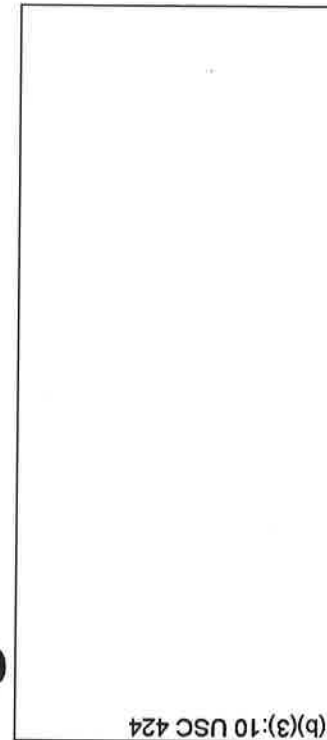
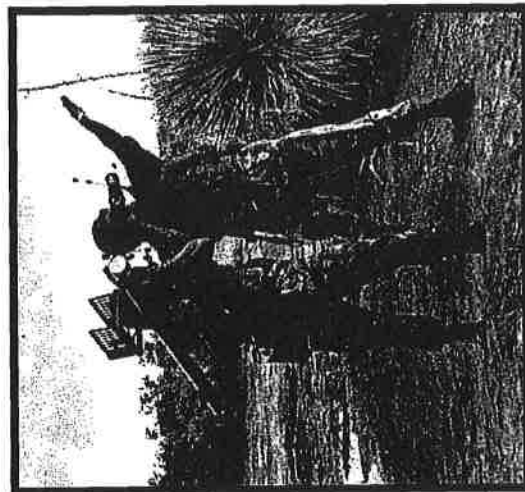


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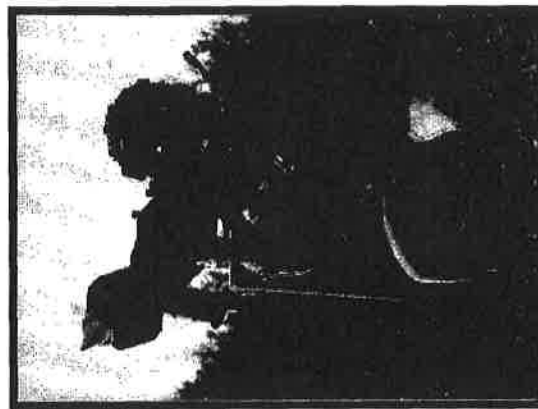
GENERATION III

Stinger and Mistral



(b)(3):10 USC 424

Defense Intelligence Agency



Derived from: Multiple Sources
Original source marked: OADR-10000004

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Outline (U)

- **Stinger Family**
 - **Characteristics**
 - **Proliferation**
 - **IRCCM Capability**
- **Mistral**
- **Unique Characteristics**
 - **Proliferation**
 - **IRCCM Capability**
- **Summary**

(b)(1):Sec. 1.4(c)

Stinger Variants (U)

System Basic

Characteristics

Passive IR homing
Blast-only warhead

(b)(1);Sec.
1.4(c)

POST

Passive IR or IR/UV Homing
Rosette pattern image scanning

(b)(1);Sec.
1.4(c)

RMP

Reprogrammable Microprocessor

(b)
(1);Sec.
1.4(c)

Improved IRCCM

(b)(1);Sec.
1.4(c)

BLOCK I

Software Upgrades
Roll frequency gyro

(b)
(1);Sec.
1.4(c)

