AIR DEFENSE ARTILLERY

WINTER 1983

AIR DEFENSE ARTILLERY

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AIR DEFENSE ARTILLERY: Published quarterly by the U.S. Army Air Defense Artillery School to keep air defense personnel informed of the latest tactical, doctrinal and technical developments in air defense worldwide, and to maintain a stimulating and productive dialogue between the school and units in the field, with a view toward increased efficiency in all aspects of air defense. Articles appearing in this publication do not necessarily reflect the position of the U.S. Army Air Defense Artillery School or the Department of the Army. Material submitted for publication is subject to edit by the Air Defense Artillery magazine staff. Footnotes and bibliographies may be deleted due to space limitations. Use of the masculine pronoun is intended to include both genders where appropriate. Copyrighted or syndicated material may not be reprinted. Unless otherwise noted, photographs are U.S. Army photos. If material is reprinted, please credit the author, photographer and the magazine. Use of printing funds was approved by Headquarters, Department of the Army, 25 April 1980, in accordance with AR 310-1.

SUBSCRIPTIONS: May be obtained through the Custodian, U.S. Army Air Defense Artillery Magazine Fund, USAADASCH, ATTN: ATSA-TDL-S, Fort Bliss, TX 79916. **Domestic:** $13 one year; $25 two years. **Foreign:** $14 one year; $27 two years. **Single Copy:** $3.50. Make checks payable to: **TREASURY OF THE UNITED STATES.**

CORRESPONDENCE: Address articles and letters to: The Editor, Air Defense Artillery magazine, USAADASCH, ATTN: ATSA-TDL-S, Fort Bliss, TX 79916. Telephone: 915-568-5603 (AV 978-5603).

POSTMASTER: Controlled circulation postage paid at El Paso, TX., 79916, Department of the Army (DOD 314) Air Defense Artillery magazine (USPS 307-010).

About the Cover

USAADASCH artist Bill Hainline's cover design shows ADA units in battle on a 21st century battlefield. The weapons portrayed are solely from the artist's imagination, but similar weaponry may evolve from the Army's AirLand Battle 2000 concept featured in this issue of *Air Defense Artillery* magazine.

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More Than a Name Change

AIR DEFENSE Magazine has changed its title to *Air Defense Artillery* magazine to coincide with the redesignation of the U.S. Army Air Defense School to the U.S. Army Air Defense Artillery School. It is the second title change for the magazine which began as *Air Defense Trends* in 1969 and was later renamed AIR DEFENSE Magazine.

This issue also unveils a reorganization of the departments section and features a special 11-page section on the AirLand Battle 2000 concept. The section, compiled and edited by ADA magazine assistant editor, Claire Starnes, is the first of special sections to follow which will provide in-depth coverage of air defense topics, trends and developments.

AIR DEFENSE ARTILLERY

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INTERCEPT POINT

History is replete with examples of campaigns in which a small force combined skill and audacity to baffle, demoralize and defeat a much larger force. In each example, the small force was able to overcome its numerical disadvantage because it operated at a high level of performance while its opponent operated at a relatively low level of performance.

During the Middle Ages, horsemen galloping out of Mongolia's frozen steppes breached the Great Wall of China and overran most of Asia and portions of Eastern Europe. The spectre of Genghis Khan and his Golden Horde hung as oppressively as the black plague over two continents. The victims of Mongol aggression honestly believed that they had been defeated by overwhelming numbers, but such was not the case. The myth of invincible hordes was an illusion created by Mongol tactics, mobility and deception. The Asiatic and European armies shattered by the Khan's swift-riding and hard-hitting *toumans* were beaten by a numerically inferior force which fought only for spoils.

The Mongol *touman,* which seldom consisted of more than 10,000 men armed with bows and leather shields and mounted on stocky Mongolian ponies, could advance 50 miles in a single day. During a time when most medieval military leaders thought in terms of protecting their flanks and the careful positioning of reserves, the Mongol warlords thought in terms of entire land masses. They launched *toumans* hundreds of miles into the enemy rear and executed vast, but carefully synchronized, envelopments.

Mongol tactics were so demoralizing and disorienting that the opposing maneuver forces were seldom able to concentrate. They cowered, in phychological defeat, within the dubious refuge of their walled cities, often surrendering at the first sign of a Mongol patrol even though the inevitable result was wholesale slaughter.

The Mongol *touman* adequately demonstrated that a small force armed with a superior organizational and operational concept that allows it to function at a high level of performance

Major General James P. Maloney

can defeat a much larger force crippled by orthodox plans of organization and battle. The martial virtues of the Mongol *touman*—agility, synchronization and the ability to project power in depth—are basic tenets of the Army's new AirLand Battle 2000 concept, the concept which defines how we will use tomorrow's weapons to wage war in the 21st century.

The AirLand Battle 2000 concept, described in this issue of *Air Defense Artillery* magazine, is more than a revision of doctrine. It is a bold, new concept that projects the Army onto future battlefields. It will transform today's Army into a high-performance system capable of waging war in the 21st century with the same economy of force and effectiveness the Mongol *touman* demonstrated on battlefields a thousand years ago.

American soldiers have demonstrated on countless battlefields that they are capable of fighting against the odds and winning but, more often than not, the odds have been on our side. American military leaders relied on the nation's once seemingly inexhaustible industrial capacity and its genius for logistics to project overwhelming military superiority onto the battlefield.

Today, demographics and world economics have dealt America a different sort of hand. We confront a potential enemy who possesses a significant numerical advantage. To offset our opponent's numerical advantage, we must develop a qualitative edge that will allow us to operate at a higher performance level than American armies of the past.

The American Army, like most large armies or organizations, has, at times, displayed a tendency toward orthodoxy and a resistance to change. Until recently, the Army organizational and operational concept was built largely on World War II premises. However, AirLand Battle doctrine, currently being written into Army field manuals, has changed the way the Army thinks. We must outsmart rather than outmuscle our enemies, relying on mobility, deception and deep thrusts to disorganize and demoralize enemy maneuver units.

AirLand Battle is a revision of doctrine; AirLand Battle 2000 is a revision of the basic Army structure. It will entail the most drastic reorganization ever undertaken by an Army not coerced into change by catastrophic defeat in battle.

The Army of the 21st century will be a leaner, more flexible force superbly organized and equipped with made-to-order weaponry to strike selectively at our enemy's vulnerable points.

The high-performance Army envisioned in AirLand Battle 2000 will require a highly motivated, technically skilled soldier capable of independent action, for AirLand Battle 2000 demands that each soldier becomes a high-performance component of a high-performance system. Producing such a soldier requires that each of us, as we go about transforming today's Army into the Army of tomorrow, be ever conscious of the need to perform at our highest level of performance, for only the finest efforts by the soldier of the present century can mold the soldier of the 21st century.

I am confident that Air Defense Artillery will rise to the challenge. In fact, that challenge is tailor-made for us. We are now the high technology combat arm. We are fielding high-tech, made-to-order weaponry. We give more than our measure of combat power per person. We are well on our way toward AirLand Battle 2000.

ON TRACK

A tough, dedicated, professional non-commissioned officer corps has always been an essential part of any army. In ancient times, armies often singled out soldiers who demonstrated exceptional abilities and assigned them duties comparable to today's NCO in the U.S. Army. Some of the similarities between then and now are obvious. Our NCOs, for instance, are still promoted from the ranks and charged with duties that support commissioned officers in accomplishing their units' missions. As an important part of the Army team, they insure that orders are carried out in spirit and fact.

But what makes a good NCO an even better team manager? If I could choose only three qualities required to effectively train soldiers and lead them in combat, I would select skill, imagination and leadership as preeminent. And of these, leadership is perhaps the most important.

Sergeants lead by example. They set high standards and see that their soldiers live up to them. Besides working one-on-one with individuals, NCOs are also responsible for training the Army's small units—the platoons, squads, crews and sections—to fight together as a team. To that end, you as an NCO must recognize that every soldier's performance is an integral part of the whole, that each soldier depends on every other soldier and that all of them rely on their equipment. It's called teamwork, and we build teamwork and unit proficiency in order to be totally prepared for the day we will have to fight.

In my opinion there are few, if any, born leaders. Leadership is learned through training, practice and experience. To be a top-notch NCO you must know your job thoroughly. You must be proficient in the care, maintenance and operation of each item of equipment assigned to your unit. And when it comes to required tasks, you must be at least as good, if not better, than any of your soldiers; for true authority flows from competence, not rank. A real leader never asks a soldier to do anything which he is not capable of doing himself. That's what I mean by "leading by example."

CSM Frederick T. Stafford Jr.

Remember, you are the coach of the team, and you can't put your people into play without proper planning and training. It is just as important to think ahead to the day when you may have to replace your superior and a member of your unit will have to replace you. When leaders become casualties in combat, soldiers at all levels must pick up, carry on and get the mission done regardless.

This brings me to my next point. Constraints on personnel, time and materiel are such today that the Army cannot afford oversupervision or duplication of effort by commissioned officers and NCOs. It cannot afford to stand idly by and allow any degree of misunderstanding and misutilization to exist between officer and NCO which adversely impacts on a unit's combat readiness. Too often, leaders at various levels believe they share and perform the same duties. This can lead to two dangers: The subordinate either will be oversupervised or he will receive no supervision at all since each superior will have assumed that the other is doing the job. The results are a reduction in the effectiveness of the soldier, a conflict in job performance and the supervisor's neglect of other important tasks.

The fundamental leadership team is found at each organizational level above squad and section. It consists of the commissioned officer and NCO, one in the chain of command and the other in the NCO support channel. Each leader is ideally suited to perform other duties because of his training, experience and position. How well this basic team works together depends partly on the interpersonal skills of the officer and NCO and their understanding of their duties. One of their most challenging tasks is to develop good teamwork among their subordinates. True teamwork with any group of individuals engaged in the accomplishment of a goal or mission is perhaps the most valuable technique for insuring efficiency and success.

It is important that members of an Army organization know to which team they belong. The mission or objective establishes the team's reason for existence. Each team member requires and depends on the other members of the team for information, coordination and individual abilities and skills needed to accomplish that mission. Along with the leader, all team members are responsible for the success of the team's efforts.

Another important factor of teamwork is that team members be competent and proficient in their individual tasks in order to make worthwhile and significant contributions to the whole. Team members work closely together, not in a vacuum or behind a wall away from their fellow soldiers.

An effective team is one in which the members recognize each other's existing strengths and weaknesses and consequently work together to correct and overcome those shortcomings. The team must, therefore, provide its members with an atmosphere in which individual weaknesses can be freely admitted and corrective actions taken through training, coaching and counseling.

Finally, the men and women of today's Army must train, work and grow together in a peacetime environment, forever keeping in mind that at any time they could be placed in a wartime situation. An effective NCO is one who will recognize that challenge and prepare his soldiers for the battles of the future.

In the last analysis, strong leadership skills, dedication to duty and the cohesiveness of team spirit are the key ingredients needed to accomplish the Army's goals. To that end, our NCOs must demonstrate both initiative and potential that far exceed the responsibilities they have been given.

M1 90mm AA gun firing at an approaching V-1 flying bomb.

THE ROBOT BLITZ

ADA Against V-Weapons

Three years after anti-aircraft artillerymen and Royal Air Force (RAF) pilots shot the German Luftwaffe out of the skies over London and won the Battle of Britain, they found themselves involved in a new kind of warfare—the "robot blitz."

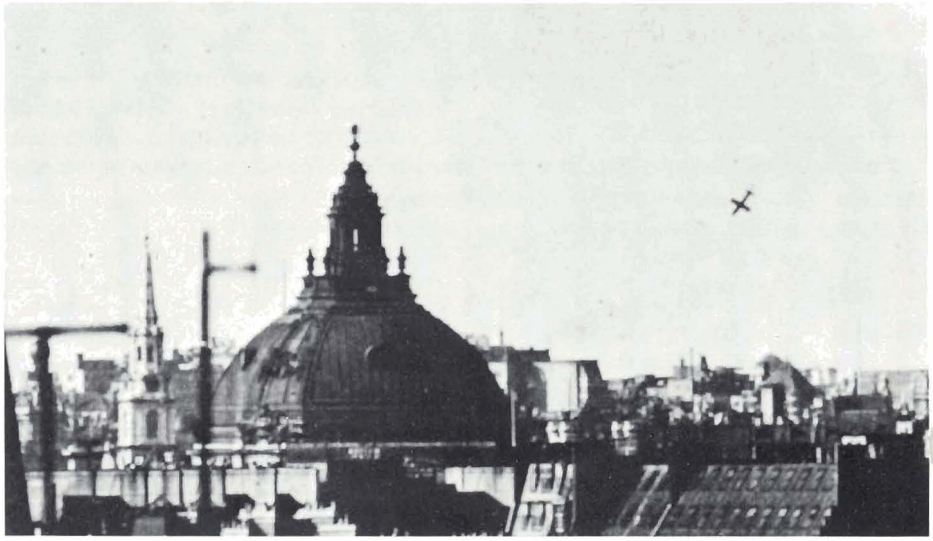
The robot blitz began the night of June 13, 1944, seven days after the Normandy landings, when the first V-1 flying bomb (forerunner of modern cruise missiles) droned across the North Sea and ended in March 1945 when the last V-2 rocket (predecessor of today's infinitely more devastating ICBMs) smashed down in London. Air defenders, after a brief period of panic spawned by the unveiling of the first of the Nazis' dreaded secret weapons, discovered they were able to cope with the V-1, but could do little about the V-2 except estimate its time of arrival—an event which occurred at a velocity faster than the speed of sound.

The first of the Nazis' dreaded secret weapons

The German V-1 was a relatively small, automatically controlled, jet-propelled monoplane carrying nearly a ton of high explosives. Its range was 250 miles and it flew at preset altitudes of 600 to 10,000 feet at a speed of 300 to 400 miles per hour. Magnetic compasses and gyroscopes controlled the flight of the V-1 which was capable of one 45-degree turn, provided the turn was preset.

Nevertheless, the V-1 had a smaller vulnerable area than that of a piloted aircraft and was a difficult target to destroy because it could only be stopped in its course by a hit on the detonator of the warhead or the destruction of a large part of the wing, a vital part of the engine or the robot pilot. Many of the bombs were not stopped, although their courses were changed when parts of the machine were damaged or the engines were hit.

The V-1s were launched against England in three different periods. The first and most serious was from June to September 1944. The English early warning system was excellent from the start. British gun operations rooms on the English coast gave advance notice of incoming V-1s and anti-



A V-1 buzz bomb, having penetrated the coastal anti-aircraft gun belt, plunges toward Picadilly in London. St. Paul's Cathedral is at left.

aircraft operations rooms were operated at eight different airfields. These centers telephoned warnings to each fire unit.

A belt of anti-aircraft guns, six miles deep, was established midway between London and the southeast coast by June 16 and included 192 British 3.7-inch and American 90mm guns. Approximately the same number of 40mm and 20mm automatic anti-aircraft weapons was placed along this belt and 480 barrage balloons were located between the gun belt and London. However, they were restricted from firing whenever RAF planes were over the area.

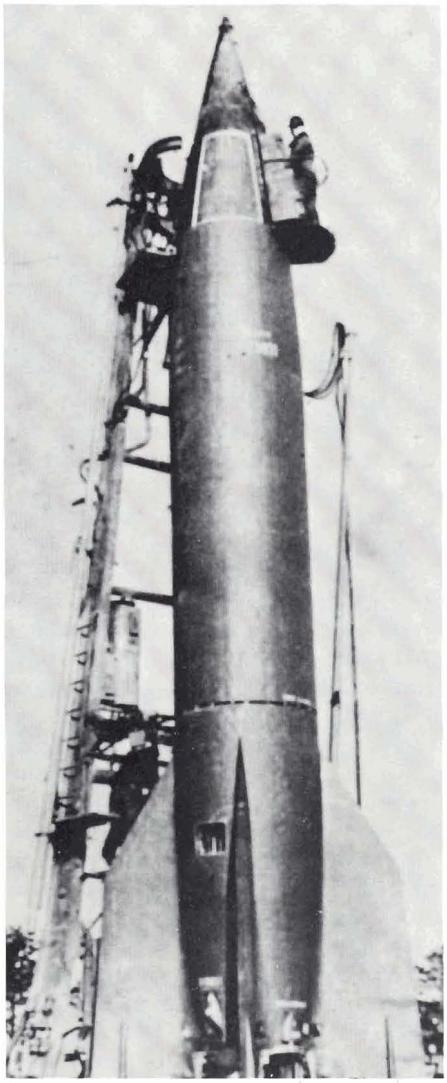
As a consequence, RAF pursuit planes destroyed about three bombs for each one the anti-aircraft guns brought down. Mutual interference between anti-aircraft guns and RAF fighters was eliminated when it was decided that the V-1s should be destroyed over water instead of over land to lessen the danger to military and civilian property. The guns were moved to the coast where they established a 5,000-yard deep belt which stretched from Beachy Head to Dover where they could engage targets 10,000 yards out to sea. The new belt gave fighters plenty of room to operate both farther out to sea and behind the gun belt. The RAF also patrolled the French coast and over the gun belt. The fighters were restricted to flying above 8,000 feet over the gun belt and the guns were free to fire up to 6,000 feet.

The anti-aircraft guns in the belt received new American SCR-584 radars and M9 directors and, as the crews became more skilled, the percentage of V-1 kills by anti-aircraft rose and the percentage of kills by RAF fighters declined. Anti-aircraft gun effectiveness against V-1s increased dramatically with the introduction of VT fuzes and, by the last week of August, the guns were shooting down 74 percent of the V-1s entering the gun belt.

The second phase of the V-1 launchings began in September 1944 and lasted until January 1945. Germany had been experimenting with launching flying bombs from aircraft and, when the Pas de Calais launching area was overrun by the Allies, they put the aircraft launch method into effect. When the enemy shifted his attack from the south to the east coast, the gun belt was moved to an area stretching from Clacton to Great Yarmouth. The kill rate continued to improve and, by the end of November, 80 percent of the V-1s were being destroyed with an average expenditure of 156 rounds per kill.

The third phase began in March 1945 when ground-launched V-1s were fired from Holland at a range of 190 to 200 miles. Of 158 V-1s launched during this period, 92 were destroyed (87 by anti-aircraft artillery fire). The V-1 threat dwindled and then ceased as Allied armies crossed the Rhine and cut their way across German lines of supply in Holland.

The V-1, by that time, however, had been upstaged by a far more devastating weapon—the V-2 rocket. The V-2 was spawned at Peenemunde, the same top-secret laboratory on Germany's Baltic coast that gave birth to the V-1.



V-2 being prepared for launching.

(One of the German scientists working on the V-2 was Wernher von Braun who, along with many of his colleagues, surrendered—just one step ahead of the advancing Red Army—to the Allies and became one of the masterminds behind the U.S. space program.)

The V-1, or "buzz bomb," spawned a generation of black-humor jokes: gallows humor inspired by the droning noise the V-1 engine emitted. You would hear the drone of the flying bomb's jet engine approaching the city, then the sound of the engine cutting off, a sound that meant you had approximately 10 seconds to duck for cover.

The V-1 was upstaged by the far more devastating V-2 rocket

The V-2 was different. No one made jokes about the V-2.

The first V-2 rocket fell on London on September 9, 1944. Early morning sunlight would have caught the rocket's exhaust as it rose high above Holland and arched toward the northwest. Perhaps the vapor trail would have been visible clear across the sea but, by then, the rocket would have reached burnout—brennschluss—and gone pure ballistic, reaching the apex of its flight path 100 kilometers above the sea and beginning to nose over.

What made the V-2 the ultimate terror weapon of its time was that you couldn't hear it coming in. First, you'd hear the blast and then, supposing the rocket had plunged through the roof of a neighborhood pub down the block or smashed into a schoolyard around the corner and you still lay safe in your bed, you'd hear the sonic boom of the rocket descending.

The V-2 rocket was a cigar-shaped, streamlined, guided missile 46 feet, 10 inches long with a maximum diameter of five feet, five inches. It consisted of a large conical warhead, a cylindrical center section and a tapered afterbody carrying four external fins. The takeoff weight was 14 tons, of which one ton was explosive material and 9 tons were fuel which was consumed in the first 60 seconds of flight.

The trajectory of the V-2 was determined before firing. The projectile was launched vertically from a special firing table. Its initial speed was slow, but increased rapidly. At the end of the burning time of 74 seconds, a maximum speed of 5,000 feet-per-second was attained at a height of 19 miles. The maximum altitude for a 200-mile range—the average distance between

launch sites in The Hague and Leyden, areas of Holland and London—was 58 miles with a flight time of 5.5 minutes. At its maximum altitude, the speed of the rocket was 3,800 feet-per-second, a speed that increased on the downward portion of the trajectory to 5,300 feet-per-second. When the rocket reached the lower atmosphere, its speed decelerated to a striking velocity of about 3,700 feet-per-second.

The V-2 was propelled by liquid oxygen and a 75-percent solution of alcohol. It could deliver one ton of amatol high explosive and could have just as easily delivered an atomic warhead if such a warhead had existed in the German arsenal. An improved V-2 which could have hit New York was on the drawing board when the Allies overran both the launch sites in Holland and Peenemunde.

The ultimate terror weapon of its time

There was no adequate air defense against the V-2s which descended so swiftly that observers could barely see them much less bring an anti-aircraft gun to bear on them. At first, it was thought it would be impossible to detect the V-2s on a radar scope but, after practice, crews were able to distinguish them at certain points in the flight.

Radar at first was used to pinpoint the launch sites so that the V-2s could be destroyed on the ground by bombers. Eventually, five types of radars were used to detect V-2s. Five long-range radars were placed on the east coast and were able to detect V-2s soon after launch. Standard British GL-2 radar sets were placed at gun sites in the London area. Modified GL-2 sets were located at Aldeburgh and Southwold, north of the usual V-2 flight paths, and one at Walmer, south of the flight paths. An SCR-584 radar set was placed at Steenbergen, Holland, about 30 miles south of the launch sites. An experimental radar was specifically designed to detect and track V-2s, but was in operation for only a short time before Allied advances on the continent eliminated the V-2 threat.

The radars gave adequate early warning of V-2 launchings, but the air defenders were powerless to stop the rockets from reaching their targets. A barrage plan based on the probable trajectory of the rocket and the probable point of impact was worked out by March 1945. The plan called for a total of 12,000 rounds to be fired at each descending rocket. The attacks ceased before this last-ditch plan could be put into effect and, therefore, no information was obtained on the effectiveness of anti-aircraft against the V-2. Radio jamming of the V-2 mechanism was unsuccessful.

Luckily, the V-2s launched from Holland at London were fired beyond their optimum operational range and many fell in the Thames Estuary instead of the city. Approximately 1,500 V-2 rockets were fired against London, 517 of them falling in or near the target.

A second target for robot bombs

The capture of Antwerp gave the Allies their only port facilities, other than those established at the Normandy beachheads, and the Germans a second target for their robot bombs. V-1 launchings against Antwerp, which began in October 1944, were almost continuous until April 1945.

Approximately 5,000 V-1s were launched against Antwerp but only 211 reached vital target areas. This was due, in part, to the V-1s' inherent inaccuracy and, in part, to the increasing effectiveness of anti-aircraft guns against the missile. Allied air defenders of Antwerp perfected anti-missile tactics developed in the gun belt outside London.

After approach routes to Antwerp from the launching sites were determined, available units were sited in depth along these routes. Anti-aircraft guns used in the Antwerp V-1 defense included 208 90mm guns, 128 3.7-inch guns and 188 .50-caliber machine guns. The night sky over the Antwerp gun belt was illuminated by 72 searchlights.

An inner artillery zone was established to eliminate interference between friendly aircraft and anti-aircraft guns but friendly aircraft continually violated the zone. Data available from Nov. 25, 1944, to Dec. 11, 1944, indicated that 375 friendly aircraft in 129 flights violated the zone.

Still, anti-aircraft gunnery proved extremely effective at stopping the robot bombs. Weapons, fire-control systems and searchlights available matched the capabilities of the enemy missile systems. Anti-aircraft batteries, equipped with the SCR-584 radar and M9 detector, were able to place accurate and sustained fire against individual V-1s and could detect, track and fire effectively on unseen targets. The proximity fuze was at least 10 percent more effective than the mechanical time fuze.

During the initial phase of the V-1 offensive against Antwerp (Oct. 22 to Nov. 3, 1944), 71 V-1s were engaged and 19 (26.8 percent) were destroyed. Results continued to improve. On Feb. 16, 1945, the day of heaviest activity, 41 (56 percent) of 73 vital-area threats were destroyed. On Feb. 23, 1945, the second heaviest day of activity, 61 (88 percent) of 69 vital-area threats were destroyed. During the last six days of the V-1 offensive, March 20 to March 30, 1945, 78 (94 percent) of 83 vital-area threats were destroyed.

The dense concentration of anti-aircraft guns against the V-1s was possible because the Allies had established

Air defenders never successfully countered the V-2.

complete air superiority over European battlefields and had no need to distribute their anti-aircraft assets evenly to cover maneuver units. It made the V-1 obsolete as a tactical weapon.

Hundreds of V-2s were launched against Antwerp where air defenders could devise no better defense against them than that which existed in London—a short early warning. Luckily, the V-2s were not nearly as accurate as today's ballistic missiles and they entered the war too late to make a decisive difference.

Allied air defenders never successfully countered the V-2. The V-2 threat only disappeared when the launch sites were overrun by Allied infantry and armor.

The official U.S. Army Air Defense Artillery School's historical analysis concluded no adequate defense against ballistic missiles existed at the end of World War II. None exists today. Although the theory of anti-ballistic-missile defense systems is well developed, the actual fielding of such systems as the Sentry and Spartan anti-ballistic missile systems—primarily designed to protect missile sites—has been delayed by treaties designed to slow the nuclear arms race. Air defense, in other words, has little more protection to offer against ballistic missiles today than it did in the 1940s.

*

New Stinger Launch Simulator Gives Live-Fire Experience

Army air defense soldiers demonstrate the Stinger Launch Simulator at Headquarters, Training and Doctrine Command, Fort Monroe, Va. The crew fired the dummy missile at a low-flying helicopter. (Courtesy of Brunswick Defense)

The Army recently approved the purchase of a new Stinger training device which will significantly enhance gunners' confidence in the weapon while increasing firing proficiency. This device is called the Stinger Launch Simulator (STLS).

The STLS uses a dummy missile which, when fired, travels only a few hundred feet before plunging back to earth. Thus, a STLS firing lets the soldier experience the same recoil and noise that he would get from launching a real missile.

The need for a realistic simulator was indicated in the Redeye training program which showed that gunners exhibit extremely high levels of anxiety, fear of the unknown and doubts about the weapon's effects prior to their initial live-firing experience. However, once soldiers actually fire the weapon, surveys indicate they experience a marked reduction in anxiety and an increase in confidence and proficiency. Live-missile firings are currently limited to one student per one station unit training (OSUT) class to conserve missiles and associated procurement costs.

The use of the STLS in confidence firings, in conjunction with annual service practices, will help the gunners overcome their fear. Bolstering the confidence of Stinger gunners should improve their accuracy and make forward area air defense more effective.

By simulating the Stinger system in physical and functional operations during the acquisition, tracking, superelevation and launch of a missile, the STLS allows realistic training and the opportunity to safely engage a tactical aircraft at a considerable cost savings. It costs about $1,200 to fire the simulator compared with $50,000 each time a real Stinger missile is fired.

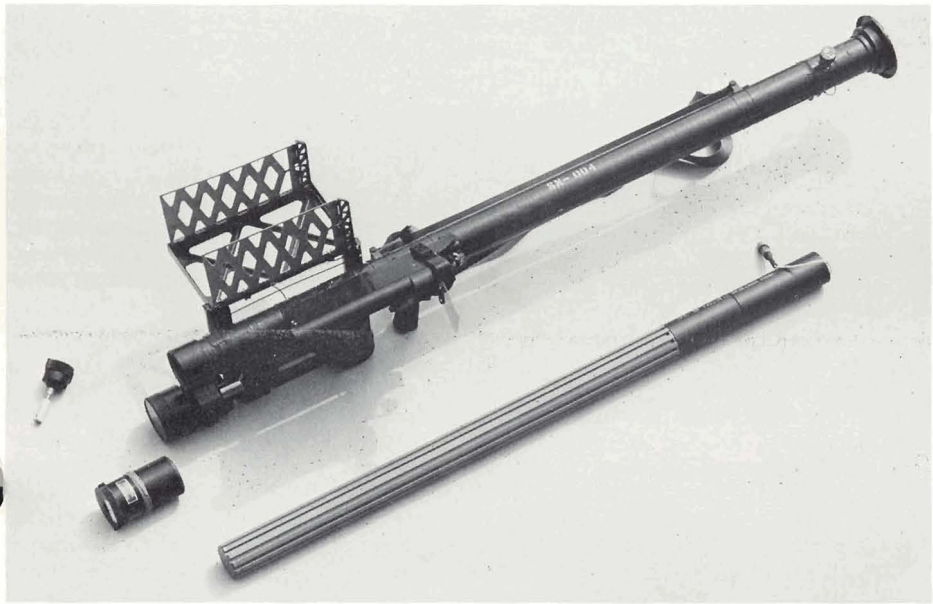
Operable at temperatures ranging from -15 degrees to 125 degrees Fahrenheit, the simulator is designed so that trained Stinger gunners can perform, while wearing mittens, all mechanical operations from activation to simulated launch within a maximum of 40 seconds.

The STLS will be used for training by Redeye/Stinger gunners at the U.S. Army Air Defense Artillery School, Fort Bliss, Texas, and at other Stinger training locations in CONUS, Europe and Korea as specified by theater and unit commanders. No impact on manpower requirements or force structure is foreseen since repairs will be contracted.

Armored, airborne, air assault and infantry divisions will be issued four STLS sets. Separate brigades, regiments and corps artillery groups that have Stinger personnel will be authorized two sets, while service schools conducting Stinger OSUT will have 12 sets. All sets will be issued through training and audiovisual support centers. One STLS round will be issued to each MOS 16S (MANPADS crewman) student per OSUT class, and one round a year per Stinger team.

The production of STLS is based on technologies which the Marine Corps developed and successfully tested.

Fielding of the STLS to Army units is expected to begin in 1985.



Stinger Launch Simulator

Designing a 'Do-It-Yourself' ARTEP

by MAJ Orin Gill

A Range Command officer scrutinizes a Fort Bliss training range for safety infractions.

The Army has a virtually inexhaustible storehouse of field expediencies a soldier can turn to when a piece of equipment malfunctions or goes AWOL at an inopportune time. One thing missing from the Army's treasury of field expediencies, however, is a workable substitute for an Army Training and Evaluation Program (ARTEP) which hasn't been written.

The ARTEP manual serves as a data base a commander can use to formulate training strategies and as a yardstick he can use to measure training effectiveness. A commander armed with an ARTEP manual which spells out training tasks, conditions and standards can rest assured his unit is training to standards identical to those of other units with a similar mission.

Unfortunately, not every unit in the Army has its own ARTEP and a commander with no ARTEP is placed at a considerable disadvantage. The lack of a school-produced ARTEP, however, is no excuse to neglect training responsibilities.

