

Advanced Natural Gas Vehicle Training

Module 4: Cummins Computerized Engine Management System

Lesson 7: Cummins Pull-up and Pull-down switches

Lecture: 25 Minutes

Lab: None

Classroom Instructional Objectives:

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

- Recognize the difference between a pull-up and pull-down circuit.
- Explain the design and operation of Cummins pull-up circuits including the PTO, brake, clutch, failure override, door interlock, and idle validation switches.
- Explain the design and operation of the Cummins pull-down circuit ECM diagnostic switch.
- Compare and contrast the voltage change between pull-up and pull-down signals.
- Analyze Cummins wiring diagrams specific to pull-up and pull-down circuits.
- Explain how to test the PTO, brake, clutch, failure override, door interlock, and idle validation switches using a scan tool.
- Explain how to test the ECM diagnostic switch using a scan tool.
- Explain how to test the PTO, brake, clutch, failure override, door interlock, and idle validation switches using a multi-meter.
- Explain how to test the ECM diagnostic switch using a multi-meter.
- Find the PTO, brake, clutch, failure override, door interlock, idle validation and ECM diagnostic switches in a Cummins repair manual.
- List the fault codes associated with PTO, brake, clutch, failure override, door interlock, and idle validation switch malfunctions

Key Classroom Points:

- Explain the design and operation of Cummins pull-up circuits including the PTO, brake, clutch, failure override, door interlock, and idle validation switches.
- Explain the design and operation of Cummins pull-down circuit the “ECM diagnostic switch”.
- Provide a classroom example of a pull-down circuit.
- Provide a classroom example of a pull-up circuit.
- Explain how to use the Cummins troubleshooting and repair manual sections specific to pull-up and pull-down circuits.

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- Identify fault codes related to PTO, brake, clutch, failure override, door interlock, idle validation and ECM diagnostic switches.

Lab Skill Objectives:

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

- None

Key Lab Points:

- None

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
- Troubleshooting section
- Wiring diagram

Instructor's notes:
