NDIA 48th Annual Fuze Conference
NSWC / Dahlgren Division

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Agenda

- Background
- Mechanical / Electronic Packaging
- Gun Hardening Efforts
- Test Program
Background - Concept

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

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

- **What Difference Will It Make?**
  - GIF Technology will greatly reduce the number of rounds (20:1) required to defeat a given enemy threat.
  - GIF is applicable to *literally millions* of existing projectile, mortar and rocket systems.
  - GIF will enhance “*Maneuver Warfare*” by reducing the time required to neutralize threats while minimizing logistic and re-supply burdens.
Background - Function

- Unguided Impact
  - Ballistic Solution
  - Initialize Fuze
  - Predict Miss
  - Deploy Controls
  - Steer to Target

- Guided Impact
  - GPS Satellites
  - DeSpin Nose
  - Acquire GPS
  - GIF Fuze Replaces Other NATO Standard Fuzes
Design – Departure Point

- Start with Army MOFA Fuze.
- Retain Radar, S&A, Primer / Initialization Components “as is”.
- Minimize Changes to Existing Tactical Procedures:
  - Aimed,Initialized,Rammed and Fired like Existing Ammo.
  - No Aim Offsets or Biases Needed (Improved Danger-Close Safety)
  - No Decrease in Rate of Fire.
  - Fail-Safe/Fail-Operational (Guidance Failures Still Allow Standard MOFA Fuze Functions.
- “QSC” (Quick, Simple, Cheap) Design Philosophy. COTS Components. Add Complexity Begrudingly, as a Last Resort.
Fuze Modifications

GIF - No Changes “North” of Coil

Self-Contained Fuze and Setter Coil Assembly

Same Stack Height

Standard MOFA Design
“Onion Peels”

GPS Anti-Jam Antennae System

Roll Brake Coils

Waffle Canards

COTS Batteries (CR2) & Drive Motor Replace MOFA Battery

Standard Primer and S&A Untouched by GIF Mods

Waffle Covers:
- Protect Waffle Canards Prior to the Initiation of Aero Control
- Provide Despin Torque with Anti-Roll Strakes

HOB Sensor

Electronic Stack

Fly-Away Configuration Launch Until 25 Seconds Before Impact

Guided Configuration Last 25 Seconds of Flight

Exploded View Showing HOB Sensor and Electronic Stack
CAS and Power Assembly

1. Assemble Spindle For Waffles

2. 59:1 Reduction

3. Assemble Power & Actuator Module and Secure to Base Plate

System Batteries (COTS)

Assemble Yoke & Slide and Secure to Base Plate

15mm Actuator (COTS)
Assembly – Forward Section

1. Assemble CCAs and Antennae
2. Assemble Pott GEU Assembly
3. Assemble Clam Shells
4. Assemble Waffles and Covers
5. Assemble HOB/DCI
6. Assemble RF Shielded Clam Shell

RF Shielded Clam Shell
3) Large Vertical Board
- Magnetometer
- Pitch Rate Gyro
- Squib Fire Circuitry
- Power Regulation

4) Daughter Board to Board 3
- Leadtek GPS Receiver

5) Daughter Board to Board 2
- Stepper Motor Controls

2) Large Vertical Board:
- DSP, PIC and Memory
- Flight Code EPROM
- DCI/Setter Functions
- Motherboard for board 5

1) Bottom T-Board:
- Roll Rate Gyro
- Manchester Encoding
- Backplane for #2 & #3

Optional Daughter Board to Board 3 for Regulation of Roll Brake Power for Cold Temp (-45 deg F) Operations.
Demo / Spiral 1 Hardware

Roll Bearing Test Fuze with Tactical Strakes

GPS Antennae System

Re-Packaged HOB/DCI Module

Roll Brake and Bearing Assembly

Complete Roll Brake and Bearing Assembly Including Fuze Body and S&A Cup
Gun Hardening Efforts

• **Todate:**
  – 15mm actuator motor to 20 kG’s
  – HOBY / DCI sensor puck to 20 kG’s
  – Roll bearing subsystem flight tested

• **Planned:**
  – All-up Demo fuze assembly at 8S levels in Picatinny ballistic railgun (BRG) prior to flight
Test Schedule

- All-up fuze BRG: spring 2004
- Pathfinder flight test: summer 2004
- Additional flight tests: through summer 2005