



HOLOgraphic Weapon Sight Product Introduction

NDIA/EOTech presentation

June 2004

NDIA/EOTech discussions

■ Agenda:

- Background on EOTech
- Technical description of HOLOgraphic Weapon sight
- Overview of features/functionality
- “Futures” or Adaptations to Core sight

EOTech's technical roots ... from the Environmental Research Institute of Michigan

- Founded in 1946 - Originally part of the University of Michigan
- Nonprofit Research and Development Institute (at peak 600+ engineers)
- Specialties - Image Processing, Remote Sensing, Battlefield Surveillance, & Advanced Optics
- Core Contracts with Intelligence Agencies, NASA, etc ...mostly classified programs
- Some Industrial Applications - Collision Avoidance/Medical Imaging/Metrology
- Holography 1st demonstrated at ERIM in 1962

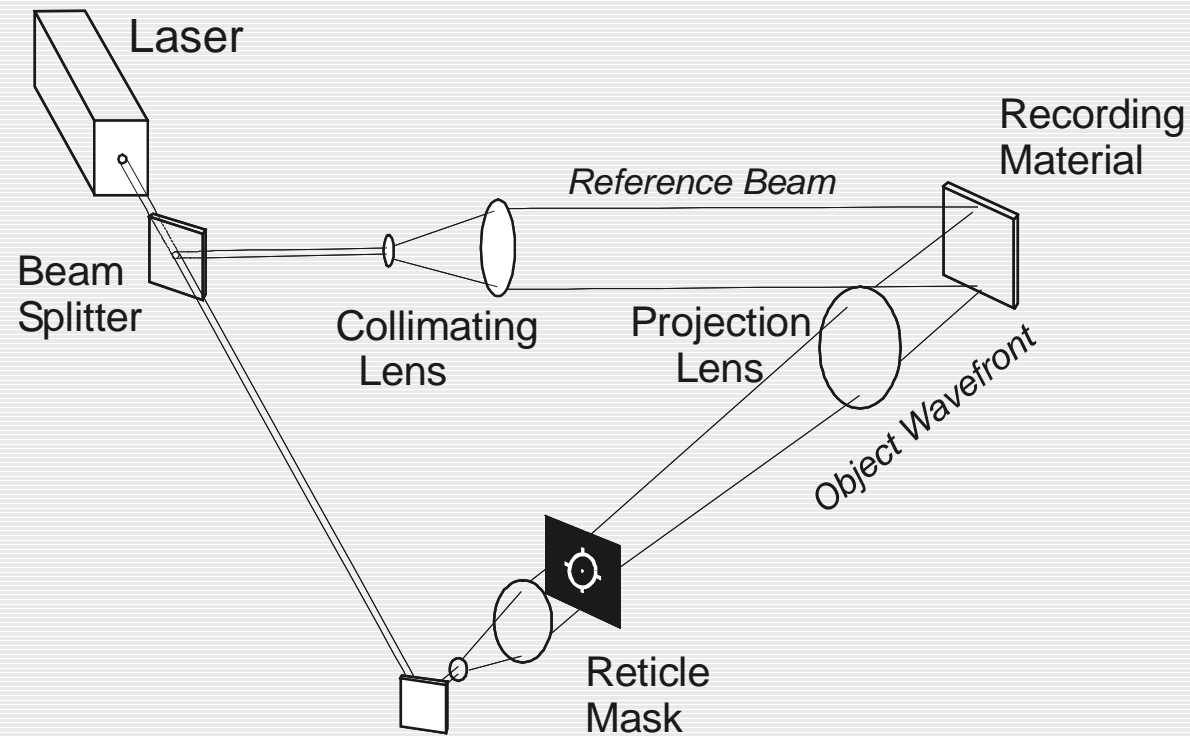
EOTech Summary

- Invented, designed, & manufacture the 1st Holographic based weapon sight
- Patented technology & proprietary manufacturing position
- All technology and manufacturing rights reside with EOTech
 - manufacture all transmission holograms in house (2 per sight)
 - perform assembly, Q/C, qualification & testing in house
- Outsource all sub-components
 - 85% of component cost fabricated in US
 - 40-45% in SE Michigan
- 200,000 sights shipped in 7.5 Yrs of production ...
- Large DoD contracts since Dec 03: ARDEC, MARCORSSYSCOM, USSOCOM SOPMOD

History of HOLOgraphic Sight Development

- ERIM invents laser holography in 1962
- Prototype sight completed for US Military in 1971 (ERIM contract)
 - helicopter gunships for Wright Patterson (Air Force R&D) contract
 - anti-aircraft weaponry for Army contract
- In early 1990's ... Laser miniaturization and diode cost reduction made the sight "feasible to market"
- In 1996, partnered with Bushnell - released commercial HOLOsight
 - won top awards at SHOT show
 - Generation 1 HOLOsight did not meet requirements for military application
 - Army awarded Aimpoint M68 contract
- Generation 2 HOLOsight released in Jan'00 ... for commercial markets
 - based on modular design ... built with military upgrade in mind
 - solved NV, AA, weight, length issues, but kept same core optical performance
- Official release of Gen 2 Military grade HWS in '01

