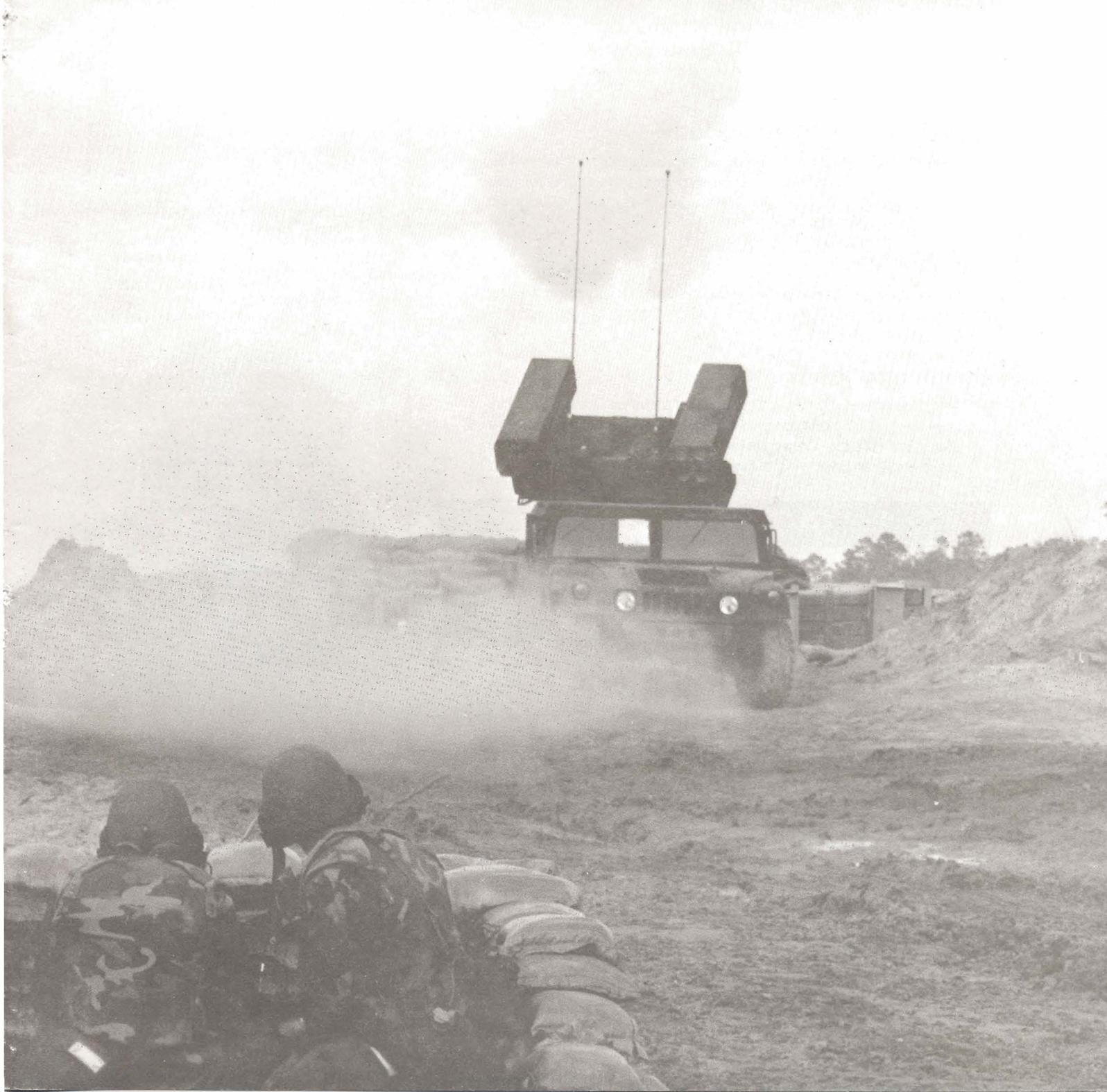




HQDA PB 44-94-1

January-February 1994





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# ON THE COVER

An 82nd Airborne Division Stinger gunner zeros in on target (photo courtesy of Hughes Aircraft Co.). The recently completed Division Air Defense Study explains how the "First to Fire" branch plans to counter the evolving low-altitude air threat with an exclusively Stinger-based arsenal of forward area air defense weapon systems.

**Maj. Gen. James J. Cravens Jr.**  
Commandant, USAADASCH

**Blair Case**  
Chief, ADA Publications Division

**Lisa B. Henry**  
Editor-In-Chief

**Terry G. Smith**  
Associate Editor

**Kathleen Coats-Doyle**  
Assistant Editor

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General, United States  
Army Chief of Staff

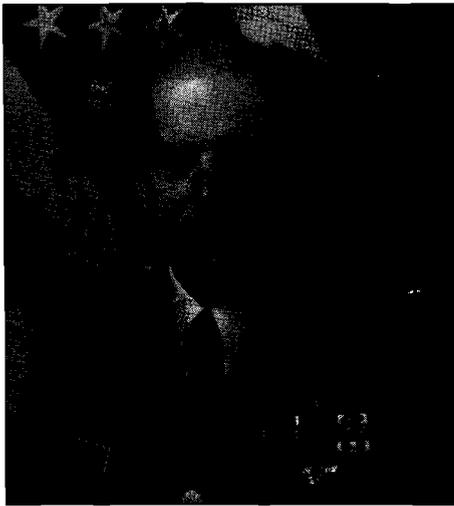
Official:

**MILTON H. HAMILTON**  
Administrative Assistant to the  
Secretary of the Army

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**CORRESPONDENCE:** Address articles and letters to Editor, ADA bulletin, USAADASCH, ATTN: ATSA-ADA, Bldg. 2E, Fort Bliss, TX 79916-3802. Telephone (915) 568-4133, DSN 978-4133, FAX 568-3002.

# Intercept Point



With the end of the Cold War and the demise of the ADATS, the Air Defense Artillery School initiated a Division Air Defense (DAD) Study to answer the following questions: What is the future air threat to the division?; Is the Forward Area Air Defense (FAAD) System concept still valid?; and, What must be done to meet the future threat?

The DAD Study was completed in December 1993, and we are in the process of briefing CINCs, corps and division commanders, and other senior officers at TRADOC and HQDA on its findings and recommendations. The results will be used to reshape the future FAAD System.

What emerged from the study is a recognition that the air threat, formerly focused on fixed-wing and rotary-wing aircraft, has greatly expanded. The future projections see an increased availability and proliferation of tactical ballistic missiles (TBMs), cruise missiles (CMs) and unmanned aerial vehicles (UAVs) that can target corps and divisional forces and assets. While fixed-wing aircraft continue to pose a threat, the U.S. Air Force will be able to adequately address most of them; however, Air Defense Artillery must remain capable of engaging the "leakers." Rotary-wing threat aircraft will continue to possess significant capabilities, but DAD Study analysis suggests that they will not pose the formidable problem

exhibited by TBMs, CMs and UAVs until sometime next century. In sum, the air threat to future division forces will be much more stressing because of the advanced technologies embedded in the three systems which give them great diversity and flexibility — factors which complicate defensive measures.

The study concluded that the FAAD concept is valid — there must be a system of systems approach which combines sensors, C<sup>3</sup>I and shooters in such a manner as to defeat the more diversified future threat. To do otherwise would expose the division to potential disaster.

One of the most obvious and troubling insights from the study is that divisional Air Defense Artillery today is Stinger based — and will remain so into the next century. Therefore, Stinger's viability must be sustained through prudent upgrades to ensure we provide vital force protection against the emerging threat. Several DAD Study recommendations address this fact.

This issue of *ADA* magazine focuses on the DAD Study and its implications for future air defense. The future embodied in the DAD Study is an integrated low-altitude air defense system capable of protecting the force during every phase of force projection operations — initial entry, buildup, decisive operations, and reconstitution and redeployment. Please read the articles in this issue, contemplate what they espouse, and provide us feedback.

Your insights coupled with changes brought about by the DAD Study will enable our forward area air defenders to remain prepared to be the . . .

— First to Fire

James J. Cravens, Jr.  
Major General, U.S. Army  
Chief, Air Defense Artillery

*Since the Soviet Union's collapse, the likelihood of facing such a high number of aircraft has declined, but what we've seen from Desert Storm and what we know about equipment being sold on the open market tells us that more sophisticated munitions and targeting systems are making modern aircraft more effective than their Cold War counterparts. Today, even one aircraft can inflict significant damage on a formation. This means even a single aircraft represents a significant threat to a battalion or brigade commander, or even to the main effort of a division, if it is not countered. Therefore, the value to us of destroying a single aircraft or small group of aircraft is actually increased in the post-Cold War era.*

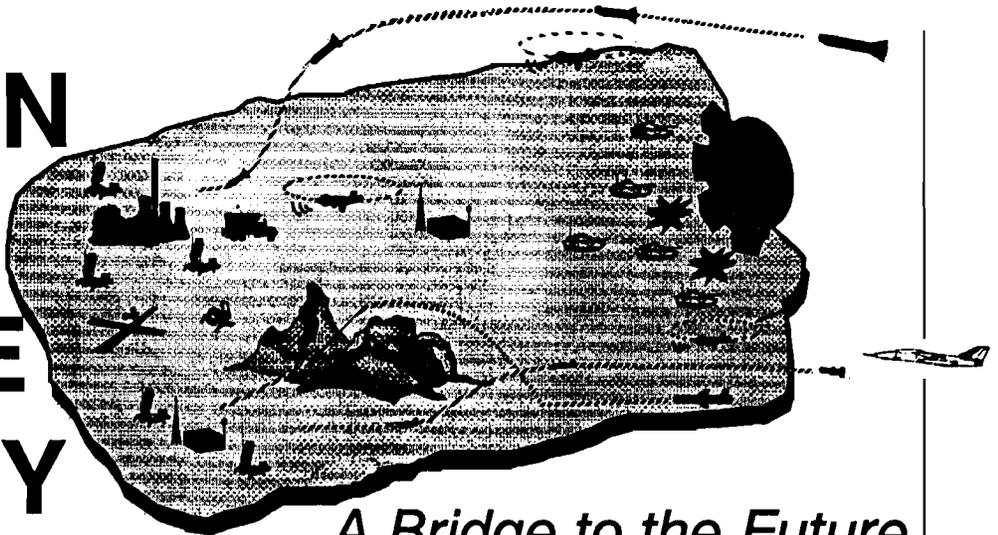
— Maj. Gen. Wesley K. Clark,  
Commanding General,  
1st Cavalry Division

*Regarding my ADA battalion: I wouldn't leave home without it!*  
— Maj. Gen. Richard F. Keller,  
Commanding General,  
3rd Infantry Division (Mech)

*The threat posed to the air assault (armed helicopters, unmanned aerial vehicles and rear threat aircraft) is potentially greater than that of other divisions. This assertion is based on the belief that as we continue to refine our concepts of employment, our adversaries also continue to better understand the fragile nature of the division at critical points in time on the battlefield.*

— Maj. Gen. John E. Miller,  
Commanding General,  
101st Airborne Division (AA)

# DIVISION AIR DEFENSE STUDY



## *A Bridge to the Future*

The recently completed Division Air Defense Study provides air defenders with a strong argument — backed by empirical evidence — that low-altitude ADA battalions are still urgently needed at the division and corps levels, despite the end of the Cold War, to counter an evolving air threat that presents a growing risk to our deployed forces. The study will alter the way air defenders fight on future battlefields and ultimately change the structure of Air Defense Artillery.

This “theme” section of *ADA* magazine focuses on the Division Air Defense Study and its implications. The most important conclusion readers should draw from these articles is that low-altitude air defense units must change doctrinal concepts, training strategies and battlefield tactics if they are to successfully defeat a still lethal and rapidly evolving air threat on 21st century battlefields. Low-altitude air defense units will continue to protect the force from fixed-wing “leakers” and attack helicopters during all phases of force projection operations, but these platforms will not be their primary targets during the early entry and buildup phases. Instead, the “arch enemy” will be reconnaissance, surveillance and target acquisition (RSTA) unmanned aerial vehicles (UAVs). Low-altitude air defense units will focus their main effort during the initial phase of operations on denying the enemy his “eyes” by defeating his RSTA UAVs, thus preserving the element of surprise and preventing the enemy from conducting deep strikes with ballistic and cruise missiles. During decisive operations, the counter RSTA mission will take on a secondary role as low-altitude air defense units shift their focus to protecting the force from the full spectrum of third-dimensional threats on a noncontiguous, high-tempo battlefield.

The articles that follow often read like doctrine, but they are not doctrine. They are designed to offer readers a look down the road Air Defense Artillery is traveling. The Division Air Defense Study does not define the future of Air Defense Artillery, but builds a bridge to the future we will cross with confidence and determination.

— LTC Frank Caravella,  
Chief, Concepts and Studies Division,  
Directorate of Combat Developments,  
U.S. Army Air Defense Artillery School

# INTO THE FUTURE WITH FORWARD AREA AIR DEFENSE

by Maj. Antonio Jenkins

The world political situation changed drastically and suddenly with a velocity that taxed even *CNN's* hyperactive news format. The wall that had separated NATO from Warsaw Pact forces for 40 years suddenly disappeared. New economic principles and political ideas, especially a move toward democracy in the Soviet Union, caused mass confusion and uncertainty. A *coup d'etat* in the fall of 1992 gave birth to independent commonwealths, new governments and new leaders. The Soviet Union was no longer considered the enemy or the threat that we planned and trained to fight against. The Cold War had come to an end.

Military planners gazed out upon a startlingly unfamiliar strategic landscape and wondered: if the Soviet Union is no longer the enemy, then who is? If the battlefield is no longer in central Europe, then where will it be?

In August 1990, Iraq became the enemy and the battlefield was in Southwest Asia. Military leaders suddenly concluded that we must now be prepared to fight anywhere in the world against a variety of potential adversaries.

As a result of these changes, the United States modified its national military strategy and the Army revised its warfighting doctrine. The modified strategy advocates power projection as a fundamental principle of the strategy that is founded upon deterrence and the capability to project power to safeguard U.S. national security interests and objectives. FM 100-5, *Operations*, provides doctrine for a force projection Army that can rapidly build and sustain substantial combat power in remote regions of the world.

## The Division Air Defense (DAD) Study

Based on world changes, the effects of those changes and lessons learned, the air defense community wrestled with the thought, "Is the forward area air defense (FAAD) system still valid, and can it meet the challenges of the future battlefield?" The DAD Study was initiated to evaluate these issues. Begun in December 1992, the DAD Study was sponsored by the U.S. Army Air Defense Artillery School, with the school's commandant as the approving authority. The school's Directorate of Combat Developments (DCD) served as the study agency; its deputy director, Henry Tarkowski, served as the study director; and personnel from various sections in the directorate comprised the study team. Other school participants were the Combined Arms and Tactics Department, the Directorate of Training Developments (now the Directorate of Training Management) and the FAAD Training and Doctrine Command system manager. The purpose of the study was to revisit the original FAAD concept and determine divisional air defense requirements for the post-Cold War force projection Army.

The following issues were established to focus the study team in accomplishing this mission:

- What is the potential air threat to the division area?
- What is the concept for division air defense in the post-Cold War era?
- What is the most cost-effective way to ensure division air defense sufficiency or overmatch capability against any potential adversary?

## The Air Threat

To help them determine the potential air threat to the division, the study team used the 1993 Air Capabilities Study conducted by the Combined Arms Center's Threat Department. This study focused on the air capabilities of various countries throughout different regions worldwide.

The study found that the air threat to U.S. forces had changed significantly as we moved from the Cold War into the post-Cold War era. Prior to the demise of the Soviet Union and the Warsaw Pact, the primary threat for U.S. forces was projected to be a major conflict in Europe. The air threat for such a conflict was characterized as a mass raid of fixed-wing aircraft coordinated with short-range ballistic missile attacks. During the theater air operation, military planners envisioned that the Soviet Union's ground attack forces would receive close air support from attack helicopters and ground attack, fixed-wing aircraft.

Today the United States faces the prospect of involvement in conflicts in any region of the world. Many of our potential adversaries are taking advantage of the post-Cold War proliferation of military technologies to aggressively pursue not only advanced military systems, but also the enhanced technologies and production facilities needed to produce such systems. The stateside-based "regional focused" Army of the 1990s and beyond must be prepared to counter highly sophisticated weapon capabilities that will be available to potential enemies during the remainder of the 20th century and the first decade of the 21st century.

The illustration on the following page depicts the spectrum of air threat that U.S. armed forces can expect to encounter in various contingencies worldwide. The magnitude of the threat by type and relative numbers of one type vs. another varies significantly from one potential contingency to another. This illustration also indicates the relative portion of the air threat falling within the purview of the low-altitude regime.

## Other Influencing Factors

The air threat was not the only thing that had changed; the FAAD system, as we once knew it, had changed also. Due to costs and budgetary constraints, two programs — NLOS, the

FAAD non-line-of-sight component, and the Air Defense/Anti-Tank System (ADATS), the FAAD line-of-sight forward (heavy) component — had been canceled, although the requirements for their capabilities still existed. The Bradley Stinger Fighting Vehicle (BSFV) had been proposed as an interim system to bridge the gap between the Vulcan's removal and its subsequent replacement by ADATS. Soon after the cancellation of the ADATS, branch leaders proposed and Army leaders directed that the interim BSFV fulfill the line-of-sight forward (heavy) role of the FAAD system.

This resulted in the FAAD system becoming a Stinger-based force consisting of BSFV, Avenger, Stinger manportable air defense (MANPAD) teams and Air-to-Air Stinger (depicted on the facing page).

The chairman of the Joint Chiefs of Staff had also directed a "roles and missions" review to determine the appropriate responsibilities for each of the services in the post-Cold War era. This review determined that the U.S. Air Force had the primary responsibility, and would be relied upon extensively, to defeat whatever fixed-wing threat may exist in any given theater of operations. However, the review also pointed out that the Air Force's contribution in countering the low- to very low-altitude air threats (cruise missiles, UAVs and helicopters) is limited by both its doctrine and capability.

Recognizing shrinking defense budgets as a reality, the DAD Study included the requirement to minimize new starts and focus on upgrading current systems to counter the changing threat and battlefield dynamics.

