Universal Fuze Monitoring Test System (UFMTS)

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Agenda

- Background

- System Upgrade

- Increased Functionality/Benefits

- Summary

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What is the UFMTS?

- Universal Fuze Monitoring Test System (UFMTS)
- Hardware and software suite
  - Agilent VEE Graphical Programming Language
  - Various instruments
    - Oscilloscope, Spectrum Analyzer, Power Supplies, etc.
  - Custom hardware
    - Interface to various fuzes
    - Junction Box
- Allows for testing Navy NATO standard fuzes in one comprehensive system
- Main application is ordnance assessment

Project History

- Initial purpose of hardware was to serve as MK419 Multi-Function Fuze (MFF) tester at NSWC Crane
- Crane utilized hardware to turn system into MK432 fuze tester
- Dahlgren was provided funding independently to develop test set for MK437 Multi-Option Fuze for Navy (MOFN) in FY05
  - Decided to leverage Crane's MK432 tester to have one hardware suite capable of testing both fuzes
- Hardware shipped to Dahlgren for full integration of MOFN into software suite
  - MK432 testing not perfected
- New MFF production lot being built and no current testing capability at Dahlgren
  - Funding provided to incorporate MFF capability into MK437 and MK432 test set in FY09 (creates UFMTS)
- Design from an Ordnance Assessment (OA) perspective
  - Speed and efficiency
  - Minimal operator interference

Legacy System

- Fuze setting station and testing station
  - Very slow to set and then test each fuze
  - Separate desktop PCs for setting the fuze and running the tests
  - Two computers used increases complexity
- Code not designed for Ordnance Assessment
  - Poor operator interaction and data reporting
- Very buggy code!

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Upgraded System

- Design and code the system for an OA application
  - Minimal operator interaction
  - Fast testing algorithms
  - Efficient, clean data reporting
- Hardware modifications
  - Remove or replace obsolete components
  - Evaluate all devices in the system
  - RF range simulator upgrade

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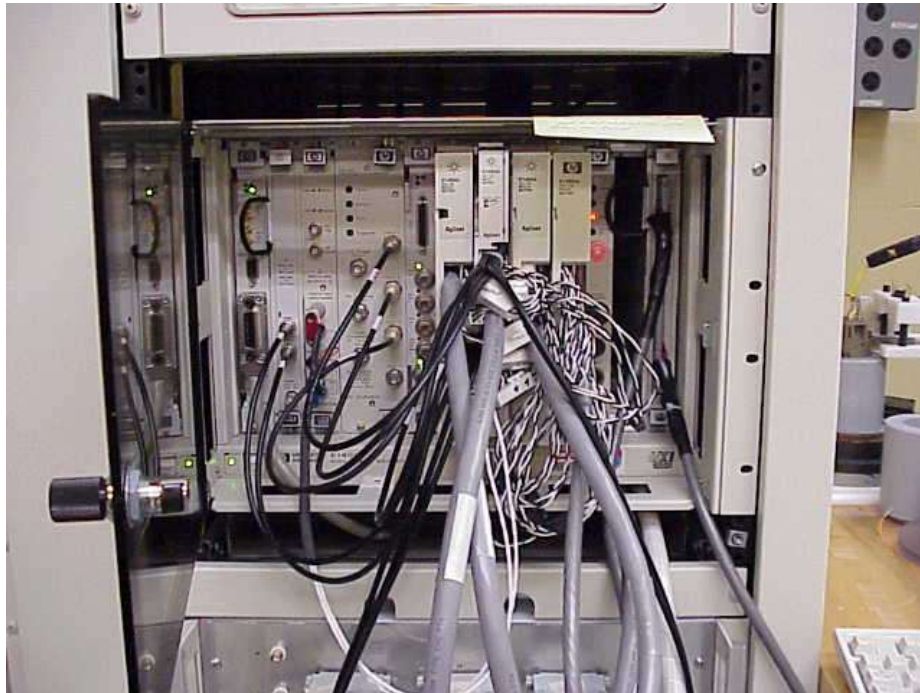
RF Range Simulator Upgrade

