
Practical

GROUNDING/EARTHING, BONDING, LIGHTNING & SURGE PROTECTION

of Electrical and Electronic Systems & Equipment



YOU WILL LEARN HOW TO:

- Apply good grounding practice to your next installation
- Minimise electrical surge problems due to Lightning and surges
- Protect sensitive electronic equipment from surges and lightning
- Correctly shield sensitive systems from noise and interference

WHO SHOULD ATTEND:

- Instrumentation & Control Engineers
- Consulting Engineers
- Electrical Engineers
- Project Engineers
- Maintenance Engineers
- Electrical Contractors
- Safety Professionals
- Consulting Engineers
- Electricians
- Electrical Inspectors
- Power System Protection & Control Engineers
- Building Service Designers
- Data Systems Planners and Managers
- Electrical and Instrumentation Technicians



Technology Training that Works

THE WORKSHOP

Few topics generate as much controversy and argument as that of grounding and the associated topics of surge protection, shielding and lightning protection of electrical and electronic systems. Poor grounding practice can be the cause of continual and intermittent difficult-to-diagnose problems in a facility. This workshop looks at these issues from a fresh yet practical perspective and enables you to reduce expensive downtime on your plant and equipment to a minimum by correct application of these principles.

This workshop is designed to demystify the subject of grounding and presents the subject in a clear, straightforward manner. Installation, testing and inspection procedures for industrial and commercial power systems will be examined in detail. Essentially this course is broken down into grounding, shielding and surge protection for both power and electronics systems. Grounding and surge protection for Telecommunications and IT systems are examined in detail. Finally, the impact of lightning is examined and simple techniques for minimizing its impact are described.

PRE-REQUISITES

Some working knowledge of basic electrical engineering principles is required, although there will be a revision at the beginning of the workshop. Experience with grounding problems will enable the workshop to be placed in context.

WORKSHOP OBJECTIVES

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

- Apply the various methods of grounding electrical systems
- Detail the applicable national Standards
- Describe the purposes of grounding and bonding
- List the types of systems that cannot be grounded
- Describe what systems can be operated ungrounded
- Correctly shield sensitive communications cables from noise and interference
- Apply practical knowledge of surge and transient protection
- Troubleshoot and fix grounding and surge problems
- Design, install and test an effective grounding system for electronic equipment
- Understand lightning and how to minimize its impact on your facility
- Protect sensitive equipment from lightning

THE PROGRAM

DAY ONE

INTRODUCTION AND BASICS

- Fundamentals of grounding
 - bonding
 - lightning
 - surge protection
 - shielding

RECOMMENDED DESIGN AND INSTALLATION PRACTICES

- Wiring and grounding for safety and performance
- Wiring and distribution systems
- Dedicated and derived neutral systems
- Grounding and bonding equipment

FUNDAMENTALS OF GROUNDING FOR BUILDING ELECTRICAL SYSTEMS

- Grounding of building systems
- Which electrical systems can be operated ungrounded
- Proper methods of grounding building electrical systems
- Location of the service grounding connection
- Proper sizing of grounded (neutral) conductors

TYPICAL RULES TO BE APPLIED

- Rules for multiple services to one building
- Rules for low impedance and high impedance systems
- Rules for bonding requirements at building service equipment
- Grounding electrodes, systems and conductors
- Bonding enclosures and equipment
- Equipment grounding conductor types
- Enclosure and equipment grounding
- Grounding of separately derived systems
- Grounding at more than one building
- Disconnecting means for separate buildings

DAY TWO

GROUNDING AND NOISE CONTROL

- Misconceptions of performance grounding
- Single point versus multi point techniques
- Noise and zero signal reference grid
- Avoiding non recommended practices
- Shielding

ELECTRICAL FAULTS

- Ground fault circuit interrupters
- Equipment ground fault protection systems

APPLICATIONS OF GROUNDING AND BONDING

- Grounding and bonding in hazardous (classified) locations
- Grounding and bonding for health care
- Grounding and bonding for swimming pools, hot tubs and spas
- Static and electricity: grounding and bonding requirements
- Common violations
- Building electrical inspection procedures
- How to recognize hazards

LIGHTNING

- Need for a lightning protection system
- Which protection systems work and which don't
- Best location for IT equipment
- Optimum grounding for building
- Pitfalls of isolated grounding
- Shielding and bonding of electronics and communications
- Optimum location of surge protection devices

SURGE AND TRANSIENT PROTECTION

- Lightning phenomena
- Protection of power supply
- Protection of electric communications circuits
- Power system faults and switching surges
- Mitigation techniques
- Case studies

POWER CONDITIONING

- Power conditioners
- Uninterruptible power systems
- Power quality alternative sources

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Great learning experience.

Winton James

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ON-SITE TRAINING

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- ✓ Customise the training to **YOUR** workplace.
- ✓ Have the training delivered when and where you need it.

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