

DTC	P0136	OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2)
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DTC	P0156	OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 2 SENSOR 2)
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CIRCUIT DESCRIPTION

Refer to DTC P0130 on page [05-60](#) .

DTC No	DTC Detection Condition	Trouble Area
P0136 P0156	The condition consists of the following two situations at once. (a) The number of the speed changes, exceeds 5 km/h per 2 seconds, was counted more than 30 times by ECM. (b) There was no change in the rich and lean outputs from heated oxygen sensor for the 480 seconds of air fuel ratio feedback. (Throttle was not closed)	<ul style="list-style-type: none"> • Open or short in heated oxygen sensor (bank 1, 2 sensor 2) circuit • Heated oxygen sensor (bank 1, 2 sensor 2) • Heated oxygen sensor heater (bank 1, 2 sensor 2) • EFI relay

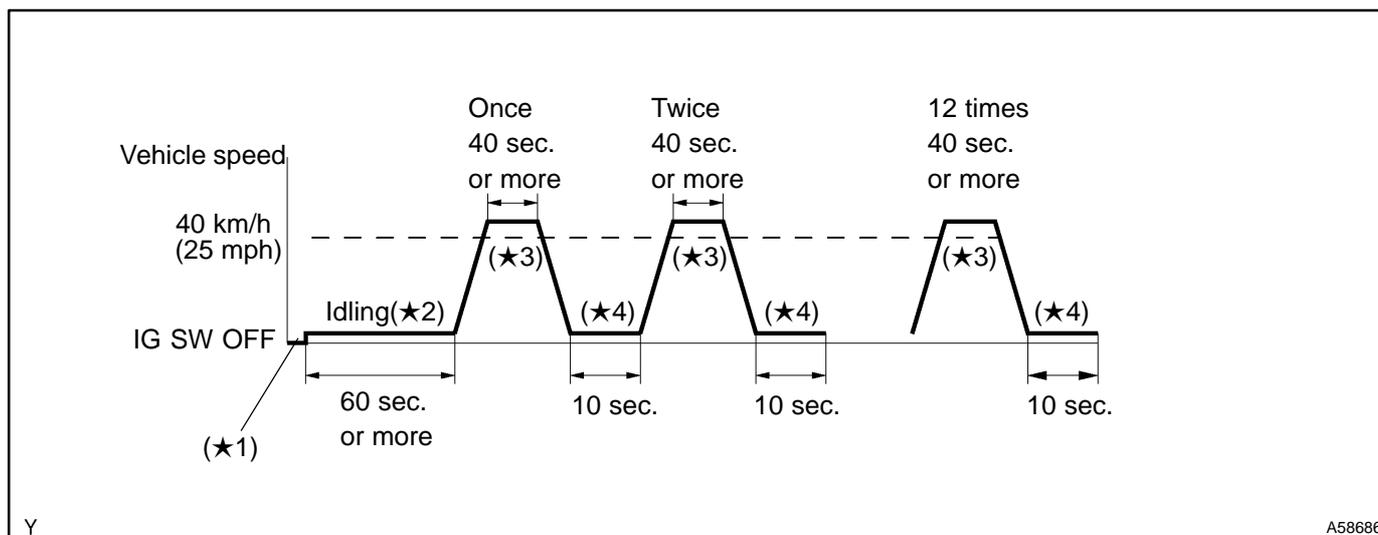
HINT:

- Bank 1 refers to the bank that includes cylinder No.1.
- Bank 2 refers to the bank that does not include cylinder No.1.
- Sensor 2 refers to the sensor farthest away from the engine body.

WIRING DIAGRAM

Refer to DTC P0130 on page [05-60](#) .

CONFIRMATION DRIVING PATTERN



1. **Connect the hand-held tester to the DLC3. (★1)**
2. **Switch the hand-held tester from the normal mode to the check (test) mode (See page 05-5). (★1)**
3. **Start the engine and let the engine idle for 60 seconds or more. (★2)**
4. **Drive the vehicle at 40 km/h (25 mph) or more for 40 seconds or more. (★3)**
5. **Let the engine idle for 10 seconds or more. (★4)**
6. **Perform steps (★3) to (★4) 12 times. (★5)**

HINT:

If a malfunction exists, the MIL will light up on the multi information display during step (★5).

NOTICE:

If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from (★2) to (★5), then perform steps from (★2) to (★5) again.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following "A/F CONTROL" (heated oxygen sensor or another can be distinguished).

