GENERAL DYNAMICS
Ordnance and Tactical Systems

25/40mm AirBurst Simulator / Trainer Technology

Presentation

38th Annual Guns & Ammunition Symposium

March 26, 2003

By

Donald E. Dillard, P.E.

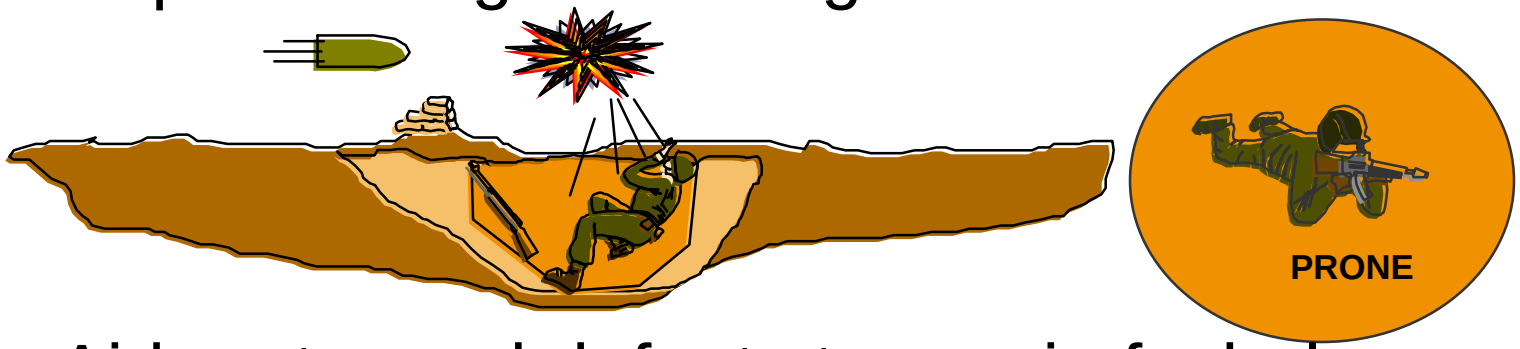
25/40mm AB Simulator/Trainer

The Purpose of This Presentation Is to Make the User community Aware of Current AirBurst Technology at General Dynamics – Ordnance & Tactical Systems

AirBurst Munitions

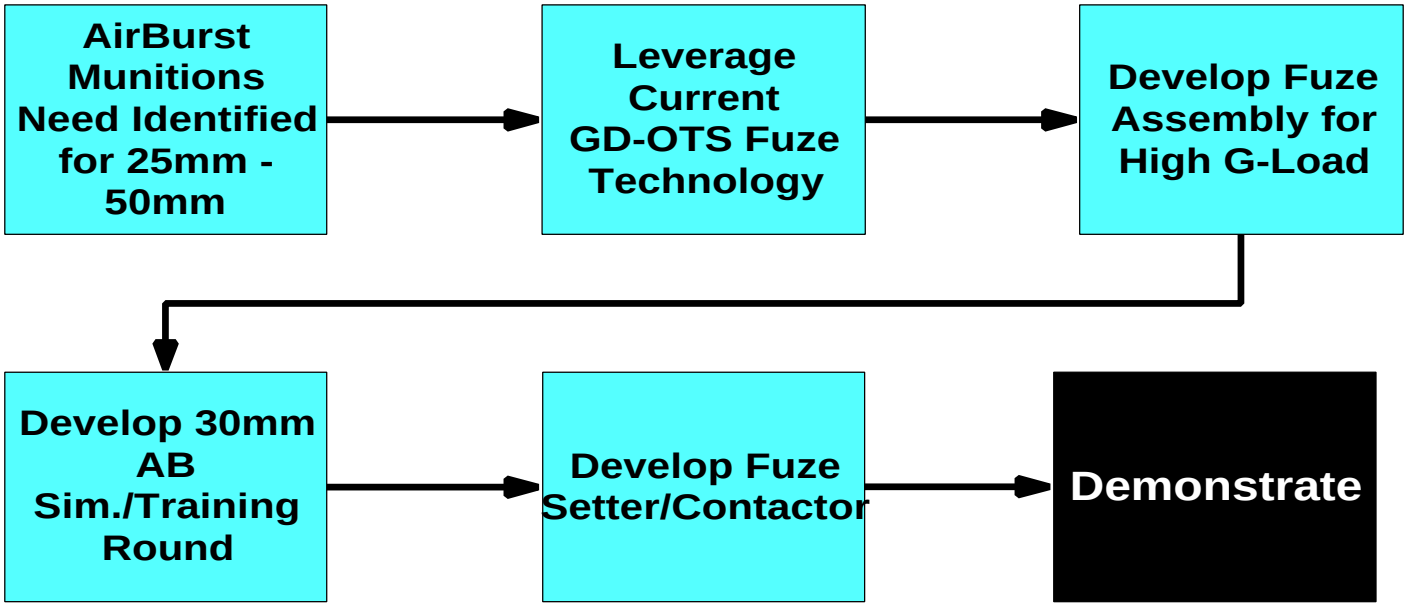
AirBurst munitions are receiving a great deal of attention in the military community.

