

<b>DTC</b>	<b>P0136</b>	<b>OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2)</b>
------------	--------------	--

<b>DTC</b>	<b>P0137</b>	<b>OXYGEN SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)</b>
------------	--------------	--

<b>DTC</b>	<b>P0138</b>	<b>OXYGEN SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)</b>
------------	--------------	---

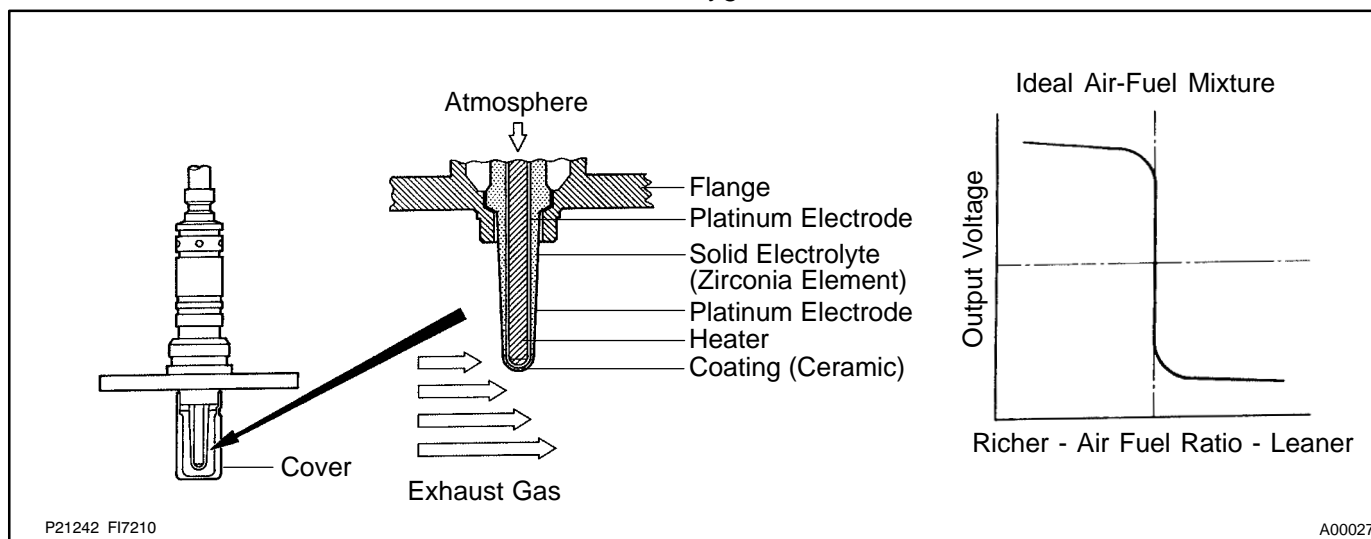
## CIRCUIT DESCRIPTION

The heated oxygen sensor is used to monitor oxygen concentration in the exhaust gas. For optimum catalytic converter operation, the air-fuel mixture must be maintained near the ideal "stoichiometric" ratio. The oxygen sensor output voltage changes suddenly in the vicinity of the stoichiometric ratio. The ECM adjusts the fuel injection time so that the air-fuel ratio is nearly stoichiometric ratio.

When the air-fuel ratio becomes LEAN, the oxygen concentration in the exhaust gas increases. The heated oxygen sensor informs the ECM of the LEAN condition (low voltage, i.e. less than 0.45 V).

When the air-fuel ratio is RICHER than the stoichiometric air-fuel ratio, the oxygen will be vanished from the exhaust gas. The heated oxygen sensor informs the ECM of the RICH condition (high voltage, i.e. more than 0.45 V).

The heated oxygen sensor includes a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), current flows to the heater in order to heat the sensor for the accurate oxygen concentration detection.



DTC No.	DTC Detection Condition	Trouble Area
P0136	<p>One of the following conditions is met:</p> <ul style="list-style-type: none"> <li>• Sensor impedance is less than 5 <math>\Omega</math> when ECM presumes the sensor warmed-up as well as operated normally</li> <li>• Under active air-fuel ratio control, either of (a) and (b) is met:               <ul style="list-style-type: none"> <li>(a) Sensor output voltage is 0.2 V or more</li> <li>(b) Sensor output voltage is 0.6 V or less</li> </ul> </li> <li>• Under active air-fuel ratio control, either of (a) and (b) is met:               <ul style="list-style-type: none"> <li>(a) Sensor output voltage is 0.25 V or more when OSC is 0.88 g or more and target air-fuel ratio is RICH</li> <li>(b) Sensor output voltage is 0.59 V or less when OSC is 0.88 g or more and target air-fuel ratio is LEAN</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Open or short in heated oxygen sensor (bank 1 sensor 2) circuit</li> <li>• Heated oxygen sensor (bank 1 sensor 2)</li> <li>• Heated oxygen sensor heater (bank 1 sensor 2)</li> <li>• EFI M relay</li> </ul>
P0137	<p>Either of the following conditions is met:</p> <ul style="list-style-type: none"> <li>• Sensor impedance is more than 15 k<math>\Omega</math> for more than 55 seconds when ECM presumes the sensor warmed-up as well as operated normally</li> <li>• Under active air-fuel ratio control, all of the following conditions are met:               <ul style="list-style-type: none"> <li>(a) Sensor output voltage is less than 0.25 V</li> <li>(b) Target air-fuel ratio is RICH</li> <li>(c) OSC is 0.88 g or more</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Open in heated oxygen sensor (bank 1 sensor 2) circuit</li> <li>• EFI M relay</li> <li>• Heated oxygen sensor (bank 1 sensor 2)</li> <li>• Heated oxygen sensor heater (bank 1 sensor 2)</li> </ul>
P0138	<p>One of the following conditions is met:</p> <ul style="list-style-type: none"> <li>• Sensor short is detected even if sensor output voltage is 1.2 V or more for 30 seconds</li> <li>• Under active air-fuel ratio control, all of the following conditions are met:               <ul style="list-style-type: none"> <li>(a) Sensor output voltage is 0.59 V or more</li> <li>(b) Target air-fuel ratio is LEAN</li> <li>(c) OSC is 0.88 g or more</li> </ul> </li> <li>• Sensor output voltage is more than 1.2 V for 10 seconds</li> </ul>	<ul style="list-style-type: none"> <li>• Short in heated oxygen sensor (bank 1 sensor 2) circuit</li> <li>• Heated oxygen sensor (bank 1 sensor 2)</li> <li>• Heated oxygen sensor heater (bank 1 sensor 2)</li> <li>• EFI M relay</li> </ul>

## MONITOR DESCRIPTION

### Active Air-Fuel Ratio Control

Usually the ECM performs the air-fuel ratio control so that the A/F sensor output indicates a near stoichiometric air-fuel ratio. This vehicle includes "active air-fuel ratio control" besides the regular air-fuel ratio control. The ECM performs the "active air-fuel ratio control" to detect deterioration in a catalyst and the heated oxygen sensor malfunction. (Refer to the diagram below)

The "Active air-fuel ratio control" is performed for approximately 15 to 20 seconds during a vehicle driving with a warm engine. Under the "active air-fuel ratio control", the air-fuel ratio is forcibly regulated to go LEAN or RICH by the ECM.

