

# Basic Natural Gas Vehicle Training

## **Module 5: John Deere Computerized Engine Management System**

### **Lesson 6: Fuel Injectors**

**Lecture: 20 Minutes**

**Lab: 15 Minutes**

### **Classroom Instructional Objectives:**

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

- Explain how the John Deere electronic control module (ECM) driver controls the fuel injectors.
- Explain the flow characteristics of pair 1, 2, 3, and 4 fuel injectors.
- Explain fuel injector on-time.
- Analyze John Deere wiring diagram sections specific to the fuel injectors.
- Explain how to test the fuel injectors for open and shorts using a multi-meter.

### **Key Classroom Objectives:**

- Explain how ECM inputs determine fuel injector on-time.
- Explain how the ECM controls the fuel injectors.
- Explain the flow rate of pair 1, 2, 3, and 4 fuel injectors.
- Analyze John Deere wiring diagram sections specific to fuel injectors.
- Explain how to test the fuel injectors using a multi-meter.
- Explain how to test the fuel injector on-time using multi-meters.
- Stress the importance of correctly using a multi-meter.
- Introduce electrical/electronic circuit testing using a lab scope.
- Explain fault codes related to John Deere fuel injectors.

### **Lab Skill Objectives:**

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

- Locate the fuel injector block on the engine.
- List the difference between pair 1, 2, 3, and 4 fuel injectors.
- Demonstrate how to test the fuel injectors for opens or shorts.

# Basic Natural Gas Vehicle Training

- Perform voltage drop tests.
- Demonstrate how to test the fuel injector on-time.
- Demonstrate how to read and analyze John Deere wiring diagram sections specific to fuel injectors.

## **Key Lab Points:**

- Demonstrate how to test fuel injectors for open and shorts using a multi-meter.
- Demonstrate how to test fuel injector on time with the aid of a multi-meter.
- Explain how to read John Deere wiring diagram sections specific to fuel injectors.
- Introduce electrical/electronic circuit testing using a lab scope.
- Explain fault codes related to John Deere fuel injector circuit.

## **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 13
- Wiring diagram

## **Instructor's notes:**

---

---

---

---

---