GE Energy

XA/21* EMS Training Course Catalog

Growth through Knowledge

GE

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General Information

Introduction

The XA/21 Technical Education Program offers unique and comprehensive courses developed specifically to support the *XA/21 Energy Management System (EMS)* software applications. Courses are designed to meet the total needs of our customers including: software maintenance and enhancement, system development, system administration, database and display maintenance, end user applications, and operator monitoring and control of the system.

Staff

A team of full-time professional instructors and product engineers is available for the delivery of technical training. Instructors work closely with design engineers to actively maintain the courses they present. This ensures that the information provided is accurate and up-to-date in all areas. Additionally, our instructors are involved in the development of new course materials, bringing you information on recent advancements and areas of customer interest.

Class Schedule

Classes begin at 8:30 a.m. and continue until 4:00 p.m. (starting days and course durations vary among the courses, so please check the current course schedule for details). Courses typically have two scheduled breaks and a break for lunch. Most courses end by mid-afternoon on the final class day to allow for departures and travel. A knowledge assessment tools (e.g. quiz, exam, tutorial, etc) are included in the courses to help track the students' progress. Quizzes and exams are reviewed for the purpose of reemphasizing the highlights of the course and to allow students the opportunity to gauge their comprehension. This allows students to clear up any remaining questions or lack of understanding pertaining to the material covered. Training Certificates are awarded upon successful completion of each training course.

Language of Instruction

English is the standard language of instruction for all classes, both in Melbourne, FL and at the customer site. For classes in any other language, an interpreter must be provided and course customization charges will apply. Customers with language translation requirements should contact the Technical Education Center.

Course Development

The XA/21 curriculum is developed using the *ADDIE training development model*. Courses are designed to assist customers in expanding their knowledge of XA/21 applications and to optimize the practical use of the software, thereby gaining the best value for their business investment.

Technical Education Center

The Technical Education Center, in **Melbourne, Florida (USA),** is a dedicated facility, located just beyond the main NASA Blvd. office building. The Education Center was designed specifically for the delivery of technical training courses. Each classroom can comfortably accommodate from up to 12 students. All classrooms are equipped with overhead projectors, white boards and audiovisual capabilities. A primary goal of each training course is to offer students an interactive learning experience. Therefore, computers are distributed throughout the classrooms for instructor demonstrations, hands-on exercises, and student use. A light breakfast and afternoon snack is served. Alternate food choices are also available in the resident cafeteria. Additionally, a wide variety of restaurants are located in the vicinity of GE Melbourne.

Customer Site Training

Customers may request that many of the technical training courses be taught at their site. Customer site (also called "on-site") courses do not require a minimum number of students, however, it is recommended that customers have at least four students scheduled for attendance to host an onsite course. We provide an expert instructor and all necessary training documents. Customers are responsible for providing adequate equipment and facilities, including but not limited to: sufficient hardware, student workstations, appropriate software, software licenses, projection equipment, whiteboards and markers, flip charts, etc. Please contact the Technical Education Center to arrange for customer site training delivery.

Course Schedules, Registration, and Contact Information

To view a listing of regularly scheduled training courses, visit the XA/21 technical training website:
 http://www.ge-energy.com/prod_serv/products/technical_software/en/training.htm

Registration requests should be submitted to the education center no later than 10 business days prior to the scheduled begin date of any class. To ensure adequate access to the laboratory equipment, enrollment in many of the classes is limited. Seating for classes is reserved in the order that requests are received.

If online registration is not convenient, the registration form located in this document, may be faxed or mailed to the Technical Education Center. You may also contact the Technical Education Center at **(321) 435-5100** to make special training requests or to get more information.

Cancellation Policy

- GE may cancel classes with less than the minimum of four (4) registered students, no less than two weeks prior to the scheduled start of that class. Any enrolled students would be notified of the cancellation and optionally rescheduled for a later offering.

- Customer cancellation of student enrollments received less than two weeks prior to the start of the class will be subject to a cancellation fee equal to 50% of the tuition. If an enrolled student fails to appear for a scheduled class, a cancellation fee equal to 100% of the tuition will be charged.

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Training Course Registration Form

Complete this form. FAX, mail, or e-mail to:

GE – Melbourne
Technical Education Center
1990 West NASA Blvd.
Melbourne, Florida   32904

Ph: (321) 435-5100
Fax: (321 435-5659
Email: mailto:tectrain@ps.ge.com with **"TRAINING"** as the subject of the message.

