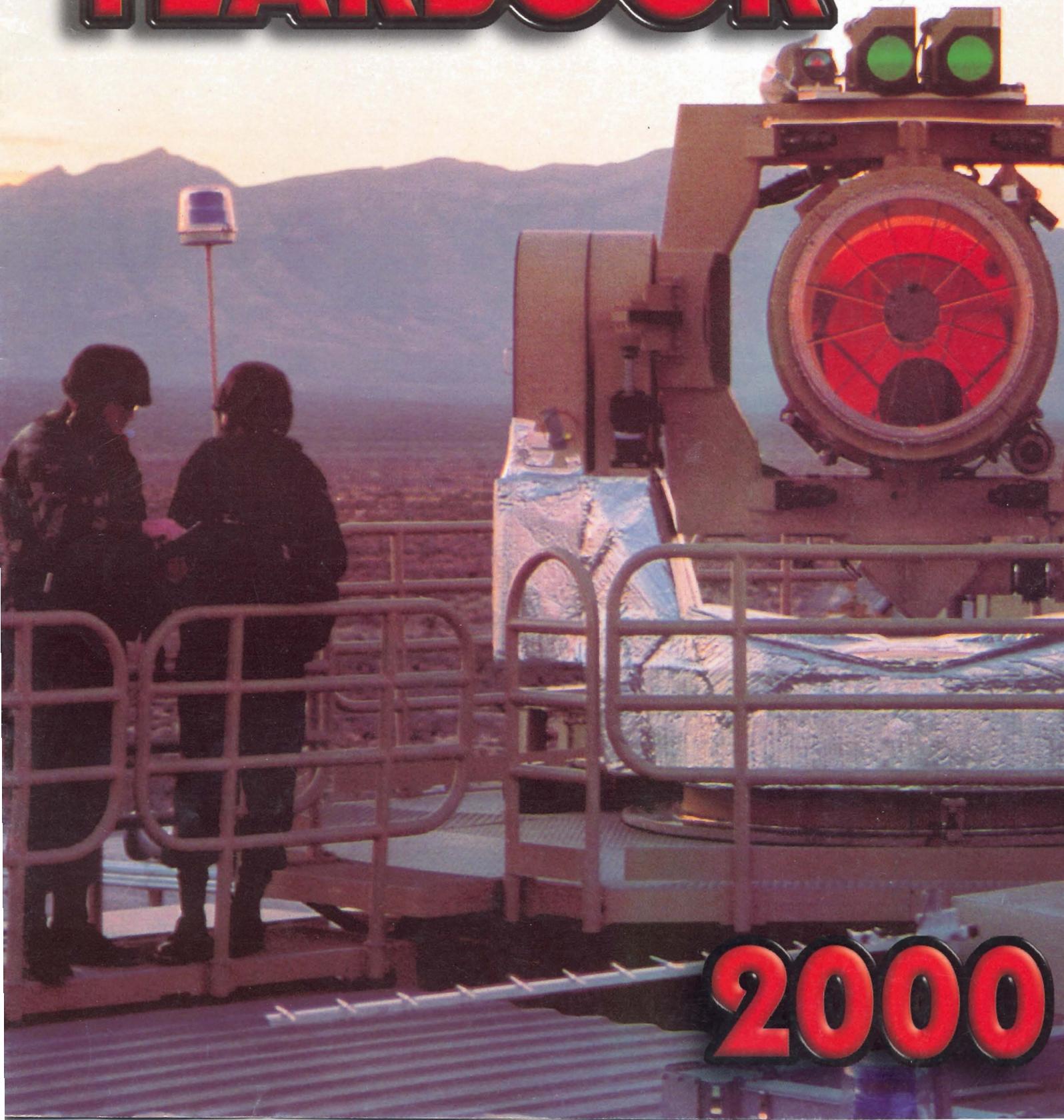


ADA YEARBOOK



2000

MISSION: Confidence. It comes standard with the thoroughly tested PAC-3 Missile. PAC-3's hit-to-kill technology enables it to completely destroy the target. And it works against a variety of threats. Aircraft, cruise missiles, tactical ballistic missiles—the PAC-3 Missile is a demonstrated response to all of them.

The PAC-3 Missile.
One shot. One kill.
Once again.

LOCKHEED MARTIN



SUCCESS: For the third time in a row, the PAC-3 Missile showed its ability to hit and kill its target. This success is yet another example of Lockheed Martin's extensive air and missile defense capabilities. And it underscores the fact that with the PAC-3 Missile, you can fire with confidence. Find out more at www.lockheedmartin.com.

Table of Contents

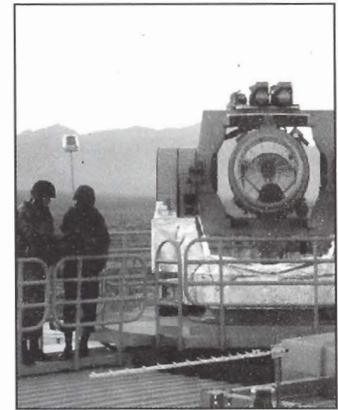


Transforming ADA

'Plugging In' the Air & Missile Defense Force of the 21st Century. By Maj, Gen. Dennis D. Cavin
Page 5

A Century of Air Defense

Key Events that Shaped Air Defense Artillery
By Capt. James D. Crabtree
Page 14



About the cover:

The Tactical High-Energy Laser demonstrator knocked down a Katyusha rocket on June 6, 2000, at White Sands Missile Range, New Mexico.

Accepting the Challenge of Change



The first ADA Commander's Conference of the new century appropriately focuses on "ADA Versatility and the Challenge of Change." I believe we can say the "Revolution in Military Affairs" is indeed underway. Army Transformation and the Air and Missile Defense Force Transformation will bring dramatic changes in weapon systems, force structure, organizational architectures and doctrine.

Resistance to change is natural, but fortunately the ADA Branch and our marvelous soldiers have always demonstrated an exceptional ability to lead from the front. The Digitized Division is an outgrowth of the tremendous work our branch did with FAADC³I and the Air and Missile Defense Planning and Control System. I am confident that once again Air Defense will be a leader in Army Transformation.

In the next few years, ADA soldiers will benefit from a number of positive changes taking place in our Army—better pay (although still not to the level required), improved housing, expanded benefits, superior child care, and an easing of the burden of constant deployments. As we begin this monumental transfor-

mation, the Army's leadership may continue to ask us to do more with less. The great news is that same leadership is keenly aware of the key enablers for tomorrow's force and is committed to fixing those programs which will ensure our soldiers and their families can rely on a firm foundation.

This week I will pass proponent responsibility for Air Defense Artillery to Brigadier General Stan Green. Stan's credentials are imposing. He knows our business and comes with exceptional talents to raise the bar even further. Simply put, the branch is in excellent hands.

I am excited about the opportunity to continue to lead American soldiers as the Commanding General of the United States Army Recruiting Command. Although I will sincerely miss the magnificent soldiers of Air Defense Artillery, I look forward to the mission of filling your ranks with the very best our nation can produce. I will work as diligently in my new capacity as I have at the Air Defense Artillery Center of Excellence over the past four years.

Thanks to each of you for your outstanding contributions to the Air Defense Artillery Branch and continuous support of the Cavin family.

First to Fire!

Major General Dennis D. Cavin



**Providing: Systems and Software Engineering * Test and Evaluation
Training * Intelligence Research * Logistics * Operations and Maintenance**

*** For ***

**Tactical High Energy Laser (THEL) * ATEC Threat Support Activity Threat Systems
THAAD BM/C4I * Patriot and THAAD PAC-3 upgrade * Other Air Defense Artillery Systems**

