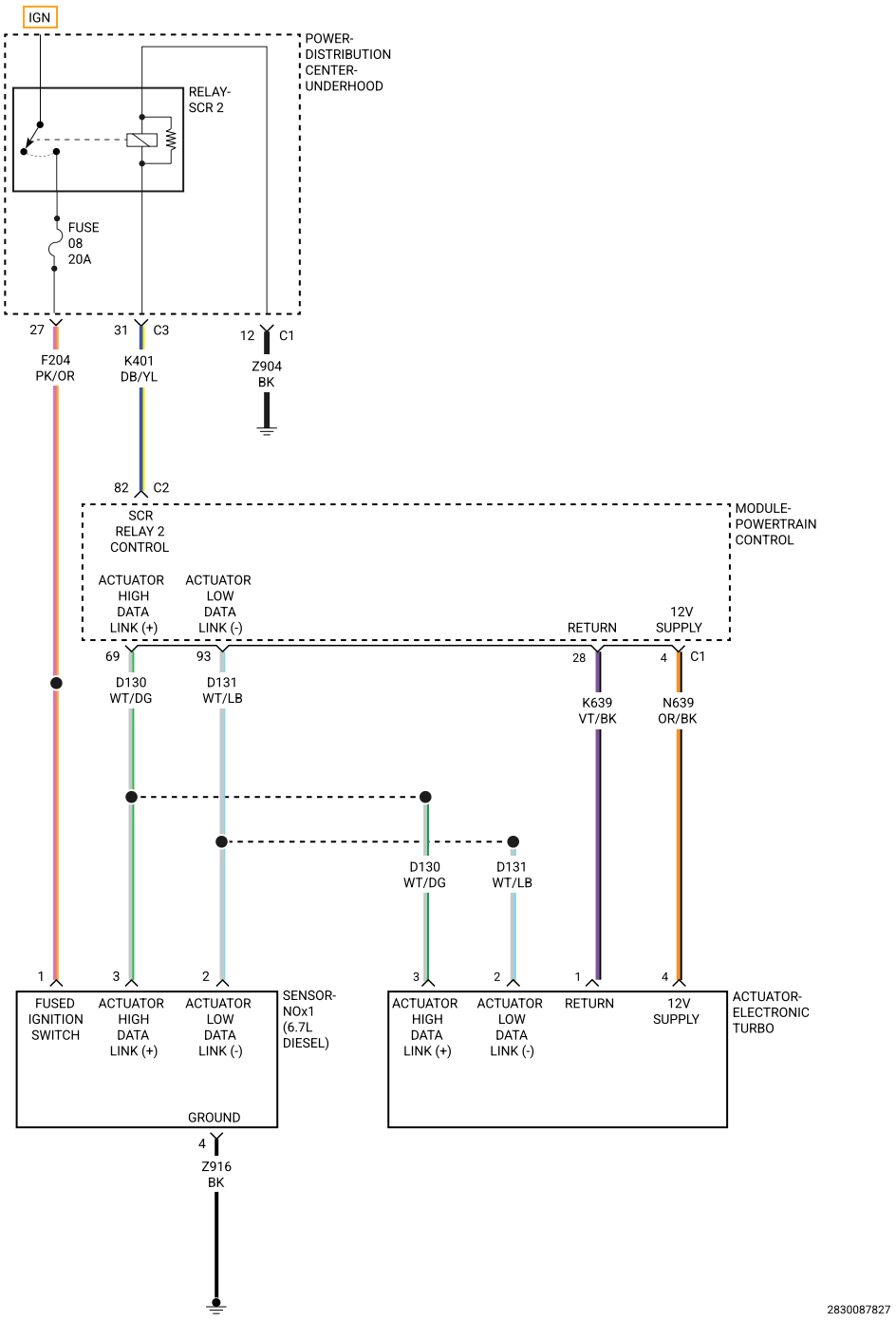
POWERTRAIN CONTROL MODULE (PCM) - LOST COMMUNICATION W/ TURBOCHARGER/SUPERCHARGER CONTROL MODULE

U010C-LOST COMMUNICATION WITH TURBOCHARGER/SUPERCHARGER CONTROL MODULE



Theory of Operation

The Variable Geometry Turbocharger (VGT) is electronically controlled by the Electronic Turbo Actuator. The Electronic Turbo Actuator is a smart device; it communicates information with the Powertrain Control Module (PCM) over the private Data Link. The Electronic Turbo Actuator performs its own internal diagnostics and reports failures back to the PCM. The PCM then decodes the error message and converts it to a fault code.

When Monitored and Set Conditions

When Monitored: This diagnostic runs continuously when the following conditions are met:

- Engine running for 30 seconds.

