

Advanced Natural Gas Vehicle Training

Module 4: Cummins Computerized Engine Management System

Lesson 5: Mass Gas Sensors

Lecture: 25 Minutes

Lab: 25 Minutes

Classroom Instructional Objectives:

Upon completion of this unit of instruction the student will be able to:

- Explain the design and operation of the Cummins mass gas sensor.
- Compare and contrast mass gas sensor design with mass air flow design.
- Graph the voltage output signal of the Cummins mass gas sensor.
- Analyze wiring diagrams specific to flow sensing devices.
- Explain how to test the mass gas sensor using a scan tool.
- Explain how to test the mass gas sensor using a lab scope.
- List the fault codes associated with mass gas sensor malfunctions

Key Classroom Points:

- Explain the design and operation of mass gas sensors.
- Provide specific examples of mass gas and mass airflow sensors.
- Explain how to use the Cummins troubleshooting and repair manuals.
- Explain how to perform a voltage drop test on the ground circuit.
- Explain how to perform a voltage drop test on the positive circuit.
- Demonstrate how to test the mass gas sensor signal voltage using a lab scope.
- Demonstrate how to test the mass gas sensor signal voltage using a scan tool.
- Identify and explain the trouble codes related to mass gas sensor malfunction.

Lab Skill Objectives:

Upon completion of this unit of instruction the student will be able to:

- Locate the mass gas sensor.
- Demonstrate how to read and analyze fault code diagnostic trees specific to flow sensing devices.

Advanced Natural Gas Vehicle Training

- Perform no code diagnostic routines to solve driveability problems related to the mass gas sensor.
- Test the mass gas sensor using a lab scope.
- Test mass gas sensor using a scan tool.

Key Lab Points:

- Demonstrate where the mass gas sensor is located on the vehicle.
- Explain how to read diagnostic trees specific to the mass gas sensor.
- Explain how to use the Cummins troubleshooting and repair manual to solve driveability issues associated with the mass gas sensor.
- Demonstrate the testing of the mass gas sensor reference using a lab scope
- Demonstrate the testing of the mass gas sensor signal using a scan tool.
- Stress the value of accurately testing mass gas sensor.

Classroom Materials:

- Attendance sheet
- Power Point presentation CD
- Lap-top
- Projector
- Instructor's guide
- White board marking pens
- Projection screen

Handouts:

- Power Point slide materials
- Lab activity sheet 37
- Troubleshooting section
- Wiring diagram

Instructor's notes:
