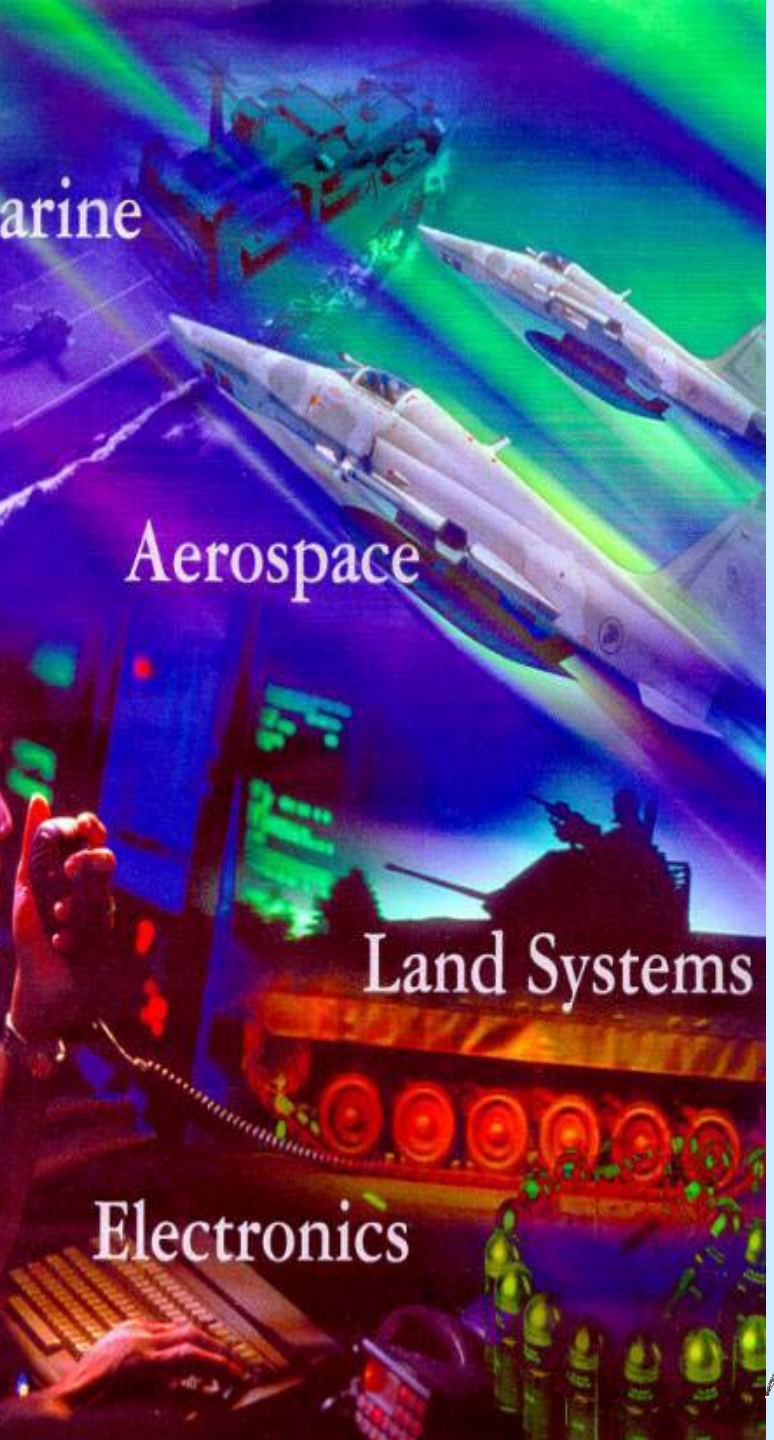


Singapore Technologies Engineering

Singapore Technologies Kinetics

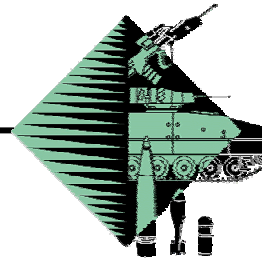
40mm Air Bursting Munition System (ABMS) and Light Weight Automatic Grenade Launch (LWAGL)

Kok Chung, Fong
Cheng Hok, Aw (PM)

19 May 2005

SINGAPORE QUALITY AWARD for business excellence
2002 Winner

Outline



- ABMS ?
- Operation Concept
- LWAGL
- System / Munition Concept
- Fire Control System Concept
- Features
- Possible Applications
- Technical Data
- Live Firing Demonstration

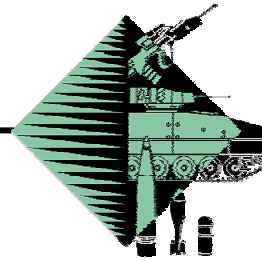
ABMS ?

The 40mm ABMS is an upgrade of the 40mm AGL with air bursting munition that showers lethal fragments effectively in front, above or from the side of intended targets.

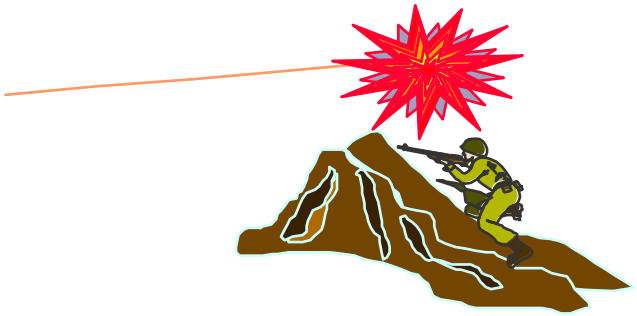
OPERATION CONCEPT

- against infantry fighting vehicles
- against troops in the open or build-up area

