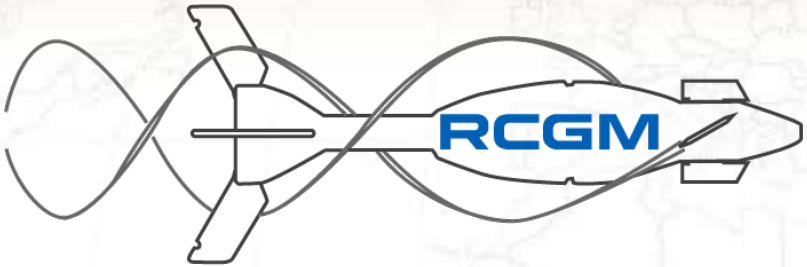

Roll Control Guided Mortar (RCGM)

Yousef Habash, Program Manager, GD-OTS

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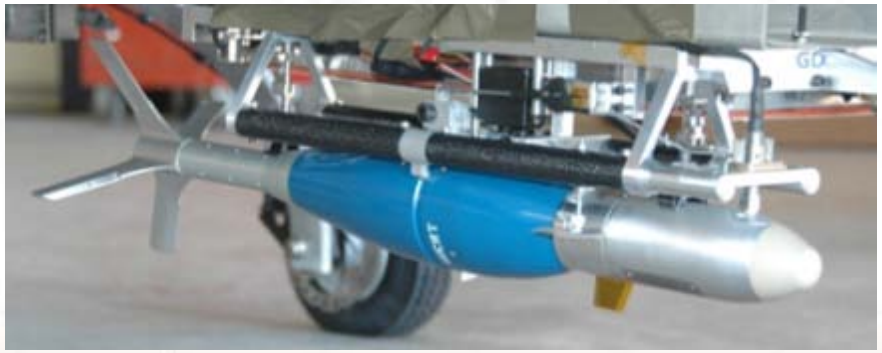
GENERAL DYNAMICS
Ordnance and Tactical Systems

Overview

- The Roll Control Guided Mortar leverages GD-OTS' patented Roll Control Fixed Canards (RCFC) and SAASM GPS to provide a low cost guidance solution to standard issue mortar warheads

- GD-OTS' Guided Mortars Initiatives
  - 81mm RCGM – Demonstrated on UK L41 mortar, available for M821 and other variants
  - 120mm RCGM - Available for XM395/M934
  - 81mm Air Dropped Mortar - for UAS and other air delivery platforms