NO ARTEP

There are no ARTEPs tailored to range commands. Range Command, U.S. Army Air Defense Center, Fort Bliss, Texas, recognized the absence of an ARTEP was a serious impediment that would have to be overcome if the command was to meet its training requirements. The solution was to develop a substitute ARTEP to fit the specific needs of Range Command.

Designing a "do-it-yourself" ARTEP turned out to be, as you might imagine, quite a challenge, but we feel the end result is well worth the effort we expended and we hope the manner in which we went about producing our own ARTEP might serve as a model for other units with a similar problem.

TRAINING IMPEDIMENTS

We started by recognizing that range commands have unique training impediments other than the lack of an approved ARTEP. Range Command at Fort Bliss, for example, occupies an isolated spot in the Chihuahuan Desert and is set amid maneuver ranges that cover more acreage than some states. We are far removed from base support activities which facilitate training and our unit sections are widely dispersed over miles of sand dunes and cacti. The extreme distances we would have to shuttle soldiers scheduled for training would make transportation problems a constant headache.

We made a list of other impediments to training. The list included the following items:

- The diversification of Range Command missions.
- The recurring seasonal support requirements for major activities, including Reserve Component summer training and Japanese annual service practice in the fall.
- The lack of authorized equipment for training in mandatory subjects (weapons, gas masks, field mess equipment, etc.).
- The multitude of "odd" MOSs represented in Range Command. We had 129 enlisted personnel with 37 different MOSs including field artillery, infantry, armor, air defense artillery and other MOSs commonly found in troop units.
- Range Command's cadre-oriented structure.

We knew these training impediments would have an impact on our training programs, and we resolved to keep them in mind and build solutions to them into our substitute ARTEP.

CRITICAL TASKS

We decided that the first step in creating a substitute ARTEP should be to identify critical tasks which must be performed to accomplish the mission. We tasked each Range Command section to identify critical tasks required to perform its collective mission. References for these tasks were annotated and we developed ARTEP-type requirements based on the collective critical tasks.

INDIVIDUAL TASKS

Once the collective critical tasks were identified and priorities set, we identified tasks and set standards for each member of each section. In identifying these individual tasks, we gave first priority to skills necessary to accomplish the critical tasks of mission support.

SQTs

We gave the next priority to MOS training. We determined to prepare our soldiers to pass the SQT for their primary MOSs. Our goal was to qualify 80 percent for promotion. Individual training requirements were provided for us in the soldier's manual for each MOS skill level. The previously noted quantity of "odd" MOSs in Range Command

was, as we expected, a problem. In order to train our "odd" MOSs, we looked for contiguous training opportunities. We added a TDA slot for an SQT training NCO to help our section chiefs provide SQT training in a realistic unit training environment. We made plans to detail soldiers for brief periods to TOE units undergoing field training which could offer them the MOS training they needed. For example, field artillerymen need to practice their skills with an artillery unit undergoing field training; cooks must perform duty with field kitchen equipment and conduct food service operations under field conditions to maintain proficiency in their MOS.

MANDATORY SUBJECTS

We incorporated the training requirements contained in the 350-series of Army training regulations into our substitute ARTEP and added local guidelines.

WORK-FLOW SCHEDULING

In order to provide section chiefs maximum flexibility in accomplishing their sections' critical tasks of mission support without neglecting training requirements, we adopted a section-level, work-flow schedule. This system allows training to "flow" in harmony with mission support activities.

HOW DOES IT WORK?

We require our section chiefs to develop a master section schedule projecting their annual mission support, SQT and training requirements. From this master schedule, a weekly work-flow schedule is prepared. In conjunction with the unit weekly training schedule, the commander and the section chiefs are thus provided not only a flexible plan of weekly activities, but also a permanent record of what training and maintenance activities were accomplished within the sections on an hourly, daily and weekly basis.

We follow the procedures listed below to maintain the work-flow schedule:

- Schedules are prepared by section chiefs and are forwarded to the S3 by Friday of the week prior to training.
- A copy of the work-flow schedule is prominently displayed within each section.
- The schedule is as closely adhered to as mission requirements permit.
- Changes are posted to section copies and are relayed by telephone to the S3.
- Training cancelled or postponed due to changes in mission support requirements is rescheduled and posted on the master schedule.

WHAT DOES IT ACCOMPLISH?

The substitute ARTEP assures that each section follows a prepared, planned and coordinated training program. Section duties, maintenance and mission support activities, as well as training activities, are prescribed for the following week. The work-flow schedule indicates exactly what is to occur within each section at all times, while allowing section chiefs the flexibility to decide when to conduct training activities in harmony with mission activities.

The section chief is held accountable to make sure scheduled training is conducted and that the section adheres as closely as possible to the work-flow schedule. It alerts the section chief to prepare the section for scheduled activities. This means the section can make sure the needed equipment will be on hand when required. The S3 makes periodic inspections to make sure the work-flow schedule is followed.

Since adopting the work-flow schedule, we've discovered it provides maximum flexibility while ensuring training, maintenance, administrative and mission support requirements are met. The work-flow schedule challenges the section chiefs to plan, organize and make the most of resources to accomplish the mission while preparing their soldiers for their SQT and improving their overall individual and collective training proficiency.

The work-flow schedule is the heart of our substitute ARTEP. We are convinced the ARTEP we designed will produce soldiers trained in a logical and systematic manner who will, as a result, possess increased individual and collective skills.

We chose *Training, Maintenance, Administration and Support* (TMAS) as the title of our "do-it-yourself" ARTEP. Designing it was a challenging, instructive and productive experience. We feel other units with a myriad of complex mission support activities and no ARTEP to guide them stand to reinforce their training strategy, enhance the quality of their training and produce better soldiers by designing their own substitute ARTEP.

Many Range Command personnel work in isolated range control towers far removed from "downtown" Fort Bliss logistics and training support activities.

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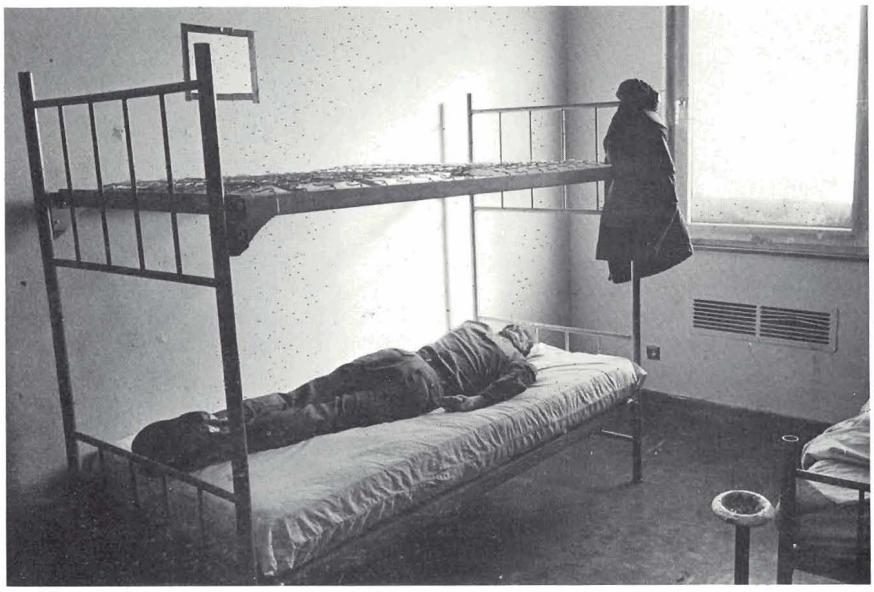


An exhausted soldier (left) catches a few winks before resuming guard duty at Battery C, 2nd Battalion, 1st ADA. As night approaches, another Charlie Battery air defender (above) pulls maintenance on one of the high-power acquisition radars. Soldiers at the isolated unit often work in shifts of 24 hours on and 24 hours off.

The Longest Tour: Surviving at an Isolated Site

by SP4 Anthony Del Valle
Photos by SP4 Patrick Burns

The 32nd AADCOM is charged with defending more than 56,000 square miles of West German airspace. Although no one job is more important than another, perhaps one of the most difficult and challenging is duty at a site. Soldiers living in isolated sites throughout the command have difficulties with isolation, shortage of transportation and lack of entertainment that their fellow 32nd AADCOM soldiers living in military communities do not have. Yet commanders and soldiers manage to survive, and even flourish, during these assignments.

"You have a lot of time to think at Charlie Battery," one soldier remarked. "When you're not working, there isn't much around here to distract you."

You have to keep reminding yourself that Battery C, 2nd Battalion, 1st ADA, is only 15 miles from Taukkunen Barracks in Worms. Battery C is located high up on a hill near the small town of Quirnheim, away from every form of public transportation. The soldiers there don't have many of the comforts that other military members have come to expect. There are no clubs, no movie theaters, no bowling alleys, no libraries; and that makes morale an all-important concern for the commanders.

"They have a tough mission," commented COL William F. Winzurk, commander of the 94th ADA Brigade. "It never slacks up. They get cold, wet, hungry and tired, but they have to keep plugging away."

In spite of the hardships, isolated sites tend to draw people closer together, both at work and during off-duty hours.

"You develop a strong sense of camaraderie here," one supervisor explained. "Our hours are long; our shifts are usually 24 hours on, 24 off. When I talk with someone from another post, I find that he doesn't have much in common with my lifestyle. It's like we're not speaking of the same Army."

No matter how much time you spend there, it's not likely you'll find anyone who claims that life at Charlie Battery is a bed of roses.

"I think what keeps a lot of soldiers going," another supervisor said, "is that everyone realizes we're not fooling around here. Our mission is important, and I think soldiers understand the need for their dedication."

That mission is the identification, tracking and destruction of aircraft operating at high altitudes in the battery's area of responsibility.

The work requires elaborate around-the-clock security measures, constant alertness and a group of soldiers able—and willing—to react with enormous self-discipline while under intense pressure.

"I worked for a while in an administrative position," one staff sergeant said. "I hated it. I mean, I felt I was being hassled all the time. Here, the Army makes more demands on me, but I don't feel I'm being hassled. I know the demands the Army makes are necessary. I guess you could say I feel more important now. I'll work a 24-hour shift and not say a word because I think I understand why I'm doing it. It would be different if I had to put up with long hours for no logical reason."

What keeps Charlie Battery personnel busy are the integrated fire control center, which houses the radars and detection equipment, and the launching area, where Nike Hercules missiles and launchers stand ready for action.

Naturally, the first part of the job is to be ready to find targets. There are two systems at Charlie Battery designed to do this, and both have

the ability to identify detections as friend or foe.

The battery control officer makes the final decision whether or not to engage the target. If he decides "yes," then a missile is fired and a computer takes over, guiding the missile to its target.

After launch, the missile is monitored by the missile-tracking radar, allowing the computers to keep tabs on the "contact point." If the target changes direction, the computer is able to change the direction of the missile. And, at the moment of truth, it's the computer that gives the burst command.

If it all sounds foolproof and infallible, supervisors are quick to point out that the Nike Hercules system works only if the sophisticated equipment functions properly. And that's where the skills of Charlie Battery soldiers come in.

They must be constantly on the look-out for targets, and their equipment must be "infallibly maintained" to insure there are no mistakes. "If you're a typist and you make a mistake, it's no big deal," one soldier commented. "Mistakes in engaging targets are a little more serious."

Charlie Battery is frequently checked by evaluation teams. There's a steady stream of unannounced alerts and land and air exercises. They call them "Blazing Skies." CPT Howard I. Harmatz, the battery commander, is proud of his unit's track record. He keeps a chart full of data for visitors that recounts the battery's history of positive evaluation results. Harmatz recognizes a responsibility to maintain a unit that is not only technically proficient, but also emotionally reliable.

A warrant officer sympathized with the problems Harmatz faces. "You know," he said, "we have more than 200 soldiers here, and very few of them have ever gotten into trouble. But when one guy is arrested for disorderly conduct, or is found smoking dope, it gets everyone's attention. And then community people start believing that what you have in isolated sites are drunks, dopers and trouble-makers.

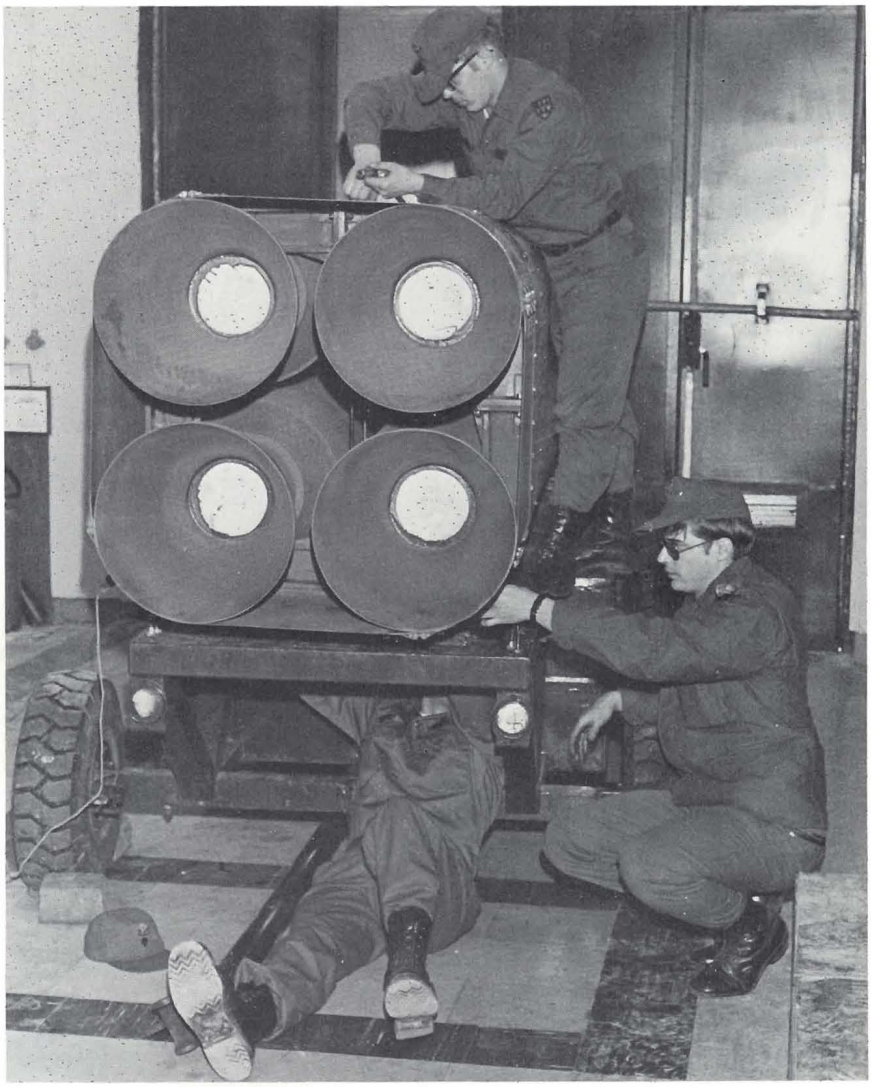
"Let me tell you, we aren't in a position to tolerate problem soldiers because of the nature of our mission. We just can't do it. I mean, if a guy is a clerk and he comes to work drunk, it's not the end of the world. But here, our mission is too important to risk using unstable people. You have to put up with a lot and if, on top of the normal pressures, you've also got serious personnel problems, you just won't survive."

Some of the "more than 200 people" at Charlie Battery are housed in hotels located several miles away. There are currently two hotels being used and there's talk of a third in the near future. Some married soldiers with cars in good working order live in Weierhof or Worms military housing areas, while a few live on the economy. The bulk of the enlisted troops lives in the barracks.

"I'm not going to pretend with you," one senior NCO said. "Living in the barracks is tough. In some instances we've had three or four people crowded into two-man rooms. We've got one soldier still living out of his duffle bag because there's no furniture for him." (That situation, Harmatz reported, was soon taken care of when the Worms military community provided Charlie Battery with 20 wall lockers.)

"When you live in the barracks, it can be hard," the senior NCO continued. "If you don't play pool or table tennis—and if you've already seen the 16mm movies we sometimes get—there isn't much for you to do."

Finding things for the troops to do often sends supervisors scrambling to Worms or Weierhof for help. The Weierhof Information, Tours and Travel brings in USO shows and bands whenever they can. And the Worms Transportation Motor Pool provides buses which allow the soldiers to get off the hill. Unfortu-



SP4 John Borman (bottom), PV2 Mike Draher (top) and PFC Joe Cummings perform around-the-clock maintenance chores. Officials point out that sophisticated, computerized defense equipment is "only as good as its maintenance crew."

nately, the buses must be used for mission-related work most of the time. Sick call is in Weierhof. Food rations and mail must be picked up in Kaiserslautern. Distribution is in Mainz. Community-related details are taken care of in Worms. One NCO noted that "every administrative action requires a trip to another city."

When a bus is available for morale support purposes, it's usually a 25-passenger vehicle, which sometimes limits the number of people who can go. It's not surprising, then, that supervisors claim good relations with surrounding military communities are taken very seriously at Charlie Battery.

"The health and welfare of the troops depend a lot on our ability to have a good rapport with the people who can help us out," one NCO commented. "If we can't get a bus, then we have to tell a group of hard-working, tired soldiers that they have to forget about a pass run to a large PX. Our job here requires so much of our people during work hours; we try to make their non-working hours as pleasant as possible."

Married soldiers have their own set of problems.

"Working here is a test of marriage," one NCO explained. "Some wives have to do a lot of adjusting. We're away from home a lot and the hours are irregular. There's nothing that can be done about that—the job requires long hours."

Harmatz tried to improve the understanding between spouses by holding a "Family Day." The installation was opened to visitors (something that's rarely done because of the sensitive nature of the work) and the unclassified portion of the unit's mission was explained in detail.

"We want to let you know what your spouses are doing when they're not home," Harmatz explained at the open house.

Areas of the installation that are normally off-limits were modified so that visitors could be allowed in. The only problem during the entire day was that few spouses attended.

"Working here isn't easy for a soldier with a family," Harmatz said, "and it's made worse, I think, when someone doesn't understand why his or her spouse is often working late away from home."

However, there are advantages to working at Charlie Battery. Everyone speaks of the annual trip to Crete where soldiers mix missile firing with a Mediterranean vacation. And the number of soldiers who extend for their present assignment indicates that some prefer their rugged living conditions over the comforts of the softer life.

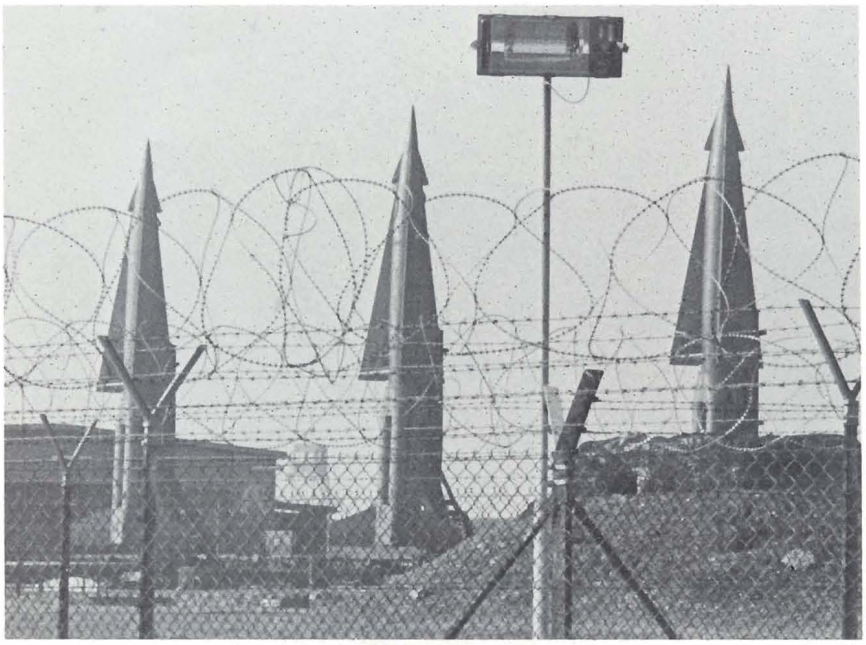
"I've been working at isolated sites since 1969," one staff sergeant said. "I like them because they give me a feeling of esprit de corps like I haven't felt since basic training. I'm secure here. There's a small group of people I've gotten to know, and there's not much, you know, 'kowtowing' to visitors. I really feel like I'm in the Army. I'm working with sophisticated equipment and I'm doing something I would never get to do as a civilian in the United States. When I retire, I'll have some stories to tell."

Harmatz' advice to soldiers stationed in isolated sites is make sure you have goals.

"A person has got to have something to look forward to, no matter where he is," he said. "If a soldier at Charlie Battery just lives day by day, he's going to have problems. You just can't do your job, then go get drunk and then crawl into bed thinking, 'well, another day's gone by.' You have to set up some kind of long-term goal, even if it's just to eventually buy a great stereo system or video set-up or to get a college degree or to see Europe. If you have a goal, every day brings you closer to it, and you feel good about yourself. If you make a few mistakes along the way—if you get an Article 15, for instance—you have your long-range goals to help get yourself back on the right track. Otherwise, living out here becomes a senseless thing. You start to feel there's no value to your life."

Harmatz likes to remind soldiers that they're not going to be living at an isolated site forever, and he feels the tour of duty can be valuable if a soldier approaches it the right way.

"Charlie Battery is a unique situation," he said, "and working here requires a unique kind of mental attitude. I like to think we live up to our motto of being 'second to none.' Isolated sites do have some unavoidable quality-of-life problems. I see my job as making sure we plug away every day to make that life better."



Three Nike Hercules missiles take aim during a readiness exercise at Battery C, 2nd Battalion, 1st ADA. The complicated weaponry keeps more than 200 military personnel at the site busy—and isolated—with constant alerts and preparatory drills.

SP4 ANTHONY DEL VALLE *is assigned to the Worms Community Public Affairs Office, West Germany.*

SP4 PATRICK BURNS *has been in Germany for three years and is currently assigned to the Worms Community photo lab.*

SP4 Robert C. Brown and PFC Anthony Hall, 5/52 ADA, keep watchful eyes on the sky during Exercise Mojave Victory II at the NTC, Fort Irwin, Calif.

5/52 Takes on NTC OPFOR

by PFC Mark Bersani

A Chaparral/Vulcan unit which participated in the Bright Star '82 exercise in Egypt recently had a chance to compare training in the shadow of the pyramids with training at the National Training Center at Fort Irwin, Calif. The huge Army "training aid" set in the Mojave Desert rates tops in realism according to soldiers of the 5th Battalion, 52nd ADA, from Fort Stewart, Ga.

Enemy planes are buzzing the battlefield trying to destroy our tanks. Suddenly, the long burping report of a Vulcan and the swoosh of a Chaparral missile join the sounds of battle. The enemy aircraft are destroyed and our tanks continue their mission.

Who are these predators of aircraft? They are the forward area alerting radars (FAAR), Vulcans and Chaparrals of the 5th Battalion, 52nd ADA. The air defense unit, veterans of desert operations in Egypt during Bright Star '82, recently deployed from Fort Stewart, Ga., to Fort Irwin, Calif., to take on the National Training Center's powerful OPFOR in Mojave Victory II.

"Our mission during Mojave Victory II," said CPT Glen Boney, "is to provide short-range air defense for the maneuver elements and other priority assets within the brigade area by destroying enemy aircraft or by forcing them to abort their mission."

Boney, normally the Battery A commander, has taken the reins of a composite battery drawn from all elements of the 5/52 for the duration of Mojave Victory II. The composite battery consists of two Vulcan platoons, one Chaparral platoon and two FAARs.

"The realism of the training here is unlike any we have participated in thus far," Boney said. "It is the closest thing to real combat without actually being in a combat situation. The realism is definitely there. The platoons are forced to do everything they have to do in combat.

"We are learning to function as a unit. The time-distance factor of the battery elements being spread so far apart puts a great deal of stress on the service support," Boney continued.

A 5/52 ADA Chaparral guided missile system and its crew stop for a brief rest before the next battle at the NTC, Fort Irwin, Calif.

"There is no comparison between the training in Egypt and the training here. In Egypt there was a fixed scenario. We knew exactly what was going to happen. We were really learning how to cooperate and train with another nation's troops. Here at the National Training Center, the training is focused on our combat mission without the benefit of knowing what the scenario or the enemy has in store for us. The only information we receive is through intelligence channels or personal observations as the battle unfolds.

"We are also learning to resupply ourselves with Black Hawks. We have never done that before. So far, we have resupplied one Chaparral with missiles while it was in its battle position. All the Vulcans' ammo has come by air."

Approaching Aircraft

PFC Bryan "Buzz" Bailey, FAAR operator, said his mission is to relay early warning of approaching aircraft to the Vulcan and Chaparral platoons.

"Our scope has four grids mapped out on it and we can detect enemy aircraft within a 12-mile radius. When an aircraft appears on the scope, we automatically challenge it. If it turns out to be a foe, we track it and determine where it is heading. We then relay that information to the Vulcans and Chap-

SP4 Claude Sandiford, Battery A, 5/52 ADA, works on the rotating barrel of a Vulcan anti-aircraft gun at the NTC, Fort Irwin, Calif.

arrals so they can shoot it down," he said.

"I've learned how to set up in a desert environment. Keeping concealed is very important. If an aircraft gets too close to our position, we have to be ready to move and move fast."

SGT Chester Parson, FAAR section chief, said, "We don't actually see battle, but we get in pretty close. We've been lucky so far because nobody has been 'killed' yet.

"I have an outstanding crew. We've been learning to deal with dry weather, the dirt and the dust. We have to be able to handle it because, if we go to war, we have to be used to it."

PFC William Cole, senior FAAR operator, said, "We spend long hours looking at the scope and watching for the enemy."

Close to Combat

"I've learned to work with the radio a lot more," said PFC Paul Dupree, FAAR operator and driver. "Tracking aircraft in the desert is easier because we can track them farther out and we can track them longer. Driving the FAAR on this terrain is a little harder. A FAAR is a little top-heavy and I had to learn how to drive without tipping it over while on these hills. I really feel that this training is close to actual combat."

After the FAARs do their jobs, it is up to the Vulcans and Chaparrals to take out the enemy aircraft.

"We usually go into battle with two Vulcans up front with the leading elements and two in the rear," said SSG Joseph Walker, Vulcan platoon sergeant. "Wherever the tanks go, we follow. If there are enemy aircraft in the area, the tanks are supposed to stop so they won't be seen. Then we fire on them (the aircraft). Our systems throw a lot of stuff in the air. We call it volume of fire. The theory is, the more rounds we put up, the better the chance of hitting the plane. If we can't shoot him down, then we try to keep him high enough so the Redeyes or the Chaparrals can get him.

"Suddenly, the long burping report of a Vulcan joins the sounds of battle."

"I hope other soldiers realize how important we really are. There are four Vulcans in one platoon and we have to protect about 30 other tracks," Walker continued.

"Personally, I've learned a lot from training at the National Training Center from sleeping in awkward positions to the importance of drinking a lot of water. Because we are so few in number, we have to learn to stay alive. If we die, then it will be like a duck shoot for the enemy. Their planes and helicopters can come in and do whatever they want."

Engaging Aircraft

When hostile planes fly above the maximum range of the Vulcans, the Chaparrals take over the air defense mission.

"We place our Chaparrals around the area to be defended," said SFC Wesley Jackson, Chaparral platoon sergeant. "We accomplish our mission with two kinds of heat-seeking missiles, the MM72A and the 72C. The 72C is an improvement because it's smokeless.

"We've learned how to engage enemy aircraft on unfamiliar terrain, how to maneuver in the dark and how to maintain our equipment in a dusty environment. Being able to train in a desert environment is a valuable asset to us and to the division. We've been trained to be able to deploy wherever the Threat may be," he continued.

"I like training here more than when we went to Egypt. There is not as much sand here as there was in Egypt and we can conceal ourselves better because of the terrain features."

There were some complaints. One 5/52 soldier thought the laser engagement system should be improved by placing laser detectors on each corner of vehicles to indicate which direction hostile fire comes from. The National Training Center plans to incorporate ground-to-air and air-to-ground laser simulators in future battle scenarios, an improvement sure to make training there even more realistic and more valuable to air defense units.

PFC MARK BERSANI *is a member of the Fort Stewart, Ga., Public Affairs Office. He has been assigned to the installation's newspaper, The Patriot, since March 1982.*

Field Expedient and Directional Antenna Techniques

by CPT Gregory G. Guernsey

Field expedient and directional antenna techniques (FEDAT) have two functional purposes. They can replace damaged or lost antenna components and they can modify transmission range and/or directionality to serve as electronic counter-countermeasures (ECCM). Proficiency in FEDATs has direct application for air defense units. To understand how FEDATs can contribute to air defense operations, one must realize how critical communications are during air defense operations, know how FEDATs can maintain radio communications during some emergencies, be aware of how they can help alleviate some of the electronic warfare threat and have a practical insight to the different FEDATs' individual characteristics.

Efficient communications are critical during air defense operations. Without visual, vocal or wire contact, commanders rely upon radio communications to maintain command and control. Commanders of all forces on the battlefield need reliable communications to transmit orders and receive reports. Reliable communications are also extremely important to the commanders of air defense elements for three additional reasons that collectively set their elements apart from those of other branches. The potential enemy places a high priority upon the destruction of air defense assets, which requires those elements to move often (as often as after each engagement for Chaparral and Vulcan) and to coordinate these moves with higher headquarters. Air defense assets must accomplish the complex task of integrating the air defense with the maneuver force commander's scheme of maneuver along with its changing requirements and his defensive priorities. This often forces air defense elements to move more frequently than other varieties of maneuver elements. The rules of engagement will change based upon the tactical air situation. In order to conserve resources and still maintain an adequate posture of air defense, the commander must be able to communicate to his firing units the changes in weapons control status, air defense warnings, weapons alert designators, DEFCONs and other control measures.

The increased emphasis upon the tactical use of radio communications results in a requirement for the air defense leaders to be proficient with FEDATs to maintain radio communications in emergencies and to avoid transmission detection.

Obviously, if a FEDAT can be used to replace lost or damaged antenna parts, it might be the only means of maintaining radio communications during some combat situations. This is a simple fact. However, the discussion of using FEDATs as ECCMs is more lengthy.

Electronic warfare is a weapon. In Vietnam, one compact but highly sophisticated enemy signal intelligence unit was captured. It had identified all divisional elements in its operational area down to the squad level. It had intercepted, understood and used radio and telephone signals to the enemy's advantage. It had misdirected or called off friendly artillery and air strikes. Realizing the threat that such enemy capabilities pose to our forces' use of radio communications, the best ECCMs are to avoid detection so that the enemy cannot easily intercept, jam or intrude into friendly radio traffic. Further, any signal received by the enemy can be used for targeting the source. Some ECCMs that can be used to avoid detection are transmitting at low power, keeping transmission time minimal, using terrain to mask signals, transmitting at irregular intervals and making the proper use of directional antennas.

Directional antennas can be an effective ECCM. To receive a transmitted signal, the enemy must have its receiving equipment in a position to intercept the radio wave. Reducing the distance that a radio signal travels in certain directions also reduces the possibility that the enemy's receiving equipment will be in the proper position to intercept the radio wave. Additionally, if the enemy does intercept the signal, but it is in the form of a weak, side transmission lobe, the difficulty of accurate direction finding and triangulation is increased. Considering the hazard of suppressive enemy artillery fire,. the survivability of the friendly forces using directional antennas is significantly increased.

