Hands-On

DCO GENBAND (Stromberg-Carlson) Virtual Live Instructor-led Switch Maintenance and Troubleshooting

Virtual Live Instructor-led or On-Site

Course Description

An accelerated version of the traditional GENBAND (formerly Stromberg-Carlson and Siemens) DCO maintenance and troubleshooting course, this class is designed to jump-start students with little or no switching knowledge to a competency where they can perform first-tier card-level repair on virtually any of the main modules in the Digital Central Office DCO switch. Topics of most interest can be emphasized, such as processor interoperation, bus types, cabling, and cell structures.
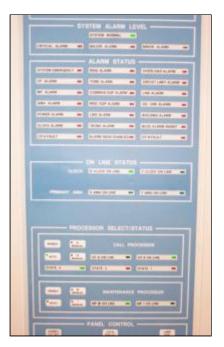
The multiple processor types are studied, including the MP, FP, CP, and TPP, along with the Serial Line Units for system console connections and the EAI. Different Line Switch types are also discussed, and their architecture including the Line Switch Controllers, Line Group Highway, and peripheral circuit cards, along with interconnection to the TSI via the Port Group Highway. Ancillary equipment such as SS7 links, recorder announcers, ringing generators, remotes, and billing are also explained, along with the different remote types including the RLS, RNS, RLG, and both SLC-96 and GR-303 RDTs, which requires the latest LLS variety, the DLS-1080.

Other important modules are described, including the CBC and MCI, and their connections to Switchover Control, plus the DL and SSC interoperation with the Call Processors, which control time slots. The Mass Storage Subsystem components are also described including the MSDA hard drive and tape drive. Servicing of the MSDA tape drive is demonstrated, extending the life of this important card.

Previous faults and any actual faults in the system can be used for analysis and research in documentation. These non-intrusive exercises are used to troubleshoot the switch via symptoms and documentation, and drill the correct troubleshooting techniques, including those normally intended for a Maintenance-window. Basic translations and interrogation of overlays like ADM, RTR, and TRK can optionally be used to familiarize students with directory number and trunk database.

Envisioned as a minimum 5 day track, the actual course length and content is flexible, and can be adjusted depending upon the needs of the class. In addition to supporting independent problem-solving skills, the course helps provide an excellent background for NOC and TAC interaction.

Students Will Learn

- **Specific TDM switch fundamentals including SS7**
- **DCO system theory of operation**
- **Modules & Processors like the MP, CP, FP, and TPP, and the BMP control panel**
- **Time Stage modules like the TSI, LSC, and interconnecting PGHs and LGHs**
- **Maintenance access methods like SLUs, EAI, and maintenance/supervisory panels**
- **Various Stromberg-Carlson & Siemens documentation, and the EDDS**
- **How to find cards within the system**
- **How to test and replace various PWBA circuit cards**
- **How to look-up alarms and determine most suspect hardware**
- **Recovery actions**
- **Basic DN and Trunk translations**
- **And much more...**

Target Audience

Technical staff such as Central Office Technicians, NOC/SCC, certain management personnel, and others responsible for the operation and maintenance of the DCO switching system.

Prerequisites

A basic understanding of telecommunications and switching principles is helpful due to the accelerated nature of the course.

Course Outline

Module 1: Switching Fundamentals
- T&R, E&M, 2/4/8 Wire
- Supervision & Signaling
- Negative Battery
- AC & DC Superposition
- Decibels
    logarithmic scale
    copper & optical measurements
- Digital: A/D & D/A Conversion
    Nyquist Theorem
    Multiplexing Samples
    PCM bit depth - 8 bit
- Time Division Multiplexing (TDM)

Pulse Code Modulation (PCM)
DS0, DS1, DS3
PGH & LGH Highways
Line Coding
AC & DC Signals
- Transport: AMI, B8ZS
- Carrier Signal Comparison
- Binary & Hexadecimal overview
- PSTN & CCS7 Overview
- Why Legacy PSTN Support

