United Defense
Armament Systems Division
Army Programs

Presented by:
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Agenda

• Variable Volume Chamber Cannon (V2C2)
• Course Correction Fuze (CCF)
• BONUS
• FCS Platforms
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
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
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.
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
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.
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”

Base Bleed Unit
Range of 27km (39 cal)
Range of 35 km (52 cal)

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

Expulsion Charge #1
Standard Electronic Time Fuze
Qualified with M762A1 Fuze
• 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
1. Launch Phase
   - Install fuze
   - Program, load, and fire
   - M762A1 Fuze “Safe and Arm” unlocks

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

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
NLOS-C / NLOS-M Overview

- 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