### The Assessment Process

With all the appropriate ingredients in hand, the study team began the assessment process to determine the FAAD system's capabilities against the new air threat and the force structure that would be needed to accomplish the mission. The process was based on four separate, but related, analyses and demonstrations: a one-on-one analysis, a series of helicopter engagement dynamics demonstrations, a force-on-force analysis and a force structure requirements analysis.

*One-on-One Analysis.* The one-on-one analysis identified capabilities and technical limitations of the FAAD systems vs. the air threat. The analysis showed that the current BSFV configuration has significant disadvantages against the air threat, but with minimal improvements (integrating a missile launcher onto the vehicle, cueing with the command, control, communications and intelligence [C<sup>3</sup>I] system and using the Bradley integrated sight unit) the BSFV could handle the helicopter threat through 1999. Further improvements (better optics and a second generation forward-looking infrared),

## AIR THREATS LOW-ALTITUDE AIR DEFENSE MUST COUNTER (1994-2010+)



### FIXED-WING AIRCRAFT

#### TYPE

- MULTI-ROLE JET AIRCRAFT
- PROPELLER DRIVEN AIRCRAFT

#### EMPLOYMENT

- ANY LUCRATIVE TARGET PRIOR TO U.S. ARRIVAL
- CRITICAL ASSETS PRIOR TO U.S. AIR SUPERIORITY
- SPORADIC, HIGH RISK ATTACKS AT CRITICAL POINTS IN THE CONFLICT



### UNMANNED AERIAL VEHICLES

#### TYPE

- REMOTELY PILOTED VEHICLES
- DRONES

#### EMPLOYMENT

- RECONNAISSANCE/SURVEILLANCE
- TARGETING (MINI-RECON STRIKE COMPLEX)
- SUPPRESSION OF ENEMY AIR DEFENSE
- GROUND ATTACK
- DECOY/DECEPTION



### MISSILES

#### TYPE

- SHORT, MEDIUM AND INTERMEDIATE RANGE "BALLISTIC MISSILES"
- CRUISE MISSILES

#### EMPLOYMENT

- CRITICAL ASSETS
- GEOPOLITICAL ASSETS



### HELICOPTERS

#### TYPE

- ARMED UTILITY
- ATTACK

#### EMPLOYMENT

- BLUNT/ATTRIT ATTACKING FORCES
- "DEEP ATTACK"
- AIR ASSAULT

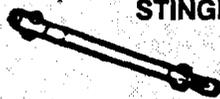
NOTE: SOLID PORTION OF "PIE" INDICATES PERCENTAGE OF THE TYPE THREAT OF PRIMARY CONCERN TO FAAD ACCORDING TO CONCEPT, DOCTRINE AND CAPABILITIES

## THE STINGER FAMILY



**STINGER MANPAD**

TEAM OF TWO  
MOBILITY: BY HMMWV  
VISUALLY ACQUIRES, IDENTIFIES,  
AND TRACKS TARGET  
CLEAR-DAY WEAPON WITH  
IRCM CAPABILITY  
MISSILES: SIX ROUNDS



**STINGER RMP**

IRCM CAPABILITY  
ADVANCED SIGNAL PROCESSING  
AUTOPILOT/DELTA WING  
INTEGRAL EJECT MOTOR  
IMPROVED WARHEAD AND FUZE  
ENHANCED ROCKET MOTOR



**AVENGER**

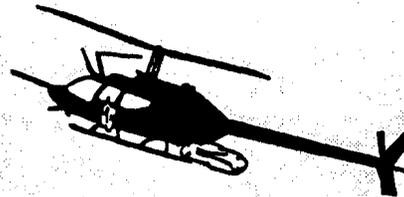
CREW OF TWO  
REMOTE CONTROL OPERATIONS  
SHOOT ON THE MOVE  
DAY AND NIGHT CAPABILITY  
FORWARD-LOOKING INFRARED  
LASER RANGEFINDER  
HMMWV CHASSIS  
AUTOMATIC TARGET TRACKING  
MISSILES: EIGHT ROUNDS



**BSFV**

CREW OF FIVE: STINGER  
TEAM DISMOUNT  
ONBOARD SENSORS: OPTICAL  
SIGHTS, THERMAL IMAGERY  
M-2A2 CHASSIS  
MISSILES: SIX STINGER  
ROUNDS, FIVE TOW ROUNDS  
25MM STABILIZED CANNON  
7.62 COAXIAL MACHINE GUN

**AIR-TO-AIR STINGER**



OH-58C/D  
SELF-DEFENSE CAPABILITY  
MISSILES: FOUR STINGER ROUNDS

along with an improved missile seeker to address helicopters in clutter, would provide a capability (within acceptable risk) against the helicopter threat from 2000 to 2010+. The analysis revealed that Avenger's effectiveness against the fixed-wing threat is sufficient. However, under current doctrine, its performance against helicopters and UAVs is degraded and very sensitive to the tactics employed. With improved tactics, techniques and procedures, the Avenger would be sufficiently capable against the UAV threat through 1999. Improvements to provide direct view optics, a position-navigation device and C<sup>3</sup>I integration will likely be needed to permit Avenger to counter the UAV threat from 2000 to 2010 and beyond.

*Helicopter Engagement Dynamics Demonstrations.* Field demonstrations resolved several issues that arose during the course of the study concerning the Stinger family of weapons' (BSFV, Avenger and MANPAD) ability to attain and maintain lock-on of helicopters against background clutter. A series of demonstrations provided insights into the relative effectiveness of the MANPAD and Avenger capabilities against a realistic helicopter threat attacking a series of mobile and station-

ary targets. Major insights acquired from the demonstrations are as follows:

- MANPAD gunners had no difficulty detecting the Hind helicopter. Aircraft movement and rotor and windscreen glint gave excellent visual cue to the gunners.
- Avenger was able to detect and track a hovering helicopter at six, eight and 10 kilometers. However, identification was not possible because no distinct features were visible.
- Avenger's missile was able to achieve lock-on beyond its kinematic range against a Hokum surrogate helicopter.

*Force-on-Force Analysis.* The analysis based on force-on-force combat modeling quantified the differences in air defense effectiveness between the current BSFV configuration and the BSFV with selected improvements (mounted Stinger launcher, second generation forward-looking infrared and an improved missile seeker). Results and findings paralleled and supported those derived from the one-on-one analysis.

*Force Structure Requirements Analysis.* This analysis was conducted in late July 1993 by a working group tasked to examine the post-Cold War FAAD requirements for a force

projection Army. The group built on the technical insights gained from the one-on-one analysis, focusing on the employment of FAAD weapon systems to counter the low-altitude air threat in each stage of a force projection operation. This effort reiterated the need for greater flexibility and versatility in providing force protection during deployment and subsequent expansion for decisive operations. It highlighted the need for countering low-altitude reconnaissance, surveillance and target acquisition platforms to ensure we retain the element of surprise and deny the enemy deep attack opportu-

nities throughout all stages of operations. It also showed that ground-based sensor information, FAAD C<sup>3</sup>I connectivity and data distribution are essential for success.

The study's answer to the question, "Is the FAAD system still valid, and can it meet the challenges of the future battlefield?" is yes, but we (the air defense community and Army) must update doctrine and tactics, rethink the old FAAD concept and improve air defense weapon systems to conduct the counter-RSTA mission and protect the force from the more capable and lethal air threat on the future battlefield.

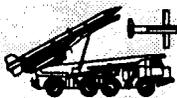
## DAD STUDY KEY CONCLUSIONS

### THREAT HAS CHANGED



EXPAND CAPABILITIES  
PROLIFERATING  
THREAT IN ALL PHASES

PRINCIPLE THREAT IN DECISIVE OPS



MAJOR THREAT TO FORCES AND  
GEOPOLITICAL ASSETS  
GROWING THREAT TO FORCE



NO LONGER MOST SERIOUS THREAT  
TO GROUND FORCES

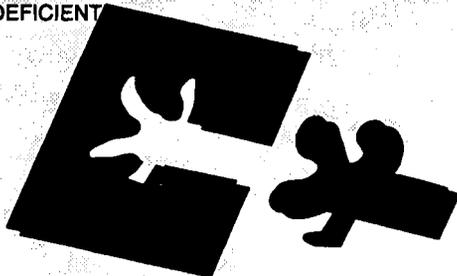
### COUNTER UAV IMPERATIVE



FREEDOM OF ACTION, SURPRISE AT RISK  
MUST COUNTER UAVs BEYOND THEIR EFFECTIVE RANGE

### DOCTRINAL DEFICIENCIES

COUNTER RSTA DOCTRINE  
AND TTP DEFICIENT



### ADA CONCEPT REVISED

THREAT REALITIES  
NEW NATIONAL MILITARY STRATEGY  
NEW ARMY DOCTRINE



HIMAD FOCUS ON TACTICAL MISSILE DEFENSE  
- AIR-BREATHING THREAT DEFENSE SECONDARY

COUNTER UAV MISSION AN IMPERATIVE



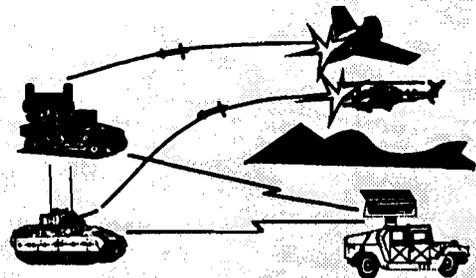
MUST STILL DEFEAT ROTARY WING THREAT

USAF DOMINANT

- ADA FOCUS ON "LEAKERS"



### MUST DEFEAT ROTARY-WING THREAT



MUST COUNTER AT LOW ALTITUDE  
MUST PROVIDE CUEING QUALITY INFORMATION

### "BASECASE" FAAD SYSTEM DEFICIENT

STINGER FAMILY

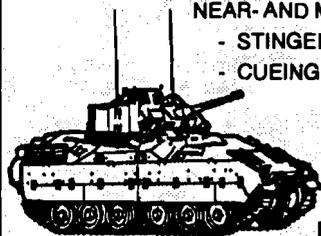
- INADEQUATE AGAINST ROTARY WINGS AT  
LOW ALTITUDE IN CLUTTER

AVENGER COUNTER UAV LIMITED BY ACQUISITION CAPABILITY  
FAAD C<sup>3</sup>I CUEING OF CURRENT BSFV NOT EFFECTIVE

## DAD STUDY KEY RECOMMENDATIONS

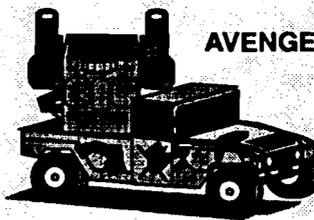
IMPROVE SURVIVABILITY & LETHALITY AGAINST  
NEAR- AND MID-TERM HELICOPTER THREAT

- STINGER LAUNCHER INTEGRATED ONTO VEHICLE
- CUEING TO SYSTEM/GUNNER



BSFV

AVENGER



IMPROVE ACQUISITION CAPABILITY  
EMPLOY WITH FAAD SENSOR IN COUNTER RSTA ROLE



MANPAD

DEVELOP AND FIELD SEEKER IMPROVEMENTS

- ALLOW ENGAGEMENTS IN CLUTTER
- MISSILE KINEMATICS IN BLUE SKY

ENSURE COMMO SUFFICIENCY FOR  
FU CONNECTIVITY



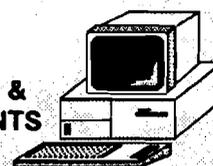
DOCTRINE

REVISE FM 44-100 TO REFLECT

- POST-COLD WAR THREAT
- NEW AIR DEFENSE CONCEPT

DEVELOP ADA DOCTRINE FOR CUAV

ANALYSIS &  
EXPERIMENTS



CONDUCT FURTHER ANALYSIS ON FAR-TERM HELICOPTER/UAV THREAT

- WHAT/WHEN BSFV IMPROVEMENTS NEEDED
- WHAT/WHEN AVENGER IMPROVEMENTS NEEDED

CONDUCT EXPERIMENTS - VARYING CONDITIONS

- QUANTIFY AVENGER - UAV ENGAGEMENT DYNAMICS
- QUANTIFY BSFV - HELICOPTER ENGAGEMENT DYNAMICS

**USE DAD STUDY INSIGHTS FOR FAAD CHANGES**

## THE LOW-ALTITUDE THREAT: THE FACTS

by Maj. Renee Lee

The Division Air Defense Study documents, for the first time, the low-altitude air threat emerging since the end of the Cold War and projects its development into the next century. Since the threat drives doctrine, strategy and tactics, understanding the evolving low-altitude air threat is essential to understanding low-altitude air defense requirements.

Low-altitude threats have existed for years. Under the Soviet concept they targeted strategic sites or, in the case of helicopters, operated strictly along the forward line of troops. But enhancements and new developments are making the forward area vulnerable to the traditional helicopter threat as well as a mix of manned and unmanned low-altitude threats. Each grouping has its own inherent stressing characteristics.

### The Manned Low-Altitude Threat

During Desert Storm, coalition air forces were quite effective in suppressing the Iraqi air force. It has become a fore-

gone conclusion that no other air force in the world can match our Air Force's tactical and technological capabilities. Although the Air Force professed achievement of air supremacy during Desert Storm, we cannot expect them to provide defense or protection from low-altitude platforms operating over division and corps forces. The Air Force is optimized against the fixed-wing aircraft portion of the third-dimension threat. A number of countries still operate fixed-wing aircraft, albeit in fewer numbers, but these are more a response to a desired regional predominance than an attempt to match the might of a U.S. or coalition air force. A statement of fact: the U.S. Air Force has very little capability against the low-flying, slow-moving rotary-wing aircraft.

Rotary-wing aircraft will continue to be a major forward area threat well into the turn of the century. They are, by design, multi-missioned, low-flying and highly sophisticated in their on-board navigation and fire control systems. Their versatility and survivability make them ideal for logistics sup-

ply, air assault and command and control, as well as heavily armed weapons platforms for attack roles. The increasing platform maneuverability exhibited in some later models allows for use of pop-up tactics, greater use of terrain-masking techniques and routine operations in clutter. All these features will combine to make helicopters more difficult to detect, target and kill.

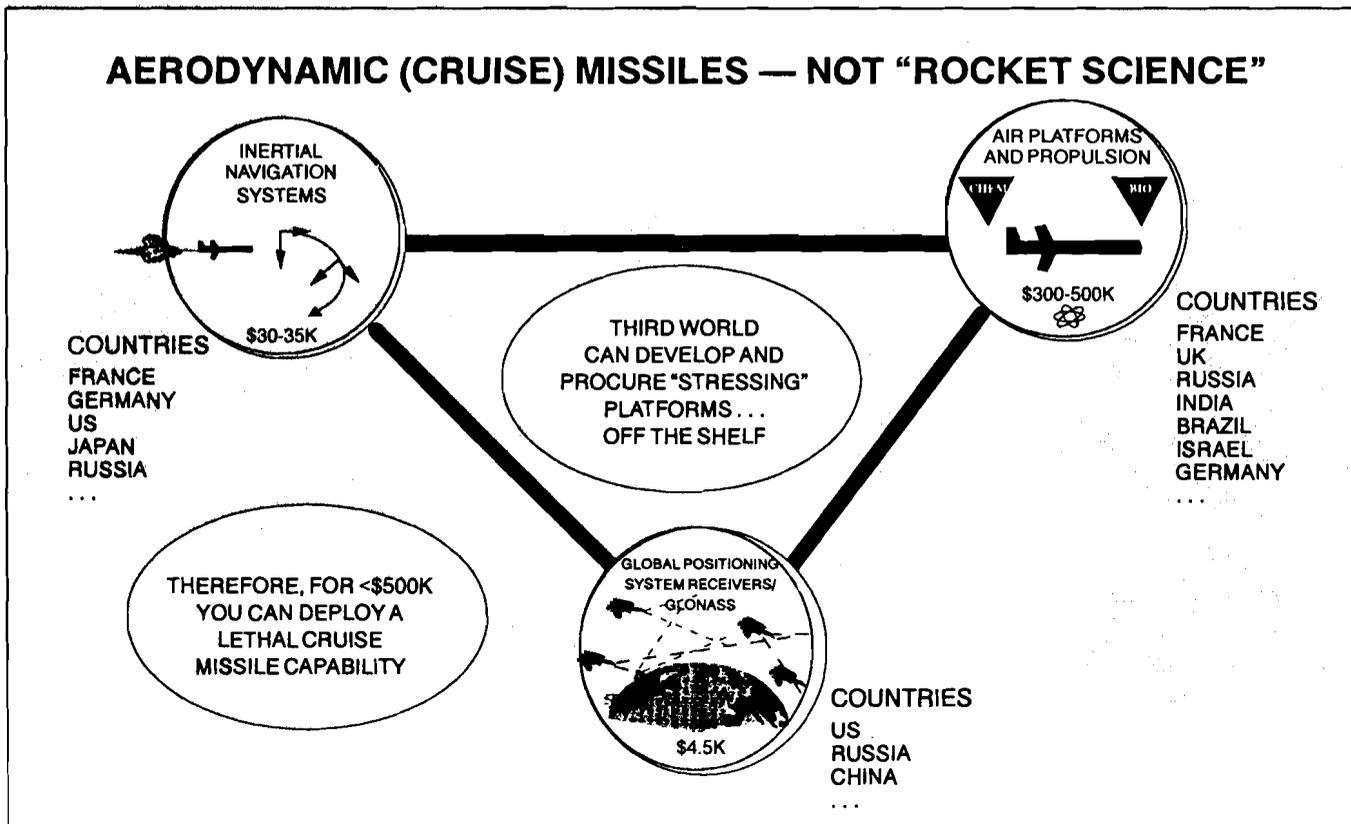
Several countries already possess helicopter inventories. Although major buyers exist, overall helicopter sales have decreased since the Soviet breakup. Economic constraints have clearly limited new platform purchases. Upgrades to existing fleets are the preferred and cost-effective choice. The world arms market is already responding to such demands through several research and development efforts, including navigation and fire control systems upgrades, extended munitions ranges and enhanced countermeasures designed to defeat air defense systems. These improvements will enhance the helicopter's overall lethality. Possibly the most significant improvement is the increased range (from 4000 meters to between eight and 10 kilometers) of helicopter-launched anti-tank guided missiles. If combined with advanced target acquisition means, these missiles pose a significant challenge to our Stinger-based low-altitude air defense systems.

