



No.: 04 TS - 37
July 14, 2004

TO: All Distributors/Dealers and Their Branches
U.S., Canada and Mexico

ATTN.: Service Managers

FROM: Evandro Silva

SUBJECT: **MBE4000 and MBE900 – EGR System - Fault Code SID 146**

In order to assist distributors/dealers technicians to service EPA04 certified Mercedes-Benz Engines - MBE4000 and MBE900 equipped with EGR Technology, we are releasing a troubleshooting procedure for the EGR System fault code 146.

This troubleshooting procedure is still not complete; there are new instructions and service tools under development. Additional information will be published between today and the end of this year.

If you have any questions, please feel free to contact the Technical Support Team

Evandro Silva
MBE4000 Technical Support



Fault Code SID 146 – EGR System

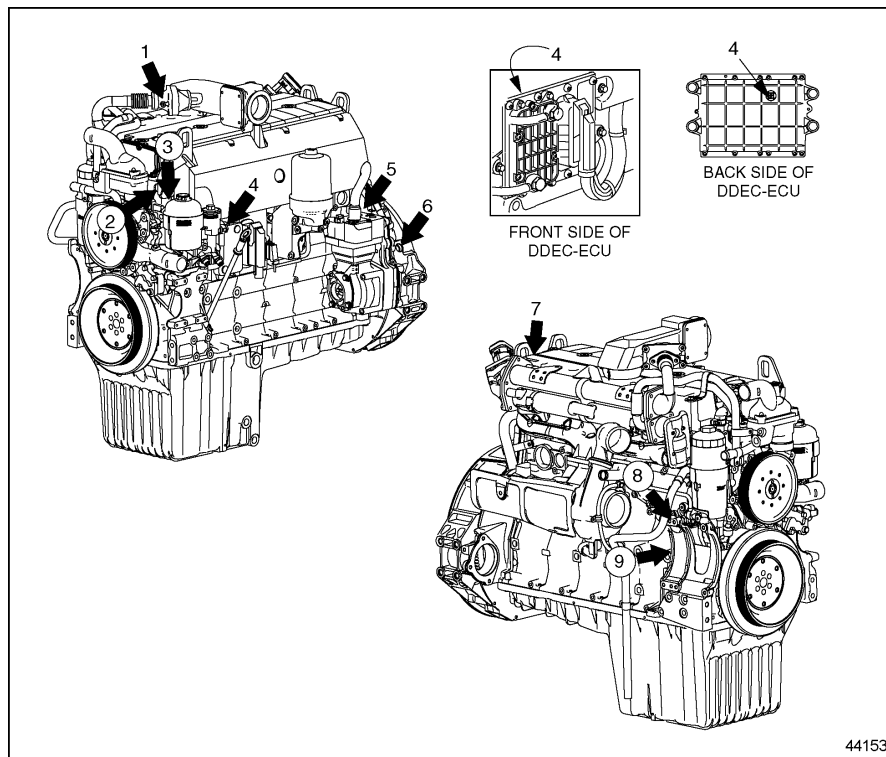
DESCRIPTION OF SID 146 – EGR SYSTEM

SID 146 indicates that during engine operation the EGR system is experiencing operation outside the normal range, resulting in one or more of the following fault codes.

- EGR Temperature Above Normal (146/0)
- EGR Temperature Below Normal (146/1)
- Bad Component (146/12)
- EGR – Valve is Not Responding (146/7)
- Data Erratic (146/2)

