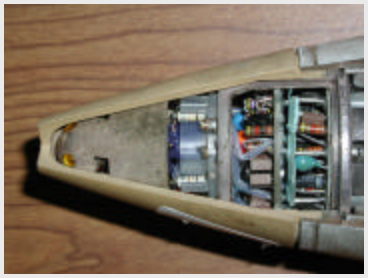
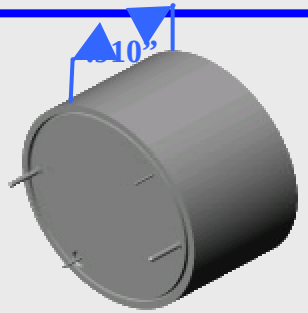
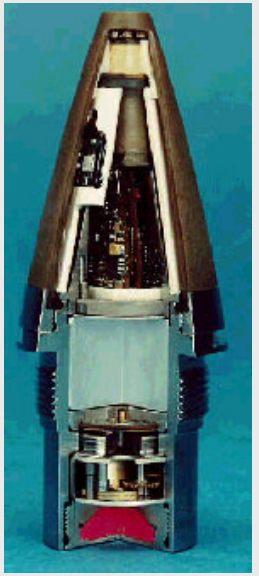
Fuzing at Dahlgren



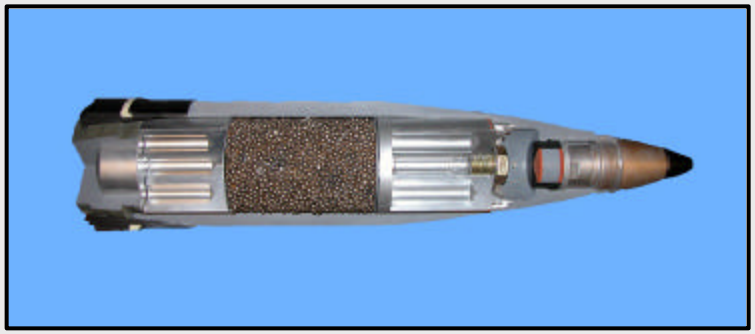




Scott M. Pomeroy

NSWC Dahlgren Division

G34, Fuze Branch



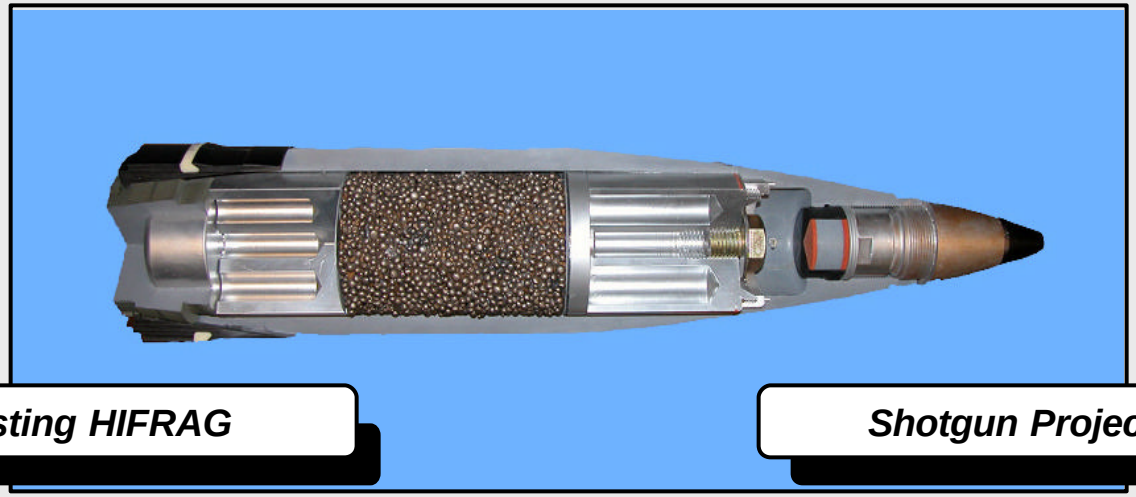
MK 432 Fuze Update

- **14,000 MK 432 fuzes passed LAT**
  - **Fuzes were set and fired from the MOD 4 Gun**
    - **For 10 second settings**
      - **Mean = 10.000, SD = .010**
    - **For 40 second settings**
      - **Mean = 40.011, SD = .014**

} ***Exceeded Requirements***

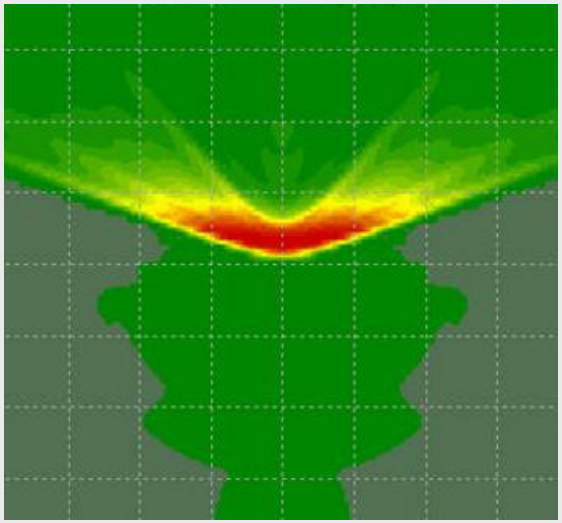
- **Two tasks remain to close out effort**
  - **Final Hazard Classification**
  - **Issue a close-out report**

