

Introduction:

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

A third 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 is offered throughout the year 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:**Pete Lunness, ASCT**

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, P25 Training Guide, MT-4E User Guide, MT-4E Maintenance Guide, Technical Notes, training tool kit and some other items. The Guides 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.

The students may bring along their own laptop computers to follow along with the Radio Service Software portion of the class. Software is provided during the class to be downloaded onto the laptops, but discs are not handed out for the students to keep.

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

- * Laptop computer
- * Daniels radio system (Repeater, Base, Crossband, Transportable, etc.)
- * Test Set (IFR 3920 or IFR 2975 by Aeroflex preferred)
- * Set of extender cards (EC-48RD or EC-48RK-1.22, and EC-96D1)
- * RF cables and adapters (N to BNC, TNC to N for IFR, 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-4E radio equipment in accordance with the TIA, given the proper test equipment and documentation.
- * describe the theory behind Daniels MT-4E radio systems and how to apply that theory in practice.
- * list all of the various options and features of a Daniels 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 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:

Chapter 1: Introduction to P25 (What is P25?, P25 Phases, How does P25 work?, P25 Radio System Architecture)

Chapter 2: P25 Interface Standards (P25 General System Model, Common Air Interface, Fixed Station Interface, Other Interface Standards)

Chapter 3: P25 Practical Applications (Analog to P25 Transition, P25 Digital Code Definitions, P25 Encryption, Analog vs. P25 Digital Coverage, P25 Radio System Performance Testing)

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

Day One – Afternoon

Students will continue to follow along with the Daniels P25 Training Guide:

Chapter 4: Anatomy of the Common Air Interface

Chapter 5: Conventional Fixed Station Interface

Chapter 6: P25 Trunking (only covered if requested by students)

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

Students will follow along with the Daniels MT-4E Analog and P25 Digital Radio Systems User Guide and MT-4E Receiver and Transmitter Instruction Manual:

Chapter 1: Introduction (Model Numbers, Hardware, Firmware and Software, Frequency Bands)

Chapter 2: Technical Information (LVDS Serial Data, Encryption, Mixed Mode, Upgrading Firmware)

Day Two – Morning

Students will continue to follow along with the MT-4E Analog and P25 Digital Radio Systems User Guide and MT-4E Receiver and Transmitter Instruction Manual:

Chapter 3: MT-4E Radio System Configurations (System Configurations and Control Cards)

Chapter 4: MT-4E Radio System Block Diagrams (Receiver and Transmitter Block Diagrams and Interface Schematics)

Chapter 5: Software (Radio Service Software Programming)

Chapter 6: Radio System Components (Subrack, System Monitor, Power Amplifiers, any additional equipment)

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

Students will follow along with the Technical Notes for a complete Technical overview of Daniels product line and tuning procedures.

Day Two – Afternoon

Students will follow along with Daniels MT-4E Analog and P25 Digital Radio Systems Maintenance Guide:

Chapter 1: Daniels Radio Maintenance (Recommended Maintenance Schedules, Reference Levels)

Chapter 2: Installation (Installation of Daniels Subrack)

Chapter 3: Test Equipment and Spares (Recommended Test Equipment, Spares and Maintenance Items)

Chapter 4: Radio Site Survey (Site Survey Checklists, Site Inventory)

Chapter 5: Daniels Radio System Testing (General Set-up and Connections, System Monitor Testing, Receiver Testing, Transmitter Testing, System Testing)

Chapter 6: 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.