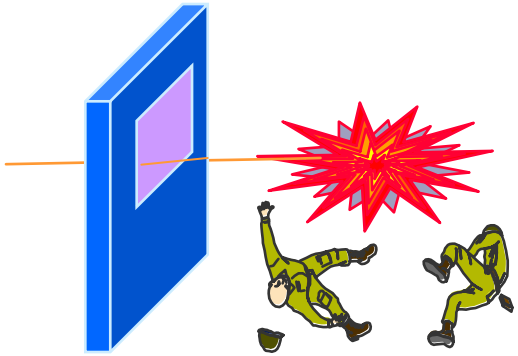
OPERATION - advantages

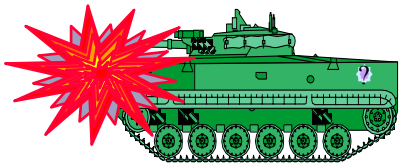


- **More effective**
- **First shot hit**



- **Reduced logistic**
- **Versatile**
  - effective against various types of targets
  - adaptable to various 40AGLs





OPERATION - weapon versatility

One ABM System for various 40mm AGL with min. modification

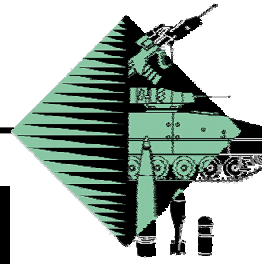
FCS

Ammo Programmer

Man-pack Configuration

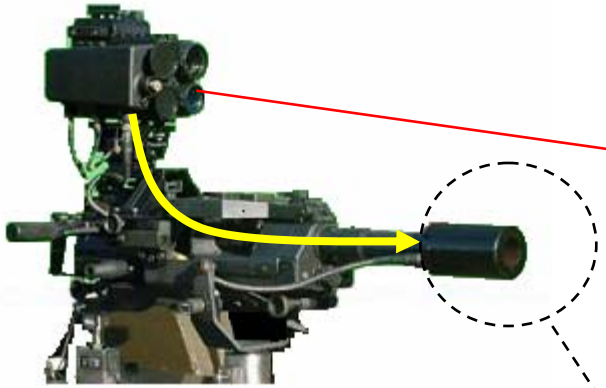
3 soldiers with each not carrying more than 25 kg.

Total System Weight = 65 kg



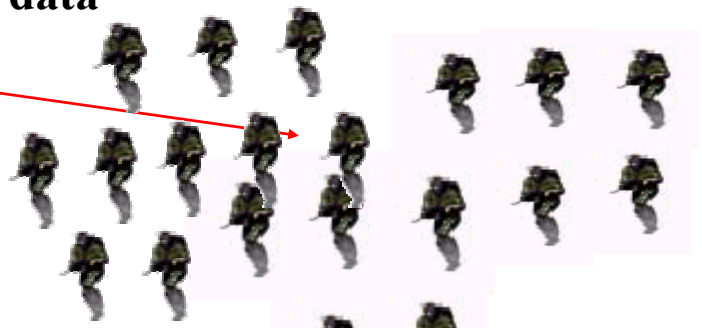
Light Weight Automatic Grenade Launcher Qualification Tests

System Concept



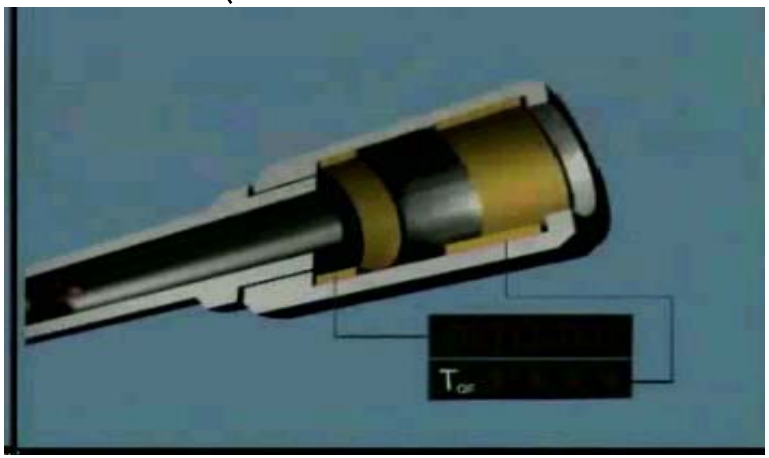
1. Obtain target data

Range

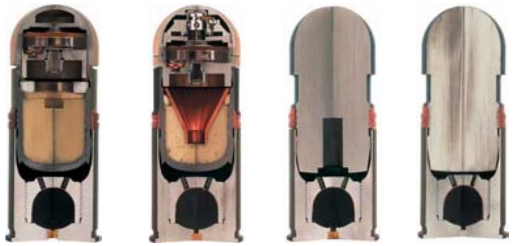


2. FCS computes firing data & transmits to ammunition programmer

3. Programme ABM

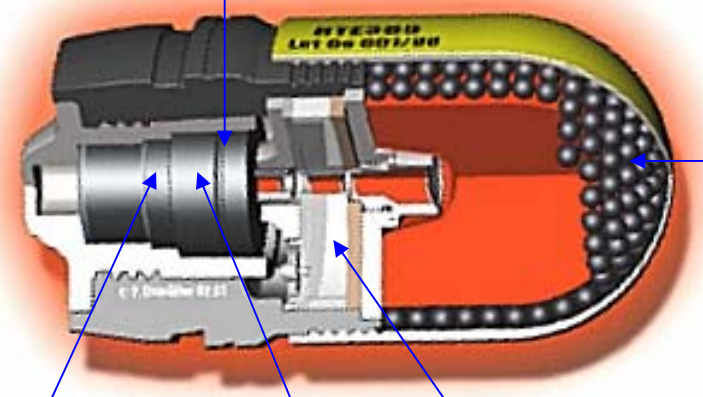


4. Fire ABM, HE, HEDP, TP-T and TP



Munition Concept

Receiving Coil for Fuze Programming

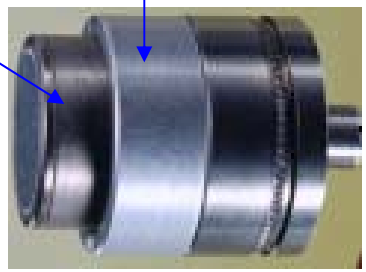


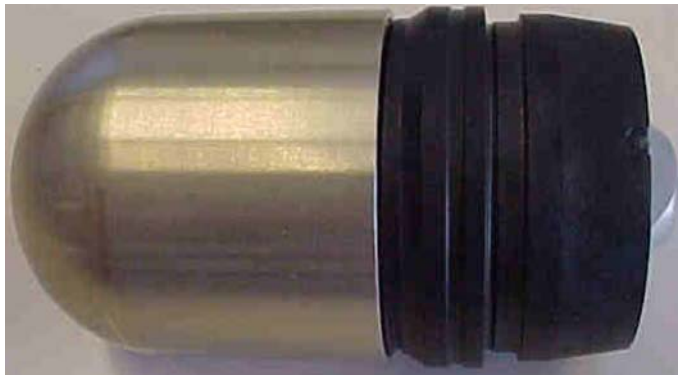
Blast
Fragmentation
Warhead

Safe & Arm

Electronic Timer Module

Power Supply
(Setback
Generator)