A study of FEDATs was conducted in order to empirically evaluate their usefulness for air defense units. Only FEDATs which can be applied to the frequency-modulated (FM), tactical radios described in TC 11-5 (How to Repair and Fabricate Antennas) were selected for study. One reason for this selection was that this publication was widely distributed and hence available to air defense units. The FM radios are also common to all air defense batteries and are the exclusive mode of radio communications for SHORAD line batteries. (Verification of the TOEs was performed by the Directorate of Training and Doctrine and the Directorate of Combat Developments.)

In order to save time and maintain line of sight, the pilots of three helicopters measured the transmission ranges of different FEDATs in conjunction with an AN/PRC-77 radio. The pilots maintained an altitude of less than 100 feet above the FEDATs' transmission site. The radio was equipped with a new battery. Only free-standing support structures made from camouflage support systems and WD-1 wire were used. In fact, an advantage of FEDATs is that they can be made with materials readily available to air defense units. Field testing also measured training plus fabrication-time requirements and directional characteristics. Directionality was defined as the ratio of a side or rear transmission range to the forward transmission range. The weather was clear.

FEDATs proved operationally effective for certain uses. The priorities for selecting the most effective directional antennas were directionality, then range. The best unidirectional FEDAT was the vertical half-rhombic antenna with side and rear ratios of directionality equal to 0.71 and 0.24. The best bidirectional FEDAT was the high frequency (HF) doublet antenna with a directionality of 0.25.

The priorities for selecting the most effective FEDATs for repairs were fabrication time and flexibility for different terrain. No omnidirectional FEDAT had greater range than the manufactured, long-whip antenna component of the AN/PRC-77 radio. However, the vertical, ¼-wave antenna was found to be a quick replacement, and the field expedient RC-292 could be elevated for better line of sight for up to 30 feet of antenna lead without degradation of effectiveness.

Each FEDAT was constructed from one-page of written directions (with diagram) by soldiers without prior FEDATs experience so that valid training-time estimates could be made. The soldiers who participated in field testing were not told that their performance was being evaluated in order to obtain this data. Training time started at the reading of instructions and included asking questions and gathering materials which were at the site. It ended when the actual construction began. However, other soldier skills, such as map reading and the use of a compass, are also required and must be taught if FEDATs are to be used effectively.

A 2-watt resistor from 400 to 700 ohms is required for two of the unidirectional FEDATs. The field testing included a locally procured 2-watt, 620-ohm commercial resistor that retailed for 31 cents and two field expedient resistors which were fabricated at no cost using a larger-size, C-ration can for one and an earplug case for the other. The filler was sand saturated with oil directly from the crankcase of a M-151A2 ¼-ton truck. The can's resistance was 550 ohms. The earplug case was rated impractical due to the difficulty of obtaining proper resistances. No power ratings were obtained. The field expedient resistors were effective but inconvenient because they required up to 15 minutes to fabricate, due to mixing oil and sand properly, which is unsatisfactory when compared with the readily available, cheap, commercial resistors that worked excellently. Resistors actually increased the range of forward transmission when applied to the unidirectional FEDATs requiring them.

In conclusion, the ¼-wave vertical and field-expedient RC-292 antennas can serve well for antenna repair, and the best directional FEDATs for ECCM are the unidirectional, vertical, half-rhombic antenna (with commercial resistors) and the bidirectional HF doublet antenna. Particular situations may require other FEDATs. For example, vertical, half-rhombic antennas have higher silhouettes than horizontal, long-wire antennas, which increase danger from direct ground observation. Therefore, one should be familiar with all of the FEDATs in order to select the proper one for a particular situation.

NOTE: The author's sincere appreciation is expressed to the Aero-Scout Platoon, 3rd Armored Cavalry Regiment, and the S3 Communications Section, 4th Battalion Chaparral/Vulcan (Self-Propelled), 1st ADA, at Fort Bliss, Texas. Their support is directly responsible for the accomplishment of the study contained in this article.

FIELD TEST DATA

Antenna	Type	Transmission Ranges (km)			Directionality*		Training	Fabrication	Passive
		Forward	Side	Rear	Side	Rear	Time (min)	Time (min)	OPSEC**
Manufactured									
Flexible Whip	O	5.6	N/A	N/A	N/A	N/A	1	N/A	Good
Long Whip	O	10.5	N/A	N/A	N/A	N/A	1	N/A	Good
Bidirectional, Long Whip	B	7.0	3.5	N/A	.50	N/A	1	N/A	Good
RC-292	O	9.6	N/A	N/A	N/A	N/A	10	10	Poor
AT 948 A/G***	U	NT	NT	NT	NT	NT	NT	NT	NT
Field Expedient									
¼-Wave, Vertical	O	7.0	N/A	N/A	N/A	N/A	3	3	Good
Coaxial Cable	O	8.9	N/A	N/A	N/A	N/A	10	15	Satisfactory
RC-292	O	5.6	N/A	N/A	N/A	N/A	10	15	Poor
HF Doublet	B	19.0	4.8	N/A	.25	N/A	10	10	Poor
Horizontal, Long Wire	B	8.1	3.0	N/A	.37	N/A	8	10	Satisfactory
Vertical, Half-Rhombic	B	7.5	3.6	N/A	.48	N/A	10	12	Poor
¼-Wave, Sloping, Long Wire	U	6.6	5.3	4.8	.88	.73	4	3	Good
Full-Wave, Sloping Long Wire	U	21.0	11.8	7.3	.56	.35	3	3	Good
Horizontal, Long Wire	U	6.7	5.0	3.6	.75	.54	8	10	Satisfactory
Vertical, Half-Rhombic	U	19.2	13.7	4.7	.71	.24	1	12	Poor

NT = Not Tested. O = Omnidirectional. B = Bidirectional. U = Unidirectional.

*Directionality is defined as a ratio of either the side or rear transmission range to the forward transmission range.

**Passive operational security was subjectively evaluated by the criterion of how easily observable the FEDAT was from the air at a distance of 200 to 400 meters.

***This antenna was not tested because no 948 A/G could be obtained.

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On the night of April 2, 1982, as the Argentine aircraft carrier Vientecinco de Mayo steamed toward the narrows at the entrance to Port Stanley in the Falklands, helicopters were landing at Mullett Creek with 120 Buzo Tactico commandos—the first invaders. By 10 o'clock the following morning, it was all over. The Union Jack was lowered from Government House and replaced by the blue and white Argentine flag; while halfway around the world, in London, the decision to retaliate was imminent. . . .

The Falklands War: The Air Defense Role

by LtCol Brian W. Moore, Royal Artillery

A task force was rapidly assembled. The Queen exercised her Royal prerogative as a result of which some 70 merchant ships belonging to some 33 companies were requisitioned to augment the ships of the Royal Navy and Royal Fleet auxiliaries. A forward base was established on Ascension Island.

On April 12, a 200-nautical-mile exclusion zone was established to prevent the Argentines interfering with our own operations and to prevent reenforcement of the garrison on the Falklands.

On April 25, the Argentine submarine *Santa Fe* was caught on the surface five miles from Grytviken, the main settlement on South Georgia Island. Helicopters attacked with AS-12 missiles and depth charges. The submarine was so badly damaged that she subsequently beached at Grytviken. Following a naval bombardment which was controlled by special forces already ashore, Royal Marines landed. Almost immediately the Argentines surrendered. Part of the British territory had been recovered and a useful although limited base had been established.

On May 2, the cruiser *General Belgrano* was sunk by *HMS Conqueror* using conventional Mk-8 torpedoes. The British submarine evaded attacks by two destroyers accompanying the cruisers and did not retaliate so that the destroyers could pick up survivors. It was a vain hope as the destroyers steamed off and only returned many hours later, a move which undoubtedly contributed to the high death toll aboard the *General Belgrano*.

Shortly after the sinking of the *General Belgrano, HMS Sheffield* was hit by an Exocet missile and eventually sank in severe weather.

The Assault

The main landings took place at 0320 hours, May 21, on four separate beaches in San Carlos Sound after diversionary attacks had been launched throughout the islands. The landings were unopposed and no casualties were sustained. Two Gazelle helicopters were shot down by Argentine Blowpipes while conducting forward reconnaissance. There is no doubt that the Argentines, who had anticipated a D-Day-type assault on Port Stanley, did not, due to the diversionary attacks, realise where the beachhead had been

Opposite: A Scots Guardsman, waiting for an air attack, relaxes in a deck chair on the *Queen Elizabeth II.*

established for some considerable time. Surprise had been achieved.

Air Defence of the Beachhead

The air defence of the beachhead was a combined effort by the Royal Navy, the Royal Army and, of course, the Royal Air Force (RAF).

The first line of defence was the Harriers, over which there was some concern as they were untried in battle and were thought to be no match for the Mirages of the Argentine air force. Initially only 20 in number but subsequently built up to 40, they proved their versatility by destroying 27 aircraft in aerial combat without loss to themselves. Equipped with the Sidewinder missile and with their ability to use their vertical thrust to rise and move sideways, the Harriers were a formidable adversary.

They did lack, however, airborne early warning radar and relied completely on early warning from the ships of the fleet which could only see to the radar horizon. This was the main air defence lesson learned as there were insufficient Harriers to maintain air patrols over such a large expanse of sea.

The second line of air defence was the ships of the Royal Navy and the task force. These were organised into three lines of defence, the outer line consisting of those ships designed primarily for an air defence role with the ability to take on missiles or aircraft at both short and long ranges. The next line of ships had the shorter range air defence missiles mounted on them and the remaining ships had their own weapons augmented by Blowpipe (MANPAD) systems and machine guns.

The last line—although in some instances they were the first to engage an attacking aircraft—was the Blowpipes and Rapiers of the Army and the Royal Marines. Both of these weapons use the command guidance system of control.

The role of Rapier in the Army is to defend field Army units. The RAF regiment's role is to defend air bases. In the Falklands, the Rapier battery defended the bridgehead initially and then moved out to support the advancing forces. It was relieved by an RAF regiment squadron at about the same time as the Harrier forward operating base became operational.

Blowpipe

The Blowpipe is a self-defence weapon with the capability of engaging targets in the head-on aspect. The target is tracked by the operator using an optical sight. Blowpipe does not have identification, friend or foe (IFF), radar. In essence, the British philosophy is that if a plane is attacking your position, it is hostile, so shoot it down! Nonetheless, visual recognition is carried out by the operator and a missile is fired. The missile is automatically gathered onto the line of sight and is then controlled by the operator using a thumb stick. It is obviously not a fire-and-forget system, and a great deal of training is required to get an operator up to the standard where he is ready to fire his first missile. A simulator is used and has proved very effective. Incidentally, every missile operator in the British Army in Blowpipe and Rapier units fires a live missile at the conclusion of his training and thereafter once a year at the unit's annual service practice.

Royal Marine aims Blowpipe in the San Carlos Bay area.

Rapier

Rapier is a completely autonomous system which comes in three different models. The self-propelled, track version, which comes into service in 1983 and carries eight missiles ready for firing, is for the support of forward units in I British Corps in Germany. The second version is towed and is a daylight only system. This can be converted into a third or all-weather system by the addition of a Blindfire radar. This gives great flexibility to its use and deployment. Briefly, the surveillance radar detects a target or targets, the computer assesses the main threat and a challenge is automatically issued by the IFF. Should the indication be incorrect or negative, the operator is alerted and the system is automatically switched up with the launcher and tracker moving round to the azimuth and elevation of the target. The operator identifies the target and fires. The missile is automatically gathered and

Rapier in the bridgehead. The missile system was credited with 14 enemy aircraft kills in the Falklands.

flies along the operator's line of sight to the target. It is designed to hit and penetrate the target and, after a slight delay, explodes inside the aircraft—resulting in a certain kill.

Deployment and Use of Rapier and Blowpipe

The Blowpipes were the first air defence weapons ashore. Carried by their operators, they were soon established with their combat units. One battery of Rapiers was deployed by helicopters onto preselected sites. The designers of Rapier had always believed that it was essential for the system to be light enough (it weighs less than 3,000 pounds) to be transported by slinging it underneath a helicopter. This belief was amply justified as, throughout the Falklands campaign, the launchers were moved by helicopter not only on the initial deployment, but in support of the advancing troops on almost every occasion.

One requirement in an operation of this nature is for the operations staff to involve the equipment staff in the early planning of operations so that the equipment dispatched to the theatre is the most up to date and effective. Due to lack of shipping space, some important spares were left at Ascension Island and, after the long sea voyage, the lack of spares did affect the operational efficiency of the unit.

One of the reasons for selecting the beachhead site was that it was virtually land-locked with some relatively high terrain and this denied the enemy the opportunity to use their potentially most dangerous weapon, the Exocet missile. Instead, they had to carry out more conventional bombing and strafing attacks.

Due to the surprise achieved in the landing, it was not until midday (some nine hours after the initial assault) that the first air attacks commenced and continued intermittently for about six hours. The Argentine pilots pressed home their attacks at extremely low levels with extreme courage and determination. Despite the fact that the hills provided some protection and that the air defence systems were deployed, five ships were hit; however, one-third of the attacking aircraft was destroyed.

The second day saw little air activity and the British took the opportunity to augment their air defence capabilities.

On the next day, the air attacks were resumed and *HMS Ardent* and *HMS Antelope* were hit. Both the *Ardent*—one of the five ships hit two days earlier—and the *Antelope* sank, but this time two-thirds of the attacking aircraft were also destroyed.

Six days after the assault, a Harrier airstrip was completed in the bridgehead and four aircraft deployed, two for ground attacks and two for air defence.

The Argentine pilots flew so low (one aircraft hit a ship's mast and crashed) that they were not detected by the Rapier's surveillance radar, in some instances, until they were only four kilometres away. Fortunately, Rapier has a fast reaction time, due to its being an autonomous system, and successful engagements were carried out despite the short alerting time.

Because Argentine aircraft flew at such low altitudes and the Blowpipe and Rapier sites were located so near sea level, several anti-aircraft engagements had to be rapidly terminated after missile launch to prevent the missiles hitting a ship when the aircraft being engaged flew behind it in the course of its attack. As the missiles are designed to fly along the sight line, disengagement was possible to achieve by merely traversing or elevating the equipment. This would not have been possible with a fire-and-forget system.

Interference was experienced between the Royal Navy radars and those of the Rapier system but as some wit said, "You don't expect to meet a destroyer in the North German Plain," which is of course Rapier's most likely operational area.

At times there was a confusion of IFF responses but, of course, visual aircraft recognition as regards fixed-wing aircraft was not a problem. It was either a Harrier or hostile! It was not so simple with helicopters as some types were common to both sides. There is no record of the British engaging their own helicopters but the Argentines did manage this on at least two occasions.

Rapier was unjustly criticized concerning the Argentine attack on the *Sir Galahad* and *Sir Tristram* at Fitzroy which resulted in the heaviest, single-incident casualties of the campaign. Unfortunately, the troop of Rapiers had been deployed inland to defend the new beachhead area and was screened from the landing beaches by a 50-metre crest.

Rapier is regularly deployed north of the Arctic Circle as part of the force that practices reinforcement of the NATO northern flank, so it was known that it would withstand the rigors of

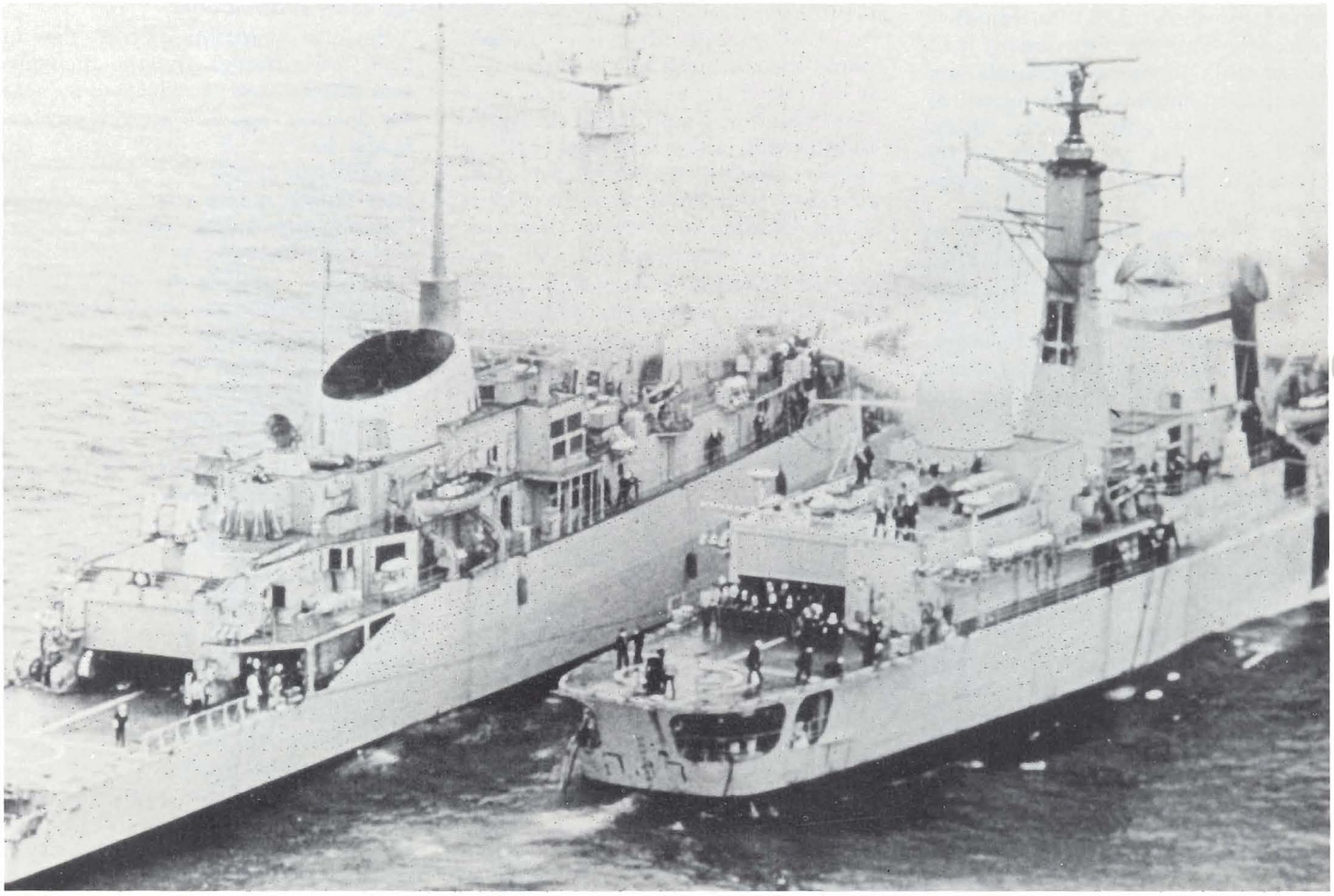
Members of 45 Royal Marine Commando enter Port Stanley. Each pack weighs between 100 and 120 pounds.

the Falklands climate where snow has been recorded in every month of the year except February. This was amply confirmed.

Blowpipe was credited with 11 kills during the campaign. It performed extremely well, but is a manportable system designed to be carried relatively short distances. Its weight of 47 pounds was found to be a handicap in the difficult Falklands terrain where the majority of movements was by "shanks pony" (own feet).

There was no shortage of ammunition in the Falklands on either side and air defence missiles, as far as the British were concerned, were no exception. Due to this fact and because it was essential that the British win the air battle, the normal rules of engagement were discarded and operators were instructed to engage targets even if there was only a remote chance of success. This applied more to the Blowpipe than the Rapier, the latter having its computer to "advise" the operator. There is no doubt that many Blowpipes were launched by necessity when they should not have been (in a pursuit role instead of at approaching or crossing targets).

The experience of one Blowpipe detachment on a Royal Fleet auxiliary (support ship) is interesting. They fired six missiles; three destroyed targets, two Mirages and a Skyhawk. Of the three remaining missiles, one completely missed the target, possibly due to an operator or missile failure; on the second, the operator lost the tracking flares amongst all the other lights and tracers in the sky; and on the third, the operator was blown off his feet by a bomb blast whilst controlling the missile. A reasonable excuse for missing the target!



HMS Arrow assists the *Sheffield* after she had been hit by an Exocet air-to-ship missile. The *Sheffield* later sank.

Exocet

The Exocet received a great deal of publicity and for security reasons my country could say little about what we were doing to combat it. In fact, some were successfully engaged by missiles, and chaff blooms played an important part in decoying them away from their target. Unfortunately, in the case of the *Atlantic Conveyor,* it is thought that chaff fired from a warship attracted the missile which then flew through it and on to the *Atlantic Conveyor* which, of course, had no anti-missile defences.

Of the four remaining known air-launched Exocets, only one penetrated the defences and hit the *Sheffield* which eventually sunk. It is of interest that the warhead did not explode and that it was the heat of the burning missile engine which set the ship on fire.

HMS Glamorgan was hit by a land-launched Exocet at about a 20 nautical-mile range and steamed on at 18 knots, remaining in action until it was eventually withdrawn to effect local repairs. At the end of the conflict, it was released and steamed the 8,000 miles back to Portsmouth.

Bombs

Three warships were lost to bombing attacks carried out at wave-top height. *HMS Coventry,* in an exposed picket position, was overwhelmed (four bombs) in a raid directed against her alone. *HMS Ardent* and *Antelope* were both on the "Gun Line" protecting the main amphibious landing. They were robbed of their manoeuverability and the full capability of their weapon systems, but there were no casualties to the

beachhead assault forces or the ships landing them. Only warships were damaged to any extent or sunk in this part of the operation.

Lessons Learned

- ☐ British forces must have sufficient flexibility to operate beyond the NATO area.
- ☐ The value of specialist amphibious ships.
- ☐ The importance of airborne early warning radar and a properly integrated C^3 link down to fire-unit level.
- ☐ The flexibility of the Harrier.
- ☐ The effectiveness of a submarine blockade.
- ☐ The value of fit, highly trained, professional troops.
- ☐ The flexibility provided to ground troops by helicopters.
- ☐ The usefulness of air-to-air refueling.
- ☐ The contribution that converted merchant ships can make to operations.
- ☐ The difficulty in completely denying an enemy airfield. (Port Stanley airfield remained operational until 48 hours before the cessation of hostilities.)

Britain could not afford to lose the air battle. In the first few days of the conflict, she inflicted such a rate of attrition that the enemy air force hardly influenced the ground battle at all, apart from the unfortunate incident at Fitzroy with the *Sir Galahad* and *Sir Tristram*. The combined defences produced by all services forced the Argentine pilots to fly in a way that they had never been trained to do and this contributed in no small way to their losses. Once the bridgehead was established and naval supremacy achieved, the outcome was not in doubt.

The first Falkland Islanders to be liberated.

Argentine Aircraft Losses	
A-4 Skyhawk	45
Mirage III and V	27
Canberra	3
Pucara	21
Mentor T-34	4
Aeromacchi 339	3
Skyvan	2
C-130	1
Lear Jet	1
Puma (one destroyed on South Georgia)	6
Chinook	2
Huey	2
	117

How They Were Destroyed	
Harriers	23
Destroyed on the ground	31
Sea Cat	10
Sea Wolf	5
Sea Dart	8
4.5-inch Gun	1
Rapier	20
Hand held (Blowpipe - 11, Stinger -1)	12
Evasion (one hit the mast of a ship)	4
Small arms	3
	117

British Aircraft Losses	
HARRIERS	
Sea Harriers	5
GR-3 (RAF)	4
	9

How They Were Destroyed	
Ground fire	5
Flying accidents	4
	9

HELICOPTERS	
Wessex	9
Gazelle	4
Chinook	3
Sea King	5
Lynx	3
	24

LtCol BRIAN W. MOORE, *Royal Artillery, was educated at Ipswich School in Suffolk, England, and later graduated from the Royal Military Academy at Sandhurst. During his career, he has served with two field artillery units and two air defense regiments. He once commanded 32 (Minden) Light Air Defence Battery, Royal Artillery, which is part of the 16th Light Air Defence Regiment. His last appointment prior to being posted to Fort Bliss, Texas, was as second in command and chief instructor of the Depot Regiment, Royal Artillery, based at Woolwich, England. LtCol Moore has been the British Liaison Officer to the U.S. Army Air Defense Center since April 1979.*

Lebanon: An Air Defense Analysis

by MAJ Charles E. Mayo

The Israelis destroyed 17 of the 19 Syrian air defense batteries (like the SA-6s pictured) deployed in the Bekaa Valley.

On June 9, 1982, the Israeli air force destroyed the Syrian surface-to-air missile (SAM) complex in Lebanon's Bekaa Valley without losing a single aircraft to Syrian air defense weapons. The success of Israeli warplanes against the same family of air defense weapon systems which had controlled the skies over portions of the Yom Kippur battlefield a decade earlier captured the attention of the air defense community.

Had the Israelis discovered an Achilles' heel that might relegate air defense to a less dominant role on future battlefields than popularly supposed, or had the Syrians mismanaged their air defense assets?

An analysis of the Syrian air defense catastrophe reveals that the well-thought-out and brilliantly executed Israeli anti-SAM offensive took advantage of Syrian mistakes rather than any inherent weakness or unsuspected vulnerability of air defense artillery. The Israeli attack succeeded because the Syrian air defenders disregarded basic air defense countersuppression measures.

Prelude

The Syrian air defense force guarding the Bekaa Valley consisted of two SA-2 batteries, two SA-3 batteries and 15 SA-6 batteries. For more than a year before the attack and also during the attack, the Israelis sent remotely piloted vehicles (RPV) such as the Scout over the Bekaa Valley. These RPVs, equipped with electro-optical sensors, located Syrian missile batteries and relayed the data to ground stations for real-time analysis. The Israelis learned that the Syrian SAM batteries had, for the most part, remained static for many months, a tactical blunder that allowed the Israelis to precisely target known sites located in a confined geographic area. The intelligence gained through the use of Scout RPVs gave the Israelis a decided edge on the eve of battle.

The Scout can carry a payload of 50 pounds. One of its principal elements is a gyrostabilized platform on which is mounted a television camera with a 15:1 zoom lens that can be aimed and zoomed by a remote operator via a radio data link. The camera transmits high resolution motion pictures at 50 frames per second. The Scout is tracked through its data-link transmitter and a parabolic antenna that determines range and bearing. From this information, the Scout's location is calculated and automatically plotted on a ground station mapboard. The ground station computer displays the coordinates of any object caught in the camera's crosshairs. The RPV's coordinates and altitude are continuously displayed, along with the time and date on the operator's TV console, and are taped.

At a typical cruise altitude of 3,000 feet, the camera provides surveillance of about 20 square miles (50 square kilometers), while at maximum zoom the area viewed measures approximately 130x160 feet (40x50 meters). The lens can be zoomed from one extreme to the other in less than four seconds.

The use of remotely piloted vehicles enabled Israeli commanders to have a near real-time picture of the battlefield situation. Senior officers were able to watch the attacks on the SAM sites on their television monitors.

After thorough planning and preparation, the Israeli air force launched a coordinated four-phase operation against the Syrian air defense complex. The four phases were electronic warfare, deception, SAM attack and counterair.

Electronic Warfare

To execute the electronic warfare phase, the Israeli air force used modified Boeing 707s and other aircraft as electronic warfare platforms near the battle area. These aircraft carried a variety of electronic sensors and palletized jammers which could be reconfigured as the tactical situation dictated. The sensors, along with supporting equipment, automatically identified missile site radars and performed real-time analysis. The jammers disrupted Syrian communications nets and blanked out missile site radars.

Deception

Next, the Israelis initiated the deception phase. According to the Israelis, waves of decoy drones, which simulated strike aircraft, were sent over the Syrian batteries. The Syrians reacted by turning on their radars and tracking the decoy drones. They even engaged the drones, expending valuable, ready-to-fire missiles. In some instances, once the radars were turned on, the Syrians continued to radiate long after there was a need for tracking information.

Additionally, the Israelis used rockets or other means to drop chaff which further confused the Syrian missile site radar operators.

SAM Attack

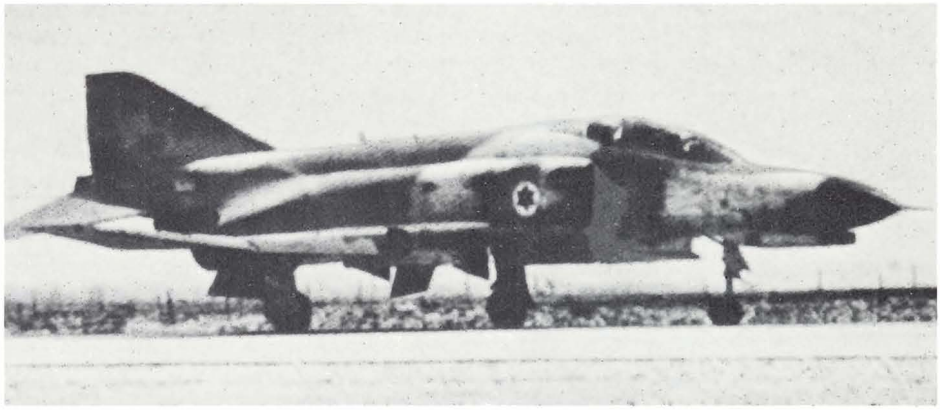
Once satisfied that the Syrian SAM batteries had been deceived, the Israelis began the SAM attack phase. First, F-4 Phantom fighter bombers armed with anti-radiation missiles (ARM) (including the AGM-78 Standard ARM and possibly the AGM-45 Shrike) attacked each SAM battery. These missiles were launched against site radars by homing in on the radars' radio frequency beams.

The Standard ARM is a large missile that turns toward the target radar even

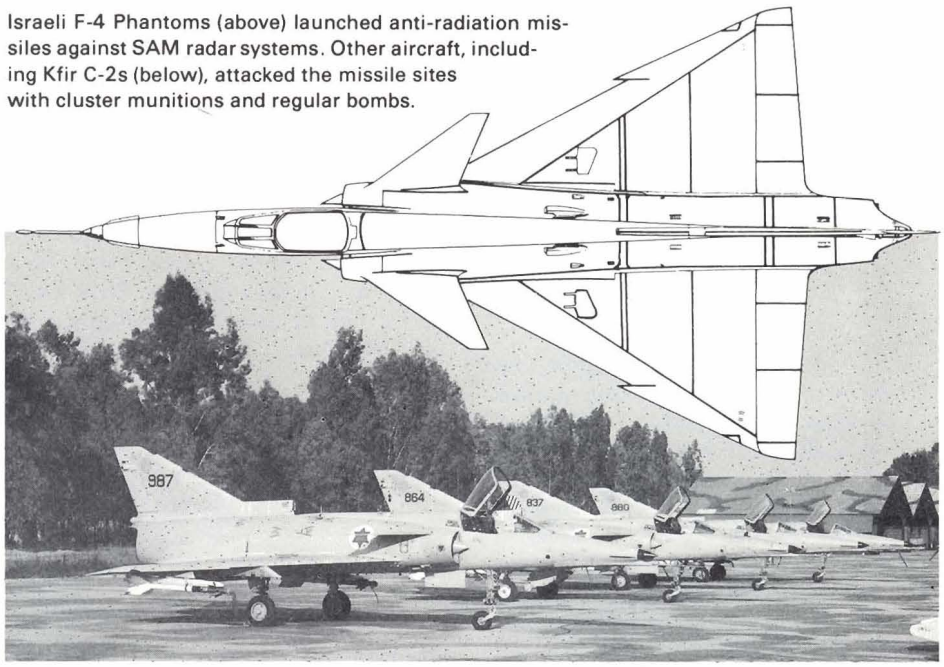
when the aircraft is not pointed directly at it. By communicating with a radar homing system in the aircraft, the missile determines the target location before launch and can turn, after firing, to acquire and home on the target.

