19185 – Multiple Trajectory 40mm Grenade Launching System

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Contents:

Introduction:

There Are Many Excellent Emerging Weapons In The 40mm Category, Each With Their Own Advantages And Disadvantages. One Item Lacking Is A Low Cost Method Of Delivering A Grenade-Like Payload Into A Precise Target In Urban Combat Where Ranges Are Short, Built Up Areas Are All Around And Overhead Cover May Be Present.

This Presentation Focuses On An Enlarged, Percussion Fired Version Of The Battelle Case-Telescoped Non-Lethal System In 40mm Diameter Which Can Vary Both The Angle Of Launch And Muzzle Velocity Of The Projectile As A Solution.

With This Capability Many More Targets Can Be Addressed, Wherever They Hide…

The Obvious Advantage Of Variable Angle & Velocity:

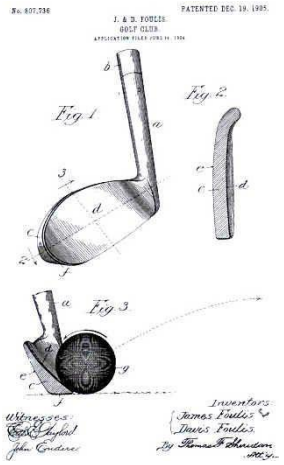
ZeroHedge Photo From “A Night In Aleppo”

Why Do Golfers Carry All These Different Clubs And More?

The Original 40mm Was Called The "Niblick" Or "Pitching Wedge" From Golf…

To Make Different Shots? To Hit At Different Speeds And Angles?

Might We Want To Make Different Grenade Shots, Except All With The Same Round?

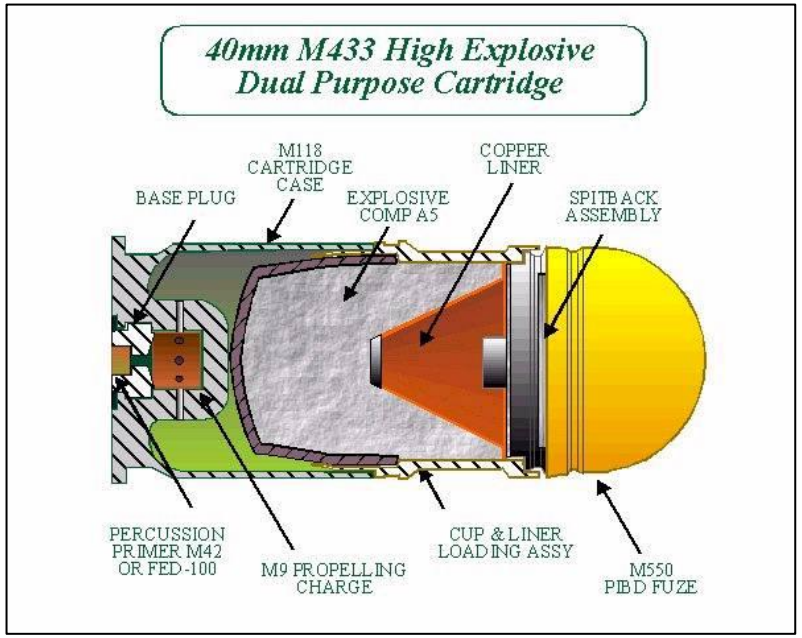


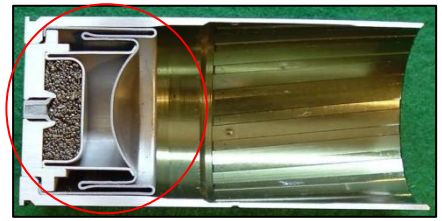
A Brief 40mm Grenade Launcher Backgrounder:

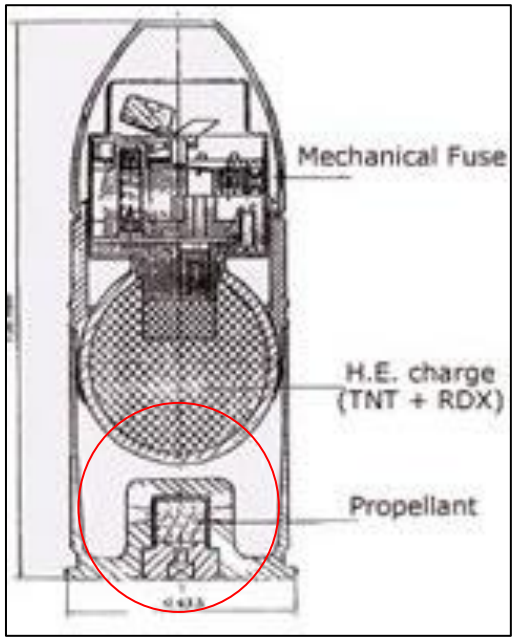
Patent Drawing Of The Mashie-Niblick Golf Club

40mm Grenade High-Low Pressure Propulsion System:

"Prevents Excessive Recoil On Firing While Efficiently Burning Propellant"







Clockwise From Left Above: Wikipedia 40mm Grenade Graphic, Internet 40mm Case Interior, US Ordnance Graphic Of HE 40mm Ammunition, SAR Photo Of 40mm Case Sectioned Illustrating High-Low Propulsion.

