Air Burst Munition (ABM)

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"Evolving Technology to Meet Emerging Threats"
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40 MM x 53 AIR BURST MUNITION
FOR AUTOMATIC GRENADE LAUNCHERS

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Air Burst Munition (ABM)

System Integration (35mm SkyShield)

- Detection/Tracking
- Ejection of 152 Subprojectiles
- Data Transmission
- Muzzle Velocity Measuring
- Fuze Programming
- Gun Computer

35mm Ahead Projectile
152 W-Subproj. (3.3 g each)

Programmable Electronic Fuze
Programing Coil
Muzzle Velocity Measurement
Ejection Charge
Heavy Metal Payload
Outer Shell

Singapore Technologies Kinetics
Fuze Challenge!
Programmable Payload Delivery (Demo 1992)

Precise Time Space Payload Delivery up to 5000 rd/min!

10 Rds between 1200 m & 300 m every 100 m!

10th Rd: 300 m
1st Rd: 1200 m

„String of Pearls“ at 550 Rd/min of 35mm Ahead-HETF Ammuno

Video QT 15555
Air Burst Munition (ABM)

Fuze Programming without & with Compensation of Muzzle Veloc. Variation

DEMO 1992

7 Rd Burst 35mm Ahead-HETF Ammunition at 1600 m Range

Video QT 15556

Without Compensation

Video QT 15557

With Compensation
ABM Family of Oerlikon Contraves

35mm x 228 Ahead NATO Qual.

30mm x 173

40mm x 53 selected by Sweden for evaluation

Other studies on following calibers:
25mm x 137
27mm x 145
up to 140 mm
Air Burst Munition (ABM)

ABM Fuze Components

Fuze Components:
1. Receiving Coil
2. Setback Generator
3. Electronic Timer Module
4. Squib
5. Safe & Arm
6. Booster, Ejection Charge
7. Base-Fuze Housing

Contactless Programming at Gun Muzzle
Air Burst Munition (ABM)

Air Bursting System Upgrade
For All 40mm Automatic Grenade Launchers

ONE ABM-SYSTEM for all 40mm x 53 Weapon with minimal modifications!

CIS 40AGL

Vektor AGL

Saco Defense MK19

H&K GMG 40 x 53
Air Burst Munition (ABM)

40mm x 53 AGL Air Burst Munition:
One Fuze for All Types
40mm x 53 Automatic Grenade Launchers: Air Bursting Munition HTE309

- Generator
- Explosive Chain
- Tungsten Balls
- Explosive
- Body
- S&A
- ETM

Air Burst Munition (ABM)
Air Burst Munition (ABM)

Air Bursting Munition Concept
Electronic Timer Module ETM

Parameters & Features

- Operating range: 40 m to 1600 m
- Self-Destruction (SD): 1600 m
- Programming of impact function: On / Off
- Impact function & SD On: if not programmed
- Sensitivity of impact sensor: 2 mm Alum. Alloy
- Data transmission check: if negative -> SD is On
- Absolutely ECM safe
- Without external energy the fuze still works on impact even at graze angles
Air Burst Munition (ABM)

Air Bursting Munition Concept
Safe and Arm System

SAFETIES

- Setback pin
- Centrifugal pin
- Setback generator
- Detonator Safety
- Mechanical muzzle safety $\geq 18\text{m}$
- Mechanical arming $\leq 40\text{m}$
- Electronic muzzle safety $\sim 40\text{m}$
Air Burst Munition (ABM)

ABM HETF 40 mm x 53
Muzzle Programming Device

Programming Coil

Ammunition Programming Phase in
Muzzle Programming Device
(X-Ray Picture)

Ammunition Programmer & Projectile

Trigger Coil

Receiving Coil
**Air Burst Munition (ABM)**

**40mm x 53 ABM HTE309:**
**Pre-Fragmented High Explosive Warhead**

- **Fragments:** Tungsten Balls
- **Number of Balls:** min 330
- **Ball Mass:** 0.25 g each

Warhead designed to be effective against the „NATO Protected Man“

X-Ray Flash Picture of Detonating Warhead
Air Burst Munition (ABM)

