Next Generation Fuzing for Next Generation Weapons

Medium Caliber Ammunition Scalable Airburst Fuze

Presented by: David A. Andersen
Agenda

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- GD-OTS Marion
- Marion Product Portfolio & Airburst Family
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DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited
General Dynamics-Ordnance & Tactical Systems (GD-OTS)

- 6 Strategic Business Units
  - Large Caliber Ammunition
  - Medium Caliber Ammunition (MCA)
  - Small Caliber Ammunition
  - Precision Systems
  - St. Marks Powder
  - GD-OTS Canada

- 3,927 Employees
- 17 Operating Facilities

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GD-OTS Marion Operations Facility

631 acres leased for Manufacturing

290 acres owned

Propelling charge, solid propellant products, Advanced Development

Ammunition Manufacturing

Test Range

Roadway: 10 miles
Buildings: 224
Operating Buildings: 76 Magazines
(Area, Square Feet) 159,290

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GD-OTS Medium Caliber Ammunition - Product Portfolio

20mm Ammunition

20mm C-RAM

30mm x 173

25mm - 57mm Airburst

30mm Lightweight

25mm Ammunition

30mm x 173

40mm Grenades

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Scalable Airburst Family

Airburst Fuze
Commonality for all Calibers is Design Goal

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Current Capability Gap: Modern Target Spectrum

- **M919 APFSDS-T**
- **M792 HEI-T/SD**
- **M791 APDS-T**
- **M919 APFSDS-T**

**Airburst** fills capability gap against troops in trenches, barricades, & buildings

**Gap to fill with MPAB-T/SD**

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25x137mm Airburst Cartridge

25mm useful caliber for MCA fuze & projectile development; resulting design easily adaptable to other calibers

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Scalable Airburst Fuze - Design Characteristics

- Inductive or Contact set, time-based, programmable electronic fuze

- PD-Immediate/PD-Delay feature to:
  - Increases capability of the ammunition by providing additional operating modes
  - Defeat light material targets
  - Provide PD function in the unlikely event that an air burst communication signal fails, or impact occurs after safe separation but before airburst time out.

- Selectable arming: allows user to select arming distance based on engagement

- Self destruct operating mode

- Command to Arm Safe & Arm

- Design meets basic Mil-Std-331 Safety Tests including:
  - Jolt, Jumble, 1.5 Meter Drop, Transportation & Tactical Vibration, Primary Explosive Component Safety, HERO, and Helicopter -ESD

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Electronic Module (EM)

EM provides airburst capability timing precisely from launch to intended burst time.

- Integrated flex approach
  - No additional interconnects
  - All electronic components on one side enhances manufacturability
- Advanced micro-controller for Muzzle Velocity Correction (MVC) accuracy
- Hardened for 8” Double Reinforced Concrete wall, and 34”Adobe wall impacts
- Stand-alone complete assembly
  - Adaptable to MCA calibers from 25mm to 50mm

Simple topology = successful high volume manufacture

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Safe & Arm Design

- Setback and centrifugal spin locks, with Command-to-Arm rotor ‘block’ release
- Arming Energy: Projectile spin
- Miniature Size - .300” thick
- Operational capabilities
  - 109,000 RPM, 110,000 G setback
  - No change in arm distance with temperature
  - No lubrication required
- Meets Mil-Std-1316 requirement of two independent launch environments - setback & spin
- Suitable for 25mm - 50 mm MCA applications

Crew safety emphasized through simple, rugged design

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Airburst Cartridge Operation

Step 1, Gunner Selects:
1. Airburst Mission:
   Vehicle fire control determines range, computes time to burst, and programs fuze with PD-immediate as back up

2. Point Detonation Delay Mission:
   Normal engagement, programmable detonation delays 4-5ms after impact

3. Arming:
   Default is safe separation range 50-100m with gunner option for “short” 10-25m arming if needed

Step 2, Arming:
Fuze arms at preset flight time beyond the safe separation range or gunner selected “short” range

Step 3, Terminal Effects
• Airburst on target
• Point Detonation-Immediate
• Point Detonation Delay
• Self Destruct

Target:
• Anti-personnel in open or defilade
• Light armor vehicle
• Hardened urban walls

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Fuze Communication - Contact & Inductive Set

Valid Airburst Contact Set Fuze Communication after 5000 Cartridge Cycles (2,500 ea M910 & 2,500 ea M793) 206 shots per minute

Valid Airburst Inductive Fuze Communication capable of 200 shots per minute fire rate

Fuze interface assembly bolts to the weapon using existing holes in the feeder frame for both contact and inductive set

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Airburst Fuze Summary

Precision Airburst Fuze
- Precision airburst with Muzzle Velocity Correction (MVC)
- Gunner selectable PD/PD delay
  - PD: Explode on a target
  - PD Delay: Penetrate and explode inside a target
- Gunner selectable arming via a Command to Arm Safe and Arm (S&A) device.
  - Default arming: Projectile arms at safe separation distance, 50-100m
  - Short arming: Projectile arms within 10-25m for short range engagements

Fuze development efforts continue using:
- IRAD funding for 25mm applications
- CRAD funding for US Army applications

Airburst fuze technology allows one round to perform the role of multiple

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## Points of Contact:

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