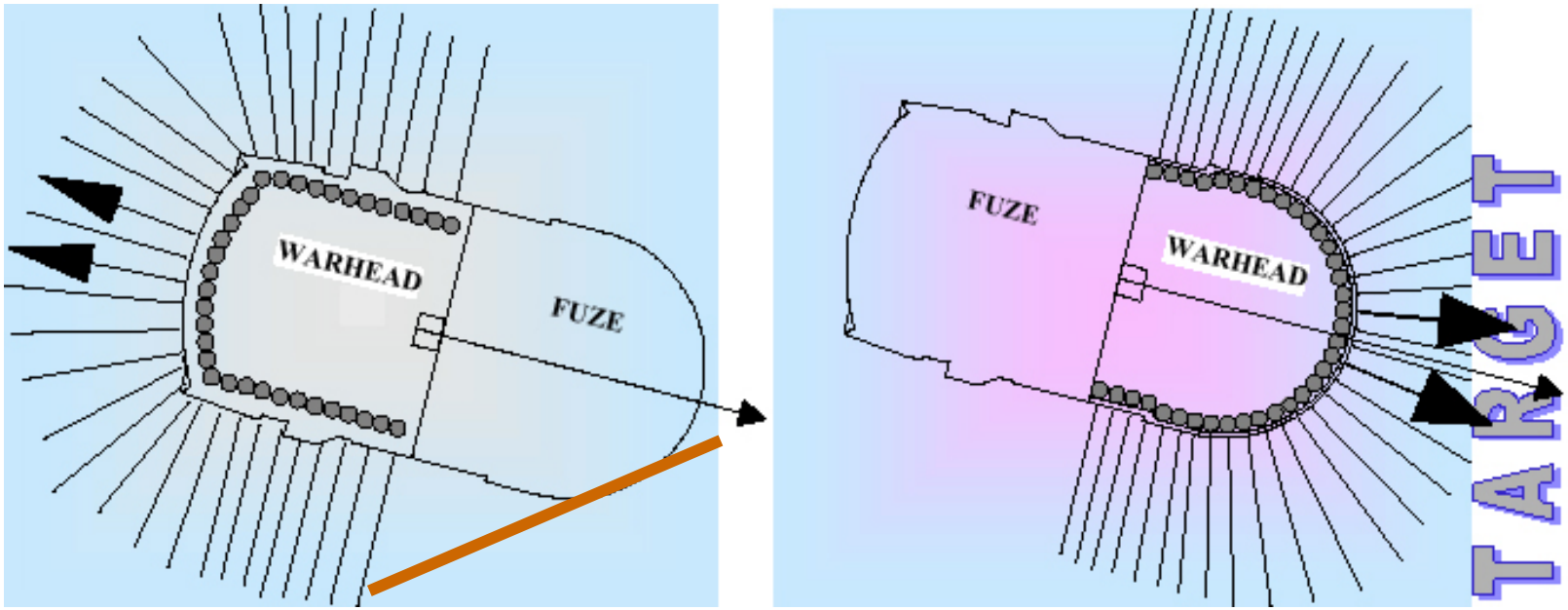




ABM Projectile

Munition Concept

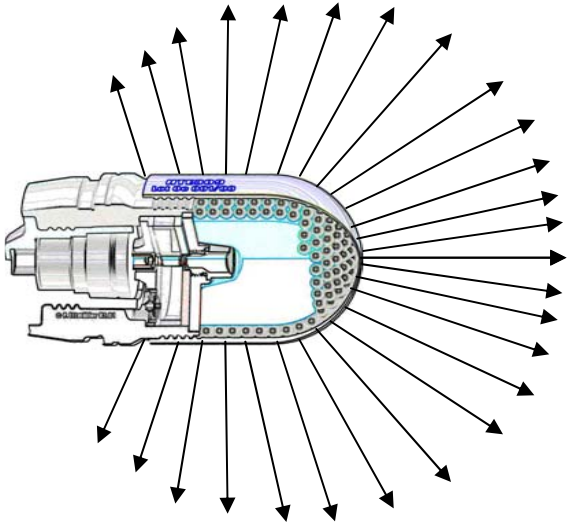
Warhead



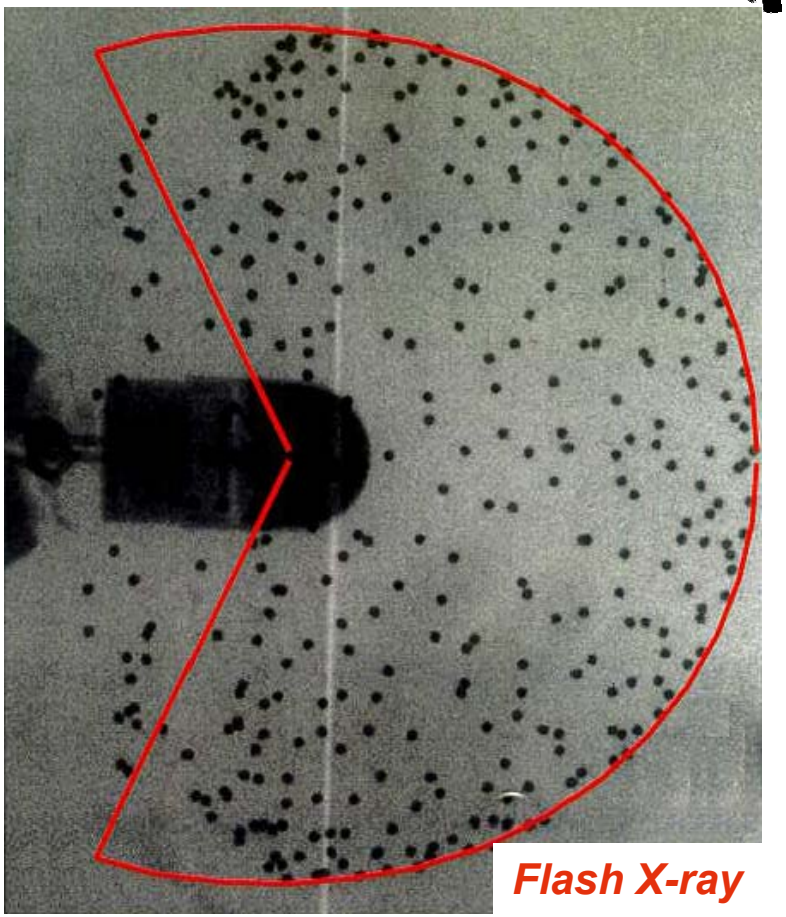
HE (PD Fuze) **ABM**

Munition Concept