Employment Of 40mm Grenade Launchers In US Service:

"Elevation Of The Barrel Allows A Single Velocity 40mm Round To Service Various Ranges"

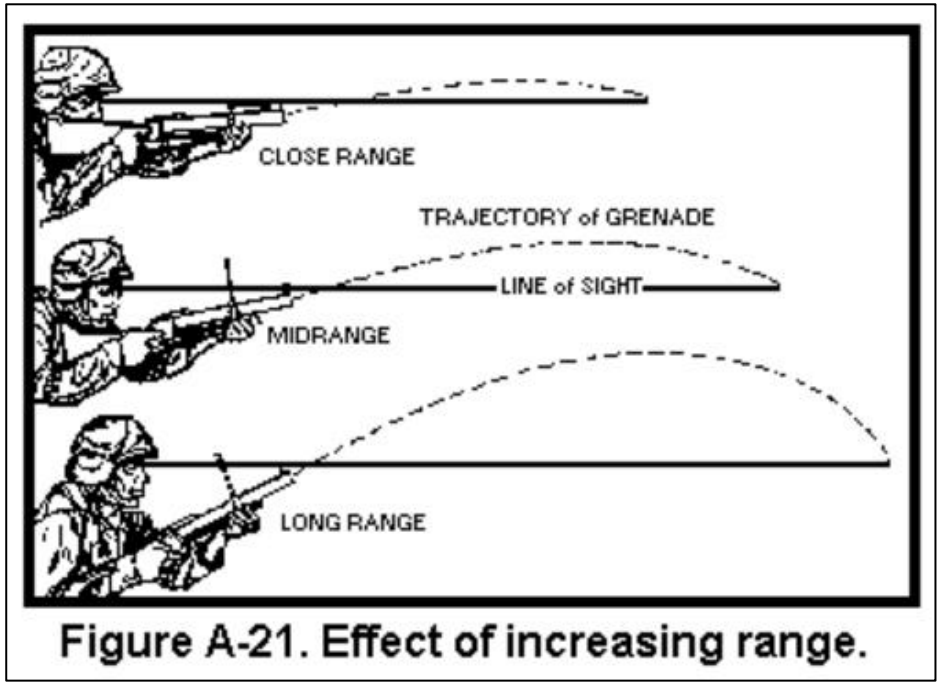


Figure A-21. Effect of increasing range.

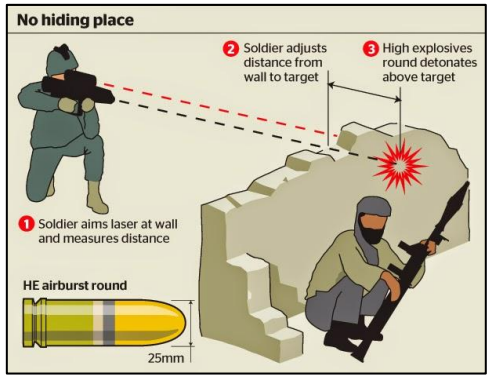
Left To Right Above: US Army TM On 40mm M79 Launcher, US Army Photo Of M203 With Round In Flight.

Examples Of 40mm Grenades & Launchers In Service Worldwide:

Clockwise From Top Left: SAR Photos; US M203, H&K G3 Launcher, Milcor Six Round Launcher, HK Launcher, US M-79, LMT Modular 40mm. Center: AMTEC Photo Of Various 40mm Grenades Both Lethal & Less Lethal.

ATK Advanced 25mm Airburst Anti-Personnel Grenade Launcher:

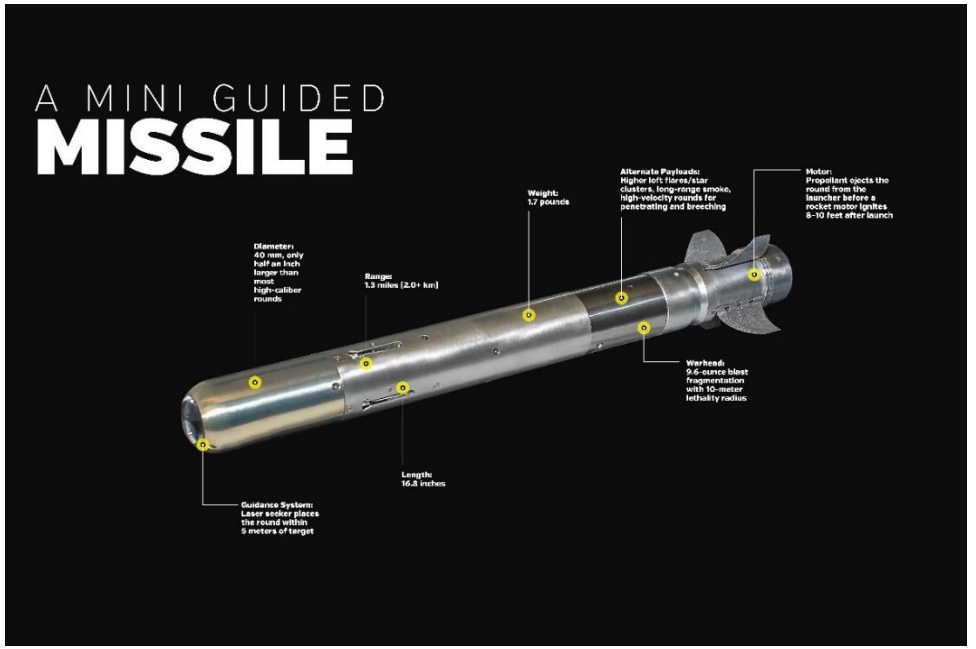
"Reduced Diameter & Payload Trade-Off For High Velocity Launch And Direct Fire Accuracy"



Clockwise From Upper Left: US Army Photo M25 Grenade Launcher, Popular Science Graphic Of 25mm Grenade Airburst Function, Bundeswehr Photo Of 25mm Airburst, ATK Testing High Speed Image Of 25mm Detonation.

