B	SAE Code: P11EF

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P219A00	Bank 1 Air-Fuel Ratio Imbalance	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system • Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM	Comes on	Engine	B	SAE Code: P219A
P219C00	Cylinder 1 Air-Fuel Ratio Imbalance	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system • Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM	Comes on	Engine	B	SAE Code: P219C
P219D00	Cylinder 2 Air-Fuel Ratio Imbalance	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system	Comes on	Engine	B	SAE Code: P219D

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
			• Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM				
P219E00	Cylinder 3 Air-Fuel Ratio Imbalance	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system • Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM	Comes on	Engine	B	SAE Code: P219E
P219F00	Cylinder 4 Air-Fuel Ratio Imbalance	The difference in air fuel ratios between the cylinders exceeds the threshold (2 trip detection logic).	• Port fuel injector assembly • Direct fuel injector assembly • Intake system • Gas leaks from exhaust system • Ignition system • Compression pressure • Air fuel ratio sensor (sensor 1) • ECM	Comes on	Engine	B	SAE Code: P219F

MONITOR DESCRIPTION

Fuel System Air Fuel Ratio Cylinder Imbalance Monitor

The ECM uses the air fuel ratio sensor (sensor 1) and crankshaft position sensor to monitor the difference in air fuel ratios between the cylinders caused by differences in injection volumes between the cylinders, leakage in the intake or exhaust system, etc.

When the air fuel ratios of the cylinders are lean or rich with respect to each other, the ECM determines that there is a malfunction, illuminates the MIL and stores a DTC.

Air Fuel Ratio Sensor (Sensor 1) Monitoring Method: P11EA00 (for port injection), or P219A00 (for direct injection) is stored primarily when a rich side imbalance is detected.

When the system detects a difference in air fuel ratios between the cylinders due to fluctuation in the air fuel ratio sensor (sensor 1) output over 1 engine cycle (2 crankshaft revolutions), the system determines that there is a problem.

Crankshaft Position Sensor Monitoring Method: P11EC00, P11ED00, P11EE00 and/or P11EF00 (for port injection), or P219C00, P219D00, P219E00 and/or P219F00 (for direct injection) are stored primarily when a lean side imbalance is detected.

The system monitors the engine speed variation and when the variation becomes large, the system determines that there is a difference in air fuel ratios between the cylinders, which it determines to be a problem.

MONITOR STRATEGY

Related DTCs	P11EA: Air fuel ratio cylinder imbalance monitor (for port injection of bank 1) P11EC: Air fuel ratio cylinder imbalance monitor (for port injection of cylinder 1) P11ED: Air fuel ratio cylinder imbalance monitor (for port injection of cylinder 2) P11EE: Air fuel ratio cylinder imbalance monitor (for port injection of cylinder 3) P11EF: Air fuel ratio cylinder imbalance monitor (for port injection of cylinder 4) P219A: Air fuel ratio cylinder imbalance monitor (for direct injection of bank 1) P219C: Air fuel ratio cylinder imbalance monitor (for direct injection of cylinder 1) P219D: Air fuel ratio cylinder imbalance monitor (for direct injection of cylinder 2) P219E: Air fuel ratio cylinder imbalance monitor (for direct injection of cylinder 3) P219F: Air fuel ratio cylinder imbalance monitor (for direct injection of cylinder 4)
Required Sensors/Components (Main)	Air fuel ratio sensor (sensor 1) Crankshaft position sensor
Required Sensors/Components (Related)	Mass air flow meter sub-assembly Engine coolant temperature sensor

	Vehicle speed sensor
Frequency of Operation	Once per driving cycle
Duration	20 seconds: Air fuel ratio sensor (sensor 1) monitoring method 10 to 15 seconds: Crankshaft position sensor monitoring method
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P11EA and P219A: Air Fuel Ratio Sensor (Sensor 1) Monitoring Method