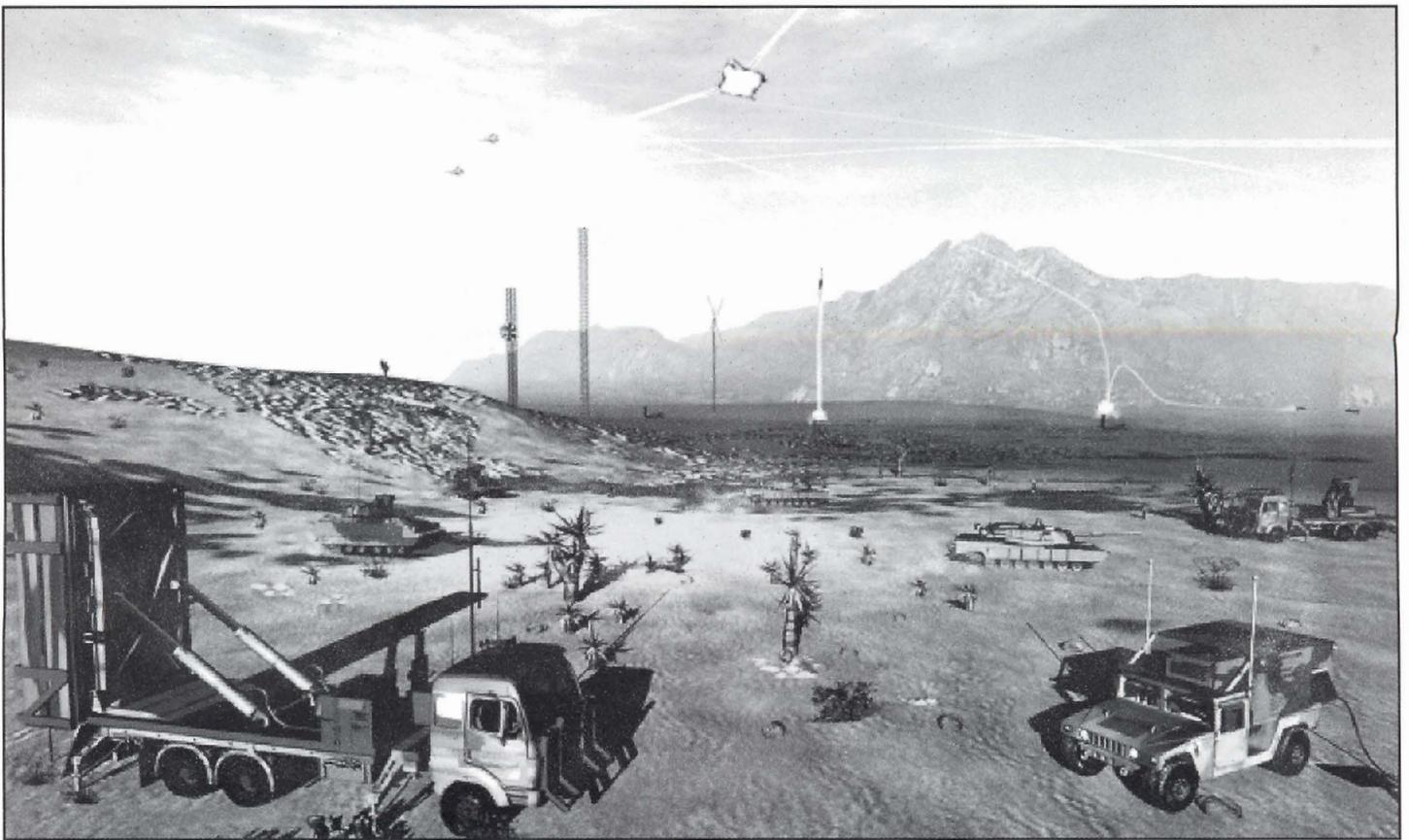
RAM is a woman-owned small business with corporate offices in El Paso, Texas. RAM has provided professional and technical services to Federal agencies and defense industry customers since 1982. If you believe you have the skills that will help RAM meet customer requirements, forward your resume to:

Research Analysis and Maintenance, Inc.

ATTN: Human Resources
1790 Lee Trevino, Suite 600
El Paso, TX 79936
915-592-7047
www.ramincorp.com/careers.htm



RAM is an Equal Opportunity Employer.



Transforming ADA

'Plugging In' the Air & Missile Defense Force of the 21st Century

by Major General Dennis D. Cavin
Chief of Air Defense Artillery

Air and Missile Defense Battle Element Bravo deployed by helicopter at H + 1. Task organized to meet the mission, Bravo is a light force composed of command and control, four light ground-based sensors, two light elevated sensor/communication relay platforms, eight directed energy weapons and six light launchers with missiles. As the individual components reach their initial deployment areas, they emplace and "plug-in" to the self-forming network. The network also connects and integrates Bravo with the remainder of the Army force and the Joint Force. As more components plug-in, the "netted and distributed, plug and fight" defense grows seamlessly in capability. At the

same time Bravo deployed, battle elements Charlie and Delta deployed by tactical air to different, non-contiguous areas to support forces conducting shaping operations. At H + 12, Bravo and Delta will merge, seamlessly, to form a larger battle element. Forces and assets in the security and sustainment area are supported by Battle Element Alpha. Employing a larger version of the same command and control used by the other battle elements, Alpha's task organization calls for medium weight, long-range missiles and long-range sensors, as well as an elevated sensor for long-range surveillance, engagement support, and communications relay. Alpha, Bravo, Charlie and Delta's mission in 2010, 2015, or 2020 is to provide continuous protection, of forces and assets, from attack or surveillance from the air.

Directed energy? Plug and fight? Battle elements? As the Army has begun a transformation, so has Air Defense Artillery. The Air and Missile Defense (AMD) force will move, along with the rest of the Army, away from large, inefficient, specialized organizational designs with embedded combat service and combat service support toward smaller, multifunctional designs. These new designs enhance tailorability and flexibility, making our transformed AMD force more responsive to Army and Joint/Coalition requirements. We will arrive at our destination equipped to defend the force against the full spectrum of the dynamic third-dimension threat, including, for the first time, rockets, mortars and artillery.

ADA Transformation will take place in step with the Army Transformation,



Bradley Linebacker



Avenger

proceeding along three major paths: the "Legacy Force," the "Interim Force," and the "Objective Force."

Legacy Force: To mitigate risk during the Transformation, our Army will update portions of the Army as we know it today—the Legacy Force—by recapitalizing it through the continuation of existing modernization programs, such as the insertion of digital technologies and bringing systems up to a zero miles, zero hours condition. This will be the part of the force we will use for war should it be necessary in the next 15 or so years. Patriot, Avenger, Bradley Linebacker and Stinger, along with their associated sensors and command and control systems, have crucial roles to play in the AMD Legacy Force. Completing Avenger buys and slew-to-cue enhancements, fielding Patriot Advanced Capability-3 upgrades and elevating the Patriot system's priority in the Army's manning system are key ingredients of the Legacy AMD Transformation plan.

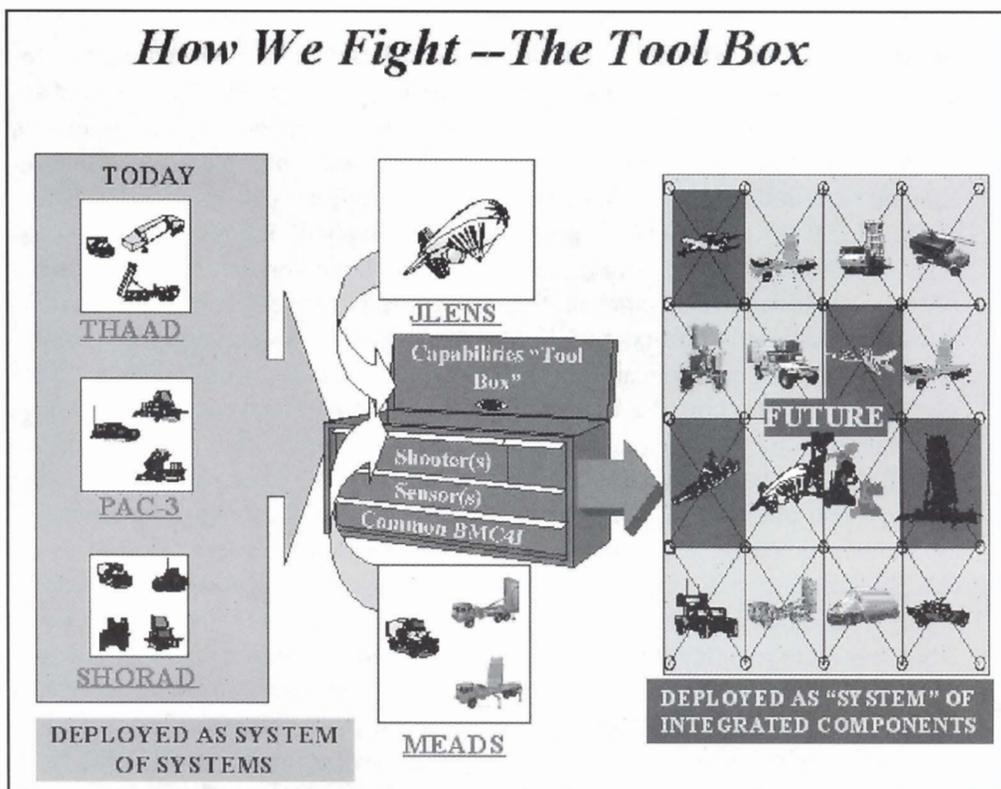
Interim Force: Bridging the gap in capabilities between today and the Objective Force starts with the Initial Brigade Combat Teams (IBCT) being formed at Fort Lewis, Washington. This is the force that will validate an organizational and operational model for the Interim Force. Based on this validated structure, the Army will fill the Interim Force with current, off-the-shelf technology. The Interim Armored

Vehicle, for example, which will be selected this year, will be used to equip Interim Force units until we are ready to begin fielding the Objective Force. AMD also has a vital role in the Interim Force. Unlike other divisional brigades throughout the Army, the IBCT will have an expanded AMD presence in the form of the Air Defense Airspace Coordination Cell. This cell, with four air defenders and two Army aviators, will empower the IBCT through aerial situational awareness and understanding, coordinate the airspace needs of the IBCT and form the

links to the air defense (AD) battalion in the parent division as well as deployed Joint/Coalition air defense forces.

Objective Force: The Army's critical transformation path leads to the Objective Force, a highly deployable but highly lethal force. It will enable us to place a combat capable brigade anywhere in the world in 96 hours; put a division on the ground in 120 hours; and five divisions on the ground in theater in 30 days. The Objective AMD Force will deploy a near leakproof, two-tier defense built around Theater

How We Fight – The Tool Box



High-Altitude Area Defense (THAAD) systems and Medium Extended Air Defense Systems (MEADS) against theater ballistic missiles. New Short-Range Air Defense (SHORAD) weapon systems employing “leap ahead” technologies will replace the Bradley Linebacker, Avenger and man-portable Stinger, permitting us to engage a wider variety of targets at the maximum range of our sensors or the sensors of our Joint/Coalition partners. Our new versatile systems, integrated to “plug and fight,” will provide the right AMD force at the right time to deter or destroy a growing arsenal of aerial threats.