### The Unmanned Low-Altitude Threat

The unmanned threat is characterized by small radar cross sections and limited infrared signatures. Their payloads may

consist of radar seekers, high-explosive warheads, forward-looking infrared, cameras, laser designators, TV, thermal imaging devices, chaff, decoy and electronic attack capabilities. These platforms will assume, at less cost, many of the missions currently performed by manned aircraft. Our ability to accurately detect and target them in a timely manner will affect their potential for success. Armed with these platforms, potential enemies may be more willing to attack heavily defended targets because of the reduced risk of pilot or expensive aircraft loss. Additionally, the use of these systems minimizes the training, logistics and defense requirements that accompany manned aircraft forces.

*Unmanned Aerial Vehicles (UAVs).* UAVs, which include both drones and remotely piloted vehicles, are potentially one of the most devastating air threats that exist today. They are also proliferating at a phenomenal rate due to their versatility and low cost. More than 100 UAV programs are being pursued by at least 20 countries. UAVs are now predominantly used for reconnaissance, surveillance and target acquisition (RSTA), and most now possess a real-time intelligence gathering capability. Real-time RSTA is especially dangerous in that it provides the enemy a direct view of our activities and targeting quality location information. The expected nature of future contingency operations will cause Army forces to concentrate during various phases such as early entry and lodgment. If accurate and timely information on friendly force concentrations was relayed directly to a longer-range



## AERODYNAMIC (CRUISE) MISSILES — NOT “ROCKET SCIENCE”

TYPE/ PRODUCER	RANGE (KM)	GUIDANCE	PROJECTIONS	CARRIER
APACHE/FR	150	INERTIALW/MMW SEEKER	IOC 1995	RAFALE, MIRAGE 2000D
SUPER APACHE/FR	800	IIR	ANTI-RUNWAY IOC 1997	
DWS-24	250	INERTIAL	POSSIBLE CM	VIGGEN, GRIPPEN

attack means (such as tactical ballistic missiles or cruise missiles), the results could be disastrous for early arriving forces.

Other emerging UAV roles include suppression of enemy air defense, ground attack, deception, communications relay, chemical detection and harassment missions. What makes UAVs so stressing is that these operations need not be restricted to single platform use; the ability to link the capabilities of more than one is relatively simple. For instance, a RSTA platform can first locate a target for a second UAV equipped with a high-explosive warhead. The result: precision strike capability. Attack UAVs are capable of destroying armored vehicles, radars and dismounted troops. Uncountered, UAVs' versatility and resultant lethality make them extremely dangerous to our forces in all phases of the battle.

*Cruise Missiles.* Cruise missiles, like UAVs, are evolving at a rapid rate. We consider them the most stressing threat because of the difficulty posed in detecting them at launch and in flight, and in killing them at extended ranges (from 10 to 4,000 kilometers). We must recognize, however, that all cruise missiles are not in the Tomahawk class. The Tomahawk is the state-of-the-art in cruise missiles and has very complex programming requirements.

Actually, most cruise missiles today are of the short-range, anti-ship variety. These systems are unsuited for use against land targets and are not a threat to the maneuver force in the forward area today. Cruise missile development generally begins with the anti-ship versions, either in an air- or a surface-launched configuration.

Of growing concern is the trend toward the development of short-range, land-attack cruise missiles capable of targeting maneuver forces, a development aided by current research and development efforts and technological improvements in guidance and navigation systems such as the Global Positioning System.

We must take care not to dismiss this type of cruise missile, as several countries are already developing such systems. France, for example, is developing the Apache, and Sweden is improving its DWS-24 Weapons Dispenser to have a cruise-like capability (see chart at top of page).

It is also possible to build a crude, homemade cruise missile from off-the-shelf components costing as little as \$500,000 with accuracies of 200 meters or less. These components are

now available for sale from a number of countries. Cruise missiles have traditionally been reserved for use against strategic high-value targets; however, with the development of short-range, land-attack systems such as the Apache, the threat will now expand to include front-line forces.

### Proliferation Trends

Worldwide economic recession and military force reductions have transformed the arms bazaar into a buyer's emporium in which arms exporters aggressively compete for new markets. Any buyer able to pay cash can purchase Cold War surplus equipment or state-of-the-art weapons straight off the assembly line. The Russians now advertise the KA-50 Hokum helicopter in a popular U.S. magazine!

Exporters desperate to refuel stagnant economies exercise far less caution in dealing with customers whose belligerence once excluded them from the marketplace. The booming arms market is all the more threatening because the post-Cold War inventory is not restricted to weapons alone, but often includes the technology and industrial base facilities to indigenously produce replications or product-improved systems. The burgeoning arms market endangers world stability by thwarting efforts to control the proliferation of weapon systems and weapon technology.

The proliferation of weapons and technology that air defenders may one day be required to counter provides perfect examples of market excesses. Today, approximately 20 different countries are developing more than 100 UAV system programs that will produce platforms for a variety of battlefield applications. A Belgian firm's five-year analysis predicts that between 1993 and 2005 alone, the worldwide commercial and military UAV market may top \$8 billion as it expands to some 120 countries.

Fourteen countries are producing helicopters, including utility, armed and attack helicopters. Research and development programs ensure that purchasers of UAVs or helicopters will be able to buy modular packages and munitions to upgrade their systems, and may, more often than not, be able to purchase the upgrades from sellers other than the original platform builder. These trends indicate a growth in potential air threats that would elude U.S. and coalition manned aircraft in the future.

Recognizing the post-Cold War forward area low-altitude threat is absolutely essential. While much has been written about the tactical ballistic missile threat since the Gulf War, prudent planners must continue to project future third-dimension threats of all types. Failure to recognize and prop-

erly address any element of the third-dimension threat family may provide America's future adversaries with a preferred attack option that could prove disastrous in the execution of our decisive victory strategy of winning quickly with minimum casualties.

## COUNTER UAV STUDY

by Maj. Eric Mosely

During the Cold War, maneuver commanders worried about swarms of Soviet Frogfoots and Hind-Ds. Today, they worry about reconnaissance, surveillance and target acquisition (RSTA) unmanned aerial vehicles (UAVs). The recently completed Division Air Defense Study revealed that maneuver commanders have sufficient cause for alarm. The RSTA UAV threat is sophisticated and proliferating.

Why are UAVs so threatening? They are threatening because they are versatile, easily procured or manufactured, and inexpensive, and because they can jeopardize the execution of our operations. These small, low-flying platforms consist of composite material that creates naturally stealthy targets. Their relatively small visible silhouettes have low radar cross sections and low infrared signatures, therefore decreasing our ability to acquire, track and engage them. Besides RSTA, UAVs perform a variety of other missions. These include communications relay, suppression of air defense, radar detection, target designation and warhead delivery.

UAVs are quickly becoming an attractive and inexpensive means for nations and developing countries to acquire highly survivable, state-of-the-art air capability. These platforms are quickly becoming the poor man's low-cost air force.

UAVs are proven combat multipliers. Their performance, accuracy, guidance, missions and payloads are limited only by the user's imagination. Threat commanders will use the real-time downlink of its RSTA sensors to accurately target friendly forces with long-range weapons of mass destruction.

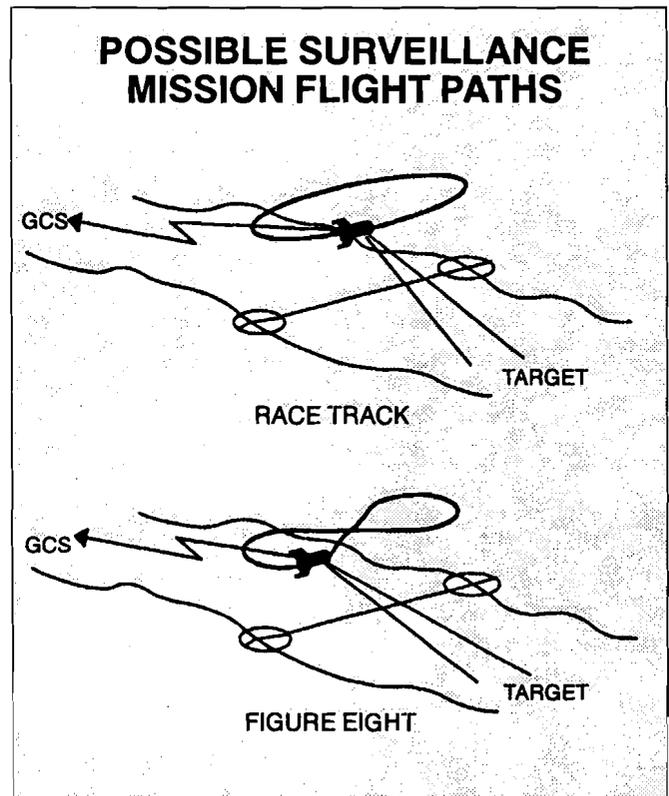
During the early entry phase of a force projection operation, current doctrine anticipates that U.S. forces will primarily encounter threat RSTA UAVs. These UAVs will overfly friendly or potentially hostile areas to collect intelligence information on aerial and sea ports of debarkation as well as assembly, staging and logistical areas. The threat may use the real-time intelligence it collects to target our forces with fixed- and rotary-wing aircraft, cruise and tactical ballistic missiles or lethal (killer) UAVs. Enemy UAV deployments during early entry will locate our massed forces, target them with long-range weapons that will inflict massive casualties, unravel our plans and break our national will to fight.

During the expansion and buildup phases, threat UAVs will continue to play a pivotal intelligence and acquisition role. The threat UAVs may loiter near suspected areas of friendly

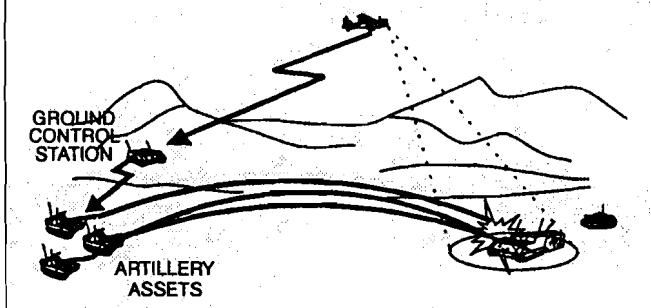
operations and along road networks in search of troops and equipment on the move, supply points, fuel points, staging areas and communications relay sites. When UAVs detect friendly assets, they go into a surveillance mode using a variety of patterns (see illustrations below). Given accurate location data, the threat could then target friendly forces at choke points or assembly areas with cruise missiles, fixed-wing aircraft and lethal UAVs.

In the decisive phase, threat UAVs will gather real-time intelligence, provide target acquisition for indirect fire systems and provide damage and other assessments. Lethal UAVs will disrupt and destroy friendly forces' freedom of maneuver. The illustration at the top of the next page depicts a UAV locating maneuver forces and targeting the forces with indirect fire.

UAVs will enhance the threat's decision process by helping them gain an understanding of our area of operations, deter-



## RSTA UAV MISSION



mine our order of battle and estimate our alternatives while developing their own. Threat commanders will use this precise information to conduct deep attack operations. Low-altitude air defense units must sever the threat's UAV intelligence link and help to win the information war.

An immediate spinoff of the Division Air Defense Study has been the initiation of a Counter UAV Study within the ADA School's Directorate of Combat Developments. The Counter UAV Study focuses on two objectives: determine the level of risk posed by threat UAVs to the force and ascertain the most effective means and procedures to counter that threat. The Counter UAV study team is assessing Air Defense

Artillery's counter UAV capabilities and limitations against enemy UAV missions and capabilities through 1995 and 2005. The team is also exploring the applicability of counter UAV capabilities possessed by other Army combat and combat support branches as well as by our sister services — the Air Force, Navy and Marines. The team's goal is to create an overarching counter UAV concept.

The need for a counter UAV concept is urgent, and low-altitude air defense systems will fill the land combat need. To counter the UAVs, low-altitude air defense systems and sensors must integrate with those of joint and combined forces. The air defense systems must be positioned well forward and outside the maneuver force on screening missions. Low-altitude air defense systems and sensors will provide continuous counter UAV coverage from entry to expansion and through the decisive phase. The magnitude and duration of the counter UAV operations will depend on the amount of risk the commander is willing to accept.

The study's conclusion that the UAV represents a grave threat to our maneuver forces comes as no surprise to maneuver force commanders. In a recent interview (page 22), Maj. Gen. Wesley K. Clark, 1st Cavalry Division commander, declared "we would like to be able to identify them [UAVs] and take them down." Maneuver force commanders are among the branch's most important customers, and we plan to keep the customer satisfied.

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## "FIRE ON RECOGNITION" STUDY

by Maj. Steven Brouse

Col. William Prescott's exhortation of "Don't shoot until you see the whites of their eyes" during the Battle of Bunker Hill in 1775 is an order one would be startled to hear on the future battlefield. Times have changed. Assessing the threat facing our forces has become increasingly difficult. This is particularly true for the battlefield's third dimension. Nowhere is the threat becoming more diversified than in the air.

Battlespace is expanding vertically as well as horizontally. No longer is it feasible to wait until you see the "whites of their eyes." Stand-off capability is no longer associated only with jamming aircraft. Expanding threat aerial capabilities put at risk our ability to execute force projection operations with minimum casualties, particularly the capabilities provided by unmanned aerial vehicles (UAVs). UAVs used in a reconnaissance, surveillance and target acquisition (RSTA) role, coupled with long-range strike means, can inflict tremendous damage to a force projection army. Today's "smart" munitions allow the enemy to stand off kilometers from an intended target, out of sight and range of our air defenses. This creates a dilemma we must address before our next confrontation on the battlefield. This predicament, along with other

findings, was pointed out in the U.S. Army ADA School's recently completed Division Air Defense Study.

Perhaps the highlights of the study were the glaring deficiencies noted in the "basecase" forward area air defense systems, namely the Stinger family of weapons. The deficiencies center around the various constraints imposed upon gunners as they attempt to engage threat aerial platforms at less than the maximum effective ranges of the weapons themselves. These constraints include airspace control measures, visual acquisition limitations of the naked eye and the ever-present fratricide issue. In this era of declining defense budgets that prohibit the procurement and fielding of new low-altitude air defense weapon systems, the ability to fire on recognition is needed more than ever. For these reasons, the Division Air Defense Study cited "fire on recognition" as a potential high payoff procedure to optimize weapon system contributions to force protection. The question remains: Is "fire on recognition" a viable concept?

To begin developing a concept, one must first define the problem and establish a need. Current doctrine requires low-altitude weapon systems to visually identify aerial platforms prior to engagement except in rare circumstances. This re-

striction, while minimizing the possibility of fratricide, degrades ADA weapon system capabilities and reduces weapon effectiveness.

With that problem statement, a valid need or requirement has been established. But how do we define "fire on recognition?" In its simplest form, fire on recognition is the ability of the gunner to engage an aerial target upon recognition rather than waiting for positive identification that the target is hostile. This sounds simple enough, but the issue is not as simple as it appears. To air defenders, there is substantially more meaning to such a definition.

An air defender's definition may go something like this: "Fire on recognition consists of the policies and procedures that allow fire units to immediately engage selected targets upon recognition that the target is correctly classified and meets hostile criteria." Given that definition and the present shortcomings noted in our low-altitude air defense weapon systems to counter the emerging aerial threat, a study to rectify the problem is certainly needed. Since past research on this

topic is practically non-existent, any study must begin with very limited background information.

Over the next several months, the Concepts Branch of the ADA School's Directorate of Combat Developments will study fire on recognition. The study will determine if fire on recognition is a viable concept, especially against UAVs. The cost of accidentally shooting down a friendly UAV is certainly more acceptable than mistakenly shooting down a manned aerial platform. In addition, ongoing improvements to the command, control and intelligence architecture will provide for more timely location data on friendly aerial platforms.

Whether or not the implementation of such a concept will require doctrinal changes or equipment modifications has yet to be determined. We anticipate that the study's recommendations will have far-reaching changes. A future article will elaborate on the results of this important undertaking. Will Air Defense Artillery get past Prescott's "whites of their eyes" syndrome? This study intends to provide the answer to that question.

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## A NEW APPROACH TO LOW-ALTITUDE AIR DEFENSE

by Capt. Eileen Williams

The Division Air Defense (DAD) Study has given Air Defense Artillery its post-Cold War marching orders: develop a new approach to low-altitude air defense to replace the Cold War's forward area air defense concept. This article describes how an integrated low-altitude air defense tailored to today's threat environment will make essential contributions to the Army's goal of decisive victory with minimum casualties.

In response to the significant changes around the globe, including dramatic changes in the nature of the threats likely to be encountered, the United States modified its national military strategy to espouse power projection — the ability of the nation to apply selected instruments of its national power to respond to crises, to contribute to deterrence and to enhance regional stability — as a fundamental principle. It recognizes the stateside-based nature of our forces. This new focus requires the Army to be deployable, lethal and versatile. In response to the significant changes in the strategic environment and the new national military strategy, the Army revised its warfighting doctrine.

The Army's implementation of the national military strategy is articulated in the new FM 100-5. Under this new doctrine, Army commanders at all echelons seek to overwhelm the enemy and achieve land force dominance. The Army contributes as part of a joint team through force projection. Force projection is the ability to rapidly alert, mobilize and deploy to achieve quick, decisive victory with minimum casualties. Force projection operations follow a general sequence, although the stages often overlap in space and time.

The stages include mobilization (if necessary), predeployment activities, deployment, entry operations (which include expansion and buildup), decisive operations, post-conflict operations, redeployment and demobilization.

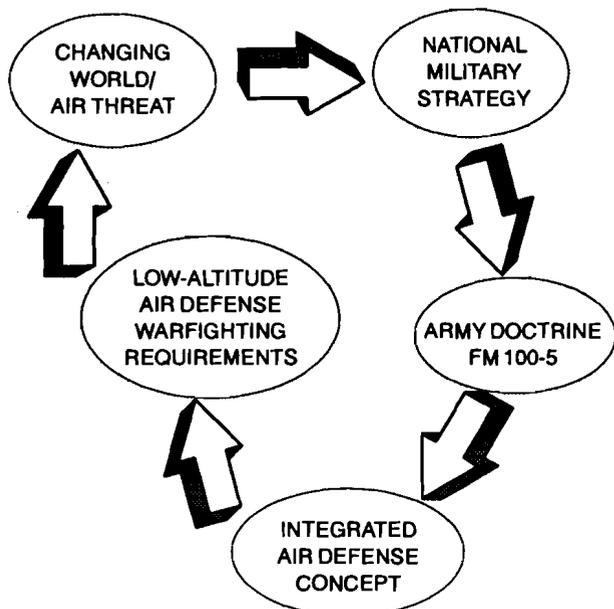
Army doctrinal changes have prompted a revision of the integrated air defense concept; subsequently, Air Defense Artillery has redefined its role and developed a new approach to low-altitude air defense in the post-Cold War environment. The evolution of the new approach to low-altitude air defense is graphically depicted in the illustration at right (top).

