

Hands-On

# Special Circuits

Installation & Troubleshooting



## Course Description

This 2-3 day Hands-On training course is designed for telephone company employees responsible for engineering and provisioning Special Circuits. This training provides in-depth training of special circuits currently used, the theory behind each type, design requirements, and actual equipment used in the Central Office, outside plant and the customer premise.

This course provides the required foundation, understanding and Hands-On skill set for any technician in a special Circuit environment.

## Students Will Learn

- **Basic Transmission**
- **Digital Fundamentals**
- **Digital Switching**
- **Fiber Optics and SONET**
- **Special Circuits**
- **And More...**
- **The following equipment is covered and demonstrated in this class NIDs, smart jacks, CSU/DSUs, RJ jacks, copper and fiber cable, pedestals, MDF and protectors, channel banks and channel cards, digital switches, and BITS clocks.**

## Target Audience

Anyone entering the telephone communications industry.

## Prerequisites

None. A basic understanding of telecommunications principles will be useful for students taking this course. This information can be obtained in our

TeleCom Today "I" or "II"  
Hands-On Basic Telephony & TeleCom Electronics

## Course Outline

### Module I - Basic Transmission

- VF transmission characteristics
- Cable pair electrical characteristics
- Load coils and frequency response
- Telephone Outside Plant and The Last Mile
- MDF and protectors
- Demarcation at the NID
- Copper cable and sheath counts
- Pedestals, closures and cross-connects
- Cable resistance and attenuation
- Line Impedance, power and noise

### Module II - Digital Fundamentals

- Channel Bank operation
- Analog-to-digital conversion
- DS1 and bipolar transmission
- DS1 Signal Format (SF/ESF)
- DS1 Line Coding (AMI/B8ZS)
- 2B1Q Line Coding used in HDSL
- DSX-1 and DCS crossconnects
- M13 Multiplexer operation
- DS3 transmission

### **Module III - Digital Switches**

- Digital Switch generic block diagram
- The Toll Network
- Toll Trunks and Feature Groups
- SS7 Network operation
- Network synchronization using BITS

### **Module IV - Fiber Optics**

- History, benefits and applications
- Digital-to-optical conversion
- LED and LASER transmitters
- Light frequency and wavelength
- Multimode and Singlemode fiber
- Fiber patch panels and connectors
- SONET technology
- OC-3, OC-12, OC-48 and OC-192
- Fiber Optic ring technology

### **Module V - Special Circuits**

- Special circuit (A-Z) orientation
- Special circuit numbers
- CSA Deployment Guidelines
- Channel Bank description
- Special circuit channel cards:
  - Analog Data
  - DDS (4.2K to 64K)
  - ISDN BRI and PRI
  - Fractional T-1
  - T1 Span Lines
  - HDSL, HDSL2 and HDSL4 span lines
  - Special Circuit test specifications
  - Frame Relay and ATM networks

## Notes

Field Trip to a local Central Office would be highly recommended.

## Delivery Method

Instructor led with numerous "Hands-On demonstrations 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

3 Days