Plug & Fight

Words like “duty,” “loyalty” “courage,” and “self-sacrifice” will continue to be part of the lexicon of the 21st century battlefield, but “net lingo,” or “web jargon,” is quickly becoming the vocabulary of modern warfare. “Plug-ins,” for example, are smaller “add-on” computer programs that work in conjunction with larger applications to enhance the capabilities of the programs they are “plugged into.” “Backplanes” are circuit boards containing sockets into which other



the common command and control “backplane” and the commander will then “fight” this tailored force.

We developed the “plug and fight” concept several years ago to describe in generic terms how we envisioned AMD units will fight on future battlefields. With Army Transformation underway, plug and fight now becomes the “ideology” that drives the AMD Force Transformation. As we transition the AMD force to fully plug and fight capable, the present distinction between High- to Medium-Altitude Air Defense (HIMAD) and Short-Range Air Defense (SHORAD) units

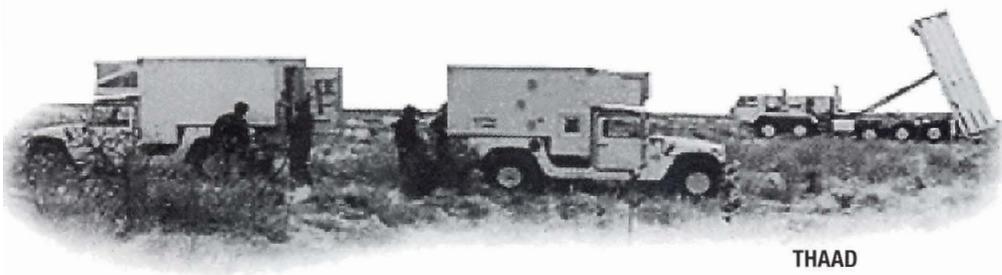
will plug into the backplane of future warfare, operating seamlessly with Army, Joint and Multinational forces.

Transforming the HIMAD Force

Patriot Advanced Capability-2 (PAC-2), the only theater ballistic missile killer in the U.S. inventory, remains, for the moment, the world's 911 anti-theater ballistic missile force. In the last few years we have fielded the PAC-2 Guidance Enhanced Missile (GEM) to improve Patriot's accuracy against short-range ballistic missiles and cruise missiles.

We are well along in the development and fielding of the PAC-3 capability for Patriot. Consisting of major upgrades to the ground components and a new missile, the PAC-3 upgrade is a quantum leap in capability for the tactical commander.

Communications improvements enhance interoperability, while radar upgrades extend system range against the theater ballistic missile threat set as well as low radar cross section cruise missiles. The new PAC-3 missile is smaller and more agile than the PAC-2 and GEM missiles, and offers hit-to-kill lethality against the full range of theater ballistic missile warheads. A PAC-3 battery will employ a mix of PAC-2, GEM, and PAC-3 missiles. In the conduct of an engagement, the system will launch the missile with the highest lethality against any given target. Patriot will serve as the lower-tier of our two-tier theater ballistic missile

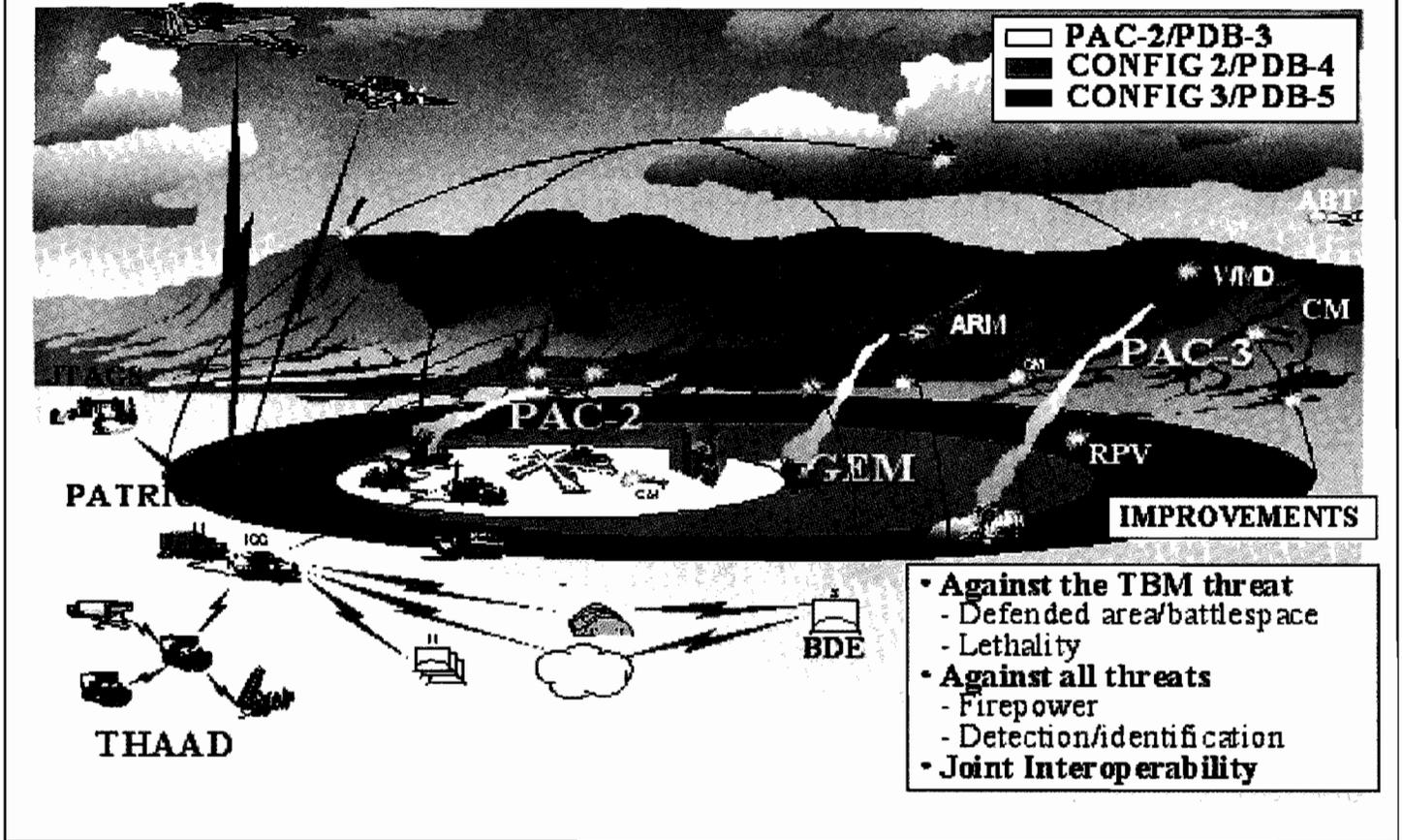


THAAD

circuit boards can be plugged in. In the context of 21st century warfare, the computer term “plug and play” will be replaced with “plug and fight.” Rather than the system-centric and battery-centric organizations of today, the AD commander on the battlefield of tomorrow will reach into his “tool box” of capabilities and deploy just the tailored mix of sensors and shooters needed to perform his mission. These sensors and shooters will “plug into”

will go away. Objective AMD Force units will be comprised of both long-range and short-range weapons. They will possess the battle management, command, control, communications, computers and intelligence (BMC⁴I) capabilities required to enable the commander to tailor just the capabilities he or she needs to accomplish his mission. Self-sufficient, multifunctional and responsive to the needs of the force, transformed AMD organizations

A Quantum Leap In Air Defense Capability



defense force through the first quarter of the century.

The THAAD system will be fielded around 2007, perhaps earlier if additional funding becomes available. Capable of intercepting incoming theater ballistic missiles at greater ranges and altitudes than Patriot, it will serve as the upper tier of our two-tier defense against one of the 21st century's predominant air threats, the theater ballistic missile. THAAD provides a highly lethal complement to the Patriot lower tier. Employing hit-to-kill lethality within the earth's atmosphere, as well as outside the atmosphere at altitudes above 100 kilometers, THAAD can defeat both short- and medium-range theater ballistic missiles. With the ability to deploy more than 80 percent of its equipment by C-130, it can readily support a transforming Army of the 21st century.

Expected to begin fielding around 2012, the MEADS will become the cornerstone of the Objective AMD Force. Combining the lethality of

Patriot with the agility of the SHORAD force, MEADS is a trilateral development program between the United States, Italy, and Germany. The MEADS BMC⁴I system will serve as the common backplane for the total AMD force, permitting us to employ the plug and fight concept at its full potential. With C-130 roll-on/roll-off capability for all its components, 360-degree coverage against an expanding threat set, and cutting edge diagnostics and prognostics, MEADS will provide essential AMD capability for the transformed Army and for the U.S. Marine Corps Operational Maneuver from the Sea (OMFTS). MEADS battalions will be smaller but more lethal than Patriot PAC-3. As a result we will field 14 MEADS battalions and replace all 10 Patriot battalions by about 2025.

Joint and Combined Forces need elevated sensors on today's battlefield and the battlefield of the future. AWACS, Hawkeye, and JSTARS already provide much of what is need-

ed. As we look at future operations similar to Bosnia, where there is much waiting in anticipation of possible conflict, coupled with the emergence of the unmanned aerial vehicle (UAV) and low-altitude cruise missile threat, there is an urgent need for an elevated sensor platform that can act as a complement to the current fixed-wing fleet. A platform that can provide very low-altitude coverage for extended periods of time and free up the fixed-wing fleet to surge when and where needed is under development today. The platform is a Joint Army and Navy program named the Joint Land Attack Cruise Missile Defense Elevated and Netted Sensor, or JLENS, system. With multiple configurations ranging from a High-Mobility, Multipurpose, Wheeled Vehicle (HMMWV) based communications relay to a full AMD sensor suite at altitudes up to 15,000 feet, JLENS is a critical capability of the future joint force.