The Shrike is smaller than the Standard ARM and was designed to destroy a SAM battery's radar antenna. The missile is fired when the aircraft is pointed at the emitter. The Shrike finds the radar emitter, then locks on and homes on the signal until impact.

Once the Syrian missile battery radars were destroyed, other attack aircraft, which included Kfir C-2s, attacked some of the missile sites with cluster munitions and regular bombs. When the attack was over, the Israeli air force had destroyed 17 of 19 Syrian SAM batteries deployed in the Bekaa Valley and had damaged the other two while losing no aircraft. The Syrian air defense system in Lebanon had suffered a catastrophic defeat.



Israeli F-4 Phantoms (above) launched anti-radiation missiles against SAM radar systems. Other aircraft, including Kfir C-2s (below), attacked the missile sites with cluster munitions and regular bombs.



Counterair

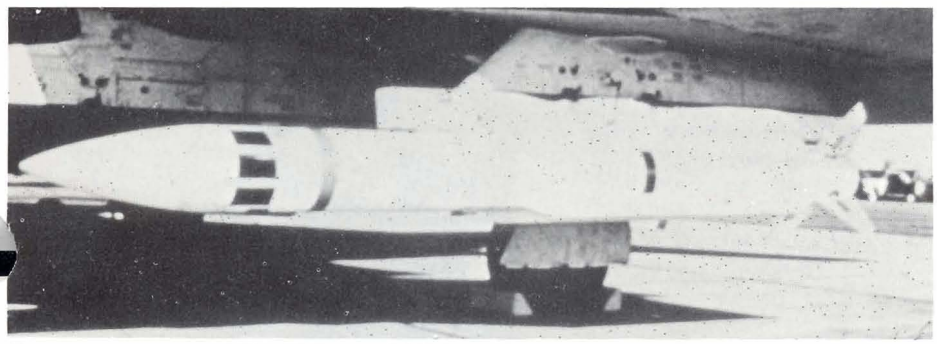
To provide air cover for its attacking F-4s, the Israelis employed an E-2C Hawkeye as an airborne command post and F-15s and F-16s as counterair aircraft. The Syrian air force reacted to the attack on their SAM sites by launching MiG-21s and MiG-23s toward the Bekaa Valley.

The E-2C Hawkeye used an onboard radar system to track the Syrian MiGs as they took off. Consequently, as soon as the MiGs rose off runways, the Israelis knew how many were coming and from what azimuth. By continuously monitoring the MiGs in flight, the E-2C directed the Israeli F-15s and F-16s on intercept paths that enabled them to shoot down the MiGs with AIM 9-L Sidewinder heat-seeking and Sparrow radar-guided missiles. The Sidewinder is capable of an all-aspect attack; its infrared seeker homes on not only the target aircraft's exhaust, but also on the aircraft's surfaces that become heated from air friction.

The E-2C can scan three million cubic miles of airspace and its radar can detect fighters at ranges up to 250 nautical miles. It can control up to 130 separate engagements and can monitor more than 200 aircraft simultaneously.

Augmenting the radar is a passive detection system, a multiband, 360-degree, azimuth coverage receiving system that detects radar signals to a distance of 500 miles, thereby doubling Hawkeye's detection range. The detected radar emitter's characteristics such as pulse width, pulse repetition frequency and amplitude are analyzed by a digital signal processor that identifies the type signals, alerting the crew to new threats. A computer links all the detection systems, processes the radar signals in real time and automatically provides target intercept data, giving the Israeli F-15s and F-16s a jump on the Syrian MiGs as they approached.

Also contributing to the Israeli success in the air were the Boeing 707s. Their electronic equipment jammed the communications links between Syrian ground controls and pilots, causing the Syrian pilots to fly according to inflexible Soviet tactics without ground radar control or vectors to targets. The Syrians, therefore, were vulnerable to Israeli fighters from various azimuths.



The Israelis employed AGM-78 Standard ARMs and, possibly, AGM-45 Shrikes against SAM radar systems.

Countersuppression Measures

The Syrians could have avoided the catastrophic loss of its entire SAM complex in Lebanon through proper use of air defense countersuppression measures such as movement, radar emission control, camouflage and deception. The most significant measure which Syria should have used to prevent a successful Israeli SAM suppression and attack operation was to move its SAM batteries as often as possible. More specifically, the Syrian batteries should have been moved after each overflight by Israeli remotely piloted vehicles or manned aircraft. Since hostilities existed with Israel, Syria should have moved its SAM batteries at least every 24 hours even if there were no known reconnaissance overflights. Also, these moves should have been conducted at night. The Syrians, however, kept many of their mobile SAM batteries in the same positions for more than a year, a clear violation of the air defense principle of mobility.

In conjunction with movement, the employment of radar emission control (with selected batteries remaining silent) would have enhanced the SAM units' survivability and mission accomplishment. Only the minimum number of radars in the air defense network should have been allowed on the air for acquisition coverage. Also, the Syrians should have minimized tracking time by waiting until Israeli targets were within engagement range before tracking.

After applying movement and radiation control measures, the Syrian air defenders should have heavily camouflaged their SAM equipment, doing everything possible to reduce the visual contrast between their equipment and the surrounding areas.

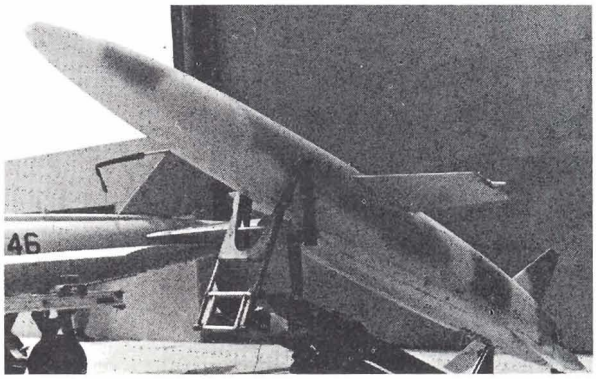
Finally, the Syrians should have implemented a deception operation by using dummy or decoy SAM positions to deceive the Israelis as to the actual number and locations of its SAM batteries. These could have included nonoperational items of SAM equipment or facsimiles of radars, launchers and missiles. Along with the dummy sites, the Syrians could have added more realism by integrating infrared radiators, radios and other electronic emitters into the sites to simulate the electromagnetic signature of real SAM sites. During the 1973 Middle East war, the Egyptians made extensive use of dummy sites. These elaborately detailed fakes, many of which included active radar transmitters, were used for two reasons: to lure the attacking Israeli air force away from real sites to attractive, but useless, targets; and to destroy the decoyed aircraft in ADA flak traps surrounding the dummy positions. These flak traps consisted of air defense guns and camouflaged SA-6 units. According to one report, there were more dummy sites west of the Suez than there were actual sites. In the 1982 Israeli-Syrian conflict, the Syrians made no attempt to use dummy sites.

Conclusion

Early reports of the Bekaa Valley campaign were characterized by half-truths and inaccuracies; many of them, apparently, purposely planted by Israeli briefing officers. *Newsweek,* for example, reported the first wave of reconnaissance drones was followed by "killer drones" armed with warheads that demolished the SAM sites. The Israeli program of disinformation, in fact, appears to have been so effective that some details of the battle may remain obscured for years. It seems clear, however, that the Israelis built on already existing technology and employed conventional rather than exotic techniques.

The Israeli air force's success in destroying Syria's air defense network in Lebanon must be credited to a number of factors. These include the intelligence gathering by RPVs, thorough planning and preparation and the skillful execution of a four-phase operation featuring electronic warfare, deception, SAM attack and counterair operations. More importantly, however, Israeli success was due primarily to Syria's tactical errors.

The failure of the Syrian air defense system in the Bekaa Valley underscores the absolute necessity for U.S. air defense units to actively practice as many countersuppression measures as possible on the modern battlefield. Failure to do so could result in catastrophic defeat for U.S. air defenders, just as it did for Syrian air defenders.



Israeli decoy drones, like the Chukar, enticed Syrian air defenders into activating their radars and exposing themselves to ARM attack.

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CONUS Hawk Goes to Autumn Forge

by SP4 Jim Bean and SP4 Al Anzini

LTC Irving Butler leaned back in the chair at his desk, a contented smile spreading across his face as he reflected on his unit's recent successes in the 14th annual REFORGER (Return of Forces to Germany) exercise. Although it is over, the 2nd Battalion, 55th ADA, stationed at Fort Bliss, Texas, continues to receive accolades for achievements as the first stateside Hawk unit ever to participate in the massive NATO war games. Deploying to sites in record time, racking up more than 200 kills of enemy aircraft and logging more than 122,000 miles on comparatively dangerous European roads without incident, the battalion won high praise from 32nd AADCOM leaders and set precedents for other air defense artillery units to follow.

Plans to include the 2/55 in REFORGER (dubbed "Autumn Forge 82") were drawn up more than 18 months before the first planeload of soldiers left Biggs Army Airfield in El Paso, Texas.

"Preplanning is essential for any mission," said Butler, "but even more so for an exercise of this magnitude."

As soon as the unit's participation was confirmed, CPT William McManaway, battalion operations officer, began coordinating logistical and transportation support with 32nd AADCOM's 108th ADA Brigade in West Germany.

"There were many phases of the operation to cover and we wanted it to be flawless," said McManaway. "Needless to say, extensive planning and coordination like that consumed a lot of long, tiring hours."

McManaway also contacted the 1st Infantry Division at Fort Riley, Kan., and various Fort Bliss agencies to arrange transportation. This was not an easy task since Autumn Forge involved the deployment of more than 600 of his soldiers and literally tons of equipment such as launchers, pallets, loaders and heavy vehicles.

Most of the equipment was prepared at Fort Bliss for transport by rail, sea and air to Germany. Drawing on outside expertise, CPT George E. Hatfield, battalion assistant S4 officer, planned the entire loading and unloading procedures, with emphasis on safety precautions. After weeks of rigorous work, the equipment was ready for transit. Soldiers from each of the five batteries labored late into the night, loading flatbeds and boxcars for the cross-country trip to the coast where the equipment would be transferred to ships bound for Belgium. Butler pointed out that most equipment was sent by ship to Antwerp for Autumn Forge to save money, but would be airlifted in a wartime situation.

The exercise went into full swing as the advance parties, with two complete assault firing units, departed on C-141 StarLifters for the eight-hour, bone-jarring flight across the Atlantic. At Antwerp, they unloaded the cargo and prepared it for the relatively short flight in German C-160s to Ramstein Air Force Base, West Germany. From the moment the last aircraft touched down at Ramstein, it took the 2/55 only 11 hours and 32 minutes to become fully integrated with the 32nd AADCOM. (The 32nd AADCOM standard is 36 hours.)

The drawing of prepositioned equipment, most of which consisted of conventional vehicles, was fast and efficient. "What was amazing," said Butler, "was that these vehicles hadn't been used for four years and they worked and ran well."

The battalion commander singled out logistical support as the most important phase of the operation. "Logistics drive the train," he said. "Without them we would be virtually helpless. I was especially impressed with the support we received from 32nd AADCOM."

Additional support for the 2/55 was provided by Delta Company, 11th Signal Battalion, 21st Support Command, and the 66th Maintenance Battalion, both of which are based near Kaiserslautern.

"Our communications support was excellent," said CPT John Nakamura, battalion S1. "32nd AADCOM leaders were really impressed with our communications capabilities. We had commo to each battery throughout the exercise. The battalion operations center used UHF radios primarily to insure the security of all lines to the batteries. Although each battery moved at least once during the exercise, communications

32nd AADCOM soldiers attach cables to a Hawk missile launcher at a site overlooking a small German village.

between them and the tactical operations center didn't suffer."

One of the initial drawbacks, however, was that message formats familiar to 32nd AADCOM and USAREUR were not acquired by the 2/55 on any of the earlier liaison trips and were obtained only after the unit arrived in Germany. Nevertheless, the soldiers quickly adapted to the new format.

Locating the higher headquarters reporting center in an area without secure communications proved awkward. As a result, some of the messages required overlong encryption and took longer than usual to transmit. The value of secure communications, even for mundane, day-to-day operations, was continually demonstrated by its absence during the month-long exercise.

In the European air battle, the 2/55 brought down more than 200 enemy aircraft, many of the kills going to Battery B. When Air Force BG Robert C. Oakes, commander of the 86th Tactical Fighter Wing, visited that unit in the field, he remarked: "This battery locked on many of the simulated aircraft minutes after take-off. I'm very impressed with the competence of this unit and the battalion."

Exercise coordinator and assistant S3 for the 108th ADA Brigade, CPT Thomas H. Barry, explained that there were two major objectives of Autumn Forge 82.

"First of all, we used this exercise to test and evaluate current plans and procedures for the CONUS-to-Europe air and sea deployment of a Hawk battalion," said Barry. "This part of the exercise went very well as the equipment and troops arrived with only a few minor problems.

"Our second objective was to train the battalion and evaluate its ability to fight in Europe. Training can be difficult for units not accustomed to the NATO environment because reporting and administrative procedures, as well as terrain and weather conditions, differ from those in the United States. But the battalion overcame these problems and performed very well."

Generally, the air defenders from Texas seemed satisfied with the training they received.

"We performed deployment procedures and got to do things that can't be realistically simulated," said CPT Karl L. Kraus, Battery A commander. "We learned about preparing equipment for shipment overseas, including how to pack the systems to protect them against corrosion from the salt air. I think the exercise went well because we were prepared and most soldiers were enthusiastic."

Butler concurred, adding: "The troops were extremely confident about the mission even before they left for Germany. However, detailed planning prior to the rotation made everything run smoothly. Preplanning is essential."

The chief purpose of REFORGER is to improve and demonstrate NATO solidarity and preparedness for mutual defense, to standardize procedures among participating nations and to improve management procedures for providing rapid response to military crisis situations.

COL Domenic P. Rocco Jr., 108th ADA Brigade commander, said he was pleased with the overall results. "I think the exercise went exceedingly well, especially considering this is the first time a Hawk battalion attempted this in its entirety. We proved that, within a short period of time, a Hawk unit deployed from the States can be incorporated into European air defense operations. Now we must continue to train in this realistic fashion, utilizing the things we have learned. I would like to see other stateside air defense artillery units come over here and train in the unique European environment."

SP4 Stephen David of Company B, 11th Air Defense Signal Battalion, hooks up coaxial cable to a UHF antenna during Autumn Forge 82. The unit provided valuable support to the 2nd Battalion, 55th ADA, during the exercise.

SP4 AL ANZINI *is a journalist assigned to the 108th ADA Brigade in Kaiserslautern, West Germany. A staff writer for the 32nd AADCOM News, Anzini has been with the brigade since September 1981.*

SP4 JIM BEAN, *assigned to the 2nd Battalion, 55th ADA, is a staff writer with the 11th Brigade Public Affairs Office at Fort Bliss, Texas.*

Oozlefinch Roosts at ADA Museum

Photos courtesy of ADA Museum

by Ima Byrd

A modern ADA artist's conception of the normally hapless-looking Oozlefinch in a warlike mood.

The last time I saw the Oozlefinch, legendary featherless birdfriend of air defenders, was in 1976 before he suddenly disappeared—an act he is famous for.

Recently, however, there have been reports of Oozlefinch sightings that I, for one, tend to believe. One recent day, as I was wandering near the Air Defense Artillery Museum at Fort Bliss, Texas, I heard whispers that the famous bird had reappeared. Deciding to investigate, I went in and, sure enough, there he was (actually, there were several of them) on a table in a back room. It seemed that a certain MG Robert Wood—more about him later—had donated his entire Oozlefinch collection to the museum.

I must warn those of you familiar with this fantastic bird that, during his years of absence spent in deep meditation, he developed an aggressive look, according to one source who "saw" him. His new look is said to be so threatening as to deter anyone who might dare confront our air defenders.

For the newcomers in air defense, I shall introduce you to the Oozlefinch—that wonderful bird who became part of American air defense history.

The first time I heard of the Oozlefinch was in 1905 through the rambling mumblings of CPT H.M. Merriam of Fort Monroe, Va. He was reluctant to describe the bird's appearance, habits or habitat; but he would emphasize the eyes.

These eyes are large and all-seeing, have no eyelids or eyebrows and are rather seriously blood-shot. Just why the eyes are so prominent and red, no one seems sure. What I do know is that he can turn his eyes 180 degrees inwardly when he desires the maximum value of self-contemplation. I also know he always flies backwards not only to keep dust and debris out of his unshaded eyes, but because he cares more about where he's been than where he's going.

Sometime before Christmas of 1905 or '06, the wife of COL E.R. Tilton, also of Fort Monroe, purchased a model of a bird which seemed to duplicate CPT Merriam's description of the Oozlefinch. COL Tilton transported it to the Fort Monroe Officers Club (known as the Casemate Club), where the Oozlefinch was given a perch behind the bar. He remained there for many years while gradually assuming magical powers of guardianship. During these years, several unprincipled individuals attempted to kidnap the bird, making it necessary to provide him with a glass cage for safekeeping.

Early in 1908, members of the newly formed Coast Artillery School introduced the shake, rattle and roll of dice in the bar. So disturbing was the noise to other patrons that a separate room was provided for the rollers. The Oozlefinch insisted on joining the festivities and moved, glass cage and all, to the mantleshelf of an adjacent room. This room became known as the "Oozlefinch Room" where sessions of the Artillery Board were held every afternoon and continued long after retreat was sounded. The Oozlefinch never

missed a meeting. The room eventually became the "Gridiron Room" and the Oozlefinch became a member of the "Gridiron Club," an organization whose members believed in "roasting" non-members.

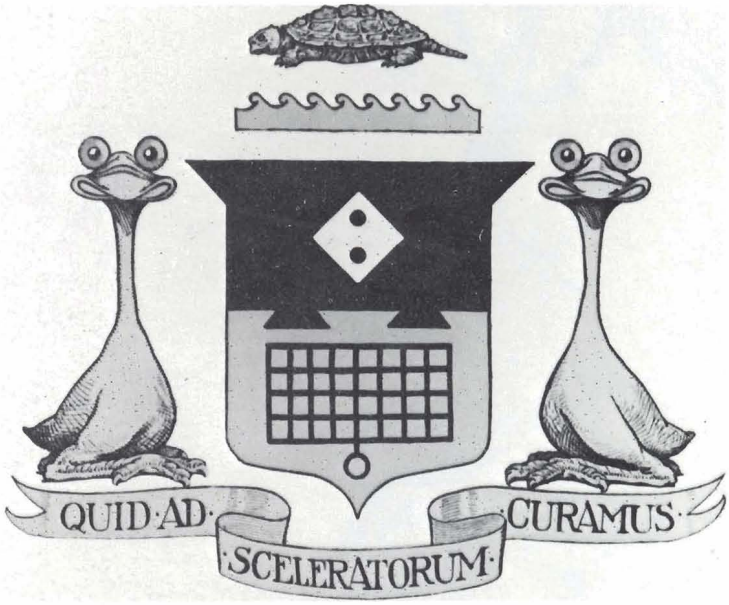
Time passed. Individuals came and went while the Oozlefinch spent much time in deep professional thought, particularly as World War I approached.

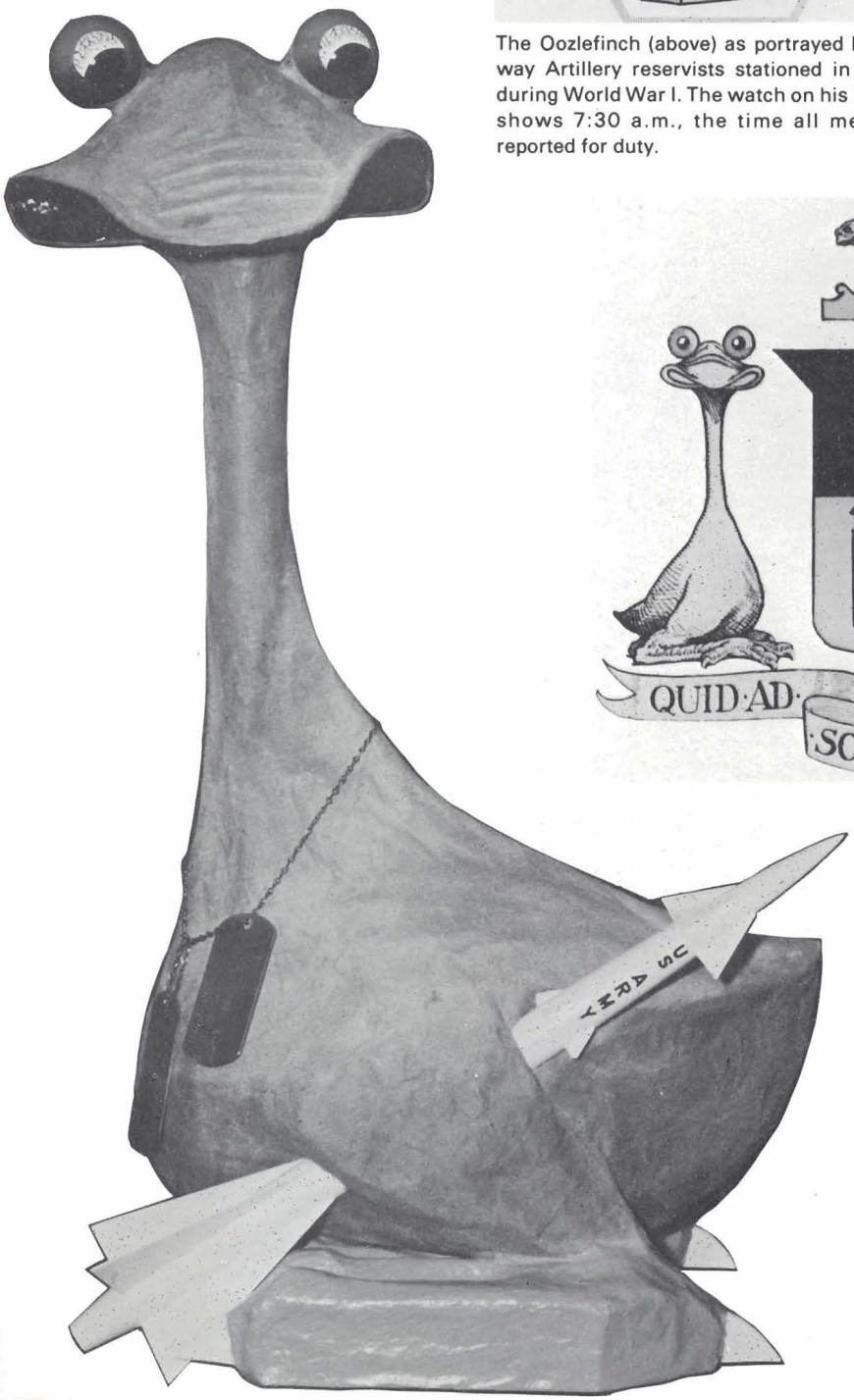
During that war, three regiments of Coast Artillery (the 42nd, 43rd and 52nd) formed the 30th Artillery Railway Brigade in France. Just as the eagles of Napoleon crossed the length and breadth of Europe, so did the spirit of the Oozlefinch which proceeded to France with the Railway Artillery. He, himself, remained at Fort Monroe, but kept both eyes focused on the proceedings "over there."

The Oozlefinch (above) as portrayed by Railway Artillery reservists stationed in France during World War I. The watch on his left foot shows 7:30 a.m., the time all members reported for duty.

It was during this period that those of us who remained at Fort Monroe thought it desirable to create a coat-of-arms for the Gridiron Club. We never divulged the secrets of its composition to outsiders. However, I suppose there is no reason why I can't do so now.

The body of the shield indicates the general woodenness, not of the Artillery Board and members of the Gridiron Club, but of those persons who did not cheerfully pay their toll when passing through our room to the bar. The colors are red and black—red for the Artillery and black in mourning for those who lost at dice. Placing the bird's likeness on either side of the shield was only natural. The top half, or honor point, was reserved for the lowest-marked dice because snake-eyes was the combination most frequently thrown by club members. The lower portion depicts the gridiron on which non-members were constantly roasted. The terrapin was included in honor of Keeney Chapman's ability to cook them to perfection for board members. (Chapman was the club's steward for 40 years.) The waves underneath the terrapin are those of its natural habitat —the Chesapeake Bay.





Tucking a Nike missile under his wing, the Oozlefinch gained wide acceptance at the U.S. Army Air Defense Center, Fort Bliss, Texas.

On May 8, 1957, Chief Oozlefinchling MG Robert J. Wood (right) initiated COL Ricardo Ramos Flores, commander of the 1st Infantry Battalion, Juarez, Mexico, into the Ancient and Honorable Order of the Oozlefinch. The throwing of salt from the Oozle-shaker was a rite performed during the ceremony.

After considerable consultations with Latin scholars, we decided to use "Quid ad sceleratorum curamus" as the motto, which freely translated means "What in hell do we care."

During World War II, anti-aircraft artillery gunners fighting overseas remembered the Oozlefinch and many took his likeness along as a talisman. Staying stateside, the bird dedicated his time to war-related activities such as selling War Bonds. But, as in World War I, his all-seeing eyes kept a constant watch "over there."

In 1945, the Oozlefinch became restless at Fort Monroe and, as all his friends began to depart, he decided to move to Fort Scott, Calif., where the Seacoast Artillery Branch of the Artillery School and the School of Mines were activated. It was when these schools were closed in 1948 that we parted. He said he was retiring to some unknown cloister where he presumably turned his eyes inward to engage in deep meditation over the events of the time and the need for modernization of the Artillery.

Eight years later, to my delight, I was reunited with the Oozlefinch when an old friend, MG Robert J. Wood, contacted him and persuaded him that the time had come for his return to active duty. Wood was commanding general of the U.S. Army Anti-Aircraft Artillery and Guided Missile Center at Fort Bliss, Texas.

Conscious of the need for taking the problems of modern-day gunnery under his care, the Oozlefinch flapped his featherless way to the Great Southwest where he assumed a new look fitting that of his role as guardian of missilemen. Henceforth, the Oozlefinch was seen with a Nike missile tucked under his left wing, the warhead pointing to the rear. Naturally, since he flies backwards, the missile would always be aimed in the right direction.

At the center, he appointed Wood as "Chief Oozlefinchling I," authorizing the general to speak for him during his many absences to the ranges. He also insisted on becoming a member of every class, on taking part in every festivity and on assuming protection of all garrison personnel. He also charged himself with particular care of Very Important Visitors to the center, not only to protect them from long-winded, technical briefings and orientations to which they were subjected, but to accord them suitable recognition.

On July 1, 1957, the U.S. Army Anti-Aircraft Artillery and Guided Missile Center was redesignated the U.S. Army Air Defense Center. Simultaneously, MG Sam C. Russell assumed command of the center and became Chief Oozlefinchling II. And so it went until 1976.

During these years and through thousands of missile firings, the Oozlefinch seemed to turn up everywhere, and sometimes the skinny-necked fellow was even thought to be in two places at once. His farthest known migration occurred in 1962 when he flew to the Hebrides in Scotland to observe—with much gusto—the Corporal missile firings by the First U.S. Army Missile Command.

It was shortly thereafter, in January 1963, that our friend barely escaped disaster. The overseer of missilemen became lost in a San Francisco fog. The exact circumstances of this all but fatal mishap are shrouded in official secrecy. But this much is known:

Enroute from McChord Air Force Base, Wash., on what should have been a routine flight, the bird, 24 hours overdue, was reported to have overshot the 40th Artillery Brigade helicopter strip and nearly crashed. The venerable warm-blooded vertebrate then became disoriented and, after barely missing a tail-on collision (remember he flies backwards) with a tower of the Golden Gate Bridge, became totally confused. He was somehow rescued and returned to Fort Bliss, where he brooded about the incident in safety.

In 1976, the Oozlefinch was involved in another incident which crushed his spirit. So sensitive was he to the incident that he wouldn't talk about it, even to his friends. For the first time in his existence, he felt unwanted and soon retired to an undisclosed place. Rumors were that he was hiding in the secluded archives of the Air Defense Artillery Museum.

However, the rumors were not quite correct. He had withdrawn to MG Wood's home. In any event, the folks at the museum are making certain that he will not disappear again. Plans are to permanently perch the bird in his own exhibit room at the museum for those who may want to view a little more of what is now history.

As for me, I welcome him and say, "Quid ad sceleratorum curamus."

The first two articles of the AirLand Battle 2000 concept are condensed, edited versions of unclassified TRADOC briefings. The air defense portions of the AirLand Battle 2000 concept were written by MAJ William D. Knox, Advanced Technology and Concepts Division, Directorate of Combat Developments, Fort Bliss, Texas.

The air defense weapons depicted in the articles on AirLand Battle 2000 are purely conceptual and do not necessarily represent current Army developments. The drawings were done by Bill Hainline, graphics director, Directorate of Combat Developments, Fort Bliss, Texas.

AIRLAND BATTLE 2000

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Future Environment: The Genesis of the Concept

Headquarters, Training and Doctrine Command, has embarked on several projects to examine and develop ideas regarding the nature of warfare, present and future. These include the "Army 86" reorganization studies and the "AirLand Battle" project. By far the most ambitious effort to date is the "AirLand Battle 2000" concept—a concept of today that will become the doctrine of tomorrow. This concept will serve as a guide to the total force for modernization.

AirLand Battle 2000 focuses on the period 1995-2015 and beyond, and projects future force requirements. It is not like the "Army 86" studies in which planners were forced to use current and developing organizations and equipment arrayed against a relatively well-defined threat force. In AirLand Battle 2000, the threat is very general in nature and there is no constraint to use current organizations and equipment in projecting threat and friendly forces.

In developing a concept that will guide Army development into the next century, it was necessary to look at certain trends because specific statements of threat capability and intentions were impossible to accurately predict. The future environment must be considered in developing operational concepts which will more accurately project future requirements. No longer do we have the luxury of time and resources which can be wasted on systems that do not answer future needs. We simply can't afford to build a better tank when the future calls for something else. Therefore, this concept must provide the focus for future technology, instead of technology driving the concept as it has in the past.

AirLand Battle 2000 is the first concept that projects far enough into the future to guide technological development. From the concept will come doctrine which will indicate the most efficient force structure and the required training and equipment. The final stages of this process will be to produce the material required to field the force.

Let's now look at the trends that will influence the Army environment in the year 2000.

Balance of Power Uncertainty

The politically bipolar world, once dominated by the Soviet Union and the United States, no longer exists. Other power blocks, such as OPEC, are a reality. As the multipolar world changes, the Army must have the flexibility to deal with shifting regional coalitions by developing alternatives to oversea stationing. Furthermore, as the Soviets continue to increase their power projection, our forces must be able to react by possessing deployability, mobility, sustainability and increased firepower.

