#### Hands-On

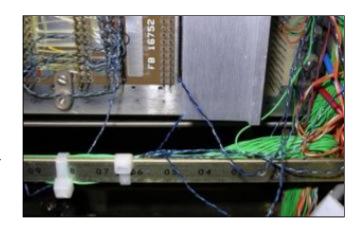
# **GTD-5** Advanced Support (Hardware)



#### **Course Description**

As OEM-support options dwindle, it has become more important than ever for telco personnel to resolve network faults on their own, including the most difficult ones. BTS recognizes the challenges of finding affordable, support-level training, and has worked hard to provide you with no-compromise, expert-led courses at the support level.

The Nokia (formerly AG Communication Systems) GTD-5 Support Course provides a detailed support-level course with updated, full-color block diagrams and images. This course was designed to bring students with a general, maintenance-level competency of the GTD-5 to a considerably more advanced understanding of the system, including its backplane and cabling. This will help the understanding of inter-



module connections, so that almost any fault can be traced and corrected. The microprocessor (MP) front-end and Common Memory Units (CMU) are looked at in detail, with an emphasis on the APC and its connections to the ACDC. Important interfaces like the Operations Gateway (OG), LCDT, RCDT, and AMA equipment are explained and accessed, as available. The role and variations of MDC & CPX are also discussed.

The course then looks the PCM network, and studies how the SIC, SSW, and BUNW are interconnected. Superordinate and Subordinate status are explained, and how they relate to the BUNW, TSW, and PCUs. Various failing diagnostic examples from previous BUNW/TSW faults are reviewed and decoded, including recovery messages such as SMA syndromes and diagnostic fault printouts. In particular, the 1.019 Non-Maskable Interrupt, 3.059 PCM Trace, and 3.028 Executive Reset SMA Syndromes are studied, along with the typical craftsperson action for each.

Documentation such as the UG, CRL and EL are used to trace cabling, and look at the layout of the backplane of key frames. Troubleshooting techniques are taught pro-actively, including Maintenance-window procedures. Time is allotted to work on troubles which students have encountered and want to discuss. Almost any type of hardware or software fault can be reviewed, with an explanation of the typical steps needed for resolution.

#### **Target Audience**

Technical staff such as those in the NOC/SCC, Central Office Technicians, and certain management personnel, or any others involved with troubleshooting of the GTD-5 switch.

# **Prerequisites**

Students should have previously taken the GTD-5 Maintenance And Troubleshooting course, or have a good working knowledge of the modules and operation of the GTD-5 and its IO commands.

#### **Course Outline**

# Module 1: GTD-5 Theory of Operation - Review

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- Front End: APC, TPC plus DM/CMU
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- CPX, DISK, IROC
- IOU, FTU
- Extension Complex
- PCM Network: BUNW, TSW, PCU plus NCU & SSW/SIC
- Lines: ALU, ELU, SLU, XAIU
- Trunks: DCU, EDCU, DS3
- Remotes: RSU incl. RSNW, RLU incl. RLNW, 914 MXU
- Remotes: GR-303 Compliant RDT
- Remotes: SLC-5, SLC-96
- PCM Overview

Frequency sampling

Binary

Frames - DS0, DS1

PCMX, PCMR

TSC

- Time-Space-Time
- A Phone Call

#### Module 2: Front-End Hardware

- Microprocessor Architecture

Intel 8086/80386SX

```
Upper & Lower Echelons
     DUBE
      Address & Data Busses
      Dedicated Memory (DMEM) incl. Page Access
     MPCC, ADDR, MPBC, CFCA functions
      Alarm Registers
      REPO LOAD INFO
- Common Memory
     CMU (CCM, COM, CMX, CM4X, CM8X)
      EXAM CONT PARA
- APC & Peripherals
     IOU0 & 1
     FTU
     MTU/mte
      ACD, ACDC, LCDT, RCDT
     ICIC/Terminals, TERM7
- TPC
      D4MW-DM32 Versions
- MDC
      Groups 0-2
      APC, TPC, TCU Interfaces
     MDCM, MDDI Card Optioning Issues
- SIC
     SIC (8 BPC)
     SCX (16 BPC)
- CPX
      CST/SS7 - incl. DSC Modems
      DSUB - DISK - 300MB & 1GB
      IROC - GR-303 Function
     LANI - OG, Ethernet Connections
- OG
```

