**FAULT CODE 2771 - Aftertreatment 1 Outlet NOx Sensor - Abnormal Update Rate**

<table>
<thead>
<tr>
<th>Procedure Title</th>
<th>Procedure Number</th>
<th>Service Model Name</th>
<th>Bulletin Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Link Circuit, Proprietary</td>
<td>Refer to Procedure 019-417</td>
<td>ISB6.7 CM2350 B101</td>
<td>2883567</td>
</tr>
<tr>
<td>Data Link Circuit, Proprietary</td>
<td>Refer to Procedure 019-417</td>
<td>ISL9 CM2350 L101</td>
<td>4310787</td>
</tr>
<tr>
<td>Data Link Circuit, Proprietary</td>
<td>Refer to Procedure 019-417</td>
<td>ISX12 CM2350 X102</td>
<td>4310646</td>
</tr>
<tr>
<td>Data Link Circuit, Proprietary</td>
<td>Refer to Procedure 019-417</td>
<td>ISX15 CM2350 X101</td>
<td>4310641</td>
</tr>
<tr>
<td>Aftertreatment Outlet NOx Sensor</td>
<td>Refer to Procedure 019-451</td>
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</table>

**TROUBLESHOOTING SUMMARY**

**STEPS**

**STEP 1:** Check the fault codes.

**STEP 1A:** Check for active fault codes

Fault Code 2771 active?

**STEP 1B:** Check for correct adjustable parameter settings.

Electrical System Voltage parameter correct for the engine configuration?

**STEP 1C:** Check the fault codes.

Fault Codes 2636 or 1894 active or more than one inactive count?

**STEP 1D:** Check the fault codes.

Fault Code 3232, 3911, 4151, 4152, or 4572 active or more than one inactive count?

**STEP 2:** Check the aftertreatment outlet mono-nitrogen oxides (NOx) sensor circuit.

**STEP 2A:** Inspect the aftertreatment outlet NOx sensor and connector pins.

Damaged or dirty pins?

**STEP 2B:** Check the voltage to the aftertreatment outlet NOx sensor.

Voltage greater than 10.8 VDC (12 volt systems) or voltage greater than 21.6 VDC (24 volt systems)?

**STEP 2C:** Check the voltage to the aftertreatment outlet NOx sensor.

Voltage greater than 10.8 VDC (12 volt systems) or voltage greater than 21.6 VDC (24 volt systems)?

**STEP 3:** Check the aftertreatment outlet NOx sensor and circuit.

**STEP 3A:** Check the J1939 terminating resistance.

Resistance between 54 to 66 ohms?
**STEP 4:** Check the power distribution center and fuse(s).

**STEP 4A:** Check the power distribution center and fuse(s).

Power distribution center and fuse(s) damaged or corroded?

**STEP 5:** Check the J1939 data link.

**STEP 5A:** Check the J1939 terminating resistance.

Resistance between 54 to 66 ohms?

**STEP 5B:** Check the J1939 terminating resistance.

Resistance between 108 to 132 ohms?

**STEP 6:** Check the J1939 data link circuit.

**STEP 6A:** Check the J1939 data link (+) for a short circuit.

Voltage between 0.1 and 4.5 volts?

**STEP 6B:** Check the J1939 data link (-) for a short circuit.

Voltage between 0.1 and 4.5 volts?

**STEP 7:** Check engine control module (ECM) calibration and clear fault codes.

**STEP 7A:** Check if an ECM calibration update is available.

If a calibration update for this fault code is available, does the ECM contain that revision or higher?

**STEP 7B:** Disable the fault code.

Fault code inactive?

**TROUBLESHOOTING STEP**

**STEP 1:** Check the fault codes.

**STEP 1A:** Check for active fault codes.

<table>
<thead>
<tr>
<th>Condition:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Turn keyswitch ON.</td>
</tr>
<tr>
<td>• Connect INSITE™ electronic service tool.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action</th>
<th>Specification/Repair</th>
<th>Next Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check for active fault codes. Use INSITE™ electronic service tool to read the fault codes.</td>
<td>Fault Code 2771 active? YES</td>
<td>1B</td>
</tr>
<tr>
<td>Fault Code 2771 active? NO</td>
<td>Use the following procedure for an inactive or intermittent fault code. Refer to Procedure 019-362 in Section 19.</td>
<td></td>
</tr>
</tbody>
</table>
### STEP 1B: Check for correct adjustable parameter settings.

