ADA

AIR DEFENSE ARTILLERY SEPTEMBER-OCTOBER 1991

We hit what we shoot at.

Whether shooting for the deployment date to field an effective Theatre High-Altitude Area Defense System, or demonstrating our proven ability to hit high altitude targets at extremely high closing speeds, Team Hughes can do.

By applying hardware, software and advanced technology developed on SDI and tactical programs, Team Hughes combines proven development capability with a history of on-time, on-cost performance.

Add to our combined technology base the highest level of management commitment to the program.

Then decide which team can offer America and her allies the greatest protection with the least risk.

T E A M

HUGHES

THAAD

FIRST TO FIRE

HUGHES • LTV • SPARTA • TRW • GE • THOMSON-CSF

SUBSCRIBE TODAY!

AIR DEFENSE ARTILLERY MAGAZINE

- ❑ Renewal
- ❑ Active Army
- ❑ Retired
- ❑ Veteran
- ❑ Civilian
- ❑ Industry
- ❑ New
- ❑ USMC
- ❑ USAF
- ❑ USN
- ❑ ARNG
- ❑ ROTC
- ❑ Payment Enclosed
- ❑ Visa/MasterCard

\# _____

Expires _____

One Year Subscription = 6 Issues
Domestic ($14) Foreign ($30)

NAME _____

ADDRESS _____

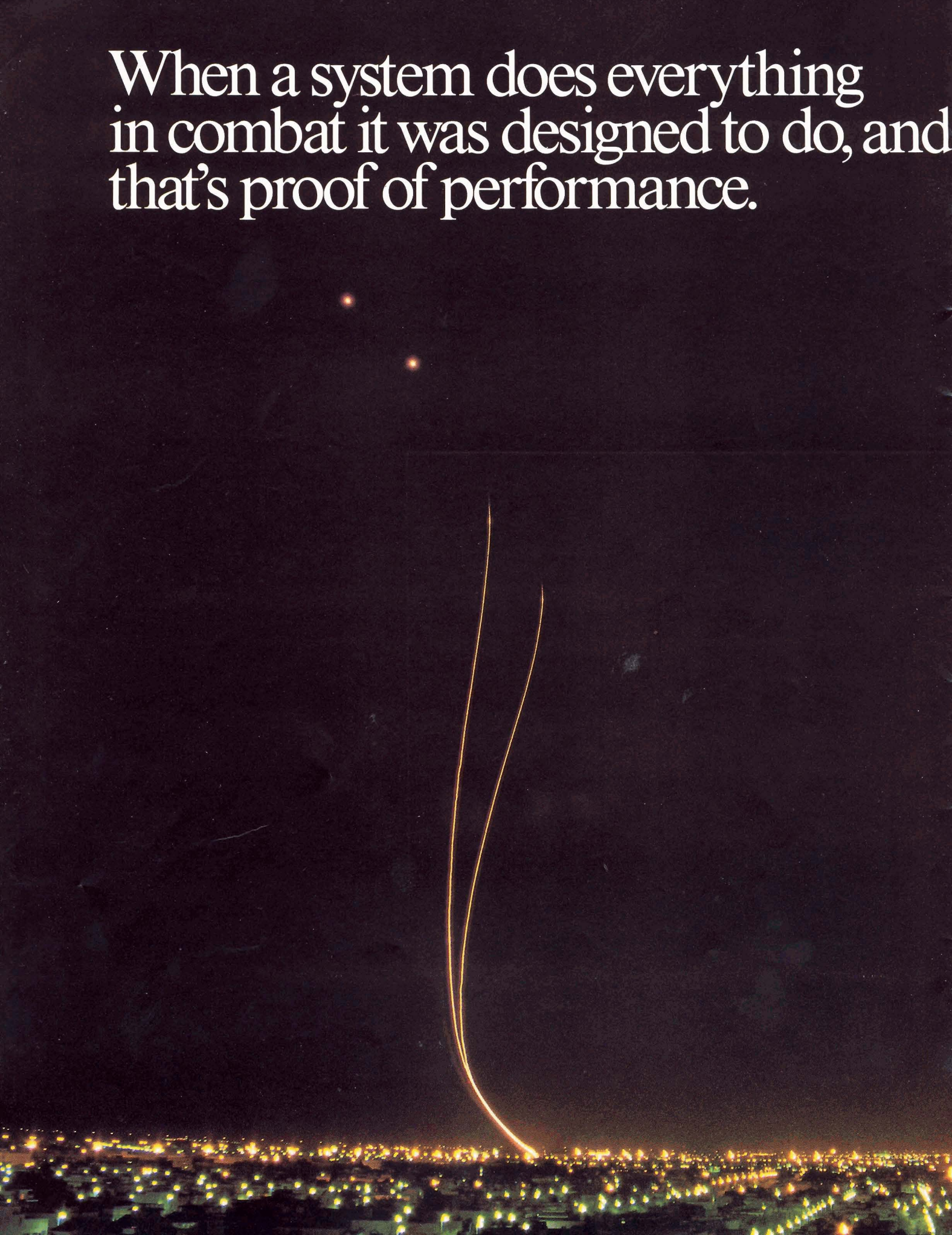
CITY _____ STATE _____ ZIP _____

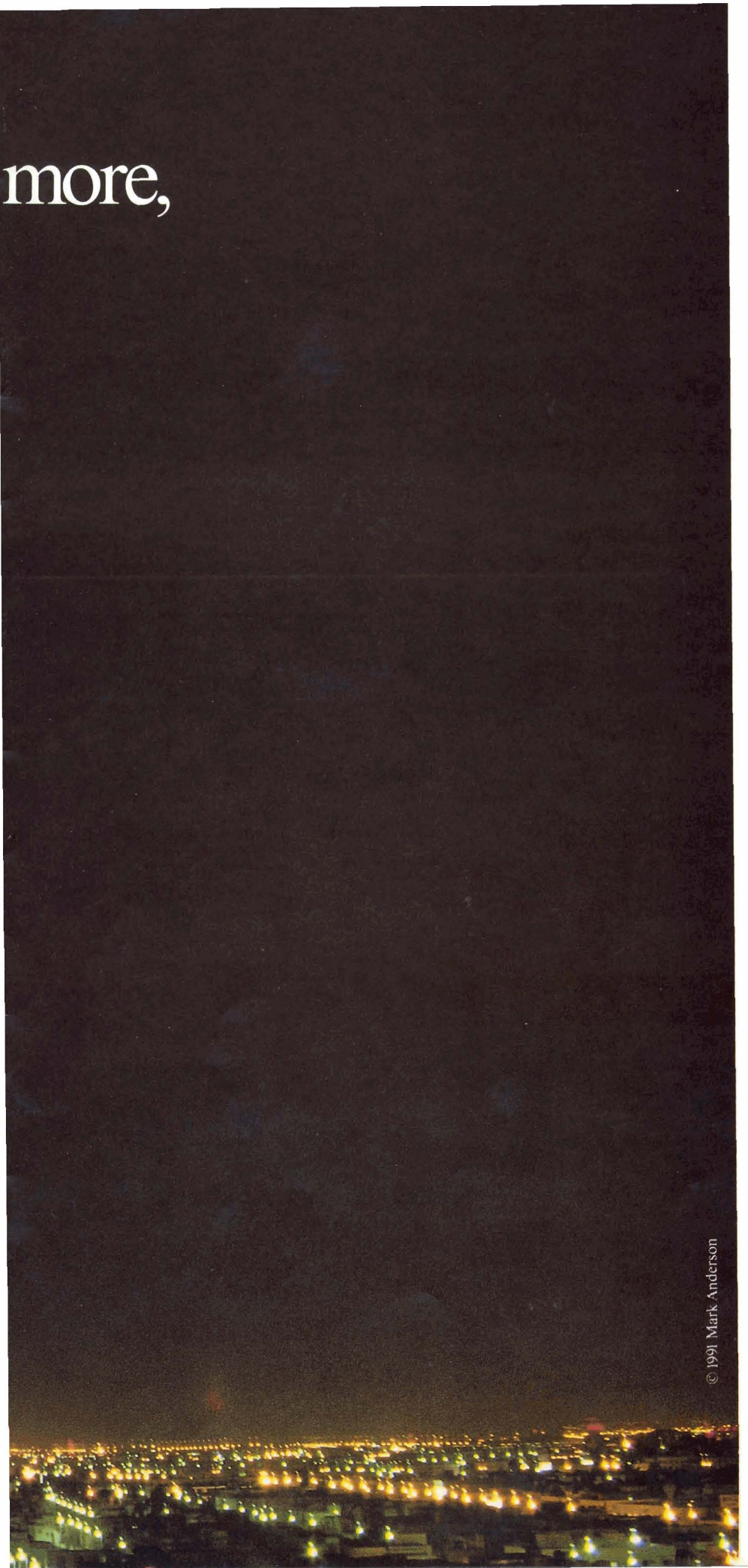
UNIT _____ RANK _____ BRANCH _____

SIGNATURE _____

MAIL TO: ADA Association, P.O. Box 6101 , Fort Bliss, TX 79906

When a system does everything in combat it was designed to do, and that's proof of performance.





Literally overnight, the world suddenly became aware of the Patriot air defense system as it knocked down Scud missiles in the skies over Israel and Saudi Arabia.

On January 18, 1991, a Patriot missile established a first by intercepting an incoming missile under hostile conditions.

But the U.S. Army and Raytheon are not resting on their laurels. Lessons learned are already being incorporated into the Patriot growth program to expand the system's capability against advanced tactical ballistic missiles and aircraft:

- A new multimode seeker being developed cooperatively with Germany is currently undergoing tests at White Sands Missile Range.
- Expansion of the system's capability to detect and track low radar cross section targets is being implemented through low risk radar enhancements.
- The footprint of coverage has been increased by locating the launchers further away from the phased array radar.

Whether its a contingency mission, or theater defense against advanced aircraft, TBM's, or cruise missiles, Patriot stands ready to defend today and into the future.

On land and sea and in the air, Raytheon-produced systems are proven performers, in more ways than one.

Raytheon Company, Government Marketing, 141 Spring Street, Lexington, MA 02173.

Raytheon

AIR DEFENSE ARTILLERY SEPTEMBER-OCTOBER 1991

FEATURES

Special Working Group Shapes ADA's Future 4

Air Defense Artillery School task force integrates the branch's high- to medium-altitude air defense capabilities with emerging high-altitude tactical missile defense capabilities.

Industry Responds to TMD Challenge . . 6

Giants of weapons industry team up to compete for theater high-altitude area defense contract.

Safeguard 9

Abandoned missile silos are a relic of discontinued mission — the defense of the continental United States against missile attack.

The Air Defense of Kuwait 19

Kuwaiti Hawk batteries battle Iraqi aircraft during August 1990 invasion.

North to Canada 22

U.S. Army Air Defense Artillery School exchange officer reports for a tour of duty at the Canadian Air Defense Artillery School.

Women of Bravo Battery 26

ADA women survive media glare, Arabic culture and the hazards of the battlefield as they move north into Iraq.

DEPARTMENTS

Intercept Point 1

Vapor Trails 14

ADA Forum 31

CORRECTION

Information presented in "FAAR Removal Impacts on Personnel," July-August 1991, was incorrect. The 24MX7 *will* remain in the unit as Vulcan system mechanic without the ASI X7, but *will not* become the maintainer for the LSDIS.

Cover art by John Paul Jones

Maj. Gen. Donald M. Lionetti
Commandant, USAADASCH

Blair Case
Chief, ADA Publications Division

Lisa B. Henry
Editor-in-Chief

Hubert L. Koker
Editor

Kathleen Cover
Assistant Editor

John Paul Jones
Contributing Illustrator

ADA is a professional journal devoted to the advancement of the art and science of air defense artillery in the U.S. Army and is published by Image Southwest of Texarkana, Texas, on behalf of the Air Defense Artillery Association. Articles appearing in *ADA* do not necessarily reflect the opinion of the officers or members of the Air Defense Artillery Association, the U.S. Army Air Defense Artillery School, the Department of the Army, or Image Southwest. Except for advertising, this version of *ADA* contains the same editorial information published in PB-44, the official professional development bulletin compiled by the U.S. Army Air Defense Artillery School.

POSTMASTER: Send address changes to *ADA* Magazine; ATTN: ATSA-ADA, Bldg. 55; Fort Bliss, TX 79916-0002.

CORRESPONDENCE: Address articles and letters to Editor, *ADA* Magazine; ATTN: ATSA-ADA, Bldg. 55; Fort Bliss, TX 79916-0002.

SUBSCRIPTIONS: May be obtained by contacting the Air Defense Artillery Association, (915) 562-0665, or writing Air Defense Artillery Association, P.O. Box 6101, Fort Bliss, TX 79906. A check or money order payable to the ADA Association must accompany all subscription requests. Subscription rates are $14 for domestic (including APO and FPO) addresses and $30 for foreign addresses for a one-year subscription (six issues). Individual copies are $3 domestic and $3.75 foreign.

ADVERTISERS: Query Image Southwest, (903) 793-5528, for advertising rates and schedules.

Image/Southwest

Terry J. Lewis
Publisher

John M. Case
Production Manager

Mellie Harding
Graphics Design

Carol Dycus
Data Processing

Glynn Leach
Advertising Representative

Intercept Point

This issue's cover featuring the cutaway view of a theater high-altitude air defense (THAAD) engagement control center springs from an artist's imagination. Any number of alternate configurations are possible, for the technological base that will produce the new air defense system is rich and varied. But the illustration's high-tech, multi-windowed, soldier-engineered display screens with their three-dimensional graphics offer an accurate representation of the broad vistas opening up for Air Defense Artillery. The entire defense community is hard at work re-imagining the high end of Air Defense Artillery for the 21st Century.

During the Gulf War, our Patriot batteries, by successfully intercepting Iraqi Scuds over Saudi Arabia and Israel, dramatically demonstrated that anti-missile technology works. Instantaneously reported via blanketing television coverage, images of Scuds that fell outside Patriot's engagement parameters, sometimes crashing into residential sections, created a national mandate for a much stronger missile defense. Today, Air Defense Artillery is challenged to strengthen the lower and to erect an upper tier of an active theater missile defense (ATMD) shield that can defend host-country population centers as well as combat forces and logistics centers spread across entire theaters of operation. The upper tier of the two-tiered ATMD shield will feature the rapidly evolving THAAD system, a totally new air defense system capable of intercepting incoming missiles at much higher altitudes and much greater ranges than Patriot. When integrated with the lower tier of ATMD (Patriot PAC-3 and Hawk's replacement — Corps SAM) both tactical ballistic missiles and the full spectrum of the airbreathing threat will be defeated by this ADA family of systems.

Chief of Air Defense Artillery Maj. Gen. Donald M. Lionetti bids farewell upon his reassignment as Chief of Staff, U.S. Army Training and Doctrine Command.

There is a national impatience for getting on with development of such capabilities. Congressional interest, manifested by specific authorization language in the '91 and '92 budgets, generated a flurry of materiel development activity in both the Strategic Defense Initiatives Office and in the Army's Strategic Defense Command. But no serious decisions can be taken under Department of Defense development and procurement guidelines without the front end contribution made by the user representative . . . the combat developer . . . in defining the concept and establishing the operational requirement. Though it may sound easy, program acceleration, extensive documentation, supporting analytics and comprehensive worldwide staffing combine to make this critical segment of the development process — which would have been challenging under normal circumstances — a monumental, unprecedented effort.

Recognizing early on that a "business as usual" approach could not succeed along the accelerated timelines imposed by Congress, a task force approach had to be adopted. Formation of the U.S. Army Air Defense Artillery School's ATMD/High Altitude Theater Missile Defense Special Working Group was our only chance of creating a workable concept and documenting analytically supportable requirements within the given time constraints. See "Special Working Group Shapes ADA's Future," page 4, this issue, to understand the magnitude of the task . . . and note the quality of the key participants to appreciate the seriousness of our

commitment to a key element of the future of our branch.

Our other "system of systems," forward area air defense, continues to progress. With Avenger (or Pedestal-Mounted Stinger) deployed with 3rd Armored Cavalry Regiment and 1st Cavalry Division and in the process of being new equipment trained into the 2nd Infantry Division, our forward air defenses are on the right growth path. The light and special division interim sensor, Lockheed Sanders' new tripod mounted radar, is on contract; and we are about to announce the winner of the ground-based radar competition for the heavy divisions. ADATS, our FLOT-ADA protector of the M-1, -2 and -3 force at this writing, is proceeding well through its reliability, availability and maintainability maturation phase . . . which should soon lead to a production decision. In the interim, we now expect Department of the Army approval to replace Vulcans with M-3 Bradleys . . . enabling us to execute our manportable air defense under armor concept (see *ADA* magazine, January-February 1991).

32nd AADCOM Patriot is back in Saudi Arabia performing a geopolitical, theater-strategic mission for this nation. Again, when the President called, ADA soldiers were ready . . . without hesitation, without complaint, but with the utmost professionalism to deploy again in a still dangerous world. Concurrently, we are in the process of executing our part of Army restructure activities, including redeployment to the continental United States of forward-based ADA battalions and inactivation of others.

Through this turbulence and unprecedented change, I continue to insist our branch future is bright. We are poised to leap into the challenging period ahead knowing the ADA role . . . from mud to space — from Stinger to THAAD . . . is well understood and appreciated. Never have I been more proud than to have served these last two years as your chief of branch. Having just been notified that I will be reassigned soon as Chief of Staff, U.S. Army Training and Doctrine Command, I am, therefore, as I know you can imagine, reluctant to let go of a job unfinished. I leave, however, certain in the knowledge that Brig. Gen. (P) John Little, as my successor, will be an extraordinary and genuinely outstanding Chief of Air Defense Artillery. He deserves the support and loyalty always given me by our worldwide air defenders. Finally, to the finest group of professional air defenders in the history of our great Army, it has been a privilege to serve you.

First to Fire!

MAJ. GEN. DONALD M. LIONETTI

The Avenger is being new equipment trained into the 2nd Infantry Division.

Crowds cheer Patriot as it rolls down Constitution Avenue in the nation's capital during the June 1991 victory parade.