- (a) Perform ACTIVE TEST by 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/ENHANCED OBD II/ACTIVE TEST/ A/F CONTROL".
- (5) Perform "A/F CONTROL" when idle condition (press the right or left button).

Result:

Heated oxygen sensor reacts in synchronizing 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:

However, there is a few second delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.55 V Less than 0.4V 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	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.55 V Less than 0.4V OK	Injection volume +25 % -12.5 % Output voltage No reaction NG	Sensor 2: rear sensor (sensor 2, heater, sensor 2 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 enable that to check its output (show its graph indication) of heated oxygen sensor.

To display the graph indication. Select and push the "YES or NO" button 2 data "O2S B1S1 and O2S B1S2" or "O2S B2S1 and O2S B2S2" and press button "4" after selecting "ACTIVE TEST/ A/F CONTROL/USER DATA".

HINT:

- If different DTCs that are related to different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand-held tester or the OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1 CHECK OTHER DTC OUTPUT(BESIDES DTC P0136 AND/OR P0156)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.

Result:

Display (DTC output)	Proceed to
Only "P0136 and/or P0156" are output	A
"P0136 or P0156" and other DTCs are output	B

HINT:

If any other codes besides "P0136 and/or P0156" are output, perform the troubleshoot on that DTC before.

B

GO TO RELEVANT DTC CHART
(See page 05-18)

A

2 READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL(OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

- (a) After warming up the engine, race the engine at 2,500 rpm for 3 minutes.
 (b) Read the output voltage of the heated oxygen sensor when the engine is suddenly raced.

HINT:

Perform a quick racing to 4,000 rpm 3 times by using the accelerator pedal.

Heated oxygen sensor output voltage: Alternates from 0.4 V or less to 0.5 V or more.

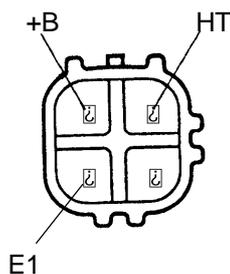
OK

Go to step 6

NG

3 INSPECT HEATED OXYGEN SENSOR(HEATER RESISTANCE)

Bank 1, 2 Sensor 2



A62378

- (a) Measure the resistance between the terminals of the heated oxygen sensor connector.

Standard (Bank 1, 2 sensor 2):

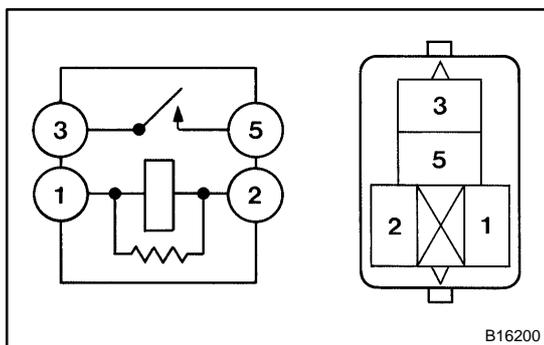
Terminal No.	Resistance
1 (HT) ↔ 2 (+B)	11 - 16 Ω at 20 °C (68 °F)
1 (HT) ↔ 4 (E1)	No Continuity

NG

REPLACE HEATED OXYGEN SENSOR

OK

4 INSPECT EFI RELAY



B16200

- (a) Remove the EFI relay from the engine room R/B.
 (b) Inspect the EFI relay.

Standard:

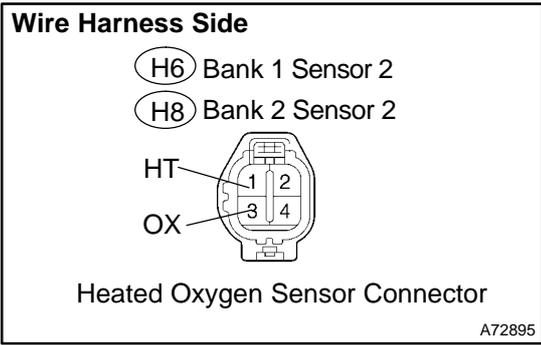
Terminal No.	Condition	Specified condition
1 ↔ 2	Constant	Continuity
3 ↔ 5	Usually	No Continuity
	Apply B+ between Terminals 1 and 2	Continuity

