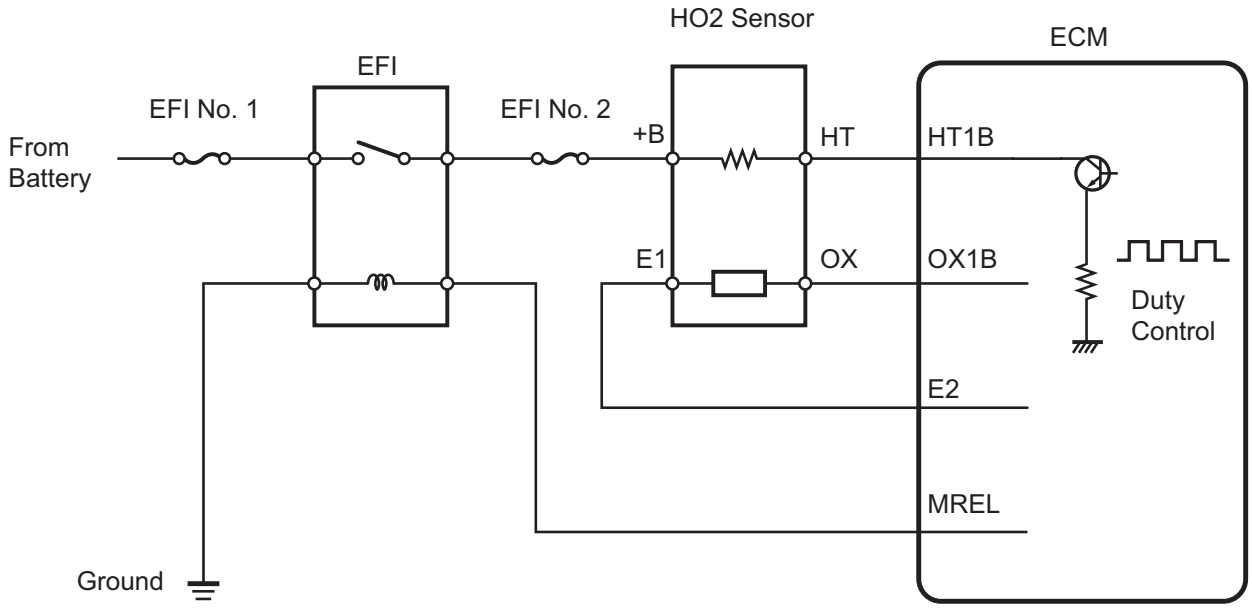
DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)
DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)
DTC	P0057	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)
DTC	P0058	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)
DTC	P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)
DTC	P0161	Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 2)

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

DESCRIPTION

Refer to DTC P0136 (See page ES-160).
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.

Reference (System Diagram of Bank 1 Sensor 2):



DTC No.	DTC Detection Condition	Trouble Area
P0037 P0057	Heated Oxygen (HO2) sensor heater current is less than 0.3 A (1 trip detection logic)	• Open in HO2 sensor heater circuit • HO2 sensor heater • EFI relay • ECM
P0038 P0058	Heated Oxygen (HO2) sensor heater current is more than 2 A (1 trip detection logic)	• Open in HO2 sensor heater circuit • HO2 sensor heater • EFI relay • ECM
P0141 P0161	Cumulative heater resistance correction value exceeds the acceptable threshold (2 trip detection logic)	• HO2 sensor • 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 furthest away from the engine assembly.

ES

MONITOR DESCRIPTION

The sensing position 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.

Heated oxygen sensor heater range check (P0037, P0038, P0057 and P0058):

The ECM monitors the current applied to the O2 sensor heater to check the heater for malfunctions. If the current is below the threshold value, the ECM will determine that there is an open circuit in the heater. If the current is above the threshold value, the ECM will determine that there is a short circuit in the heater.

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.

Heated oxygen sensor heater performance (P0141 and P0161):

After the accumulated heater ON time exceeds 100 seconds, the ECM calculates the heater resistance using the battery voltage and the current applied to the heater. If the resistance is above the threshold value, the ECM will determine that there is a malfunction in the HO2S heater and set DTC P0141 and P0161.

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) P0141: Heated oxygen sensor heater performance (bank 1 sensor 2) P0161: Heated oxygen sensor heater performance (bank 2 sensor 2)
Required Sensors / Components (Main)	Heated oxygen sensor heater (bank 1 and 2)
Required Sensors / Components (Related)	Vehicle speed sensor
Frequency of Operation	Continuous
Duration	0.5 seconds: P0037 and P0057 1 second: P0038 and P0058 10 seconds: P0141 and P0161
MIL Operation	Immediate: P0037, P0038, P0057 and P0058 2 driving cycles: P0141 and P0161
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

P0037 and P0057:

Battery voltage	10.5 to 20 V

P0038 and P0058 Case 1:

Battery voltage	10.5 V or more
Engine	Running
Starter	OFF

P0038 and P0058 Case 2:

Battery voltage	10.5 to 20 V

P0141 and P0161:

One of the following conditions is met:	Condition A or B
A. All of the following conditions are met:	Conditions 1, 2, 3, 4 and 5
1. Battery voltage	10.5 V or more
2. Fuel cut	OFF
3. Time after fuel cut ON to OFF	30 seconds or more
4. Accumulated heater ON time	100 seconds or more
5. Learned heater OFF current operation	Completed
B. Duration that rear heated oxygen sensor impedance is less than 15 kΩ	2 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P0037 and P0057:

Heater Current - Learned heater OFF current	Less than 0.3 A

P0038 and P0058:

Learned heater OFF current	More than 2 A
Heater Current - Learned heater OFF current	2 A or more

P0141 and P0161 (Heater performance monitor check):

Accumulated heater resistance	Varies with sensor element temperature (Example: More than 23 Ω)

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)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-19).

WIRING DIAGRAM

Refer to DTC P0136 (See page ES-167).

INSPECTION PROCEDURE

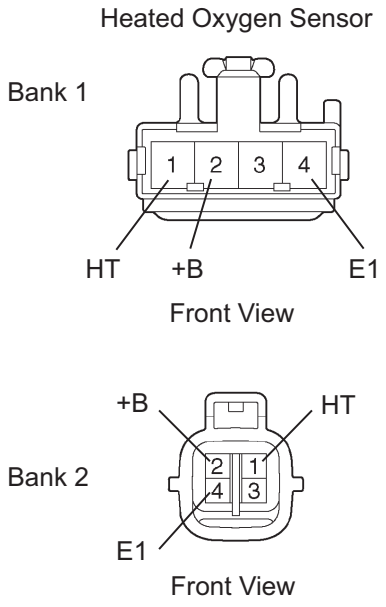
HINT:

- 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 the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

1	INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)

Component Side:



(a) Disconnect the H14 heated oxygen (HO2) sensor connector (Bank 1 Sensor 2) or H9 heated oxygen sensor connector (Bank 2 Sensor 2).

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

Bank 1

Tester Connection	Condition	Specified Condition
HT (1) - +B (2)	20°C (68°F)	11 to 16 Ω
HT (1) - E1 (4)	Always	10 kΩ or higher

Bank 2

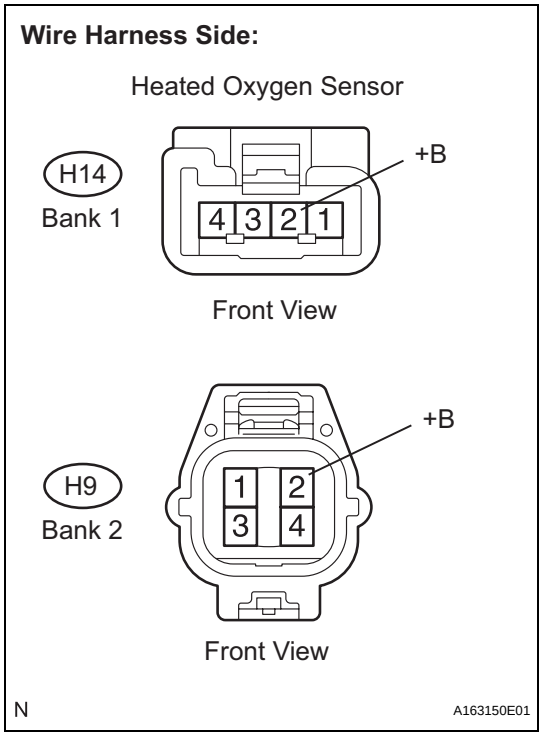
Tester Connection	Condition	Specified Condition
HT (1) - +B (2)	20°C (68°F)	11 to 16 Ω
HT (1) - E1 (4)	Always	10 kΩ or higher

(c) Reconnect the HO2 sensor connectors.

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

2 CHECK TERMINAL VOLTAGE (+B OF SENSOR)



(a) Disconnect the H14 or H9 HO2 sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

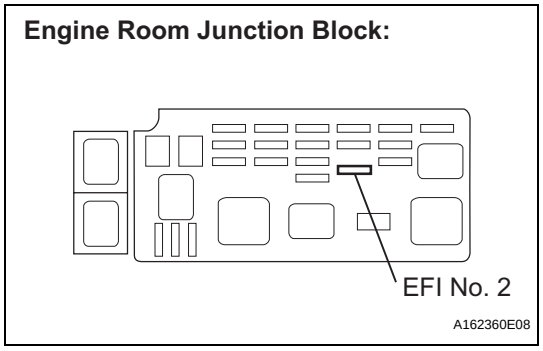
Tester Connection	Specified Condition
+B (H14-2) - Body ground	9 to 14 V
+B (H9-2) - Body ground	9 to 14 V

(d) Reconnect the HO2 sensor connector.