2nd Annual

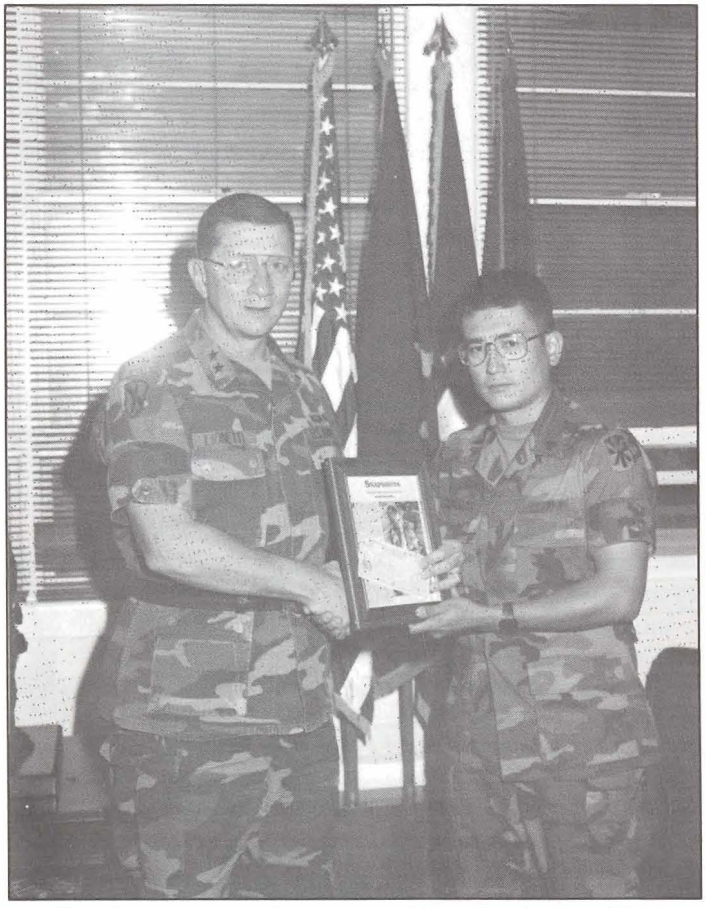
ADA Photo Contest

The cash awards for the 1992 Air Defense Artillery Photo Contest will be identical to last year's photo contest. A $500 savings bond goes to the Sweepstakes winner. First, second and third place in each of the two categories (ADA in Action and Fort Bliss) pay $350, $250 and $150 savings bonds respectively.

The Fort Bliss category allows you to submit photographs that portray operations, training and facilities at Fort Bliss, McGregor Range and Biggs Army Airfield. The Fort Bliss category is also open to photographs of families at work and at play, recreational activities and military life in all of its exciting facets.

The ADA in Action category is open to action photographs of ADA units and soldiers from around the world performing their duties. Appropriate subjects include, but are not limited to, combat operations, field training exercises, National Training Center rotations, live-fire exercises, parades and ceremonies.

The entry deadline for the 1992 ADA Photo Contest is March 1, 1992. Photos received after this deadline will not be eligible for prizes.



Maj. Gen. Donald M. Lionetti presents a $500 savings bond to 1991 Sweepstakes winner Sgt. John Originales.

1991-1992 ADA Photo Contest

Please enter the enclosed photographs and/or slides in the annual ADA Photo Contest.

Name _____

Address _____

City _____

State _____ **Zip** _____

I certify that the attached photograph(s) is an original made by myself. I grant the Army or its civilian publishers exclusive rights to reprint the attached photograph(s) as they see fit without compensation to myself. I understand that upon submission the photograph(s) becomes the property of the United States.

Signature _____

Mail photos to: Photo Contest
ADA Magazine
ATTN: ATSA-ADA, Bldg. 55
Fort Bliss, TX 79916-0002

Special Working Group Shapes ADA's Future

by Lt. Col. Gary Wilson

Patriot's success in countering Iraqi ballistic missiles during Operation Desert Storm highlighted the improved technological capabilities in the Army's air defense weapon systems. Many doubted the capability of a missile to kill another missile, but the diligent efforts of the Patriot Project Office and the U.S. Army Air Defense Artillery School to develop Patriot Anti-tactical Missile Capability-2 (PAC-2) paid off. The process of developing PAC-2 started long before last year's war in response to Soviet improvements in the accuracy of their ballistic missile inventory. PAC-2 was scheduled for fielding in January 1991, a fortuitous turn of events.

The Iraqi-modified Scuds employed were technically beyond the design capabilities of PAC-2, but Patriot was nonetheless successful. Iraq's attacks on Israel's population as a terrorist tactic demanded that air defense be able to provide very good protection of assets that were not militarily hardened and covered large areas. Although Patriot was not designed for this mission, it did a superb job and managed to maintain the alliance coalition.

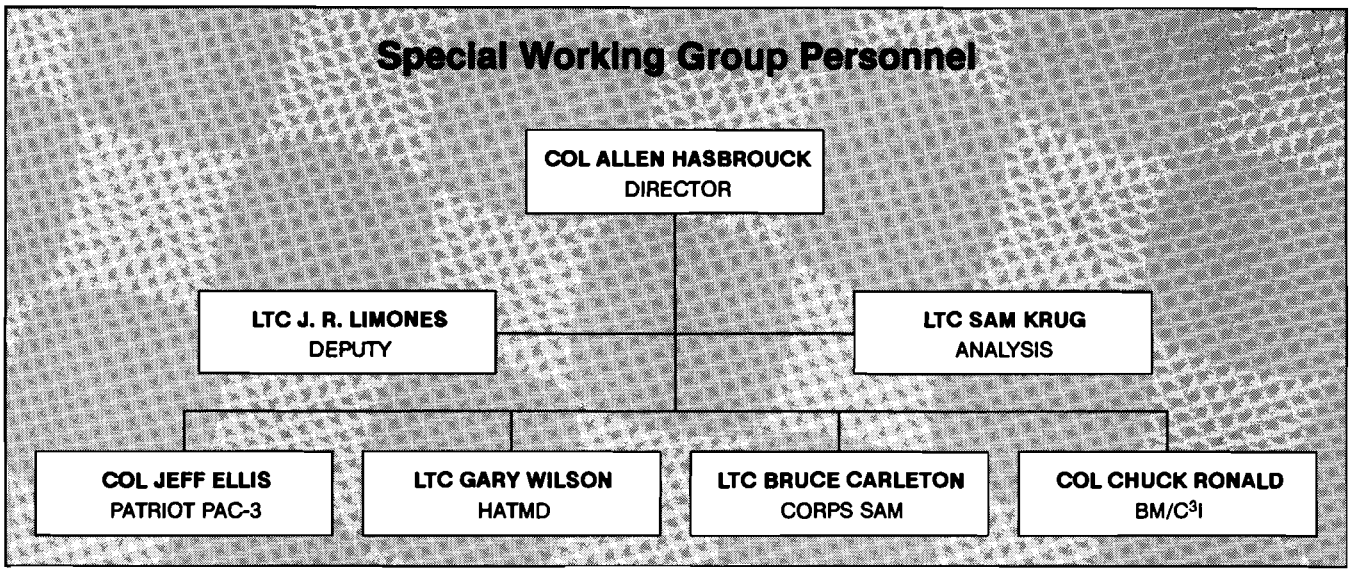
Iraqi attacks on geopolitical assets demanded a new mind set for ADA missions in a theater-strategic sense. No longer could we think of protecting military assets only. Nor could we be satisfied with the levels of protection we had asked from Patriot. A near-leakproof defense was demanded to meet this new mission.

The Army Strategic Defense Command (SDC) and the Strategic Defense Initiative Organization (SDIO) had been developing technological programs that appeared to provide the technological answers to the emerging operational needs. SDC technologies included the Theater High-Altitude Area Defense (THAAD) interceptor program. This program was restructured in January 1991 to develop a system for tactical missile defense (TMD) which included sensors, battle management/command, control, communications and intelligence (BM/C^{3}I), interceptors and launchers. THAAD's mission was envisioned to counter the growing ballistic missile threat that faced the United States, its allies and other important countries. It was to provide a high-altitude, wide area coverage that could be complementary to PAC-2 and Patriot's improvements to Patriot Advanced Capabilities-3 (PAC-3).

Shortly after SDC's restructuring of the THAAD program, the ADA School formed a special working group (SWG) under Col. Allen Hasbrouck to provide the combat development effort for ADA's improvements to Patriot (PAC-3), development of a High-Altitude Theater Missile Defense (HATMD) system, and continuation of development of a Corps Surface-to-Air Missile (Corps SAM) system. The HATMD piece is intended to provide the operational requirements for which THAAD will be designed and built to, and is intended to be a ballistic missile killer. PAC-3 plus Corps SAM will both be primarily aircraft and cruise missile killers with significant capabilities to kill ballistic missiles. This system of systems approach is essential to ensure that the total air threat is addressed in the Army's modernization efforts.

In developing the Army's new air defense capabilities, consideration had to be given to the Joint Chiefs of Staff doctrinal guidance that specified requirements in four areas of TMD: active defense (killing threat missiles after launch), passive defense (hardening assets, deceiving the enemy about friendly unit locations and warning of impending missile attacks), attack operations (killing missiles, launchers and support elements on the ground prior to launch), and BM/C^{3}I (providing near real-time capability to conduct the TMD fight).

The framework of the "four pillars" of TMD and the ADA School's system of systems approach to active TMD was critical to the development of HATMD and THAAD requirements. The HATMD and THAAD teams (representing the combat developer and materiel developer) have worked closely to ensure a coordinated effort as they move toward an Army acquisition milestone in October 1991 and a DoD acquisition mile-



stone in December 1991. These efforts have been on an accelerated schedule due to the urgency to field this new capability by the turn of the century. The ADA School has developed an operational requirements document while the THAAD Project Office has produced a technical requirements document and request for proposal to move the effort into the next acquisition phase (demonstration/validation). (See "Industry Responds to TMD Challenge," page 6.)

The SWG is organized into five teams that include a Patriot PAC-3 team, a HATMD team and a Corps SAM team. There is also a C^3I team to support development of the C^3I element of each weapon system and an analysis team to support the scenario development and modeling efforts for each team and to develop requirements and analyze cost and operational effectiveness of each weapon system.

The SWG's mission is to ensure that all three weapon systems are developed complementary to each other based upon each mission and the place on the battlefield that each system will fight. The PAC-3 team is charged with improving Patriot to its reasonable, cost-effective limits as a near-term (mid to late 1990s) improvement in both its aircraft and missile killing roles. PAC-3, therefore, forms the baseline for all other efforts within the SWG. The HATMD team is responsible for developing the high-altitude wide area ballistic missile killer to complement PAC-3's capabilities. HATMD will have some inherent capability to kill cruise missiles, high-altitude aircraft and tactical air-to-surface missiles; a capability that will be exploited to the extent practical. HATMD will use advanced technologies that have been developed by SDC and SDIO where possible. The HATMD system will be a midterm (FY 2000 or so) air defense capability improvement. Corps SAM is a longer term solution (FY 2005) to improving corps-level air defense capability. It will provide maneuver forces in the corps with tremendous improvements over current Hawk systems and will complement Patriot capabilities that are being added to Corps ADA brigades. Corps SAM is reaching for 21st Century state-of-the-art technologies to maximize defense with minimum force structure requirements.

When Hasbrouck established the SWG, his desire was to have all five teams working together in one place (actually all in one large room) so that each team would be constantly aware of the other teams' activities and to cross-fertilize information so their development was truly complementary. In an atmosphere of a build-down of Army forces and austere budgets, we must ensure that we get the right amount of complementary capabilities without producing three systems that kill everything but are too costly or require too much force structure. The SWG is a short-term ad hoc arrangement to facilitate rapid development of combat development requirements to meet the nation's need for improved missile defenses on an accelerated schedule. Once the initial phases are complete, the SWG will disband and the acquisition process will return to normal Directorate of Combat Developments' purview.

To date, the SWG organizational structure and its system of systems approach has permitted it to successfully meet exacting deadlines, developing requirements for mutiple systems in a short time.

Lt Col. Gary Wilson is the HATMD team chief in the ATMD/HIMAD Special Working Group.

Industry Responds to TMD Challenge

by John Rhea

Driven by the necessity of countering Iraqi Scud missiles during the Persian Gulf conflict, the Army Strategic Defense Command (SDC) has accelerated its efforts to develop a more "leak proof" tactical missile defense (TMD) system than the Patriot, which performed well in a role for which it was never intended.

Based on CIA estimates that 15 or more developing nations may have tactical ballistic missiles — many of them potentially with chemical and some with nuclear warheads — by the year 2000, SDC has outlined a demonstration/validation (dem/val) program for pushing forward a new TMD system that could, in an emergency, be fielded as early as 1995.

The urgency of proceeding with the Theater High-Altitude Air Defense (THAAD) system — even to the point of resorting to some concurrent development — was spelled out by Brig. Gen. James Jellett, program manager of the Joint Theater Missile Defense Program Office, during a news briefing in May at SDC headquarters in Huntsville, Ala. "This will be a dem/val system that could be used in an emergency if necessary," he said.

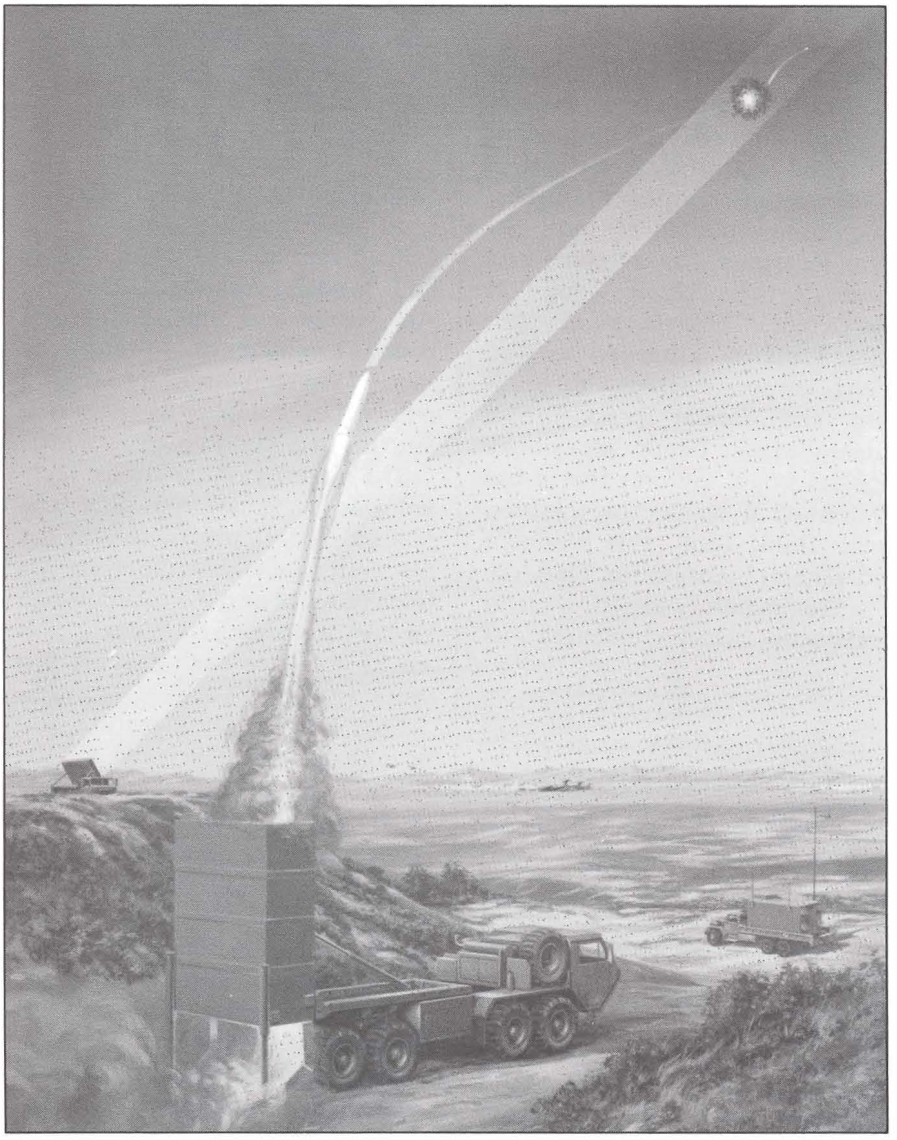
Although the request for proposal has been delayed pending resolution of procurement issues by top-level Pentagon echelons, the dem/val contract is expected to be awarded to a single team by year's end. It should be valued at "several hundred million dollars," according to Paul Lynch, chief of the THAAD division at SDC. He explained that THAAD is the upper tier of theater missile defense, which is the lower tier of the proposed Global Protection Against Limited Strikes (GPALS) system being refined by the Strategic Defense Initiative Organization. GPALS is projected to cost $46 billion (in FY 92 dollars exclusive of operations and maintenance costs) and is the umbrella program embracing surface and space assets.

The lower tier of theater missile defense would consist of an upgraded version of Raytheon's Patriot and LTV's Extended Range Intercept Technology (ERINT) missile. In preparation for this integrated theater missile defense system, SDC is planning three improvements to Patriot: a multimode seeker for increased coverage and lethality, radar upgrades to handle more warheads and remote siting of launchers to extend coverage.

Unlike Patriot, which detonates a warhead in the atmosphere to destroy incoming missiles, ERINT and THAAD are hit-to-kill weapons guided all the way to their targets at hypersonic (about Mach 7) speeds. During the Persian Gulf conflict PAC-2 version Patriot missiles flying at Mach 3 intercepted Scuds traveling at Mach 6 and destroyed more than half of their warheads. The maximum altitude was about 10 kilometers, which was generally adequate for the Iraqi conventional warheads, but an exo-atmospheric system like ERINT or THAAD would be needed to protect against nuclear or chemical warheads.

Another TMD system, Arrow, is being jointly developed by the United States and Israel to attack incoming missiles at altitudes of about 40 kilometers. However, it is not intended to be a mobile system

An artist's rendering depicts the Team Hughes concept for the THAAD system.



McDonnell Douglas foresees their THAAD system looking something like that shown above.

since Israel would not need to deploy it beyond its own borders.

Also during the news briefing, Lynch of SDC spelled out the baseline THAAD concept as a truck-mounted launcher containing about a dozen hit-to-kill missiles employing a medium-range infrared seeker, a mobile battle management center and a fire control radar — all to be loaded onto C-130 aircraft fully assembled for roll-on, roll-off deployment for full operational capability within an hour of landing.

The procurement strategy for the associated ground-based radar program reportedly is yet to be resolved. The radar will be supplied to the THAAD prime contractor as government-furnished equipment, and is expected to be a trailer-mounted, X-band system for both surveillance and fire control.

The decision is still pending on whether to initially use conventional traveling wave tubes and then upgrade later to solid-state components available from DoD's Microwave and Millimeter Wave Monolithic Integrated Circuit program or whether to go directly to the more capable (but riskier) solid-state approach. Among the companies reported to be planning to compete for this phase of the program, either alone or in a team arrangement, are General Electric, Hughes, Raytheon, TRW and Westinghouse.