Your Name: _____

Company: _____

Address: _____

_____

_____

City   State   ZIP

Telephone: (   ) _____

Fax Number: (   ) _____

E-Mail Address: _____

Course Name: _____

Course Date: _____

Student Name(s):

_____

_____

Method of Payment:
Purchase Order # _____ Please send a copy of PO with registration

Credit Card: **MC** _____ or **VISA** _____ → Credit Card payments require a special *Credit Card Information Form* to be completed and returned with the Registration. Please email or call to inquire.

Melbourne Area

Hotel Accommodations

Listed below are some of the hotel properties in the Melbourne area:

Melbourne Harbor Suites	(321) 723-4251	Crown Plaza Oceanfront	(321) 777-4100
Melbourne Hilton Rialto	(321) 768-0200	Doubletree Guest Suites Melbourne Beach Oceanfront	(321) 723-4222
Hilton Melbourne Beach	(321) 777-5000	Courtyard by Marriott	(321) 724-6400
Hilton Cocoa Beach Oceanfront	(321) 799-0003	Extended Stay Deluxe (Airport)	(321) 733-6050
Suburban Lodge (Airport)	(321) 768-9777	Hampton Inn (I95)	(321) 956-6200

Local Transportation

A variety of conveniently scheduled flights are available daily into the Melbourne International Airport (MLB) or nearby Orlando International Airport (MCO).

Public transportation in the Melbourne area is limited. Car rental is recommended for those attending classes at the GE facility. Car rentals are readily available from national agencies at either the Melbourne or Orlando airports.

Special arrangements can be made with local transportation companies (taxi, van, car service) for students without driver's licenses.

Visitors' Information

Melbourne Florida is home to several historic villages and neighborhoods, fine shopping, and diverse dining.   Additionally, there are many opportunities for "fun in the sun" such as: fishing, sailing, golfing, tennis, surfing, hiking, beach play, and airboat rides just to name a few.

Melbourne International Airport (MLB) is an approximately 8 minutes drive from the Atlantic Ocean, one mile from the Intra-Coastal Waterway and an easy drive to Port Canaveral Cruises, the Kennedy Space Center, Sebastian Inlet State Park and many wildlife refuges and preserves. Orlando, Disney, Universal Studios, Sea-World and other popular attractions are a one-hour drive from the Melbourne area.

The following website links can provide more information about Melbourne FL and the surrounding space coast area.

www.melbournefl.com   www.brevardcounty.com   www.space-coast.com
www.florida.com

Melbourne Area Map

The **GE Melbourne Technical Education Center is located at 1990 West NASA Boulevard** (behind the main GE Melbourne office), just west of the Melbourne Airport.
Phone number 321-435-5100.

General Directions: From Orlando International Airport, take Toll Road 528 (Beach Line Expressway) East to Interstate I-95. Go South towards Melbourne, FL. Exit East on Hwy. 192 (W. New Haven Blvd). Turn left on Evans Road (just west of the Melbourne Square Mall) and proceed to **1990 West NASA Boulevard**.

