# AIR DEFENSE MAGAZINE

JULY-SEPTEMBER 1978

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# AIR DEFENSE MAGAZINE


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**AIR DEFENSE MAGAZINE is published quarterly by the US Army Air Defense 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 mutually productive dialogue between the School and units in the field, with a view toward increased efficiency in all aspects of air defense.**

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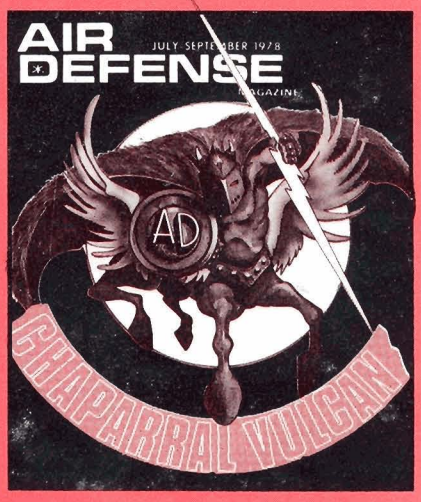
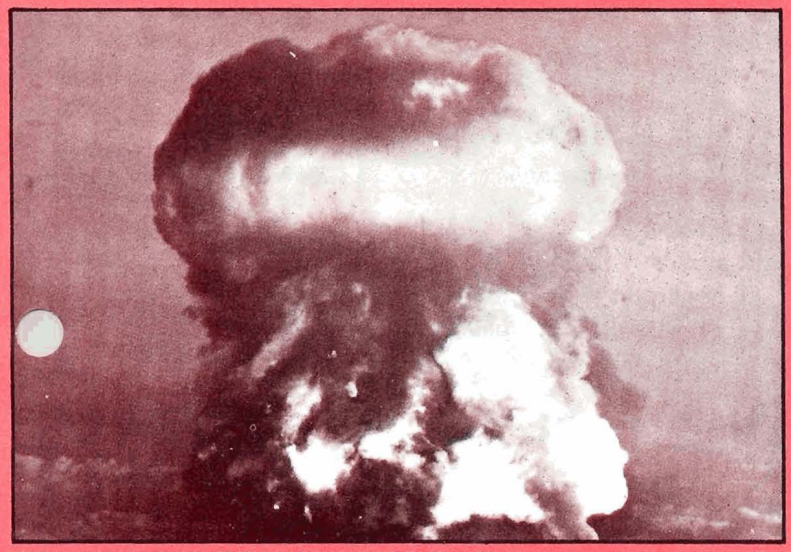
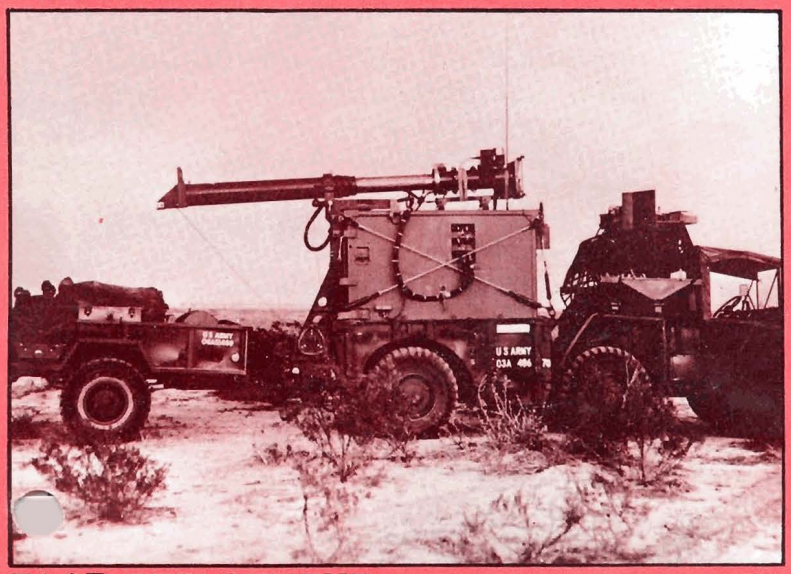



*COVER: Our cover is an artist's concept of the Roman God of Fire [after whom the Vulcan Weapon System was named], protected with armor and teamed with the lightening-swift striking power of the Chaparral system.*

AIR DEFENSE 10



THE BATTLEFIELD THREAT 24



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# INTERCEPT P

MAJOR GENERAL JOHN J. KOEHLER, JR.

In this issue I want to bring into focus what I consider to be one of the most useful commander's training guides to be fielded in recent years.

Certainly, the reorganization of the US Army Air Defense School under "School Model 76" and the implementation of the Enlisted Personnel Management System (EPMS) have had a dramatic impact on the training and training products for our Air Defense soldiers. But one of the most important products resulting from these developments is the Commander's Manual, and that is the training guide I want to discuss.

The Commander's Manual is distributed to all officers and senior NCOs having enlisted soldiers under their command or supervision. One manual was designed for each air defense MOS and fielded in accordance with the EPMS implementation schedule. Currently, Commander's Manuals for all 16-series MOS have been completed and distributed to the field. The 24M and 24N MOS manuals were recently finished and are in the process of being fielded. The Hercules 24P, Q, and U and 26H will be fielded about November 1978; the Hawk 24E and G in November 1979; and the Hawk 24C and command and control 25L MOS in December 1979.

Even though the Commander's Manual is relatively small and in simple format, it contains a wealth of information for the commander and supervisor. The manual lists all those critical tasks that must be mastered by the individual soldier for each skill level of a given MOS. These tasks coincide with those listed in each individual's Soldiers Manual as well as the Job Book on his particular MOS.

Each critical task has been determined through the Instructional System Design (ISD) process. Each air defense job is broken down into duties and the duties, in turn, are broken down into tasks. These tasks are then validated in the field; i.e., proved to be necessary and critical in actual use with troops before being accepted. Therefore, the critical tasks listed in the Commander's Manual accurately reflect the job requirements for each skill level of each air defense MOS.

Another key feature of the manual is a matrix that describes the location and type of training for each task. The location is either institutional: Basic Combat Training (BCT), Advanced Individual Training (AIT), Basic Noncommissioned Officers Course (BNCOC), Primary Noncommissioned Officers Course (PNCOC), and Advanced Noncom-

missioned Officers Course (ANCOC); at the unit as on-the-job training; or through self-study. The tasks selected for training in the institution or school setting coincide with EPMS guidance, which suggests skill level 1 tasks be trained in BCT/AIT, skill level 2 in PNCOC, skill level 3 in BNCOC, and skill level 4 in ANCOC. Of course all soldiers are encouraged to continue individual training in their appropriate tasks while in the unit and through self-study.

One of the most important and controversial parts of the manual is that dealing with the type of training listed for each task. Training is described by either a "Q" for qualified, "F" for familiarized, or "R" for reinforcement. It is not always possible to qualify the trainee fully in every task during his MOS training here at the Air Defense School. In fact, he will receive only familiarization training in many of the tasks due primarily to time and equipment constraints. Of necessity, the individual soldier will have to gain qualification in the performance of a number of tasks through training conducted in his unit. The Commander's Manual delineates these tasks and serves as a road map for the cooperative effort between the School and the unit to insure that the soldier is fully qualified to perform his individual duties. Reinforcement training must also be conducted at the various locations so that the soldier maintains his individual skills for a specific task.

The Commander's Manual may also serve as an excellent training resource document. It provides a detailed list of references, study aids, and training devices appropriate for each MOS task.

The Commander's Manual is a valuable training tool for commanders as well as supervisors. The importance of this document is best described in the introduction to each manual which states, "If you use it in conjunction with the Soldier's Manual, the Army Training and Evaluation Program, and an aggressive training program, you will have well-trained, motivated soldiers with the ability to perform efficiently and effectively.

Commanders are urged to take full advantage of the Commander's Manual so as to profit from this highly valuable training tool.

John J. Koehler Jr

# ENGAGEMENT ZONE

*letters to the editor*

## ORDNANCE SUPPORT

Dear Sir:

The 3d Ordnance Battalion was recently reactivated as the Command and Control Headquarters for three General Support Missile Maintenance Companies and one General Support Missile Supply Company. The Battalion, through its assigned mission companies, provides general support level missile maintenance and supply support to the European Theater.

Your professional magazine serves as an excellent source of information and one that I would like to have available on a continuing basis. Please add the 3d Ordnance Battalion to your circulation list at the following address: Commander, 3d Ordnance Battalion, APO New York 09058.

I have inclosed a copy of our 3d Ordnance Battalion Pamphlet 360-1 for your information.

CPT DOUGLAS R. BAKER
Adjutant
HQ, 3d Ordnance Battalion
APO New York 09058

*The mission of the 3d Ordnance Battalion is stated below for the information of AD unit personnel who may need its services.*

*1. Provide General Support level missile maintenance and Direct Exchange [DX] supply to the organizations in USAREUR equipped with missiles and the Vulcan air defense system.*

*2. Store, maintain, and issue USAREUR reserves of large missiles [less nuclear components].*

*3. Provide Direct Support missile maintenance to the Berlin Brigade, SETAF, and other units/activities as directed.*

*4. Maintain Operational Readiness Float [ORF] of Pershing and Nike Hercules equipment for the 56th Field Artillery Brigade and the 32d Army Air Defense Command, respectively.*

*5. Support missile and Vulcan Annual Service Practice [ASP] and Pershing Follow-On Operational Test [FOT] in accordance with USAREUR directives.*

*- Ed.*

## ON PSY WARFARE

Dear Sir:

In this quarter's AIR DEFENSE (Jan-Mar 78), I found an ageless tactic discussed. Gideon defeated a superior force by imitating the noise of a force a hundred times larger. In another section of the Bible, Josuah has his "inferior" forces polish their shields. The enemy, again, is frightened literally out of its combat boots!

On the battlefield of modern warfare, I have read or seen on television these same tactics. In Korea and Vietnam the enemy used trumpets to signal human waves against smaller American forces. The Americans won the battles, but at great costs in terms of human resources. Why not use Josuah's "shield polishing" against the human waves to minimize American loss of life? Also, when a cache of enemy supplies is found on the surface, why not **look hard** in the area for the honeycombed tunnel foxholes of an out-of-sight foe? They may be using a "shield polishing" technique of their own which is costing the Free World lives and psychological advantages.

SP4 BARBARA J. THOMAS
HHB, BCT, 1st ADA Tng Bde
Fort Bliss, TX 79916

## FROM DOWN UNDER

Dear Sir:

In reply to your survey on the AIR DEFENCE Magazine, I would like to point out that this unit receives the AIR DEFENCE Magazine and Air Defence Bulletin, hence the answers to your survey questions are given collectively. Both

publications are read with great interest by all officers, warrant officers, and senior noncommissioned officers of the unit. The majority of articles generate much discussion and debate, especially because this unit is the only Air Defence Regiment in Australia, and we look forward to learning about air defence trends in the United States of America and other countries.

LTC M.R. HAWKINS
Commanding Officer
16 AD Regt (Lt) RAA
Woodside SA 5244

*Your letter reminds us to sincerely thank you and all others who responded to our recent readership survey. And we are always glad to be of service to our friends.*

*- Ed.*

## FROM ARAB COUNTRY

Dear Sir:

I've about finished my year in Saudi Arabia and am going back to Fort Hood from here, so I may get back to Bliss from time to time.

The magazine has really been a bulwark to me over here because you find yourself cut-off from almost everything and news on Air Defense is always welcome. The Saudis hound me for copies when a new issue comes in, so you really do have an international following, even though I can't release copies to them. If I get into anything interesting back at Hood, I may send in an item or two; once I get back to my own world. I'll be assigned to HQ, TCATA, so if I can be of assistance to you, let me know.

LTC BILLY A. LYLES
Air Defense Adviser

## NEW ADA BATTALION

Dear Sir:

Request that the 2d Bn, 51st ADA, be added to the mailing list for all letters, magazines, and other professional materials disseminated by the Air Defense School.

An advance party for the 2d Bn, 51st ADA, has been established under control of the 2d Bn, 76th FA, at Fort Riley, and I have been designated as Activation Project Officer by the Commander, 1st Infantry Division and Fort Riley.

The 2d of the 51st is scheduled to be activated on 21 September 1978; however, several battalion personnel have already arrived at Fort Riley, and the unit cadre should be formed by midsummer.

Mail may be addressed to Commander, 2d Bn, 51st ADA, since a mail drop for this unit has been established under the auspices of the 2d Bn, 76th FA.

LTC GEORGE R. AZ
Commander
2d Bn, 76th FA
Fort Riley, Kansas 66442

## REDEYE MILESTONE

Dear Sir:

This is a report on the first firing of the Redeye missile at Fort Benning, which we would like you to consider for inclusion in the AIR DEFENSE Magazine. Our unit was organized August 1977 as the first Redeye Battery in a separate brigade to facilitate training and prepare for conversion to the Stinger missile system. We think the event is of special note because it was the first missile fired at the Infantry Center by an ADA Battery assigned to a Field Artillery Battalion.

"BATS AWAY!!" On 2 February 1978 at 1215 the Air Defense Artillery Battery (Provisional) of the 2d Bn, 10th Field Arty, fired the first Redeye guided missile to be fired at the Army's Infantry Center. The ADA Battery, commanded by 1LT Thomas J. Mayock, Jr. (FA) was organized as the first Redeye battery in a separate brigade on 12 August 1977 by consolidating Redeye assets of the 197th Infantry Brigade (Sep) under the control of the 2d Bn, 10th Field Artillery. The unit consists of a battery headquarters and five Redeye sections.

The first firing of an Air Defense missile at Fort Benning was the result of 4 months of hard work and coordination, especially on the part of 2LT Edenfield, Battery Executive Officer, and SFC John E. O'Laughlin. They tackled the problems of range and airspace requirements, which were new to Fort Benning. All battery personnel were engaged in at least one aspect of preparation for the firing, and the satisfactory end result was due to the dedicated group effort.

One Redeye team, consisting of SGT Kevin DeHart and PFC Michael Wade, engaged a ballistic aerial target system (BATS), scoring a tactical kill. The firing was an overall success, but more importantly, the infantry, artillery, and armor soldiers of the 197th Infantry Brigade (Sep) and Fort Benning saw for the first time the

effectiveness of short-range air defense on the battlefield.

1LT THOMAS J. MAYOCK, Jr.
Commander
ADA Btry, 2d Bn, 10th FA
Fort Benning, GA 31905

## MORE ON SKYCRANE

Dear Sir:

I noticed your article in the Jan-Mar 1978 AIR DEFENSE Magazine on jumping from the CH-54 Skycrane with pod. I was the project officer for the test and was pleased to find that information on a new use for the CH-54 helicopter is being disseminated. The article factually described the test and results. The USA Infantry School has approved the procedures developed during the test and is waiting for the Troop Support and Aviation Materiel Readiness Command to revise the CH-54 operator's manual before publishing the procedures as a change to TM 57-220.

I was sorry to see that no mention was made of the Alabama National Guard which requested the procedures and provided the helicopters and crews for the test from the 307th Aviation Company. The crews who participated in the test demonstrated an outstanding professional knowledge of and skill in flying, which contributed toward a safe and expeditious test. The active Army can certainly be proud to have units of this caliber on call as the need arises.

LEONARD R. TAVERNETTI
MAJ, Infantry
USA Abn and Com-Elect Bd
Fort Bragg, NC 28307

## FOCUS ON TEC

Dear Sir:

I am enclosing an article on the effectiveness of the Training Extension Course (TEC) Program and five 35-mm slides that could be used to highlight specific sections of the article. Naturally, as the TRADOC office responsible for the TEC Program, we are proud of our product and want to see the program reach its fruition and receive greater acceptance.

The greater acceptance that we are seeking is that of the individual soldier who is the TEC target audience.

As you can see from the most recent Army Research Institute (ARI) study, 35 percent of our surveyed soldiers indicated that they had never heard of TEC. This is a tragedy, since we are talking about more than one-third of our total enlisted strength Army-wide.

We all know that TEC can do the job—but TEC isn't doing the job well enough when it isn't being used to the maximum because of simple ignorance of its existence.

The officers, warrant officers, noncommissioned officers, specialists, and soldiers who read your journal are the type of dedicated professionals who will read and study the enclosed article. They will see that other soldiers "get the word" about the value of TEC. We look forward to AIR DEFENSE Magazine including this article in a future publication.

COL WARREN G. LAWSON
Dir, Tng Programs Dir
US Army Tng Spt Ctr
Fort Eustis, VA 23604

*The article to which Colonel Lawson refers appears on page 51 of this issue of AD Magazine.*
*- Ed.*

## CORRECTION

Dear Sir:

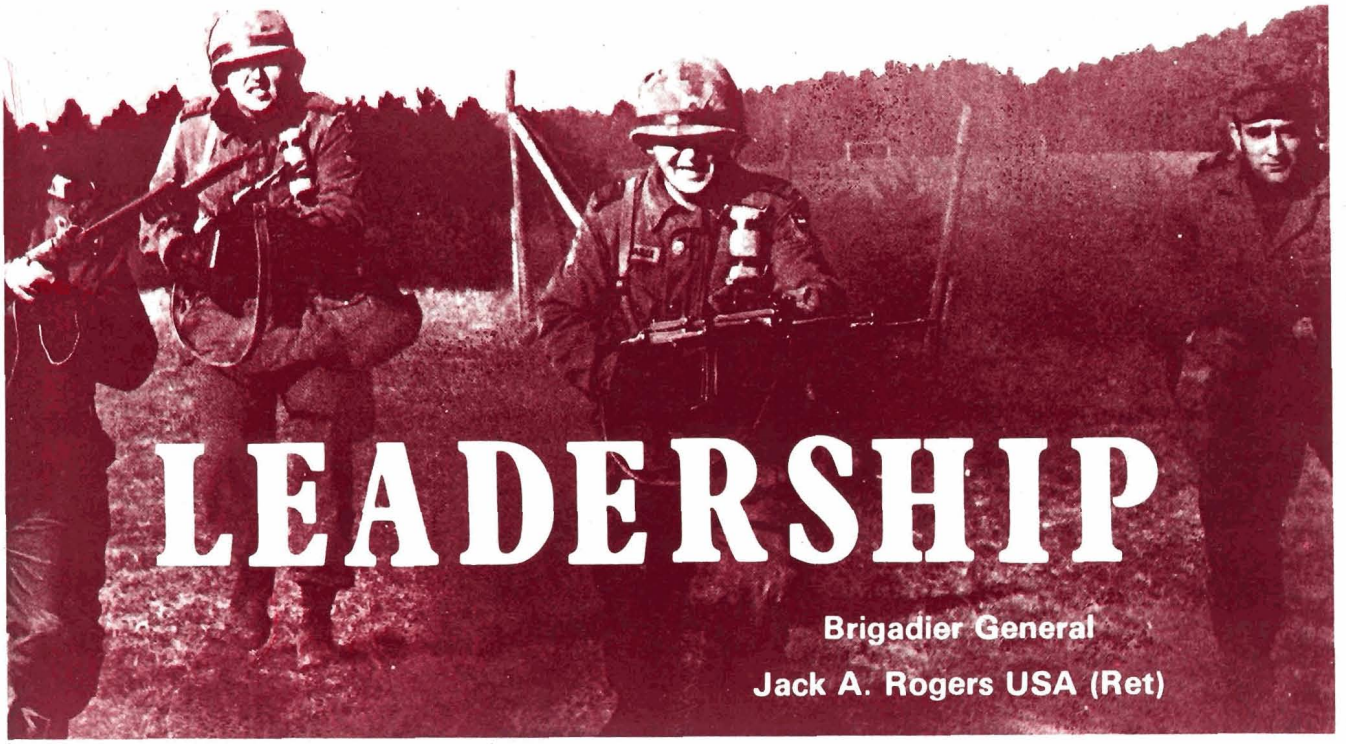
May I point out a recognition error in your October-December 1977 edition of the AIR DEFENSE Magazine.

In your article, "Intelligencewatch," you show a British Gazelle helicopter landing on the Landing Ship Logistic (LSL), Sir Geraint. This ship is operated by the Royal Fleet Auxillary (RFA), which is the support organization for the British Royal Navy. It is not a Norwegian ship.

There are five other ships of this class operated by the RFA, and I have spent several days in three of them during amphibious exercises in the Persian Gulf, Baltic, and Hong Kong in 1969/1970.

May I also say that I find your magazine extremely interesting and most informative.

ROLLO J. RUMFORD
MAJOR ROYAL SIGNALS
British Exchange Officer
9th Infantry Division
Fort Lewis, WA 98433



# LEADERSHIP

Brigadier General
Jack A. Rogers USA (Ret)

Leadership is all too often presented as a matter of technique: 3 x 5 cards in the shirt pocket, checklists for all occasions, or management formulae. There is nothing inherently wrong with any of these; they contribute to personal efficiency, but only very indirectly to leadership. The foundation of leadership is not technique but rather a frame of mind. I hold that the two key mental qualities are a sense of humor and a sincere, undeviating devotion to the welfare of your troops.

That a sense of humor should even appear on this short list, let alone lead it, may seem strange, but it is not really so. Certainly, the profession of arms is serious and at times grim. Neither an army nor its purpose are to be treated lightly. But an army is a large, complicated thing; and large, complicated machinery—be it an army or a widget-manufacturing conglomerate— is bound to backfire, creak, and sputter at times. The US Army is not immune. Things do go awry. And even when they don't, events do not always appear the same all along the chain of command as they do from on high. Viewed from the wrong end of the telescope (from very far down the chain), things can seem at best inexplicable and at worst comical. This is neither a local nor a modern phenomenon. Probably it dates to antiquity, and certainly it was pungently described more than a half-century ago by a British author and soldier. Chronicling the teething troubles of a newly-organized Scottish Infantry Battalion in 1914-1915, he referred to the War Office, which he styled "Olympus," as being divided into three major departments: the Fairy Godmother, the Round Games (US translation: parlor games, crossword puzzles, etc.), and the Practical Joke.

The Fairy Godmother Department is, unfortunately, the smallest of the three. It is chronically understaffed and only intermittently active, but now and then will send you on TDY to Paris, promote you before you expect, or raise your pay. It functions erratically, and according to a logic all its own. Our British soldier furnished a prime example of Fairy Godmother and her logic. A young lieutenant of his acquaintance once received a mysterious add-on to his pay. Being newly-commissioned, he had not yet ceased to question the workings of Olympus. So he made inquiries and, after some difficulty, he discovered the reason behind his windfall. In those days a British officer on field service was entitled to a small daily field allowance to compensate for the loss of those indoor comforts he would otherwise have enjoyed. Our lieutenant, some weeks earlier, had been compelled to share his room with a newly-assigned and homeless subaltern. Temporarily, then, he had only half a room. Or, as Fairy Godmother saw it, only half of him was able to sleep in barracks. The other half obviously must be in the field and therefore entitled to field allowances. Hence the extra pay.