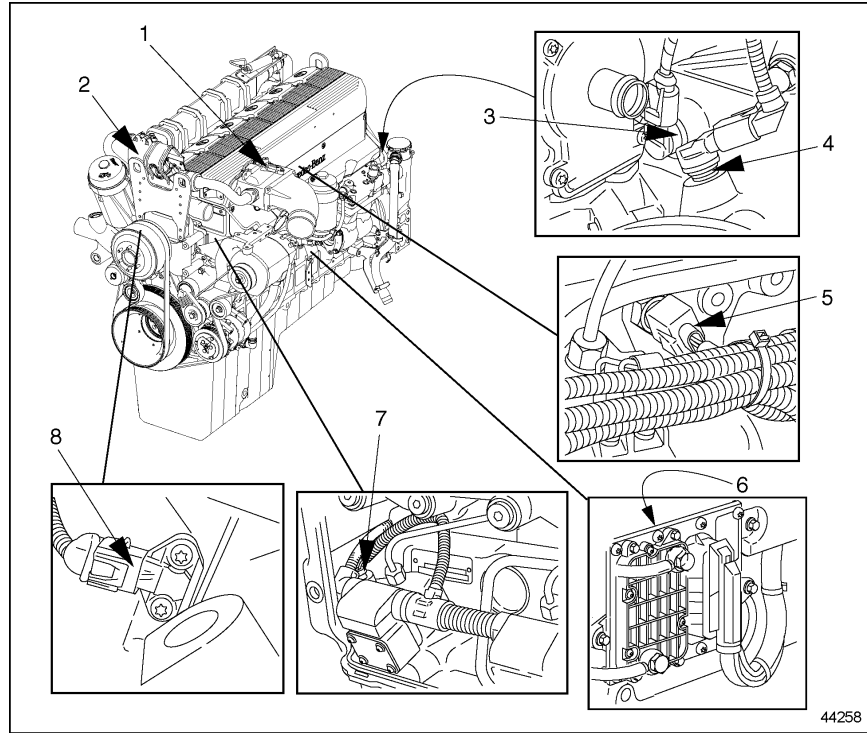
TROUBLESHOOTING SID 146

The EGR Temperature Sensor is located in the EGR supply tube on the top front section of the engine. See figures 1 and 2 for the MBE 900 and MBE 4000 engines respectively.



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| <ol style="list-style-type: none"> 1. EGR Temperature Sensor 2. Engine Coolant Temperature Sensor 3. Fuel Temperature Sensor 4. Barometric Pressure Sensor (integrated into DDEC-ECU) 5. Camshaft Position Sensor | <ol style="list-style-type: none"> 6. Crankshaft Position Sensor (on timing case) 7. Intake Manifold Pressure/Temperature Sensor 8. Engine Oil Temperature Sensor 9. Engine Oil Pressure Sensor |
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Figure 1 - Sensor Locations on the MBE 900 EGR Engine



- 1. Intake Air Pressure/Temperature Sensor
- 2. EGR Temperature Sensor
- 3. Camshaft Position Sensor (on camshaft)
- 4. Crankshaft Position Sensor
- 5. Engine Coolant Temperature Sensor
- 6. Barometric Pressure Sensor (integrated into DDEC-ECU)
- 7. Fuel Temperature Sensor
- 8. Engine Oil/Pressure Sensor

Figure 2 - Sensor Location on the MBE 4000 EGR Engine

Data for the EGR temperature sensor is routed through pin locations 28 and 22 on the large, 55-pin PLD-MR wiring harness connector. See figure 3.

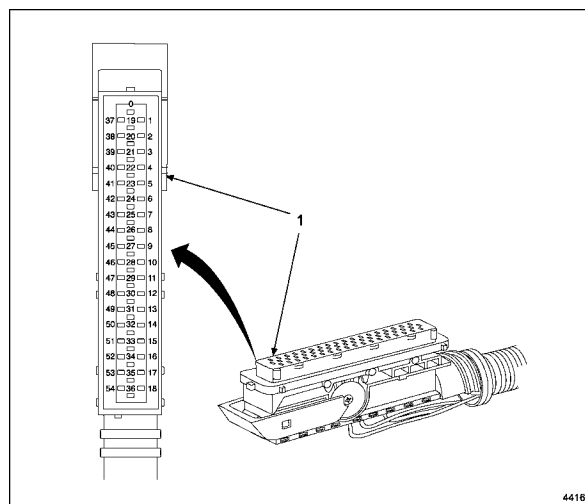


Figure 3 - Pin Locations on 55-Pin Connector



Fault code 146/0: EGR Temperature Above Normal

Perform the following steps to troubleshoot EGR Temperature Above Normal:

- If fault 110/0 and 146/0 are active at the same time, refer to MBE Electronic Controls – Troubleshooting Guide - Section 11, Coolant Temperature High. Repair or replace, as required.
 1. Verify coolant level is correct.
 2. Check for blockage in radiator and charge air cooler.
 3. Check fan belt condition (slippage).
 4. Check for proper location of fan shroud.
 5. Check for proper radiator hose condition (no collapsed hoses).
 6. Check for proper viscous fan operation.
 7. Check for restricted EGR cooler.