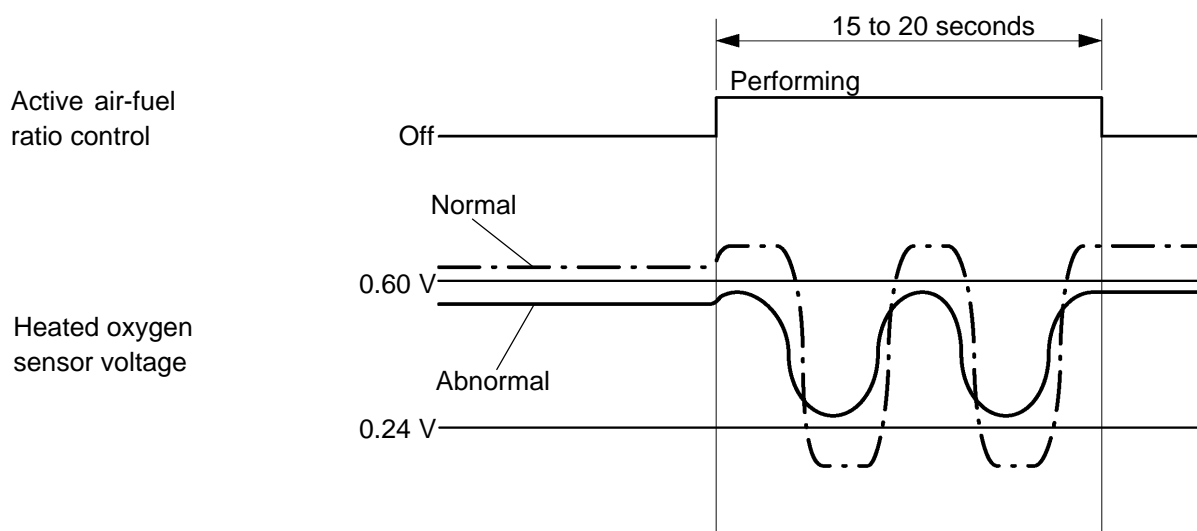
If the ECM detects malfunction, it is recorded in the following DTCs: DTC P0136 (Abnormal Voltage Output), DTC P0137 (Circuit Open) and P0138 (Circuit Short).

### Abnormal Voltage Output of Heated Oxygen Sensor (DTC P0136)

As the ECM is performing the "active air-fuel ratio control", the air-fuel ratio is forcibly regulated to go RICH or LEAN. If the sensor is not functioning properly, the voltage output variation is smaller.

Under the "active air-fuel ratio control", if the maximum voltage output of the heated oxygen sensor is less than 0.6 V, or the minimum voltage output is 0.24 V or more, the ECM determines that it is abnormal voltage output of the sensor (DTC P0136).

#### HEATED OXYGEN SENSOR CIRCUIT MALFUNCTION (P0136: ABNORMAL VOLTAGE):



Y

A76837

### Oxygen Storage Capacity Detection in the Heated Oxygen Sensor Circuit (P0136, P0137 or P0138)

Under "active air-fuel ratio control", the ECM calculates the Oxygen Storage Capacity (OSC)\* in the catalyst by forcibly regulating the air-fuel ratio to go RICH (or LEAN).

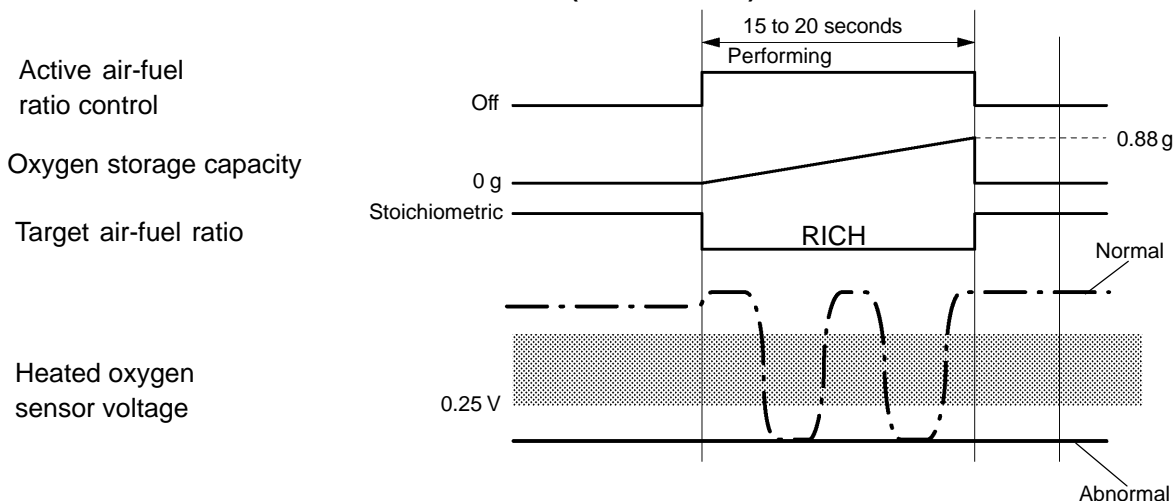
If the heated oxygen sensor has an open or short, or the voltage output by the sensor noticeably decreases, the OSC will indicate extraordinary high value. Even if the ECM attempts to continue regulating the air-fuel ratio to go RICH (or LEAN), the heated oxygen sensor output does not change.