Local Map to GE - Melbourne
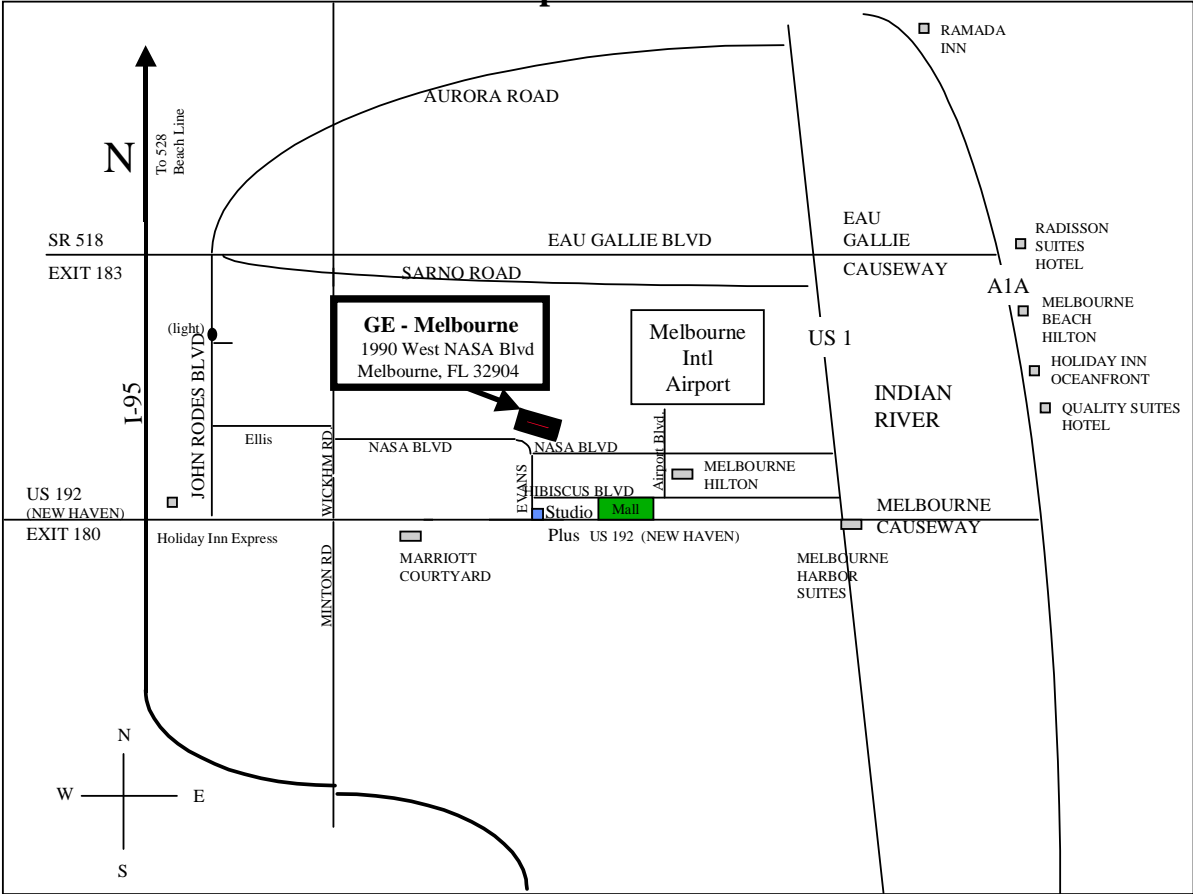
FROM ORLANDO AIRPORT TAKE State Road 528 East to I-95 South

Training Plans

XA/21 Energy Management Systems (EMS) Training Courses are arranged into the following categories based on common **roles and responsibilities** of the typical electrical power utility business. This organization is offered as a guideline to assist customers in selecting the best training plan for each employee and therefore for their business.

System Orientation – System overview and software architecture courses; The System Overview course is primarily for Project Managers, Senior Management, and Administrative support personnel who require a comprehensive high-level overview of the XA/21 EMS system. The Software Architecture course is designed for the system administration and support staff.

Database and Display Engineers – Technical classes that teach how to edit and maintain an XA/21 database and build graphical displays.

Software Developers/Engineers – Software intensive courses for staff who will be maintaining and enhancing XA/21 software at the customer site, such as software developers, engineers and programmers.

System Administrators and Communications Engineers – Technical instruction focused on the administrative duties required for the EnterNet Suite applications and the configuration, administration, and use of the ICCP (Inter-Control Center Protocol) software application.

Power Systems – Power Systems Engineering courses focus on the power systems applications (Network Analysis and Generation Dispatch and Control) of XA/21.

End Users – Operator/Dispatcher training typically performed at the customer's site after Final Acceptance Testing (FAT).

Workshops – Workshops span a variety of topics and are developed based on customer specific requirements. Workshops are not part of the standard XA/21 course schedule and are priced based on requirements and necessary preparation. Workshops require special scheduling arrangements and may be delivered either at the customer site or the Technical Training Center

Several of the XA/21 training courses are offered in two parts.

- **Part I** courses are considered basic or fundamental for understanding of the XA/21 system and are highly recommended for each member of the customer team who will be involved in implementing and supporting the XA/21 system (as appropriate based on roles and responsibilities).

- **Additional (Part II)** courses target specific technical areas of various software applications. Each additional course has a prerequisite *Basic Course* that must be completed prior to attendance in the ***Part II Course***. Part II courses may not be necessary for all members of the customer team.

The following pages contain course durations, prerequisites, descriptions, and course objectives for the technical training courses offered by GE Melbourne Technical Education Center.

Course Descriptions

System Orientation Courses

These courses are designed to provide an overview of the XA/21 EMS system and software architecture.

XA21 System Overview

Duration
1 - 3 Days as needed

Prerequisites

None

Description

This course provides students with a high-level comprehensive overview of the XA/21 EMS System. The system is logically broken down and studied from a functional viewpoint, using block diagrams of both hardware and software, and hands-on demonstrations to illuminate discussions. Each function's capabilities are explored to achieve understanding of what the system can do and how to apply its applications. Standard documentation is discussed as the roadmap to follow-on training for the XA/21 system. This course is typically taught onsite as a preliminary overview of the XA/21 System.

