DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0137	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)

DTC	P0138	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)

DTC	P0156	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)

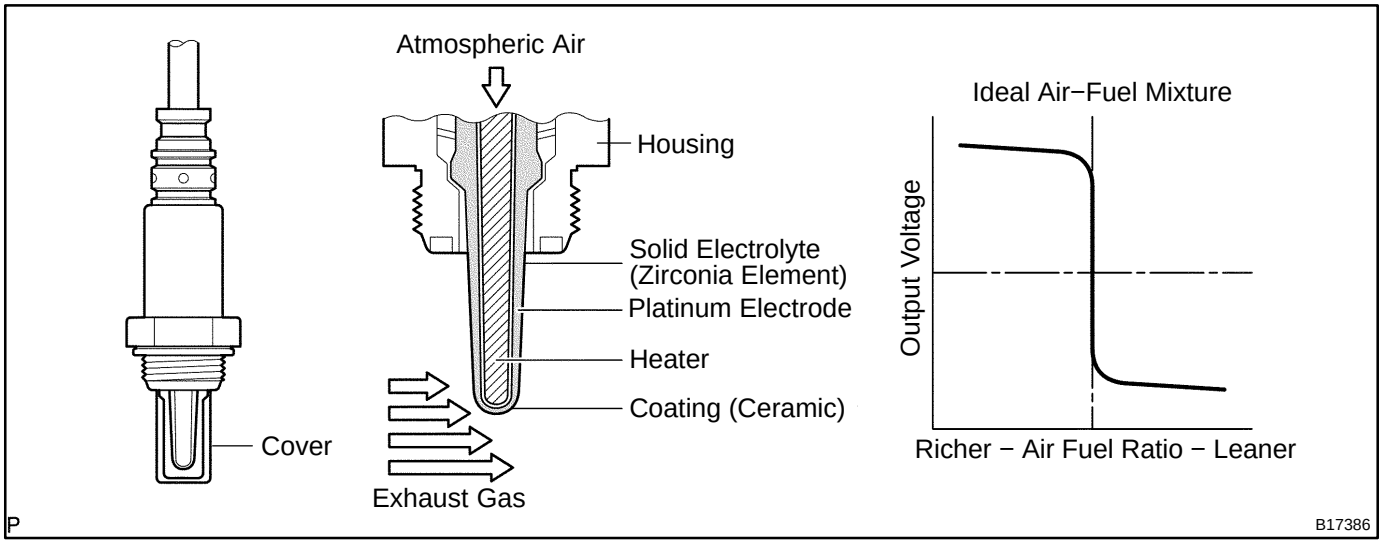
DTC	P0157	Oxygen Sensor Circuit Low Voltage (Bank 2 Sensor 2)

DTC	P0158	Oxygen Sensor Circuit High Voltage (Bank 2 Sensor 2)

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

CIRCUIT DESCRIPTION

In order to obtain a high purification rate of the carbon monoxide (CO), hydrocarbon (HC) and nitrogen oxide (NOx) components in the exhaust gas, a TWC is used. For the most efficient use of the TWC, the air−fuel ratio must be precisely controlled so that it is always close to the stoichiometric air−fuel level. For the purpose of helping the ECM to deliver accurate air−fuel ratio control, a Heated Oxygen (HO2) sensor is used.
The HO2 sensor is located behind the TWC, and detects the oxygen concentration in the exhaust gas. Since the sensor is integrated with the heater that heats the sensing portion, it is possible to detect the oxygen concentration even when the intake air volume is low (the exhaust gas temperature is low).
When the air−fuel ratio becomes lean, the oxygen concentration in the exhaust gas is rich. The HO2 sensor informs the ECM that the post−TWC air−fuel ratio is lean (low voltage, i.e. less than 0.45 V).
Conversely, when the air−fuel ratio is richer than the stoichiometric air−fuel level, the oxygen concentration in the exhaust gas becomes lean. The HO2 sensor informs the ECM that the post−TWC air−fuel ratio is rich (high voltage, i.e. more than 0.45 V). The HO2 sensor has the property of changing its output voltage drastically when the air−fuel ratio is close to the stoichiometric level.
The ECM uses the supplementary information from the HO2 sensor to determine whether the air−fuel ratio after the TWC is rich or lean, and adjusts the fuel injection time accordingly. Thus, if the HO2 sensor is working improperly due to internal malfunctions, the ECM is unable to compensate for deviations in the primary air−fuel ratio control.