No superelevation for helos
Improved terminal accuracy

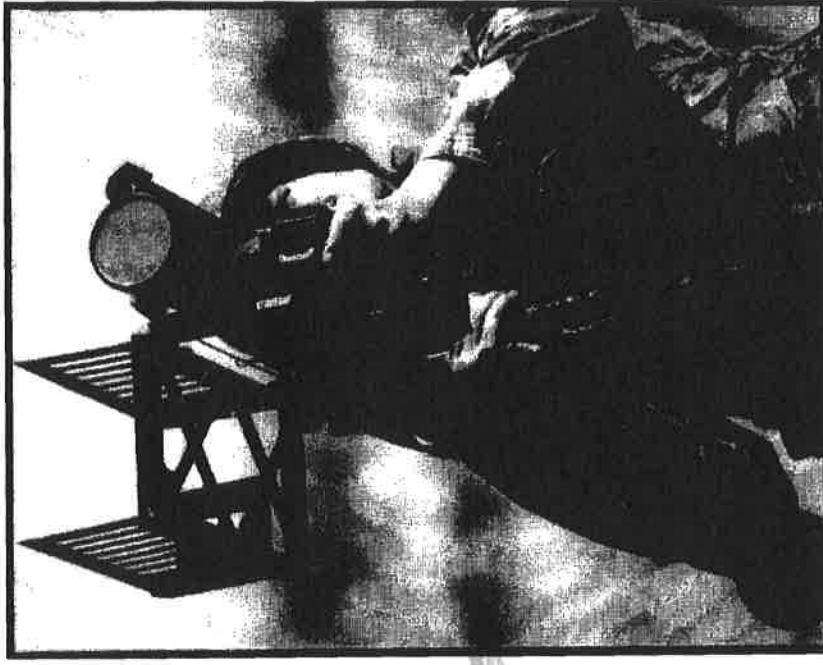
BLOCK II

Focal plane array

Improved acq of helos in clutter
UAVs/Cruise missile capability
Off boresight launch

Stinger Basic (U)

Origin	U.S.	
IOC	1981	
Guidance	Passive IR Homing	
Flare Rejection	Kinematic/Temporal	
Intercept Capability		
Range (nmi)		
Altitude (ft)		
Maneuverability (g)	22	
Maximum velocity (Mach)	1.94	
Maximum flight time (s)	17 (self-destruct)	
Warhead type	HE blast/contact fuze	



(b)(1);Sec. 1.4(c)

Mistral (U)

Origin

France

IOC

1989

Guidance

Passive IR Homing

Flare Rejection

Intercept Capability

Range (nmi)

Altitude (ft)

Maneuverability (g)

Maximum velocity (Mach)

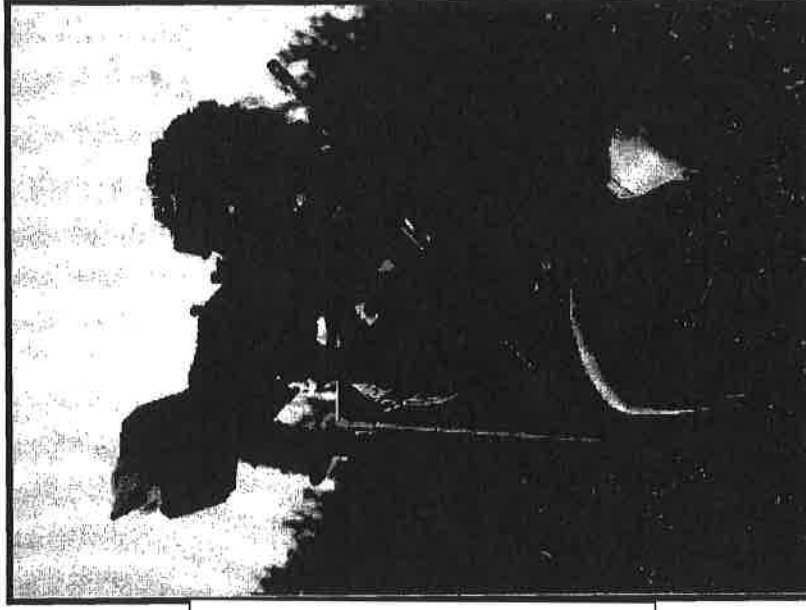
2.5

Maximum flight time (s)

14 (self-destruct)

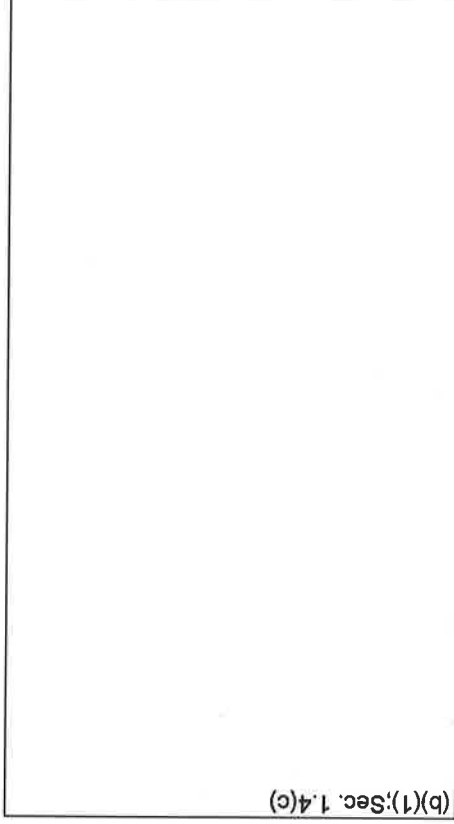
Warhead type

**HE blast/frag contact
fuze and laser prox**



(b)(1);Sec. 1.4(c)