### Integrated Air Defense Concept

The implementation of the new Army doctrine necessitated a reexamination and modification of the air defense concept for how Air Defense Artillery fights. During the Cold War, the principal aerial threat to U.S. forces consisted of fixed- and rotary-wing aircraft. Our strategy was to avoid defeat through sufficient redundancy in ground- and air-based defenses. Separate fighter and missile engagement zones were established to bring about the attrition of attacking aircraft and to protect U.S. forces.

To counter the spectrum of aerial threats, current initiatives are built on the realization that synergy must be the overall goal of the services' air and missile defense efforts. Today, the necessary doctrine, joint training and institutionalized relationships exist among the services to ensure unity of effort. As such, air- and ground-based air defenses can avoid duplication. The threat's nature also helps to avoid such redundancy. Air threats confronting the joint force today are divided into

## NEW WARFIGHTING ENVIRONMENT



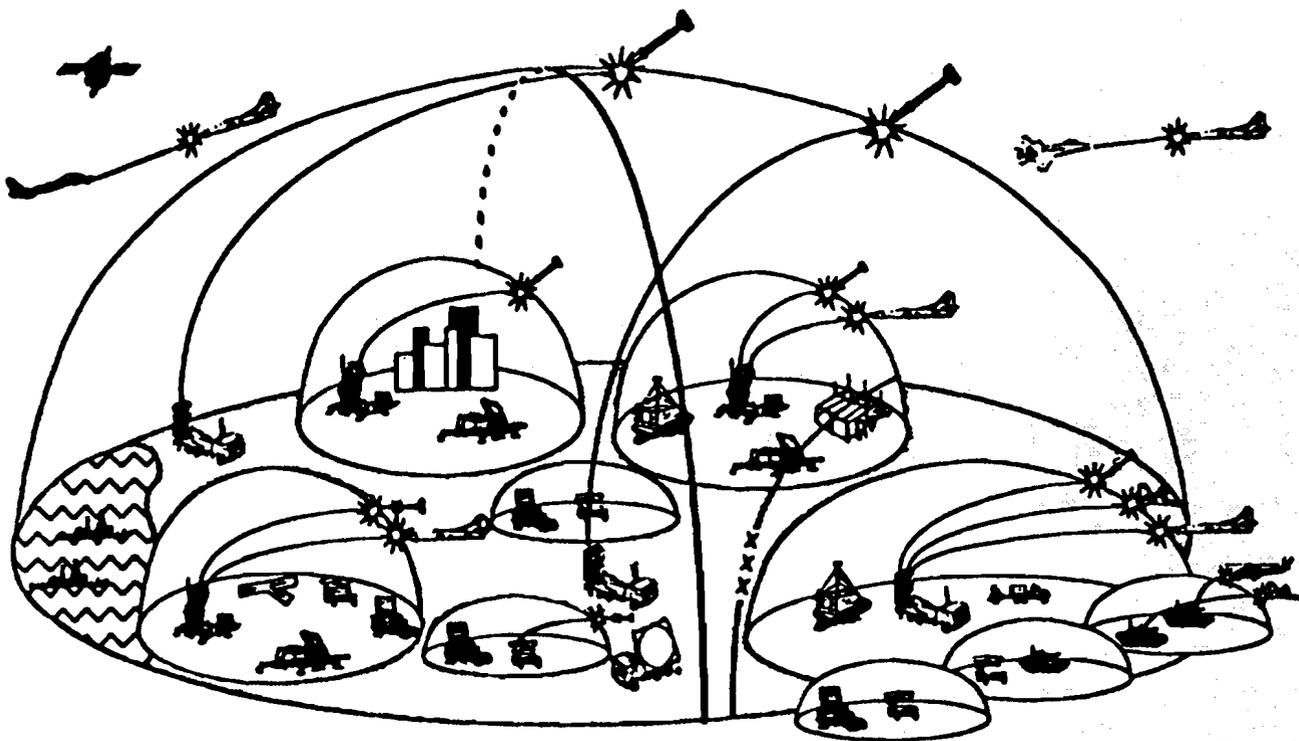
those best addressed by manned aircraft and those best countered by ground-based systems.

During the post-Cold War era, ground-based systems can expect to counter ballistic and cruise missiles, unmanned aerial vehicles (UAVs), rotary-wing aircraft and fixed-wing leakers that escape destruction by U.S. Air Force, Navy and Marine fighters. The challenge for manned aircraft to counter these types of targets is two-fold: physics and doctrine.

Manned aircraft are inappropriate platforms to counter tactical ballistic missiles in the terminal phase due to detection difficulties and inadequate kill potential. Cruise missiles, particularly low-altitude missiles, are more difficult to detect and kill from above due to the clutter of the earth background when viewed from an aircraft. UAVs and rotary-wing threats operate at altitudes and locations where air-to-air combat is doctrinally avoided. These threat platforms are more readily countered by ground-based systems such as the Theater High-Altitude Area Defense system, Patriot, Hawk and low-altitude air defense weapons than by manned aircraft.

The integrated air defense concept (below) requires a complementary mix of air and missile defenses to provide the synergy necessary to counter today's range of aerial threat

## INTEGRATED AIR DEFENSE CONCEPT



**PROVIDES HIGH LEVEL OF FORCE AND ASSET PROTECTION**

platforms and technologies. The concept also requires ADA forces to be present throughout the battlefield, theater of operations and theater of war while simultaneously maintaining strategic protection of the United States. Once force projection operations begin, ADA forces will provide requisite force protection in synergy with other joint and combined air defense elements, from entry through decisive operations to redeployment. The ADA mission has been expanded to employ ground-based air and missile defenses to protect the force and designated geopolitical assets from aerial attack, missile attack and surveillance. Inherent in this mission is ensuring that the ground commander can dominate battlespace to achieve decisive victory with minimum casualties. Air Defense Artillery, in its expanded role, contributes by providing the force with protection from enemy aerial attack and helps win the information war by thwarting the enemy's attempts to "see" the battlefield, thereby preserving operations security and ensuring we retain the element of surprise.

Effective, timely distribution and use of command, control, communications and intelligence (C<sup>3</sup>I) information with existing and planned employment of friendly ground-based systems is critical to ADA weapon system performance. Interoperability and connectivity are imperative for success on the battlefield. They allow the Army to fight as part of a joint team. C<sup>3</sup>I interoperability and connectivity will ensure horizontal and vertical integration and provide the Army warfighter with greater protection, allowing him more freedom to fight in his battlespace.

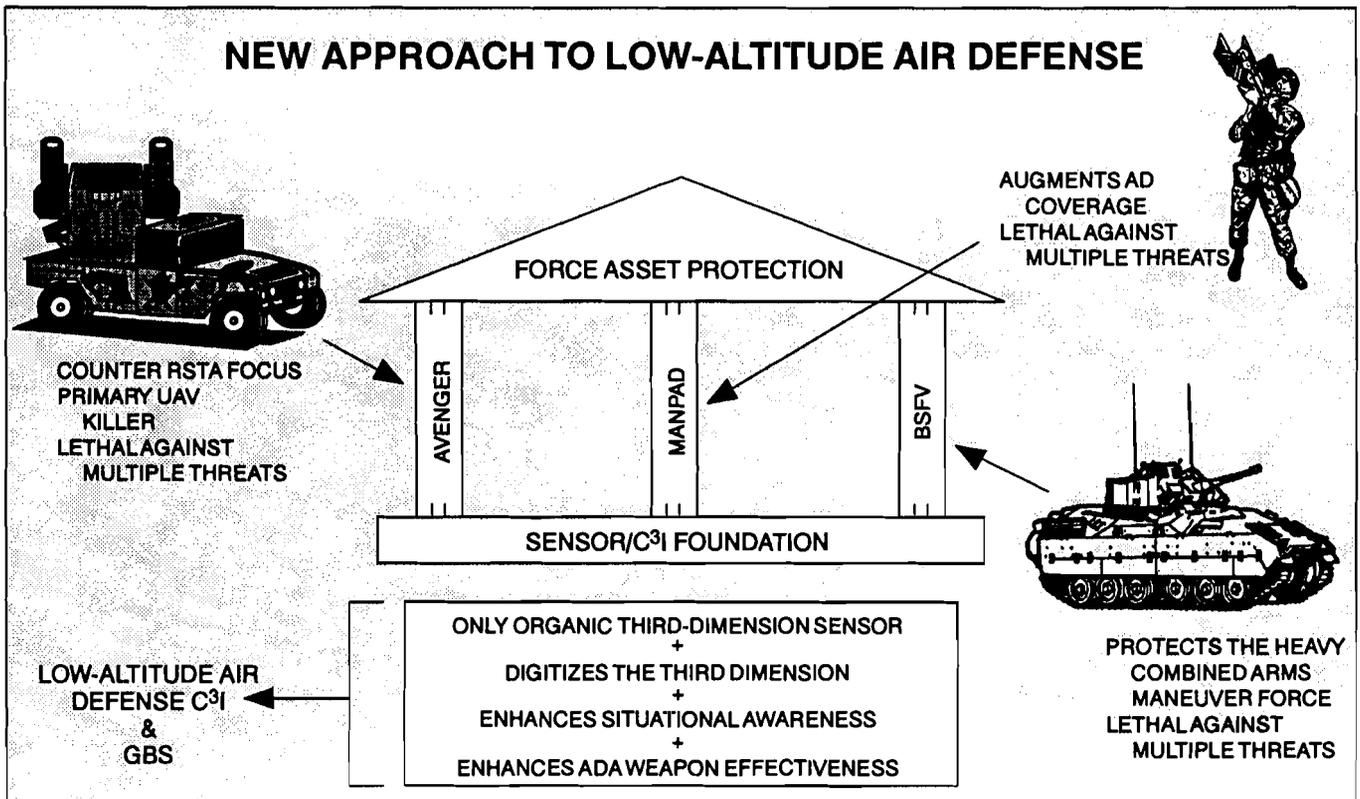
### Low-Altitude Air Defense

Low-altitude air defense plays a major role in the execution of the integrated air defense concept. The figure below depicts the relationship among the three pillars of the low-altitude air defense approach.

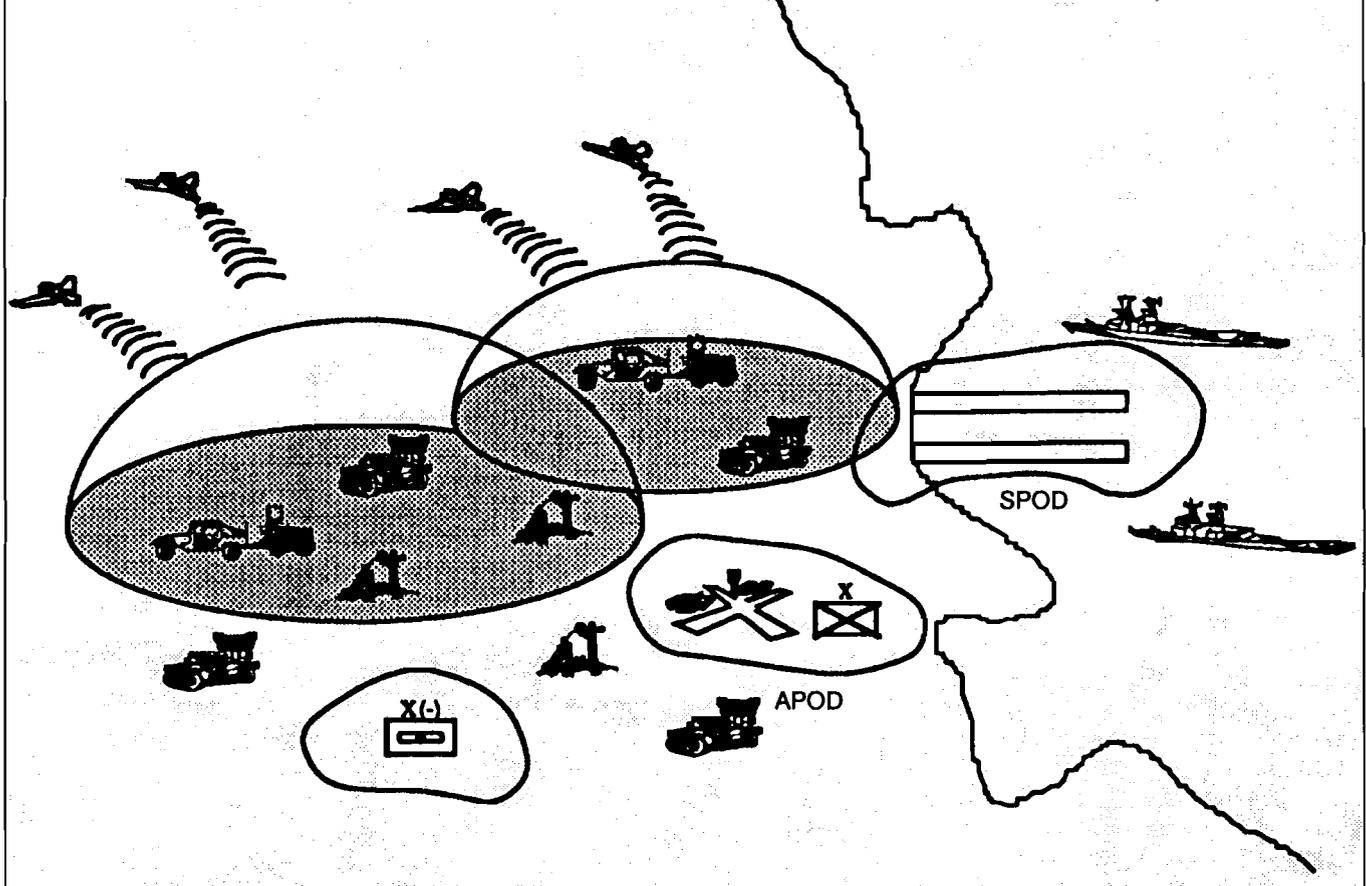
The approach's focus goes beyond the Cold War mission of air defense against threat rotary- and fixed-wing aircraft in the forward area of the battlefield and air defense against fixed-wing aircraft attacking critical assets in the rear area. Today, low-altitude air defense executes counter-reconnaissance, surveillance and target acquisition (RSTA) missions and protects the force as it executes force projection operations on what is expected to be an extended, non-contiguous battlefield. Low-altitude air defense specifically addresses detecting and killing UAVs and rotary-wing aircraft. These systems also contribute to the destruction of low-altitude cruise missiles and engage fixed-wing leakers as required.

Low-altitude air defense weapon systems include the Avenger, Bradley Stinger Fighting Vehicle (BSFV) and Stinger Manportable Air Defense (MANPAD) system. These systems are integrated by a low-altitude air defense C<sup>3</sup>I system composed of a suite of subsystems, including the ground-based sensor (GBS). The GBS is a critical element of low-altitude air defense C<sup>3</sup>I; it detects, tracks and provides identification information on air tracks. The GBS is the "eyes" of low-altitude air defense.

The low-altitude air defense C<sup>3</sup>I system integrates data from a multitude of organic and external sensor platforms to



## LOW-ALTITUDE AIR DEFENSE (ENTRY OPERATIONS)



provide responsive, near real-time track location data, or cueing, to air defense weapons. The C<sup>3</sup>I architecture also completes the three-dimensional battlefield picture for maneuver commanders by providing real-time data on activities above the battlefield.

To better understand the roles and warfighting requirements of low-altitude air defense, one must understand the potential low-altitude aerial threat to force projection operations. Low-altitude aerial threats are more diverse, increasingly sophisticated and of growing concern to U.S. force commanders who strive for decisive victory with minimal casualties. The following section describes the roles low-altitude air defense plays in countering these aerial threats during force projection operations.

### Force Projection Operations Role

The overall focus for low-altitude air defense is to protect the force from low-altitude aerial threats in entry operations through post-conflict activities (including redeployment and reconstitution). Low-altitude air defense denies enemy intelligence gathering efforts (counter-RSTA), reduces the enemy's aerial combat power (allowing the force freedom of maneuver) and protects the force's critical assets.

Each low-altitude air defense system plays a specific role in the above-mentioned stages. The Avenger focuses on countering enemy RSTA efforts and providing force protection to maneuver elements and designated critical assets. The BSFV provides freedom of maneuver to heavy forces, thereby providing the ground force commander with the opportunity to seize the initiative and achieve rapid, decisive victory. Stinger MANPAD teams are essential for light and special forces and enhance force protection for heavy forces. They provide the flexibility and versatility needed on a fluid battlefield by augmenting the coverage of other low-altitude air defense systems. Low-altitude air defense C<sup>3</sup>I allows for a more effective air defense synchronization by providing detection and tracking data, early warning and situational awareness while reducing the potential for fratricide.

*Entry Operations.* A typical joint force scenario begins with forces deploying from stateside and other locations via air or sea lift ports of debarkation contained within or near the area or areas of operation. Upon debarkation, the forces are marshaled into staging areas to prepare for future operations or further movements. Deploying forces are most vulnerable, and the success of the contingency operation at greatest risk, during initial entry. Air and sea ports of debarkation, as well

as staging areas, will be lucrative targets for threat air. Throughout this stage, enemy UAVs conducting RSTA missions can reveal details about arriving forces and provide targeting information to long-range attack systems.

The early deployment of low-altitude air defense assets is crucial to the success of entry operations. During this stage, the low-altitude air defense mission focuses on denying enemy RSTA efforts. Avenger and GBS are the systems of choice to conduct counter-RSTA operations and should be deployed with the earliest airlifts to ensure composite defense against the threat spectrum. The Avenger provides firepower and mobility while the GBS furnishes requisite early warning of threat aerial platforms. Early entry low-altitude air defense elements must integrate their weapon and sensor coverages with those of the joint or combined air defense assets.

To deny the enemy their "eyes," Avenger and GBS must be positioned forward of, or out from, the defended asset (air and sea ports of debarkation, staging areas, etc.) and focused in the expected direction of approach of threat RSTA platforms.

