

DTC	P0143	OXYGEN SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 3)
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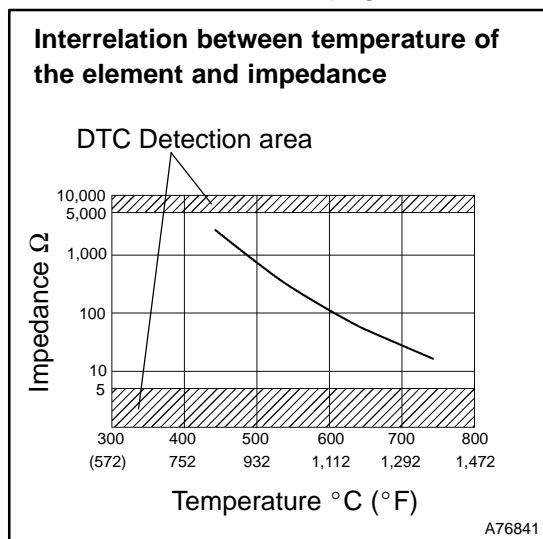
DTC	P0144	OXYGEN SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 3)
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HINT:

This DTC has been added to meet the requirement for Partial Zero Emission Vehicle (PZEV) (see page 05-350).

CIRCUIT DESCRIPTION

Refer to DTC P0142 on page 05-418.

**P0143**

During normal feedback control of the air-fuel ratio, there are still small variations in the exhaust gas oxygen concentration. As a result, the ECM cannot detect a malfunction in the heated oxygen sensor 3 using the conventional method of sensing output voltage variation. In a circuit inside the ECM, the impedance* of the sensor 3 is measured by the ECM. The ECM determines that there is a malfunction in the sensor when the measured impedance deviates from the standard range.

*: The effective resistance in an alternating current electrical circuit.

HINT:

The impedance can not be measured with an ohm meter.

DTC No.	DTC Detection Condition	Trouble Area
P0143 (Open or GND short)	The sensor impedance is outside of the normal range, at a time when the ECM expects the sensor to be warmed-up and operating normally Following condition continues for 10 seconds: Impedance of heated oxygen sensor 3 is less than 5 Ω , or more than 5,000 Ω	<ul style="list-style-type: none"> • Open or short in heated oxygen sensor 3 (bank 1 sensor 3) circuit • Heated oxygen sensor 3 (bank 1 sensor 3) • Heated oxygen sensor 3 heater (bank 1 sensor 3) • EFI relay
P0144 (B+ or VCC short)	Detects a short to the terminal voltage of the heated oxygen sensor 3 Following condition continues for 10 seconds: Heated oxygen sensor 3 voltage output is 4.8 V or more	<ul style="list-style-type: none"> • Short in heated oxygen sensor 3 (bank 1 sensor 3) circuit • Heated oxygen sensor 3 (bank 1 sensor 3)

HINT:

P0142 (see page 05-418) and P0143 (see page 05-421)

- P0142 indicates deterioration of the heated oxygen sensor 3 by the ECM calculating the impedance of the sensor 3 after the typical enabling conditions are satisfied (detected after 2 driving-cycles).
- P0143 indicates an open or short circuit in the heated oxygen sensor 3 system. (1 driving-cycle). The ECM determines this by sensing that the impedance of the sensor exceeds the threshold, i.e. less than 5 Ω or more than 5,000 Ω .

MONITOR STRATEGY

Related DTCs	P0143: HO2S (Sensor 3) Range Check (Open, GND short) P0143: HO2S (Sensor 3) Range Check (Open/range check low) P0144: HO2S (Sensor 3) Range Check (+B short) P0144: HO2S (Sensor 3) Range Check (Range check high)
Required sensors/ components (Main)	HO2S (Sensor 3)
Required sensors/ components (Related)	CKP sensor, ECT sensor, MAF meter, TP sensor
Frequency of operation	Continuous
Duration	90 seconds: HO2S (Sensor 3) Range Check (Open/range check low) 30 seconds: Others
MIL operation	2 driving cycles: HO2S (Sensor 3) Range Check (Open/range check low) Immediate: Others
Sequence operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever these DTCs are not present	See page 05-360
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P0143: HO2S (Sensor 3) Range Check (Open, GND short)

Engine	Running
Battery voltage	10.5 V or more
Estimated catalyst temperature	400°C (752°F) or more

P0143: HO2S (Sensor 3) Range Check (Open/range check low)

Engine	Running
Battery voltage	10.5 V or more
HO2S (Sensor 3) voltage	0.55 V or more

P0144: HO2S (Sensor 3) Range Check (+B short)

Engine	Running
Battery voltage	10.5 V or more

P0144: HO2S (Sensor 3) Range Check (Range check high)

Engine	Running
Battery voltage	10.5 V or more
Impedance in high frequency	5 to 5,000 Ω

TYPICAL MALFUNCTION THRESHOLDS

P0143: HO2S (Sensor 3) Range Check (Open, GND short)

