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United Defense
Armament Systems Division
Army Programs

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Agenda

- Variable Volume Chamber Cannon (V2C2)
- Course Correction Fuze (CCF)
- BONUS
- FCS Platforms

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United Defense V2C2 Program

- V2C2 Program Objectives **…Investigate the Technical Feasibility of An Alternative Design To Artillery Cannon Technology that Provides Substantial Benefits In:**
  - **Logistics Support**
  - **Integrated Armament-Ammunition Performance**
  - **System Weight and Volume**

  that Uses:
  - **Adaptation of Proven Gun Technology**
  - **Existing Propelling Charge**
- V2C2 Team
  - United Defense: **System Design; V2C2 Breech Design & Fabrication, Integration, Test Projectile Fabrication, Project Lead**
  - ARDEC: **Test Projectile Design, Laser Igniter, Internal Ballistics Analysis**
  - ARL: **Internal Gas Management Modeling**
  - Benet Labs: **Structural Component Design**
  - Watervliet Arsenal: **Gun Tube and Breech Fabrication**
- United Defense IRAD Investment
  - **$4.9M in 2003 and $3.2M in 2004**

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V²C² Overview

- Variable Volume Chamber Cannon (V2C2)
- Common Propellant (M231 & M232) for Both 105 and 155mm
- Fires Existing Projectiles/Fuzes
- Extended 105mm Range (30km assisted/24km unassisted)
- Fully-automated 105mm Artillery Cannon, 62 Caliber Tube

**** Patent Pending***

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United Defense Course Correction Fuze

- Objective of UDLP's CCF is to provide a cost effective approach to improving standard artillery to accuracies better than 50m CEP.

- Maximize reliability by using very simple, highly reliable mechanical components combined with excellent guidance algorithms
  - No movable aero surfaces or despinning relative to the airframe
  - No IMU or autopilot
  - Uses multiple small adjustments to increase accuracy
  - All brakes affect both range and cross range and are optimized by a guidance algorithm that decides the optimum time to deploy each
    - Early deployment maximizes the amount of correction possible
    - Late deployment minimizes the time to target and the external influences that can increase the error.

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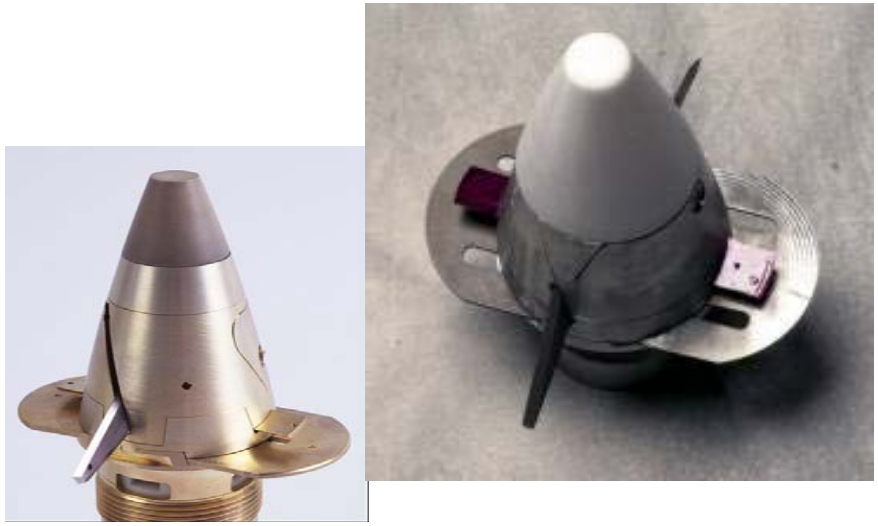
Course Correction Fuze Overview

- Provides both range and cross-range correction
- Extremely simple design – based on aeromechanical design and a powerful guidance algorithm
- < 50m CEP
- Low Cost
- Risk Reduction IR&D Program has demonstrated technical feasibility and established baseline design configuration



Demonstration Fuze Hardware

A JDAM approach for cannon artillery: 5.5 million projectiles

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Course Correction Fuze Program

- IR&D activity initiated in early CY2001
- Technical feasibility and preliminary test configuration determined from 3 series of fixed fin flight tests during 2001
- First full deployment test accomplished in October 2002 in round fired at Dugway Proving Grounds (Zone 7)
- Limited Spark Range test (1 Mach No.) run at ARL in March 2003 confirmed control authority adequate to conduct demonstrations
- Windtunnel evaluation of despin brake configurations completed in October 2003
- Full deployment tests accomplished at YPG at Zone 8S in December 2003.

