DTC	P2A00	A/F SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

DTC	P2A03	A/F SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 1)

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05–369.

DTC No.	DTC Detection Conditions	Trouble Areas
P2A00 P2A03	Calculated test value for A/F sensor response rate deterioration level is less than threshold.	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • ECM

HINT:

- DTC P2A00 means malfunction related to the bank 1 A/F sensor.
- DTC P2A03 means malfunction related to the bank 2 A/F sensor.
- Bank 1 refers to the bank that includes cylinder No. 1.
- Bank 2 refers to the bank that includes cylinder No. 2.
- Sensor 1 refers to the sensor closest to the engine assembly.

WIRING DIAGRAM

Refer to DTC P2195 on page 05–369.

INSPECTION PROCEDURE

HINT:

Hand–held tester only:

Narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (A/F sensor, heated oxygen sensor or other trouble areas can be distinguished).

(a) Perform ACTIVE TEST by the hand–held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is an ACTIVE TEST which changes the injection volume to –12.5 % or +25 %.

(1) Connect the hand–held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approx. 90 sec.
(4) Select the item ”DIAGNOSIS / OBD/MOBD / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” when idle condition (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:
+25 % → rich output: Less than 3.0 V
–12.5 % → lean output: More than 3.35 V
Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:
+25 % → rich output: More than 0.55 V
–12.5 % → lean output: Less than 0.4 V

NOTICE:

There is a few second delay in the A/F sensor output and there is about 20 seconds delay in the heated oxygen sensor output.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Mainly suspect trouble area
Case 1	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0 V **OK**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	—
Case 2	Injection volume +25 % –12.5 % Output voltage No reaction **NG**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0V **OK**	Injection volume +25 % –12.5 % Output voltage No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % –12.5 % Output voltage No reaction **NG**	Injection volume +25 % –12.5 % Output voltage No reaction **NG**	Extremely rich or lean of the actual air–fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following procedure of A/F CONTROL enables the user to check its output (show its graph indication) of A/F sensor and heated oxygen sensor.

For displaying the graph indication, enter ”ACTIVE TEST/ A/F CONTROL/USER DATA”, then select ”AFS B1S1 and O2S B1S2” or ”AFS B2S1 and O2S B2S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.

HINT:

- DTC P2A00 or P2A03 may be also detected, when the air fuel ratio is stuck rich or lean.
- A low A/F sensor voltage could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.
- Read freeze frame data using the Intelligent Tester II. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK OTHER DTC OUTPUT(BESIDES A/F SENSOR DTC)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the ignition switch ON.
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, select the item: Powertrain / Engine and ECT / DTC.
(e) Read DTCs.

Result :

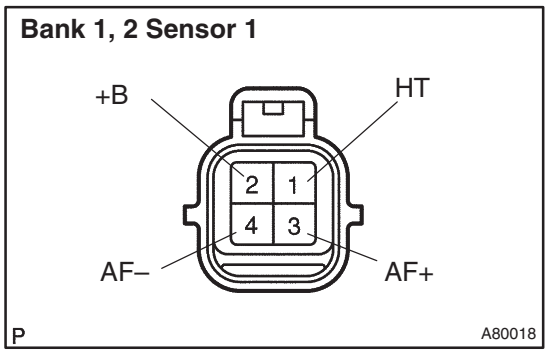
Display	Proceed to
DTC "P2A00 and/or P2A03" are output.	A
DTC "P2A00 and/or P2A03" and other codes are output.	B

HINT:
If any other code besides P2A00 are/or P2A03 are output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART**

A

2 INSPECT AIR FUEL RATIO SENSOR(RESISTANCE OF A/F SENSOR HEATER)



(a) Disconnect the A/F sensor connector.
(b) Measure resistance between the terminals HT and +B of the A/F sensor.

Standard:

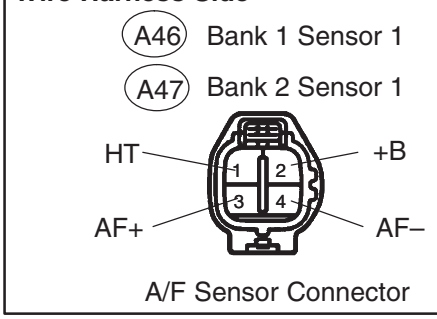
Terminal No.	Specified condition
1 (HT) – 2(+B)	1.8 to 3.4 Ω at 20°C (68°F)
1 (HT) – 4(AF–)	10 kΩ or higher