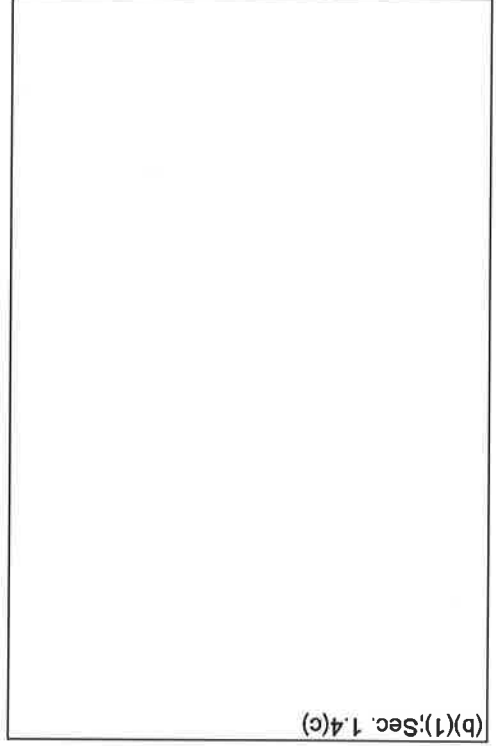
Mistral Seeker (U)



(b)(1);Sec. 1.4(c)

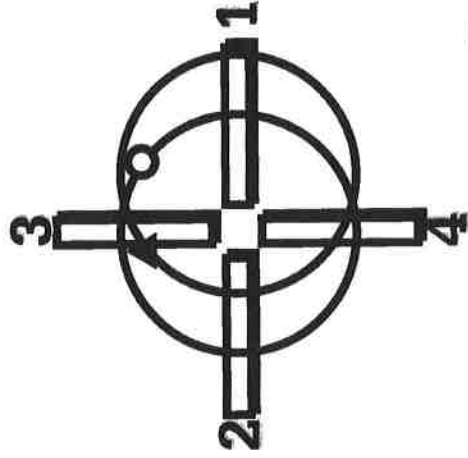
**Cassegrain telescope
4 element cruciform array**

**Optical system
Detector arrangement
Detector material
NEI (pW/cm²)
TFOV/IFOV (deg)
CCM**



(b)(1);Sec. 1.4(c)

Derivation of Tracking Commands (U)



Detector Crossings



$T_a = T_b = T_c = T_d$ On-Axis Target

Detector Crossings

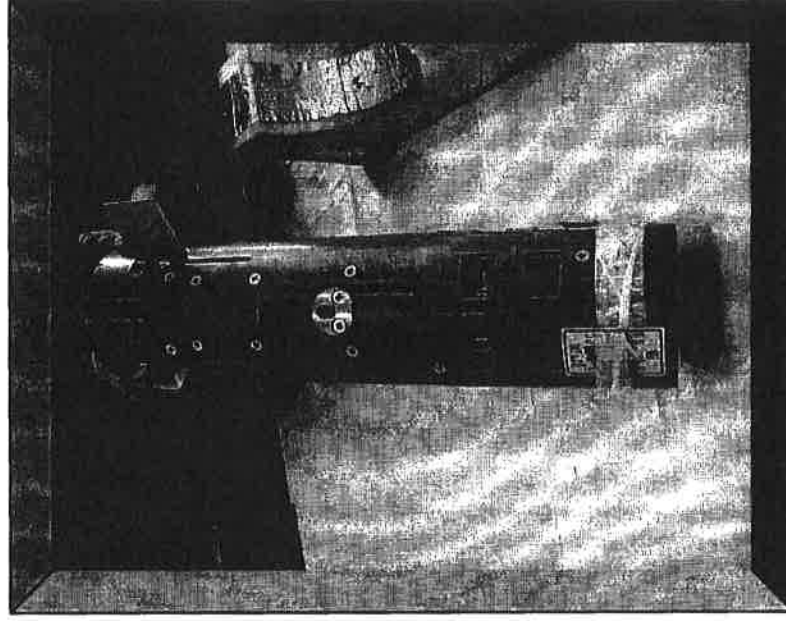
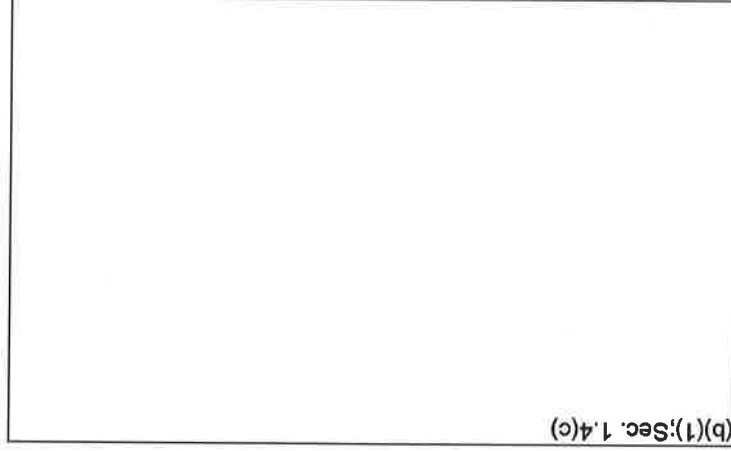


$T_a < T_b$ Azimuth Error

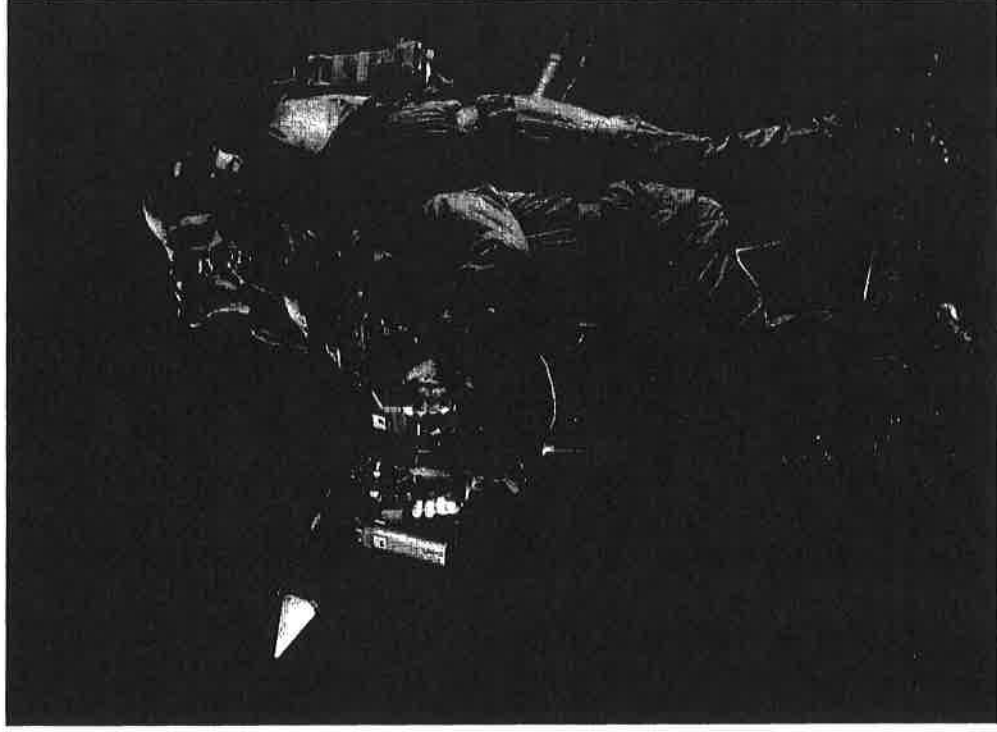
$T_c = T_d$ No Elevation Error

Warhead and Fuze (U)

Warhead
Mass (kg)
Fragment Mass (g)
Explosive Type
Explosive Mass (g)
Fuze
Type
Fuze Range (m)



Mistral Tripod Launcher (U)



Advantages

- Provides stable launch platform
- Eases gunner fatigue
- Electronic heads-up display (HUD) reduces gunner workload
- HUD provides good preemptive flare discrimination
- Easily adapted to NVD use