Political and Economic Climate

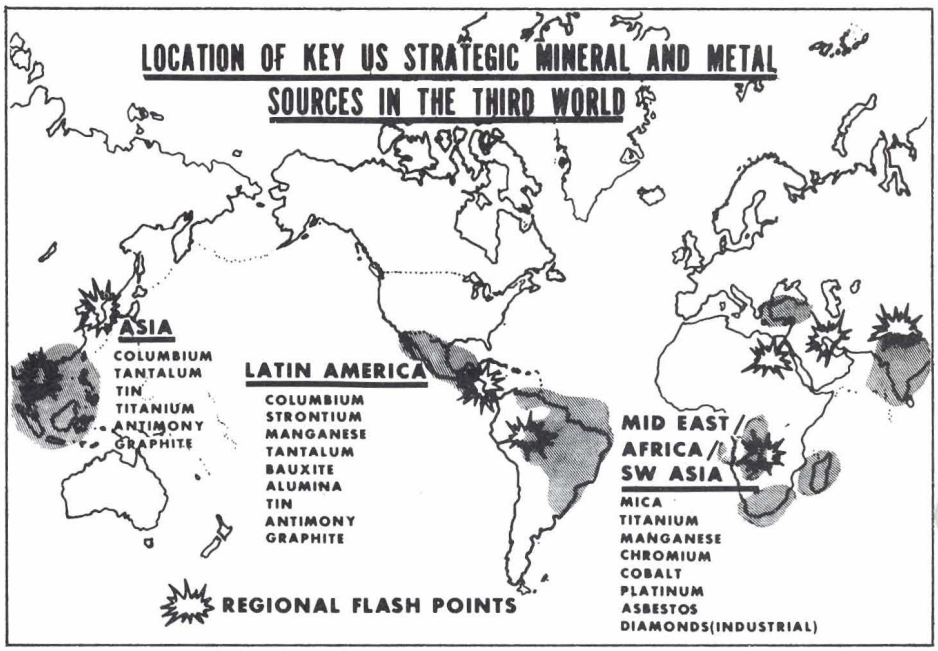
The pace of world events is quickening as witnessed recently by the simultaneous occurrences of several regional conflicts. There are more issues today without a consensus for solution. The AirLand Battle 2000 concept recognizes the difficulty in obtaining wide approval for manning and equipping future military forces. It also recognizes the widening disparity between rich and poor nations and the increasing demands upon the earth's dwindling resources. With greater instability among the nations and regions, the Army needs to adapt to a rapidly changing international climate and be prepared to react to these changes.

Strategic Mineral Resources

As more nations become energy importers, competition for resources will be intense, increasing the political and economic leverage of the source nations. The threat to these strategic resources makes it imperative that we maintain access to those sources and develop substitutes. It must be noted that our dependence on outside supply of resources is not limited to oil. For instance, the United States imports a significant percentage of its cobalt, which is critical for the production of jet engines.

Proliferation of Arms

Recent wars in the Middle East and South Atlantic illustrate the proliferation of highly lethal weapons technology. Increased competition among arms suppliers is accelerating the trend. Nuclear proliferation appears to be irreversible. Who knows how many countries or power blocks will have a nuclear capability by the year 2000?



Technology

Technological trends additionally complicate the environment of year 2000. Other nations' investments will accelerate, with much of the emphasis on warfare technology. Our capacity for heavy industry, which is decreasing at an alarming rate, will affect wartime production. To counter these trends, we need to select areas for high-tech leverage (quality *vs.* quantity) and take every opportunity to specialize force capabilities with associated research and production in cooperation with our allies.

Weapons parity will have to be achieved through technology since we cannot match the Soviets in numbers. We must achieve combat advantage through the quality of our weapon systems and our leaders' innovative method of using these weapons. This means more accurate weapons, better surveillance and reconnaissance equipment and more effective command and control are required. We must reduce the observation-decision-action time on the battlefield. We must decide and act faster and more aggressively than the enemy.

Demography

World demography has very definitive implications for the military. The average population is getting older in both the Soviet Union and the United States. There will be fewer people under 40 in year 2000 in both countries.

Meanwhile, soaring population figures in lesser-developed countries have major implications for world politics and for the armed forces. The potentiality of conflict caused by Third World instability due to population pressures will increase.

Another trend which impacts on military planning is worldwide urbanization resulting in more diversified lifestyles. Urban populations have ready access to issues and can be easily influenced en masse. Social values from a rural environment are more traditional, patriotic and conservative. City dwellers tend to be more adaptable to technology, personal isolation, individual violence and stress than rural dwellers.

Another more direct implication is that heavily urbanized areas of Western Europe will restrict maneuverability. Urban areas are increasingly likely battlegrounds for future conflicts. Many areas which were once considered good avenues of approach for armor are now filled with large towns and cities.

For the Army, all this means increased potential for terrorism or low-level conflict, increased threat to strategic resources and markets, increased likelihood of urban combat and increased refugee displacement. It also means that an intensive high-tech force relying on less manpower will be essential.

Social Climate

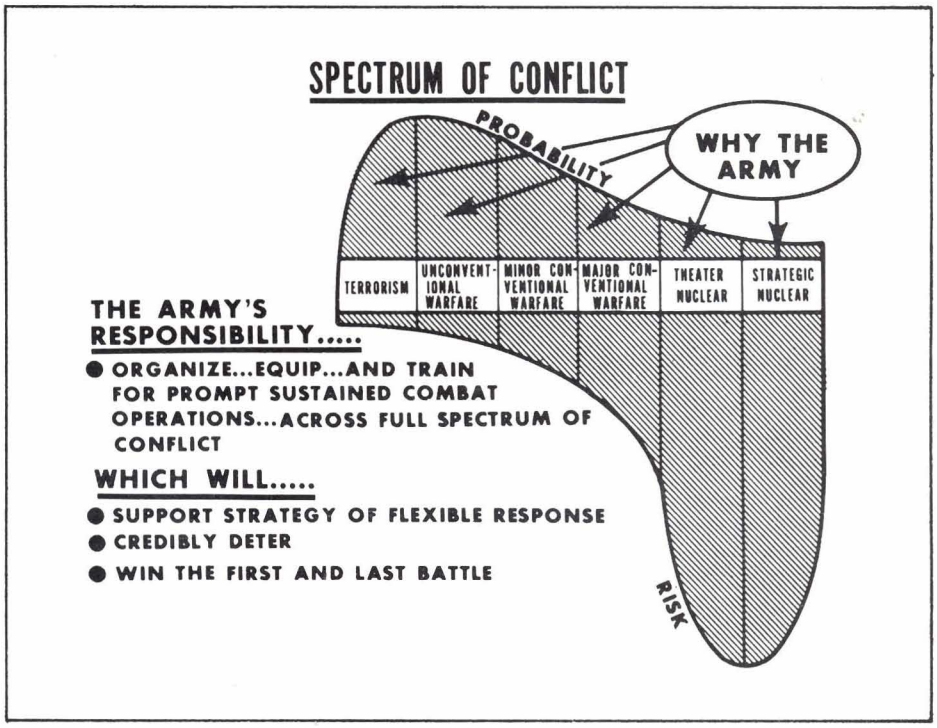
National goals will be subject to frequent changes. Today, there is doubt about our ability to motivate a democratic nation toward a single goal such as we once could. Our ability to obtain the necessary resources from our society will become more difficult. Fiscal constraints will have greater influence on policy and force structure.

We, therefore, must have dynamic manning policies geared to a shifting culture and be able to adapt training and leadership concepts to a changing educational system and society. Because the United States is becoming an information-based society, knowledge of data management will be most important.

On the other hand, Soviet society and national goals are, and probably will remain, relatively constant. The Soviets' objective has not changed. Their policy and initiatives indicate a continuing resolve, of which Afghanistan is a good example.

The implications are clear. The Army must be prepared to fight anywhere at any time and across the entire spectrum of military conflict. We must counter Soviet or surrogate thrusts by being able to fight and win the land battle. This means high mobility, some specialization and reliance on technology. The emphasis is on winning. We cannot afford to simply avoid defeat because, in the long term, that equates to attrition warfare.

In past wars, the United States always experienced early setbacks and then began to win. We have always been late to mobilize, but eventually developed overwhelming combat superiority. In future wars of higher intensity and shorter duration, winning will have to begin immediately. There may be only one battle and no opportunities to regroup after initial heavy losses. Our initial battle plan will have to succeed. The nature of future wars will prevent total engagement of the armed forces of nations. Wars will take a pattern of local or isolated conflicts, such as the Falkland Islands war, in which only a part of the military might of a nation can be employed. There is, therefore, a driving need for a concept of how to integrate our forces and win from the beginning of the conflict to the cessation of hostilities in remote areas of the world.



Battlefield of the Future: The Concept

Our forces will have a qualitative advantage in future wars but will have no single dominating weapon such as the atomic bomb which ended World War II. This qualitative edge will help compensate for the enemy's expected numerical advantage but it will not in itself dominate the enemy. Our force must be designed to fight decisive actions on a chemical, nuclear and electronic battlefield. To win, we must see and attack deep into the heart of the enemy's command and control, logistics and offensive capabilities.

The key ingredient in how we must fight in year 2000 is the retention of the initiative, not just by the traditional means but by extensive use of a blend of firepower and maneuver and the use of all combat assets in a truly integrated effort. It is believed the Soviets will continue to rely heavily on detailed, preplanned and continuous attack. We must, therefore, be prepared to strike selectively at their vulnerable points.

An analogy which explains the AirLand Battle 2000 concept is a comparison of American football and soccer. We currently tend to view battle as a football game—detailed plays, heavy sporatic engagement (battles) along a line of contact and constant regrouping before each play.

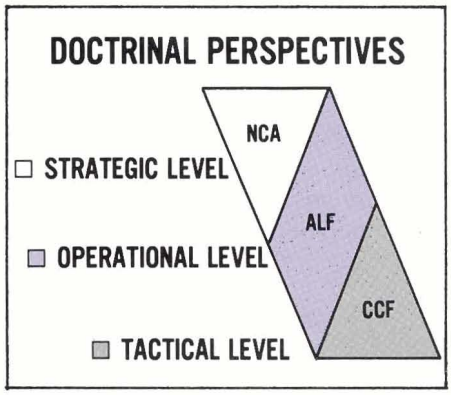
Soccer, on the other hand, has a continuous flow; an overall strategy or plan which is understood by all and to which players react automatically. Positioning in depth on the field is more important than massing on a line for a play (battle). The team that wins is the one with the greatest mobility, ball control and overall individual skills which equate to the quality, not quantity, of the force. We must envision this type of warfare from three doctrinal perspectives.

- The strategic level of warfare, the political strategy which identifies the broad objectives leading to victory, does not change for the year 2000. National goals are pursued and interests are protected by coordinated political and military means. It is characterized by flexible, rapidly deployable forces.
- The operational level of warfare has been practiced very well by the United States in the past even though it has not been clearly defined in our military doctrine. In its true sense, it is large-scale military operations that bring about decisive outcomes in war. MacArthur's Inchon landing is an excellent example of the operational level of war. In the future, AirLand Battle 2000 doctrine within an operational area will guide commanders in the deployment of forces on the battlefield to attain strategic objectives. It is the link by which strategy is connected to tactics. It seeks, by large scale decisive action, to put the enemy in an untenable position, destroying his capability to continue.
- The tactical level, where military forces engage at the decisive point, is unchanged. At this level, warfare is still an attrition conflict where the capability of *leaders, soldiers* and their *weapons* is paramount. It is characterized by firepower, movement, intensive decisive engagements and the destruction of the enemy.

Warfare in the year 2000 will create new underlying principles which will complement the already accepted nine principles of war and stress the salient features of AirLand Battle 2000.

Initiative

Initiative is obtained in battle through maneuvering, positioning of forces and maintaining an offensive spirit. This is accomplished by commanders making independent decisions and executing them in decentralized fashion. Future commanders will be encouraged to be aggressive and take risks like successful battle commanders always have. Planning must be detailed and effective so when the time comes to execute missions, all leaders will understand the overall objective and how it can be achieved. Sound doctrinal base and detailed planning better prepare the commanders for unusual situations. Currently, we have a loose doctrinal base and planning is too flexible. Consequently, we tend to oversupervise the execution phase to fine-tune the plan. We must, by the year 2000, reinstill more doctrinal stability, more confidence in independent leadership and independent action.



Depth

Depth will be a more important dimension on future battlefields because of the greater range of weapon, reconnaissance and surveillance systems and because of greater mobility. The continuous nature of operations and fluid orientation on the enemy instead of on fixed terrain will also add depth. Enemy forces not directly engaged will have to be considered for their future influence in the battle. The use of nuclear and chemical weapons will require dispersions of forces over greater areas, creating independent and continuous actions. We must attack deep into enemy formations and command and control to disrupt his intentions. Commanders may be required to operate in isolated areas hundreds of miles apart and out of touch with other elements for considerable periods of time.

Agility

Agility is the ability to react faster and surer than the enemy. We must find the enemy's weak points and exploit them. Somewhere, he is subject to bureaucratic, procedural processes

that make him vulnerable. We must find those weaknesses and learn to take advantage of them. To do so, however, our communications must be instant, our decision-making rapid and decisive and our resources allocation efficient. We hope to frustrate him by continually presenting him with more adverse situations than he is capable of handling.

Time

Everything will occur faster on the battlefield of the future. This means information processing technology must be used to accelerate decision-making. Procedures for getting things done within headquarters and battle staffs will be considerably more streamlined than current procedures. Data terminals will replace written orders, overlays and even topographic maps. Since battles will be compressed from days to minutes, decisions will have to be rapid and correct on the first implementation.

Synchronization

Synchronization does not mean planning and execution in some elaborately prearranged and detailed order. It means agreement and understanding of the commander's intent and reliance on accepted common knowledge of the best ways of conducting the battle.

In order for a force to be well synchronized, all elements must work in complete harmony with the commander's intent, strike precisely at the right time and know exactly what the other elements of the force are doing and what they will do.

Command and Control

Command and control is the exercise of authority and direction by a commander over his forces. The principle of unity of command, the singleness of purpose for a military force, will not change in the 21st century, but the command levels will. These levels do not correspond to any current Army organizations.

AirLand Battle 2000 has four levels of command: combined force headquarters, airland battle command, land battle command and close combat command. Only two of these levels will be present at all times—the airland battle command and the close combat command. Combined force headquarters will only be in those theaters where more than one airland battle force is required and may consist of another airland battle headquarters to control two or more subordinate airland battle forces.

Airland Battle Force

The airland battle force is an operational level command that has assigned organic elements including air and naval components. It could be thought of as a rapid deployment joint task force organization with the size and function of a small corps headquarters. It contains its own fire support, air defense, combat support and combat service support. Special assets can be attached to it as necessary, depending upon the mission assigned. It conducts intelligence gathering and long-range planning and executes attack of the deep enemy echelon. It is envisioned that eight to 12 close combat forces will be assigned to the airland battle command to provide its combat power. Land battle commands are command and control elements which are a part of the airland battle headquarters. They have no organic assets assigned to them. If the span of control over numerous close combat forces becomes too large for the airland battle command, then one or more of these control elements will be detached to control close combat forces. The close combat force is the real combat power of the airland battle command. It has all assets organic to it to sustain combat for extended periods of time. It is envisioned to have the lethality of a division, yet have the manpower of brigade size or less. Close combat forces can be added to an airland battle command to increase combat power for specific airland battle missions.

Close Combat Force

Close combat relates to the direction of combat power for the purpose of disrupting or destroying the enemy. Usually associated with direct-fire battle, it includes support weapons organic to maneuver forces, close-air support, attack helicopters and directed-energy weapons.

The close combat force will have to fight dispersed and be capable of orienting 360 degrees. It will have to be austere, yet self-sufficient for extended periods of time. It must be easily deployed and mission-packaged. It must be small enough so as not to present a feasible nuclear target on the battlefield, yet be large enough to effectively employ sophisticated fire support, surveillance and other combat assets.

As you can see, our organization for the battlefield of the future will be quite different from the one we now know. In preparing to win that future battle, we must begin to accept the coming changes. The understanding of today's AirLand Battle 2000 concept will make the future doctrine easier to implement, as the junior officers of today will be the close combat force commanders of tomorrow.

LEVELS OF COMMAND

AIRLAND COMMAND (OPERATIONAL)

- ☐ ARMY, NAVY, AIR FORCE ASSETS
- ☐ TERMINAL AND AREA AIR DEFENSE
- ☐ REINFORCES CLOSE COMBAT FORCE AS REQUIRED
- ☐ COMPLEMENTS CLOSE COMBAT COVERAGE

LAND BATTLE COMMAND (IF REQUIRED)

- ☐ AIR DEFENSE STAFF ELEMENT
- ☐ INTEGRATES CCF AIR DEFENSES IF REQUIRED
- ☐ REQUESTS AIRLAND ASSETS AS REQUIRED
- ☐ NO ORGANIC AIR DEFENSE

CLOSE COMBAT COMMAND (TACTICAL)

- ☐ ORGANIC AIR DEFENSE
- ☐ TERMINAL PROTECTION

AirLand Battle 2000: Air Defense

The current air defense mission and that of the year 2000 are similar—to protect ground elements and vital assets against all airborne threats. However, the mission may expand to include countering space-based threats should they threaten airland forces. The following describes air defense as it supports the AirLand Battle 2000 concept. Its functions include destroying, disrupting and degrading the effectiveness of enemy air-breathing systems, tactical missile systems and satellites used for reconnaissance or attack of friendly forces.

To accomplish its mission, the air defense force uses a balanced and survivable defense consisting of emission-controlled diverse sensors, command and control (C^2) facilities and a complementary family of weapon systems including aircraft. A mix of sensor technologies, varying attack mechanisms and a balance of range and altitude capabilities limit the enemy's ability to capitalize on a particular weapon system's vulnerability. AirLand Battle 2000 air defense concept must be viewed from the same three doctrinal perspectives as the overall concept.

Strategic Level

The national command authority (NCA) provides direction to accomplish long-range national objectives. At the national level, these objectives are achieved through economic, political and military actions such as strategic arms limitation treaties, foreign-aid programs and foreign military sales. These programs are aimed at improving air defense of friendly nations and are politically driven. They can have significant impact on worldwide air defense requirements. Air defense resources protect the sustaining base, strategic lines of communications, national retaliatory capability, areas surrounding high-tech sensors and communications facilities. Assets used for strategic air defense include ballistic missile defense, interceptors, ground-based air defense, strategic intelligence and sensors. National and theater air defense systems are interconnected at the strategic level and are interdependent.

Operational Level

Multinational and multiservice air defense capabilities are integrated at the operational level. Operational objectives are determined by the airland battle commander. Operational-level air defense usually supports two general objectives: insuring freedom of maneuver for major forces and air superiority. To accomplish these objectives, enemy air defense C^2, long-range sensors and aircraft on the ground are attacked early in the war. Follow-on campaigns will focus on enemy C^2, air and space vehicles and missiles that can inhibit major force maneuver. Attacks on enemy airfields, missile launch sites and their supporting facilities and operations against aircraft in their attack cycle are planned and directed by the airland force command. Airland battle force complements the capabilities of close combat forces and defeats air threats that bypass or survive close combat force air defense. Fire-support functions in support of air defense operations are directed and integrated at the airland battle command level.

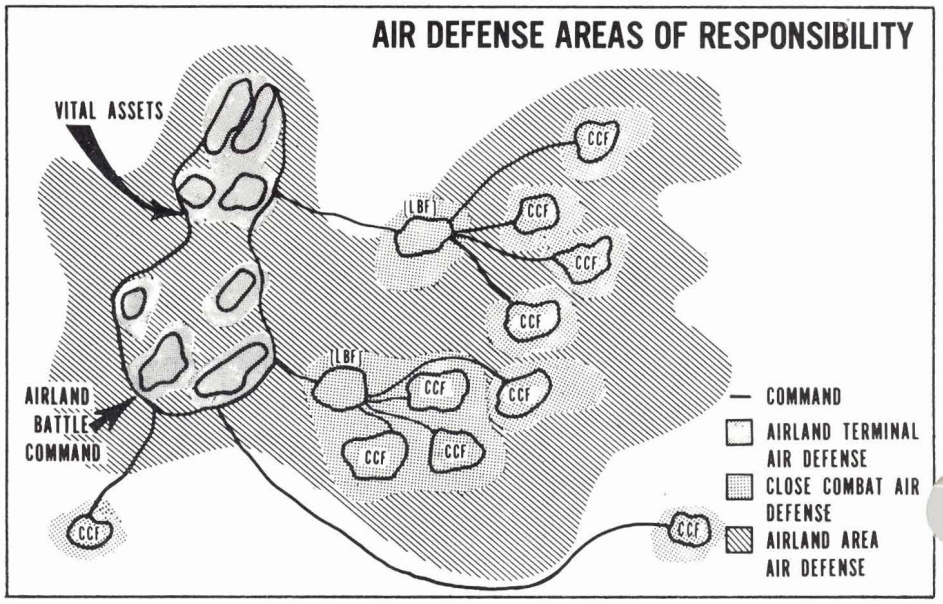
Tactical Level

Tactical objectives are usually short-term and are established by airland battle command levels down to close combat command levels. The airland battle force tactical objectives for air defense include terminal defense for critical assets such as reconstitution forces, lines of communications, airfields and ports. The primary objective for air defense at the close-combat level is to provide freedom of maneuver for the close combat forces. Organic and supporting air defense, offensive counterair and fire-support functions are coordinated to accomplish this task.

Command and Control (C^2)

The essense of AirLand Battle 2000 is rapid and responsive coordination between close-combat elements and higher echelons. In addition to providing the means for coordination, the C^2 system links command cells to seize the initiative.

Air defense C^2 systems are capable of performing detection, identification and early warning functions through interconnected, all-source intelligence data bases and air defense intelligence



systems. Air defense C^2 provides essential alerting and fire-distribution information to air defense fire units and aircraft interceptors.

Close combat force air defense is fully capable of operating independently from higher echelons if necessary. While not essential to its effectiveness, netting with the airland battle force air defense C^2 optimizes air defense operations.

The airland battle force commander establishes and modifies airspace management procedures, identification criteria and rules of engagement for all air defense forces operating within his assigned area of responsibility. If his span of control over attached close combat forces becomes too large, C^2 elements, known as land battle forces, are detached from the airland battle force and serve as C^2 headquarters for a specified number of close combat forces.

The land battle command monitors the close-combat air situation with its air defense staff element and requests assets from the airland battle force as required. Although land battle commands have no organic air defense assets, they have the capability to combine and integrate subordinate close combat force air defenses if the mission requires enhanced capabilities. Each land battle command headquarters element receives its own air defense protection from airland battle assets or by satelliting on a subordinate close combat force.

Airland Battle Force

The airland battle force integrates triservice air defense capabilities to protect high-valued assets and close combat forces within the theater of operations. Offensive air defense capabilities are pursued with air defense and fire-support functions to destroy and disrupt air threats and their supporting facilities. When launched, enemy air vehicles are detected and countered by interdependent air defense weapon systems that are capable of continually engaging enemy air vehicles in any direction and at any speed or altitude. Weapon systems include, but are not limited to, missiles, guns with ballistic or smart maneuvering projectiles, directed-energy weapons (lasers, high-energy microwave, non-nuclear electromagnetic pulse and particle beam), obstacles (anti-air mines and wire barriers), jammers and obscurants (smoke, gases and aerosols).

Offensive air defenses preempt enemy air and space operations before they threaten friendly forces by attacking enemy aircraft on the ground, at standoff ranges and deep within enemy airspace. This is accomplished by the use of offensively capable aircraft, fire-support weapons with specially capable warheads and air defense systems controlled by the airland battle command.

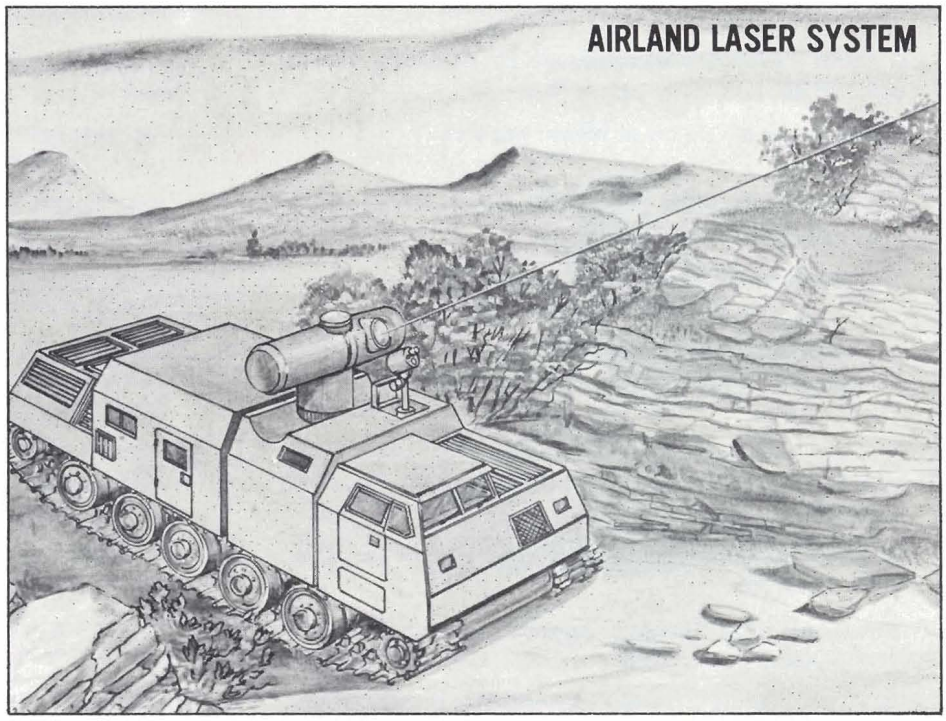
Increased speed, accuracy and lethality of air threats necessitate the use of air defense systems with minimal reaction and engagement times. Long-range ground and air systems can be used to quickly mass air defense efforts at remote locations.

Since enemy efforts to suppress U.S. air defense systems could be conducted throughout the entire theater area of operations, detection and warning systems would be netted to provide an integrated and continuous operational capability even when parts are selectively disrupted or destroyed. Target data is provided directly to all users simultaneously to avoid delays caused by layered C^2.

Though the primary means of defeating enemy air capabilities is by active means, the effectiveness of enemy reconnaissance systems and attacking aircraft is significantly reduced through passive means such as use of camouflage, visual and electronic deception, frequent displacement, dispersal, hardening and reducing or modifying electromagnetic, thermal and acoustic signatures. Minimizing and screening electromagnetic emissions counter enemy electronic sensor systems (electronic intelligence collectors, anti-radiation missile sensors and radar-warning receivers) and jammers. Air defense systems limit emissions to the minimum time required for engagements and rely on passive, quiet or external airborne and ground-active sensors for cueing. When operations permit, weapon systems are shielded from the electronic threat by terrain or other means to preclude detection, jamming and the effects of nuclear and directed-energy weapons.

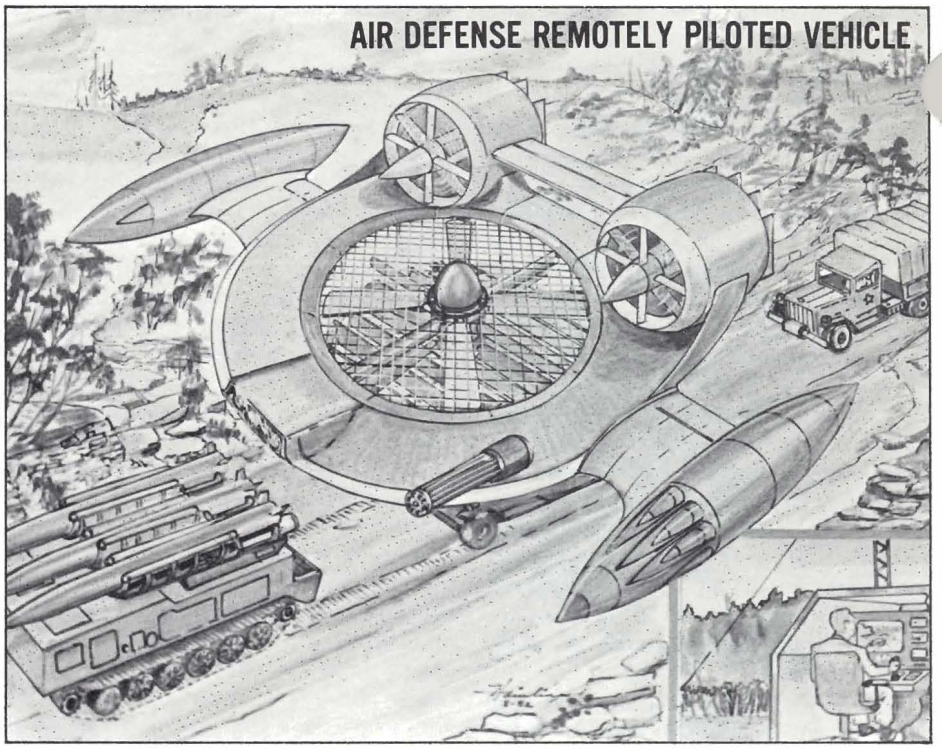
Close Combat Force

The primary function of close combat force air defense is to provide a continuous shield for close combat forces. It also is available to counter air threats to reduce the burden on airland battle force air defense. The shield is capable of changing horizontal or vertical dimensions in response to changes in C^2 considerations, enemy attack parameters or mission requirements. Highly mobile medium- and short-range systems counter threats, including attack and reconnaissance aircraft, helicopters, remotely piloted vehicles, cruise missiles and precision-



guided munitions. Man-portable air defense weapons and anti-air mines thicken low-altitude defenses. Anti-air mines are also used to deny landing zones and nap-of-the-earth routes used by enemy air-assault forces. Air defense dedicated platforms provide command and control of air defense fires and counter high-density attacks. Platforms may include air platforms which possess great agility and air defense firepower.

While interceptors are selectively used in conjunction with ground-based defense during saturation attacks, greater effectiveness is derived from their use at extended ranges outside the protective envelope and range capabilities provided by land-based air defense. Interceptors also attack threats which bypass or survive close combat force air defenses.



Air Defense: Present and Future

The following are conceptual differences between current air defense and that of AirLand Battle 2000 which give a better understanding of the air defense function in the AirLand Battle 2000 concept.