Mk 432 ET Fuze's 1st Mission: 5-Inch Shotgun (BB) Projectile

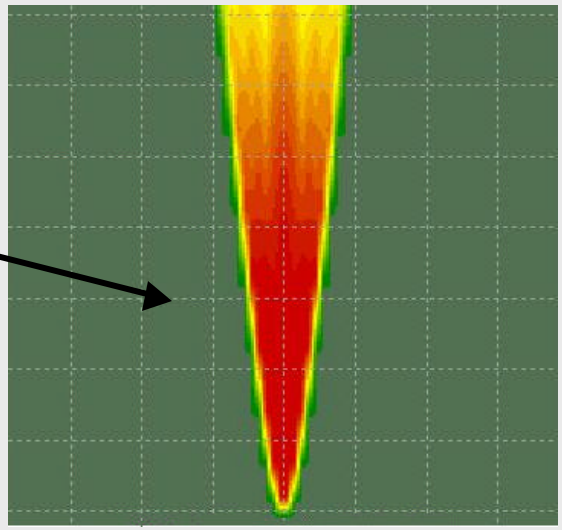


Existing HIFRAG

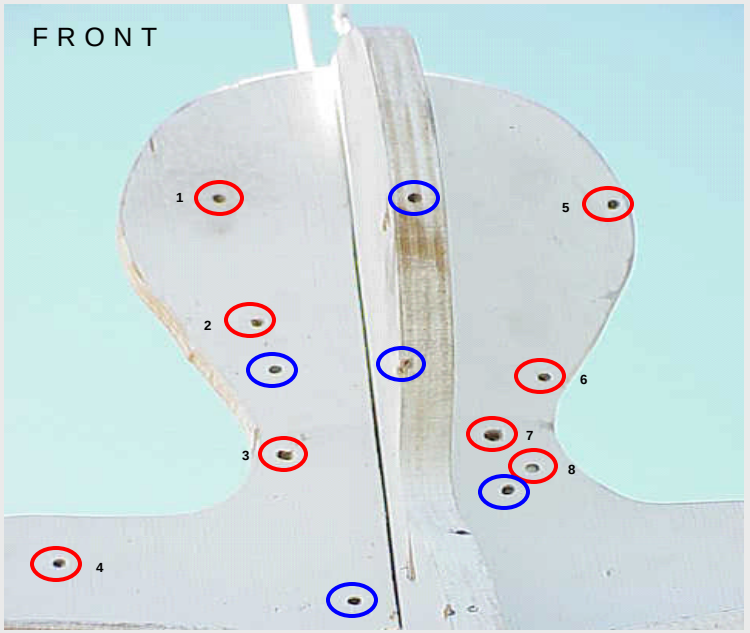
Shotgun Projectile

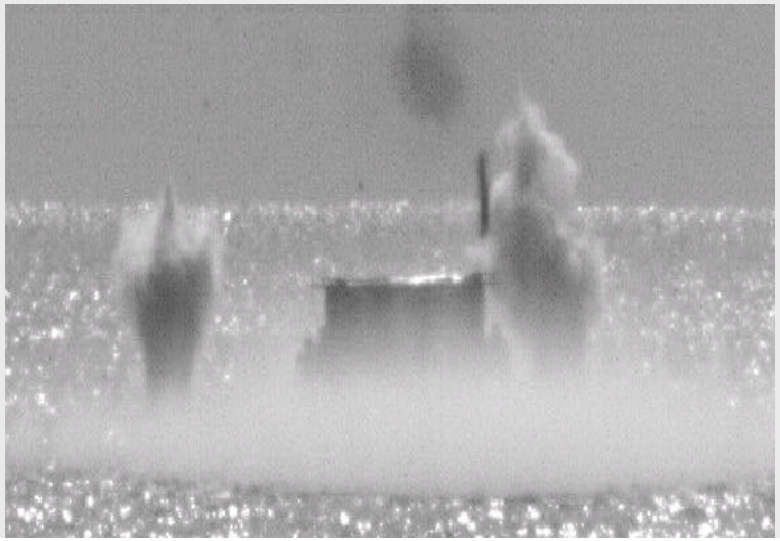


Twice the Lethal Area



Test Results



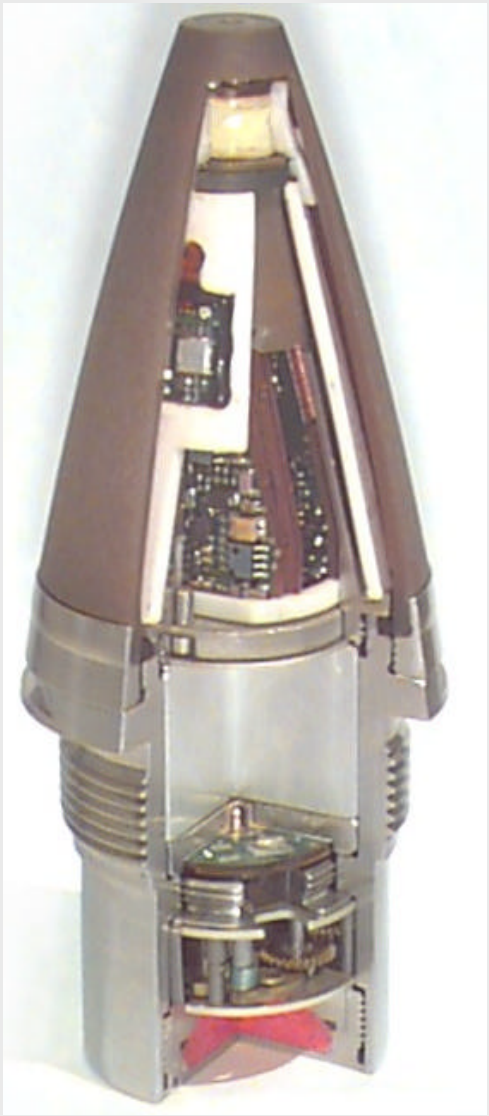


MK 437 MOFN Update

- **"Navalized" version Army's MOFA uses same approach as Mk 432 fuze.**
  - **"Change as little as possible"**
- **Navalizing effort**
  - **Inductive set software & hardware for Gun setter compatibility**
  - **Increase min arming to 400'**
- **Status**
  - **Risk reduction efforts nearly completed on S&A, EMV testing, & setting power**
  - **Fuze software being written, tested and documented**
  - **RFP issued**
  - **Schedule: On-track for May 05 PIP completion**

Multi-function Fuze (MFF) Update

- Failed FAAT led to Fixes
  - Sea Clutter algorithm tweaked and validated at sea.
  - S&A binding issue gone.
  - Detonators passed after weld seal quality was improved.
  - Still working a fix for inductive coil wire break during trans' vibration test.