OK → **Go to step 5**

NG

3 INSPECT FUSE (EFI NO. 2 FUSE)



(a) Remove the EFI No. 2 fuse from the engine room junction block.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

Below 1 Ω

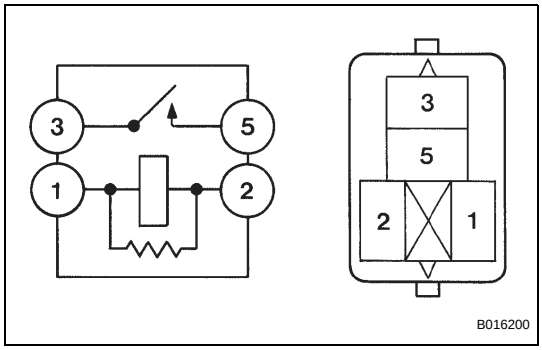
(c) Reinstall the EFI No. 2 fuse.

NG → **REPLACE EFI NO. 2 FUSE**

OK

ES

4 INSPECT RELAY (EFI RELAY)



(a) Remove the EFI relay from the engine room junction block.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage between terminals 1 and 2)

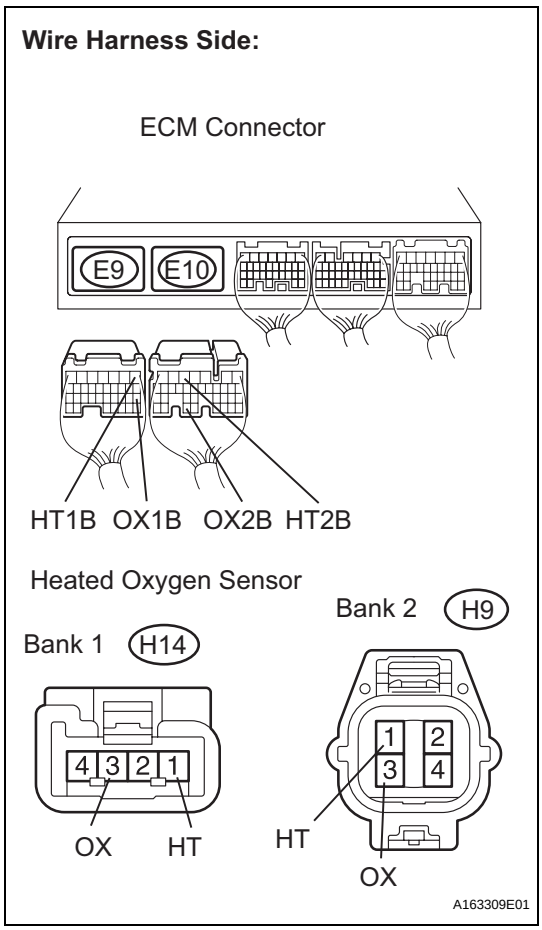
(c) Reinstall the EFI relay.

NG → REPLACE RELAY (EFI RELAY)

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (HO2 SENSOR - EFI RELAY)

5 CHECK HARNESS AND CONNECTOR (HO2 SENSOR - ECM)



(a) Disconnect the H14 or H9 HO2 sensor connector.
(b) Disconnect the E9 and E10 ECM connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

Check for open

Tester Connection	Specified Condition
HT (H14-1) - HT1B (E9-1)	Below 1 Ω
OX (H14-3) - OX1B (E9-18)	Below 1 Ω
HT (H9-1) - HT2B (E10-5)	Below 1 Ω
OX (H9-3) - OX2B (E10-33)	Below 1 Ω

Check for short

Tester Connection	Specified Condition
HT (H14-1) or HT1B (E9-1) - Body ground	10 kΩ or higher
OX (H14-3) or OX1B (E9-18) - Body ground	10 kΩ or higher
HT (H9-1) or HT2B (E10-5) - Body ground	10 kΩ or higher
OX (H9-3) or OX2B (E10-33) - Body ground	10 kΩ or higher

(d) Reconnect the ECM connectors.
(e) Reconnect the HO2 sensor connectors.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (HO2 SENSOR - ECM)

OK

6	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the intelligent tester ON.
(d) Clear the DTCs (See page ES-39).
(e) Start the engine.
(f) Allow the engine to idle for 1 minute or more.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
No output	A
P0037, P0038, P0057, P0058, P0141 and/or P0161	B

B → REPLACE ECM

A

CHECK FOR INTERMITTENT PROBLEMS