| | | |
|---|---|---|
| **Last Modified:** 12-04-2024 | 6.11:8.1.0 | **Doc ID:** RM100000002BLVF |
| **Model Year Start:** 2023 | **Model:** Prius Prime | **Prod Date Range:** [03/2023 - ] |
| **Title:** M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P014C00,P014D00,P015A00,P015B00; O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1; 2023 - 2024 MY Prius Prius Prime [03/2023 - ] | | |

| | | |
|---|---|---|
| **DTC** | **P014C00** | **O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1** |

| | | |
|---|---|---|
| **DTC** | **P014D00** | **O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1** |

| | | |
|---|---|---|
| **DTC** | **P015A00** | **O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1** |

| | | |
|---|---|---|
| **DTC** | **P015B00** | **O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1** |

# DESCRIPTION

Refer to DTC P003012.

Click here INFO

**HINT:**

Although the DTC titles say O2 sensor, these DTCs relate to the air fuel ratio sensor (sensor 1).

| DTC NO. | DETECTION ITEM | DTC DETECTION CONDITION | TROUBLE AREA | MIL | DTC OUTPUT FROM | PRIORITY | NOTE |
|---|---|---|---|---|---|---|---|
| P014C00 | O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 1 | The rich to lean response rate deterioration level* value is standard or less (2 trip detection logic). | • Air fuel ratio sensor (sensor 1)<br>• Air fuel ratio sensor (sensor 1) heater<br>• ECM | Comes on | Engine | B | SAE Code: P014C |
| P014D00 | O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1 | The lean to rich response rate deterioration level* value is standard or more (2 trip detection logic). | • Air fuel ratio sensor (sensor 1)<br>• Air fuel ratio sensor (sensor 1) heater | Comes on | Engine | B | SAE Code: P014D |

| DTC NO. | DETECTION ITEM | DTC DETECTION CONDITION | TROUBLE AREA | MIL | DTC OUTPUT FROM | PRIORITY | NOTE |
|---|---|---|---|---|---|---|---|
| | | | • ECM | | | | |
| P015A00 | O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 1 | The rich to lean delay level* value is standard or more (2 trip detection logic). | • Air fuel ratio sensor (sensor 1)<br>• Air fuel ratio sensor (sensor 1) heater<br>• ECM | Comes on | Engine | B | SAE Code: P015A |
| P015B00 | O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 1 | The lean to rich delay level* value is standard or more (2 trip detection logic). | • Air fuel ratio sensor (sensor 1)<br>• Air fuel ratio sensor (sensor 1) heater<br>• ECM | Comes on | Engine | B | SAE Code: P015B |