Warhead



Static Warhead Test



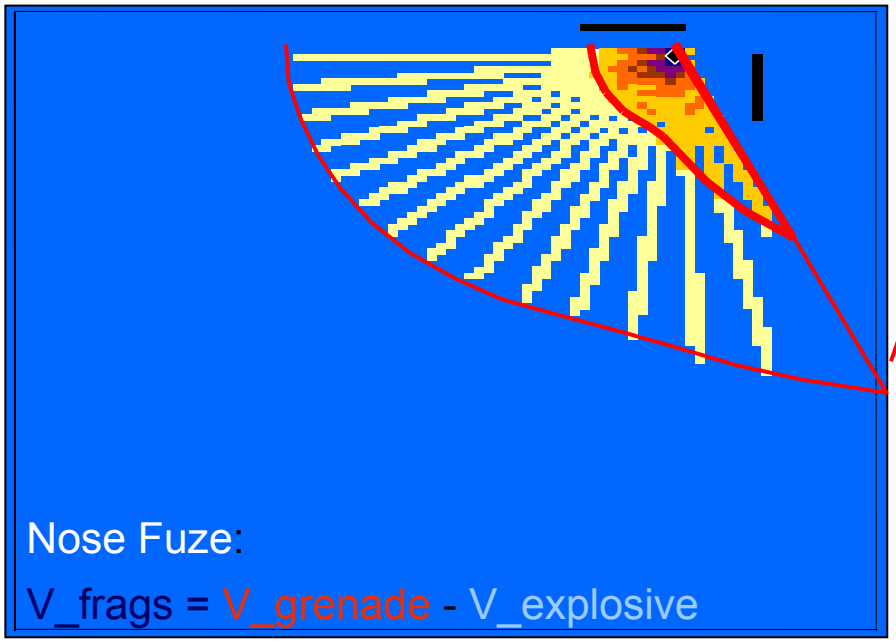
Flash X-ray

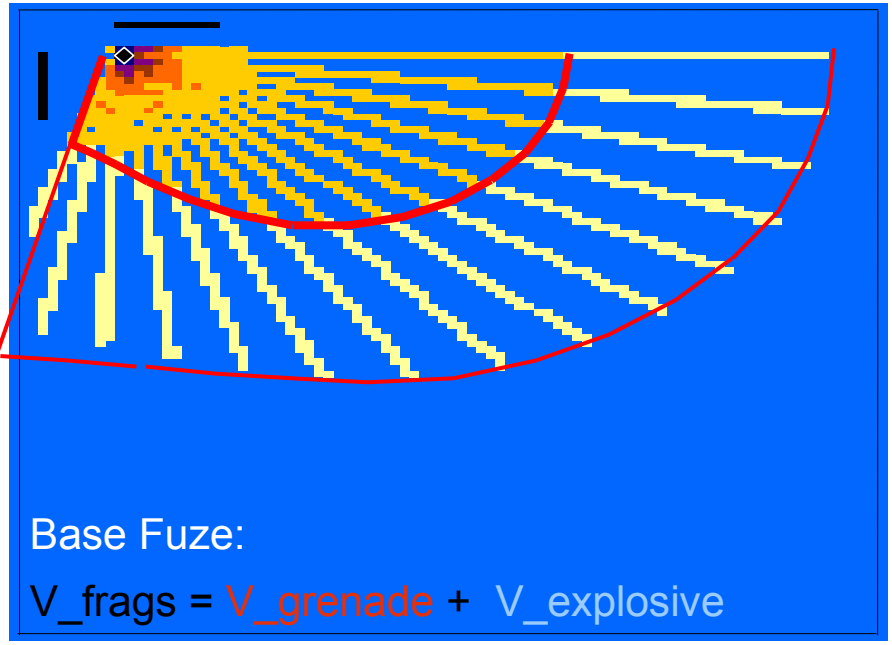
Fragment	**:**	**Tungsten Ball**
Nos. of ball	**:**	**330**
Mass	**:**	**0.25g per ball**

