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	P0057	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)
DTC	P0058	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)

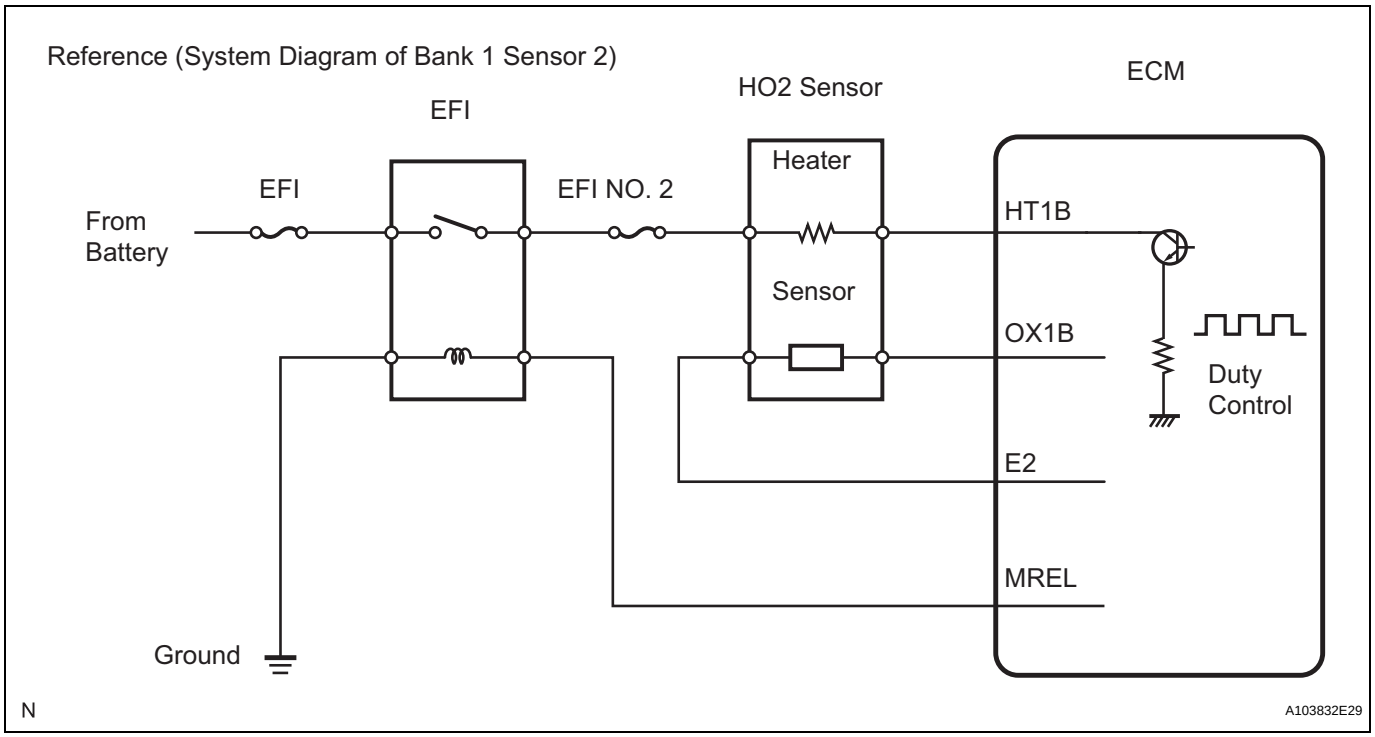
ES

HINT:
Sensor 2 refers to the sensor mounted behind the Three-Way Catalytic Converter (TWC) and located far from the engine assembly.

DESCRIPTION

Refer to DTC P0136 (See page ES-128).
HINT:

- When any of these DTCs are set, the ECM enters fail-safe mode. The ECM turns off the Heated Oxygen (HO2) sensor heater in fail-safe mode. Fail-safe mode continues until the ignition switch is turned OFF.
- The ECM provides a pulse width modulated control circuit to adjust the current through the heater. The HO2 sensor heater circuit uses a relay on the B+ side of the circuit.