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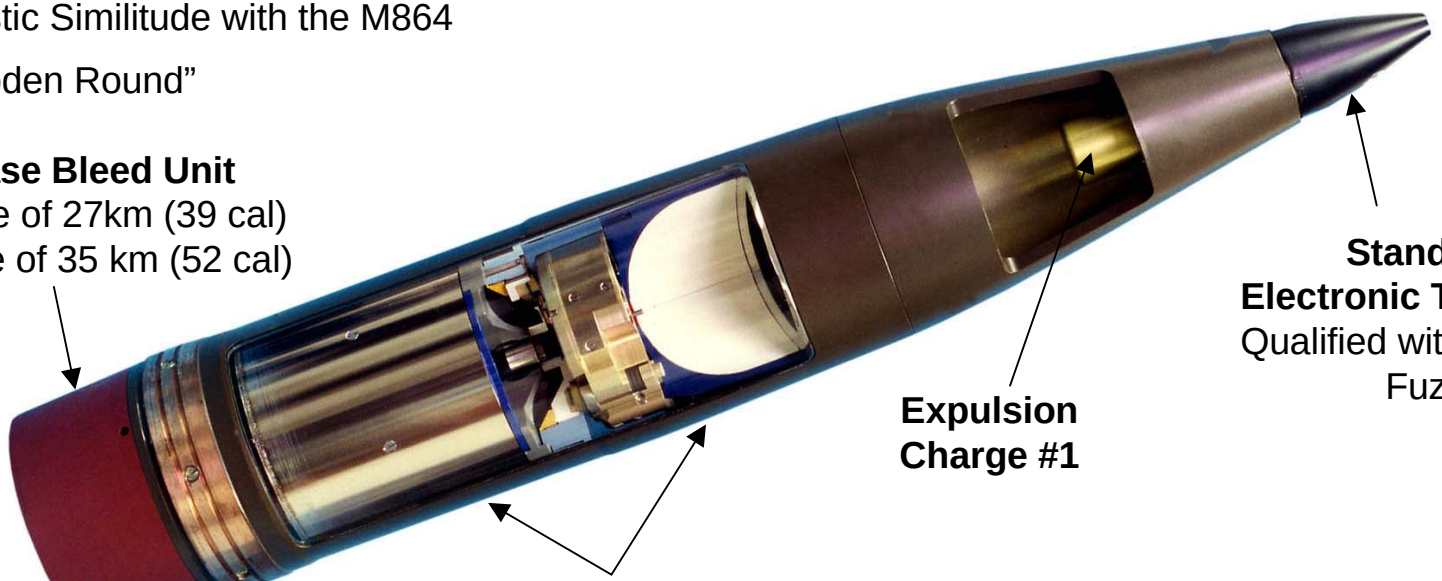
155 BONUS Mk II

Cost Effective, Fire & Forget Anti-Armor Weapon System

- In Serial Production in Sweden and France
- Compatible with JBMOU 39 and 52 Caliber Tubes
- Ballistic Similitude with the M864
- “Wooden Round”



Two Cylinders including Submunitions
Submunitions Sized for Compatibility with Other Potential Systems
Dual Mode Sensor – Excellent Target Detection & Discrimination
Fixed Wings - Rapid Spin/Descent Rate & Minimized Wind Effects
EFP Warhead provides 100 to >140mm armor penetration

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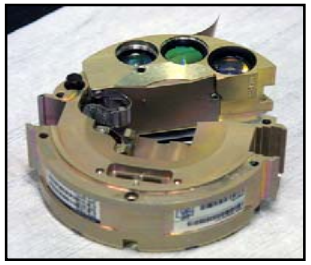
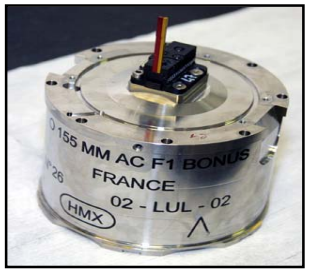
BONUS – Technical Data

- Ballistic Similitude M 864
- Launch Weight 45 kg
- Maximum Range
  - 52 Caliber 35 km
  - 39 Caliber 27 km
- Descent/Rotation Free spinning
  - Descent Velocity 45 meters per second
  - Rate of Rotation 15 revolutions per second
- Search Pattern Helical
  - Search Diameter 200 m diameter
  - Search Area 32,000 m2
- Sensor Suite Dual Mode
  - Sensortype Multi-band IR and Ladar
  - Altimeter Ladar
- Warhead Type Explosively Formed Penetrator >2000 m/s
  - Penetration 100 mm to >140 mm of RHA
  - Diameter Compatible with Excalibur