To ensure that we put capabilities in the field as soon as technology allows,



on a heavy HMMWV) will gradually displace some Avenger forces as the AMD Transformation progresses. The Army is currently in a partnership with the U.S. Marine Corps to develop the HUMRAAM capability. The USMC requirement is called Complementary Low Altitude Weapon System (CLAWS).

The transformation will begin with the conversion of a heavy division Avenger battery into a mixed HUMRAAM and Avenger battery. HUMRAAM gives us the increased range and lethality we need to take full advantage of our new Sentinel sensor and FAAD C³I digital data relay capabilities. It will reign over battlespace six times the size of Stinger's and will allow us to destroy cruise missiles, UAVs and other stand-off aerial threats. HUMRAAM prototypes

we have established the following intermediate objectives in the HIMAD portion of the AMD Transformation campaign plan.

- Field the PAC-3 missile to Patriot with light launchers ultimately to be used by MEADS when it fully replaces Patriot around 2025.

- Field JLENS to provide an economical, long-duration, elevated surveillance and precision tracking capability to enable AMD fire units to kill low-altitude targets at maximum missile range and to greatly enhance the Single Integrated Air Picture.

- Field THAAD to provide near leakproof asset protection over large areas against theater ballistic missiles.

- Begin MEADS fielding and start the transition to full plug and fight.

Transforming the SHORAD Force
Air Defense Artillery's current SHORAD Force (Sentinels, Avengers, Bradley Linebackers, Bradley Stinger

Fighting Vehicles and manportable Stingers) are categorized as "legacy" systems, but will stay in the force into 2020 and beyond and will maintain the branch's ability to accomplish its mission during transformation to the Objective Force.

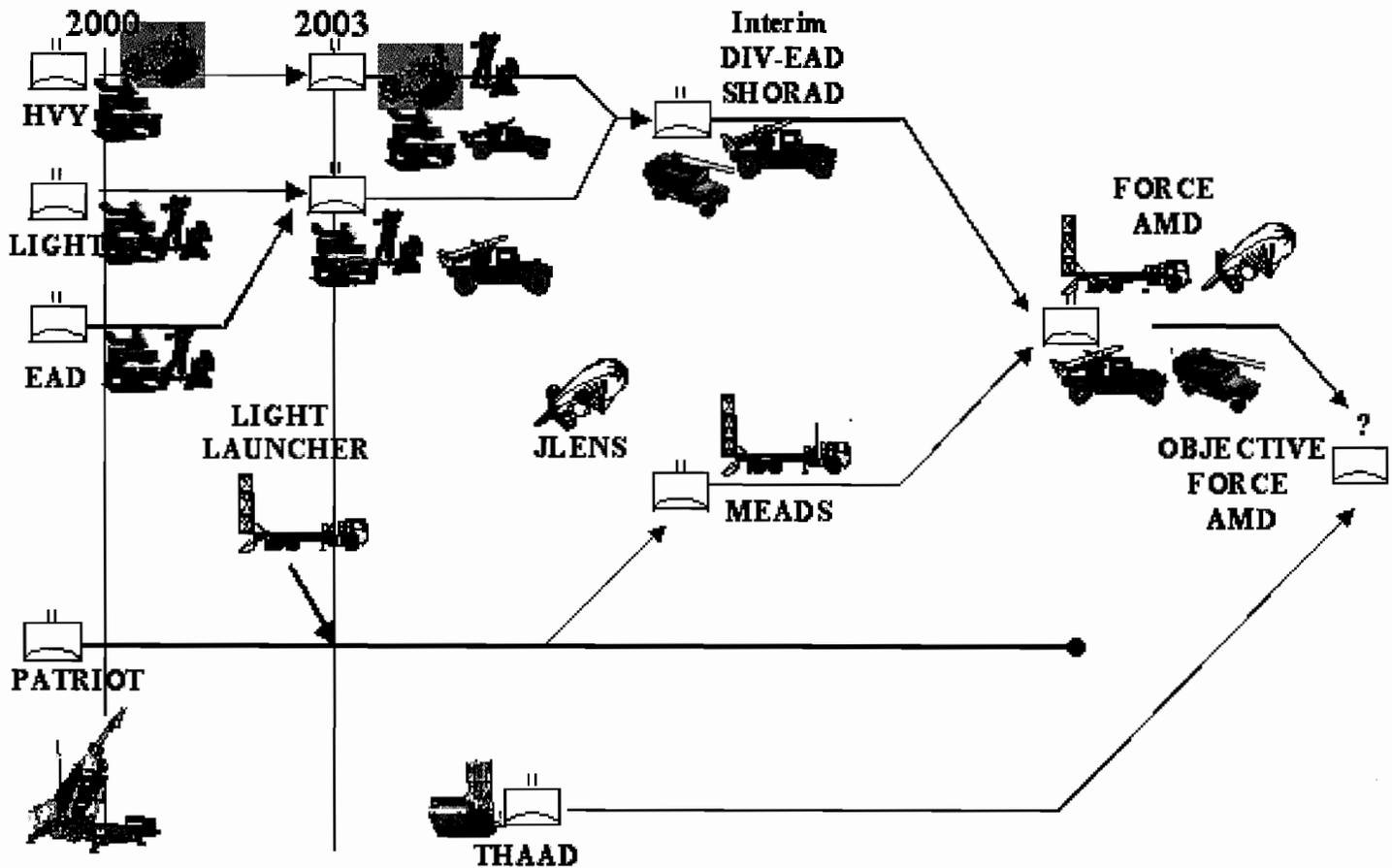
Before the advent of Sentinel and the Forward Area Air Defense Command, Control, Communications and Intelligence (FAAD C³I) system, we were "sensor-limited," i.e., we could not detect and track targets at the maximum range of our missiles. Today, we can see targets at tremendous ranges and pass data digitally to shooters, but we can't kill them at optimum ranges because our enhanced sensor range exceeds the range of our Stinger-based SHORAD force. This translates into lost battlespace that must be bought back. Replacing Stinger missiles with AMRAAM missiles appears to be the solution. The HUMRAAM (AMRAAMs mounted

have already demonstrated an ability to use external JLENS data/control to engage cruise missiles beyond line-of-sight. The JLENS also may have utility as a lower-cost anti-cruise missile complement to the PAC-3 missile in MEADS. Future experimentation is planned to test HUMRAAM's capabilities against large-caliber rockets.

The future HUMRAAM/Avenger mix will not only enhance combat power, it also will significantly reduce organization size. HUMRAAMs can overwatch non-contiguous division or brigade operations while the remaining Avengers can be employed in their primary configuration or can be modified to manportable Stinger team configurations. As another option, the Avengers can dismount individual Stinger gunners for integration into dismounted brigade combat team operations.

During Operation Desert Storm in 1991, Air Defense Artillery added the-

AMD Transformation Campaign Plan -- AMD Force



Full Spectrum Dominance -- Mud to Space --

ter ballistic missiles to its target list when U.S. Patriots engaged Iraqi Scuds over Saudi Arabia and Israel, but the biggest casualty creator on the battlefield has been, and will continue to be, rockets, mortars and artillery. In the past, the only good defense was entrenching tools, sandbags and prayer. But in June, the Tactical High Energy Laser (THEL) Advanced Concept Technology Demonstrator shot down a short-range Katyusha rocket during a closely watched test at White Sands Missile Range, New Mexico.

Israel hopes to deploy the THEL, which it has named the "Nautilus," early next year to protect its population centers against short-range rocket attacks. Israel is a small country that can be defended by a small number of relatively static but strategically located Nautilus systems. The U.S. Army,

on the other hand, needs an easily transportable, highly mobile system that can operate alongside maneuver forces to protect them in a variety of battlefield situations, anywhere in the world. The technology required to field the objective weapon system is maturing, but may still be a decade away. We envision this future SHORAD system, the Enhanced Area Air Defense (EAAD) system, could be a directed energy (DE) weapon that builds on THEL technology experience. It could also be some form of kinetic energy (KE) weapon or a combination of DE and KE kill mechanisms. Our intent is to move rapidly through the EAAD concept definition phase while taking advantage of the tremendous leaps in technology that occur each year.