DTC No.	DTC Detecting Condition	Trouble Area
P0136 P0156	During active air−fuel ratio control, following conditions (a) and (b) met for certain period of time (2 trip detection logic): (a) Heated Oxygen (HO2) sensor voltage does not decrease to less than 0.2 V (b) HO2 sensor voltage does not increase to more than 0.6 V	• Open or short in HO2 sensor (sensor 2) circuit • HO2 sensor (sensor 2) • HO2 sensor heater (sensor 2) • Air−Fuel Ratio (A/F) sensor (sensor 1) • EFI relay • Gas leakage from exhaust system
P0136 P0156	Sensor impedance less than 5 Ω for more than 30 seconds when ECM presumes sensor to being warmed up and operating normally (1 trip detection logic)	
P0137 P0157	During active air−fuel ratio control, following conditions (a) and (b) met for certain period of time (2 trip detection logic): (a) HO2 sensor voltage output less than 0.21 V (b) Target air−fuel ratio rich	• Open in HO2 sensor (sensor 2) circuit • HO2 sensor (sensor 2) • HO2 sensor heater (sensor 2) • EFI relay • Gas leakage from exhaust system
P0137 P0157	High impedance: Sensor impedance 348.1 MΩ or more for more than 90 seconds when ECM presumes sensor to being warmed up and operating normally (1 trip detection logic)	
P0138 P0158	During active air−fuel ratio control, following conditions (a) and (b) met for certain period of time (2 trip detection logic): (a) HO2 sensor voltage output 0.59 V or more (b) Target air−fuel ratio lean	• Short in HO2 sensor (sensor 2) circuit • HO2 sensor (sensor 2) • ECM internal circuit malfunction
P0138 P0158	HO2 sensor voltage output exceeds 1.2 V for more than 30 seconds (1 trip detection logic)	

MONITOR DESCRIPTION

Active Air−Fuel Ratio Control

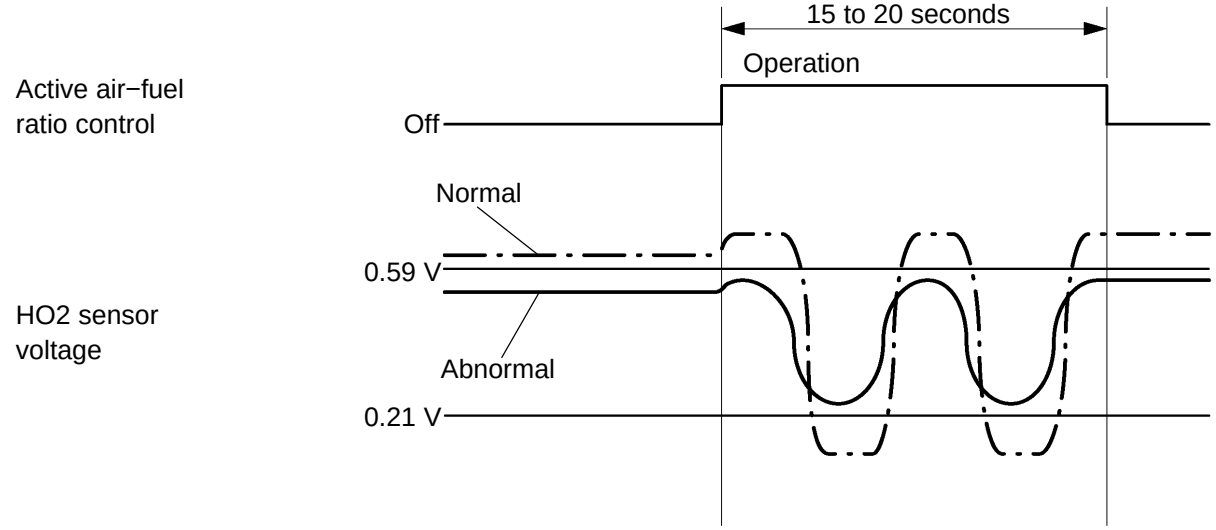
The ECM usually performs air−fuel ratio feedback control so that the Air−Fuel Ratio (A/F) sensor output indicates a near stoichiometric air−fuel level. This vehicle includes active air−fuel ratio control in addition to regular air−fuel ratio control. The ECM performs active air−fuel ratio control to detect any deterioration in the Three−Way Catalytic Converter (TWC) and Heated Oxygen (HO2) sensor malfunctions (refer to the diagram below).

Active air−fuel ratio control is performed for approximately 15 to 20 seconds while driving with a warm engine. During active air−fuel ratio control, the air−fuel ratio is forcibly regulated to become lean or rich by the ECM. If the ECM detects a malfunction, one of the following DTCs is set: DTC P0136, P0156 (abnormal voltage output), P0137, P0157 (open circuit) and P0138, P0158 (short circuit).

Abnormal Voltage Output of HO2 Sensor (DTC P0136, P0156)

While the ECM is performing active air−fuel ratio control, the air−fuel ratio is forcibly regulated to become rich or lean. If the sensor is not functioning properly, the voltage output variation is small. For example, when the HO2 sensor voltage does not decrease to less than 0.21 V and does not increase to more than 0.59 V during active air−fuel ratio control, the ECM determines that the sensor voltage output is abnormal and sets DTC P0136.

HO2 SENSOR CIRCUIT MALFUNCTION (P0136, P0156: ABNORMAL VOLTAGE)



Open or Short in the Heated Oxygen (HO2) Sensor Circuit (DTC P0137, P0157, P0138 or P0158)

During active air−fuel ratio control, the ECM calculates the Oxygen Storage Capacity (OSC)* of the Three−Way Catalytic Converter (TWC) by forcibly regulating the air−fuel ratio to become rich or lean.

If the HO2 sensor has an open or short, or the voltage output of the sensor noticeably decreases, the OSC indicates an extraordinarily high value. Even if the ECM attempts to continue regulating the air−fuel ratio to become rich or lean, the HO2 sensor output does not change.