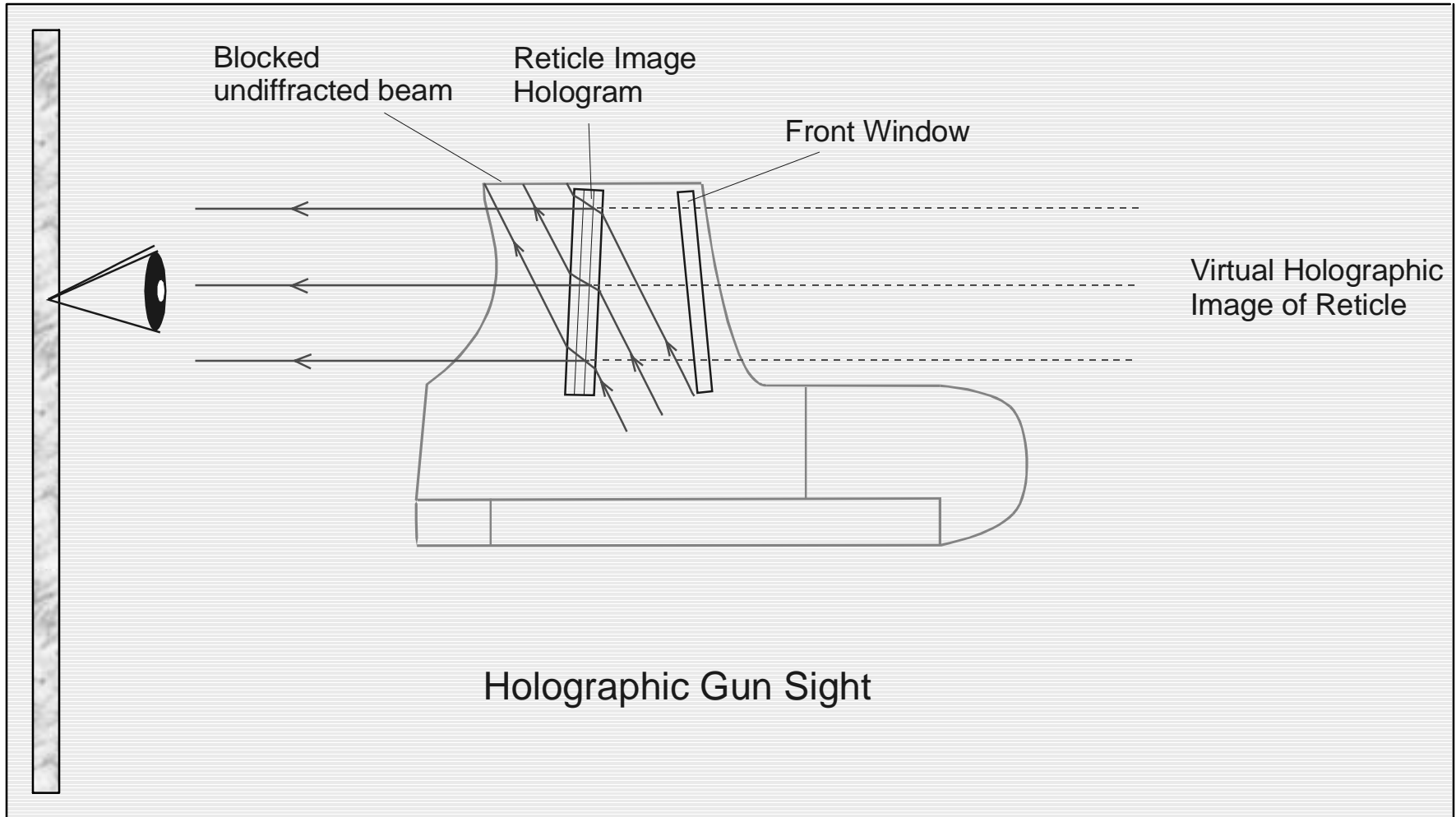
Holographic Gun Sight – Basic Concept



Recording of Reticle Hologram

Holographic Gun Sight – Basic Concept

(continued)