NOW	AIRLAND BATTLE 2000
Air defense only reacts to threat attacks.	Air defense is offensive, destroying threats on the ground or prior to their employment against friendly forces.
Multilevel air defense responds to layered and complicated chain of command.	Bilevel air defense is not layered. It is responsible only to the airland battle force and the close combat force commanders.
Orientation is on area and belt defense with altitude layering—SHORAD/LOMAD/HIMAD.	Orientation is on threat and assets to be defended, not on areas or altitudes.
Separate service air defenses are not well integrated.	Triservice air defense assets are integrated under a single commander to practice operational level air defense, both offensive and defensive.
Centralized control is desired. However, failing that, autonomous operation is the likely fallback mode.	Decentralized air defense is the normal mode of operation. Offensive capabilities are centralized.
Command and control structure is rigid and vulnerable.	Command and control receives information by netted sensors. Highly fluid changeable operations are possible.
Fire units depend upon their own sensors for intelligence and early warning acquisition with minor contributions available from higher echelons.	All air defense units contribute to and draw from the all-source intelligence data base where all sensors, including strategic ones, net and shotgun information to participants.
Air defense systems are limited by munition constraints, both logistically and in ability to deliver munitions to the target, thus being susceptible to large-volume air attacks.	Air defense systems are logistically inexpensive due to highly lethal single munitions and directed-energy systems.
Air defense systems depend primarily on active radar for their primary means of acquisition.	Multimode sensing with quiet, passive technologies and remote cueing is the normal technique.
Command and control depends on boundaries, corridors and rules for control of weapon system firings.	All systems are referenced to a command grid and netted so C^2 can be fluid, changeable and responsive to situations.
Manpowered, intensive systems create logistically burdensome movements and operations.	Non-manpowered, intensive systems are agile and capable of independent operations.

Future Weapons: Air Defense Needs

The air defense systems of the future are simple, durable and reliable, yet capable of accomplishing complex tasks with great effectiveness. Since there are fewer operators, robotics are used extensively. Air defense systems maintain commonality with Army and other service systems which are modularly designed to allow product improvements without major redesign.

Simplicity

Close combat weapon systems are sufficiently "self-contained" to permit deep battlefield penetration without refueling, reloading of ammunition, resupply of repair parts or replenishment of rations or other expendables. The air defense systems are capable of operating over extended periods of time in a battlefield environment, and are manned by personnel who need not be technically super-qualified. Modularized resupply and maintenance packs can be inserted on the battlefield during the battle. To increase mobility, the systems are transportable by standard military aircraft.

Durability

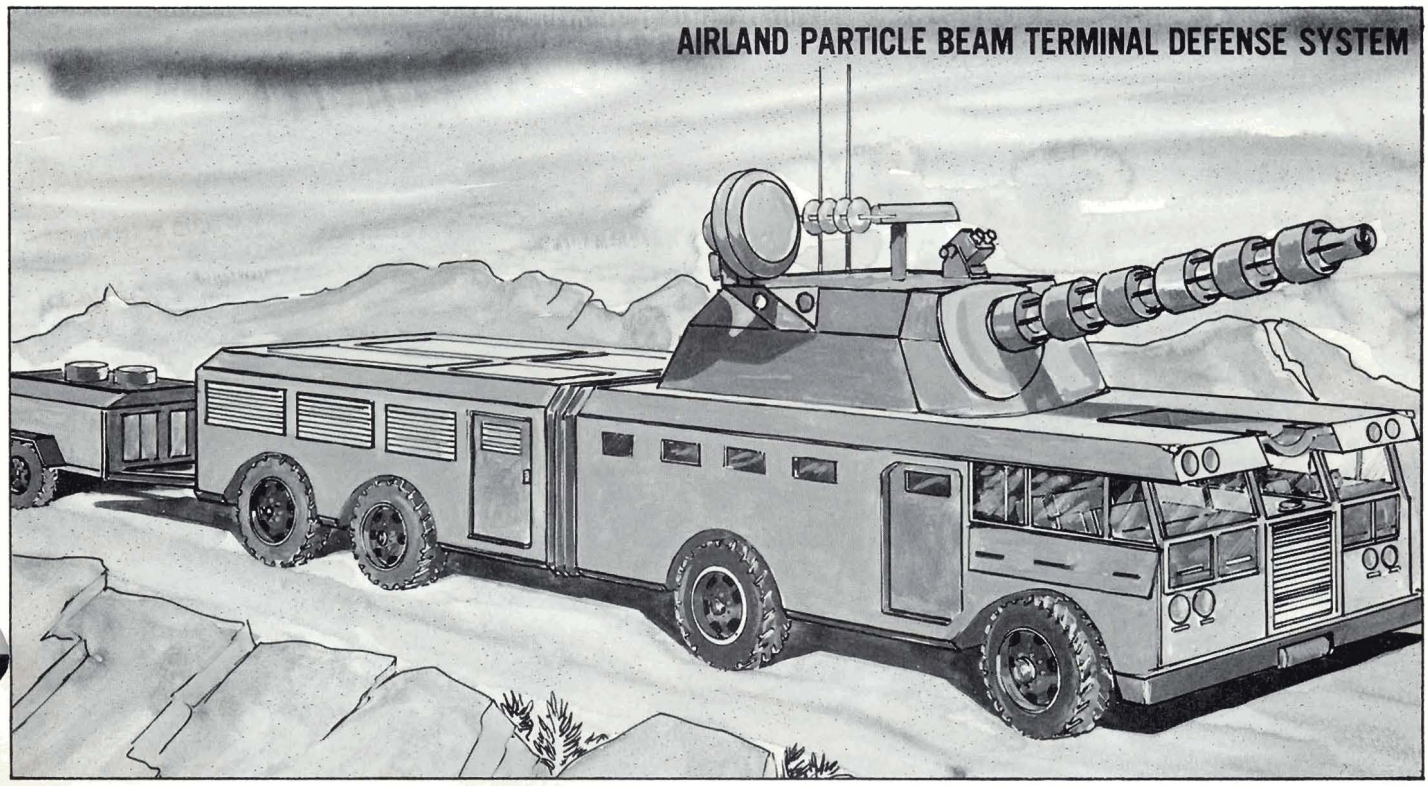
Critical air defense functions, such as target acquisition, identification and engagement control, have alternate modes of operation to insure continuance if any one mode fails or is neutralized. If system failures occur, a degradation results instead of a complete loss of operation. The systems are capable of some degree of self-maintenance and self-decontamination. Additionally, built-in diagnostic and training equipment is available to the crew for use during periods of light activity.

Supportability

Airland battle force air defense weapons have less demanding supportability requirements than close combat air defense. However, common systems are designed for airland and close combat systems. Long-range and special-capability airland ground-based air defenses have supportability equal to the mobility and employment options required of the airland battle forces.

Survivability

The ability of the systems to move rapidly provides a great degree of survivability. Accurate, onboard, passive navigation capabilities keep close combat air defense systems closely integrated with operations. The systems are referenced to a common central grid of the airland battle force. They are sufficiently hardened to withstand the rigors of combat. Although armor protection is effective, weight and volume remain consistent with worldwide employment options. In addition to armor protection, air defense systems can withstand and operate in an electromagnetic pulse



and chemical and biological warfare environment for extended periods. Both individual and collective protection are given developmental considerations.

By using multimode, quiet, passive sensors and engaging threats by remote cueing, air defense systems remain indistinguishable from other elements on the battlefield. Environmental disturbances such as electronic, visible light and thermal emissions are suppressed across the entire spectrum to avoid enemy detection. Survivability also is enhanced by projecting false signatures to deceive enemy sensors.

Units providing close combat force air defense require great mobility. Their systems are able to traverse varying terrain including wet and dry gaps, rubbled urbanized areas and forest, desert, jungle and mountainous terrain while withstanding climatic extremes.

Airland ground-based air defense systems do not require the same type of hardness as close combat air defense systems, but requirements for electromagnetic pulse and biological and chemical protection are the same. Since special-capability air defense units and ground-based, long-range air defense lack the mobility of close combat air defense units, the ability to project false signatures and remain undetected is the key to their survivability.

Lethality

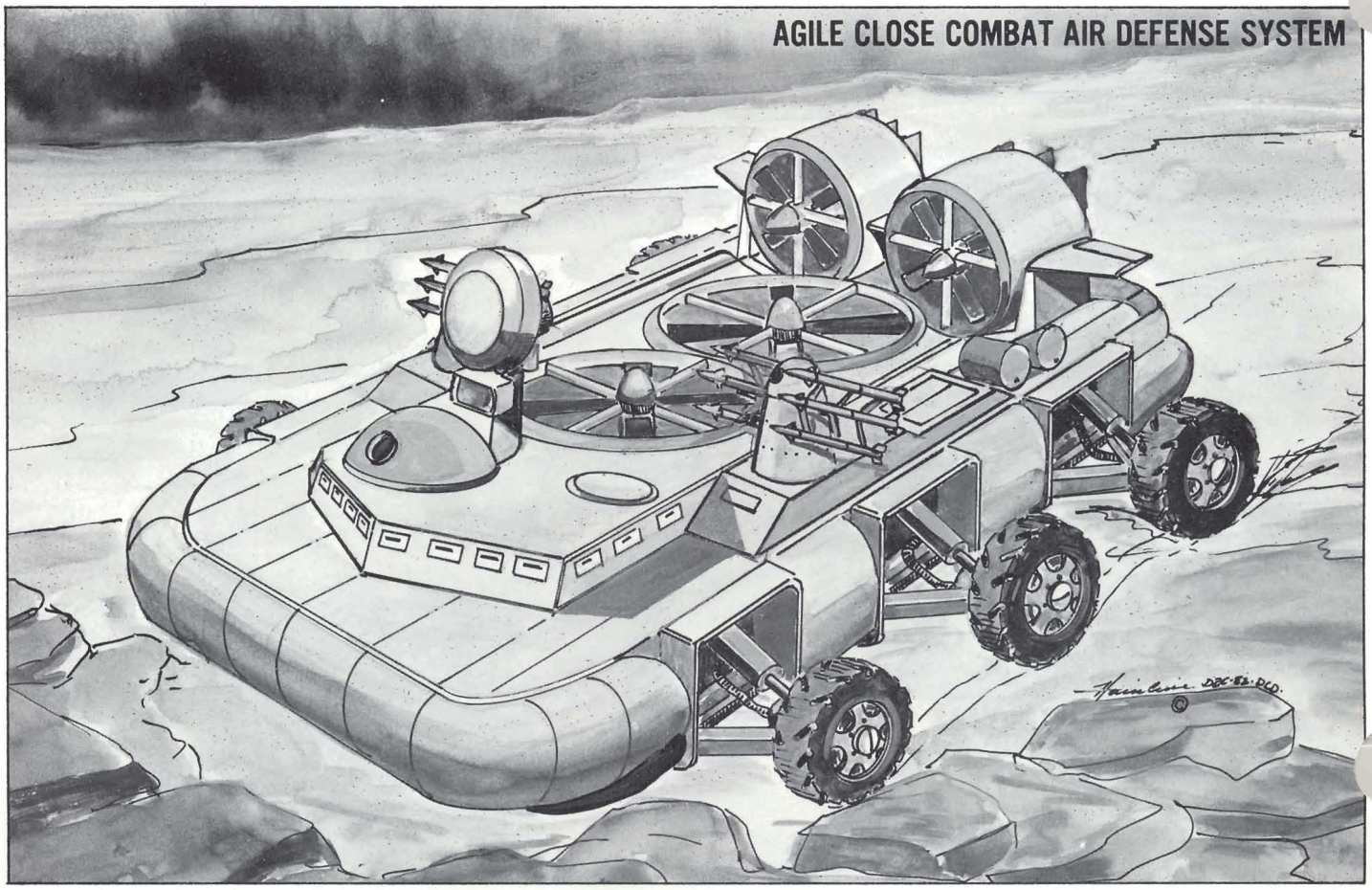
Air defense systems have sufficient lethality to provide a high degree of protection for vital assets and mobile forces. These systems are capable of reducing enemy aircraft effectiveness to levels that allow effective operations by friendly forces. Thus, the weapons engage threat weapon platforms in excess of effective threat ordnance delivery ranges and can engage the actual ordnance if launch occurs prior to weapon platforms kill.

Functions such as target acquisition, identification and tracking and engagement dwell times are streamlined to insure rapid system reaction. Due to the large volume of potential threats, high rates of fire and multiple-engagement capabilities are required. However, because of resupply constraints, numerous "shots" per engagement are not allowed. Thus, each single "shot" must be lethal. Here again, the constraints on airland battle forces are not as severe. Systems using missiles to effect target kills are not constrained in multiple-engagement capabilities by requirements to control missiles during flyout. Close combat air defense systems have shoot-on-the-move, all-weather, day-or-night and fire-and-forget capabilities.

Weapon system performance cannot accept degradation as a result of threat countermeasures. Therefore, systems incorporate multiple modes of operation (radio frequency, infrared, acoustic, optical, ultraviolet, etc.) to maintain tactical viability.

Effectiveness

Close coordination among combat forces is the essence of the AirLand Battle 2000 concept. These forces are given a real-time picture of the battlefield including threat and friendly locations, force characteristics, enemy axis of advance and other key tactical information. Collection and dissemination of all-source, real-time surveillance data via jam-resistant communications links are fundamental. However, weapon systems are optimized to autonomous operations (without communications to higher C^2 levels) to avoid capability degradation in the



event of communications loss. This requires each system to have its own near-perfect identification and target classification capability. Although a system optimized for autonomous operations performs well with no external communications, its capability is greatly enhanced when communications are present.

Air defense systems require a capability to provide rapid and highly reliable identification and discrimination between all types of air vehicles (remotely piloted vehicles, fighters, bombers, tactical ballistic missiles, cruise missiles, etc.). Non-cooperative systems that use air-vehicle signatures for identification are essential to complement active interrogation, friend or foe systems.

As threat forces increase in sophistication, so does the opportunity to exploit emissions. Air defense forces use these emissions for purposes of identification, classification and alerting.

Air defense weapon systems need to engage the entire spectrum of threat vehicles, especially at low levels. Therefore, target acquisition functions cannot be limited by terrain or horizon considerations and are effective in an intense electronic and electro-optical (smoke, aerosols, etc.) countermeasure environment.

Finally, these weapon systems of the future have multifunction capabilities. For example, a directed-energy weapon designed primarily to engage satellites has the capability to engage other elements of the threat spectrum. While not all inclusive, the chart shows possible technologies which may be explored to achieve the air defense capabilities required in the year 2000 and beyond.

Future Role

Gun technology and directed-energy weapons have tremendous application in the future air defense role. Additionally, the potential exists for countermeasures to be more significant in passive air defense than is true today. Missiles with new innovations will continue to be prominent, and the use of anti-air mines may play a significant role. Signature exploitation is especially critical to the air defense of the future.

Technology will open the door to the capabilities described in the AirLand Battle 2000 concept. However, doctrine and training must also be developed to support that concept. In this effort to attain the air defense posture required by the year 2000, the air defense soldier and leader will be the most important factor.

POSSIBLE TECHNOLOGIES TO BE INVESTIGATED

GUN

- ☐ rail gun (hypervelocity)
- ☐ smart or maneuvering projectiles

COUNTERMEASURES

- ☐ jammers
- ☐ obscurants
- ☐ aerosols

DIRECTED ENERGY

- ☐ laser
- ☐ particle beam
- ☐ microwave
- ☐ non-nuclear electromagnetic pulse

MISSILES

- ☐ shoot-on-the-move
- ☐ fire-and-forget
- ☐ self-initiating

ANTI-AIR MINES AND BARRIERS

- ☐ signature exploitation
  - infrared
  - ultraviolet
  - visible
  - acoustics
  - radio frequency

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MAJ KNOX *holds a bachelor's degree in aerospace engineering, a master's in industrial engineering and is a graduate of the Army's Systems Engineering and Management Course. Assigned to the Advanced Technology and Concept Division of the Directorate of Combat Developments, USAADASCH, Fort Bliss, Texas, he is task leader for material development in the ADA mission area analysis and project officer for the air defense high-energy laser. He is responsible for the development of the air defense concept to support AirLand Battle 2000.*

Joint Task Force Seeks Answer to 'SHORAD Problem'

The Joint Forward Area Air Defense (JFAAD) Task Force currently assembling at Fort Bliss, Texas, is scheduled to deliver a final test report in late 1986 that promises to have as much impact on short-range air defense (SHORAD) as any weapon technology developed in the last 40 years.

The test report will be the result of a four-year JFAAD Test Program its designers hope will provide the "final solution" to the "SHORAD problem."

The SHORAD target engagement envelope has been expanding for years, while its target identification envelope has remained essentially the same. Improved Chaparral, Stinger and the SGT York Gun will give SHORAD units quicker reaction time, greater range and increased lethality. The Army, meanwhile, is developing an automated command and control (C^2) system that will feed SHORAD gunners target information fast enough for them to engage hostile aircraft at the earliest possible engagement window.

The "SHORAD problem" is that SHORAD gunners, while blessed with innovative weaponry, are cursed with antiquated rules of engagement that would—during a shooting war—shrink the SHORAD engagement envelope back to its World War II dimensions. Current rules of engagement protect U.S. combat aircraft from friendly fire by requiring SHORAD gunners, in most instances, to make positive visual identification of targets before pulling the trigger—today's equivalent of "waiting until you see the whites of their eyes." Today's SHORAD gunner, in other words, isn't going to get a round or missile off any faster than the anti-aircraft artilleryman of World War II who also had to make positive visual identification before pulling the trigger.

Visual identification problems always favor the attacker. Statistics compiled during World War II show that anti-aircraft artillerymen failed to engage one-third of all possible targets due to identification problems. Since MiGs fly faster than Messerschmitts and Zeros, the visual identification problems will probably worsen rather than lessen in any future conflict despite early warning and more-accurate cueing.

A Stinger gunner operating under restrictive rules of engagement will probably end up firing in the tail-chase mode rather than the forward-engagement mode. The same goes for Improved Chaparral—despite its product improvements—and for SGT York Gun crewmen. New SHORAD technology works well in theory but, due to restrictive rules of engagement, much of it will be wasted on the battlefield of the future unless the rules of engagement change.

The JFAAD Task Force, a joint-service group with a direct charter from the Department of Defense, can change all that because its test results will pack the muscle required to have air defense doctrine rewritten and rules of engagement changed.

"Our purpose is to improve the effectiveness of SHORAD while reducing friendly air casualties from friendly fire," explained test director COL John W. Moore. "We intend to do this by analyzing and removing obstacles that rob SHORAD weapons of their full potential."

The obstacles on the JFAAD Task Force target list include restrictive rules of engagement; inadequate command, control and communications (C^3); inadequate airspace management over the battle area and the resulting target identification problems which delay the decision to engage targets.

"The SHORAD identification envelope is much smaller than the weapon engagement envelope," Moore said. "The disparity becomes more acute with each new weapon development. Our systems and procedures do not provide SHORAD crews with enough timely information for them to make a correct decision to engage a hostile aircraft at optimum weapon range.

"There are extensive, ongoing, multiservice efforts to solve the aircraft identification problem. Equipping SHORAD weapons with identification, friend or foe, sensors is only part of the solution. Correct identification of all aircraft depends on multiple inputs with computer-assisted analyses. A reliable C^3 system to support SHORAD will have to be developed and fielded. The final solution to this problem will have a profound effect on SHORAD employment procedures," Moore explained.

The search for the final solution to SHORAD problems began in July 1981 when the JFAAD test concept was formulated and original task force staff members began selecting and analyzing test issues. The issues selected included:

- ☐ How can collective means of aircraft identification be used in support of the forward area air defense (FAAD) mission?
- ☐ How can other sensor sources (AWACS, forward air control post, tactical air operations center, etc.) augment the FAAD mission?
- ☐ How effectively can projected C^3 capabilities support FAAD employment?
- ☐ How can airspace management procedures be altered to enhance both SHORAD and aircraft effectiveness?
- ☐ How will multiple transits by friendly aircraft—particularly close-support aircraft—affect SHORAD and C^3 operations and procedures?

"The JFAAD test will also tell us what rate of attrition we can realistically expect SHORAD units to inflict on Threat aircraft at the forward edge of the battlefield," Moore said. "We are currently basing our procurement of other air defense weapons on expected SHORAD attrition rates that are really only assumptions which have never been tested. They could turn out to be dangerous assumptions."

Most of the actual testing will be accomplished through computer modeling and simulation, supplemented by small field exercises to validate data and fill information voids. A methodology is being developed for the design of a computer model the JFAAD Task Force can use as an analytical tool. JFAAD's Fort Bliss test facility will eventually include a field environment simulator and a computer-modeling facility. Scenarios will be run on the computer model with real-time inputs from the field environment simulator.

Air Force blue that mingles with Army olive drab at JFAAD Task Force headquarters is evidence of the joint-service character of the operation, an operation scheduled to balloon from a dozen or so staffers to more than 100 Air Force, Army, Navy, Marine and Department of Defense civilian personnel.

"The JFAAD Task Force is an entirely new concept. Nothing like it has ever existed before," said Deputy Commander (Air Force) COL Theodore J. Conrad. "Combat aircraft and air defense have traditionally competed for airspace over the battlefield. The results were not always mutually beneficial. Today, for the first time, we are working together to find a solution.

"One of the ground commander's tactical concerns is the employment of Army aviation and Air Force close-air-support aircraft. We have to find a way to include friendly aircraft movements in Army-controlled airspace in the overall identification process or else develop a separate airspace management program. The program must be sufficiently refined to enable the ground commander to employ his organic aviation and Air Force close-air support without danger of them being engaged by friendly SHORAD weapons.

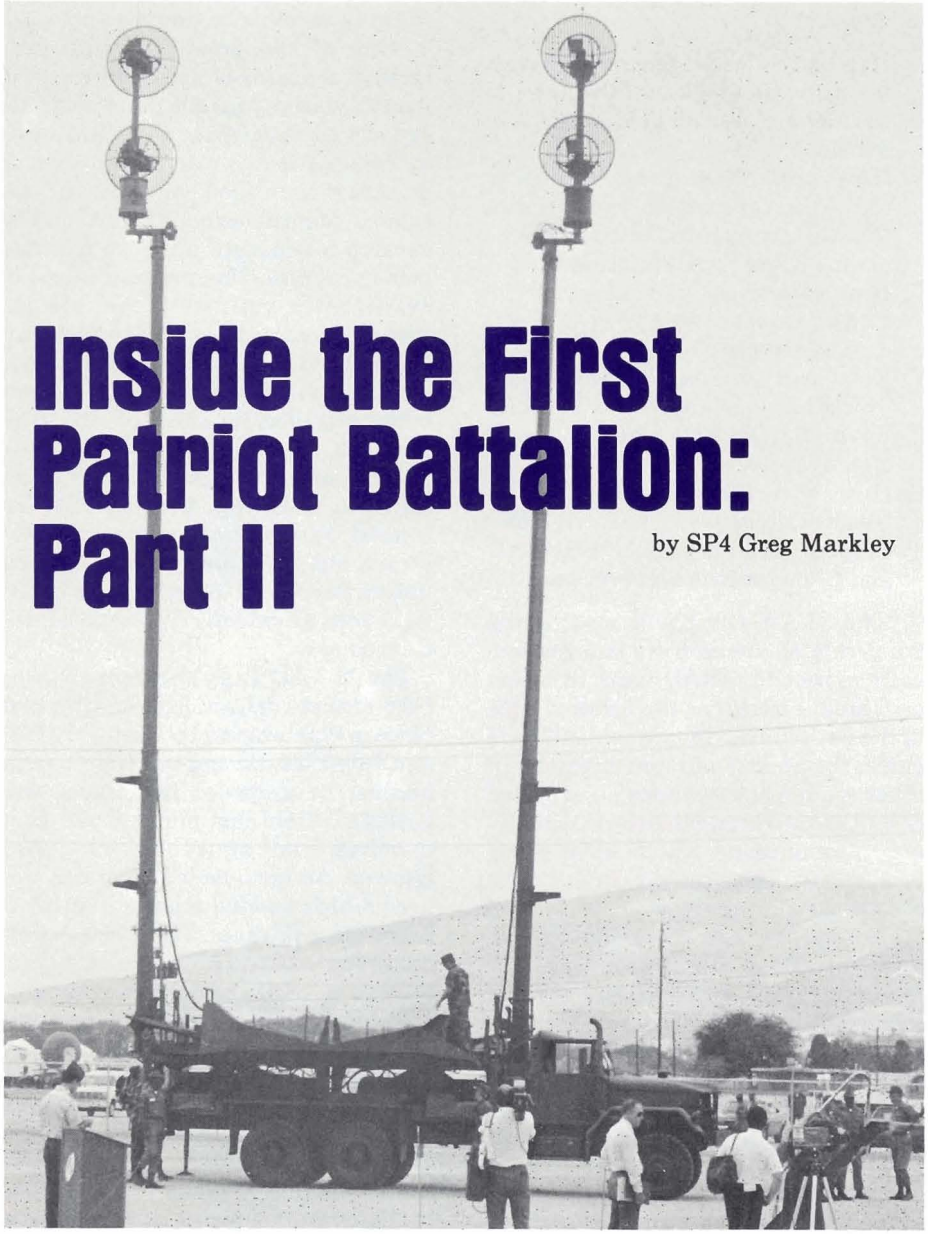
"The Air Force is naturally interested in reducing the friendly fire hazard by eliminating identification errors, but we're also interested in enabling SHORAD to perform its battlefield role as effectively as possible," Conrad said.

The JFAAD Task Force progression from concept definition to charter took place in Washington between July 1981 and July 1982. During this time, a large number of proposed test issues was gathered from as many field commanders and staffs as scheduling allowed. An open-ended approach was used which yielded a large number of proposed test issues. These issues were consolidated and reduced to only those that, if resolved, would directly contribute to achieving JFAAD objectives. A thorough document search was launched to determine what data on FAAD subjects are already available through studies, tests and exercises. Applicable data from the document search will be retained for use in the computer-model design as baseline performance information supplemented by field environmental simulator tests.

"The performance baseline will use current C^3 (including new SHORAD C^2 developments), tactics, procedures, airspace management and air defense systems we expect to be in the field by 1986," Moore said. "I feel, as does everyone involved in the task force, that JFAAD can have as much impact on SHORAD as any new weapon development in the last four decades. Unless JFAAD succeeds in eliminating the obstacles to SHORAD effectiveness, most of the money we've spent during the last few years on SHORAD technology will have been wasted. The JFAAD Task Force can push the SHORAD engagement envelope out to where it belongs—at the limits of its forward engagement capability." ✱

Inside the First Patriot Battalion: Part II

by SP4 Greg Markley



The ribbon-cutting ceremony at Abernethy Park, Fort Bliss, Texas, marked the official opening of Patriot training, an event that received extensive press coverage by the local media.

For soldiers assigned to 1st Battalion, 43rd ADA, the heady days of post-activation hoopla are over. As the nation's first unit to field the highly advanced Patriot missile system, the Fort Bliss, Texas, battalion garnered great media attention in its first few weeks.

Now, however, the nitty-gritty, less glamorous work begins. Soldiers in Patriot MOSs are undergoing in-depth instruction in the new air defense system. Other members of the unit, such as engineers and communications personnel, are learning how to adapt their skills to the Patriot operations.

Both officers and enlisted personnel are gearing up for an extended collective training period. This training, which is expected to last about 10 weeks, will be the first collective training activity to utilize the Patriot missile system. The last challenge of collective training will be to successfully pass the Patriot ARTEP administered during the last week.

Training will be closely monitored by high military officials and the press. In the meantime, though, the 1/43 troops are immersed in their studies inside the classrooms and outside where they work on the actual equipment.

LTC James G. Manning: "Our soldiers are 'hitting the books.' They're very motivated and are grasping the knowledge quickly and thoroughly. Most important of all, though, they are receiving hands-on training to get the feel of the Patriot equipment. They can't wait for collective training and they're optimistic that we'll set a fine example in that first, crucial field training exercise."

Soldiers acquiring the 16T MOS (Patriot missile system crewman) underwent six weeks of training between October and December. Classes were conducted 24 hours a day at Fort Bliss' Abernethy Park to get the battalion personnel qualified in time for their ARTEP. Soldiers interviewed midway through the course seemed pleased with the Patriot system and instruction.

SP4 Monica Dunnigan: "My background is in Nike Hercules. Along with a lot of people, I was transferred here from the 2nd Battalion, 52nd ADA, at McGregor Range. I've found this course outstanding. We spend a lot of time on the equipment, finding out how it really operates. The instructors are experienced and very helpful. I consider this a good battalion, and look forward to testing the equipment—and what I've learned—in the field."

PV2 Norman L. Clark: "I came here right from AIT and I've learned a lot in a short period of time. People seem to have a lot of motivation and desire to succeed. I can't wait for the ARTEP when we'll really find out if it stacks up. Some people volunteered for Patriot to be part of the first unit with the new ADA system. I'm just lucky to be here, so I'm trying my best."

SP4 Anthony L. Griffis: "My background is in Hawk, but I volunteered for Patriot because it seemed like it would be more challenging. Patriot is a lot less work, maintenance-wise, and it's proving to be much more efficient overall. The 24Ts will be responsible for tactical operations and repair, of course, so our job isn't difficult if we apply ourselves properly. We couldn't ask for better instructors!"

SGT Arrick P. Price: "My background is in Nike Hercules, so I've not found the training tough. It's not tough to learn the new system once you have some knowledge of ADA emplacement procedures and operations. The principles are the same, though the details are a little bit different. This course has been most effective, thanks to super teachers who know the material and make it interesting. All of us are looking forward to field duty with the Patriot system."

SSG Richard A. Grimes: "Learning is easier for new non-site-experienced people. They don't have to unlearn the old ways. Experienced ADA people find the transition simple, because the basic procedures are the same. On the whole, we have good instructors. Of course, it's a learning process for both the instructors and the troops. We're getting the maximum time on the equipment. We're learning to love the Patriot system. As 16Ts we'll be setting the system up and providing a perimeter defense. The 24Ts will fight the air battle inside on the computer screens, and we'll just be performing other assorted weapons tasks and double-checking the equipment maintenance."

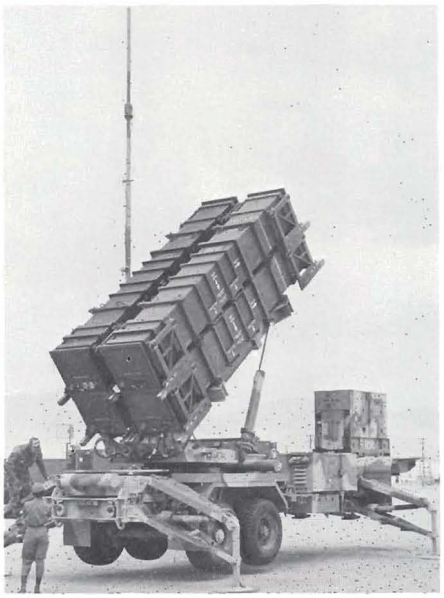
The 24T MOS (Patriot operator/maintainer) requires knowledge of the new missile system's sophisticated electronic circuitry and computerized operations. After a comprehensive 23-week course of instruction, the 24Ts should understand Patriot quite well. The instruction combines hands-on training, work on simulators and thorough study of the operations and repair manuals provided by the civilian contractors.

SFC Richard A. Mashburn: "The course has been beneficial, but it's basically geared to 'off-the-street' people unfamiliar with ADA concepts. Some of the material seems redundant for ADA veterans, but there are enough new procedures to keep you interested, no matter how experienced you are. The training is as realistic as you can get at this point. We won't get a real good feeling on whether the maintenance will be easier until we actually put it 'through its paces' in the field. We won't know how good our instructors were, whether they gave us an honest effort, until the FTXs. The instructors, from the 'old pros' to the just hired, are very concerned that we get the proper training. They mean well, and that's bound to pay off."

The instructors themselves are new to the Patriot system, but they seem dedicated and knowledgeable.

