Hands-On

CO IMTR

Central Office Installation, Maintenance, Troubleshooting & Repair

Course Description

This extensive course is designed for Central Office Technicians with responsibility for the installation, maintenance, troubleshooting and repair of Central Office equipment.

The course provides a well-rounded introduction to many areas of the Central Office that most technicians work with on a daily basis.

Theory is effectively combined with a practical Hands-On approach that enhances the students learning experience and maximizes their value as a Central Office Technician.

Students Will Learn

- **Basic Central Office Concepts**
- **Basic Electricity**
- **Telephony**
- **AC and DC Power**
- **Central Office Grounding & Protection**
- **Central Office Power**
- **Digital Concepts**
- **Digital Switches**
- **Special Circuits**
- **T1/T3 Transmission**
- **Fiber Optics**
- **Network Timing & Synchronization**
- **Read & Interpret Circuit Order Documents**
- **Telecom Wire and Cable Colors**
- **Wiring and Option Settings**
- **Practical Hands-On equipment installation**
- **Hands-On Test Equipment Used in the CO & Out in the Field**
- **Troubleshooting & Repair Techniques**
- **And much more**

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Target Audience

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

Prerequisites

An understanding of basic electrical concepts, telecommunications equipment terminologies and OSP Bonding & Grounding is required. This knowledge can be obtained in our course(s)

-TeleCom I & II
-Basic Telephony & TeleCom Electronics

Course Outline

Module I: Basic Electrical Principles

Metric System terms and relationships
Basic AC and DC concepts
Voltage, Current and Resistance definitions
Ohms Law
Calculations using Ohms Law
Series and parallel circuits as they apply to the local telephone copper loop.
Capacitance, Inductance and Impedance as they apply to the telephone copper loop.
Power calculations and telephone circuit applications.
Noise definition and application in the telephone loop.

Module II: Basic Telephony

Voice Frequency definition and C-Message weighting
Telephone set operation and customer requirements.
48VDC voltage and ringing voltage applies to the Tip and Ring loop.
Outside Plant aerial and buried plant components.
Copper cable transmission characteristics and signal loss.
Outside plant power influence and noise.
MDF (Main Distributing Frame) terminal blocks and protection (i.e.: gas tubes).
Relay Rack layout, counting and shelf assignments.
Cable color code identification.
Safety and security related to Central Offices and company vehicles.

Module III: Central Office Power

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Commercial AC Power components and characteristics including single- and 3-phase.
Multi-Grounded Neutral application.
Central Office Main AC disconnect.
AC Surge Arrestor application.
Standby Generator and Transfer Panel operation.
Rectifier operations.
Central Office battery description and application.
DC powerboard, and fuse and breaker operation.
DC power distribution, fuse panels and breaker panels.
DC Power cable ampacity ratings and load limitations.

Module IV: Central Office Grounding and Protection

Grounding theory and practical applications.
Master Ground Bar connections
Ground Window Bar connections.
AC MGN ground connection.
Central Office ground grid connections.
Radio Tower ground connections.

Module V: Basic Digital Concepts, DS0 - DS3

Numbering systems currently used in telecommunications transmission.
Channel Bank operation and Analog-to-Digital conversion.
DS1 description and applications (T1 copper span lines, HDSL, DSX-1 crossconnects and Central Office DS1 cabling.
DS1 line coding (AMI or B8ZS) and signaling format (SD or ESF).
DS3 description and applications.
DS3 MUX operation.

Module VI: Digital Switch Basics

Basic Digital Switch hierarchy and operation.
Digital Switch line and trunk interfaces.
Base Unit and Remote operation and links.
SS7 network components and operation including A-links from Digital Switches.

Module VII: Special Circuits

DS0 description and applications (POTS, Analog Data, Digital Data including 2.4K-to-56K, 64K, Fractional-T1, ISDN with 2B1Q line coding, Frame Relay and ATM applications.
T1 and T3 HiCap circuits and applications.
DSL applications.
Special Circuit number description.
Special Circuit test & acceptance requirements.

Module VIII: Fiber Optics Basics

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Fiber Optic technology theory and application to the telecommunications network.
LED and LASER operation and applications.
Single-Mode and Multi-Mode applications.
Fiber cable operation and applications.
Fiber Optic MUX, Terminal and DCS applications.
SONET theory and applications.
OC-3, OC-12 and OC-48 terminal equipment.
Fiber Optic Ring technology and application.
DWDM applications.

Module IX: Network Synchronization

Central Office digital timing source (BITS Clock) application.
Stratum-1, -2 and -3 clock reference applications.
Central Office equipment timing reference requirements.

Delivery Method

Instructor led with numerous Hands-On 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

4 Days

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