Effectiveness

Analysis : Nose Vs Base Fuze

scale: black bar reference = 5m





V_frags ~750m/s

150m/s

900m/s

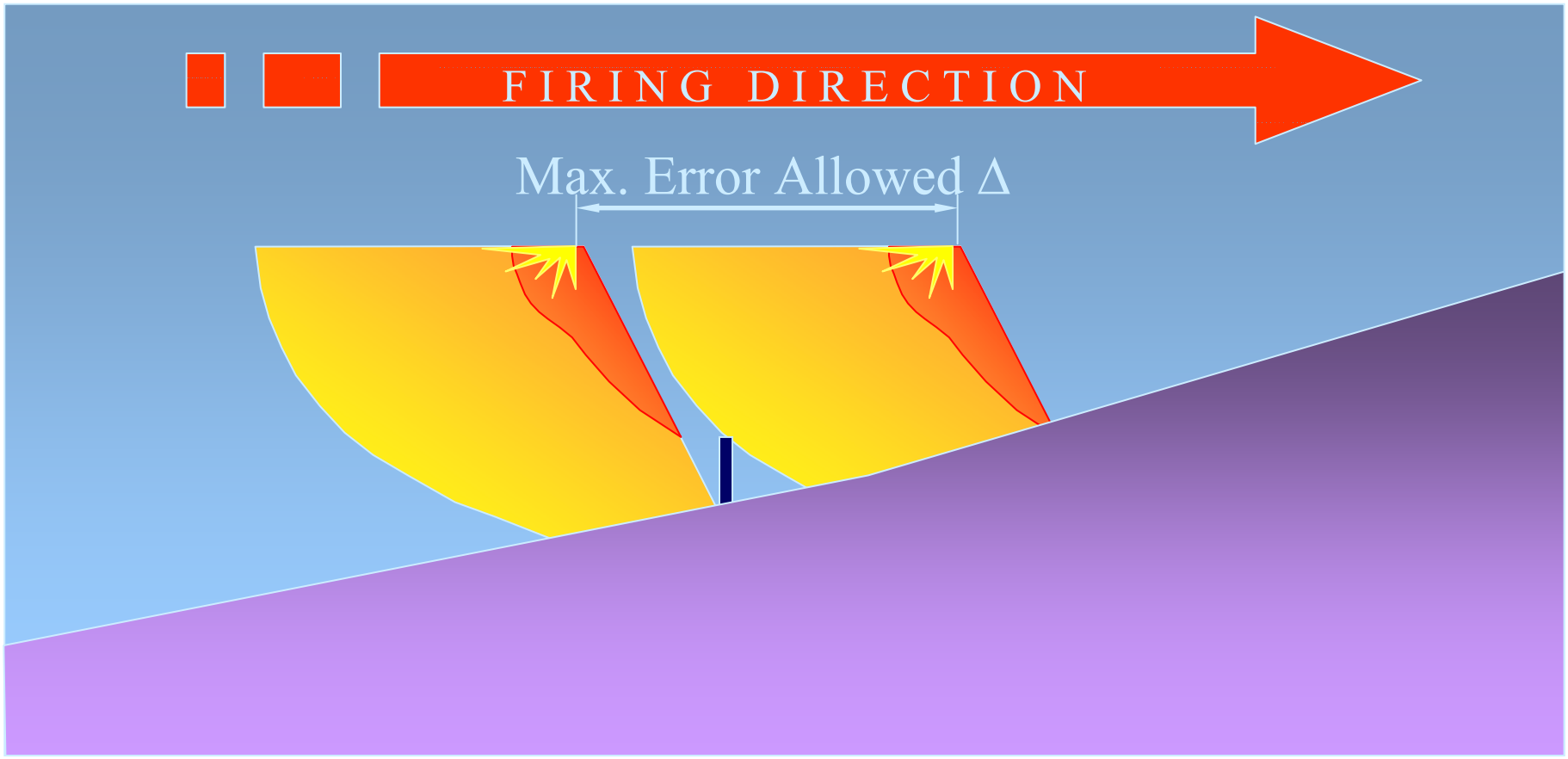
V_frags ~ 1050m/s

900m/s

150m/s

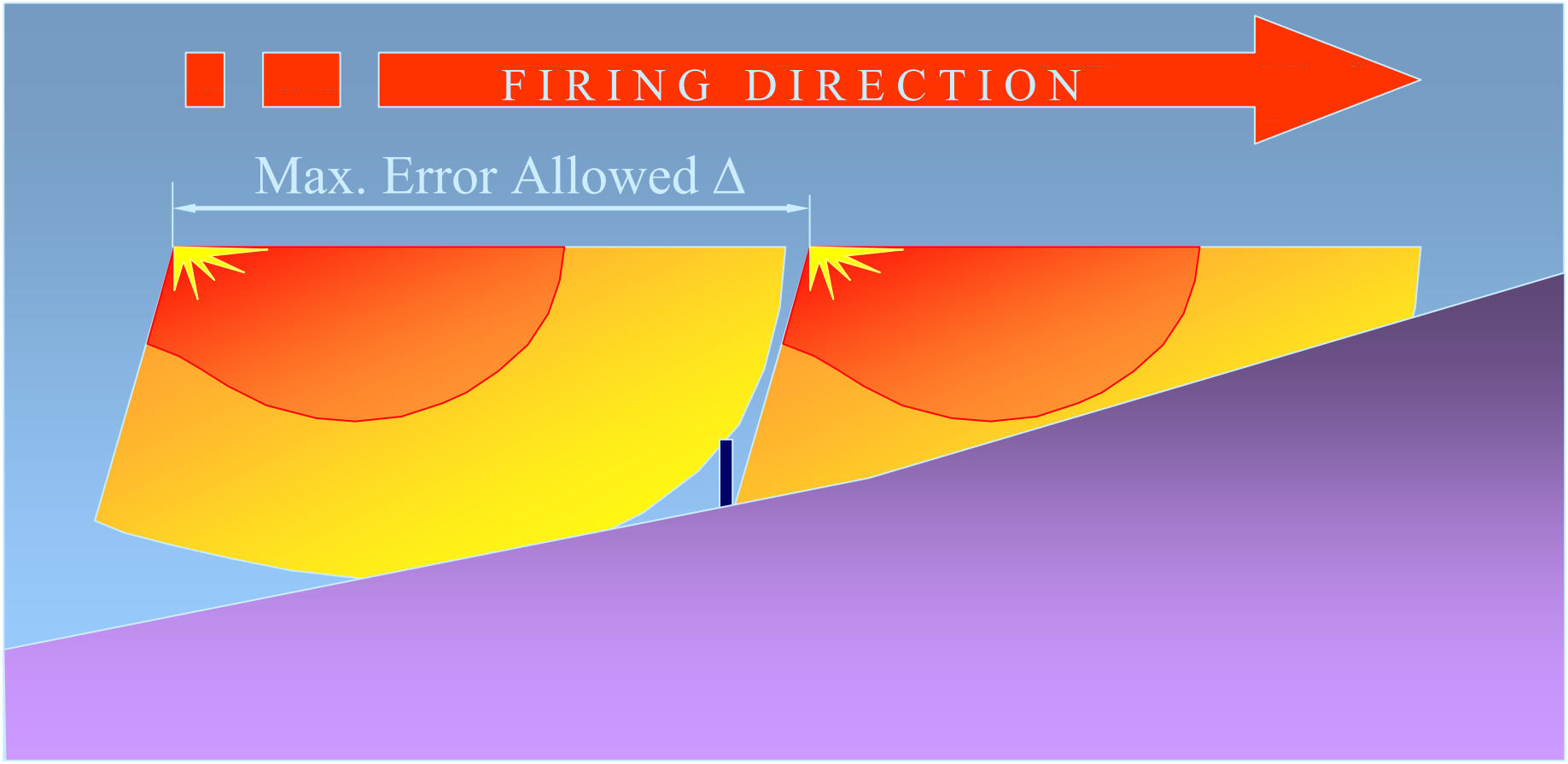
Effectiveness

Max. Allowable Error in the Open - Nose Fuze



