



Anti-Vehicle (Anti-tank) Mines

by

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Topics Covered

- ❑ **Philosophy**
- ❑ **Engineering**
- ❑ **Impact on Non-Combatants**



Mine Classifications

- **Classified by target:**
 - **Anti-Vehicle**
 - **Anti-Helicopter**
 - **Anti-Personnel**



Philosophy - AV/AT Mines

- ❑ **Hit the weakest point**
- ❑ **Aim for Total Kill**
 - **Mobility Kill** (Driver, Tracks or Engine)
 - **Weapons Kill** (Turret Crew, Optics or Gun)
 - **Total Kill**



Areas of Attack



Off Route
or Side

Top

Track

Belly

Track

Full Width (FWAM)



ATTACK CONSIDERATIONS





Types of AV/AT Mine

- ❑ Pattern**
- ❑ Scatterable**
- ❑ Side Attack or Off-Route**
- ❑ Area Defence**



Mine Components

- ❑ **Warhead**
- ❑ **Fuze**
- ❑ **Sensor**
- ❑ **Power Source**
- ❑ **Safety and Arming Unit**



Warhead Types

- ❑ **Blast**
- ❑ **Shaped Charge (HEAT)**
- ❑ **Explosively Formed Projectile (EFP)**
(sometimes referred to as Self Forging Fragment (SFF))



Patterned Mines

- ❑ Normally blast mines.
- ❑ Laid in patterns to reinforce natural obstacles.
- ❑ Laid buried at fixed spacing.



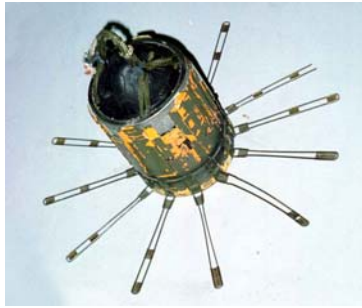


Typical Blast Mines



PRB 3
Belgium



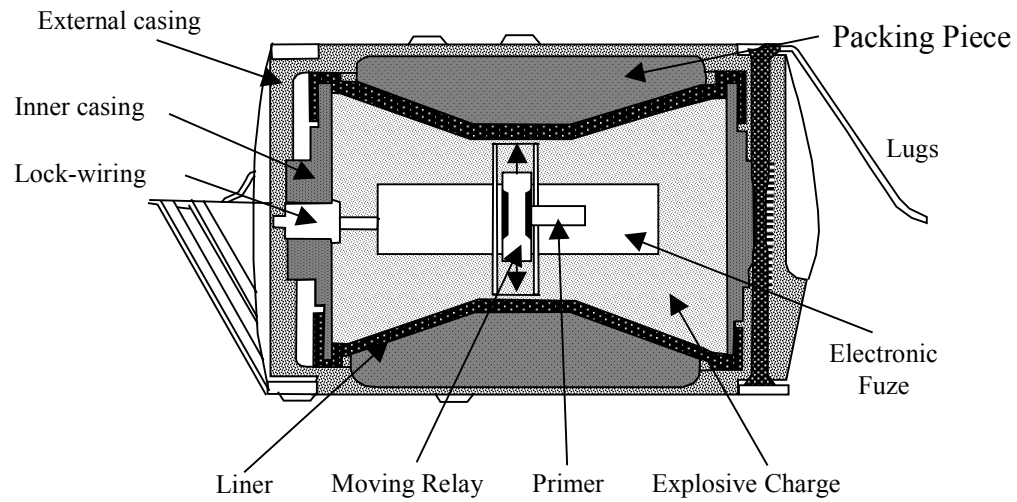


Scatterable Mines

- ❑ **Laid remotely and quickly.**
- ❑ **Situation or target orientated.**
- ❑ **Can be used to disrupt known key locations.**
- ❑ **Surface laid.**
- ❑ **Small and light, therefore Belly Attack Mode.**
- ❑ **Need sophisticated fuzes.**



Typical Scatterable Mine





Scatterable Mine Systems





Side Attack

- ❑ **Designed to dominate an area of ground.**
- ❑ **Usually based on light anti-tank rockets.**
- ❑ **Sophisticated sensor package.**
- ❑ **Effective range of 100m.**



