

DTC P0120, P0122, P0123, P0220, P0222, P0223, or P2135 (W/LS3 or LS7)

DTC Descriptors

- DTC P0120: **Throttle Position (TP) Sensor 1 Circuit**
- DTC P0122: **Throttle Position (TP) Sensor 1 Circuit Low Voltage**
- DTC P0123: **Throttle Position (TP) Sensor 1 Circuit High Voltage**
- DTC P0220: **Throttle Position (TP) Sensor 2 Circuit**
- DTC P0222: **Throttle Position (TP) Sensor 2 Circuit Low Voltage**
- DTC P0223: **Throttle Position (TP) Sensor 2 Circuit High Voltage**
- DTC P2135: **Throttle Position (TP) Sensor 1-2 Correlation**

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
TP Sensor 1 Signal	P0122	P2135	P0122	P0123	P0068, P0121
TP Sensor 1 5-Volt Reference	P0122	P2135	P0122	P0123	--
TP Sensor 1 Low Reference	--	P2135	P0123	--	--
TP Sensor 2 Signal	P0222	P2135	P0223	P0223	P0068, P0121
TP Sensor 2 5-Volt Reference	P0222	P2135	P0222	P0223	--
TP Sensor 2 Low Reference	--	P2135	P0223	--	--

Typical Scan Tool Data

<u>TP Sensor 1</u> Circuit	Short to Ground	Open	Short to Voltage
<i>Operating Conditions:</i> Engine running at various operating conditions			
<i>Normal Range:</i> 4.75-0.35 V			
TP Sensor 1 Signal	0 V	0 V	5 V
TP Sensor 1 5-Volt Reference	0 V	0 V	5 V
TP Sensor 1 Low Reference	--	5 V	--

<u>TP Sensor 2</u> Circuit	Short to Ground	Open	Short to Voltage
<i>Operating Conditions:</i> Engine running at various operating conditions			
<i>Parameter Normal Range:</i> 0.25-4.59 V			
TP Sensor 2 Signal	0 V	5 V	5 V
TP Sensor 2 5-Volt Reference	0 V	0 V	5 V
TP Sensor 2 Low Reference	--	5 V	--

Circuit/System Description

The throttle actuator control (TAC) system uses two throttle position (TP) sensors to monitor the throttle position. The TP sensors 1 and 2 are located within the throttle body assembly. Each sensor has the following circuits:

- A 5-volt reference circuit
- A low reference circuit
- A signal circuit

Two processors are also used to monitor the TAC system data. Both processors are located within the engine control module (ECM). Each signal circuit provides both processors with a signal voltage proportional to throttle plate movement. Both processors monitor each other's data to verify that the indicated TP calculation is correct.

Conditions for Running the DTC

P0120, P0122, P0123, P0220, P0222, and P0223

- DTC P0601, P0602, P0603, P0604, P0606, P0607, P0641, P0651 are not set.
- The system voltage is more than 5.23 volts.
- The ignition is in the Unlock/Accessory or Run position.
- DTC P0120, P0122, P0123, P0220, P0222, P0223 run continuously when the above conditions are met.

P2135

- The system voltage is more than 5.23 volts.
- The ignition is in the Unlock/Accessory or Run position.
- DTC P0120, P0220, P0641, P0651 are not set.
- DTC P2135 runs continuously when the above conditions are met.

Conditions for Setting the DTC

P0120

TP sensor 1 voltage is less than 0.325 volt or more than 4.75 volts for more than 1 second.

P0122

The ECM detects that the TP sensor 1 voltage is less than 0.325 volt for more than 1 second.

P0123

The ECM detects that the TP sensor 1 voltage is more than 4.75 volts for more than 1 second.

P0220

The TP sensor 2 voltage is less than 0.25 volt or more than 4.59 volts for more than 1 second.

P0222

The ECM detects that the TP sensor 2 voltage is less than 0.25 volt for more than 1 second.

P0223

The ECM detects that the TP sensor 2 voltage is more than 4.59 volts for more than 1 second.

P2135

The difference between the TP sensor 1 and TP sensor 2 exceeds a predetermined value for more than 2 seconds.

