Workshop Summary

MAINTENANCE AND TROUBLESHOOTING OF UPS SYSTEMS (Uninterrupted Power Supply) AND BATTERY POWER SUPPLIES

Objectives
At the end of this workshop participants will be able to:

- Describe the basic building blocks of UPS Systems
- List typical Power Quality Problems
- Detail the operation of the popular UPS Systems
- Maintain and test Lead Acid and Nickel Cadmium Batteries
- Apply Safe working practice for UPS’s and Batteries

Who should attend?
Maintenance Tradespeople & Technicians
Instrumentation and Control Engineers
Consulting Engineers
Electrical Engineers
Project Engineers
Maintenance Engineers

Power System Protection and Control Engineers
Building Service Designers
Data Systems Planners and Managers
Electrical and Instrumentation Technicians

Pre-requisites:
Some working knowledge of basic electrical engineering principles is required, although this will be revised at the beginning of the course. Real-life experience in working with batteries and UPS systems will enable the workshop to be placed in context.

Accrediation
Satisfactory completion of the two-day version of this course satisfies the requirements of the International Association for Continuing Education and Training for the award of 1.4 Continuing Educations Units. The course also satisfies criteria for Continuing Professional Development according to the requirements of the Institution of Electrical Engineers and Institution of Measurement and Control in the UK, Institution of Engineers in Australia, Institution of Engineers New Zealand, and others.

Companion courses:
IDC courses which will enhance the knowledge gained from this workshop include:

- Practical Electrical Power Distribution
- Practical Variable Speed Drives for Instrumentation and Control Systems
- Practical Earthing/Grounding, Bonding, Lightning and Surge Protection of Electrical and Electronic Systems and Equipment
- Practical Power Quality: Problems and Solutions
- Practical EMC & EMI Control for Engineers and Technicians
- Practical Electrical Troubleshooting and Problem Solving
Introduction
♦ Overview of course
♦ Why have a UPS

Types and Duration of Power System Disturbances
♦ Sags
♦ Surges and Spikes
♦ Power Quality

Review of Electronic Components
♦ Volts/Ohms and Amps
♦ Phase Relationships
♦ Resistors/capacitors/inductors/RLC circuits in series and parallel
♦ Diodes/Transistors/Thyristors/SCR’s/TRIACs/IGBT’s/Op Amps

Introduction to UPS’s
♦ Power conditioners
♦ Uninterruptible power systems
♦ Power quality source alternatives
♦ Power disturbance cost comparisons

Three General Types of UPS’s
♦ Kinetic (Motor Generator Sets)
♦ Flywheel
♦ Static and Components
  ♦ Rectifier
  ♦ Batteries
  ♦ Inverter

Three types of Static UPS’s
♦ Traditional UPS
♦ Static UPS
♦ Static UPS with Bypass

UPS Topologies
♦ Single Phase Rectifiers
♦ Single Phase Inverters
♦ Three Phase Rectifiers
♦ Three Phase Inverters

Troubleshooting and Maintenance of UPS Systems
♦ Manufacturers Recommendations
♦ Tools and Equipment
♦ Electrical Safety
Introduction to Batteries
♦ Primary Batteries
♦ Secondary Batteries

Lead Acid Batteries
♦ Chemistry
♦ Different types
♦ Capacity Factors
♦ S-Curves
♦ Battery Safety and Maintenance
♦ Float and Equalize Voltages
♦ Load Testing

Nickel Cadmium
♦ Chemistry
♦ Battery Types
♦ Capacity Factors
♦ Battery Safety and Maintenance
♦ Float and Equalize Voltages
♦ Load Testing

Case Studies
♦ Selection and Sizing
♦ Batteries
♦ UPS’s
♦ Batteries and UPS’s

Summary, Open Forum and Closing