The Round Games Department is much better staffed and far more active. It has special interests

in the supply and maintenance fields. It did the research that led to those forms with blanks too small for the information Round Games demands you insert into them. And it will ruthlessly bounce your requisitions and other submissions should you commit criminally serious errors such as writing the date as "April 1st" rather than "1 April," or vice versa, depending on how Round Games is feeling that day. It also developed the SOP that won wide acceptance among supply agencies: (1) Accept requisitions only on alternate Tuesdays; (2) Issue only on alternate Thursdays; (3) Arrange to be closed for inventory on all four. The department's watchwords are: "Submit in quintuplicate" (which assures that your record copy, the sextuplicate, is so faint you will have trouble proving you ever asked for anything in the first place), "Reply by indorsement hereon," and the immortal "Due out."

Last, but not at all least, is the Practical Joke Department. Lavishly manned, Practical Joke is hyperactive. It operates on a three-shift basis, 7 days a week, and observes no holidays. Like lightning, it can strike anywhere, but it seems particularly drawn to troop movements and changes of station. (I, for example, once spent a frantic 10 days, courtesy of Practical Joke, simultaneously attending a course on Arctic Operations and packing, crating, and clearing post for a PCS to the Panama Canal Zone.) But Practical Joke really prefers badgering units to annoying individuals. It delights in moving battalions and batteries about like pieces on a giant chessboard. And to quote our British source, it employs this scoring system: "If you are dumped down into comparatively modern barracks at Aldershop which, although they contain no furniture, are at least weatherproof. The Practical Joke Department scores one point. Barracks that were condemned as unsafe and unsanitary before the war are reckoned highly eligible. Count 3 points. But if you can maneuver your helpless pawns in Mudsplosh Camp, you receive 10 whole points, with a bonus of 2 points thrown in if you can effect the move without previous notice of any kind." The game gains spice if some unoffending unit can be displaced in the process. For example, after you have labored to drain your corner of the swamp, put in duckboards, and winterized your tents, Practical Joke will delight in moving you to a nearby and identical, but unimproved mudhole from which you can watch the new tenants enjoy the fruits of your labors in the cold. This is surely a 20-pointer.

I hope no one will interpret the foregoing as a call for inaction or passivity in the face of adversity. Leadership most certainly does not consist of waiting quietly for the Fairy Godmother Department to arise from its torpor and do something nice for your unit. Nor is a tolerant smile the only response to the antics of Round Games and Practical Joke. But there will be times when you at your level can do nothing to correct what has gone astray. Or perhaps things aren't really astray but merely appear so from your standpoint. This is frequently the case at the platoon, gun section, and squad levels. Or there just isn't enough to go around and a shortage must be shared. Or maybe it's just your outfit's turn to hold the dirty end of the stick, to do the unpleasant but necessary job. Then is when you need a sense of humor, for your unit will reflect your attitude. The troops watch you for clues more carefully than perhaps you realize, and when they are in trouble or in danger, uncomfortable, or faced with seemingly impossible tasks, the last thing they need is a morose, whining, defeated-by-the-unfairness-of-it-all officer or NCO.

In short, when you can't do anything about a bad situation, put the best possible face on matters. Grin and get on with the job, willingly and as cheerfully as you can.

The need for concern with the welfare of your troops stems from the fact that, being in command, you have the power to require them to risk danger and suffer discomfort, and it will often be your duty to do just that. To put it another way, when a soldier takes the oath he gives up in significant measure his ability to care for himself. No longer is he a free agent. If you put him on a cold, wet hill in, say, Germany, he must stay put. He can no longer do what any normally intelligent young man would, i.e., come in out of the rain. Nor can he run back to the barracks for a forgotten poncho or dry socks. And when he gets hungry he can't repair to the nearest Gasthaus; you've ordered him to stand fast. He has, in effect, ceded to you certain of his capacities, and you are responsible that he does not suffer from having done so. This responsibility cannot be evaded. It may be the mess sergeant's **function** to prepare hot chow and the motor sergeant's **function** to provide transport for it, but it's your **responsiblity** to see that it gets (still as hot as possible) into your troops' stomachs. A cheery, "Well, the old mess truck's broken down again," won't cut it. Arrange a tow, borrow another truck or commandeer one, organize carrying parties, but don't let your men go hungry.

You can't control the weather, but you can see that your men are equipped for it, that their equipment is serviceable, and that it is with them. What will get left behind if you don't check is almost unbelievable until you've been to the field once or twice and have seen it happen. This endeavor will surely set you at odds with the Round Games Department, which presumably has the required item but seems disinclined to issue it

or to repair it. Don't give up. Make out those impossible requisitions in as many copies as are necessary to make Round Games purr. Write the date in italics, Roman numerals, or Chinese characters; in red or purple ink if it pleases Round Games. And rattle their cages (the polite term for this is "follow-up action"). You won't always win a complete victory. After all, as a last resort Round Games can always call upon Practical Joke for help. But an honest, forceful effort will usually pay off to some extent and—to mix a metaphor badly—a half loaf is far better than an entirely empty messkit.

Pay is another area that needs watching. It has always been susceptible to foulups, even in the golden days when the payroll was made up in the battery office and a soldier got his money from the battery commander, eyeball to eyeball, across the pay table. At least then he had easy access to the battery clerk, who prepared the payroll and kept track of deductions for PX chitbooks, the battery barber, the pool table, statements of charges, and so on. Now his pay records are probably "centralized" somewhere at battalion or division or, for all I know—since I've been retired for some years—on the dark side of the moon. In fact, if the pay process does go astray, the remedy may be (or at least seem to him to be) as remote as the far side of the moon, even if physically it is as close as battalion. And if he does reach the right agency, after a laborious ascent of administrative channels, he may get the brushoff from an overworked or disinterested clerk. But if you come to his support, using your rank and your greater experience, his chances for a quick resolution improve immeasurably. If your rank isn't all that impressive, or your experience not all that comprehensive, enlist your superiors. After all, you want your troops to be true professionals, and one of the hallmarks of the professional is that he gets paid.

Keep a close eye, too, on promotions. It is all too easy to forget that to a slick-sleeved private, his first stripe is just as important as your hoped-for new bar or rocker or star is to you. And he deserves to have his promotion handled in the same scrupulously fair, serious manner you hope the next selection board will employ with yours. Admittedly, it was easier to monitor promotions in the "Old Army" when they, and demotions as well, were largely a matter of cutting a battery order. Nowadays, again for all I know, PFC stripes may be issued directly from the Office of the Secretary of Defense. Nevertheless, you can help. Promotion records must be accurate and up-to-date. Boards, if you're in a position to appoint them, must be well instructed, impartial, and efficient. If you are not yet in such a lofty position, you can help your men in preparing for appearances before boards, preparing for promotion-related examinations, and in making sure their records contain all existing favorable information. As a rule of thumb, keep in mind **your** next promotion and how you'd like all concerned to behave, and conduct yourself accordingly.

Your concern for your troops cannot, however, end with just a full belly, a full wallet, and a tastefully ornamented sleeve. You owe them, for their welfare, two more things; things that they may not realize they need and quite possibly may not particularly want: first-class training and discipline.

The well-worn expression, "The more you sweat in peace, the less you bleed in war," may be a truism but it is chillingly accurate. In the shock of combat, especially first combat, troops will, for better or worse, fall back on what they've been trained to do. If that training has been good they'll instinctively do the right things at the right times; if it was sloppy or inadequate they'll do the wrong things, freeze, or come apart at the seams. Ask yourself each morning, "Is my outfit completely ready to fight if war breaks out this afternoon?" If the answer is "no"—and in my view it always will be unless you are actually engaged with an enemy, and sometimes even then—set about making it ready by plugging gaps, polishing, refining, providing depth by cross-training.

Discipline is the glue that holds everything else together, the absolute essential. Without it, an army becomes a mob that won't fight; whose weapons, because of neglect, won't fire. Instill discipline so that equipment will work when it's a matter of life or death that it do so—so that weapons fire and hit because they are well served. With it, your troops will survive because they will have dug when they would much rather have slept; and because under fire, wet, tired, and frightened though they may be, everyone will do his job well. Untrained and undisciplined troops take heavy casualties; trained and disciplined ones inflict them. It's as simple as that, and your men deserve to be among the latter. You owe it to them.

*Brigadier General Rogers served in the Army from 1941 to 1972, attaining the rank of flag officer in 1968, when he became Assistant Commandant of the US Army Air Defense School. His long experience in numerous commands and high-level staff assignments is reflected in the wisdom he portrays in his article. Since his retirement, he has remained interested in military and civil affairs and is very active in the Fort Bliss/El Paso area.*

# AIR DEFENSE

## PREPARING FOR THE FUTURE THREAT

MAJOR GENERAL JOHN J. KOEHLER, JR.

*Editor's Note: This article is a reprint, having originally appeared in the July-August 1978 issue of National Defense Magazine.*

Air defense plays a vital role in maintaining the combat effectiveness of our ground and air forces. The staggering losses that can be inflicted upon these forces by tactical air power are illustrated by the Japanese attack on Pearl Harbor, the massacre of Egyptian ground forces in the Mitla Pass in 1967, and the destruction of most of the Egyptian Air Force on the ground in the Six-Day War.

In any major conflict of the future, the air battle will commence with a sudden attack by large numbers of aircraft on multiple targets. The attack will most likely be launched with little or no warning. It will be characterized by the delivery of many different types of munitions and varieties of aircraft maneuvers against our early warning radars. Air defense artillery will be concentrated at well-defended locations, rather than in random deployments across the battlefield, so that the price the enemy must pay in an attack will be as high as possible. A classic example of air defense weapon concentration was our defense of the Remagen Bridgehead in World War II. We had 672 antiaircraft guns deployed, and they destroyed 186 enemy aircraft that attacked the bridgehead. The air defense mission was accomplished and troops and supplies flowed unhindered across the bridgehead.

In 1967, the Egyptians paid the price of having a weak air defense. Israeli aircraft, in a premptive strike, destroyed the Egyptian Air Force on the ground. Israeli airpower also massacred Egyptian troops and armament in the field. The Arabs, having learned their lesson, deployed more antiaircraft guns in the 1973 War than are currently owned by the United States worldwide. Their key weapons were the SA-6 and SA-7 missile systems and the ZSU-23-4 gun system, all Soviet made and still in the inventory. The Israelis lost 115 aircraft in that short war. Most fell to the Arab antiaircraft guns and missiles rather than to the Soviet-manufactured Mig

aircraft that also figured in the conflict. Israeli close air support effectiveness was greatly degraded for several days.

The air threat of the 1980s will include such Warsaw Pact aircraft as the FISHBED, FOXBAT, FENCER, and BACKFIRE. Tactical aircraft of the Soviet Union, its allies, and its client-states outnumber NATO aircraft 2 to 1. NATO must meet that threat. Throughout the history of warfare, defensive weapons development has been a reaction to each new offensive threat as it appears. In the middle 1960s, however, the Army made an attempt to get ahead of the threat by making known the weapons requirements to meet the **projected** threat. Accordingly, the required future air defenses are defined primarily with respect to the postulated air threat and its potential targets. Additionally, the potential of the antiradiation missile (ARM) and the cruise missile system is of concern in planning future air defense. Currently, the United States possesses no defense against intercontinental ballistic missiles (ICBMs) and sea-launched ballistic missiles (SLBMs), which present a threat to the continental United States and our forces on the battlefield.

In any major conflict in the future, the US Army will probably be required to fight a foe who will outnumber us in men and equipment and who may have weapons as good as or better than ours. To win, our forces must be intensively trained and must use tactics and techniques designed to defeat a well-equipped, numerically superior adversary. The numerical disadvantage demands that we impose heavy losses on the enemy while minimizing our own. We **must** win the **first battle** and air defense artillery **must** win its share of that battle.

It is obvious that force-level constraints and current limited spending on air defense preclude the dense deployment of air defense artillery such as was assembled at the Remagen Bridgehead. Air defense will most likely focus on optimizing the terminal defense to achieve a high kill probability while decreasing the cost of deployment.

Air defense artillery must protect our mobile tank and infantry forces so they can exercise the freedom of movement essential to battlefield success. Accomplishment of this task requires the capability to engage the enemy air threat whatever its altitudes and speeds. Since no one type of weapon yet developed can attain the air defense objective against all threat options under all battle conditions, a family of Army air defense systems, working in conjunction with Air Force interceptors, is required.

Generally, we use long-range missile systems to provide overall medium- and high-altitude coverage of Army field forces. These weapons are normally positioned behind the forward edge of the battle area (FEBA) out of enemy field artillery range. The effects of terrain masking limit the protection provided by these missile units to forces along the FEBA or to critical assets that can be reached by aircraft using low-altitude approaches. The masking problem requires that the long-range missile system be complemented by other weapons. Present air defense systems fall into four categories: man-portable air defense (MANPAD), short-range air defense (SHORAD), low-to-medium altitude air defense (LOMAD), and high-to-medium altitude air defense (HIMAD). The tremendous capability and projected effectiveness of the Soviet threat require a well balanced and integrated use of these weapon systems to leave the enemy no preferred attack options. Future improvements in enemy aircraft will demand an even greater extent of integration across the battlefield.

The current air defense coverage umbrella over NATO ground forces begins with the Nike Hercules missile system. The Hercules provides medium-to-high altitude, long-range protection throughout the NATO forward areas and denies freedom of use of high-altitude air attack routes. Presence of the nuclear-capable Hercules forces potential attackers down to lower altitudes where they become vulnerable to the low- and medium-altitude weapons located in the corps and division areas. A comprehensive program of product improvements, especially in the area of electronic counter-countermeasures, has sustained the system's formidable capabilities throughout its 20-year operational history. By the mid 1980s, however, age and inherent design limitations will have exacted their toll on Hercules effectiveness. First fielded in 1958, the vacuum tube technology used in the Hercules system has become obsolete and expensive to maintain. The major problem limiting the effectiveness of Hercules in the future, however, lies in the threat air forces opposing the system. Dramatic increases in numbers and speeds of Warsaw Pact attack aircraft are rendering the Hercules air defense battery more and more inadequate to the task at hand.

Hercules will be phased out of the NATO inventory as the more versatile Patriot system is fielded. However, a version of the Nike Hercules system configured strictly for surface-to-surface artillery use may be available for some time to come because the system is the most accurate, medium-to-long range, surface-to-surface weapon in our inventory.

The Hawk missile system is designed to cope with low- and medium-altitude targets. Special emphasis is placed on countering aircraft that attack at low altitudes to escape radar detection and attempt to penetrate a defense by taking

advantage of the degradation of pulse-type radars caused by ground clutter. Hawk continuous-wave radars and semiactive homing guidance are not seriously degraded by ground clutter.

Operating in the corps area, the Hawk is generally employed in support of the committed divisions. This deployment in the forward area completes the second level in the air defense coverage umbrella and provides increasingly dense air defense firepower over the forward committed forces.

Although the Hawk system, fielded in 1959, is almost as old as the Nike Hercules, it was designed using transistor technology. Like the Hercules, the Hawk has undergone a series of comprehensive technological improvements. The major revisions to the system are in the electronic counter-countermeasures and fire control capabilities, where digital computer technology has been incorporated to give the system a high degree of automation in the acquisition-identification-engagement cycle. As a result of the successful series of improvements and the ability of one Hawk battery to engage two to three targets simultaneously, the Hawk remains a viable element in the overall air defense system and, as such, will continue to be deployed with the NATO forces for several years to come.

The massive use of electronic countermeasures by the Soviet Union has been observed for many years in training exercises and has been confirmed tactically in the invasion of Czechoslovakia. There is no question that our future air defenses must be prepared to cope with such techniques. If the established pattern is followed, the newer Soviet suppression techniques and tactics will spread throughout the world during the Patriot life cycle. The Patriot missile system, which will replace Hercules and most, if not all, of Hawk, is the first major air defense weapon system designed in advance of the realization of the threat. The system, originally called SAM-D, was first conceived in the 1960s to counter the threat postulated for the 1980s time frame. Development of the Patriot system centered around the solution of major problems facing the continued deployment of the Hercules and Hawk systems; namely, extreme levels of electronic countermeasures and large, saturation-type attacks. The Patriot can simultaneously detect, identify, and destroy large numbers of attacking aircraft while maintaining the long-range, high-altitude capabilities of the Hercules system. Deployment of Patriot will provide essential air defense improvements including substantially more firepower, increased survivability, and greatly reduced operational costs. As a result of the newer technology, a deployed Patriot fire unit consists of only five vehicles, where a large convoy-sized unit was previously required. The high degree of automation built into the system further enables the Army to provide greatly increased air defense protection to the forces in the field while realizing a significant reduction in the number of people needed to operate and maintain the equipment.

SHORAD and MANPAD systems are required to fill the voids in HIMAD-LOMAD coverage and weapon engagement due to masking and emplacement distances from the forward battle areas. These short-range systems can cover the low-altitude approaches into the battlefield effectively and prevent successful attack of our ground forces, air bases, and logistical centers by providing a high volume of accurate fire in the terminal defense. The current MANPADS is Redeye, and plans are to replace it with Stinger in the 1980 time frame.

Redeye is a man-portable, shoulder-fired, heat-seeking guided missile system designed to provide air defense against low-altitude hostile aircraft. As part of the current family of AD systems, Redeye is normally deployed in teams composed of a team chief and a gunner. The team is equipped with a ¼-ton truck and trailer, communications equipment, target alert data display set (TADDS), and a basic load of six Redeye missiles.

Stinger is the replacement weapon system for Redeye in the new family of AD systems for employment in the early 1980s. Stinger also is a man-portable, shoulder-fired, heat-seeking missile system designed to provide air defense against low-altitude hostile aircraft. Each Stinger missile system is self-contained. Once it is fired, the gripstock, containing the identification, friend-or-foe (IFF) equipment, is retained for reuse (the launcher is discarded). Maintenance of the Stinger weapon is simple, requiring only visual inspection and replacement of external rubber parts. The weapon system can destroy targets at all aspects, in clear weather, at altitudes and ranges exceeding Redeye capabilities. Stinger improvements include a full forward engagement capability, where Redeye is basically a tail-chase weapon against jet aircraft. Stinger also provides an improved seeker and warhead which, along with an improved rocket motor, give it greater altitude and range engagement capabilities. A follow-on Stinger system, designed to give the weapon system improved counter-countermeasure capabilities for the 1990 time frame, is also under development.

The Chaparral, a SHORAD weapon system, provides air defense for corps, division, and brigade level forces. Chaparral is a fair-weather missile system with an optical tracker, radiofrequency command link, four "ready" missiles on launcher arms, and an additional eight missiles in storage compartments under the deck of the launching station. The weapon system can destroy targets at all aspects, except jet aircraft head-on, in clear weather and out to a maximum range of

approximately 5 kilometers. Improvements in the system expected to be fielded before 1980 are an improved warhead and seeker, giving the system a forward engagement capability against jet aircraft, and an improved rocket motor providing increased performance.

The Roland missile system is the replacement for Chaparral in the new family of SHORAD weapons. Roland will give the SHORAD family an all-weather, radar/optical search and track missile system with an IFF capability. Roland has two missiles on launcher arms and an additional eight missiles in two four-round, on-board magazines capable of automatic reload. This weapon system can destroy targets at all aspects, in adverse or clear weather, day or night, out to a maximum range of approximately 6 kilometers.

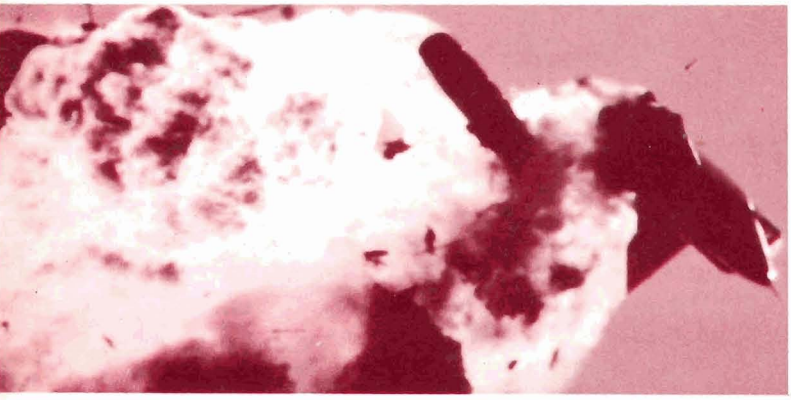
The Vulcan is a mobile air defense gun system using visual acquisition, radar ranging, and an optical tracker on a 6-barrel, 20-mm Gatling-type gun capable of firing at a rate of 3,000 rounds per minute. Vulcan is a fair-weather air defense weapon capable of destroying aerial targets at all aspects out to a maximum range of approximately 1,200 meters.

The division air defense (DIVAD) gun system, replacement for the Vulcan, is part of the new family of SHORAD weapons to be deployed in the early 1980s. The DIVAD gun will have the hardness and mobility to advance with and protect the forward maneuver units from air attack as they operate close to, on, or beyond the FEBA. Its quick reaction time, increased survivability, all-weather/radar-directed firing system, with optical backup and increased range (from 3 to 4 km), give the DIVAD gun greatly improved capabilities over the present air defense gun systems. The protection afforded by this weapon system will give the commander in the forward battle area increased flexibility in his conduct of operations and will allow the attacking force no easy air attact options.

A key ingredient of coordinated and successful air defense is effective command and control. Wire and radio communications were sufficient for the older air defense systems but, with the speed of the highly sophisticated Soviet aircraft and the rapid data processing capability of the new family of air defense weapons, advanced command and control systems are required. Currently, Army air defense forces use the AN/MSG-4 Missile Monitor fire distribution system. Requirements for digital data link to pass digitized information from one level of command to another and for automation of the decision processes have now surpassed the capability of the AN/MSG-4. The AN/TSQ-73 Missile Minder command and control system is being fielded to replace the AN/MSG-4. A highly sophisticated processor in the AN/TSQ-73 enables it to communicate with and exchange digital data with other Army and Air Force command and control systems.

