TACOM

Lethality, Survivability, Mobility and Sustainment for America's Army

Leadership
Teaming
Communication
Employee Support
Strategic Thinking
Organizational Climate

Medium Caliber Laser Ignition

38th Annual Guns, Ammunition and Missile Symposium and Exhibition
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Title: 30mm Developmental Project Officer

Objectives

- **PROGRAM** - DEVELOP AN INITIATION MECHANISM WHICH IS:
  - ELECTROMAGNETICALLY SAFE
  - COMPATIBLE WITH THE M230 30MM AUTOMATIC CANNON
  - HAS THE POTENTIAL FOR DUAL MODE OPERATION
- **DEMONSTRATION** - DEVELOP AMMUNITION & WEAPON COMPONENTS TO DEMONSTRATE THE FEASIBILITY OF USING LASER IGNITION IN A MEDIUM CALIBER GUN.

BENEFITS OF LASER IGNITION

- **ELIMINATION OF LEAD COMPOUNDS**
- **REDUCTION OF POTENTIAL FOR INADVERTENT FIRINGS**
  - NO IGNITION MATERIAL WITHIN AN ELECTRICAL CIRCUIT
  - NO ANVIL OR OTHER COMPRESSION DEVICE IN PROXIMITY WITH IGNITION MATERIAL
- **POTENTIAL REDUCTION IN AMMUNITION COST**

M230 SYSTEM REQUIREMENTS

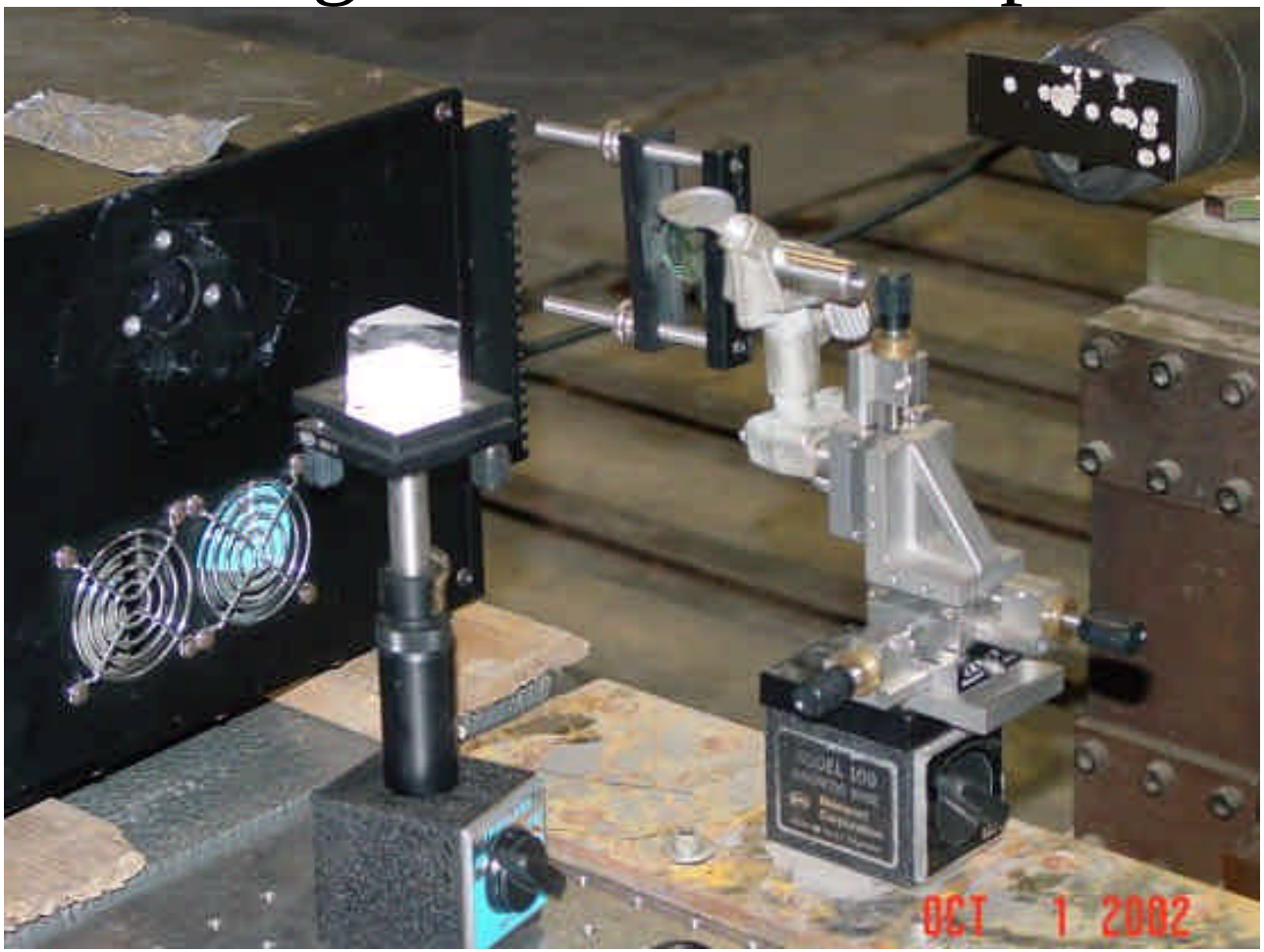
- AMMUNITION ACTION TIME < 4 MSEC
- MUZZLE VELOCITY 805 ± 10 M/S
- WEAPON CYCLIC RATE 625 - 25 SPM
- WEAPON OUT OF BATTERY SAFETY MAINTAINED
- MAXIMIZE USE OF EXISTING WEAPON COMPONENTS

