# Hands-On Central Office DC Power & Grounding Virtual Live



Virtual Live Instructor-led or Available On-Site

# **Course Description**

This extensive 2-day "Live" Instructor-Led (On-Site or Virtual) course is designed for Central Office Technicians or others with the responsibility for the installation, maintenance, troubleshooting, and repair of Central Office power equipment. The course provides a well rounded basic study of Central Office power that most technicians work with on in their regular duties. Theory is effectively combined with a practical hands-on approach that enhances the students' learning experience.

Upon successful completion of the course, students will have a solid foundation in how all CO power systems are interconnected, safety around those systems, how to locate key type of equipment, and perform both routine and as needed maintenance and troubleshooting.



#### Topics include

- DC Rectifiers, Battery chemistries and their maintenance, DC Power Boards
- DC Inverters
- Ground Return Paths within the CO and to the outside commercial power network
- Dangers including high-amperage paths, open grounds, lead reversals, etc.
- Breaker, Fuse, and Disconnect panels and their locations
- Interconnections to the commercial AC network including the transfer switch and generators
- Types of Test Equipment
- Testing for low or high voltages, ripple current, regulation
- Telcordia (formerly Bell-Core) best practices, plus common regulatory agencies
- And much more, including topics of particular interest to students.

# **Students Will Learn**

- CO Power concepts including electrical fundamentals of L, C & R
- Interconnected Grounds How DC & AC grounds are related

- Disconnects AC & DC interrupts to halt current flow
- Breakers & Fuses including primary & 'tell-tale'
- DC Wiring Schemes A/B Feeds, Wire Gauges
- Batteries & Their Connections including charging vs. equalizing
- DC Rectifiers traditional vs. switching designs, features, load-sharing
- DC Grounding zones bus bar types, isolated/IGZ, etc.
- DC volt & ammeters high-current, clamp-on vs. in-circuit
- Safety including opens, loose connections, return paths
- Test & Maintenance battery maintenance, DC & grounding checks
- · Troubleshooting by previous examples
- And much more

#### **Target Audience**

Vendors and telecommunications personnel (incl. engineers, planners, supervisors and technicians) responsible for Central Office equipment installation, maintenance, troubleshooting & repair.

## **Prerequisites**

An understanding of basic electrical concepts, telecommunications equipment terminologies and OSP Bonding & Grounding is recommended. BTS courses meeting these prerequisites include our

- Basic Electricity
- TeleCom I
- OSP Bonding & Grounding
- CO Bonding & Grounding

#### **Course Outline**

#### Module 1: CO Power Concepts

Safety - What Could Go Wrong?

AC & DC Electrical Principles

Electricity & Grounding

- AC & DC returns
- Earth as a conductor

Voltage & Current

# - AC vs. DC

- Series & Parallel

Resistance, Capacitance, Inductance, Impedance

- Effects on Power

- Power Factor: Effective vs. Real Power

**Decibel Measurements** 

- Electrical Noise

# Module 2: AC Power Interconnections

CO Power Components (supporting DC)

Conventions:

- Regulatory
- Circuits & their Returns

- MGN

Power Conversion

- Phases
- Rectification
- P-P, Average, RMS

Ground Potential Rise

Transfer Switch

- varieties

- problems

Generator Connections

Panel Types

# Module 3 : DC Power Interconnections

CO Power Components (distribution)

#### - Points of Failure

#### Rectifier-to-Battery

- Charge & Discharge Buses
- Rectifier Types
- Negative Voltage Systems
- Wiring Conventions

#### Battery Types

- LA, LC, VLRA

## DC Power Boards

- LVD, Feeds
- Metering
- primary & secondary protection

## Buses

- wired vs. bar

- bar types - Cu vs. Al, coated vs. non-coated

# Fuse Types

### Examples

#### Testing

- Reconciling Currents potential & return leads
- Charge voltages
- Regulation & Ripple Current

## Module 4 : Power & Grounding

CO Grounding Components

Ground Bar Types

Ground Zones

- PANI vs. AT&T wiring order

Isolated Grounds

- Noise mitigation
- Importance of SPG
- Firewalls

## Remote Site Example

#### Testing

- ground loop potentials
- leakage current
- CO grounds required vs. measured
- field resistance

#### Module 5: Power Routines

Battery String Maintenance

- Specific Gravity
- Electrolyte Level
- Common Problems & Solutions

#### Rectifier & Powerboard

- Voltage & Current Readings
- Baseline
- Floating vs. Equalizing
- Potential Problems & Solutions

#### Breakers & Fuses

- Primary vs. Monitor 'tell-tale'
- oxidizing contacts
- Unexpected Problems

## Smoke & Fire

- Symptoms What to do
- Firestopping

# **Delivery Method**

Virtual Live Instructor-led with numerous labs and exercises.

## **Equipment Requirements**

(This apply's to our hands-on courses only)

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

# **Course Length**

2 Days