

Hands-On

# GTD-5 Live Virtual Maintenance and Troubleshooting



## Course Description

This Virtual Live Instructor-Led GTD-5 course is an extensive and accelerated maintenance course with updated, full-color block diagrams and frame images. The course was designed to jump-start students with little or no switching knowledge to a competency where they can perform Level-1 card-level repair on virtually any of the main modules in the GTD-5 switching system, including the ACDC, the APC/TPC complexes, the TCU (expanded & non-expanded versions), the MDC, NCU, and SSW, plus all subordinate devices within the BUNW such as the ACU, ALU & BLU lines, plus ATU, DCU and EDCU trunks. Ancillary equipment such as SS7 links, recorder announcers, ringing generators, and gateways such as those used for system remote-access equipment, the CPX, Extension Complex, billing, and remote switch monitoring are also discussed as needed. Troubleshooting techniques are taught pro-actively, including Maintenance-window procedures.



Other modules are discussed per the needs of the class, such as the IOM, CMU, and remotes like the RSU, RLU, and MXU, plus the important role of GR-303 compliant RDT remotes in providing voice switching for customers served by optical or digital line networks. The FTU is emphasized, so that students have an appreciation of this critical module, and how line and trunk diagnostics operate.

The GTD-5 Users Guide is used extensively, allowing students to gain confidence in how the guide is presented, and how information can be found quickly. Other key documents are used as needed, like the Product Line Reference Guide (PLRG), Hardware Matrix Report (HDWM), and Cable Running List (CRL), which help show the parts of the system, and how they're interconnected. Recent-Change can optionally be added to the course, to show the basics on adding lines, trunks, or interrogating switch settings (CONT PARA, EXAM LTT, etc.) plus an overview of FACTS, such as Digit Translation (PRIN DXLN), and call registers (PRIN PROT, PRIN UNPR).

Non-intrusive exercises are provided to locate various modules and cards within the switch, with a large number of previous faults & solutions used to gain practical experience. Existing system faults can also be analyzed, with repair action determined by the class, and the analysis provided to the group responsible for repair, where results can later be compared to the recommended action.

## Students Will Learn

- **Switching Fundamentals**
- **GTD-5 Theory of Operation**
- **Terminal Access IOM & Telnet**
- **Primary bays and modules used in the GTD-5 switching system, including different types of remotes, SS7 connections, and key system features**
- **How to use the IO & OG IOMM Terminals with various commands**
- **Various documentation including the Interleaf viewer, the GTD-5 UG, and cabling docs**
- **How to find the physical location of a fault**
- **How to change cards in various bays**
- **How to EXAM directory numbers, view system database, and use information to find cards**
- **Where to find Emergency ACDC & recovery procedures**
- **Optional Recent-Change & Basic Call Tracing**
- **And much more**

## Target Audience

Technical staff such as Central Office Technicians, combo techs, and those who are responsible for the maintenance and troubleshooting of Central Office systems, plus NOC/SCC personnel who must respond to alarms. No previous switching background is required, although some familiarity with CO equipment will be beneficial. Certain management and provisioning personnel will also benefit, providing a greater understanding of the resources needed for the system, and how to program it.

## Prerequisites

A basic understanding of telecommunications and switching principles is helpful due to the accelerated nature of the course. Our BTS Telephony For Telecom Techs, or our TDM Switching Fundamentals courses are available for students with little or no previous telecom background.

## Course Outline

### Module 1: Switching Fundamentals

- T&R, E&M, 2/4/8 Wire Trunks
- Battery, Biasing, AC & DC Superposition
- Audio Signals
- Decibels incl. logarithmic scale
- Digital Signals: A/D & D/A Conversion, Nyquist Theorem

- PCM: sampling, PAM, bit-depth, multiplexing
- TDM: DS0, DS1, DS3, AMI, B8ZS, Line Coding
- Carrier & Optical Signals
- Stored Program Control Systems
- The PSTN

## **Module 2: GTD-5 Theory of Operation**

- Time-Space-Time
  - Analog-To-Digital Conversion
  - Time Switch (TSW)
  - PCMX and PCMR
  - Space Switch (SSW)
  - Time Slot Count (TSC)
  - SSW Matrix
  - Blocking & Concentration Ratio
- A Phone Call - Basic PCM
- The GTD-5 Complex
  - What is a GTD-5 EAX?
  - Extension Complex
  - Switch Capabilities
  - Processor Types: APC, TPC, TCU, RSU, RLU, MXU, RDT, SLC
  - Memory Types: CMU, DM
  - Front-End Modules
  - PCM Modules: BUNW, RSNW, RLNW, TSW, SSW, Sub/Superordinate Devices
  - Phone Call Sequence of Events
- Switch Module Exercise