When the value of OSC calculated by the ECM reaches 0.88 gram under the active air-fuel ratio control, although the targeted air-fuel ratio is RICH but the voltage output of the heated oxygen sensor is 0.25 V or less (LEAN), the ECM determines that it is an abnormal low voltage (DTC P0137). Also, the targeted air-fuel ratio is LEAN but the voltage output is 0.59 V or more (RICH), it is determined that the voltage output of the sensor is abnormally high (DTC P0138).

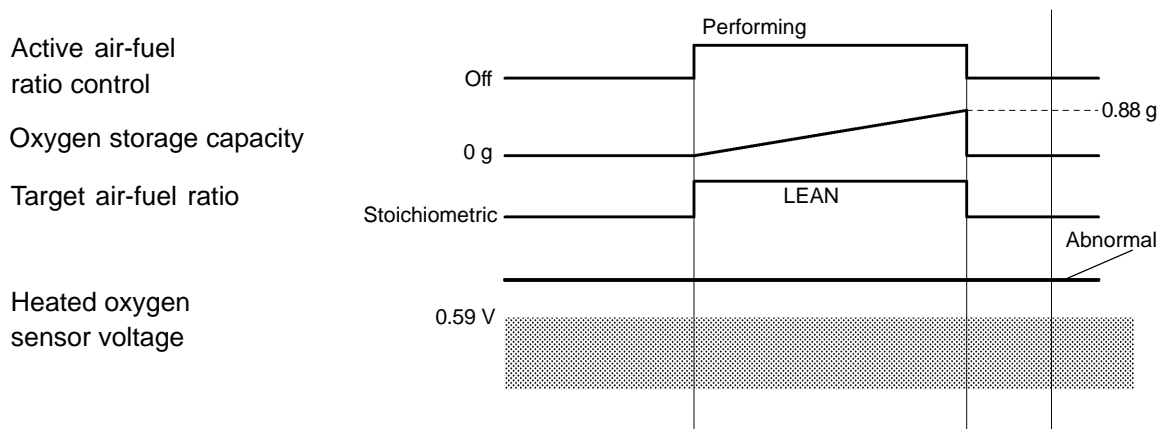
In addition to the OSC detection, if the fluctuation of the sensor voltage output is in a specific narrow range (more than 0.25 V and less than 0.59) despite the ECM ordering the air-fuel ratio to go RICH or LEAN while the OSC is above 0.88 gram, the ECM interprets this as a malfunction in the heated oxygen sensor circuit (DTC P0136).

\*Oxygen Storage Capacity (OSC): A catalyst has a capability for storing oxygen. The OSC and the emission purification capacity of the catalyst are mutually related. The ECM judges if the catalyst has deteriorated based on the calculated OSC value. (See page 05-194 )

#### HEATED OXYGEN SENSOR CIRCUIT LOW VOLTAGE (P0137: OPEN):



#### HEATED OXYGEN SENSOR CIRCUIT HIGH VOLTAGE (P0138: SHORT):



Y

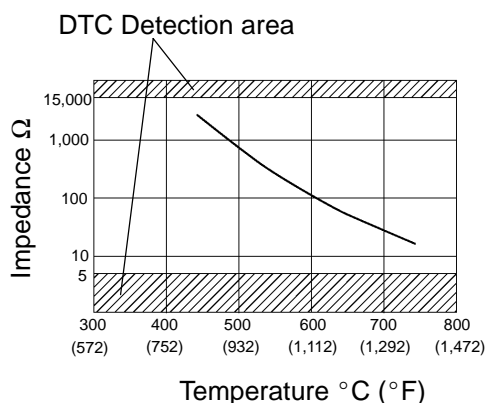
A92775

#### HINT:

DTC P0138 is also set if the voltage output from the heated oxygen sensor is more than 1.2 V for 10 seconds or more.

## Heated oxygen sensor impedance

### Interrelation between temperature of the element and impedance:



During normal feedback control of the air-fuel ratio, there are small variations in the exhaust gas oxygen concentration. In order to continuously monitor the slight variation of the signal from the oxygen sensor while the engine is running, the impedance\* of the sensor is measured by the ECM. The ECM detects that there is 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 ohmmeter.
- DTC P0136 indicates deterioration of the heated oxygen sensor. The ECM sets the DTC by calculating the impedance of the sensor after the typical enabling conditions are satisfied (1 driving-cycle).
- DTC P0137 indicates an open or short circuit in the heated oxygen sensor system (1 driving-cycle). The ECM sets this DTC when the impedance of the sensor exceeds the threshold 15 kΩ.

## MONITOR STRATEGY

Related DTCs	P0136: Heated oxygen sensor output voltage P0137: Heated oxygen sensor output voltage (Low) P0138: Heated oxygen sensor output voltage (High)
Required sensors/components	Main: Heated oxygen sensor Related: Mass air flow meter, vehicle speed sensor
Frequency of operation	Active air-fuel ratio control detection : Once per driving cycle Impedance detection: Continuous
Duration	Impedance detection: P0136, P0138: 30 seconds, P0137: 155 seconds Active air-fuel ratio control detection: P0136, P0137, P0138: 15 to 20 seconds Output voltage (short-circuited) P0138: 10 seconds
MIL operation	Impedance detection: Immediately OSC detection with active air-fuel ratio control: Immediately Output voltage detection (only P0136): 2 driving cycles
Sequence of operation	None

## TYPICAL ENABLING CONDITIONS

### Case 1: Impedance detection

#### P0136:

The monitor will run whenever the following DTCs are not present	See page 05-20
Following condition is met	30 seconds or more
Estimated sensor temperature	Less than 750 °C (1382 °F)

#### P0137:

The monitor will run whenever the following DTCs are not present	See page 05-20
Following conditions are met	55 seconds or more
Estimated sensor temperature	450 °C (842 °F) or more
Intake air amount per second	More than 0 g/sec

#### P0138:

The monitor will run whenever the following DTCs are not present	See page 05-20
--	----------------

### Case 2: Output voltage and OSC detection

The monitor will run whenever the following DTCs are not present	See page 05-20
Engine	Running
Battery voltage	10.5 V
Precondition of "Active air-fuel ratio control"	Met

#### "Active air-fuel ratio control"

Battery voltage	11.5 V
Engine coolant temperature	75 °C (167 °F)
Continuous time of IDL ON status	Less than 1000 seconds
Engine speed	Less than 3200 rpm
A/F sensor status	Activated
Sub-feedback control	Executing
Delay time after fuel cut is OFF	10 seconds or more
Engine load	10 % or more, and less than 70 %
All of following conditions are met:	—
Intake air amount	5 g/sec or more, and less than 30 g/sec (vary with vehicle speed)
Upstream catalyst	430 °C (806 °F) or more, and less than 800 °C (1472 °F) (vary with vehicle speed)
Downstream catalyst	290 °C (554 °F) or more, and less than 675 °C (1247 °F) (vary with vehicle speed)