- AirBurst Munitions are being primarily designed for troop suppression by exploding over the top of troops sending lethal fragments downward.



•The Airburst round defeats troops in foxholes and in prone & defilade positions where typical HEI point detonating rounds are not effective.

GD-OTS Systems Approach



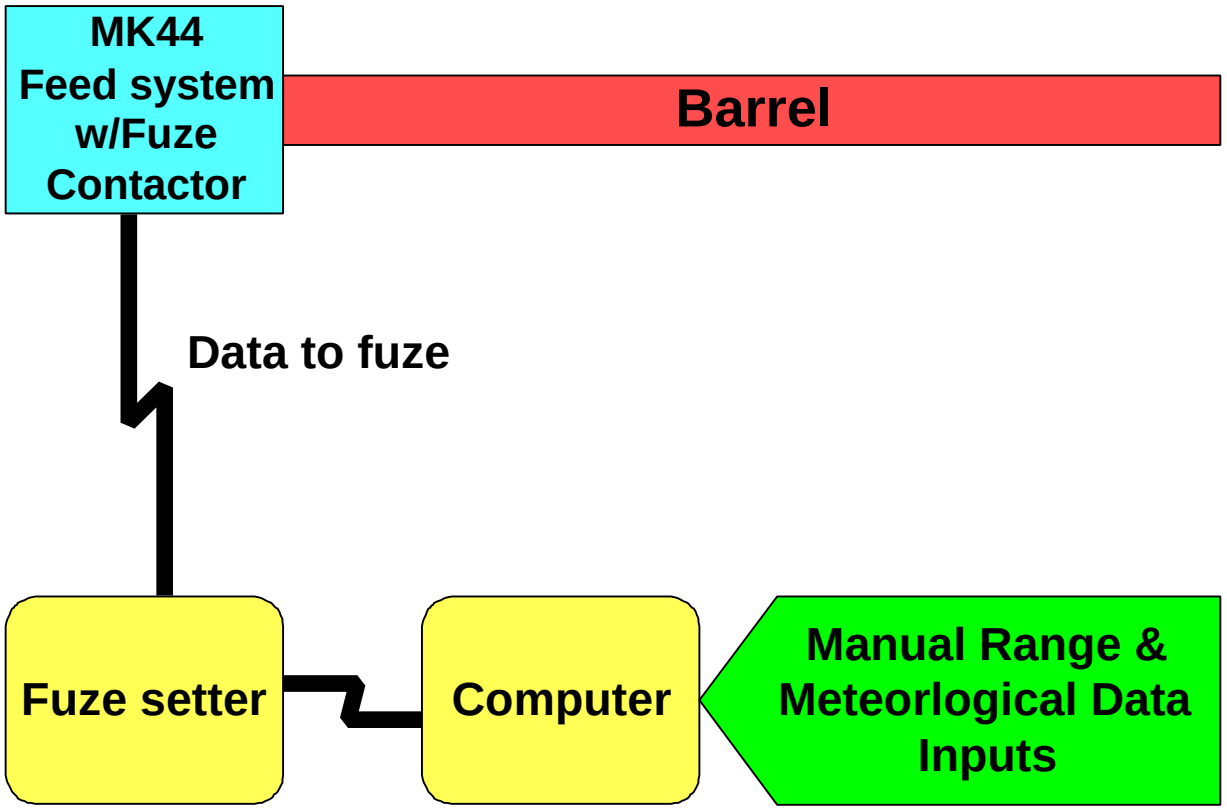
Successful 30mm Demonstration in a Bradley Fighting Vehicle (BFV) at the Live Fire Demonstration at Aberdeen Test Center in November 2002