Monitor runs whenever the following DTCs are not stored	P0010, P1360, P1362, P1364, P1366, P2614 (Motor drive VVT system control module) P0011 (VVT system - advance) P0012 (VVT system - retard) P0013 (Exhaust VVT oil control solenoid) P0014 (Exhaust VVT system - advance) P0015 (Exhaust VVT system - retard) P0016 (VVT system - misalignment) P0017 (Exhaust VVT system - misalignment) P0031, P0032, P101D (Air fuel ratio sensor (sensor 1) heater) P0087, P0088, P0191, P0192, P0193 (Fuel pressure sensor (for high pressure side)) P0101, P0102, P0103 (Mass air flow meter) P0107, P0108 (Manifold absolute pressure) P0117, P0118 (Engine coolant temperature sensor) P0121, P0122, P0123, P0222, P0223, P2135 (Throttle position sensor) P0125 (Insufficient coolant temperature for closed loop fuel control) P014C, P014D, P015A, P015B, P2195, P2196, P2237, P2238, P2239, P2252, P2253 (Air fuel ratio sensor (sensor 1)) P0201, P0202, P0203, P0204, P062D, P21CF, P21D0, P21D1, P21D2 (Fuel injector) P0335, P0337, P0338 (Crankshaft position sensor) P0340, P0342, P0343 (Camshaft position sensor) P0365, P0367, P0368 (Exhaust camshaft position sensor) P0401 (EGR system (closed)) P0657, P0658, P2102, P2103 (Throttle actuator) P107B, P107C, P107D (Fuel pressure sensor (for low pressure side)) P1235 (High pressure fuel pump circuit)

P11EC, P11ED, P11EE, P11EF, P219C, P219D, P219E and P219F: Crankshaft Position Sensor Monitoring Method

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

	P0015 (Exhaust VVT system - retard) P0016 (VVT system - misalignment) P0017 (Exhaust VVT system - misalignment) P0087, P0088, P0191, P0192, P0193 (Fuel pressure sensor (for high pressure side)) P0101, P0102, P0103 (Mass air flow meter) P0107, P0108 (Manifold absolute pressure) P0112, P0113 (Intake air temperature sensor) P0117, P0118 (Engine coolant temperature sensor) P0121, P0122, P0123, P0222, P0223, P2135 (Throttle position sensor) P0125 (Insufficient coolant temperature for closed loop fuel control) P0201, P0202, P0203, P0204, P062D, P21CF, P21D0, P21D1, P21D2 (Fuel injector) P0327, P0328 (Knock control sensor) P0335, P0337, P0338 (Crankshaft position sensor) P0340, P0342, P0343 (Camshaft position sensor) P0365, P0367, P0368 (Exhaust camshaft position sensor) P0401 (EGR system (closed)) P0657, P0658, P2102, P2103 (Throttle actuator) P107B, P107C, P107D (Fuel pressure sensor (for low pressure side)) P1235 (High pressure fuel pump circuit)

P11EA and P219A: Air Fuel Ratio Sensor (Sensor 1) Monitoring Method

Air fuel ratio sensor (sensor 1) status	Activated
Engine speed	1400 rpm or higher, and less than 2600 rpm
Engine coolant temperature	75°C (167°F) or higher
Atmospheric pressure	76 kPa(abs) [11 psi(abs)] or higher
Fuel system status	Closed loop
Engine load	40% or higher, and less than 70%

P11EC, P11ED, P11EE, P11EF, P219C, P219D, P219E and P219F: Crankshaft Position Sensor Monitoring Method (First Judgment)

Engine speed	1400 rpm or higher, and less than 2600 rpm
Engine coolant temperature	75°C (167°F) or higher
Air fuel ratio sensor (sensor 1) status	Activated
Fuel system status	Closed loop
Auxiliary battery voltage	11 V or higher

P11EC, P11ED, P11EE, P11EF, P219C, P219D, P219E and P219F: Crankshaft Position Sensor Monitoring Method (Second Judgment)

Vehicle speed	Less than 3 km/h (1.875 mph)
Engine speed	1400 rpm or higher, and less than 2600 rpm

Engine coolant temperature	75°C (167°F) or higher
Air fuel ratio sensor (sensor 1) status	Activated
Fuel system status	Closed loop
Auxiliary battery voltage	11 V or higher

P219A: Air Fuel Ratio Sensor (Sensor 1) Monitoring Method

Air fuel ratio sensor (sensor 1) status	Activated
Engine speed	1400 rpm or higher, and less than 2600 rpm
Engine coolant temperature	75°C (167°F) or higher
Atmospheric pressure	76 kPa(abs) [11 psi(abs)] or higher
Fuel system status	Closed loop
Engine load	40% or higher, and less than 70%

TYPICAL MALFUNCTION THRESHOLDS

P11EA: Air Fuel Ratio Sensor (Sensor 1) Monitoring Method

Air fuel ratio sensor (sensor 1) monitoring method criteria (rich side imbalance for port injection)	1 or more

