

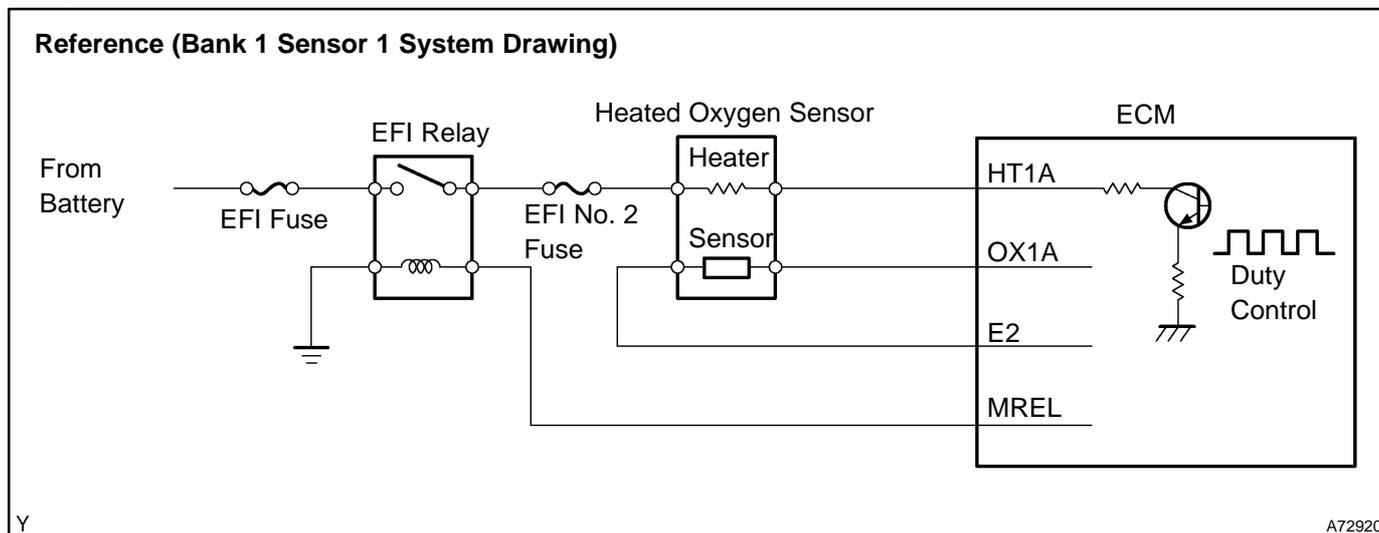
DTC	P0031	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)
DTC	P0032	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)
DTC	P0037	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)
DTC	P0038	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)
DTC	P0051	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1)
DTC	P0052	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1)
DTC	P0057	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2)
DTC	P0058	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2)

CIRCUIT DESCRIPTION

Refer to DTC P0130 on page 05-60 .

HINT:

The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the B+ side of the circuit.



DTC No.	DTC Detection Condition	Trouble Area
P0031 P0037 P0051 P0057	Heated current is 0.2 A or less when heater operates with +B > 10.5 V and < 11.5 V (1 trip detection logic)	<ul style="list-style-type: none"> • Open or short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • EFI relay • ECM
	Heated current is 0.25 A or less when heater operates with +B \geq 11.5 V (1 trip detection logic)	
P0032 P0038 P0052 P0058	When heater operates, heated current exceeds 2 A (1 trip detection logic)	

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 1 refers to the sensor closest to the engine body.
- Sensor 2 refers to the sensor farthest away from the engine body.

WIRING DIAGRAM

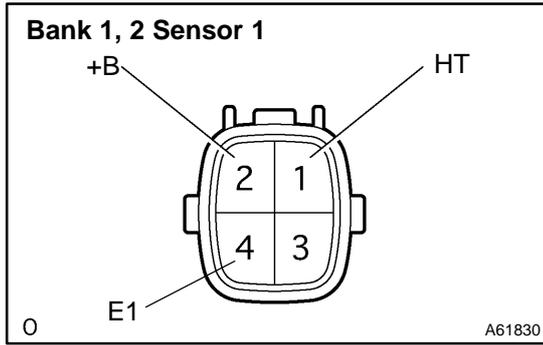
Refer to DTC P0130 on page 05-60 .