Cartridge Development Areas

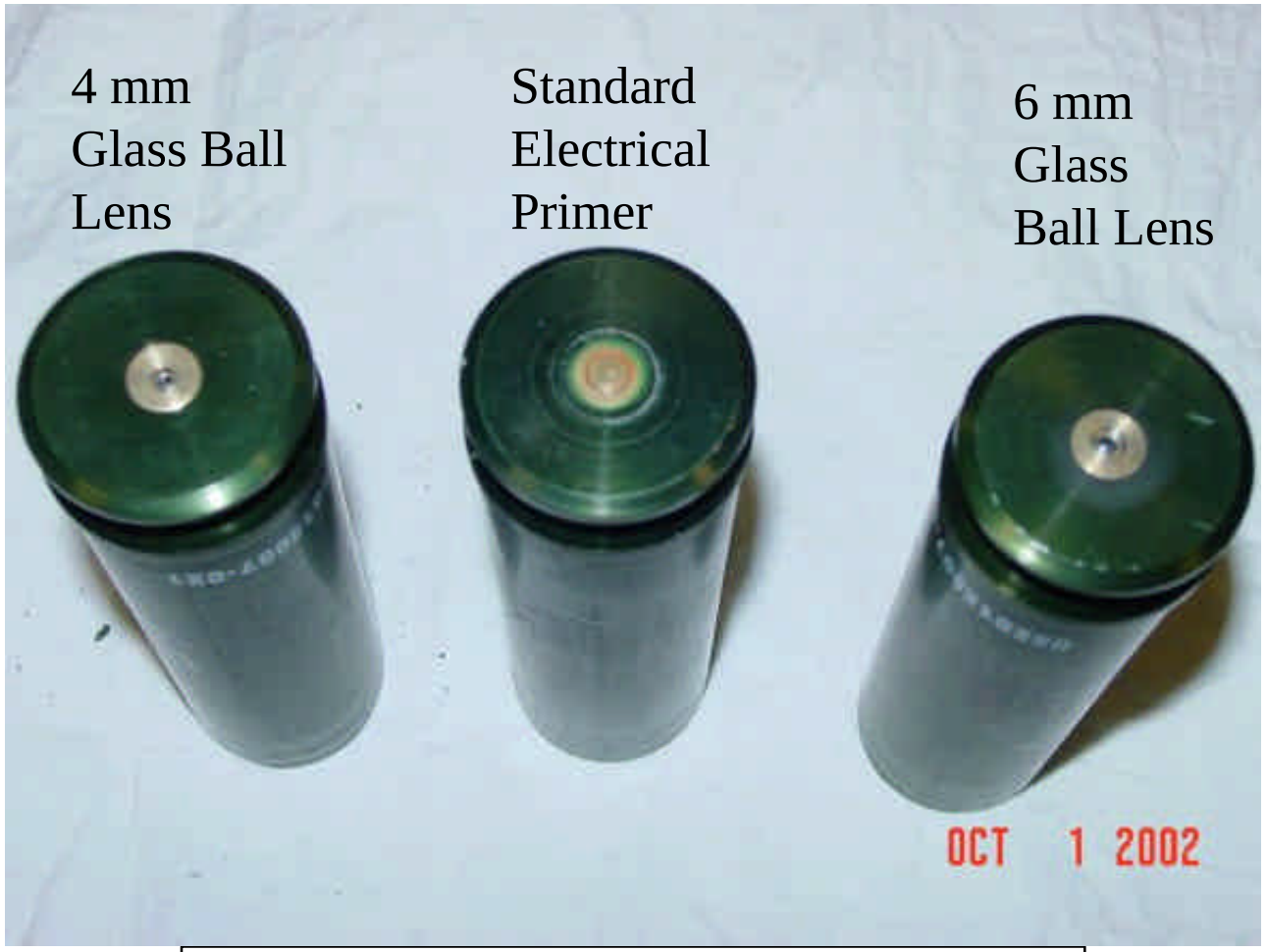
- Ignitor Materials
  - MIC + 10 Established as Baseline (Nano-Aluminum Based)
  - Azido substituted cyclophosphazine {1,1-diamino-3,3-5,5,7,7-hexaazidocyclotetraphosphazene (DAHA)} Showed Good Potential in Single Shot Firing
- Window Size/ Focusing
  - 6 mm Glass Ball is Baseline
  - 4 mm Glass Ball Initial Evaluation