P11EC, P11ED, P11EE and P11EF: Crankshaft Position Sensor Monitoring Method (First Judgment)

Crankshaft position sensor monitoring method criteria (lean side imbalance for port injection) (first Judgment)	1.5 or more

P11EC, P11ED, P11EE and P11EF: Crankshaft Position Sensor Monitoring Method (Second Judgment)

Crankshaft position sensor monitoring method criteria (lean side imbalance for port injection) (second judgment)	1 or more

P219A: Air Fuel Ratio Sensor (Sensor 1) Monitoring Method

Air fuel ratio sensor (sensor 1) monitoring method criteria (rich side imbalance for direct injection)	1 or more

P219C, P219D, P219E and P219F: Crankshaft Position Sensor Monitoring Method (First Judgment)

Crankshaft position sensor monitoring method criteria (lean side imbalance for direct injection) (first Judgment)	1.5 or more

P219C, P219D, P219E and P219F: Crankshaft Position Sensor Monitoring Method (Second Judgment)

Crankshaft position sensor monitoring method criteria (lean side imbalance for direct injection) (second judgment)	1 or more

MONITOR RESULT

Refer to detailed information in Checking Monitor Status.

Click here INFO

P11EA: Fuel System / A/F SENSOR DETERMINATION (Port) B1

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$96	Multiply by 0.001	No dimension	Monitoring method using air fuel ratio sensor (sensor 1) (Port)

P11EC: Fuel System / ENGINE SPEED FLUCTUATION AVERAGE (Port) #1

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$8D	Multiply by 0.001	No dimension	Monitoring method using crank angle sensor (Port)

P11ED: Fuel System / ENGINE SPEED FLUCTUATION AVERAGE (Port) #2

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$8E	Multiply by 0.001	No dimension	Monitoring method using crank angle sensor (Port)

P11EE: Fuel System / ENGINE SPEED FLUCTUATION AVERAGE (Port) #3

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$8F	Multiply by 0.001	No dimension	Monitoring method using crank angle sensor (Port)

P11EF: Fuel System / ENGINE SPEED FLUCTUATION AVERAGE (Port) #4

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$90	Multiply by 0.001	No dimension	Monitoring method using crank angle sensor (Port)

P219A: Fuel System / A/F SENSOR DETERMINATION (Direct) B1

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$95	Multiply by 0.001	No dimension	Monitoring method using air fuel ratio sensor (sensor 1) (Direct)

P219C: Fuel System / ENGINE SPEED FLUCTUATION AVERAGE (Direct) #1

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$85	Multiply by 0.001	No dimension	Monitoring method using crank angle sensor (Direct)

P219D: Fuel System / ENGINE SPEED FLUCTUATION AVERAGE (Direct) #2

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$86	Multiply by 0.001	No dimension	Monitoring method using crank angle sensor (Direct)

P219E: Fuel System / ENGINE SPEED FLUCTUATION AVERAGE (Direct) #3

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$87	Multiply by 0.001	No dimension	Monitoring method using crank angle sensor (Direct)

P219F: Fuel System / ENGINE SPEED FLUCTUATION AVERAGE (Direct) #4

MONITOR ID	TEST ID	SCALING	UNIT	DESCRIPTION
$81	$88	Multiply by 0.001	No dimension	Monitoring method using crank angle sensor (Direct)

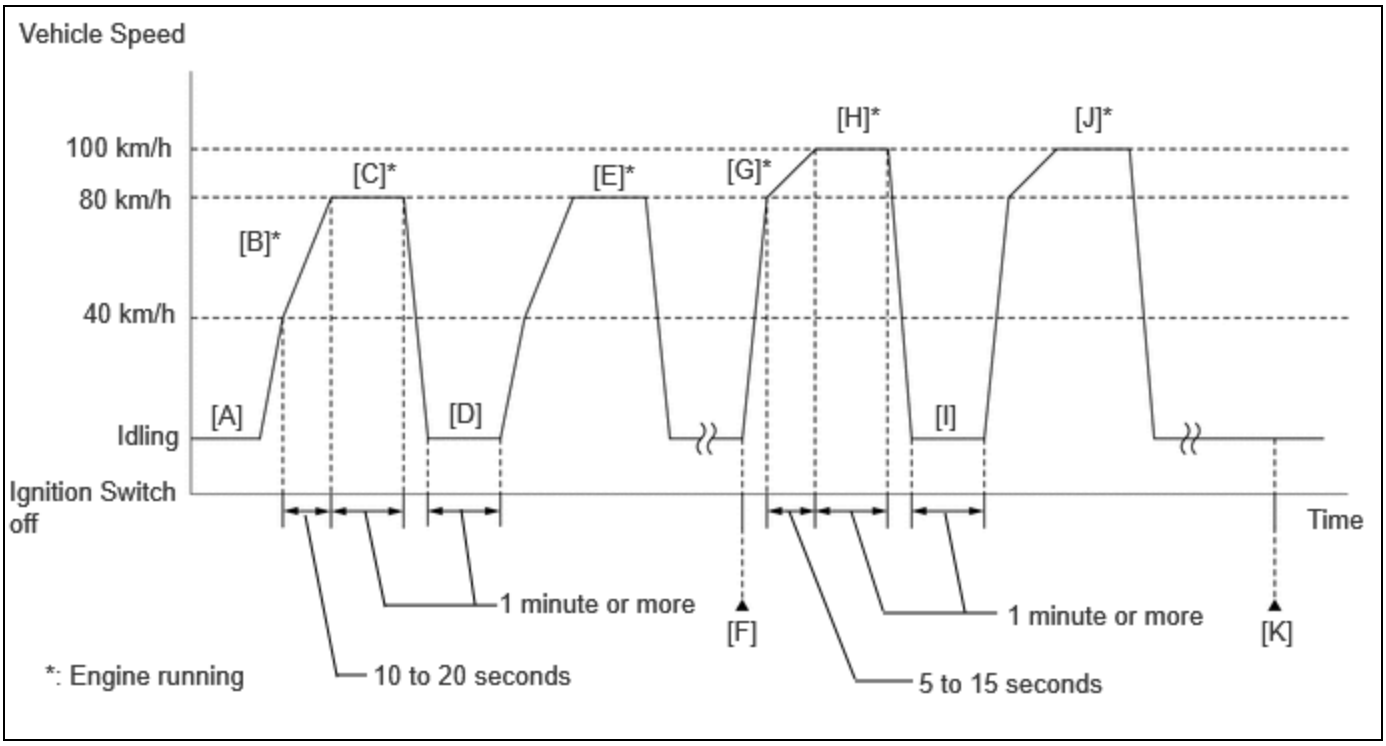
CONFIRMATION DRIVING PATTERN

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

   Click here INFO
3. Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or higher [A].
4. Press the EV/HV mode selection switch to select HV mode. (for PHEV Model)
5. With the engine running, drive the vehicle at 40 km/h (25 mph) or higher.

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.

6. With the engine running, gradually accelerate the vehicle from 40 km/h (25 mph) to 80 km/h (50 mph) taking approximately 10 to 20 seconds [B].

CAUTION:

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

HINT:

- Refer to engine load and engine speed in Typical Enabling Conditions, and then accelerate the vehicle to 80 km/h (50 mph).
- If the engine stops, further depress the accelerator pedal to restart the engine.

7. With the engine running, drive the vehicle at 80 km/h (50 mph) or more for 1 minute or more [C].

CAUTION:

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

HINT:

- Electrical load can be applied while the vehicle is driven.
- If the engine stops, further depress the accelerator pedal to restart the engine.

8. Idle the engine for 1 minute or more [D].

HINT:

Perform this step with the shift lever in D.

9. Repeat steps [B] and [D] above at least 3 times [E].
10. Enter the following menus: Powertrain / Engine / Trouble Codes [F].
11. 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.
- [A] to [F]: 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.

12. With the engine running, drive the vehicle at 80 km/h (50 mph).

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.

13. With the engine running, gradually accelerate the vehicle from 80 km/h (50 mph) to 100 km/h (62 mph) taking approximately 5 to 15 seconds [G].

CAUTION:

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

HINT:

- Refer to engine load and engine speed in Typical Enabling Conditions, and then accelerate the vehicle to 100 km/h (62 mph).
- If the engine stops, further depress the accelerator pedal to restart the engine.

14. With the engine running, drive the vehicle at 100 km/h (62 mph) or more for 1 minute or more [H].

CAUTION:

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

HINT:

- Electrical load can be applied while the vehicle is driven.
- If the engine stops, further depress the accelerator pedal to restart the engine.