Throughout the history of air defense, target identification has consistently been a serious problem. A completely reliable method of determining aircraft identity under all battle conditions has never been satisfactorily developed. Consequently, the optimum effectiveness of ground-based air defenses has never been achieved. In view of the expected intensity of any future air attacks, this shortcoming could prove to be fatal. Currently, several different active and passive techniques are under consideration as possible solutions to the age old problem. One of the major breakthroughs in tackling the identification problem has centered around the use of high-speed digital computer technology. The "real time" analytical capabilities of modern computers, coupled with miniaturization of components, will soon permit air defense to determine the true status of all approaching aircraft with confidence. Such aircraft identifiers as origin, use of safe passage corridors, penetration of forbidden airspace over critical installations, use of electronic countermeasures, speed, altitude, response to electronic challenges, along with other aircraft characteristics, can be rapidly evaluated and provided to the fire unit in time to initiate a successful engagement or to avoid attacking friendly aircraft. As technology enables passive aircraft evaluation, the secondary benefits of increased survivability of the weapon system become more easily attainable due to the reduced electronic emissions it will be generating. In the future, increasingly sophisticated sensors will permit aircraft identification through passive receivers examining an aircraft's navigation and engine signature emissions. The signature of an aircraft (i.e., the disturbance it causes in the atmosphere, the temperature of its exhaust, and its unique sound and engine modulation) will become detectable, measurable, and identifiable. Passive identification will provide the ground unit some immunity to suppressive measures.

With tomorrow's battlefield being more lethal, intense, and complex, we must maintain our capability by a thorough examination of all possible technological advances. The US Army air defense must continue to be responsive and well equipped. As the threat becomes greater and more sophisticated, so must the Army air defense. Missile systems with longer range and greater kill probability will be required. Countermeasures against enemy airborne jammers must continue to be developed as the ECM levels increase. Early warning of all types of attacks, including ICBM, may be accomplished through a satellite surveillance system. New technologies and concepts will be required and may include, but not be limited to, high-energy lasers, high-frequency sound, satellite vectoring of air defense to intercept, and even satellite-based air defense.



# VULNERABILITY OF t FRIENDLY

CAPTAIN MICHA

*Articles in the April-June and October-December 1977 issues of AIR DEFENSE Magazine contained comments regarding field exercise experiences that bear on the subject of vulnerability of friendly aircraft to friendly ADA fires. The specific comments were:*

- *In airspace management, there is an evident lack of training in the areas of coordinating, integrating, and regulating flights.*
- *Early warning at battalion level from Hawk AADCAP sometimes is interrupted. A backup system might be considered.*
- *Some communication problems were experienced. One that arose was with the AN/GRC-106. The radio historically has had questionable reliability.*
- *Some difficulty was experienced due to an inadequate flow of information.*
- *When the radio did work, we found that the Air Force control and reporting center did not pass data to the Army Liaison Officer. He was moved to the command reporting post, a multichannel shot was put in to battalion, and early warning was finally available to the battalion tactical operations center. From there, it went by AN/GRC-106 to the battery. This sytem is cumbersome and unworkable in a moving situation. The man with the Hawk AFU was provided with an AN/PRC-77 and a wire line. Although the distance to the AFU was only 5 km for the radio and 8 km for the wire line, commo was poor and the data were stale by the time the information reached the battery. Without FAAR, C/V has no effective early warning.*

*Experiences related in the foregoing articles, along with personal experiences of the author, have moved him to write this article. His views and recommendations are not necessarily the views of the US Army Air Defense School or the Department of the Army.*

The purpose of this article is to discuss the vulnerability of friendly aircraft to fires from friendly air defense units in a wartime environment and to offer a suggested remedy. This situation exits because of:

- Inadequate early warning.
- Failure of Air Force pilots to adhere to strict identification, friend-or-foe (IFF) procedures.
- Inability of Air Force control and reporting centers (CRC) or control and reporting posts (CRP) to acquire and identify low-flying aircraft at extended distances.
- Inconsistent coordination between Air Defense Artillery (ADA) and Air Force personnel at division airspace management element (DAME) level.
- Poor "lead time" notification on friendly aircraft sortie strikes within the division area to ADA personnel.
- Questionable communications equipment, particularly the AN/GRC-106 radio.

During an air battle, the primary source of identification of aircraft for a Hawk battery, assault fire unit, or battalion is IFF. Although a few other means such as the use of sanctuary levels, augmented weapons engagement zones (WEZ), and visual sightings are also available, the **mandatory** use of proper IFF procedures by friendly aircraft is the primary means a Hawk unit employs for accurate identification.

In the case of Chaparral, Vulcan, and Redeye the primary means of detection and identification of aircraft is through visual sightings. All three weapon systems are supplemented in their detection by the forward area alerting radar (FAAR), which identifies aircraft primarily, again, through the use of IFF. Aircraft detected are challenged and identified with the end result information (friend, foe, unknown) passed to the firing sections by FM radio voice or target alert data display set (TADDS).

Under existing procedures, the CRC supplements IFF challenges by the Hawk fire units by providing information on friendly and hostile air movements through the battalion operations center (BOC) down to fire unit level. This information is passed either verbally or automatically through automatic data link (ADL) symbology. At this point, it is important to understand that without CRC inputs the only means of

# FRIENDLY AIRCRAFT
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# ADA FIRES

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friendly aircraft identification is through an IFF challenge.

The CRC, a primary Air Force command and control center, is a high-priority target for enemy aircraft. In the event the CRC is forced to become mobile, it loses a substantial amount of effectiveness and, because of its delicate equipment, may not become completely operational for some time. In the past, the CRC has experienced difficulty sustaining consistent operations due to equipment failures. When the capability of providing timely, accurate information during the course of an air battle is lost, the CRC hinders the Hawk fire units, unless it relinquishes control of the air battle and the responsibility for engagements down to battalion level. In the event the CRC becomes nonoperational, the Hawk BOC assumes control of the air battle.

Within a Hawk battalion, the BOC plays an integral role in the coordination of air defense throughout the battalion's area of operation. In addition to acting as a relay for information passed down to battalion and battery level by the CRC, the BOC is capable of providing early warning information on hostile as well as friendly air movements from information provided by its organic radar (AN/GSS-1).

When the CRC is out of action, the Hawk battalion does not receive any information on friendly air movements within its area of operation. Unless strict IFF procedures are followed by friendly aircraft, they stand a chance of being declared hostile and engaged by a Hawk fire unit.

Within the 1st Cavalry Division, the main problem is the inability of "the system" to get timely, accurate information concerning friendly and enemy air movements within the division area of operation to the ADA firing squad and Redeye team level.

Under the present system, a method of **rebroadcasts** is used to pass early warning information (on hostile aircraft only). From a liaison officer stationed at the Hawk BOC, the message is transmitted over an AN/GRC-106 radio to the division main tactical operations center (TOC), a division battle TOC, ADA battalion TOC, the maneuver battalions, DIVARTY, DISCOM, and the 1st Battalion, 9th Cavalry. Once this information is received at that level, it is then rebroadcasted down to battery and company level, at which time it is again rebroadcasted down to fire unit level. This method is completely dependent on good communications at all levels and, unfortunately, by the time the information is rebroadcasted down to the fire unit level, it is old, inaccurate, and virtually useless.

Within the 1st Cavalry Division, friendly air sorties allocated to the division are requested by air liaison officers (ALO) located with the brigades and at the division level TOCs. The Air Force personnel, using their own communications network in the form of the MK-107A system, are capable of communicating not only among themselves but also with friendly aircraft. When an aircraft sortie request is approved, this information is **sometimes** provided to the ADA representatives at division main or TOCs for passage to the ADA battalion. When Hawk support is also available, the sortie information is required to be provided to the Hawk battalion liaison officer stationed at the division main TOC for passage to the Hawk BOC.

There are stumbling blocks that prevent the vital flow of information necessary to insure that friendly aircraft are not engaged by friendly ADA.

- Information on friendly air sorties has not been passed to ADA representatives at division TOCs with enough "lead time" for the information to be relayed to battalion, battery, and fire unit/team level.
- Communications outages, due to problems with AN/GRC-106 and AN/VRC-46 radios or VHF, have resulted in ZERO early warning information being passed to the fire units on friendly air sorties or hostile air movements.
- The Hawk battalion liaison officer at division main is dependent on the unreliable AN/-GRC-106 radio to pass friendly air sortie information to the Hawk BOC for relay to the Hawk fire units, and he does not have any backup communications equipment available to him in the

event of a malfunction in the AN/GRC-106.

■ This division, including its ADA battalion, has yet to work in conjunction with a Hawk BOC to test its ability to pass timely, accurate early warning information on enemy as well as friendly aircraft, coordinate movements and activities of ADA units, or work with division ALOs on establishing procedures for protecting friendly aircraft from being mistakenly engaged by friendly ADA.

■ There is a tendency on the part of some Air Force pilots to turn off their IFF to prevent their transponder returns from being acquired by enemy air defense units.

It is my opinion that these stumbling blocks can be overcome by establishing an Air Force liaison team, consisting of two personnel equipped with an MK-107A communications system, at the Hawk BOC. The advantages are:

■ Immediate, accurate information on friendly air sorties is available for passage to Hawk fire units.

■ Capability would exist for information not otherwise available (if CRC was nonoperational) to be passed to the Hawk fire units on friendly movements within the division.

■ In case of an emergency, a communications link would exist to the division ALOs and division TOCs that otherwise would not exist.

■ Elimination of the need for the Hawk liaison officer to pass friendly sortie information from the division TOC to the Hawk BOC.

■ Knowledge of enemy air movements becomes available for possible dissemination to Air Force pilots.

■ Assistance in the identification of aircraft returning from the FEBA if IFF is not used.

Last year, after Exercise Rolling Thunder III, an official suggestion was submitted by an Air Force field grade officer that an Air Force liaison team be collocated with the ADA battalion headquarters. The reason was that the team was very effective in providing up-to-the minute information concerning friendly air strikes in the division during the exercise. The suggestion was disapproved, and the reason given was that placing an Air Force liaison team with the ADA battalion does not significantly increase the early warning capability or air defense posture of the division. The respondent also reasoned that information required by ADA units primarily concerns enemy air activity and is best provided by Air Force and Army radars via the doctrinal communications network; i.e., collocating an ADA liaison team with the CRC, CRP, or Hawk AADCP. Liaison teams, such as the ones provided to the 1-68 ADA during the two exercises, are better used at maneuver battalion level where the ability to monitor and call in air strikes is essential.

Regarding the observations made resulting in the rejection of the suggestion, I feel that proper consideration was not given to establishing an Air Force liaison team with the ADA headquarters because of the following reasons:

■ During the Gallant Crew Exercise, the CRP was stationed only about 20 miles from the ADA headquarters. During a wartime posture the CRP would be located considerably farther to the rear of the FEBA.

■ A Hawk BOC was not used during the Gallant Crew Exercise.

■ The one Hawk battery that was employed during the Gallant Crew Exercise was not available to the 1st Cavalry Division for early warning or friendly air sortie control purposes.

■ No Hawk representative was stationed at the division TOC.

■ A communications relay was required between the CRP and the ADA headquarters TOC (approximately 20 miles distance) because of AN/GRC-106 radio problems. Early warning information was passed over FM radio and was only marginally effective even though the ADA Chaparral, Vulcan, and Redeye units were in close proximity due to maneuver area restrictions.

■ The suggestion was not staffed through Air Force channels for their approval, disapproval, or recommendations.

It is important for us to be open-minded and consider what a valuable asset the Air Force liaison team would be to the division's air defense, especially when Hawk assets are available. Although the information provided by the Air Force liaison team will greatly assist the Hawk fire units, it can also provide valuable information to the division's Chaparral, Vulcan, and Redeye assets. The end result will be greater cooperation between the division's ADA and Air Force elements.

In summary, the assets needed to implement liaison are presently available at Bergstrom Air Force Base and have been allocated down to battalion level. Air Force personnel should be given the opportuniity to make suggestions concerning the establishment of the liaison, and the liaison should be included in the next major corps exercise. The idea should be given more field testing, and should be tested on a full scale by the TRADOC Combined Arms Testing Activity for possible implementation in the Army air defense as a whole.

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# AUTOMATED OPERATION WITH HUMAN CONTROL

## A KEY FEATURE OF PATRIOT

Lieutenant Colonel
Eugene Naegele USA (Ret)

Previous articles in this series discussed two of Patriot's three key features—the multifunction phased-array radar and track-via-missile guidance. Patriot's multifunction phased-array radar performs all air defense radar functions, requiring nine separate types of radars in the Nike Hercules and Improved Hawk system, and the track-via-missile guidance system combines the advantages of both command and semiactive homing guidance into a single guidance system, which can adapt to future threat changes without expensive missile inventory retrofit. This article treats the third key feature—automated operation with human control—which enables the introduction of Patriot's substantially increased capability while offering substantial savings in an area now comprising 55 percent of the defense budget—people costs. This third feature completes the essence of a Patriot.

### PEOPLE RESOURCES

People resources in air defense units may be grouped into three categories: operators, maintenance/logistics, and administrative/support. Patriot-peculiar personnel are in the first two categories. The maintenance and logistics catecory is a special concern of air defense because we are prime users. This category of manpower is difficult to recruit, expensive to train, and an overhead to basic combat costs. Our current air defense systems require numerous school-trained people, from fire control and missile technicians at unit levels, through direct support specialists, to the general support, theater, and depot specialties. Many of these skills require about a year of training and present rotational assignment and skill-retention problems since the bulk of our air defense is deployed overseas. A principal objective of Patriot automation, then, must be the minimization of manpower in general and maintenance/logistics personnel in particular. Patriot has achieved this objective to a considerable extent.

### THE FUNCTIONS TO BE PERFORMED

Patriot must perform the same three basic functions performed by all air defense system, namely:

- Emplacement and initialization, and their counterparts: shutdown and march order.
- Air defense operations.
- Maintenance operations.

### EMPLACEMENT INITIALIZATION

There are five phases in the emplacement initialization process. The first two are mechanical and electrical in nature and are not computer controlled. The last three are computer operations under human control. The five phases are:

- Emplacement.
- Activation.
- Equipment operability verification.
- Fire unit data acquisition.
- Tactical operations initiation.

Emplacement consists of positioning the vehicles at predetermined locations, connecting the fire control section cabling, and measuring radar set and launching station location and alinement. Activation consists of starting generators, applying power, performing any operator visual checks, and enabling remote operation. Emplacement and activation phases will not be further discussed in this article.

In the **equipment operability verification phase,** automatic and operator assisted diagnostic tests derived from the maintenance software system are performed to check the operability of fire control sections. Satisfactory performance of these tests indicates that those fire control section elements that have been tested require no further evaluation until the next scheduled maintenance period. No data are required to be held for later use in the data acquisition phase. Detection of a fault requires transition to the maintenance mode of operation. When the tests are completed, transition to the data acquisition phase is permitted to occur.

The objective of the **fire unit data acquisition phase** is to provide the tactical data base for the

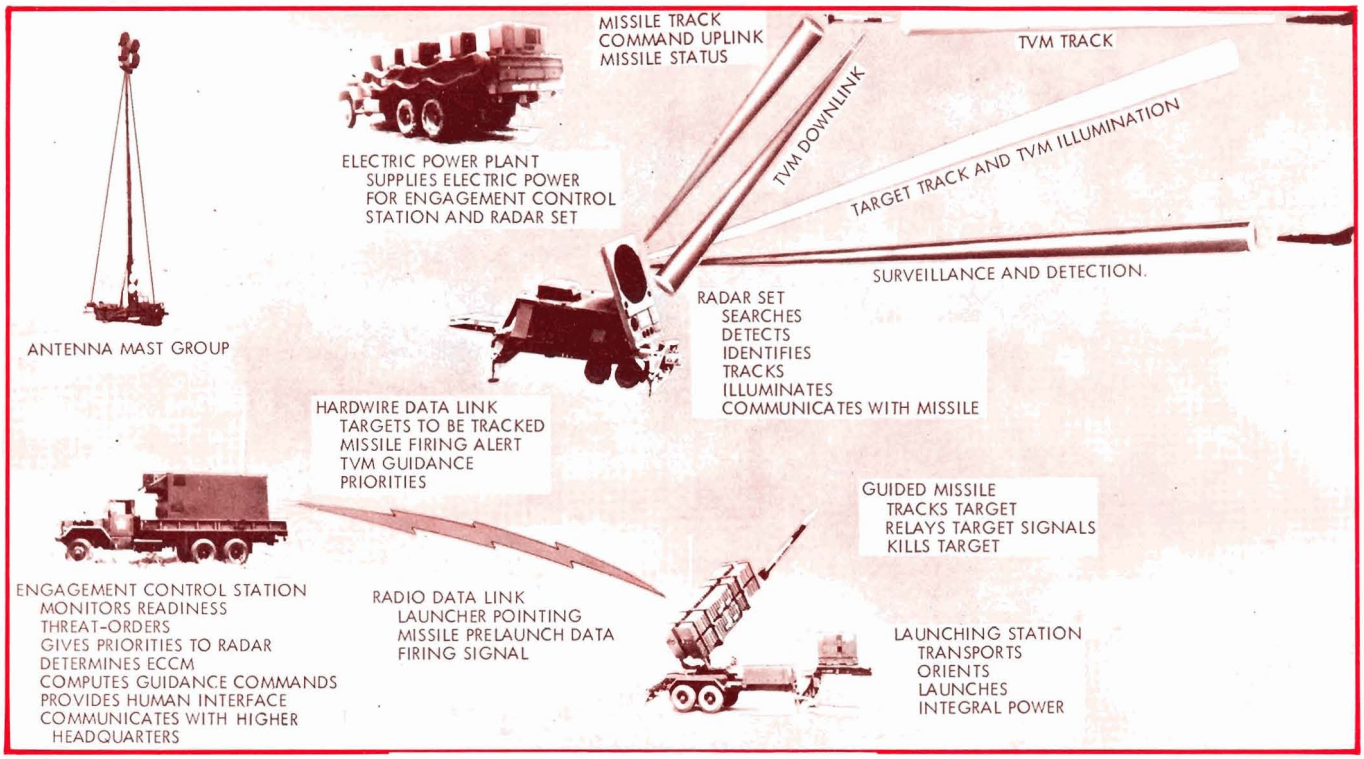



*Figure 1. Patriot System Operation.*

air defense mission. In an emplacement initialization, this phase commences immediately upon completion of the operability sequence. Whereas the fire control section is an isolated entity in the operability phase, in the data acquisition phase it becomes the center of the fire unit and interfaces with all sources of data. Because of the required interfacing compatibility, data acquisition software uses elements of the air defense operations software for the communications and display function.

Launching stations emplacing simultaneously with the fire control section are synchronized into the digital data link after each launcher crew has performed its own operability sequence. The launching station data link terminals are set up to synchronize on the fire control terminal at the earliest possible times consistent with crew checkouts. Once the link is established, the fire control section performs periodic status checks of the launching stations, including simulated launches. When each launcher crew has completed its tasks, the local remote enable switch is placed in the REMOTE ENABLE position and the area vacated. After the switch is activated, the launcher is under remote control of the fire control section.

When the radar is capable of radiation, the mapping functions are to be commenced. Battlefield conditions, time available, and commander and operator decisions will determine the extent of mapping to be performed. Under imminent combat conditions, wherein the platoon must become operational in minimum time, the operator will select an operational search lower bound for the primary target line centered sector, based on his knowledge of the terrain and the relative altitude of the radar set. The clutter map will be generated automatically for that sector and, provided all other functions are complete, the platoon will transition to the final initialization phase. Masked terrain mapping will be preempted.

If the battlefield situation allows sufficient time, the operator may perform the terrain mapping functions over a full 360° azimuth coverage. In this case, the operator will determine the operational search lower bound (lowest elevation angle to be used in surveillance) and masked terrain. The primary-target-line-centered coverage is to be mapped last, and the clutter mapping function (only at primary target line centered coverage) is to be performed automatically, interleaved with the terrain mapping process. When the terrain map is complete, the firing platoon transitions to the final initialization phase.

At any time after the equipment becomes operational, the UHF link with battalion and/or adjacent fire units may be established. With this link established, and with the engagement control station in the operating mode, command and coordination data are automatically received, processed, and stored in the data base. Commands and information that are specifically for the fire control operators are either written out on the hard copy unit or displayed on the tabular display.

If the UHF data link is not available, but voice communications are maintained, the command and control data may be received via voice. Manual

input to the data base may be performed by an operator.

In the **tactical operations initiation phase**, an updated evaluation of tactical readiness is obtained. This update is based on a full set of fire unit status monitor test actions, including simulated launch sequences. The tactical software and tactical data base are then read into the computer and the air defense operations mode commences.

**Air Defense Operation** (Fig 1)

The engagement control station is the brain of the Patriot system. It is also the only manned station during firing operations, and this is where the human control is exercised. Stored computer programs guide the entire system operation in accordance with operator request, instructions, and decisions entered on either of the two operating stations (Fig 2). The weapon control computer monitors all hardware status and displays that status on the fire unit status panel. The radar is controlled through the radar set/engagement control station interface. The launching stations are communicated with and controlled via the data link terminal through the data link antenna and a radio link. Radio relay terminal equipment communicates with adjacent fire units and higher headquarters with both voice and data links. There is also a generator control panel to monitor the power plant operation and to remotely shut down the power.

The human control of the fire unit is exercised through either of the two operating stations. Information is provided to the operators on the cathode ray tube display, on a number of readouts and light-coded indicators, and as printed data from the hard copy unit.

Human control is also exercised at the next higher level of command at the command and coordination set. Its interior is almost identical to that of the engagement control station shown in Figure 2, with the exceptions of omitting the radar set/engagement control station interface unit and the data link terminal (launching station interface) and adding the data modems necessary for US Army group level and joint service interfaces.

**Fire Unit Computer Programs**

All functional items of the Patriot weapon system are operated under the supervision and control of computer programs of the weapon control computer. The software not only exercises control over the functional radar and guidance system equipment but also over those items of equipment which include computers. The items in this latter category include the radar control unit group (used for trigger generation and mode control in the radar) and the radar signal processor group (used for mode implementation and data processing control in the radar receiver). Computer programs integral to these items are loaded into their memories via the weapon control computer.