81mm and 120mm RCGM

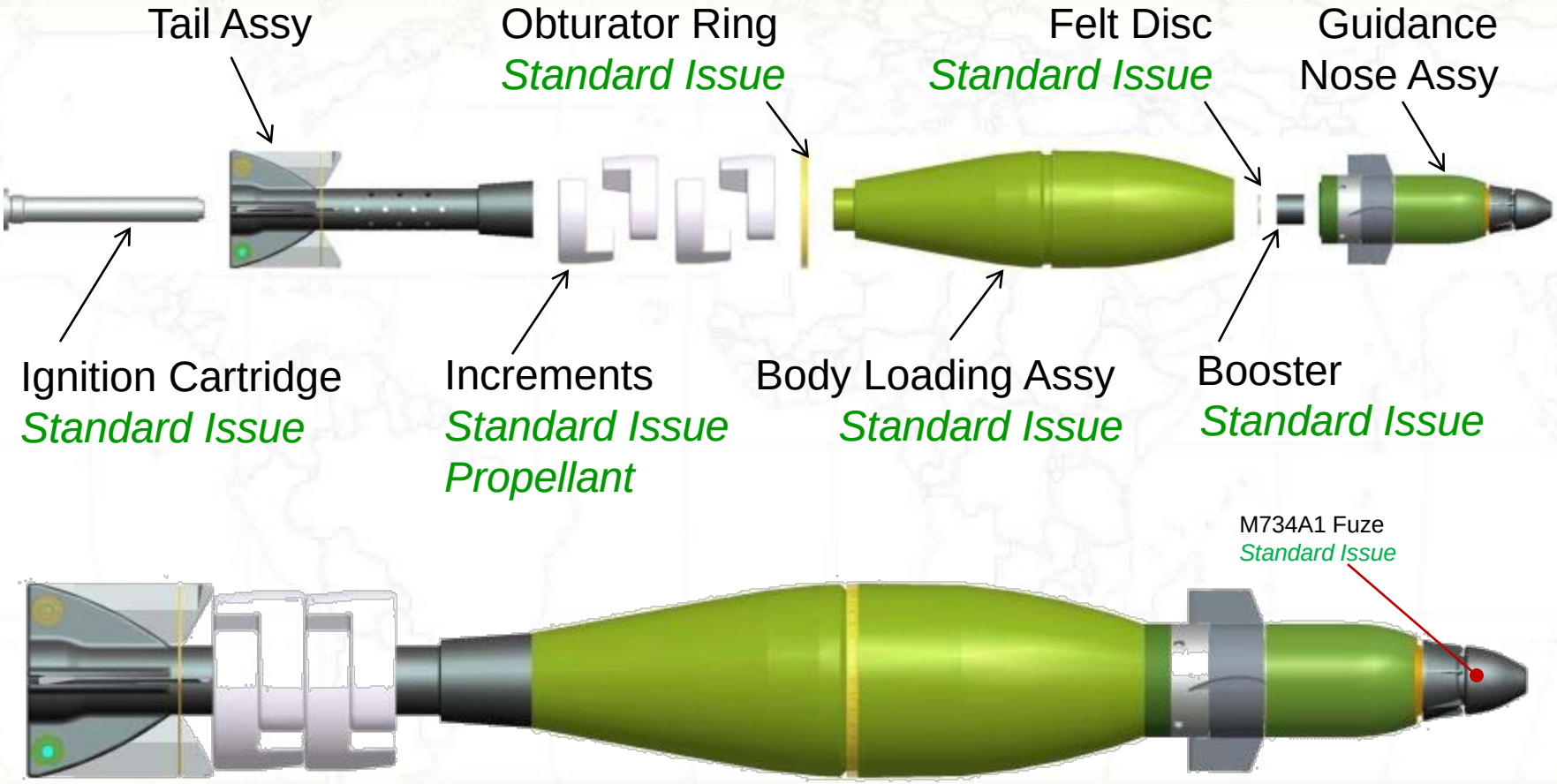


81mm Air Drop Mortar

Design Approach

- Warhead – Standard Issue
- M734A1 fuze – Standard Issue
  - No changes to fuze modes
  - No changes to Safe and Arm
  - No changes to Ignition Train
- Guidance, Navigation and Control
  - Simple Design: 2 boards, batteries, antenna and RCFC control module
  - Low Power System
  - Autopilot software
- Patented Roll Control Fixed Canards
  - Significantly cheaper than Control Actuation Systems
  - Roll Brake
  - Simple design, very few moving parts
  - Provides control authority to meet accuracy requirements
- Modified Tail
  - Super Caliber Folding Fins
  - Compatible with Existing Propulsion System