## TYPICAL MALFUNCTION THRESHOLDS

### Case 1: Impedance detection

#### P0136:

Heated oxygen sensor impedance	Less than 5 Ω
--------------------------------	---------------

#### P0137:

Heated oxygen sensor impedance	15 kΩ or more
--------------------------------	---------------

#### P0138:

Output voltage of heated oxygen sensor	1.2 V or more
--	---------------

**Case 2: Output voltage detection**

P0136:

Either of the following conditions A or B is met:	2 times or more
A. Following conditions are met	(a) and (b)
(a) Active air-fuel ratio control	Executing
(b) Sensor output voltage	Less than 0.6 V, and 0.59 V or more
B. Following conditions are met	(a) and (b)
(a) Active air-fuel ratio control	Executing
(b) Sensor output voltage	0.24 V or more, and 0.25 V or less

**Case 3: OSC detection**

P0136:

Active air-fuel ratio control	Executing
Either of the following conditions A or B is met:	A or B
A. Following conditions are met	(a), (b) and (c)
(a) Target air-fuel ratio	RICH
(b) Sensor output voltage	0.25 V or more
(c) OSC	0.88 g or more
B. Following conditions are met	(a), (b) and (c)
(a) Target air-fuel ratio	LEAN
(b) Sensor output voltage	0.59 V or less
(c) OSC	0.88 g or more

P0137:

Active air-fuel ratio control	Executing
Following conditions are met:	(a), (b) and (c)
(a) Target air-fuel ratio	Rich
(b) Sensor output voltage	Less than 0.25 V
(c) OSC	0.88 g or more

P0138:

Either of the following conditions 1 or 2 is met:	1 or 2
1. Active air-fuel ratio control	Executing
Following conditions are met:	(a) and (b)
(a) Target air-fuel ratio	Lean
(b) Sensor output voltage	More than 0.59 V
(c) OSC	0.88 g or more
2. Sensor output voltage	1.2 V or more

**COMPONENT OPERATING RANGE**

Heated oxygen sensor voltage	0 to 1.0 V
------------------------------	------------

**MONITOR RESULT**

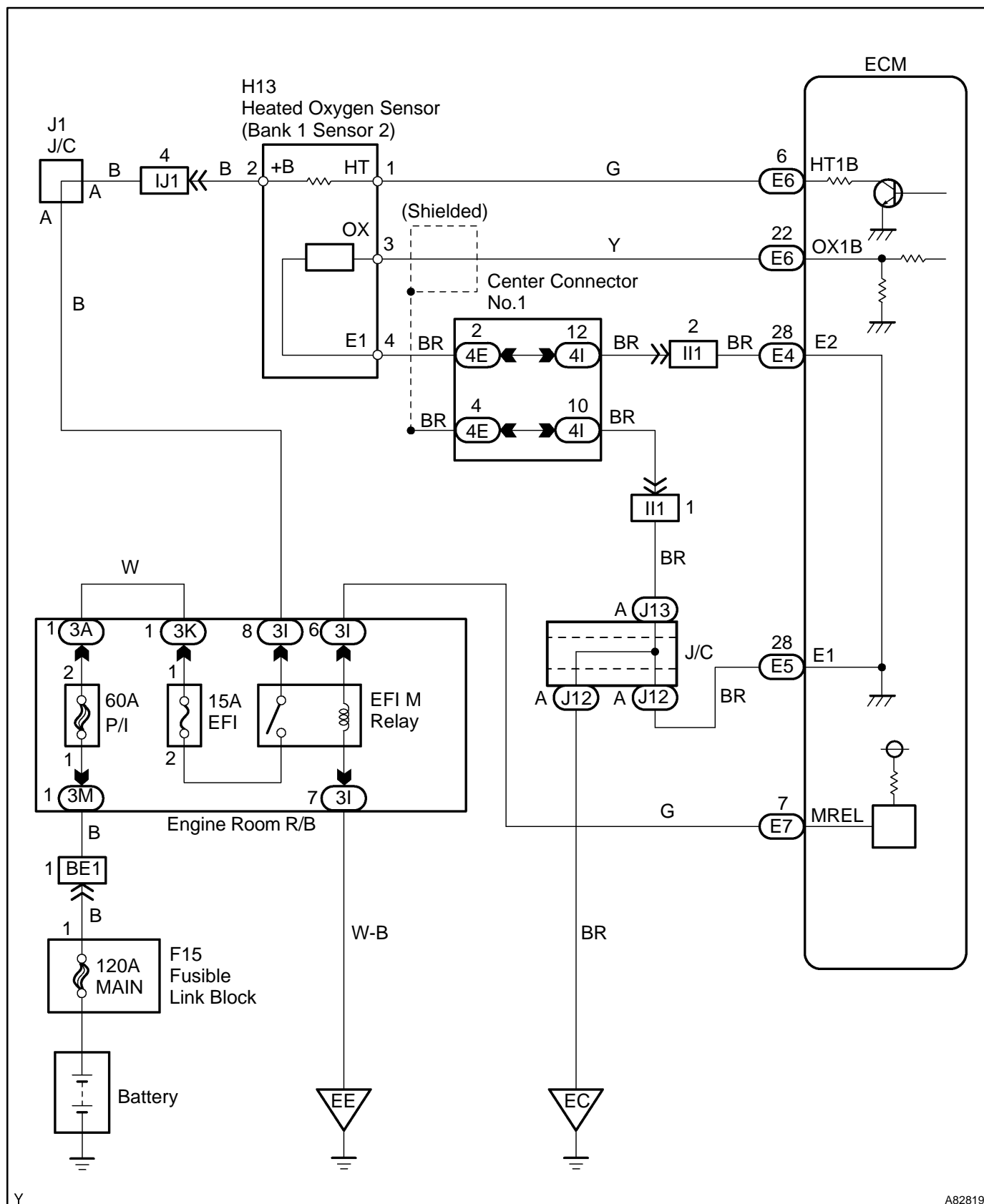
The detailed information is described in "CHECKING MONITOR STATUS" (see page [05-26](#) ).