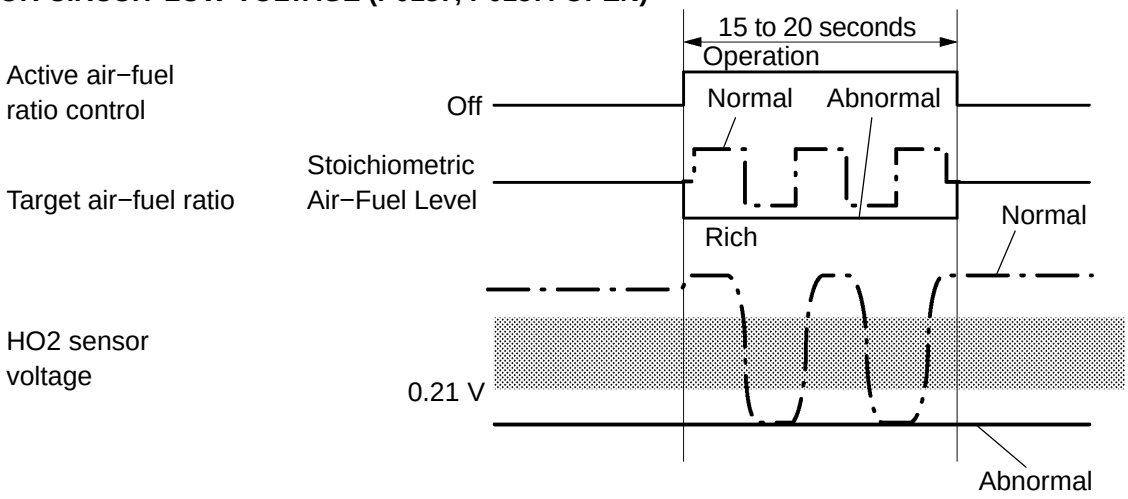
While performing active air−fuel ratio control, when the target air−fuel ratio is rich and the HO2 sensor voltage output is 0.21 V or less (lean), the ECM interprets this as an abnormally low sensor output voltage and sets DTC P0137 or P0157. When the target air−fuel ratio is lean and the voltage output is 0.59 V or more (rich) during active air−fuel ratio control, the ECM determines that the sensor voltage output is abnormally high, and sets DTC P0138 or P0158.

HINT:

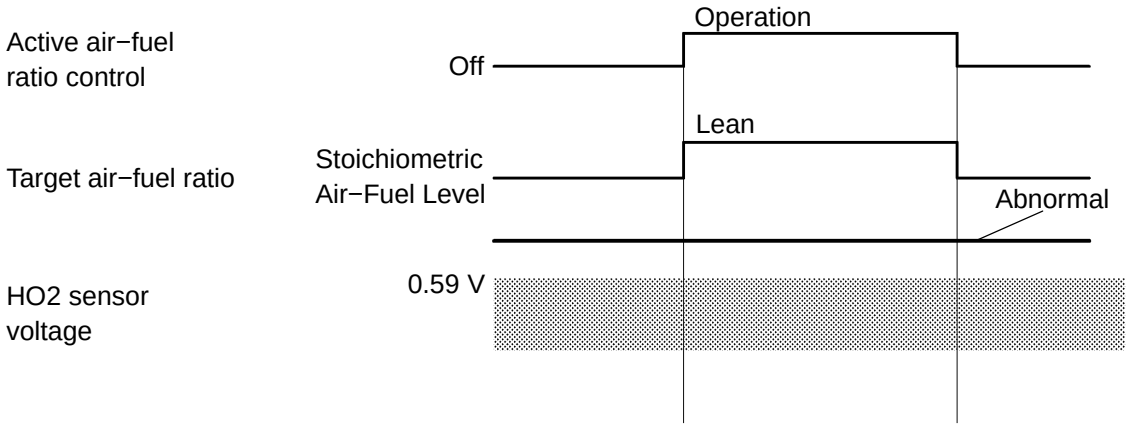
DTC P0138 or P0158 is also set if the HO2 sensor voltage output is more than 1.2 V for 30 seconds or more.

*: The TWC has the capability to store oxygen. The OSC and the emission purification capacity of the TWC are mutually related. The ECM determines whether the catalyst has deteriorated, based on the calculated OSC value (see page DI−672).

HO2 SENSOR CIRCUIT LOW VOLTAGE (P0137, P0157: OPEN)



HO2 SENSOR CIRCUIT HIGH VOLTAGE (P0138, P0158: SHORT)



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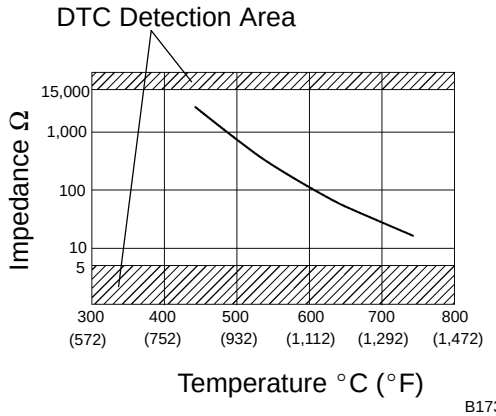
High or Low Impedance of Heated Oxygen (HO2) Sensor (DTC P0136, P0156, P0137 or P0157)

Interrelation between temperature of the element and impedance:



During normal air−fuel ratio feedback control, there are small variations in the exhaust gas oxygen concentration. In order to continuously monitor the slight variation of the HO2 sensor signal while the engine is running, the impedance* of the sensor 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 using an ohmmeter.
- DTC P0136 or P0156 indicates the deterioration of the HO2 sensor. The ECM sets the DTC by calculating the impedance of the sensor when the typical enabling conditions are satisfied (1 driving cycle).
- DTC P0137 or P0157 indicates an open circuit in the HO2 sensor (1 driving cycle). The ECM sets this DTC when the impedance of the sensor exceeds the threshold 348.1 MΩ.