- Schedule
  - FAAT retest in April.
  - LAT #1 September 2003.
  - LAT #2 February 2004.
  - TECHEVAL – OPEVAL Fall '03



Fuze Power Supply PIP

- Objective
  - Develop battery to replace MFF's lead acid battery
  - Integrate battery into MFF
- Approach
  - Investigate two battery designs
    - ATK's MOFA
    - Thales's UA 6275/821
  - Conduct Electrolyte research for MOFA battery
    - Increase the rise time and current carrying capability
    - Most significant research into electrolyte risetime for many years.
  - Enhance test capability
    - Now able to test gun fired fuze batteries with simulated fuze electrical load profile.

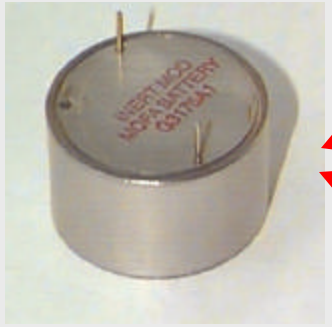
MOFA Battery Design Requirements

Army's MOFA
Post Launch Battery
5.6-11.7 V

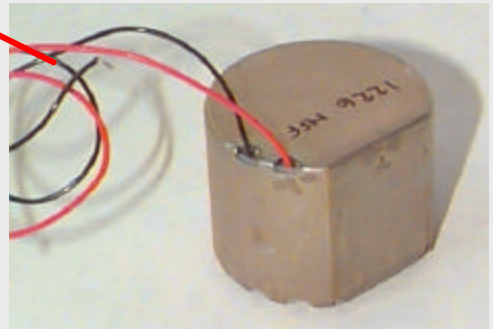
Baseline design

MK 43 MOD 0 RE
used in MK 404,
MK 418, MK 417
30 volts min

Requirements



Navy's MFF+
"modMOFA-2"
12.5-20.0 volts min



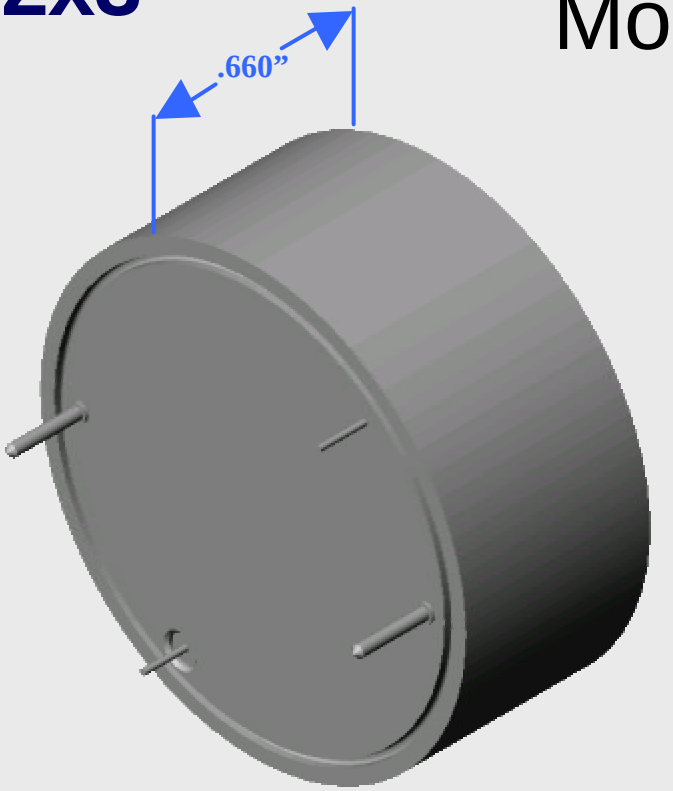
MK 44 MOD 0 RE
used in MK 419,
11.6 volts min

