



U.S. Army CECOM RDEC Night Vision & Electronic Sensors Directorate

CECOM Bottom Line: THE WARFIGHTER



NVESD Vision and Purpose



Vision: The U.S. Army equipped with the most cost effective sensor technology so that it can win decisively across the spectrum of conflict with minimum allied casualties.

Purpose: To unearth, foster and dominate the most promising technical opportunities for the warfighter in our mission areas.



Why Sensors for the Objective Force and FCS?



Survivability of a medium weight force is dependent on sensors:

- High quality situation awareness (SA) is the key to avoiding unintentional close combat and supporting BLOS targeting
- Combination of distributed sensors and the network to interconnect them is the source of SA



Advanced sensors can add capability at ***reasonable cost***

However, the investment paradigm must change:

- Both on-board and off-board sensors important
- Must deal with threats in complex terrain
- Affordability is critical

Also note, sensor investments are largely independent of vehicle type. Objective Force/FCS sensor technology can be retrofitted to the IBCT and the existing heavy forces

See First - Understand First - Act First - Finish Decisively



NVESD Legacy: Transitioning Military Unique Sensor Technology That Makes a Difference!



Image Intensifiers



>400,000 Systems Fielded



Thermal Systems



>60,000 Systems Fielded

Countermine



>15,000 Systems Fielded

Laser Systems



>40,000 Systems Fielded

**“Our night vision capability provided the single greatest mismatch of the war”
- MG Barry McCaffrey, CG 24th ID, Desert Storm**



Army Unique Sensor Environments



Dirty Battlefield



Cost, Weight & Power Constrained Systems



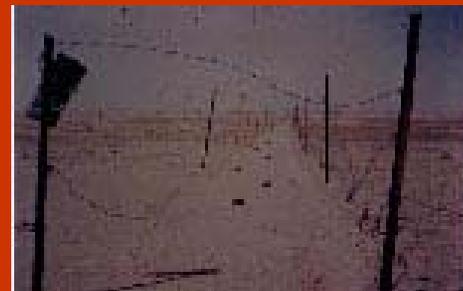
High Clutter/Parallel-to-Ground Engagements



Complex Terrain/Short Line of Sight



Landmine Detection & Neutralization



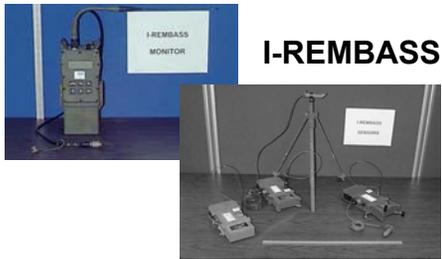
- *Vehicles*
- *Soldier Systems*
- *Aviation: Fixed Wing/Rotary Wing/UAV*



NVESD Remote Sensors



Rapid Prototyping and Field Support Division

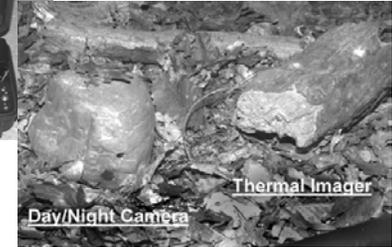


I-REMBASS

- Unique Applications
- Rapid Deployment
- Leverage COTS
- Adapt Existing Equipment
- Communications
- Image Transmission

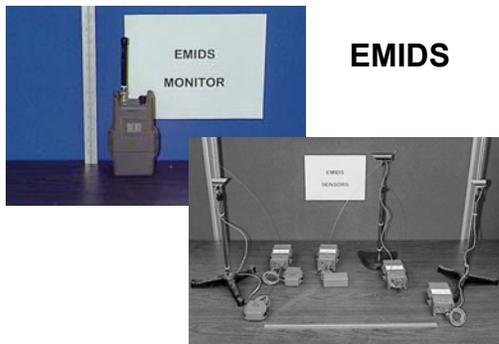


ROCS



Thermal Imager
Day/Night Camera

PEWD-II



EMIDS

Customers

- JSA Korea
- USBP
- DOJ
- INS
- JTF Bosnia
- Macedonia
- USSOCOM

Remote Sentry





Microsight Configuration

Baseline LOCUSP Sight



Packaged As Weapon Sight:
IR Band: 8-12 um
Weight: 2 lbs.
Size: 6" (L) x 3" (W) x 3.5" (H)
Lens: 1.5" (f/1.0)
FOV: 15° x 11°
Cost: \$3K/unit in quantity



Uncooled IR Technology



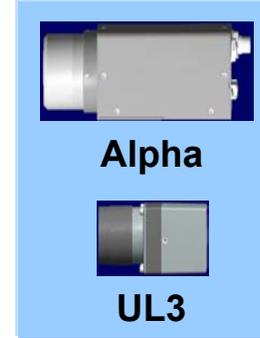
OBJECTIVES

- Smaller Pixels/Increased Sensitivity
- Larger Formats (640x480)
- No Mechanical Chopper
- No Temperature Stabilization
- Lower Power
- Low Cost Optics



SENSOR PAYOFFS

- Lower Cost
- Longer Autonomous Life
- Lighter Weight
- Smaller Volume
- Medium Performance



Baseline LOCUSP Sight



APPLICATIONS

New:

- Seekers / Munitions
 - APLA
 - UGS
 - UGV
 - Mini/Micro UAVs
 - Goggles for MOUT
- Head Tracker SA

Lower Cost/Improved:

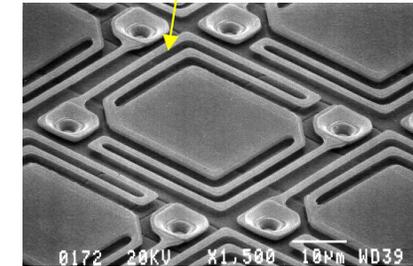
- Rifle Sights
- Driver Aides
- Physical Security
- Seekers

Low Cost through Dual Use Commercial Volume



640 x 480
Advanced Uncooled

DUAP Product



Microbridge

Lower Logistics Costs



No more cryo-cooler - "lowest reliability component"

Low Performance Driven By Commercial Market - $\leq 340 \times 280$ / big pixel Night Imaging < \$1K for the First Time, New Applications

Medium / High Performance (640x480 / small pixel) Enables Affordable Sensor Suites (with Eyesafe Laser Illuminators for ID)

Mil and Commercial

Military only



Advanced Night Vision Goggle



I² for Aviation

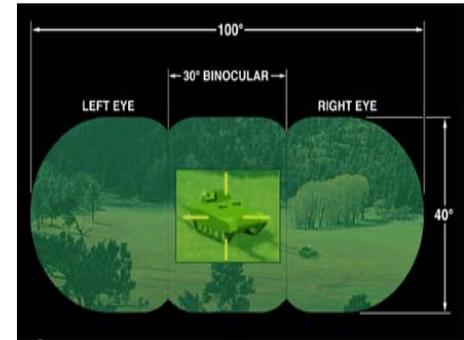
Standard



Low Halo



Symbology for the Aviator



I² for Driving



40° x 100° ANVG

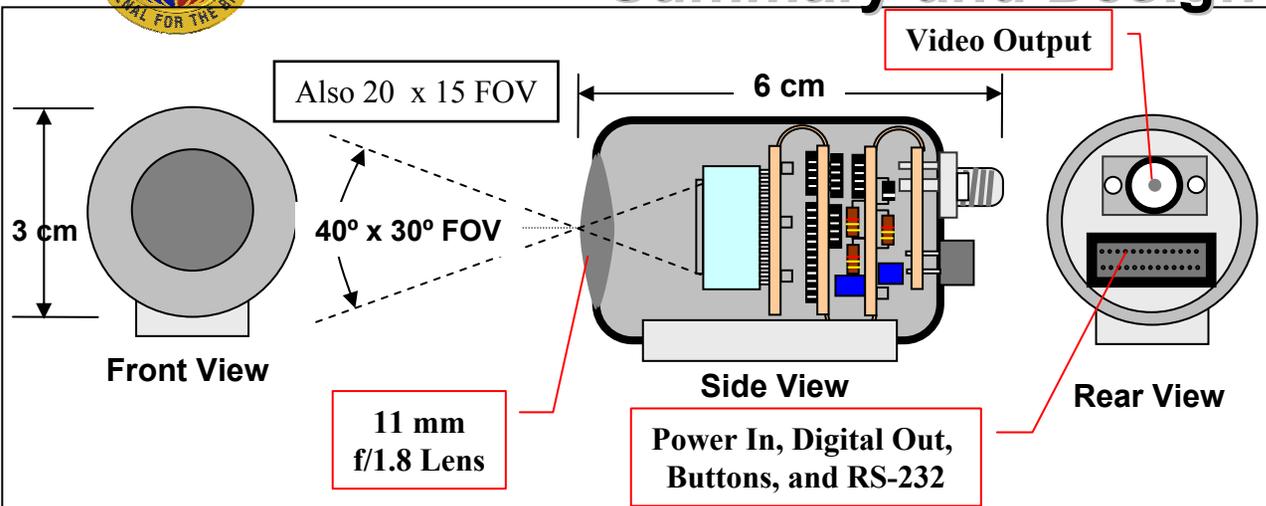


Fused I² and IR for dismounted soldier

Improved situation awareness and safety of flight with wider FOV
Added IR target detection capability for dismounted soldiers
HTI approach for Aviation and Infantry



Low Cost Night Imaging UL³ Uncooled IR Camera Specification Summary and Design



Design Goal: Ultra low cost \$500 FLIR for day/night imaging
Applications: Mini-UAVs, Sensor Networks, APLA, UGS, Goggles

Specifications

- Total System Power = 540 mW @ 4.5V
- Total Weight (with optic) <90 g
- Radiometric Performance <70 mK
- Array size = 160x128
- Pitch = 51 um x 51 um
- Optics = f/1.8, Frame Rate = 30 Hz
- Operating temperature = -40° to 55°C

Detection of Walking Man Target

FPA	Sensor Field of Regard/Range	
	40° FOV	15° FOV
160x120	FOR = 165m/ Range= 240m	190m/ 720m
320x240	330m/ 480m	380m/ 1440m

Target: Walking Man (0.75m/2.0° C), 90% Detection/0.5 cycles on target, Atmosphere: 80%/lm

“Alpha” camera (190g) development completed in FY99 and seven 40° FOV units delivered. 15° and 25° FOV versions available in FY00.



Summary



NVESD will meet the sensor challenges for the 21st Century battlefield with technology that is:

- **More capable**
- **Proliferated across more platforms**
- **Rigorously used for more applications and**
- **Lower cost.**



Conclusions



As part of CECOM RDEC

NVESD will:

unearth, foster and dominate the most promising technical opportunities for the warfighter in our mission areas

ensure that the U.S. Army is equipped with the most cost effective sensor technology so that it can win decisively across the spectrum of conflict with minimum allied casualties.