Objectives

Upon completion of the course, the participant will be able to:

- Use and understand XA/21 terminology
- Identify the major subsystems and their capabilities within XA/21
- Understand the distribution of the system data and identify where functions reside
- Find documents on a given topic

Software Architecture

Duration

4 Days

Prerequisites

Unix® Fundamentals
Windows® Fundamentals

Description

The purpose of this course is to provide a detailed introduction of the architecture of the XA/21 system. Software subsystems are broken down and discussed at a program level. This course serves as the foundation for the remainder of the courses offered by the GE Technical Education Center. The course is designed for students who will be modifying, maintaining and supporting the XA/21 system software. External interfaces such as hardware and user interactions are illustrated through lab demonstrations to further aid understanding.

Objectives

Upon completion of the course, the participant will be able to:

- Describe the overall functionality of the XA/21 System
- Describe the functions of the XA/21 subsystems (functional components) and of the XA/21 System
- Describe the XA/21 environment in terms of functional and physical nodes
- Determine a given program's subsystem and function
- Describe program interactions within various subsystems
- Identify the users of various database elements
- Identify the directory paths for source, header, configuration, and data files

XA/21 Database and Display Courses

These courses are recommended for support staff that will be configuring and maintaining the XA/21 database and building or maintaining system displays. These classes are usually needed early in the standard XA/21 training course sequence, thus preparing customers to configure, build and maintain their own database and displays.

Database Editor – Part I

Duration

2 Days

Prerequisites

Software Architecture for XA/21
Unix Fundamentals
SQL Basics

Description

This course is an introduction to the organization of the relational database for the XA/21 system. The concept of a relational database view is presented to provide the information required to populate the SCADA portions of the database. These tables include point tables (status, analog, accumulator, etc.), as well as the supporting tables required to incorporate customer requirements. The data is presented from the focal point of the database views as designed for the XA/21 system. This course trains the user on database editing operations using the XA/21 Database Editor, which provides a simplified, user-oriented picture of the underlying database. The class also covers bulk data loads into the database. Students use standard database batch files as examples on how to construct their own batch files. The presentation also encompasses utility support programs related to database maintenance and file integrity. Various database views are examined to identify the structure of the editing system and its related functional interfaces.

Objectives

Upon completion of the course, the participant will be able to:

- Demonstrate familiarity with XA/21 database terminology
- Identify and describe standard database views
- Initialize and use a database editor session to enter new data into the database
- Efficiently use both interactive and batch editing processes
- Demonstrate the use of the database editor search techniques

Database Editor – Part II

Duration

2 Days

Prerequisites

Database Editor – Part I

Description

The course focuses on the database views required for configuration of SCADA telemetry devices such as RTUs, communication devices, and associated point data. Students will perform a comprehensive hands-on tutorial in which an RTU and its supporting devices and data are configured in the XA/21 training Database environment.

This course may optionally be customized to match to the customer's actual RTU Protocol. Custom delivery arrangements must be made in advance if the customer chooses this option.

Objectives

Upon completion of the course, the participant will be able to:

- Identify the database views required to define SCADA telemetry devices such as RTUs, communication devices, and associated analog, status, and accumulator point data.
- Configure an RTU and related database items in the training environment
- View the newly defined RTU and related telemetry points via the standard dynamic data Display

Display Editor – Part I

Duration

1 Day

Prerequisites

Software Architecture

Description

The Display Editor Part I course provides a high level overview of user interface displays representative of a power control center's energy management, generation, and transmission networks through the use of instructor lead and demonstrations. The primary focus of the course is to discuss and practice the installation of the Display Build Facility (DBF) software required to run ACAD (2006) in the XA/21 environment. This course is intended for those who are responsible for the installation and support of the XA/21 Display Build Facility as it relates to AutoCAD (2006).

Objectives

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

- Participate in the planning process for designing and developing devices and displays that may be effectively utilized by the dispatcher/operator of a power control center
- Install the Display Build Facility (DBF) software
- Verify the functionality of the Display Build Facility (DBF) software with ACAD
- Recognize and verify the standard AutoCAD features supported in the XA/21 environment
- Run various XA/21 tools available for viewing the contents of the device and runtime displays

Display Editor – Part II

Duration

4 Days

Prerequisites

Software Architecture
Display Editor Part 1 or Familiarity with ACAD

Description

The Display Editor (with AutoCAD) course provides instruction to design and implement user interface displays representative of a power control center's energy management, generation, and transmission networks. The focus will be based on AutoCAD features applicable to the XA displays for power control centers. Dialog boxes, devices, AutoCAD to XA layer/page mapping, layer control, overlays and de-clutter are some of the features addressed. Using a step-by-step tutorial, the student will go through the processes necessary to build a typical SCADA energy management one-line display and a dynamic, high-level overview display. Display design concepts and specific display building techniques are reviewed and discussed. Creation of representative displays is incorporated into the course to enhance the student's comprehension of the material.