EOTech Alliances

- Bushnell is marketing partner for commercial shooting sports sector (since '96)
- ITT relationship secured for tandem operation behind NV monocular
- Diemaco places HWS on C7/C8 weapon ... resell only in NATO countries (i.e. Holland, Norway, and Denmark)
- FN Herstal/Armor Holdings/Sage/CTS on their respective Less Lethal Launchers - with ranging/trajectory reticle
- Smaller M16/M4 suppliers (7-8 mfgs) as well as IMI/Singapore Tech as “system integrators”
- General Dynamics on Tri-barrel .50 Electronic Gatling Gun for Helo/Hummer applications; and XM-312 and 307 sighting system
- Informal arrangements with H&K, Litton & Sig ... quote as option to their weapon/NV platforms
- Working with Talley Defense & Bofors on light armour launcher with specialized reticle image

HOLOgraphic Sight Product Line

- M550 - a military grade unit with NV compatibility & AA battery option
 - Both versions listed on GSA
- Model 510 – a tactical law enforcement unit without NV (N or AA battery option)
- Model 510 for specialized less lethal launchers
- Model 500 – called Bushnell HOLOsight for resell to commercial firearms market
- Model 520 – archery product sold direct by EOTech thru its commercial channels
- Various weapon mounting platforms to ensure secure positioning on weapon platforms

HWS's #1 Feature - Speed

- Full, large, “see through” reticle images provide quicker eye recognition ... easier and faster than a single dot
 - Speed advantages over Red Dots are very apparent ... especially when users or targets are moving
 - A more “forgiving” reticle & sight picture
 - Improper cheek weld, sloppy weapon presentations
 - Awkward shooting position or engaging around physical barriers
 - Standard pattern provides no compromise between speed & precision accuracy
 - 65 MOA ring for natural centering
 - 1 MOA Dot -smallest in the industry
- Reticle does not “cover up” target area at 300m+ ranges

Heads Up - Eyes Searching Vision

- Rectangular Heads Up Display - like looking through a windshield (a greater FOV)
- Tubeless design eliminating “blind spots” or constricting view
- Streamline design with no blockage from battery compartments, mounting rings, lens protectors, ...
- True 2 eye open shooting is achieved
- Maintain Use of Peripheral Vision – assists in engaging multiple threats
- Optical Field of View is between 25-50% greater than Red Dots

Other Key HOLONsight Features

- No physical blockage of light source to make Sight inoperable (exposed light source)
- Functional if window covered with mud, snow, sand, water, etc. - **AND** - Zero maintained
- “Shatterproof” laminate 3/16” thick - bonding of 3 optical surfaces creating a “hardened” Heads Up Display
- Functional if window is broken/cracked
- Elimination of Muzzle Side Signature
 - No light emitting beams to give up user’s position
 - Reflective glare is eliminated due to A/R coated flat surface
 - Non -detectable even with muzzle side NVGs

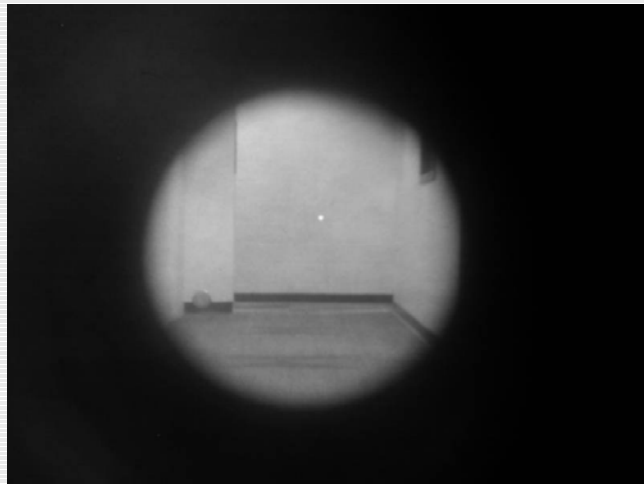
Compatibility with Night Vision

- Works in tandem with Gen I – Gen III+ intensifier tubes
- Tube saturation is eliminated – no “halo” affect of reticle on target scene
- A passive weapon aiming system - no user signature
- Flexibility to witness reticle with either head mounted or weapon mounted NV monocular
- Minimal target obstruction with 1 MOA aiming dot ... improved accuracy

HWS Night Vision specifics

- Instantaneous drop to NV mode – fractions of a second
- 10 settings within NV mode – supports 128:1 brightness contrast ratio
 - Variances in tube sensitivity
 - Ambient light conditions
 - Variances in human eye sensitivity in NV mode
- 30 total settings – 20 for normal day/low light operation (28,000:1 contrast ratio)
- Toggle between NV and normal day operation
- Auto-turn-on for NV mode with setting at NV brightness level 4

Operation with Night Vision Scope



Seen through M-68



Seen through HWS

Additional HWS Capabilities

- Parallax Free optics - eliminates critical eye, sight, target alignment
 - Eliminates multi-plane focusing error
 - Cheek weld is not needed to engage
 - Very simple for soldiers to use A point and shoot weapon optic
- Unlimited eye relief - adaptable to various weapon platforms or user preferences
- Common AA battery source – unique among Military Red Dot competitors
- No reticle “wash out” in bright sunlight, white targets, or desert/artic conditions ... Reticle clearly visible in ALL types of lighting conditions
- Tool-less User Interfaces for battery change-out, mounting, W/E adjustments, etc.