AirBurst Munitions

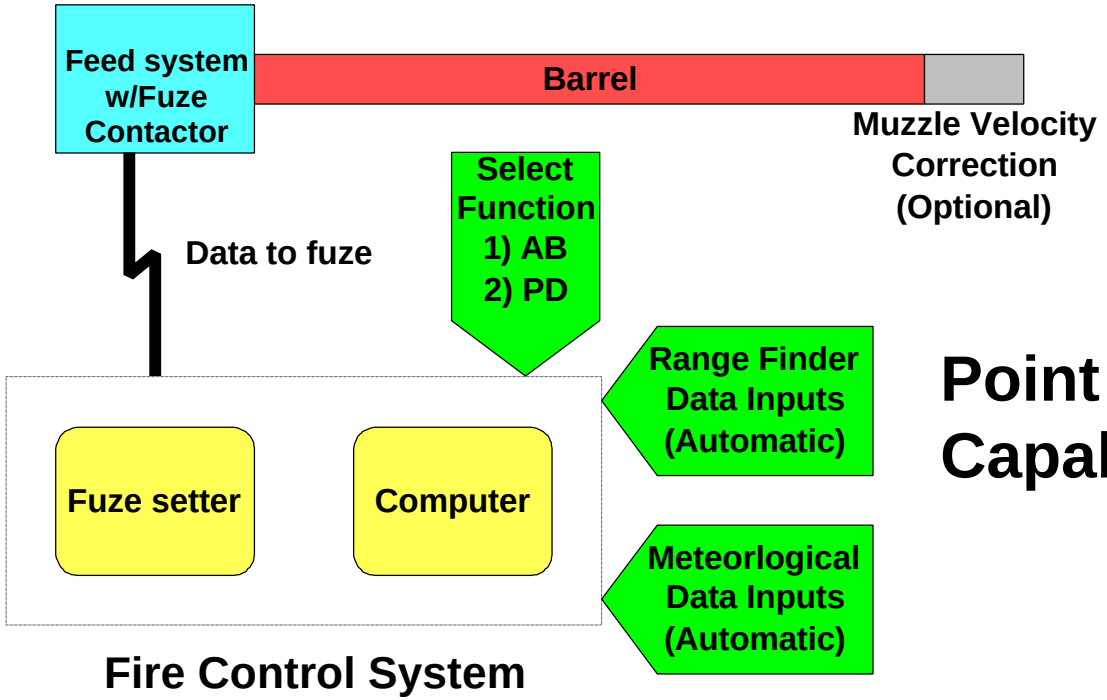
Key Elements of the System

- Fuze power-up and communication technology in the feed system
- Fuze setter and software with special progressive or digressive “string of pearls” variable position time of flight to burst.
- AirBurst simulator/trainer round comprised of:
  - Electronic fuze
  - Mechanical Safe & Arm
  - Pyrotechnic flash-bang charge