MONITOR STRATEGY

Related DTCs	P0136	Heated rear oxygen sensor (Bank 1) output voltage (Output voltage)
		Heated rear oxygen sensor (Bank 1) impedance (Low)
	P0137	Heated rear oxygen sensor (Bank 1) output voltage (Low voltage)
		Heated rear oxygen sensor (Bank 1) impedance (High)
	P0138	Heated rear oxygen sensor (Bank 1) output voltage (High voltage)
		Heated rear oxygen sensor (Bank 1) output voltage (Extremely high)
	P0156	Heated rear oxygen sensor (Bank 2) output voltage (Output voltage)
		Heated rear oxygen sensor (Bank 2) impedance (Low)
	P0157	Heated rear oxygen sensor (Bank 2) output voltage (Low voltage)
		Heated rear oxygen sensor (Bank 2) impedance (High)
	P0158	Heated rear oxygen sensor (Bank 2) output voltage (High voltage)
		Heated rear oxygen sensor (Bank 2) output voltage (Extremely high)
Required sensors/components	Main sensors/components	Heated rear oxygen sensor
	Related sensors/components	Mass air flow meter
Frequency of operation	Once per driving cycle: Active air−fuel ratio control detection Continuous: Others	
Duration	20 sec.: Heated oxygen sensor output (Output voltage, High voltage, Low voltage) 30 sec.: Heated oxygen sensor impedance (Low) 90 sec.: Heated oxygen sensor impedance (High) 10 sec.: Heated oxygen sensor output (Extremely high)	
MIL operation	2 driving cycles Heated oxygen sensor output (Output voltage, High voltage, Low voltage, Extremely high) Immediate: Heated oxygen sensor impedance (Low, High)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI−437	
Heated oxygen sensor output voltage (Output voltage, High voltage and Low voltage):		
Active air−fuel ratio control	Performing	
Active air−fuel ratio control being when all of following conditions met	−	
Battery voltage	11 V	−
Engine coolant temperature	75°C (167°F)	−
Idle	OFF	

Engine RPM	−	3,200 rpm
A/F sensor status	Activated	
Fuel system status	Closed loop	
Fuel−cut	OFF	
Engine load	10 to 70%	
Shift position	4th	−
Heated oxygen sensor impedance (Low):		
Battery voltage	11 V	−
Estimated rear oxygen sensor temperature	−	700˚C (1,292˚F)
ECM monitor	Completed	
P0606	Not set	
Heated oxygen sensor impedance (High):		
Battery voltage	11 V	−
Estimated rear oxygen sensor temperature	450˚C (842˚F)	−
ECM monitor	Completed	
P0606	Not set	
Heated oxygen sensor output voltage (Extremely high):		
Battery voltage	11 V	−
Time after engine start	2 sec.	−

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Heated oxygen sensor output voltage (Output voltage):	
Either of the following conditions is met:	Condition 1 or 2
1. All of the following conditions are met:	Condition (a), (b) and (c)
(a) Commanded air−fuel ratio	14.3 or less
(b) Rear HO2S voltage	0.21 to 0.59 V
(c) OSC (Oxygen Storage Capacity of catalyst)	3 g or more
2. All of the following conditions are met:	Condition (d), (e) and (f)
(d) Commanded air−fuel ratio	14.9 or more
(e) Rear HO2S voltage	0.21 to 0.59 V
(f) OSC (Oxygen Storage Capacity of catalyst)	3 g or more
Heated oxygen sensor output voltage (Low voltage):	
All of the following conditions are met:	Condition 1, 2 and 3
1. Commanded air−fuel ratio	14.3 or less
2. Rear HO2S voltage	Less than 0.21 V
3. OSC (Oxygen Storage Capacity of catalyst)	3 g or more
Heated oxygen sensor output voltage (High voltage):	
All of the following conditions are met:	Condition 1, 2 and 3
1. Commanded air−fuel ratio	14.9 or more
2. Rear HO2S voltage	More than 0.59 V
3. OSC (Oxygen Storage Capacity of catalyst)	3 g or more

Heated oxygen sensor impedance (Low):	
Duration of following condition	30 sec. or more
Heated oxygen sensor impedance	Less than 5 Ω
Heated oxygen sensor impedance (High):	
Duration of following condition	90 sec. or more
Heated oxygen sensor impedance	15 kΩ or more
Heated oxygen sensor output voltage (Extremely high):	
Duration of following condition	10 sec. or more
Heated oxygen sensor voltage	1.2 V or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor voltage	Varies between 0.1 to 0.9 V

MONITOR RESULT

Refer to page DI−445 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page DI−446).

- MID (Monitor Identification Data) is assigned to each emissions−related component.
- TID (Test Identification Data) is assigned to each test value.