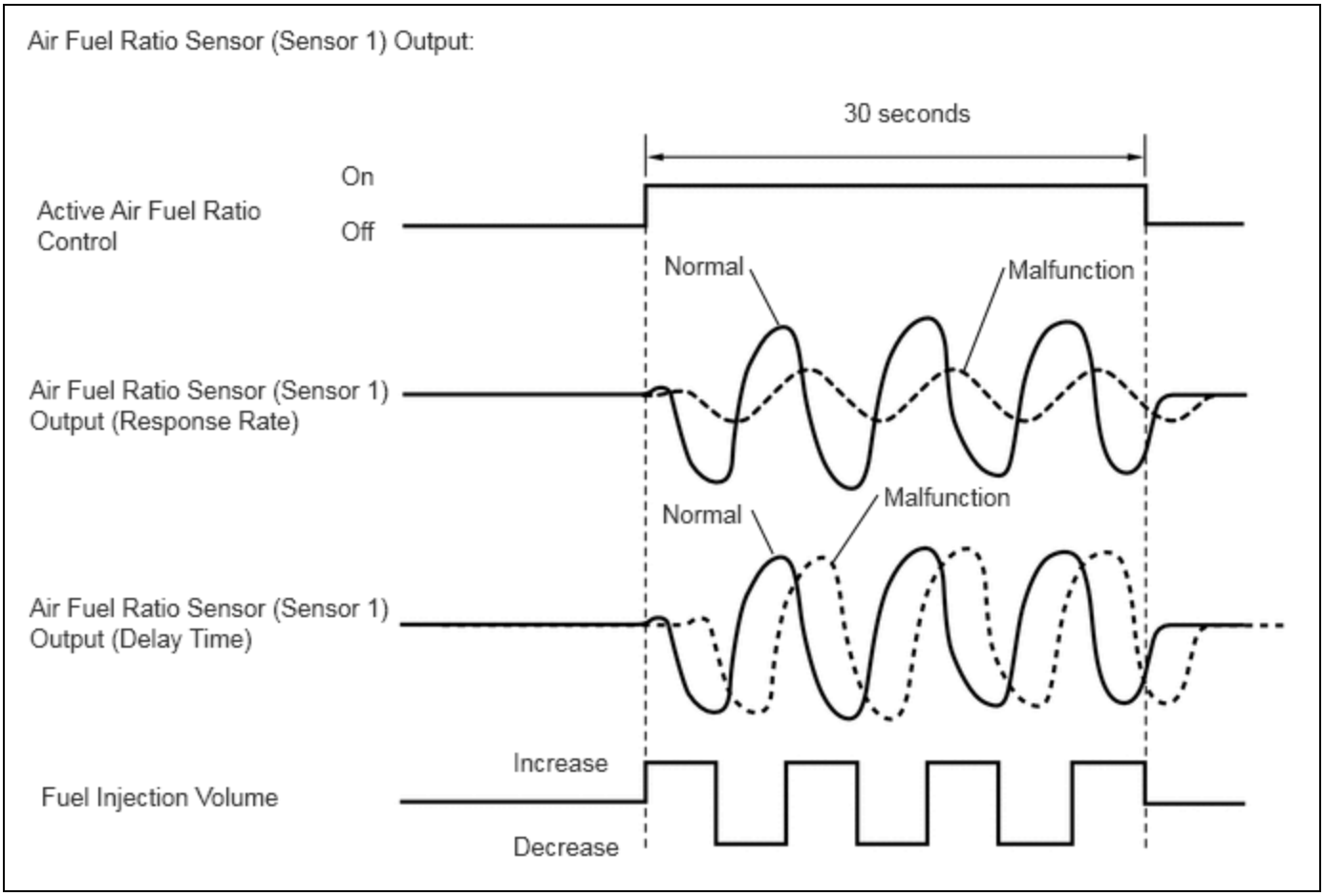
*: Calculated by ECM based on the air fuel ratio sensor (sensor 1) output.

## MONITOR DESCRIPTION

After the engine has been warmed up, the ECM carries out air fuel ratio feedback control and maintains the air fuel ratio at the theoretical ratio. In addition, after all the preconditions have been met, active air fuel ratio control is performed for approximately 30 seconds. During active air fuel ratio control, the ECM measures the response of the air fuel ratio sensor (sensor 1) by increasing or decreasing a specific injection quantity based on the theoretical air fuel ratio learned during normal air fuel control. The ECM determines whether there is an air fuel ratio sensor (sensor 1) malfunction at the mid-point of active air fuel ratio control.

If the response of the air fuel ratio sensor (sensor 1) has decreased, DTC P014C00 and P014D00 are output.

If the air fuel ratio sensor (sensor 1) output timing is delayed, DTC P015A00 and P015B00 are output.




## MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P014C: Air fuel ratio sensor (sensor 1) response rate (rich to lean response rate)<br>P014D: Air fuel ratio sensor (sensor 1) response rate (lean to rich response rate)<br>P015A: Air fuel ratio sensor (sensor 1) response rate (rich to lean delay)<br>P015B: Air fuel ratio sensor (sensor 1) response rate (lean to rich delay) |
| Required Sensors/Components (Main) | Air fuel ratio sensor (sensor 1) |
| Required Sensors/Components (Related) | Crankshaft position sensor |
| Frequency of Operation | Once per driving cycle |
| Duration | 10 to 15 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) |