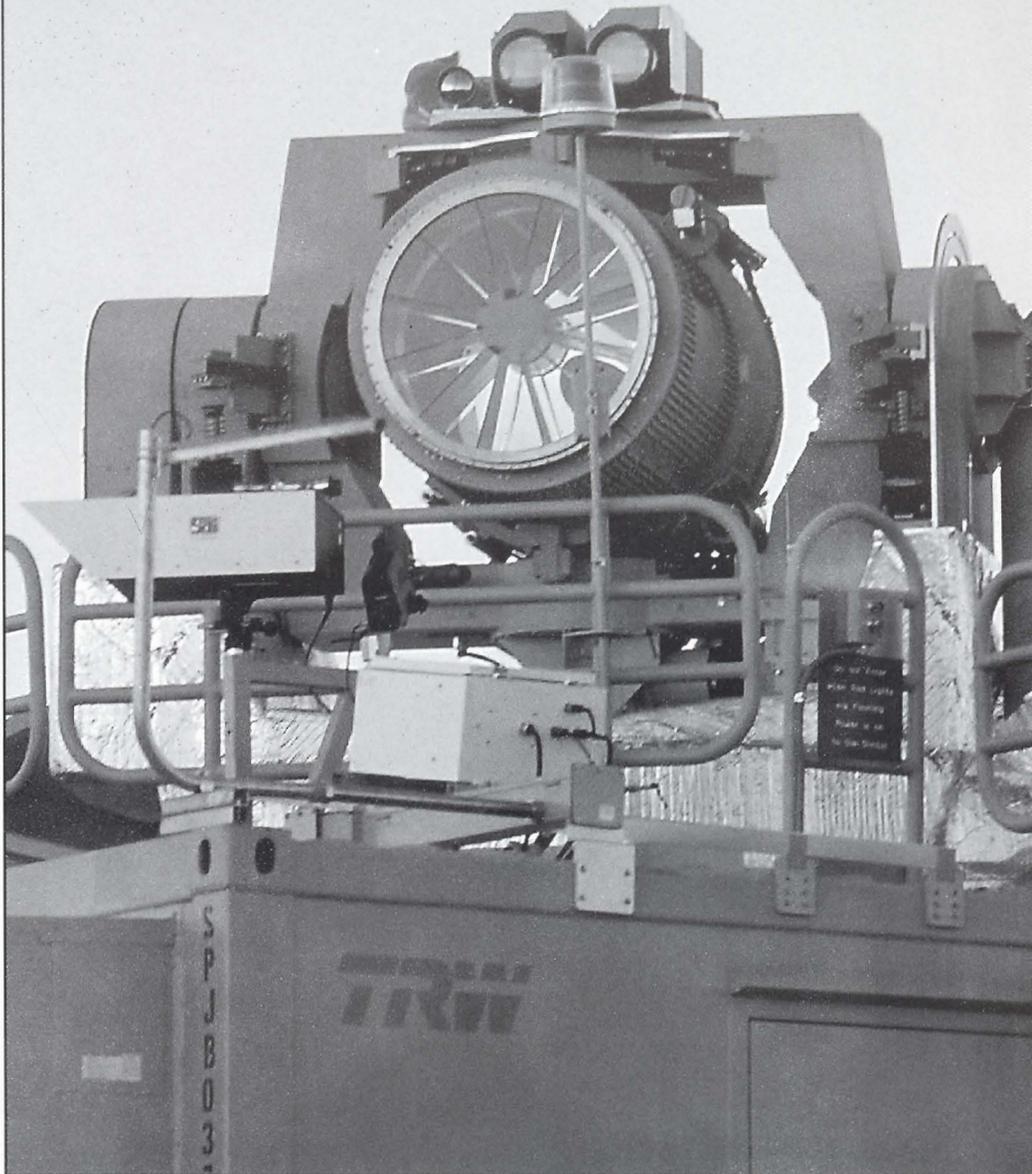
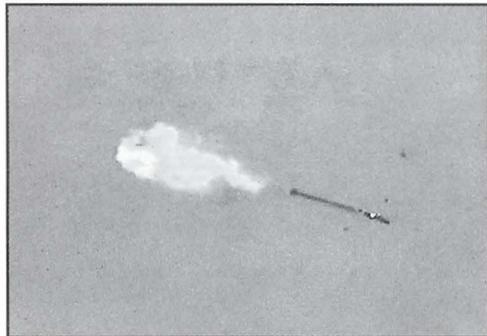
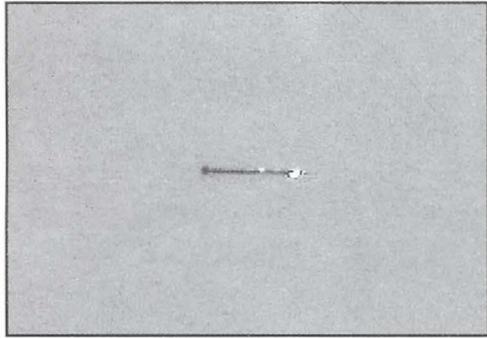
As technology allows, we will retire the, by then, aging Stinger-based Avengers and Bradley Linebackers and

field EAAD alongside HUMRAAM to achieve full overmatch against the non-theater ballistic missile third-dimension threat. By accomplishing the Avenger to HUMRAAM transformation in the active Army and Army National Guard simultaneously, we will reduce overall system requirements, retire manportable Stingers from the force, and provide comparable capabilities to both active and Army National Guard forces. We have established the following intermediate objectives for the SHORAD transformation.

- Field HUMRAAM, the key SHORAD "enabler," in cooperation with the Marine Corps
- Begin the SHORAD force organizational transformation as soon as the HUMRAAM capability is acquired.
- Field EAAD as technology allows to achieve overmatch against short-



Katyusha Rocket Kill - June 6, 2000,
White Sands Missile Range



range rockets, mortars and artillery threat.

•Retire the Stinger missile from the AMD force.

Turning Science Fiction Into Reality

"We've just turned science fiction into reality," declared Lieutenant General John Costello, Commanding General, U.S. Army Space and Missile Defense Command, the day the THEL Advanced Technology Demonstrator knocked a Katyusha rocket out of the

sky, appropriately enough, on June 6, the anniversary of another important date in American and U.S. military history.

Shortly after World War II, an anti-aircraft artilleryman writing for the *Antiaircraft Journal*, predecessor of today's *ADA Magazine*, noted: "No anti-aircraft artilleryman will ever be satisfied until he has a weapon with a muzzle velocity equal to the speed of light and a kill probability factor of 100 percent."

We're not quite there yet, but we are getting close.

Major General Dennis D. Cavin served as Chief of Air Defense Artillery and Commanding General, U.S. Army Air Defense Artillery Center, Fort Bliss, Texas, from July 1998 to August 2000. His new assignment is Commanding General, U.S. Army Recruiting Command.

OWN THIS PIECE

With increased defense capabilities, the new Boeing is helping to lead air and missile defense into the 21st century.



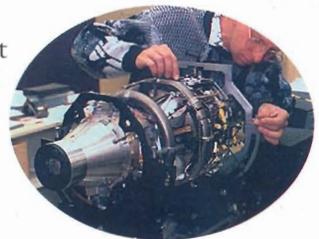
Air defense is essential to controlling the integrated battlefield of the future. That's why the U.S. Army and Boeing are working together on advanced programs for

A v e n g e r P a t r i o t (P A C - 3) B r a d l e y - L i n e b a c k e r

E OF PROPERTY.



theater, cruise and national missile and defense capabilities needed to protect our soldiers by
defense. These systems will controlling the most important
provide the vital information part of any battlefield—the sky.



FEL GBI SLID AWACS THAAD ASAT THEL

 **BOEING**



A Century of Air Defense

Key Events that Shaped Air Defense Artillery

by **Captain James D. Crabtree**

The 20th century saw great advances in military technology and tactics. The world went in a single century from bolt-action rifles and cavalry charges to tanks and “smart” weapons. It is no exaggeration to say the 20th century “made” Air Defense Artillery. Below are my selections as the key events that shaped the “First to Fire” branch.

Kitty Hawk

The first flight by the Wright Brothers in 1903 changed the way wars would be fought, although this was not immediately obvious. Powered flight altered the very nature of the air threat that had existed up to that point, from a passive one (observation) to an active one (bombing and strafing).

Germany’s World War I zeppelins, which conducted cross-channel bombing attacks against London, preceded

the airplane as the first active air threat. These early airships could not only navigate but could also carry enough bombs to cause considerable damage. However, the zeppelins would prove to have an insurmountable vulnerability to incendiary weapons and would be relegated back to use as passive air weapons after 1918, and then only rarely. The airplane proved to be the air threat of the future, as well as the cause of the zeppelins ultimate demise.

The emergence for the first time of an active air threat necessitated the development of countermeasures, among them fighter aircraft and anti-aircraft artillery. Even though dedicated anti-aircraft weapons had appeared earlier, in the form of “balloon guns,” this new form of artillery was distinct. It was more accurate, it could be aimed and traversed faster, and its rate of fire was far higher than anything previously used. Although other innovations would be needed to make it a truly for-

midable weapon, anti-aircraft artillery was created in response to the airplane as developed by the Wright Brothers, and would remain the mainstay of ground-based air defense for the next 40 years.

Decision To Deploy Coast Artillery In World War One

When the order was sent out to send the Coast Artillery to Europe, not in its role as an anti-shipping arm but as an anti-aircraft arm, a new way of warfare was introduced to the U.S. Army. Armed with its own doctrine, tactics, and weapons, coast artillerymen fought a unique battle parallel but separate from the infantrymen, gunners, and troopers of the American Expeditionary Force.

Secretary of War Newton D. Baker made the decision to include an Anti-aircraft Service in the American Expeditionary Force being prepared for duty in Europe based upon the

observations of U.S. Army officers sent to the theater to evaluate military requirements. Coast Artillery gunners were chosen because of their experience with moving targets and because the Royal Navy blockade of the German High Seas Fleet minimized the threat to the American coast.

Prior to World War One the soldiers of the Coast Artillery Corps were not taken seriously by other branches of the service. Coast Artillery, by its very nature, always operated out of well-built fortresses, in areas like Boston or Los Angeles, a far cry from the desert outposts in the west manned by the Cavalry and the Infantry. It's little wonder that their Army nickname was "the Comforter Corps."

But in Europe the Coast Artillery Corps shared the trenches and the discomfort of operating near or on the front lines. They manned their guns within range of German heavy artillery and stood ready whenever there was a chance of enemy airplane activity. The anti-aircraft gunners often occupied the

same location as the target the enemy planes wanted to destroy and sometimes became targets themselves. Life in Europe was a far cry from life in Boston for coast artillerymen.