DTC No.	DTC Detection Conditions	Trouble Areas
P0037 P0057	Heated Oxygen (HO2) sensor heater current less than 0.3 A (1 trip detection logic)	• Open in HO2 sensor heater circuit • HO2 sensor heater • EFI relay • ECM

DTC No.	DTC Detection Conditions	Trouble Areas
P0038 P0058	Heated Oxygen (HO2) sensor heater current more than 2 A (1 trip detection logic)	• Short in HO2 sensor heater circuit • HO2 sensor heater • EFI relay • ECM

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

MONITOR DESCRIPTION

ES

The sensing portion of the Heated Oxygen (HO2) sensor has a zirconia element which is used to detect the oxygen concentration in the exhaust gas. If the zirconia element is at the appropriate temperature, and the difference between the oxygen concentrations surrounding the inside and outside surfaces of the sensor is large, the zirconia element generates voltage signals. In order to increase the oxygen concentration detecting capacity of the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When the current in the sensor heater is outside the standard operating range, the ECM interprets this as a malfunction in the sensor heater and sets a DTC.
Example:
The ECM sets DTC P0038 or P0058 when the current in the HO2 sensor heater is more than 2 A. Conversely, when the heater current is less than 0.3 A, DTC P0037 or P0057 is set.

MONITOR STRATEGY

Related DTCs	P0037: Heated oxygen sensor heater (bank 1) open/short (Low electrical current) P0038: Heated oxygen sensor heater (bank 1) open/short (High electrical current) P0057: Heated oxygen sensor heater (bank 2) open/short (Low electrical current) P0058: Heated oxygen sensor heater (bank 2) open/short (High electrical current)
Required Sensors/ Components (Main)	Heated oxygen sensor heater (bank 1 and 2)
Required Sensors/ Components (Related)	Vehicle speed sensor
Frequency of Operation	Continuous
Duration	P0037 and P0057: 0.5 seconds P0038 and P0058: 0.3 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs not present	None
Battery voltage	10.5 V or more
Engine	Running
Starter	OFF
Catalyst intrusive monitoring	Not operating
Intrusive heating	Not operating

P0037 and P0057 (Low current):

When the following conditions are met	0.5 seconds or more
(a) Following conditions are met	-
Learned heater current during heater OFF	Completed
Intrusive heating	Not operating
Heating is OFF	Less than 0.1 seconds
Heater current	Less than 0.3 A
Intrusive heating for high current monitor	Not operating

(b) Following condition are met	-
Time after heaters are OFF	1 seconds or more

P0038 and P0058 (High current):

When the following conditions are met	0.3 seconds or more
(a) Following conditions are met	-
Learned heater current during heater OFF	Completed
Intrusive heating	Not operating
Heating is OFF	Less than 0.1 seconds
Heater current	2 A or more
(b) Following condition is met	-
Time after heaters are OFF	1 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P0037 and P0057 (Low current):

Following conditions are met	-
Heater	ON
Heater current	Less than 0.3 A
Intrusive heating	Operating

P0038 and P0058 (High current):

Either A or B is met	-
A. Following conditions are met	With intrusive heating
Heater	ON
Heater current	2 A or more
B. Following conditions are met	Without intrusive heating
Intrusive heating of learned heater current	Operating
Learned heater current during heater OFF	Operating
Heater current	More than 2 A

COMPONENT OPERATING RANGE

Heated Oxygen (HO2) sensor heater current	0.4 to 1 A (when engine idles, HO2 sensor warmed up and battery voltage 11 to 14 V)

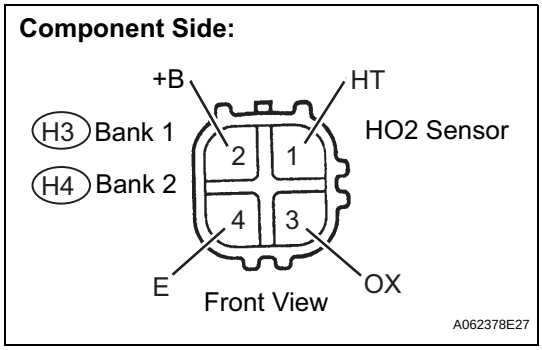
WIRING DIAGRAM

Refer to DTC P0136 (See page ES-135).