Initial Design of new MOFA Battery

“modMOFA-2 Battery”

Current Army MOFA battery

2x3

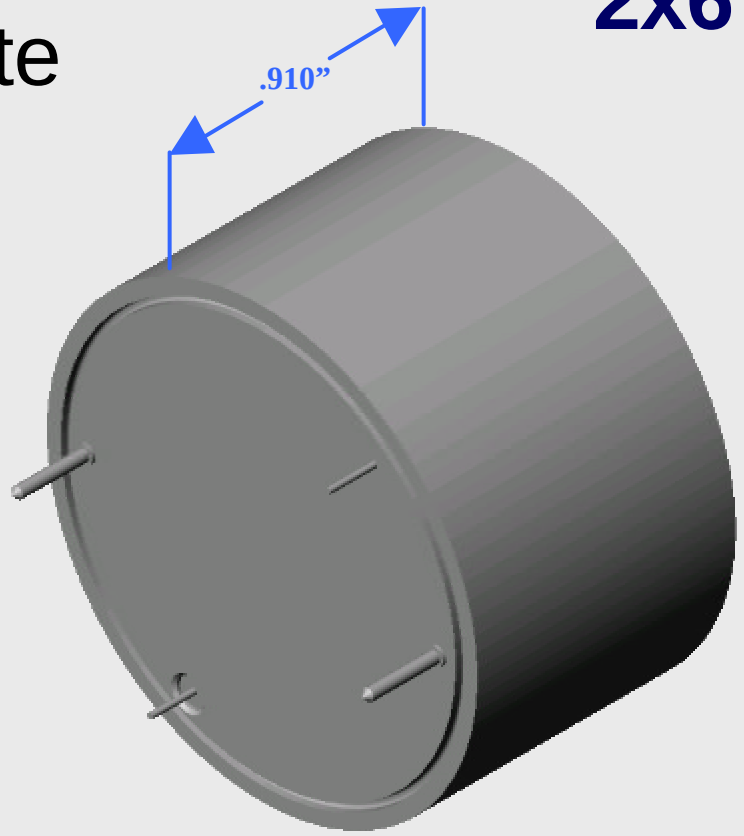


More power

More electrolyte

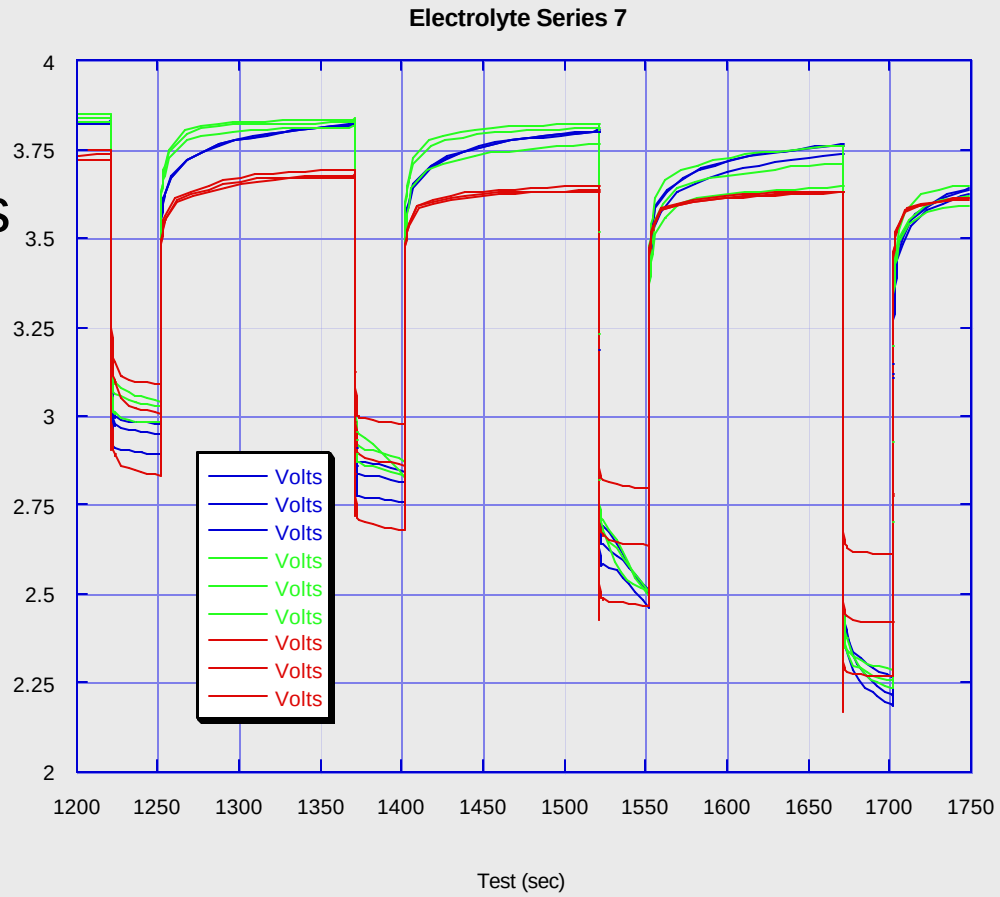
New Navy modMOFA-2 battery

2x6



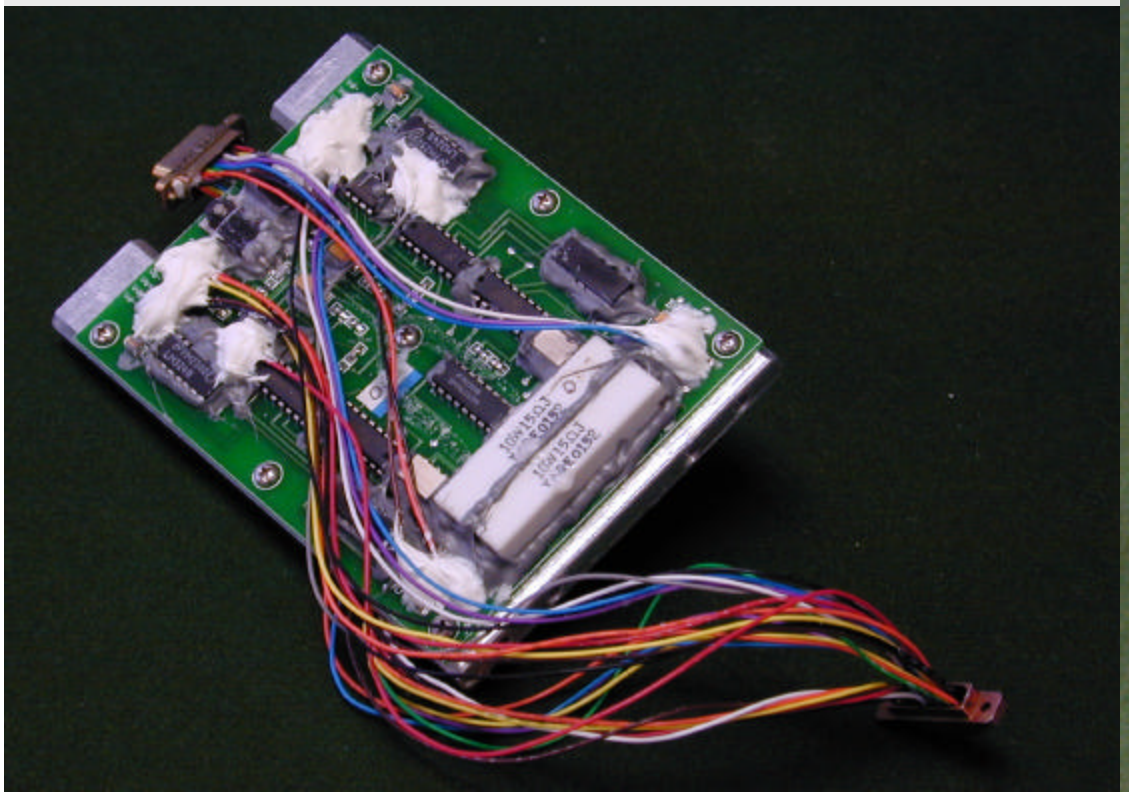
