P1713

Fault code description

NOx sensor before catalyst - Data valid but too high

Possible cause

1. Incorrect EGR measurement due to:
   - Fouled/corroded EGR venturi
   - Faulty EGR pressure difference sensor (F751)
   - Blocked EGR pressure difference sensor tubes and/or mounting block
   - Faulty EGR temperature sensor (F749)
   - Faulty boost pressure sensor (F802)
   - Faulty pressure sensor before turbine (F826)
   - Faulty intercooler temperature sensor (F750)
   - Leakage in EGR system
   - Leakage in intake system
2. Blocked EGR cooler
3. Contaminated NOx sensor (F844)
4. Incorrect EGR valve position measurement
5. Faulty NOx sensor (F844)
6. Faulty humidity sensor (F852)
7. Fuel system failure
8. Incorrect type of fuel used

Additional information

Monitoring the difference between the NOx sensor signal and the NOx model.

Set condition of fault code

The PMCI-2 detects a difference between the measured NOx and the NOx model.

Reset condition of fault code

This fault code will change to inactive immediately after the diagnostic runs and passes.

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P1713, Diagnostic information

Technical data

"Sensor, EGR pressure difference (F751)"

"Sensor, EGR temperature (F749)"

"Sensor, boost pressure (F802)"

"Sensor, pressure before turbine (F826)"

"Sensor, intercooler temperature (F750)"

"Sensor, NOx before catalyst (F844)"

"Sensor, humidity (F852)"

Location of component(s)

"Location information, PMCI-2"

Electrical diagram(s)

"PMCI-2"

Description of component(s)

"Sensor, EGR pressure difference (F751)"

"Sensor, EGR temperature (F749)"

"Sensor, boost pressure (F802)"

"Sensor, pressure before turbine (F826)"

"Sensor, intercooler temperature (F750)"

"Sensor, NOx before catalyst (F844)"

"Sensor, humidity (F852)"

Block diagram

"PMCI-2"

Step by step troubleshooting

Please perform the troubleshooting steps below by utilising the breakout harness if necessary to check electrical components such as sensors, electrical control units or harnesses. Back probing is not recommended as it could damage the harness. The ignition should always be in the OFF position when connecting or disconnecting electrical components to reduce the likelihood of damage to electrical

components.

- This troubleshooting tree is based on the assumption that supply power and earth to the PMCI are functioning properly.
- Disconnecting the PMCI connectors during the troubleshooting process will result in multiple errors.
- For specific electrical component information and pin out locations, always refer to the technical data in Rapido.
- It is necessary to exit the 'active errors' screen in DAVIE and run the diagnostic test again to identify a change in errors.
- Remember that the truck's operational or mechanical issues may be the root cause of both active and inactive codes. Refer to the 'possible causes' section in Rapido.

Step by step 1: Check fault codes

Step 1A: Check for fault codes

Troubleshooting steps

1. Turn the key switch ON.
2. Use DAVIE to check for fault codes.

Is there only a P1713, or only a P1713 with P1711 fault active?

- Yes – Proceed to step 2A
- No – Proceed to step 1B.

Step 1B: Check for NOx related fault codes

Troubleshooting steps

1. Turn the key switch ON.

2. Use DAVIE to check for fault codes.

Are upstream NOx sensor related fault codes active (P3952, P3953, P3954, P3955, P3956, P3957, P3958, P3959, P3960, P3961)?

- Yes – Stop troubleshooting P1713.
  Proceed with the appropriate fault codes.
- No – Proceed to step 1C.

Step 1C: Check for EGR-related fault codes

Troubleshooting steps

1. Turn the key switch ON.
2. Use DAVIE to check for fault codes.

Are EGR system fault codes active (for example P040F or P1719)?

- Yes – Stop troubleshooting P1713.
  Proceed with the appropriate fault codes.
- No – Proceed to step 1D.

Step 1D: Check for other related fault codes

Troubleshooting steps

1. Turn the key switch ON.
2. Use DAVIE to check for fault codes.

Are fault codes related to the sensors listed in the 'possible cause' section active?

- Yes – Stop troubleshooting P1713.
  Proceed with the appropriate fault codes.
- No – Proceed to step 2A.

Step by step 2: Check the EGR measurement system

Step 2A: Check the EGR temperature sensor (F749) for damage

Troubleshooting steps

1. Turn the key switch OFF.
2. Visually inspect the EGR temperature sensor (F749) for damage.

Is there visible damage to the EGR

temperature sensor (F749)?

- Yes – Replace the EGR temperature sensor (F749). Proceed to Step 2B.
- No – Proceed to step 2B.

Step 2B: Check for soot build-up in the EGR pressure difference sensor (F751)

Troubleshooting steps

1. Turn the key switch OFF.
2. Visually inspect the EGR pressure difference sensor (F751) for soot build-up.
3. Check for proper sealing between the EGR pressure difference sensor (F751) and the mounting block.
4. Check for proper sealing at the pipe fittings.