In this stage, low-altitude air defense systems must provide contiguous, and perhaps overlapping, coverage of protected assets depending on the factors of air intelligence preparation of the battlefield; mission, enemy, terrain, troops and time available; and asset criticality. Positioning based on an in-depth intelligence preparation of the battlefield will provide defense against UAVs and other potential low-altitude, low radar cross section threats.

*Expansion and Buildup.* Expansion operations set the conditions for victory. Buildup in combat power and supporting forces and equipment occurs during this phase of entry

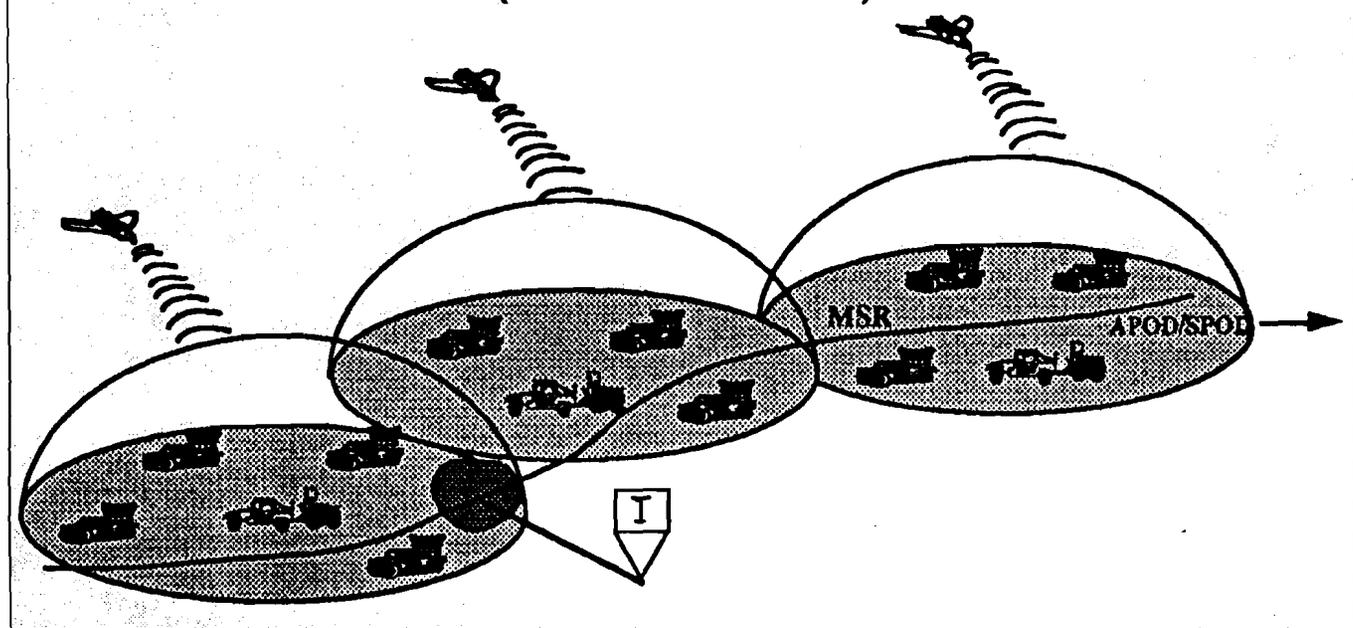
operations. Expansion of the force and rapid buildup may include establishing forward operating and logistics bases, expanding the lodgment, closing the remainder of the force, linking up with other forces and preparing for future operations. During this phase, units road march or maneuver to tactical assembly areas. These movements can be quite extensive — up to several hundred kilometers. Within the assembly areas, units are equipped, rehearsed and prepared to initiate decisive operations.

The threat will focus on locating unit movements, determining unit sizes and strengths and postulating ultimate destinations. The primary low-altitude threat platform during this stage is the RSTA UAV, which relays information to an enemy who will use any attack means necessary to inflict maximum casualties, inhibit momentum and destroy capabilities. These attack means may include lethal UAVs, cruise missiles and rotary- and fixed-wing aircraft. Unless low-altitude air defense systems counter threat RSTA efforts by denying discovery and targeting, the enemy may disrupt the ground force commander's plan by inflicting significant casualties or preempting his actions.

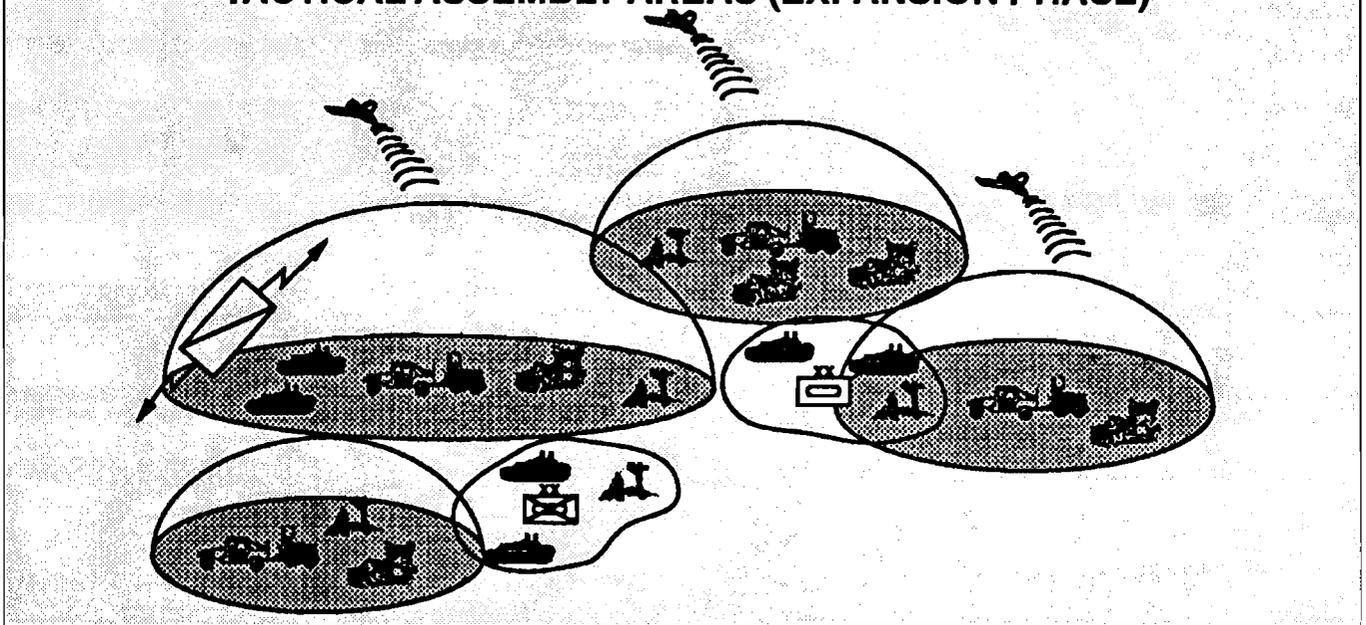
Denial of threat observation of force composition and direction and routes of movement requires that ADA weapons and sensors be pre-positioned along the routes and or positioned with the screening force to allow for tactical flexibility.

Again, Avenger and GBS are the systems of choice. Stinger MANPAD systems and BSFVs may thicken defenses as required. Systems will generally be pre-positioned to ensure that threat reconnaissance platforms cannot observe friendly force movements or assets. Positioning in depth and orienting

## LOW-ALTITUDE AIR DEFENSE DURING ROAD MARCH (EXPANSION PHASE)



## LOW-ALTITUDE AIR DEFENSE PROTECTING TACTICAL ASSEMBLY AREAS (EXPANSION PHASE)



toward primary directions of approach based on a comprehensive aerial intelligence preparation of the battlefield will provide for the early engagement of UAVs regardless of the flight profile they employ. The duration of the counter-RSTA screen, in terms of both time and distance, depends upon the ground commander's plan and willingness (or unwillingness) to accept risk. Just prior to decisive operations, units will position in tactical assembly areas to complete their final preparations before launching the attack.

Avengers screen well forward and to the flanks of the assembly areas, ensuring continued denial of threat reconnaissance efforts. BSFVs position with their supported maneuver units, prepared to execute decisive operations. Stinger MANPAD teams augment air defense coverage. By countering the enemy's RSTA efforts throughout these initial stages, low-altitude air defense ensures that the ground force commander retains the element of surprise and the ability to mass forces at the place and time of his choice.

**Decisive Operations.** During this stage of operations, maneuver forces deploy out of tactical assembly areas and into attack formations that facilitate movement and mass sufficient combat power to ensure decisive victory (see illustration, next page). Distances from tactical assembly areas to close combat areas can be extremely long, with intermediate objectives designated along the routes. Numerous refuel and rearm points may be established along the way. Upon entering the close combat area, friendly forces will attack, using swift and decisive maneuver and firepower.

The threat will attempt to counter the attack with a myriad of aerial weapons. RSTA UAVs will seek to determine friend-

ly unit locations, movements and objectives. The enemy will use the gathered intelligence to generate aerial and artillery strikes against forward ammunition and refuel points, aviation forward operating bases, command and control nodes, reserve troop concentrations, logistical support areas and geographical or manmade features that could constrict unit movements and mass forces. Lethal UAVs will be employed against maneuver forces as they advance toward and close with enemy forces. The lethal UAVs' primary mission is to disrupt the tempo of the offensive by disabling or destroying armored vehicles. Cruise missiles will be targeted against logistical concentrations and command and control nodes. Rotary-wing aircraft will attack the flanks of the advancing maneuver forces to slow their tempo, cause confusion and inflict maximum casualties. These attack and armed helicopters constitute the most widespread and capable air threats to ground forces in the close battle.

During this stage of force projection operations, the primary focus of low-altitude air defense shifts from counter-RSTA to force protection. BSFV platoons will directly support maneuver units, primarily to counter close air support threats such as rotary-wing aircraft and lethal UAVs. Generally, they should remain behind the lead maneuver elements and should be weighted toward the most likely aerial directions of approach. Stinger MANPAD systems augment air defense coverage of maneuver forces and provide flexible force protection to air defense commanders. Avengers will deploy along the flanks of the maneuvering force to defend against rotary-wing aircraft and lethal UAVs and to counter enemy RSTA efforts. GBSs must leap-frog through the area of operations

to ensure continuous, extended coverage and to provide cueing information to low-altitude air defense systems supporting the maneuver units.

At the close of the decisive battle, friendly forces may need to prepare for follow-on operations. They must rearm, refuel and reconstitute personnel and equipment. The maneuver force is extremely vulnerable during these types of activities. They become lucrative targets for enemy long-range strike systems able to detect and target them based on information received from enemy RSTA UAVs. Low-altitude air defense shields the force from enemy reconnaissance and attack, thus ensuring success of future operations.

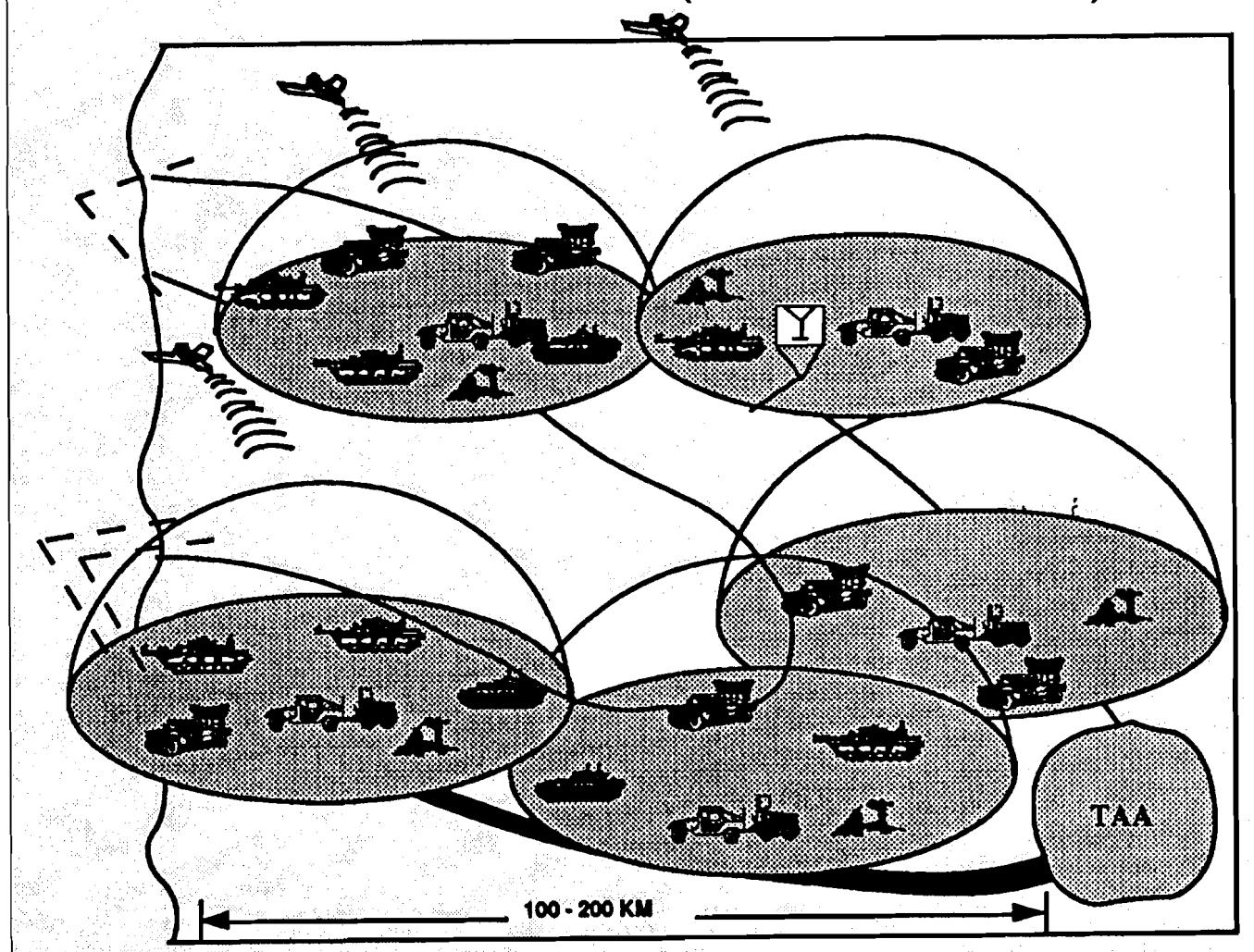
*Post-Conflict Activities.* Friendly forces are marshaled into staging areas to prepare for follow-on operations or redeployment. Forces will either redeploy to another theater of operation or back to the United States. While the most significant aerial attack capabilities may have been eliminated, friendly

forces must be prepared to counter "last ditch" air and missile attacks. Low-altitude air defense will be primarily concerned with countering potential enemy UAV RSTA efforts, thereby providing force security and preventing surprise attacks. These actions allow for unimpeded reconstitution and unharassed redeployment of forces.

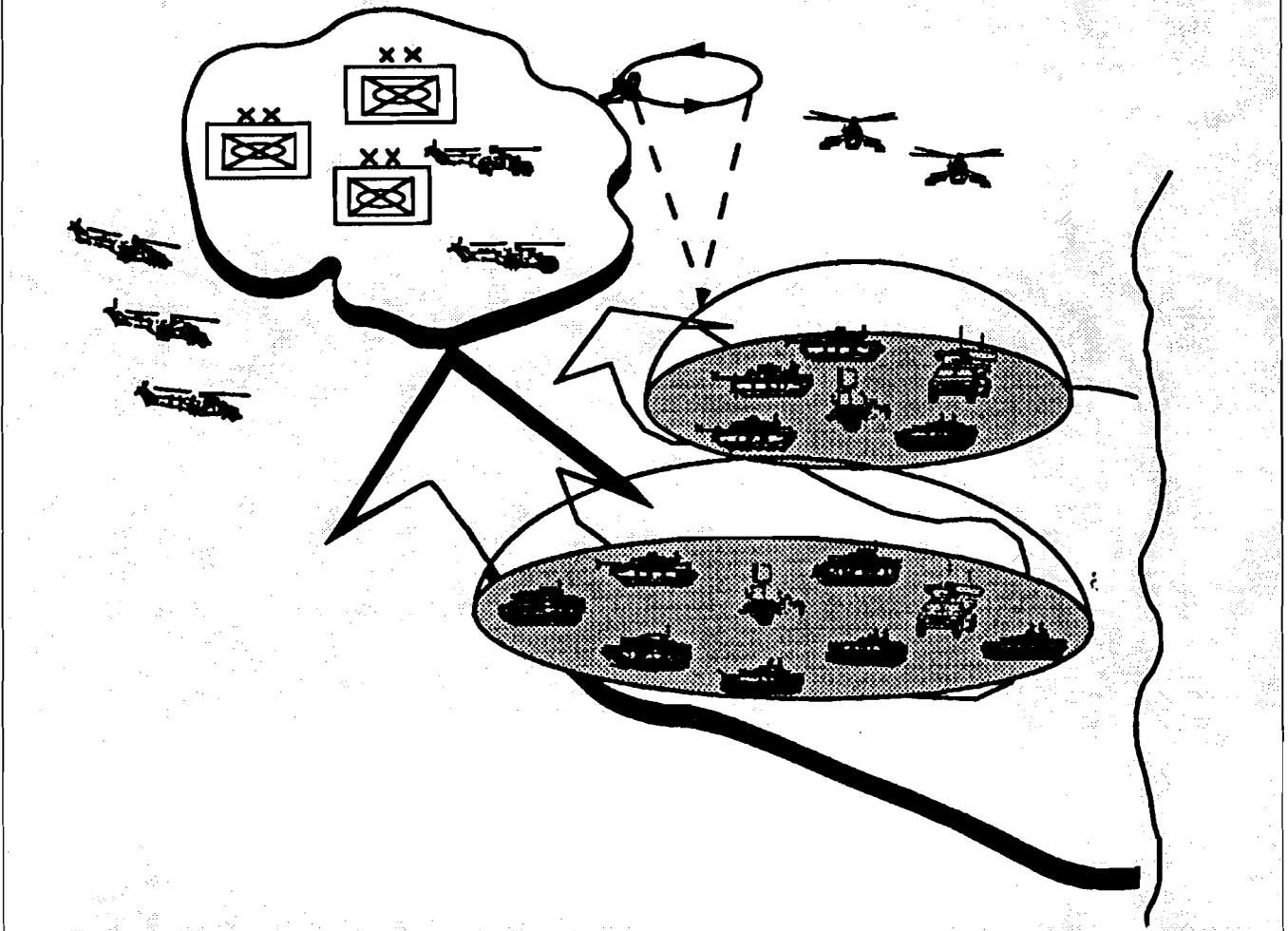
### Conclusion

As the Army enters the 21st century, it can expect a multitude of changes in the low-altitude aerial threat arena. Threat platforms increased from the two dominant airframes of the 1970s — rotary- and fixed-wing aircraft — to five highly capable airframes: UAVs, cruise missiles, tactical ballistic missiles and rotary- and fixed-wing aircraft. Air Defense Artillery, recognizing this shift in threat lethality and diversity, has developed a new approach to low-altitude air defense that addresses the full spectrum of the low-altitude threat and

## LOW-ALTITUDE AIR DEFENSE DEPLOYING FROM TACTICAL ASSEMBLY AREAS (DECISIVE OPERATIONS)



## LOW-ALTITUDE AIR DEFENSE IN THE CLOSE BATTLE (DECISIVE OPERATIONS)



focuses on protecting the force and winning the information war.

