

DTC P2120, P2122, P2123, P2125, P2127, P2128, or P2138

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](#) provide an overview of each diagnostic category.

DTC Descriptors

DTC P2120: Accelerator Pedal Position (APP) Sensor 1 Circuit

DTC P2122: Accelerator Pedal Position (APP) Sensor 1 Circuit Low Voltage

DTC P2123: Accelerator Pedal Position (APP) Sensor 1 Circuit High Voltage

DTC P2125: Accelerator Pedal Position (APP) Sensor 2 Circuit

DTC P2127: Accelerator Pedal Position (APP) Sensor 2 Circuit Low Voltage

DTC P2128: Accelerator Pedal Position (APP) Sensor 2 Circuit High Voltage

DTC P2138: Accelerator Pedal Position (APP) Sensor 1-2 Correlation

Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
APP Sensor 1 Signal	P2122	P2138	P2122	P2123	--
APP Sensor 1 5-Volt Reference	P2122	P2138	P2122	P2123	--
APP Sensor 1 Low Reference	--	P2138	P2123	--	--
APP Sensor 2 Signal	P2127	P2138	P2127	P2128	--
APP Sensor 2 5-Volt Reference	P2127	P2138	P2127	P2128	--
APP Sensor 2 Low Reference	--	P2138	P2128	--	--

Typical Scan Tool Data

APP Sensor 1 and 2

Circuit	Normal Range	Short to Ground	Open or High Resistance	Short to Voltage
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APP Sensor 1 Signal	0.33-4.75 V	0 V	0 V	5 V
APP Sensor 1 5-Volt Reference	0.33-4.75 V	0 V	0 V	5 V
APP Sensor 1 Low Reference	0.33-4.75 V	--	4.96 V	--
APP Sensor 2 Signal	0.33-2.50 V	0 V	0 V	5 V
APP Sensor 2 5-Volt Reference	0.33-2.50 V	0 V	0 V	5 V
APP Sensor 2 low Reference	0.33-2.50 V	--	4.92 V	--

Circuit/System Description

The throttle actuator control (TAC) system uses two accelerator pedal position (APP) sensors to monitor the accelerator pedal position. The APP sensors 1 and 2 are located within the pedal 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 pedal movement. Both processors monitor each other's data to verify that the indicated APP calculation is correct.

Conditions for Running the DTC

P2120, P2122, P2123, P2125, P2127, P2128

- The system voltage is more than 5.23 volts.
- The ignition is in the Unlock/Accessory or Run position.
- DTC P0641 and P0651 are not set.
- DTC P2120, P2122, P2123, P2125, P2127, P2128 run continuously when the above conditions are met.

P2138

- The system voltage is more than 5.23 volts.
- The ignition is in the Unlock/Accessory or Run position.
- DTC P0641, P0651, P2120, P2125 are not set.
- DTC P2138 runs continuously when the above conditions are met.

Conditions for Setting the DTC

P2120

The APP sensor 1 voltage is less than 0.325 volt, or more than 4.75 volts for more than 0.4 second.

P2122

The ECM detects that the APP sensor 1 voltage is less than 0.325 volt for more than 0.4 second.

P2123

The ECM detects that the APP sensor 1 voltage is more than 4.75 volts for more than 0.4 second.

P2125

The APP sensor 2 voltage is less than 0.325 volt, or more than 4.75 volts for more than 0.4 second.

P2127

The ECM detects that the APP sensor 2 voltage is less than 0.325 volt for more than 0.4 second.

P2128

The ECM detects that the APP sensor 2 voltage is more than 4.75 volts for more than 0.4 second.

P2138

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

Action Taken When the DTC Sets

- DTCs P2120, P2122, P2123, P2125, P2127, P2128, and P2138 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 P2120, P2122, P2123, P2125, P2127, P2128, and P2138 are Type A 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. Ignition ON, observe the scan tool APP sensor 1 voltage parameter. The reading should be between 0.32-4.75 volts, and change with accelerator pedal input.
2. Ignition ON, observe the scan tool APP sensor 2 voltage parameter. The reading should be between 0.32-4.75 volts, and change with accelerator pedal input.
3. Ignition ON, observe the scan tool APP 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.
 - If DTC P2120 or P2125 are the only DTCs set, replace the control module.
 - If DTC P0641 or P0651 are set, refer to [DTC P0641 or P0651](#).
5. 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 accelerator pedal. Allow sufficient time for the ECM to power down.
2. Test for less than 5 ohms between each low reference circuit terminals 4 and 5 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 each 5-volt reference circuit terminals 2 and 1 and ground.
 - If less than 4.8 volts, test the affected 5-volt reference circuit for an open/high resistance or short to ground. If the circuit tests normal, replace the ECM.
 - If greater than 5.2 volts, test the affected 5-volt reference circuit for a short to voltage. If the circuit tests normal, replace the ECM.
4. Ignition ON, verify the scan tool APP sensor 1 and 2 voltages are less than 0.1 volt.
 - If greater than 0.1 volt, test the APP sensor 1 and 2 signal circuits terminals 3 and 6 for a short to voltage. If the circuit tests normal, replace the ECM.
5. Install a 3A fused jumper wire between the signal circuit terminal 3 and the 5-volt reference

circuit terminal 2 of the APP sensor 1. Verify the scan tool parameter AP sensor 1 voltage is greater than 4.8 volts.

If less than 4.8 volts, test the APP sensor 1 signal circuit for an open, or short to ground. If the circuit tests normal, replace the ECM.

6. Install a 3A fused jumper wire between the signal circuit terminal 6 and the 5-volt reference circuit terminal 1 of the APP sensor 2. Verify that the scan tool parameter APP sensor 2 voltage is greater than 4.8 volts.

If less than 4.8 volts, test the APP sensor 2 signal circuit for an open/high resistance or short to ground. If the circuit tests normal, replace the ECM.

7. Ignition OFF, disconnect the harness connector at the ECM.
8. Test for less than 5 ohms of resistance on all APP sensor circuits between the following terminals:

- ECM X1 signal circuit terminal 29 to APP terminal 3
- ECM X1 signal circuit terminal 32 to APP terminal 6
- ECM X1 5-volt reference circuit terminal 36 to terminal 1
- ECM X1 5-volt reference circuit terminal 56 to terminal 2

If greater than 5 ohms, repair the affected circuit.

9. Test for infinite resistance between APP sensor 1 signal circuit terminal 3 and APP sensor 2 signal circuit terminal 6.

If less than infinite resistance, repair the short between APP sensor 1 signal circuit and APP sensor 2 signal circuits.

If all circuits test normal, replace the accelerator pedal.

Component Test

Important: Perform the Circuit/System Testing before proceeding with the Component Test.

Dynamic Test

1. Install a 3A fused jumper wire between the 5-volt reference terminal of the applicable APP sensor and 5 volts. Install a jumper wire between the low reference terminal and a ground.
2. Sweep the sensor through the entire range while monitoring the voltage between the signal terminal and the low reference terminal with a DMM. The voltage should vary between 0.30-4.98 volts without any spikes or dropouts.

If the voltage is not within the specified range or is erratic, replace the accelerator pedal assembly.

Repair Instructions

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

- [Accelerator Pedal Position Sensor Replacement](#)
- [Control Module References](#) for ECM replacement, setup, and programming