Set Conditions:

- The Powertrain Control Module (PCM) does not receive a message from the Turbo Actuator in a calibrated amount of time.

Default Actions:

- The MIL will illuminate.

Possible Causes
VGT POWER SUPPLY OR RETURN CIRCUIT OPEN/HIGH RESISTANCE
ACTUATOR HIGH DATALINK CIRCUIT OPEN/HIGH RESISTANCE
ACTUATOR LOW DATALINK CIRCUIT OPEN/HIGH RESISTANCE
ACTUATOR HIGH DATALINK CIRCUIT SHORTED TO BATTERY OR GROUND
ACTUATOR LOW DATALINK CIRCUIT SHORTED TO BATTERY OR GROUND
ACTUATOR HIGH DATALINK CIRCUIT SHORTED TO ANOTHER CIRCUIT
ACTUATOR LOW DATALINK CIRCUIT SHORTED TO ANOTHER CIRCUIT
DATALINK COMPONENT INTERNALLY SHORTED
ELECTRONIC TURBO ACTUATOR
POWERTRAIN CONTROL MODULE (PCM)

Always perform the PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE before proceeding. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

Diagnostic Test

1. **CHECK FOR AN ACTIVE DTC**

Is DTC U010C Active?

Yes

- Go To **2**

No

- Perform the INTERMITTENT CONDITION diagnostic procedure. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

2. **CHECK FOR OTHER DTCS**

NOTE: Repair any Voltage Low DTCs before proceeding with this test procedure.
NOTE: The Actuator Datalink is a BUS circuit which the PCM uses to communicate with the DEF Quality Sensor, Turbo Actuator, DEF Dosing Control Unit, NOx Sensor 1/1, NOx Sensor 1/2, and Particulate Matter Sensor (if equipped). The Turbo Actuator and NOx Sensor 1/1 are located on their own network in the engine harness. The DEF Quality Sensor, DEF Dosing Control Unit, NOx Sensor 1/2, and Particulate Matter Sensor (if equipped) are located on a separate network in the vehicle harness. If the Actuator Datalink in the engine harness is shorted, communication lost DTC's will be set against the Turbo Actuator and NOx Sensor 1/1. If the Actuator Datalink in the vehicle harness is shorted, communication lost DTCs will be set against the DEF Quality Sensor, DEF Dosing Control Unit, NOx Sensor 1/2, and Particulate Matter Sensor (if equipped). The DEF Quality Sensor, NOx Sensor 1/1, NOx Sensor 1/2, and Particulate Matter Sensor (if equipped) share the same fused battery supply circuit in the PDC. All these sensors will lose communication and set DTCs if the fuse is blown. The Turbo Actuator and the DEF Dosing Control Unit have their own separate fused battery circuits in the PDC.

Are there lost communication DTCs present against both the Turbo Actuator and NOx Sensor 1/1?

Yes

- Go To **5**

No

- Go To **3**

3. **CHECK THE POWER SUPPLY TO TURBO ACTUATOR FOR AN OPEN**

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1. Turn the ignition off.
2. Disconnect the Turbo Actuator harness connector.

NOTE: Check connectors - Clean/repair as necessary.

3. Ignition on, engine not running.
4. Measure the voltage between the Turbo Actuator Power Supply circuit and the Turbo Actuator Return circuit at the Turbo Actuator harness connector.

NOTE: Check the voltage at key-on and while cranking the engine.

Is the voltage above 11.0 Volts?

Yes

- Go To **4**

No

- Repair the VGT Power Supply circuit or VGT Return circuit for an open or high resistance.
- Perform the POWERTRAIN VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

4. **CHECK THE ACTUATOR DATALINK OPEN/HIGH RESISTANCE**

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1. Turn the ignition off.
2. Disconnect NOx Sensor 1/1 Module harness connector.
3. Disconnect the PCM C1 harness connector.

NOTE: Check connectors - Clean/repair as necessary.

4. Measure the resistance of the (D130) Actuator High Datalink circuit between the Turbo Actuator harness connector and the PCM C1 harness connector.
5. Measure the resistance of the (D131) Actuator Low Datalink circuit between the Turbo Actuator harness connector and the PCM C1 harness connector.

Is the resistance below 3.0 Ohms for both circuits?

Yes

- Replace the Turbocharger Actuator in accordance with the Service Information.
- Perform the POWERTRAIN VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

No

- Repair the Actuator Datalink circuit that measured above 3.0 Ohms for an open or high resistance.
- Perform the POWERTRAIN VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

5. **CHECK THE COMPONENTS ON THE ACTUATOR DATALINK**

NOTE: Disconnect only one component at a time during this next step. If the DTCs for the components that are STILL CONNECTED change from active to stored, the component that was disconnected is faulty. If all of the DTCs remain active, then the disconnected component is not the problem. Reconnect each component before going on to the next one so that only one component is disconnected at a time.

