

# Advanced Natural Gas Vehicle Training

## **Module 4: Cummins Computerized Engine Management System**

### **Lesson 9: Idle Speed Control, Waste Gate Control, and Fuel Shut-off**

**Lecture: 20 Minutes**

**Lab: 20 Minutes**

#### **Classroom Instructional Objectives:**

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

- Explain the operational characteristics of the idle speed control valve.
- Explain the operational characteristics of the waste gate control valve.
- Explain the operational characteristics of the fuel shut-off valve.
- Compare and contrast the idle speed control, waste gate control, and fuel shut-off valves.
- Explain how to use the Cummins Trouble Shooting and Repair Manual.
- Explain how to test the idle speed control valve using a scan tool
- Explain how to test the idle speed control valve using a lab scope.
- Explain how to test the waste gate control valve using a scan tool
- Explain how to test the waste gate control valve using a lab scope.
- Explain how to test the fuel shut-off valve using a scan tool
- Explain how to test the fuel shut-off valve using a lab scope.
- Analyze Cummins wiring diagram sections specific to electronic controlled valves.
- Explain how to test electric valves for open and shorts.
- Define the fault codes related to the idle speed control valve, waste gate control, and fuel shut-off valves.

#### **Key Classroom Objectives:**

- Explain the operational strategy used by the ECM to control engine RPM.
- Explain the operational strategy used by the ECM to control boost pressure.
- Explain the operational strategy used by the ECM to control fuel shut-off to the engine.
- Compare and contrast the operation of idle speed control, waste gate control, and fuel shut-off valves.
- Explain how to use the Cummins Trouble Shooting and Repair Manual.
- Demonstrate how to read Cummins wiring diagram sections specific to electrical valves.
- Explain how to test the idle speed control valve using a scan tool
- Explain how to test the idle speed control valve using a lab scope.

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- Explain how to test the waste gate control valve using a scan tool
- Explain how to test the waste gate control valve using a lab scope.
- Explain how to test the fuel shut-off valve using a scan tool
- Explain how to test the fuel shut-off valve using a lab scope.
- Define the fault codes related to the idle speed control, waste gate control and fuel shut-off.
- Explain how to perform symptom and no fault code driveability checks.
- Explain how to perform symptom and fault code driveability checks.

### **Lab Skill Objectives:**

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

- Locate the idle speed control, waste gate control, and fuel shut-off valves on the engine.
- Perform fault code diagnosis using the Cummins Trouble Shooting and Repair Manual.
- Perform no fault code diagnostic routines.
- Perform fault code diagnostic routines.
- Test the idle speed control valve using a scan tool.
- Test the idle speed control valve using a lab scope.
- Test the waste gate control valve using a scan tool.
- Test the waste gate control valve using a lab scope.
- Test the fuel shut-off valve using a scan tool.
- Test the fuel shut-off valve using a lab scope.
- Read and analyze Cummins wiring diagram sections specific to electric controlled valves.
- List fault codes related to the idle speed control, waste gate control, and fuel shut-off valves.

### **Key Lab Points:**

- Demonstrate how to test the idle speed control, waste gate control, and fuel shut-off valves for opens and shorts using a scan tool and multi-meter.
- Demonstrate how to use the Cummins Trouble Shooting and Repair Manual.
- Explain how to read Cummins wiring diagram sections specific to electric controlled valves.
- Define the fault codes related to the idle speed control, waste gate control and fuel shut-off valves.
- Explain how to perform no fault code diagnostic routines.
- Explain how to perform fault code diagnostic routines.

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## **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 40
- Wiring diagram

## **Instructor's notes:**

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