

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	P0043	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 3)
DTC	P0044	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 3)

HINT:

- These DTCs are recorded when a heated oxygen sensor heater circuit is not working properly.
- DTCs P0043 and P0044 have been added to meet the requirement for Partial Zero Emission Vehicle (PZEV) (see page 05-350).
- Sensor 2 is the sensor positioned in the 2nd location from the engine assembly, located after the front catalyst.
- Sensor 3 is the sensor positioned in the 3rd location from the engine assembly, located after the rear catalyst.

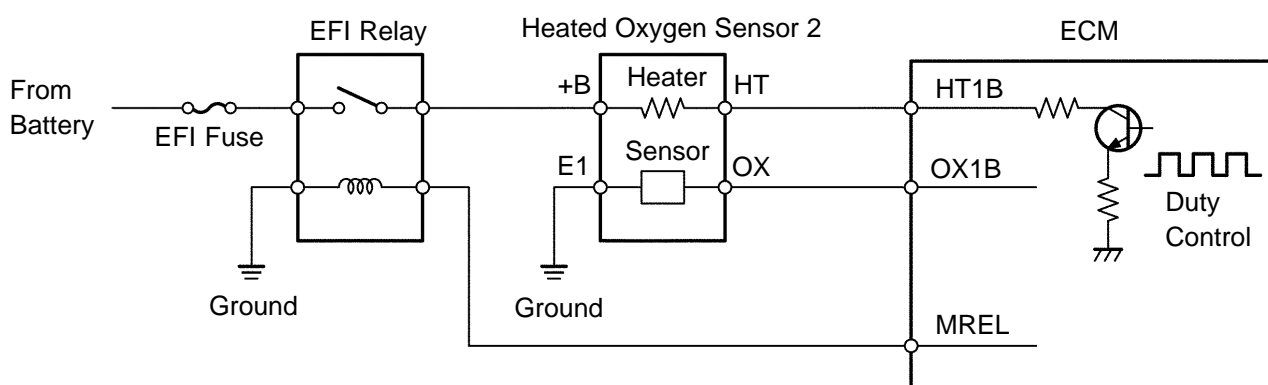
CIRCUIT DESCRIPTION

Refer to DTC P0136 for heated oxygen sensor 2 on page 05-403.

Refer to DTC P0142 for heated oxygen sensor 3 on page 05-418.

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.

Reference (Bank 1 Sensor 2 System Drawing)

DTC No.	DTC Detection Condition	Trouble Area
P0037 P0043	Heater current is 0.3 A or less when heater operates (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 • EFI fuse • ECM
P0038 P0044	Heater current exceeds 2 A when heater operates (1 trip detection logic)	<ul style="list-style-type: none"> • Short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM

MONITOR DESCRIPTION

The sensing portion of the heated oxygen sensor has a zirconia element which is used to detect oxygen concentration in the exhaust. If the zirconia element is at the proper temperature and difference of the oxygen concentration between the inside and outside surface of sensor is large, the zirconia element will generate voltage signals. In order to increase the oxygen concentration detecting capacity in the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When current in the sensor is out of the standard operating range, the ECM interprets this as a fault in the heated oxygen sensor and sets a DTC.

Example:

The ECM will set a high current DTC if the current in the sensor is more than 2 A when the heater is OFF. Similarly, the ECM will set a low current DTC if the current is less than 0.25 A when the heater is ON.

MONITOR STRATEGY

Related DTCs	P0037: HO2S heater (sensor 2) open/short (Low electrical current) P0038: HO2S heater (sensor 2) open/short (High electrical current) P0043: HO2S heater (sensor 3) open/short (Low electrical current) P0044: HO2S heater (sensor 3) open/short (High electrical current)
Required sensors/ components (Main)	HO2S heater
Required sensors/ components (Related)	Vehicle speed sensor
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-360
Engine	Running
Starter	OFF
Battery voltage	10.5 or more

TYPICAL MALFUNCTION THRESHOLDS

P0037, P0043:

HO2S heater current when HO2S heater OFF	Less than 0.3 A
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P0038, P0044:

HO2S heater current when HO2S heater ON	2 A or more
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COMPONENT OPERATING RANGE

HO2S heater current	0.4 to 1 A (at idle, warmed-up engine and +B: 11 to 14 V)
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MONITOR RESULT (MODE 06)

Refer to page 05-369 for detailed information.

