



Course Information Letter ---- E340

CONCEPTS OF PROTECTIVE RELAYS E340

At the completion of this course, the participant will be able to discuss protective relaying fundamentals, a basic relaying channels, relay coordination and zoning, and various voltage, current, and differential protection schemes used in power systems.

COURSE OBJECTIVES: Upon completion of this course, the participant should be able to:

1. Explain the purpose of a protective relay.
2. Describe the different types of relays available.
3. Discuss a basic relay circuit.
4. Explain the importance of relay coordination.
5. Discuss current and voltage transformers used in protective relaying schemes.
6. Discuss a current, voltage, or differential relaying scheme, from the development of a signal to providing a protective function.
7. Discuss differential relaying and its applications in a power system in protecting generators, transformers, and buses from overloads and faults.

COURSE OUTLINE

1. **Introduction to Protective Relaying:** The Purpose and Application of Protective Relays; Protective Relay Applications, The Generic Protective Relay Channel, Protective Relay Fundamentals, Relay Ratings and Definitions, Relay Performance Measures, Power System Protection, Power System Functional Layout, Zones of Protection, Coordinating Principles
2. **Protective Relay Construction:** Types of Relays, Electromagnetic, Solid State
3. **Instrument Transformers:** Potential Transformers, Potential Transformer Problems, Potential Transformer Testing, Current Transformers, Current Transformer Design and Operation, Current Transformer Accuracy
4. **Overcurrent Protection:** Application, Instantaneous Relays, Time Overcurrent Relays, Overcurrent Relaying, Coordination, Relay Adjustments, Solid State Overcurrent Relays
5. **Voltage Relaying:** Construction, Relay Types
6. **Frequency Relaying:** Purpose and Application, Types of Protection, Types of relays
7. **Differential Relaying:** The Differential Principle, Differential Circuit Advantages, CT Saturation in Differential Relay Schemes, Percent Differential Relaying, Alternative Differential Relaying Schemes, Generator Differential Protection, Transformer Differential Protection

Concepts of Protective Relays – E340

www.hpcnet.com

WHAT YOU WILL RECEIVE:

- HPC Technical Services' fully illustrated textbook: Concepts of Protective Relays.
- HPC's Certificate of Completion, including 2.9 Continuing Education Units, as authorized by the International Associate of Continuing Education/Training (IACET).

COURSE DATES/LOCATION/FEE

For current dates / locations / prices, please see HPC's website, www.hpcnet.com.

FREQUENTLY ASKED QUESTIONS

- Will HPC Technical Services bring this course to our location for our personnel only? YES, call or email Stephen Parker, stparker@hpcnet.com for a price quotation.
- Will HPC Technical Services customize the presentation at our site to suit our particular needs? Yes.
- Is HPC Technical Services' textbook available for purchase as a reference document? No.
- What is the cost for HPC Technical Service to deliver this course at our location? Well, of course that can vary and it needs to be priced on an individual need basis. You gain from the customization and price.
- Is HPC Technical Services' consultants available for "technical advice" on the evaluation of your maintenance procedures, systems, tests? Yes. Call Harold Parker, hparker@hpcnet.com for a rate sheet.

INSTRUCTOR (S):



John Marshall. Mr. Marshall, worked for GE 35 years in the power system service and installation business. 25 years of this time was in the international service business. During his career, Mr. Marshall's positions included Field Engineer, Service Supervisor, Technical Training Instructor and Senior Application Engineer. Mr. Marshall's work covered electrical power distribution and control of power generation equipment. His expertise is GE manufactured excitation systems for large and medium size generators used on gas and steam powered turbines. As a Technical Training Instructor for over 20 years, Mr. Marshall developed and presented training programs for GE manufactured excitation systems. As a Senior Application Engineer, Mr. Marshall's work included the upgrading/replacement of older excitation systems with GE's digital excitation system. His Field Service work was worldwide. BSEE degree from Virginia Polytechnic Institute and State University in Blacksburg, Virginia.

Leonard Fox. Mr. Fox has approximately 20 years experience working in the electrical field. In his earlier career he worked for several manufacturers of power transformers where he was involved in the installation, checkout and troubleshooting of said transformers. Later in his career he became involved in the inspection of property to ensure safety and code requirements have been met. Over the past few years, Mr. Fox has started to teach some of HPC's electrical maintenance courses.

HPC TECHNICAL SERVICES
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REGISTRATION FORM

Company: _____

Plant: _____

Address: _____

City/State/Zip: _____

Telephone: _____ **FAX:** _____

Course Number/Title: _____

Course Dates: ____/____/____ **Thru** ____/____/____

Course Location: _____ **Course Fee:** _____

Please enroll the following individual(s) listed below:

Student #1: _____

Student #2: _____

Taking advantage of HPC's 3-4-2 Policy: Send 3, Pay for 2 when paying in advance.

Student #3: _____

Enrolled by: _____ **Date:** _____

METHOD OF PAYMENT

- Check to Follow
- Check Enclosed #: _____
- MC/Visa/AMEX #: _____
Expiration Date: _____ CV Code: _____
- Purchase Order #: _____

HOW DID YOU LEARN OF THIS COURSE?

- Familiar with HPC
- Received a fax
- Received an email
- Internet search
- Other: _____