The coast artillerymen learned much from the AA gunners of France and Britain, such as the intricacies of gun-laying and the use of sound detectors and searchlights. Not only did the U.S. gunners learn these skills, towards the end they surpassed their teachers in AA accuracy. These skills and experiences would not have been possible without the initial decision to deploy the Coast Artillery. And if the introduction of the airplane directly led to the creation of true anti-aircraft artillery, then the deployment of Coast Artillery in the anti-aircraft role led to the creation of an independent Air Defense Artillery branch.

The Caliber Board

The next important event followed the end of World War I. The Caliber Board (also known as the Westervelt Board,

for its chairman) was established to look at the whole question of modern artillery material and its distribution. The First World War had caught the U.S. Army unprepared for the artillery changes which had overtaken the European powers. Most field artillery pieces and all anti-aircraft artillery used by Americans in World War One were made in France or England because quality American weapons were not available in necessary numbers.

The Caliber Board looked at the characteristics of individual artillery pieces developed by all the major combatants of the recent war. Guns were tested for their range, their destructive power, their rate of fire, and factors like mobility and maintainability. Experiences in the First World War were also kept in mind for the utility of these weapons.

As a result, a new series of field artillery weapons were adopted, in effect establishing the "echelon" type of artillery support enjoyed by the U.S. Army to this day. More important from

**YOU CAN
hear
IT SOMETIMES...**

www.littondatasystems.com

SOFTWARE — you can't see it, touch it, fly it, or fire it, and it won't keep you warm and dry. But if it's good, you can hear it sometimes.

And you can see what it does right there on your screen. Our BMC4I software shows you where the missiles were launched and when the intercept will take place and how effective your hit was, along with a myriad of other critical real-time information you need to know for fast and intelligent battlefield decisions.

Listen ... you'll see what we mean.

Litton
Data Systems

the perspective of ADA was the recognition of a permanent need for antiaircraft artillery and the decision to develop 3-inch and 4.7-inch guns antiaircraft guns to arm the force. While development of the guns did not proceed at a rapid pace, the recognized need for such weapons led to antiaircraft units being placed in the permanent table of organization of U.S. Army units. At this time, the antiaircraft units organized in France had been disbanded and return to Coast Artillery duties, but now they began to be reorganized. An air defense presence has remained in the Army ever since, regardless of budget cuts or technological changes.

The Invention of Radar

Radar revolutionized air defense. One might even say radar made modern air defense possible. Radar provides early warning of enemy aircraft, it supplies guidance to antiaircraft weapons, and it allows for integrated air defense networks, or an orchestrated air defense.

Development of radar was led by the British during the 1930s. British scientists noted the physical effect of radar beams on objects, in effect reflecting off of them. The significance of this was not lost on the British, who recognized that security of their island-nation no longer depended on mastery of the sea but on superiority in the air. By the outbreak of World War II they possessed a nominally effective device that could locate aircraft in flight.

It made the difference between success and failure, between victory and defeat for the British in 1940. Germany, having defeated or neutralized all other potential enemies on the continent, turned its attention to Great Britain. So long as the English Isles remained unoccupied, it would provide air bases from which bombing attacks could be launched and a potential staging area for amphibious invasion. But to invade Britain the Luftwaffe would first have to gain air superiority; until that was done invasion was out of the question.

Radar prevented a German victory, despite the inferiority in numbers of the Royal Air Force, during the Battle of Britain. With so few aircraft left, the RAF had to be able to remain on the ground until the last possible moment, then find enemy air formations without fail. Instructions to RAF aircraft based on radar information maximized British resources . . . but even then it was a close thing.

Radar has been the key to every successful air defense network since World War II.

Proximity Fuze

The proximity fuze increased the lethality of antiaircraft guns in a way not possible even for well-laid, well-planned ground-based air defense networks. The proximity fuze made it possible, if not to always hit the target, to at least damage it with near-misses.

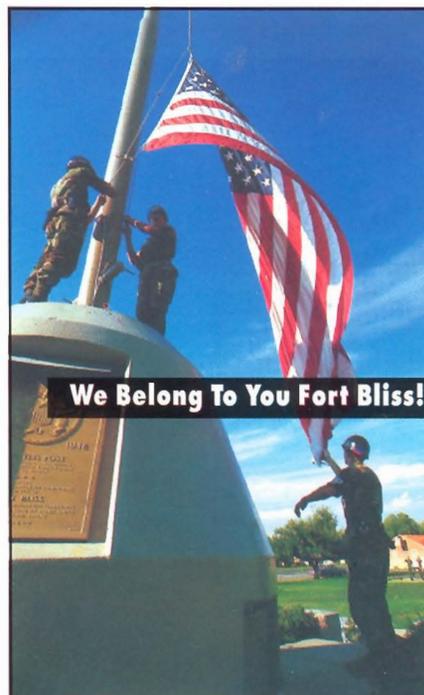
The proximity fuze is a kind of miniature radar, designed to detonate its shell when a nearby object begins moving away. Prior to proximity fuzes the range to a target was esti-

mated and, in the most advanced antiaircraft artillery pieces, automatically set in a mechanical fuze after being mathematically derived. The problem lay in the possible error in timing due to the erratic course of the target or a mistaken range reading, or even human error. The proximity fuze allowed the shell to detonate closer to the target than was possible except through sheer chance.

Proximity fuzes were used with great success over England and arrived on the continent just in time to meet the threat posed by V-1s, the first cruise missiles. The jet-powered V-1 was a difficult target to hit, even with radar guidance of the guns. But proximity fuzes destroyed or critically damaged the great majority of the "buzz bombs" well before they could hit London. Later in the war, U.S. antiaircraft gunners took advantage of the deadly fuze to shoot down most of the V-1s targeted against the vital Port of Antwerp.

Ballistic Missile Development

The launching of the first German V-2 rocket at London in 1944 changed forever the essential nature of the air threat, just as the first powered flight at the sand dunes of Kitty Hawk had. No longer did enemy aircraft approach thier target on a relatively level course. No longer were pilots concerned with returning to home base. No longer were target aircraft flown at subsonic speeds. The ballistic missile had made its debut.



Fort Bliss Federal Credit Union serves the financial needs of all active duty, retired military, and civilians assigned to Fort Bliss, Biggs Field and William Beaumont Army Medical Center, plus any relative of current members. Call us today and we'll be glad to talk to you about all of our financial services.

- Mortgage Loans
- ATM locations
- Free Checking
- 24-Hour Voice Response
- Savings Plans
- Remote Banking
- Low Interest Loans & Credit Cards



Fort Bliss Federal Credit Union

1741 Marshall Road - Fort Bliss
4650 Transmountain Rd.
WBAMC - 1st Floor
562-1172 • 1-800-351-1670
www.fbfcu.org • cumail@fbfcu.org