The 40mm Grenade Launcher As A Guided Missile Platform:

"Extended 40mm Launchers Open The Door To A Variety Of High Payload And Guided Munitions"



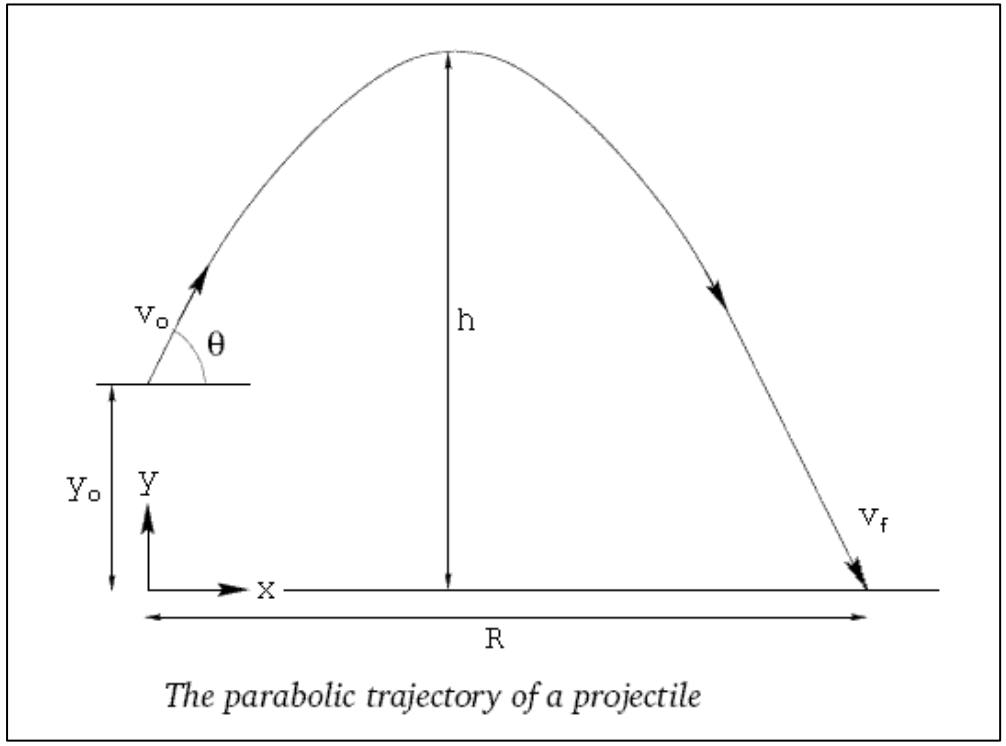
From Left To Right: Raytheon Graphic Of Pike 40mm Guided Missile, Futurism Image Of Raytheon Pike

$$\theta = \arctan\left(\frac{v^2 \pm \sqrt{v^4 - g(gx^2 + 2yv^2)}}{gx}\right)$$

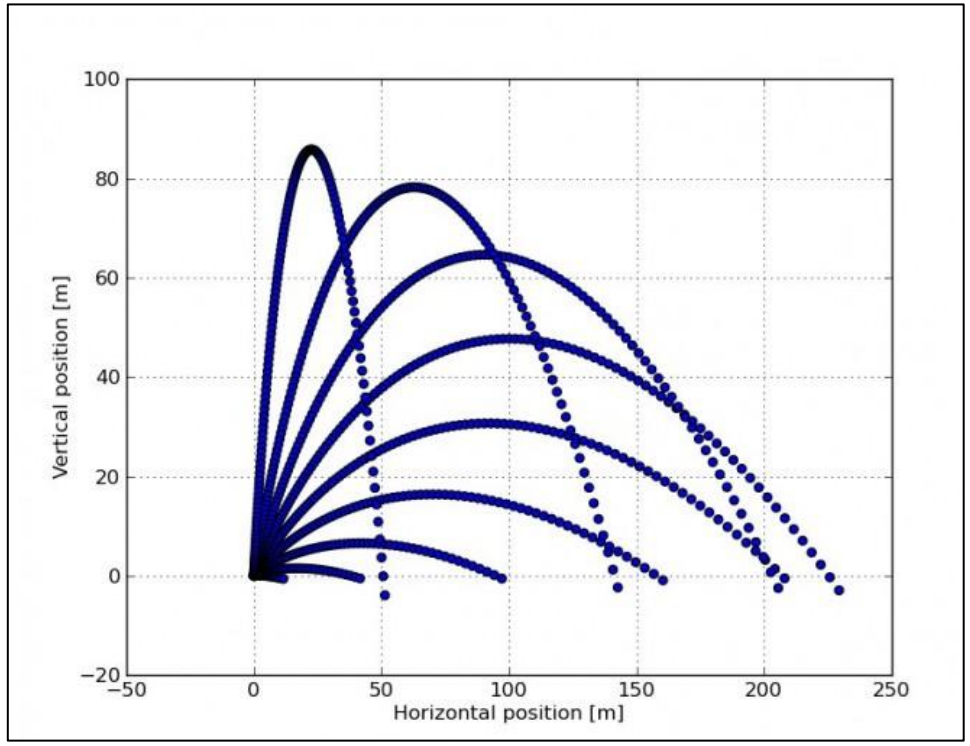
Single vs. Multiple Trajectory Launch Examples:

For Those Who Like Formulas: Angle Required To Hit An X,Y Coordinate

What We Have: One Velocity / High Trajectories vs. Range:

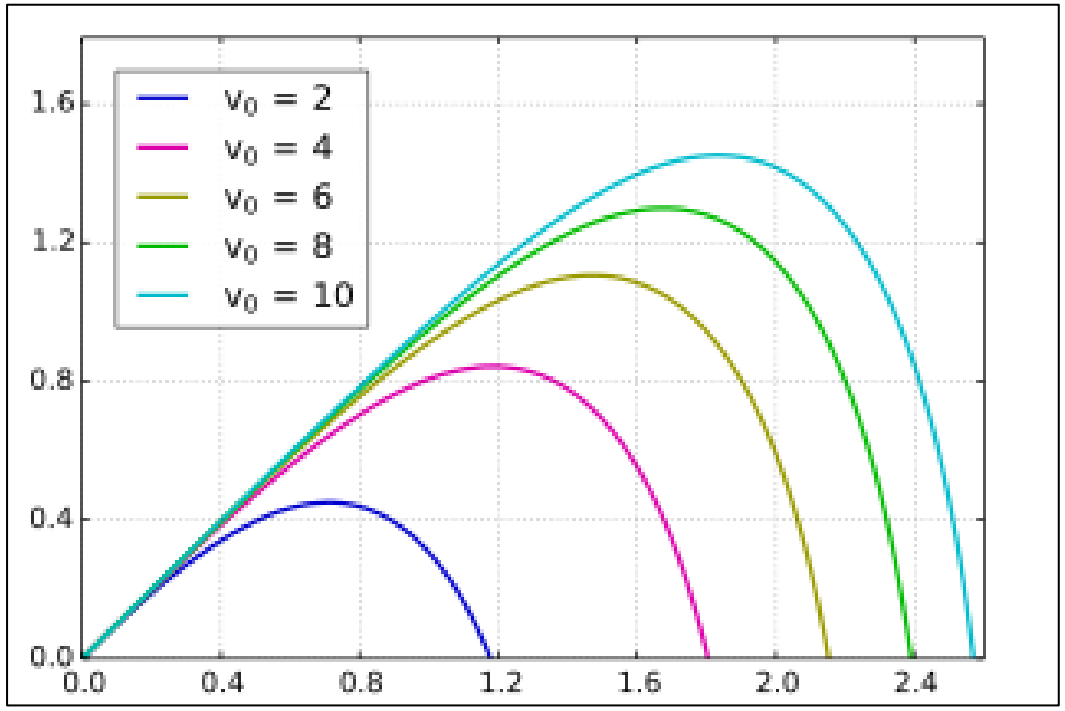


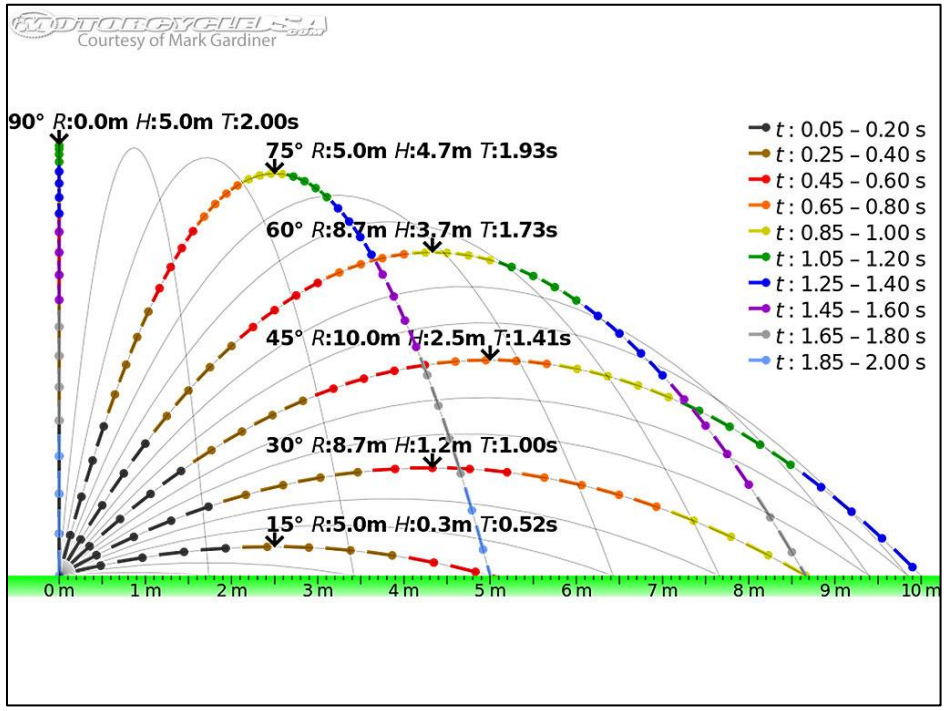
The parabolic trajectory of a projectile



When You Launch At One Velocity, You Must Change Angle To Vary Range

What We Can Have: Multiple Velocities / Variable Trajectories:





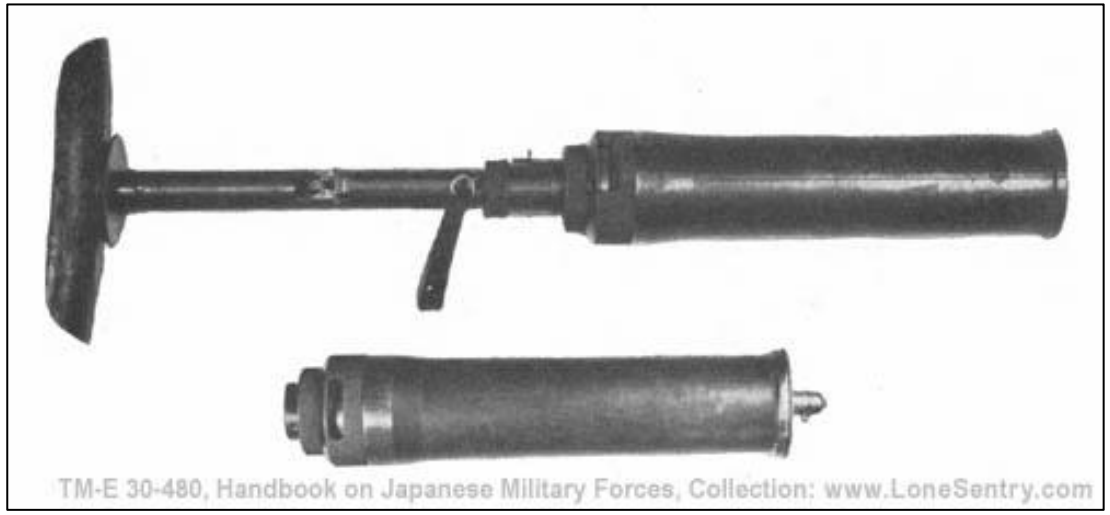
When You Launch At Many Velocities, You Don’t Have To Change Angle To Vary Range

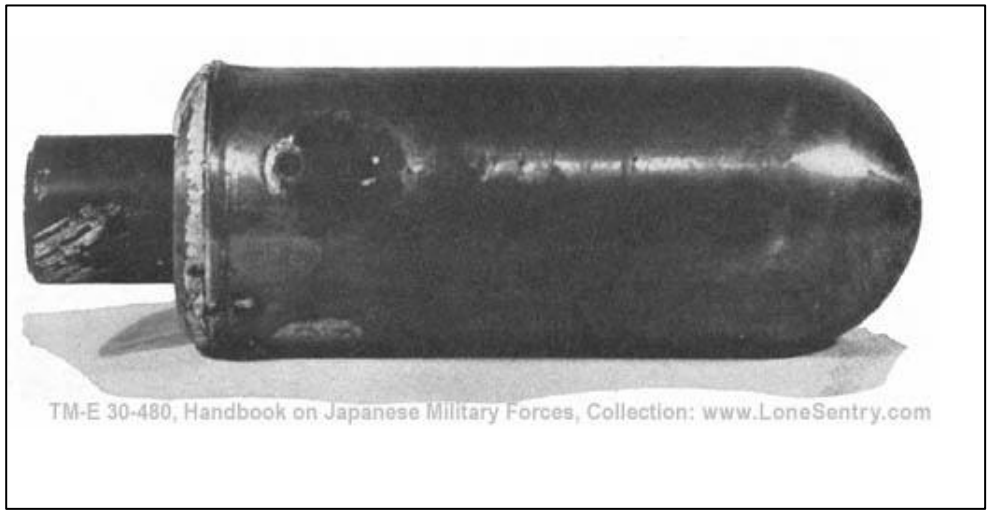
Review Of Previous “Pedestal” Propulsion Rounds:

LoneSentry.com Photo US Army TM-E-30-480 50mm “Knee Mortar”

World War II Era Japanese Pedestal Launched "Knee Mortar":

An Alternative Lightweight Projector From The "Rifle Grenade Era"

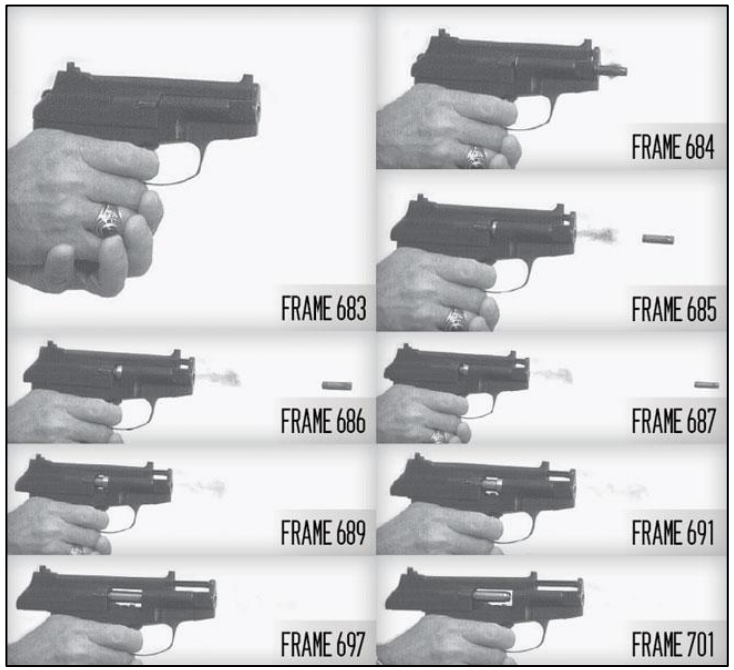




Above Left To Right: LoneSentry.com Photos From TM-E 30-480 Handbook On Japanese Forces Showing So Called "Knee Mortar" Which Was Actually Intended To Be Ground Fired.

