

# Advanced Natural Gas Vehicle Training

## Module 4: Cummins Computerized Engine Management System

### Lesson 6: Voltage Producing

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 engine position sensor (EPS).
- Explain the design and operation of the Cummins vehicle speed sensor (VSS).
- Explain the design and operation of the Cummins engine speed sensor (ESS).
- Compare and contrast the voltage output signal from the EPS, VSS and ESS.
- Analyze wiring diagrams specific to speed and position sensing sensors.
- Explain how to test the EPS, VSS, and ESS sensors using a scan tool.
- Explain how to test the EPS, VSS, and ESS sensors using a lab scope.
- List the fault codes associated with EPS, VSS, and ESS sensor malfunctions.

### Key Classroom Points:

- Explain the design and operation of the Cummins engine position sensor (EPS).
- Explain the design and operation of the Cummins vehicle speed sensor (VSS).
- Explain the design and operation of the Cummins engine speed sensor (ESS).
- Provide specific examples of the Cummins EPS, VSS, and ESS sensors.
- Explain how to use the Cummins troubleshooting and repair manual to solve driveability issues.
- Explain how to perform a voltage drop test on the ground circuit using a lab scope.
- Explain how to perform a voltage drop test on the positive circuit using a lab scope.
- Demonstrate how to test the EPS, VSS, and ESS sensor signals using a lab scope.
- Demonstrate how to test the EPS, VSS, and ESS sensor signals using a scan tool.
- Provide factory information on fault codes related to EPS, VSS, and ESS sensor malfunctions.

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## **Lab Skill Objectives:**

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

- Locate the EPS, VSS, and ESS sensors.
- Read and analyze fault code diagnostic trees specific to flow sensing devices.
- Perform no code diagnostic routines to solve driveability problems.
- Test the EPS, VSS, and ESS sensors using a lab scope.
- Test EPS, VSS, and ESS sensors using a scan tool.

## **Key Lab Points:**

- Demonstrate where the EPS, VSS, and ESS sensors are located on the vehicle.
- Explain how to use the Cummins troubleshooting and repair manual diagnostic trees specific to the EPS, VSS, and ESS.
- Demonstrate the testing of the EPS, VSS, and ESS sensor signal using a lab scope
- Demonstrate the testing of the EPS, VSS, and ESS sensor signal using a scan tool.
- Stress the value of accurately testing EPS, VSS, and ESS.

## **Classroom Materials:**

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

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## Handouts:

- Power Point slide materials
- Lab activity sheet 38
- Troubleshooting section
- Wiring diagram

Instructor's notes:

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