| | |
|---|---|
| | 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)<br>P0031, P0032, P101D (Air fuel ratio sensor (sensor 1) heater)<br>P0037, P0038, P102D (Air fuel ratio sensor (sensor 2) heater)<br>P0087, P0088, P0191, P0192, P0193 (Fuel pressure sensor (for high pressure side))<br>P0101, P0102, P0103 (Mass air flow meter)<br>P0106, P0107, P0108 (Manifold absolute pressure)<br>P0112, P0113 (Intake air temperature sensor)<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>P0128 (Thermostat)<br>P0136, P013A, P2270, P2271, P22AB, P22AC, P22AD, P22B3, P22B4 (Air fuel ratio sensor (sensor 2))<br>P0171, P0172 (Fuel system)<br>P0201, P0202, P0203, P0204, P062D, P21CF, P21D0, P21D1, P21D2 (Fuel injector)<br>P0300, P0301, P0302, P0303, P0304 (Misfire)<br>P0327, P0328 (Knock control sensor)<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>P0441 (EVAP system)<br>P0489, P0490 (EGR control circuit)<br>P0657, P0658, P2102, P2103, P2111, P2112, P2119 (Throttle actuator)<br>P107B, P107C, P107D (Fuel pressure sensor (for low pressure side))<br>P11EA, P11EC, P11ED, P11EE, P11EF, P219A, P219C, P219D, P219E, P219F (Air-fuel ratio imbalance)<br>P1235 (High pressure fuel pump circuit)<br>P2228, P2229 (Atmospheric pressure sensor) |
| Active air fuel ratio control | Performing |
| Active air fuel ratio control is performed when the following conditions are met | - |
| Auxiliary battery voltage | 11 V or higher |
| Engine coolant temperature | 75°C (167°F) or higher |
| Idle | Off |
| Engine speed | 1000 rpm or higher, and less than 4000 rpm |
| Air fuel ratio sensor (sensor 1) status | Activated |
| Fuel-cut | Off |

| | |
|---|---|
| Engine load | 10% or higher, and less than 70% |
| Catalyst monitor | Not yet |
| Mass air flow | 4 gm/sec or higher, and less than 12 gm/sec |

## TYPICAL MALFUNCTION THRESHOLDS

**P014C: Air Fuel Ratio Sensor (Sensor 1) Response Rate (Rich to Lean Response Rate)**

| | |
|---|---|
| Rich to Lean Response rate deterioration level | 22.583 µA or less |

**P014D: Air Fuel Ratio Sensor (Sensor 1) Response Rate (Lean to Rich Response Rate)**

| | |
|---|---|
| Lean to Rich Response rate deterioration level | -22.4304 µA or more |

**P015A: Air Fuel Ratio Sensor (Sensor 1) Response Rate (Rich to Lean Delay)**

| | |
|---|---|
| Rich to Lean delay level | 393.22 msec. or more |

**P015B: Air Fuel Ratio Sensor (Sensor 1) Response Rate (Lean to Rich Delay)**

| | |
|---|---|
| Lean to Rich delay level | 376.83 msec. or more |

## MONITOR RESULT

Refer to detailed information in Checking Monitor Status.

Click here INFO

**P014C: O2 Sensor / RL RESPONSE RATE B1S1**

| MONITOR ID | TEST ID | SCALING | UNIT | DESCRIPTION |
|---|---|---|---|---|
| $01 | $98 | Multiply by 0.004 | mA | Rich to Lean response rate deterioration level |

**P014D: O2 Sensor / LR RESPONSE RATE B1S1**

| MONITOR ID | TEST ID | SCALING | UNIT | DESCRIPTION |
|---|---|---|---|---|
| $01 | $99 | Multiply by 0.004 | mA | Lean to Rich response rate deterioration level |

**P015A: O2 Sensor / RL DELAY B1S1**

| MONITOR ID | TEST ID | SCALING | UNIT | DESCRIPTION |
|---|---|---|---|---|
| $01 | $95 | Multiply by 0.001 | Second | Rich to Lean delay level |

**P015B: O2 Sensor / LR DELAY B1S1**

| MONITOR ID | TEST ID | SCALING | UNIT | DESCRIPTION |
|---|---|---|---|---|
| $01 | $96 | Multiply by 0.001 | Second | Lean to Rich delay level |

