DTC P003A

DTC DESCRIPTOR

DTC P003A

Turbocharger Boost Control Position Not Learned

DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open or High Resistance	Short to Voltage	Signal Performance
Turbocharger Vane Position Solenoid High Control	P0045	P0045	P0045	P003A
Turbocharger Vane Position Solenoid Low Reference	P0045	P0045	P0045, P003A	P003A

IMPORTANT: Always perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure. <u>See: Testing and Inspection/Diagnostic Trouble Code Tests and Associated Procedures</u>

CIRCUIT/SYSTEM DESCRIPTION

The position of the <u>turbocharger</u> vanes is controlled by the engine control module (ECM). The <u>ECM</u> utilizes a turbocharger vane control solenoid valve and a turbocharger vane position sensor to control the turbocharger vanes. The ECM will vary the boost dependant upon the load requirements of the engine. The vane control solenoid valve uses 2 circuits, a high voltage control circuit and a low reference circuit. The ECM uses a pulse width modulation (PWM) on the high control circuit to control the solenoid valve. The ECM provides a ground on the low reference circuit. The ECM will detect if the automatic turbocharger learn has failed or the commanded position of the turbocharger vanes does not match the actual position by more than **15 percent**. Refer to Turbocharger Description and Operation.

CONDITIONS FOR RUNNING THE DTC

- DTC P0117, P0118, P2563, P2564, P2565, P2228, P2229 are not set.
- The battery voltage is more than **11 volts**.
- The <u>ECM</u> is commanding the <u>turbocharger</u> vanes open or closed during a position learn process.
- The engine speed is between 600-750 RPM .
- The engine coolant temp (ECT) is between 160-205°F (71-96°C) .
- DTC P003A runs continuously when the above conditions are met.

CONDITIONS FOR SETTING THE DTC

The <u>ECM</u> detects that the commanded position of the <u>turbocharger</u> vanes does not match the actual position for more than **30 seconds** during the learn process.

ACTION TAKEN WHEN THE DTC SETS

• The <u>control module</u> illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.

• The <u>control module</u> records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

CONDITIONS FOR CLEARING THE MIL/DTC

- The <u>control module</u> turns OFF the malfunction indicator lamp (MIL) after 3 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the <u>MIL</u> and the DTC with a scan tool.

DIAGNOSTIC AIDS

If any service has been performed on the <u>turbocharger</u> or on the turbocharger components, a turbocharger relearn must be performed. Failure to perform the turbocharger learn procedure may cause this DTC to set. Refer to Turbocharger Learn Procedure.

CIRCUIT/SYSTEM VERIFICATION

- If DTC P0652, P0653, P0698, P0699, P2564, or P2565 are set, refer to Diagnostic Trouble Code (DTC) List - Vehicle for further diagnosis. <u>See: Diagnostic Trouble Code</u> <u>Descriptions</u>
- 2. Always perform the <u>Turbocharger</u> Learn Procedure , then review the DTC information with a scan tool. **IMPORTANT:** If you cannot duplicate the condition, 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.
- 3. With the engine running, increase the engine speed to **1,200 RPM** and maintain. With a scan tool, command the <u>turbocharger</u> vane position control solenoid valve ON. The engine pitch and turbocharger whine should change.

CIRCUIT/SYSTEM TESTING

IMPORTANT: The DMM and test leads must be calibrated to **0 ohms** in order to prevent misdiagnosis. Use the DMM to perform this test. Refer to the DMM User Manual for calibration procedure.

- With the ignition ON and engine OFF, disconnect the <u>turbocharger</u> vane position control solenoid. Measure for a voltage of less than **1 volt** at the solenoid low reference circuit with a DMM connected to a good ground.
 - If the voltage is greater than **4.8 volts**, repair the short to voltage.
 - If the circuit tests normal, replace the <u>ECM</u>.
- 2. With the <u>ECM</u> and the <u>turbocharger</u> solenoid disconnected, measure for a resistance of less than **3 ohms** on the high voltage control and the low reference circuits.
 - If the resistance is over **3 ohms**, repair the high resistance or poor connection in the faulty circuit.
 - If the resistance is less than **3 ohms**, test the <u>turbocharger</u> solenoid. Refer to Component Testing in this diagnostic.

- 3. With the <u>ECM</u> and the turbocharger vane position sensor disconnected, measure for a resistance of less than **10 ohms** on each of the three vane position sensor circuits.
 - If the resistance is more than **10 ohms**, repair the high resistance or poor connection on the faulty circuit.
- 4. Remove the solenoid from the <u>turbocharger</u>. Connect the <u>ECM</u> and the turbocharger solenoid connectors. With the ignition ON and the engine OFF, depress the button at the tip of solenoid slightly. Command the TC Vane Pos. Ctrl. solenoid valve ON with a scan tool while observing for the spool valve to open at the slot closest to the button.
 - If the spool valve did not operate, replace the solenoid.
- 5. With the ignition OFF, remove the turbocharger vane position sensor. With the ignition ON, slowly depress the button on the end of the TC sensor. Observe the TC vane position sensor parameter for a smooth decreasing percentage from **100-0 percent**.
 - If the parameter does not increment smoothly, replace the turbocharger vane position sensor.
- 6. Inspect the <u>turbocharger</u> for debris, damage, or stuck.
 - If all circuits, the TC solenoid, the TC vane position sensor, and the <u>turbocharger</u> tests OK, replace the <u>ECM</u>.

COMPONENT TESTING

With the <u>turbocharger</u> solenoid disconnected, measure for a resistance of less than **7 ohms** across the turbocharger solenoid terminals.

• If the resistance is more than more than 7 ohms, replace the solenoid.

REPAIR INSTRUCTIONS

IMPORTANT: Always perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Turbocharger Vane Position Sensor Replacement
- <u>Turbocharger</u> Vane Position Control Solenoid Valve Replacement
- <u>Control Module</u> References for <u>ECM</u> replacement, setup, and programming

REPAIR VERIFICATION

IMPORTANT: Always perform the <u>Turbocharger</u> Learn Procedure. Refer to Turbocharger Learn Procedure , then review the DTC information with a scan tool.

- 1. With the engine at idle, observe the TC vane position sensor and the desired TC vane position in the TC data list. Slowly increase the engine speed from idle to **2,500 RPM**, and slowly decrease the engine speed back to idle.
- 2. The TC vane position parameter should remain near or equal to the desired TC vane position parameter.