

DTC	P0136/27	OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2)
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## CIRCUIT DESCRIPTION

Refer to DTC P0130/21 on page 05-322.

DTC No	DTC Detection Condition	Trouble Area
P0136/27	Heated oxygen sensor voltage does not change during driving (1 trip detection logic)	<ul style="list-style-type: none"> <li>• Open or short in heated oxygen sensor circuit</li> <li>• Heated oxygen sensor (sensor 2)</li> <li>• Heated oxygen sensor heater (sensor 2)</li> <li>• EFI relay</li> </ul>

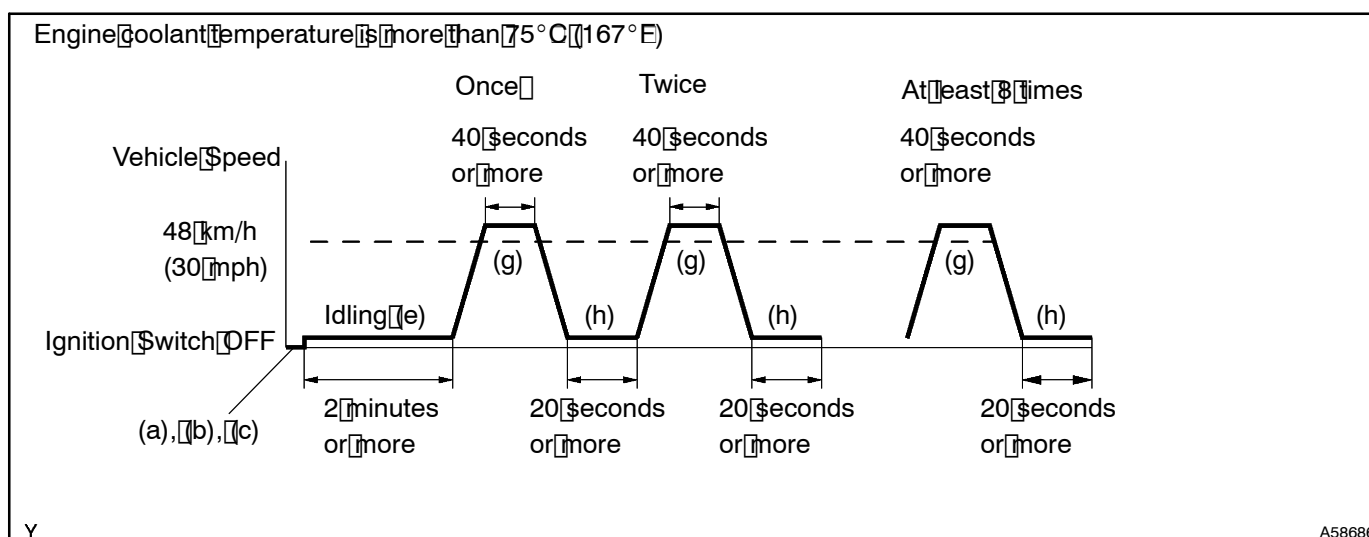
HINT:

Sensor 2 refers to the sensor farthest away from the engine assembly.

## WIRING DIAGRAM

Refer to DTC P0130/21 on page 05-322.

## CONFIRMATION DRIVING PATTERN



- Connect the intelligent tester II to the DLC3.
- Turn the ignition switch to ON and turn the intelligent tester II ON.
- Switch the ECM from normal mode to check mode using the intelligent tester II (see page 05-270).
- Start the engine.
- Allow the engine to idle for 2 minutes.
- Warm up the engine until the engine coolant temperature reaches more than 75°C (167°F).
- Drive the vehicle at 48 km/h (30 mph) or more for 40 seconds or more.
- Stop the vehicle and allow the engine to idle for 20 seconds or more.
- Repeat the steps (g) and (h) at least 8 times in one driving cycle.

HINT:

If a malfunction exists, the MIL will be illuminated during step (i).

### NOTICE:

If the conditions in this test are not strictly followed, no malfunction will be detected. If you do not have the intelligent tester II, turn the ignition switch to OFF after performing steps from (e) to (i), then perform steps (e) to (i) again.

## INSPECTION PROCEDURE

### HINT:

intelligent tester II only:

Malfunctioning areas can be found using the Active Test / A/F Control operation. The A/F Control operation can determine if the heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform the Active Test using the intelligent tester II.

### HINT:

The A/F CONTROL operation lowers the injection volume by 12.5 % or increases the injection volume by 25 %.

- (1) Connect the intelligent tester II to the DLC3.
- (2) Start the engine and turn the intelligent tester II ON.
- (3) Warm up the engine by running the engine at 2,500 rpm for approximately 3 minutes.
- (4) On the intelligent tester II, select the following menu items: Powertrain / Engine and ECT / Active Test / A/F Control.
- (5) Select the following monitor items: O2S B1 S1 and O2S B1 S2.
- (6) Perform the A/F Control operation with the engine in an idling condition (press the right or left button).