Disadvantages

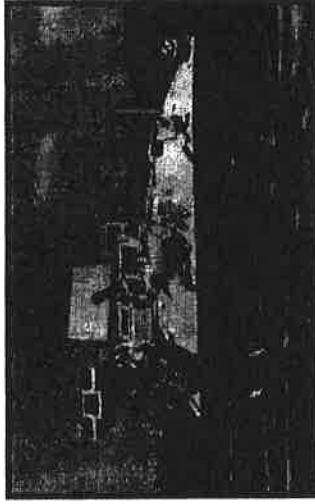
- Less portable than MANPADS
- Slewing in azimuth difficult due to design

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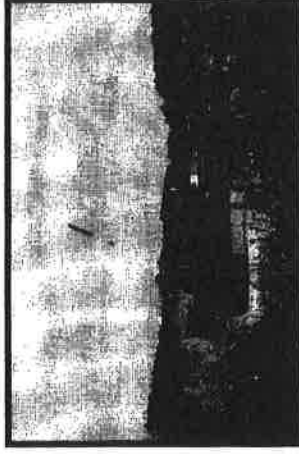
Alternate Firing Platforms (U)



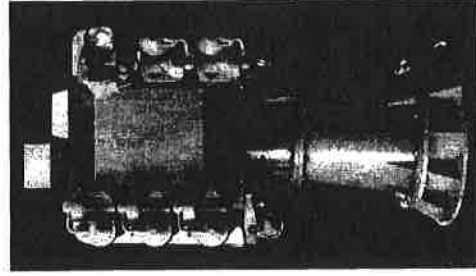
Air-to-Air (ATAM)



BLAZER



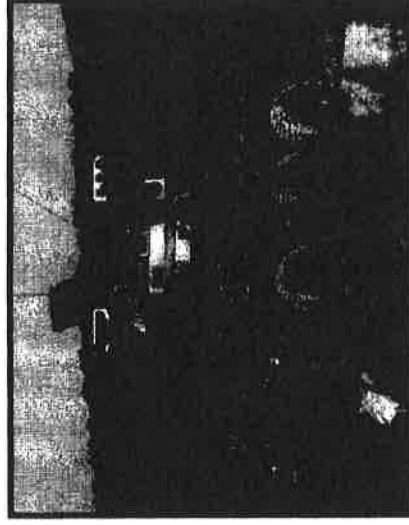
ALAMO



SADRAL

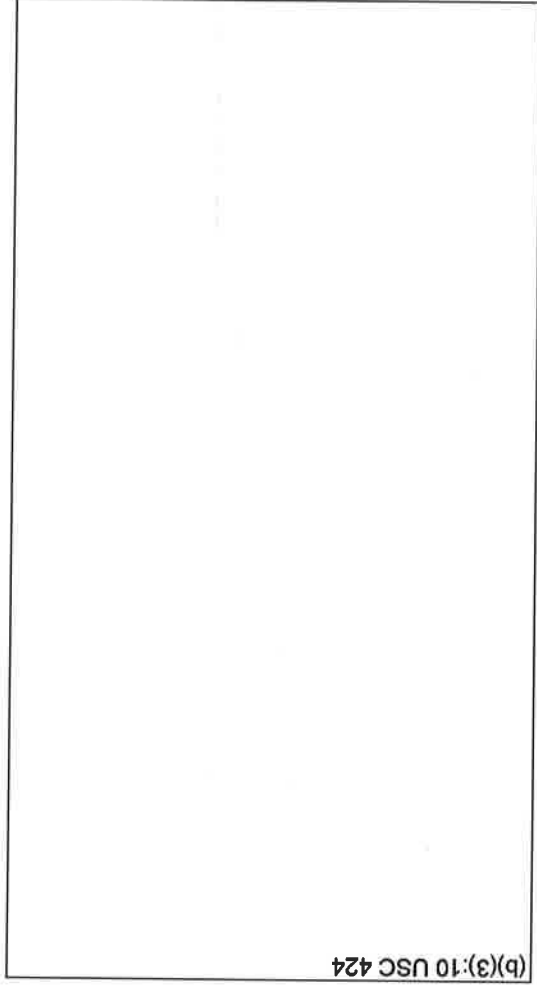


SIMBAD



SANTAL

Questions???