Erase fault code memory.

- If fault 146/0 is still active, verify coolant flow through EGR cooler. Repair or replace as necessary.
Erase fault code memory.

Perform the following steps to troubleshoot an EGR temperature sensor circuit fault:

1. Bridge EGR temperature sensor between pins 1 and 2. See figure 4.

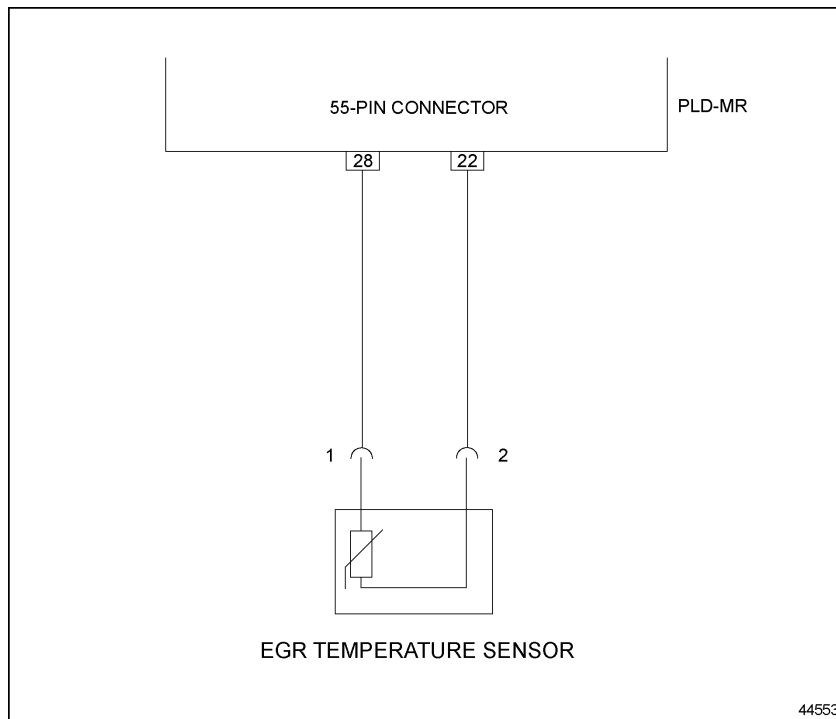


Figure 4 – EGR Temperature Sensor Diagram

- a. If fault code 146/0 is not the only active code, go to step 2.
- b. If fault code 146/0 is the only active code, replace the EGR temp sensor.
- c. Erase fault code memory



2. Bridge pin 1 of the EGR temperature sensor to ground.
 - a. If fault code 146/0 is still active, repair open circuit in wire between pin 28 of the 55-pin connector and pin 1 of the EGR temperature sensor.
 - b. If fault code 146/0 is no longer active, erase fault code memory.
 - c. If fault code 146/0 is still active, go to step 3.
3. Check the resistance between pin 22 of the 55-pin connector and pin 2 of the EGR temp sensor.
 - a. If resistance is greater than 3 Ohm, repair open circuit in wire between pin 22 of the 55-pin connector and pin 2 of the EGR temperature sensor
 - b. If resistance is less than 3 Ohm, Check all contact and connections. Remove corrosion, if evident.
 - c. If fault code 146/0 is not active, erase fault code memory.
 - d. If fault code 146/0 is still active, go to step 4.
4. Check for damaged reed valve as follows:
 - a. Look for open valves (damaged or stuck)
 - b. Look for presence of soot deposit in the valve. Clean as necessary.
 - c. Replace the valve if necessary.
5. If fault code 146/0 is still active, contact Detroit Diesel Technical Service for authorization to replace the DDEC-ECU.