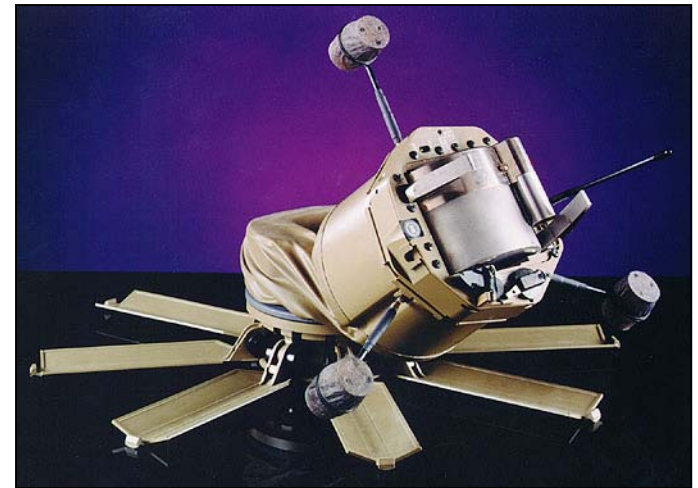
Typical Side Attack Mine





Area Defence Weapons

- ❑ Cover both azimuth and area.
- ❑ Top attack munitions.
- ❑ Now in production.
- ❑ US Wide Area Munition “HORNET”.





Target Emissions

Infra-red / Heat

Magnetic field



Sound/acoustic

Seismic vibrations

Ground pressure



Direct Fuses

- ❑ **Pressure Activation - Springs**
- ❑ **Pressure Activation - 2 & 3 Impulse**
- ❑ **Pressure Activation - Hydraulic**
- ❑ **Trip Wires**
- ❑ **Break Wires**
- ❑ **Mechanical (Tilt Rod / Castor)**



Pressure Fuses

- ❑ **First generation.**
- ❑ **Double/Triple Impulse designed to defeat “Roller” counter-measures.**
- ❑ **Used in Blast AT Mines only.**
- ❑ **Track Attack Mode.**
- ❑ **Pressure required to activate is variable.**



Tilt Fuses

- ❑ **Belly Attack Mode**
- ❑ **Tilt**
- ❑ **Mast and Castor Wheel**



Sensors

- ❑ **Magnetic**
- ❑ **Acoustic**
- ❑ **Vibration / Seismic**
- ❑ **Infra-Red**
- ❑ **Milli-Metric Wave (mmW) Radar**
- ❑ **Scratch Wire**



Power Source - Battery

- ❑ **Battery design is the key.**
- ❑ **Requires up to 12 years “shelf-life”.**
- ❑ **Must generate sufficient power at the right time.**
- ❑ **Must last for the “active” period.**



Control of Minefields

- ❑ Your own minefield can become an obstacle to your own manoeuvre.**
- ❑ International concern about collateral damage to non-combatants post-conflict.**
- ❑ These have led to proposed technical solutions.**



Control of Mines - Technical Solutions

- ❑ **Self Neutralisation (SN)**
 - For sophisticated and high value mines.
 - Allows recovery and re-use.
- ❑ **Self Destruct (SD)**
 - For those difficult to detect or clear.
- ❑ **Remote Control**
 - SN or SD can be achieved by time delay or remote control.



CONTROL OF MINES - TECHNICAL PROBLEMS

- ❑ **SN and SD mechanisms add cost and complexity.**
- ❑ **Reduction of explosive content in same space.**
- ❑ **Reliable and secure communication link to the mine.**



Future Developments

- ❑ **Sensor Technology:**
 - Detect targets at a distance
 - Distinguish between target types and non-targets.
 - Engage targets at greater distances, therefore less mines required.
 - Be selective about target attack.
- ❑ **Integrated logic circuits**



Impact on Non-combatants

- ❑ **AV/AT Mines lethal to vehicles.**
- ❑ **AV/AT Mines lethal to farm equipment.**
- ❑ **AV/AT Mines deny access.**
- ❑ **In some theatres, AV/AT mines cause as many civilian casualties as AP mines.**



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