### Result:


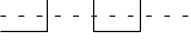



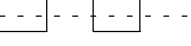
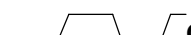


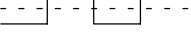


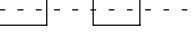
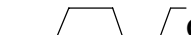


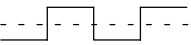



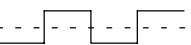


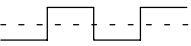


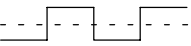

**The heated oxygen sensor reacts in accordance with increase and decrease of the injection volume:**

**+25 % → Rich output: More than 0.5 V**

**-12.5 % → Lean output: Less than 0.4 V**

### NOTICE:

**There is a delay of few seconds in the sensor 1 (front sensor) output, and there is a delay of about 20 seconds at maximum 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)	Main Suspect Trouble Area
Case 1	Injection volume +25 %   -12.5 % Output voltage More than 0.5 V  <b>OK</b> Less than 0.4V 	Injection volume +25 %   -12.5 % Output voltage More than 0.5 V  <b>OK</b> Less than 0.4V 	—
Case 2	Injection volume +25 %   -12.5 % Output voltage Almost no reaction  <b>NG</b>	Injection volume +25 %   -12.5 % Output voltage More than 0.5 V  <b>OK</b> Less than 0.4V 	Sensor 1: front sensor (Sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 %   -12.5 % Output voltage More than 0.5 V  <b>OK</b> Less than 0.4V 	Injection volume +25 %   -12.5 % Output voltage Almost no reaction  <b>NG</b>	Sensor 2: rear sensor (Sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 %   -12.5 % Output voltage Almost no reaction  <b>NG</b>	Injection volume +25 %   -12.5 % Output voltage Almost no reaction  <b>NG</b>	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F Control procedure enables the technician to check and graph the voltage output of both the heated oxygen sensors.

To display the graph, select the following menu items on the tester: View / Line Graph.

**NOTICE:**

**If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and the heated oxygen sensor DTCs will be recorded, and the MIL then illuminates.**

**HINT:**

- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester II. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, 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.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.

**1 CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0136/27)**

- (a) Connect the intelligent tester II to the DLC3.
- (b) Turn the ignition switch to ON and turn the intelligent tester II ON.
- (c) Select the following menu items: Powertrain / Engine and ECT / DTC.
- (d) Read DTCs.

**Result:**

Display (DTC Output)	Proceed To
P0136/27	A
P0136/27 and other DTCs	B

**HINT:**

If any other DTCs besides P0136/27 are output, perform troubleshooting for those DTCs first.

**B**

**GO TO RELEVANT DTC CHART**  
(See page 05-277)

**A****2 READ VALUE OF INTELLIGENT TESTER II (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)**

- (a) Connect the intelligent tester II to the DLC3.
- (b) Start the engine and turn the intelligent tester II ON.
- (c) Select the following menu items: Powertrain / Engine and ECT / DTC.
- (d) After warming up the engine, run the engine at 2,500 rpm for 3 minutes.
- (e) Read the output voltage of the heated oxygen sensor when the engine speed is suddenly increased.

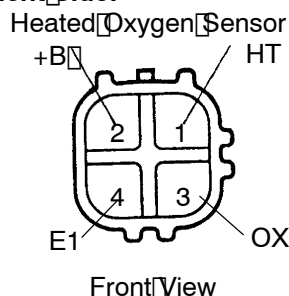
**HINT:**

Quickly accelerate the engine to 4,000 rpm 3 times by using the accelerator pedal.

**Heated oxygen sensor output voltage: Alternates 0.4 V or less and 0.5 V or more.**

**OK**

**Go to step 6**

**NG****3 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)****Component Side:**

- (a) Disconnect the H10 heated oxygen sensor connector.
- (b) Measure the resistance between the terminals of the heated oxygen sensor connector.

**Standard (Sensor 2):**

Tester Connection	Specified Condition
1 (HT) – 2 (+B)	11 to 16 $\Omega$ at 20°C (68°F)
1 (HT) – 4 (E1)	10 k $\Omega$ or higher

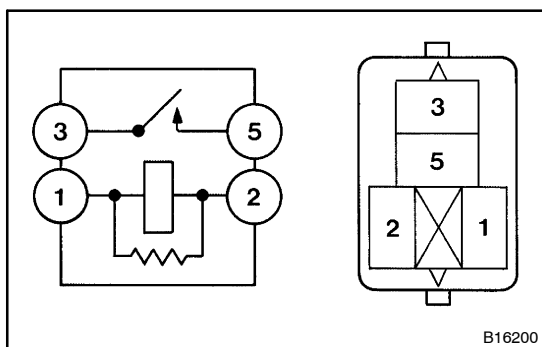
- (c) Reconnect the heated oxygen sensor connector.

