

## 2001 Chevrolet Blazer

2001 ENGINE PERFORMANCE Self-Diagnostics - 4.3L "L", "M", "S" & "T" Series Trucks

### DTC P0410: AIR INJECTION SYSTEM ("S" & "T" SERIES)

**NOTE:** For circuit reference, see **WIRING DIAGRAMS** article.

#### Circuit Description

An secondary Air Injection (AIR) pump is used to lower tailpipe emissions on start-up. The PCM supplies ground to AIR pump relay, which energizes AIR pump and AIR solenoid valve. Engine vacuum is applied to AIR shut-off valve when AIR solenoid is energized. The engine vacuum opens AIR shut-off valve which allows AIR to flow to exhaust manifolds.

PCM monitors the HO2S voltages to diagnose AIR system. During the AIR test, PCM activates the AIR pump during closed-loop operation. When AIR system is activated, PCM monitors the HO2S voltages and short term fuel trim values for both banks of the engine. If AIR system is operating properly, HO2S voltages should go low and short term fuel trim should go high.

If PCM determines that HO2S voltages for both banks did not respond as expected during the tests, DTC P0410 will set. If only one sensor responded, the PCM sets either a DTC P1415 or DTC P1416 to indicate on which bank the AIR system is inoperative.

#### Code Enable Criteria

Conditions for running DTC:

- | DTCs P0101, P0102, P0103, P0106, P0107, P0108, P0112, P0113, P0117, P0118, P0121, P0122, P0123, P0125, P0131, P0132, P0133, P0134, P0135, P0137, P0138, P0140, P0141, P0151, P0152, P0153, P0154, P0155, P0157, P0158, P0160, P0161, P0171, P0172, P0174, P0175, P0300, P0440, P0442, P0446, P0506 or P0507 is not set
- | Engine run time is more than 15 seconds after closed-loop operation.
- | Engine load is less than 33 percent.
- | Engine airflow is less than 18 grams/second.
- | Engine speed is greater than 750 RPM.
- | Ignition voltage is greater than 11.7 volts.
- | Air/fuel ratio is 13.1:1.
- | Engine coolant temperature is 158-230°F (70-110°C).
- | The intake air temperature is greater than 36°F (2°C).
- | Fuel system is not operating in power enrichment or Deceleration Fuel Cut-Off (DFCO) mode.
- | Short term fuel trim is 1.08.
- | Start-up ECT is less than 176°F (80°C).
- | Vehicle speed is greater than 25 MPH.

Conditions for setting DTC:

- | HO2S voltage does not go less than 222 millivolts within 1.2 seconds when AIR pump turns on during

## 2001 Chevrolet Blazer

2001 ENGINE PERFORMANCE Self-Diagnostics - 4.3L "L", "M", "S" & "T" Series Trucks

closed-loop operation.

- Short term fuel trim does not go greater than a predetermined amount when AIR pump turns on during closed-loop operation.

