



**2010 Schedule**  
**AMETEK Solidstate Controls**  
**UNIVERSITY**  
**Offering Technical Training Classes**  
**for UPS Systems & Batteries**

## TRAINING OBJECTIVE

More than ever, plant personnel are being challenged with the maintenance and repair of the Uninterruptible Power Supply (UPS) systems in their plants. In order to do this efficiently, without risking plant operations, personnel require hands on training for their UPS systems. The objective of our training seminars is to teach the basic information needed in order to keep these UPS systems and their associated Stationary Batteries in top condition to prevent catastrophic failures and downtime.

## OUR TRAINING PHILOSOPHY

Our training philosophy is to provide qualified instructors to teach the basic technical knowledge needed at a level the students can understand. Thus, plant personnel can return to their jobs with the knowledge and confidence to work on their UPS equipment.

## WHO SHOULD ATTEND?

Our seminars are intended for anyone involved with industrial grade critical power and battery systems, including maintenance technicians, planners, supervisors, plant engineers, operators and facility managers.

## WHY SHOULD YOU ATTEND?

Our seminars are customized for the applications and equipment that you have on site. We understand your business and develop the content accordingly.

## WHO TEACHES THE SEMINAR?

Our instructors are seasoned technicians, engineers, and consultants with many years of field experience. They blend their knowledge of operating theory with their real world field experience to provide a learning environment that is ideal for plant personnel.

**Don Imlay** is the technical training manager at AMETEK Solidstate Controls. He presents most of the electronics training seminars. Don has over 30 years of experience with critical power systems. He has served as a final test technician, service manager, and design engineer. He has traveled extensively to 1000's of sites to service and maintain their critical power systems. Don has instructed over 200 training classes on critical power systems.

**Marco Migliaro** teaches the stationary battery classes and has been employed in the electric utility industry for over 35 years. He provides a wide range of consulting services in the areas of DC power systems, Stationary Batteries and UPS systems to both end-users and battery manufacturers. He is a member of the IEEE Power Engineering and Industry Applications Societies and is the President and CEO of the IEEE-ISTO. He is a member of the IEEE PES committee on Stationary Batteries. He served as Chapter Chairman for the revision of Chapter 5

*Stored Energy Power Systems*, in the IEEE Standard 446-1995 (the Orange Book).

## EXPECTED OUTCOMES

At the time of registration, we ask for the serial number(s) of the systems in your plant. We use this information to customize the seminars to match the needs of the persons attending. Upon completion of the seminar you will have the basic knowledge and skills to handle routine operation, maintenance, and troubleshooting of the system in your plant. ***Class sizes are limited so that individual attention can be given to address specific needs of each attendee and allow them to participate in discussions, demonstrations and hands on troubleshooting.***

## COURSE OVERVIEW

### ***Uninterruptible Power Supply (UPS)***

Many of the people attending the UPS classes have some previous electronics training but may not have used it recently. With this in mind, the class starts out by identifying components such as capacitors, diodes, IGBTs, etc. A simple explanation of the fundamentals for each device is covered. Actual components are used for visual inspection. Students use a DVM to identify failed components. After the basic components are understood, then one-line diagrams are presented showing the major blocks (rectifier, inverter, static switch, etc.). When functioning systems are available they are used to enhance the understanding of the one-line diagrams by allowing students the opportunity to go through startup, shut down, and emergency procedures.

Once the normal operation of the equipment is understood, we use drawings and schematics to attack each block of the system. We identify the electrical/electronic components and their function. Design theory is briefly covered to understand the basic operation while minimizing formulas, calculations, and design equations. Much of the remainder of the presentation emphasizes troubleshooting techniques. Specific topics covered include:

### **SYSTEM OVERVIEW**

- Rectifier
- Inverter
- Static switch
- Manual bypass switch

### **RECTIFIER/CHARGER**

- Phase angle control
- Input transformer & breaker
- Rectifier bridge
- Control circuits
- Output filter
- Adjustments
- Alarms

### **INVERTER/STATIC SWITCH**

- Input filter
- DC switching circuits



- Output voltage regulation
- Current limit/protection circuits
- Synchronizing circuits
- Static switch transfers

#### **TROUBLESHOOTING**

- Component identification
- Component replacement techniques
- Real world examples

#### **PREVENTIVE MAINTENANCE**

- Annual 1-year, 5-year and 10-year maintenance
- Component replacement
- Readings and calibrations

#### **STATIONARY BATTERY SEMINAR**

Many battery problems may go unrecognized for long periods of time before a failure occurs. When asked why there are two whole days of battery maintenance training, our response is "unfortunately we only have two days to talk about Stationary Batteries." The battery seminar will provide you with the tools to properly install, maintain, and test all of your battery systems. Problems will be identified and help will be given to correct problems so that surprises can be avoided. The topics covered are:

#### **PARAMETERS**

- Valve regulated (VRLA) and vented cell differences
- Cell anatomy
- Charging
- Effects of temperature

#### **INSTALLATION**

- Safety equipment and procedures
- Receiving and storage
- Installation steps
- Acceptance and baseline testing
- Disposal of old Stationary Batteries

#### **MAINTENANCE**

- Safety equipment and procedures
- Inspection frequencies and types
- Visual checks
- Types of checks
- Types of battery problems

#### **DISCHARGE TESTING**

- Types of discharge tests
- Procedures for testing
- Interpreting test data

#### **HANDS ON TROUBLESHOOTING**

By far, the most common request is for real hands on troubleshooting with fully functional systems. With this in mind our seminars strive to provide as much hands on work as possible.