120mm RCGM Hardware Overview



81mm RCGM Hardware Overview

M734A1 Fuze S&A
Standard Issue

Ignition Cartridge
Standard Issue

Tail Assy - Stowed

Increment Charges
Standard Issue

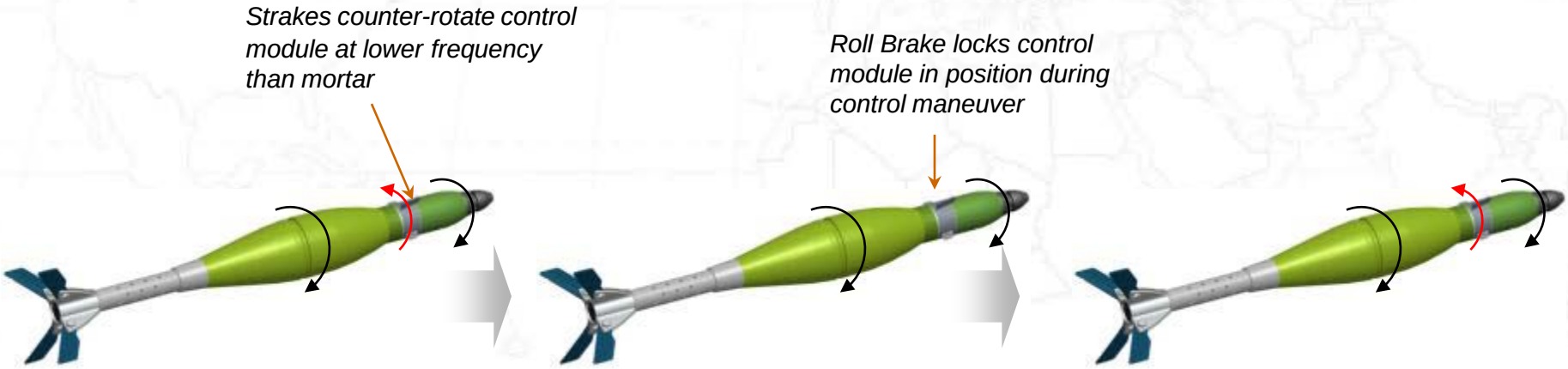
Mortar Bomb, HE
Standard Issue

Guidance Nose Assy

M734A1 Fuze Electronic Head Assembly
Standard Issue

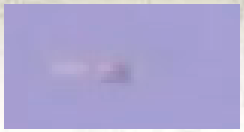
UK L41 Mortar Variant Shown

Roll Control Fixed Canards (RCFC) Concept of Operations

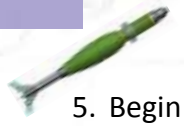


1. During flight, entire mortar spins resulting in a neutral guidance mode
2. Control Maneuver; Roll Brake modulated to de-spin collar and orient canards to steer mortar
3. After desired flight correction, the Roll Brake re-establishes prescribed collar spin resulting in a neutral guidance mode.

RCGM Flight Operations



6. Apogee

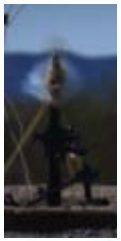


5. Begin GPS Controlled Trajectory
   Maneuver towards GPS target location
   Maneuver to reference trajectory waypoints

4. RCFC Module Spin/GPS Acquisition (1<t<10)
   Collar Spun to Desired Spin
   Acquire GPS Signal and Vertical Reference

7. Continuing GPS Controlled Trajectory (t<Det)
   Maneuver towards GPS target location

3. GEU Calibration/Stabilization (0<t<1)



2. Launch (t=0)
   Round Fired
   System Power-up
   Tail Fins Deploy

Launch

1. Round Initialization (t<0)
   Data uploaded via GPS/Fuze Setter
   - Target Location Data
   - Velocity/Trajectory Data

8. Round Detonates (t=Det)
   PD, Prox or Delay

81mm RCGM Guide to Target Tests at YPG

Round Setting using EPIAFS System/ Direct Connect

81mm RCGM Guide to Target Tests at YPG

Propulsion System and Mortar Release Device Installation

81mm RCGM Guide to Target Tests at YPG

Muzzle Exit and Fin Deployment

81mm RCGM Guide to Target Tests at YPG

Target Impact at 3,700m – Point Detonation (Impact)