Low-altitude air defense offers unique capabilities to the ground commander during force projection operations. Its primary focus in entry operations and the expansion or build-up phase is to deny enemy reconnaissance. Ground forces are most vulnerable to enemy indirect fire means during this stage. Low-altitude air defense assists the force in maintaining a balanced posture, ready to respond to unforeseen events by countering enemy RSTA efforts.

Without low-altitude air defense, enemy UAVs will gather intelligence about our activities in and around air and sea ports of debarkation. The UAVs will probably then forward that information to long-range strike systems, the expected prelude to air and missile strikes against friendly forces, and thereby cause a disruption in the ground force commander's plan. Low-altitude air defense's counter-RSTA efforts enable the ground commander to seize the initiative and mass forces

at the time and place he chooses while retaining the element of surprise.

In decisive operations, the primary focus of low-altitude air defense shifts from counter-RSTA to force protection. Low-altitude air defense still denies the enemy its "eyes" while limiting the enemy's preferred attack options and reducing the probability of additional air or missile strikes. The absence of low-altitude air defense on the battlefield slows the tempo of ground operations and inhibits the commander's ability to achieve a positional advantage in both time and space over his enemy. With low-altitude air defense, the commander can maximize capabilities so that he can seize the initiative and achieve victory with minimum casualties.

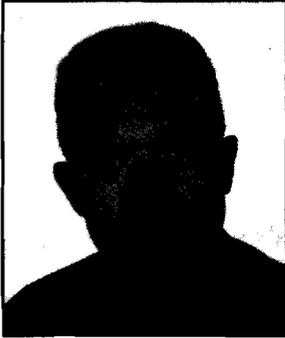
During post-conflict activities, low-altitude air defense concentrates on providing force security and preventing surprise attacks and enemy retaliatory efforts, thus permitting unimpeded reconstitution and aiding unopposed embarkation of forces that are no longer needed.

Air Defense Artillery's presence is crucial to the success of force projection operations. It is an essential member of the combined arms team; it provides the commander with the only capability available to detect and destroy the type of

low-altitude aerial threat that friendly forces can expect to face. Low-altitude air defense will play a critical role on the next battlefield in achieving decisive victory with minimum casualties.

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## ABOUT THE AUTHORS



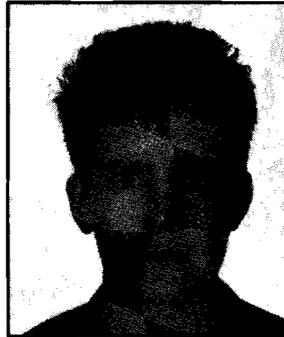
**Maj. Antonio Jenkins**  
*Into the Future with Forward Area Air Defense*

*Jenkins is an analyst in the Concepts and Studies Division's Studies and Analysis Branch, DCD, Fort Bliss, Texas. He holds a B.A. from Trenton State College and a Master of Science from Central Michigan University.*



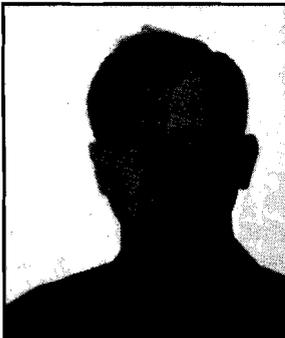
**Maj. Renee Lee**  
*The Low-Altitude Threat: The Facts*

*Lee is the Chief of the Threat Office, DCD. She holds a Bachelor of Science from the University of Mary Hardin Baylor.*



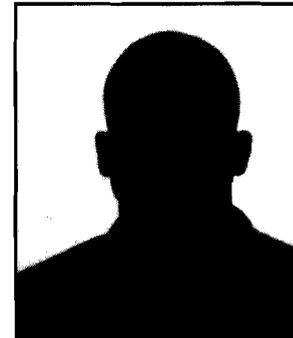
**Capt. Eileen Williams**  
*A New Approach to Low-Altitude Air Defense*

*Williams is a concepts action officer in the Concepts and Studies Division, DCD. She holds a Bachelor of Science from the University of Maryland, a Master of Arts from Webster University and a Master of Science from New Mexico State University).*



**Maj. Steven Brouse**  
*Fire on Recognition Study*

*Brouse is a concepts action officer in the Concepts and Studies Division, DCD. He holds a B.A. from Virginia Military Institute and an M.B.A. from Embry-Riddle Aeronautical University.*



**Maj. Eric Mosely**  
*Counter UAV Study*

*Mosely is the Chief of the Concepts Branch, Concepts and Studies Division, DCD. He holds a Bachelor of Science degree from Texas College.*

# Column Write

## ADA: A Step Ahead in Soldier Care



Can untrained soldiers test fairly against trained soldiers? Probably not. So does Air Defense Artillery expect its untrained soldiers to test competitively on their self-development tests? No.

Unfortunately, ADA leaders created just such a problem when they won an exception to policy to equalize promotion opportunities for our forward area air defense soldiers (see the July-August 1993 issue of *ADA* magazine). With this move, Air Defense Artillery converted MOS 16P, 16R, 16S, 24M and 24N soldiers to the new primary MOSs (14R and 14S) *before* they received school or new equipment training. A Y2 additional skill identifier keeps track of those soldiers who have not yet undergone transition training.

But the conversion ADA leaders fought for created a testing disparity: according to Army policy, involuntarily reclassified ADA soldiers would now test in an MOS without prior training. The next step — the only *logical* step for a branch that has established soldier care as a top priority — was to delay MOS-specific SDT testing until all MOS 14R and 14S soldiers have received conversion training.

Chief of ADA Maj. Gen. James J. Cravens Jr. requested just such an exception to policy

last November. "Effective FY94," Cravens explained, "SDT scores will be a major factor in determining who will be selected for advancement and schooling and also who will be eliminated from the service through QMP [Quality Management Program] channels. It would be unfair to have those soldiers with ASI Y2 who are not school trained compete with the school or NET [new equipment training] trained soldiers since SDT scores play such a major part in these important decisions."

Cravens specifically requested that soldiers with a primary MOS of 14R, 14RY2, 14S and 14SY2 take and be scored only on section one (leadership) and section two (training management) of their SDTs for FYs 94, 95 and 96.

Brig. Gen. Joe N. Frazar III, acting deputy chief of staff for training at U.S. Army Training and Doctrine Command, approved the request to defer the testing for FYs 94 and 95, but not for FY96. FY96, Frazar stated, will be used to field test the SDT, allowing the proponent agency to validate the test questions while also giving the soldiers an opportunity to experience the SDT before testing for record. Neither the chain of command nor personnel managers will receive the results of the FY96 field test.

During FY94 and FY95, MOS 14R and 14S NCOs will take the common core SDT (leadership and training management) according to established Department of the Army policy.

Air Defense Artillery continues to shine as a prime example of true soldier care. Your priorities are our priorities, your quality of life and opportunity for advancement are paramount concerns. Air Defense Artillery — definitely the place to be.

**CSM James E. Walthes**  
Post Command Sergeant Major

*Soldiers are central to Army doctrine. They are the foundation of the Army's will to win. Their spirit, initiative, intelligence, discipline, courage and competence comprise the basic building blocks of a victorious Army. The combination of quality soldiers with professional, caring and competent leaders in versatile, cohesive units presents an indomitable force on the battlefield.*

— FM 100-5, Operations

*We cannot train without planning and we cannot teach without preparation.*

— Gen. George C. Marshall

*Only through high training requirements, rigidly enforced can low casualty rates be possible. Only well armed and equipped, adequately trained and efficiently led forces can expect victory in future combat.*

— Gen. Matthew Ridgway

# PROTECTING THE FORCE



*Air defenders of the 4th Battalion, 5th Air Defense Artillery, are "living the legend" along with the 1st Cavalry Division, a contingency division whose readiness, deployability and tremendous combat power make it a key player in the nation's post-Cold War defense strategy. During the past 18 months, reports Lt. Col. Allen Taylor, 4-5 ADA commander, the battalion has participated in five NTC rotations, three deployments to Kuwait and a Sea Emergency Deployment Readiness Exercise and took part in a division and a corps Battle Command Training Program exercise.*

*"The battalion made the transition from Chaparral to Avenger in 1990 and completed the transition from Vulcan to Bradley Stinger Fighting Vehicle in February," Taylor said. "Last year our battalion had a 100 percent reenlistment rate and led the division in Combined Federal Campaign contributions. The 'Renegades' are at the top in soldier care. It's tough — but also fun — to meet the contingency division challenge. 'Living the Legend' is our reward."*

*The 4-5 ADA Renegades work for Maj. Gen. Wesley K. Clark, a former Rhodes Scholar and former National Training Center commander who, as a division commander, has definite ideas about the role divisional air defense units should play in today's new threat environment. ADA magazine recently visited Fort Hood, Texas, to interview the 1st Cavalry Division commander as part of its "Protecting the Force" series of articles and interviews. Clark came directly to the interview from a Fort Hood firing range where the 4-5 ADA commander had just introduced him, along with Lt. Gen. Horace G. Taylor, the Fort Hood and III Corps commander, to the next-generation Bradley Stinger Fighting Vehicle, a BSFV equipped with a Stinger launch pod.*



Maj. Gen. Wesley K. Clark began his current assignment as Commanding General, 1st Cavalry Division, on July 31, 1992. His recent assignments were as Deputy Chief of Staff for Concepts, Doctrine and Developments, U.S. Army Training and Doctrine Command, Fort Monroe, Va., from October 1991 until July 1992, and as Commander, National Training Center, Fort Irwin, Calif., from October 1989 until September 1991.

Clark's previous command assignments include tours as Commander, Battle Command Training Program, Fort Leavenworth, Kan.; Commander, 3rd Brigade, 4th Infantry Division (Mechanized), Fort Carson, Colo.; Commander, Operations Group, National Training Center, Fort Irwin, Calif.; and Commander, 1st Battalion, 77th Armor, Fort Carson, Colo. He commanded three companies, including a mechanized infantry company in Vietnam. Clark served as staff officer at almost every level, including Battalion and Brigade S-3 in 1st Armored Division in Germany, Assistant Division G-3 in Vietnam and

Assistant Executive Officer to the Supreme Allied Commander, Europe. As a White House Fellow (1975-76), he was Special Assistant to the Director of the Office of Management and Budget in the White House. He also served as Chief of the Army Studies Group in the Office of the Army Chief of Staff in the Pentagon.

Clark was commissioned in Armor from the U.S. Military Academy at West Point in 1966 and then attended Oxford University, England, as a Rhodes Scholar. His military schooling includes the National War College, the Command and General Staff College, the Armored Advanced and Basic Courses, and Ranger and Airborne Schools.

*ADA leaders contend that, far from vanishing since the end of the Cold War, the air threat has grown more diverse and more sophisticated. What is your personal assessment of the air threat in the post-Cold War environment?*

During the Cold War era, we anticipated massive waves of air attacks in the first stages of battle. Our air power was dedicated to a counterair mission to destroy those waves of attacking aircraft, but we could not be confident that, in the first stages, we wouldn't have to deal with dozens, scores, even several hundreds of aircraft attacking our ground forces, so there was a requirement for a dense, high-volume, highly integrated, air and ground battlefield air defense system.

Since the Soviet Union's collapse, the likelihood of facing such a high number of aircraft has declined, but what we've seen from Desert Storm and what we know about equipment being sold on the open market tells us that more sophisticated munitions and targeting systems are making modern aircraft more effective than their Cold War counterparts. Today, even one aircraft can inflict significant damage on a formation. This means even a single aircraft represents a significant threat to a battalion or brigade commander, or even to the main effort of a division, if it is not countered. Therefore, the value to us of destroying a single aircraft or small group of aircraft is actually increased in the post-Cold War era.

Another thing changes the calculus. In the Cold War period, we knew that if we went up against the might of the great

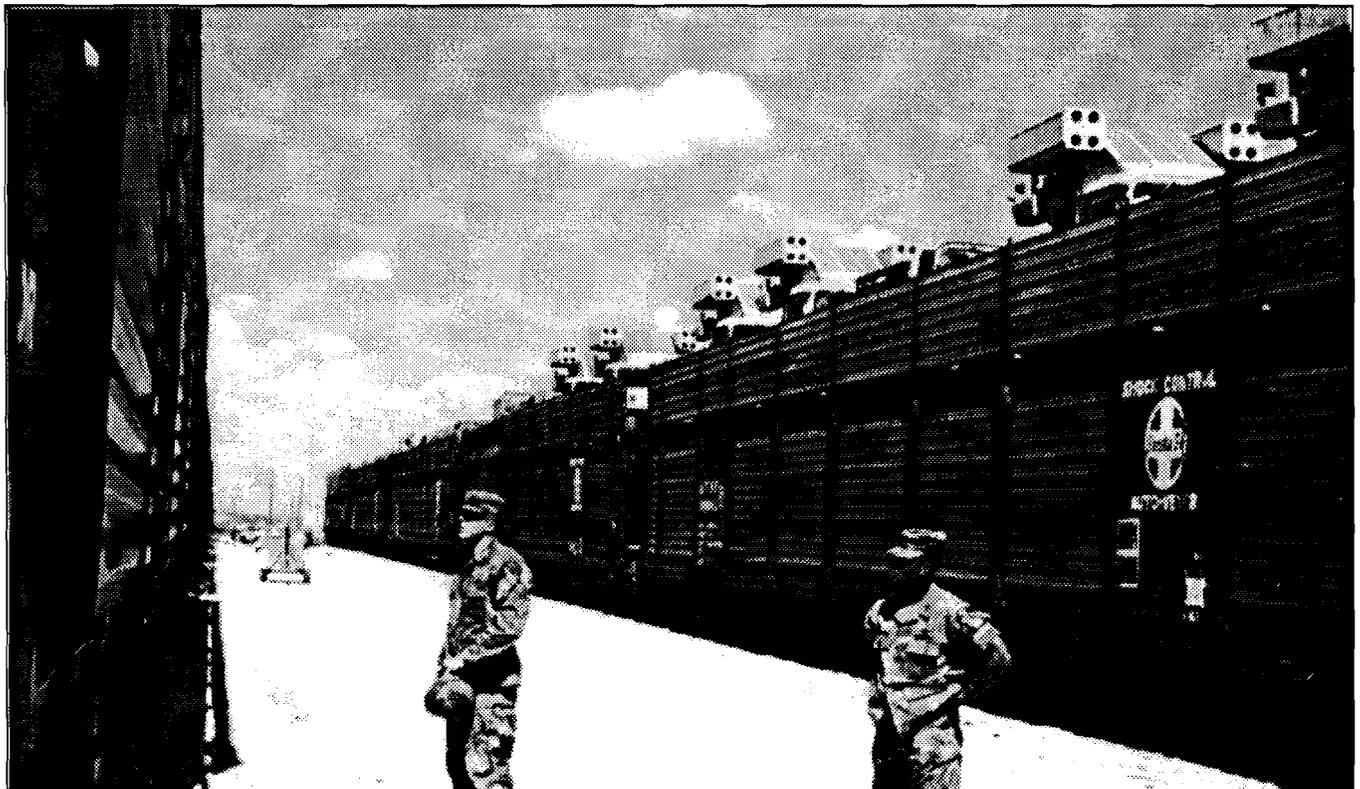
Red Army, we would take tremendous casualties, that it would be a fight upon which the fate of our nation and the West hung in the balance. This is not the case in the post-Cold War world. The success of our military operations in the post-Cold War environment will be measured in inverse proportion to the number of casualties. The significance of even small numbers of casualties, as the recent public reaction to casualties in Somalia demonstrates, has been greatly multiplied. Again, this increases the importance of high-resolution air defense.

*From your viewpoint as 1st Cavalry Division Commander, how do you rate the air threat to the division?*

One has to look at the air threat from two perspectives. There's a threat that one has to consider in terms of the immediate mission of the division — the air threat as it exists today. One also must look ahead and — recognizing that it takes many, many years to introduce weapon systems and develop training programs — project what the threat might be like in the future.

In terms of the immediate threat to the division, there are forces out there with helicopters and high-performance aircraft with which the division could become engaged. And while it would be ideal if we could always rely on the Air Force to take care of the air threat for us, we also know that, in war, there's seldom such a thing as a perfect battle. So we

Being part of a contingency division requires that 4-5 ADA Avengers and other weapon systems continually practice deployment readiness training.





4-5 ADA commander Lt. Col. Allen Taylor displays a Bradley Stinger Fighting Vehicle prototype with the new Stinger module for Maj. Gen. Wesley K. Clark, 1st Cavalry Division commander.

do have to face the possibility of so-called “leakers” coming through. Even more significant air problems may emerge as a consequence of the peculiarities of intervention scenarios, as a consequence of enemy tactical or strategic innovations, or as a consequence of some environmental condition that interferes with the Air Force’s anticipated effectiveness.

So I do believe there is potentially an air threat to the division, and it’s important that we have the capabilities to counter these potential threats. I think the division requires the capabilities of specialized air defense systems and also the ability to bring in the small arms fire or, in the case of hovering helicopters, tank main gun fires to provide an “all arms” defense against aircraft.