NG

REPLACE EFI RELAY

OK

5 CHECK HARNESS AND CONNECTOR(HEATED OXYGEN SENSOR - ECM)



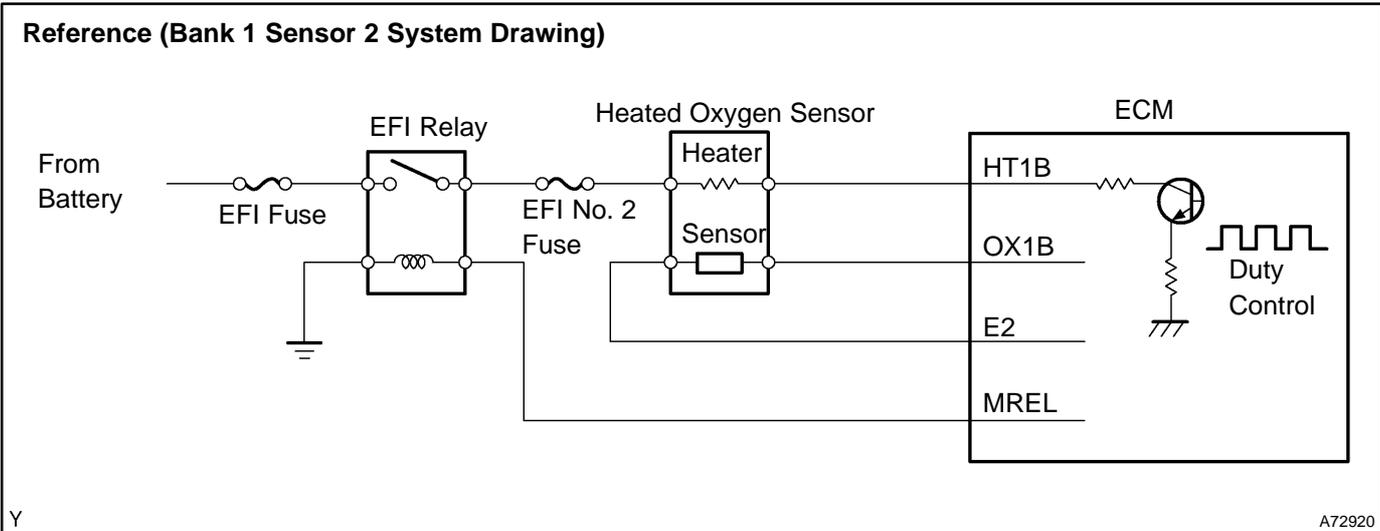
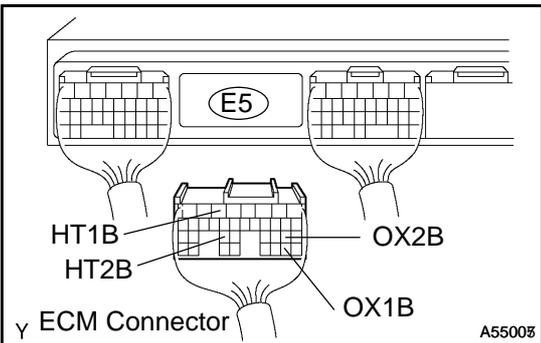
- (a) Disconnect the H6 or H8 heated oxygen sensor connector.
- (b) Disconnect the E5 ECM connector.
- (c) Check the continuity between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
OX (H6-3) ⇔ OX1B (E5-29)	Continuity
HT (H6-1) ⇔ HT1B (E5-5)	
OX (H8-3) ⇔ OX2B (E5-21)	
HT (H8-1) ⇔ HT2B (E5-25)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
OX (H6-3) or OX1B (E5-29) ⇔ Body ground	No continuity
HT (H6-1) or HT1B (E5-5) ⇔ Body ground	
OX (H8-3) or OX2B (E5-21) ⇔ Body ground	
HT (H8-1) or HT2B (E5-25) ⇔ Body ground	



NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HEATED OXYGEN SENSOR

6 PERFORM CONFIRMATION DRIVING PATTERN

GO

7 | READ OUTPUT DTC(DTC P0136 AND/OR P0156 ARE OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.

Result:

Display (DTC output)	Proceed to
"P0136 and/or P0156" are not output again	A
"P0136 and/or P0156" are output again	B

B → **REPLACE HEATED OXYGEN SENSOR**

A

CHECK FOR INTERMITTENT PROBLEMS (See page 05-5)