

[2009 Holden VE Sedan](#) | [VE, WM, Caprice, Statesman, Lumina, Omega, VXR8, Sportwagon Service Manual](#) | [Engine](#) | [Engine Controls and Fuel - 2.8L, 3.0L, 3.2L, or 3.6L](#) | [Diagnostic Information and Procedures](#) |

Document ID: 1985756

## DTC P0137, P0138, P0140, P0157, P0158, or P0160

### Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

### DTC Descriptors

**DTC P0137:** O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)

**DTC P0138:** O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)

**DTC P0140:** O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 2)

**DTC P0157:** O2 Sensor Circuit Low Voltage (Bank 2 Sensor 2)

**DTC P0158:** O2 Sensor Circuit High Voltage (Bank 2 Sensor 2)

**DTC P0160:** O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 2)

### Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
HO2S Bank 1 Sensor 1 Signal	P0131	P0134, P0135	P0132	P0133, P2096, P2097
HO2S Bank 1 Sensor 2 Signal	P0137	P0140, P013A	P0138	P0140, P013A, P013E
HO2S Bank 2 Sensor 1 Signal	P0151	P0154, P0155	P0152	P0153, P2098, P2099
HO2S Bank 2 Sensor 2 Signal	P0157	P0160, P013C	P0158	P0160, P013C, P014A
Low Reference	--	P0134, P0135, P0154, P0155	--	--

### Typical Scan Tool Data

#### Bank 1 or 2 HO2S 2

Circuit	Short to Ground	Open	Short to Voltage
<i>Operating Conditions:</i> Engine operating in Closed Loop			
<i>Parameter Normal Range:</i> Fluctuates above and below 350-500 mV			

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Sensor Signal	0-60 mV	445-450 mV	1275 mV
Low Reference	--	445-480 mV	1275 mV

## Circuit Description

The heated oxygen sensors (HO2S) are used for fuel control and catalyst monitoring. Each HO2S compares the oxygen content of the surrounding air with the oxygen content of the exhaust stream. When the engine is started the engine control module (ECM) operates in an Open Loop mode, ignoring the HO2S signal voltage while calculating the air/fuel ratio. The ECM supplies the HO2S with a reference or bias voltage of about 450 mV. While the engine runs the HO2S heats up and begins to generate a voltage within a range of 0-1,000 mV. This voltage will fluctuate above and below the bias voltage. Once sufficient HO2S voltage fluctuation is observed by the ECM, Closed Loop is entered. The ECM uses the HO2S voltage to determine the air/fuel ratio. An HO2S voltage that increases above bias voltage toward 1,000 mV indicates a rich fuel mixture. An HO2S voltage that decreases below bias voltage toward 0 mV indicates a lean fuel mixture.

The heating elements inside each HO2S heat the sensor to bring the sensor up to operating conditions faster. This allows the system to enter Closed Loop earlier and the ECM to calculate the air/fuel ratio sooner.

## Conditions for Running the DTCs

### **P0137 or P0157**

- DTC P0117, P0118, or P0128 is not set.
- The HO2S 2 is at operating temperature for greater than 90 seconds.
- The engine is operating for greater than 5 seconds.
- The ignition voltage is greater than 10 volts.
- The engine coolant temperature is less than 40°C (104°F) at start-up and the engine coolant temperature was greater than 60°C (140°F) when the ignition was turned OFF last ignition cycle.
- The DTCs run continuously once the above conditions are met.

### **P0138, P0140, P0158, and P0160**

- The HO2S 2 is at operating temperature for greater than 30 seconds.
- The engine is operating for greater than 1 second.
- The ignition voltage is greater than 10 volts.
- DTCs P0138 and P0158 runs continuously once the above conditions are met for greater than 5 seconds.
- DTCs P0140 and P0160 runs continuously once the above conditions are met for greater than 60 seconds.

## Conditions for Setting the DTCs

### **P0137 or P0157**

The ECM detects that a secondary HO2S signal voltage is less than 60 mV for greater than 1 seconds or for a cumulative of 10 seconds.

### **P0138 or P0158**

The ECM detects that the HO2S signal voltage is greater than 1,150 mV for greater than 1 seconds or for a cumulative of 10 seconds.

### **P0140 or P0160**

- The ECM detects that the HO2S 2 signal voltage is between 401-519 mV, when the calculated exhaust temperature is less than 800°C (1,472°F).
- The ECM detects that the HO2S 2 signal voltage is between 401-548 mV, when the calculated exhaust temperature is greater than 800°C (1,472°F).
- The ECM detects that the measured internal resistance of the HO2S is greater than 40,000 Ω, when the calculated exhaust temperature is greater than 450°C (802°F).
- The ECM detects any one of the above conditions for greater than 1 second or for a cumulative of 10 seconds.

## **Action Taken when the DTC Sets**

DTCs P0137, P0138, P0140, P0157, P0158 and P0160 are type B DTCs.

