SPN 609 or 3464

Suspect Parameter Number (SPN) and Failure Mode Indicator (FMI) Description

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<th>SPN</th>
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| 609 | 12  | Main Processor Heartbeat Synchronization Fault | • Intermittent or poor connection in CAN data link circuits between ECM and TCM  
|     |     |                                      | • Faulty terminating resistor  
|     |     |                                      | • Internal ECM malfunction |
| 3464| 12  | Level 2 Processor (TSM) Not Executed   | • Internal TSM malfunction |

Circuit Description

The engine control module (ECM) sends information to the torque security module (TSM) on the SAE J1939 data link at specific intervals. If this information is not processed correctly the SPN will set.

Conditions to Run SPN

SPN 609–12 Main Processor Heartbeat Synchronization Fault

The SPN runs continuously with the ignition ON.

SPN 3464–12 Level 2 Processor (TSM) Not Executed

The SPN runs once upon initial ignition ON.

Conditions to Set SPN

SPN 609–12 Main Processor Heartbeat Synchronization Fault

The TSM detects a fault if no change in the synchronization counter field of the SAE J1939 CAN data link message is observed for a continuous period of time.
3464–12 Level 2 Processor (TSM) Not Executed

The ECM suspects a fault if the correct answer is not received within 60 ms after the corresponding algorithm argument is transmitted.

Action Taken When SPN Sets

SPN 609–12 Main Processor Heartbeat Synchronization Fault

- The ECM will turn ON the check engine light (CEL).
- Power limit mode with be enabled during the current key cycle.
- Cruise control will be disabled.
- Power take off will be disabled.
- 609 is a Type A SPN.

3464–12 Level 2 Processor (TSM) Not Executed

- The ECM will turn ON the stop engine lamp (SEL)
- The ECM will turn ON the check engine lamp (CEL)
- The ECM will disable the main power relay (MPR)
- SPN 3464 is a Type A SPN

Diagnostic Reference

- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.
- Perform the Diagnostic System Check prior to using this diagnostic.
- Test for intermittent or poor connections.
- Review Schematics and Connector End Views to locate test points.
- Review the SPN Type, Indicator Lamp Definitions, and Conditions to Clear the SPN/Indicator Lamp.
Diagnostic Tips

- Test for intermittent or poor connections.
- Test for a faulty terminating resistor.

Required Tools

- Terminal Test Probe Kit
- Fused Jumper
- Digital Multi-meter
- High Impedance Test Lamp
- Electronic Service Tool

Circuit Diagnostics

WARNING! To prevent bodily injury or death, stay away from hot engine surfaces and rotating engine components.

1. Ignition OFF, disconnect the harness connector C4 at the TSM, connect a test lamp between the ignition voltage circuit terminal 13 and ground, ignition ON, verify the test lamp illuminates.

   - If the test lamp does not illuminate and the fuse is good, test for less than 5 Ω between the ignition voltage fuse and TSM connector C4 terminal 13.
     - If 5 Ω or greater, repair the open/high resistance in the circuit.
     - If less than 5 Ω, verify there is voltage at the fuse.

   - If the test lamp does not illuminate and the fuse is open, disconnect all components on the ignition voltage circuit, test for infinite resistance between terminal 13 and ground.
     - If not infinite resistance, repair the short to ground in the circuit.
     - If infinite resistance, test each component on the circuit for an internal short to ground, replace as necessary.

   - If the test lamp illuminates, go to step 2
2. Ignition OFF, connect a test lamp between the TSM ground circuit terminal 14 and the TSM ignition circuit terminal 13, ignition ON, verify the test lamp illuminates.

- **If the test lamp does not illuminate**, test for less than 5 Ω between TSM ground circuit terminal 13 and ground ring C20.
  - If the 5 Ω or greater, repair the open/high resistance in the circuit.
  - If less than 5 Ω, repair the ground connection at C20.

  ✔ If the test lamp illuminates, go to step 3

3. Ignition ON, verify 1.0 – 4.0 V between the CAN HI circuit terminal 6 and ground.

- **If not between 1.0 – 4.0 V**, ignition OFF, disconnect the ECM harness connector J1-B, verify less than 10 Ω between the TSM harness connector terminal 6 and the ECM harness connector J1-B terminal C1.
  - If greater than 10 Ω, repair the open/high resistance in the circuit.
  - If less than 10 Ω, replace the ECM.

  ✔ If between 1.0 – 4.0 V, record the voltage value and go to Step 4

4. Test for 1.0 – 4.0 V between the CAN LO circuit terminal 19 and ground.

- **If not between 1.0 – 4.0 V**, ignition OFF, disconnect the ECM harness connector J1-B, verify less than 10 Ω between the TSM harness connector terminal 19 and the ECM harness connector J1-B terminal C2.
  - If greater than 10 Ω, repair the open/high resistance in the circuit.
  - If less than 10 Ω, replace the ECM.

  ✔ If between 1.0 – 4.0 V, record the voltage value and go to Step 5

5. Ignition OFF, verify the recorded voltage values added together equal approximately 5.0 V.

- **If not approximately 5.0 V**, replace the ECM.
➢ If approximately 5.0 V, replace the TSM.