Vehicle Electrification System Standards

VII. 3-Phase Power Inverter Systems and Controls

VII.e 3-Phase Power Inverter Diagnostics & Service

Overview:

3-Phase Power Inverter Diagnostics and Service
- HV 3-Phase Cable Jumper System
- Laptop Based Oscilloscope (Differential)
- AC Current Clamps
- Scan Tool & PID
- Power Inverter Service Considerations

Description:

Acquiring skills in testing and diagnostics of any system or component are the most critical cognitive and skills in the automotive space. Understanding the tools/equipment necessary to perform the testing, how to prepare the vehicle for testing, and how to interpret data and waveform data are key skills for vehicle electrification technicians.

Outcome (Goal):

Students will acquire skills in how to select, configure, and connect testing tools/equipment to analyze 3-Phase Power Inverter Module waveforms.

Objective:

Students shall be able to:
1. Select the proper oscilloscope and current clamps for acquiring 3-Phase Power Inverter Waveforms
2. Safety connect jumper cable test leads between the power inverter and the 3-Phase power inverter cabling system
3. Road test a vehicle that is instrumented with an oscilloscope, current clamps, jumper cable test leads (if necessary) and acquire waveform data
4. Road test a vehicle with a serial data (scan) tool connected and acquire PIDs associated with the Power Inverter Module

Task:

1. Students will use a procedural worksheet to configure voltage, time base, and filtering settings for multi-channel digital oscilloscope for acquiring power inverter module 3-Phase waveforms
2. Complete a procedural worksheet on connecting power cable jumper leads and AC current clamps to the power inverter and power inverter 3-Phase cables
3. Students will complete a vehicle drive cycle worksheet and acquire 3-Phase waveforms while performing a road test
4. Students will analyze the 3-Phase power inverter waveforms acquired during a vehicle drive cycle, describe the quality the primary components of the waveform, and complete a written analysis of their findings on a lab worksheet
5. Using an oscilloscope and AC current clamps, students will determine the Power Factor of a Power Inverter Module during a road test
6. Using a serial data (scan) tool, students will acquire Power Inverter Module PID data and record it on a lab worksheet while on a vehicle road test
7. Utilize technical documentation to ensure proper electrical connections to the primary power inverter module for testing

To comment or offer suggestions on this standard, contact Ken Mays:

Ken Mays
541-383-7753
tmays@cocc.edu