Soviet Era “Silent Pistol” Pedestal Round Propulsion:

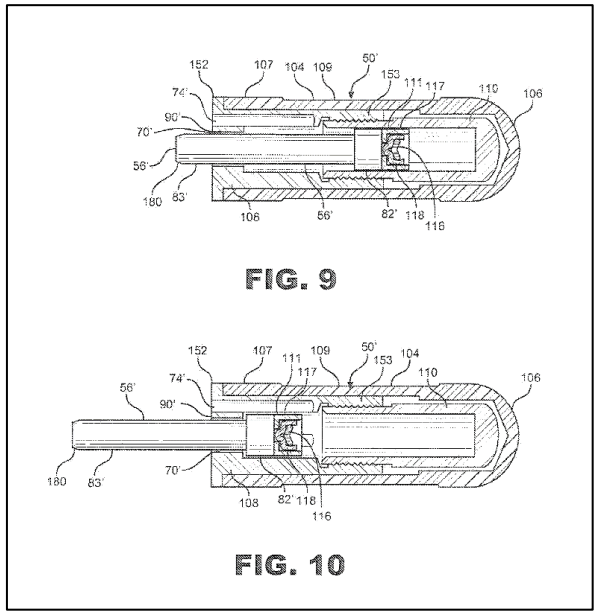
“Projectile Leaves The Barrel At Subsonic Velocity While Propellant Gases Remain In The Cartridge Case”

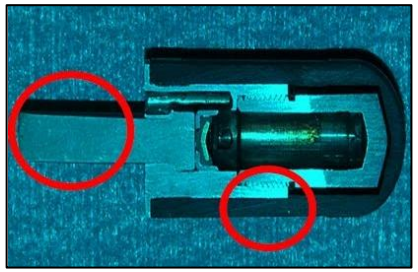


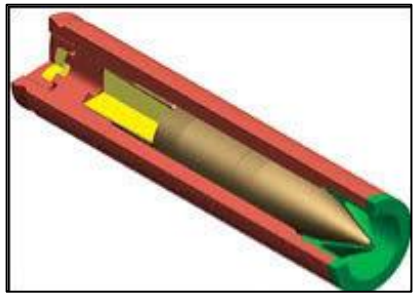
Above Left To Right: Small Arms Review Dr. Phil Dater Article On Soviet Era PSS Pistol With High Speed Images And Cutaway Rounds In Various Positons Pre- And Post-Firing.

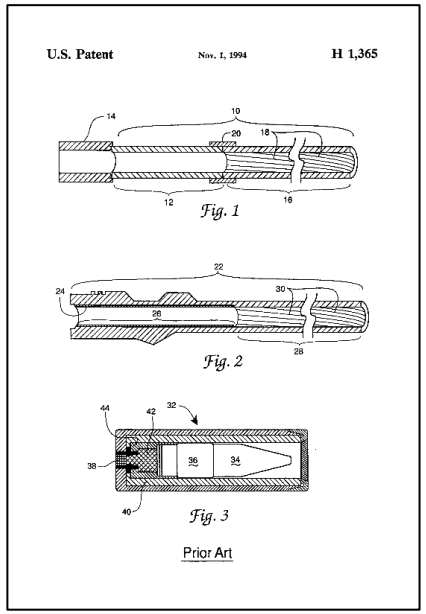
Differences In Battelle CTNLS vs. Textron CT Ammunition:

One Launches The Bullet While The Other Launches The Whole Cartridge









Clockwise From Left: Battelle Patent Drawings For CTNLS, CTNLS Fired Showing Pedestal And Retained Body, Textron Patent Drawings For CT Ammunition, Example Drawing Of Textron CT Where Only Bullet Exits Barrel.

The Battelle CTNLS Technology…Writ Large:

Proposed Drop In Percussion Version Identical Visually To 40mm With Rotating Range Band Regulating Exhaust Jets

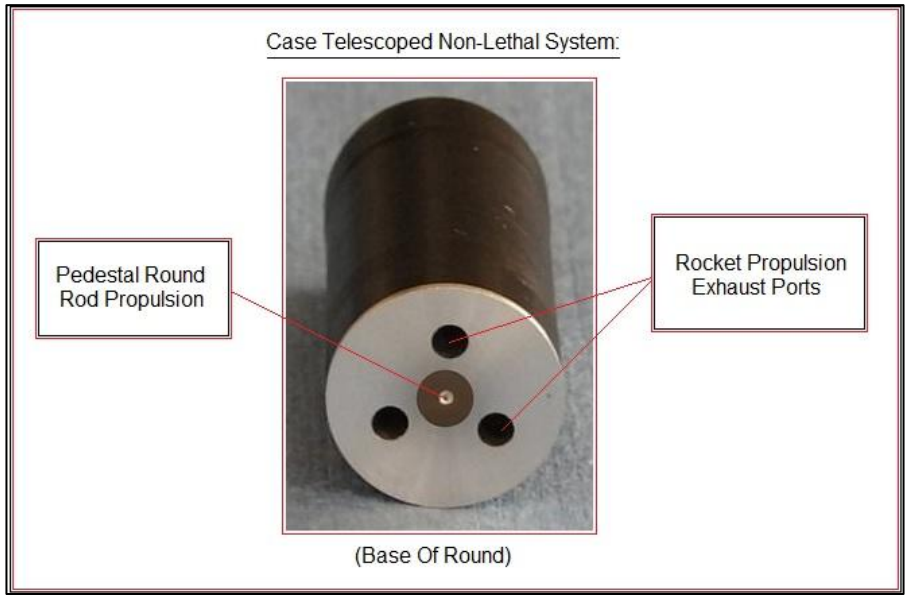
Battelle “Pogo-Jet” Less-Lethal Captive Piston Pedestal Round:

Invented by Jeff Widder & Chris Peralta of Battelle Institute. A 0.50 Caliber Electrically Fired, Hard Rubber Encased Projectile. Fires At Variable Velocity To Impact At 300fps From 0 – 125+ Yards With Electronically Controlled Firing Rates Of Up To 20/Second. Combines pedestal and gas propulsion with a variable position breech engagement.