Module 2: DCO Theory of Operation
- Time-Space-Time
Analog-To-Digital Conversion
Blocking & Concentration Ratio
- DCO Functional Block Diagram
- The DCO Switching System
What is a Digital Central Office? (DCO, DCO-SE, DCO-CS)
Switch Capabilities
Common Control Area (CCA) & Program Logic - CMF
- Processor Types
Telephony Pre-Processor (TPP)
Call
Feature
Maintenance
- Timeslot Interchange (TSI) SC Bus, Differential Bus
- Mass Storage Subsystem
- SS7 SSC/CLC (DS0 & DS1 options)
- Line Side Operations:
Timeslot/LGH/PGH
Local Line Switch (LLS), Remote Line Switch (RLS-x, RLS-4000)
LTF Frame & Cell Common Equipment
DTI/GRP/Span
EWSD & ONEUPTM Summary
- Switch Hardware
Frame Types
Cells, PWBAs
- Phone Call Sequence of Events (L-L, L-T)

Module 3: Input-Output Commands
- Terminal IO
MCC, SIDCO, EAI, Virtual Terminal Driver
- DCO Commands
Minimum Character Recognition (MCR)
Help, Special Characters
Overlay Examples: RTR, TTU, TCOS, TRK, SS7, etc.
Command Syntax
Line Display by EN, List by EN, Short List
- Adding SLU Terminals & Users
 - Sample Commands
UTL, TIMEC, STATUS, ADMIN, ROUTER

Module 4: Documentation
- Support & Provisioning Documentation

Electronic Document Delivery System (EDDS)
.chm file format
00-040 Maintenance and Operations Manual
00-050 Operating Procedures
00-060 Maintenance Procedures
00-070 Input Manual
00-080 Message Dictionary
00-090 Status Reports
00-100 Equipment Removal and Replacement
00-011 Translation Guide
00-160 Emergency Recovery Guide
00-170 Alarm Surveillance Guide
Job Engineering Docs S817 series
Implementation Procedures (IP)
Other Docs - IMDP, RP, GPA, IMs, CRL, CORCs
Schematic Diagrams & Optioning
- Examples & Practice

Module 5 : Maintenance
- System Status
STATUS, HOURLY, RNS, LG, LINEGROUP, etc.
OSPORT, ALPORT, LNLOUT, TKLOUT, RALINE, etc.
DBVER/DBCHEK, AUDIT, etc.
- Line & DN
STATUS LS, LINEGROUP
CONFIG REMOVE & RESTORE
ADMIN LINE
TEST PORT LINE
- Trunks
STATUS TOS, SPAN STANDARD
PORTST TKLOUT, OSPORT
PGH Grading: DBVER CONRPT, DBUTL DTSITE
MANUAL ROS/RPS, CONFIG REMOVE & RESTORE
TEST PORT DTI
- Time & Date
TIMEC
CONFIG
- Dumping Images
FILSYS Backup
UTL SCED
AUTOBK, AUTOTB
- Reports
DBVER, COPY CFSITE, ADMDB, CPDB, LOAD etc.
AMOPT
RSMUTL
STATUS SPAN
- Basic Maintenance Panels
ALMSEN
RNSBMP
Panel Functions
- LLS Supervisory Panels
Panel Functions
- MSDA/Archive 150S Tape Drive

Module 6 : Troubleshooting

- Precautions & Preparations
    Do You Understand the Work?
    NOC/SCC Interaction
    ESD
- Troubleshooting
    Alarm Levels, Diagnostic Types
    AUDIT: SS7 CQT, SS7 CVT, MEMCHK, CNAM (SCP) Query
- Alarm Messages
    MML & PDS Formats
    Alarm Sort Key Prefixes
    Alarm and Message Processing (AMP) Messages
- Recoveries
    CONFIG SWITCH
    SWITCH
    REBOOT
    RECOV
    STATE4, 3, 2, 1
    CPREST
    RESTORE
    CPSU, CPSU COLD
    RSUTL
    CRASHDUMP
- Examples
    No Dial Tone Recovery Procedure
    LLS Outage Recovery Procedure

Module 7 : Translations Introduction
- Translation Guides
- DBVER
    VAL ALL DONE, CONRPT
- Line & DN
    ADMIN - ADD, LIST, DISPLAY, CHANGE, DELETE, SUSPEND, etc.
- Trunks
    TCOS, DERV
    RTR, TRK, TTU, ADMIN SS7
- Tracing
    ROUTER, TTU
    Example: Fixing InterLATA Routing Issue

Module 8 : Frame Images
- Equipment Location
    Frames, Cells/CUA, PWBA, Backplane, Equipment numbering
- Typical Floor Plan
    LLS, LLSc Frames
- Frame Types
    Mnemonics
    Image

Delivery Method

LIVE Virtual Instructor-led or On-Site with a flexible approach that adjusts content most relevant to students. Includes

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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)

Physical or remote Access to switch is required 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