81mm RCGM Guide to Target Tests at YPG

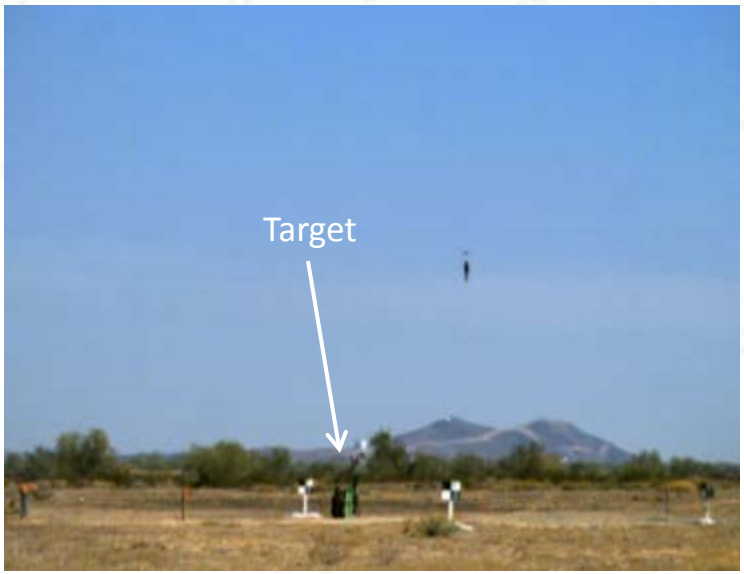
Target Impact at 980m – Time Delay

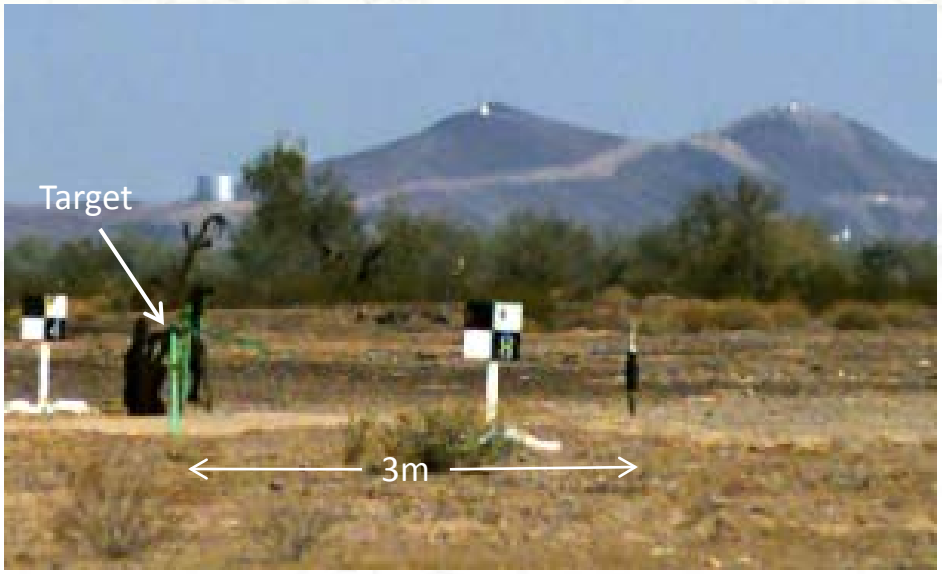
120mm RCGM Guide to Target Tests at YPG