Fault Code 146/1: EGR Temperature Below Normal

Perform the following steps to troubleshoot EGR Temperature Below Normal:

- Verify that the PLD-MR hardware and software are correct. The software level is: SW60- HW D3.1. PLD-MR hardware part number is: 0014466440. This information is available using the DDDL or Minidiag2 electronic tools. Remove and replace if required.
- If fault codes 146/1 and 146/12 are active at the same time, check the EGR valve for damage.
- If fault code 146/1 and 146/0 are active at the same time, see fault code 146/0.
- If fault code 146/1 is the only active code, check the reed valve as follows:
 - a. Look for open valves (damaged or stuck)
 - b. Look for presence of soot deposit in the valve. Clean as necessary.
 - c. Replace the valve if necessary.
- If fault code 146/1 is still active, check the EGR shut-off valve for damage. Replace if necessary. Erase fault code memory.
- If fault code 146 01 is still active, contact Detroit Diesel Technical Service for authorization to replace the DDEC-ECU.



Fault Code 146/2: EGR Data Erratic

- If fault codes 146/2 and 146/0 are active at the same time, refer to code 146/0.
- If fault code 146/2 is the only code active, perform the following steps:
 1. Check EGR valve wiring between the valve and the DDEC-ECU. Look for: Bad wire connection, corrosion on terminals, short circuit, lost continuity between the DDEC-ECU and the EGR valve. For wiring diagram, see figure 5.

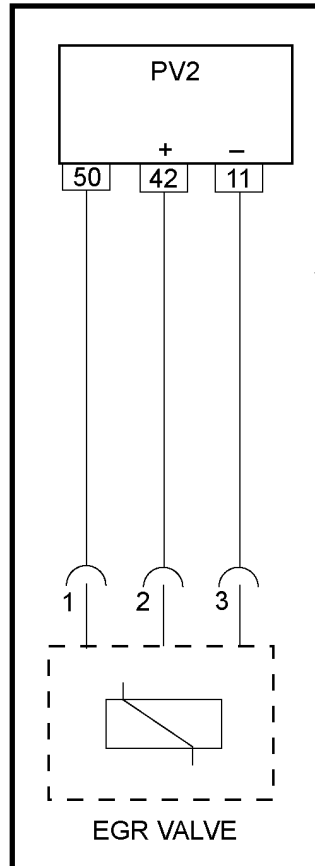


Figure 5 – EGR Valve – Wiring Diagram

2. Check the resistance between pin 42 of the 55 pin connector and pin 2 of the EGR valve.
 - a. If the resistance is greater than 3 Ohms, repair open circuit in wire between pin 42 of the 55 pin connector and pin 2 of the EGR valve. Erase fault code memory.
 - b. If the resistance is less than 3 Ohms, check all contacts and connections. Remove corrosion if evident.
 - c. If fault code 146/2 is not active, erase fault code memory.
 - d. If fault code 146/2 is still active, go to step 3.



3. Bridge pin 3 of the EGR valve to ground.
 - a. If fault code 146/2 is no longer active, repair open circuit in wire between pin 11 of the 55 pin connector and pin 3 of the EGR valve.
 - e. If fault code 146/2 is no longer active, erase fault code memory.
 - f. If fault code 146/2 is still active, go to step 4.
4. Check the resistance between pin 50 of the 55 pin connector and pin 1 of the EGR valve
 - a. If the resistance is greater than 3 Ohms, repair the open circuit in the wire between pin 50 of the 55 pin connector and pin 1 of the EGR valve.
 - b. If fault code 146/2 is no longer active, erase fault code memory.
 - c. If the resistance is less than 3 Ohms, contact DDC Technical Service

Fault Code 146/7: EGR Valve Not Responding

- If fault codes 146/7 and 146/2 are both active, refer to code 146/2.
- If fault code 146/7 is the only code active, perform the following steps:
Check for lost continuity between the DDEC-ECU and the EGR valve (PV2).
Refer to fault code 146/2.
- If fault code 146/7 is still active, contact DDC Technical Service for test procedure for the EGR Valve.
- If fault code 146 07 is still active, contact DDC Technical Service for DDEC-ECU replacement authorization.
- If fault code is no longer active, erase fault code memory.

Fault Code: 146/12: EGR – Bad component

Perform the following steps to troubleshoot EGR- Bad component:

Check the EGR valve flap for freedom of movement. Remove soot and clean deposits if necessary.

Contact DDC Technical Service for instructions to verify flap valve functionality by performing a PV2 activation test.

- If fault code 146 12 is still active, replace the EGR valve.