HO2S (Sensor 3) impedance in high frequency	Less than 5 Ω , or more than 5,000 Ω
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P0143: HO2S (Sensor 3) Range Check (Open/range check low)

HO2S (Sensor 3) voltage	Less than 0.02 V
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P0144: HO2S (Sensor 3) Range Check (+B short)

HO2S (Sensor 3) voltage	4.8 V or more
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P0144: HO2S (Sensor 3) Range Check (Range check high)

HO2S (Sensor 3) voltage	More than 1.2 V
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COMPONENT OPERATING RANGE

HO2S (Sensor 3) voltage	Varies between 0.1 and 0.9 V
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WIRING DIAGRAM

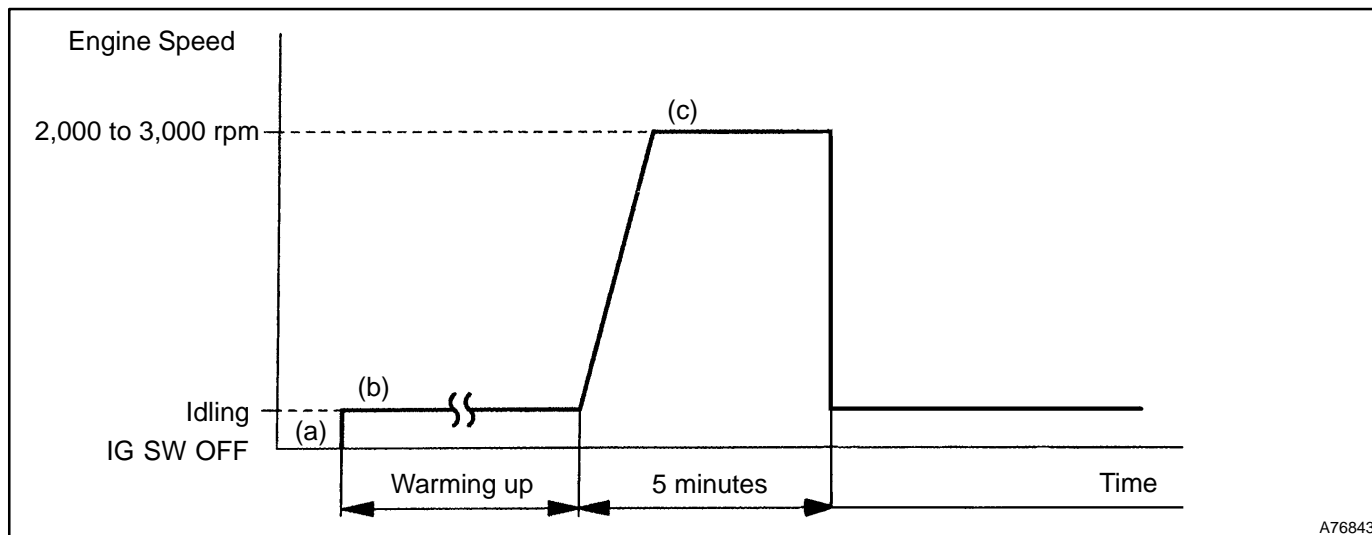
Refer to DTC P0136 on page [05-403](#).

CONFIRMATION ENGINE RACING PATTERN for DTC P0143

PURPOSE (See page 05-371)

HINT:

Performing this confirmation pattern will activate the DTC detection (P0143) of the ECM. This is very useful for verifying the completion of a repair.



(a) Clear the DTCs.

(1) Disconnect the battery cable or remove the EFI and ETCS fuses for 60 seconds or more.

(b) Start the engine and warm it up with all the accessory switches OFF.

(c) Run the engine at 2,000 to 3,000 rpm for about 5 minutes.

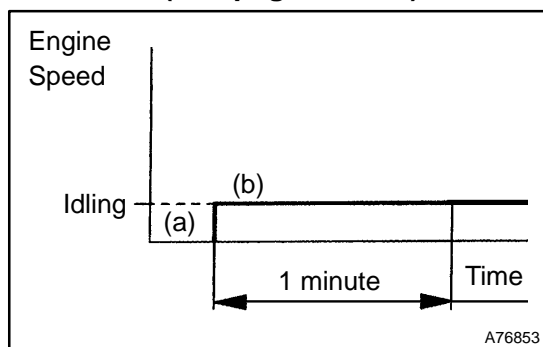
(d) Read the DTC.

NOTICE:

If the conditions in this test are not strictly followed, detection of a malfunction will not occur.

CONFIRMATION ENGINE RACING PATTERN for DTC P0144

PURPOSE (See page 05-371)



HINT:

Performing this confirmation pattern will activate the DTC detection (P0144) of the ECM. This is very useful for verifying the completion of a repair.

(a) Clear the DTCs.

(1) Disconnect the battery cable remove the EFI and ETCS fuses for 60 seconds or more.

(b) Start the engine and let the engine idle for 1 minute.