C-130 transportability is a critical requirement and this puts a premium on advanced packaging techniques to reduce weight and volume. But Lynch believes this technology is available from the Strategic Defense Initiative (SDI) program. "The technology is further along than we anticipated a year and a half ago from a risk standpoint," he said at the May briefing. "The problem is still integrating this technology into an operating system. That's no small task."

Because of the perceived urgency of the theater missile defense requirement, the development and deployment schedule for THAAD is about half as long as most current programs, according to some industry estimates. The entire weapon system (except for the radar) will be bought from a single contractor, who will have total system integration responsibility.

This dictates a degree of concurrency reminiscent of the Polaris submarine and ballistic missile program of the 1950s and the Apollo moon landing program of the 1960s. Despite the potential technical risk, the necessary building blocks are in hand. Many of them, such as the supporting technologies of interceptors, propulsion and guidance, are available from SDI.

These include the filament-wound solid rocket motor cases developed by LTV for ERINT, Hughes' mid-range (three to five microns) infrared sensors and Aerojet-General's cryogenic cooling techniques for sensor windows. The THAAD missile airframe will be able to use carbon-carbon composites from the Air Force's X-30 hypersonic National Aerospace

Plane, and the critical electronic functions will rely on second generation Army common hardware and software modules, militarized versions of today's commercial 16- and 32-bit microprocessors and the Ada military software language.

Software will be an especially formidable task. Total requirements are estimated at upward of one million lines of code, about half of it for battle management and C^3I and most of the rest for the launcher. At the standard industry estimate of $100 total life cycle cost to create and maintain a single line of code, software costs alone represent an investment of nearly $100 million. Closely allied with the software requirement is the necessity to maintain a high degree of architectural flexibility to ensure compatibility with existing sensors.

The stringent schedule and the potential risk factors of concurrent development dictate a coordinated, integrated approach on the part of the competing contractors. Hughes, which has been relatively forthright about its efforts, has created a new corporate organization, known as Air Defense/THAAD, in Los Angeles, Calif. It is headed by Ted Wong, corporate senior vice president and former president of Hughes' Missile Group. McDonnell Douglas would say only that it has established a similar organization under Hank Todd, vice president and general manager for THAAD, at Huntington Beach, Calif. Lockheed, which manages its THAAD program out of Sunnyvale, Calif., declined comment on all facets of its efforts other than the names of its team members.

Wong stresses the need for a focused organization, saying that Hughes had already anticipated this need in its earlier work in the Corps-Level Surface-to-Air Missile and Medium-Altitude Surface-to-Air Missile programs. "This program is a confluence of events," he says. "We're putting together a number of complex systems that amount to a multi-system system."

The maturity of the critical technologies available from SDI and related tactical programs provides the confidence that the risks are under control and the schedule can be met, according to Wong. "This would not have been feasible five years ago."

But Wong notes there are also new challenges. The need for the system to be rapidly deployable and small enough not to strain the Army's logistics capability goes far beyond the Army's concept definition studies of the 1960s on the Sprint and Spartan anti-ballistic missile system. These were large, fixed-base systems that did not have the hit-to-kill requirement.

Since then, in the critical area of electronics technology, such far-sighted DoD research efforts as the Very High Speed Integrated Circuit and Microwave and Millimeter Wave Monolithic Integrated Circuit programs — coupled with the new technology of optical fiber communications links for immunity to detection and electronic countermeasures — have made possible this next generation of anti-ballistic missile systems.

The THAAD Competition

Three industry teams (below) — headed by Lockheed, McDonnell Douglas and Sparta — began working on the concept definition phase of THAAD in 1989. For the 57-month dem/val phase, due to begin around the end of this calendar year, SDC will "down select" to one. Hughes will replace Sparta as team leader during this phase.

Deliverable items, according to the program announcement issued by SDC in July, are 120 missiles (10 for flight tests, 10 for systems tests and 100 for user evaluation), launchers to accommodate 40 missiles, two battle management and C^3I units and associated ground support equipment.

The schedule calls for 10 flight tests in FY 94 and 10 systems tests in FY 95. Full-scale development would begin concurrently in 1994 and continue until production is approved in late 1997. However, pre-production systems could be pressed into service as early as 1995 if world conditions warrant.

Lockheed Missiles & Space Co.
United Technologies Corp.
Loral Corp.
Westinghouse Electric Corp.
Honeywell Inc.
Litton Industries
Rockwell International Corp.
Dornier GmbH (Germany)
Israel Aircraft Industries Ltd. (Israel)

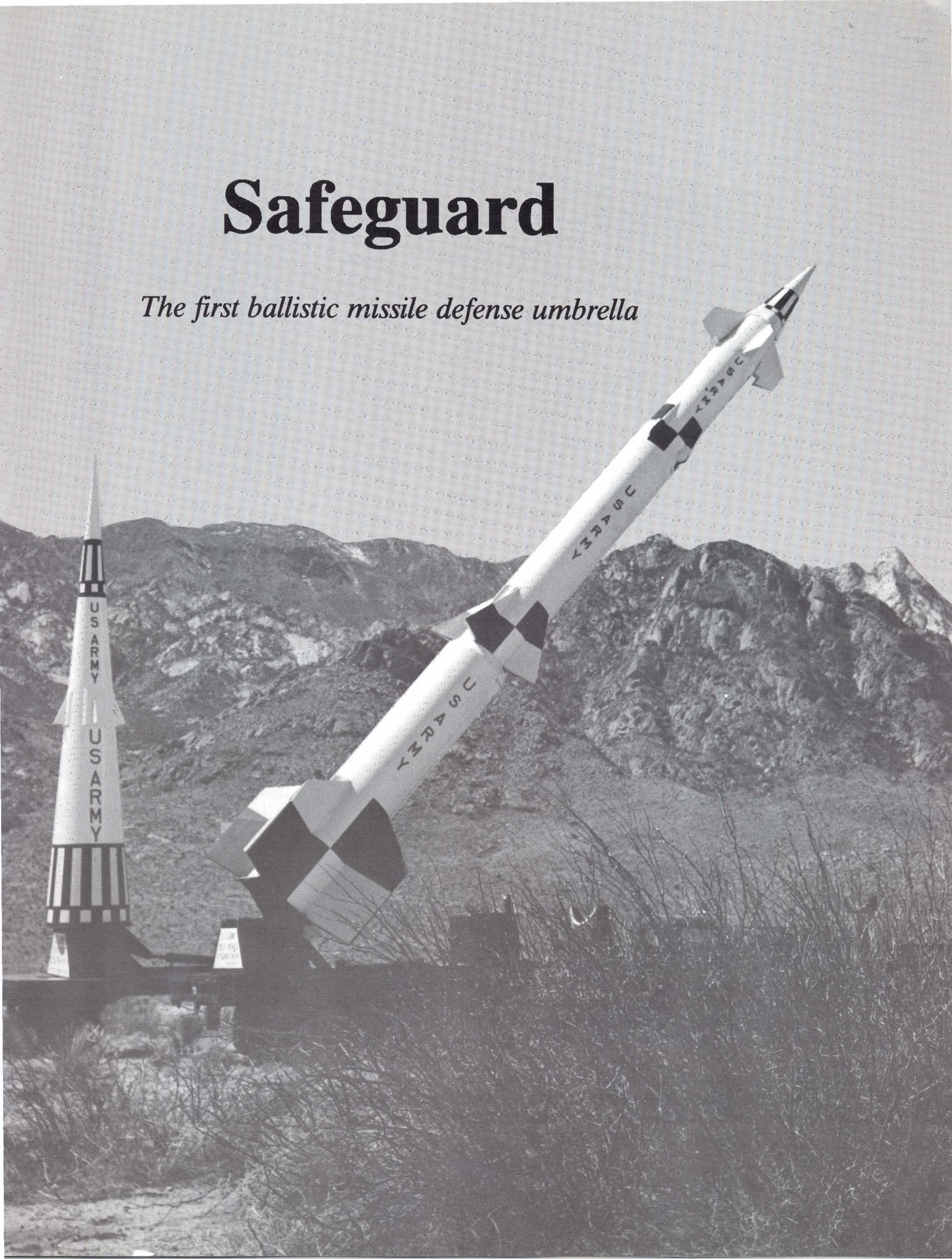
McDonnell Douglas Space Systems Co.
Raytheon Co.
Martin Marietta Corp.
Rockwell International Corp.
BGT (Germany)
Harris Corp.
Aerojet-General Corp.

Hughes Aircraft Co.
Sparta Corp.
LTV Corp.
TRW Inc.
General Electric Co.
Thomson-CSF (France)

John Rhea is a freelance writer who specializes in military technology, and is the author of *SDI — What Could Happen: 8 Possible Star Wars Scenarios*, published by Stackpole Books.

Safeguard

The first ballistic missile defense umbrella



Americans growing up during the Cold War lived with the fear of ballistic missile attack for so long that most, assuming there was no possible defense, gave up worrying about it. Today, few recall that, for a brief moment, the United States fielded an air defense system, the Safeguard, that could have countered ballistic missile attacks. However, the impact of Iraqi tactical ballistic missiles in Saudi Arabia and Israel during Desert Storm and the proliferation of tactical ballistic missiles throughout Third World countries have changed the "Why Worry?" attitude. Today people are again worrying about ballistic missiles, and their concern may result in Air Defense Artillery being reassigned a long-abandoned mission — the defense of the United States against intercontinental ballistic missiles (ICBMs).

Air Defense Artillery is spearheading the development of a theater high-altitude air defense system capable of warding off tactical ballistic missile strikes against the combined arms force and host nation population centers in a forward deployed theater of operations. However, the defense of the continental United States, its population centers, strategic military assets and government facilities — a mission formerly executed by the U.S. Army Air Defense Command (ARADCOM) — has yet to be reassigned to Air Defense Artillery. But if the Bush Administration's push to create a scaled-down, land-based anti-ballistic missile defense network succeeds, the "First to Fire" branch's resume will undoubtedly make it the best-qualified candidate for the job.

During the early years of the Cold War, the North American Air Defense Command (NORAD) built a strong, continental-based defense based on its fighter aircraft and the U.S. Army Antiaircraft Command's growing arsenal of surface-to-air missiles. The first surface-to-air missile phased into the Army inventory was the Nike Ajax, which became operational on-site in the Washington-Baltimore defense in May 1954. By 1957, Nike Ajax sites proliferated across the country, and the Antiaircraft Defense Command became ARADCOM. It functioned both as a major command of the U.S. Army and as a component of NORAD. In June 1958, ARADCOM's first Nike Hercules unit obtained operational readiness in the Chicago defense, and Nike Hercules missiles rapidly replaced Nike Ajax missiles across the country.

With its new high-performance surface-to-air missiles in place, ARADCOM seemed perfectly capable of performing its primary mission, protecting major U.S. population centers from long-range bomber attacks. The problem was that ICBMs had replaced bombers as the primary threat.

An active Safeguard site in Grand Forks, N.D. (above), and in various stages of construction (right).

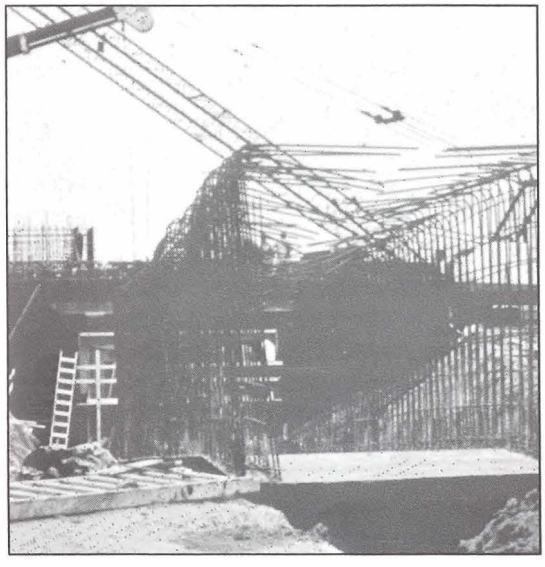
ARADCOM had nothing to counter ICBMs, but was working on the problem. On June 3, 1960, an improved Nike Hercules system destroyed a Corporal surface-to-surface missile, the first known kill of a ballistic missile by another missile. Hawk later demonstrated its growing anti-ballistic missile capability by intercepting and destroying Honest John and Little John ballistic missiles. In January 1961, three decades before Patriot intercepted Iraqi Scuds during the Gulf War, Hawk intercepted and destroyed a Corporal missile.

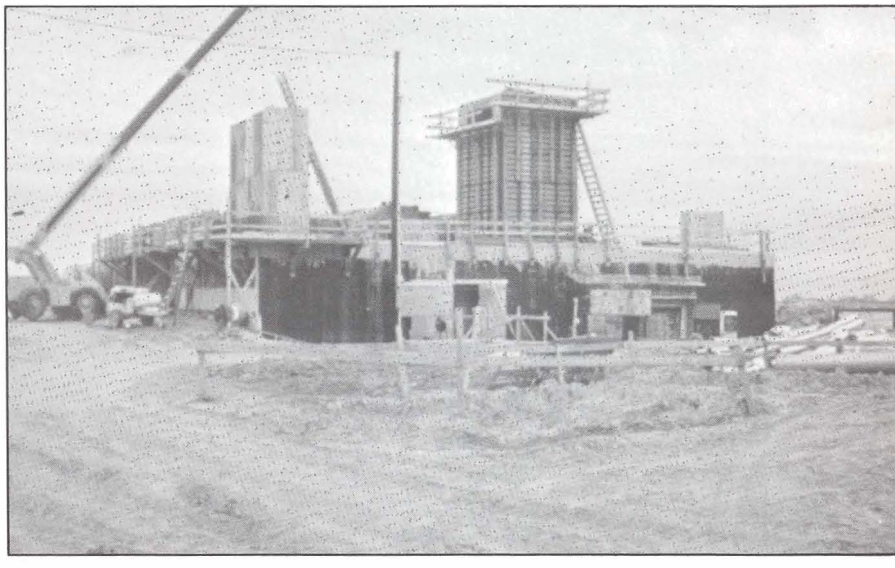
Tactical ballistic missiles of the 1950s and 1960s, however, were easy targets compared to ICBMs. ARADCOM continued to work on nuclear-armed missiles that could intercept ICBMs before they reentered the atmosphere. Spartan evolved from Nike X, which tracked its own lineage back through Nike Zeus to Nike Hercules. A new missile, Sprint, was developed to intercept ICBMs that leaked past the Spartan umbrella. Spartan and Sprint gave ARADCOM a nuclear "one-two punch" designers thought could stop a saturation ICBM attack.

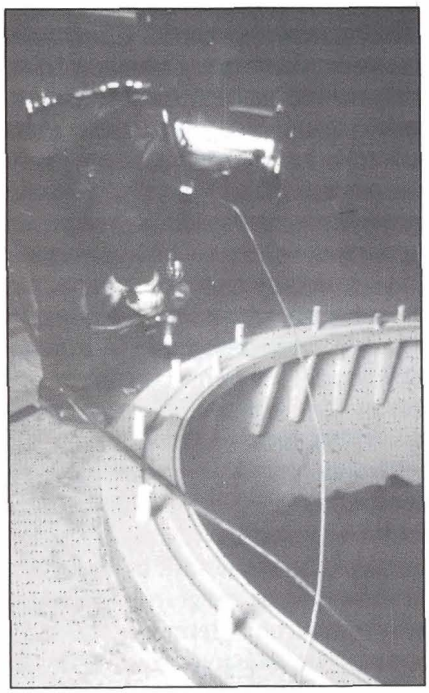
In September 1967, Secretary of Defense Robert McNamara made public a decision to deploy a ballistic missile defense system to protect major U.S. population centers against nuclear missiles. The driving force behind the ballistic missile defense initiative was not fear of a possible Soviet ICBM attack but concern over China's growing ICBM capabilities. The system, which was to employ Spartan and Sprint missiles, was named Sentinel. At first, the program progressed steadily. There were successful test firings of Spartan missiles at Kwajalein Missile Range in the South Pacific and Sprint missiles at White Sands Missile Range, N.M. A system manager at the DoD general staff level was appointed, and commands to administer, develop, support and evaluate the Sentinel system were organized. The Army opened a centralized training facility that merged Ordnance, Engineer and Air Defense Artillery components at the U.S. Army Air Defense School, Fort Bliss, Texas.

A threat re-assessment in March 1969 revealed that the Chinese ICBM program had slipped and that the Soviet ICBM program had not leveled off as expected. The Soviets were installing highly accurate SS-9 ICBMs capable of carrying multiple warheads or a single 25-megaton warhead. President Richard M. Nixon announced a change in plans, initiating a phased deployment program rather than the package deployment originally planned. The emphasis shifted from the defense of population centers to the defense of the nation's retaliatory base, its land-based ICBM sites. "The modified system has been designed so that its defensive intent is unmistakable," said Nixon. "It will be implemented not according to some fixed, theoretical schedule, but in a manner clearly related to our periodic analysis of the threat."

Because of the shift in emphasis, the anti-missile program's name was changed from Sentinel to Safeguard. The Safeguard system was to be deployed in phases geared to threat evolution. The first phase of the project included two sites: Grand Forks Air Base, N.D., and Malmstrom Air Force Base, Mont. These sites were to be completed by the mid-1970s. Authorization was also granted to proceed with site preparation at Whiteman Air Force Base, Mo., and Warren Air Force Base, Wyo. Subsequent deployment options existed for an eventual 12-site deployment.