- MID (Monitor Identification) is assigned to each component/system.
- TID (Test Identification) is assigned to each test component.
- Scaling is used to calculate the test value indicated on generic OBD scan tools.

**HO2S Bank 1 Sensor 2**

MID	TID	Scaling	Description of Test Value
\$02	\$07	Multiply by 0.001 (V)	Minimum sensor voltage
	\$08	Multiply by 0.001 (V)	Maximum sensor voltage
	\$8F	Multiply by 0.001 (g)	Maximum oxygen sensor storage capacity

## WIRING DIAGRAM

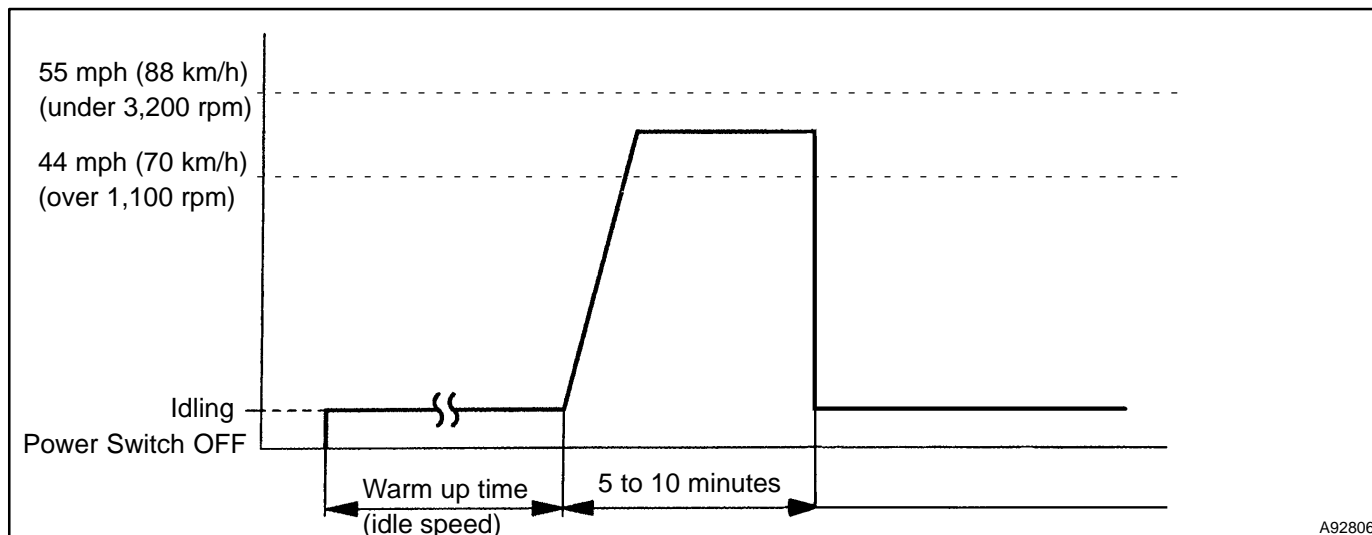


## CONFIRMATION DRIVING PATTERN for DTC P0136 and P0137

### PURPOSE

#### HINT:

Performing this confirmation pattern will activate the DTC detection (P0136) of the ECM. This is very useful for verifying the completion of a repair.



A92806

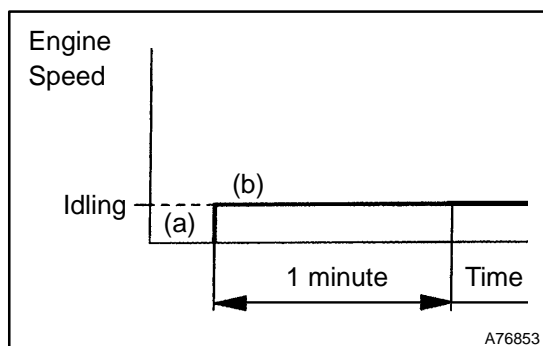
- Clear the DTCs (see page 05-40 ).
- Put the engine in inspection mode (see page 01-27 ).
- Start the engine and warm it up with all the accessory switches OFF.
- Deactivate the inspection mode and drive the vehicle at 44 to 70 mph (70 to 112 km/h) for 5 to 10 minutes.
- Read DTCs.

#### NOTICE:

- If the conditions in this test are not strictly followed, no malfunction will be detected. If you do not have the hand-held tester, turn the power switch OFF after performing steps (c) and (e), then perform step (d) again.
- Do not drive the vehicle without deactivating inspection mode, otherwise damaging the trans-axle may result.

## CONFIRMATION DRIVING PATTERN for DTC P0138

### PURPOSE



A76853

#### HINT:

Performing this confirmation pattern will activate the DTC detection (P0138) of the ECM. This is very useful for verifying the completion of a repair.

- Clear the DTCs (see page 05-40 ).
- Put the engine in inspection mode (see page 05-1 ).
- Start the engine and let the engine idle for 1 minute.
- Read DTCs.

#### NOTICE:

If the conditions in this test are not strictly followed, no malfunction will be detected.

## INSPECTION PROCEDURE

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine condition when malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, 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.

### Hand-held tester:

<b>1</b>	<b>CHECK OTHER DTC OUTPUT(IN ADDITION TO DTC P0136, P0137 AND/OR P0138)</b>
----------	---

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the power switch ON (IG).
- (c) Turn the hand-held tester ON.
- (d) On the hand-held tester, select the item: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- (e) Read DTCs.

#### Result:

Display (DTC output)	Proceed to
P0136, P0137 and/or P0138	A
P0136, P0137 and/or P0138, and other DTCs	B

#### HINT:

If any other codes besides P0136, P0137 and/or P0138 are output, perform troubleshooting for those DTCs first.

**B**

**GO TO RELEVANT DTC CHART**  
(See page [05-54](#) )

**A**

<b>2</b>	<b>PERFORM ACTIVE TEST USING HAND-HELD TESTER(A/F CONTROL)</b>
----------	--

#### HINT:

Malfunctioning areas can be found by performing the ACTIVE TEST / A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble area are malfunctioning or not.

- (a) Perform A/F CONTROL operation using the hand-held tester.

#### HINT:

The A/F CONTROL operation lowers the injection volume 12.5% or increases the injection volume 25%.