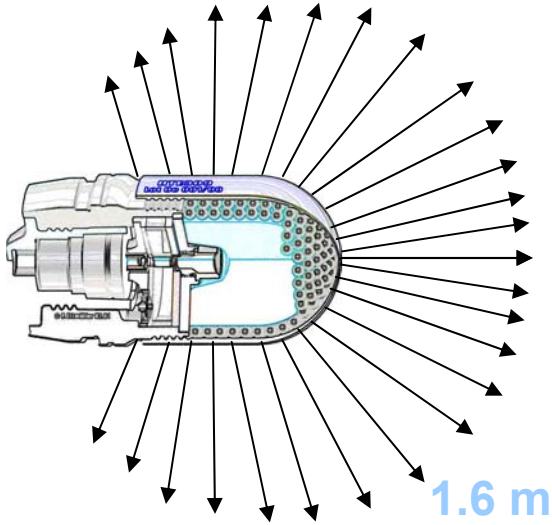
Effectiveness

Max. Allowable Error in the Open - Base Fuze



Effectiveness

ABM met the 'Protected Man criteria of Pk 0.224'



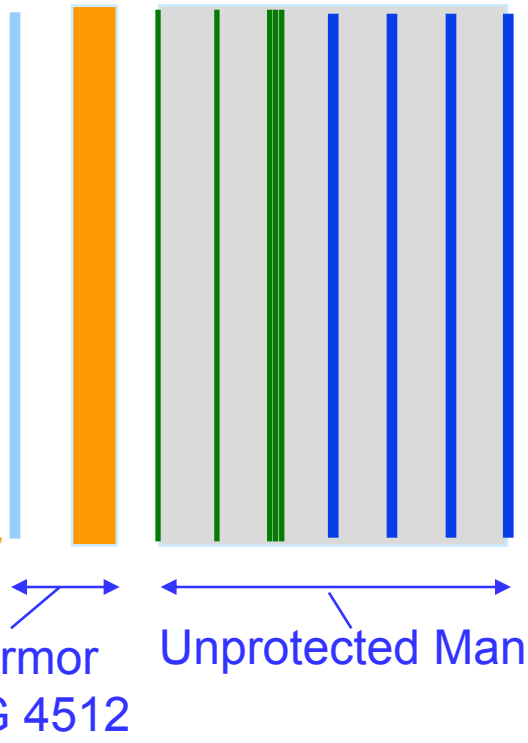
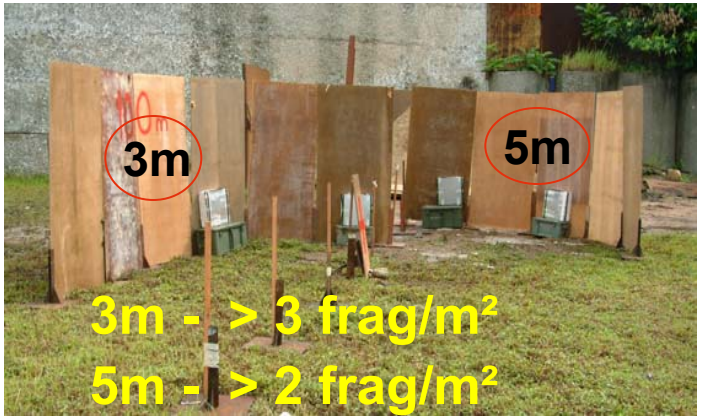
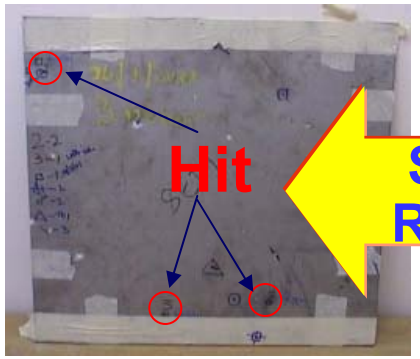