IOMM - GTD-5 IO Terminal

UNIX - UNIX Terminal

BI - Batch Interface Terminal

AMA - Connectapp AMA

## Module 3: PCM & Peripheral Hardware

- BUNW

Time Switch - TSW, TSWE, and TSC

PCU - ACU, CCU, DCU, EDCU

PIU - ALU, ATU, SPAN

NCU - incl. BITS, master timing signal (MTS), oscillator issues

- SSW

Large SSW

Expanded SSW (SSWE or XSS)

Cable & Frame Differences

SIC connections

TCU connections - Rail A&B/C&D

- RSNW incl. Survivability, FIU0-3 & FIU4-7
- RLNW
- MXU
- FTU

KA & KG varieties, Small (Remote)

Functional Block Diagram

#### **Module 4: Documentation**

- Users Guides 4008, OG, AMA, XLMF, etc.
- GTD-5 Engineering Documents how to use:

FA - Functional Assembly

FB - Functional Block

FE - Functional Explanation

EL - Electronic Locator (wiring planes, cable pinouts)

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ECD - Equipment Configuration Document
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CRL - Cable Running List

PLRG - Product Line Reference Guide

HDWM - Hardware Matrix Report

- Tracing a Lead

Using the EL

Using the FB

- Cabling

Reading Labels

Using the CRL

Using the EL

- Practice

## Module 5: Binary & Hexadecimal

- Binary to Decimal
- Hexadecimal to Decimal
- Hex Words, Bytes, Nibbles

DIAG PRIN4 vs. PRIN3

Convert Hex to Bin

- Advantages to Each Format
- DIAG FTU PHAS30,31 example
- DIAG MRCC PRIN3.3 EPAR2 example
- Practice

## Module 6: System Malfunction Analysis (SMA)

- SMA Classes priority through deferred
- SMA lookup in UG
- Recognizing Patterns
- SMA Breakdown

Hex & Binary fields

Part 16 Messages

Craftsperson Action

## - 1.019 NON-MASKABLE INTERRUPT

Key Fields

Examples

## - 3.059 PCM TRACE

Meaning of Fields

Enabling

Examples

#### - 3.028 EXECUTIVE RESET

Meaning of Fields

Interpreting the Messages, Associated Messages

Craftsperson Action

## **Module 7: DIAGNOSTICS**

- Diagnostics

PRIN3.3 vs PRIN4.4

- Part 15 - Repair Manual

Level 1 Card Repair - card level repair

Level 2 Card Repair - diagnostic info, options

Level 3 Card Repair - diag breakdown, backplane

Practice

- Using System Malfunction Analysis (SMA)
- DIAG vs ROUT
- RUN and ITER
- Execution Parameter (EPARM)
- PUT vs FORC

#### Module 8: Practical

- ACU Fault
- BUNW Fault
- FIU Outage Encapsulated State
- MP Fault local copy
- MP Fault cross copy
- DLNK Fault remote impact
- CMU Fault
- Exercises student request

## Module 9: Adjunct Equipment

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- GTD-5 Adjunct Equipment
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4TEL

ANA

DPMS

RA, DERA

RGG

FTU:

Wiltron MCA/CAP, DTMS

Coin Battery (CB)

Pad Disable Battery (DB)

Insulation Breakdown (IBT)

4WTP/4WTS

SFM

# **Notes**

The course length is flexible at 5-10 days, with the longer version intended for NOC and key COT personnel who work more frequently on difficult problems. A shorter version is helpful for persons working with either the NOC or TAC, while still allowing them to understand and handle many problems independently.

# **Delivery Method**

Instructor-Led with numerous labs and exercises.

# **Equipment Requirements**

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

This course requires access to customer 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