HINT:

- If other DTCs relating 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 an intelligent tester. 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.

1 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



(a) Disconnect the H3 or H4 Heated Oxygen (HO2) sensor connector.
(b) Measure the resistance between the terminals of the HO2 sensor connector.
Standard Resistance (Bank 1, 2 sensor 2)

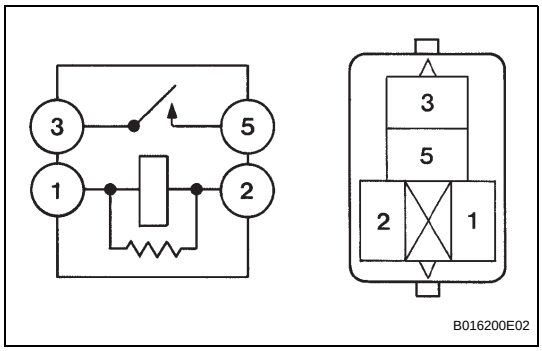
Tester Connections	Specified Conditions
HT (1) - +B (2)	11 to 16 Ω at 20°C (68°F)
HT (1) - E (4)	10 kΩ or higher

(c) Reconnect the HO2 sensor connector.

NG → REPLACE HEATED OXYGEN SENSOR

OK

2 INSPECT EFI RELAY



(a) Remove the EFI relay from the engine room relay block.
(b) Check the EFI relay resistance.
Standard Resistance

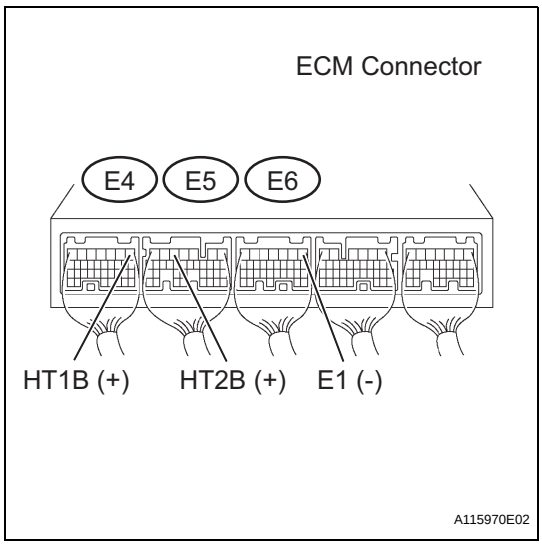
Terminal Connections	Specified Conditions
3-5	10 kΩ or higher
3-5	Below 1 Ω (when battery voltage applied to terminals 1 and 2)

(c) Reinstall the EFI relay.

NG → REPLACE EFI RELAY

OK

3 INSPECT ECM (HT1B OR HT2B VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminals of the E4, E5 and E6 ECM connectors.
Standard Voltage