- (1) Connect the hand-held tester to the DLC3 on the vehicle.
- (2) Turn the power switch ON (IG).
- (3) Put the engine in inspection mode (see page [01-27](#) ).
- (4) Warm up the engine by running the engine at 2,500 rpm, depressing the accelerator pedal more than 60 % for approximately 90 seconds.
- (5) Select the item: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
- (6) Perform the A/F CONTROL operation with the engine in an idle condition (press the right or left button).

**Result:**

**A/F sensor reacts in accordance with increase and decrease of injection volume:**

**+25 % → rich output: Less than 3.0 V**

**-12.5 % → lean output: More than 3.35 V**

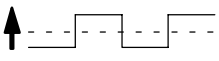



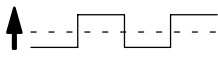

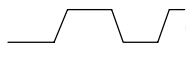

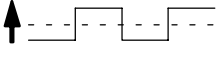


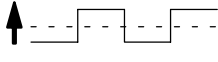

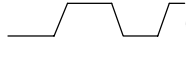

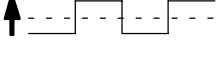

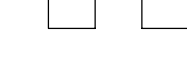

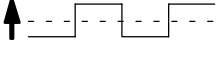


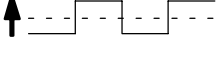


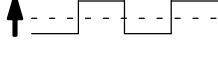


**Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:**

**+25 % → rich output: More than 0.55 V**

**-12.5 % → lean output: Less than 0.4 V**

**NOTICE:**

**The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.**

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main Suspect Trouble Area
Case 1	Injection volume +25 %  -12.5 %  Output voltage More than 3.35 V  Less than 3.0 V  <b>OK</b>	Injection volume +25 %  -12.5 %  Output voltage More than 0.55 V  Less than 0.4V  <b>OK</b>	—
Case 2	Injection volume +25 %  -12.5 %  Output voltage Almost no reaction  <b>NG</b>	Injection volume +25 %  -12.5 %  Output voltage More than 0.55 V  Less than 0.4V  <b>OK</b>	A/F sensor (A/F sensor, sensor heater, sensor circuit)
Case 3	Injection volume +25 %  -12.5 %  Output voltage More than 3.35 V  Less than 3.0V  <b>OK</b>	Injection volume +25 %  -12.5 %  Output voltage Almost no reaction  <b>NG</b>	Heated oxygen sensor (heated oxygen sensor, sensor heater, sensor circuit)
Case 4	Injection volume +25 %  -12.5 %  Output voltage Almost no reaction  <b>NG</b>	Injection volume +25 %  -12.5 %  Output voltage Almost no reaction  <b>NG</b>	Extremely RICH or LEAN ac- tual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of both A/F sensor and heated oxygen sensor.

To display the graph, enter ACTIVE TEST/ A/F CONTROL / USER DATA, select "AFS B1S1 and O2S B1S2" by pressing the "YES" button followed by the "ENTER" button and then the "F4" button.

- A high A/F sensor voltage could be caused by a RICH air-fuel mixture. Check the conditions that would cause the engine to run with the RICH air-fuel mixture.
- A low A/F sensor voltage could be caused by a LEAN air-fuel mixture. Check the conditions that would cause the engine to run with the LEAN air-fuel mixture.

**Result:**

Output voltage of A/F sensor	Output voltage of heated oxygen sensor	Proceed to
OK	OK	A
NG	OK	B
OK	NG	C
NG	NG	D

**B****GO TO DTC P2238****C****Go to step 5****D****GO TO DTC P0171****A****3****PERFORM CONFIRMATION DRIVING PATTERN****HINT:**

Clear all DTCs prior to performing the confirmation driving pattern.

**GO****4****READ OUTPUT DTCS (DTC P0136, P0137 AND/OR P0138 ARE OUTPUT AGAIN)**

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the power switch ON (IG).
- (c) Turn the hand-held tester ON.
- (d) On the hand-held tester, select the item: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- (e) Read DTCs.

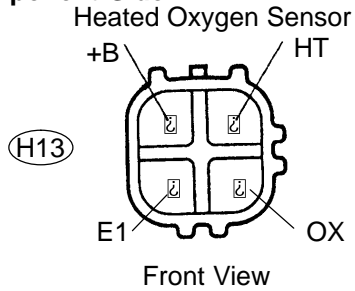
**Result:**

Display (DTC output)	Proceed to
P0136, P0137 and/or P0138	A
P0136, P0137 and/or P0138, and other DTCs	B

**B****REPLACE HEATED OXYGEN SENSOR****A****CHECK FOR INTERMITTENT PROBLEMS (See page 05-17 )**

## 5 INSPECT HEATED OXYGEN SENSOR(HEATER RESISTANCE)

### Component Side:



A62378

- Disconnect the H13 heated oxygen sensor connector.
- Measure the resistance between the terminals of the heated oxygen sensor connector.

### Standard:

Tester Connection	Specified Condition
HT (H13-1) - +B (H13-2)	11 to 16 $\Omega$ at 20 °C (68 °F)
HT (H13-1) - E1 (H13-4)	10 k $\Omega$ or higher

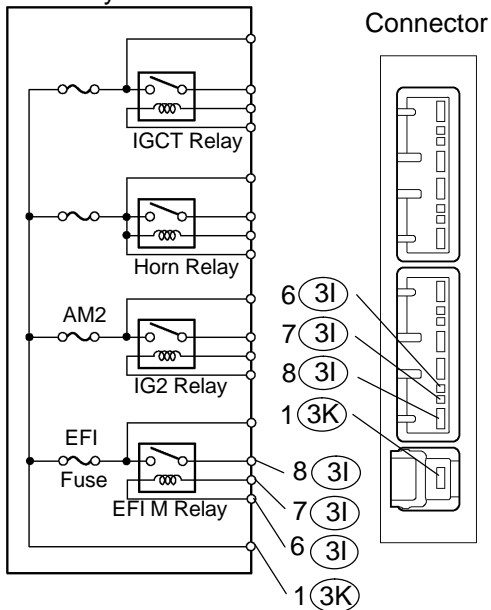
- Reconnect the heated oxygen sensor connector.

**NG**
**REPLACE HEATED OXYGEN SENSOR**
**OK**

## 6 INSPECT INTEGRATION RELAY(EFI M RELAY)

### Integration Relay:

#### Relay Detail



Y

A82812

- Remove the integration relay from the engine room R/B.
- Inspect the EFI M relay.