- RF Range Simulator (RFRS) incorporated into test system
  - Built by Electronic Development Corporation
  - Allows for proximity mode and RF testing
  - Simulates surface and air encounters
- EDC offered significant hardware and software changes to increase functionality of the instrument
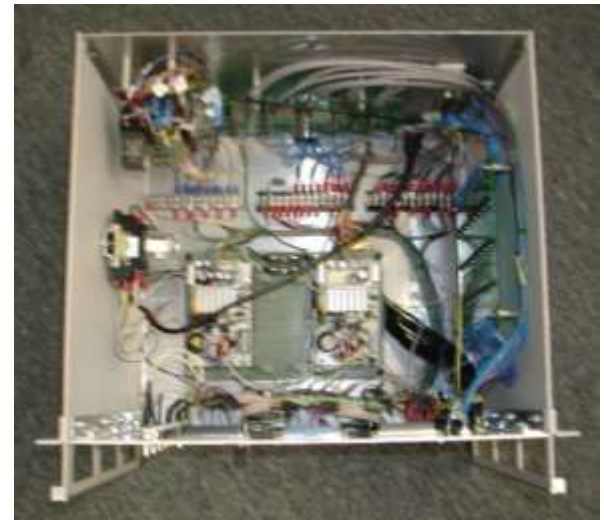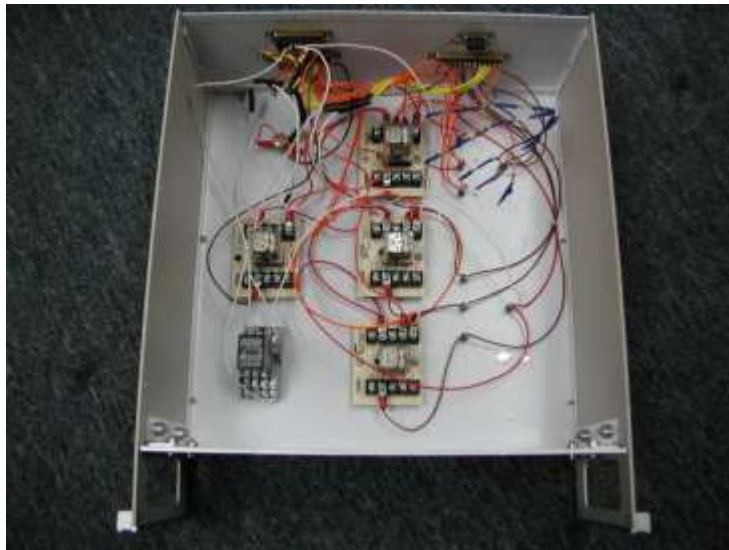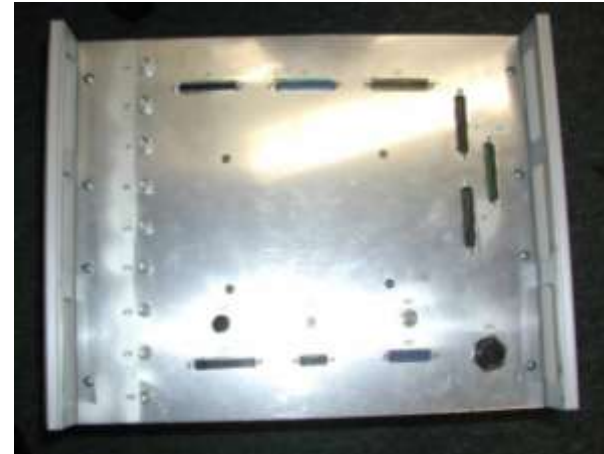
Hardware Changes

Neat and Tidy

Original Wiring

Original Custom Boxes

Interface Box

Junction Box

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Junction Box

- J-Box
  - 2U unit (could easily have been 1U)
    - Could take up much less room, smallest box we could find
  - Performs all necessary switching to connect test points from all three fuzes to all of the instrumentation
  - Provides spin switch closure for time zero of MK432, level shifting for MK419, crush switch emulation for PD functionality of MK419 and MK437, and multiple det resistances for minimum and maximum spec values across all three fuzes

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Instrumentation

- Using one computer for fuze setting and the test program
- Shrank system from two full side by side racks to one rack with room to spare
- Added a counter to increase functionality
  - Necessary for MOFN testing
- Removed and replaced obsolete components
  - i.e. VXI Oscilloscope card was broken
- Only need two Relay Matrix Switches and one Relay Driver Module
  - Down from 4 relay matrix switches and two relay drivers
- Large instrumentation set to allow for future capability
  - Relay matrix switch has open channels
  - Fuze interface cable is not utilizing all pins

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Fuze Connection and Interface

- One shared cable using military connectors for reliability and ruggedness

- Interfaces designed in house
    - Minimal time required for swapping fuzes
    - Cores easily interchanged to switch among the three fuzes

- Modular interface design is vast improvement over original approach

Increased Functionality/Benefits

MK432   **MK437**   **MK419**

- One comprehensive instrumentation and software set capable of setting and testing all Navy NATO standard Electronically settable fuzes

- MFF Test time decreased from ~6 minutes to 90 seconds
  - Working with contractor to realize part of this time savings on their tester

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In Summary

- Original system only capable of testing MK432
  - Outdated hardware and software requiring work
- Requirements analysis to trim system and remove unnecessary, broken, or obsolete hardware
- Custom PCB designed to allow switching among and testing three Navy electronically settable fuzes
  - MK432, MK437, MK419
- RFRS upgrade increased functionality for proximity and RF testing
- Ability to expand for addition of new hardware and fuzes to be tested

Questions?