Is there soot build-up in the pipes or mounting block for the EGR pressure difference sensor (F751)?

- Yes – Clean out the soot build-up. Repair any leaking seals. Proceed to Step 2C.
- No – Proceed to step 2C.

Step 2C: Check for soot build-up in the boost pressure sensor

Troubleshooting steps

1. Turn the key switch OFF.
2. Remove the boost pressure sensor.
3. Check for soot build-up in the boost pressure sensor orifice and the sensor port on the engine.

Is there soot build-up?

- Yes – If the port is clogged, remove the blockage. If the boost pressure sensor orifice is clogged and cannot be cleaned, replace the sensor. Proceed to Step 2D.
- No – Proceed to step 2D.

Step 2D: Check for corrosion and soot build-up in the EGR venturi

Troubleshooting steps

1. Turn the key switch OFF.
2. Measure any corrosion.
3. Check for soot build-up.

Is there more than 0.5 mm of corrosion (about 1/32") or soot build-up inside the EGR venturi?

- Yes – If the venturi has more than 0.5 mm of corrosion, replace the venturi. If there is soot build-up, clean the inside of the venturi. Proceed to Step 3A.
- No – Proceed to step 3A.

Step by step 3: Check for EGR system blockage

Step 3A: Check the EGR system for restrictions or blockages

Troubleshooting steps

1. Turn the key switch OFF.
2. Check these EGR system regions for restrictions:
   - EGR valve
   - piping
   - intake horn/mixer

Were any restrictions or blockages found?

- Yes – Solve the restriction or blockage. Proceed to step 3B.
- No – Proceed to step 3B.

Step 3B: Inspect the EGR cooler for blockage

Troubleshooting steps

1. Remove the inlet and the outlet of the EGR cooler.
2. Check the outlet for blockage and face plugging.
3. If the EGR cooler seems clogged or

plugged, blow shop air from the front to the back through the cooling cells. Be aware that this may cause a soot cloud. Perform in a well-ventilated area.

Is the EGR cooler restricted or blocked?

- Yes – Perform the following actions as needed.

  If the EGR cooler is still blocked or restricted by soot build-up, see campaign E051 for a cleaning kit.

  If coolant is found, use the EGR Cooler Pressure Test Kit (part number 1903031).

  Before replacing an EGR cooler, contact the Engine Support Center with the test results.

  After performing the above actions, proceed to step 3C.
- No – Proceed to step 3C.

Step 3C: If EGR sensor or blockage issues have been found and solved proceed to confirm repair

Troubleshooting steps

Have the answers to any of the questions in steps 2 or 3 been Yes, and has the issue been resolved?

- Yes – Proceed to step 7A to confirm repair. If the fault recurs then return to step 4A.
- No – Proceed to step 4A

Step by step 4: Check for air and exhaust leaks

Step 4A: Check for air and exhaust leaks

Troubleshooting steps

1. Turn the key switch ON.
2. Block the exhaust.
3. Pressurise the intake to 5 psi.
4. Spray soapy water on connections throughout the intake and exhaust

system.

5. Check the intake and exhaust system for leaks.

Were any leaks found?

- Yes – Repair the leaks. Proceed to step 7A to confirm the repair. If the fault recurs, return to step 5A.
- No – Proceed to step 5A.

Step by step 5: Check the NOx sensor before catalyst

Step 5A: Check for physical damage

Troubleshooting steps

1. Turn the key switch OFF.
2. Disconnect the NOx before catalyst sensor from the harness.
3. Inspect the NOx before catalyst sensor harness and connector for:
   - Corroded or dirty pins
   - Damaged pins
   - Pushed back or expanded pins
   - Loose connector
   - Moisture in or on the connector
   - Connector shell damage
   - Missing or damaged connector seals
   - Wire insulation damage
4. Remove the NOx before catalyst sensor.
5. Inspect the NOx before catalyst sensor tip for corrosion, blockages and/or physical damage.

Was any damage found?

- Yes – Repair the damage if possible. Do not replace the sensor if it is only coated with soot. If soot coating is the only sensor issue - Proceed to step 7A to confirm repair. If the fault recurs then return to step 5B.

- No – Proceed to step 5B.

Step 5B: Check for sensor contamination

Troubleshooting steps

1. This test can be negatively affected by truck exhaust inside the shop. Before beginning this test, the truck must be moved outside or efforts must be made to vent the exhaust outside the shop.
2. Remove the NOx sensor before catalyst from the exhaust system, leaving it connected to the wiring harness.

