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## Relay & Automation Schools

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## Relay Product Training

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Now offering Continuing Education Units (CEUs)!

Please inquire for more information.
Symmetrical Components and Fault Analysis

Objective
This three-and-a-half day school is designed to provide a review of phasors, a review of per-unit calculation method, and a comprehensive coverage of symmetrical components in power system, their application in relay design, and performance analysis.

The school discusses the symmetrical component representation of various power system components, and comprehensively analyzes faults.

Relay segments covered:
- Per unit system
- Introduction to symmetrical components
- System faults
- Fault calculations
- Sequence network modeling: Generator
- Sequence network modeling: Transformer
- Sequence network modeling: Overhead lines

Participant Profile
Engineers and Senior Level Technicians who wish to reacquaint themselves with vector mathematics and fault analysis computations

Prerequisites
A general knowledge of basic electrical engineering is recommended, as well as Elementary Phaser Mathematics, Mathematical Matrix Manipulation, and Power System Basics

Participants Learn
- Mathematical fault analysis techniques
- Fault calculations and system stability for single-phase and multiple-phase fault scenarios
- Understand real case examples
- Rapid calculation of how your system will behave under abnormal conditions

What to Bring
Only scientific calculator

CEUs Earned
2.4 credits
Basic Relay School (Distribution Protection)

Objectives
This three-and-a-half-day school provides comprehensive relay application principles on distribution protection.

Training segments covered:
- Introduction to Protective Relaying
- Phasors, Polarity, Per Unit system, and basic Power concepts
- Review of Symmetrical Components
- Relay Input Sources
- Overcurrent and Directional Overcurrent protection
- Feeder, Transformer, Motor, and Arc Flash protection
- Auto Reclosing

Participants Learn:
- Distribution protection, system design and implementation
- Distribution equipment protection, system design and implementation
- Apply theory to real system examples
- Protection theory and practice on microprocessor based relays and electromechanical relays

Prerequisites
Knowledge of basic electrical engineering is required. Symmetrical Component School is recommended.

What to Bring
Only scientific calculator

CEUs Earned
2.8 credits

Participant Profile
Electrical Engineers, Relay Engineers, and Senior Technicians.
Power Systems Protection & Coordination

Objectives
This course covers the fundamental aspects of Power System Protection and Coordination. The basic philosophy and introduction to application problems is also covered.

Participants Learn:
Students will learn the basis upon which the selection of protection systems is made for the different components of the Power System (Lines, Transformers, Motors, Generators, and Busbars) as well as the basic criteria for Relay settings and coordination.

Participant Profile
Electrical Engineers, Relay Engineers, and Senior Technicians.

Prerequisites
Knowledge of basic electrical engineering is required. Basic Relay School is highly recommended.

What to Bring
Only scientific calculator

CEUs Earned
2.4 credits
Electromechanical Relays & FT Switches

Objectives
This three day training program is designed for participants to become proficient in application, installation, operation, maintenance, and testing of ABB Electromechanical Relays and FT Switches. Our mission is to train a new and changing Power Utility workforce to become experienced in these products using personalized, hands-on training.

Training segments include:
- Current non-directional and current directional
- Distance
- Current differential
- Auxiliary and annunciator
- Under/over voltage
- Power directional
- Under/over frequency
- FT Switches

Participants Learn and Perform Hands-On
- Applications: learn to apply relays for various combinations of fault protection
- Settings: set up relay functions for your specific application
- Maintenance: maintain relays to perform for a lifetime
- Calibration: calibrate relays to precision accuracy
- Acceptance Testing: test relays to verify acceptance criteria and characteristics

- Relay Construction: learn cylinder unit, induction disc element, transformer, compensator, polar unit and auxiliary relay components
- Troubleshooting Techniques: use relay tools to reduce operating costs and minimize downtime

Participant Profile
Relay Engineers, Technicians, and Operators

Prerequisites
Knowledge of/experience with Protective Relaying and use of electrical equipment

What to Bring
Laptop is recommended

CEUs Earned
2.4 credits
Objectives
This two-day training course is designed for participants to become proficient in application, installation, operation, maintenance, testing and commissioning of PCD Relays and OVR Reclosers.