## CONFIRMATION DRIVING PATTERN

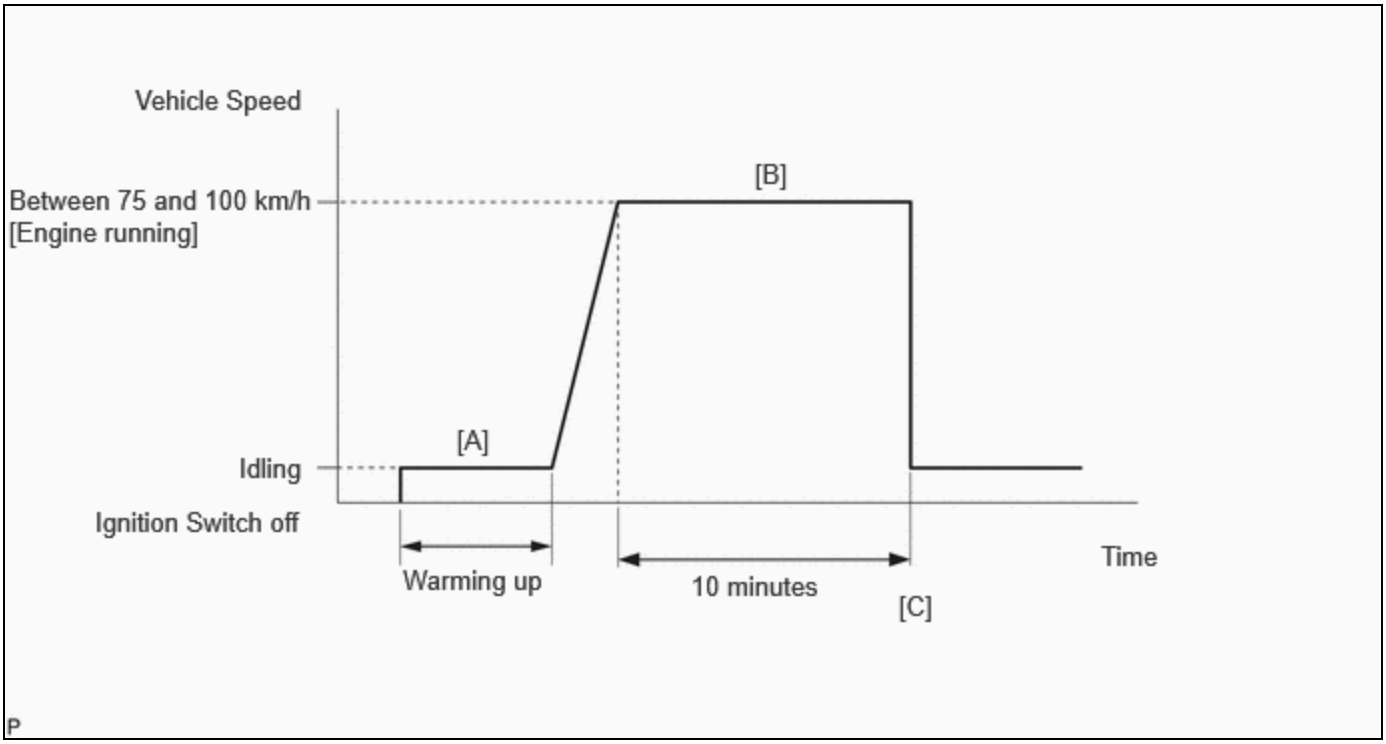
**HINT:**

- Performing this confirmation pattern will activate the air fuel ratio sensor (sensor 1) response monitor.
- 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. Enter the following menus: Powertrain / Engine / Monitor / Current Monitor.
4. Check Incomplete is displayed for O2 Sensor / Current.

**HINT:**

The test values for the test items RL RESPONSE RATE B1S1, LR RESPONSE RATE B1S1, RL DELAY B1S1 and LR DELAY B1S1 do not exist in the Details of O2 Sensor monitor at this time (the initial value of "0.000" is indicated in each test item).

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

Click here INFO

6. Start the engine and warm it up (until the engine coolant temperature is 75°C (167°F) or higher) [A].
7. Press the EV/HV mode selection switch to select HV mode. (for PHEV Model)
8. Drive the vehicle at a constant speed between 75 and 100 km/h (47 and 62 mph) for 10 minutes [B].