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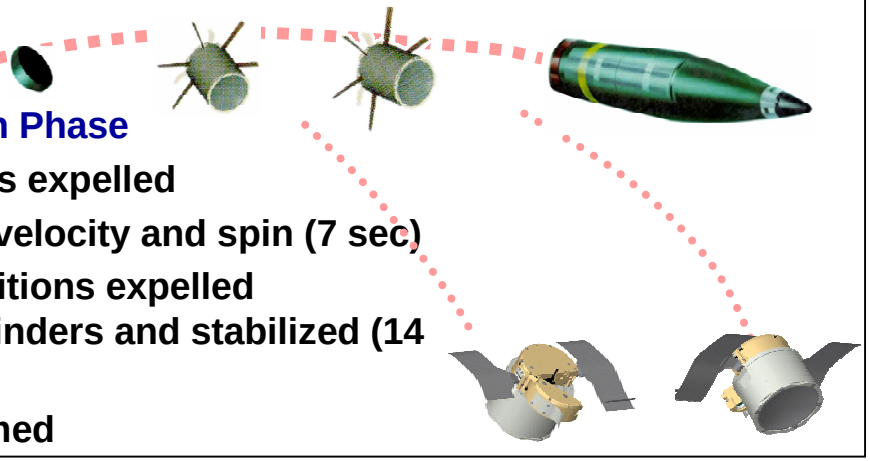
BONUS Mk II Functional Description

2. Ballistic Phase

- Ballistic flight until expulsion
- Base bleed extends range
- Ballistics similar to M864

1. Launch Phase

- Install fuze
- Program, load, and fire
- M762A1 Fuze ”Safe and Arm” unlocks

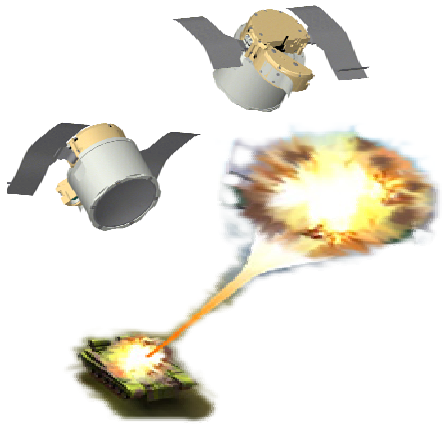


3. Transition Phase

- Cylinders expelled
- Reduce velocity and spin (7 sec)
- Submunitions expelled from cylinders and stabilized (14 sec)
- SAU Armed

4. Terminal Phase

- Search mode activated at 175 m altitude
- Wings provide rapid descent and high spin rate resulting in stable flight, insensitivity to wind & wind gusts, and reduced chance of detection
- Sensors and software search and identify targets
- Warheads fire



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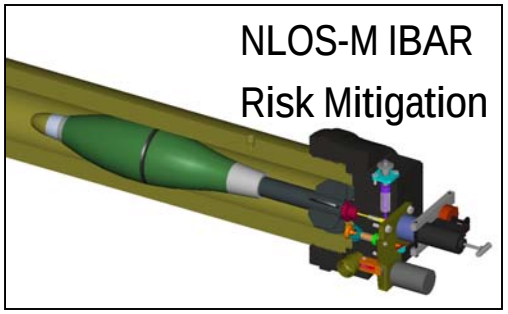
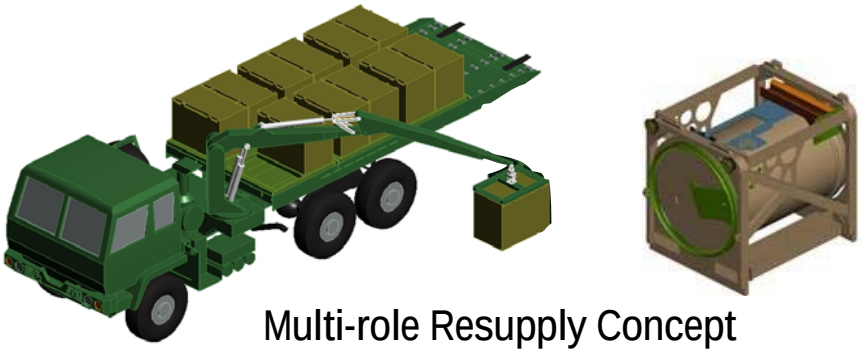
NLOS-C / NLOS- M Overview

NLOS-C

NLOS-M



- NLOS-C offer full automated ammunition handling; including projectile and propellant
- NLOS-M semi-automated ammunition handling
- All IMP Criteria successfully completed except SFR
- System Demonstrator delivered
  - **Firings for Stability, Rate, Range**
  - **All zones**
  - **Mobility Performance Operations**
- Multi-role Resupply Concept
- Concepts for each MGV Variant
- Concept for Common Platform
- Objective Strategy Initial Path
- Subsystem Demonstration & Risk Mitigation Programs



Multi-role Resupply Concept