Battery options & electronic features

Universally available AA batteries (M552 and M512 only)

- Use Lithiums, Alkaline, or re-chargeable AA
- Adds 1 inch to length – spatial issue on Picatinny rail
- Common battery source and interchangeable to NV, Flashlights, IR pointers, GPS, etc ...
- 5X greater battery life with Lithiums
 - At default (Level 4) to 800 hours at 70 F
 - At 7 F to 400 hours – at default setting
- N Alkaline battery option available ... used when space is limited (sub guns)
 - available at K-Mart/WalMart at \$3/set (camera batteries)
 - Battery Life ranging from 200 hours (default setting 12) to 500 hours (at setting 5) at room temperature
- Auto Battery Check upon start-up with blinking reticle at 20% or less
- Auto shut down at 8/4 hrs

Environmental Parameters

- Operating Temp = -40 to 150 F; Storage to -40F
- Waterproof & Submersible
 - M550 to 33 ft (10m)
 - M510 to 10 ft (3m)
- Fog-proof internal optics
- Scratch Resistant, A/R coated and maintenance free optical surfaces
- Corrosion resistant components
- Hardened/Anodized finish
- Typically used solvents do not affect operation

Durability

- Survives 10 ft drop tests - holds zero to 1-2 MOA
- Tested in various environmental chambers including salt spray, thermal shock, pressure, etc.
- Recoil testing at 3,300 G's/0.5 Msec (.454 Casull) with 100% sampling
- Field tested on heavy resonance weaponry – General Dynamic's Tri Barrel .50 Gatling Gun

Mounting Accessories

- Interfaces to standard Picatinny rail for Flattop configurations ... with flip up iron sights (co-witnessing)
- Repeatable to within 1 MOA upon re-mounting
- M-16A1 fixed carrying handle configurations
 - Cantilever mount to achieve co-witnessing
 - Carrying handle mount ... access to iron sights or for NV mounting
- For most weapon platforms - no changes to the receiver or user's trained cheek weld position
- 1 thru bolt/clamp ... allows user flexibility for placement anywhere along the rail
- Mounting brackets/rings available for ITT PVS 14 and Litton 983 monocular tandem setup

Upgrades and Releases in CY03

- New battery contact design ... standard on all military models
- New membrane switch design for M550
 - Much sharper tactical feel ... especially with cold weather gloves
 - Larger switches ... much easier to operate
 - Separation of NV switch with round inlay ... avoid user error
 - Now standard on all military models
- Standardized to 33 ft water immersion depth
- A battery cap tether design is being worked on ... no decision to offer yet
- Release of 2 x less lethal reticle images ... for Sage and FN Herstal
- In testing for a hydrophobic lens coating to minimize external condensation and raindrop occlusion

Adding Magnification for Long Range Engagement

- Holographic sight provides true point source as aim point
- Dot size limited only by eye resolution to 1 m.o.a.
- Placing 4X scope behind sight magnifies target scene 4X but dot size remains 1 m.o.a.
- Effective dot size is 0.25 m.o.a. or 1 " at 400 yards
- Aiming dot provided by holographic sight, placement of magnified scope not critical
- Not true with red-dot sight where image of LED is projected
 - If magnified scope is placed behind sight, dot is magnified with target scene – no gain in aiming precision
 - If magnified scope is in front of sight, target scene is shifted relative to aiming dot, re-zeroing is required. Long eye relief also severely restricts FOV

Optical magnification for longer range engagement

- CQB/MOUT capability is seriously compromised by operating a variable power 1X-4X scope at 1X as CQB/MOUT optics.
- Better solution is to add 4X magnification to a CQB/MOUT optics to provide long range engagement capability
- The unique feature of a holographic reticle makes such an approach feasible
- Together with a night vision scope, the sighting system meets the needs of DoD ground forces in various mission scenarios

HWS used in Different Configurations



CQB



With Night Vision Scope



With Backup sight



With 4X scope

Summary of HWS Attributes

- Superior Product for a CQB/MOUT weapon sight - optically, user features, enhanced user performance
- Clear performance gain in tandem with NV and magnified systems
- Pricing is comparable to military grade Red Dots
- No change to M-16 style weapons ... all mounting/co-witness platforms are in place
- Adaptability to a host of small arms weapon platforms ... with no weapon modification
- Flexibility to adapt to crew-served weapons platforms
- Rich technology company with strong electro-optics resources