TID \$04: HO2S heater

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	\$02	Multiply by 0.000076 (A)	Maximum HO2S heater current (Bank 1 Sensor 2)	Malfunction threshold for HO2S heater
1	\$04	Multiply by 0.000076 (A)	Maximum HO2S heater current (Bank 1 Sensor 3)	Malfunction threshold for HO2S heater

WIRING DIAGRAM

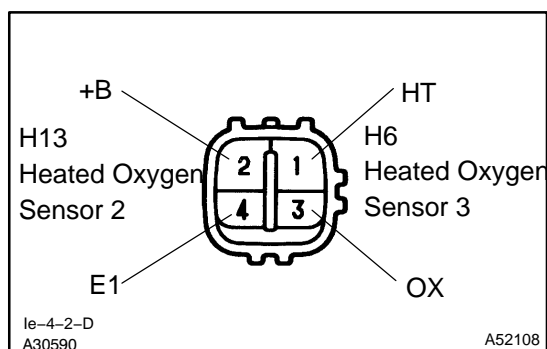
Refer to DTC P0136 on page 05-403.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when the 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)



- Disconnect the H6 or H13 heated oxygen sensor connector.
- Check the resistance of the heated oxygen sensor terminals.

Standard:

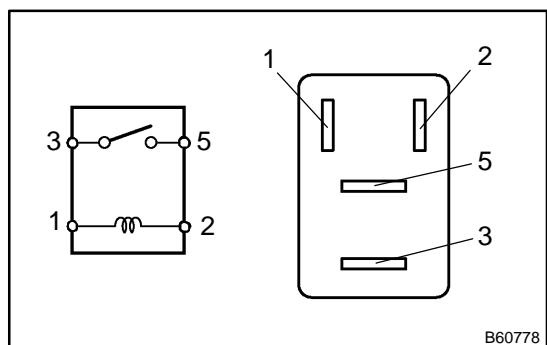
Tester Connection	Condition	Specified Condition
1 (HT) – 2 (+B)	20°C (68°F)	11 to 16 Ω
1 (HT) – 2 (+B)	800°C (1,472°F)	23 to 32 Ω

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REPLACE HEATED OXYGEN SENSOR

OK

2 INSPECT RELAY (EFI)



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

Standard:

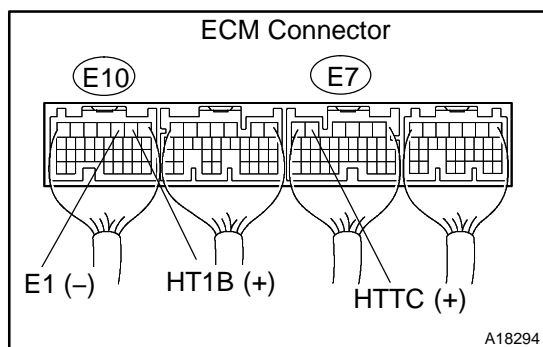
Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

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REPLACE RELAY

OK

3 INSPECT ECM (HT1B OR HT1C VOLTAGE)



- Turn the ignition switch ON.
- Check the voltage of the ECM connectors.