Current AB Simulator/Trainer Fire Control System



Planned Fire Control System for AB Trainer and Tactical Rounds

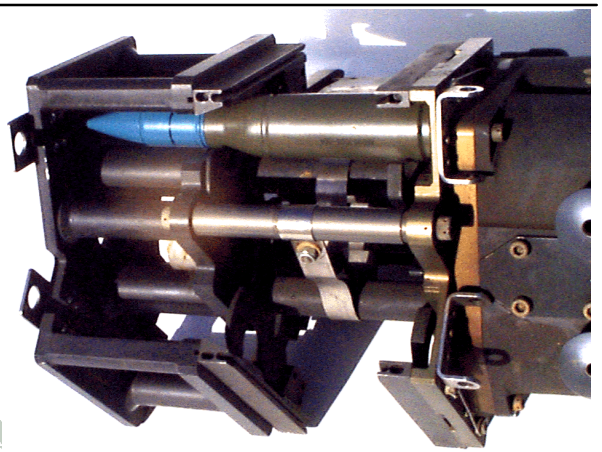


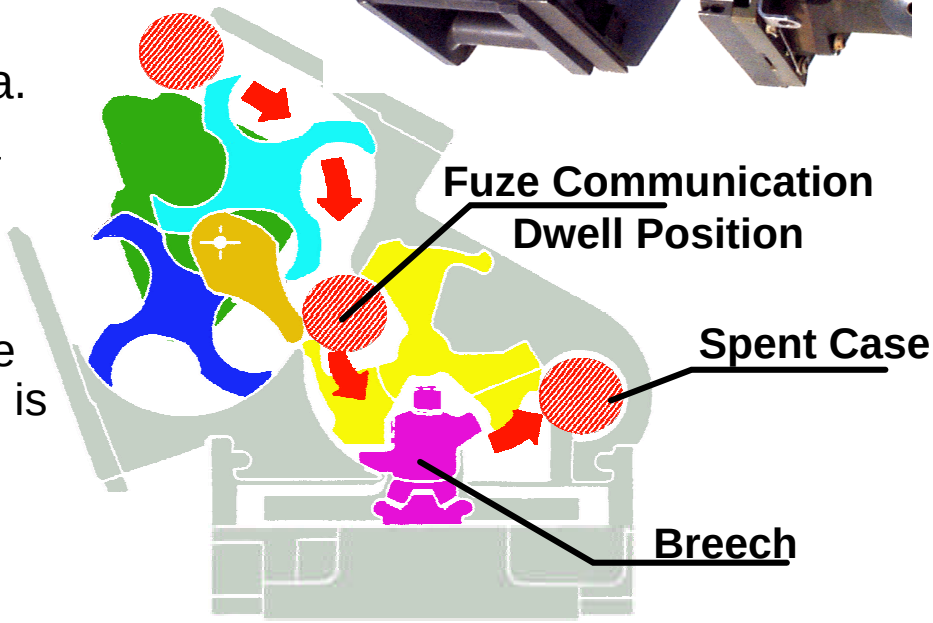
Point and Shoot Capability

Note: The AB round will default to a Point Detonate (PD) function with delay if an object is struck before the timer functions

GD-OTS FUZE COMMUNICATION

- Fuze Power and Communication in Feed System at “Dwell Position”.
  - Apply initial charge to capacitor bank.
  - Maintain a “Trickle Charge” to Keep Fuze at Full Power During Delays in Firing.
- Approach to communicate fuze data.
  - Communicate Nominal TOF Data to Fuze during initial Power-Up.
  - Every time firing solution is updated, new TOF data is communicated to the fuze and the fuze returns the data. This signal is repeated 5 times.
  - If the signal is not received and returned correctly, the round defaults to a PD function





AB Fuze Communication Timeline

300 msec cycling time (@ 200 spm)

- @200 spm, 300 msec available per round.

80 ms charging

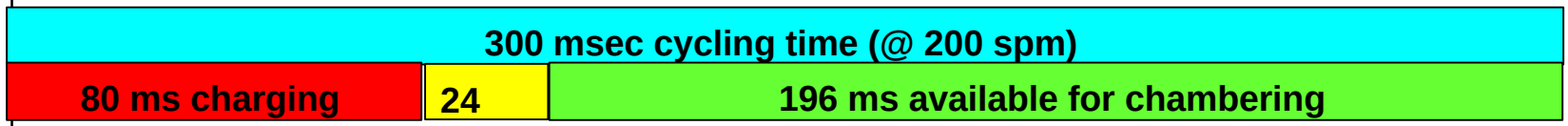
- Charging Fuze capacitors requires 80 msec.

24

- Data communication and talkback requires 24 msec.

