DTC B0249, B0269, B0409, or B0419

Circuit Description

- DTC B0249 Mode actuator range error
- DTC B0269 Recirculation actuator range error
- DTC B0409 Left air temperature actuator range error
- DTC B0419 Right air temperature actuator range error

The actuator is an electronic stepper motor. The HVAC control module supplies power and ground to the actuator. The HVAC control module controls the direction of the actuator by changing the polarity of the control circuits. When the actuator reaches its desired position, both circuits are fixed to the same value 0 volts. The HVAC control module determines the door or mode film position by counting pulses (voltage fluctuations) caused by the brush to commutator action generated during normal motor operation. The HVAC control module monitors a voltage drop across an internal resistance to detect the pulses. The HVAC control module converts the pulses to counts with a range of 0–255 counts. When a calibration or recalibration procedure is performed, the HVAC control module calculates the door or mode film travel range. The HVAC control module commands the actuator in one extreme position then counts pulses starting from 0 counts. The HVAC control module compares the total number of pulses to calibrated limits. If the total pulse count is less than or equal to the maximum calibrated limit and greater than or equal to the minimum calibrated limit, then the calibration is considered successful.

Conditions for Running the DTC

The HVAC control module will run the DTC when either of the following conditions are met.

- The HVAC control module has completed a calibration/recalibration of the actuator.
- The HVAC control module commands the actuator to move.

Conditions for Setting the DTC

The HVAC control module will set this DTC if either of the following conditions are true.

- The actuator fails calibration/recalibration due to an over travel or under travel condition. The HVAC control module does not detect the calibrated

number of total pulse counts during a travel range check.

- The HVAC control module determines that the actual door position does not equal the commanded door position. The HVAC control module commands the door to move but does not see the expected number of pulses between positions.

Action Taken When the DTC Sets

- The HVAC control module will attempt to make use of whatever range is still available.
- The HVAC control module will recalibrate the actuator each time the ignition switch is turned ON.

Conditions for Clearing the MIL/DTC

- The DTC will become history if the HVAC control module no longer detects a failure.
- The history DTC will clear after 100 fault free ignition cycles.
- The DTC can be cleared with a scan tool.

Diagnostic Aids

a). Inspect the appropriate actuator door and actuator for the following conditions:
   - A misaligned actuator. Refer to Mode Actuator Replacement on page 1-67, Air Temperature Actuator Replacement - Right on page 1-67, Air Temperature Actuator Replacement - Left on page 1-68 or Recirculation Actuator Replacement on page 1-66.
   - Broken or binding mode actuator film or actuator door
   - Obstruction that prevents the mode film or actuator door from operating within its full range of motion
   - Missing seals to the actuator door
   - Misaligned seals to the actuator door

b). Refer to Testing for Intermittent and Poor Connections on page 8-13 in Wiring Systems.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step verifies that the HVAC control module is able to command the

actuator through its full range of motion.

4. If the actuator does not move at all, the problem is likely to be the drive circuitry within the HVAC control module, the actuator, or the wiring harness. If the actuator does move, but not within its full range of motion, the problem is likely to be a mechanical binding of the actuator door or actuator door linkage.
6. This step drives the actuator in one direction. The actuator shaft will not move if the actuator door is already in the position you are attempting to drive it to.
7. This step drives the actuator in the opposite direction.

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Step	Action	Values	Yes	No
Schematic Reference: HVAC Schematics on page 1-4 Connector End View Reference: HVAC Connector End Views on page 1-21				
1	Did you perform the Vehicle Diagnostic System Check?	—	Go to Step 2	Go to Diagnostic System Check -Vehicle in Vehicle DTC Information
2	1).Install a scan tool. 2).Turn the ignition ON, with the engine OFF. 3).With the scan tool, command the appropriate actuator in both directions. 4).Observe the appropriate Actual parameter. Does the scan tool indicate that the value of the appropriate Actual parameter is within 5).counts of the minimum and maximum specified values?	3 Counts 250 Counts	Go to Diagnostic Aids	Go to Step 3
3	When commanding the actuator in both directions, does the scan tool indicate that the value of the appropriate Actual parameter changes by more than the specified value?	0–3 Counts	Go to Step 7	Go to Step 4

Step	Action	Values	Yes	No
4	Test the appropriate door control A circuit and the appropriate door control B circuit for an open, high resistance, short to ground or a short to voltage. Did you find and correct the condition?	—	Go to Step 12	Go to Step 5
5	1).Turn the ignition OFF. 2).Disconnect the HVAC control module. 3).Connect a 10-amp fused jumper wire between the actuator door control A circuit of the appropriate actuator and battery positive voltage. 4).Connect a 10-amp fused jumper wire between the actuator door control B circuit of the appropriate actuator and a good ground. Does the actuator shaft rotate?	—	Go to Step 9	Go to Step 6
6	1).Connect a 10-amp fused jumper wire between the actuator door control B circuit of the appropriate actuator and battery positive voltage. 2).Connect a 10-amp fused jumper wire between the actuator door control A circuit of the appropriate actuator and a good ground. Does the actuator shaft rotate? Inspect the appropriate door and actuator for the following conditions:	—	Go to Step 9	Go to Step 7

Step	Action	Values	Yes	No
7	● A misaligned actuator. ● Broken or binding linkages or actuator door ● An obstruction that prevents the actuator door from operating within its full range of motion ● Missing seals to the actuator door • Misaligned seals to the actuator door Did you find and correct the condition?	—	Go to Step 12	Go to Step 8
8	Inspect for poor connections at the harness connector of the appropriate actuator. Did you find and correct the condition?	—	Go to Step 12	Go to Step 10
9	Inspect for poor connections at the harness connector of the HVAC control module. Did you find and correct the condition?	—	Go to Step 12	Go to Step 11
10	Important: Perform the recalibration procedure for the appropriate actuator. Replace the appropriate actuator. Did you complete the replacement?	—	Go to Step 12	—

Step	Action	Values	Yes	No
11	Replace the HVAC control module. Did you complete the replacement?	—	Go to Step 12	—
12	1).Use the scan tool in order to clear the DTCs. 2).Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	—	Go to Step 3	System OK