40mm x 53 ABM HTE309: Warhead Function
Air Burst Munition (ABM)

40mm x 53 Air Burst Munition for AGL
Two Blast Fragmentation Warhead Concepts
## Air Bursting Munition Analysis

### Energy Pattern: Nose vs Base Fuze

<table>
<thead>
<tr>
<th>Fuze Type</th>
<th>Formula</th>
<th>V_frags (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nose Fuze</td>
<td>$V_{\text{frags}} = V_{\text{grenade}} - V_{\text{explosive}}$</td>
<td>~750</td>
</tr>
<tr>
<td>Base Fuze</td>
<td>$V_{\text{frags}} = V_{\text{grenade}} + V_{\text{explosive}}$</td>
<td>~1050</td>
</tr>
</tbody>
</table>

- **Range:** ca. 850 m
- **Fragments:** W-Balls 0.25 g

**Scale:** black bar reference = 5 m

**Firing Direction**

- 19 m → 4 m
- 22 m → 35 m

**Energy Patterns**

- **Base Fuze**:
  - 60 J
  - 22 m
  - 19 m
- **Nose Fuze**:
  - 40 J
  - 35 m
  - 4 m

**Kinetics**

- $V_{\text{frags}} \approx 900$ m/s
- $V_{\text{frags}} \approx 150$ m/s
Air Burst Munition (ABM)

Air Bursting Munition Analysis
Max. Allowable Error Against Openings - N.F.

NOSE FUZE

Δh

Δv

FIRING DIRECTION
Air Burst Munition (ABM)

Air Bursting Munition Analysis
Max. Allowable Error Against Openings - B.F.

BASE FUZE

Δh

Δv

FIRING DIRECTION
Air Bursting Munition Analysis
“Behind Wall” Lethal Area

NOSE FUZE

BASE FUZE

Lethal Area

FIRING DIRECTION
Operation Versatility of the 40mm x 53 ABM
40mm x 53 Air Bursting Munition for AGL

Summary of Main Advantages

1. Smart technology simple and safe in use
2. No rate of fire limitation due to fuze programming
3. Inductive fuze programming at muzzle (not in the gun)
4. On-line compensation for muzzle velocity variation (optional)
5. Easy system upgrade: minimal weapon modification
6. Absolute gun unload safety
7. Insensitive to mud, humidity & other environmental factors
8. Firing through bushes (impact sensor switched off)
9. If no fuze programming required, self-destruct automatically on
10. Lethality level of each round adjustable
Air Burst Munition (ABM)

40mm x 53 Air Bursting Munition for AGL

Summary of Main Features

Electronic Base Fuze: Ahead technology
Programmable at Muzzle: Fuze time / impact sensor
Arming Time: Mechanically & electronically driven
Safe and Arm: Mechanically driven (Stanag)
Propulsion System: Accurate / low muzzle velocity variation
Exterior Ballistics: Compatible with standard ballistics
Point Detonating: Piezo impact sensor / graze angle capability
Impact Sensor:
  - Automatically On w/o fuze programming
  - Switched Off function programmable
Warhead:
  HE pre-fragmentation / large footprint / high lethality
  (forward and lateral fragment release)
Self-Destruct Function: Automatically On when no fuze programming
<table>
<thead>
<tr>
<th>Milestone</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start R&amp;D (ABMS)</td>
<td>Early 1998</td>
</tr>
<tr>
<td>Start Partnership OCP - ST Kinetics</td>
<td>May 1999</td>
</tr>
<tr>
<td>Contract Signed with FMV-Sweden</td>
<td>Dec. 2000</td>
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<tr>
<td>Prototype Delivery FMV-Sweden</td>
<td>May 2002</td>
</tr>
<tr>
<td>Product Qualification Completed</td>
<td>End 2003</td>
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<tr>
<td>Start Serial Production</td>
<td>2004</td>
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</table>
40mm x 53 ABM HTE309: Firing Tests

Slow Motion Videos
of single shot
and burst firings
up to 570 Rd/min

Video: M1 16117BA