196 ms available for chambering

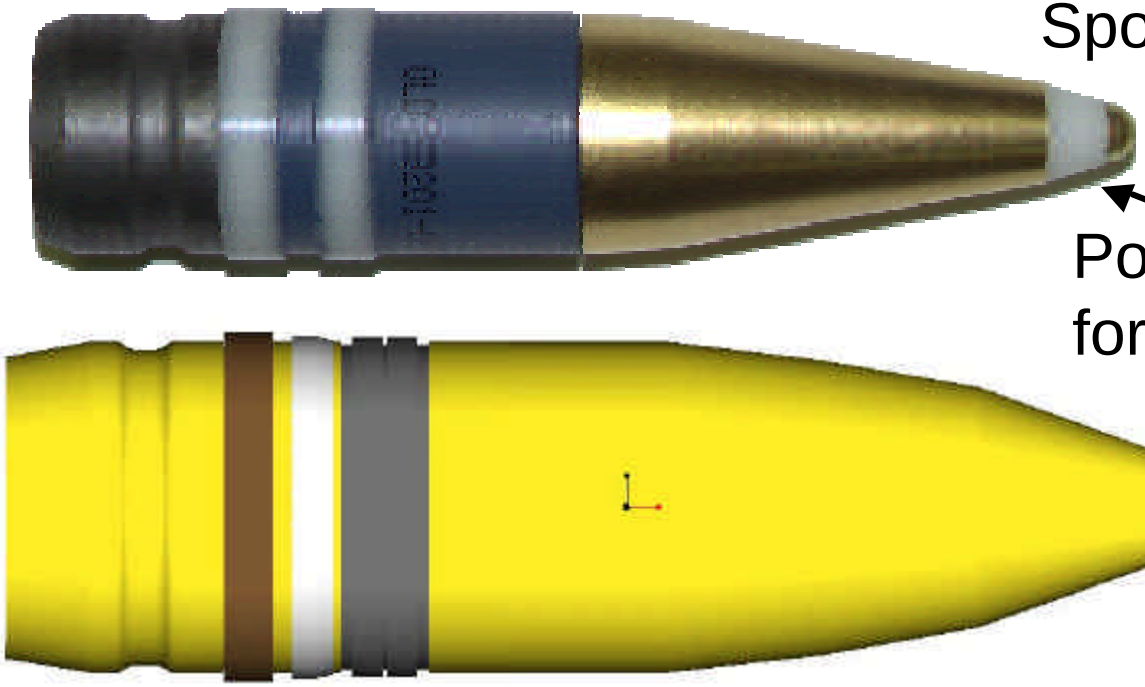
- 196 msec available for chambering cycle.



30mm AirBurst Simulator Description

- GD-OTS is using a 30mm AirBurst Simulator/Trainer round as the test vehicle.
- The round has an AirBurst fuze assembly consisting of an electronic assembly and a Safe & Arm Device (S&A).
- Forward of the fuze assembly is a spotter charge. When ignited by the fuze, this charge pops off the nose and emits a flash-bang effect.
- This AirBurst simulator/trainer round is a very effective & safe training round.