### Diagnostic Procedures

- Perform powertrain diagnostic system check. See **POWERTRAIN DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. After performing powertrain diagnostic system check, go to next step.
- Turn ignition on, with engine off. Observe AIR pump. If AIR pump runs constantly, go to step 25. If AIR pump does not run constantly, go to next step.
- Start and operate engine at idle for 5 minutes after closed-loop is achieved. Using scan tool, observe the long term fuel trim parameter. If long term fuel trim is greater than 10 percent, go to step 14. If long term fuel trim is not greater than 10 percent, go to next step.
- Turn ignition on, with engine off. Using scan tool, command AIR pump on and off. If AIR pump turns on and off, go to next step. If AIR pump does not turn on and off, go to step 6.
- Start and operate engine for 2 minutes. Ensure engine is at normal operating temperature and in closed-loop. Using scan tool, command AIR pump. Monitor HO2S 1 bank 1 and HO2S 1 bank 2 sensors. If HO2S 1 bank 1 and HO2S 1 bank 2 value decreases to 100 millivolts in 6 seconds, see **DIAGNOSTIC AIDS**. If HO2S 1 bank 1 and HO2S 1 bank 2 value does not decrease to 100 millivolts in 6 seconds, go to step 15.
- Disconnect AIR pump harness connector. Using a test light connected to a known-good ground, probe Gray AIR pump harness connector C2 terminal "A" (Red wire). Using scan tool, command AIR pump on and off. If test light turns on and off, go to step 11. If test light does not turn on and off, go to next step.
- Turn ignition off. Remove vehicle battery. Remove AIR fuse block assembly near battery tray. Check AIR fuse. If fuse is open, go to step 28. If fuse is okay, go to next step.
- Reconnect battery cables. Using a test light connected to a known-good ground, probe AIR pump relay battery voltage circuit, switched side, at fuse block. If test light illuminates, go to next step. If test light does not illuminate, go to step 40.
- Turn ignition on. Using test light connected to a known-good ground, probe AIR pump relay ignition 1 voltage circuit, coil side, at fuse block. If test light illuminate, go to next step. If test light does not illuminate, go to step 41.
- Using test light connected to battery voltage, probe AIR pump relay control circuit. Using scan tool, command AIR pump relay on and off. If test light turns on and off, go to step 12. If test light does not turn on and off, go to step 30.
- Using test light connected to battery voltage, probe AIR pump ground circuit. If test light illuminates, go to step 37. If test light does not illuminate, go to step 45.
- Turn ignition off. Remove AIR pump relay (located in AIR fuse block). Connect a fused jumper between battery voltage circuit of AIR relay block and AIR pump supply voltage circuit at AIR fuse block. If AIR pump turns on, go to step 36. If AIR pump does not turn on, go to next step.
- Check open or high resistance in AIR pump battery supply voltage circuit between the AIR relay and AIR pump. If resistance is 0-5 ohms, go to step 37. If resistance is not 0-5 ohms, go to step 43.
- Operate engine at 1500 RPM for one minute. If long term fuel trim is greater than 10 percent, diagnose fuel system. If long term fuel trim is not greater than 10 percent, go to next step.