## **Conditions for Clearing the MIL/DTC**

DTCs P0137, P0138, P0140, P0157, P0158 and P0160 are type B DTCs.

## **Reference Information**

### **Schematic Reference**

[Engine Controls Schematics](#)

### **Connector End View Reference**

[Component Connector End Views](#)

### **Electrical Information Reference**

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

### **DTC Type Reference**

[Powertrain Diagnostic Trouble Code \(DTC\) Type Definitions](#)

## Scan Tool Reference

[Control Module References](#) for scan tool information

## Circuit/System Verification

1. Engine idling, observe the appropriate scan tool HO2S 2 voltage parameter. The reading should fluctuate above and below the range of 350-550 mV.
2. Operate the vehicle within the Conditions for Running the DTC to verify the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

## Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the appropriate HO2S 2.
2. Ignition ON, verify that the scan tool HO2S 2 voltage parameter is between 350-500 mV.
  - If less than the specified range, test the signal circuit terminal 4 for a short to ground. If the circuit/connections test normal, replace the ECM.
  - If greater than the specified range, test the signal circuit terminal 4 for a short to voltage. If the circuit/connections test normal, replace the ECM.
3. Connect a 3 A fused jumper wire between the signal circuit terminal 4 and ground. Verify the scan tool HO2S voltage parameter is less than 60 mV.
  - If greater than the specified range, test the signal circuit for an open/high resistance. If the circuit/connections test normal, replace the ECM.
4. Connect a 3 A fused jumper wire between the signal circuit terminal 4 and the low reference circuit terminal 3. Verify the scan tool HO2S 2 voltage parameter is less than 60 mV.
  - If greater than the specified range, test the low reference circuit for an open/high resistance or for a short to voltage. If the circuit/connections test normal, replace the ECM.
5. Verify that the following conditions do not exist:
  - Lean, rich, or leaking fuel injectors--Refer to [Fuel Injector Solenoid Coil Test](#).
  - A fuel pressure that is too low or too high--Refer to [Fuel System Diagnosis](#).
  - Fuel that is contaminated--Refer to [Alcohol/Contaminants-in-Fuel Diagnosis](#).
  - Evidence of water intrusion into the electrical connector of the HO2S
  - The HO2S is loose
  - Exhaust leaks near the HO2S
  - Engine vacuum leaks
    - If you find any of the above conditions, repair as necessary.
6. If all circuits/connections test normal, replace the appropriate HO2S 2 sensor.

## Repair Instructions

Perform the [Diagnostic Repair Verification](#).

- [Heated Oxygen Sensor Replacement - Bank 1 Sensor 2](#)
- [Heated Oxygen Sensor Replacement - Bank 2 Sensor 2](#)
- [Engine Control Module Replacement](#) for engine control module replacement, setup, and programming

## DTC P013A, P013C, P013E, or P014A

### Diagnostic Instructions

- Perform the [Diagnostic System Check - Vehicle](#) prior to using this diagnostic procedure.
- Review [Strategy Based Diagnosis](#) for an overview of the diagnostic approach.
- [Diagnostic Procedure Instructions](#) provides an overview of each diagnostic category.

### DTC Descriptors

**DTC P013A:** HO2S Slow Response Rich to Lean Bank 1 Sensor 2

**DTC P013C:** HO2S Slow Response Rich to Lean Bank 2 Sensor 2

**DTC P013E:** HO2S Delayed Response Rich to Lean Bank 1 Sensor 2

**DTC P014A:** HO2S Delayed Response Rich to Lean Bank 2 Sensor 2

### Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
HO2S Bank 1 Sensor 1 Signal	P0131	P0134, P0135	P0132	P0133, P2096, P2097
HO2S Bank 1 Sensor 2 Signal	P0137	P0140, P013A	P0138	P0140, P013A, P013E
HO2S Bank 2 Sensor 1 Signal	P0151	P0154, P0155	P0152	P0153, P2098, P2099
HO2S Bank 2 Sensor 2 Signal	P0157	P0160, P013C	P0158	P0160, P013C, P014A
Low Reference	--	P0134, P0135, P0154, P0155	--	--

### Circuit Description

The heated oxygen sensors (HO2S) are used for fuel control and catalyst monitoring. Each HO2S compares the oxygen content of the surrounding air with the oxygen content of the exhaust stream. When the engine is started, the control module operates in an Open Loop mode, ignoring the HO2S signal voltage while calculating the air-to-fuel ratio. The control module supplies the HO2S with a reference, or bias voltage of about 450 mV. While the engine runs, the HO2S heats up and begins to generate a voltage within a range of 0-1,000 mV. This voltage will fluctuate above and below the bias voltage. Once sufficient HO2S voltage fluctuation is observed by the control module, Closed Loop is entered. The control module uses the HO2S voltage to determine the air-to-fuel ratio. An HO2S voltage that increases above bias voltage toward 1,000 mV indicates a rich fuel mixture. An HO2S voltage that decreases below bias voltage toward 0 mV indicates a lean fuel

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