High Rate Electrolyte Study

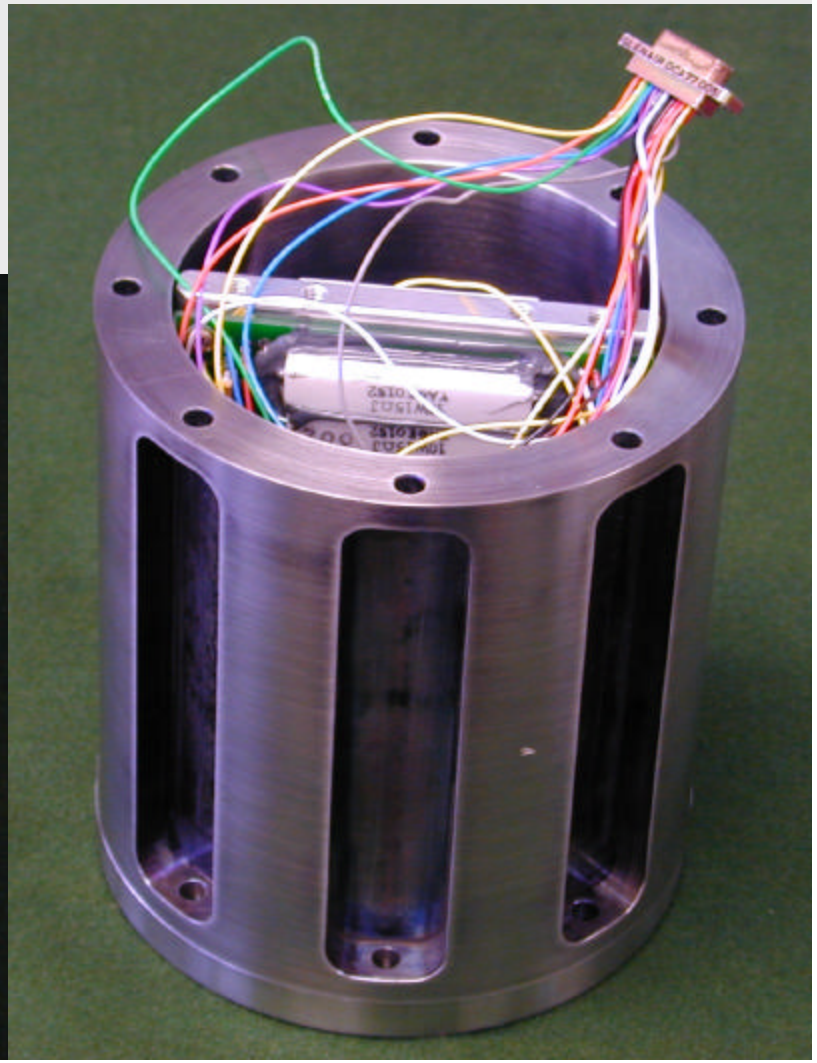
- Compared the properties of 12 electrolytes to determine best candidates to conduct preliminary testing on.
- Down selected two which will be railgun tested in standard MOFA battery with a MFF electrical load profile.