## 2001 Chevrolet Blazer

### 2001 ENGINE PERFORMANCE Self-Diagnostics - 4.3L "L", "M", "S" & "T" Series Trucks

15. Turn ignition off. Remove vacuum hose at the shut-off valve. Connect a hand-held vacuum pump to AIR shut-off valve and apply 10 in. Hg to AIR shut-off valve. If AIR shut-off valve holds vacuum for 30 seconds, go to next step. If AIR shut-off valve does not hold vacuum for 30 seconds, go to step 49.
16. Connect a vacuum gauge to AIR shut-off vacuum hose. Start and operate engine at idle. If vacuum reading is zero in. Hg, go to next step. If vacuum reading is not zero in. Hg, go to step 50.
17. Ensure vacuum gauge is still connected. Command AIR pump on and off. If vacuum reading increases to greater than 10 in. Hg and then drops back to zero in. Hg, go to step 31. If vacuum reading does not increase to greater than 10 in. Hg and then drops back to zero in. Hg, go to next step.
18. Connect vacuum gauge to AIR solenoid outlet port. Command AIR pump on and off. If vacuum reading increases to greater than 10 in. Hg and drops back to zero inches, go to step 47. If vacuum reading does not increase to greater than 10 in. Hg and drops back to zero inches, go to next step.
19. Remove vacuum hose at AIR solenoid inlet. Connect vacuum gauge to vacuum supply hose. Start and operate engine at idle. If vacuum reading is 10 in. Hg, go to step 21. If vacuum reading is not 10 in. Hg, go to next step.
20. Remove vacuum check valve from vacuum supply hose. Connect vacuum gauge to hose. If vacuum reading is greater than 10 in. Hg, go to step 34. If vacuum reading is not greater than 10 in. Hg, check for plugged vacuum source.
21. Using test light connected to ground, probe AIR solenoid supply voltage circuit. Using scan tool, command AIR pump on and off. If test light turns on and off, go to next step. If test light does not turn on and off, go to step 23.
22. Using test light connected to battery voltage, probe AIR control solenoid ground circuit. If test light illuminates, go to step 38. If test light does not illuminate, go to step 45.
23. If AIR fuse is open, go to step 42. If AIR fuse is okay, go to next step.
24. Turn ignition off. Check AIR solenoid supply voltage circuit for open or high resistance. Repair as necessary. After repairs, go to step 53.
25. Turn ignition off. Remove AIR pump relay. Turn ignition on. If AIR pump runs constantly, go to next step. If AIR pump does not run constantly, go to step 27.
26. Disconnect AIR pump harness connector. Using test light connected to a known-good ground, probe AIR pump supply voltage. If test light illuminates, go to step 44. If test light does not illuminate, see **DIAGNOSTIC AIDS**.
27. Using test light connected to battery voltage, probe AIR pump relay control circuit at fuse block. If test light illuminates, go to step 46. If test light does not illuminate, go to step 48.
28. Check battery voltage circuit between AIR fuse and AIR pump relay for short to ground. Repair as necessary. Replace AIR fuse as necessary. After repairs, go to step 53. If circuit is okay, go to next step.
29. Check AIR pump supply voltage circuit for short to ground. Repair as necessary. Replace AIR fuse as necessary. After repairs, go to step 53. If circuit is okay, go to step 51.
30. Turn ignition off. Check AIR pump relay control circuit for open or short to voltage. Repair as necessary. After repairs, go to step 53. If circuit is okay, go to step 39.
31. Turn ignition off. Remove right side AIR crossover hose at right bank exhaust check valve. Turn ignition on. Using scan tool, command AIR pump on. If air pressure flows at crossover hose, go to step 34. If air pressure does not flow at crossover hose, go to next step.
32. Remove crossover hose at AIR shut-off valve. Command the AIR pump on. If air pressure flows at the shut-off valve, go to step 34. If air pressure does not flow at the shut-off valve, go to next step.

## 2001 Chevrolet Blazer

### 2001 ENGINE PERFORMANCE Self-Diagnostics - 4.3L "L", "M", "S" & "T" Series Trucks

33. Remove outlet hose at AIR pump. Command AIR pump on. If air pressure flows at the pump outlet, go to next step. If air does not flow at the pump outlet, go to step 35.
34. Check for leaks or restrictions in AIR shut-off valve, check valves, vacuum check valve fittings, AIR pipes and exhaust manifolds. Repair as necessary. After repairs, go to step 47. If no problem is found, go to next step.
35. Check AIR inlet and outlet hoses for leaks or restrictions. Repair as necessary. After repairs, go to step 53. If no problem is found, go to step 51.
36. Check for poor connections at AIR pump relay block. Repair as necessary. After repairs, go to step 53. If connections are okay, go to step 48.
37. Turn ignition off. Check for poor connections at AIR pump harness connector. Repair as necessary. After repairs, go to step 53. If connections are okay, go to step 51.
38. Check for poor connections at AIR vacuum control solenoid harness connector. Repair as necessary. After repairs, go to step 53. If connections are okay, go to step 50.
39. Check for poor connections at PCM. Repair as necessary. After repairs, go to step 53. If connections are okay, go to step 52.
40. Repair open or short to ground in AIR pump relay battery voltage circuit. After repairs, go to step 53.
41. Turn ignition off. Repair open or short to ground in AIR pump relay ignition 1 voltage circuit. Replace fuse as necessary. After repairs, go to step 53. If circuit is okay, go to step 48.
42. Repair short to ground in AIR solenoid supply voltage circuit. Replace AIR solenoid fuse as necessary. After repairs, go to step 53.
43. Repair open, high resistance or short to ground in AIR pump supply voltage circuit. After repairs, go to step 53.
44. Repair short to voltage in AIR pump supply voltage circuit. After repairs, go to step 53.
45. Turn ignition off. Repair open or high resistance in AIR ground circuit. After repairs, go to step 53.
46. Check for short to ground in AIR pump relay control circuit. After repairs, go to step [53](#). If circuit is okay, go to step 52.
47. Turn ignition off. Replace hoses or components as necessary. After repairs, go to step 53.
48. Replace AIR pump relay. After replacing relay, go to step 53.
49. Replace AIR shut-off valve. After replacing shut-off valve, go to step 53.
50. Turn ignition off. Replace AIR vacuum control solenoid. After replacing solenoid, go to step 53.
51. Replace AIR pump. After replacing AIR pump, go to step 53.
52. Replace PCM. Perform PCM relearn procedure. See **POWERTRAIN CONTROL MODULE** under PROGRAMMING. After replacing PCM, go to next step.
53. Turn ignition on, with engine off. Using scan tool, clear DTCs. Turn ignition off for 3 seconds. Start engine. Operate vehicle within the conditions for running the DTC. See **CODE ENABLE CRITERIA**. If DTC runs and passes, go to next step.
54. Using scan tool, observe the stored information and Capture Info. If scan tool displays any undiagnosed DTCs, diagnose affected DTCs. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS**. If no DTCs are displayed, system is okay.