**NG**

**REPLACE HEATED OXYGEN SENSOR**

**OK**

## 4 INSPECT EFI RELAY



- Remove the EFI relay from the engine room R/B.
- Check the EFI relay resistance.

### Standard:

Tester Connection	Specified Condition
3 - 5	10 k $\Omega$ or higher
3 - 5	Below 1 $\Omega$ (Apply battery voltage to terminals 1 and 2)

- Reinstall the EFI relay.

NG

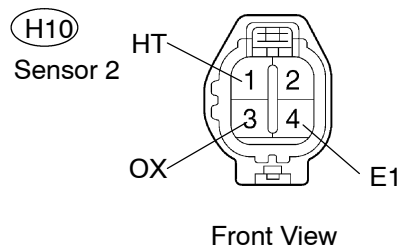
REPLACE EFI RELAY

OK

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

### Wire Harness Side:

#### Heated Oxygen Sensor Connector



- Disconnect the H10 heated oxygen sensor connector.
- Disconnect the E10 and E11 ECM connectors.
- Check the resistance.

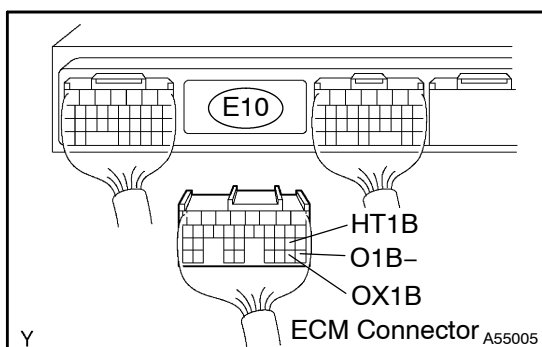
### Standard (Check for open):

Tester Connection	Specified Condition
OX (H10-3) - OX1B (E10-29)	Below 1 $\Omega$
HT (H10-1) - HT1B (E10-21)	Below 1 $\Omega$
E1 (H10-4) - O1B- (E10-28)	Below 1 $\Omega$

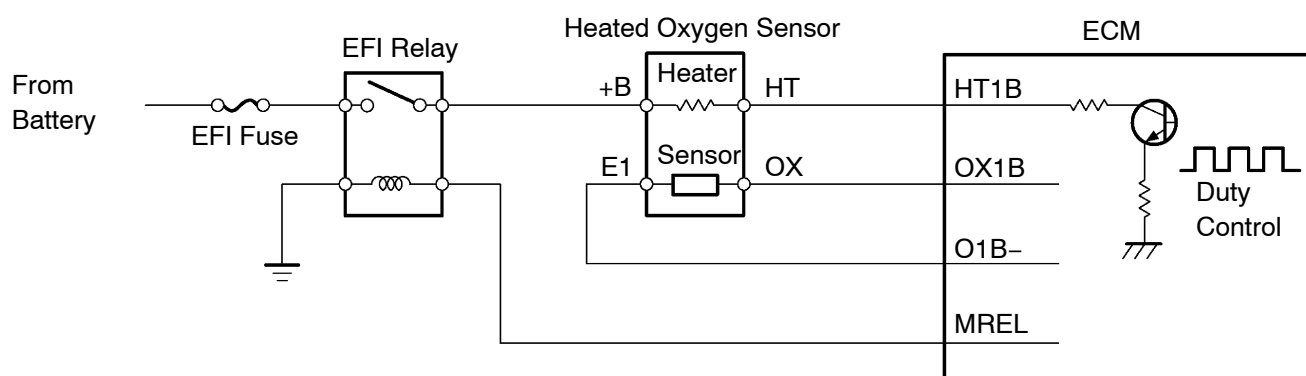
### Standard (Check for short):

Tester Connection	Specified Condition
OX (H10-3) or OX1B (E10-29) - Body ground	10 k $\Omega$ or higher
HT (H10-1) or HT1B (E10-21) - Body ground	10 k $\Omega$ or higher

- Reconnect the heated oxygen sensor connector.
- Reconnect the ECM connector.



### Reference (Sensor 2 System Diagram):



Y

A88106

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HEATED OXYGEN SENSOR

6 PERFORM CONFIRMATION DRIVING PATTERN

HINT:

Clear all DTCs prior to performing the confirmation driving pattern.

GO

7 CHECK IF DTC OUTPUT RECURS (DTC P0136/27)

- (a) Connect the intelligent tester II to the DLC3.
- (b) Turn the ignition switch to ON and turn the intelligent tester II ON.
- (c) Select the following menu items: Powertrain / Engine and ECT / DTC.
- (d) Read DTCs.

Result:

Display (DTC Output)	Proceed To
No output	A
P0136/27	B

B

REPLACE HEATED OXYGEN SENSOR

A

CHECK FOR INTERMITTENT PROBLEMS (See page 05-259)