Computer programs for the Patriot system, including those computers in the radar, are divided into four basic software families. Each family of software programs fills a distinct role and is read via computer tape into the weapon control computer memory when needed. The four functional grouping of computer routines are recorded on two master reels of computer tape. One tape (the tactical tape) contains three sets of computer programs required to:

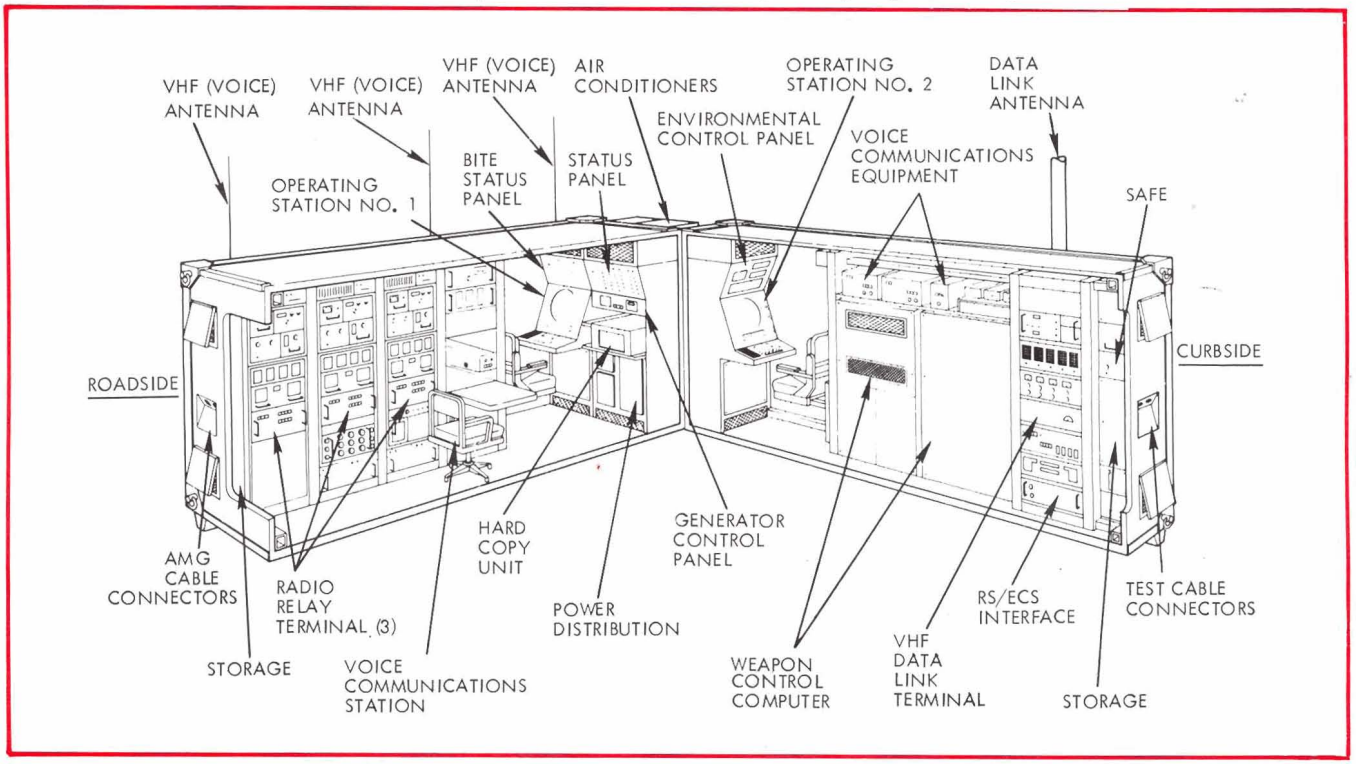



*Figure 2. Interior View of Engagement Control Station.*

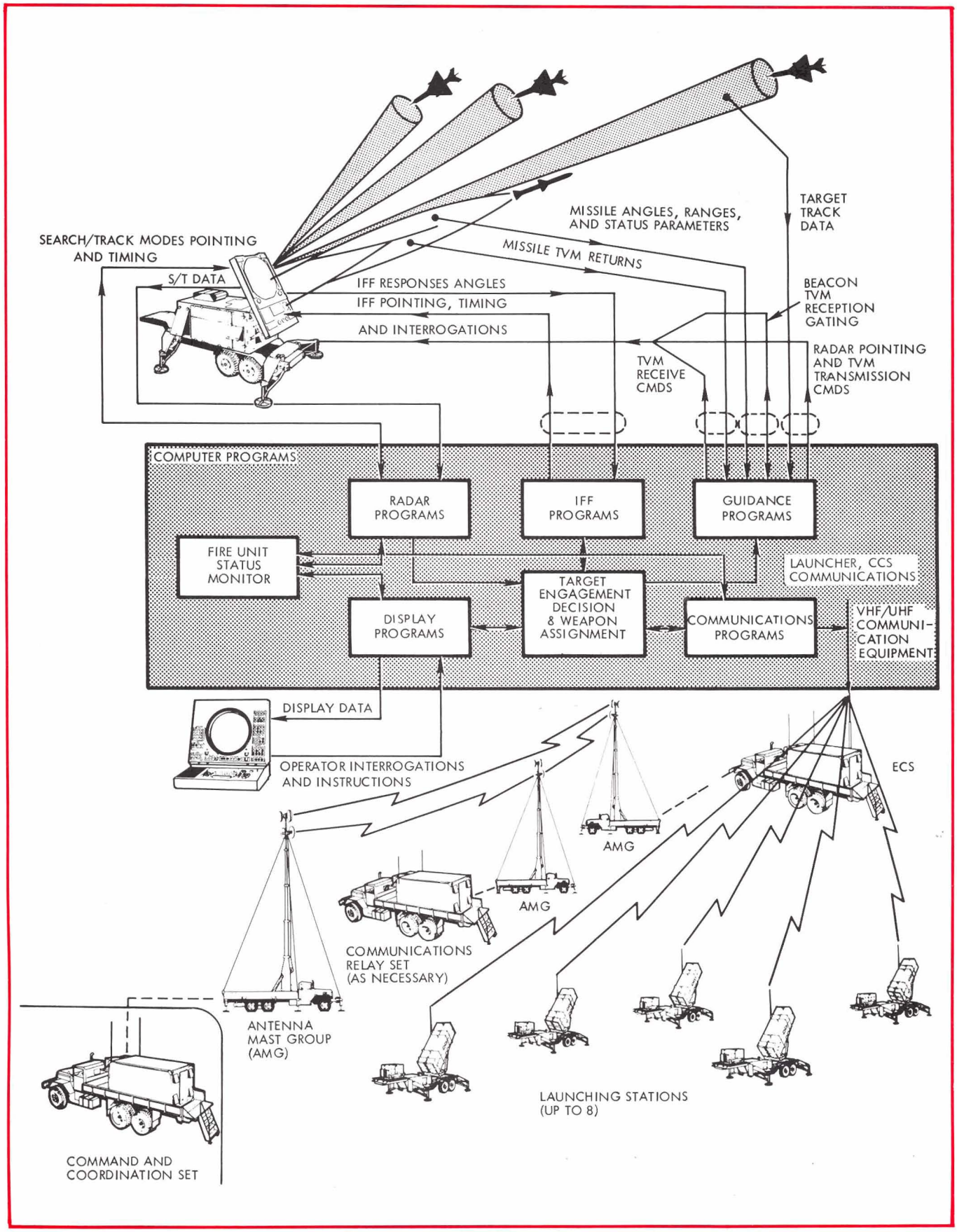



*Figure 3. Operating Programs.*

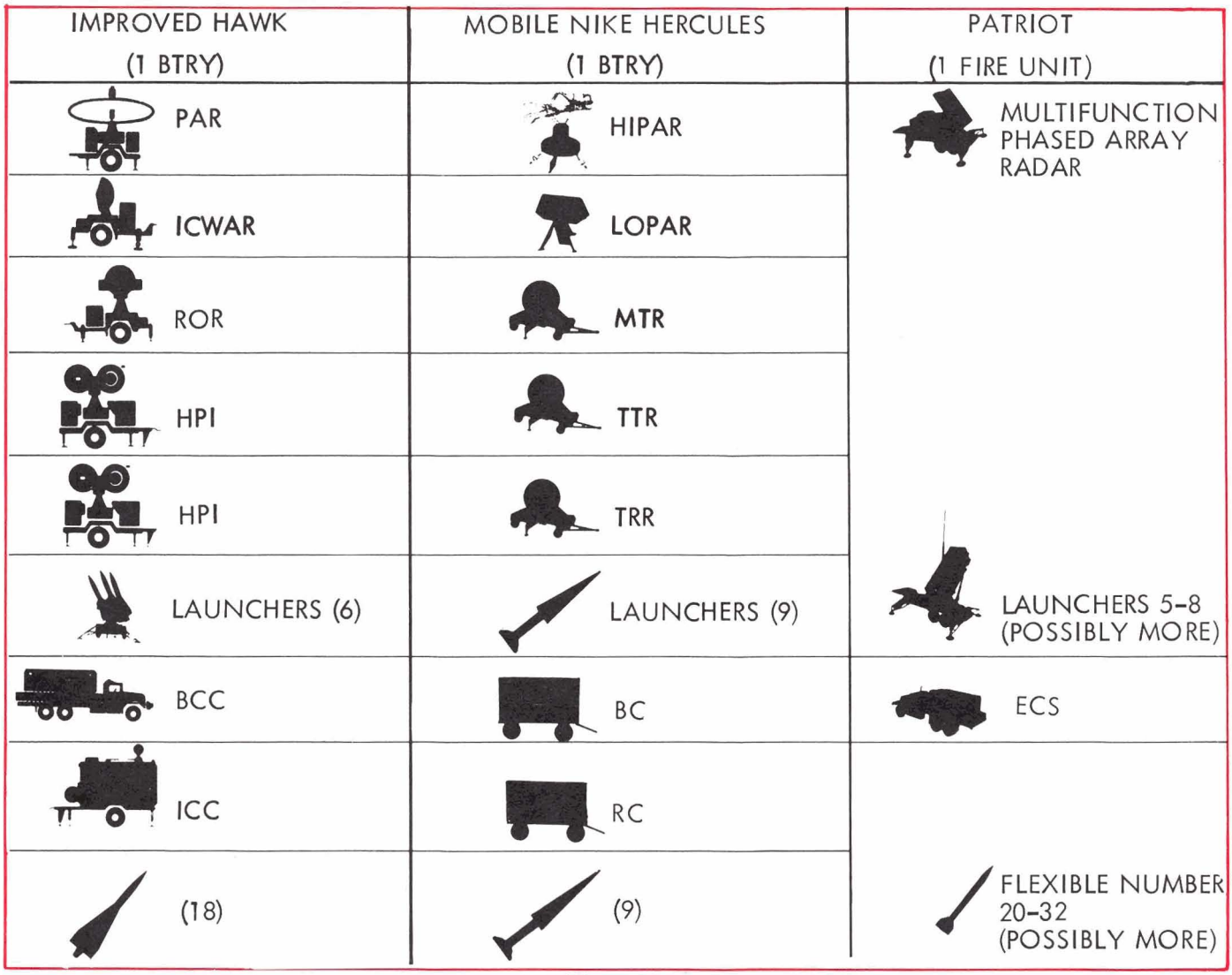



*Figure 4*

- Turn on and verify equipment operability.
- Initialize the equipment with site-to-site and day-to-day system variables.
- Control and monitor the equipment during all phases of tactical operation (including a fault detection capability).

The fourth set of computer routines is diagnostic programs for isolating faults and is on the second tape reel.

The procedures for loading the tactical programs, after the engagement control station equipment has been powered up, involve simply loading of the correct tape onto the tape drive unit, initializing the weapon control computer with the reset button, and initiating bootstrap loading. From then on, the operator's decisions are presented to him at the display console.

A functional block diagram showing the major family groups of operating programs is shown in Figure 3. The diagram illustrates the names and functional subdivisions of the program as follows.

Radar programs control the radar surveillance activities, including implementation of modes, radar beam steering, transmit/receive timing, power levels, waveforms, and processing.

Target evaluation, engagement decision, and weapon assignment programs evaluate the total tactical environment and decide which targets are to be engaged, when, and by which launcher. The engagement decision and weapon assignment programs include routines to control the IFF/SIF equipment and interpret received IFF/SIF data.

Guidance programs control the functions related to inflight communication to and guidance of the missiles. Software operations include the processing of target and missile track data, processing of track via missile data, and the formulation and timing of uplink guidance commands.

Communications programs format output messages and data interchanges between the engagement control station and both the launchers and higher headquarters. The communication function transmits launch commands to the launcher and initiates guidance operations.

Display programs map radar data into a synthetic plan-position indicator display and provide the two-way data exchange between the fire control operator and the computer. Certain display instructions are also accepted and

| | PATRIOT | IMPROVED HAWK | NIKE HERCULES |
|---|---|---|---|
| TOTAL BN SIZE UNIT STRENGTH | 600 | 762 | 986 |
| SYSTEM PECULIAR PERSONNEL<br>OPERATORS<br>MAINTENANCE | 205<br>(177)<br>(28) | 335 | 491 |
| SYSTEM PECULIAR REPAIR PARTS | 1928 | 4398 | 13,230 |

*Figure 5*

processed from the command and coordination set.

Fire unit status monitor programs continuously monitor fire unit equipment and provide the necessary adjustments and alarm indications in the event of failures. Serious system faults produce an audible alarm and a flashing alert message. Amplifying data are provided (upon operator demand) as a tabular display printout. Fault isolation to particular major assemblies is generally documented both on display readouts and built-in test equipment displays on the individual equipment. Subsequent isolations of the fault to the specific subassembly or component are then made either directly or through the use of diagnostic software.

The command and coordination set (CCS) computer programs use many of the same routines developed for the weapon control computer in the engagement control station. Since the CCS does not directly control radar or missiles in flight, there is no need for the radar or guidance functions of the fire unit computer programs. There are, however, requirements for display programs similar to those of the engagement control station and for modified engagement and weapon assignment programs. Additional computer programs, different from those provided for the engagement control station, are provided for the CCS-level functions of:

- Correlation and management of track inputs from multiple sources.
- Selection of fire units for engagement.
- Management of external (to Patriot) interfaces.

**Maintenance Operations**

If systems problems or degradations arise that are not fully interpretable from tactical software, the fire control operator may call upon fault isolation and analyses programs contained on the diagnostic tape. The diagnostic programs provide the necessary controls, signal selections, and pathway routing logic to interrogate major and low-level subsystems for fault isolation purposes. Operators at the remote equipment may, in some instances, cooperate with the software to select specific equipment functions and observe diagnostic results on control lamps and indicators. The diagnostic programs must be run in the maintenance mode, thus the fire unit becomes nonoperational. The diagnostic tape is loaded in the same manner as the tactical tape loading description previously given.

The overall objective of all maintenance functions associated with the fire unit equipment is to establish an operational system, to monitor the capability of the operational system to perform its air defense mission, and to provide for rapid isolation of any failures detected to a fire unit replaceable unit.

To accomplish these objectives, the majority of fire unit maintenance functions is performed under the supervision and control of computer-based monitoring and diagnostic test programs. These programs are designed to monitor and report the status of equipment on an automatic basis with the system in the on-line (operational) mode and, whenever a failure is detected, to perform fault detection and isolation to an organizational repair part level with the system in the off-line (maintenance) mode. Use of computer-based monitoring and diagnostic test programs in performing maintenance begins during equipment emplacement initialization and continues until equipment operation is terminated. Status monitoring and status reporting functions are provided by the fire unit status monitor program and maintenance functions are provided by the equipment operability verification programs and off-line diagnostic test programs. The usage and configuration of these maintenance programs are

determined by the operational status of the equipment. For this discussion, the maintenance functions will be described as they apply during emplacement initialization, on-line maintenance operation, and off-line maintenance operation.

**Emplacement Initialization Maintenance Functions**

Emplacement initialization commences as soon as prime power is applied to the engagement control station, the equipment has been visually inspected, and the operator has initiated loading of the computer programs contained on the tactical tape. As discussed above, the initialization processes consist of three phases:

- Equipment operability verification.
- Fire unit data acquisition.
- Tactical operations initialization.

During the operability phase of initialization, which is in itself a maintenance function, a series of diagnostic test programs is run to establish a basic equipment operational capability. The diagnostic tests performed are actually subsets of the off-line diagnostic test programs that have been tailored to meet initialization requirements. During the latter phases of initialization, the status monitor programs provide for equipment status monitoring and status reporting on an automatic interleaved basis. When initialization is complete, the status monitor software reports the status of all operational system equipment.

**On-Line and Off-Line Maintenance Functions**

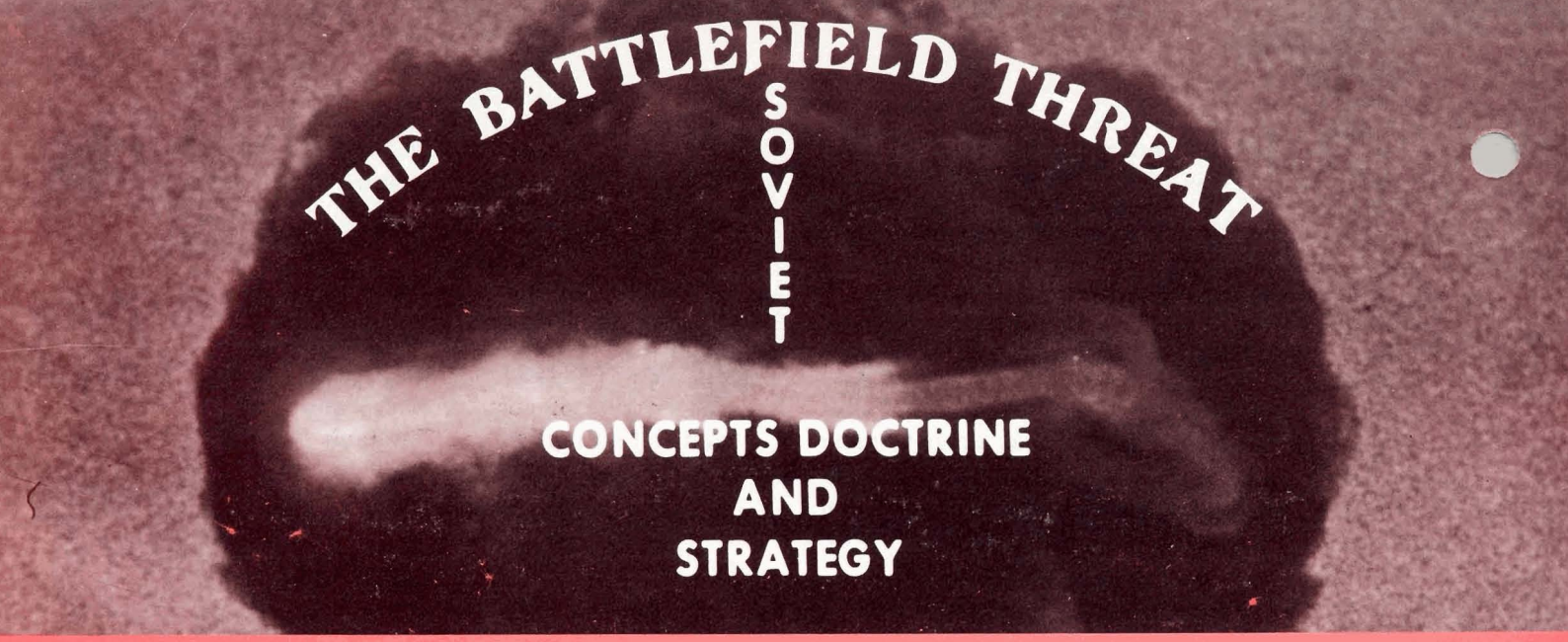
When the fire unit is operating in the on-line mode performing air defense operations, the status monitor detects system failures, assesses failure impact, updates a system status file, and reports the failure to the operator. When a failure is reported, the operator or the commander must decide whether to continue operations with something less than full capability or to cease air defense operations and go into the maintenance mode. The operating system used with the diagnostic tape permits either a complete fault detection/fault isolation sequence, or a search and selection of a particular diagnostic test that has been preselected by the operator. Most faults will be isolated in this manner. Some fault detections and fault isolations, however, will require a combination of portable test equipment and the built-in test equipment. The fault isolation output is a listing of one or several battery replaceable units, which are replaced in the sequence given. The diagnostic tape is then rerun for validation of the success of the replacement action.

**Equipment and Personnel Savings**

Automated operations with human control conserves scarce people resources in several ways: fewer major items, fewer skilled personnel, and a major reduction in spare parts. Fewer major items results directly from the multifunction phased-array radar and automated operation. Figure 4 compares Improved Hawk, Nike Hercules, and Patriot, and shows how 18 major items (9 each) in Improved Hawk and Nike Hercules are replaced by the 4 major items of Patriot. Fewer major items means less operators and less administrative and support personnel.

Fewer skilled personnel results directly from the automation, and a major reduction in spare parts is enabled indirectly by use of standard digital electronic circuits with multiple usage. Figure 5 compares total battalion-size unit strengths, system-peculiar personnel, and system-peculiar parts for Improved Hawk, Nike Hercules, and Patriot. Patriot requires less than one-third of the personnel of the system being replaced, less than one-fourth of the system-peculiar personnel, and about one-ninth of the system-peculiar repair parts.

*Lieutenant Colonel Naegele has a solid background in physics and electrical engineering, having graduated from Case Institute of Technology and completed graduate work at the University of Arizona. As Requirements Research Manager for the Raytheon Company Patriot Program Office, he has written two previous articles on key features of Patriot, both of which were published in AIR DEFENSE Magazine.*



# THE SOVIET BATTLEFIELD THREAT

## CONCEPTS DOCTRINE AND STRATEGY

MAJOR JOHN P. ROSE

Because the United States emphasizes the nonnuclear battlefield, and due to the necessity of preparing for an opponent's strategy, it is necessary to examine the latter closely to determine whether the former is sound. United States/NATO success may well depend on an understanding of Soviet doctrine and capabilities. The purpose of this article is to examine the continuing trend in Soviet military literature, doctrine, training, and equipment toward combat in a nuclear environment. What appears to be the basic Soviet approach to war, especially in Europe, is that nuclear weapons would be used and that the nation best prepared for their use would win.

It is possible to grasp some notion of Soviet doctrine, concepts, and objectives (besides what is revealed in their military literature) from an evaluation of Soviet military capabilities and from observations of military exercises and force deployments. If force capabilities and training exercises are similar to the view expressed in Soviet literature, it would seem logical that one could draw conclusions about Soviet military concepts and objectives. A comment by Marshal Grechko indicates that Soviet military writers generally "say what they mean, and usually mean what they say." According to the former Soviet Minister of Defense:

> *We have never and will never hide the basic, fundamental provisions of our military doctrine. They are expressed with utter clarity in the policy of the Communist Party and the Soviet State and in the status of our Armed Forces.*

Often, critics of the literature review method argue that it is subject to distortion and misrepresentation. Nevertheless, it is impossible to indoctrinate, train, and equip an armed force the size of the Soviet military establishment without using doctrinal literature. Therefore, it would appear wise for analysts to be discriminating when examining Soviet military literature and to evaluate its content based on the intended audience. In spite of gaps in our knowledge about the Soviet military establishment stemming from incomplete information as well as Soviet deception, concealment, and misinformation, one cannot wait for a universally acceptable picture of the threat to appear. To do so one forfeits the opportunity to reduce, offset, or rechannel the threat through effective countermeasures.