**Condition:**
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

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<tbody>
<tr>
<td>Check for correct adjustable parameter settings. • Make sure the Electrical System Voltage setting in INSITE™ electronic service tool is correct for the engine configuration. To check the voltage configuration of the engine, disconnect the original equipment manufacturer (OEM) connector from the ECM and measure the voltage from the ECM battery SUPPLY (+) pin of the OEM harness ECM connector to the block ground.</td>
<td>Electrical System Voltage parameter correct for the engine configuration? YES</td>
<td>1C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical System Voltage parameter correct for the engine configuration? NO</td>
</tr>
<tr>
<td></td>
<td>Repair: Use INSITE™ electronic service tool to configure the electrical system voltage to match the engine configuration.</td>
<td></td>
</tr>
</tbody>
</table>

### STEP 1C: Check the fault codes.

**Condition:**
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

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</tr>
</thead>
<tbody>
<tr>
<td>Check for active fault codes. • Use INSITE™ electronic service tool to read the fault codes.</td>
<td>Fault Codes 2636 or 1894 active or more than one inactive count? YES</td>
<td>5A</td>
</tr>
<tr>
<td></td>
<td>Fault Codes 2636 or 1894 active or more than one inactive count? NO</td>
<td>1D</td>
</tr>
</tbody>
</table>

### STEP 1D: Check the fault codes.

**Condition:**
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

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</tr>
</thead>
<tbody>
<tr>
<td>Check for active fault codes. • Use INSITE™ electronic service tool to read the fault codes.</td>
<td>Fault Code 3232, 3911, 4151, 4152, or 4572 active or more than one inactive count? YES</td>
<td>4A</td>
</tr>
<tr>
<td></td>
<td>Fault Code 3232, 3911, 4151, 4152, or 4572 active or more than one inactive count? NO</td>
<td>2A</td>
</tr>
</tbody>
</table>
STEP 2: Check the aftertreatment outlet mono-nitrogen oxides (NOx) sensor circuit.

STEP 2A: Inspect the aftertreatment outlet NOx sensor and connector pins.

Condition:
- Turn keyswitch OFF.
- Disconnect the aftertreatment outlet NOx sensor from the selective catalytic reduction (SCR) aftertreatment interface harness.

<table>
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</tr>
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</table>
| Inspect the interface harness and aftertreatment outlet NOx sensor connector pins for the following: 
  - Loose connector 
  - Corroded pins 
  - Bent or broken pins 
  - Pushed back or expanded pins 
  - Moisture in or on the connector 
  - Missing or damaged connector seals 
  - Dirt or debris in or on the connector pins 
  - Connector shell broken 
  - Wire insulation damage 
  - Damaged connector locking tab. | Dirty or damaged pins? 
YES | 7A |

Repair: 
A damaged connector has been detected in the sensor or harness connector. 
Clean the connector and pins. 
Repair the damaged original equipment manufacturer (OEM) harness, connector, or pins, if possible.

Dirty or damaged pins? 
NO | 2B |

STEP 2B: Check the voltage to the aftertreatment outlet NOx sensor.

Condition:
- Turn keyswitch OFF. 
- Disconnect the aftertreatment outlet NOx sensor from the SCR aftertreatment interface harness. 
- Turn keyswitch ON.

<table>
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</table>
| Check the power supply and return circuit to the aftertreatment outlet NOx sensor. 
  - Measure the voltage between the aftertreatment outlet NOx sensor battery voltage supply circuit and the aftertreatment outlet NOx sensor return circuit at the NOx sensor wiring harness connector. 
  - Check the voltage at keyswitch ON while cranking the engine and with the engine at idle. 
  - Use the wiring diagram or circuit diagram for connector pin identification. 
  - Use the following procedure for general inspection techniques. Refer to Procedure 019-361 in Section 19. | Voltage greater than 10.8 VDC (12 volt systems) or voltage greater than 21.6 VDC (24 volt systems)? 
YES | 3A |

Voltage greater than 10.8 VDC (12 volt systems) or voltage greater than 21.6 VDC (24 volt systems)? 
NO | 2C |
**STEP 2C:** Check the voltage to the aftertreatment outlet NOx sensor.