15. Idle the engine for 1 minute or more [I].

HINT:

Perform this step with the shift lever in D.

16. Repeat steps [G] and [I] above at least 2 times [J].
17. Enter the following menus: Powertrain / Engine / Trouble Codes [K].
18. 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.

19. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
20. Input the DTC: P11EA00, P11EC00, P11ED00, P11EE00, P11EF00, P11F000, P219A00, P219C00, P219D00, P219E00 or P219F00.
21. Check the DTC judgment result.

HINT:

- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows INCOMPLETE, perform the confirmation driving pattern and check the judgment result again.
- [A] to [K]: 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:

- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.
- When any air-fuel ratio imbalance is detected, the ECM will perform air-fuel ratio feedback control to make the air-fuel ratio close to the stoichiometric level. This may result in an air-fuel ratio imbalance of normal cylinders and DTCs may be stored.

- Whether malfunctions occur on the port injection side or direct injection side cannot be determined solely by the output DTCs. Inspect every suspected area even if it is not related to the DTCs.

PROCEDURE

1.	**CHECK ANY OTHER DTCS OUTPUT**

(a) Read the DTCs.

Powertrain > Engine > Trouble Codes

RESULT	PROCEED TO
P11EA00, P11EC00, P11ED00, P11EE00, P11EF00, P219A00, P219C00,P219D00, P219E00 or P219F00 and other DTCs are output	A
P11EA00, P11EC00, P11ED00, P11EE00, P11EF00, P219A00, P219C00,P219D00, P219E00 or P219F00 is output	B

HINT:

If any DTCs other than DTC P11EA00, P11EC00, P11ED00, P11EE00, P11EF00, P219A00, P219C00, P219D00, P219E00 and/or P219F00 are output, troubleshoot those DTCs first.

A ▶ **GO TO DTC CHART**

B ▼

2.	**READ VALUE USING GTS (FREEZE FRAME DATA)**

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

HINT:

Click here INFO

Freeze Frame Data Items for DTC P11EA00, P11EC00, P11ED00, P11EE00, P11EF00, P219A00, P219C00, P219D00, P219E00 or P219F00

- Vehicle Speed
- Engine Speed
- Calculate Load
- Short FT B1S1
- Long FT B1S1
- Misfire Count Cylinder #1 to #4

HINT:

When the sum of Short FT B1S1 and Long FT B1S1 is positive, the engine is running lean, and when the sum is negative, the engine is running rich.

AIR FUEL RATIO SENSOR (SENSOR 1) MONITORING METHOD (P11EA00 AND P219A00)	CRANKSHAFT POSITION SENSOR MONITORING METHOD (P11EC00, P11ED00, P11EE00, P11EF00, P219C00, P219D00, P219E00 AND P219F00)	NOTE
DTCs are output	DTC is output (Only one DTC relating to a single cylinder is output)	Malfunctioning of cylinders detected by the Crankshaft Position Sensor Monitoring Method is primarily suspected
DTCs are output	DTCs are output (Multiple DTCs relating to multiple cylinders are output)	Malfunctioning of cylinders except ones detected by the Crankshaft Position Sensor Monitoring Method is primarily suspected.*
DTCs are not output	DTCs are output	Malfunctioning of cylinders detected by the Crankshaft Position Sensor Monitoring Method is primarily suspected.
DTCs are output	DTCs are not output	Malfunctioning of the bank detected by the Air Fuel Ratio Sensor (Sensor 1) Monitoring Method is primarily suspected.

*: When any air-fuel ratio imbalance is detected, the ECM will perform air-fuel ratio feedback control to make the air-fuel ratio close to the stoichiometric level. This may result in an air-fuel ratio imbalance of normal cylinders and DTCs may be stored.

NEXT

3.	**READ DTC OUTPUT**

Pre-procedure1

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

HINT:

- If any misfire count (Misfire Count Cylinder #1 to #4) increases while idling or driving the vehicle, proceed to step 6 (CHECK INTAKE SYSTEM).
- Perform inspections while focusing on the cylinder whose misfire count has increased.

Procedure1

(b) Read the DTCs.