Plate	P_k
1	0.092
2	0.224
3	0.349
4	0.425
5	0.488
6	0.549
7	0.590

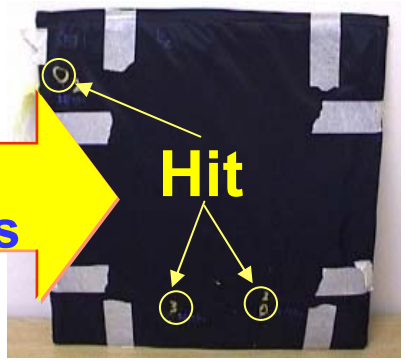
Effectiveness

Static and Dynamic Arena Tests





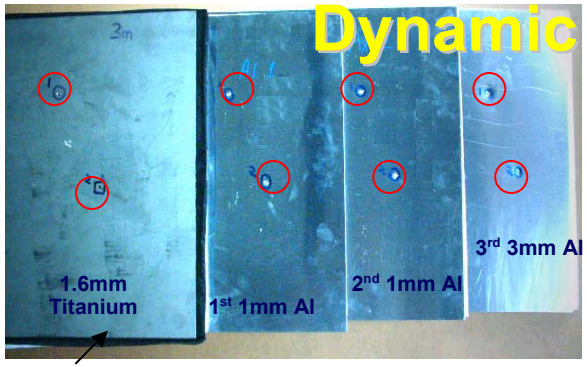
Static Results



1.6mm Titanium

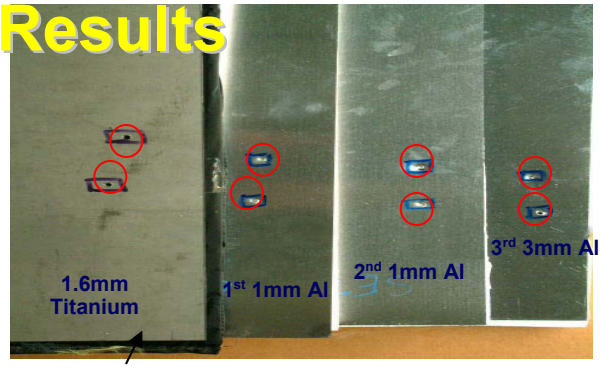
20 layers Kelvar

Dynamic Results



20 layers Kelvar

Target: 3m



20 layers Kelvar

Target: 5m

Fire Control System Concept

FCS

Eye Guard

3X Optical Scope

Day Camera

Remote Control Pad Input

Video In/Out Port

Night Camera

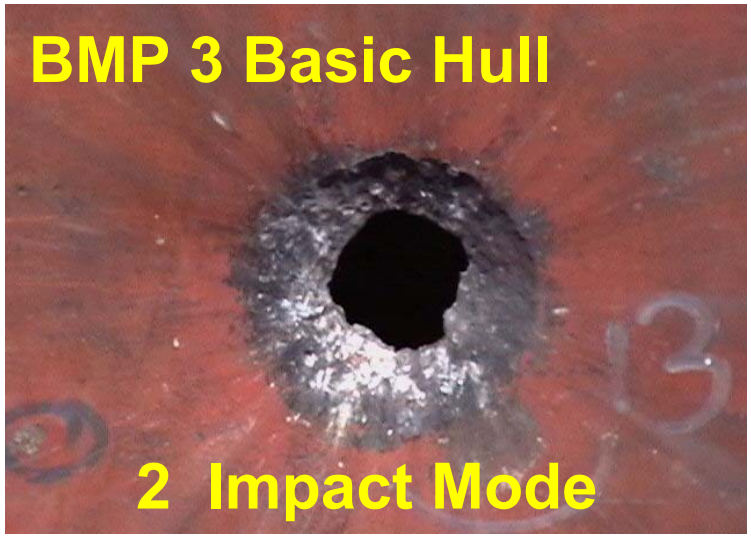
Sensor Suite Pod

Laser Range Finder

Fire Control System Concept

Ammunition Programmer

Features



Features

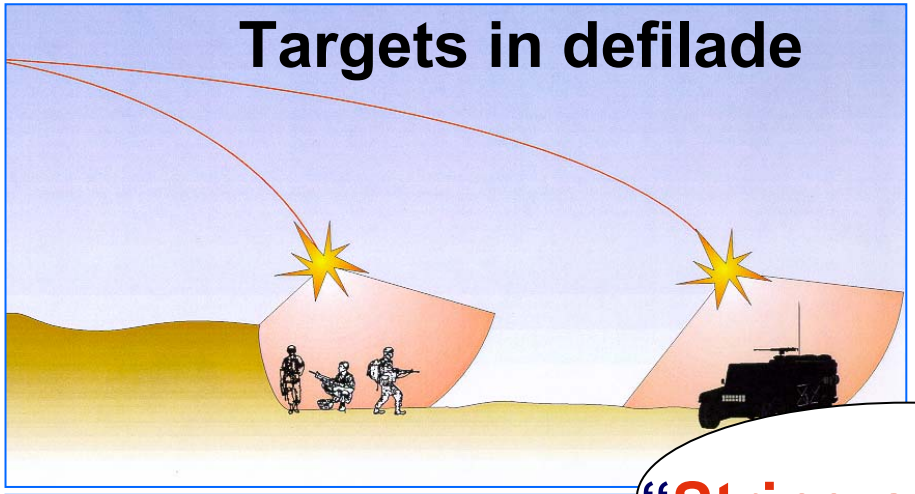
Simulate firing through foliage

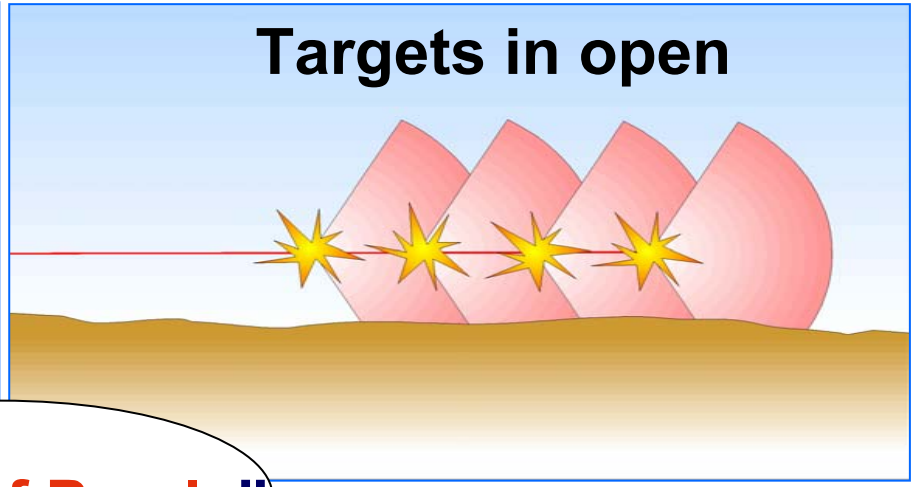
40mm HV HE

40mm ABM HE

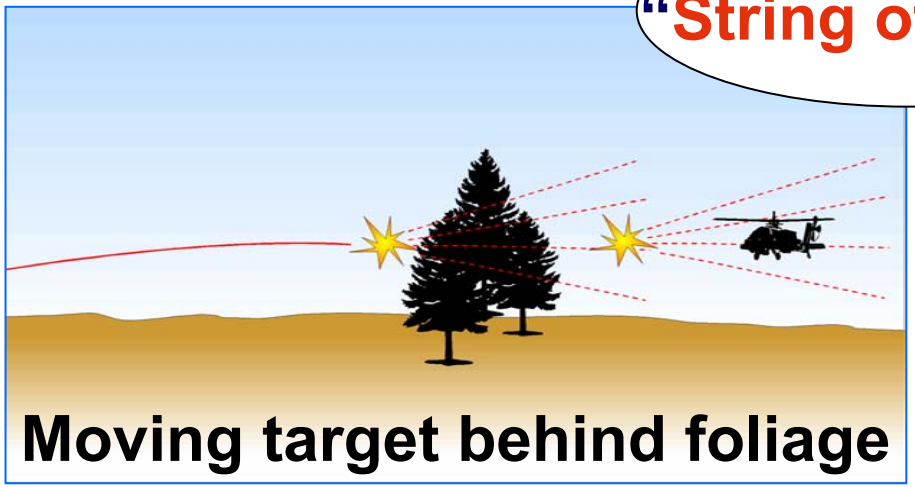
Possible Applications

Operation Versatility of the 40mm ABM



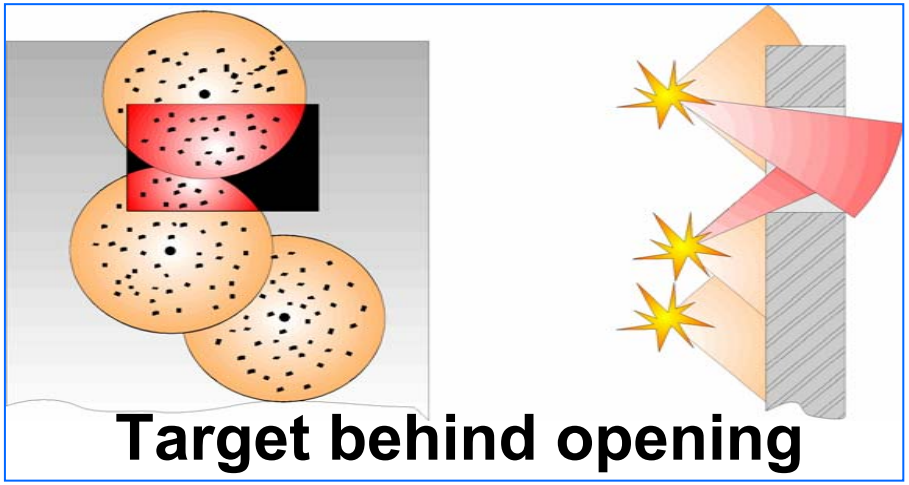


"String of Pearls"

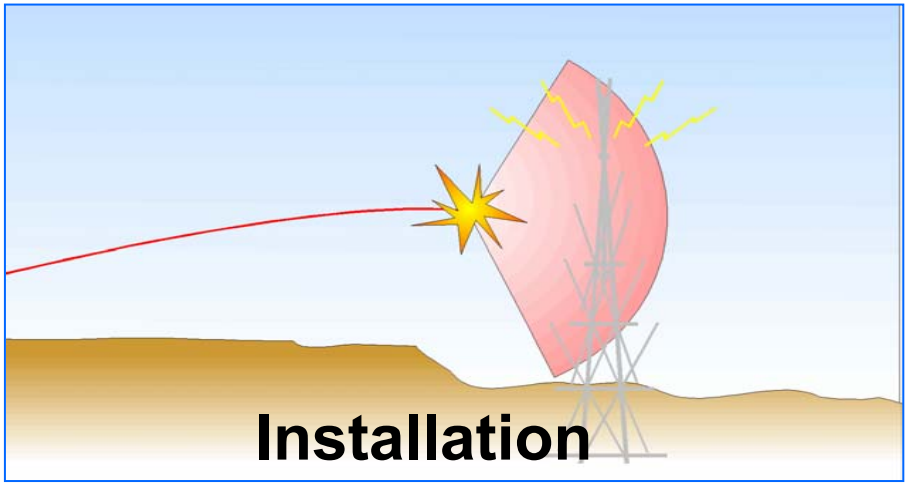


Possible Applications

Operation Versatility of the 40mm x 53 ABM



Target behind opening



Installation

Point burst against Opening or Installation

Technical Data - ABM

HE Round Parameter

• Round Length	112mm max.
• Round Mass	350 g