30/40mm AB Simulator / Trainer



The GD-OTS fuze is without power and unarmed prior to setting within the gun

AirBurst Element Descriptions

Electronic Fuze Assembly

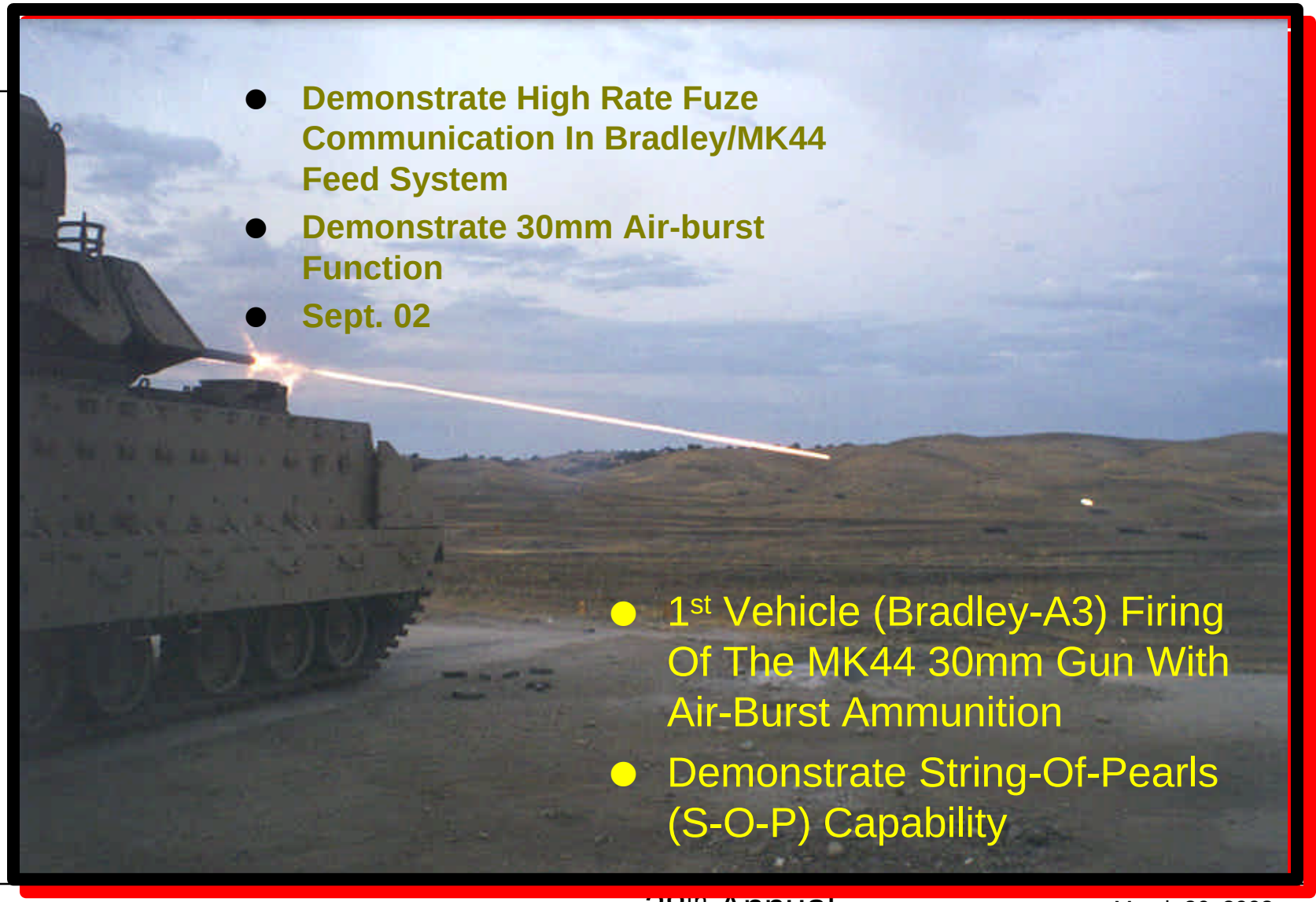
- Full integration with weapon and fuze setter
- Proven accurate time based logic circuitry with infinite talk back capability and independent power supply.
- 2-way communication between fuze and Fire Control System @ automatic high rate bursts
- 10-sec. time of flight power
- Structural Integrity and function in 100,000g environment
- New designed mechanical rotor safe & arm with setback & spin lock features

LFD – 30mm AB Simulator Test Data

GD-OTS has successfully fired the 30mm Airburst Simulator round out of a Mann Barrel at ranges of:

- 225m (+/- 1ms timing accuracy)
- 1200m (+/- 2ms timing accuracy)
- 2780m (+/- 2ms timing accuracy)