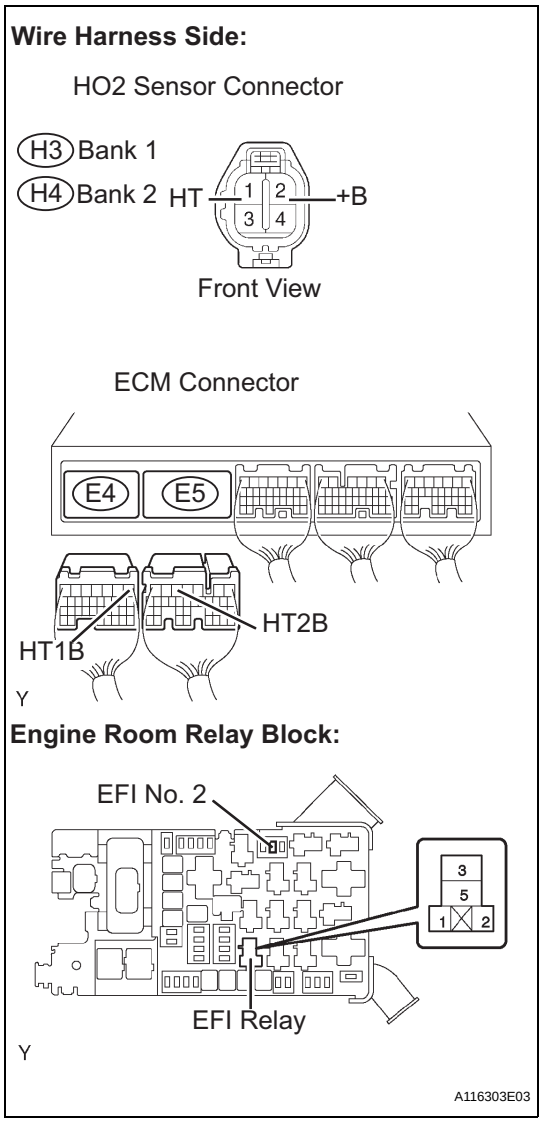
Terminal Connections	Specified Conditions
HT1B (E4-1) - E1 (E6-1)	9 to 14 V
HT2B (E5-5) - E1 (E6-1)	

HINT:
- The HT1B means the heated oxygen sensor bank 1 sensor 2.
- The HT2B means the heated oxygen sensor bank 2 sensor 2.

OK → REPLACE ECM

NG

4	CHECK HARNESS AND CONNECTOR (HO2 SENSOR - ECM, HO2 SENSOR - EFI RELAY)



(a) Check the harness and connector between the ECM and HO2 sensor.
  (1) Disconnect the H3 or H4 HO2 sensor connector.
  (2) Disconnect the E4 or E5 ECM connector.
  (3) Check the resistance.

Standard Resistance (Check for open)

Terminal Connections	Specified Conditions
HT (H3-1) - HT1B (E4-1)	Below 1 Ω
HT (H4-1) - HT2B (E5-5)	

Standard Resistance (Check for short)

Terminal Connections	Specified Conditions
HT (H3-1) or HT1B (E4-1) - Body ground	10 kΩ or higher
HT (H4-1) or HT2B (E5-5) - Body ground	

  (4) Reconnect the HO2 sensor connector.
  (5) Reconnect the ECM connector.

(b) Check the harness and connector between the HO2 sensor and EFI relay.
  (1) Inspect the EFI No. 2 fuse.
    • Remove the EFI No. 2 fuse from the engine room relay block.
    • Check the EFI No. 2 fuse resistance.

Standard Resistance:
Below 1 Ω

    • Reinstall the EFI No. 2 fuse.
  (2) Disconnect the H3 or H4 HO2 sensor connector.
  (3) Remove the EFI relay from the engine room relay block.
  (4) Check the resistance.

Standard Resistance (Check for open)

Terminal Connections	Specified Conditions
+B (H3-2) - EFI relay (3)	Below 1 Ω
+B (H4-2) - EFI relay (3)	

Standard Resistance (Check for short)

Terminal Connections	Specified Conditions
+B (H3-2) or EFI relay (3) - Body ground	10 kΩ or higher
+B (H4-2) or EFI relay (3) - Body ground	

  (5) Reconnect the HO2 sensor connector.
  (6) Reinstall the EFI relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

ES

OK

REPLACE ECM