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<tr>
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<th>Action</th>
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</tr>
</thead>
</table>
| • Turn keyswitch OFF.  
• Disconnect the aftertreatment outlet NOx sensor from the SCR aftertreatment interface harness.  
• Turn keyswitch ON. | Check the power supply and return circuit to the aftertreatment outlet NOx sensor.  
• Measure the voltage between the aftertreatment outlet NOx sensor battery voltage supply circuit at the aftertreatment outlet NOx sensor wiring harness connector and battery ground.  
Check the voltage at keyswitch ON while cranking the engine.  
Use the wiring diagram or circuit diagram for connector pin identification.  
Use the following procedure for general inspection techniques. Refer to Procedure 019-361 in Section 19. | Voltage greater than 10.8 VDC (12 volt systems) or voltage greater than 21.6 VDC (24 volt systems)?  
**YES**  
**Repair:**  
An open or high resistance circuit has been detected in the aftertreatment outlet NOx sensor battery voltage return circuit.  
• Troubleshoot the SCR aftertreatment interface harness, OEM harness, and all interconnects for the malfunction.  
• Repair or replace the damaged component as necessary. | 7A |
| NO | Voltage greater than 10.8 VDC (12 volt systems) or voltage greater than 21.6 VDC (24 volt systems)? | **YES**  
**Repair:**  
An open or high resistance circuit has been detected in the aftertreatment outlet NOx sensor battery voltage supply circuit.  
• Troubleshoot the SCR aftertreatment interface harness, OEM harness, and all interconnects for the malfunction.  
• Repair or replace the damaged component as necessary. | 7A |
| **NO** | | | |
STEP 3:  **Check the aftertreatment outlet NOx sensor and circuit.**

**STEP 3A:**  **Check the J1939 terminating resistance.**

**Condition:**
- Turn keyswitch OFF.
- Disconnect the INLINE™ adapter from the 3-pin service data link connector.
- Disconnect the aftertreatment outlet NOx sensor.

<table>
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<tr>
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</table>
| Check the terminating resistance of the Society of Automotive Engineers (SAE) J1939 data link.  
- Measure the resistance between the SAE J1939 (+) and SAE J1939 (-) at the aftertreatment outlet NOx sensor wiring harness connector.  
Use the wiring diagram or circuit diagram for connector pin identification.  
Use the following procedure for general resistance measurement techniques. Refer to Procedure 019-360 in Section 19. | Resistance between 54 to 66 ohms?  
YES  
Repair:  
A malfunction has been detected in the aftertreatment outlet NOx sensor.  
- Replace the aftertreatment outlet NOx sensor. Refer to Procedure 019-451 Associated Procedures Table. | 7A |
| Resistance between 54 to 66 ohms?  
NO | 5A |

STEP 4:  **Check the power distribution center and fuse(s).**

**STEP 4A:**  **Check the power distribution center and fuse(s).**

**Condition:**
- Turn keyswitch OFF.

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| Check the power distribution center and fuse(s)  
- Inspect for a blown aftertreatment sensor power supply fuse.  
- Inspect the aftertreatment sensor power supply fuse for cracks, burns, corrosion, or discoloration.  
- Inspect the power distribution center for loose or expanded pins.  
- Inspect the power distribution center for corrosion. | Power distribution center and fuse(s) damaged or corroded?  
YES  
Repair:  
Repair or replace the damaged component(s). See equipment manufacturer service information. | 7A |
| Power distribution center and fuse(s) damaged or corroded?  
NO | 5A |
**STEP 5:** Check the J1939 data link.

**STEP 5A:** Check the J1939 terminating resistance.

**Condition:**
- Turn keyswitch OFF.
- Disconnect the INLINE™ adapter from the 3-pin service data link connector.

<table>
<thead>
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</table>
| Check the terminating resistance of the SAE J1939 data link.  
- Measure the resistance between the SAE J1939 (+) and SAE J1939 (-) at the 3-pin service data link connector. Refer to Procedure 019-417 in the Associated Procedures Table.  
Use the following procedure for general resistance measurement techniques. Refer to Procedure 019-360 in Section 19. | Resistance between 54 to 66 ohms?  
YES | 6A |
| | Resistance between 54 to 66 ohms?  
NO | 5B |
**STEP 5B: Check the J1939 terminating resistance.**

**Condition:**
- Turn keyswitch OFF.
- Disconnect the INLINE™ adapter from the 3-pin service data link connector.
- Disconnect the 14-pin OEM crossover connector.