**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.

9. Check Complete is displayed for O2 Sensor / Current.

**HINT:**

Check the test values on the GTS by entering the following menus: Powertrain / Engine / Monitor / Current Monitor / O2 Sensor / Details / RL RESPONSE RATE B1S1, LR RESPONSE RATE B1S1, RL DELAY B1S1 and LR DELAY B1S1.

10. If Complete is not displayed for monitor item O2 Sensor / Current (if the test values indicated on the GTS do not change), perform Readiness Monitor Drive Pattern for the air fuel ratio sensor (sensor 1) and air fuel ratio sensor (sensor 2).

    Click here INFO

11. Enter the following menus: Powertrain / Engine / Trouble Codes [C].
12. 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.

13. Enter the following menus: Powertrain / Engine / Utility / All Readiness.
14. Input the DTC: P014C00, P014D00, P015A00 or P015B00.
15. 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, perform steps [B] through [C] 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.

## WIRING DIAGRAM

Refer to DTC P003012.

Click here INFO

## CAUTION / NOTICE / HINT

**NOTICE:**

- Inspect the fuses for circuits related to this system before performing the following procedure.
- 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:**

- A low air fuel ratio sensor (sensor 1) current could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A high air fuel ratio sensor (sensor 1) current could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.
- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P014C00, P014D00, P015A00 OR P015B00)** |

(a) Read the DTCs.

**Powertrain > Engine > Trouble Codes**

| RESULT | PROCEED TO |
|---|---|
| P014C00, P014D00, P015A00 or P015B00 and other DTCs are output | A |
| P014C00, P014D00, P015A00 or P015B00 is output | B |

**HINT:**

If any DTCs other than P014C00, P014D00, P015A00 or P015B00 are output, troubleshoot those DTCs first.

**A** ▶ **GO TO DTC CHART**

**B** ▼

| | |
|---|---|
| **2.** | **INSPECT AIR FUEL RATIO SENSOR (SENSOR 1) (HEATER RESISTANCE)** |

(a) Inspect the air fuel ratio sensor (sensor 1).

Click here INFO

**NG** ▶ **REPLACE AIR FUEL RATIO SENSOR (SENSOR 1)**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK HARNESS AND CONNECTOR (AIR FUEL RATIO SENSOR (SENSOR 1) - ECM)** |

Pre-procedure1

(a) Disconnect the air fuel ratio sensor (sensor 1) connector.

(b) Disconnect the ECM connector.

Procedure1

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

Standard Resistance:

EWD INFO

**Click Location & Routing(C44,C52)**
**Click Connector(C44)**
**Click Connector(C52)**

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION | RESULT |
|---|---|---|---|
| C44-1 (HA1A) - C52-9 (HA1A) | Always | Below 1 Ω | Ω |
| C44-3 (A1A+) - C52-95 (A1A+) | Always | Below 1 Ω | Ω |
| C44-4 (A1A-) - C52-94 (A1A-) | Always | Below 1 Ω | Ω |
| C44-1 (HA1A) or C52-9 (HA1A) - Body ground and other terminals | Always | 10 kΩ or higher | kΩ |
| C44-3 (A1A+) or C52-95 (A1A+) - Body ground and other terminals | Always | 10 kΩ or higher | kΩ |
| C44-4 (A1A-) or C52-94 (A1A-) - Body ground and other terminals | Always | 10 kΩ or higher | kΩ |

Post-procedure1

(d) None.

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **4.** | **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**

| | |
|---|---|
| **5.** | **CHECK WHETHER DTC OUTPUT RECURS (DTC P014C00, P014D00, P015A00 OR P015B00)** |

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 |
| P014C00, P014D00, P015A00 or P015B00 is output | B |

Post-procedure1

(c) None.

**A** ▶ **CHECK FOR INTERMITTENT PROBLEMS**

**B**

| | |
|---|---|
| **6.** | **REPLACE AIR FUEL RATIO SENSOR (SENSOR 1)** |

**HINT:**

Click here INFO

**NEXT**

| | |
|---|---|
| **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.** | **CHECK WHETHER DTC OUTPUT RECURS (DTC P014C00, P014D00, P015A00 OR P015B00)** |

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 |
| P014C00, P014D00, P015A00 or P015B00 is output | B |

Post-procedure1

(c) None.