### Standard:

Tester Connection	Specified Condition
(3K-1) - (3I-8)	10 k $\Omega$ or higher
(3K-1) - (3I-8)	Below 1 $\Omega$ (Apply battery voltage to terminals 3I-6 and 3I-7)

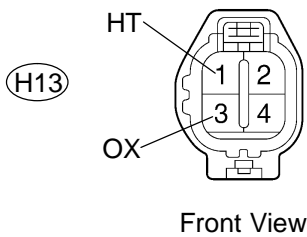
- Reinstall the integration relay.

**NG**
**REPLACE INTEGRATION RELAY**
**OK**

7

CHECK HARNESS AND CONNECTOR(HEATED OXYGEN SENSOR - ECM)

Wire Harness Side:  
Heated Oxygen Sensor Connector



A79118

- (a) Disconnect the H13 heated oxygen sensor connector.
- (b) Disconnect the E6 ECM connectors.
- (c) Check the resistance between the wire harness side connectors.

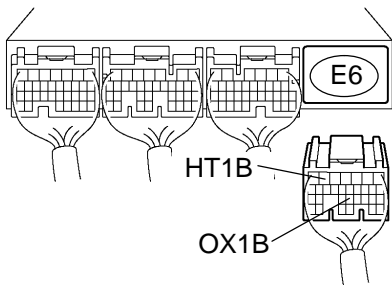
Standard (Check for open):

Tester Connection	Specified Condition
HT (H13-1) - HT1B (E6-6)	Below 1 Ω
OX (H13-3) - OX1B (E6-22)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
HT (H13-1) or HT1B (E6-6) - Body ground	10 kΩ or higher
OX (H13-3) or OX1B (E6-22) - Body ground	10 kΩ or higher

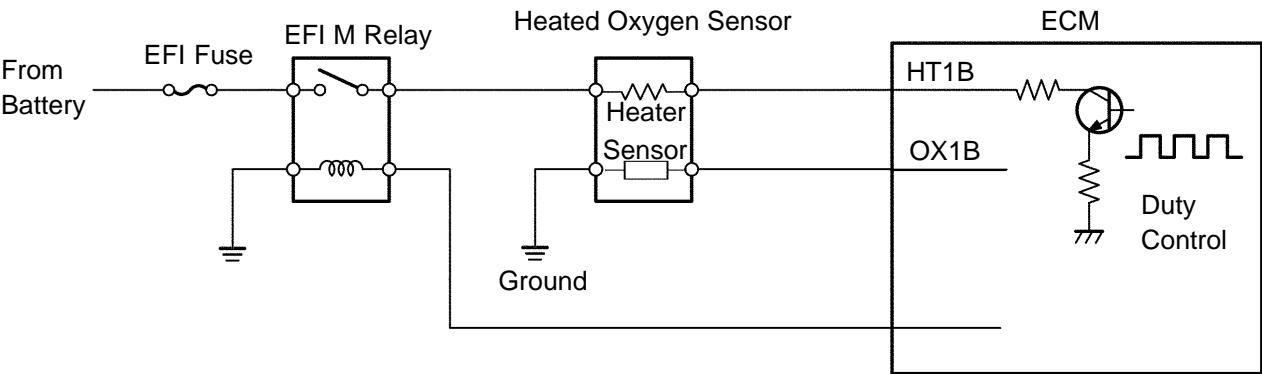
- (d) Reconnect the heated oxygen sensor connector.
- (e) Reconnect the ECM connector.



ECM Connector

A65748

Reference (Bank 1 Sensor 2 System Diagram)



P

A73886

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HEATED OXYGEN SENSOR

**OBD II scan tool (excluding hand-held tester):****1 CHECK OTHER DTC OUTPUT(IN ADDITION TO DTC P0136, P0137 AND/OR P0138)**

- (a) Connect the OBD II scan tool to the DLC3.
- (b) Turn the power switch ON (IG).
- (c) Turn the OBD II scan tool ON.
- (d) Read DTCs using the OBD II scan tool.

**Result:**

Display (DTC output)	Proceed to
P0136, P0137 and/or P0138	A
P0136, P0137 and/or P0138, and other DTCs	B

**HINT:**

If any other codes besides P0136, P0137 and/or P0138 are output, perform troubleshooting for those DTCs first.

**B**

**GO TO RELEVANT DTC CHART**  
(See page [05-54](#) )

**A****2 INSPECT HEATED OXYGEN SENSOR(OUTPUT VOLTAGE)**

- (a) After warming up the engine, run the engine at 2,500 rpm for 90 seconds.
- (b) Read the output voltage of the heated oxygen sensor when the engine rpm is suddenly increased.

**HINT:**

Quickly accelerate the engine to 2,500 rpm 3 times by using the accelerator pedal.

**Heated oxygen sensor output voltage: Fluctuates.**

**NG**

**Go to step 5**

**OK****3 PERFORM CONFIRMATION DRIVING PATTERN****HINT:**

Clear all DTCs prior to performing the confirmation driving pattern.

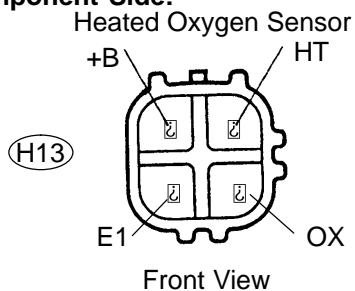
**GO**

**4 READ OUTPUT DTCS (DTC P0136, P0137 AND/OR P0138 ARE OUTPUT AGAIN)**

- (a) Connect the OBD II scan tool to the DLC3.
- (b) Turn the power switch ON (IG).
- (c) Turn the OBD II scan tool ON.
- (d) Read DTCs using the OBD II scan tool.

**Result:**

Display (DTC output)	Proceed to
P0136, P0137 and/or P0138	A
P0136, P0137 and/or P0138, and other DTCs	B

**B****REPLACE HEATED OXYGEN SENSOR****A****CHECK FOR INTERMITTENT PROBLEMS (See page 05-17 )****5 INSPECT HEATED OXYGEN SENSOR(HEATER RESISTANCE)****Component Side:**

A62378

- (a) Disconnect the H13 heated oxygen sensor connector.
- (b) Measure the resistance between the terminals of the heated oxygen sensor connector.