Topics covered:
- Receiving, handling, and storage
- Installation
- Recloser assemblies
- Using AFSuite™ software
- Communications, programming, and troubleshooting
- Recloser operation and testing the PCD control
- Maintenance and adjustments

Participants Learn and Perform Hands-On
- Functionality of the settings
- Fast and efficient techniques for application
- How to minimize downtime
- How to optimize availability of resources
- How to maximize performance
- How to quickly and effectively test the control
- To decrease commissioning time with advanced features
- Proper setup for event capture and fault record recording

Prerequisites
Knowledge of distribution operation and protection principles

What to Bring
You will need to bring your own laptop that meets the following requirements:
- 256 MB of RAM or higher
- 30 MB of Hard Drive Space
- Windows NT 4.0, Windows 98 2nd Edition, Windows XP or Windows 2000 operating system
- Internet Explorer 5.50 or higher
- AFSuite™
- RS-232 serial port or USB port and USB to serial port converter RS-232
- Null modem cable

Participant Profile
Relay Engineers, Protection Engineers, Technicians, and Operators
Objectives
This three-day hands-on training course is designed for participants to become proficient in the application, installation, operation, maintenance, testing and commissioning of RER620 Relays and GridShield Reclosers.

Topics covered:
- Introduction of the GridShield recloser; high and low voltage cabinets
- Using the RER620 LHMI, WebHMI and COM600
- RER620 settings over WebHMI and Parameter Setting Tool
- Using the Graphical Display Editor to customize RER620 HMI
- Configuring the RER620 recloser application
- Relay protection applications
- Relay logic design with Application Configuration Tool
- DNP3 point remapping using the Communication Management Tool
- Understanding DNP3 objects, classes, variations, events and deadbands

Participants Learn and Perform Hands-On
- RER620 settings using the WebHMI and PCM600
- RER620 Application Configuration Tool for customized logic
- DNP3 serial and TCP communications

Participant Profile
Relay Engineers, Protection Engineers, Technicians, Operators, Dispatchers, SCADA and Communication Engineers

Prerequisites
Knowledge of distribution operation and protection principles

What to Bring
You will need to bring your own laptop that meets the following requirements:
- 2 GB of RAM or higher
- 30 GB of Hard Drive Space
- Windows XP or Windows 7 operating system
- Internet Explorer 7 or higher
- ASE2000 DNP3 key
COM600 Communication Gateway Configuration

Objectives
A three day training program designed for engineers and technicians to become proficient in installation, operation and configuration of the COM600 gateway/HMI. Our mission is to train a new and changing power utility work force to become experienced in ABB’s substation automation COM600 series product using personalized, hands-on training.

Training segments include:
- Hardware identification and configuration
- Operating the COM600, both locally and remotely
- License upgrades
- Configuration of master and slave communications
- Configuration of the HMI
- Implementation of the advanced features of the COM600
- How to use event and alarm lists
- How to use the Web HMI
- How to use advanced features of the COM600 such as historical data storage and IEC61131-3 active logic programming (emphasis will be placed on the implementation of the Fault Detection Isolation and Restoration (FDIR) algorithm unique to the COM600)
- Troubleshooting techniques

Participants Learn and Perform Hands-On:
- Where and how to apply COM600 in various applications
- How to set up the COM600
- How to set up communication networks for your specific application
- How to configure and apply HMI functions
- How to configure and apply functions utilizing ABB connectivity packages and templates
- Upload and download configurations to/from the COM600

Product Highlights
- COM600: Gateway and/or HMI
- Communication protocols including IEC61850, DNP and Modbus
- Simple configuration and commissioning
- Bottom up engineering approach

CEUs Earned
3.2 credits
Registration information

Please register for the course by using the registration form. Please make reservations at least four weeks before the start of the course, as we are only able to accept a limited number of participants on each course. We accept bookings in the order they arrive. To find course dates, please refer to the course descriptions or course schedule. You can email us at allschools@us.abb.com or visit us at www.abb.com/substationautomation (and click on Training, followed by USA - Transmission and Distribution products) for online registration.

Confirmation, facilities and accommodations
A confirmation will be returned upon receipt of your application with specific details about the hours, and location. We’ve negotiated the best rates available in each area during the ABB training program, please contact us for hotel information.

Cancellation and notice
If the course is cancelled or postponed, you will be informed at least one week prior to the course start. We reserve the right to postpone or cancel courses. If you need to cancel, please send an email to allschools@us.abb.com as soon as possible, but no later than two weeks prior to course start. The course fee will not be reimbursed to anyone canceling with less than two weeks notice from the scheduled course date.

Course certificate
Each participant will receive a course certificate upon the completion of the course.

Instructors and staff
Training is conducted by our professional instructors who are specialized in delivering the latest information and knowledge about the subject at hand.