Single Shot Test Setup

Single Shot Test Setup



Ball Lens Configurations



6 mm Lens – Post Firing

MIC +10

DAHA

Single Shot Firing Data
Laser Input Energy ~ 250 mJ

Configuration	Lens Size	Action Time (msec)	Standard Dev (msec)
MIC +10 w/o lens	6 mm	3.53	1.11
MIC +10 w/lens	6 mm	3.50	0.79
MIC +10 w/o lens	4 mm	4.48	1.31
MIC +10 w/lens	4 mm	3.13	0.51
MIC +10 w/o lens	6 mm (config 2)	4.39	1.96
MIC +10 w/lens	6 mm (config 2)	2.81	0.08
DAHA w/o lens	6 mm (config 2)	2.74	0.29
DAHA w/lens	6 mm (config 2)	2.76	0.36

Laser Firing System Development

- SBIR Phase I – Prototype Laser Emitter Mountable on Weapon Capable of 3 Round Burst
- 13-16 May 02 – Successfully Dry Cycled Weapon and Laser System at Full Rate – Cartridge Case Gas Seal Leak Destroyed Optics
- 19-21 Feb 03 – Successfully Fired 3 Round & 10 Round Burst at Full Cyclic Rate from Modified Prototype M230 Weapon

10 Round Firing Burst

Areas for Potential Future Effort

- New Initiators (Developmental Green Primary Explosives)
  - 1,1-(N,N'-ethylenedinitramino)-3,3,5,5-tetraazidocyclotriphosphazene (ENTA)
  - diaminoazotetrazole-n-oxide (DAAT-NOx)
  - 1,1' Azo-bis-3-nitro-1,2,4 triazole
  - Perchloramides
- Case/Lens/Holder Sealing
- Phase II SBIR – Miniaturizing Laser to Fit Inside Weapon