   Lubricate the NOx sensor or plug threads with high-temperature lubricant to aid in sealing and removal. Install another NOx sensor or other plug into the NOx sensor mounting hole. If using a plug, the mating thread is M20x1.5-6e and the total threaded length must not exceed ¾ inch. Ensure that the removed NOx sensor is not in contact with non-metallic parts as it will become hot during this procedure.
3. Initiate a stationary regeneration.
4. When the temperature before DOC reaches 200°C (392°F), abort the regeneration. Do not turn off the engine.
5. Use DAVIE to monitor the NOx sensor before catalyst.
6. It is normal for any of the following fault codes to be set during this test and they do not indicate a problem. If codes P3971, P3977 or P3978 are set they should be cleared before proceeding.

Is the oxygen concentration (O2 %) between 17 and 23 and the NOx concentration (NOx PPM) between -20 and 40?

- Yes – Reinstall the NOx sensor and proceed to Step 5D. Use caution during installation, the NOx sensor could be hot.

- No – Reinstall the NOx sensor and proceed to Step 5C. Use caution during installation, the NOx sensor could be hot.

Step 5C: NOx sensor before catalyst cleaning procedure

Troubleshooting steps

1. Connect DAVIE and monitor the BPV temperature.
2. Drive the truck until the engine reaches the operating temperature.
3. Drive the truck without a trailer or load at approximately 1100 RPM.
4. The BPV temperature should be approximately 300°C. Adjust the engine speed as necessary to maintain a temperature of at least 300°C. Note that this may require engine speeds below 1100 RPM depending on the conditions.
5. Maintain the BPV Temperature of at least 300°C for at least 30 minutes to completely burn soot out of the sensor. It is acceptable for the temperature to temporarily fall below 300°C (for example while at a stop light), but the total time at 300°C must be greater than or equal to 30 minutes.

   If unable to meet the cleaning conditions, inspect the exhaust system for leaks. See Engine Rapido for the pressure testing (inlet/exhaust) instructions and tool. Repair as needed, then repeat step 5B.
6. Repeat Step 5B, then answer the questions below.

Is the oxygen concentration (O2 %) between 17 and 23 and the NOx concentration (NOx PPM) between -20 and 40?

- Yes – Reinstall the NOx sensor and proceed to Step 5D. Use caution during installation, the NOx sensor could be hot.

- No – Replace the NOx before catalyst sensor. Proceed to step 7A to confirm repair. If the fault recurs then return to step 5D. Use caution during installation, the NOx sensor could be hot.

Step 5D: Confirm operation and check accuracy

Troubleshooting steps

1. Connect all components.
2. Move electrical and AdBlue connections from truck-mounted AdBlue dosing valve to another AdBlue dosing valve. Put the secondary AdBlue dosing valve in a bucket to catch dosed AdBlue. The bucket must be no smaller than 1 gallon.
3. Perform a stationary regeneration and record an SCR overview. For more information, go to 'Explanatory notes to DAVIE'
4. Compare the NOx before catalyst sensor value to the NOx after catalyst sensor value shortly before the end of the regeneration. The NOx before catalyst sensor value should be within 40 ppm of the NOx after catalyst sensor value.
5. It is normal for fault codes P3978 and/or P3977 to be set during this test and they do not indicate a problem. If they are set they should be cleared before proceeding.
6. Return the DEF dosing valve connections to their original configuration.

Shortly before the end of the stationary regeneration, is the NOx before catalyst sensor value within 40 ppm of the NOx after catalyst sensor value?

- Yes – Proceed to Step 6A.
- No – Replace the NOx before catalyst sensor. Proceed to step 7A to confirm

repair. If the fault recurs then return to step 6A

Step by step 6: Check EGR valve

Step 6A: Check the EGR valve

Troubleshooting steps

1. Turn the key switch ON.
2. Use DAVIE to initialise the EGR valve.
3. Check for initialisation and/or position faults.

Are initialisation and/or position faults found?

- Yes – Retry initialisation. If faults re-occur, re-flash the ECU and retry initialisation. If faults still re-occur, replace the EGR valve. Proceed to step 7A to confirm repair.
- No – Contact the Engine Support Center for further instructions.

Step by step 7: Verify the repair

Step 3A: Check for active P1713 fault code

Troubleshooting steps

1. Connect all components.
2. Drive the truck for 15 minutes at freeway speed.
3. Check for active faults upon completion of the drive.

Is fault code P1713 inactive?

- Yes – Proceed to step 7B
- No – Return to the troubleshooting steps. Proceed to step 1A.

  If all of the steps have been completed and the fault is still active, contact the Engine Support Center for further instructions.

Step 7B: Check for other active fault codes

Troubleshooting steps

1. Check for other active fault codes.

Are there other active fault codes?

- Yes – Proceed with the appropriate fault codes.
- No – Proceed to step 7C.

Step 7C: Clear all the fault codes

Troubleshooting steps

1. Turn the key switch ON.
2. Use DAVIE to clear the inactive fault codes.

Have all the fault codes been cleared?

- Yes – Repair complete.
- No – Troubleshoot any remaining active fault codes.

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