Objectives

Upon completion of this course, the participant will be able to:
- Participate in the planning process for designing and developing devices and displays that may be effectively utilized by the dispatcher/operator of a power control center
- Build representative energy management displays
- Identify and utilize the various display tools available for creating page based, world based, and list based displays
- Create system overview displays
- Modify existing displays
- Create commonly used electrical devices and XA dynamic cross references
- Recognize and verify the standard AutoCAD features supported in the XA/21 environment
- Run and utilize various XA/21 tools available for viewing the contents of the device and runtime displays

XA/21 Software Courses

These courses are recommended for EMS staff that support and manage software applications for the XA/21 system, as well as those personnel responsible for supporting applications that require user interaction with data definitions. Some courses require prerequisite knowledge, including Unix Fundamentals, SQL, and C Programming.

Software Tools & Utilities – Part I

Duration

3 Days

Prerequisites

UNIX, Software Architecture for XA/2, Database Editor – Part I

Description

This class presents the fundamental tools and utilities used to manage and make adjustments to XA/21 software. Topics include: system start-up procedures; node restarts; cparm and opchar entry modifications; database saves across cold starts (memos, tags, manual entries); disturbance data archives and transfers; User Interface audio files; User Interface configuration and administration; Logical Display Reference printouts; debugging files and methods.

Objectives

Upon completion of the course, the participant will be able to:

- Define the entries for the system configuration file used at XA/21 system start-up
- Determine and make changes to the operational characteristics (OPCHAR) of system executables
- Determine and make changes to the values of the current configurable parameter (CPARM) entries
- List which programs are included in the system initialization list (ILIST) entries
- Determine which system files will be distributed to configured nodes at system start-up
- Determine which database files will be distributed to each node at database initialization
- Determine the rate at which remote console (RC) database updates are performed
- Locate the directories and files used for system base history and database editor history
- Locate the directories and files used as audio resource files
- Locate the resource directory and files used by the User Interface (UI) functions
- Use CMS to incorporate changes to XA files
- Use debug to trace system software problems

Software Tools & Utilities – Part II

Duration

2 Days

Prerequisites

Software Tools & Utilities – Part I

Description

This class is a continuation of the Software Tools and Utilities Basic course. The Part II Course discusses additional, more advanced tools and utilities used to manage and make adjustments to XA/21 system operations in the Disturbance Data, Load Shed, and RDIGS User Interface subsystems. Topics include: Disturbance data archives and transfers; Load Shed group and control point definition; User Interface audio files; User Interface configuration and administration for RDIGS; Logical Display Reference printouts.

Objectives

Upon completion of the course, the participant will be able to:

- Define a disturbance data trigger
- Define a disturbance data transfer set
- Define a load shed group
- Define a load shed control point
- Locate the directories and files used as audio resource files for RDIGS
- Locate the resource directory and files used by the User Interface (UI) functions for RDIGS

Historical Data Collections with Time Series Builder

Duration

3 Days

Prerequisites

Software Architecture for XA/21
Database Editor – Part I
Oracle® SQL Basics

Description

The Historical Data Collections course offers instruction and hands-on exercises for engineering staff that maintain and use the Oracle based XA/21 Historical Database Subsystem. Topics discussed encompass the following; the Historical Database Subsystem Architecture, User Interface, Data Management, Collection Schedules for Aggregate Data, Data Processing for Simple Point Collections, Data Retention, Truncation and Archiving. This course includes discussion and hands-on practice for using the Time Series Builder (TSB) feature for forms and reports application development.

Objectives

Upon completion of this course students will be able to:

- Define Historical Subsystem tables and views using PL/SQL
- Enter and manage table definitions via the Historical Administration Form
- Use the database editor to establish and manage Collection Schedules for aggregate data
- Use text files to establish and manage Collections for non-aggregate point data
- Archive data from the Historical Subsystem to off-line storage
- Establish and monitor Retention and Truncation processing on Historical Data

Real Time Data Calculations

Duration

2 Days

Prerequisites

Software Architecture for XA/21
Database Maintenance - Basic
Unix
C Language Programming

Description

The Real Time Calculations course provides instruction and hands-on exercises for engineering staff that maintains and uses the XA/21 Real-Time Data Calculations Subsystem. Topics discussed include the Subsystem Architecture, Application Processes, User Interface, Real-Time Calculations database definitions, Standard and Custom Calculation functions and related macros and library calls.