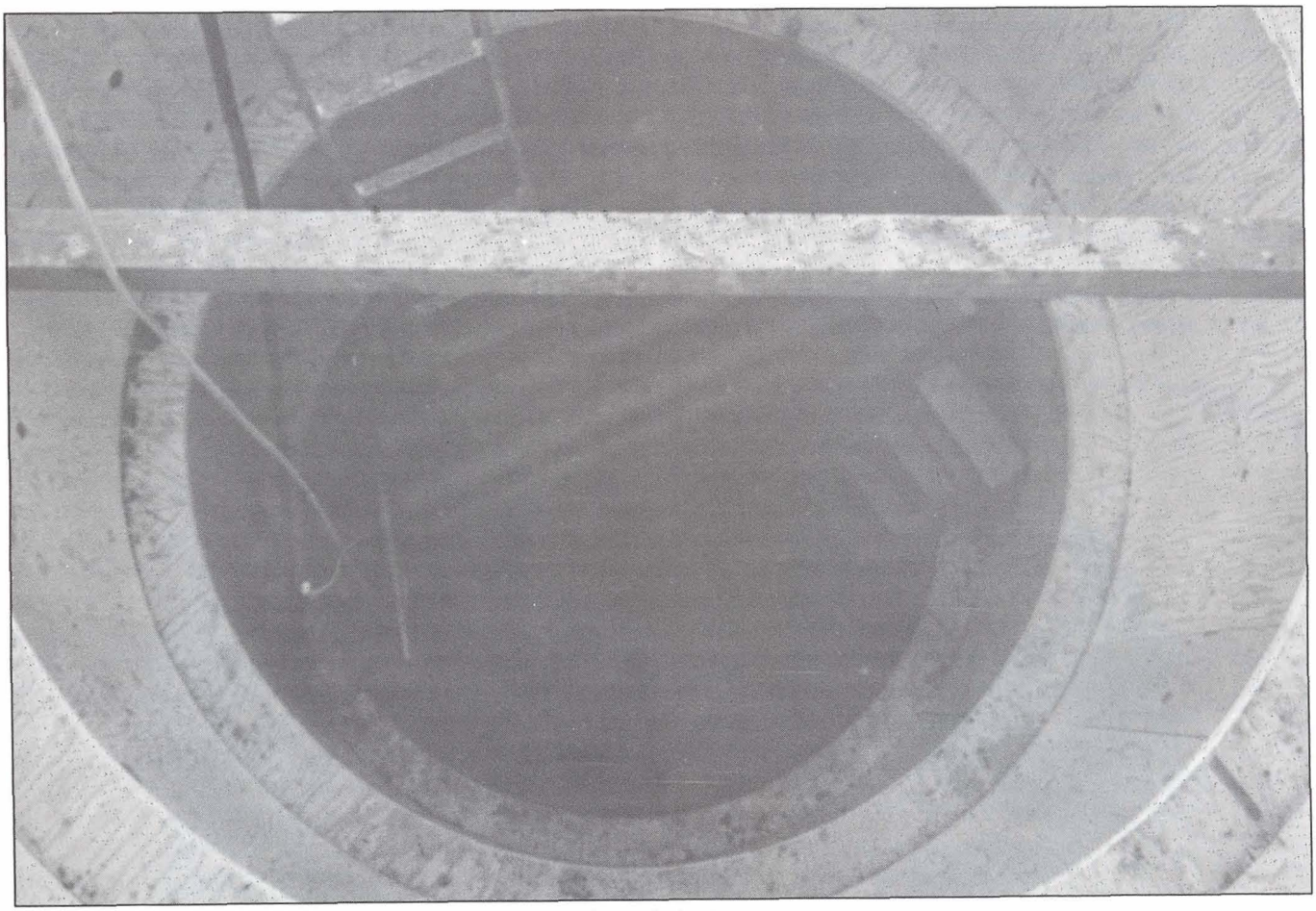


The basic Safeguard system hardware components consisted of two radars, a data processing system and a Spartan and a Sprint missile. One radar was the perimeter acquisition radar (PAR), the other was the missile site radar (MSR).

The PAR was a long-range, phased-array radar used for early detection and tracking of incoming warheads at ranges in excess of 1,000 nautical miles. The PAR was housed in a concrete building that measured approximately 130 feet in height and 200 feet on each side. The MSR, also a phased-array radar, tracked incoming targets at ranges up to several hundred miles. In addition to tracking incoming missiles, the MSR also launched and command-guided the Spartan and Sprint missiles to intercept. The major portion of the MSR was underground, with only its radar face and ancillary electronic equipment above ground.

Spartan was a longer-range, more powerful version of the Nike Zeus. In developmental testing, Zeus scored several successful intercepts of ICBMs and also demonstrated a satellite intercept capability. McDonnell-Douglas Astronautic Corporation began Spartan development in October 1965. Other prime contractors were Bell Telephone Laboratories and Western Electric Co. The Atomic Energy Commission developed the nuclear warhead for Spartan. The first Spartan prototype was delivered to the Army in March 1968.

Collocated with the MSR, the 55-foot long Spartan was a three-



A Safeguard silo under construction (above) and nearing completion (below).

stage, solid-propellant missile designed to intercept attacking ballistic missiles at long range and in the exoatmosphere. The missile was stored in an environmentally controlled underground cell and could be quickly activated and launched. The Spartan was silo-launched and guided to its target by the MSR and its data processors. The third stage, which operated outside the atmosphere, was ignited by ground command. The missile carried a nuclear warhead (in the megaton range) that was to be detonated in the vicinity of an attacking ballistic missile to destroy or neutralize it. The warhead had elaborate safety devices to prevent a nuclear explosion until after the missile was launched and reached a safe altitude. Spartan's extended range gave Safeguard an area defense capability, allowing each site to protect large areas of the country against limited or accidental ICBM attacks.

An inside view of the Safeguard system's MSR.

Terminal defense, protecting small targets such as Minuteman missile silos or Strategic Air Command bomber bases against ICBMs that might leak through the Spartan umbrella, was assigned to Safeguard's other missile — the Sprint. Sprint missiles were collocated with the MSR, but were also deployed at remote launch sites some distance from the MSR to provide added protection to vital targets. Measuring about half the length of a Spartan, Sprint was a two-stage, solid-propellant missile designed to intercept nuclear re-entry vehicles at a relatively close range. The conical missile was also stored in an environmentally controlled underground cell. Sprint could be quickly activated and was launched by a gas-propelled piston through the explosively fragmented cell cover. The booster was ignited once the missile was in the air, and the missile was guided to the target by the MSR and its data processors. The missile had extremely high acceleration, reaching intercept altitude within seconds after launch. Sprint was armed with a nuclear warhead in the kiloton range and, like Spartan, was equipped with elaborate safety devices to prevent premature detonation.

In case of an ICBM attack, the PAR would locate the incoming object in space and relay information to the Safeguard fire coordination center. The fire coordination center, upon receipt or autonomous initiation of a hostile targeted identification, would assign the target to an MSR operating under its control. The MSR would precision-track the target and a fire control operator would launch a Spartan or Sprint and guide the interceptor to the intercept point where the interceptor warhead would be detonated, thus destroying the incoming ICBM.

At work on the Grand Forks site, Sgt. Robert E. Balonier, an anti-ballistic missile maintenance technician, was convinced the Safeguard system would work. "I had 100 percent confidence in the system," said Balonier. "We all did. There had been several successful demonstrations at White Sands and at Kwajalein [Marshall Islands]. There was no reason to think it wouldn't work."

U.S.-Soviet nuclear arms treaties, which limited each of the superpowers to 100 anti-ballistic missiles to defend its capitol and 100 missiles to protect its ICBM launch sites, eventually killed Safeguard. By the time the treaties were signed, nuclear stockpiles in both the Soviet Union and the United States had reached overkill levels, and U.S. planners decided the treaty's meager anti-ballistic missile allotment offered such little deterrence that systems such as Safeguard were no longer worth the effort.

"The Grand Forks site was the only Safeguard site completed," said Balonier, today a sergeant first class assigned to the Personnel Proponent Division, Office, Chief of Air Defense Artillery, Fort Bliss, Texas. "It didn't last long. A civilian contractor was awarded a contract to demolish the site in return for the material he could salvage. One of the contract's provisions was that he weld the doors to the MSR shut before he walked away."

Vapor Trails

Hollywood Comes to Fort Bliss

Hollywood came to Fort Bliss to recognize the heroic deeds of a female soldier in the 11th Air Defense Artillery (ADA) Brigade during Operation Desert Storm. The television movie also made stars of several Fort Bliss soldiers.

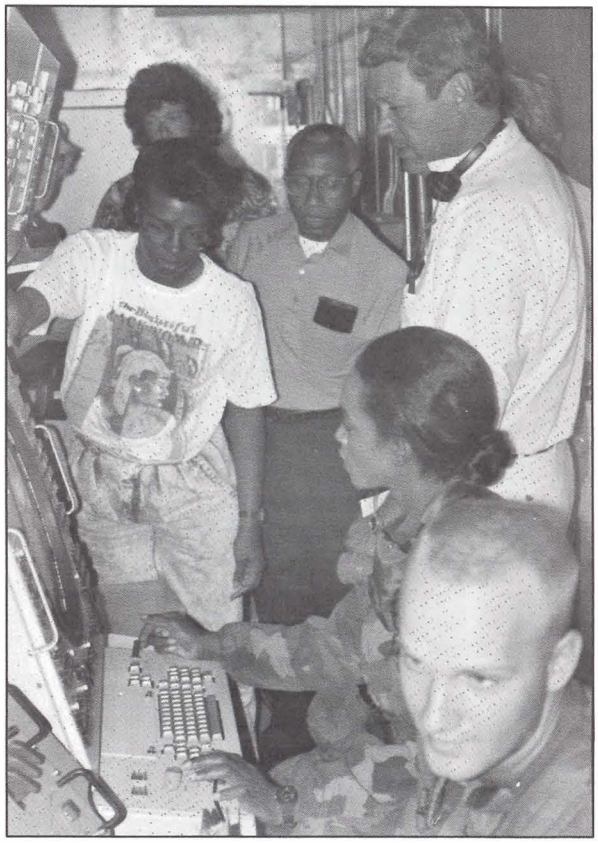
1st Lt. Phoebe Jeter, now the executive officer of Charlie Battery, 3-43 ADA, 11th ADA Brigade, is recognized as the first female to shoot down an Iraqi Scud missile in combat. She was serving as the tactical control officer in a crew of four inside an engagement control station (ECS) van in Riyadh, Saudi Arabia, on the night of Jan. 21, when she and her crew blasted a Scud missile out of the sky with a Patriot missile.

Her efforts, and those by soldiers like her, were portrayed in a "docudrama" made for ABC Television by Ohlmeyer Productions of Hollywood. The movie, called "Heroes of Desert Storm," was aired Oct. 6, according to Army public affairs officials in Los Angeles.

Jeter's war experiences were portrayed in the movie by actress Angela Bassett, who recently played in the controversial movie "Boyz n the Hood." The roles of the rest of the crew were played by Fort Bliss soldiers, all Desert Storm veterans.

Cpl. Kenneth Franks and Sgt. Sam Stinson, of Headquarters and Headquarters Battery, 11th ADA Brigade, played key roles in the movie. Franks played the other tactical control officer who was in the van and Stinson played an enlisted soldier who was responsible for fire control in the crew.

Other soldiers appearing in the movie were Sgt. Brian Stacy from Delta Battery, 3-43 ADA, and Spec. David Lockett, assigned to Headquarters and Headquarters Battery, U.S. Army Air Defense Artillery Center and Fort Bliss. Lockett was an Iraqi prisoner-of-war during the Persian Gulf war.



1st Lt. Phoebe Jeter (standing) gives advice to actress Angela Bassett while director Ohlmeyer looks on. (Photo by Charles R. Williams)

Jeter was on the set as an advisor and consultant during the filming of the movie and was helpful in her anonymous role as "Lieutenant Ann," a soldier who was there to ensure Bassett played her role convincingly as a tactical control officer. Jeter assumed the anonymous role because director Don Ohlmeyer feared the actress would go "bananas" if she knew Jeter was on the set. While the movie ran approximately two-

Air Threat Conference

The air threat hasn't evaporated along with the Warsaw Pact, but continues to grow in diversity and sophistication. Those whose lives or livelihoods depend on staying abreast of changing trends in air threat evolution should attend the "Air Threat in a New World Order" Conference-1991 Oct. 30 and 31 at the U.S. Army Sergeants Major Academy, Biggs Army Airfield, Fort Bliss, Texas. Hosted by Management Works, the classified briefings are open to military, government and contractor personnel. Military personnel and government employees interested in attending should contact 1st Lt. Mary Peterson (AV 978-5810/5730),Threat Office, U.S. Army Air Defense Artillery School, Fort Bliss. Civilian contractors should contact Mike White (915-774-0707).

and-a-half hours, Jeter's story in the movie played about 20 minutes. Some scenes had been shot earlier, so the Fort Bliss filming was only about the military operations of her story. The movie crew, comprised of approximately 15 people, used the Air Defense Center's Patriot training simulators to film the combat scenes about the Scudbusters.

For Stinson and Franks, the chance to be television stars was an experience to remember.

"Even though we were not real actors, the movie people said we were pretty authentic," said Stinson. "I don't know how many takes we shot, but we completed the filming in about five hours."

The high point of the day for Franks was sitting next to Angela Bassett.

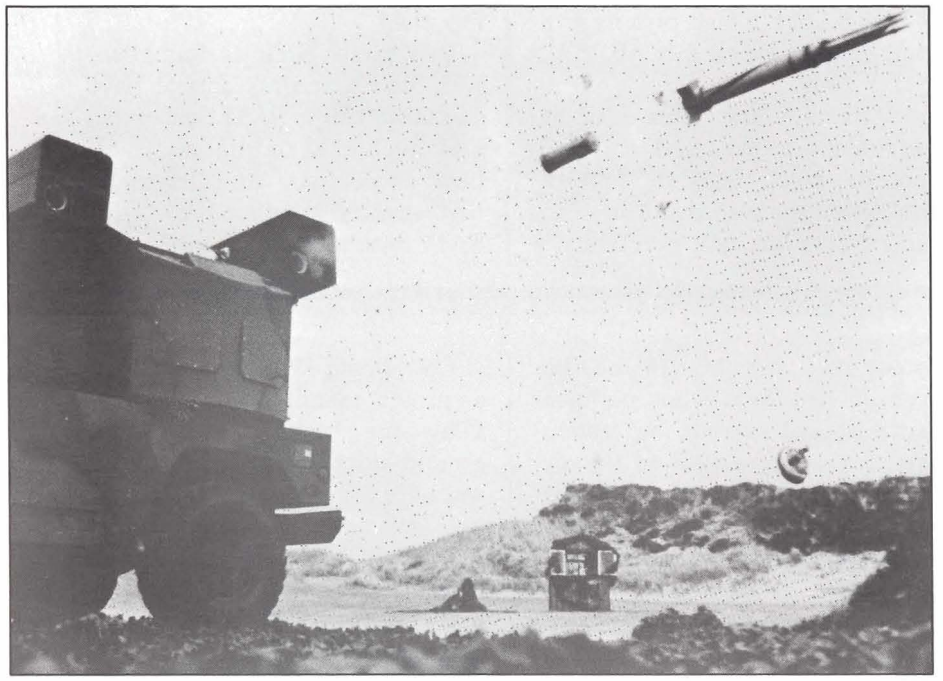
"She sat next to me on the set during the filming and hit me several times and held onto me," he said smiling.

Both soldiers said the pressure was not as intense as they thought it would be during the filming process. Several incidents occurred that stopped the filming and caused everyone in the room to break out in laughs and smiles.

At one point, Stinson was pushing buttons on the simulator console and turned off the computer, wiping the huge radarscope clean and causing it to go blank. Another time, Franks said he was doing what he was told to do, "turn and push the knobs," when one knob fell off in his hand.

Ohlmeyer was pleased with the performances of all the actors, including Jeter, who had a very hard role to play. Her performance must have been convincing, because Bassett never knew until shooting was "wrapped" that Ann was Jeter, the lieutenant she was portraying.

BY SSGT. CHARLES R. WILLIAMS



A Starstreak missile launches successfully from an Avenger turret during a recent firing at the West Freugh Range in Scotland that demonstrated the integration of the Short Brothers' Starstreak missile on an Avenger fire unit. (Photo courtesy of The Boeing Company)

"Top" Stinger

Stinger soldiers all over the country are training and gearing up for the annual III Corps "Top Stinger" competition to be held at Fort Hood, Texas, this fall.

According to SFC Angel Cruz, the noncommissioned officer in charge, 2-3 ADA will send four teams (three teams compete and one is a backup) to represent Fort Riley, Kansas.

SSgt. George M. Rainey, the team NCOIC, will accompany the soldiers when they go to Fort Hood. He explained that the soldiers were chosen for the honor after each battery in the battalion did an internal evaluation. After that, the competition trainers picked the teams that would go using guidelines set forth by the III Corps competition requirements.

These tough and challenging events include visual aircraft recognition, target tracking and engagement, general soldier knowledge, Stinger preventive maintenance, crew drills, a 10-kilometer dismounted road march (each person carries one field handling trainer and full combat equipment), Stinger inspection procedures and high-mobility multipurpose wheeled vehicle preventive maintenance checks and services.

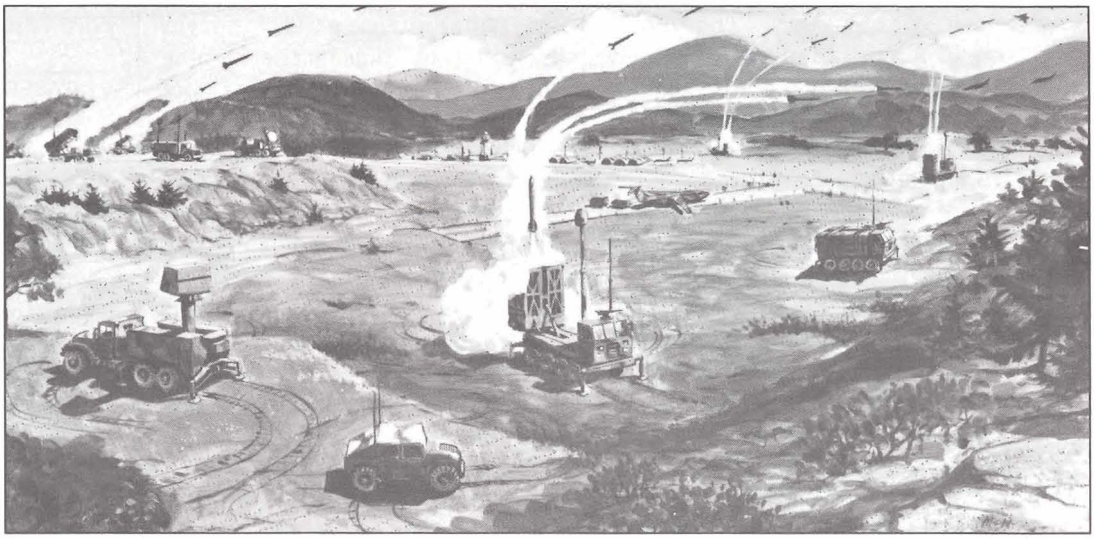
BY LORI L. STEPHENS

Corps SAM

Back when Corps SAM was known as M-SAM, the joke was that the "M," which actually stood for "Modular," stood for "Mythical." But Corps SAM is no longer a myth.

The Corps SAM Program Management Office, which has already released a draft Corps SAM operational and organizational plan, expects to release a request for information to industry late this year and follow it up with a request for proposal in early FY 93.

"Corps SAM will replace Hawk to become, along with Patriot, the medium- to high-altitude defense against tactical ballistic missiles, cruise missiles and conventional aircraft," said Pete Olson, the deputy U.S. Army Training and Doctrine Command system manager for high- to medium-altitude air defense. "Its mission will be to protect forward maneuver forces against targets beyond forward area air defense systems' engagement capability. Corps SAM is a high-priority project, but its fielding is 10 to 15 years away."