Powertrain > Engine > Trouble Codes

RESULT	PROCEED TO
P11EA00 or P219A00 is output	A

RESULT	PROCEED TO
P219A00 and P219C00 are output	B
P219A00 and P219D00 are output	C
P219A00 and P219E00 are output	D
P219A00 and P219F00 are output	E
P11EA00 and P11EC00 are output	F
P11EA00 and P11ED00 are output	G
P11EA00 and P11EE00 are output	H
P11EA00 and P11EF00 are output	I
P11EC00, P11ED00, P11EE00, P11EF00, P219C00, P219D00, P219E00 or P219F00 is output	J

Post-procedure1

(c) None.

B ▶ **GO TO STEP 6**

C ▶ **GO TO STEP 6**

D ▶ **GO TO STEP 6**

E ▶ **GO TO STEP 6**

F ▶ **GO TO STEP 6**

G ▶ **GO TO STEP 6**

H ▶ **GO TO STEP 6**

I ▶ **GO TO STEP 6**

J ▶ **GO TO STEP 6**

A

4.	**PERFORM ACTIVE TEST USING GTS (CONTROL THE INJECTION VOLUME)**

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

HINT:

The A/C switch and all accessory switches should be off and the shift lever should be in P or N.

Procedure1

(c) Perform the Control the Injection Volume operation with the engine idling.

Powertrain > Engine > Active Test

ACTIVE TEST DISPLAY
Control the Injection Volume

DATA LIST DISPLAY
Coolant Temperature
Misfire Count Cylinder #1
Misfire Count Cylinder #2
Misfire Count Cylinder #3
Misfire Count Cylinder #4

HINT:

When the "Control the Injection Volume" Active Test is selected (injection volume is 0%), if a misfire count increases, proceed to step 6 (CHECK INTAKE SYSTEM).

(d) Check the misfire counts (Misfire Count Cylinder #1 to #4) while decreasing the injection volume in 5% increments.

The cylinder whose misfire count has not increased can be assumed to be running rich. Therefore, perform inspections while focusing on that cylinder.

Post-procedure1

(e) None.

NEXT

5.	**CHECK FOR EXHAUST GAS LEAK**

(a) Check for exhaust gas leak.

OK:

No gas leaks in exhaust system.

HINT:

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

Click here INFO

NG ▶ **REPAIR OR REPLACE EXHAUST SYSTEM**

OK

6.	**CHECK INTAKE SYSTEM**

(a) Check the intake system for vacuum leaks.

Click here INFO

OK:

No leaks in 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

7.	**INSPECT SPARK PLUG**

(a) Inspect the spark plug of the cylinder causing the imbalance.

Click here INFO

NG ▶ **REPLACE SPARK PLUG**

OK

8.	**CHECK FOR SPARK (SPARK TEST)**

Click here INFO

HINT:

- If the result of the spark test is normal, proceed to the next step.
- Perform "Inspection After Repair" after replacing the spark plug or ignition coil assembly.

Click here INFO

NEXT

9.	**CHECK CYLINDER COMPRESSION PRESSURE**

(a) Measure the cylinder compression pressure of the misfiring cylinder.

Click here INFO

HINT:

Perform "Inspection After Repair" after repairing or replacing the engine assembly.

Click here INFO

NG ▶ **CHECK ENGINE TO DETERMINE CAUSE OF LOW COMPRESSION**

OK

10.	**CHECK PORT FUEL INJECTOR ASSEMBLY**

(a) Check the port fuel injector assembly injection [whether fuel volume is high or low, and whether injection pattern is poor].

Click here INFO

NG ▶ **REPLACE PORT FUEL INJECTOR ASSEMBLY**

OK

11.	**CHECK DIRECT FUEL INJECTOR ASSEMBLY OF CYLINDER CAUSING IMBALANCE**

Click here INFO

NG ▶ **REPLACE DIRECT FUEL INJECTOR ASSEMBLY**

OK

12.	**CHECK FOR CAUSE OF FAILURE**

(a) If the cause of the problem has not been found even after performing the troubleshooting procedure, perform the inspection below.

(1) Check the intake valve for deposits.

HINT:

As the DTC may have been stored due to deposits on the intake valve, remove the cylinder head sub-assembly and check the intake valve.

(2) Check that the intake manifold EGR port is not blocked by accumulating deposit.

HINT:

The EGR flow rate between the cylinders may change and cause an imbalance due to EGR port blockage.

NEXT

13.	**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

14.	**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) Check for DTCs.

Powertrain > Engine > Trouble Codes

DTCs are not output.

Post-procedure1

(c) None.

NEXT **END**