Prototype Is A Pistol (Shown At Middle Right) And High Capacity Shoulder Fired Weapons Are Under Development.

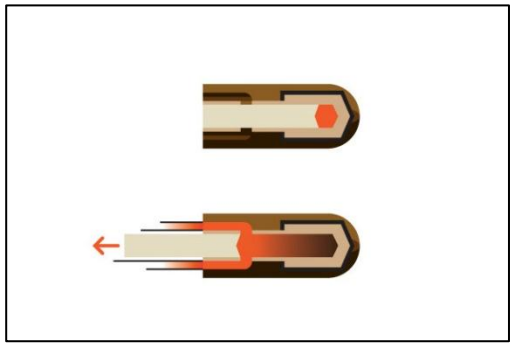
Case Telescoped Non-Lethal System Dual-Propulsion Operation:

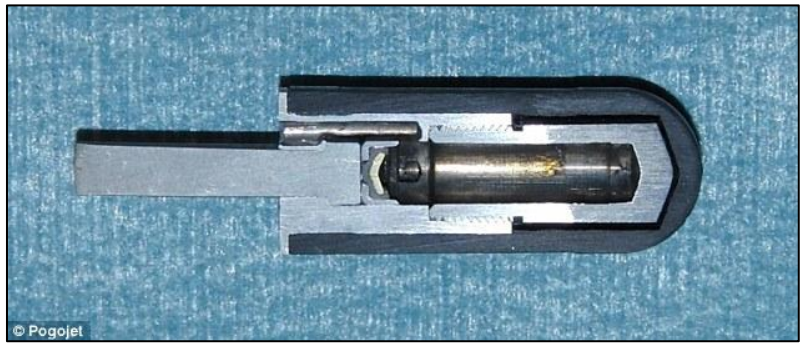
"High Energy Variable Velocity Rounds Actually Accelerate After Leaving The Launcher"

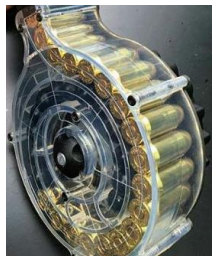


Left To Right Above: Battelle CTNLS Case Bottom View Showing Pedestal And Rocket Exhausts, Battelle CTNLS Pistol With Range Adjustable Picatinny Rail Featuring Burris FastFire Miniature Red Dot Sighting System.

Adapting Non-Lethal CTNLS To High Capacity Weapon System:

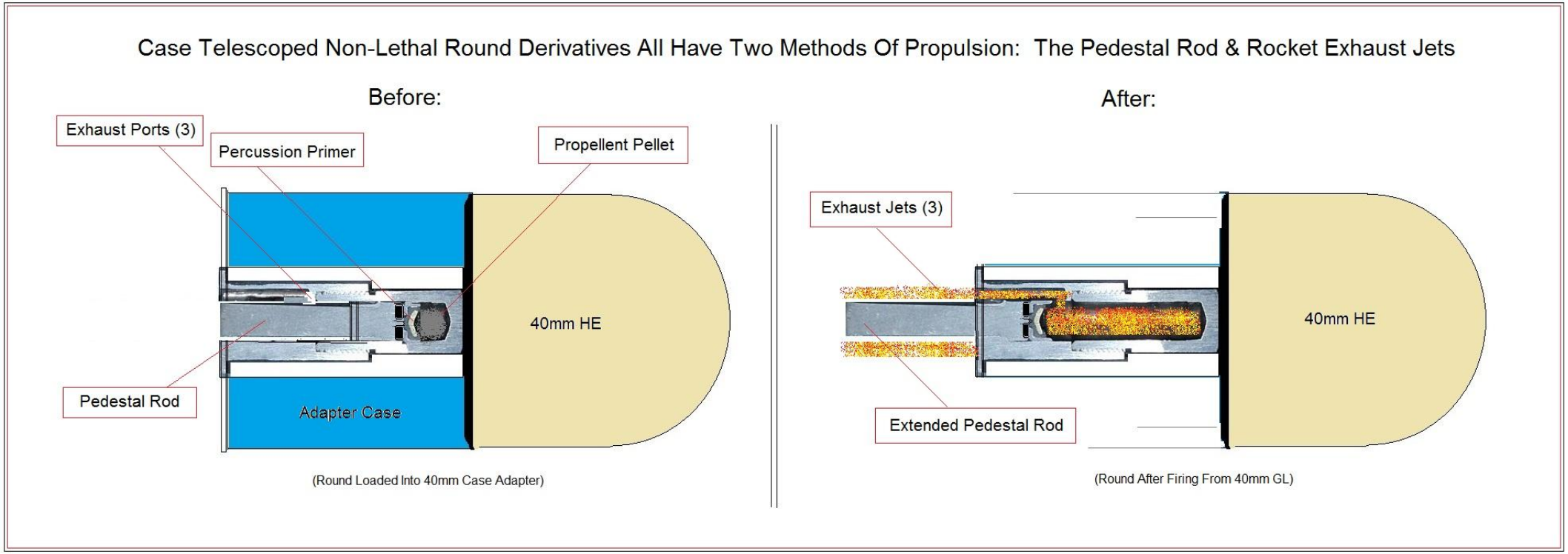






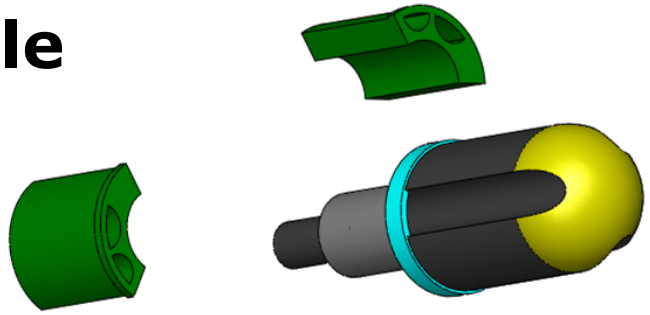
Clockwise From Upper Left: Wired Pogo-Jet Illustration, Battelle Fired CTNLS Round, Battelle Rifle Mounting, CAA Roni Pistol Conversion, Battelle Pistol-Roni Overlay, Lancer Stick Magazine, Pro-Mag Drum Magazine.