Camp Roberts Test Objectives

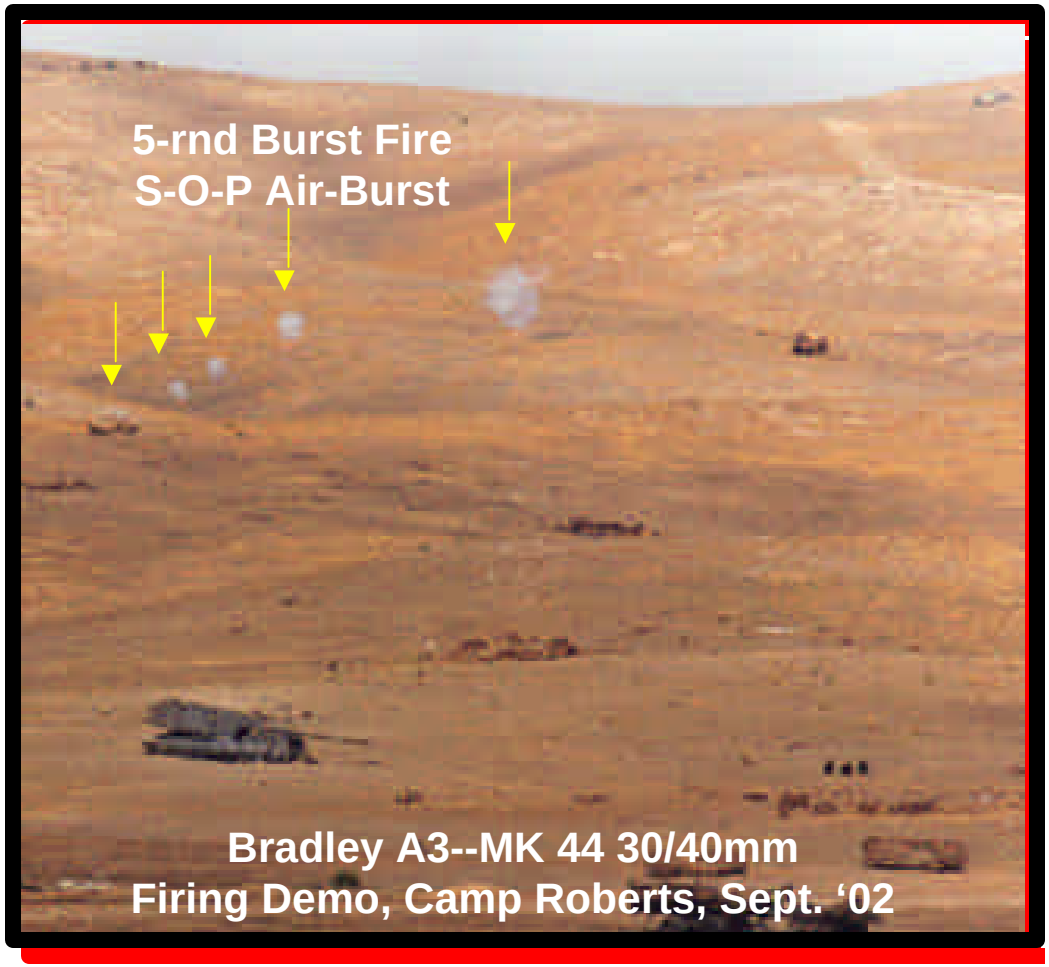


- **Demonstrate High Rate Fuze Communication In Bradley/MK44 Feed System**
- **Demonstrate 30mm Air-burst Function**
- **Sept. 02**

- 1st Vehicle (Bradley-A3) Firing Of The MK44 30mm Gun With Air-Burst Ammunition
- Demonstrate String-Of-Pearls (S-O-P) Capability

Camp Roberts Test Results

- **Excellent Range and Timing Accuracy Achieved:**
  - **600M**
  - **1250M**
  - **S-O-P (1250M – 80M)**
- **MK44 Feeder / Fuze Setter Integration Successfully Demonstrated:**
  - **No Communication Errors**
  - **Single Shot**
  - **Hi-Rate (200spm)**
- **S-O-P Capability Successfully Demonstrated:**
  - **Various Range Spacings**
  - **Excellent Spacing Accuracy**



String – Of - Pearls

30mm AB Accuracy

30mm AirBurst Simulator/Trainer rounds have demonstrated burst point accuracies of 2.5m SD at 1500m range when fired from a MK44 auto gun in a Bradley Fighting Vehicle.

Current design activities are focused on reducing the error by 50%.

AirBurst Munitions

- GD-OTS has developed an AirBurst system that can be applied to multiple platforms such as:
  - AAAV
  - Bradley Fighting Vehicle
  - LAV
  - Stryker
  - FCS
  - Ship Mounted Applications

AirBurst Munitions

- The GD-OTS ABM system can be integrated into the following caliber ammunition:
  - 25mm
  - 30/40mm
  - 35/50mm

AirBurst Penetrator (ABP-T)

GD-OTS is developing 25/40mm tactical AirBurst rounds with multi-task capabilities.

- Current designs are for rounds with AirBurst capability combined with a delayed Point Detonate - Penetration capability.
- This type of round combines the features of an AirBurst round with Multi-functional penetration capabilities
- The ABP-T round will provide capabilities against light armor and concrete/brick walls.

Summary

General Dynamics Ordnance & Tactical Systems is committed to the development and supply of superior AirBurst Munitions for our Military requirements.