HO2S bank 1 sensor 2

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$02	$07	Multiply by 0.001 (V)	Minimum sensor voltage	Minimum test limit	Maximum test limit
$02	$08	Multiply by 0.001 (V)	Maximum sensor voltage	Minimum test limit	Maximum test limit
$02	$8F	Multiply by 0.001 (g)	Maximum oxygen storage capacity	0	Maximum test limit

HO2S bank 2 sensor 2

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$06	$07	Multiply by 0.001 (V)	Minimum sensor voltage	Minimum test limit	Maximum test limit
$06	$08	Multiply by 0.001 (V)	Maximum sensor voltage	Minimum test limit	Maximum test limit
$06	$8F	Multiply by 0.001 (g)	Maximum oxygen storage capacity	0	Maximum test limit

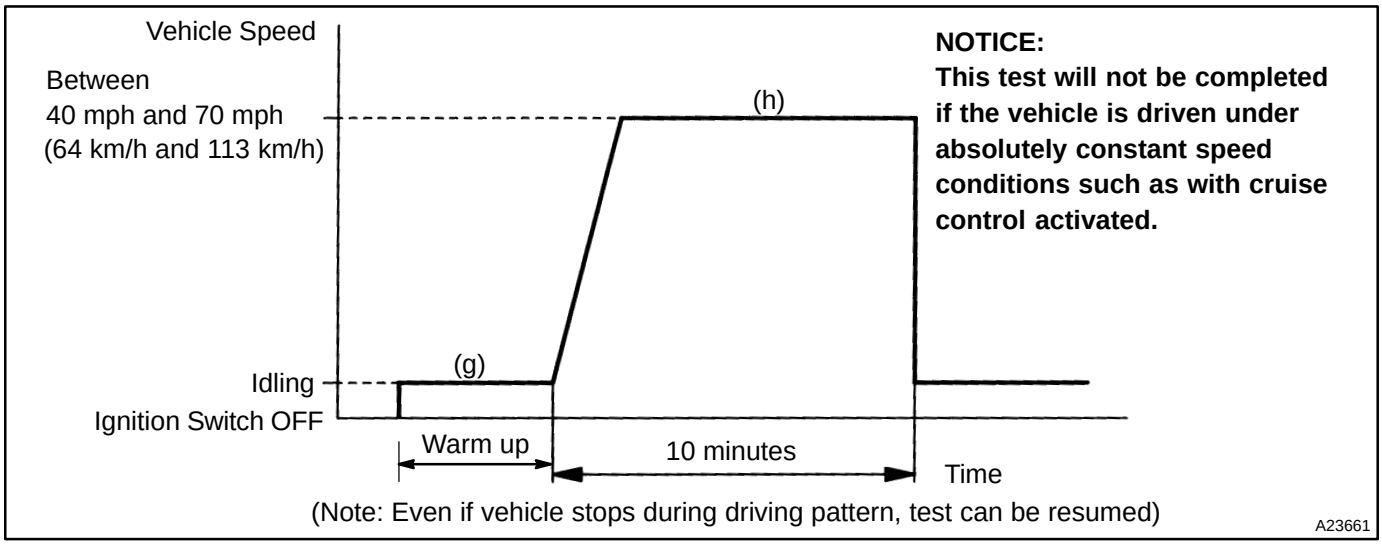
WIRING DIAGRAM

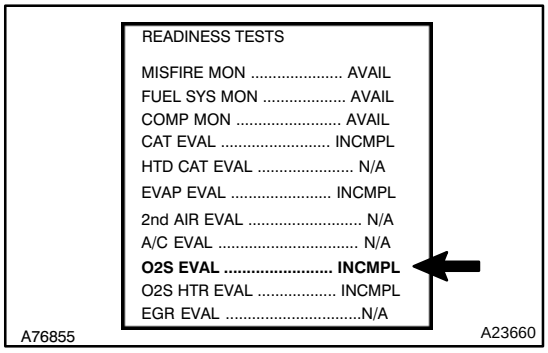
Refer to DTC P2195 on page DI−806.

CONFIRMATION DRIVING PATTER

HINT:

- This confirmation driving pattern is used in steps 5, 8 and 11 of the following diagnostic troubleshooting procedure when using either a hand−held tester.
- Performing this confirmation pattern will activate the Heated Oxygen (HO2) sensor monitor. (The catalyst monitor is performed simultaneously.) This is very useful for verifying the completion of a repair.





(a) Connect a hand−held tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Turn the tester or scan tool ON.
(d) Clear DTCs (where set) (see page DI−462).
(e) If using a hand−held tester, select the following menu items: DIAGNOSIS / CARB OBD II / READINESS TESTS.
(f) Check that O2S EVAL is INCMPL (incomplete).
(g) Start the engine and warm it up.
(h) Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes.
(i) Note the state of the Readiness Tests items. Those items will change to COMPL (complete) as O2S EVAL monitor operates.
(j) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTCs (any pending DTCs) are set.

HINT:

If O2S EVAL does not change to COMPL, and any pending DTCs fail to set, extend the driving time.

INSPECTION PROCEDURE

HINT:

Hand−held tester only:

Narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand−held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to −12.5 % or +25 %.

(1) Connect the hand−held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the menu ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
−12.5 % → lean output: Less than 0.4 V

NOTICE:

There is a few seconds delay in the sensor 1 (front sensor) output. And there is approximately 20 seconds delay in the sensor 2 (rear sensor).