#### Diagnostic Aids

Microsoft

Saturday, December 04, 2010 1:26:32 PM

Page 4

© 2005 Mitchell Repair Information Company, LLC.

## 2001 Chevrolet Blazer

2001 ENGINE PERFORMANCE Self-Diagnostics - 4.3L "L", "M", "S" & "T" Series Trucks

Using FREEZE FRAME/FAILURE RECORDS data may aid in locating an intermittent condition. If you cannot duplicate the DTC, the information included in the FREEZE FRAME/FAILURE RECORDS data can aid in determining how many miles since the DTC set. The Fail Counter and Pass Counter can also aid in determining how many ignition cycles the diagnostic reported a pass or a fail. Operate vehicle within the same FREEZE FRAME conditions, such as RPM, load, vehicle speed, temperature etc., observed. This will isolate when DTC failed.

An intermittent may be caused by a poor connection, rubbed-through wire insulation or a broken wire inside insulation. Check harness connectors for backed-out terminals, improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wire connection, and damaged harness.

### **DTC P0418: SECONDARY AIR INJECTION PUMP & AIR SOLENOID CIRCUIT ("S" & "T" SERIES)**

**NOTE:** For circuit reference, see **WIRING DIAGRAMS** article.

#### **Circuit Description**

The PCM controls the relay by grounding the control circuit via an internal switch called a driver. The primary function of driver is to supply ground for the controlled component. Each driver has a fault line which PCM monitors. When PCM commands a component on, voltage of control circuit should be low, near zero volts. When PCM commands control circuit to a component off, the voltage potential of the circuit should be high, about battery voltage. If fault detection circuit senses a voltage other than what the PCM expects, the fault line status changes causing DTC to set.

The relay controls the high current flow to the Secondary Air Injection (AIR) pump and AIR solenoid. This allows PCM driver to only have to control the relatively low current used by the relay.

#### **Code Enable Criteria**

Conditions for running DTC:

- | Engine speed is greater than 400 RPM.
- | Ignition voltage is 6-18 volts.

Conditions for setting DTC:

- | PCM detects that the commanded state of the driver and the actual state of the control circuit do not match.
- | Condition is present for a minimum of 5 seconds.

#### **Diagnostic Procedures**

1. Perform powertrain diagnostic system check. See **POWERTRAIN DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. After performing powertrain diagnostic system check, go to next step.