#### **TRAINING SEMINARS LOCATIONS: HOUSTON, TX**

Our regional field office in **Houston, TX** houses the official training center for AMETEK Solidstate Controls. At the training center we have new and recycled UPS and battery systems dedicated for training. Many of the systems have been modified so that faults and malfunctions can be easily simulated. ***The Houston Training Center provides the best opportunity for hands on training.***



#### **COOSA VALLEY TECHNICAL SCHOOL**

In cooperation with Georgia Power (the Atlanta area), we now have a complete Ferroresonant UPS training facility available. This location offers the best possible hands on training for our Southeastern Clients who utilize our Ferroresonant equipment.

#### **NEW ORLEANS, LA**

This seminar will be held in a conference center. Due to limited availability of electrical power, detailed hands on troubleshooting will be limited. Troubleshooting is discussed in the classroom. However, the emphasis is on preventive maintenance procedures. Mock-up UPS systems and simulators will be used for hands on work.



#### **ONSITE TRAINING**

Training can also be provided at your facility. We will be happy to work with your training coordinator to meet your needs.

Rental equipment can be provided if suitable power is available. Training can be scheduled to coincide with start-up and commissioning of new installations.



## Testimonials

### Kevin W:

"The Instructors know the subject very well and were able to answer any question (we came up with). They were easy to listen to, engaged the class, and were open to any question- good class, I learned a lot."

### Thane T:

"The battery course with the battery instructor was very in-depth and the UPS course was outstanding."

### Wade W:

"The instructor was extremely knowledgeable and set the pace for learning."

### Joshua S:

"The hands on experience was great. Classroom information was very informative and accompanied with Good handouts. The Instructor was very knowledgeable."

### Colton E:

"Hands on training and troubleshooting was very useful."

### Mike B:

"Very detailed, yet full of useful information for diagnostics, operations, troubleshooting, and repair work."

## 2010 Seminar Schedule

DATES	LOCATIONS	COURSE TYPE	COMMENTS
March 9 – 12	New Orleans, LA	Stationary Battery, UPS Overview & Operation	Seminar begins on Tuesday at 8:00 AM and concludes Friday at 4:00 PM
May 17 – 20	Houston, TX	Digital Process Power UPS & Stationary Battery	Seminar begins on Monday at 8:00 AM and concludes Thursday at 4:00 PM
May 17 – 21	Houston, TX	Ferroresonant UPS & Stationary Battery	Seminar begins on Monday at 8:00 AM and concludes Friday at noon.
June 7 – 11	Atlanta, GA	Ferroresonant UPS & Stationary Battery	Seminar begins Monday at 12:00 PM and concludes Friday at noon
August 9 – 12	Houston, TX	Digital Process Power UPS & Stationary Battery	Seminar begins on Monday at 8:00 AM and concludes Thursday at 4:00 PM.
August 9 – 13	Houston, TX	Ferroresonant UPS & Stationary Battery	Seminar begins on Monday at 8:00 AM and concludes Friday at noon.
November 8 – 11	Houston, TX	Digital Process Power UPS & Stationary Battery	Seminar begins on Monday at 8:00 AM and concludes Thursday at noon.
November 8 – 12	Houston, TX	Ferroresonant UPS & Stationary Battery	Seminar begins on Monday at 8:00 AM and concludes Friday at noon.

Note: About 98% of all inverters built by AMETEK Solidstate Controls prior to 2003 are of the Ferroresonant type. Since 2003 both Ferroresonant and Digital Process Power (DPP) equipment have been built. Ferroresonant systems are characterized by panel meters on the front door. DPP systems are characterized by a touch screen on the front door.

**PLEASE NOTE: Class size will be limited to encourage active participation.**

### SEMINAR FEES PER PERSON:

Seminar Location	Four Day Training Seminar (2 days Battery & 2 days UPS)
Houston, TX	\$1,995
New Orleans, LA	\$2,195
Atlanta, GA	\$2,195

Fees include registration, course materials, continental breakfast, lunch, snacks and individual consulting time with the instructor.

Fees **do not** include travel and living expenses for the attendees. However, contact AMETEK Solidstate Controls for details regarding hotel accommodations before booking a room, in order to take advantage of recommended hotels and special rates

AGENDA	
7:30 AM	Continental Breakfast, Introductions
8:00 AM	Seminar begins
12:00 – 1:00 PM	Lunch (catered)
4:30 PM	Seminar concludes

There will be breaks in the morning and afternoon as required. Refreshments and snacks will be provided throughout each day.

**DEADLINE for enrollment is 15 days prior to seminar date.**

### Contact Information

**AMETEK Solidstate Controls**  
875 Dearborn Drive  
Columbus, OH 43085-9742  
Phone: 614-846-7500  
Fax: 614-785-7062

E-mail: [tech.training@ametek.com](mailto:tech.training@ametek.com)

Website for online registration: [www.solidstatecontrolsinc.com/seminar.html](http://www.solidstatecontrolsinc.com/seminar.html)