Improved Test Hardware

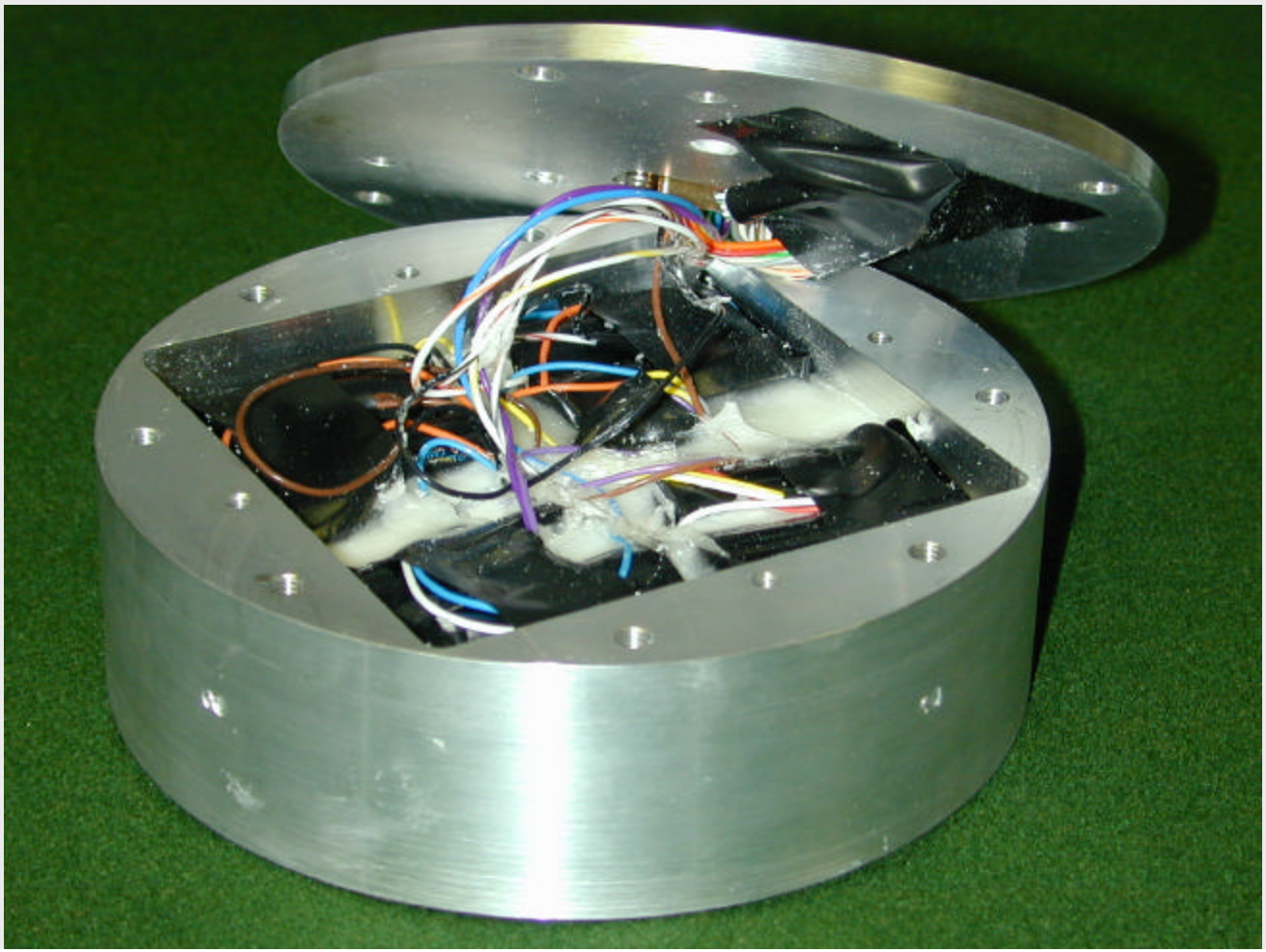
- 4 separate fuze-load simulation circuits on 2 boards.
- Lucy Switch senses gunfiring and starts time to simulate load profile during flight.