**Soviet Nuclear Emphasis Strategy**

The emphasis given to nuclear forces in current Soviet strategy is not merely an isolated notion. Numerous books and articles—Soviet and Western—reflect the Soviet attitude, intentions, and expectations of nuclear weapons for warfare.

Soviet writings since the early 1960s have shown an unwavering commitment to a nuclear emphasis strategy. Marshal V.D. Sokolovsky's **Soviet Military Strategy**, first known in the West in 1962, stressed that Soviet military doctrine adopted in the late 1950s requires that the Armed Forces, the country, and the whole Soviet people be prepared for the eventuality of nuclear rocket war.

On the battlefield, nuclear weapons have continued to be seen as the basic form of firepower. In 1965, Major General V.G. Reznichenko and Colonel A. Siderenko wrote:

> *There will also be a different way of breaking through the enemy's defense. The method used will no longer be that of "gnawing through" as was the case in past wars. The defense will be dealt nuclear strikes and will then be attacked from the line of march, at high tempo, by tank and mechanized troops.*

*The use of nuclear weapons will create favorable conditions for the rapid advance of troops. They should be able to utilize quickly the results of nuclear weapons, penetrate boldly through breaches in the enemy's combat formations, avoid both frontal attacks on strongpoints and straight line movements, carry out flexible maneuvers, and deal decisive blows to the enemy's flank and rear.*

In Marshal Sokolovsky's 1968 edition of **Soviet Military Strategy**, he stated:

*On the battlefields the decisive role will be played by fire of nuclear weapons; the other means of armed combat will utilize the results of nuclear attacks for the final defeat of the enemy.*

In 1971, Soviet Defense Minister Marshall A.A. Grechko further attested to the notion of the utility of nuclear weapons on the battlefield when he said:

*The operational and tactical missile units comprise the basis for the firepower of the Ground Troops. This is a qualitatively new branch of arms which is the basic means for employing nuclear weapons in combat and operations.*

A University of Miami research team (Leon Goure, Foy D. Kohler, and Mose L. Harvey) concluded in **The Role of Nuclear Forces in Current Soviet Strategy** (1974), that basic Soviet doctrine has not changed in over a decade and emphasis on the use of nuclear weapons in war remains a cornerstone of Soviet doctrine. Professor Kohler, a former United States Ambassador to the Soviet Union, said:

*Today as much as at any time since the Kremlin finally effected in January 1960 its adjustment to the 'revolutionary' implications of nuclear weapons for warfare, Soviet military theory, doctrine, strategy, war planning, force structure and organization, instruction and training programs, battle exercises, resource allocations, research and development programs and activities, civil defense efforts, indoctrination programs for the troops and for the population, war readiness measures, and so on are all keyed to and dominated by the nuclear weapons factor. We have no evidence that agreements reached at the Moscow and Washington Summits of 1972 and 1973, or the general relaxation of tension between the U.S. and the U.S.S.R. have brought any changes in Soviet positions.*

Colonel William F. Scott (US Army, Retired) notes in a 1975 essay entitled, "Soviet Military Doctrine and Strategy: Realities and Misunderstandings," that neither the Cuban Missile Crisis in 1962, the Limited Test Ban Treaty in 1963, the ouster of Krushchev in 1964, nor the SALT agreements of 1972 have altered basic provisions found in Soviet doctrine and concepts. Weapon systems development, production, and deployments (says Scott) have all been in line with stated military objectives and principles.

A July 1977 essay by Richard Pipes, Professor of History at Harvard and the former director of the Russian Research Center, further reinforces arguments on the Soviet intent to use nuclear weapons in land combat. Pipes argues that while the United States considers nuclear war "unfeasible and suicidal for both," the Soviet Union views it as "feasible and winnable."

*. . doctrine adopted by the USSR over the past 2 decades calls for a policy diametrically opposite to that adopted in the United States by the predominant community of civilian strategists: not deterrence but victory, not sufficiency in weapons but superiority, not retaliation but offensive action . . .*

An examination of the continuing nuclear emphasis in Soviet tactical warfighting doctrine,

*"Warsaw Pact forces . . . are trained for follow-on attacks by armored forces to exploit the nuclear attack and rapidly seize NATO territory."*

along with the increased hardware capability to carry out warfare in a nuclear environment, follows.

**Soviet Tactical Warfighting Doctrine and Concepts.**

The predominant tenet of Soviet tactical doctrine is in achieving results through offensive action while exploiting the use of nuclear weapons. Seizing and maintaining the initiative is indispensable to success in battle. The thrust of this principle is expressed in Soviet military literature in terms of boldness and decisiveness in the execution of combat operations—which translates as attack. Soviet ground forces see a defensive posture as only temporary while seeking an opportunity to resume the offensive. While in a defensive posture, ground forces are instructed to prepare for the resumption of the offense at the earliest opportunity.

Soviet tactical doctrine emphasizes an offensive based upon surprise, speed, decisiveness, shock power, and the exploitation of nuclear weapons and operations in a nuclear environment. The following statements by Soviet military officers illustrate the importance and expected use of nuclear weapons in the offensive.

Major General V.G. Reznichenko:

*The main purpose of offensive combat is the complete destruction of a defending enemy, and will now be achieved, first of all, by strikes of nuclear weapons and firepower or other means of destruction, and by the growing [in force] swift actions of the motorized infantry and tank troops coordinating with aviation and with paratroop drops.*

Lieutenant General I. Zavyalov:

*. . . use of nuclear weapons has further emphasized the role of the offensive as a decisive form of military action, even given rise to the necessity to solve defensive tasks by means of active offensive operations.*

Marshal V.D. Sokolovsky, **Soviet Military Strategy,** 1968 edition:

*Immediately after the nuclear strikes the airborne troops will be landed, and an attack will be begun by tank troops . . .*

Colonel A. Sidorenko:

*To attain the greatest effectiveness, it is recommended that the nuclear strike be launched at the start of the firepower preparation unexpectedly for the enemy. Preemption in launching a nuclear strike is expected to be the decisive condition for the attainment of superiority over him and the seizure and retention of the initiative.*

Marshal of Armored Troops P.A. Ropmistrov:

*This weapon [nuclear] . . . is expected to insure the rapid achievement of strategic results at the very start of combat actions . . . What is more, the use of nuclear weapons sharply increases the combat capability of ground forces and offers them extensive new opportunities for waging actual offensive operations.*

Major General I. Kupchenko:

*The employment of nuclear weapons has greatly increased the role and significance of surprise in combat and has raised the requirement for its attainment.*

Soviet military doctrine also states that if the Soviet Union is threatened with war, it will initiate a preemptive attack with nuclear strikes which, among other targets, would seek to destroy the enemy's nuclear weapons forces before they are launched.

Soviet literature describes the modern battlefield as wide, deep, and subject to sudden changes in the relative combat power of the contending forces. Battlefield tactics are geared to speed, mobility, and firepower—all characteristics of the nuclear battlefield. Their motorized rifle and tank divisions have the capability to conduct operations in a nuclear environment over great distances in short periods of time. It is worth noting that former Secretary of Defense James R. Schlesinger highlighted in his FY 1976 **Annual Defense Department Report** to Congress the growing Soviet theater nuclear capability. His report stated:

*But however much the original initiative lay with us, the Soviet Union has shown the liveliest possible interest in the concept of theater nuclear warfare. As a consequence, it is now the Soviets who set the pace here, as they do in so many other respects.*

Soviet Warsaw Pact ground forces have dual nuclear and conventional warfighting capabilities. However, their primary effort is directed toward the preparation and training for nuclear war. The relationship between nuclear and conventional warfare from a Soviet perspective is not an either/or proposition. The Soviets view conventional and nuclear warfare as a single concept where future battlefields will employ both types of munitions in achieving the overall objective. In a report to the Congress in April 1975, the Secretary of Defense described Warsaw Pact forces, doctrine, and training as oriented for battle in nuclear environment. Excerpts from his report state:

*Warsaw Pact forces, current doctrine and training indicate a readiness, however, for conducting war in Europe with theater-wide, large scale nuclear strikes. Their large armored forces are postured to exploit these*

*nuclear attacks with rapid, massive penetrations . . .*

*The Warsaw Pact does not think of conventional and nuclear war as separate entities. Despite a recent trend to improve its conventional forces and to recognize that a conventional war in Europe need not escalate to nuclear war, the WP strategy, doctrine, and forces are still strongly oriented toward nuclear operations . . .*

*While there are indications that Warsaw Pact strategists have accepted the concept of a possible initial conventional phase, WP forces are in fact postured and trained for theater-wide nuclear strikes against NATO nuclear and conventional military forces and for follow-on attacks by their armored conventional forces to exploit the nuclear attack and rapidly seize NATO territory.*

Soviet ground forces are taught that successful combat operations depend on the integrated employment of all branches and services. Theater nuclear weapons are a fundamental part of the overall warfighting capability. In fact, according to the late Soviet Defense Minister Marshal A.A. Grechko, "Nuclear warhead missiles will constitute the decisive means of warfare." Theater nuclear forces are part of the combined arms team of infantry, armor, artillery, air defense, and tactical air support. Russia shows no sign of accepting nuclear weapons or conventional weapons as a one arm, unsupported capability. Her tactics emphasize the necessity for coordinated action of maneuver and fire support elements, and of nuclear and nonnuclear weapons. The coordination and integration of all elements of combat power are considered by the Soviets as a most important duty of the field commander. Major General V. Reznechenko and Colonel A. Sidorenko wrote in June 1956 that—

*It is no longer simply combat by mechanized infantry, tanks, artillery, and aviation which can solve tactical problems, but it is primarily nuclear weapons and highly maneuverable coordinated actions of combined-arms formations, units, and subunits. A rapid maneuver, in conjunction with nuclear fire thrusts and headlong attacks, is the essence of modern combat.*

*The skillful use of a nuclear weapon in combat enables one to increase the relative strength of one's own forces and to achieve the destruction of the enemy in a short time. Springing from this is the need for commanders to have a thorough knowledge of the combat properties and capabilities of the nuclear weapon and of the means of delivering it to the target, and to attain skill in rapidly analyzing the situation and making use of the results of this weapon.*

Beyond the fact that Soviet writers appear to see nuclear weapons and nuclear armed forces as central to all phases of Soviet military power, there is also evidence that military planning for theater warfare is based primarily on operations in a nuclear environment. Soviet ground forces are taught and practice tactics and techniques designed to achieve success on the nuclear battlefield. All troops—combat and combat support—receive frequent chemical, biological, and radiological (CBR) training, which includes the wearing and use of protective clothing and equipment and the use of detection and decontamination equipment Most field maneuvers include prolonged operations conducted by the troops wearing protective masks and clothing.

General Brown's FY 1978 Military Posture statement describes the magnitude, emphasis, and scope of Soviet CBR readiness in rather stark terms. According to General Brown:

*"The Soviet objective is to be qualitatively and quantitatively superior in all aspects of military strength-conventional as well as nuclear."*

*The Soviet/Warsaw Pact forces continue to maintain a superior capability to operate in toxic environments. They are the best equipped and prepared forces in the world to employ chemical weapons and to operate under chemical, biological, and radiological [CBR] warfare conditions.*

**On Soviet Training Areas:**

*CBR training areas are becoming more sophisticated, improved training methods are being developed, and equipment is being improved and fielded at an increasing rate.*

**On Soviet/Warsaw Pact Doctrine and Plans:**

*There is no evidence to suggest slowdown in their efforts to improve troop operations in toxic environments. Warsaw Pact doctrine and plans envision the employment of these weapons in conjunction with either conventional or nuclear weapons. A variety of delivery systems and chemical agents for use against any tactical target in the battle area is available to front commanders.*

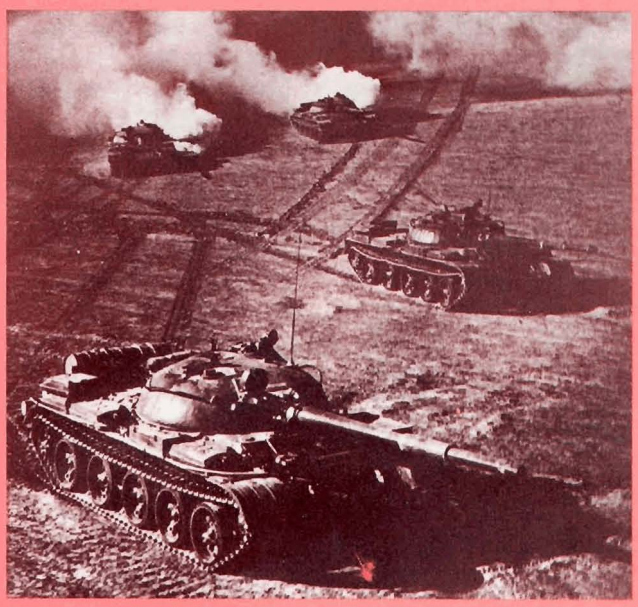
*Interwoven throughout all of the formidable efforts being put forth by the Soviets and other Warsaw Pact forces is the tenet that a viable CBR protection posture is a prerequisite to employment of mass destruction weapons whether nuclear, chemical or biological.*

**On Tactical Operations:**

*They [Soviet/Warsaw Pact] are unsurpassed in their capability to protect themselves and to conduct offensive and defensive tactical operations when such weapons are used.*

**On Training:**

*The Soviets emphasize the need for field personnel to be able to perform their duties while wearing full protective clothing and require that such clothing be worn while performing strenuous tasks under simulated combat conditions.*



*"Soviet CBR training areas are becoming more sophisticated . . ."*

General Brown's FY 1978 Military Posture statement disclosed that increasing numbers of both combat and combat support vehicles with integrated CBR collective protection systems are appearing throughout the Warsaw Pact area.

**Maneuvers:**

Realism prevails in Soviet maneuvers. Live isotopes are used to simulate nuclear contamination. Airborne troops often fire on popup targets and air and artillery fire is used to "prep" objectives during maneuvers. Two-sided exercises are generally preferred but frequently the Soviets will conduct live-fire exercises.

One military analyst disclosed that NATO and the US Seventh Army estimate that since 1971 the time spent by Soviet forces in training for warfare on a nuclear battlefield and the amount of equipment devoted to nuclear operations have increased by more than 30 percent.

**Soviet Conventional Emphasis:**

Some military commentators claim they have detected indications in Soviet military publications that lead them to believe there has been a change in Soviet thinking. These analysts are predicting a return to a doctrine envisioning more conventional forms of war.

For the past 10 years the development of Soviet ground forces seems to be marked by an effort to improve conventional firepower; however, improvements and equipment are as nuclear-oriented as conventional. This might lead one to believe that the Soviet Army has sufficient military means to meet a battle under a nuclear threat without using nuclear weapons. The increased attention by the Soviets to conventional warfighting capabilities over the past decade does not represent any less readiness for nuclear war. Conventional forces have always been part of a nuclear attack strategy. Colonel A.LA. Sidorenko of the Soviet Army has written:

*The principle of the employment of nuclear weapons in combination with other means of destruction follows from the fact that it is impossible to destroy all varied objectives on the battlefield with nuclear weapons alone. It is believed that nuclear weapons, as the main means of destruction, will be employed only for the destruction of the most important objectives; all other targets are neutralized and destroyed by the artillery, aviation, and the fire of tanks and other weapons. In other*

*words, nuclear weapons are deployed in combination with other means in accordance with the concept of battle.*

Soviet tactical doctrine for fighting, surviving, and winning a nuclear war has undergone no significant change since Marshal Sokolovsky's book first appeared. Nuclear weapons provide the firepower for the ground gaining force to seize and occupy territory while the conventional capabilities provide the other essential instruments to accomplish the wartime mission of the ground gaining force. The nuclear weapon is a military fact that retains its full value. Moreover, current organization, equipment, and training for a nuclear environment substantiate this.

Soviet developments over the past decade have led to an even greater improvement of the ground forces' capability to wage nuclear war. The Soviets have shown no indication of reducing the strength of their nuclear capable systems. As they improved conventional forces they also improved their nuclear capabilities. A move toward a conventional warfighting posture would be tantamount to giving the initiative of employing nuclear weapons and the advantage of the element of surprise to their adversary. It would also be equivalent to denying the nuclear weapon its decisive character that has been and is consistent in Soviet military literature.

In Soviet tactical doctrine, the importance attached to the initial phase of battle lies in the belief that this period will influence the subsequent course and conclusion of the battle. To delegate nuclear forces to a reserve role would be in absolute contradition to the concepts accepted and expressed consistently by Soviet military writers. If there has been any change in Soviet doctrine it may be away from past references to automatic nuclear escalation and toward a possible limited or selective nuclear weapons employment. As Secretary of Defense James R. Schlesinger observed:

*In their exercises the Soviets have indicated far greater interest in the notions of controlled nuclear war and nonnuclear war than has ever before been reflected in Soviet doctrine.*

Conventional force improvements reflect the continuing thrust of the Soviet Union for military superiority in all aspects of warfare. The conventional buildup in recent years should not be seen as separate from but as compatible with combined arms doctrine. As stated by Joseph D. Douglass and reflected in many such assessments—

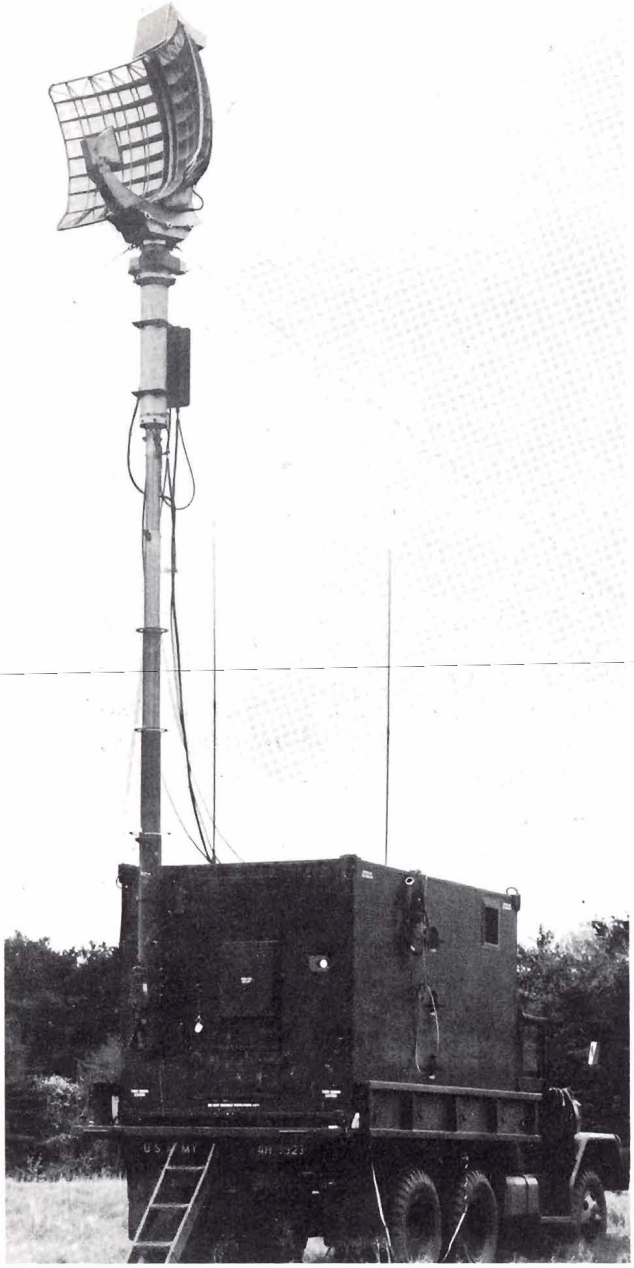
*. . . the increased conventional emphasis reflects the continuing revolution in military affairs that was initially triggered by the nuclear weapon and now continues and expands into all aspects from command/control to small arms to precision-guided munitions. The Soviets' objective is to be qualitatively and quantitatively superior in all aspects of military strength—conventional as well as nuclear. However, modern war and modern means still include nuclear weapons as the most important weapons.*

**Conclusion:**

Evidence suggests that Soviet ground forces and military planners envision the conduct of military operations in future war in a nuclear environment. Their doctrinal literature focuses on it; their training is oriented around it; their organization and equipment are able to fight and survive in it; they have developed, tested, and deployed a variety of nuclear capable weapon systems; and they advocate an offensive strategy through which they intend to implement it. Soviet writers on military affairs appear, generally, to see nuclear weapons and nuclear armed forces as central to all phases of Soviet military power.

In light of Soviet warfighting doctrine, equipment, organization, and training, it seems imperative that the US Army (whose current doctrinal direction is aimed at the conventional battlefield as seen in FM 100-5, "Operations" (1976) and other "How-To-Fight" doctrinal manuals) direct greater attention toward warfare in a nuclear environment.

*Major Rose is a graduate of the University of Dayton and recently received a Ph.D. in International Relations from the University of Southern California with emphasis in US Defense and Strategic Studies. He has served in Hawk batteries in Germany and Vietnam and is currently assigned to the Department of Social Sciences at West Point.*



# FAAR DEP
# RELATED I

Captain Will

The purpose of this article is to discuss problems encountered in employing the forward area alerting radar/target alert data display system (FAAR/TADDS), with the goal of providing a clear idea of what can realistically be expected from the system on the battlefield.

A secondary purpose is to bring together information on the FAAR that is presently scattered through four different military publications and Air Defense School teachings that have not yet been published.

The crews of Chaparral, Vulcan, and Redeye rely entirely on visual aircraft recognition before making an engagement decision. Consequently, they have only a very short time in which to engage. The range at which the aircraft is identified determines the amount of time the crew has in which to engage the target. The average recognition range by observers who are given large search sectors and no early warning is about 900 meters. When observers are assigned small sectors and provided alerting information, their recognition range increases to about 4,000 meters. So SHORAD crews need fairly reliable alerting information. It is for that purpose that the FAAR/TADDS system was fielded, and it is essential to SHORAD crews and the assets they are defending that the system performs effectively.

**The FAAR's Role**

The FAAR system is organic to the radar platoon of the headquarters and headquarters battery of each Chaparral/Vulcan (C/V) and Vulcan battalion. The radar platoon is allocated two FAAR sections for each firing battery in the battalion. Therefore, each divisional C/V or Vulcan battalion has eight FAAR sections in its radar platoon and nondivisional battalions have six sections.