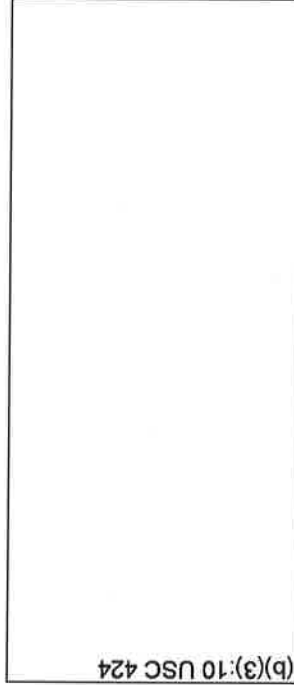


28

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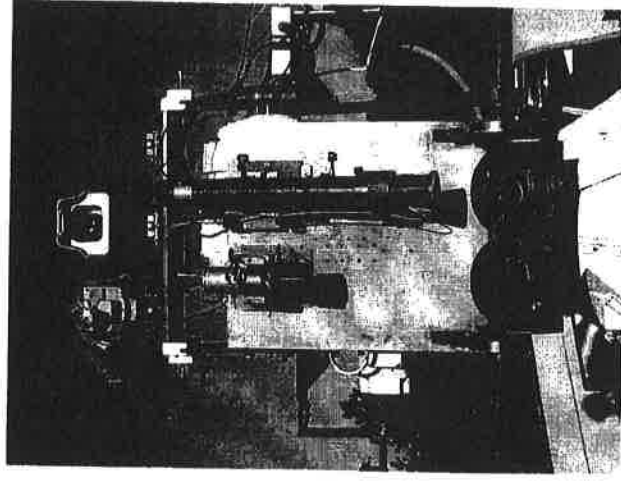
Seeker Capabilities

Pages # 4, 8 - 12, 14, 15, 17 - 23 are Withheld in full and are not provided.



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Derived from: Multiple Sources
Original source marked: OADR-10000004

Outline (U)

Seeker Acquisition Capabilities

MSIC Seeker Test Van

Seeker Tracking Video Clips

Acquisition

Helicopter Benign/Jammer On

IRCCM Effectiveness

(b)(1)1.4(c)

Track Loop Simulator

(b)(1)1.4(c)

Threat Characterization (U)

- Methods -

Analytical Methods

Used to characterize and assess system performance from all-source intelligence data

Used when actual hardware is not available for exploitation

Field Testing

Allows operation of threat hardware in real environment against actual aircraft and countermeasures

One of MSIC's foreign hardware exploitation tools to characterize system
Used by weapons/countermeasure developers

Utilized by military aviation units to evaluate aircraft susceptibility

Track Loop Simulator

Provides capability to execute large number of simulated fly-outs using actual threat hardware electronics

Used by MSIC for exploitation of foreign hardware operation
Used by weapons/countermeasure developers

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Seeker Field Testing (U)

(b)(1);Sec. 1.4(c)

- Acquisition and tracking range data
- Determine missile's response to aircraft countermeasures
- Pre-launch or in-flight mode
- Digitized collection of up to 16 seeker signals per missile being tested

MSIC Seeker Test Van (U)



Initial capability – 1992

Laser Range Finder

Radiometer

Thermal camera

4-missile capability

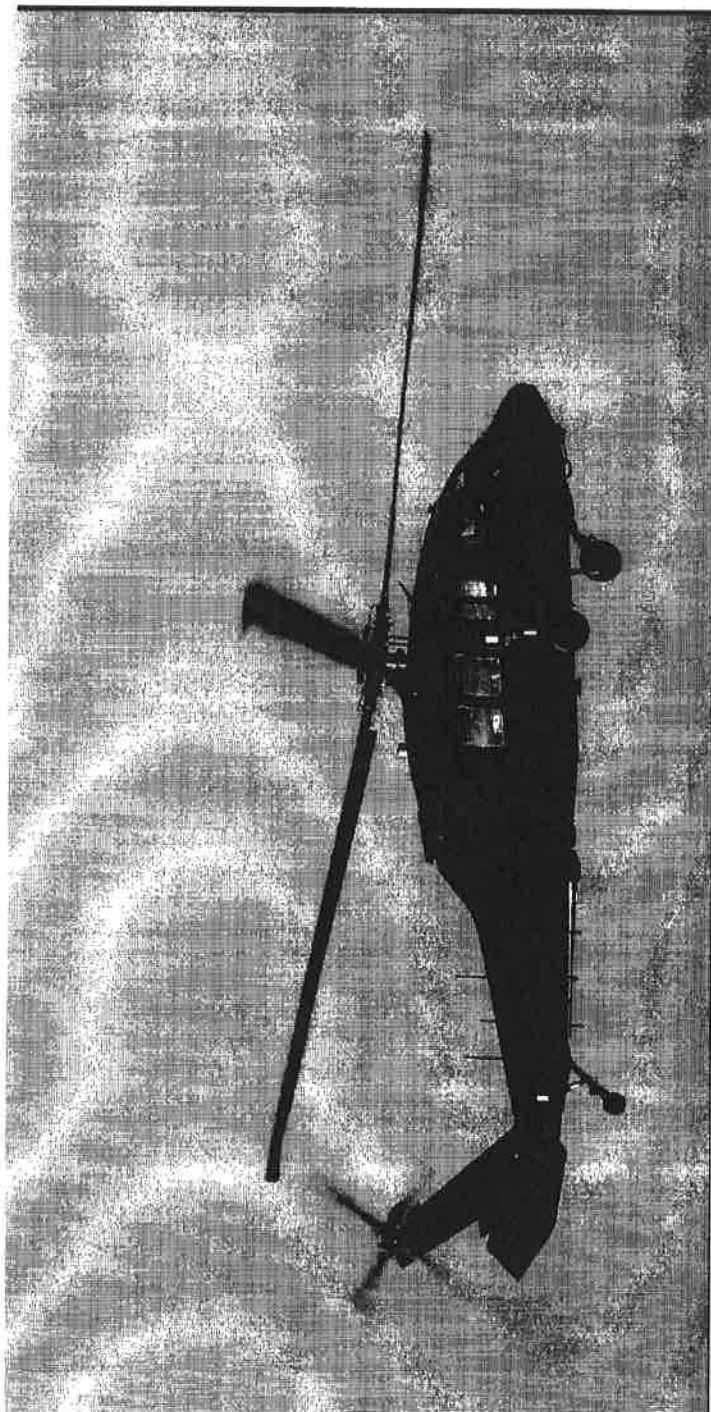
Self-generated power

**Pre-launch and In-flight
Test Capability:**

(b)(1)1.4(c)

SECRET

EH-60 Field Test Results (U)



(b)(1)1.4(c)

Track-Loop Simulator (U)

- Signal Injection -

OBJECTIVES

FME Characterizations

Mode Evaluations

Design Criteria

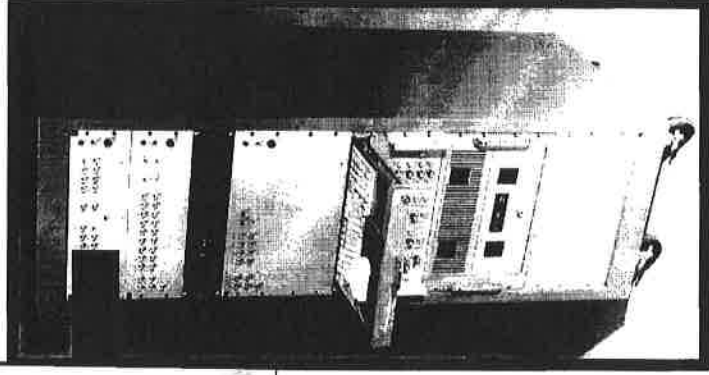
Digital Sim Correlations

Customer Support

Seeker Field Tests

IRCM Evaluations

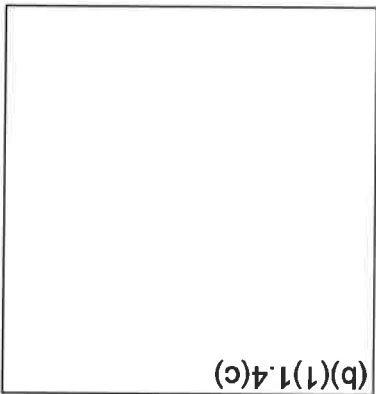
(b)(1)1.4(c)



(b)(1)1.4(c)

**Seeker and Missile
Flyout Tests**

Seeker Test Verification (U)