(c) Read the DTC.

NOTICE:

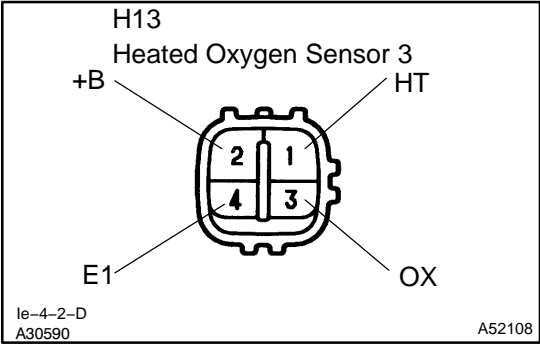
If the conditions in this test are not strictly followed, detection of a malfunction will not occur.

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 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) Disconnect the H13 heated oxygen sensor 3 connector.
- (b) Check the resistance of the heated oxygen sensor terminals.

Standard (Bank 1 Sensor 3):

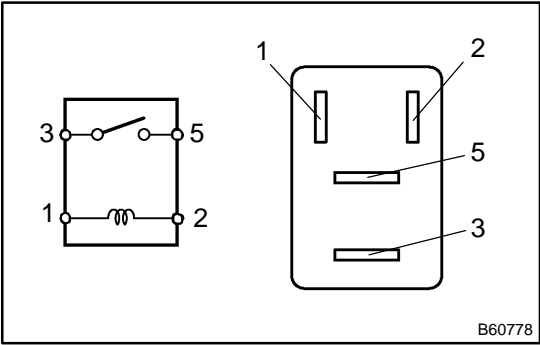
Tester Connection	Specified Condition
1 (HT) – 2 (+B)	11 to 16 Ω
1 (HT) – 4 (E)	10 kΩ or higher

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REPLACE HEATED OXYGEN SENSOR

OK

2 INSPECT RELAY (EFI)



- (a) Remove the EFI relay from the engine room J/B.
- (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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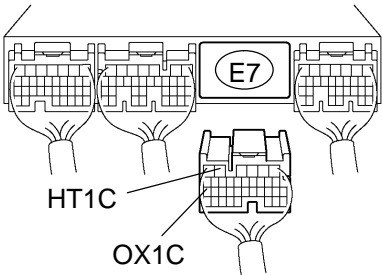
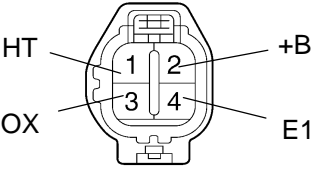
REPLACE RELAY

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3 | CHECK WIRE HARNESS (ECM - HEATED OXYGEN SENSOR)

Wire Harness Side

H13
Heated Oxygen Sensor 3



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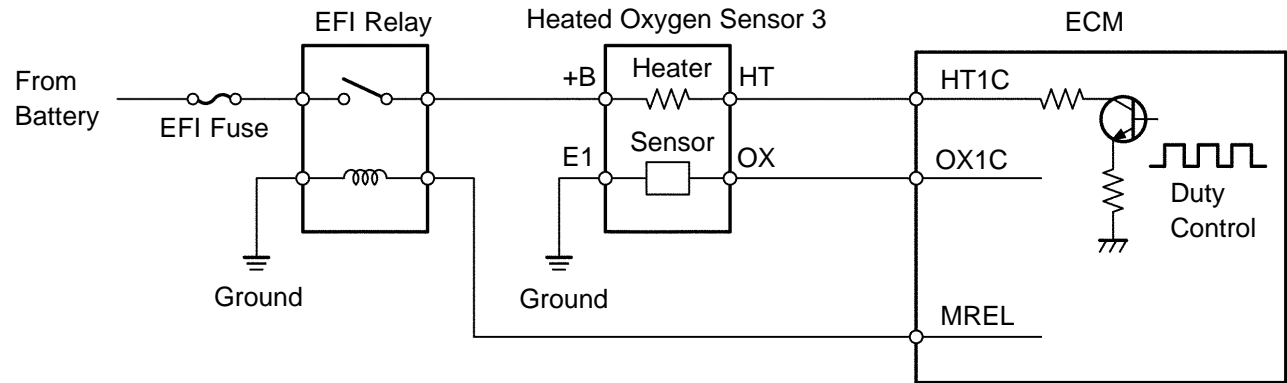
G35751

- (a) Disconnect the H13 heated oxygen sensor 3 connector.
- (b) Disconnect the E7 ECM connector.
- (c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
H13-3 (OX) - E7-27 (OX1C) H13-1 (HT) - E7-5 (HT1C) H13-4 (E1) - Body ground	Below 1 Ω
H13-3 (OX) or E7-27 (OX1C) - Body ground H13-1 (HT) or E7-5 (HT1C) - Body ground	10 k Ω or higher

Reference (Bank 1 Sensor 3 System Drawing)



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REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE HEATED OXYGEN SENSOR