### **Module 3: Input-Output Commands**

- IO Terminals
  - Terminal Assignments
  - High Speed Terminal Limit
- GTD-5 IO Commands
  - Command Syntax
  - Operator/Device/Device Assignments
  - Summary
- DIAG vs ROUT
  - DIAG, ROUT
  - RUN and ITER
- PUT vs FORC
- Sample Commands

### **Module 4: Documentation**

- Support & Provisioning Documentation
  - Users Guides
  - Using Worldview
  - Practices - AE/GTE/AGCS
  - Technical Specification - Bellcore, Telcordia
- Card & Equipment Documentation
  - GTD-5 Engineering Documents
  - FA, FB, FE, EL, ECD, EC, CC, RW
  - CRL
  - PLRG
  - HDWM
- Users Guide Practice Exercises

## **Module 5 : Maintenance**

- Sample Maintenance Commands - DUMP STAT SYSA, EXAM DN, DUMP w/SUBO, etc.
- Alarms
- Diagnosing Lines & Trunks - FTU
- Dump System Image (DISK, OG, Flash)
- Dump Status
- Examine - EXAM DN, EXAM EN, EXAM various hardware, etc.
- Recent Change (Database) Overview
- Reporting - REPO NSM, REPO TDA, REPO ED, etc.
- Setting - SET MTU/set mte, SET STAT, etc.
- Network Clock Voltages (NCU)
- SCHE MESS
- Card Location Exercises

## **Module 6 : Troubleshooting**

- NOC/SCC Communication & Policy
  - ESD Precautions
  - Binary and Hexadecimal
    - Hex Words, Bytes, Nibbles
    - Converting Hex to Bin
- Diagnostics
  - PRIN3.3 vs PRIN4.4
- Part 15 - Repair Manual
- Level 1 Card Repair
- Level 2 Card Repair
- Level 3 Card Repair
- System Malfunction Analysis (SMA)

### 1.019 NMI

- ACDC Menu Processing
- ACDC Keypad Processing
- Examples & Exercises (BUNW, MP, and student-provided)

### **Module 7 : Operations Gateway**

- The Extension Complex - Role of the OG
- Operations Gateway:
  - Logon, Logoff
  - UNIX Commands
  - Batch Interface Commands
  - IOMM Commands
  - Connectapp AMA Commands
- Review

### **Module 8 : Block Diagrams**

- MP
- TSW/TSWE
- ALU/ELU
- SSW/SSWE
- etc.

### **Module 9 : Frame Images**

- ACIF thru TPCF frames
- 914A, 914E, & 914EX
- Full color frame images that match the main Functional Block Diagram color scheme

## Notes

This course can also be delivered in 5-8-10 day formats, depending upon the number of labs and specific topics covered. This course can also integrate support level topics to prepare students to work at a Tier-2 level, and/or add Recent-Change topics to prepare students for programming line and trunk translations.

The course is designed to run in a Live Instructor-Led Virtual Classroom setting, where additional length is added upon request to provide a greater understanding of foundational topics, such as telecom network/stored-program control background, PCM theory, hexadecimal-binary-decimal conversion, and the tracing functions available in the FACTS utility. More complex troubleshooting concepts can also be introduced with this course including various OG logs, inter-bay cabling, and backplane fault analysis (i.e. to help provide a tier-2 expert level of support) for students who need additional skills. Virtual Field Trips can be added to allow students an opportunity to see and understand where all the parts of the system are found, what they do, and to provide a better end-to-end understanding of the switch.

This course can be combined with other courses like the CO Technician Bootcamp, the GTD-5 Support Course, and the GTD-5 Translations Course for a customized curriculum.

## Delivery Method

LIVE Virtual Instructor-Led with a flexible approach that adjusts content most relevant to students. Includes various non-intrusive labs, demonstrations, and exercises to help students focus on and retain the material presented.

## Equipment Requirements

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

This course requires remote access to customer(s) GTD-5 Switch or Switches for Non-Intrusive training.

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

5 Days