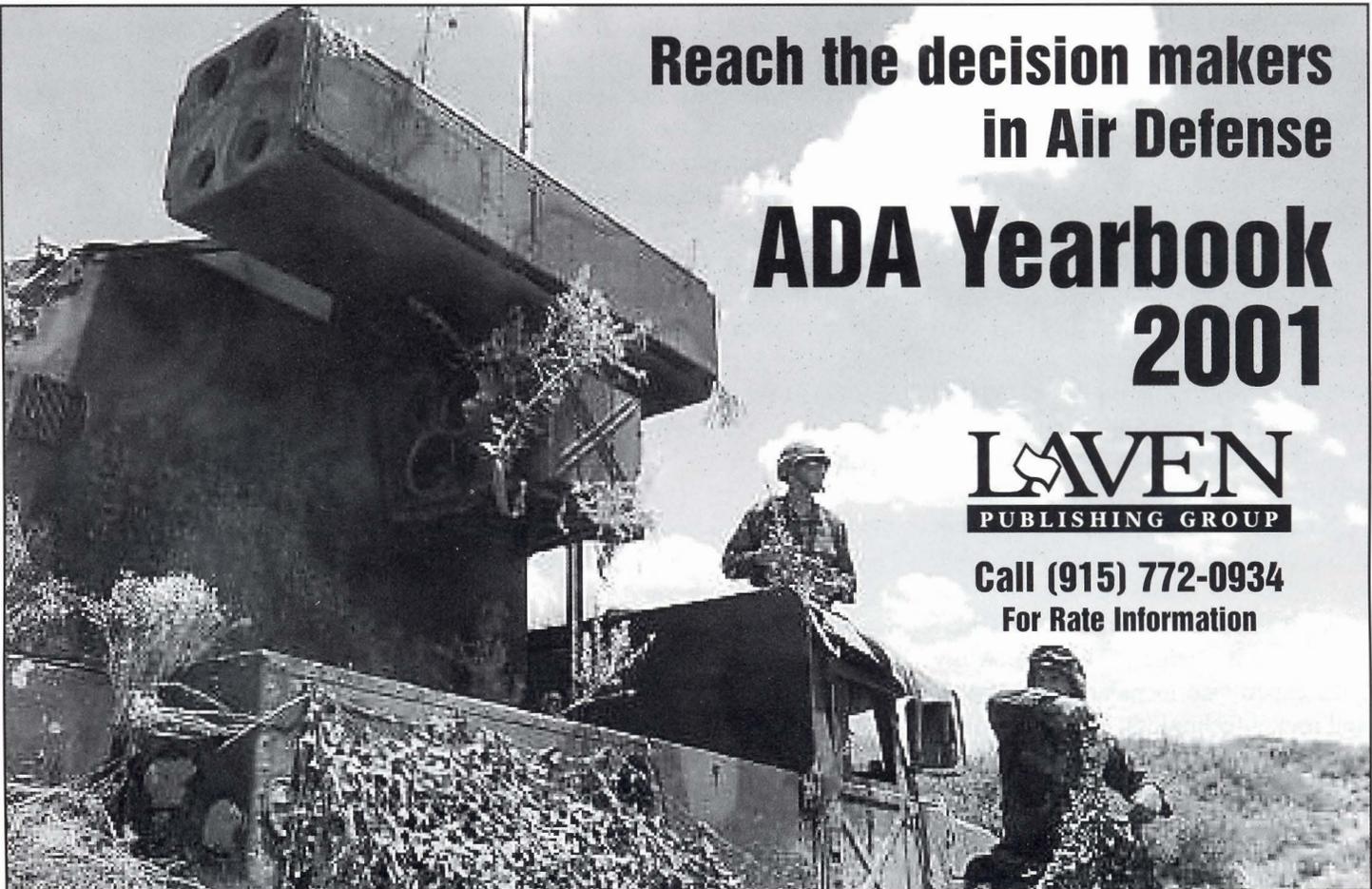


ADA ASSOCIATION

ADA Yearbook 2000 is published by The Laven Group, 1420 Geronimo, El Paso, Texas, 79925, on behalf of the U.S. Army Air Defense Artillery Association. The ADA Association is a private organization formed in 1980 as the replacement for a nonappropriated fund activity formed in 1975. It operates under (1) the provisions of Army Regulation 210-1, Private Organizations on Department of the Army Installations; (2) IRS Code 501 © (3), tax exempt nonprofit status; and (3) a Constitution and Bylaws which are periodically examined and evaluated. All donations to the Association are tax deductible.

The goals of the Association are to support Air Defense Artillery soldiers and retirees, to foster a spirit of unity and esprit de corps among members of the Branch and to provide both moral and financial support to the Air Defense Artillery Museum and other programs of the Fort Bliss Museums Division. The Association has more than 7,345 individual life members, 80 corporate members, four business partners and six chapters. Lifetime membership in the Association is offered to anyone committed to Air Defense Artillery.

For more information on the Air Defense Artillery Association, call (915) 568-2711 or write to the ADA Association at P. O. Box 6101, Fort Bliss, Texas 79906. You may contact the ADA Association by e-mail at fannine@emh10.bliss.army.mil. We invite you to visit our web site (<http://www.firststofire.com>).



**Reach the decision makers
in Air Defense**

**ADA Yearbook
2001**

LAVEN
PUBLISHING GROUP

**Call (915) 772-0934
For Rate Information**

One might argue that the V-1 flying bomb did the same thing, only slightly earlier. However, the V-1 was merely an unpiloted version of an aircraft; it was faster, because of its jet engine, and was not designed to return to home base, but it was still an airplane. The V-2 was something else altogether: a supersonic projectile that flew almost straight down on its target.

Although methods were looked at to defeat the V-2, nothing available in World War Two was capable of defending against it. And nothing would be available in the 1950s and 1960s either, even when the ballistic missile was mated with nuclear warheads. Because there was nothing available to defend against a missile attack, the logical step of deterring such an attack came about, primarily through retaliation in kind. Mutually Assured Destruction, as it came to be known, was based on the acceptance that the enemy would not attempt to kill us, because we would in turn kill him, to put it bluntly.

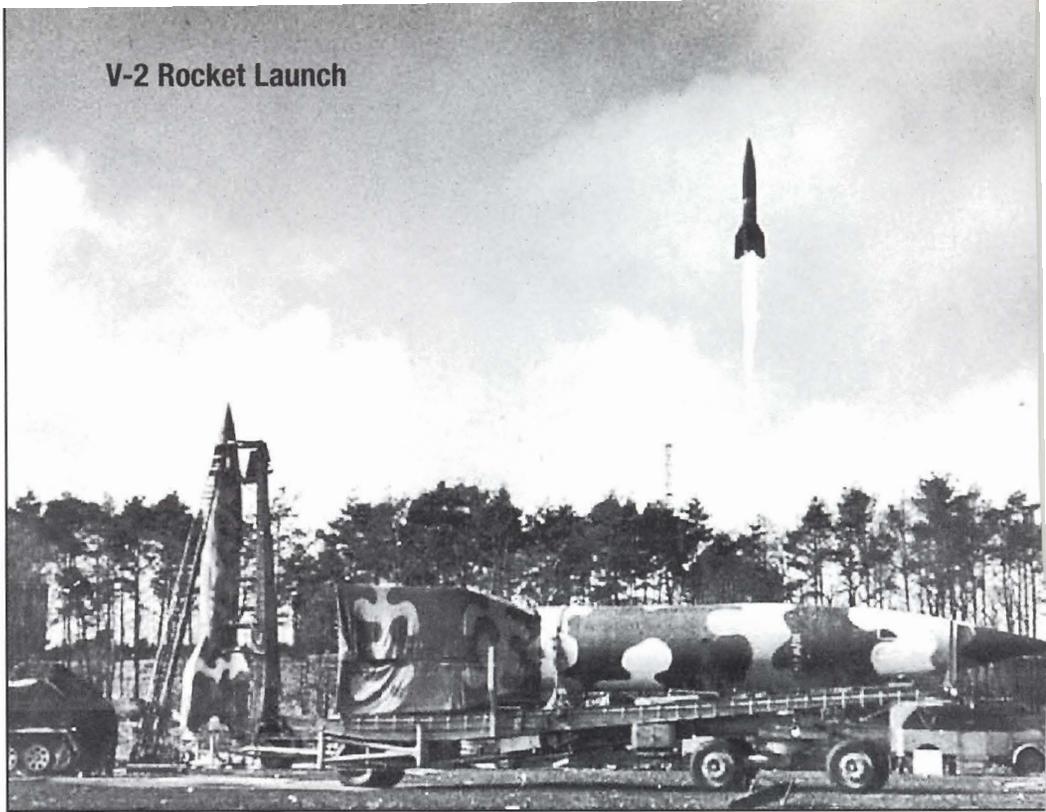
This mindset became so ingrained that, today, the United States' efforts to develop a limited National Missile Defense against missile strikes by rogue states is opposed by nations that fear it might upset the balance of nuclear terror.

Deployment of Nike

The end of World War II left the United States the premier military power in the world, having built up a huge conventional military force, a strategic bombing capability, and the atomic bomb. The U.S. Army would go one step further in defense: surface-to-air missiles.

Germany had attempted to adapt some of their ballistic missile research to anti-aircraft missiles, but the war ended before a practical weapon system could be fielded. The U.S. Army took experience in radar development and rocket technology gained from the defeated Germans and put it together in the Nike missile system.

Though primitive by modern standards, Nike represented a great leap



forward. The destruction of enemy aircraft was no longer expressed in terms of hundreds of shells fired but in terms of the probability of success of a single missile.

Missiles would supersede artillery weapons in the 1950s, for all but close-range tactical air defense. In the United States the concept of an air defense network protecting the nation from attack saw expression in the Army Air Defense Command (ARADCOM) and its battalions of Nike missiles protecting American cities. ARADCOM was deactivated in the 1970s, and the last Nike unit was deactivated a few years later, but Nike proved to be a strong foundation for later systems, such as Hawk and Patriot, and it gave the U.S. Army truly formidable anti-aircraft capability.

ADA Becomes a Separate Branch

The separation of Air Defense Artillery from Field Artillery and its establishment as an independent branch made it possible for ADA to develop its own doctrine, to oversee the professional development of officers and NCOs within its field, and to build esprit.

For the better part of the 20th century, Air Defense Artillery was part of some other type of artillery organiza-

tion. From its beginning, anti-aircraft artillery was formed from and remained part of the Coast Artillery Corps (CAC). Even as AAA became more mobile and automatic weapons played a greater part in tactical air defense, it remained a part of the static CAC. When the CAC was dissolved as an Army branch in the 1950s, both Field Artillery and AAA were placed under the Artillery branch, symbolized by the crossed cannons and missile emblem.

The missions of the two services could not be more different: Field Artillery was concerned with the destruction of surface targets, usually targets which were in contact with friendly surface forces. Air Defense Artillery was concerned with aerial targets.

Finally, General Order No. 25, issued June 14, 1968, established Air Defense Artillery as a basic branch of the Army. Surface-to-air missiles and automatic weapons of the Artillery branch came under the control of Air Defense Artillery, while ballistic missiles and tube artillery came under the Field Artillery branch. The Field Artillery branch insignia reverted to the plain crossed cannons while ADA retained the missile-and-cannon insignia.



Redeye

Development Of Redeye

When the Redeye short-range missile system was placed in the hand of air defenders it gave a single soldier the ability to bring down an enemy aircraft. True, it was a single-shot weapon and it was a “revenge weapon” only useable after the enemy aircraft had passed, but the Redeye became the basis of other shoulder-fired anti-aircraft missiles, such as the Stinger and the SA-7 Grail. Potentially, every platoon could have an air defense capability for the first time since the jet came to dominate the battlefield.

This development proved its importance in the 1980s in Afghanistan, when Mujideen freedom fighters employed SA-7s and Stingers to combat Soviet airpower. The Stinger, a second-generation man-portable air defense systems, was highly effective against Soviet helicopters, even those equipped with infrared countermeasure devices.

In the end, the Soviets had to withdraw from Afghanistan, all but beaten by an enemy with no air force, no artillery, and no armor . . . but they did have Stinger, a direct result of Redeye’s invention.