SFC Bobby R. Dawkins: "Patriot amazes me because it's living up to my expectations. Patriot is truly state-of-the-art hardware."

SSG Robert L. Keely: "As instructors, we have to set the standards. We have to know the material fully and be prepared to answer any question that is raised. Since we are teaching some of the key personnel, we must do our homework and prepare complete lesson plans. We give exams—either written or practical—every two weeks to gauge student performance. If anyone needs remedial help, all he has to do is ask for it and we'll gladly provide it. Everyone is impressed with Patriot; it's easier to maintain, simpler to operate and more mobile than other ADA systems. The troops from the 1/43, for their part, are devoted to their studies and are fast learners. I guess they aim to set an example for successor Patriot battalions."



Air defenders from the 1st Battalion, 43rd ADA, check out a newly arrived Patriot launcher.

SFC Robert T. Hughes: "I'm an old Nike Hercules field-test equipment repairman who volunteered for this assignment. I find new weapon systems fascinating. The most interesting feature is that the computer has the capacity to find faults in the system—all you have to do is repair the problem. This system will last well into the 1990s. Patriot will be around for ages because it can be modified. The capabilities with the software are unreal. We teach the course mainly for 'off-the-street' high school graduates with no electronics background. The hands-on component is popular; students get excited when they finally get a chance to work on the actual equipment."

Personnel with non-Patriot MOSs have been familiarized with the system, too. Communications personnel have spent weeks at White Sands Missile Range, N.M., learning how to adapt their general knowledge to the specific Patriot equipment they will be required to operate. With two new types of generators, 52Cs in the 1/43 have undergone a major reorientation to the Patriot's generator setup.

SSG Mike Erdmann: "The battalion has two engineers authorized for each battery, and five in the headquarters contingent. We studied the Patriot system from an engineer's standpoint and role for about 18 weeks. Some of these troops came right from AIT and have been in training status almost a year, so they're ready to see some real Army life and field duty after a year of schooling."

Engineers at 1/43 spent weeks on electronics, air-conditioning, welding and other ADA-related tasks. People realize they're part of something new and challenging, and consider themselves fortunate to be trendsetters.

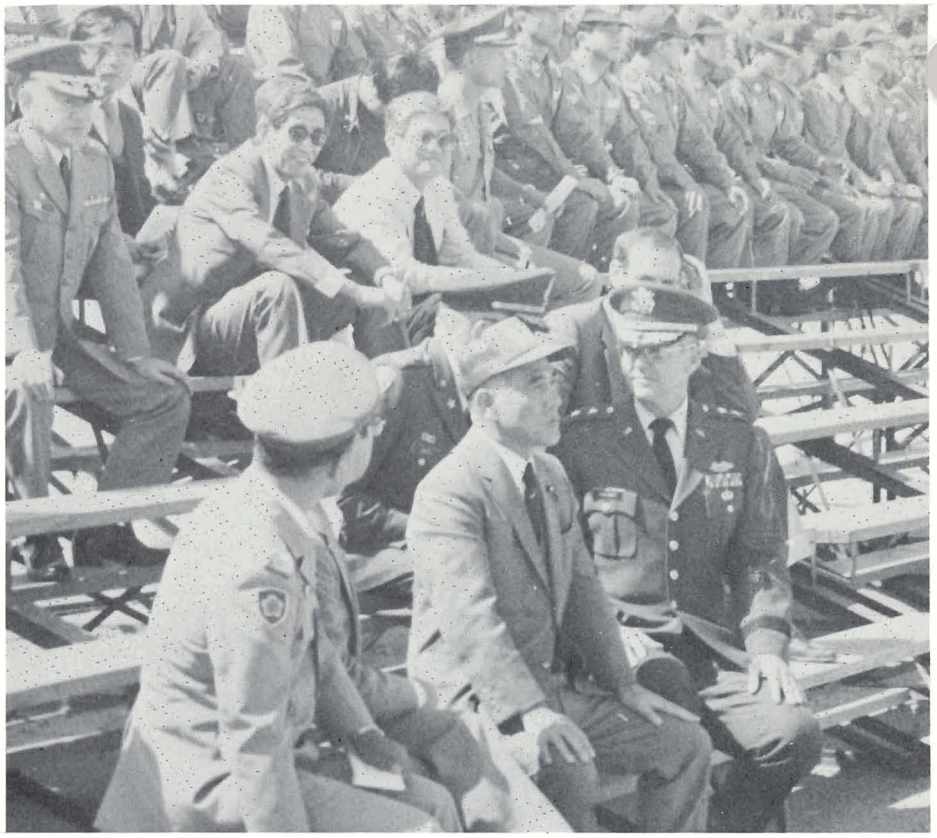
CW3 Earl H. Stevens II: "As the main instructor of the Patriot engineers, I'm impressed with their abilities. Most of them are young, but they've got great attitudes and potential. They realize that they're fortunate to be working on these new advanced generators, and they want to set an example. Patriot uses a lot of energy, but these generators are quite rugged and durable. This system is simpler, easier and vastly better from an engineer's perspective. I look forward to the field training, the ultimate test for this new equipment."

Personnel from the Patriot battalion know that the "eyes of ADA" will be upon them during collective training and the ARTEP. They know they must perform well to reflect favorably on this revolutionary air defense system.

LTC Manning: "Judging by unit performance in the initial months, our battalion will be up to the task. Our troops are motivated, disciplined and well-trained. The ball is in our court, and we intend to score with it."

SP4 GREG MARKLEY, *formerly the School Brigade's public information specialist at Fort Bliss, Texas, has been assigned to Turkey. A graduate of the Defense Information School, Fort Benjamin Harrison, Ind., he was a frequent contributor to The Monitor, Fort Bliss' unofficial weekly newspaper. He is a graduate of Rhode Island College (B.A. Political Science, 1980), and has had free-lance articles published in the Providence (R.I.) Journal-Bulletin and the Pawtucket (R.I.) Evening Times.*

WHO'S NEWS



EAST MEETS WEST—Japanese Minister of Defense SOICHIRO ITO (center front) recently joined members of the Japanese Self-Defense Forces to watch Hawk and Nike Hercules firings at McGregor Range, Fort Bliss, Texas, during their annual service practice. MG JAMES P. MALONEY (right), Fort Bliss commander and the minister's host during the visit, briefed Ito on the post's mission as an air defense center.

CPT CHRISTOPHER HAAS trains regularly at Fort Bragg, N.C., for athletic competitions.

After injuring his knees while running two years ago, ***CPT Christopher Haas*** took up biking. Shortly after that, he took up swimming. Now the commander of Headquarters Battery, 3rd Battalion, 4th ADA, 82nd Airborne Division, proves to be a tough competitor in endurance trials along the East Coast.

In September, Haas entered a triathlon in Wilmington, N.C., which demanded that he swim one mile in a rough ocean inlet, cycle 42 miles, then run 10 miles to the finish line. The air defense officer was the 37th person to complete the grueling event in a field of more than 300 contestants.

In a similar triathlon in October in Savannah, Ga., he placed seventh out of 182 athletes from as far away as Bermuda and California.

"After completing Ranger School at Fort Benning, I gained 35 pounds in about three weeks," said Haas, who stands an inch over six feet tall and weighs 160 pounds. "I started working out to get in better shape and figured I might as well compete since I was training so much."

In his opinion, the triathlon is the ultimate test of endurance. ✱

CW3 John Dalton, Fort Bliss, Texas, is the first air defender to be awarded a SGT York Gun MOS. Upon completion of the contractors' courses, the 22-year Army veteran was awarded MOS 224DO. He is currently assisting with the development of the Army's first warrant officer course for MOS 224D (SGT York Air Defense Gun System Technician) which is scheduled to be implemented sometime next year.

MRS. RICHARD ARMSTRONG accepts the Legion of Merit on behalf of her father from MG JAMES P. MALONEY.

COL Oscar D. McNeely, who disappeared on a flight between Hollandia and Finschafen, New Guinea, during World War II, was recently honored at Fort Bliss, Texas. ***Mrs. Richard Armstrong,*** McNeely's daughter, accepted the Legion of Merit from ***MG James P. Maloney,*** Fort Bliss commander, on behalf of her father at a ceremony celebrating the 134th anniversary of the post.

The original award for McNeely was signed on Feb. 18, 1945. Due to an oversight, however, the award was never presented. The error was discovered last year when ***Mrs. Julia McNeely,*** the colonel's widow, was filing paperwork with Army Mutual Aid in Washington, D.C. The Army was notified and a medal was prepared for presentation.

Because McNeely's most significant contributions to the Army were in the field of anti-aircraft artillery, it was felt the award should be made at the U.S. Army Air Defense Center. But Mrs. McNeely, who is 86 and living in Marietta, Ga., was unable to make the trip and asked that her daughter be permitted to accept the award in her place.

McNeely achieved recognition for his work in the development of anti-aircraft gunnery for 40mm guns and the .50-caliber machine gun. He also devised a sophisticated simulator for anti-aircraft gunners that became known as the McNeely Trainer. At the time he was declared missing in action, McNeely was commanding the 25th Anti-aircraft Group. ✱

SP5 IVOR COFFIE—Track star wins citizenship.

No doubt about it. ***SP5 Ivor Coffie*** of Headquarters Battery, 94th ADA Brigade, is an all-around winner. Last year, the 32nd AADCOM soldier garnered two medals and five trophies for running and jumping in USAREUR track meets. They included two first-place and one second-place trophies and a bronze medal for the long jump. However, those were only among the most recent accolades added to an already long list of remarkable accomplishments.

A native of Ghana, West Africa, Coffie was chosen in 1972 for that country's national track team and ran against other African countries in a semi-Olympic league. When he emigrated to the United States later that year, he enrolled at Virginia Wesleyan College in Norfolk, Va., graduating in 1976 with a bachelor's degree in political science. After a two-year stint in the editorial section of the Washington Post from 1976 to 1978, he joined the Army.

At first he wanted to become an officer, but was barred because he wasn't yet a naturalized citizen. "I love the Army," he said. "I had always wanted to join, but wasn't able to because I wasn't a permanent citizen."

Now that he has been naturalized, he is considering becoming a warrant officer. His wife, Doris, and three children also plan to become citizens in the near future. ✱

Congratulations to ***1LT Christine Witteveen*** and ***SFC George E. Ricker Jr.*** of the 1st Battalion, 4th ADA, 9th Infantry Division at Fort Lewis, Wash. The two were runners-up in the Active Army Field Kitchen category at the 14th annual Connelly Awards Ceremony held at the MGM Grand in Reno, Nev.

Also on the subject of food, air defenders selected for outstanding cook awards by Digest magazine included ***SP4 Kenneth Banazek*** of Battery A, 3rd Battalion, 7th ADA, in West Germany, and ***PFC Jacqueline Bemke*** of the 4th Battalion, 1st ADA, Fort Bliss, Texas. ✱

A training brigade drill sergeant and the S3 officer of the 2nd Battalion, 55th ADA, were named the outstanding NCO and commissioned officer at Fort Bliss, Texas, by the Omar N. Bradley Chapter of the Association of the United States Army. ***SSG James Van Eck*** of the 1st Training Brigade and ***CPT William McManaway*** were the focal point at the association's annual banquet in November. The two soldiers were selected on merits that best typify the qualities of the late Omar Bradley, the nation's last five-star general officer. ✱

Communiqué

Changes To Uniform Policy Approved

The Army chief of staff has approved changes in Army uniform policy, based on results of the Uniform Board which met in June. Specific dates on which the changes will take effect will be announced later.

General purpose athletic shoe. A $25 clothing-bag allowance to buy commercial athletic shoes will not be provided enlisted personnel as previously announced.

Cold-weather headgear. A trooper cap will be adopted for wear with the Army green uniform and black all-weather coat, green overcoat or green raincoat. The cap will be an optional purchase and is expected to be available by November 1983.

Wash-n-wear uniform. Washable Army green trousers, skirts and slacks made of 100-percent texturized polyester fabric will be adopted for optional purchase.

Maternity work uniform. A camouflage maternity work uniform will be adopted. Issue will be two uniforms, either the camouflage or the white maternity uniform, as determined by the commander.

Army green coat. One Army green coat will be deleted from the clothing bag of all soldiers beginning sometime during FY83.

Mess uniform for female soldiers. New optional-purchase blue and white mess uniforms will be made available for female officer and enlisted personnel. Jackets will be dark-blue and white. Officers' blue jackets will have branch-colored lapel facing, sleeve trefoil and shoulder knots. Enlisted blue jackets will have a dark-blue lapel facing and sleeve ornamentation. Shoulder knots will not be worn. The current knee- or full-length white or black skirts will be worn with the new white jacket. A knee- or full-length dark-blue skirt will be worn with the new dark-blue jacket. Current white and black mess uniforms will be authorized for wear by female officers as long as the uniforms are serviceable.

Scarves. The white scarf for female enlisted soldiers will be discontinued. Only the black scarf will be authorized for optional purchase and worn by all soldiers, male and female, with the black all-weather coat.

Sweaters. The olive-drab field sweater or the black pullover sweater will no longer be issued as a clothing-bag item. Current procedures for providing sweaters will continue.

Umbrellas. Male soldiers still are not permitted to carry an umbrella while in uniform. Female soldiers, however, may continue to carry an umbrella while wearing the service, dress or mess uniforms.

Claim Limit Raised For Household Goods

The maximum amount that can be paid on claims for loss of or damage to household goods has been raised to $25,000.

The increase from $15,000 is the result of an amendment to the Military Personnel and Civilian Employees' Claims Act of 1964. Portions of this act also cover certain other types of property losses related to incidents in the military.

The change in payments for household goods losses applies to loss or damage that occurred on or after July 28, 1982.

If planning a move, your transportation counselor will advise you of all changes in allowable claims.

Army Initiates New Joint Domicile Program

Officials at the U.S. Army Military Personnel Center have announced a new program concerning joint domicile assignments for soldiers married to other soldiers.

Although the deadline for applying for the program was Nov. 15, 1982, officials say they will accept requests at anytime once the program goes into effect. Couples can drop from the program whenever they wish.

A soldier included in the Married Army Couple Reassignment Program will have his spouse's social security number and military personnel class (officer, enlisted, warrant) noted in his personnel file. When one comes up for reassignment, the career manager will see this data and will automatically locate the spouse's file for consideration of an assignment to the same location.

Although this program does not guarantee an assignment together, it does simplify things somewhat for Army couples. Married couples will no longer have to request a joint domicile each time one person is reassigned.

If a career manager cannot grant a joint assignment to a short-tour area, the manager will try to assign the spouse somewhere in that area or to another short-tour area so the couple will rotate back to the Unites States at the same time.

Married couples who wish to take part in the program must submit a DA Form 4187 and a Married Couple Data Code Sheet through their local military personnel office.

Locator Service Can Help

Many active duty and retired servicemembers would like to contact military acquaintances, but have lost track of their whereabouts.

The Privacy Act of 1974 normally prevents the military from releasing current addresses. However, each service operates a locator service which will forward correspondence.

Here's how to do it. On one envelope, which contains your message, write the name and grade of the person you're trying to find. Write your return address on the upper left corner and place a stamp in the upper right. Insert this envelope in another stamped envelope addressed to the locator service. Also include your return address on this envelope.

Because so many people have identical names, accuracy of spelling and completeness of the name are vital. If possible, also send the locator service a data sheet of your friend's service background, duty stations, dates, etc. This will help the locators track the right individual more quickly.

Locators' addresses are:

Army: HQDA-DAAG-PSR,
Alexandria, VA 22331

Navy: USN (NMPC-641E),
Washington, DC 20370

Air Force: AFMPC/D003,
Randolph AFB, TX 78150

Marine Corps: HQ USMC (MSRB-13),
Washington, DC 20380

Coast Guard: HQ USCG (G-PS-1),
Washington, DC 20593

White T-shirt OK With Fatigues

Thinking about other useful purposes for the white T-shirt? Don't. It is still good for wear and will be for a while longer. So, don't give it up yet.

Although it may no longer be worn with the battle dress uniform, the white T-shirt is still authorized for wear with the fatigue uniform, according to a spokesman for the Army's Uniform Board. The fatigue uniform is authorized for wear until Oct. 1, 1985.

The proper T-shirts for wear with the battle dress uniform are the brown or green as authorized by the commander.

The article titled "Wearing the Right T-shirt?" which appeared in the Bulletin Board section (p. 49) of the October-December issue was inaccurate. To clarify things, a new draft of AR 670-1, containing the latest rulings on wear of all Army uniforms, will soon be in print.

Army Can Now Withhold Support Payment

A law that went into effect Oct. 1 allows the military to withhold a spouse or child support payment when a servicemember falls behind in an amount equal to two payments.

The Department of Defense, upon being notified by an authorized state official that a servicemember is in arrears, will notify the individual but will not withhold money for at least 30 days. This gives the servicemember time to contact a local judge advocate official.

The law, passed as an amendment to the Social Security Act, is in keeping with the long-standing Army policy spelled out in AR 608-99.

Soldiers having questions concerning this new law should contact their nearest legal assistance office. (ARNews)

Test Begins On Official Mail Stamp

If an upcoming Air Force test proves a U.S. Postal Service theory to be correct, you just might find yourself licking a stamp every time you mail an official letter.

Because it feels that an official mail stamp system would provide a more precise means of collecting postage revenue from official mail users, the Postal Service has asked certain elements of the Air Force and the Department of Agriculture to test the new system early in 1983.

If the test is successful and the concept is adopted government-wide, stamps will replace the official mail indicia now in use, and government agencies will buy official mail stamps instead of preprinted "For Official Use Only" franked envelopes.

The Postal Service emphasizes that the stamps will be restricted to official government mail. Envelopes bearing the stamps must have a government return address. (AFPS)

Career

Air Defense Artillery Personnel Changes

A personnel management transition plan has been developed to facilitate proper manning of the new air defense systems being introduced in the 1980s. The transition period began in October 1982 and will last about six years.

Most of the air defense soldiers to be affected occupy Career Management Fields 16 (Air Defense Artillery), 23 (Air Defense Missile Maintenance) and 27 (Ballistic/Land Combat Missile and Light Air Defense Weapons Systems Maintenance). In Career Management Field 27, however, only soldiers in certain specialties will be affected by the transition plan.

The need for the plan centers on such new weapon systems as the Patriot missile, the Stinger and the SGT York Gun. At the same time, the Army will phase out or phase down the Nike Hercules, Improved Hawk, Vulcan and several other systems. These modernization efforts create requirements for new and different types of training and management for air defense soldiers. The transition plan addresses retraining, reclassification, requisitions, curtailments, reassignments, reenlistments and promotions.

Air Defense Artillery soldiers desiring further information should see their unit commander or personnel officer.

ROTC Instructors Needed

Officers (O-1 through O-6), warrant officers and non-commissioned officers (E-6 through E-9) who are retiring within one year or who have retired within the last five years may qualify as instructors in the Army Junior ROTC Program.

The Junior ROTC Program is offered at 711 high schools throughout the United States, as well as Puerto Rico, Europe, Guam, Korea, Alaska, the Virgin Islands, Canal Zone and American Samoa.

The prerequisites are 20 or more years of active service; if retired, not to be retired for more than five years; and possess, as a minimum, a bachelor's degree.

For information on pay, working hours and benefits, contact one of the following ROTC Region Headquarters: ROTC Region One, Fort Bragg, NC 28307; ROTC Region Two, Fort Knox, KY 40121; ROTC Region Three, Fort Riley, KS 66442; ROTC Region Four, Fort Lewis, WA 98433.

Other specific requirements on the Junior ROTC Program may be found in paragraph 6-15, AR 145-2.

Education Mandatory For Reserve Officers

Staffers at the Reserve Components Personnel and Administration Center (RCPAC) warn that Army Reserve officers must meet certain mandatory education requirements for promotion consideration.

During the past few years, thousands of Army Reserve officers have learned this cold fact the hard way—by not being selected for promotion when they are otherwise eligible.

The requirement for promotion from first lieutenant to captain is that a basic officer's course be completed within three years after commissioning. The course can be completed in an Active Army resident program or by correspondence.

Captains have the distinction of being among those with the highest rate of non-selection for education reasons. For advancement to major, an advanced officer's course must have been completed. This requirement can be met in one of four different ways, depending on funds and which method is most convenient for the reservist. Reservists can participate in a USAR school or a correspondence program. It may be possible to attend an Active Army resident course or, in some cases, a Reserve Component resident course.

For promotion to lieutenant colonel, at least 50 percent of the Command and General Staff Course (CGSC) must be completed. This may be substituted by the Logistics Executive Development Course, taken only in residence, or the Associate Logistics Executive Development Course. The latter combines correspondence and two-week resident phases.

Lieutenant colonels cannot become colonels unless they complete CGSC, either by participating in a USAR school program, a correspondence course or a combination of both. It can also be completed by attendance at the resident course.

Officials recommend the planning of military education far enough in advance to make sure that officers are educationally qualified when considered by a promotion board. Education requirements should be met before the date of eligibility for actual promotion. Selection boards consider officers for promotion during the calendar year preceding the year in which the required number of service years is completed. Thus education requirements must be completed no later than the date the board convenes.

For more information, contact the nearest USAR school or the personnel management officer at the RCPAC.

Retirement/Promotion Policy Explained

Policy concerning soldiers who elect to retire and are selected for promotion has been spelled out by officials at the Army Military Personnel Center (MILPERCEN).

A soldier whose retirement is approved before the convening date of a promotion board is not eligible for promotion consideration. The soldier's personnel qualification records should not be sent to the promotion board.

If a soldier is erroneously selected, the servicing military personnel office will notify MILPERCEN of the error so that the soldier's name can be withdrawn from the recommended promotion list. If the retirement was approved before a promotion board convened, MILPERCEN will not withdraw the approved retirement so the soldier can accept the promotion. Withdrawal, however, may be authorized based on the needs of the service and extreme hardship. Should MILPERCEN withdraw the approved retirement, the soldier will not be reinstated on the promotion list.

Additionally, a soldier whose retirement is approved on or after the convening date of a promotion board will remain on the list in a non-promotable status. If MILPERCEN approves the retirement withdrawal, the soldier's status will change to promotable.

Soldiers affected by this policy, and those seeking more information, should check with their servicing personnel office.

Defense Attache System Seeks NCOs

Non-commissioned officers are needed in grades E-5 through E-7 to fill worldwide positions in the Defense Attache System. Prerequisites and application procedures are contained in AR 611-60.

Preparation for an attache assignment takes from four to 18 months, depending on the length of language training, if required. Administrative orientation, attache and language training are normally given in Washington, D.C.

Especially needed are personnel who possess excellent foreign language skills, or have a qualifying Defense Language Aptitude Battery Test score. Although personnel may volunteer for assignment worldwide, specific needs exist in Hungary, Poland, Bulgaria, China, Jordan, Zaire, Ghana, Cameroon, Yugoslavia, Columbia, Ivory Coast, Soviet Union, Turkey, Nepal and Sudan.

Interested personnel should contact the Attache Support Division, USAASD, INSCOM, Fort Meade, MD 20755, AV 923-6001/6027.

Army Revises Re-enlistment Policy

A revision in re-enlistment policy has phased out Option 4-7 (CONUS to CONUS station of choice option).

Under the new policy, a first-term soldier can re-enlist for his or her present duty station or for an oversea assignment if a vacancy exists there. Selection of another CONUS station is no longer available.

The suspension of this option will not affect a soldier who currently has a valid contract for Option 4-7. It will be honored, regardless of whether a soldier has re-enlisted or will do so in the future.

Counseling Expanded For Officers

The Officer Personnel Management Directorate of the Military Personnel Center (MILPERCEN) has expanded its formal counseling procedures for officers (in grades of captain through colonel) who are not selected for promotion.

Commanders or MILPERCEN will counsel non-selected officers upon their request. MILPERCEN will also prepare, at the request of the non-selected officer, individual file summaries and interview sheets to be forwarded to the commander for counseling purposes. Counseling will be available as soon as practicable after a promotion list is released.

Officers desiring MILPERCEN counseling or interview sheets should contact their career manager (assignment officer) at their respective control branch.

The ADA MILPERCEN point of contact is LTC Michael Barnes, DAPC-OPE-A, AV 221-0146.

Flight School Looking For Officers

According to personnel managers at the Military Personnel Center, approximately 80 flight school openings will be available for officers currently on active duty during the next fiscal year.

Officers who have less than 48 months of active federal commissioned service are eligible, but the standards for entering the program are high. Candidates must pass a Class 1A flight physical and score a minimum of 90 on the Flight Aptitude Selection Test.

Application must be made to the Aviation Flight Training Selection Board which will meet July 1 and Nov. 1, 1983. Officers who wish to attend the course should submit applications through command channels to: Commander, U.S. Army Military Personnel Center, ATTN: DAPC-OPE-V (for SC15 Aviation) or DAPC-OPG-T (for SC71 Aviation), 200 Stovall Street, Alexandria, VA 22332.

Once selected, officers are sent to Fort Rucker, Ala., for nine months of flight training. Upon successful completion of flight school, officers will receive an aviation specialty and will be assigned to an operational flying position. For details, interested officers should read AR 611-110.

Scanning

Prototype Peacekeeper System Delivered

A prototype Peacekeeper (MX) intercontinental ballistic missile guidance and control system was delivered to Vandenburg Air Force Base, Calif., for use with a Pathfinder ground test missile. The Pathfinder was used to check launch procedures, ground facilities and software in preparation for the first Peacekeeper flight test in January.

Air Force Accepts JTIDS Delivery

The U.S. Air Force's Electronic Systems Division recently accepted delivery of the first production Joint Tactical Information Distribution System (JTIDS) terminal. Air Force LTG James W. Stansberry said the JTIDS delivery "demonstrably establishes jam-resistant, secure digital data links as a viable medium for tactical command, control and communications (C^3) systems."

Army Evaluates Stinger-POST

A Pentagon ad hoc working group met Oct. 14 to begin review of test results of a new weapon system designed to meet the current threat.

Stinger-POST (Passive Optical Seeker Technique), under development for the U.S. Army and Marine Corps, is an advanced guidance system that uses a rosette scan inside a small computer as opposed to the Stinger which uses two rotating mirrors. The image scan method is said to have the capability of enhancing target detection with the two-color seeker providing an option to track in either the infrared or ultraviolet spectral band. The two-channel Stinger-POST is reportedly capable of comparing and locking on the larger of two heat sources. The basic seeker uses only the infrared band to lock on targets.

Stinger-POST gunner training and testing began in May 1982 at Fort Bliss, Texas, partially to determine if the tone is similar to the basic Stinger or if additional gunner training will be required. The firing of two live missiles against full-scale drone targets, an F-86 aircraft and a helicopter, concluded the tests in September at White Sands Missile Range, N.M.

The decision as to whether the Army will accept Stinger-POST in its inventory is imminent.

Members of the Air Defense Board, Fort Bliss, Texas, test the Stinger-POST (without its antenna) at White Sands Missile Range.

Developments

New Fiber Optic System Installed

The Army's first fiber optic transmission system, recently installed at Fort Monmouth, N.J., permits the evaluation of commercial state-of-the-art transmission technology for military applications.

The new system uses a laser to transmit voice, video and data communications over hair-thin glass strands. The laser generates light pulses that travel through the fiber optic cable. These beams are detected at the receiving end, converted into electronic signals and demultiplexed.

The Fort Monmouth system uses 12 fibers bundled together in a half-inch cable. Four of the fibers, which provide 192 transmission paths, replaced a large cable containing hundreds of wires; six are being used for testing and evaluation; the remaining two are to expand the system. (DARNews)

Army Orders Night-Vision Goggles

The U.S. Army Electronic Research and Development Command has ordered production of a new helmet-mounted, aviator's night-vision imaging system.

The new device, which can be used in overcast starlight conditions compared to the current device's need for at least quarter-moon illumination, will provide low-flying helicopter pilots with significantly enhanced nighttime visibility.

Advanced Infrared Technology Developed

Advanced infrared (ir) technology which will improve the ability of future short-range, air-to-air missiles to find and track low-flying targets is being developed.

Under a two-year Naval Research Laboratory contract, Hughes Aircraft Company is developing a focal plane array, no larger than a collar button, which will be the heart of a seeker having several advantages over current ir guidance systems.

The focal plane array is a tiny hybrid sandwich with infrared detectors on one side, each attached to a silicon signal processing chip, called a charge-coupled device, on the other side. The nerve centers of the focal plane array are the thousands of detectors sensing infrared radiation and converting it to an electronic charge.

The significant advantages which the focal plane array provides over current generation detectors are:

- Greater sensitivity for detecting and locking on lower-contrast targets.
- Improved scene information from a larger number of detectors, thus reducing the confusion sometimes caused by "ground clutter." (Ground clutter is generated by heat radiating from the imaged background. Missile infrared guidance systems must distinguish low-flying targets from this clutter.)
- Ability to perform better terminal guidance against the target by "imaging" it rather than just homing against the jet exhaust.

The contract calls for development of a mercury-cadmium-telluride hybrid containing more than 4,000 tiny infrared detectors arranged 64 across and 64 down. This array will form one quadrant of an even larger hybrid containing more than 16,000 detectors arranged 128 across by 128 down. Having more detectors increases the missile seeker's ability to detect targets.

Focal plane array detectors electronically observe an entire scene in their view at one time without having to "scan" a scene through an arrangement of oscillating or rotating mirrors. That is why the system is called a "staring" array, as opposed to the "scanning" of the mechanical-optical technique.

The focal plane array technology is also being used in the development of an infantry, man-portable tank-breaker missile.

Marines Evaluate Laser Device

A laser device for pinpointing targets for laser-homing weapons and conventional artillery has passed rugged testing by the Marine Corps.

During evaluation under simulated combat conditions, modular universal laser equipment (MULE) operators designated targets for the Copperhead laser-guided artillery projectile, laser-guided bombs and the Hellfire laser-guided missile. Aircraft equipped with laser trackers located and identified all designated targets.

The MULE's laser module, which resembles a short-barreled rifle, can be aimed from a tripod or by hand for target designation or range finding.

Artillerymen Get New Laser System

The Army has received delivery of a new laser which lights up enemy targets with an invisible beam, signaling laser-homing weapons to strike.

Designed for forward observers and mounted on

tripods or armored vehicles, the Ground Vehicular Laser Locator Designator (G/VLLD) is a combination range finder and target designator that pinpoints rapidly moving targets for laser-guided or conventional weapons. By relaying a target's location and bearing for conventional artillery, the G/VLLD reduces firing time by 50 percent and saves ammunition, eliminating the need to "walk" shells to a target.

The G/VLLD can operate in extreme heat or arctic cold and can absorb shock and rough handling.

Navy Installs Advanced Sonar

A new era in sonar for anti-submarine ships has begun with the first installation of the SQS-52B sonar aboard the *USS Moosbrugger*. This surface-ship sonar, which is more powerful and capable than existing systems, can detect, track and classify many submarine targets simultaneously.

The SQS-52B's sonar bulb, built into the bow of the ship below the waterline, creates sound waves and detects their echoes off targets.

The system will be installed in more than 40 ships.

Navy Commissions Trident Submarine

The nation's second Trident submarine, *USS Michigan,* has been commissioned and has joined the first Trident submarine, *USS Ohio,* at sea. Admiral Kinnaird McKee, director of the Navy's Nuclear Propulsion Program, termed the Trident "the most capable warship of its kind in the world today."