The radar platoon has a headquarters section led by a SHORAD-qualified lieutenant and six or eight FAAR sections. Each section has a section chief, senior radar operator, and radar operator/vehicle driver.

The radar uses the doppler shift to eliminate stationary targets and acquires moving targets at speeds in excess of 40 knots. It can detect hovering helicopters because the blade rotation exceeds 40 knots. The FAAR displays targets out to a range in excess of 15 kilometers on the radar's control-indicator scope. After the radar operator designates a target as "Friend" or "Unknown," the approximate target location and tentative identification are transmitted from the FAAR via radio-frequency data link (RFDL) to the TADDS, located with SHORAD crews, using one of the AN/VRC-46 radios.

The TADDS is located with Chaparral and Vulcan squads and platoons and all Redeye teams and sections. It contains an FM receiver and a decoder that processes the RFDL signal sent from the FAAR. The information is displayed on a matrix 7 squares long and 7 squares wide. Each of these 49 squares normally represents a ground area of 5 kilometers square and has two discs. A green disc displayed in a square indicates a

possible friendly aircraft within that 5-kilometer square and an orange disc indicates an unknown or possibly hostile aircraft in that area. The TADDS is powered by a rechargeable, 6-volt DC, nickle-cadmium battery. The SHORAD crews must maintain a good charge on the TADDS. If the battery runs low, it takes at least 14 hours to recharge it. (Consult TM 9-1430-589-12 for charging technique.) The TADDS receiver can pick up voice communications from either the RFDL signal or the FAAR operator. So the FAAR operator can send additional information such as raid size and aircraft speed and heading to the SHORAD fire units.

For the TADDS to display useable target information at the fire units, the following requirements must be met:

■ The fire unit must know the location of the FAAR that is transmitting the data.

■ The FAAR and TADDS must be oriented in the same direction, which is magnetic north.

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■ The TADDS must be set on the same FM frequency and RFDL address code as the transmitting FAAR. This information is obtained from the current CEOI.

■ Because an FM radio is used to transmit data, line of sight must be maintained between FAAR and the supported SHORAD fire units.

■ The FAAR must be within 15 kilometers of the supported fire units.

**Limitations**

The Gama Goat presents one of the major employment problems. FAAR equipment carried on the Goat weighs more than 3,300 pounds, while the vehicle is designed to carry only 2,900 pounds. The assembly has a high center of gravity, which makes it top-heavy; so its capability for traversing rough terrain is limited due to the tendency to overturn easily. The FAAR cannot always keep up with the fire units it is supporting, even on improved roads, since its speeds must be kept below 40 mph (25 mph in Europe). Although the Gama Goat itself is swimmable, it cannot swim while carrying the radar. It can ford depths up to 30 inches however. All these factors necessitate a careful selection and reconnaissance of routes of march and access routes to planned positions.

The FAAR system must be deployed where there is as little radar masking as possible. Also, an area with a tree canopy of 30 feet or higher is unacceptable because the radar mast does not extend above 30 feet. Further, the terrain cannot have a slope in excess of 10° if the emplaced radar's antenna is to be able to obtain a true vertical position.

With no armor protection, FAAR is vulnerable to small arms fire. However, this security problem could be reduced if the FAAR collocated with a Vulcan fire unit. But the radar, which has a high profile (with the antenna continually turning during operation), poses another security problem.

**Employment**

Normally, the FAAR sections are controlled and deployed by the FAAR platoon leader under supervision of the C/V battalion S3. There are several factors that bear on the employment of the FAAR sections. The location and mission of the supported fire units are of primary importance. Although FAAR sections are deployed to provide information to the fire units, the fire units do not always locate with the receipt of that information in mind. So, if several SHORAD fire units are unable to receive information on their TADDS, a FAAR section(s) should be required to relocate for better support of these units.

Returning to security, particularly in defensive operations it may be difficult to locate terrain that is secure or that combat commanders will permit the FAAR to occupy since the ease with which it can be detected might give away the location of combat units or facilities. Since FAAR can be targeted by either enemy air or artillery, alternate positions must be planned to enhance survivability. Every effort should be made to conduct a reconnaissance of both the proposed positions and the routes to them. This action will save valuable time if displacement becomes necessary.

Finally, plans for future division operations also play a role in determining FAAR deployment. Whenever possible, FAAR should be positioned to support not only current operations but also these future operations. Generally, FAAR sections are positioned farther forward for offensive operations and are evenly spread for defensive operations.

Guidelines have been established for FAAR/TADDS deployment that take into consideration the system's capabilities and limitations.

■ FAAR should be deployed no closer than 2 kilometers from the forward edge of the battle area (FEBA) for the sake of security from small arms fire. If it is deployed closer, or beyond the FEBA, it should be located only in secured areas.

■ If possible, FAAR systems should be positioned no more than 9 kilometers apart so that if one of the systems goes out of action, continuous

radar coverage of the area will still be maintained. When the area to be covered is so large that it is not possible to position all radars that close to one another, FAAR should be deployed in pairs, with no more than 9 kilometers of separation. Overlapping radar coverage between pairs will minimize radar gaps.

■ To provide adequate alert warning to the fire units, radar coverage should extend at least 10 kilometers beyond the supported units in the direction of expected air attack. If this coverage is not provided, the unit's location on the TADDS display will be in the outer two rows of squares. This would result in the fire unit have to search a greater area in azimuth, thus increasing the time required to detect and identify a target and get set to engage.

Under these guidelines, FAAR may be deployed using one of two methods: area coverage or attachment. **Area coverage** is the primary method of deployment and is used by the FAAR platoon leader under the supervision of the C/V battalion S3. Using this method, radar coverage of the maximum area is provided (with priority going to SHORAD fire units operating near the FEBA and defending critical assets). This coverage may be weighted toward likely low-altitude avenues of approach.

**Attachment** is used to support SHORAD fire units involved in a separate operation that is at such a distance from the other fire units that control and communications would be difficult, such as a convoy movement. In attachment, a minimum of two FAAR sections must be used for each operation. FAAR is attached to SHORAD units only.

On defense, the radars should be positioned to provide area radar coverage as described above throughout the division area of operations. Should enemy forces succeed in penetrating the FEBA, it may be necessary for FAAR sections to relocate to planned supplementary positions that afford good radar coverage of the area of penetration. If a retrograde movement becomes necessary, FAAR systems should be leapfrogged rearward and positioned to insure that enough radars are operating to provide continuous area coverage. FAAR sections could be attached to SHORAD batteries involved in the withdrawal when central control becomes difficult due to extended communications and control distances.

In offensive operations, FAAR sections are positioned farther forward to provide radar coverage for Vulcan and Redeye fire units advancing with the attack forces. However, enough sections must remain in the division rear to provide radar coverage for the Chaparral units defending critical assets. As the attack commences, if enough systems are available, one or two FAAR systems may be placed in march order prepared to deploy to positions farther forward as territory is seized and secured. Sections may then displace alternately (leapfrogging) to provide continuous radar coverage for advancing SHORAD units.

If the attack turns into an exploitation or pursuit operation with objectives deep behind enemy lines, FAAR would probably be unable to keep up with the advancing forces by alternating positions. Additionally, security of the system might become an overriding concern because small pockets of enemy resistance may continue in existence until follow-on forces secure the area. It may then be necessary to keep the FAAR sections with the follow-on force for security reasons. To maintain flexibility in an extremely fluid situation, sections could be attached to SHORAD batteries. If the attack slows down, battery commanders may be in the best position to decide radar locations. After the situation stabilizes, control could be returned to the battalion.

The FAAR system can also be used in airborne or air assault operations. It is air-transportable either as an exterior load by a CH-47 (or larger helicopter) or as an interior load in a C-130 (or larger aircraft). System security is again an extremely important consideration. FAAR should not be introduced into the airhead or objective area until the area is relatively secure from small arms fire. Since communications and control lines are extended in these operations, each towed Vulcan battery supporting a brigade would have two FAAR sections attached. The remaining two sections would stay under battalion control.

Although SHORAD fire units generally cannot identify and engage aerial targets during night operations or periods of limited visibility, the FAAR can still be used to detect aircraft during these periods. This capability could be used to monitor aircraft flights over the division area, assist disoriented friendly aircraft in reaching airfields, provide intelligence concerning possible hostile air movements, or alert the division to incoming hostile aircraft. However, troops and weapons should be made available during periods of darkness to provide security for the FAAR section.

The FAAR/TADDS system has a limited electronic counter-countermeasure (ECCM) capability to overcome an electronic countermeasure (ECM) threat. It is equipped with a device that can detect jamming and indicate the general azimuth from which the jamming is being received. The indication is a video band on the outside ring of the plan position indicator (PPI) that is located in the operator's control indicator unit. At this point, the operator turns the receiver VIDEO switch to RAW/STROBE ON JAM, then adjusts the receiver video attenuator switch to determine the azimuth to the jammer. The section chief

immediately relays this information, encoded, through the command communications net. When two or more radar sections complete this action, the battalion S3 can, through map intersection, locate the approximate position of the jamming equipment (if ground based) and try to obtain fire or air support to eliminate the source. Meanwhile, the operator has only three courses of action available to overcome the effects of the jamming signal. First, he might be able to acquire and track targets through the interference, if the jamming signal strength is low. But if the jamming is effective enough to keep him from detecting targets on his scope, he can attempt to decrease the effectiveness of the jamming signal by sector-blanking the area from which the signal is coming. Sector-blanking is the capability to prevent the radar from radiating over a given arc of a circle from 1 to 359° while still radiating over the remainder of the circle. This capability may also be employed if the radar is receiving interference from other electronic equipment operating in its vicinity. Possibly, this method may not be effective against a jamming signal because the signal may still affect the radar through the side lobes it generates. If that occurs, the operator has only one remaining course of action. He can change the transmission frequency of the FAAR. However, this procedure requires about 30 seconds to accomplish. It is done by changing the setting of the 12-position STAMO frequency dial on the radar receiver. Then the operator must install the band pass filter for the receiver, which corresponds to the selected STAMO frequency. This will permit the receiver to accept return signals generated by the transmitter. If the enemy is employing an ECM unit that can quickly scan the frequency band on which the FAAR is operating, he will be able to relocate the new frequency quickly and again jam the system. The FAAR system currently has no effective defense against this activity.

Because the RFDL between the FAAR and the TADDS is an FM radio, this signal can also be readily jammed. The radio operator has two choices to counteract jamming the RFDL. He can attempt to plot tell target location and information by voice over the RFDL FM radio to the TADDS at the fire units or he can change to an alternate frequency and code listed in the current CEOI. For the first action to be effective, the battalion tactical SOP must have established a grid labelling system for the TADDS matrix that is common throughout the division to allow plot tell of target position to SHORAD fire units. If alternate frequencies and codes are used, all units receiving information from that FAAR system must change the frequency and code on the TADDS. But the enemy may once again have the capability to sweep the FM frequency band and reacquire the new frequency being used for the FM RFDL and jam that too.

The weapons that will be employed by our opponent in a future battle will almost certainly include ECM equipment and, as we have seen, the FAAR/TADDS system is vulnerable to ECM. Without altering the system, the best method the ADA commander currently has to combat ECM is extensive and intensive training of FAAR operators under ECM conditions. This in itself is difficult; however, a solution to this training problem has been developed. Sanders Associates, Inc., has produced a portable FAAR trainer/evaluator that can simulate targets and all known jamming in video on the radar operator's PPI exactly as it would appear in combat. The Army intends to field this system with each C/V and Vulcan battalion as soon as possible after funding is obtained to put it into production.

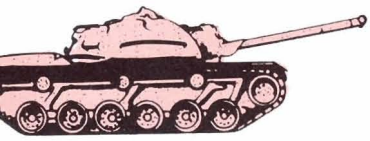
Fielding the trainer/evaluator, however, will not completely resolve the inherent shortcomings of the FAAR itself. It is my opinion that the system will not be fully viable in combat unless it is equipped with the following items of ECCM equipment which, incidentally, are available now:

- A fast frequency change device that would provide the radar with frequency agility to avoid ECM signals more effectively.
- A side lobe cancellor to cancel side lobe jamming usually used by stand-off jammers.
- An Ajax ECCM device that is effective against self-screening jammers.

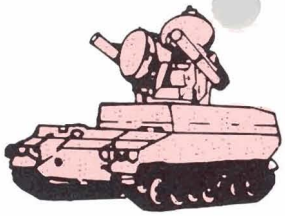
Also, the prime mover should be changed to permit the FAAR to use terrain more effectively to support SHORAD fire units on the move. One current concept places the radar set on a double-axle trailer capable of carrying it with much greater stability than provided by the Gama Goat. The trailer could be towed by any vehicle with the capability of at least a 2½-ton, cargo truck.

Whether improvements are made in the system or not, it is imperative that ADA commanders understand the limitations of the FAAR/TADDS system. If any alerting information can be expected, the FAAR operators must be intensively trained under ECM conditions. Additionally, even if improvements are made, ADA officers must be educated in the techniques of deploying this system to minimize its shortcomings while enhancing its capabilities.

*Captain Mattfeld graduated from the US Military Academy in 1971. He has served as commander of ADA units and was a Chaparral/Vulcan/FAAR instructor in Tactics Department, US Army Air Defense School in 1975 and 1976. He was also in charge of Advanced Individual Training in FAAR operator training and package training. He is now commanding Btry A, 1st Bn [Hawk], 44th ADA in Korea.*



# THE RESTRUCTURED DIVISION



COLONEL WILLIAM O. STAUDENMAIER

In its search for the optimum mix of battlefield mobility and firepower, the Army has reorganized its basic combat division four times since World War II. The TRIANGULAR, PENTOMIC, ROCID, and ROAD divisions followed one another in quick succession. Today, a combination of the combat experience provided by the Arab-Israeli and Vietnam conflicts—the introduction into modern armies of new, complex weapon systems and the expected increase in the intensity and lethality of modern warfare—demands still another major Army reorganization. Therefore, the US army Training and Doctrine Command (TRADOC) has developed and is in the process of testing the Restructured Division Concept.

**Restructured Division Concept**

To understand and properly evaluate the divisional air defense requirements that will result from the restructuring of the division, it is necessary to review some of the underlying organizational and doctrinal concepts. The purpose of the reorganization is to develop a new division structure that will integrate and optimize the employment of the next generation of Army equipment. New tanks, personnel carriers, artillery, helicopters, and air defense weapons, wedded to new tactical doctrine, will characterize the Army of 1985. The developers of the Restructured Division hoped to provide a clear organizational alternative that would provide the greatest potential for the new doctrine and the new technology.

To achieve this goal, the division was structured with smaller, although more numerous, maneuver battalions with increased firepower and mobility. The concept also enhanced the division's organic air defense, aviation, and field artillery capabilities. Combat service support elements were changed to keep logistic systems in step with the combat arms. The salient features of the Restructured Division are summarized below:

■ The battalion, rather than the company, is the base unit at which combat arms integration occurs. The maneuver battalions are smaller but more numerous, totaling 15. (Although the current brigade could be assigned 3 to 5 battalions, seldom are 5 assigned.) Like-weapons are grouped in company organizations; for example, there are dedicated tank, TOW, and mechanized infantry companies. But the companies are smaller—11 tanks per company and 3 tanks per platoon, with 9-man squads rather than the current 11. The normal mode of operation will be to tailor battalions by cross-attaching companies rather than by tailoring within companies.

■ The division artillery is being restructured to improve its target acquisition and fire support coordination capability and to increase its weapons density. The 4 divisional field artillery battalions will be expanded to 16 firing batteries with 112 tubes, representing a 70 percent increase in firepower.

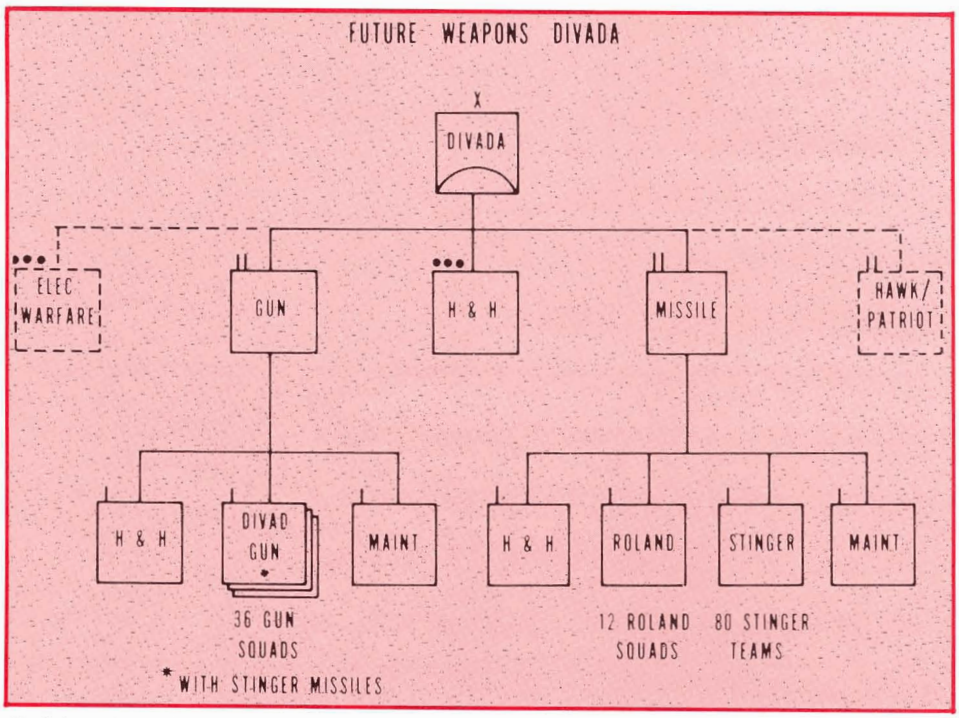
■ The assignment of a combat aviation battalion will enable the consolidation of all divisional air assets, including the air cavalry troop, under division control. In addition to its tank-killer role, the attack helicopter is accorded a key role in the new tactical doctrine as a prime element of the division's mobile reserve.

■ Although the division engineer battalion loses its organic bridging capability, it plays a vital part in the active defense, which will be examined shortly. New equipment such as the surface launch unit fuel air explosive (SLUFAE); the surface launch unit, mine (SLUMINE); and the improved combat engineer vehicle (CEV), will enhance the battalion's effectiveness in mobility and countermobility operations.

■ Of more parochial interest, the Restructured Division also includes a new division air defense artillery (DIVADA) organization. The improved field army air defense systems of the 1980s have been designed to provide the freedom of maneuver demanded by the division's tank and mechanized infantry elements. The air defense contribution to tactical doctrine, as well as its organizational aspects, will be considered in more detail in a later issue.

■ Combat service support units will be weapon systems oriented and structured to "arms forward, fuel forward, and fix forward."

Structural changes will enable the division to handle the increased ammunition resupply tonnages required by the proliferation and greater expenditure rates of future weapons. These weapons will be rearmed at their forward battle positions. Additional storage capacity will increase the division's fuel reserve by about 80 percent. Moving maintenance support closer to the main battle area (MBA) should also result in more rapid repair part replenishment and in faster return of disabled equipment, thus lowering equipment deadline rates.




■ A chemical defense company will be organic to the division to counter the Soviet chemical capability more effectively. A combat electronic warfare and intelligence (CEWI) battalion has also been added to provide the division with more efficient management for intelligence and electronic warfare operations. An air defense electronic warfare platoon from the CEWI battalion will be in direct support of DIVADA.

**Test of the Restructured Division**

While there is much to praise in the Restructured Division Concept, there are also some potential weaknesses that should be carefully and comprehensively examined. Among these are the brigade's extended span of control, the marginal combat sustainability of the smaller platoons and companies, the advisability of removing the medical evacuation battalion from the division and, perhaps most critically, the questionable adequacy of tactical communications for command and control of the Restructured Division. These and other issues such as the DIVADA concept were programmed for test and evaluation by TRADOC.

Originally, the reorganization of Army divisions was to be implemented in three phases:

Phase I - Development of the conceptual division organization.

Phase II - Restructuring of an active division to test and refine the conceptual organization that was developed during Phase I. These tests were to progress from battalion-level tests to a division minus test to a full-scale test at division level.

Phase III - Implementation of division restructuring throughout the Army beginning in FY 79.

During Phase I, the Restructured Division Concept was briefed Army-wide and received significant support, although the concerns noted above were raised. At the end of Phase I, the proposed concept was reviewed by an independent ad hoc group consisting of representatives from the Army War College, the Strategic Studies Institute, and action-level members of the DA Staff. This group concluded that the restructuring proposals, without exception, merited test or evaluation. The report also noted, however, that a major reorganization was not absolutely required; that product improvements to the current divisional structure were possible. In January 1977, the Army Chief of Staff approved the TRADOC test plan.

Consequently, the battalion-level Phase II tests were conducted at Fort Hood, Texas, from October to December 1977. The objective of this test phase was to compare the effectiveness of the restructured units with similar units from an active division. These tests, involving both attack and defense scenarios, used an automated, electronically monitored, real-time casualty assessment field instrumentation system. A review of the results of these battalion tests indicated that the remainder of the test plan—division minus and full-scale division—was overambitious. A decision was made to substitute a brigade test for the more comprehensive division-level tests. The emphasis will also be switched from the testing of combat support and combat service support units to issues pertinent to maneuver units that were not resolved by earlier testing.

In essence, this decision means that the

original desire to develop a clear organizational alternative to the current division will not be realized. Instead, evolutionary adjustments (product improvements) to current units will be made to enhance the effectiveness not only of the new generation of weapons but of on-hand equipment as well. Many of the structural changes recommended by the TRADOC developers will be implemented in this way. The effect that this decision will have on air defense, particularly in its command and control aspects (DIVADA), will be discussed in more detail in a future issue. Meanwhile, planning is underway to field DIVADA in the 9th Infantry Division and evaluate the concept during scheduled training exercises.

As was the case with the Restructured Division Concept, the effects of new weapons technology are at the base of the Army's new tactical doctrine. The tactical concepts in FM 100-5 have been derived from a consideration of Soviet weapons and tactics, of the experiences of the Arab-Israeli and Vietnam Wars, and from discussions with our NATO Allies, principally the *Bundeswehr*. As such, it represents the latest in Western military *theory*. And, as is the case with most theory, it raises as many questions as it provides answers.

Some of the questions that have been raised center on:

- Overemphasis on the defense in central Europe.
- Overemphasis on firepower at the expense of maneuver.
- Overemphasis on fighting a conventional war when the USSR is clearly prepared to fight with special weapons in central Europe.