Improved Test Hardware

- On board power supply for load simulation circuit



Batteries for Future Munitions:

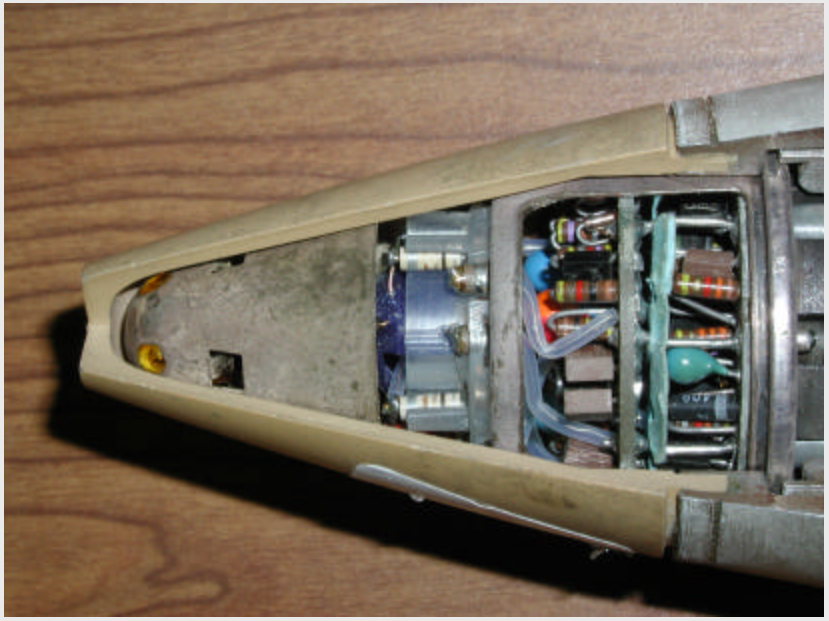
- Autonomous Naval Support Round
  - Guided projectile using GPS & INS
  - Program is in Demo Phase
  - No plans to develop a reserve battery
  - COTS active battery planned

ANSR Wind Tunnel Testing (LTV)

Batteries for Future Munitions:

- NSWC has no plans to develop any new batteries for gun fired munition other than what is currently being developed
- Current thinking is that COTS battery technology is good enough for the future smart gun-fired munitions
- Demo programs are not concerned about suitability of low risk items such as batteries
  - Sponsors of some Demo programs may not have adequately considered the impact to the logistic system

MK 417 --76mm RF Prox Fuze



- Navy has continuing need for 76mm ammunition.
- Procurement of 13,000 MK 417's in FY 03.
- First Article testing in progress at Dahlgren – parts obsolescence slowing progress.

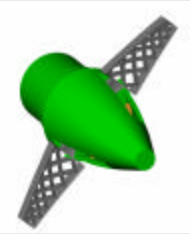
MK 417 --76mm RF Prox Fuze

- Next Procurement of 76mm fuzes expected in FY06-07 – MK 417 will be obsolete
- Therefore, need to develop replacement now
  - Update electronics & RF design.
  - IM Booster Required.
  - New Battery Required.
- “Sources Sought” letter issued
  - Air Target is Highest Priority.
  - Close-in Surface Targets also get attention

Guidance Integrated Fuze (GIF)