ABM Cancellation

The deployment and speedy inactivation of the Safeguard Anti-Ballistic

Missile system was another significant event in the history of Air Defense Artillery. Although obsolete by today’s standard, the Safeguard was the first practical anti-ballistic missile (ABM) system. It employed long-range Spartan missiles and super-fast Sprint missiles to provide a defense capability against an enemy ICBM attack.

Political concerns overcame the military problem of missile defense. The United States signed a treaty with the Soviet Union that limited each country’s ability to construct ABM

systems. Despite the Soviets’ increasing ABM capability, political concerns mounting over potential East-West confrontation resulted in the cancellation of the U.S. ABM system, set to defend U.S. Air Force ICBM silos in northern states, soon after it became operational.

Though seemingly a footnote, the ABM system of the 1970s represents a lost opportunity. Had the Safeguard system remained in place into the 1980s, it could have been upgraded as part of the Strategic Defense Initiative. Experience and technological development would have provided a basis for the National Missile Defense that the armed forces of the United States has been charged with developing by Congress.

The Sergeant York Gun And FAAD

The winter of 1986 was the winter of Air Defense Artillery’s discontent. Secretary of Defense Caspar Weingberger’s abrupt cancellation of the Sergeant York Gun, which was to have protected the maneuver force at the forward edge of the battlefield, threw the branch into a crisis. However, out of the ashes of the Sergeant York Gun, arose the Forward Area Air Defense (FAAD) system, a “system of systems” approach to the

Sergeant York Gun



problem of protecting the maneuver force.

The FAAD concept was pioneered by Col. John H. Little, a future chief of branch, and Maj. Michael A. Vane, today the commanding general of the 32nd Army Air and Missile Defense Command, under the guidance of Maj. Gen. Donald R. Infante, then Chief of Air Defense Artillery. It was a Cold War system never completely fielded as originally envisioned. However, it produced today's Avenger, Bradley Linebacker and FAAD Command, Control, Communications and Intelligence system. Today, the system of systems approach to air defense still dominates both High- to Medium-Altitude and Short-Range Air Defense doctrine.

First Scud Intercept

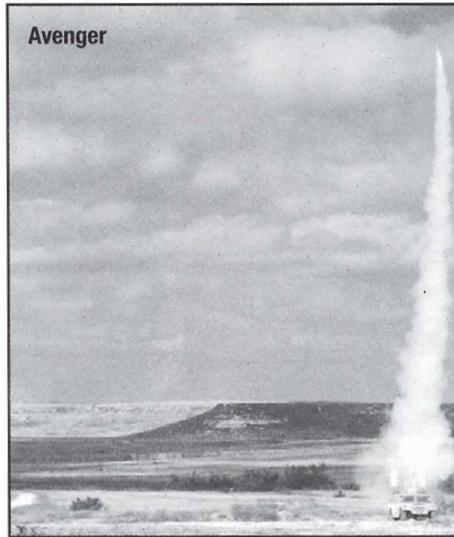
Although it was far from being a "leak-proof" missile defense, Patriot proved that it was possible to intercept and destroy enemy missiles. The ABM debate closed in the 1970s was reopened in the 1990s by the successful intercept of tactical ballistic missiles in the Gulf War.

When the air campaign was launched against Iraq in 1991, Saddam Hussein responded the only way he had at his disposal: he launched modified SS-1 missiles, code-named "Scuds," at targets in Israel and Saudi Arabia. Iraq had developed a significant tactical ballistic missile force during its long war with Iran and believed the TBMs to be the key to breaking the morale of the Coalition forces and the cohesion between the Arab and Western members.

Whatever merit this strategy might have had was made moot by Patriot. The destruction of the first Scud on January 15, 1991, dispelled the conviction held by many military experts that missiles would always get through. In all, more than 80 Scud missiles were fired during the war, and most were intercepted by Patriot.

Although it was recognized at the time that the system needed improvements in target evaluation and warhead

kill capability, the use of Patriot in the Gulf created a determination to build more effective theater missile defense weapons and inspired the National Missile Defense initiative. Patriot pointed the way to a true Air and



Missile Defense Force and the promise of an effect missile shield for the nation in the 21st century.

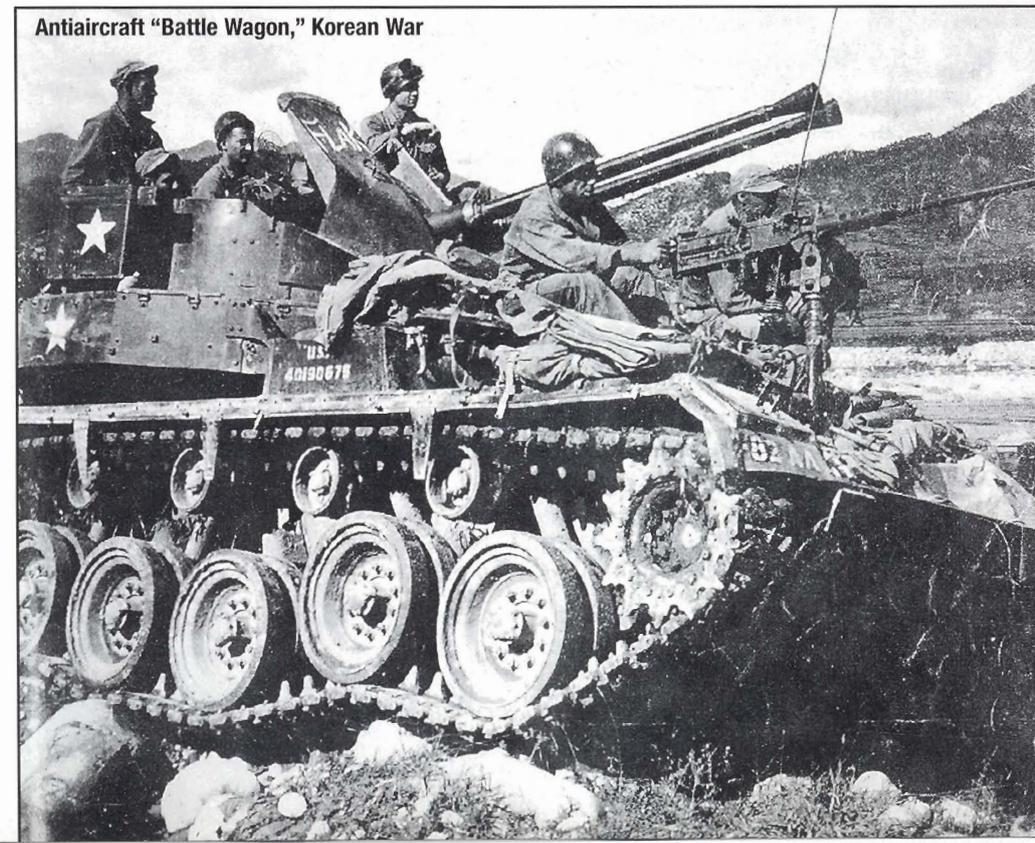
ADA Warrior Image

"We had a certain type of anti-aircraft gun, mounted on a half-track, which required two men to fire," wrote Ernie Pyle, World War II's legendary war correspondent. "The gunners sat in

metal seats just back of the guns. An infantry lieutenant named Lennie Bessman was lying near this ack-ack outfit during a terrific dive-bombing and strafing, and he kept his eyes on those two special gunners at the Stukas came down right upon them. The two never wavered. That set there firing until suddenly and in unison they toppled sideways out of their seats—dead. And all within the same instant two more Americans rose like twins from the bed of the half-track, took their seats just vacated by death, and went right on with the firing. Lennie was terribly moved by that little drama of duty automatically performed, and he almost choked up when he told the story."

On the battlefields of Europe and the Pacific, astride Korea's tortured ridge lines, amid the jungles and rice paddies of Vietnam, and across Southwest Asia's desert expanse, ADA soldiers of the 20th century earned a well-deserved reputation for valor and self-sacrifice—a lasting legacy they now bequeath to ADA soldiers of the 21st century.

Captain James D. Crabtree, an ADA officer and Gulf War veteran, is the author of *On Air Defense*



First to field...First to digitize - FAAD C2I



Regional conflicts have dramatically changed the system requirements necessary to rapidly counter emerging threats and weapons. That's where the Short Range Air Defense Command and Control System known as FAAD C2I (Forward Area Air Defense Command, Control and Intelligence System) comes in.

FAAD C2I was the first in the series of the U.S. Army's Tactical Command and Control

systems that initiated the digitization of the battlefield, helping protect ground forces against enemy air assets while protecting friendly aircraft.

This state-of-the-art system provides mission response times measured in seconds, facilitating joint and combined operations by processing air picture information in near-real time.

As prime contractor for FAAD C2I, TRW's leading-edge integration technology helped field this critical air defense program.

TRW. Taking command and control into the 21st century.

TRW

Where Performance Counts

"Based on Tradition..."



...Poised for the Future"



MEVATEC CORPORATION
Huntsville, AL - (256) 890-8000
WWW.MEVATEC.COM



When our troops need the best equipment, we answer the call.

Over the years and during conflicts around the world, the American soldier has been there.

And, when our troops have needed the support of the latest warfighting technology, Raytheon has answered the call. On today's battlefield, the survivability of soldiers and their critical assets depends on effective air and missile defense – on systems that can be relied upon to get the job done. Radar to detect hostile, third dimension intruders, and best-in-the-world missiles to deliver the knockout punch when critical decisions for response are made.

Whatever the threat, wherever the battlefield, we are there. Make a call, or visit www.raytheon.com

Sentinel, HUMRAAM, THAAD Radar, Patriot and Stinger

Raytheon