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors.
For displaying the graph indication, first enter ”ACTIVE TEST / A/F CONTROL / USER DATA,” then select ”A/F B1,2S1and O2S B1,2S2” by pressing ”YES” button, and push ”ENTER” button before pressing ”F4” button.

	Output voltage of A/F sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspected trouble area
Case 1	Injection volume +25 % −12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % −12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % −12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % −12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % −12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % −12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % −12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % −12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean actual air−fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

HINT:

- If different DTCs that are related to different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand−held tester. 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. when a malfunction occurred.

1	**Read output DTC.**

PREPARATION:

(a) Connect the hand−held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand−held tester main switch ON.
(c) When using hand−held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand−held tester.

RESULT:

Display (DTC Output)	Proceed to
P0138, P0158	A
P0137, P0157	B
P0136, P0156	C

HINT:

If any other codes besides P0136 are output, perform the troubleshooting for those DTCs first.

B → **Go to step 14.**

C → **Go to step 7.**

A

2	**Check output voltage of heated oxygen sensor.**

PREPARATION:

(a) Connect the hand−held tester to the DLC3.
(b) After warming up the engine, run the engine at 2,500 rpm for 3 minutes.
(c) When using hand−held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1S2 or B2S2.
(d) Allow the engine to idle.

CHECK:

Read the Heated Oxygen (HO2) sensor output voltage while idling.

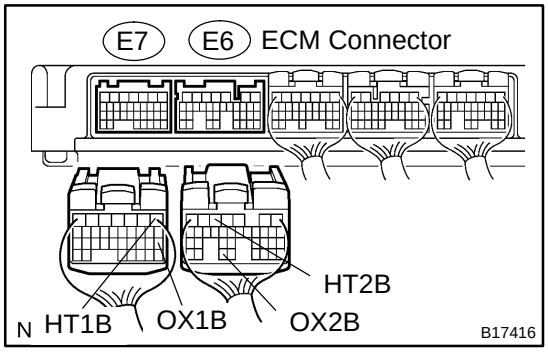
RESULT:

HO2 Sensor Output Voltages	Proceed To
More than 1.2 V	A
Less than 1.0 V	B

B → **Go to step 5.**

A

3	Check for short in harness and connector between terminal OX1B and HT1B, OX2B and HT2B of ECM.



PREPARATION:

(a) Turn the ignition switch to OFF and wait for 5 minutes.

(b) Disconnect the E6 and E7 ECM connector.

CHECK:

(a) Check the resistance.

OK:

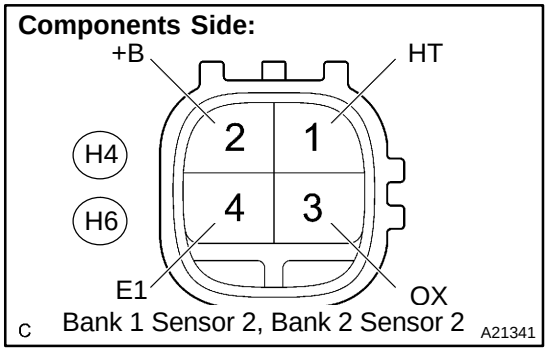
Standard:

Tester Connections	Specified Conditions
HT1B (E7−1) − OX1B (E7−18)	10 kΩ or higher
HT2B (E6−5) − OX2B (E6−33)	10 kΩ or higher

OK	Replace ECM (See page SF−82).

NG

4	Check resistance of heated oxygen sensor heater.



PREPARATION:

Disconnect the heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

OK:

Standard:

Tester Connection	Specified Condition
HT (1) − +B (2)	11 to 16 Ω at 20°C (68°F)
+B (2) − OX (3)	10 kΩ or higher

NG	Replace heated oxygen sensor.

OK

Repair or replace harness or connector.

5	Perform confirmation driving pattern.

NEXT

6	**Check whether DTC output recurs (DTC P0138, P0158)**

CHECK:

(a) On the hand−held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P0138 or P0158	A
No output	B

B → **Check for intermittent problems (See page DI−430).**

A →

Replace heated oxygen sensor.

7	**Check output voltage of heated oxygen sensor.**

PREPARATION:

(a) Connect the hand−held tester to the DLC3.

(b) Turn the ignition switch to ON and turn the tester ON.

(c) Start the engine.

(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1S2.

(e) After warming up the engine, run the engine at an engine speed of 2,500 rpm for 3 minutes.

CHECK:

(a) Read the output voltage of the HO2 sensor when the engine rpm is suddenly increased.

HINT:

Quickly accelerate the engine to 4,000 rpm 3 times using the accelerator pedal.

Standard: Fluctuates between 0.4 V or less and 0.5 V or more.

NG → **Go to step 14.**

OK →

8	**Perform confirmation driving pattern.**

NEXT →

9	**Check whether DTC output recurs (DTC P0136, P0156)**

CHECK:

(a) On the hand−held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P0136 or P0156	A
No output	B

B → **Check for intermittent problems (See page DI−430).**

A

10	**Replace heated oxygen sensor.**

NEXT

11	**Perform confirmation driving pattern.**

NEXT

12	**Check whether DTC output recurs (DTC P0136, P0156)**

CHECK:

(a) On the hand−held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P0136 or P0156	A
No output	B

B → **Repair completed.**

A

13	Perform active test (injection volume).

PREPARATION:

(a) Connect the hand−held tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INJ VOL.