**A** **END**

**B**

| | |
|---|---|
| **9.** | **PERFORM ACTIVE TEST USING GTS (CONTROL THE INJECTION MODE)** |

Click here INFO

| ITEM | | PROCEED TO |
|---|---|---|
| PORT | DIRECT | |
| OK | OK | A |

| ITEM | | PROCEED TO |
|---|---|---|
| PORT | DIRECT | |
| OK | NG | B |
| NG | OK | C |
| NG | NG | D |

**B** ▶ **GO TO STEP 11**

**C** ▶ **GO TO STEP 18**

**D** ▶ **GO TO STEP 19**

**A** ▼

| | |
|---|---|
| **10.** | **CHECK IF VEHICLE HAS RUN OUT OF FUEL IN PAST** |

Click here INFO

| RESULT | PROCEED TO |
|---|---|
| YES | A |
| NO | B |

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

**B** ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| **11.** | **READ VALUE USING GTS (FUEL PRESSURE (HIGH))** |

Click here INFO

| RESULT | PROCEED TO |
|---|---|
| The value of Fuel Pressure (High) is between 3000 and 25000 kPag | A |

| RESULT | PROCEED TO |
|---|---|
| None of the above conditions are met | B |

**B** ▶ **GO TO STEP 14**

**A**

| | |
|---|---|
| **12.** | **PERFORM ACTIVE TEST USING GTS (CONTROL THE INJECTION MODE (DIRECT))** |

Click here INFO

| ITEM | | | PROCEED TO |
|---|---|---|---|
| INJECTION MODE | HIGH PRESSURE FUEL PUMP DUTY RATIO (D4) | TOTAL OF SHORT FT B1S1 AND LONG FT B1S1 | |
| Direct | 10 to 50% | - | A |
| | 50% or higher | -20% or less | B |
| | 10% or less | +20% or higher | |
| | 50% or higher | +20% or higher | C |
| | 10% or less | -20% or less | D |

**B** ▶ **REPLACE FUEL PRESSURE SENSOR (FOR HIGH PRESSURE SIDE)**

**C** ▶ **GO TO STEP 15**

**D** ▶ **REPLACE ECM**

**A**

| | |
|---|---|
| **13.** | **PERFORM ACTIVE TEST USING GTS (CONTROL THE INJECTION MODE (DIRECT))** |

Click here INFO

| ITEM | | | PROCEED TO |
|---|---|---|---|
| INJECTION MODE | HIGH PRESSURE FUEL PUMP DUTY RATIO (D4) | TOTAL OF SHORT FT B1S1 AND LONG FT B1S1 | |
| Direct | 10 to 50% | -25% or less | A |
| | 10 to 50% | +25% or higher | |
| | 10 to 50% | -25 to +25% | B |

**A** ▶ **REPLACE DIRECT FUEL INJECTOR ASSEMBLY**

**B** ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| **14.** | **CHECK MISFIRE COUNT OF DIRECT INJECTION** |

Click here INFO

| INJECTION MODE | MISFIRE COUNT | PROCEED TO |
|---|---|---|
| Direct | No misfire counts, or misfire counts occur randomly in all cylinders | A |
| | Misfire counts occur in particular cylinder | B |

**B** ▶ **REPLACE DIRECT FUEL INJECTOR ASSEMBLY**

**A**

▼

| | |
|---|---|
| **15.** | **REPLACE FUEL (ENGINE ROOM SIDE) PUMP ASSEMBLY (FOR HIGH PRESSURE SIDE)** |

Click here INFO

**NEXT**

▼

| | |
|---|---|
| **16.** | **CLEAR DTC** |

Click here INFO

**NEXT**

| | |
|---|---|
| **17.** | **CHECK WHETHER DTC OUTPUT RECURS (DTC P014C00, P014D00, P015A00 OR P015B00)** |

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 |
| P014C00, P014D00, P015A00 or P015B00 is output | B |

Post-procedure1

(c) None.

