GOVERNOR CONTROL SYSTEMS

TRAINING

WOODWARD E-3 Control System

CLASS OBJECTIVES:

Upon successful completion of this course, the student will be able to:

Demonstrate a strong foundation on gas engine control theory.

Field calibrate the controls and adjust actuators.

Field calibrate VE, TE and lambda tables.

Describe the concepts of basic adjustments, paralleling, of gas engines.

Demonstrate an understanding of theory, methods of synchronizing, and paralleling of electrical generators.

Demonstrate an understanding of PID loop tuning, 5 point dynamics utilizing island and base load mode.

Understanding of gas engine efficiencies and combustion cycles

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The Woodward E3 control system replaces the EGS-01 gas engine control. Learn the operation, installation and adjustments of the E3 engine control. Ideal for those who need the understanding of how the E3 controls actuators, and their associated accessories allow their engines to operate together, either on or off the infinite bus (utility). The hardware and software will be explained. During the course both hardware and software configuration/monitoring will be explained. The E3 system can be used on both Rich and Lean burn engines. An explanation of Tecjet and F-L series trim valves will be explained.

CLASS OUTLINE:

A. Concepts of Basic Gas Engine Theory

- A review covering gas engine fundamentals of detonation, emissions, ignition timing, fuel flow and efficiently curves.
- Calibration and Adjustment of E3 controller tables and use of a emission analyzer
- PID theory using 5 point dynamics, and comparison of base load/island mode dynamics
- An understanding of Stoichiometric air fuel ratio and hydro carbon, lower heat, BTU and density values

B. Concepts of the E3 engine controller

Controller - PCM128HD platform

- Air/Fuel Ratio Control
  - Controls TecJet
  - Setup with Oxygen Sensor
- Speed Control
  - Controls Engine Throttle
  - 3 Sets of Dynamics
- Misfire Detection
  - Senses partial/no-fire conditions
- Brains of the System
  - Controls Ignition Energy
  - Diagnostic tool