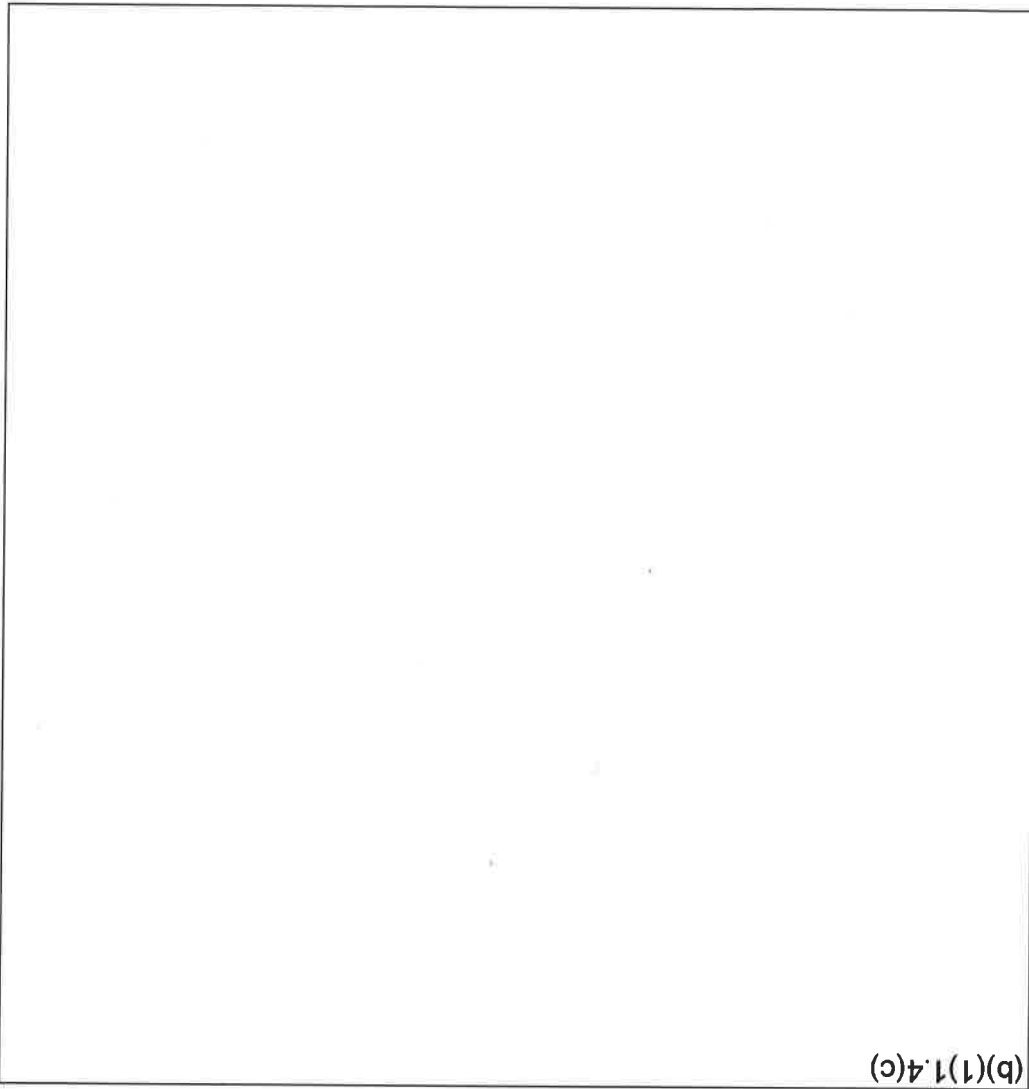


2000 ft Offset

200 ft AGL

Jammer OFF

**Seeker in Manual (or
Slow Target) Mode**



SECRET

SA

(b)(1)1.4(c)

(b)(1)1.4(c)

Offset: 3000 ft
Speed: 110 kts

(b)(1)1.4(c)

Summary (U)

EO/IR MANPADS are increasing in sophistication with new and better IRCCM schemes.

(b)(1)1.4(c)

Field testing is an extremely valuable tool to be used by both analytical as well as military customers

Certain limitations of this field testing capability requires the use of high fidelity models and simulations to fully understand the missile's capabilities/limitations

Proper employment of countermeasures can provide a very high level of protection against most of today's threat MANPADS

Questions???