A Raytheon artist's rendering depicts how Corps SAM will deploy to protect forward maneuver forces in a high-intensity conflict. Corps SAM should replace Hawk within 10 to 15 years.

Normally the release of requests for information and proposals, which lead to concept-definition studies, demonstrations and evaluation and, eventually, a contract award, signals the beginning of corporate competition, but corporate campaigning for the contract has been underway for months.

Companies such as Raytheon, LTV and General Electric have displayed Corps SAM conceptual artwork and scale models at recent exhibitions, and Raytheon has already produced a Corps SAM brochure.

Stinger Project Office Renamed

The Stinger Project Office, Program Executive Office (PEO), U.S. Army Missile Command, Redstone Arsenal, Ala., has been renamed the Air-to-Air Missile Project Office. The name change reflects a shift of focus from ground-launched to air-to-air roles.

A statement issued by the Army describes a two-fold mission for the Air-to-Air Missile Project Office: "In the near term, the Stinger RMP [reprogrammable microprocessor] missile will be improved to effect better performance against current and emerging threats, especially in the air-to-air environment. To satisfy far-term requirements, the PM [program manager] will conduct RDA [research, development and acquisition] of a new missile system which complements the RAH-66 Comanche and other helicopters. It is anticipated that significant surface-to-air RDA will be concurrently executed."

Col. David Watt will continue as project manager with responsibility for both air-to-air and ground-launched applications. He will have product managers for air and ground applications on his Redstone Arsenal staff and an assistant project manager collocated with the PEO-Aviation in St. Louis, Mo. Lt. Col. Albert Hamilton, the Avenger product manager, will report directly to the PEO Air Defense, Brig. Gen. Robert Drolet.

ADATS Passes Test

Martin Marietta's Air Defense Anti-tank System (ADATS), the line-of-sight forward (heavy) component of the Army's forward area air defense system, has passed the first of three crucial tests designed to ensure the system meets reliability goals prior to fielding.

An Army production decision on Martin Marietta's ADATS is expected in 1992.

ADATS met or exceeded Army performance requirement during operational testing last summer at Fort Hunter Liggett, Calif., but the system's reliability and availability performance did not meet Army standards. The Army decided not to seek approval to begin production of the weapon system, but instead asked Martin Marietta to bring the system up to Army reliability standards. The special series of tests now underway are designed to verify the system's reliability growth.

During contractor-sponsored tests at Martin Marietta's Orlando, Fla., facility, the ADATS achieved an impressive 75.6 hours mean time between failures, far surpassing the benchmark of 30 hours required for the first round of reliability testing. Two fire units operated by soldiers from Alpha Battery, 2-6 ADA, compiled 1,128.67 mission hours of testing at Orlando. The testing resulted in a total of 17 hardware mission failures as of July 26 when Army scorers met to assess the results.

According to Col. James Patterson, the line-of-sight forward (heavy) project manager, the system achieved an officially scored 66.4 hours mean time between hardware failures in the first phase of reliability testing that began June 3. The fire units continued the test cycle through July 31, compiling more than 150 additional mission hours without fur-ther failures. This brought the total to 75.6 hours between failures.

On Aug. 1, an Army review panel recommended that ADATS proceed to the next phase of reliability testing. In the next phase, which will be sponsored by the government, the ADATS will have to demonstrate 54 hours mean time between hardware failures. In the third and final interim reliability test, the system will have to clear 85 hours between failures. The requirement at the time of fielding is 117 hours between equipment failures. The government-sponsored tests were scheduled to begin in September at White Sands Missile Range, N.M.

Army program officials, having drawn fire from the press and the Government Accounting Office because of ADATS' reliability problems, also expressed delight over the results of the first round of reliability testing. ADATS is designed to maneuver alongside battle tanks near the forward edge of the battlefield, countering attack helicopters and fixed-wing aircraft. The system impressed Army officials with the accuracy of its laser-beam riding missiles against a variety of targets during a competitive shootoff. The Army wants to purchase 378 ADATS fire units in the late 1990s for about $6.4 billion.

Best Equipment

The 1st Infantry Division Maintenance Excellence Award for 1990 was presented recently to Charlie Battery, 2nd Battalion, 3rd Air Defense Artillery.

Although Charlie Battery won the award last year in the heavy equipment category, the award presentation was delayed because of the division's deployment to Southwest Asia.

Brig. Gen. William Carter, the assistant division commander for maneuver, presented the battery with two plaques — one for being the best in the division and one for being the runner-up at the Forces Command level.

BY LORI L. STEPHENS

Thai System

General Dynamics and Israel's RAFAEL Arms Development Authority are jointly developing a mobile air defense system for Thailand. Designated the Air Defense Advanced Mobile System/ High Value Site Defense, the system incorporates versions of the vertically-launched Barak 1 naval missile and the 20mm Phalanx Gatling cannon.

General Dynamics conceived high value site defense to protect Patriot batteries, airfields, command and control centers, radar sites and logistics centers.

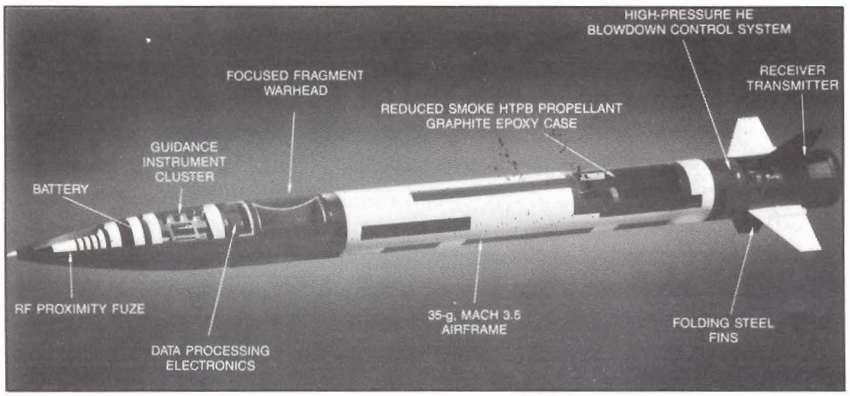
Should Thailand decide to purchase and field the truck-mounted system, RAFAEL would serve as prime contractor and General Dynamics as main subcontractor. RAFAEL would be responsible for the Barak 1 missiles and launcher while General Dynamics would be responsible for the Phalanx fire unit. The Phalanx radar would be modified to track helicopters and would guide both the Barak 1 missile and the Phalanx 20mm Gatling gun. Israel Aircraft Industries would produce the launch control unit and work with Tadiran on the control, communications and display unit.

The system is designed to provide air defense from 500 meters to 12 kilometers. Its missile intercept range against helicopters is 12 kilometers, against aircraft 10 kilometers and against attacking missiles eight kilometers.

LTV Teams with Thomson-CSF

LTV Aerospace and Defense Co.'s Missile and Electronics Group has teamed with Thomson-CSF to start production of 1,000 VT-1 hypervelocity surface-to-air missiles for the French army and navy and the Finnish army. LTV officials describe the missile, designed to travel at more than three times the speed of sound, as the world's fastest short-range air defense missile. Thomson-CSF will launch the VT-1 from its New Generation Crotale air defense systems.

LTV develped the VT-1 on behalf of Thomson-CSF in 1987. Under an agreement signed by Thomson-CSF, Aerospatiale, MBB and Euromissile, further production of the VT-1 missile will be continued in Europe. Thomson-CSF, having ordered the first 1,000 VT-1 missiles from LTV, will transfer production to Euromissile in 1992. Under this agreement, the missile will eventually equip Euromissile's Roland as well as Thomson-CSF's New Generation Crotale air defense systems.



LTV officials describe the VT-1 hypervelocity surface-to-air missile as the world's fastest short-range air defense missile.

P-Star/Mistral System Under Development

MATRA Defense of France and Lockheed Sanders have signed a memorandum of understanding to jointly develop, produce and market an air defense system for potential international customers. The system will consist of MATRA's Mistral air defense missile and Sanders' portable search and target acquisition radar (P-STAR).

The Mistral missile embodies a "fire and forget" capability. Its effectiveness will be further enhanced by the surveillance and tracking capabilities of Sanders' P-STAR, which will reduce the missile's operations response time to engage and destroy hostile aircraft. P-STAR is a low-cost, state-of-the-art, highly portable radar recently selected by the U.S. Army as its light and special division interim sensor. The sensor will replace the Army's forward area alerting radars, also a Lockheed Sanders product, until the objective forward area air defense ground-based sensor is fielded. Lockheed Sanders recently concluded an approximately $10 million sale of its P-STAR to a foreign military customer. The contract includes multiple P-STAR systems, training, spares, documentation and support.

The Air Defense of Kuwait

"What are you doing?" the lieutenant colonel yelled at the tactical control officer. "Why are you firing missiles? Have you gone crazy?"

The Hawk tactical control officer looked up from the scope and answered, "Sir, we are at war. Iraq has attacked us."

by Capt. Steven Matthews

Following the Gulf War, U.S. air defenders celebrated Patriot's dramatic success against Iraqi Scuds, but were disappointed that the fortunes of war hadn't granted Air Defense Artillery a chance to show what air defense soldiers and systems could do against hostile fixed- and rotary-wing aircraft. They, and the rest of the world, had no way of knowing that Kuwaiti air defenders manning Hawk fire units had already staged a perfectly convincing demonstration. Iraq's invasion force quickly overran Kuwaiti Air Defense Brigade fire units, but not before the tiny kingdom's air defenders made Saddam Hussein's pilots pay a huge price.

The shriek of the alert siren pierced the nighttime silence, abruptly jolting the Hawk tactical control officer into wakefulness. "Why another crew drill right now?" the lieutenant wondered. "I had just managed to get comfortable." As he quickly made his way to the platoon command post (PCP), soldiers of the assault fire unit rushed past him in the darkness on the way to their stations.

As he stepped into the PCP, a crewman handed him the headset and said the tactical direction officer located in the TSQ-73 wanted to talk to him right away.

"Bring your unit to battle stations," said the tactical direction officer.

The lieutenant's eyes widened and, thinking the tactical direction officer must be mistaken, he asked for a repeat.

"Yes, battle stations," the tactical direction officer replied. "We are under attack."

At 2300 on Aug. 1, 1990, the tactical control officer brought his Hawk assault fire unit on Faylakah Island, Kuwait, up against the Iraqi air force.

Prior to Iraq's August invasion, Kuwait had two Hawk batteries deployed to the south of Kuwait City and one battery, manned only by security guards, deployed atop Multa Ridge northwest of the city. A Hawk training/float battery was located at the Air Defense Brigade Camp inside the capital, and one Hawk assault fire unit defended Faylakah Island.

In addition to the Hawk battalion, Kuwait had SA-7 Strela shoulder-fired missiles, SA-8 Ossa missiles and 35mm antiaircraft guns. The air defense systems belonged to the Kuwaiti air force and were tied together by an integrated air operations center. Later in the year, the Kuwaiti air force was scheduled to activate a sophisticated, state-of-the-art air defense command and control system purchased from France.

The tactical control officer ordered his downrange crew to insert umbilicals and arm all missiles. His tactical control assistant called from the high-power illuminator radar (HIPIR) to report it ready and requested permission to take it to remote. Remote targets were scattered across the scope, and the continuous-wave acquisition radar was providing good local video. Then the missile crew chief gave him a ready, and the tactical control officer ordered the J-box operator to take the launcher to operate and began the seemingly endless wait for MISSILE READY lights to appear. As MISSILE READY lights winked on, he reported to the TSQ-73 that he was at battle stations.

The invasion caught most of the Kuwaiti military by surprise, even though relations with Iraq had been strained for some time. Iraq, which had long claimed sovereignty over Kuwaiti territory, had attempted a previous invasion in the early 1960s that was turned back only with the intervention of British forces stationed there. Many Kuwaitis suspected Iraq had been behind sever-

al attacks and bombings that occurred on Kuwaiti soil during the Iran-Iraq War in an attempt to coerce their government's continued support for the Iraqi war effort. Saddam had recently accused Kuwait of stealing Iraqi oil and had re-asserted Iraq's claims to portions of Kuwaiti territory. Still, the leaders of several friendly countries had assured Kuwait that Saddam's heated rhetoric was merely a bluff intended to force concessions. Much of Kuwait's military leadership was vacationing away from the country to escape Kuwait's intense midsummer heat.

Targets were visible to the west but were out of range. Minutes turned into hours. More targets were tracked with the HIPIR but were either out of range or friendly. Then a new target appeared in the north, heading along the coast of Bubiyan Island. The tactical control officer locked the HIPIR on the target and simultaneously challenged it with the IFF. No response was received, and he requested instruction from the TSQ-73.

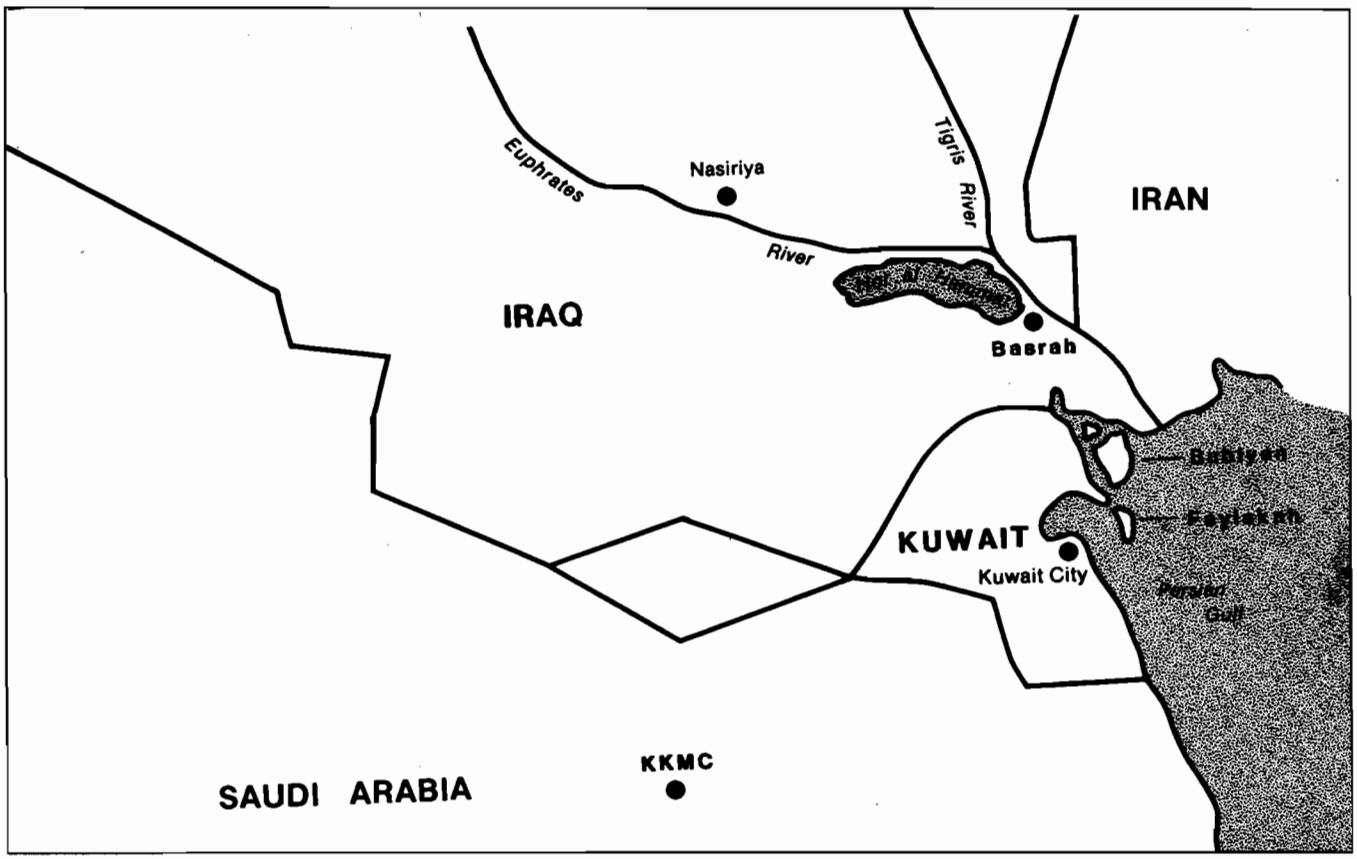
The tactical direction officer replied, "Challenge him again."

Still no response. Seconds crawled by as the target continued its approach. The doppler sound in his headset grew in intensity. The IN RANGE light glowed and the lieutenant looked over to his tactical control assistant. Even in the chilled air of the PCP, beads of sweat stood out on the tactical control assistant's brow.

When the target closed to within 20 kilometers, the tactical control officer called the TSQ-73 again and finally heard the quiet response, "Engage the target."

The tactical control officer reached for the FIRE button, murmured "Allah protect us," and pressed the button. The click sounded loudly in his ear, but nothing happened. He was immediately struck with fear that he had a misfire. But then a loud roar shook the van and a second doppler spike appeared on the A scope. Doppler noise continued to increase, followed by a squeal and a rushing sound. The target on the A scope disappeared, and shortly afterward the computer symbol dropped off the display.

The Hawk site on Multa Ridge had been maintained in caretaker status since the end of the Iran-Iraq War because of chronic manpower shortages that prevented the Kuwaiti Air Defense Brigade from fully manning many of its weapon systems and because harsh environmental conditions made the site difficult to maintain. Desert heat and



Kuwaiti Hawk fire units played a critical role in defending the Faylakah and Bubiyan Islands.

constantly blowing sand take a toll on mechanical and electrical equipment. These conditions are particularly harsh along Multa Ridge much of the year. Once a particularly bad three-day sandstorm left the windward sides of Hawk missiles scoured of paint to the bare metal. Along Multa Ridge, the bedrock lies only inches below the desert sand, making it difficult to properly ground electrical equipment. The blowing sand and dry air impart strong static charges that often cause metal objects to arc four to six inches.

Over the next hour, the tactical control officer had little time to reflect on the first engagement. Targets continued to appear and were tracked. In most cases the aircraft were friendly or permission to fire was not forthcoming. An hour later, the tactical control officer again received permission to fire, and a Hawk missile destroyed another Iraqi aircraft.

The long night wore on and the first light of dawn glowed faintly on the horizon. The door of the PCP suddenly burst open, and a Kuwaiti army lieutenant colonel rushed into the van.

"What are you doing?" the lieutenant colonel yelled at the tactical control officer. "Why are you firing missiles? Have you gone crazy?"

The tactical control officer looked up from the scope and answered, "Sir, we are at war. Iraq has attacked us."