Objectives

Upon completion of this course students will be able to:

- Explain the application processes required for RTC
- Use database editor to establish and manage I/O Set and Version definitions
- Apply standard calculation functions, macros and library calls for real-time calculation processing.
- Write custom calculation functions in C-language
- Use the required scripts for compiling and adding new calculation functions to the executable library
- Understand and apply quality propagation rules to custom calculation functions
- Locate and understand configuration entries used for this subsystem

Program Development for XA/21

Duration

10 Days

Prerequisites

UNIX; C Programming; Software Architecture; Software Tools and Utilities

Description

This course provides in-depth emphasis on the subsystems and interfaces useful for programming on the XA/21 system. Topics for discussion include system environment variables, implementation of makefiles, system base services (Portable Application Interfaces), System Communication Subsystem (SCS), program integration and in-line debugging macros. Additionally, writing interfaces to Distributed Graphics, Database Access, and Alarm/Events is included in the programming techniques discussed. Various C programming language projects are assigned to utilize the interfaces to these subsystems; an on-line development system is provided for program testing.

Objectives

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

- Identify design conventions of standard XA/21 level programs
- Write specific code to utilize various system services and library routines
- Execute system utilities that aid the programmer with implementation and development of programs
- Identify the characteristics of system programs and the techniques needed to add or modify additional programs
- Schedule and/or abort real-time programs, as well as query a program's status
- Write code that utilizes database access routines, including alarm/event interfacing
- Write a data collection routine that interfaces with a system graphic display

ClearCase® for XA/21

Duration

2 Days

Prerequisites

UNIX fundamentals; Software Architecture

Description

This course is intended for the new user of the IBM Rational® software configuration management tool ClearCase® (CC). The class is tailored for use of the CC product with the GE Energy Management System (EMS) XA/21™ software. The course will cover the basic operational commands of CC and how XA/21™ source code is controlled and distributed to customer sites.

Following topics discussions and demonstration of CC features, students will be directed to hands-on exercises to practice using the CC tools.

Objectives

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

- Explain what ClearCase is and how ClearCase works with XA/21
- Describe the VOBS and how it is used
- Perform various CC user and administrative functions including:
    - Snapshot
    - Check-out
    - Check-in
    - Views
    - Define a Config Spec
    - Labels
    - Branches
- Understand and administer Multi-site Configuration

System Administration & Communication Courses

These classes address administrative duties required to configure the EnterNet Suite User Interface applications, maintain several of the Oracle based XA/21 functions and the set-up and use of the ICCP communications protocol.

EnterNet Suite Administration

Duration

2 Days

Prerequisites

XA/21 System Overview or
Software Architecture

Description

This course is designed to teach the configuration and administration functions of the XA/21 EnterNet Suite User Interface. Hands-on exercises are used to learn and practice the configurable components of the ES UI.

Objectives:

Upon completion of the course, the participant will be able to:

- List the possible configuration options of the EnterNet Suite agent and server (single vs. multiple node).
- List the steps required to install the agent and server in the desired node configuration.
- List the steps to install the Java software if required.
- List the steps to install the Java WebStart software if required.
- List the steps to install the EnterNet Suite client on a PC.
- Perform administration functions to add, modify, and delete control and view-only users.

Inter-Control Center Communications Protocol (ICCP)

Duration

3 Days

Prerequisites

UNIX Fundamentals

Description

This course provides information and hands-on exercises that will enable the student to understand ICCP associations and define them in an XA/21 database. Students will configure the PC and XA/21 ICCP software, and use various utilities to effect datalink transfers.

The class includes an overview of the TASE.2/ICCP and MMS standards, an explanation of the mapping between TASE.2 objects, and the XA/21 database; procedures to configure the ISO network software; procedure to populate the XA/21 database for ICCP associations; and the actual transfer of data between two (fictional) control centers. The class will enable Engineering/ Programming staff to configure the XA/21 system ICCP software and to initialize and use the ICCP datalink.

Objectives

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

- Define the essentials of bilateral table agreements
- Define the relationship of ICCP and TASE.2 (IEC) standards to MMS
- Define the relationship between ICCP objects and XA/21 database entities
- Identify and define ICCP Block transfers between control centers
- Configure the XA/21 database and OSI stack to accomplish an ICCP transfer
- Describe the OSI layers of the network protocol
- Configure ISO network software
- Determine the type of block (1-9) required for a specific transfer task
- View the results of a block transfer
- Add and delete ICCP transfer sets
- Use the ICCP Administration Utility to start and stop transfers
- Examine Data Link Logs to view datalink historical activity

Power Systems Engineering Courses

The following Power Systems Engineering courses are intended for Power Systems Engineering staff. Course discussions include theory on power engineering topics plus hands-on exercises for the XA/21 Power Systems applications.