*Air Defense Artillery recently revised its mission statement to read: To protect the force and selected geopolitical assets from aerial attack, missile attack and surveillance. How seriously do you regard the tactical ballistic and cruise missiles threat and the surveillance threat?*

I think tactical ballistic and cruise missiles will constitute a threat to fixed installations such as ports, airfields and forces in assembly areas. The post-Cold War proliferation of weapons of mass destruction heightens further the significance of missile delivery systems. Some degree of mobile protection against such a threat is going to become increasingly important.

Unmanned aerial vehicles, or UAVs, also pose a potential threat to the division. Certainly, in our own offensive planning within the division, we are counting very heavily on the use of unmanned aerial vehicles. A number of nations already have such systems in the field. These systems can be used in surveillance and targeting, and we would like to be able to identify them and take them down.

The UAV’s significance will vary depending on the particular scenario that’s envisioned and on its technical characteristics. In some fast-moving scenarios, primitive UAVs — without precision locating, targeting and communications gear — might be less significant. One can envision, however, more static scenarios, particularly those generated by low-intensity operations or operations in a peacekeeping mode, in which UAV surveillance would be very, very damaging to our ability to function effectively.

The unmanned aerial vehicle presents a very difficult threat to counter. One of the most difficult challenges we face in every rotation at the National Training Center is downing the remotely controlled aerial targets — the RCMATs — even at close range and even with their flying deliberately provocative flight patterns. They prove to be tough targets. Their small signature and small size, which approximate those of unmanned aerial vehicles, require rapid sensing and acquisition, high track rates and dense patterns of fire. They are not easy targets.

*What other things have the National Training Center rotations taught maneuver force commanders about air defense?*

There are several groups of lessons derived from the NTC. The first of these is to begin with the air threat — the importance of air intelligence preparation of the battlefield, or air IPB. It's something that's driven home every rotation. The proper study of the ground, the enemy's location and our mission yields, to a skilled observer, some important clues as to the enemy's probable direction of attack, air avenues of approach and attack patterns of both his fast-movers and helicopters. These, in turn, provide us the means of either avoiding high-threat areas or taking specific actions to neutralize or ameliorate those threats. Start with air IPB — that's something that's been learned and relearned, not only at the NTC, but also at the Battle Command Training Program.

The second air defense lesson learned at the NTC is the importance of air defense early warning. The air defense elements serve as the conscience of the maneuver commander at all echelons. The commander must be sensitive to the need to spread air defense early warning, either through air defense early warning nets or across maneuver command nets.

The third lesson has to do with the importance of integrating air defense assets into the combined arms plan. Planning for air defense is integral to the planning of the operation. Not only do we have to consider how to position the assets themselves, we also have to consider the command and control of

air defense assets and all of the sustainment and support aspects. Who refuels them? How do they get the word to reposition at night if the maneuver unit they are next to is redeployed? Who evacuates any casualties they suffer?

The fourth set of lessons has to do with battlefield cunning. It is below the doctrinal level and goes under the terms of tactics, techniques and procedures. There are smart things that people learn how to do, and there are attitudes that they learn through participation in NTC and BCTP rotations. They learn to outfox the enemy. Battle is a contest not only of will but also of skill, and there is no substitute for the incentive that the NTC and BCTP provide for soldiers to learn how to outsmart the enemy: things like aerial ambushes, deploying Stingers far forward, the uneven distribution of air defense assets weighted toward air avenues of approach and feeding information to the enemy to draw his air resources toward you so you can engage them under favorable circumstances.

*Do you think the air threat is adequately portrayed at the NTC? Do our soldiers demonstrate that they have learned the air defense lessons necessary for success on the battlefield?*

Learning at the NTC is a continuous, neverending process: there's no termination point, because the Army turns over and people learn different things at different levels of responsibility. The squad leader becomes a platoon sergeant, the platoon leader a company or battery commander, the company or

B Battery, 4-5 ADA, runs through pre-combat inspections prior to embarking on a National Training Center mission.





4-5 ADA's assistant S-3 briefs battalion commander Lt. Col. Allen Taylor during a BCTP Warfighter exercise.

battery commander a staff officer and then a battalion commander.

But the answer to your question is yes: we learn at every rotation and soldiers and units leave the NTC at the end of each rotation as better trained units and soldiers. In BCTP, the higher echelon staff officers and commanders are learning, and every rotation teaches something new.

Battle is like a chess game; although every game uses the same pieces, each game is unique. So is every battle unique. The challenge to the student of war is to take the insights gained from one battle and apply them to the next battle.

The air threat at the NTC is an adequate representational air threat from high-performance aircraft. We are awaiting anxiously the addition of the Air Combat Maneuver Instrumentation System. This system will fully integrate the air into the ground, allowing realistic casualty assessment of ground force vehicles by air systems and allowing realistic engagement of air systems by ground forces. The AC-MI is currently being installed at the NTC and should become operational later this year.

*DoD recently rejected a proposal that would have transferred high-to-medium altitude air defense assets (Patriot and the Theater High-Altitude Area Defense system) from the Army to the Air Force. Today, ADA leaders worry that continuing force reductions might generate pressure to eliminate or*

*reduce the number of divisional ADA battalions. How important do you think organic ADA battalions are to the division?*

Commanders have inherent responsibilities for protection of forces. How ADA is provided to the ground force is properly the province of informed study by those charged with overseeing the total force structure. It is not a decision that can be made in isolation. That having been said, all commanders like supporting resources to be organic and integral.

My air defense battalion commander already knows my predispositions, how we like to attack and how we plan to defend. He already has a good idea of how to array his forces and the peculiarities of my way of looking at the battlefield that will drive his deployment. This gives him a chance to train his organization to meet those requirements. Without an organic air defense capacity, we might not have the same opportunity to train together.

*You mentioned your "predispositions" and the "peculiarities" of your way of looking at the battlefield. How do these characteristics affect the way the 1st Cavalry Division employs its air defense assets?*

Based on our METT-T, we want the air defense forward on the battlefield, not rearward. This starts at the cutting edge of the force. The Stinger gunners and teams should be forward. They go in with the scout platoons and task forces. Or, they may air assault them forward to form antiair ambushes. We

may put them in with TOW teams or dismounted Infantry companies conducting air assaults. They are very effective at protecting our forces from patrolling enemy helicopters as well as from fast movers that pass overhead. We follow that up by positioning the gun assets forward. We also put the Avengers forward. The Avenger is our best night system, and our best anti-aircraft system against hovering helicopters. Avenger or the Bradley Stinger Fighting Vehicle might not be as capable as ADATS would have been, but I think they represent a measurable step forward in air defense. So we push that system forward, even though it is under the enemy's medium and small caliber artillery umbrella.

Soft-skinned vehicles will be forward on the battlefield under enemy artillery fire in the post-Cold War environment. It is inevitable they will not all be armored. Avenger is one of those systems that will be up there with the rest of the forces.

*Now that the 1st Cavalry Division has fielded Avengers and will soon make the transition to Bradley Stinger Fighting Vehicles, what's your impression of the Forward Area Air Defense family of weapon systems?*

Air Defense Artillery has cultivated an incredible spirit of innovation. Rapid development has characterized the branch for many years now. From the time of the demise of the Sergeant York air defense gun onward, the air defense branch appears to have been creative, it's been innovative, it has used

off-the-shelf technology in ways that parallel but are much quicker than the formal acquisition process to accelerate the fielding of new systems. It's been very impressive.

The Avenger is an outstanding system. I like its autotrack, its FLIR [forward-looking infrared], the fact that it can be controlled remotely, and the fact that it can fire on the move. I believe the Army is looking at the Avenger's FLIR for other systems.

I have just seen the Bradley Stinger Fighting Vehicle for the first time, along with some of the new technology — the new sight for the Bradley gunner and the Stinger pod — that's being considered for further integration onto the Bradley Stinger Fighting Vehicle. They seem very promising. We ought to move rapidly toward the more advanced configuration.

It's important with the Bradley Stinger Fighting Vehicle that we consider developing training programs for the Bradley commanders and gunners. For example, why not develop some UAV, helicopter and high-speed targets to enhance target acquisition skills? And do we need to retain training of the TOW gunnery skills?

We haven't seen the FAAD C<sup>3</sup>I system in the division, but believe that the transmission of information on the battlefield can give one a tremendous advantage. We know from other efforts that we ought to introduce these new systems in an evolutionary and experimental fashion. It's not possible to

Headquarters Battery, 4-5 ADA, prepares to march order during BCTP.





4-5 ADA officers and command sergeant major "live the legend" at an ADA dining-in social.

forecast precisely all the interconnections, all the possibilities for data exchange, and the magnitude of the impact that something like FAAD C<sup>3</sup>I can have on the battlefield. Therefore, we should develop FAAD C<sup>3</sup>I in close conjunction with the users through troop tests and focused rotations at the National Training Center. It must be coordinated with other efforts to digitalize the battlefield, because there are opportunities for "up tell" and "cross tell" that are as significant as the "down tell."

*The 1st Cavalry Division established an enviable reputation for innovation in Vietnam where it pioneered air mobility tactics. Do you think that the division will prove just as innovative in adapting divisional air defense to the changed threat environment?*

I am very proud of the soldiers in the division and of the air defense soldiers within the division. They are hard working and innovative. But the spirit of innovation is not the sole prerogative of the 1st Cavalry Division. American soldiers in all our organizations possess the spirit of innovation, a trait that often distinguishes them from combatants in other armies.

*How would you advise ADA leaders to position the air defense branch for the future?*

We need to look hard at the balance between specialization and common skills. Specialization is a concept that our Army worked very hard to institutionalize in the 1970s and 1980s.

Specialization brought us to the standards of excellence that we enjoy today. Through the officer and enlisted personnel management systems and through the system of service schools and proponent offices, we worked very hard to make each of our soldiers an expert in some area.

However, specialization carries with it a cost, and as the Army downsizes, some branches, particularly our combat service support branches, are relooking specialization. They are asking, for example, why soldiers who rearm helicopters can't also refuel helicopters.

Napoleon is supposed to have said, "God is on the side of the big battalion," and I suppose the laws of warfare will always favor larger, highly advanced technological forces against smaller forces, but the economic laws of the 21st century say the force is going to be smaller. It's going to have fewer people and fewer platforms. In that case, we need to think carefully how we train and how we equip our force. We must look not only for platforms that possess complementary capabilities, but for multi-role platforms as well.

The Bradley Stinger Fighting Vehicle is an important step in this direction. We have to deal with the degree to which the Bradley Stinger Fighting Vehicle should be optimized for the air defense role, and the appropriate degree of specialization for the soldiers who man that system.

And beyond this, the implication for all of us is that we must continue to study our profession, to develop our subordinates, to examine conditions worldwide and to be ready if called on to execute the mission as assigned.

# ADA DIGEST

## COMBAT TRAINING CENTERS

### NTC TRENDS



Air defense training at the National Training Center is about to move into the computer age. Integrating the Air Combat Maneuvering Instrumentation (ACMI) system with the NTC's instrumentation system does away with probability tables and dice rolls that have, in the past, determined ADA assessments against fixed-wing aircraft.

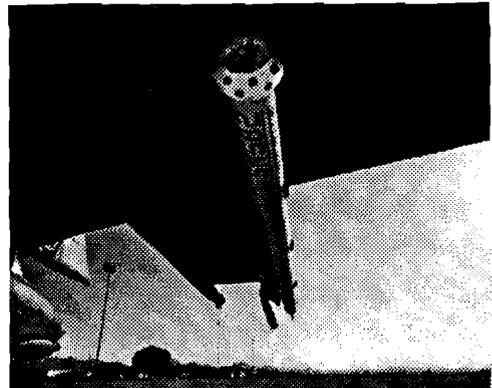
The revolutionary ACMI system puts MILES receptors on aircraft, enabling MILES-equipped ground systems to engage and kill aircraft. Through the use of computers, the system also replicates air-to-ground weapon systems. Thus an aircraft delivering simulated ordnance at a specific target will receive a realistic assessment through the NTC instrumentation system.

The system's chief advantage is that it records all surface-to-air and air-to-surface engagements for after action review purposes. Thus for the first time we will be able to tell if air defense fires killed an aircraft prior to its ordnance release. (The computer does not accept ordnance release from dead aircraft.)

As with any new system, there are still a few bugs to be worked out. But the future is bright and the training benefit to air defenders is tremendous.

Air defenders with A/1-5 ADA benefited tremendously when they live-fired Avengers and Stingers as part of the NTC's live fire operation. While Stingers have been fired at the NTC in the past, this marked the first time the missile firing was integrated into the NTC's combined arms live-fire scenario. Stingers and Avengers were integrated into a task force

battle position along with Infantry, Armor and Artillery. This integration provided air defenders the opportunity to demonstrate that the "First to Fire" branch is a true and lethal member of the combined arms team. Units wanting to live fire at the NTC should contact the NTC Operations Group,



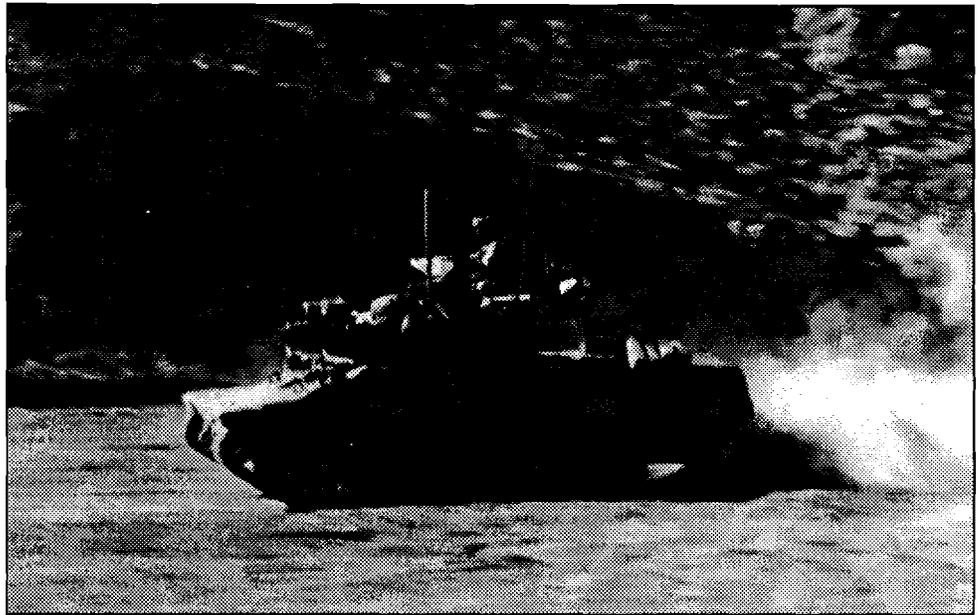
Above, the ACMI pod installed on an A-10 aircraft; below, an Air Force observer-controller mans the ACMI computer system that displays engagements. →

Plans and Operations, through their division G-3.

### Positive Trends

Most ADA batteries try to conduct sand table rehearsals as a matter of SOP. However, very few are successful at conducting meaningful sand table rehearsals. Units are now placing more emphasis on the FM radio rehearsal. Recent experience at the NTC has shown the FM rehearsal to be superior to the sand table for several reasons. First, units have extreme difficulty in gathering key players to conduct a sand table rehearsal due to different planning and order cycles. Since air defense units are spread throughout the brigade's sector, travel time to and from the rehearsals often adversely impacts troop leading procedures. And often subordinate leaders come to the rehearsal unprepared. The solution has been FM rehearsals that overcome the disadvantages of time and distance. The most successful units have trained using FM rehearsals and have SOPs on their conduct.

We are also seeing improvement in the transmission of early warning to non-ADA units. Most brigades and task forces retransmit early warning across the command net and units are starting to view air attack early warning as a tool for force protection. The best units are linking early warning to execution of air attack alarms and drills. Effective early warning received prior to air attacks has been key to strong combined arms air defense reactions. Air attack early warning at the company and team



*An "enemy" BMP races to its objective during an NTC rotation.*

levels — where it is needed the most — is still poor.

### Negative Trends

General support Avengers and Stingers are often given missions to move forward between advancing task forces and artillery to add ADA mass forward by overwatching the task forces and to provide early engagement of aircraft attacking deeper. The squads and teams are usually told to follow a specified distance behind a unit, but most plans do not specify positions or routes. The result is that the squads end up moving in an uncoordinated fashion, often bunching up. Due to battlefield effects and changes to the plan, the squads lose contact with the unit they are to follow. The overall effect is poor air defense. Platoon leaders need to plan routes, direction and axis of movement for each squad and identify the best positions along that route. The purpose is to provide the squad leader guidance as to when and where to move.

A lack of NCO leadership in the platoon is contributing to poor time management and a lack of discipline. Both of these problems adversely affect mission accomplishment and survivability. Without the support of strong squad leaders, platoon leaders find themselves overwhelmed with task force planning, coordinating with the ADA battery and platoon supervision.

The result is normally a weak plan executed by poorly prepared soldiers. It is not uncommon to find squads doing nothing while the platoon leader is planning and the platoon sergeant is out coordinating logistical support. In units where squad leaders are proactive, the soldiers are better prepared and the platoon leader can focus on producing a good plan. Order and unit survivability are much higher as a result.

MAJ. DALE EIKMEIER

# JRTC TRENDS

The Joint Readiness Training Center's recent Peace Enforcement rotation — the first of its kind — presented a wide variety of new challenges and reemphasized the keys to success: well trained and disciplined soldiers with a desire to learn on a stressful and challenging battlefield.

The U.S. Army Infantry School recently published a white paper, "The Application of Peace Enforcement Operations at Brigade and Battalion," that defines peace enforcement as a "form of combat, armed intervention or the physical threat of armed intervention that, in most cases, is pursuant to international license authorizing the coercive use of military power to compel compliance with international sanctions or resolutions." The primary purpose of peace enforcement is to maintain or restore peace under conditions broadly defined by the international community.

Armed with the emerging doctrine found in the school's white paper and a strong desire to accomplish the mission, the paratroopers of Task Force 2nd Brigade, 82nd Airborne Division, conducted an airborne assault, as a show of force, to seize a flight landing strip and immediately began conducting peace enforcement operations.