After talking to the Air Operations Center, the lieutenant colonel left the van to begin gathering the few forces available to him. This was the last time the tactical control officer saw him.

The Multa site was captured by Iraqi forces before personnel sent by the Kuwaiti Air Defense Brigade's Hawk battalion were able to reach it. A Kuwaiti officer en route to the site was stopped and turned around by Iraqi soldiers. The soldier who stopped him unwittingly let him turn his car around and drive back to Kuwait City.

The officers and soldiers at the Air Defense Brigade Camp attempted to move the training/float battery to a firing location, but were unable to get the system operational in time. However, the two Hawk batteries to the south of Kuwait City were fully engaged in the air battle, each destroying four Iraqi aircraft before being ordered to evacuate.

At 0800, the Faylakah assault fire unit commander, having ordered a terrified ferry operator to transport him to the island, arrived on site. The captain listened to the tactical control officer's update, and then began checking the site. He reloaded missiles on one launcher, and began organizing the remaining soldiers to defend the site.

Iraqi pilots reacted to the attrition by avoiding Faylakah Island and, instead, approaching Kuwait City from the west. About midday, the captain was manning the PCP when two Iraqi helicopters, flying low over the water, approached Faylakah Island. The captain locked onto the lead helicopter and engaged it at about 15 kilometers. Observing the destruction of the lead helicopter, the pilot of the second helicopter turned around and flew off.

When the southern Hawk batteries began taking a toll on the Iraqis, they again began flying close enough to Faylakah to be engaged. By late in the afternoon, the tactical control officer had destroyed five Iraqi aircraft and the captain had destroyed two. They had expended 11 of their 18 missiles when the Iraqi pilots finally got the message and began giving Faylakah Island a wide berth. Late in the evening, the captain received orders to render his equipment unusable and evacuate the site. Taking their personal weapons, the soldiers of the assault fire unit changed into civilian clothing and disappeared among the civilians in a nearby village.

The Iraqis took Faylakah Island that night, shelling the abandoned Hawk site before launching their assault boats. Aircraft approached the island only after the assault forces assured the pilots that the Hawk site had been captured. Most of the Kuwaiti Hawk soldiers managed to infiltrate back into Kuwait City when the Iraqis forced the Faylakah populace to evacuate the island.

Having served with distinction during the initial Iraqi onslaught, many people in the tactical control officer's situation would have been satisfied to wait out the occupation or fight for the resistance. The tactical control officer was not satisfied with either.

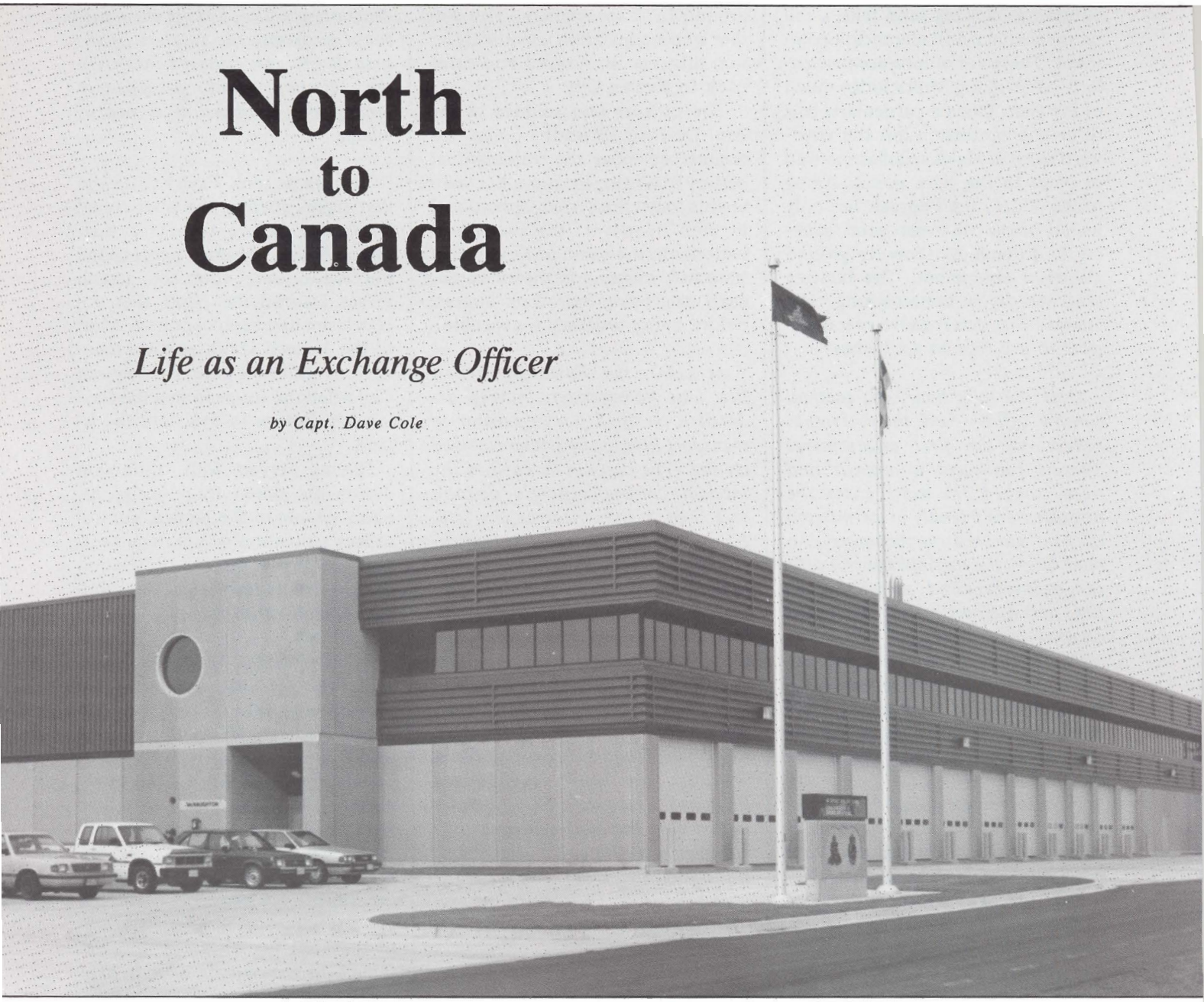
In November, he traveled into Iraq with a false passport and crossed into Iran. From Iran he made his way to Saudi Arabia, where he linked up with the U.S. Special Forces to work as an interpreter. He learned to scuba dive with the Navy Seals, and was on one of the first teams to fight its way into Kuwait City during Operation Desert Storm. He remained with the Special Forces as an interpreter until they left the city. He then rejoined the Kuwaiti air force to help reconstitute its forces. The tactical control officer says his next goal is to travel to the United States to attend the Hawk Tactical Control Officer Course at the U.S. Army Air Defense Artillery School, Fort Bliss, Texas.

Capt. Steven Matthews, an ADA officer, is assigned to the Kuwait Defense Reconstitution Assistance Office.

North to Canada

Life as an Exchange Officer

by Capt. Dave Cole



The U.S. Army Air Defense Artillery School, Fort Bliss, Texas, normally doesn't send exchange officers to English-speaking countries, but a recent exception to policy based on Canada's fielding of the air defense anti-tank system (ADATS) — the system selected to become the line-of-sight forward (heavy) component of the U.S. Army's forward area air defense system — sent me packing to the Canadian ADA School. In return, the Canadians dispatched a warrant officer (a rank equivalent in the Canadian Forces to our sergeant major) to Fort Bliss.

While my Canadian counterpart basked in the warm Texas sun, I shivered on the Canadian tundra, but I did have the experience of guiding Canadian soldiers through an ADATS training course designed to make them ADATS instructors, and celebrated with them as, under enormous pressure, they demonstrated ADATS' capabilities during a climactic live-fire exercise. I also got to play a part in the rapid expansion of the Canadian Forces air defense artillery capabilities, and learned a lot about air defense, Canadian style.

In July 1985, when the Canadian Forces established the Canadian Air Defense Artillery School, it occupied one room in one building on Canadian Forces Base (CFB) Chatham, an air command (air force) base in the province of New Brunswick, on the Miramichi River. Today, the school occupies two buildings, and the base is controlled by Force Mobile Command (FMC), which is the land component of the Canadian Forces.

In September 1990, I arrived as the first U.S. ADA exchange officer to the Canadian ADA School, fresh out of the ADA Officer Advanced Course at Fort Bliss. After settling in, I began the task of learning my way around air defense artillery, Canadian style.

The first thing I had to adjust to about Canada, the Canadian Forces, and their air defense branch was the fact that all three are much smaller than what I was accustomed to. For example, although Canada is the second-largest country in the world territorially, its total population is roughly the same as California's. There are currently only four active duty air defense batteries in the Canadian Forces, each of them at various stages in the process of manning and equipping.

Of these four air defense batteries, three are part of 4 Air Defense Regiment of Canadian Forces Europe, or CFE. One of them, 128 Air Defense Battery, is based at CFB Baden. 128 Battery's mission is protection of the airfield there, which is home to some of Canada's CF-18 fighters. 127 Air Defense Battery and 129 Air Defense Battery are based at CFB Lahr. 127 Battery's mission is protection of 4 Canadian Mechanized Brigade Group (4 CMBG), while 129 Air Defense Battery provides air defense of the Lahr airfield.

The sole fully operational air defense battery in Canada is 119 Air Defense Battery, based here at CFB Chatham. Their mission is to provide air defense for 5 Canadian Mechanized Brigade, although they also are often tasked to support training at the Air Defense School. Three other air defense batteries, designated U, V and Y, are also in the process of organizing, equipping and training to support the major maneuver units of the Canadian Forces within Canada.

119 Air Defense Battery also has the distinction of having sent the only Canadian air defenders to the Persian Gulf. 119 Battery soldiers, equipped with newly purchased Javelin air defense systems, augmented the air defense capabilities of the three Canadian ships operating in the gulf. The three ships, *HMCS Athabaskan*, *Terra Nova* and *Protecteur*, were in the theater with their air defense guests almost from the start of the Gulf War and remained until its end.

I began my education in Chatham as a member of the school's Tactics Troop, which manages the Air Defense Troop Commander Course. (A "troop" in the Canadian military is roughly the same as a platoon in the United States.) The Troop Commander Course, much like our Officer Basic Course, is designed to train air defense lieutenants (pronounced "leftenants") in the necessary skills to take over an air defense troop in a battery. However, the 14-week course focuses much more on air defense specific training, while ADA's OBC includes more general military subjects. This is because Canadian field and air defense artillery are not separate branches. Many subjects are taught in Field Artillery "Phase Training," which consists of four courses (or phases) that take an individual "officer cadet" from basic military subjects to qualification as a Field Artillery officer. Graduates destined to become "bird gunners" enter the Air Defense School's Troop Commander Course as either a second lieutenant or lieutenant.

Ten motivated young officers were enrolled, and I started work almost immediately. There was a Canadian captain in charge of the course, and we set out to produce a brand new batch of air defenders for the Canadian Forces. Since I

Canadians held a successful ADATS live-fire last May.

knew nothing of the Canadian military and their equipment, tactics, doctrine and terminology (they are quite different from ours), it was as much of an education for me as it was for the lieutenants.

However, most of my time here has been spent working in the ADATS Troop of the school. The U.S. Army hopes to field Martin Marietta's Americanized version of ADATS as the line-of-sight forward (heavy) component of its forward area air defense system. The U.S. version of ADATS impressed everyone with its accuracy during a competitive shootout (Canada, in fact, largely based its decision to purchase ADATS from its European manufacturer, Oerlikon Aerospace, on the shoot-off results), but the Army decided to delay a fielding decision because of reliability problems that surfaced during the competition. Martin Marietta now seems well on the way to solving the reliability problems (see story, page 17), so my assignment to the Canadian Air Defense School offered me experience on a system scheduled to soon become part of the U.S. Army air defense arsenal.

The Canadian 35mm gun/Skyguard system.

I moved into the office at the first of the year, and as my first task conducted an Assistant Instructor-in-Gunnery Course (AIG) ADATS field training exercise. The AIG (pronounced "ack-IG") Course is a senior NCO course designed to produce ADA instructors at the NCO level. Warrant officers and sergeants in the AIG Course receive training on all Canadian air defense weapons, including a six-week block on ADATS. The final week of the ADATS package includes a four-day exercise at Tracadie Range, about an hour north of the school. During the exercise, the students fill all the positions in an ADATS detachment and practice employing the system in a field environment.

This was not my first time in the field since coming to Canada, but Exercise Roving Majesty took place in February, and it was *very* different from what I was used to. I had never been to the field in a severe cold weather climate before, and I never quite got used to six-foot snowdrifts and temperatures in the -30 degree (Celsius) range. I did, however, get my first snowmobile ride courtesy of the master warrant officer (abbreviated MWO but addressed as "sergeant major") who runs Tracadie Range. But I was the only one bothered by the weather. The Canadian soldiers are quite used to it, and the exercise was a success.

The next order of business with the ADATS Troop was to conduct the first ADATS Conversion Course for Canadian soldiers. The Canadian ADATS program includes training soldiers from field units as the equipment is delivered. The first fire units are now being delivered to 128 Air Defense Battery, and it was their soldiers who were first to be trained.

ADATS Conversion Course 9101 began March 25, 1991, and ran for seven weeks. We trained a troop of 24 soldiers of varying ranks and experience in the skills they would need to operate the ADATS systems being delivered to their unit. I was the course officer, meaning that I was responsible overall for the conduct of the training and administrative details. I was assisted by several warrant officers and civilian instructors from Oerlikon Aerospace, who did most of the actual teaching.

A unique training aid we had at our disposal was a piece of equipment known as the crew station trainer, or CST. Manufactured by CAE Electronics, the CST is a computerized ADATS simulator similar in concept and configuration to our Patriot conduct-of-fire trainer, except, of course, it is modeled after the ADATS. It consists of an instructor facility and six ADATS crew stations. The crew stations almost perfectly replicate the operator's stations in the ADATS fire unit, both in form and function. The electro-optics operator and radar operator can use the CST to practice almost any operation that can be done in the actual fire unit, from power up and orientation to conducting simulated engagements.

The CST computer generates images of terrain, buildings and aircraft. The instructor at the instructor facility selects one of many available lesson plans, which recreate an actual piece of ground and almost any type attack profile by either fixed- or rotary-wing aircraft or tanks. The soldiers of ADATS Conversion Course 9101 used the CST to track and engage Fulcrums, Fencers, Floggers and Frogfoots, as well as Hinds and Havocs. An added twist is the capability to simulate electronic countermeasures, dark-

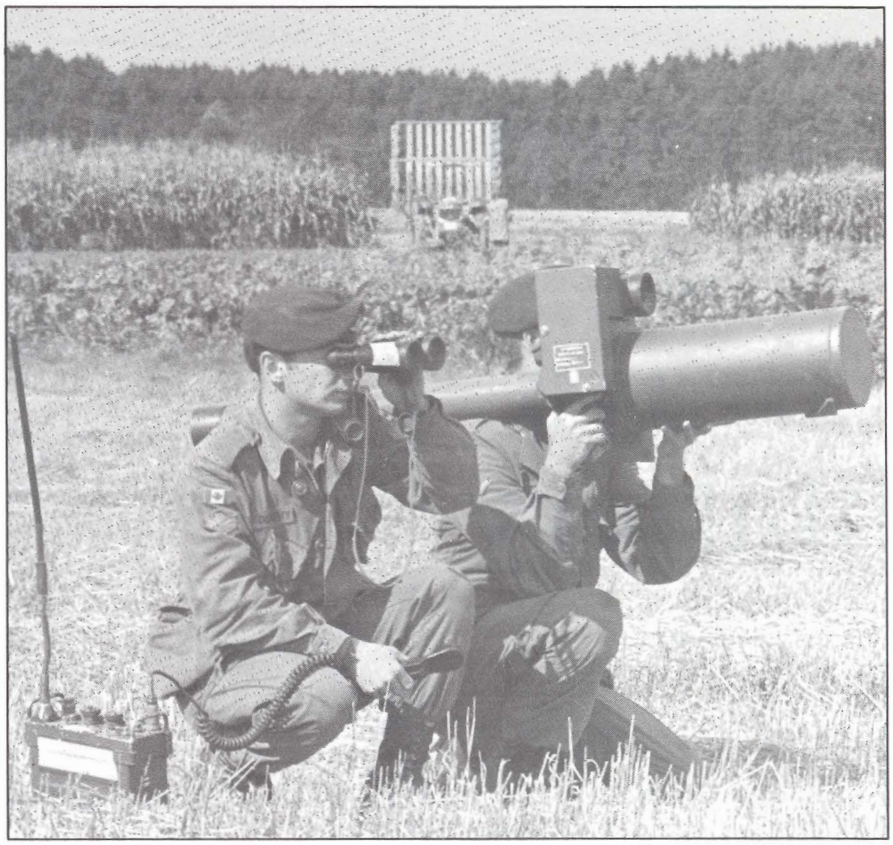
ness or adverse weather, and the ability to mix in friendly aircraft.

The Canadian ADATS program is part of a larger air defense modernization program known as low-level air defense, or LLAD. The LLAD program includes ADATS, Javelin and the Skyguard/35mm gun. Javelin is a British-made man-portable weapon command-guided by the gunner by either radio or laser, depending on the version. The trailer-mounted Skyguard shelter houses TV and laser modules and a survelliance and tracking radar that can control and remotely fire up to three trailer-mounted, twin 35mm guns.

But things only got more interesting after the course was finished. My final duty as course officer was to select four teams of soldiers from the course to fire live missiles at Exercise Perfect Kill, which was to commence almost immediately at CFB Suffield in the western Canadian province of Alberta. We loaded up the ADATS for shipment and boarded a Canadian Air Force C-130 for the trip to Suffield. After landing in the city of Medicine Hat, we headed out on a bus for Suffield.

Upon arrival, we set to work preparing equipment and settling into our base camp, called Viper Village. The first of five missiles to be fired was scheduled to go downrange on May 22, and basically the entire Canadian air defense community was holding its breath. This would be the first time Canadian soldiers fired the ADATS missile, and it could mean success or failure for ADATS in Canada because of political pressure to cut back on the military (just as we are feeling). So we all felt as if we were "in the fishbowl," with everybody looking at us, and the pressure was on.

Fortunately the story had a happy ending, with two of the four missiles fired hitting their targets and a third scoring a tactical kill. The targets were the Boeing Canada Vindicator, a propeller-driven, remotely-piloted drone with about an eight-foot wing span. Despite the target's small size, two of the missiles' proximity fuzes functioned properly, detonating the warhead and destroying the targets. One missile warhead failed to function, although videotape of the engagement showed the missile passing *extremely* close to the Vindicator (actual miss distance is classified).