More generally, F. Clifton Berry, Jr., of the Armed Forces Journal, has raised the following questions:

. . . whether sustained combat is possible under the doctrine, whether commanders imbued with it tend to the defense and shy away from the offense, and whether they have the will and means to regain the intiative in the ground battle if it is lost during the first engagements.

Other criticisms concern the heavy reliance on tactical mobility, both heliborne and tracked, on a battlefield that, according to our own doctrine, is likely to be dominated by firepower. This becomes critical when considered in relation to the idea that all forward deployed forces that are not engaged are considered to be "in reserve." That is, under the new doctrine, only small reserves will be held out of the battle line. Fighting when outnumbered requires that (1) most of the defending forces be deployed forward; (2) the enemy's main thrust be determined early; (3) risks be taken on the flanks by withdrawing lightly engaged units to concentrate them against the enemy's main attack, thereby altering the firepower ratio in favor of the defender. The question, and one with which ADA should be vitally concerned, is whether this battlefield lateral movement can be accomplished in the face of enemy ground and air interdiction.

The tactical concepts in FM 100-5 are based on the concept that Western Europe is of such vital strategic importance to the United States that the armed forces of the nation must be oriented on and structured for its defense to the exclusion, if necessary, of other areas of the world. It is a land-oriented strategy that, not incidentally as far as the Army is concerned, provides the chief force structure rationale for the Army's current 16 divisions. Without this focus on NATO, a likely strategy would be a maritime strategy that could muster support for only 8 or 10 ground combat divisions.

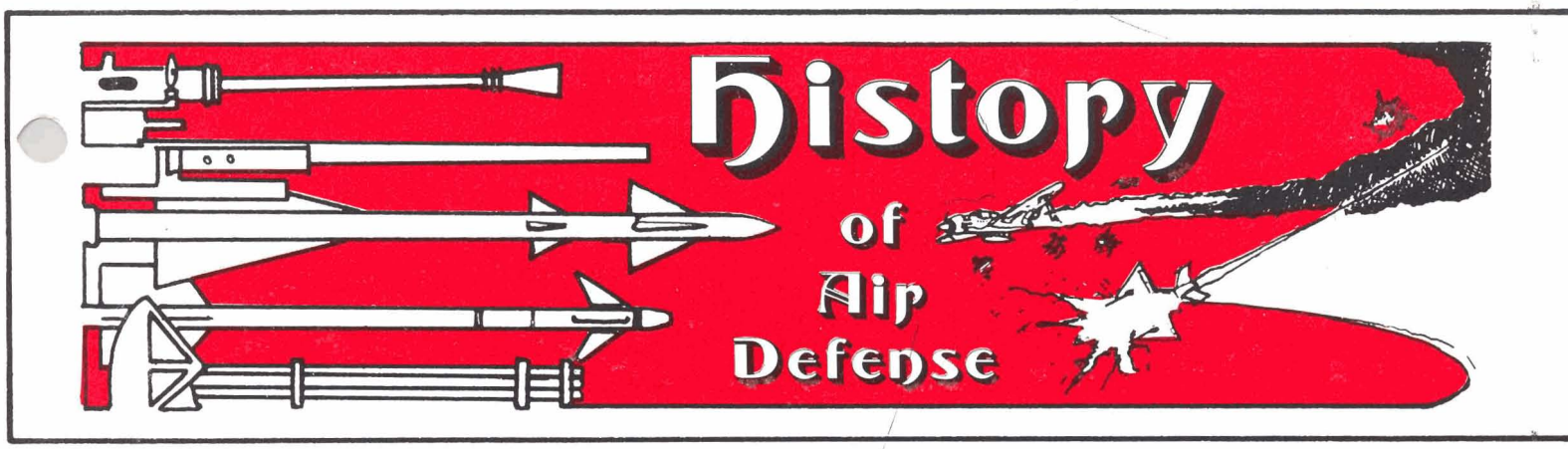
Despite recognized and potential flaws, both the new doctrine and the Restructured Division have created a healthy dialog throughout the Army, insofar as that dialog has been centered on fundamental tactical organization and doctrine.

**Air Defense of the Restructured Division**

It is important to the air defense community specifically and to the Army generally to review the adequacy of the organization and doctrine with which air defense will support the Army of 1985. The increased Soviet air threat to our field forces comes at a time when the US Army is virtually without senior commanders (or any other soldiers for that matter) who have experienced an enemy air attack. Obviously, the responsibility to insure that the Army can meet the challenge posed by the increased Soviet heliborne and tactical air threat falls squarely on the shoulders of those air defenders on active duty today. Therefore, it is important that we in the Air Defense Branch understand and debate the organizational and doctrinal issues that face the Army today. For out of today's debate will come the tactics of tomorrow's battlefield.

There is no branch of the Service that is more involved in the questions surrounding the new tactical battlefield environment than Air Defense. How successful the Air Defense Branch is in adapting to the new battlefield, both doctrinally and organizationally, will in large measure determine the success or failure of the Army on the battlefield of the future.

*Colonel Staudenmaier is one of the Army's more prolific writers, having had at least six major articles published in several leading Service magazines during the last 3 years. This is his fourth to be selected for publication by AIR DEFENSE Magazine. LTC Staudenmaier is currently assigned at the Army War College as an instructor with the Strategic Studies Institute.*




*Japanese Antiaircraft Tactics and Techniques in World War II.*

Combat divisions operating in the field did not have antiaircraft units assigned as an organic part of the division. Antiaircraft units were assigned to corps and armies, depending on the tactical situation existing at a particular time. When the combat commander determined that antiaircraft defense was required, it was necessary to request assignment of units from the next higher headquarters, who would make assignments according to availability. Antiaircraft units operating in the field consisted of gun battalions equipped with 75-mm or 88-mm mobile mounts. Other gun battalions were equipped with 75-mm, 88-mm, or 120-mm fixed mounts. Also available were units equipped with 20-mm antiaircraft weapons. Separate searchlight units were also used with the army in the field.

The combat division commander exercised complete control of any assigned unit. The division had no antiaircraft staff officer available but used the operations officer to perform this function. The nonavailability of an antiaircraft staff officer left many of the decisions to the antiaircraft unit commander.

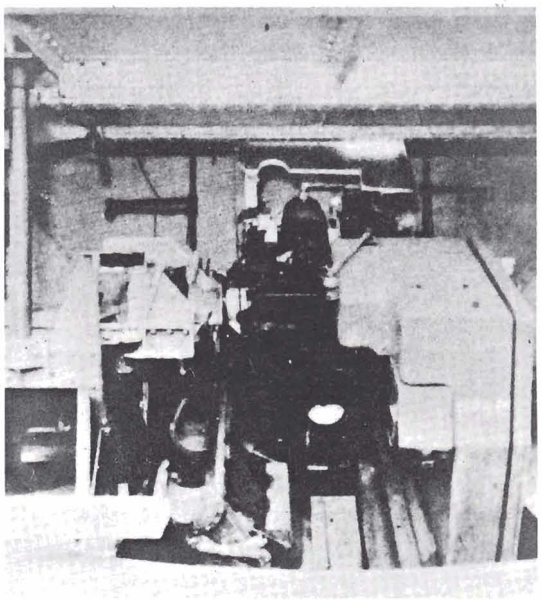
Early warning information was furnished to the units from separate radar units, searchlight and sound devices, and visual observation posts. Japan began in 1940 to employ pulse-radar transmissions and, by 1942, produced early warning sets comparable to our SCR-270 and SCR-271. The Japanese sets were known as the Taichi 6 and Taichi 7.

Target priorities were assigned by the combat unit commander through the operations officer. The antiaircraft commander decided on the exact target to be engaged.

The primary means of fire control at night was by use of searchlights and sound detecting devices operating with a mechanical computer. Radar, when introduced, furnished only early warning information. The primary means of communications was wire, with radio backup.

Fighter aircraft operating in an area were controlled by the Air Force and coordination with antiaircraft units was practically nonexistent. The Navy was responsible for the protection of its own

*150-mm antiaircraft gun experimental type, showing gun and splinter shield.*



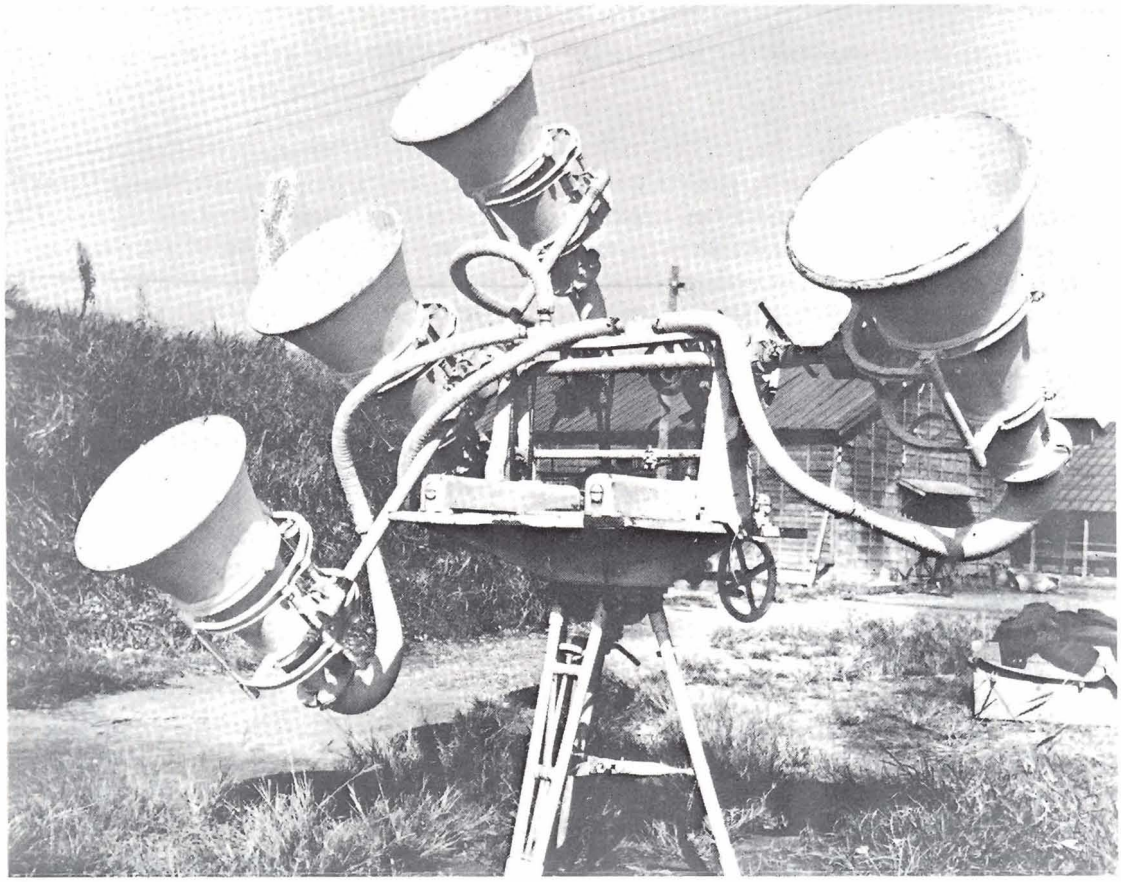
*Breech view of the 150-mm AA gun, experimental type, showing automatic loading mechanism.*

installations and did not coordinate its air defense activities with Army military elements. The only indication of coordinated control was in the defense of some small islands, where all units were under one command regardless of branch of service.

Japan's basic plan for the Greater East Asia War, placed in effect in December 1941, contained a supporting plan for organization of air defense in the home islands, to include the strengthening of air defense organizations.

The organizational structure of Japanese antiaircraft in the homeland was patterned as a static defense. Operational control was vested in the antiaircraft division commander or in the senior antiaircraft unit commander in localities where the antiaircraft unit was not a part of a divisional defense. Above the division, the next senior in the chain of command was the area army commander, who made no attempt to influence operations.

The antiaircraft division commander exercised personal control of his divisional command post during battle. This command post corresponded in organization and functions to our antiaircraft operations room (AAOR). However, the division commander exercised practically no direct control over subordinate elements during battle. Prior to action, the division issued directives as to sectors of fire, priority of targets, altitude and ranges for engagement, and conservation of ammunition prior to and during battle. The division alerted subordinate units and collected, evaluated, and disseminated information. Antiaircraft fire was not restricted or limited to permit action of friendly aircraft, but ammunition shortages necessitated drastic restrictions on fire. Division commanders specified range and altitude limits for engagement for each type of weapon.



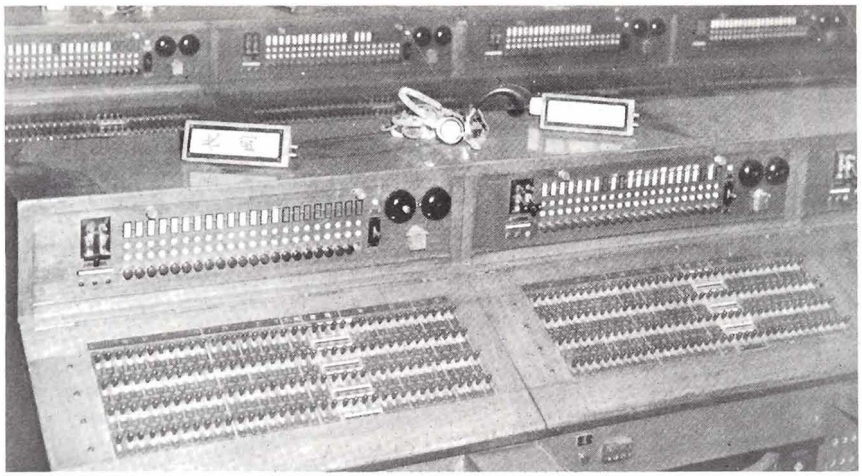
*Sound locator Type 90 used with searchlights for target pickup.*

Guns were considered ineffective below about 35° elevation, due to the instability of the carriages at low angle. The field of fire for antiaircraft guns was divided into a far zone, a central zone, and a near zone. The central zone was within the quadrant elevation of 30° and 55°. Guns usually were restricted to firing in their central zone, which had range and altitude limits where fire effect was considered greatest.

Upon interrogation, Lt Gen Ito, Commanding General, 4th Antiaircraft Division, stated:

"It was usually the idea to concentrate the fire on the lead plane as it was believed the commander was in this plane and that other planes guided on it; if the lead plane was destroyed, the bombing accuracy of the other planes would be greatly decreased."

There is no evidence of any other effort to



*Control equipment for lighting lamps indicating early warning radar data.*

concentrate fire under divisional control. Commanders preferred to engage as many targets as possible rather than concentrate their force on a single target. Division commanders exercised control over assignment of targets by indoctrination rather than by direction during battle.

Sectors were established for gun batteries on a target-approaching basis, not on a terrestrial basis. The inaccuracy of the Japanese directors on courses other than approaching courses (directly approaching or at an angle of less than 500 miles either side of this line) was taken into consideration, and the normal zone was thus the sector that would include targets approaching within these limits. Guns were fired at maximum rate.

With the start of B-29 raids in 1944, they were given first priority for engagement. Division control doctrine called for concentration of fire against the formation threatening the most important or most vulnerable targets. When our bombers attacked in closely packed streams, selection of targets was made by the battery commander, as higher commanders found it impossible to exercise any control.

No directives were issued for using barrage fire, either by guns or automatic weapons. Japanese commanders had given some thought to this type of fire but felt their shortage of ammunition precluded the firing of barrages.

The regimental commander exercised no control over his units during battle. He was tied into a communications net laterally so that he was familiar with all information passed or orders given to his units. This facilitated corrective action after the battle rather than enabling him to influence the action during the battle.

Battalion commanders were in the direct chain of command from division. Gun battalion commanders exercised control of fire by giving orders to batteries, assigning targets, ordering time of "commence firing," and changing targets.

Searchlight battalion commanders exercised close supervision over the action of their lights, designating which battery and how many lights would illuminate in case of a multiple plane raid, sometimes directing the time of illumination. Lights were not placed in action unless the target was being tracked by radar or sound locator.

Automatic weapons battalion commanders did not exercise any operational control over their units during battle, but they did prescribe maximum range for engagement of targets. Automatic weapons had no means of directing fire against unseen targets.

Japanese commanders admitted they had found no workable method for coordination, above battery level, of fire during saturation raids. Selection of targets for guns and searchlights was left entirely to the battery commander.

The Japanese could exercise little control over their antiaircraft at night or during periods of poor visibility as their radars, when available, were practically useless for gun-laying purposes. Being almost entirely dependent on searchlight illumination, they were limited to firing on targets of opportunity. There were instances where the Japanese were unable to fire a single round of aimed fire at large raids at night where the raid was above the overcast. There also were instances of raids by a hundred or more planes when the Japanese antiaircraft ammunition expenditure was less than 100 rounds.

Intelligence information flowed into the divisional command post from various sources. Maximum use was made of such information-gathering equipment and agencies as were available to the Japanese. These consisted of long-range radar, ultrahigh-frequency radio equipment, visual observers, and (to a limited extent) picket boats and radio intercept. In setting up the system within Japan to use this information, the problem was simplified by the geographical location and extent of the homeland with its outlying islands and the canalized routes of approach of our B-29s from their bases.

# CHILD advocacy in ADA?

LIEUTENANT COLONEL ROBERT A. MULVEY

The initial response to this question is most often one of confusion or disbelief. The idea of battered children and ADA battery control vans in the same scene is ambiguous at best. But in point of fact, the stress, emotional demands, tension, and similar factors that are side effects of alert status, evaluations, technical proficiency inspections, and similar factors associated with remote sites or short tours are often the crisis producing situations that result in an innocent child becoming the victim of abuse or neglect.

Air defensemen are subjected to more of these abnormal stains than most other soldiers and, therefore, need to be looking for the danger signs that can mean trouble for family members. Even the Russian Army admits to the excesses of pressure that duty places on troops manning the air defense systems (see "Take a Que From the Russians," p. 33, Apr-June 78 issue of AIR DEFENSE Magazine).

Let's face it. The profession of arms is not an easy call to answer. The soldier who seeks to serve his or her nation, or mankind, or defend that nation, is supporting a cause that is not readily identified with our modern society. By-products of the speed with which communication has changed our life-style are reduced permanence as well as altered historical values and traditions from the yesteryears upon which our culture and social order has been built. This orientation to space travel and leisure living (however we care to orient ourselves) does not lend itself to the time-consuming demands of parenthood and sustained family life as traditionally viewed. As a result, the peacetime Army—something our nation has not really experienced in almost 4 decades—is a victim of disfavor, often derision, from the very people it stands ready to protect and sustain. The "security" ascribed to military service is again assailed, leaving the defenders playing a role that becomes more and more complex.

We must now look upon problems such as indebtedness, UCMJ Article 15 punishment, and morale and motivation loss as indicators of potential crisis situations for the individual service member, and this certainly includes Air Defense personnel. One crisis situation that has only recently received full official and public attention is child abuse. Let's look at this appalling crisis for a moment.

By using a systems approach to child abuse and neglect, we become aware of several peculiar facts. First, more than 90 percent of all abusive or neglectful parents or adult caretakers are otherwise normal or average people. Another way to view it is that less than 10 percent of the abusive or neglectful adults suffer from psychoses or other medical/mental disorders. A popular misconception is that child abuse is a greater problem than that of neglect. Actually, physical and psychological neglect is twice as prevalent as the reported cases of abuse. An additional interesting factor is that 80 percent of those adults who mistreat children experienced abuse or neglect in their own childhood. The "learning theory" of repeating in their behavior that conduct which was used or which they experienced in their upbringing establishes the groundwork for the very real fact of "The **Cycle** of Child Abuse and Neglect."

Now our society can break this cycle of child mistreatment. The Child Advocacy Program, described in Army Regulation 600-48, makes available both resources and educational measures to provide a positive, nonpunitive approach to child abuse and neglect. In true Air Defense fashion, we in the Child Advocacy effort at Fort Bliss have developed a program that we think says it all: Child Advocacy Resources, and Education (CARE). Our approach has been a systems approach to family dysfunction. Realizing that economic, social, cultural, educational, and many other factors (including sheer happenstance) can intersect at a crisis level, we attempt to view the societal disease of child abuse from a rational and educated point of view rather than the emotional response most often recognized by the uninitiated.

The resources range from the medically based Child Protection Team (with social workers included) to chaplains, law enforcement agencies, and even volunteer agencies. Education programs are designed to include professionals and paraprofessionals serving children and families, as well as chain of command instruction and general awareness programs. The audiences range from senior commanders to leaders in platoon-sized units and also include Parent Teachers Associations and church groups. In short, we capitalize on available resources in a systems design to provide resources and education for all service members.

# the Air force connection

The idea of attacking air defense weapons with an aircraft is not a good one. It is analogous to a wild turkey taking on a group of hunters armed with shotguns. But situations arise in combat when enemy air defense weapons will be engaged to ensure our own mission accomplishment. An example of this is the close air support mission the Air Force will fly for the Army ground commander. For these special situations, aircraft like our US Air Force Wild Weasels have been designed; however, we adhere to the fundamental reasoning that established enemy air defenses will be avoided if at all possible. When it becomes absolutely necessary that we suppress the air defenses, then detection of these weapons becomes a primary problem.

Under almost all circumstances except terrain masking, the air defender on the ground can detect the aircraft easier than the aircraft crew can detect him. Visually acquiring any target on the ground is indeed a most difficult task for the airman. Air Force training programs expend a great deal of time and effort in trying to improve the pilot's capability to acquire targets. Pilots use major geographical references such as roads, rivers, tree lines, mountain ranges, ridge lines, etc.—things that are easily discernible from the air. Once the pilot has acquired the general area, he will then try to detect something unique within that area to provide additional cueing to the specific target. In most cases, there is little within the area to provide this additional information. Let's assume, for example, that you are flying commercially and have just taken off. Try to spot your car in the parking lot. You know exactly where you parked but it is very doubtful that you can locate it specifically. Take this same situation and double or triple the airspeed, put the aircraft in unfamiliar territory, put some misguided individual on the ground trying to destroy your aircraft, and it's certain to be most difficult to detect anything specific on the ground. Along with these factors, a little bit of camouflage goes a long way. So the weapon crew on the ground can see that aircraft much better than the pilot can see the weapon.