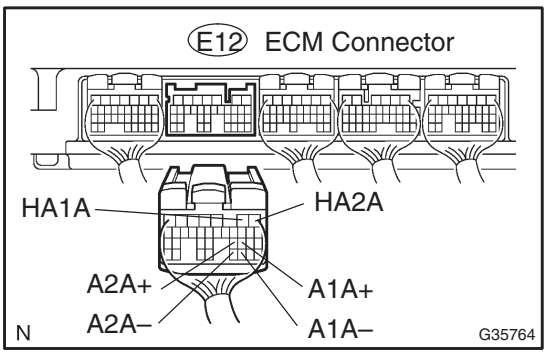
NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

3 CHECK HARNESS AND CONNECTOR(A/F SENSOR – ECM)

Wire Harness Side





(a) Disconnect the A46 or A47 A/F sensor connector.
(b) Disconnect the E12 ECM connector.
(c) Check for resistance between the wire harness side connectors.

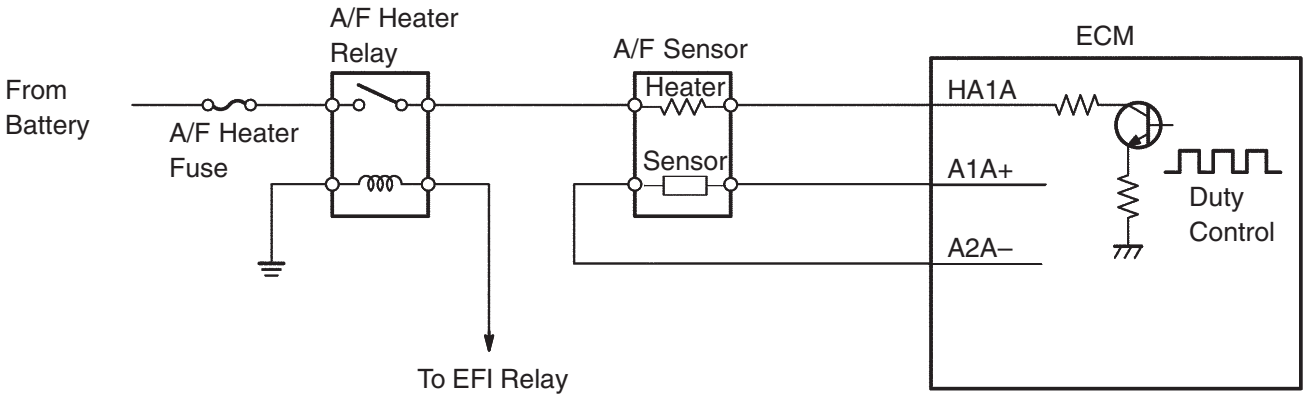
Standard (Check for open):

Symbols (Terminal No.)	Specified condition
AF+ (A46–3) – A1A+ (E12–22)	Below 1 Ω
AF– (A46–4) – A1A– (E12–30)	
HT (A46–1) – HA1A (E12–2)	
AF+ (A47–3) – A2A+ (E12–23)	
AF– (A47–4) – A2A– (E12–31)	
HT (A47–1) – HA2A (E12–1)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
AF+ (A46–3) or A1A+ (E12–22) – Body ground	10 kΩ or more
AF– (A46–4) or A1A– (E12–30) – Body ground	
HT (A46–1) or HA1A (E12–2) – Body ground	
AF+ (A47–3) or A2A+ (E12–23) – Body ground	
AF– (A47–4) or A2A– (E12–31) – Body ground	
HT (A47–1) or HA2A (E12–1) – Body ground	

Reference (Bank 1 Sensor 1 System Drawing)



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

5	READ OUTPUT DTC(A/F SENSOR DTC OUTPUT AGAIN)

(a) Connect the Intelligent Tester II to the DLC3.
(b) Turn the ignition switch ON.
(c) Turn the Intelligent Tester II ON.
(d) On the Intelligent Tester II, select the item: Powertrain / Engine and ECT / DTC / Pending.
(e) Read DTCs.

Result :

Display	Proceed to
DTC "P2A00 and/or P2A03" are not output.	A
DTC "P2A00 and/or P2A03" are output.	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

6	REPLACE AIR FUEL RATIO SENSOR

NEXT

7	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

8	READ OUTPUT DTC(A/F SENSOR DTC OUTPUT AGAIN)

(a) Connect the Intelligent Tester II to the DLC3.
(b) Turn the ignition switch ON.
(c) Turn the Intelligent Tester II ON.
(d) On the Intelligent Tester II, select the item: Powertrain / Engine and ECT / DTC / Pending.
(e) Read DTCs.

Result :

Display	Proceed to
DTC "P2A00 and/or P2A03" are not output.	A
DTC "P2A00 and/or P2A03" are output.	B

A → CHECK AIR–FUEL RATIO EXTREMELY LEAN OR RICH

B

END