<table>
<thead>
<tr>
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</table>
| Check the terminating resistance of the SAE J1939 data link.  
• Measure the resistance between the SAE J1939 (+) and SAE J1939 (-) at the 3-pin service data link connector. Refer to Procedure 019-417 in the Associated Procedures Table.  
Use the wiring diagram or circuit diagram for connector pin identification.  
Use the following procedure for general resistance measurement techniques. Refer to Procedure 019-360 in Section 19. | Resistance between 108 to 132 ohms?  
**YES**  
**Repair:**  
A malfunction has been detected in the aftertreatment side of the SAE J1939 data link circuit.  
Continue to troubleshoot the aftertreatment side of the proprietary data link.  
Preform the OEM Harness Check. Refer to Procedure 019-417 in the Associated Procedures Table.  
Repair or replace the malfunctioning component(s). | 7A |
| Resistance between 108 to 132 ohms?  
**NO**  
**Repair:**  
A malfunction has been detected in the engine side of the SAE J1939 data link circuit.  
Continue to troubleshoot the engine side of the proprietary data link.  
Go to the Engine Harness Check. Refer to Procedure 019-417 in the Associated Procedures Table.  
Repair or replace the malfunctioning component(s). | 7A |
### STEP 6: Check the J1939 data link circuit.

#### STEP 6A: Check the J1939 data link (+) for a short circuit.

<table>
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</table>

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</tr>
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<tbody>
<tr>
<td>Check the SAE J1939 data link (+) for a short circuit. • Measure the voltage between the SAE J1939 (+) pin at the 3-pin service data link connector and battery ground. Refer to Procedure 019-417 in the Associated Procedures Table. Use the wiring diagram or circuit diagram for connector pin identification. Use the following procedure for general resistance measurement techniques. Refer to Procedure 019-360 in Section 19.</td>
<td>Voltage between 0.1 and 4.5 volts? YES</td>
<td>6B</td>
</tr>
<tr>
<td></td>
<td>Voltage between 0.1 and 4.5 volts? NO</td>
<td>7A</td>
</tr>
<tr>
<td>Repair:</td>
<td>A short circuit has been detected in the SAE J1939 data link circuit. Continue to troubleshoot the proprietary data link. Go to the data link Short Circuit Isolation section. Refer to Procedure 019-417 in the Associated Procedures Table. Repair or replace the malfunctioning component(s).</td>
<td></td>
</tr>
</tbody>
</table>

### STEP 6B: Check the J1939 data link (-) for a short circuit.

<table>
<thead>
<tr>
<th>Condition:</th>
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</tr>
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</table>

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<th>Specification/Repair</th>
<th>Next Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the SAE J1939 data link (-) for a short circuit. • Measure the voltage between the SAE J1939 (-) pin at the 3-pin service data link connector and battery ground. Refer to Procedure 019-417 in the Associated Procedures Table. Use the wiring diagram or circuit diagram for connector pin identification. Use the following procedure for general resistance measurement techniques. Refer to Procedure 019-360 in Section 19.</td>
<td>Voltage between 0.1 and 4.5 volts? YES</td>
<td>7A</td>
</tr>
<tr>
<td></td>
<td>Voltage between 0.1 and 4.5 volts? NO</td>
<td>7A</td>
</tr>
<tr>
<td>Repair:</td>
<td>A short circuit has been detected in the SAE J1939 data link circuit. Continue to troubleshoot the proprietary data link. Go to the Data Link Short Circuit Isolation section. Refer to Procedure 019-417 in the Associated Procedures Table. Repair or replace the malfunctioning component(s).</td>
<td></td>
</tr>
</tbody>
</table>
**STEP 7:** Check ECM calibration and clear fault codes.

**STEP 7A:** Check if an ECM calibration update is available.

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| • Connect all components.  
• Connect INSITE™ electronic service tool. | If a calibration update for this fault code is available, does the ECM contain that revision or higher? | 7B |
| Action | YES | |
| Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History for applicable changes related to this fault code. | If a calibration update for this fault code is available, does the ECM contain that revision or higher? | 7B |
| • Use INSITE™ electronic service tool to find the present ECM code and revision number in the ECM. The ECM code and revision number are found in the Calibration Information section of System ID and Dataplate in Features and Parameters. | NO | |
| Repair: | If necessary, calibrate the ECM. Refer to Procedure 019-032 in Section 19. | 7B |

**STEP 7B:** Disable the fault code.

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</table>
| • Connect all components.  
• Connect INSITE™ electronic service tool. | Disable and clear the fault code.  
• Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of this troubleshooting procedure. |  |
| Action | Fault code inactive? | |
| Disable and clear the fault code. | YES | Repair complete. |
| Fault code inactive? | NO | 1A |
| Repair: | Return to the troubleshooting steps or contact a Cummins® Authorized Repair Location if all steps have been completed and checked again. |