Target Impact at 5,000m – Proximity Mode

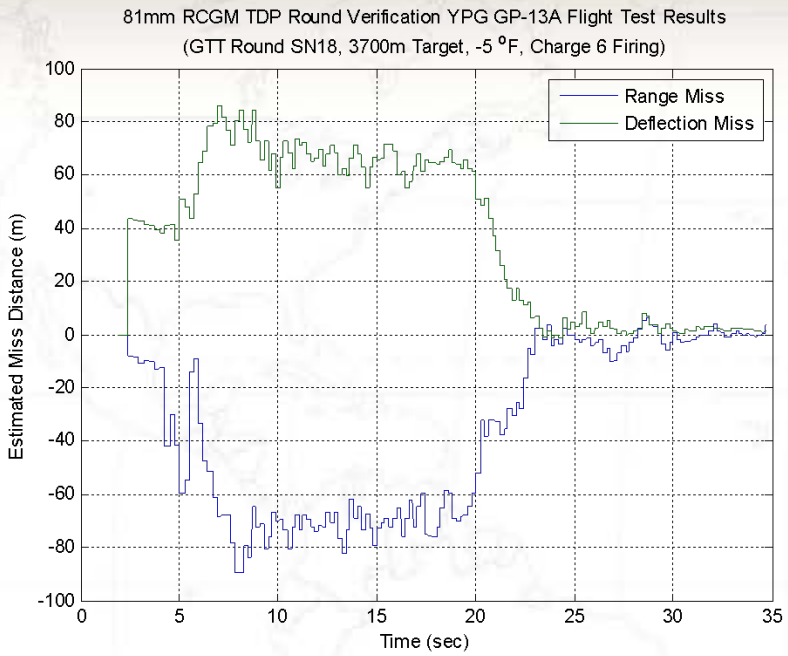
120mm RCGM Guide to Target Tests at YPG

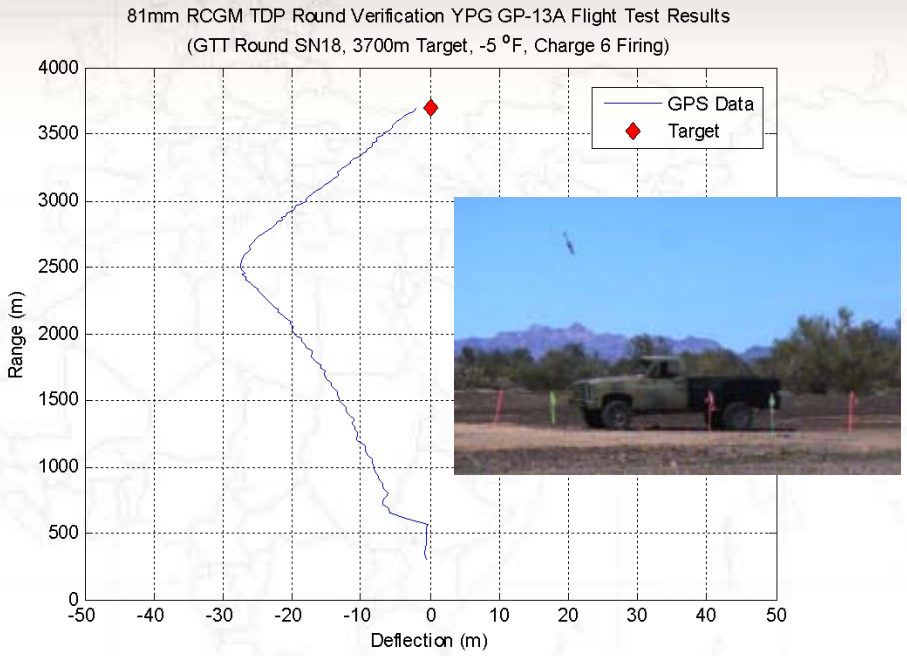
Target Impact at 980m – Point Detonation (Impact)