Action Taken When the DTC Sets

- DTCs P0120, P0122, P0123, P0220, P0222, P0223, and P2135 are Type A DTCs.
- The control module commands the TAC system to operate in the Reduced Engine Power mode.
- A message center or an indicator displays Reduced Engine Power.
- Under certain conditions the control module commands the engine OFF.

Conditions for Clearing the MIL/DTC

DTCs P0120, P0122, P0123, P0220, P0222, P0223, and P2135 are Type A DTCs.

Circuit/System Verification

1. Ignition ON, observe the scan tool TP sensor 1 voltage parameter. The reading should be between 4.75-0.35 volts and change with accelerator pedal input.
2. Ignition ON, observe the scan tool TP sensor 2 voltage parameter. The reading should be between 0.25-4.59 volts and change with accelerator pedal input.
3. Ignition ON, observe the scan tool TP sensor 1 and 2 parameter. The scan tool should indicate agree.
4. Clear the DTCs with the scan tool. Operate the vehicle within the Conditions for Running the DTC, or within the conditions that you observed from the Freeze Frame/Failure Records.
5. Verify that DTC P0120 or P0220 are not the only throttle position DTCs set.
⇒If DTC P0120 or P0220 are the only DTCs set, replace the control module.
6. Verify that DTCs P0641 or P0651 are not set.
⇒If DTC P0641 or P0651 is set, refer to [DTC P0641 or P0651](#).
7. Operate the vehicle within the Conditions for Running the DTC. 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 throttle body. Allow up to 2 minutes for the ECM to completely power down.
2. Ignition OFF, test for less than 5 ohms between the low reference circuit terminal C and ground.
⇒If greater than 5 ohms, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
3. Ignition ON, test for 4.8-5.2 volts between 5-volt reference circuit terminal E and ground.
⇒If less than 4.8 volts, test 5-volt reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
⇒If greater than 5.2 volts, test the 5-volt reference circuit for a short to voltage. If the circuit tests normal, replace the ECM.
4. Verify the scan tool TP sensor 1 voltage is less than 0.1 volt.
⇒If greater than 0.1 volt, test the signal circuit terminal D for a short to voltage. If the circuit tests normal, replace the ECM.
5. Verify the scan tool TP sensor 2 voltage is greater than 4.8 volts.
⇒If less than 4.8 volts, test the signal circuit terminal F for a short to ground. If the circuit tests normal, replace the ECM.
6. Install a 3A fused jumper wire between the signal circuit terminal D and the 5-volt reference circuit terminal E of the TP sensor 1. Verify the TP sensor 1 voltage is greater than 4.8 volts.
⇒If less than 4.8 volts, test the TP sensor 1 signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
7. Install a test lamp between the signal circuit terminal F of the TP sensor 2 and ground. The test lamp should not illuminate.
⇒If the test lamp illuminates, test the TP sensor 2 signal circuit for a short to voltage. If the circuit tests normal, replace the ECM.
8. Install a 3A fused jumper wire between the signal circuit terminal F and the low reference circuit terminal C of the TP sensor 2. Verify that the TP sensor 2 voltage is less than 0.1 volt.
⇒If greater than 1.0 volt, test the TP sensor 2 signal circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
9. Ignition OFF, disconnect the harness connector at the ECM.
10. Test for less than 5 ohms on all TP sensor circuits between the following terminals:

- ECM X2 signal circuit terminal 65 to TP terminal D
 - ECM X2 signal circuit terminal 63 to TP terminal F
 - ECM X2 5-volt reference circuit terminal 3 to terminal E
⇒If greater than 5 ohms, repair the affected circuit for open/high resistance.
11. Test for infinite resistance between TP sensor 1 signal circuit terminal D and TP sensor signal circuit terminal F.
⇒If less than infinite resistance, repair the short between TP sensor 1 signal circuit and TP sensor 2 signal circuit.
 12. If all circuits test normal, replace the throttle body.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the diagnostic procedure.

- [Throttle Body Assembly Replacement](#)
- [Control Module References](#) for ECM replacement, setup, and programming