## Soldier Readiness

Continual challenges arose as the task force expanded their lodgment within the contested area to separate the belligerents, stop the hostilities and establish a U.N.-mandated buffer zone. Identifying the enemy and the enemy's equipment became paramount as the task force had to con-



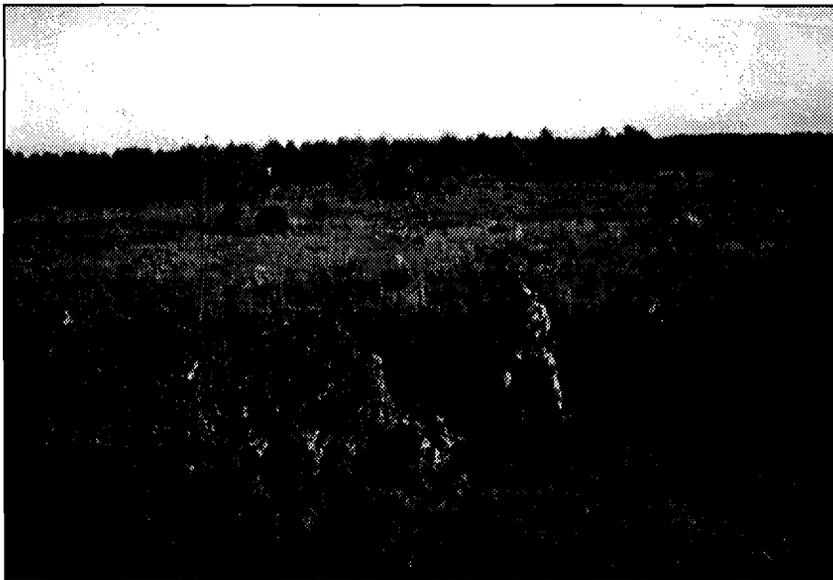
tend with the primary belligerents (the Acadians and the Cortinians) as well as an insurgent force (the Acadian Freedom Fighters), armed civilians, displaced civilians and non-governmental organizations such as

the International Committee of the Red Cross and World Vision Relief and Development. The wide variety of forces operating within the area of operations dictated the need for explicit tactical rules of engagement (ROE). A complete understanding of these rules and disciplined soldiers were critical in ensuring that situations were handled with a proportional use of force. This resulted in minimal collateral damage and minimal friendly casualties when responding to hostile acts.

Extensive and detailed troop leading procedures ensured all subordinate leaders and soldiers understood the air defense warning, weapons control status and hostile criteria specified in the tactical ROE. This understanding enabled the air defenders



*This Vulcan squad operated from a hasty position for several hours. Their failure to improve the position contributed to their rapid loss to enemy action.* ➔



*This Stinger team dramatically improved their survivability by taking advantage of the terrain.*

to operate within the guidelines of the ROE and avoid inadvertently shooting down an aircraft. We cannot overlook the importance of this fact: destroying an "other forces" aircraft could have been the catalyst that embroiled U.S. forces in open hostilities.

#### **Mixed Military Working Group**

The Mixed Military Working Group meetings provided the forum for the belligerents, U.S. forces and the U.N. negotiator to meet, air grievances and allegations, negotiate and reach solutions. The brigade commander or executive officer served as the senior U.S. forces representative and negotiator. The air defenders of B/3-4 ADA contributed significantly to mission success when they provided the brigade commander with information on historical aircraft flight routes. These flight routes, while not approved by the United Nations, were flown into the buffer zone. This detailed information enabled the brigade commander to confront the guilty party, reduce fu-

ture occurrences, protect the force from aerial observation and reduce the likelihood of an inadvertent air defense engagement. On many occasions, individual soldiers found themselves in situations that required them to serve as negotiator, mediator and arbitrator. Flexible, informed soldiers aware of the tactical situation and provided with current intelligence were essential to mission success.

#### **Media**

While media relations are always important, they took on increased importance as the belligerent parties attempted to manipulate the media coverage of various incidents to slant coverage in their favor.

Timely investigations to ascertain the true circumstances of an incident, followed by an aggressive dissemination of these facts to the people within the area of operations, were beneficial in eliminating rumors, reducing support for the insurgents and portraying U.S. forces in a favorable light. Soldiers trained in crater anal-

### **TACTICS SEMINAR**

The JRTC air defense team recently hosted the Air Defense Artillery Tactics Seminar at Fort Polk, La., to exchange information between the observer/controller team, the ADA School and the JRTC client units. The ADA School personnel provided the latest information on ongoing force modernization efforts, the evolving threat and doctrinal updates. The observer/controller team provided feedback on trends occurring during the past 12 JRTC rotations. This information, combined with superb dialogue, resulted in a valuable seminar beneficial to all. The JRTC has distributed videotapes of the seminar to all of the ADA client units that participate in JRTC rotations. Properly used, these tapes will provide many valuable insights and should significantly improve a unit's warfighting capabilities. Units desiring copies of the seminar tapes should contact Maj. James Oman (DSN 863-0268) or Capt. Lorenzo Mack (DSN 863-0273). The next ADA Tactics Seminar is scheduled for December of this year. Hope to see you there.

ysis and fragmentation identification provided the factual basis for certain investigations, thereby documenting violations of cease fire agreements or buffer zones. This information is invaluable in fixing responsibility for damage and civilian casualties caused by the indiscriminate use of artillery and mortar fires.

Media awareness was important for all members of the task force. We often assume the media will interview only leaders, but this was simply not the case. On many occasions the media interviewed junior soldiers as well. Providing all members of the task force with a simple theme, tying any subsequent questions back to this theme, and allowing the soldier to speak only to those areas of familiarity (to stay within his lane of expertise) proved beneficial. ➡

### Force Protection

Air defenders accomplished this extremely important task by posturing Vulcan and Stinger fire units within the defense design to rapidly respond to a potential air threat. The potential for rapid escalation was always present due to the close proximity of airfields and the numbers and types of aircraft operating within the buffer zone and the immediate area. While the air defense warning and weapon control status remained at WHITE HOLD during the peace enforcement mission, the battery remained ready to repel hostile aircraft.

The requirement for individual fire units to construct fighting positions and acquire engineer support was critical. The insurgent forces, attempting to shape the battlefield, sought out air defense forces and destroyed them where possible. Those fire units that camouflaged their systems, prepared fighting positions and hardened these positions greatly enhanced their survivability.

### Summary

Well-trained, disciplined soldiers met and overcame the diverse challenges of the peace enforcement mis-

sion. I have focused on those areas of impact to air defenders, and my observations are certainly not all inclusive. The recently published Infantry School white paper provides valuable insights into this potential mission, and time reading this publication would be well spent. In today's world of increased ethnic, nationalistic and religious tensions, the possibility of deployment in support of a peace enforcement operation has increased dramatically.

MAJ. JAMES OMAN

## UNIT NEWS

# 4-6 ADA HITS THE ROAD!

"Never volunteer," you are told again and again. When asked to cover the International Student Battalion's trip to Santa Fe and Albuquerque, N.M., I felt an ominous tingling that told me I might be biting off more than I could chew. Being the junior member of the ADA magazine staff and already up to my ears in hot projects, those words — never volunteer — haunted me as I agreed to take on the assignment.

Like Alice in Wonderland, that decision led me into the international realm of the 4th Battalion, 6th Air Defense Artillery, and awakened me to a world beyond the scope of traditional soldiering.

I received my first orientation on the International Student Battalion from the commander, Lt. Col. Luther D. Barbee, and the executive officer, Maj. William D. Leitch. They gave me a guided tour of the battalion and introduced me to an assortment of soldiers and civilians who administer

the specific programs geared to provide the essential support required by the students and their family members. I immediately realized that there were two distinct sides to this intricate and unique battalion. On one side are the U.S. soldiers assigned to 4-6 ADA who are responsible for providing administrative and limited logistical support for the international students training at Fort Bliss and their families; on the other side are the international military students and their families.

The day after my orientation, as I boarded one of two Greyhound buses, along with half of the 94 other passengers from nine different countries, headed for the Santa Fe capitol building, I thought I had a better understanding of 4-6 ADA and its mission. It wasn't until I heard, "Pardon me, can you tell me, please, is this New Mexico a separate state or another city in Texas?" from Qasem El-Na'mneh, a first lieutenant from

Jordan, that I realized my answer — as well as how I answered — and all the responses provided by the soldiers and civilians of 4-6 ADA to all the questions asked by the international students, were of great importance. How would you answer the question, "Which is better, homesickness or culture shock?" Think about it.

I encountered many new experiences and was prompted to give greater thought to things I usually take for granted. Imagine, for a moment, introducing pistachio nuts to someone for the first time. Not only do you have to demonstrate the proper way to eat them, you must explain which pieces are discarded and exactly how to do so with a proper amount of decorum. It also helps to know where and how they are grown, since someone will certainly ask you.

Picture the Santa Fe capitol legislative assembly hall with international students seated



sporadically throughout the circular room. The vision immediately reminds you of clips from the evening news being televised directly from the United Nations.

Contemplate the wonders of the universe that can unfold when you take an African safari, complete with tour guides 1st Lt. Jean-Paul Mahamat from Chad and 1st Lt. Gondoi Jairos Soroti from Zimbabwe, while visiting a zoo in Albuquerque. I can guarantee it'll be a trip to remember.

Later try to explain why there are camels with two humps in the United States to a person who sees camels on a regular basis, but never a camel with more than one hump! I hope Capt. El-Hjoj Mohamed from Jordan understood my explanation that there are no camels native to the United States, and that the camels in question came from Asia.

I also learned that you should never take for granted that one of your traveling companions is joking, or you may find yourself committed to a 20-mile walk after dinner. I found myself walking a desolate stretch of road at 2300 hours in an unfamiliar city and being thankful that I only had to do six miles instead of the full 20.

This excursion was indeed a learning, as well as a teaching, experience. I realized that the personnel assigned to 4-6 ADA regularly encounter these experiences and I felt a little envious (and much relieved) that such competent people are available to accomplish the mission. As I watched and listened to Sgt. Wanda Karn, Spec. Jesus Cisneros, Spec. Kevin Korte and Mr. Edward Kasinski, the 4-6 ADA personnel in charge of this excursion, I knew that their selflessness, dedication, commitment and extraordinary professionalism exemplified the attributes required of their uniquely important

mission. After all, what name do you give to those who put their personal lives on hold; who are the first up and the last to go to sleep; who are available days, nights and weekends; who serve as chauffeurs, tour guides, caterers, historians, teachers, arbitrators, friends and, when need be, disciplinarians? Most likely "Mom" comes to mind; however, this description accurately describes the fine soldiers and civilians assigned to 4-6 ADA.

4-6 ADA symbolizes the ADA community's dedication to and support of international students. "Let us not forget," said Barbee, "that we learn as much from the international students, if not more, than we teach." The leadership and soldiers of 4-6 ADA recognize that the international

students who pass through their battalion are their most important business. As unofficial ambassadors for the United States, they take their mission very seriously and do it with pride.

I'm glad I ignored my initial hesitation and accepted this assignment. The words "never volunteer" could very well have robbed me of the opportunity to meet some extraordinary people. I learned new things about exotic places, acted as an unofficial ambassador and teacher, and witnessed first-hand the inner workings of 4-6 ADA. It really is a Wonderland. Thanks for taking me along!

KATHLEEN COATS-DOYLE

## 1-5 ADA LIVE-FIRE

Air defenders from A, B and C Batteries, 1-5 ADA, Fort Stewart, Ga., recently launched Stinger missiles from Bradley Stinger Fighting Vehicles. The BSFV, a modified Bradley that carries Stinger missiles and Stinger teams, replaces the battalion's Vulcan weapon system that was mounted on an M-113 chassis.

SSgt. Michael S. Mills, C Battery, said the new arrangement brings anti-aircraft fire up front, where it's needed the most.

"Before, the guys we were meant to support were always leaving us behind," Mills said. "Now we can keep up with the Infantry and Armor guys and give them the anti-aircraft support they've always needed."

During the recent exercise, the BSFVs moved downrange where they conducted both defensive and

offensive engagements with their 25mm guns, according to battalion commander Lt. Col. Bill Laramore. "Over the radio warning net would come the warning. 'Dynamite, dynamite, dynamite!'" The two-man Stinger team would burst from the BSFV, take up a good firing position and begin to scan for hostile targets. A ballistic aerial target would be launched, the Stinger team would engage and then remount the BSFV to continue traveling through offensive engagements," said Laramore.

Laramore said the battalion's average score was 857 for its first exercise with the BSFVs. He said that of the 30 crews in the exercise, 10 fired superior, 12 fired distinguished and eight qualified.

SPEC. JAY DILLING

## WEAPON SYSTEMS

# BSFV FIELDINGS

The 1st Armored, 3rd Infantry (Mechanized), 2nd Infantry, 4th Infantry (Mechanized), 24th Infantry (Mechanized) and 1st Cavalry Divisions have received the Bradley Stinger Fighting Vehicle (BSFV). The next two divisions to receive the BSFV are the 1st Infantry (Mechanized) and 2nd Armored Divisions. Fielding of the BSFV to all designated ADA units should be complete by the end of FY95.

Current doctrine calls for the Stinger team to dismount from the BSFV to engage hostile aircraft. Most ADA units will receive the M-2A2 version (increased armor protection, TOW upgrade and better transmission); however, a few will receive the M-2A0 version. During the fielding of the BSFVs, the FAAD Project Office worked to develop and field an improved capability to carry the basic load of Stinger missiles in-

side the rear of the BSFV. The modification kit has a three-tier rack to carry six Stinger missiles (four with mated gripstocks); 24 battery coolant units; the identification, friend or foe device; binoculars; and the portable single channel ground-to-air radio system. These kits have been fielded to the 4th Infantry (Mechanized), 24th Infantry (Mechanized) and 1st Cavalry Divisions. The project office plans to field the modification kits as units receive their BSFVs.

FAAD WEAPON SYSTEM NEWS

# AVENGER AAR RECORDING DEVICE

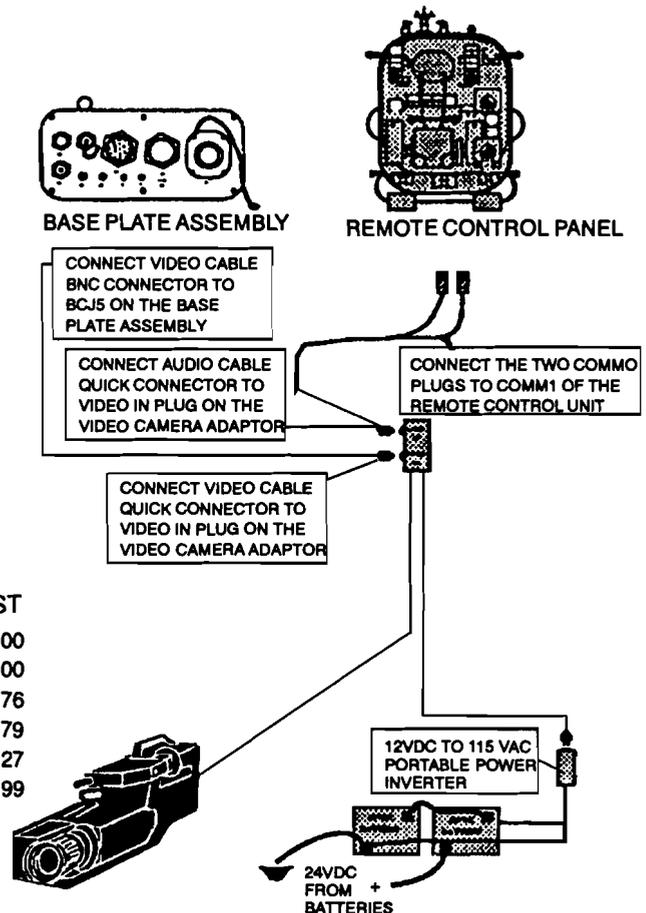
When units requested an after-action review recording device to provide feedback during training, a defense contractor offered a \$50,000 system. Soldiers at 1-5 ADA, Fort Stewart, Ga., solved the problem with a video recording system that costs less than \$200 per device.

The device and concept has been assembled and tested, and will meet all of the specified requirements. The low-cost approach should eliminate the need for project funding. The most expensive component, the video recorder, is available through the AudioVisual Support Center at all installations. The remaining items can be purchased at local electronics stores.

FAAD WEAPON SYSTEM NEWS

## VIDEO CAMERA SYSTEM (AVENGER) PARTS LIST

ITEM	PART NO.	COST
Triaxe to BNC Connector	Pomona ITT Model 5300	\$6.00
Cable Assembly (Video)	VCR Connector Cable 161-2917	5.00
Cable Assembly (Audio)	5995-00-302-7521	47.76
Video/Audio Jacks	274-319	1.79
Inverter	22-132	119.27
Safety Fuse/Filter	272-1085	5.99



# TURRET SHOOTOFF UNDERWAY

Beginning in March, the congressionally mandated Bradley Stinger Fighting Vehicle (BSFV) Turret Study will pit turret designs by Boeing, FMC and Martin Marietta that exist only within computer matrices against one another in a shootoff conducted on a computer-simulated battlefield. The shootoff is scheduled to conclude in July.

The BSFV was fielded as a substitute for the canceled Air Defense/Anti-Tank System, which was a casualty of post-Cold War budget cuts. The BSFV serves, despite deficiencies in survivability, target acquisition and identification and fire control, as the forward area air defense system's line-of-sight forward (heavy) component. The current BSFV configuration is equipped

with a 25mm cannon, a TOW-2 launcher, a 7.62 machine gun, four ready-to-fire Stingers in a ready-rack, and two additional Stingers. At present, BSFV Stinger gunners have to dismount before engaging targets.

The BSFV Turret Study is part of the Army's effort to convert the BSFV into a fully integrated air defense system with increased survivability, integrated fire control and improved target detection and tracking. The "objective" BSFV will feature the full-fledged air defense turret, four to eight ready-to-fire Stinger missiles, a laser rangefinder, an auto tracker, a position-navigation unit, a 7.62 or 50-caliber machine gun, a forward-looking infrared system and the potential for additional growth capabilities.

Meanwhile, the Program Manager for Forward Area Air Defense has completed the BSFV Growth Study, which addressed upgrades to the present BSFV configuration for survivability, target acquisition, identification and fire control. The study recommended a block improvement upgrade (standard vehicle mounted launcher, position navigational devices, integrated command and control and on-board target acquisition capability) based upon affordability.

Pre-positioning at the National Training Center for the BSFV is expected in 3QFY94. Rotation 94-10 is to be the first to draw pre-positioned BSFVs, contingent upon the National Training Center receiving additional contract maintenance funds.