**A** ▶ **END**

**B** ▶ **REPLACE ECM**

| | |
|---|---|
| **18.** | **INSPECT PORT FUEL INJECTOR ASSEMBLY** |

Click here INFO

**OK** ▶ **REPLACE ECM**

**NG** ▶ **REPLACE PORT FUEL INJECTOR ASSEMBLY**

| | |
|---|---|
| **19.** | **CHECK PCV VALVE AND HOSE CONNECTIONS** |

Click here INFO

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

**OK**

| | |
|---|---|
| **20.** | **CHECK INTAKE SYSTEM** |

Click here INFO

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

**OK**

| | |
|---|---|
| **21.** | **PERFORM ACTIVE TEST USING GTS (CONTROL THE INJECTION VOLUME FOR A/F SENSOR)** |

Click here INFO

| STATUS A/F (O2) SENSOR CURRENT B1S1 | STATUS A/F (O2) SENSOR CURRENT B1S2 | AIR FUEL RATIO CONDITION AND AIR FUEL RATIO SENSOR CONDITION | SUSPECTED TROUBLE AREA | PROCEED TO |
|---|---|---|---|---|
| Lean/Rich | Lean/Rich | Normal | - | A |
| Lean | Lean | Actual air fuel ratio lean | • PCV valve and hose<br>• PCV hose connections<br>• Gas leak from exhaust system<br>• Intake system<br>• Fuel pressure<br>• Mass air flow meter sub-assembly<br>• Engine coolant temperature sensor<br>• EGR valve assembly | |
| Rich | Rich | Actual air fuel ratio rich | • Gas leak from exhaust system<br>• Ignition system<br>• Fuel pressure<br>• Mass air flow meter sub-assembly | |

| STATUS A/F (O2) SENSOR CURRENT B1S1 | STATUS A/F (O2) SENSOR CURRENT B1S2 | AIR FUEL RATIO CONDITION AND AIR FUEL RATIO SENSOR CONDITION | SUSPECTED TROUBLE AREA | PROCEED TO |
|---|---|---|---|---|
| | | | • Engine coolant temperature sensor<br>• EGR valve assembly | |
| Lean | Lean/Rich | Air fuel ratio sensor (sensor 1) malfunction | • Air fuel ratio sensor (sensor 1) | B |
| Rich | Lean/Rich | Air fuel ratio sensor (sensor 1) malfunction | • Air fuel ratio sensor (sensor 1) | |

**B** ▶ **GO TO STEP 31**

**A**

▼

| | |
|---|---|
| **22.** | **READ VALUE USING GTS (COOLANT TEMPERATURE)** |

Click here INFO

**NG** ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

**OK**

▼

| | |
|---|---|
| **23.** | **PERFORM ACTIVE TEST USING GTS (CONTROL THE EGR STEP POSITION)** |

Click here INFO

**OK** ▶ **GO TO STEP 25**

**NG**

▼

| | |
|---|---|
| **24.** | **INSPECT EGR VALVE ASSEMBLY** |

Click here INFO

**NG** ▶ **REPAIR OR REPLACE FUEL SYSTEM**

**OK** ▼

| | |
|---|---|
| **25.** | **READ VALUE USING GTS (MASS AIR FLOW SENSOR)** |

Click here INFO

| RESULT | PROCEED TO |
|---|---|
| The value of Mass Air Flow Sensor is between 5.5 and 18.6 gm/sec | A |
| None of the above conditions are met | B |