• Projectile Mass	248 g
• Fuze Design	Programmable Base Fuze
• Arming Distance	18 to 40 m
• Muzzle Velocity	242 m/s

Warhead

• Direction of fragments	Front and Side
• Payload	Tungsten Balls
• Number of balls	> 330

Technical Data - ABM Training

Flash & Bang Round Parameter

• Round Length	112mm max.
• Round Mass	350 g
• Projectile Mass	248 g
• Fuze Design	Programmable Base Fuze
• Arming Distance	18 to 40 m
• Muzzle Velocity	242 m/s

Warhead

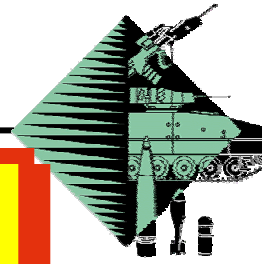
• Sound Level	145 db

Technical Data - FCS

System Parameters

- Dimensions — 265 (L) x 160 (W) x 160 (H)mm
- Weight — < 4.0 kg with batteries
- Sighting
  - Day sight — 15° @ 3x magnification
  - Night sight — Integrated GE II+I^2
- Laser (Eye Safe)
  - Range — up to 2.5km(max.)
  - Ranging accuracy — ± 1m
- Battery
  - Power — 12V DC nominal
  - Life — > 6 hours (continuous operation at -40°C)
- Operating temperature — -40°C to +71°C

Live Firing Demonstration



40mm Air Bursting Munition System

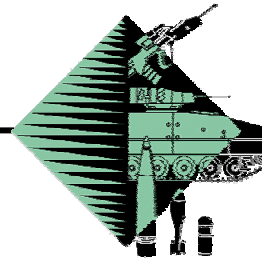
Live Firing Demonstration

2nd October 2003

Live Firing Demonstration

Target Set-up

Video



THANK YOU

Contact :

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Cheng Hok, Aw awch@stengg.com