NDIA 48th Annual Fuze Conference

Navy

Overview
Agenda

- Introduce the Navy Energetics Enterprise
  - A collaboration between Navy R&D labs
- Dahlgren Overview
- China Lake Overview
- Indian Head Overview
Navy Energetics
Enterprise

China Lake  Crane  Dahlgren  Indian Head
Navy Energetics Enterprise

• A Coalition Chartered & Led by SYS.COM Vice Commanders of NAVSEA & NAVAIR
  • NAVSEA Ordnance Product Area:
    • Dahlgren, Indian Head & Crane
  • NAVAIR Weapons & Energetics Department:
    • China Lake

• Goal
  • Provide leadership in-line with warfighters’ vision,
  • Provide rapid transition of technology to the warfighter,
  • Provide the best technical solutions to the warfighter,
  • Effectively align with industry,
  • Efficiently use resources,
  • Effectively Steward the Navy’s energetic core equities.
NDIA 48th Annual Fuze Conference
NSWC / Dahlgren Division
Overview

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G34 Branch Head
Guidance Integrated Fuze Technology Development Program

- **What is GIF?** GIF is a low-cost, fuze-sized module that is intended to replace a “NATO standard” fuze on existing stockpiled Army, Navy, & Marine Corp Ammunition.

- **What Does it Do?** GIF corrects the ballistic trajectory of the projectile in 2D, resulting in a small terminal miss distance. GIF provides “First Round - Steel on Target”.

- **When?** The 80% solution, Spiral 1, in FY07. 1000 fuzes for operational assessment/bunker in 155mm system. The 100% solution in FY10, incorporating military grade GPS.

On track for a guided demonstration flight in October of this year
How Does GIF Work?

Unguided Impact

- Ballistic Solution
- Initialize Fuze

Guided Impact

- Predict Miss
- Deploy Controls
- Steer to Target

GPS Satellites

- DeSpin Nose
- Acquire GPS

GIF Fuze Replaces Other NATO Standard Fuzes

NAVSEA

WARFARE CENTERS
Low Cost Guidance Electronics Unit (LCGEU) Program Objectives

- Develop a *Low Cost* Alternative Guidance Electronic Unit Concept
- Demonstrate concept capability through flight tests of prototype GEU on EX-171 ERGM & ANSR projectiles

Program Office - NAVSEA IWS3C
Technical Design Agent - NSWCDD
Prime Contractor - Charles Stark Draper Laboratory
Program Objectives Met in Oct 2003

- LCGEU guided ERGM to within 20 m of the target at 44.8 nmi
- LCGEU guided ANSR to within 20 m of the target at 53.6 nmi
Fuze Power Supply PIP

- **Objective**
  - Develop battery to replace MFF’s lead acid battery

- **Approach**
  - Investigate two battery designs
    - ATK’s MOFA
    - Thales’ UA 6275/821
  - Conduct Electrolyte research for MOFA battery
    - Increase the rise time & current carrying capability
    - Most significant research into electrolyte rise time for many years
  - Enhance test capability
    - Now able to test gun fired fuze batteries with simulated fuze electrical load profile in rail gun
    - ARL airgun validated
      - MOFA Battery Risetime results same in both guns
MK 417 76mm RF Prox Fuze

- Navy & CG has continuing need for 76mm ammo
- Final Procurement of MK 417’s occurred in FY 03
- Obsolescence prohibits further procurement
MK 417 76mm RF Prox Fuze

- Risk Mitigation Program Initiated in Anticipation of Future Procurement
- Hardware Producibility Improvements
  - Update electronics & RF design
  - IM Booster Required
  - New Battery Required (Lead acid no longer manf.)
- Synopsis Issued
  - ASuW is Highest Priority
    - HSMST
MK 437 MOFN Update

- Navalization PIP to Army’s MOFA uses “Change as little as possible” paradigm
- Navalization effort
  - Modify Inductive set software & hardware for Gun setter compatibility
  - Increase timing accuracy to .01 seconds
  - Modify S&A to Increase min arming to 400’
  - Harden for Navy Electro-Magnetic Radiation environment
- Status
  - Contract Award to L3 Communications May 2003
    - KDI, Bulova and EDC
  - Software PDR Held Sept 2003
  - Inductive Set and Safe & Arm device PDR held Nov 2003
  - Currently finalizing engineering changes required to enable build of first lot of 20 fuzes for qualification testing
MOFN S&A Progress

• Go Forward Configuration:
  – Reduce Rotor mass: drill holes in standard rotor
  – Increase Pallet moment of inertia: use double thick Brass Pallet
  – Preliminary results indicate >400 feet min. arm distance
  – Proof of Design testing to be completed in April
  – S&A arming distance and reliability testing in May
Inductive Interface Progress

- Two bench top designs pursued
  - 1st made changes to coil, added ferrite core, tuned circuit, reduced power consumption
  - 2nd used ferrite impregnated nylon for coil form, more than doubled turns on coil, continued work in tuning circuit & reducing power requirements
- Down-selected 1st design
  - ferrite impregnated nylon yielded unpredictable performance from batch to batch
- Ready for Proof of Design testing
Software Progress

- Intended to modify existing software (2000+ lines of assembly code)
- Doing total rewrite of the Software to meet safety requirements
- Based on IEEE/EIA 12207.1 &.2
- Completed Software Design Document
- Completed Software Preliminary Design Review
- Generating Code Now
ERGM Concept of Operations

- Motor Burn
- Battery On
- Fins Deploy
- DCI
- Canards Deploy
- GPS Acquisition Window
- GPS Guidance
- GPS Jammed
- Inertial Guidance
- Target
- Unitary Detonation
- Fragment Impact

Additional Details:
- GPS Acquisition Window
- Canards Deploy
- Motor Burn
- Battery On
- Fins Deploy
- DCI

Naval Sea Systems Command (NAVSEA)
Warfare Centers
ERGM Projectile

- **Length:** 61 Inches (1.55m)
- **Diameter:** 5 Inches (127mm)
- **Weight:** 110 Pounds
- **Fuze:** Integral, HOB Initiated
- **Guidance:** GPS/INS
- **Accuracy:** <20m CEP
- **Payload:** Unitary
- **Propulsion:** Rocket Assisted
- **Range:** 15 to 50 Nautical Miles
- **Charge:** 18 Megajoule
- **Loading:** Double Ram

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Multi-function Fuze (MFF) Update

• Progress
  – FAAT passed
  – LAT #1 passed
  – LAT #2 passed

• Next
  – GWS integration tests spring ’04
  – Shipboard OPEVAL summer ’04
  – Milestone III end of FY