1. Turn the ignition off.
2. Disconnect the Turbo Actuator harness connector. Cycle the ignition key on and off three times ending with the ignition on. Leave the ignition in the off position for 75 seconds each time.

NOTE: Monitor the status of the DTCs for the remaining connected components with the scan tool.

3. Turn the ignition off and reconnect the Turbo Actuator harness connector.
4. Disconnect the NOx Sensor Module 1/1 harness connector. Cycle the ignition key on and off three times ending with the ignition on. Leave the ignition in the off position for 75 seconds each time.

NOTE: Monitor the status of the DTCs for the remaining connected components with the scan tool.

Did the status of the DTCs change to stored for the components STILL CONNECTED when disconnecting any one of the components listed above?

Yes

- Replace the component that caused the DTC change from active to stored in accordance with the Service Information.
- Perform the POWERTRAIN VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

No

- Go To **6**

6. **CHECK THE ACTUATOR DATALINK FOR A SHORT TO GROUND**

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1. Turn the ignition off.
2. Disconnect the Turbo Actuator, NOx Sensor Modules, and the PCM C1 harness connectors.
3. Measure for continuity between ground and the (D130) Actuator High Datalink circuit at the PCM C1 harness connector.
4. Measure for continuity between ground and the (D131) Actuator Low Datalink circuit at the PCM C1 harness connector.

Is there continuity between ground and either J1939 Datalink circuit?

Yes

- Go To **7**

No

- Repair the Actuator Datalink circuit that measured a short to ground.
- Perform the POWERTRAIN VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

7. **CHECK THE ACTUATOR DATALINK FOR A SHORT TO ANOTHER CIRCUIT**

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1. Measure the resistance between the (D130) Actuator High Datalink circuit at the PCM C2 harness connector and all other circuits in the PCM C1 harness connector.
2. Measure the resistance between the (D131) Actuator Low Datalink circuit at the PCM C2 harness connector and all other circuits in the PCM C1 harness connector.

Is the resistance above 10k Ohms for both measurements?

Yes

- Go To **8**

No

- Repair the Actuator Datalink circuit for a short circuit.
- Perform the POWERTRAIN VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

8. **CHECK THE ACTUATOR DATALINK CIRCUITS FOR AN OPEN/HIGH RESISTANCE**

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1. Measure the resistance of the (D130) Actuator High Datalink circuit between the Turbo Actuator harness connector and the PCM C1 harness connector.
2. Measure the resistance of the (D131) Actuator Low Datalink circuit between the Turbo Actuator harness connector and the PCM C1 harness connector.

Is the resistance below 3.0 Ohms for both circuits?

Yes

- Go To **9**

No

- Repair the Actuator Datalink circuit for an open or high resistance.
- Perform the POWERTRAIN VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

9. **POWERTRAIN CONTROL MODULE**

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1. Disconnect all PCM harness connectors.
2. Disconnect all related in-line harness connections (if equipped).
3. Disconnect the related component harness connectors.
4. Inspect harness connectors, component connectors, and all male and female terminals for the following conditions:
   - Proper connector installation.
   - Damaged connector locks.
   - Corrosion.
   - Other signs of water intrusion.
   - Weather seal damage (if equipped).
   - Bent terminals.
   - Overheating due to a poor connection (terminal may be discolored due to excessive current draw).
   - Terminals that have been pushed back into the connector cavity.
   - Perform a terminal drag test on each connector terminal to verify proper terminal tension.

   Repair any conditions that are found.
5. Reconnect all PCM harness connectors. Be certain that all harness connectors are fully seated and the connector locks are fully engaged.
6. Reconnect all in-line harness connectors (if equipped). Be certain that all connectors are fully seated and the connector locks are fully engaged.
7. Reconnect all related component harness connectors. Be certain that all connectors are fully seated and the connector locks are fully engaged.
8. With the scan tool, erase DTCs.
9. Using the recorded Freeze Frame and Environmental Data, along with the When Monitored and Set Conditions above, operate the vehicle in the conditions that set the DTC.
10. With the scan tool, read PCM DTCs.

Did the DTC return?

Yes

- Replace the Powertrain Control Module (PCM) in accordance with the Service Information.
- Perform the POWERTRAIN VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

No

- Test complete.
- Perform the POWERTRAIN VERIFICATION TEST. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).