The Canadian Blowpipe may not be included in Canada's modernization program.

The one miss occurred when the operator, after firing the missile, failed to keep the system in the "coast" mode long enough. The coast mode maintains the proper rate of tracking while the gunner's view of the target is obscured by the missile efflux, and is disengaged by the gunner when he regains sight of the target. In this instance, for whatever reason, the gunner broke the coast function prematurely, and lost sight of the target.

As I write, planning is underway for Exercise Perfect Kill 2, scheduled for this September. This time, nine missiles are to be fired. Four missiles each will be fired by ADATS Conversion Courses 9102, which just graduated, and 9103, which has just begun. The ninth is to be fired by a detachment made up of instructor personnel from the ADATS troop here in the school.

As the ADATS troop commander, I will serve as range safety officer for the firing in September, and will continue to run ADATS Conversion Courses for Canadian air defenders practically until the time I leave for my next assignment in another year.

Capt. Dave Cole, the first ADA Canadian exchange officer, will be reassigned in 1992.

Women of Bravo Battery

by 1st Lt. James Crabtree

PFC Sylvia Sanchez during a quiet moment at the Radar Hill site.

The media focus on women in the military has all but shoved male soldiers out of the Operation Desert Storm spotlight. The latest victims of the "first women" syndrome are soldiers of Alpha Battery, 2nd Battalion, 7th Air Defense Artillery. On Jan. 18, Alpha's Patriot soldiers became the first in the history of warfare to engage and destroy a hostile tactical ballistic missile. But when "Heroes of Desert Storm," an ABC "docudrama," aired Oct. 6, the ADA heroes were 1st Lt. Phoebe Jeter, the "first female to shoot down an Iraqi Scud" and soldiers of Charlie Battery, 3rd Battalion, 43rd Air Defense Artillery.

Actress Angela Bassett ("Boyz 'n the Hood") portrayed Jeter, who has also been featured in a two-page *Life* magazine photo spread. Jeter served as the tactical control officer in a crew of four inside an engagement control van the night of Jan. 21, the night Charlie Battery blasted a Scud out of the sky over Riyadh, Saudi Arabia. People who know Jeter say she's a terrific soldier. And she has garnered a windfall of positive publicity for Air Defense Artillery, a branch that, until the Scuds began impacting, labored in relative obscurity.

Still, you can't help but wonder if Alpha Battery might not have felt a little overlooked, perhaps even a little resentful, when the docudrama hit prime time. Don't blame Jeter. She didn't go asking for all the media attention. It was showered on her by journalists looking for a fresh news angle, and women in combat is news. It might not seem news to soldiers who serve in high-to-medium altitude air defense units. Women can be found at all levels within a Hawk or Patriot battery, from the operators who watch the radar screens and reload the missiles to leadership positions. In training, we had grown so accustomed to sharing combat roles with ADA women that it never occurred to most of us that anyone would make a big deal out of it once the action started.

But we were wrong. The Gulf War tested the mettle of women in uniform, giving them the opportunity to stand proudly, side by side with their male counterparts, sharing the difficulties and dangers of Desert Shield and Desert Storm. Their closely scrutinized performance seems certain to expand the role of women in the military. This is the story of female soldiers who served in Bravo Battery, 2nd Battalion (Hawk), 1st Air Defense Artillery, just one of the many Desert Storm

combat units in which women played a vital part.

2-1 ADA arrived in Saudi Arabia in late October 1990. Its mission: to deploy its Hawk batteries with Patriot batteries from 3-43 ADA and form Task Force Scorpion, the first ADA task force, to defend maneuver forces from attacking aircraft or tactical ballistic missiles. The mission ensured that soldiers assigned to the task force wouldn't spend the war in the static defense of an air base or logistics area. Instead, they'd be moving forward with the armored and mechanized infantry divisions as they positioned themselves for battle and breached the Iraqi defenses.

Prior to deployment, a rumor floated around that all female soldiers would be withdrawn from the line units before Task Force Scorpion moved north. This rumor, which we later learned made its way back to Fort Bliss, Texas, and the Air Defense Artillery School, was widely discounted, mainly because of its impracticality. Commanders weren't about to go into battle short of critical personnel if they could help it.

Bravo Battery's first order of business was to recover its vehicles and equipment at the Port of Dammam. The work details tasked to unload ships almost invariably included Bravo Battery females. PFC Mary Drussel helped move trucks off the cargo ships, then off the dock and into the holding area. "There wasn't much to do until the ships got there. I watched the guys fish, and that was about it," Drussel said.

The radars and other equipment were checked out in the port, any "bugs" were ironed out and the battery was put on the road headed north. Bravo Battery was going to the "front."

The battery's primary mission was to defend the 24th Mechanized Infantry Division area south of An Na'ariyah. The assault fire platoons set up missile sites on two hills about 20 kilometers apart.

A period of watchful waiting followed. We watched the coalition forces grow stronger and wondered if the sanctions against Iraq would take hold. Spec. Linda Carter, one of Bravo Battery's motor section petroleum, oil and lubricants clerks, found Thanksgiving dinner in the desert sand unappetizing. "Thanksgiving 1990 was the first one I'd ever spent away from home," she said. "I didn't even go to see what they had for Thanksgiving dinner; I asked to be put on guard duty instead. I just wasn't in the mood for it.

"I didn't really think anything was going to happen during Desert Shield," Carter continued. "Even the Scud alert in December wasn't all that scary." Just before Christmas, she was to become one of Bravo Battery's first "casualties."

"It was dumb," said Carter. "We left a can of Campbell's chicken noodle soup on top of the stove — we didn't even plan on eating it that night. The can exploded, and a piece of metal cut my leg. I still have a scar."

Once the air campaign began on Jan. 16, Bravo Battery prepared to occupy new positions, sites more than 300 miles away near the Saudi border town of Rafha. From its new firing sites, the battery would protect the 6th French Light Armored Division, which was operating as part of the U.S. XVIII Airborne

Spec. Pamela Peterson packs up materials at the Radar Hill site in Saudi Arabia.

The women of Bravo Battery rolled toward combat with Hawk convoys sporting the American flag.

Corps. The move would put the battery within 20 kilometers of Iraq — well within enemy artillery range.

"It was kind of scary," recalled Spec. Pamela Peterson. "I was with a vehicle recovery crew, and I ended up guarding one of our trucks that broke down on the way to Rafha."

As the battery's Army maintenance management system clerk, Peterson was in charge of ordering parts for the motor section. "But there I was with my rifle, waiting for the Iraqis to show up."

Once in position, the air defenders worked to make their sites "livable" as well as defensible. "The hardest part was digging fighting positions; the soil was real rocky." But Peterson recalled that not everything was drudgery. "We found a pair of puppies playing near the site. We adopted one and named her 'Rebel.' She became our good luck charm."

French soldiers occasionally visited the Hawk site near Rafha to trade items with the American air defenders. "They were surprised to see us," said PFC Tricia Walsh. "The French couldn't believe we had women up there. Once, they offered to trade a truck for one of us."

U.S. servicewomen sometimes suffered the same restrictions Islamic code applies to Saudi Arabian women. "We tried eating at a restaurant once," said Walsh, "and some guy came over to me and told me I had to leave. A friend I was with had left me for a couple minutes and, since I was un-escorted, I wasn't allowed there."

Walsh shrugged it off. "We just sat outside his picket fence," she said, "and we didn't have any more trouble, except for getting chairs. It did sort of bother me though."

With coalition forces poised for the ground campaign, Bravo Battery packed up and prepared to follow the infantry and armor into Iraq. It was a time of uncertainty and speculation.

"Nobody knew what we were getting into, where we were going, or what to expect," said Spec. Grace Gilbert, a Hawk missile system crew member. Task Force Scorpion designated Bravo Battery to lead the way into enemy territory. Its route of march took it along Main Supply Route Texas and through Iraqi defensive positions which, a few hours earlier, had been occupied by Saddam Hussein's 45th Infantry Division. When the orders came to commence to move, Gilbert, along with other Bravo Battery soldiers, donned her MOPP suit and grabbed her rifle.

Thus far, Saddam Hussein's air force had not contested the air defense network set up by the 11th Air Defense Artillery Brigade over Saudi Arabia, but neither had it been destroyed in the coalition's air campaign against Iraq. Saddam's planes redeployed to secondary airfields, escaped to the safe haven of Iran or remained hidden in reinforced concrete bunkers,

The exodus of warplanes to Iran caused much confusion and consternation among the soldiers in the field. Why was Iran, a bitter enemy of Iraq, permitting the Russian-

made MiGs and Sukhois to flee from the wrath of the allies? Had Hussein made a deal with his former foes, exchanging disputed territory for help against the United Nations? Were the Iraqi pilots fleeing the terror of Saddam's "Republic of Fear?" Did Iran intend to let Iraqi planes operate from their airfields?

Soldiers watching the cruise missiles and allied fighter-bombers streaking north could only speculate on this and other questions, such as where and when Iraq would use gas (no one doubted that they would), whether Jordan would openly come to Iraq's aid once our forces crossed the border, and whether the war would end quickly or would drag out. The movies never show you one of the worst elements of a war — the unknown. But one question bothered the air defenders more than any other: where were Iraq's helicopters? Iraq had the reliable Mi-8 Hip, the deadly effective Mi-24 Hind and several French helicopters, some of them the best money could buy. Saddam's generals had proven they knew how to use helicopters while fighting Iran, and Iraq's rotary-wing aircraft had been a contributing factor in Kuwait's rapid fall. Yet since coalition air forces had begun their bombing campaign of Iraq, there had been hardly any sign of Iraq's helicopters.

It was becoming obvious that Hussein intended to keep his expensive tactical aircraft in reserve for some reason, possibly to contest the allied invasion of Iraq. With this in mind it was decided that, once the ground offensive began, Task Force Scorpion, consisting of 2-1 ADA (Hawk) and A/B/E/3-43 (Patriot), would follow the main force north and set up as rapidly as possible inside Iraq. B/2-1 ADA would be augmented by reconnaissance, surveillance and occupation of position (RSOP) teams and detachments (called "slices") from other elements of the task force and serve as a nucleus around which the new air defense network would be built.

So this is Iraq, thought soldiers of Bravo Battery as they crossed the Saudi Arabian border into the pages of history. On Feb. 26, the Bravo Battery "MiG Busters" became the lead element for Task Force Scorpion's invasion of southern Iraq. Their mission: protect XVIII Airborne Corps' maneuver forces from air attack. Soon after crossing the border, the soldiers found that things would not work out as quickly as originally hoped. Pockets of resistance slowed the column to a standstill as it entered Iraq. EPWs (enemy prisoners of war) delayed the advance as they were disarmed, processed and sent to the rear, succeeding where the Republican Guard had failed by slowing the coalition forces. The enemy rolled past in green buses, apparently in high spirits to still be alive. Americans waved at Iraqis, grinning for a moment at the absurdity of it all. But when they faced north again they wondered about the enemy ahead — an enemy that might not surrender so willingly.

Iraq's desert was as featureless and uninteresting as Saudi Arabia's. So far there had been no sign, other than the EPWs, that Bravo Battery was even in a hostile land. But the illusion that Iraq was a harmless country slowly eroded as the column finally began moving up the highway again. At first an occasional bunker, a checkpoint or small guard post appeared on either side of the road. Then came better-built, extensive bunkers still equipped with heavy machine guns. Inside the bunker complexes, ZPU-4 AA guns, their quad barrels aimed south, starting showing up. Farther north the column passed dug-in T-55 tanks, some of them so well protected and camouflaged that the air defenders didn't even know they were there until they passed them. It started getting dark, and one of the last sights Bravo Battery saw in the failing light was the evil-looking barrels of Soviet-made S-60 57mm AA guns pointing toward the hundreds of trucks slowly crawling up the road, looking as if its presence alone could stem the tide. But as the sun set, the RSOP teams reached the positions selected for the two Hawk fire platoons.

By dawn on Feb. 27 Bravo One and Bravo Two were both fully operational, missiles armed and prepped, radars searching the skies for enemy aircraft, crewmen alert and ready. But Saddam's air force was beaten, as surely as his army in Kuwait was beaten. When he failed to take advantage of the inevitable confusion of the allied invasion's logistics and transportation, when he didn't use his helicopters to gain tactical surprise, when he wouldn't challenge the U.S. Air Force and Air Defense Artillery for control of the air, that was when the Iraqi air force was beaten, as surely as if every plane had been shot down in air-to-air combat or destroyed by surface-to-air missiles. A weapon that cannot or will not be used isn't really a weapon at all.

Most of the Iraqis in Bravo Battery's sector had surrendered by the time the battery was set up and operational. "The only Iraqis I saw were waving at us from the EPW buses going south," said Gilbert. She was thoughtful for a moment. "We did come across some Iraqi graves near a bunker. You could tell that's what it was because of the way the ground had been cleared of rocks."

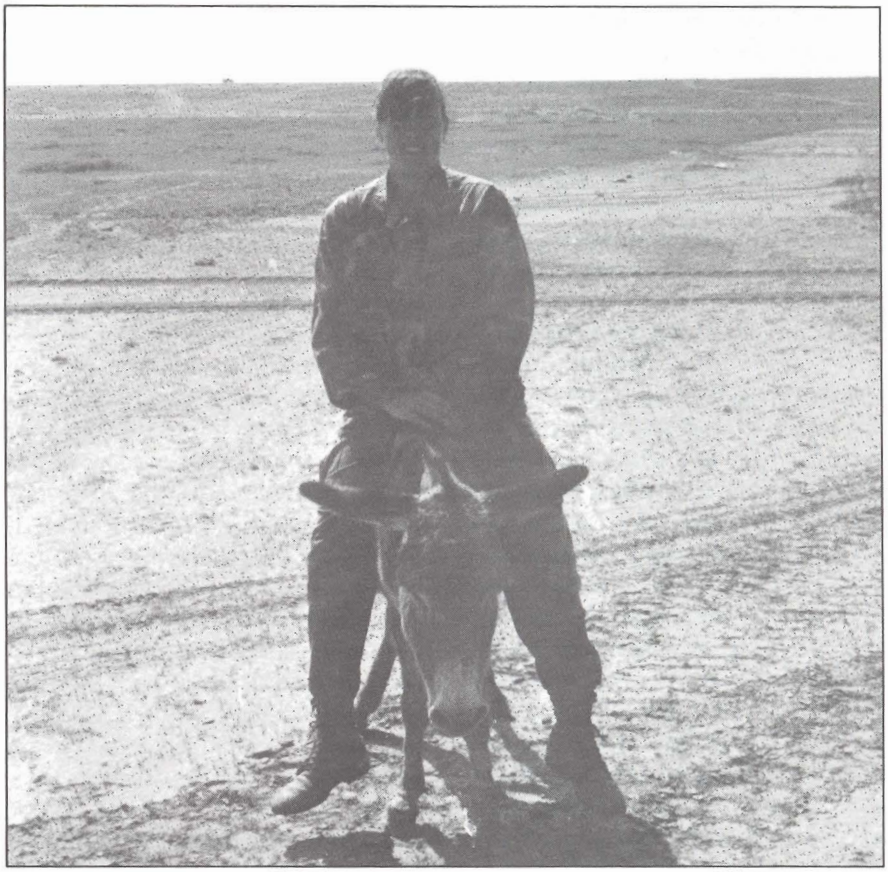
The next day a cease-fire was called into effect: Saddam had had enough. Bravo Battery was told to sit tight. Both platoons maintained their vigilance in case the Iraqis had second thoughts and violated the cease-fire. The rest of Task Force

Scorpion stayed in Saudi Arabia until the situation in Iraq became clearer. If it looked as if Saddam had changed his mind about the agreement and started getting belligerent again, the air defense assets would follow up the XVIII Airborne Corps as planned, prepared to go all the way to Baghdad to ensure victory. And indeed, there were a couple of nights during the following weeks when it looked as if Iraq might try to fight after all, but Hawk was always ready to defeat the enemy air threat. It never became necessary to follow up with the rest of the task force.

"How did I feel when they announced that the fighting was over?" asked Gilbert. "Happy, relieved, glad! We knew we would be going home soon."

The cease-fire gave the air defenders an opportunity to explore abandoned enemy positions in relative safety. The Iraqis had either fled north or surrendered south, leaving just about everything you can imagine: gas masks, grenades and rocket-propelled grenades, load-bearing equipment, ammo magazines, helmets, hats, AK-47s, radios, canned food, antiaircraft guns, surveyor instruments, artillery pieces and tanks — all or most of it intact. Bravo Battery soldiers fired an AK-47 and a heavy machine gun found inside one of the tanks at an impromptu range. Ammunition was no problem at all; it was literally just lying around wherever you went.

Some soldiers grabbed Iraqi uniforms as souvenirs, especially after a supply depot was found with crates of unissued clothing. Others wanted to bring back expended shell casings or weapons, but were told they couldn't bring them back. There were pictures of Saddam Hussein to be found everywhere, on notebooks, in magazines and even on a watch that one 34th Ordnance soldier stumbled across.



Spec. Grace Gilbert shares a lighter moment with a "friendly" native.

Gilbert was one of the soldiers who participated in so-called "search and destroy" missions in occupied Iraq. "It was neat," she said. "There were a lot of abandoned tanks and bunkers where we were, and we checked out most of them. I was surprised that there was so much ammunition inside the tanks, hardly any of it touched. They could have fought forever, but they didn't."

But after the initial novelty of examining what was left of Saddam's war machine wore thin, it became a matter of waiting, either for the order to pull back to Saudi Arabia and join units being sent to the States, or for the war to flare up again in earnest.

There were a few lighter moments inside Iraq. "Some jackasses wandered into our site one day, and we took turns riding them," said Gilbert. "Do you know the inverted 'V' emblem that the coalition vehicles were required to have on their sides? Well, we spray-painted it on a burro to show that he was a 'friendly' jackass."

"The nights were beautiful up there," said PFC Diane Nicasio. "You could see all the stars and constellations. It was pretty boring once we got used to it."

The air defenders of occupied Iraq hoped and prayed for withdrawal — but if Iraq decided to attack, to challenge the authority of the United Nations that the coalition forces represented, then they were ready to live up to their motto: "First to Fire."

1st Lt. James Crabtree was a platoon leader in Bravo Battery, 2-1 ADA, during Operation Desert Storm.