INSPECTION PROCEDURE

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 INSPECT HEATED OXYGEN SENSOR(HEATER RESISTANCE)



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

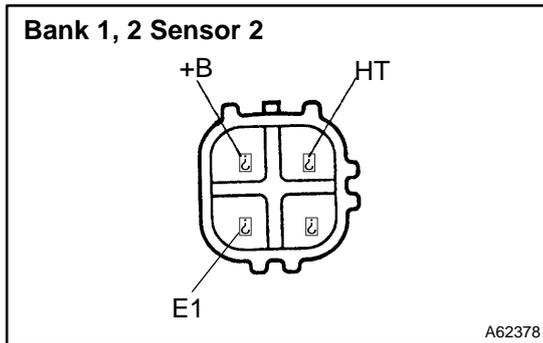
Standard (Bank 1, 2 sensor 1):

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

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

Standard (Bank 1, 2 sensor 2):

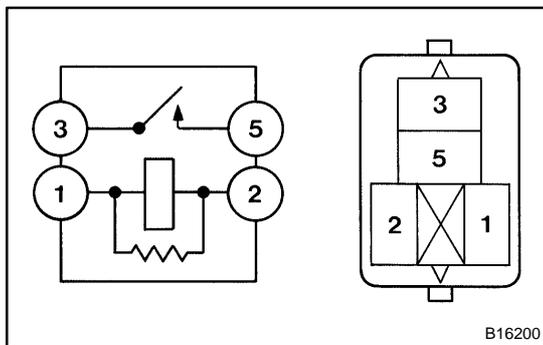
Terminal No.	Resistance
1 (HT) ↔ 2 (+B)	11 - 16 Ω at 20 °C (68 °F)
1 (HT) ↔ 4 (E1)	No Continuity



NG → REPLACE HEATED OXYGEN SENSOR

OK

2 INSPECT EFI RELAY



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

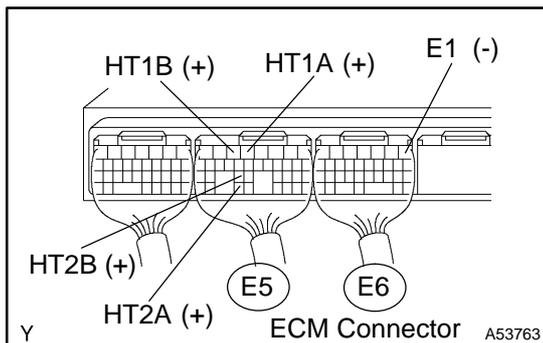
Standard:

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

3 INSPECT ECM(HT1A, HT1B, HT2A OR HT2B VOLTAGE)



- (a) Turn the ignition switch ON.
 (b) Measure the voltage between the applicable terminals of the E5 ECM connector.

Standard:

Symbols (Terminal No.)	Specified condition
HT1A (E5-4) ↔ E1 (E6-1)	9 - 14 V
HT1B (E5-5) ↔ E1 (E6-1)	
HT2A (E5-33) ↔ E1 (E6-1)	
HT2B (E5-25) ↔ E1 (E6-1)	

