4-1/2 day training in the principles and methods used to perform protective device coordination studies for low voltage through distribution level power systems with or without software. This is one of the few courses that is not merely a software training course.

Specifically designed for industrial and government engineers that want knowledge of the principles of protective device coordination but also practical knowledge of how to achieve reasonable and economical device coordination.

Covers concepts, procedures, and guidance not covered in other courses in the industry. Examples will include critical systems fed from emergency generators and uninterruptible power supplies (UPS).

Student involvement in actual coordination problems where the instructor will use EasyPower® software to perform the required calculations and to plot the protective device coordination curves. In other words, the students will be able to make the coordination decisions during the process without wasting time learning to push the right button on a computer.

A CDROM containing all audio and video of the lecture for days 4 and 5. This saves note taking on the problem solving session.

If you are looking for a unique, highly rated, and comprehensive course on basic and advanced principles of protective device coordination for low voltage and distribution voltage systems, read on.

Education Partner
Course Topics

- System Analysis
  - Fault Current and Load Flow Calculations Using Computer Software
  - Remote Effects Of Faults
  - Hand calculation method overview
- Protective Device Coordination Principles
  - Graphical Tools and Time/Current Curve Interpretation
  - Load Flow and Unbalanced Fault Effects
  - Cold Load Pickup
  - Grounding System Constraints
  - Coordination Economics
  - Asymmetrical Current Impacts
  - Coordination Time Intervals
  - Transformer Effects on Coordination
- Equipment and Device Characteristics
  - Fusible - Low Voltage and Medium Voltage
  - Molded case and Insulated Case Breakers
  - Solid-State Trip Low Voltage Breakers
  - Equipment Damage Characteristics
  - Proper Protective Device Selection
  - High Voltage Breakers
  - Low Voltage Cable Protection
  - Shielded Cable Protection
  - Overhead Conductor Protection
  - Motor Protection
  - Generator Protection
  - Transformer Protection
  - Panelboard and Switchgear Protection
  - Inverse Time/Overcurrent Protective Relays and Instantaneous Trip Devices
  - Series Rated Breakers
  - Differential and Voltage Constrained Relays
  - Reclosing relays, reclosers, and sectionalizers
  - Current transformer characteristics and calculations
- Ground Fault Protection
  - Arcing Ground Fault Magnitudes
  - Ground Fault Protection Schemes
  - Interaction Of Ground Fault Relays And Phase Overcurrent Devices
- Emergency Power System Design
  - Weak Source Systems
  - Generator Fault Characteristics
  - Uninterruptible Power Supply Fault Characteristics
  - Transfer and Static Switch Limitations
  - Improving Emergency Circuit Design
- Common Coordination Problems, Errors, And Misconceptions
- Preliminary System One-line Development for a Coordinated System

Lessons Learned and “Rules of Thumb” to spot uncoordinated systems and methods to develop a coordinated system design

Criteria Impacting Coordination
- NESC, IEEE Std C2
- NFPA 70-National Electrical Code
- Arc Flash Protection of Employees
- Arc Blast – Equipment and Coordination Impact

Switchgear And Relay Commissioning Including Hands-On Student Calibration Of A Relay

Putting It All Together
- 8-11 classroom hours will be used to work example design problems with student involvement in the following system types:
  - Low voltage system with critical systems fed from normal and emergency power sources
  - Medium voltage system from a 15 kV class substation primary to the low voltage secondary.
- Specification Writing Tips for a Coordinated System

Government Criteria
- O.D.O. Unified Facility and FAA Criteria
- Some classes extend to the fifth day which can be spent covering the government criteria related to protective device coordination

ABOUT THE INSTRUCTOR

Charles Pratt, P.E.

Mr. Pratt has been a practicing professional engineer for over 45 years in this subject. He was an instructor for the U.S. Army Corps of Engineers for 17 years in the subject areas and an engineer for the U.S. Air Force and U.S. Army Corps of Engineers. He is president and principal engineer of Quadrelec Engineering Corporation in Tulsa, OK. His experience in the coordination of power systems and the associated studies span numerous industrial, manufacturing, utility, generation, hospital, and critical military facilities and related load flow and arc flash hazard analyses. Prior to his professional career he was trained by the Oklahoma Gas & Electric Company in the areas of overhead and underground system design and in substation and protective relaying testing and commissioning. As a member of the IEEE Power Engineering and Industrial Applications societies since 1976 and previously trained through Westinghouse and Schweitzer (SEL) industry courses, he brings a wealth of knowledge and practical experience to the course.

ESA

ESA Inc. may be conducting their regional training courses in the same city on use of EasyPower software or other related topics. Learn from the experts, tips and techniques to facilitate your use of EasyPower. See the ESA website for such course offerings at http://www.easypower.com/support.

The course is not an EasyPower course use but merely utilizes the unsurpassed characteristics of EasyPower® as a training tool with student involvement.