On-Site and customized customer training
On-site and customized customer training sessions are offered upon request. We will gladly arrange courses at any agreed location. Our training staff will be happy to assist in the planning and organizing of your on-site or customized training requirements. Arrangements may also be made by contacting the Customer Support Department.

Course descriptions
Course descriptions concern standard courses only. For tailor-made courses please call +1 954-825-0633. ABB reserves the right to make changes to standard courses without notice.
## 2012 Course Schedule

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Price (USD) *</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Sept</th>
<th>Oct</th>
<th>Dec</th>
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<tbody>
<tr>
<td>SCH001</td>
<td>Symmetrical Components and Fault Analysis</td>
<td>$1,500</td>
<td></td>
<td></td>
<td>19-22</td>
<td>Coral Springs, FL</td>
<td></td>
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<tr>
<td>SCH002</td>
<td>Basic Relay School (Distribution Protection)</td>
<td>$1,500</td>
<td>15-18</td>
<td>Coral Springs, FL</td>
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<tr>
<td>SCH003</td>
<td>Power Systems Protection &amp; Coordination</td>
<td>$1,500</td>
<td></td>
<td>5-8</td>
<td>Coral Springs, FL</td>
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<tr>
<td>RPT006</td>
<td>Electromechanical relays and FT switches</td>
<td>$1,000</td>
<td>11-13</td>
<td>Coral Springs, FL</td>
<td></td>
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<tr>
<td>RPT009</td>
<td>COM600 Configuration</td>
<td>$2,000</td>
<td></td>
<td></td>
<td></td>
<td>11-12</td>
<td>Lake Mary, FL</td>
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<td></td>
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<tr>
<td>OVR001</td>
<td>Recloser and Recloser Control (OVR, PCD, AFSuite)</td>
<td>$1,000</td>
<td>10-11</td>
<td>Lake Mary, FL</td>
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<td>10-11</td>
<td>Lake Mary, FL</td>
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<tr>
<td>GSR001</td>
<td>GridShield Recloser and RER620 Applications</td>
<td>$1,000</td>
<td>1-3</td>
<td>Lake Mary, FL</td>
<td>17-19</td>
<td>Lake Mary, FL</td>
<td>18-20</td>
<td>Lake Mary, FL</td>
<td>4-6</td>
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* A multi-session 10% discount is granted on the total tuition fee of the same student registering to more than one class during the same calendar year. All schools are 3.5 days held in Coral Springs, except for OVR Recloser and PCD Control Application & COM600.
Webinars

To access webinar archives, please visit the Protective Relay Webinar Series page. More webinars will be added throughout the year. Please email allschools@us.abb.com or call us at 1-954-752-6700 for more information.
2012 School Registration Form

You can register for any course on-line or by faxing or mailing this form. To register on-line, go to www.abb.us/mvservice and click on Training. If you prefer, mail or fax this form to CORAL SPRINGS NO LATER THAN FOUR WEEKS PRIOR to the start of the school. Tuition fee must be paid ONE WEEK PRIOR to the first day of the school. Checks are to be made payable to ABB Inc. and sent to the attention of Education Dept. at the Coral Springs address below. Indicate the name of the attendee plus name and date of the school on the check stub. Please note that checks from foreign countries must designate “payable in U.S. Dollars”. Please fax your PO to +1 954-345-5329.

Arrangements
Course Name: ______________________________________________________
Course Date:__________ Course Location:______________________________
Tuition Fee: $________ Method of Payment:  ___Check ___Visa ___ Mastercard ___ Purchase Order #__________

Student Information
Name: ______________________________________________________________
(First Name)               (Initial)                   (Last Name)
Title: _______________________________________________________________________
Company: _______________________________________________________________________
(company name)
Company Address: _______________________________________________________________________
(street or P.O. Box number)
____________________________________________________________________________
(city)    (state)    (zip)
Phone:  ________________________________________________________________
(area code)  (number)
Fax:  ________________________________________________________________
(area code)  (number)
E-mail address: ____________________________________________________________

Highest Level of Education: _____
Work Experience in Protective Relaying: _____ Years

Return completed form to: Phone: +1 954-752-6700
Education Department Fax: +1 954-345-5329
ABB Inc. Toll Free: (800) 523-2620
4300 Coral Ridge Drive Email: allschools@us.abb.com
Coral Springs, FL 33065

Note: 1 ABB reserves the right to cancel at any time prior to the start of the school (with full refund to the applicant) in the event minimum class sizes are not met.
2 Please do not include your credit card information on the registration form. An ABB representative will call and confirm the registration and payment information.
Notes