RCGM Guide to Target Performance



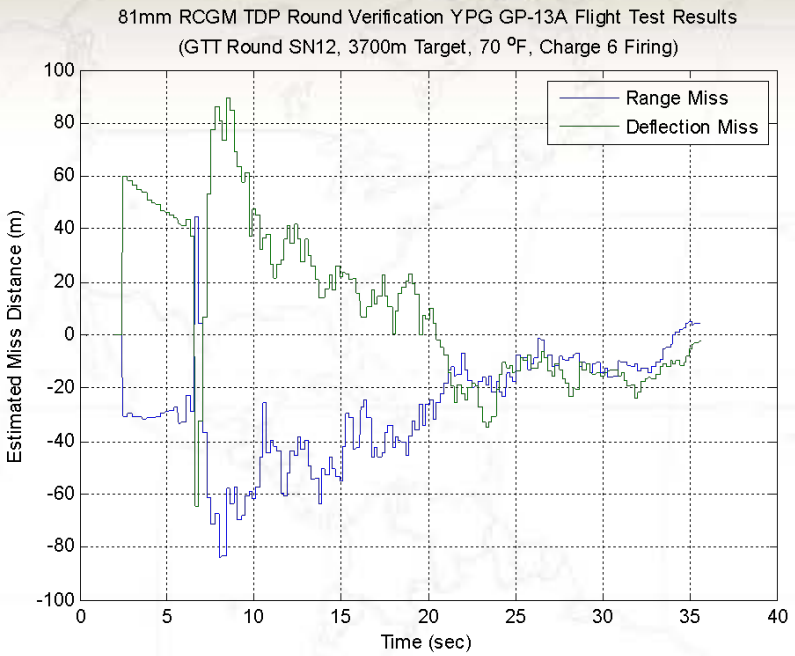


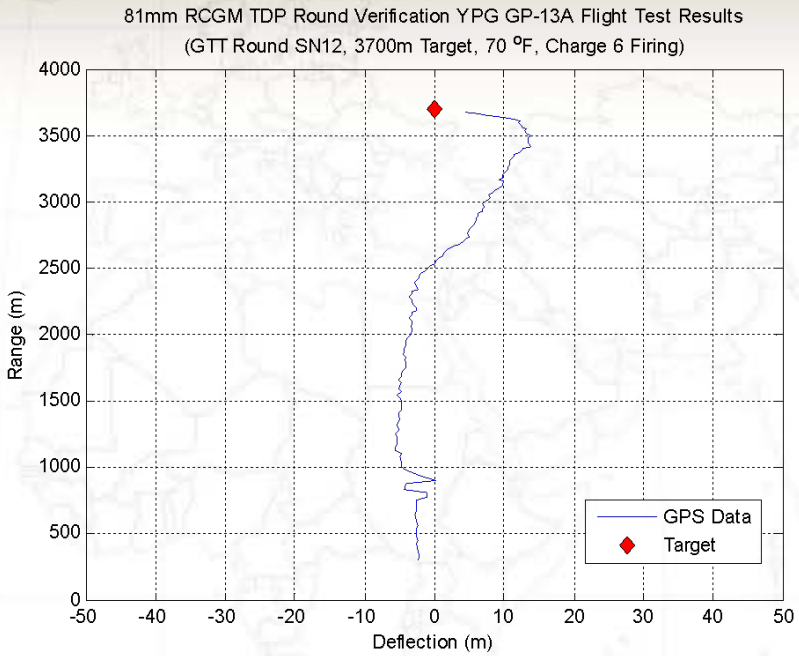
- Round successfully guided to within ~1.6m of the target, correcting for ~70m range miss and ~60m deflection miss.
- Point Detonation (Impact)

BAE SYSTEMS

GENERAL DYNAMICS
Ordnance and Tactical Systems

RCGM Guide to Target Performance





- Round successfully guided to within ~5.2m of the target, correcting for ~40m range miss and ~15m deflection miss.
- Time Delay Detonation

Summary

- GD-OTS's RCGM has been successfully demonstrated on both 81mm and 120mm Mortar platforms
  - Demonstrated end-to-end Guidance, Navigation and Control
  - Demonstrated Accuracy – Less than 10m median miss distance for both systems
  - Demonstrated Ignition Train
  - Demonstrated Performance across limited Environmental Tests*
    - Temperature Cycling, Vibration and Drop Tests
- RCGM provides our soldiers mobile precision capability (mounted and dismounted).
- GPS target coordinates can be loaded on weapon in seconds using existing Portable Fuze Setter
  - Coordinates can be relayed by forward positioned recon unit or UAVs
- Similar operation as standard mortar including mortar tube and propulsion system
- One Shot – One Kill capability

*: conducted on 120mm RCGM

Contact Information

Yousef Habash
Program Manager, Guidance Technogies
Email: yousef.habash@gd-ots.com
Phone: 425-420-9322

Joe Buzzett
Director, Technology Programs
Email: joe.buzzett@gd-ots.com
Phone: 727-578-8253

*: conducted on 120mm RCGM