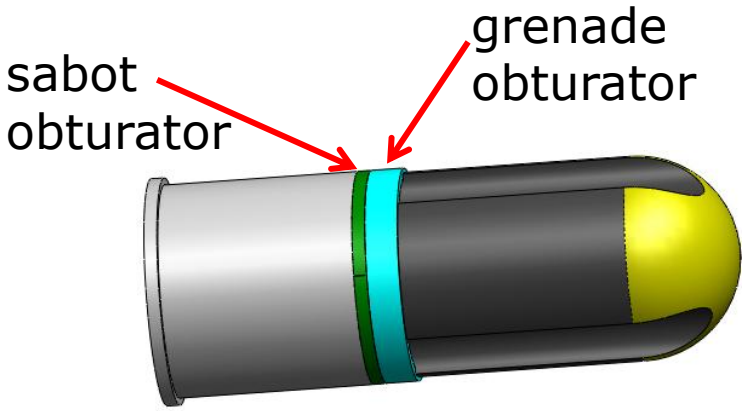
Case Telescoped 40mm Round Propulsion Method:



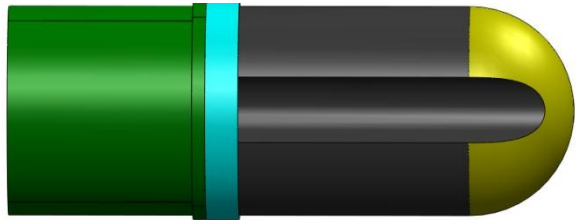
Part Of The Propulsion Is Derived From The Pedestal And Part From Exhausts Selectively Venting Exhaust Gas from Barrel Varies Muzzle Velocity.

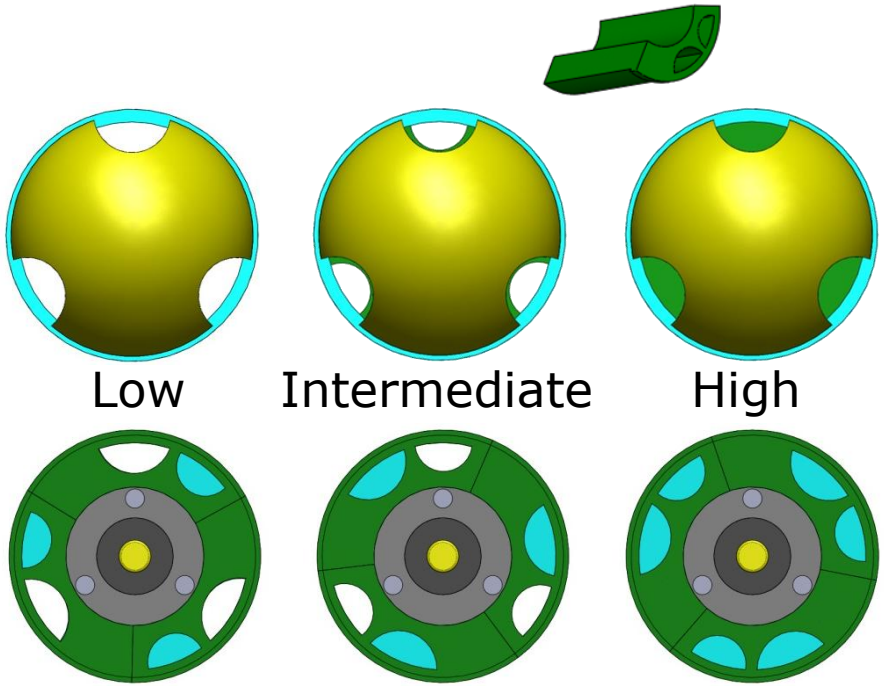
Holes in sabot allow reduction of muzzle velocity by venting low side gas. High side ballistics are not perturbed.





Rotation of munition relative to sabot selectively opens and closes vents. Rifling locks relative position of sabot and grenade





Conclusions:

- It Is Relatively Low Risk To Produce A “Drop-In” 40mm CT Variable Velocity Round
- No Modifications To Existing Weapons, But Sighting System Changes Would Be Needed
- New Round Would Require Revised Training Regime For Additional Trajectory Capability
- A Scaled Battelle CTNLS Can Also Deliver Heavier Payloads Without Increased Recoil
- The Same Propulsion Can Theoretically Deliver Identical Payloads To Longer Range
- Percussion Versions Of Currently Electrically Primed CTNLS Can Be More Powerful Due To The Additive Effect Of Larger (e.g. CCI 35 BMG, 209 12ga) Centerfire Primer

Recommendations:

- Explore Advantages Of Additional 40mm Trajectory Capability To Battlefield Performance
- Evaluate Sighting System Modifications Needed To Accommodate Variable Trajectory
- Prepare Demonstration Of Increased Payload With No Increase In Recoil Claims
- Test Ability To Also Fire Current Grenade Payloads To Extended Ranges With System
- Design Modular Payloads To Match Range & Payloads To A “Universal CT 40mm Case”

Credits:

Armor Development Group

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