Standard:

Tester Connection	Specified Condition
Sensor 2: E10-2 (HT1B) - E10-3 (E1)	9 to 14 V
Sensor 3: E7-5 (HT1C) - E10-3 (E1)	

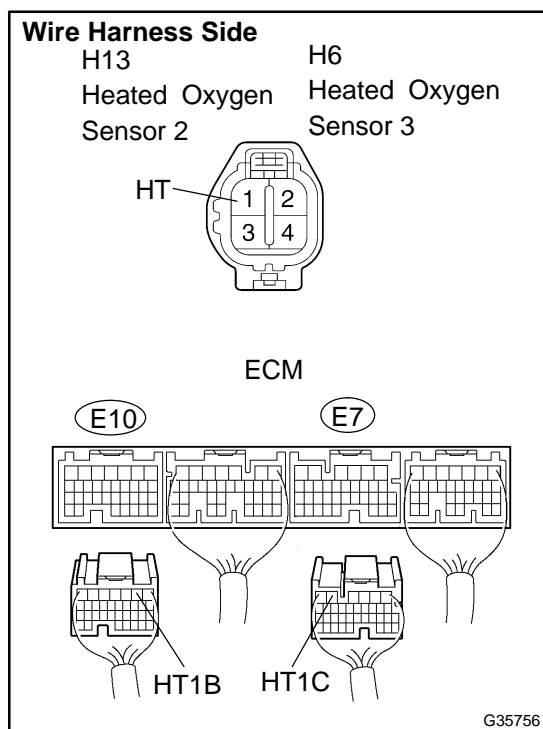
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Go to step 4

OK

REPLACE ECM (See page 10-9)

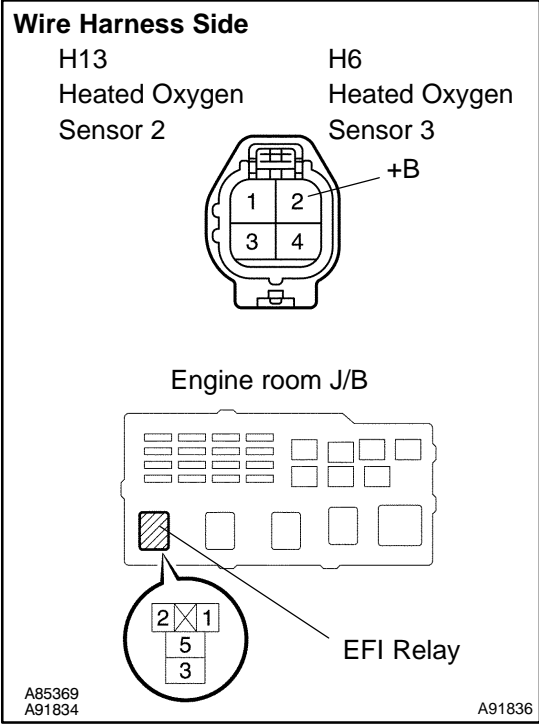
4 CHECK WIRE HARNESS (HEATED OXYGEN SENSOR - ECM, HEATED OXYGEN SENSOR - EFI RELAY)



- Check the wire harness between the ECM and heated oxygen sensor.
 - Disconnect the H6 or H13 heated oxygen sensor connector.
 - Disconnect the E10 or E7 ECM connector.
 - Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
Sensor 2: H6-1 (HT) - E10-2 (HT1B) Sensor 3: H13-1 (HT) - E7-5 (HT1C)	Below 1 Ω
Sensor 2: H6-1 (HT) or E10-2 (HT1B) - Body ground Sensor 3: H13-1 (HT) or E7-5 (HT1C) - Body ground	10 k Ω or higher



- (b) Check the wire harness between the heated oxygen sensor and EFI relay.
- (1) Disconnect the H6 or H13 heated oxygen sensor connector.
 - (2) Remove the EFI relay from the engine room J/B.
 - (3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
Sensor 2: H6-2 (+B) – J/B EFI relay terminal 3 Sensor 3: H13-2 (+B) – J/B EFI relay terminal 3	Below 1 Ω
Sensor 2: H6-2 (+B) or J/B EFI relay terminal 3 – Body ground Sensor 3: H13-2 (+B) or J/B EFI relay terminal 3 – Body ground	10 k Ω or higher

NG **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-9)