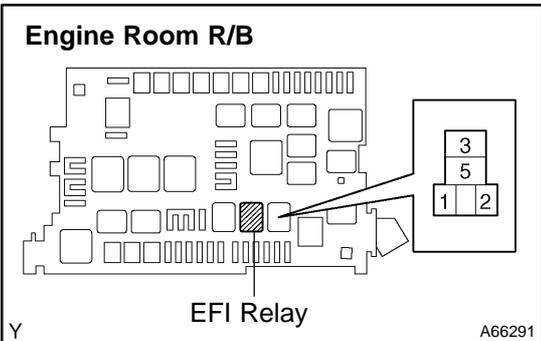
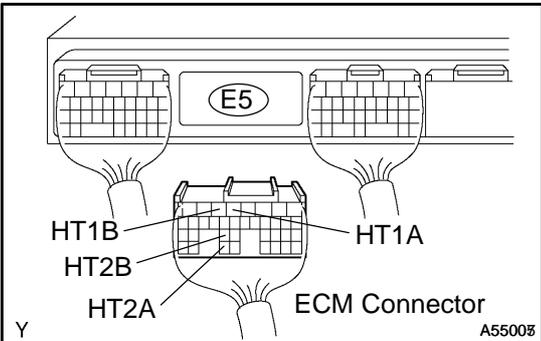
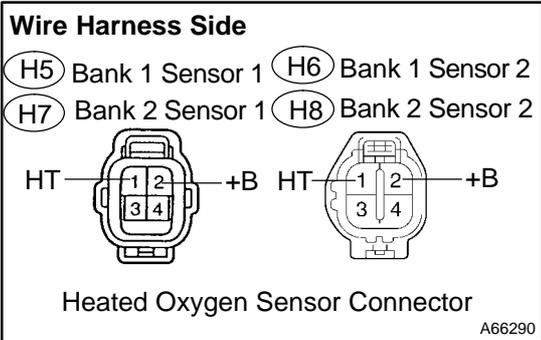
HINT:

- The HT1A means the heated oxygen sensor bank 1 sensor 1.
- The HT1B means the heated oxygen sensor bank 1 sensor 2.
- The HT2A means the heated oxygen sensor bank 2 sensor 1.
- The HT2B means the heated oxygen sensor bank 2 sensor 2.

OK CHECK AND REPLACE ECM
(See page 01-35)

NG

4 CHECK HARNESS AND CONNECTOR(HEATED OXYGEN SENSOR - ECM, HEATED OXYGEN SENSOR - EFI RELAY)



- (a) Check the harness and connector between the ECM and heated oxygen sensor connectors.
- (1) Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.
 - (2) Disconnect the E5 ECM connector.
 - (3) Check the continuity between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
HT (H5-1) ⇔ HT1A (E5-4)	Continuity
HT (H6-1) ⇔ HT1B (E5-5)	
HT (H7-1) ⇔ HT2A (E5-33)	
HT (H8-1) ⇔ HT2B (E5-25)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
HT (H5-1) or HT1A (E5-4) ⇔ Body ground	No continuity
HT (H6-1) or HT1B (E5-5) ⇔ Body ground	
HT (H7-1) or HT2A (E5-33) ⇔ Body ground	
HT (H8-1) or HT2B (E5-25) ⇔ Body ground	

- (b) Check the harness and connector between the heated oxygen sensor connector and EFI relay.

- (1) Inspect the EFI No.2 fuse.
 - Remove the EFI No.2 fuse from the engine room R/B.
 - Check the continuity of the EFI No.2 fuse.

Standard: Continuity

- (2) Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.
- (3) Remove the EFI relay from the engine room R/B.

- (4) Check the continuity between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
+B (H5-2) ⇔ EFI relay (3)	Continuity
+B (H6-2) ⇔ EFI relay (3)	
+B (H7-2) ⇔ EFI relay (3)	
+B (H8-2) ⇔ EFI relay (3)	
+B (H8-2) ⇔ EFI relay (3)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
+B (H5-2) or EFI relay (3) ⇔ Body ground	No continuity
+B (H6-2) or EFI relay (3) ⇔ Body ground	
+B (H7-2) or EFI relay (3) ⇔ Body ground	
+B (H8-2) or EFI relay (3) ⇔ Body ground	

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR
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OK

CHECK AND REPLACE ECM (See page [01-35](#))