A 2-d, Low-cost, Competent Munition

Guidance Integrated Fuzing



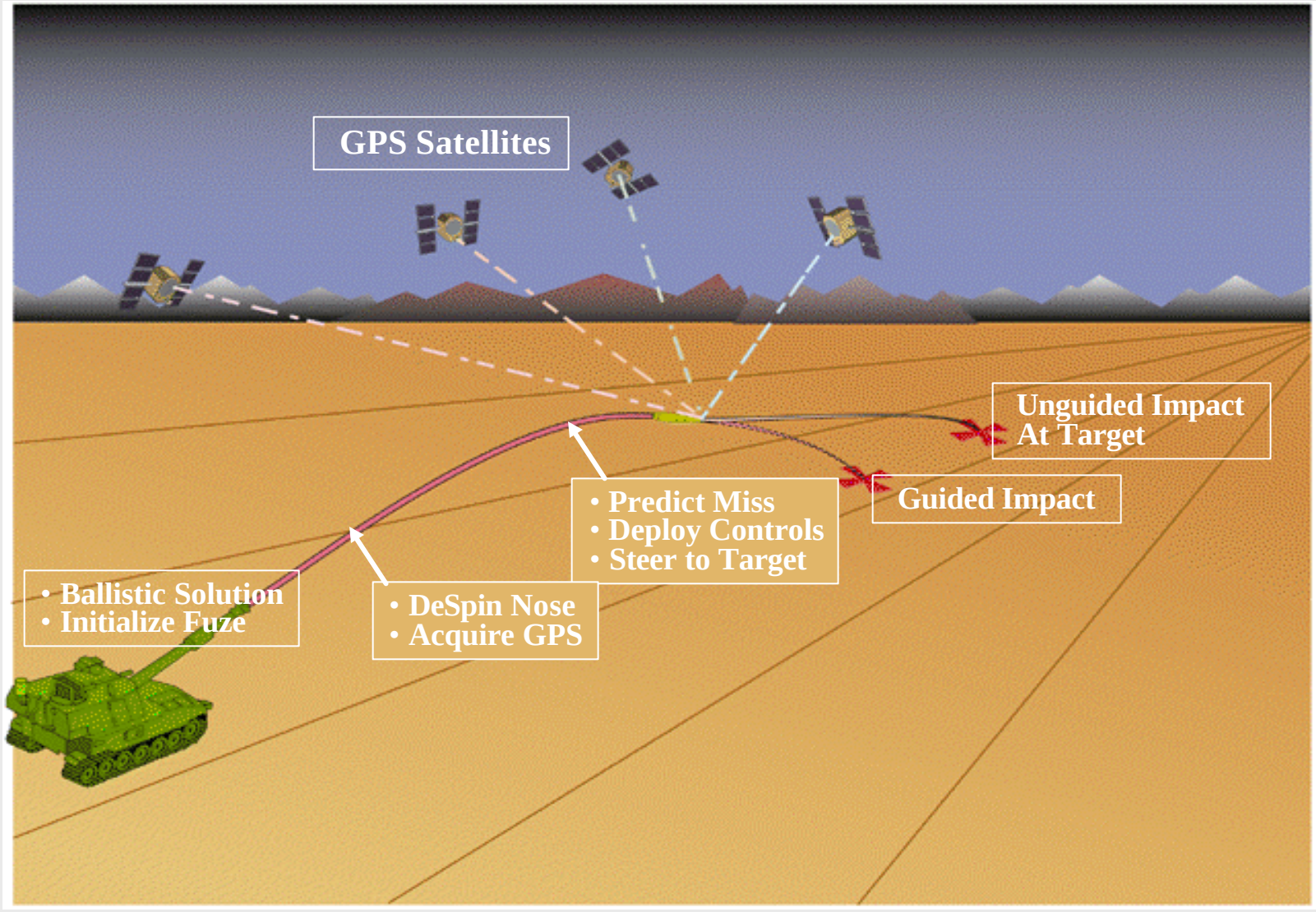
What is GIF ? **GIF is a low-cost, fuze-sized module that is intended to replace a "NATO standard" fuze on *existing* stockpiled Army and Navy Ammunition.**

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 and minimizing logistic and re-supply burdens.**

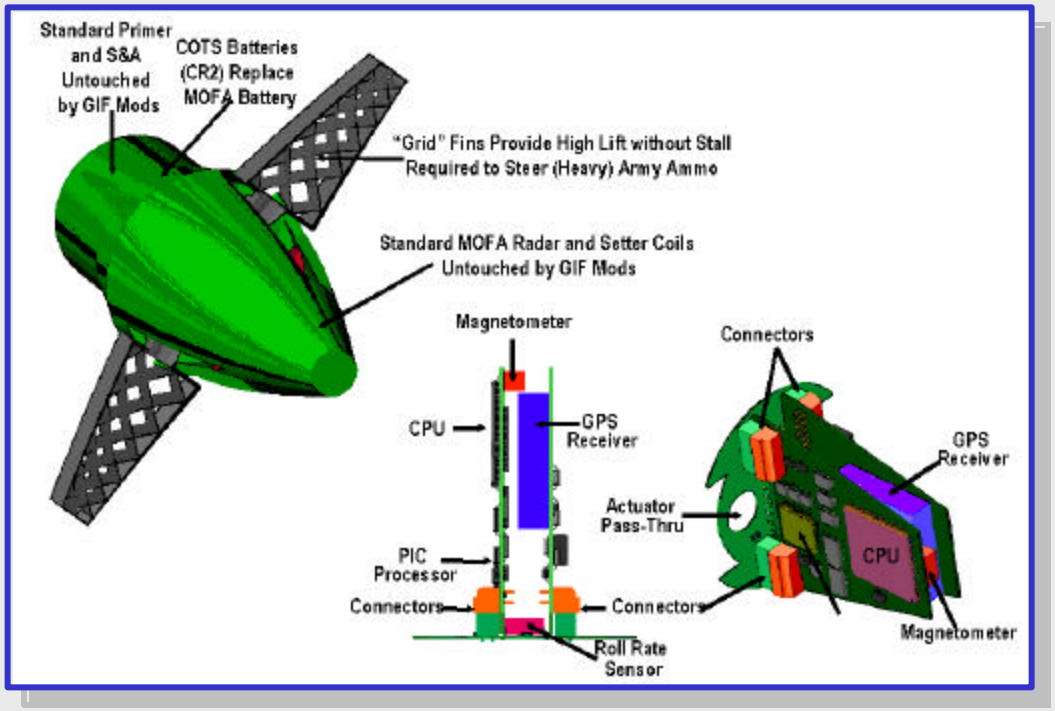
How Does GIF Work?



Progress in Exploratory Phase

Approach

- Army ***MOFA*** is the Baseline
- Retain Radar, S&A, Explosive Train if Possible
- ***Q***uick, ***S***imple, ***C***heap
  - COTS
  - Add Complexity as a Last Resort.



3D Modeling of Actual Components