ADA Forum

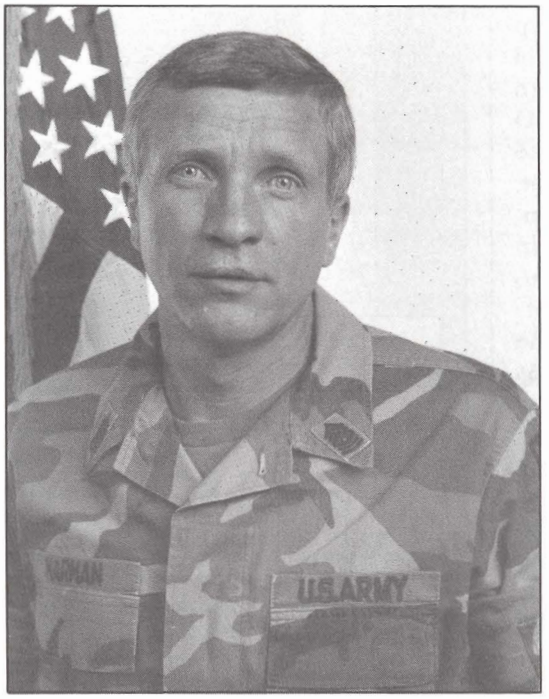
A New NCO Evaluation Tool

The NCO corps is the best trained in this nation's history, due largely to the highly successful NCO Education System and continuing advances in training doctrine. This October marks a major change in the Army's individual testing program: the advent of the first SDT or Self-Development Test. Senior command sergeants major at an October 1989 conference recommended the new test, believing the Army had outgrown the need for the Skill Qualification Test (SQT), designed to promote and evaluate individual training in units.

What was needed instead was an instrument to evaluate an NCO's progress in self-development as part of leader development. This led to the CSMs' recommendation for the SDT, whose stated purpose is "to allow NCOs to measure and guide their growth in the skills and competencies they will need as they continue to develop as leaders." Former Chief of Staff of the Army, Gen. Carl E. Vuono, accepted the recommendation and, in a July 3, 1990, message to the field, directed implementation of the SDT in fiscal year 1992.

The SDT is, in fact, an important part of the self-development pillar of leader development. Leader development rests on the three pillars of institutional training, operational assignments and self-development.

Under the first two pillars the NCO learns fundamental skills, knowledge and attitudes and puts them to use in his various job assignments. Under the third pillar, self-development, he initiates and completes a program of self-development to round out leader development needs not addressed or satisfied under the first two pillars.



U.S. Army Air Defense Artillery School CSM Robert W. Harman advocates the SDT as a valuable NCO self-development evaluation tool.

The Army already has instruments to measure NCO performance under the first two pillars (resident course tests, NCO Evaluation Report) but none for the self-development pillar. The SDT is the Army's response to that shortcoming. While it does not provide a complete profile of NCO self-development, it does measure certain critical aspects: MOS knowledge, leadership and training.

So what can we say about the SDT itself? Every sergeant, staff sergeant and sergeant first class will take the SDT, with each of those ranks in an MOS having its own test. Active Component, National Guard and Reserve NCOs will begin testing in October (FY 92) and will test annually; Reserve Component NCOs will begin testing in FY 93 and will test every other year. The FY 92 SDT test period schedule is laid out in DA Circular 350-91-1, now in the field. The Training Standards Officer network now in operation will administer this new test.

The SDT will be a written test, normally taking two hours or less to complete. It will have 20 questions on MOS knowledge. To promote NCO versatility in an MOS, the MOS knowledge section will be broad based, testing the NCO on his entire MOS rather than a single duty or equipment system. This is a fundamental difference between the SQT and SDT.

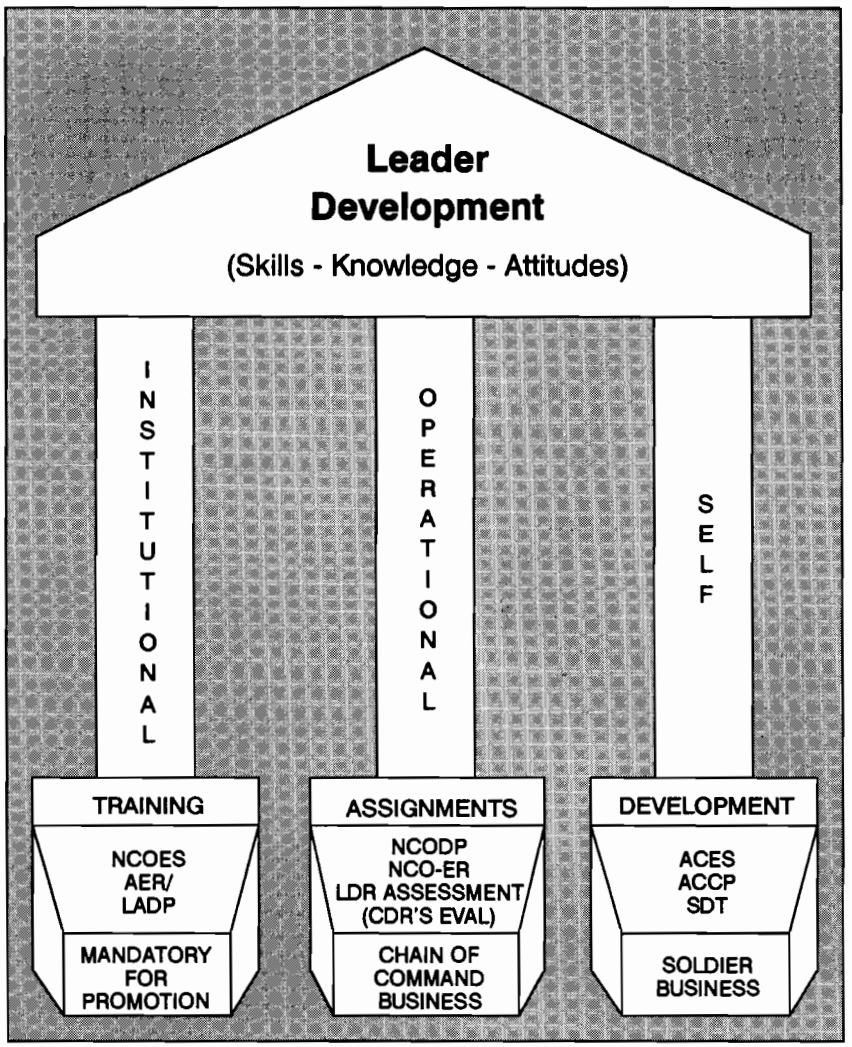
An NCO will prepare for the SDT on his own. This matches up with the self-development philosophy, which stresses personal responsibility. Units will no longer allocate time on their training schedules to prepare soldiers for an upcoming test.

To aid his study, the NCO will receive an SDT notice about two

months before the test period. To prepare for the leadership section of the SDT the NCO must study FM 22-100, *Military Leadership*, FM 22-101, *Leadership Counseling*, and FM 22-102, *Soldier/Team Development*. For the training section he must study FM 25-101, *Battle Focused Training*. For the MOS knowledge section he will need to study his MOS-specific soldier's manual and any supporting references shown in the SDT notice.

By now, each NCO should have a personal set of these leadership and training manuals that he will maintain and take with him when he PCSs from the unit. If the NCO does not yet have the manuals, he should immediately notify the unit publications clerk to order them. The NCO should be able to obtain the MOS-specific soldier's manual and needed supporting references in his work area or the installation/unit learning center.

Following testing, the NCO will receive two reports showing his SDT results. He will get the first report, the initial Individual Soldier's Report (ISR), within 30 days after testing. This unofficial report tells the NCO how many questions he answered correctly on each section of the SDT — leadership, training and MOS knowledge — and on each subject area of the MOS knowledge section. The NCO will receive the second report, the final ISR, about two-and-a-half months after his test period closes. In addition to SDT section feedback, the report will show the NCO's official SDT score (0 to 100) and a corresponding percentile or ranking. If, for example, the NCO receives an SDT score of 85 and a percentile of 65, this means his SDT score of 85 was as good as or better than the scores of 65 percent of the NCOs taking his SDT.



Leader development rests on the three pillars of institutional training, operational assignments and self-development. Beginning this October, the SDT will round out leader development through self-development.

The FY 92 and FY 93 iterations of the SDT will not be used for personnel management purposes. Individual test results will go to the NCO only. Besides acclimating himself to the new test, the NCO can use the results to steer his self-development. Beginning in FY 94, however, the NCO's SDT results will become a part of his permanent records and be tied to the Enlisted Personnel Management System. As such, they will be an important factor in promotion, retention/separation and school attendance decisions.

In conclusion, the Army has high expectations for the SDT. Properly designed and administered, it should be a highly useful new NCO evaluation tool.

BY CSM ROBERT W. HARMAN

PERFORMANCE

Performance:

No other word best sums up the Patriot air defense systems results witnessed during Desert Storm. Canadian Marconi Company is proud to be part of the Patriot success story as supplier of weapon system UHF communications equipment.

For the last two decades, the Communications Systems Division has been delivering L.O.S Digital UHF Radios for Patriot, Hawk and for other air defense C2 applications. In the Middle East theater, CMC equipment not only supports L.O.S radio communications of coalition forces, it also provides high quality CVSD voice and data multiplexing through application of the TD-5064 multiplexer (TD-1427 U.S. nomenclature).

Canadian Marconi is fully committed to provide its defense customers the utmost in competitively priced, reliable equipment.

For information please contact Canadian Marconi Company, Communications Systems Division.

CMC

CANADIAN MARCONI COMPANY

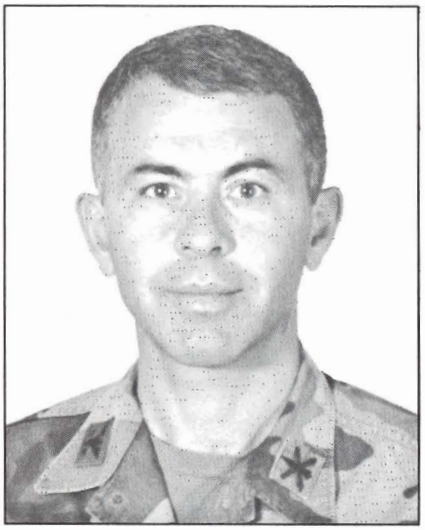
COMMUNICATIONS SYSTEMS DIVISION, US Marketing, 2442 Trenton Avenue,
Montreal, Quebec, Canada H3P 1Y9
Telephone: (514)340-3000 Telex: 05-827822 Fax:(514)340-3100

The McDonnell Douglas team:

Raytheon • Martin Marietta • Rockwell • BGT • Aerojet • Harris

MCDONNELL DOUGLAS

A Company of Leaders



One of your Air Defense Artillery Association's primary goals is to support the ADA Museum. Located at Fort Bliss, Texas, the museum preserves ADA's heritage and serves the "First to Fire" branch as its most effective showcase.

The association supports the museum by sharing revenues generated by the ADA Association Gift Shop, collocated with the museum at Building 5000, Pleasanton Road, Fort Bliss. Our long term goal is to help the museum build a new facility to replace the existing structure.

"Scudbuster" T-shirt sales bolstered gift shop revenues during the Gulf War, but security cautions that made it difficult for visitors and tourists to enter Fort Bliss virtually killed museum attendance. You can help by visiting the museum and the gift shop on a regular basis.

You haven't seen it all! The museum continually adds to its collections and regularly presents new exhibitions and audiovisual programs that make each visit to the museum a new experience.

There's never been a better time than now to visit the museum which is in the midst of its 50th Anniversary Commemoration of World War II. The museum recently interrupted its Fort Bliss Mobilization exhibit, the second in a series of exhibits which began with "Their Finest Hour-The Battle of Britain," to present a "Desert Storm" exhibit featuring paintings by prominent artists and memorabilia collected by ADA soldiers.

The museum's World War II commemoration will continue with the following exhibits:

Red Sun Rising-War in the Pacific (Dec. 91-June 92). Opens Dec. 7, the anniversary of Pearl Harbor, with special emphasis on the air defense of Bataan, Corregidor and Ie Shima.

World War II Art (June 92-Dec. 92). Treasured paintings and sketches from the art collection of the U.S. Army War College featuring combat scenes, including some with air defense themes.

The Homefront-Life in America in World War II (Dec. 92-June 93). "Rosie the Riveter" and a war-fueled economy transform American society.

World War II in Miniature (June 93-Nov. 93). Sponsored by the ADA Association, this exhibit of World War II weaponry will feature winners from a special El Paso Model Association World War II competition.

Kilroy Was Here (Dec. 93-June 94). A social history of "GI Joe" from recruiting station through boot camp to overseas deployment.

D-Day (June 94-Dec. 94): Anti-aircraft artillery units unfurl an air defense umbrella above the Normandy beachhead during history's largest amphibious invasion.

Tracers Fill the Sky-Antwerp and Remagen (Dec. 94-May 95): "Triple A" units battle V-1 "buzz bombs" and bombers during two of World War II's most significant air battles.

Victory and Peace (May 95-Aug. 95). Johnny comes marching home, and the United States emerges from World War II as the preeminent world power.

Visiting the ADA Museum and patronizing the ADA Gift Shop is a great way to promote the branch and, at the same time, stay in touch with your ADA heritage.

Milton A. Whitley Jr.

MILTON A. WHITLEY JR.
Executive Director
ADA Association

"First to Fire," by Bassel Wolfe, depicts 11the ADA Brigade soldiers in Saudi Arabia. (Desert Storm Collection)

Become a part of a proud tradition. Join the ADA Association today!

Soldiers should belong to an organization that champions their branch and promotes their professional development.

The Air Defense Artillery (ADA) Association safeguards the heritage and traditions of the "First to Fire" branch; manages accessions into the Order of Saint Barbara; sponsors *ADA Magazine*, recognizes distinguished ADA soldiers and sponsors a variety of projects to help ADA soldiers and their families.

ADA's membership fees, designed for soldiers of all ranks, are among the Army's lowest. When you join ADA, **you'll receive a $12.50 gift from the ADA Association Gift Shop** along with your membership package.

Joining ADA is easy:

Fill out and mail the membership application request at right. We'll send you an application and more information. Or, ask your platoon sergeant or battery first sergeant for information about the benefits of joining ADA and how you may become a member. After you join, we'll send you your membership package along with your own **free $12.50 gift** from the ADA Association's gift shop.

Join today!

YES! Please send me a membership application.

UNITED STATES ARMY AIR DEFENSE ARTILLERY

Name _____

Unit _____

Station _____

Address _____

City _____ State ____ ZIP _____

MAIL TO: ADA Association, P.O. Box 6101 , Fort Bliss, TX 79906

New Feature Moved to Next Issue—

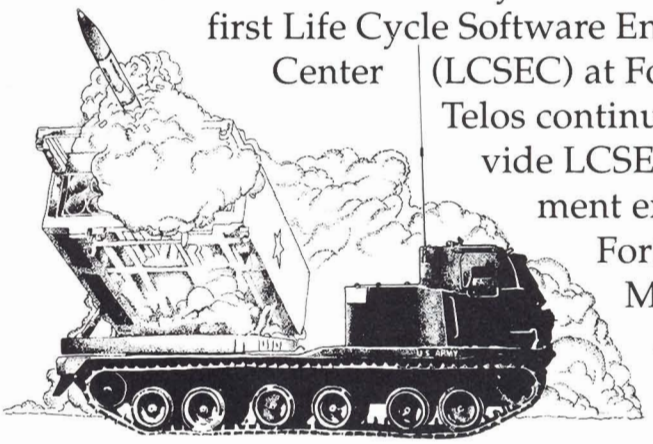
"Beginning with our November/December issue, we will be offering a limited amount of space to a feature we're calling Industry News," said ADA magazine publisher Terry J. Lewis.

The purpose of the feature is to allow air defense and other government contractors to run articles pertaining to their products and services in a news-like format for ADA Readers.

The article may be press releases or announcements and will carry a line at the bottom as to the company who sponsors the story.

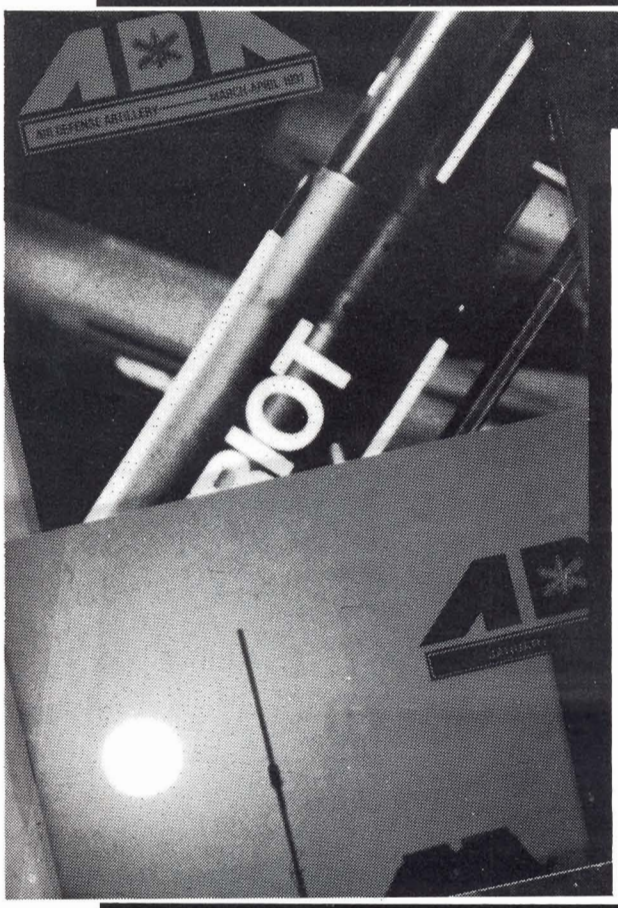
For further information and rates, contact Image/Southwest, 517 Main Street, Texarkana, Texas 75501, or call (903) 793-5528.

Telos assisted the Army in establishing the first Life Cycle Software Engineering Center (LCSEC) at Fort Sill. Telos continues to provide LCSE management expertise at Fort Sill, Fort Monmouth and Fort Huachuca.



TELOS *The Leader in Life Cycle Software Engineering*

Telos Systems Group
4755 Meadow Wood Lane, Suite 200 N. • Chantilly, Virginia 22021



Get your message direct to the decision makers...

Advertise in ADA Magazine!

Call 903/793-5528
for advertising rates

Stinger-RMP Makes Obsolescence a Thing of the Past.

General Dynamics Air Defense Systems Division is incorporating a Reprogrammable Microprocessor (RMP) into the U.S. Army's Stinger Weapon System that makes it possible to counter new threats without building a new weapon.

Fielded Stinger-RMP systems can be rapidly upgraded to defeat advanced countermeasures. Stinger-RMP's digital processing can also be used to improve guidance control and extend tactical range.

This innovative approach to evolving weapons systems counters both obsolescence and the high cost of defense.

GENERAL DYNAMICS
A Strong Company For A Strong Country