## 2001 Chevrolet Blazer

### 2001 ENGINE PERFORMANCE Self-Diagnostics - 4.3L "L", "M", "S" & "T" Series Trucks

2. Using scan tool, command the relay on and off. If relay turns on and off when commanded, go to next step. If relay does not turn on and off when commanded, go to step 5.
3. Turn ignition off. Disconnect PCM harness connector C2. Install 5-amp fused jumper wire to control circuit at PCM harness connector. Turn ignition on, with engine off. Replace relay if DVOM goes to zero during the current draw test. Using DVOM, check current draw from relay control circuit in PCM harness connector to ground for 2 minutes. If current draw measures less than 0.75 amps, see **DIAGNOSTIC AIDS**. If current draw does not measure less than 0.75 amps, go to next step.
4. Turn ignition off. Disconnect AIR pump relay. Check resistance from the relay control circuit in PCM harness connector to ground. If resistance is infinite resistance, go to step 12. If resistance is not infinite, go to step 10.
5. Turn ignition off. Disconnect relay. Connect test light between AIR pump relay control circuit and AIR pump relay ignition feed circuit, on coil side of the relay, at AIR pump relay harness connector. Turn ignition on, with engine off. Using scan tool, command relay on and off. If test light turns on and off when commanded, go to step 8. If test light does not turn on and off when commanded, go to next step.
6. Using test light connected to ground, probe ignition feed circuit, located on coil side of relay, at AIR pump relay harness connector. If test light illuminated, go to next step. If test light does not illuminate, go to step 11.
7. Turn ignition off. Reconnect relay. Disconnect PCM connector C2. Turn ignition on, with engine off. Using a fused jumper wire connected to ground, momentarily probe relay control circuit in PCM harness connector. If relay turns on when circuit is grounded and turns off when circuit is opened, go to step 9. If relay does not turn on when circuit is grounded and or turn off when circuit is opened, go to step [10](#).
8. Check connections at relay. Repair as necessary. After repairs, go to step 14. If connections are okay, go to step 12.
9. Check connections at PCM. Repair as necessary. After repairs, go to step 14. If connections are okay, go to step 13.
10. Repair faulty relay control circuit. After repairs, go to step [14](#).
11. Repair faulty relay ignition feed circuit. After repairs, go to step 14.
12. Replace the relay. After replacing relay, go to step 14.
13. Replace PCM. Perform PCM relearn procedure. See **POWERTRAIN CONTROL MODULE** under PROGRAMMING. After replacing PCM, go to next step.
14. Using scan tool, clear DTCs. Turn ignition off for 30 seconds. Start and operate vehicle within the conditions for running the DTC. See **CODE ENABLE CRITERIA**. If DTC runs and passes, go to next step. If DTC resets, go to step 2.
15. Using scan tool review the stored information and Capture Info. If scan tool displays any undiagnosed DTCs, diagnose affected DTCs. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS**. If no DTCs are displayed, system is okay.

#### Diagnostic Aids

**NOTE:** Remove any debris from PCM connector surfaces before servicing PCM. Check PCM connector gaskets when diagnosing or replacing PCM. Ensure that gaskets are installed correctly to prevent water intrusion into PCM.

## 2001 Chevrolet Blazer

2001 ENGINE PERFORMANCE Self-Diagnostics - 4.3L "L", "M", "S" & "T" Series Trucks

This diagnostic only runs once per ignition cycle. A malfunction in HO2S heater circuits causes a DTC to set. Check HO2S heater circuits for intermittent opens and for poor connections. The HO2S wires provide supply of oxygen. Check the HO2S wires and connections for breaks or for contamination.

Using the FREEZE FRAME/FAILURE RECORDS may help to locate an intermittent condition. If DTC cannot be duplicated, the information included in the FREEZE FRAME/FAILURE RECORDS can help determine how many miles since the DTC set. The fail and pass counter can also help determine how many ignition cycles the diagnostic reported a pass or a fail. In order to isolate when DTC failed, operate vehicle within the same FREEZE FRAME conditions. These conditions include, RPM, vehicle load and vehicle speed.