Another Trident, *USS Georgia,* was christened in November and will complete six to 12 months of shakedown cruises prior to commissioning. The *USS Florida,* currently under construction, will be the next Trident to slide down the launching ramps. Six other Tridents are scheduled for construction.

Chief of Naval Operations, Admiral James Watkins, speaking at the launching of the *USS Georgia,* said the new Tridents help make the nuclear Navy the number one deterrent to "the most important war of all."

Navy Takes Delivery of HARM Missiles

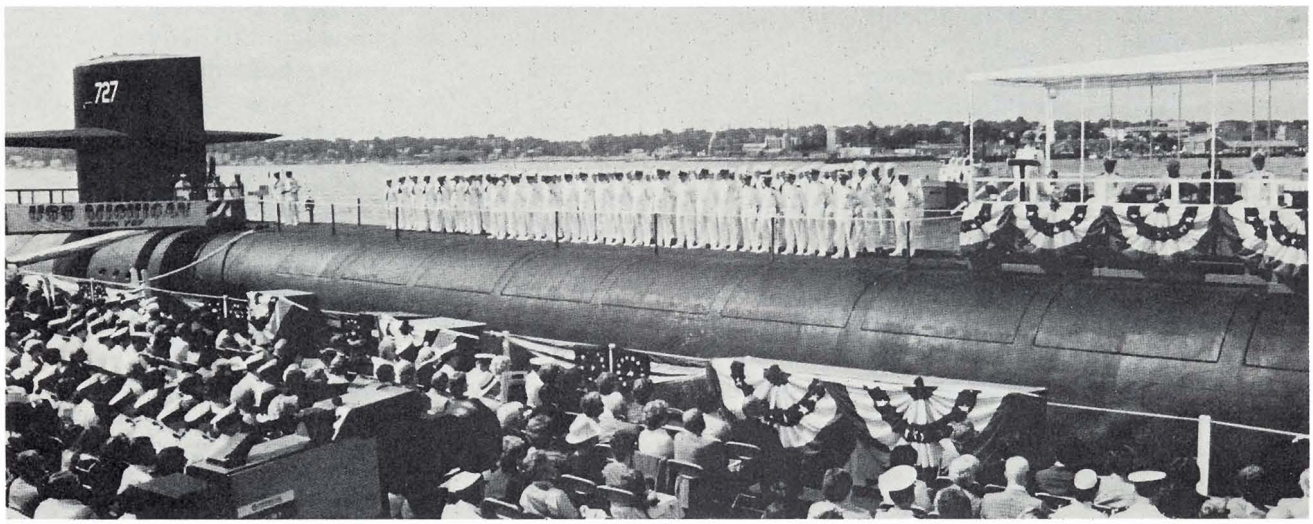
The U.S. Navy took delivery in December of its first production High-Speed, Anti-Radiation (HARM) missiles. Six missiles were accepted under a 1981 contract calling for delivery of 80 weapons. The balance of the missiles is expected to be delivered through September 1983. Also under contract are an additional 236 missiles, plus spares, at a maximum rate of 25 per month beginning in November 1983 as part of an FY82 contract award.

Navy Develops New Anti-ship Missile

The Naval Weapons Center at China Lake, Calif., is developing a low-cost, anti-ship missile using off-the-shelf hardware that includes a 1,000-pound bomb fitted with a Shrike rocket motor and a Paveway 2 laser-seeking guidance unit. The missile, designated Skipper 2, could enter service in mid-1984. Skipper 1 is an unpowered version of the same weapon.

Army Orders Digital Radar-Warning Models

The U.S. Army Electronic Warfare Laboratory has ordered 23 development models of a new digital, radar-warning system for evaluation for use in helicopters and light, fixed-wing aircraft. First delivery of the computer-based system, designated



The Navy's second Trident submarine, *USS Michigan,* joins the fleet as its crew participates in commissioning ceremonies.

the AN/APR-39A(XE-1), is scheduled for October 1983.

The new radar-warning system is designed for Army and Marine Corps helicopters operating at nap-of-the-earth and for Marine light aircraft operating at low altitudes. It is intended to replace the analog system that is currently installed in approximately 3,000 military helicopters.

The older system, the AN/APR-39, can alert a pilot or electronic warfare officer to the presence of an operating radar and the angle of arrival of the radar's pulses, but is considered unsatisfactory for radar-type analysis and threat priority. Also, reprogramming the system for new or modified threats requires hardware modification.

The new system provides a computer-generated display that is less cluttered and more informative than its predecessor. It provides both visual and audible warnings of threat radars, and can be reprogrammed in the field to make it quickly effective against new and modified weapons. Frequency coverage extends into the millimeter-wave region.

Air Force Thinks Ahead

In the aftermath of a nuclear war, the Air Force might want to hoist low-frequency antennas into the sky for emergency communications. The service's Geophysics Laboratory at Hanscom Field, Mass., is planning an 18-month study for design of such an antenna which would be supported by balloons.

The contractor must fashion a transportable system which could be put into operation quickly after extended storage. A prototype system would use a 25,000-cubic-foot aerostat, or lighter-than-air, suspension. The balloon would be tethered by a 3,000-foot antenna that could handle 25 kilowatts of transmitter output power.

F-16XL Testing Continues

Since its first flight in July 1982, the F-16XL—designated the F-16E by the Air Force—has made 43 test flights for a total of 49 hours, most of them at Edwards Air Force Base, Calif., site of the Air Force Flight Test Center.

In late August, the F-16XL was returned to the contractor in Fort Worth, Texas, for installation of a spin chute and for heavy-load, ground vibration tests. Evaluation resumed at Edwards Air Force Base in September.

Shortly before the F-16XL was returned to Fort Worth, the first aerial test of the aircraft's weapons release system was made. Twelve 500-pound bombs—close to the payload of a World War II B-24 bomber—were dropped from 13,000 feet over a California range. The bombs were released at intervals of 50 milliseconds as the F-16XL was flying at more than 500 miles per hour. The final bomb was released just six-tenths of a second after the first. They landed on target in an area not much larger than a small house.

The principal differences between the F-16 and the F-16XL are the F-16XL's distinctive cranked-arrow wing and longer fuselage. The new graphite composite wing has more than twice the area of the standard F-16 wing. Combined with the longer aluminum fuselage, the F-16XL can carry 80 percent more fuel, giving the aircraft a greater combat radius.

Normally, the basic F-16 carries two AIM-9 Sidewinder missiles and six bombs when configured for an air-to-surface mission. The F-16XL, in addition to carrying 12 bombs, routinely flies with two AIM-9 missiles and four advanced medium-range, air-to-air missiles.

Twelve 500-pound bombs are released from the F-16XL flying at 13,000 feet at more than 500 miles per hour over a bombing range in California. (Photo courtesy of General Dynamics)

Intelligence

Soviet Union Deployment Reported

Aviation Week & Space Technology reported that the Soviet Union has deployed sufficient forces in northeast Asia to fight a war in the region, if necessary. The magazine's Washington staff says there is a large Tupolev Backfire bomber fleet in that area. Older fighter/interceptor aircraft are being replaced at the rate of 200 a year with modern aircraft, especially the MiG-25 Foxbat. Fighter forces total more than 2,500. The Soviet fleet in the area is the largest of their four fleets.

The editors also claim that long-range reconnaissance aircraft are operating out of and returning to Vietnam in unrefueled flights over Guam and Midway Island.

USSR Offers MiGs To Argentina

Sources say that the Soviet Union has offered to sell Argentina MiG-21s and MiG-23s to replace aircraft lost in the Falklands conflict. The offer is understood to include generous credit terms with payments to be stretched over 10 years at 2 percent interest. The Argentine government has neither accepted nor refused the offer.

Singapore Offered Radar System

The Pentagon has announced a letter of offer to Singapore for six AN/TPQ-36 mortar-locating radar systems built by Hughes Aircraft. The deal, if accepted by Singapore, would be worth $30 million.

New Versions of Swedish Missile

A Swedish company recently announced two new versions of the RBS-70 anti-aircraft, laser-guided, manportable missile—one mounted in a suitable army vehicle and known as the vehicle-launched missile (VLM), the other mounted on an armored vehicle (ARMAD).

The VLM launcher, which can be folded and covered when in transit, is mounted on a special stand secured to the floor of the vehicle. Six missiles are normally carried in the vehicle. Designed to accompany units on the move, the system is fitted to receive warning information from mobile warning radars. When the radar detects hostile aircraft, an alarm is activated in the VLM vehicle. The bearing and range of approaching aircraft are transmitted by a data link from the radar onto a target data receiver mounted in the vehicle's cabin.

Setting up time for the VLM from the moment of a radar warning alarm can be as short as 30 seconds.

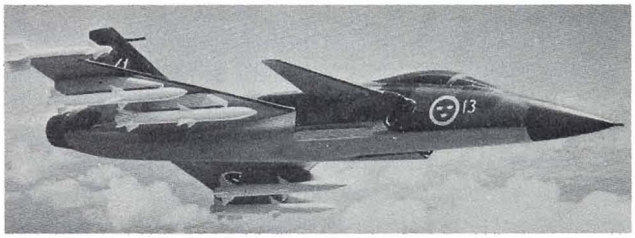
The ARMAD version consists of a turret in which seven missiles are stored vertically and can be mounted on any suitable armored personnel carrier. The launcher inside the turret is raised before firing.

Also on the turret is a three-dimensional surveillance radar but, if desired, data from a separate air-warning radar can be received, as in the VLM system.

Swedish Aircraft Assigned Multiple Roles

The new Swedish multimission combat aircraft, JAS-39, will carry a variety of equipment, including air-to-air and air-to-surface missiles, electronic countermeasures and reconnaissance pods to perform air defense, ground strike and reconnaissance missions.

Full-scale development work has started and five prototypes are scheduled to be built. The Swedish Defense Ministry has ordered an initial group of 30 JAS-39 aircraft which is being developed by Industry Group JAS, a Swedish consortium.



The Swedish JAS-39 can be equipped with a variety of ordnance in accordance with specific missions.

Lebanon Looking For Air Defense Systems

Lebanon wants to rearm and re-equip its military forces with weapon systems such as the Improved Hawk and the Stinger infrared-guided, manportable missile. It also wants helicopters and ground force armaments. Lebanon's approximate $5 billion in gold and foreign currency would partially finance its rearming.

UK To Boost Air Defenses

Two Royal Air Force (RAF) Phantom air defense squadrons will be kept in service alongside Tornado Air Defense Variant (ADV) squadrons until the aircraft run out of life, at which time they will probably be replaced with more ADVs. The RAF is also looking to increase Rapier surface-to-air missile squadrons and to replace the Bloodhound system, "hopefully in collaboration with France and Germany," according to the chief of the air staff.

Germany Develops 105mm Tank Guns

Germany is developing a new family of 105mm tank guns.

The Rh-105-11 version was developed from the M-68 gun which is in production in 14 countries and in service in 44 countries. It features a multihole muzzle brake and a newly developed recoil mechanism consisting of two recoil brakes and a pneumatic recuperator. The thermal sleeve, automatic breech with vertical sliding wedge and firing mechanism of the M-68 gun will be retained.

The proposed Light Protected Turret System has a low silhouette and offers protection against 7.62mm armor-piercing rounds. The stabilized gun, which can be automatically loaded in any position, is placed outside the combat compartment. The electro-hydraulic, gun-laying system is controlled by joysticks.

Also being developed is a new 105mm rifled, kinetic-energy round which features improved internal ballistics and a newly developed penetrator for use against helicopters. This fragmentation round, which has ball fragments embedded in the jacket, is intended to raise the first-round hit probability against helicopters from 15 percent for conventional rounds to 84 percent.

Germany's Light Protected Turret System featuring newly developed 105mm gun.

Germany's Air Defense Radar Now Operating

The first of four new air defense radars for West Germany is now keeping a close watch over surrounding skies.

As reported in the last issue of *Air Defense Magazine,* the Hughes Air Defense Radar (HADR) is a long-range, three-dimensional radar that provides civilian air traffic control and military air defense. It pinpoints aircraft locations and heights, eliminating the need for a separate height-finding system, and detects targets in heavy clutter and under intense electronic countermeasures.

The HADR won't become obsolescent because it is computer-controlled and can be reprogrammed to meet future threats. Built-in fault detection and isolation features reduce the number and overall skill level of maintenance personnel needed to keep the HADR operational.

Germans Cancel Roland Purchase

Air defense of German air bases remains a high priority following cancellation of the air force's planned Roland (Euromissile) purchase.

The German company which builds the AIM-9L Sidewinder under license is promoting an "affordable Roland replacement" in the form of a Chaparral-type ground installation using the AIM-9L.

Japan Budgets for Developments

Japanese Defense Agency's Technical Research and Development Institute's FY83 budget includes $2.9 million to assemble the first prototype of a new air-to-air missile to replace the AIM-9L Sidewinder, $3.8 million for development of an advanced long-range air defense radar to be completed by 1988 and $6.3 million for a subsonic, air-launched, expendable target drone.

Also funded are 16 Ishikawajima-Harima XF-3-30 turbofan engines for $21.8 million and six Kawasaki XT-4 subsonic intermediate trainer aircraft for $141.4 million.

Britain Develops Infrared Jammer

British Aerospace Dynamics Group is testing an infrared jammer to protect helicopters operating in forward battle areas from attack by surface-to-air, heat-seeking missiles.

The jammer consists of an infrared source contained in a cylindrical shutter assembly which is operated in such a way as to generate sufficient "noise" in a missile's infrared seeker head circuits to break the homing head lock. The infrared emissions from the jammer are said to provide the helicopter with a 360-degree cover.

BOOKS

WAR IN SPACE
by James Canan
Harper & Row Publishers, New York, N.Y., 1982. 180 pages. $13.95.

James Canan's *War in Space* is necessary reading for a thorough and timely understanding of why the United States is playing catch up with the Soviet Union's space program and why space weapons are a controversial topic.

As Pentagon correspondent for *Business Week,* Canan has followed the military's expenditures and plans for strategic use of space through the terms of four presidents, five defense secretaries and innumerable consultants and scientists whose input has affected national space policy. In *War in Space,* he profiles the players and the policies in the race to dominate space.

"What I've tried to emphasize is the importance of the development of all defense policies and weapons technologies as they relate to and, in fact, bring about the increasing urgency of taking advantage of space as the final frontier of national defense," Canan writes. "In order to understand why we (and for that matter, the Soviets) need to go to space, you have to understand what has happened and what is going to happen with respect to defense strategies and technologies in the terrestial environment."

Beginning with an historical overview of the space program, Canan covers its progress from NASA's early insistence on purely scientific missions to the moon, Mars, etc., to its current status as a sphere of interest for the Department of Defense. Canan notes that experience shows that available technology translates into weapons production—as in the case of the first atomic bomb. After discussing various missiles and missile systems (precision-guided missiles, high-speed, anti-radiation missiles, stealth missiles, the MX system and many more), he moves on to the defensive and strategic uses of space.

Canan delves into laser and particle beam technology development and explores its slow beginnings along with the on-again, off-again budgetary fights. Although space weapon programs have been tossed around in the Pentagon, Congress and the White House, Canan shows that development never really stopped. These and other destruction-dealing weapons were quietly but relentlessly being developed and tested by the United States and the Soviet Union while public attention was largely focused on arguments about land-based missiles, small submarines, B-1 bombers, neutron bombs and on the conflict between the advocates of increased military spending and those fighting to maintain domestic programs.

War in Space does not answer any morality questions; it does not editorialize. It simply presents the historical facts, allowing the reader to make his own judgement about the necessity of space weapons to maintain our national security.

C.B.S.

SPACE WAR
by David Ritchie
Atheneum, New York, N.Y., 1982. 224 pages. $14.95.

Should the heavens be used for military purposes? David Ritchie's *Space War* explores this question and gives a chilling account of the superpowers', including China's, space programs.

Space War looks at what has become of the "civilian" space program. It tells about the loopholes in the International Outer Space Treaty of 1967 which allow competing powers to launch spaceborne weapon systems.

Focusing on the military aspects of the space programs, Ritchie gives a brief history of space exploration, from Goddard to the German specialists to the first manned space flights to orbiting space stations. He examines space use for communications, reconnaissance, navigation, ocean surveillance and weather tracking and how this usage is militarily oriented. He discusses space weaponry such as lasers and particle beams and the orbiting platforms upon which these weapons can be built. He explains how the heavens have become an armed camp and how floating debris crashing into orbiting satellites could be mistaken for an enemy attack, causing one to push the panic button. Finally, he describes a scenario in which a nuclear confrontation on earth could be triggered in space.

Ritchie does not see space weapons as a deterrent to future wars. His theory is they will escalate to a nuclear catastrophe. Giving examples, he tells how all space machinery can be negated by simple, inexpensive countermeasures. Of the vulnerability of the space programs, Ritchie writes:

> "If a space platform costs billions to build and can be knocked apart like a house of cards for little more than pocket money by anyone with access to simple rocket technology, then the generals and admirals here and abroad may decide that wars in space are a quixotic enterprise after all."

A professional science writer, Ritchie paints a grim picture of the militarization of outer space and concludes that, "like H.G. Wells' Martians, (we will become) the victims of our own military adventure beyond our world."

C.B.S.

THE ROCKET TEAM—From the V-2 To The Saturn Moon Rocket
by Frederick I. Ordway III and Michell R. Sharpe
The MIT Press, Cambridge, Mass., 1982. 462 pages. $9.95.

Having read an essentially completed copy of the manuscript, Wernher von Braun wrote about *The Rocket Team* nine months before he died: "If I had been writing this book myself, it is possible I would have told some things differently, but I have not immersed myself in the sources as they have."

The way the authors tell about the history of rocketry is unique. In a distinctive story-telling style, they rely on accounts of those who were involved.

The book is entirely about people, not about propulsion systems. It's about people who, at Mittelwek and Peenemunde, would change the course of world history. It takes the reader behind the scenes from the formation of the Society for Space Travel (Berlin) in 1927 of which 19-year-old von Braun was a member, to Hitler's Third Reich in which members of the society were recruited for the V-1 and V-2 rocket program. The reader follows the German scientists and engineers through World War II and on to postwar United States where many of them set the stage for the national space program. *The Rocket Team* is full of fascinating characters who are allowed to describe one another and the episodes in which they were involved.

In an effort to tell the complete story, Ordway and Sharpe look at all sides—at the German scientists and their frustration in getting the rockets off the ground; at the German military in charge of the program and their frustration in meeting Hitler's demands; at the English and their frustration in sorting conflicting agents' reports about the "activity" in Germany; at the Allies and their frustration in defending themselves against the "new" weapon; and finally, at those German scientists who surrendered themselves to the Americans near the end of the war and their frustration in adjusting to their newly adopted country.

Throughout the book, charts and photographs, many of them never published before, are inserted to add interest and give additional information.

This story makes for fascinating reading.

C.B.S.

BROTHERS, BLACK SOLDIERS IN THE NAM
by Stanley Goff, Robert Sanders with Clark Smith
Presidio Press, Novato, Calif., 1982. 224 pages. $14.95.

Stan Goff and Bob Sanders were both grunts in Vietnam and both had the duty of carrying the "pig," the M-60 machine gun. *Brothers* is an oral history of their experiences in a war they hadn't given much thought to until they were drafted in 1968.

The narrative is an outgrowth of research by Clark Smith of the Winter Soldier Archive in Berkeley, Calif. The research was assisted by the Columbia University Oral History Research Office.

Brothers is not a story of politics; it is not a story of race as such; but rather a story of two soldiers surviving in a war in a far-off jungle. Before their tours were over, Stan had earned the Distinguished Service Cross for bravery in action and Bob had earned the Air Medal for more than 25 combat assaults.

Their story is an unvarnished account of the war from the eyes of two soldiers who fought it. It is a tale of unrecognized heroes, fear, hate, camaraderie—the full gamut of human emotion. While Al Santoli's *Everything We Had* brought us a few short glimpses of the human experience in the war, *Brothers* expands our knowledge of war as it related to the soldier in the field.

The book does not put itself up as a definite political statement on the war or the policies of the country, but merely voices the experiences of two soldiers who were there. Neither viewed themselves as heroes or as anyone special. They were soldiers who realized what was needed to do the job they were trained and sent into combat to perform. They show the combat soldiers' disdain for the incompetent. Their lives depended upon not only their abilities, but also of those around them.

Bob sums up their story when he sees Stan for the first time back in the States. "We didn't talk about our feelings that much. But I'll never forget my feeling when I saw Stan that day in the hospital. It was one of the greatest moments in my life just to realize that we'd survived."

E.C.S.

WAR IN THE FALKLANDS
by The Sunday Times of London Insight Team
Harper and Row, Publishers, New York, N.Y., 1982. 294 pages. $14.95.

The Sunday Times of London Insight Team—the same clique of journalists who co-authored the definitive account of the Yom Kippur War—has assembled facts and photographs from all sides to publish the first in-depth documentary on the recent hostilities in the South Atlantic. *War in the Falklands,* however, is more than a chronicle of political and military victories and defeats; it also attempts to unravel the often complicated and convoluted history behind the polemics that ultimately led to Argentina's sudden, unexpected invasion of the islands and Britain's responsive retaliation in force. The first sentences of the book's introduction seem to succinctly sum up the situation:

"Even now that it is all over, it is hard to grasp the enormity of what happened. In the last quarter of the twentieth century, Great Britain went to war, sending a naval task

force of one hundred ships eight thousand miles to the South Atlantic, to engage an enemy off the last outpost of a forgotten empire."

Before the last shot was fired and the last missile launched, nearly 1,000 men would die.

In typical "thriller" style, the book opens with the Argentine invasion of the Falklands and the capture of Government House in Port Stanley, dramatically broadcast as it was happening by radio announcers Patrick Watts and Mike Smallwood in what was probably one of the most unusual record request shows ever aired.

"Well, as it says in those large, famously friendly letters on the Hitch-Hiker's Guide to the Galaxy, 'DON'T PANIC.' It's now time for requests—let me dig out my form here—and we begin with 'You Are My Best Friend' by Don Williams. This is for Fred, Joyce, Pop, Maggie, Eileen, Jim and Cyril—from Dolly."

But readers who expect *War in the Falklands* to be a play-by-play report of encounters, skirmishes and battles will be disappointed. This is a book for the armchair analyst rather than the adventurer. After the opening chapters, the military maneuvers are soon dominated by political machinations of both sides and, almost as an aside, the attempt on the part of the United States to mediate a settlement. (It is now conjectured that then Secretary of State Haig's failure to resolve the crisis hurried his expulsion from the White House staff.) Quite naturally, the question of sovereignty is explored in some detail and personalities are laid bare in the clashes that were to ensue in Parliament, Buenos Aires and the United Nations in New York.

War in the Falklands touts itself in the subtitle as "The Full Story," but it is far from complete. No mention is made, for instance, of the Harrier jet that was brought down over Goose Green, reportedly by a Roland (Euromissile). In fact, little is mentioned about the air defense role, period. Still, one must keep reminding oneself that this is a book compiled and edited from journalists' reports on the war as they saw it and that many of those reports were gleaned from interviews after the fact. Too often, personalities overshadow the events. But this is small criticism.

While no book on the subject of war can remain totally objective, just as history is often slanted by the opinions of those writing it, *War in the Falklands* tries to remain aloof so that what emerges in the end is a carefully reconstructed, well-told account of what many have termed a confusing, farcical, exhilarating and tragic conflict.

The book includes several explanatory diagrams, maps and photographs, one of which is the spectacular explosion of HMS Antelope.

Highly recommended.

B.R.K.

THE SHAPE OF WARS TO COME
by David Baker
Stein and Day, Briarcliff Manor, N.Y., 1982. 262 pages. $19.95.

True afficionados of the space industry in general and the military applications of space-age technologies specifically, will find *The Shape of Wars to Come* rivetting reading. The book opens with a rip-roaring, Buck Rogers kind of scenario centered around Star Raker, a futuristic spacecraft that is described as a logical outgrowth of the current space shuttle. It is significant, then, that the remainder of the book traces the history of space-age developments from the earliest pre-World War II stages to the present day and concludes with a glimpse of the future. In the end, the reader will realize that Star Raker is much closer to reality than may be thought in the first chapter.

David Baker has assembled the hard facts about the arms race in space and presented them in an easily readable and, more importantly, understandable style. His explanations of highly sophisticated systems are always clear, never pedestrian. Recounting the giant leaps that both the United States and the Soviet Union have made since Discoverer and Sputnik, he takes us through the gamut of space weaponry from ballistic missiles to killer satellites and particle-beam devices.

The Shape of Wars to Come is just that—a shape rather than a definition; but it is guaranteed to enlighten the skeptics and raise more than just a few questions about space-environment weapon development. Illustrated.

B.R.K.

NEW RELEASES

AN ILLUSTRATED GUIDE TO THE ISRAELI AIR FORCE
by Bill Gunston
Arco Publishing, Inc., New York, N.Y., 1982. 159 pages. $9.95.

Bill Gunston's latest guide should interest military aircraft enthusiasts. In this book, he compiles an impressive, illustrated fighting aircraft directory of "the world's most combat-proven air force." Each of the described 78 aircraft types and variants are supported by more than 130 photographs, most of them in color, and 68 technical line drawings.

AN ILLUSTRATED GUIDE TO THE MODERN SOVIET NAVY
by John Jordan
Arco Publishing, Inc., New York, N.Y., 1982. 159 pages. $9.95.

This guide describes 54 Soviet warship classes and contains more than 150 photographs (70 in color) and 30 drawings. Jordan begins with the organization of the Soviet surface navy, its capabilities and limitations and new developments. The guide does not include submarines.

MODERN COMBAT AIRCRAFT AND INSIGNIA
by Andrew Kershaw
Arco Publishing, Inc., New York, N.Y., 1982. 125 pages. $6.95.

This pocket-size book provides information on more than 65 fighters, attack aircraft, bombers, patrol, reconnaissance and multirole planes in service today. It includes air force insignias of 96 countries, a glossary and index chart of aircraft names and markings.

Senior Air Defense Artillery Commanders

GERMANY

MG William E. Cooper
32nd AADCOM

COL Robert J. Weinfurter
10th ADA Bde (Prov)

LTC Vance T. Turner
1st Bn, 1st ADA (Hawk)

LTC Robert H. Upchurch
2nd Bn, 2nd ADA (Hawk)

LTC John P. Rose
3rd Bn, 59th ADA (Hawk)

COL Wallace C. Arnold
69th ADA Bde (Prov)

LTC James P. Kress
3rd Bn, 7th ADA (Hawk)

LTC Stephen J. Kemf
6th Bn, 52nd ADA (Hawk)

LTC Chapin Horton
2nd Bn, 57th ADA (Hawk)

LTC Andrew L. Jackson
3rd Bn, 60th ADA (Hawk)

COL William F. Winzurk
94th ADA Bde (Prov)

LTC Theodore S. Clements
2nd Bn, 1st ADA (Herc)

LTC William M. Arrants
2nd Bn, 56th ADA (Herc)

LTC Gary E. Epperson
3rd Bn, 71st ADA (Herc)

COL Domenic P. Rocco Jr.
108th ADA Bde (Prov)

LTC Leroy Woods
6th Bn, 56th ADA (Hawk)

LTC Vernon L. Conner
2nd Bn, 60th ADA (C/V)

LTC Donald E. Nowland
2nd Bn, 62nd ADA (Hawk)

LTC James L. Smith
2nd Bn, 67th ADA (C/V)

LTC James P. Durbin
2nd Bn, 59th ADA (C/V)
1st Armd Div

LTC Richard D. Kline
3rd Bn, 1st ADA (C/V)
2nd Armd Div

LTC Leopoldo R. Vasquez Jr.
3rd Bn, 67th ADA (C/V)
3rd Inf Div

LTC Richard N. Murray
1st Bn, 59th ADA (C/V)
8th Inf Div

LTC Brian Flynn
5th USA Arty Group

ITALY

COL Richard J. Galliers
559th USA Arty

KOREA

LTC Herbert J. Smith III
2nd Bn, 61st ADA (C/V)
2nd Inf Div

HAWAII

LTC Donald J. Banta
1st Bn, 62nd ADA (C/V)
25th Inf Div

CONUS

LTC Henry A. Nemec
3rd Bn, 68th ADA (Hawk)
XVIII Abn Corps

LTC Jerry W. Felder
3rd Bn, 4th ADA (V)
82nd Abn Div

LTC Vincent J. Tedesco
1st Bn, 3rd ADA (V)
101st Abn Div

LTC Paul M. Vilcog II
2nd Bn, 5th ADA (C/V)
3rd Armd Div

LTC William E. Pedigo
1st Bn, 68th ADA (C/V)
1st Cav Div

LTC Neal J. Delisanti
2nd Bn, 51st ADA (Hawk)
1st Inf Div

LTC George L. Martindell
4th Bn, 61st ADA (C/V)
4th Inf Div

LTC David G. Bell
1st Bn, 55th ADA (C/V)
5th Inf Div

LTC Edgar L. Wylie
1st Bn, 51st ADA (C/V)
7th Inf Div

COL Donald M. Lionetti
9th Inf DIVADA

LTC John B. Rodgers
1st Bn, 4th ADA (Hawk)

LTC Zigmund J. Roebuck
1st Bn, 67th ADA (C/V)

LTC Richard V. Lowe
5th Bn, 52nd ADA (C/V)
24th Inf Div

As of January 1983

COL Gerald H. Putnam
11th ADA Bde

LTC Russell I. Moore
4th Bn, 1st ADA (C/V)

LTC Terry D. DePhillips
1st Bn, 7th ADA (Hawk)

LTC Irvin S. Butler Jr.
2nd Bn, 55th ADA (Hawk)

LTC James H. Cook
1st Bn, 65th ADA (Hawk)

COL Travis N. Dyer
School Brigade

LTC Robert E. Huston
4th Bn, 3rd ADA (Patriot)

LTC James G. Manning Jr.
1st Bn, 43rd ADA (Patriot)

LTC Jimmy B. Yancey
2nd Bn, 52nd ADA (Herc)

LTC Glenn R. Love
Allied Student Bn

LTC Gerald J. Dunn Jr.
Student Bn

LTC Terrence J. Camp
Staff & Faculty Bn

COL Edmond S. Solymosy
1st ADA Tng Bde

LTC Stephen S. MacWillie
2nd Bn (BT)

LTC Peter H. Poessiger
3rd ADA Tng Bn

LTC Lawrence E. Aune
4th ADA Tng Bn

LTC Alan N. Christensen
Instructor Group

NATIONAL GUARD

BG Herbert Taylor
11th ADA Bde, NMARNG

LTC Donald Garringer
1st Bn, 200th ADA, NMARNG

LTC Carroll Crawford
2nd Bn, 200th ADA, NMARNG

LTC Lawrence Lujan
3rd Bn, 200th ADA, NMARNG

LTC John B. Southern
4th Bn, 200th ADA, NMARNG

LTC Albert G. Jones
3rd Bn, 11th ADA, VARNG

LTC Andrew Regrut
2nd Bn, 263rd ADA, OARNG

LTC Hoyt E. Thompson
2nd Bn, 263rd ADA, SCARNG

LTC James S. Irwin
1st Bn, 265th ADA, FLARNG

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