CHECK:

(a) Change the fuel injection volume using the tester, monitoring the voltage output of Air−Fuel Ratio (A/F) and HO2 sensors displayed on the tester.

HINT:

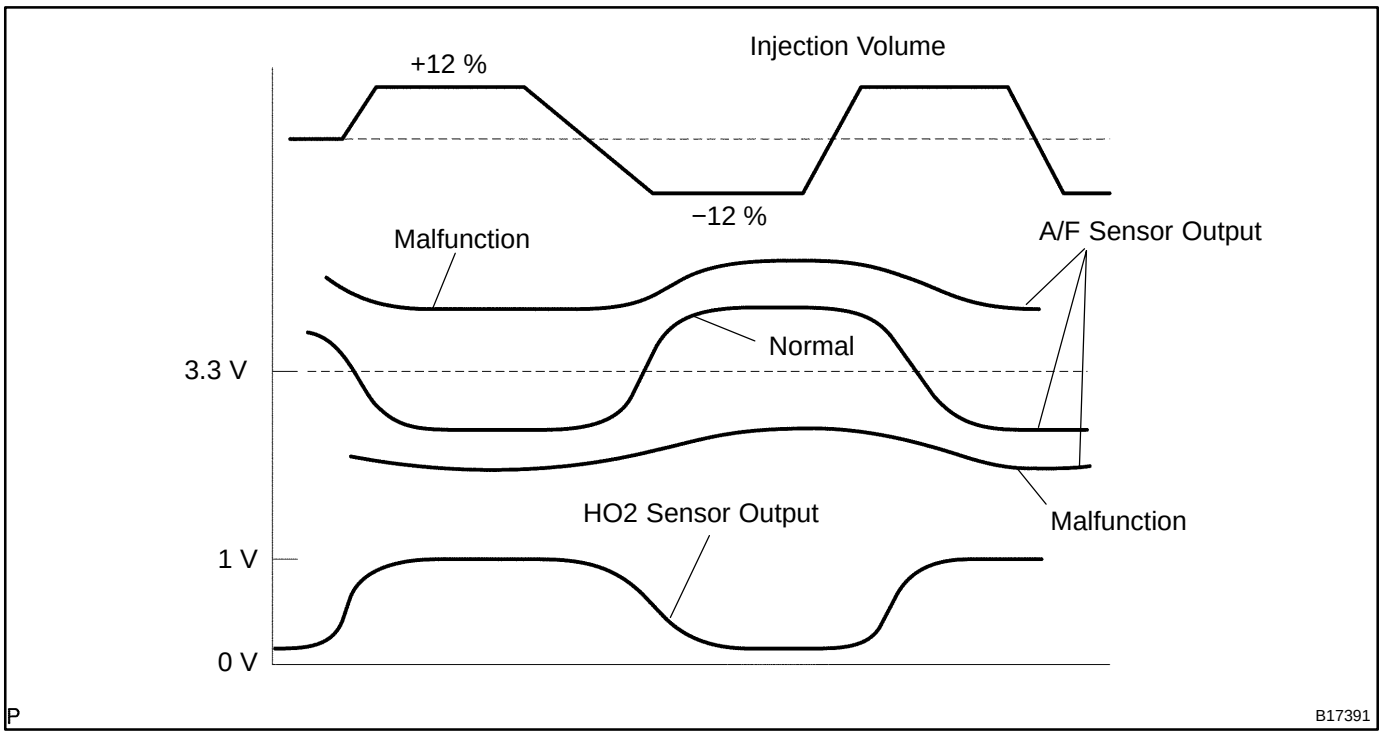
- Change the fuel injection volume within the range of −12 % and +12 %. The injection volume can be changed in 1 % graduations within the range.
- The A/F sensor is displayed as AFS B1S1 (AFS B2S1), and the HO2 sensor is displayed as O2S B1S2 (O2S B2S2), on hand−held testers.

RESULT:

Tester Display (Sensor)	Voltage Variations	Proceed To
AFS B1S1 (AFS B2S1) (A/F)	Alternates between more and less than 3.3 V	OK
AFS B1S1 (AFS B2S1) (A/F)	Remains at more than 3.3 V	NG
AFS B1S1 (AFS B2S1) (A/F)	Remains at less than 3.3 V	NG

HINT:

A normal HO2 sensor voltage (O2S B1S2) reacts in accordance with increases and decreases in fuel injection volumes. When the A/F sensor voltage remains at either less or more than 3.3 V despite the HO2 sensor indicating a normal reaction, the A/F sensor is malfunctioning.



NG → **Replace air−fuel ratio (A/F) sensor.**

OK

Check and repair extremely rich or lean actuarial air fuel ratio (injector, fuel pressure, gas leakages from exhaust system, etc.)

14	Check for exhaust gas leakage.

CHECK:

Check for exhaust gas leakage from the exhaust manifold and pipe.

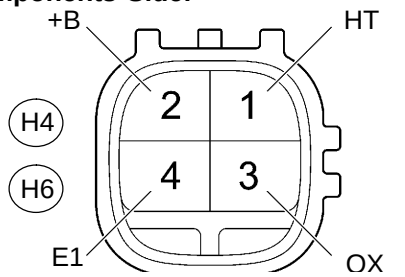
OK: No exhaust gas leakage.