Generation Dispatch & Control (GDC) – Part I

Duration

3 Days

Prerequisites

Knowledge of power systems operations is desirable

Description

This course gives an overview of the theory, function and use of the GDC subsystem software. Discussion topics include:

- Automatic Generation Control, (AGC)
- Generation Dispatch,
- Reserve Monitoring,
- AGC Performance Monitoring and NERC Reporting,
- Production Costing and Reporting,
- System and Unit Tuning and Response Testing,

Objectives

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

- Identify the functions of the principle GDC component programs
- Identify the input variables to the Area Control Error (ACE)
- List the control modes for generating units and describe the impact of the control mode on Generation Dispatch
- Perform mode changes for system and unit components via GDC display interaction

Hands-on lab experience reinforces the topics discussed in class.

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Generation Dispatch & Control (GDC) – Part II

Duration

2 Days

Prerequisites

GDC – Part I course
Knowledge of power systems operations is desirable

Description
This course gives an overview of the theory, function and use of the GDC subsystem software.
Discussion topics include:

- Interchange Scheduling, (IS)
- Inadvertent Reporting,
- Load Forecasting (SDF or DF),
- Unit Commitment/Transaction Evaluation, (UC/TE)
- Comprehensive Operational Planning and Scheduling (COPS) including:
  - Optimization and constraints (Fuels, Emissions, Hydro)
  - Long Term Planning and Analysis Functions

Objectives:

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

- Identify input functions for Interchange Scheduling
- Identify the interfaces for Load Forecasting
- Identify the major functions associated with the Unit Commitment/Transaction Evaluation
- Identify the major functions associated with the Comprehensive Operational Planning and Scheduling

Hands-on lab experience reinforces the topics discussed in class.

Transmission Security Management (TSM) – Part I

Duration

3 Days

Prerequisites

Knowledge of power systems operation is desirable

Description

This course gives an overview of the theory and use of the TSM subsystem software.
Discussion topics include:

- Network Modeling
- TSM Subsystem Architecture
- Network Configuration
- State Estimation
- Power Flow
- Contingency Analysis

Objectives

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

- Identify the functions of the principle TSM component programs
- Run Real-Time Network Analysis and identify violations
- Initialize a Study Case and run Study Network Analysis with hypothetical situations such as generating unit outages)
- Run Real-Time and Study Contingency Analysis and call up the resulting displays to determine current and potential network problems
- Store case studies for future retrieval and analysis

Hands-on lab experience reinforces the topics discussed in class.

Transmission Security Management (TSM) – Part II

Duration

2 Days

Prerequisites

TSM - Part I Course
Knowledge of power systems operation is desirable

Description

This course gives an overview of the theory and use of the TSM subsystem software. Discussion topics include:

- Security Constrained Dispatch
- Voltage/VAR Scheduling
- Remedial/Preventative Action
- Fault Level Analysis

Objectives:

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

- Use Real-Time and Study Optimization Functions to develop plans for meeting specific operating objectives, subject to system constraints
- Use Real-Time and Study Remedial/Preventative Action functions to develop plans for minimizing the effects of harmful contingencies on the power system

Hands-on lab experience reinforces the topics discussed in class.

End User Courses

These courses are typically conducted at the customer site. Each control room operator is preferably trained at a single workstation, thus allowing for maximum hands on exposure during the training session.

SCADA Operator

Duration

2.5 Days per session or 3 days per session with NERC CEH Option

Prerequisites

Basic knowledge of local operating requirements, constraints, and procedures of control systems is necessary. It is suggested that this course be offered prior to commissioning the system. We highly recommend 1 student per workstation, depending on customer requirements.

Description

This course is designed to teach control room operations staff the operation and use of the SCADA features of an XA/21 workstation using the Graphical User Interface (GUI) Application specific to the customer (X®-Windows Motif® or EnterNet Control). Training is at a customer site on customer workstations This course is instructed using extensive hands-on exercises.

Objectives

Upon completion of the course, the participant will be able to:

- Call up SCADA displays in various ways
- Set-up the display screen in a desired configuration, in order to view several displays in separate Viewports
- Perform status point selection and device control
- Perform analog point selection and data entry
- Perform tag placement, modification, and deletion
- Display summary information of alarms, abnormal conditions, and tagged points
- Acknowledge and delete alarms
- Assign data points to video trend variables

TSM Operator

Duration

2.5 Days per session or 3 days per session with NERC CEH Option

Prerequisites:

SCADA Operator Training

Description

This course identifies all functions related to Transmission Security Management (TSM) Operations, Equipment Outage Scheduler (EOS), and Network Status Processor (NSP). The course gives a hands-on overview of the functionality, capabilities, and utilization of those functions.