**B** ▶ **GO TO STEP 38**

**A** ▼

| | |
|---|---|
| **26.** | **CHECK FUEL PRESSURE (FOR LOW PRESSURE SIDE)** |

Click here INFO

**NG** ▶ **GO TO STEP 30**

**OK** ▼

| | |
|---|---|
| **27.** | **CHECK FOR EXHAUST GAS LEAK** |

Click here INFO

**NG** ▶ **REPAIR OR REPLACE EXHAUST SYSTEM**

**OK**

| | |
|---|---|
| **28.** | **INSPECT SPARK PLUG** |

Click here INFO

**NG** ▶ **REPLACE SPARK PLUG**

**OK**

| | |
|---|---|
| **29.** | **CHECK FOR SPARK (SPARK TEST)** |

Click here INFO

**NEXT** ▶ **GO TO STEP 38**

| | |
|---|---|
| **30.** | **CHECK FUEL LINE** |

Click here INFO

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

**NG** ▶ **REPAIR OR REPLACE FUEL SYSTEM**

| | |
|---|---|
| **31.** | **INSPECT AIR FUEL RATIO SENSOR (SENSOR 1) (HEATER RESISTANCE)** |

Click here INFO

**NG** ▶ **REPLACE AIR FUEL RATIO SENSOR (SENSOR 1)**

**OK**

| | |
|---|---|
| **32.** | **CHECK TERMINAL VOLTAGE (POWER SOURCE OF AIR FUEL RATIO SENSOR (SENSOR 1))** |

Click here INFO

**NG** ▶ **GO TO STEP 41**

**OK** ▼

| | |
|---|---|
| **33.** | **CHECK HARNESS AND CONNECTOR (AIR FUEL RATIO SENSOR (SENSOR 1) - ECM)** |

Click here INFO

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **34.** | **REPLACE AIR FUEL RATIO SENSOR (SENSOR 1)** |

Click here INFO

**NEXT** ▼

| | |
|---|---|
| **35.** | **CLEAR DTC** |

Click here INFO

**NEXT** ▼

| | |
|---|---|
| **36.** | **CHECK WHETHER DTC OUTPUT RECURS (DTC P014C00, P014D00, P015A00 OR P015B00)** |

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 |
| P014C00, P014D00, P015A00 or P015B00 is output | B |

Post-procedure1

(c) None.

**A** ▶ **END**

**B**

▼

| | |
|---|---|
| **37.** | **READ VALUE USING GTS (MASS AIR FLOW SENSOR)** |

Click here INFO

**NEXT**

▼

| | |
|---|---|
| **38.** | **CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY CONNECTOR CONNECTION)** |

Click here INFO

**NEXT**

▼

| | |
|---|---|
| **39.** | **CLEAR DTC** |

Click here INFO

**NEXT**

▼

| | |
|---|---|
| **40.** | **CHECK WHETHER DTC OUTPUT RECURS (DTC P014C00, P014D00, P015A00 OR P015B00)** |

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 |
| P014C00, P014D00, P015A00 or P015B00 is output | B |

Post-procedure1

(c) None.

**A** ▶ **END**

**B** ▶ **GO TO STEP 45**

| | |
|---|---|
| **41.** | **INSPECT EFI-MAIN NO. 2 RELAY** |

Click here INFO

**NG** ▶ **REPLACE EFI-MAIN NO. 2 RELAY**

**OK** ▼

| | |
|---|---|
| **42.** | **CHECK TERMINAL VOLTAGE (POWER SOURCE OF EFI-MAIN NO. 2 RELAY)** |

Click here INFO

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - EFI-MAIN NO. 2 RELAY)**

**OK**

| | |
|---|---|
| **43.** | **CHECK HARNESS AND CONNECTOR (EFI-MAIN NO. 2 RELAY - BODY GROUND)** |

Click here INFO

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**

| | |
|---|---|
| **44.** | **CHECK HARNESS AND CONNECTOR (EFI-MAIN NO. 2 RELAY - AIR FUEL RATIO SENSOR (SENSOR 1))** |

Click here INFO

**OK** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (EFI-MAIN NO. 1 RELAY - EFI-MAIN NO. 2 RELAY)**

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| **45.** | **CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)** |

Click here INFO

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**

| | |
|---|---|
| **46.** | **INSPECT MASS AIR FLOW METER SUB-ASSEMBLY** |

Click here INFO

**NEXT**

| | |
|---|---|
| **47.** | **CLEAR DTC** |

Click here INFO

**NEXT**

| | |
|---|---|
| **48.** | **CHECK WHETHER DTC OUTPUT RECURS (DTC P014C00, P014D00, P015A00 OR P015B00)** |

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 |
| P014C00, P014D00, P015A00 or P015B00 is output | B |

Post-procedure1

(c) None.

**A** **END**

**B** **REPLACE ECM**