NG → **Repair or replace exhaust gas leakage point.**

OK

15	Inspect heated oxygen sensor.

Components Side:



C Bank 1 Sensor 2, Bank 2 Sensor 2 A21341

PREPARATION:

Disconnect the HO2 sensor connector.

CHECK:

Measure the resistance between the terminals of the HO2 sensor connector.

OK:

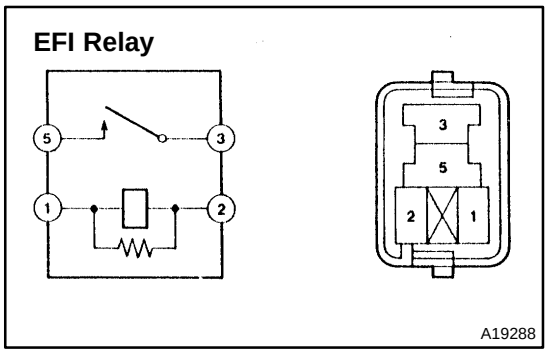
Standard:

Tester Connections	Specified Conditions
HT (2) − +B (1)	11 to 16 Ω at 20°C (68°F)
HT (2) − E (3)	10 kΩ or higher

NG → **Replace heated oxygen sensor.**

OK

16	Check EFI relay.



PREPARATION:

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

CHECK:

Inspect the EFI relay.

OK:

Standard:

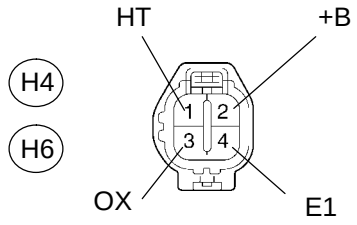
Terminal No.	Condition	Specified Condition
3 − 5	Always	10 KΩ or higher
3 − 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **Replace EFI relay.**

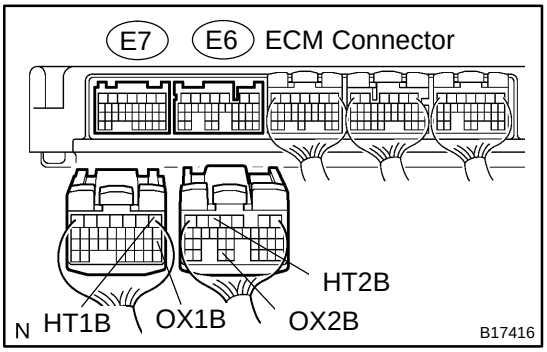
OK

17	**Check for open and short in harness and connector between ECM and heated oxygen sensor.**

Wire Harness Side:



Bank 1 Sensor 2, Bank 2 Sensor 2 A23543



PREPARATION:

(a) Disconnect the heated oxygen sensor connector.

(b) Disconnect the E6 and E7 ECM connector.

CHECK:

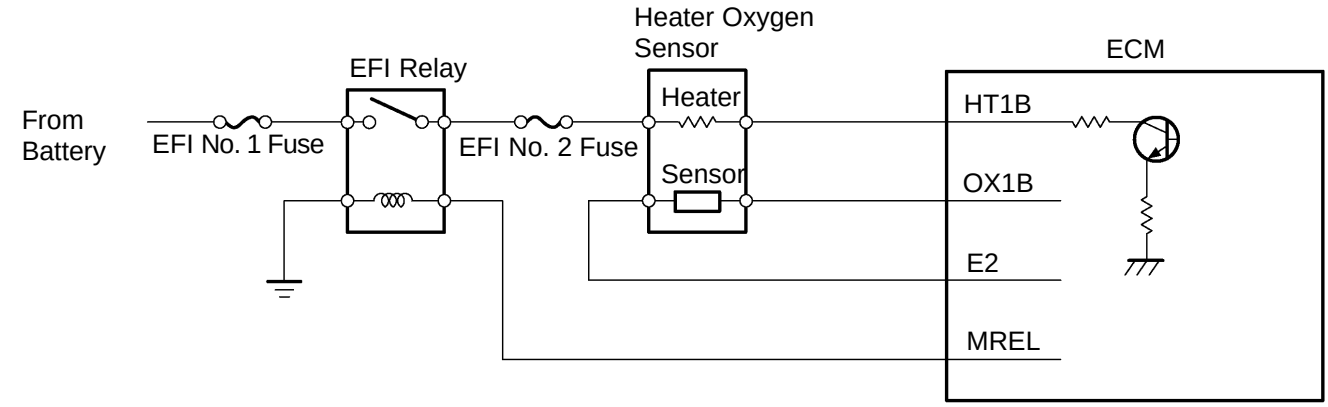
Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
OX (H4−3) − OX1B (E7−18)	Below 1 Ω
HT (H4−1) − HT1B (E7−1)	Below 1 Ω
OX (H6−3) − OX2B (E6−33)	Below 1 Ω
HT (H6−1) − HT2B (E6−5)	Below 1 Ω
OX (H4−3) or OX1B (E7−18) − Body ground	10 kΩ or higher
HT (H4−1) or HT1B (E7−1) − Body ground	10 kΩ or higher
OX (H6−3) or OX2B (E6−33) − Body ground	10 kΩ or higher
HT (H6−1) or HT2B (E6−5) − Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing):



NG → **Repair or replace harness or connector.**

OK →

Replace heated oxygen sensor.