Hands-on lab exercises and demonstrations are included to reinforce the topics covered in class.

Objectives

- Identify the principle TSM, NSP and EOS functions
- Identify different modes of TSM operation
- Interpret State Estimator outputs
- Set up and analyze present and postulated system operating conditions
- Perform "what if" study
- Identify the schedule of power controls that optimizes a specified objective while simultaneously satisfying system operating constraints for a study case
- Identify the strategy for responding to the occurrence of a contingency for a study case
- Identify a list of actions to prevent the hazardous conditions in the event that the contingency case becomes reality for a study case
- Interpret TSM outputs
- Operate TSM displays
- Interpret NSP outputs

GDC Operator

Duration

2.5 Days per session or 3 days per session with NERC CEH Option

Prerequisites

SCADA Dispatcher

Description

This course identifies all the Power System Analysis functions related to Generation Dispatch and Control (GDC) and Interchange Scheduling (I/S) operations. It gives a hands-on overview of the functionality, capabilities, and utilization of those functions.

Hands-on lab exercises and demonstrations are included to reinforce the topics covered in class.

Objectives

- Identify the principle GDC functions
- Identify the input components to the Area Control Error
- List the unit control modes for generating units and the impact of the control mode on the Generation Dispatch
- Perform AGC Tuning and Unit Response Testing
- Identify the reserve categories
- Identify the principle interchange schedule components
- Enter interchange schedule through the I/S user interface

Dispatcher /Operator Training Simulator (DTS/OTS)

Duration

2.5 Days per session or 3 days per session with NERC CEH Option

Prerequisites

SCADA Operator
Generation Dispatch & Control – GDC Part I
Transmission Security Management – TSM Part I

Description

The participants will learn the functions of the Dispatcher/Operator Training Simulator to train other operators in a real-time simulation of an energy control center's daily environment. Engineers will become versed in the instructor-simulator interface and the procedures involved in the set-up and execution of a model simulation.

Objectives

Upon completion of the course, the participant will be able to:

- Set-up a simulation scenario and to initialize the simulation
- Store scenarios for future simulation sessions
- Demonstrate the use of the instructor interface to simulate system conditions and disturbances
- Set-up a list of events (generator outages, breaker changes of state, etc.) to occur during a training simulation session according to a specified time schedule or conditional events
- Demonstrate basic skills and knowledge necessary to use the DTS system for training dispatchers for both normal and emergency operating conditions, planning for scheduled equipment outages and planning, emulating, and training for future system scenario

Workshops

Workshops are designed based on customer specific requirements and are not part of the standard XA/21 course schedule.   Workshops are priced based on specific delivery requirements and necessary preparations and must be arranged by special request.

The following workshops are offered:

- Refresher Training for Effective Use of XA/21
- Industrial Defender™ for XA/21
- Database and Display Maintenance
- Power Systems Applications Advanced Topics

Workshops can be taught at the customer site or at the Technical Training Center. Please contact the Technical Training Center to arrange the delivery of a Workshop.

XA/21 Refresher Training Workshop

Duration
1 - 3 Days as needed

Prerequisites

XA/21 System Knowledge

Description

The XA/21 Refresher Training Workshop[2] is intended for existing XA/21 customer who have the need for refresher training in various topics of the XA/21 EMS system. The course is highly customized for each delivery as it provides students with hands-on training of the XA/21 EMS System applications based on the customer's specific needs.

Prior to preparation and delivery an instructor will consult with the customer to determine the areas of XA/21 to be included in the workshop. The consultation will guide the instructor to determine how much detail will be covered in each discussion topic. Topics and content may be used from existing courses or new content may be developed.   Course duration will be determined based on the customer's needs and a mutually agreed upon curriculum for the delivery.

Call and schedule a Refresher Training Consultation with a technical instructor to determine the best Refresher Training Plan for your business needs.

Note: ***This workshop is priced at a special rate and is not a standard course delivery.***

Prerequisite Subject Matter

Following is a list of topics and subject matter that is considered prerequisite knowledge for various XA/21 technical training courses and workshops described in this catalog.

Please note that these courses will not appear on the XA/21 course schedule.

- Unix Fundamentals
- Networking Fundamentals
- C Programming Language
- Java Programming Language
- Oracle Database Administration
- Oracle System Administration

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