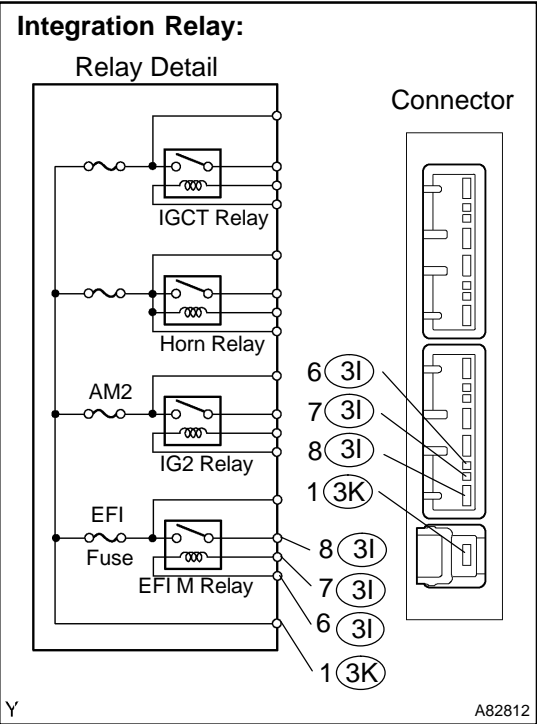
**Standard:**

Tester Connection	Specified Condition
HT (H13-1) - +B (H13-2)	11 to 16 $\Omega$ at 20 °C (68 °F)
HT (H13-1) - E1 (H13-4)	10 k $\Omega$ or higher

- (c) Reconnect the heated oxygen sensor connector.

**NG****REPLACE HEATED OXYGEN SENSOR****OK**

6 INSPECT INTEGRATION RELAY(EFI M RELAY)



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

**Standard:**

Tester Connection	Specified Condition
(3K-1) - (3I-8)	10 kΩ or higher
(3K-1) - (3I-8)	Below 1 Ω (Apply battery voltage to terminals 3I-6 and 3I-7)

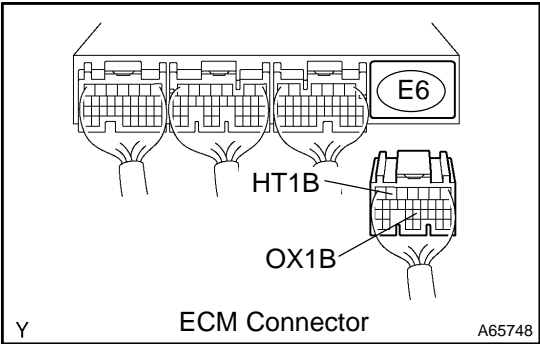
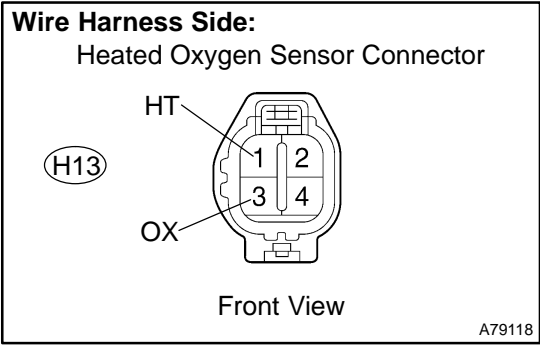
- (c) Reinstall the integration relay.

NG

REPLACE INTEGRATION RELAY

OK

7 INSPECT HARNESS AND CONNECTOR(HEATED OXYGEN SENSOR - ECM)



- (a) Disconnect the H13 heated oxygen sensor connector.
- (b) Disconnect the E6 ECM connectors.
- (c) Check the resistance between the wire harness side connectors.

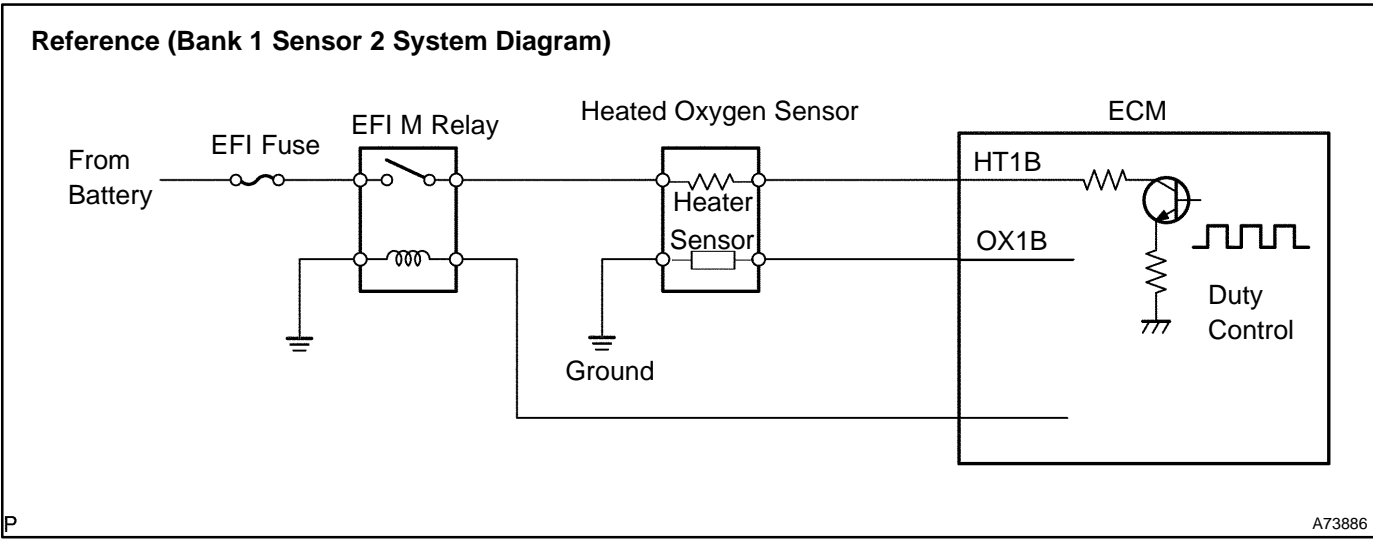
Standard (Check for open):

Tester Connection	Specified Condition
HT (H13-1) - HT1B (E6-6)	Below 1 Ω
OX (H13-3) - OX1B (E6-22)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
HT (H13-1) or HT1B (E6-6) - Body ground	10 kΩ or higher
OX (H13-3) or OX1B (E6-22) - Body ground	10 kΩ or higher

- (d) Reconnect the heated oxygen sensor connector.
- (e) Reconnect the ECM connector.



NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE HEATED OXYGEN SENSOR