



Introduction:

Daniels Electronics Ltd. offers a three-day training course that covers the P25 Standards and Daniels MT-3 and MT-4E Radio System product lines.

A fourth day may be added to the course (by the instructor or the customer), allowing for more hands-on tuning and programming by the students, however the students should be able to supply additional equipment for the hands-on portion as described in the Course Requirements.

The course may be offered at the Daniels factory in Victoria, BC, Canada or in other select locations throughout North America. The courses are typically scheduled 2-3 months in advance. The Daniels training department maintains an e-mail contact list to notify students of upcoming courses when they are scheduled.

The Daniels training department can also schedule a training course at your facility for a minimum charge based on 8 students. Please contact the Daniels Sales department for a quote.

Contact Information:

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Training and Special Projects

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Pete is a member of the Applied Science Technologists & Technicians of B.C., has a diploma in Electronics Engineering Technology from Camosun College and a Certificate in Adult and Continuing Education from the University of Victoria. Pete has been instructing Daniels technical training courses for eleven years.

Student Prerequisites:

It is not necessary, but the students should be familiar with conventional Two-Way Radio Communications systems.

Course Handouts:

Course Enrollment includes a set of Daniels Instruction manuals, MT-3 User Guide, P25 Training Guide, MT-4E User Guide, MT-4E Maintenance Guide, Technical Notes, training tool kit and some other items. The Guide and Technical Notes will be referenced and used throughout the class.

The Guides are available at www.danelec.com/support/training/training_dl.asp.

The Technical Notes are available at www.danelec.com/library/english/technotes.asp.

Course Length:

Although the course length may vary, the course typically runs from 8:00 AM until 4:30 PM each day, with a 45 minute lunch and several 15 minute breaks throughout the day.

Course Requirements:

When holding the course at the customers' facility, the customer is required to provide a training room free from distractions and comfortable for the students.

The instructor will supply a projector, a Daniels radio system with a variety of control cards, an IFR 3920 Test Set, and all additional equipment required to demonstrate Daniels tuning, testing and maintenance procedures.

For a more hands-on training course, the customer can also set up a work area for every 3 or 4 students that includes:

- * Daniels radio system (Repeater, Base, Crossband, Transportable, etc.)
- * Test Set (IFR 3920, IFR 2975, IFR 1200, IFR COM-120, Marconi, HP or other test set)
- * Set of extender cards (EC-48RD or EC-48RK-1.22, and EC-96D1)
- * RF cables and adapters (N to BNC, SMB to BNC)
- * Alligator clips used to connect to an audio line (or a custom audio connector)
- * Power supply and cables
- * Any other meters (DVM, SINAD, etc. not available on Test Set)
- * Any other test equipment typically used by students to maintain a site

The students may also bring any of this equipment to any Daniels training course.

Course Objectives / Learning Outcomes:

At the end of the training course the students will be able to:

- * demonstrate the ability to install, maintain and tune Daniels MT-3 and MT-4E radio equipment in accordance with the TIA, given the proper test equipment and documentation.
- * describe the theory behind Daniels MT-3 and MT-4E radio systems and how to apply that theory in practice.
- * list all of the various options and features of a Daniels MT-3 and MT-4E radio system and the Radio Service Software.



Course Outline:

This course outline is flexible and will change according to the students needs.

Day One – Morning

Introductions, Housekeeping and Company Background.

Part One: The students will be introduced to Daniels MT-3 and MT-4E product line.

Students will follow along with the Daniels MT-3 User Guide, Daniels MT-4E Analog and P25 Digital Radio Systems User Guide:

Introduction (Daniels Model Numbers, Hardware, Firmware and Software, Frequency Bands, Oscillators)

Technical Information (Wide / Narrowband, Frequency Programming, LVDS Serial Data, Encryption, Mixed Mode, Upgrading Firmware)

Radio System Configurations and Block Diagrams (Repeater / Base Station System Configurations and Control Cards)

Software (Radio Service Software Programming)

Radio System Components (Subrack, System Monitor, Power Amplifiers, Channel Programmer, Maintenance Tools)

Students will follow along with the Daniels Instruction Manuals:

Subrack / Motherboard: The students will be introduced to the Daniels Subrack and Motherboard which routes power, audio and control signals between all modules in a Daniels radio system.

System Monitor: The students will be introduced to the System Monitor module that is used as a voltage regulator and maintenance tool for the Daniels radio system.

Day One – Afternoon

Students will continue to follow along with the Daniels Instruction Manuals:

Receiver: The students will be introduced to the MT-3 and MT-4E Receiver module. The course will cover all frequency bands (VHF AM, Lowband VHF, Highband VHF, UHF 400 MHz, UHF 800 MHz, UHF 900 MHz) and models (Crystal, Low Current Synthesized, Enhanced Synthesized) that the students are interested in.

The course will include theory of operation, options and functionality of the Receivers.



Day Two – Morning

Students will continue to follow along with the Daniels Instruction Manuals:

Transmitter: The students will be introduced to the MT-3 and MT-4E Transmitter module. The course will cover all frequency bands (VHF AM, Lowband VHF, Highband VHF, UHF 400 MHz, UHF 800 MHz, UHF 900 MHz) that the students are interested in.

The course will include theory of operation, options and functionality of the Transmitters.

Control Cards: The students will be introduced to the various control cards and their operation.

Students will follow along with the Technical Notes for a complete Technical overview of Daniels product line and will have the opportunity to investigate any other Daniels products in depth.

Day Two – Afternoon

Part Two: The students will be introduced to Daniels MT-3 and MT-4E testing, tuning and maintenance procedures.

Students will follow along with the Technical Notes and Daniels MT-4E Analog and P25 Digital Radio Systems Maintenance Guide for complete Daniels MT-3 Radio System Testing procedures including:

- Daniels Radio Maintenance (Recommended Maintenance Schedules, Reference Levels)

- Installation (Installation of Daniels Subrack)

- Test Equipment and Spares (Recommended Test Equipment, Spares and Maintenance Items)

- Radio Site Survey (Site Survey Checklists, Site Inventory)

- Daniels Radio System Testing (General Set-up and Connections, System Monitor Testing, Receiver Testing, Transmitter Testing, System Testing)

- Additional Radio System Tests (Filtering, Tests with Antenna)

The instructor will include demonstrations of Daniels testing, tuning and maintenance using a Daniels repeater / base station and an IFR 3920 Test Set. Students can follow along if they are prepared for hands-on.



Day Three – Morning

Students will continue to follow along with the Technical Notes and Daniels MT-4E Analog and P25 Digital Radio Systems Maintenance Guide for complete Daniels MT-3 Radio System Testing procedures:

Day Three – Afternoon

The students will be introduced to the P25 standards from an industry perspective (this material is not specific to Daniels Electronics).

Students will follow along with the Daniels P25 Training Guide:

- Introduction to P25 (What is P25?, P25 Phases, How does P25 work?, P25 Radio System Architecture)

- P25 Interface Standards (P25 General System Model, Common Air Interface, Fixed Station Interface, Other Interface Standards)

- P25 Practical Applications (Analog to P25 Transition, P25 Digital Code Definitions, P25 Encryption, Analog vs. P25 Digital Coverage, P25 Radio System Performance Testing)

- Anatomy of the Common Air Interface

- Conventional Fixed Station Interface

- P25 Trunking (only covered if requested by students)

The instructor will include demonstrations of P25 operation using other manufacturers' handheld radios, Daniels repeaters / base stations and an IFR 3920 Test Set.