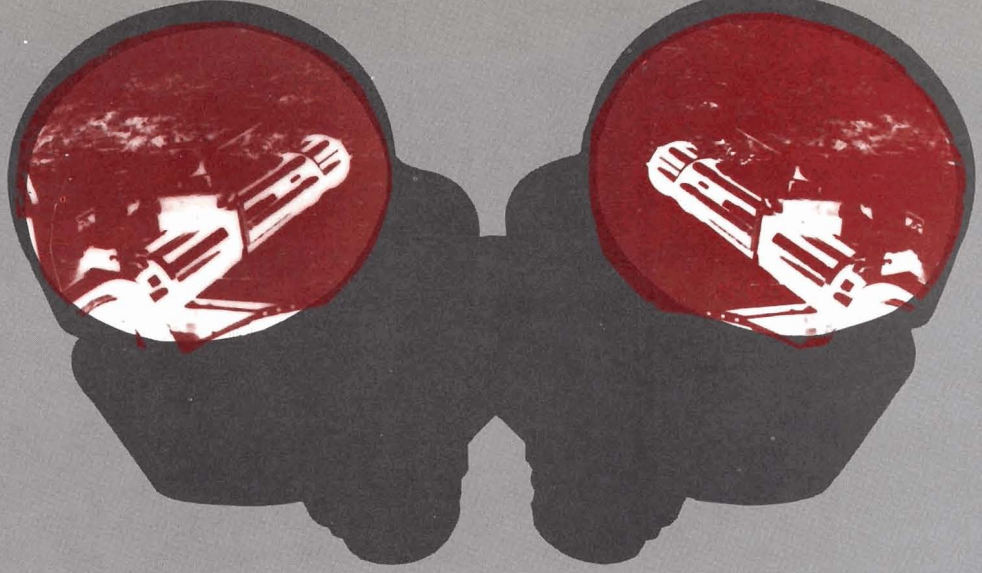
To visually acquire something small on the ground, the pilot must have additional, unique cueing. This usually takes the form of significant movement, reflected sunlight, dust trails, or smoke from the expenditure of ordnance. These additional, unique cues then become the aiming points.

One of the most valid clues that an aircraft can obtain is emission cueing, which can be either heat or electronic emissions. Aircraft are now beginning to carry detection equipment that allows translation of these heat/electronic emissions into direction and cueing information for the pilot. Without this "electronic" cueing, the chances of accurately acquiring an air defense weapon become much more remote. Air Force people believe that if air defense weapon systems are "quiet," the probability of being detected in an area being searched is quite low and approaches zero.

What does all this mean to the air defender? It means that you have a built-in advantage over the attacking aircraft. It means that it becomes a very expensive proposition, in terms of airframes and capabilities, to engage or come in range of air defense weapons. It also means that if a pilot has to attack an asset that is defended by air defensive weapons, he will spend no more time in the target area than he absolutely has to, which directly affects the accuracy of his ordnance and his ability to damage that asset. The ideal strike profile is to launch weapons outside the air defense weapons envelope, which may significantly complicate acquisition capabilities, again affecting accuracy. The bottom line is that using airpower is becoming more and more expensive and from the air defense standpoint, that is what it's all about.

A logical question is—When will an air defense weapon become the target? For man-portable systems the answer is almost never because of the difficulty of detecting the weapon. However, if man-portable systems are surrounding an asset and one must suppress these weapons to successfully attack that asset, then one will attack the area from which these weapons are launched—the visual cue usually being the smoke from the missile launch. Likewise, the LORAD and SHORAD weapons will be suppressed only for mission accomplishment. In this case, detection cueing will usually be obtained from electronic emissions emanating from the air defense weapon or smoke from the missile.

In conclusion, you as an air defender can feel certain that hostile aircraft are much easier to see than you are. And you are as big a threat to the attacking aircraft as he is to the target you are defending.



# VIEW from the FIELD

## A MEANS TO IMPROVE AIR DEFENSE GUNNERY TRAINING

Major V. Paul Baerman and Staff Sergeant Lawrence E. Wilkie

*The US Army Air Defense School observes certain limitations in employing the technique described if used with Chaparral/Vulcan systems. However, the idea does have merit and could be useful in AD gunner training. Similar techniques serving this same purpose are being perfected.*

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The 1st Squadron, 10th US Cavalry, Fort Carson, Colorado, has developed a system that makes use of subcaliber training to improve the effectiveness of its TOW gunners. This system employes a set of collars designed to fit over the TOW launch tube that mounts either the M-55 laser or the standard M-16 rifle. The system is presently being evaluated at Fort Benning, Georgia, for use Army-wide.

It was obvious to members of the 10th Cavalry that other units had a need for devices to improve their tracking training. The 10th Cavalry, therefore, decided to apply the TOW subcaliber concept, with minor modifications, to the training of Vulcan and Chaparral gunners.

The system devised is shown in Figures 1 and 2. It is basically a set of TOW collars mounted on either the barrels of the Vulcan (in line with the sight) or on the upper right rail of the Chaparral. The collars adjust the weapons used (either the laser or the M-16 rifle for the Vulcan, or the laser for the Chaparral) for elevation and deflection to zero the weapons to the sight at the range desired. The weapons are fired electrically using the vehicle's 24-volt power source. The laser used is the standard M-55 laser found in the Training and Audiovisual Support Center (TASC) inventory. The whole system, less the weapon used, costs less than $25 and is now being produced by the Fort Carson TASC.

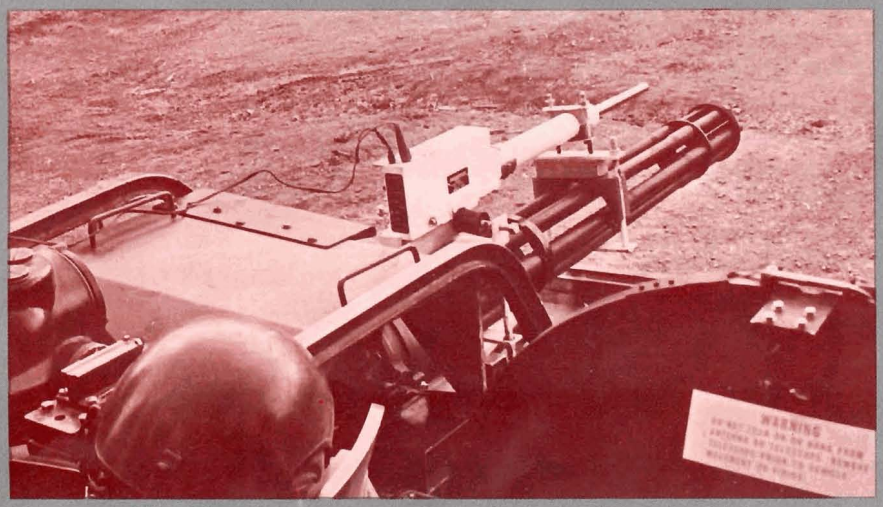

*Figure 1. The M-55 laser mounted on the barrels of the Vulcan gun is held in place by collars designed by the 10th Cavalry.*

**The system works as follows:**

**Vulcan. We propose that the Vulcan use both the laser and the M-16 rifle. The laser on continuous**

mode would be fired against a serpentine board, bearing tracking lines of reflective tape, that is mounted against the side of a building; for example, a unit motor shop. The retro reflective tape should be affixed to the serpentine board in straight or wavy lines to represent various target tracks the gunner may be required to follow in an engagement. The red dot of light from the laser would show up on the reflective strip and give the gunner (and his supervisor) immediate positive feedback on the gunner's tracking ability. The intensity of the dot indicates the level of the gunner's accuracy. Bright red means he is on the tape and tracking well. Low intensity means he is high or low. This automatic feedback during hands-on training allows the trainer to weed out poor gunners. We found, however, that most of those who started with a poor showing improved greatly in just a few minutes of tracking practice.

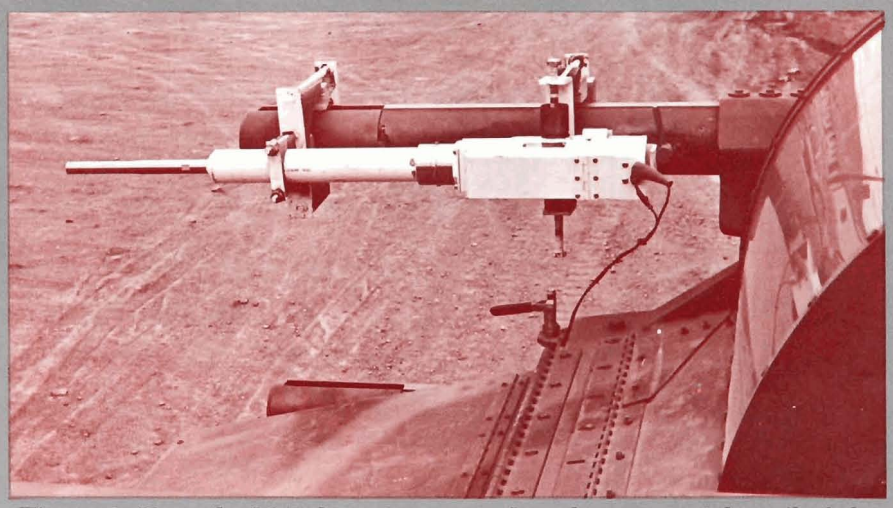

*Figure 2. Here the M-55 laser is mounted to the upper right rail of the Chaparral.*

The M-16 rifle would be mounted on the system and used for inexpensive live-fire training, especially when the unit is under ammunition or range space constraints. The collars could be modified to mount an M-60 machinegun but the cost and availability of M-16 rifles (particularly when the .22 cal., Rimfire adapter enters the system) make the rifle the more attractive choice. The drawback to the use of the rifle is the limited ammunition capacity of the present magazine, but you have the offsetting advantage of being able to train in a small area, firing inexpensive ammunition at radio-controlled miniature aerial targets. The rifle, when mounted, is fired electrically using a TASC-issued solenoid.

**Chaparral.** The Chaparral would use only the laser on continuous mode, employing the same type serpentine board and training technique as the Vulcan.

The targets that could be used by this system are numerous and depend only on the imagination of the user. An exciting possibility might be using the laser-mounted version in a Redeye moving target simulator against its targets.

We in the 10th Cavalry are concerned that all the gunners in the combined arms team are well trained. We hope these ideas may prove useful to our partners in Air Defense Artillery.

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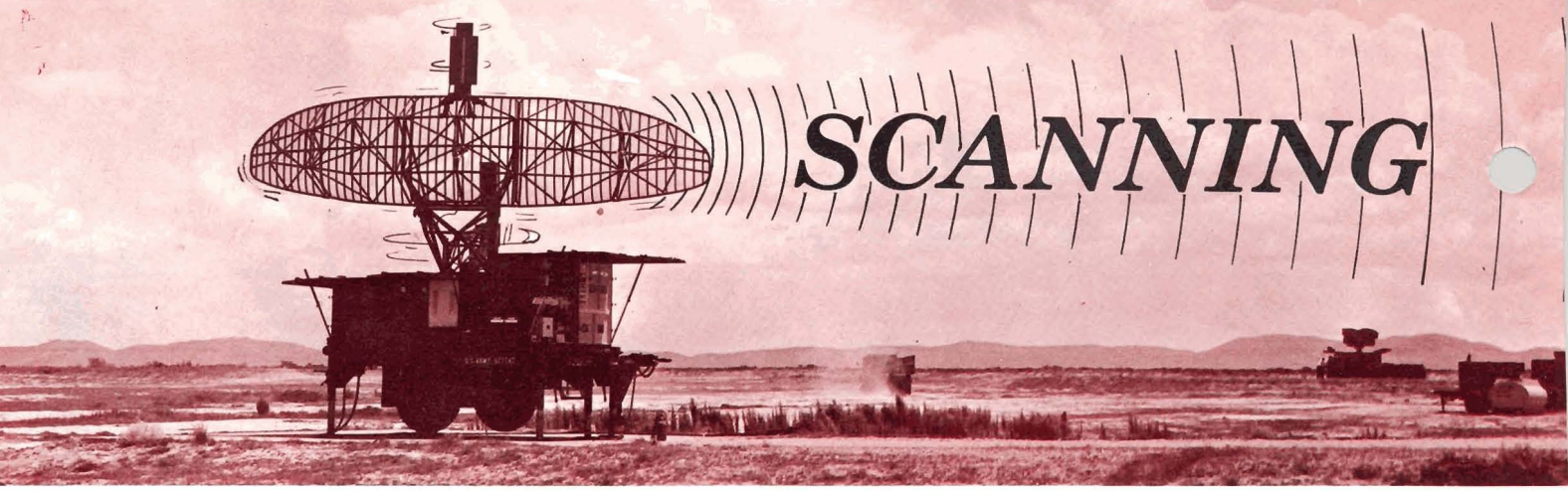
*Editor's Note: For additional details on the foregoing equipment, contact Fort Carson TASC, ATTN: Mr. Alpha Morgan, Fort Carson, Colorado 80913 or S3, 1st Squadron, 10th Cavalry, Fort Carson, Colorado 80913 [AUTOVON 691-2288/5292].*

*Major Baerman graduated from West Point in 1968. He has commanded armor and cavalry units in Vietnam and the United States and has been a battalion and brigade S3 and division G3 training officer. He is assigned to the S3, 1st Squadron, 10th Cavalry, Fort Carson, Colorado.*

*Staff Sergeant Wilke entered the Army in 1966. He has served with cavalry troops in Korea, Germany, and the United States. He is a graduate of the Advanced 11D NCOES Course and Master Gunner Program. He is assigned as the Master Gunner, 1st Squadron, 10th Cavalry.*




## BETTER VULCAN RADAR

The US Army Armament Materiel Readiness Command (ARRCOM) has announced field modifications to the AN/VPS-2 range-only radar that have resulted in significant reliability improvement and life cycle cost savings.

The AN/VPS-2 radar is a portion of the fire control system for the Vulcan air defense system and provides range and range-rate information for the gun lead angle computation. It is an X-band, pulse doppler, vehicle-mounted radar consisting of six component units: transmitter, receiver, computer, power supply, antenna, and distribution box.

In 1973 a two-phased product reliability improvement program (PRIP) contract was initiated by ARRCOM to assist the US Army in improving the availability and readiness of the radar in the field. The objectives of the PRIP were essentially to:

- Test and measure the functional performance and reliability (mean time between failure (MTBF) ) of the existing radar and delineate specific limited cost improvements intended to increase the MTBF to at least 100 hours.
- Incorporate the recommended improvements into the radar and again test and measure the radar's functional performance and MTBF to certify the effectiveness of the improvements.

The PRIP was completed successfully within 15 months by a team of specialists in the fields of reliability and quality assurance; thermal, mechanical, circuit design; and component parts engineering. During phase I of the program, up to eight radars were tested for 2,650 operating hours (in and out of the VADS weapons systems) and under a wide range of environmental conditions. The measured MTBF of the unimproved radar was 37 hours, a level consistent with the low availability reported in the field.

During Phase II, four radars were modified with improvements and then tested for 1,350 hours under conditions similar to Phase I. The measured MTBF of the modified radars was 122 hours and the radar met its functional requirements in field environments. These results demonstrated that the product reliability improvements were highly effective in significantly improving functional capabilities while reliability of the radar improved 300 percent.

- Electronic Warfare Digest

## STINGER ADVANCES

The Army Missile Research and Development Command (MIRADCOM) has ordered into production the Army's new Stinger, a shoulder-fired missile that can kill enemy planes ranging from helicopters to low-level, high-speed jets. MIRADCOM recently awarded approximately $24.4 million to General Dynamics Corporation for first year production and engineering services of the manportable system, the Army's successor to Redeye.

Colonel Vincent P. DeFatta, Stinger Project Manager at Redstone Arsenal, directs the program for both the Army and Marine Corps. General Dynamics will perform most of the work under the contract. Other Stinger team members include Atlantic Research Corporation of Gainesville, Virginia, for the propulsion system; and Armament Research and Development Command at Picatinny Arsenal and Magnavox at Fort Wayne, Indiana, for the fuze-warhead.

Stinger will be an all-arms weapon and will give combat forces immediate air defense against aircraft attacking from any direction. Featuring the latest technology, the infrared, heat-seeking missile will have improved range and maneuverability, significant countermeasures resistance, and a device to identify friendly aircraft.

Since Stinger is delivered as a certified round, no test equipment is required at ammunition supply points or in the field. The missile comes packaged in a disposable launch tube that is discarded after firing. A separable, reusable gripstock, containing launch electronics and an

IFF antenna, is attached to each round and can be used for multiple firings. The missile, equipped with a high-explosive, hit-to-kill warhead, homes automatically on the target.

## BETTER TESTING THROUGH AUTOMATION

The US Army Air Defense Board has taken a big step towards automating test data acquisition in its quest to improve test functions by contracting for a range instrumentation control system (RICS) (right). The "turn key" RICS, scheduled for delivery in July 1978, will be operational by the end of the summer.

The RICS will collect test data from remote sites in the form of airborne target position and weapons status information, perform quality checks, smooth and predict target position, perform coordinate conversion, and transmit pointing data to the appropriate tracking station. RICS will print out quick-look and/or post-test data during test progress. This quick-look capability is essential to the test officer for determining possible changes to the plan of test and to insure the collection of valid data.

The heart of the system is a general purpose central processor unit (CPU) with a core memory of 32K 16 bit words, with provisions for possible expansion to 128K words in the future. The CPU and its associated peripherals will be housed in building 1656 at Fort Bliss, Texas. Test data will be transmitted over the existing Fiesta microwave system using 40.8 kilobits per second modulator-demodulators (MODEMS). All test data received will be recorded on 9-track magnetic tape recorders; selected pieces of data will be displayed in real-time; and a quick-look report will be printed by an on-line printer after each recorded run. All the necessary software will be delivered as part of the overall system. The CPU will be equipped with an operator console that allows the operator to manually control the program from a keyboard.

The RICS is capable of receiving data from three tracking stations simultaneously. The data will be received in the form of X, Y, H, and slant range in meters. The CPU will smooth and predict target positions to account for transmission and computation times; compensate for parallax; and transform to aiming information and transmit to remote tracking stations. These seven tracking stations will be a combination of other radars,

laser tracking stations, and tracking cameras.

The RICS will also check pre-mission and post-mission orientation/calibration on up to 3 known data points (KDP) per station. These KDPs will be used in an automatic calibration procedure in which a specified tracker sends data while locked on a KDP. The tolerance will be defined by the operator through the keyboard entry. The received data will be compared to the known data and if it is outside the defined limits, the operator will be alerted and the actual error and limits will be printed out. If the error is within the defined limits, the RICS will adjust the position and alinement of the tracker data to compensate for the error.

The RICS will automate target acquisition, improve the quality of the test data, provide real-time data capabilities, and also provide a quick-look report so that the test officer can effectively and efficiently conduct his test. The ultimate goal is to improve testing methodology so that the soldier in the field is provided with the best air defense weapon systems.

## HERC HONOR BATTALION

The Nike Hercules missilemen of the 1st Bn, 43d ADA, Alaskan Command, completed their 1978 annual service practice (ASP) with honors.

Historically, ADA battalions whose individual batteries **all** scored above 95 percent in their ASPs were cited for their achievement by being declared an Honor Battalion. The 1st Bn, 43d ADA, had an overall average of 97.2 percent, with the firing batteries scoring as follows: A Btry 96.5 percent, B Btry 97.3 percent, and C Btry 97.8 percent.

All units received perfect scores in missile assembly. Batteries B and C achieved maximum point totals in system preparation. A Btry received maximum points in the tactical effectiveness area.

Brigadier General James G. Boatner of the 172d Infantry will present the Honor Battalion

Award to the 1st of the 43d at appropriate ceremonies. Colonel Edward S. Graham, Jr., Commander of the 43d, will present each battery with individual Honor Battery trophies.

## ALL-WEATHER CHAPARRAL

The first all-weather, Chaparral guided missile test firing against a target drone has been successfully conducted at the White Sands Missile Range, New Mexico, by the US Army. The missile was guided successfully to the high-speed MOM-107 target drone with an accuracy that would have assured a target kill in a real tactical engagement.

For its initial intercept flight, the Chaparral missile teamed with the BLINDFIRE tracking radar provided by the British Government and the smokeless rocket motor developed by Hercules Powder Company of Cumberland, Maryland.

The all-weather Chaparral program is intended to demonstrate that the present missile with an additional command guidance module can be accurately guided by a tracking radar to provide extended performance to Chaparral under adverse weather conditions. The missile also retains the infrared (heat) seeking guidance.

Additional all-weather missiles will be fired. The purpose of the all-weather Chaparral demonstration, directed by Congress, is to show the potential of the additional radar guidance for Chaparral. The major items of equipment being used in the demonstration are already developed items in use.

## MISSILE MINDER

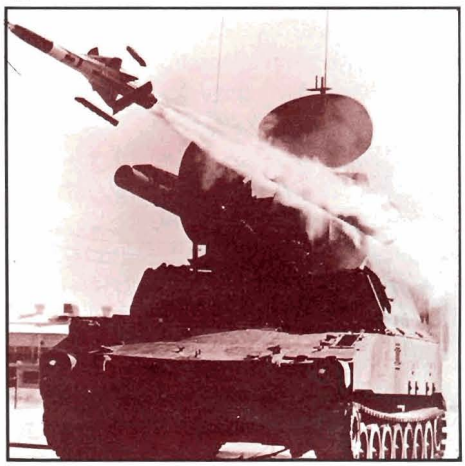
Litton Data Systems has delivered to the Army the first full-scale production Missile Minder, a computerized command and fire control system for the Improved Hawk and Nike Hercules missiles. MIRADCOM awarded approximately $25.6 million to Litton in March 1977 for full-scale production of Missile Minder.

Missile Minder, or AN/TSQ-73, not only controls surface-to-air missile batteries, but coordinates air defense capabilities and communications with the Navy, Marine Corps, and Air Force. The equipment is housed in a shelter that can be moved by truck, plane, or helicopter and deployed quickly.

Featuring the latest in electronic and computer technology, Missile Minder receives, processes, and displays target information from various radars and assigns the appropriate Hawk or Nike Hercules battery to the hostile threat. The system requires fewer operators than its predecessors, has faster reaction time, and is more reliable and easier to maintain. The first production system is now at Redstone Arsenal where it will be used in maintenance and diagnostic software development and support for fielded systems.

## ROLAND LAUNCH

*A supersonic missile roared from the launch tube of the US Roland short-range, all-weather air defense system during tests underway at White Sands Missile Range, New Mexico. In its first test against a target, the system successfully intercepted a drone. Ongoing tests are to evaluate the US Army's success in transferring the technology of the European Roland fire unit to US manufactured equipment. Targets for the current series of missile firings will include drones, helicopters, and unpiloted, full-size fighter aircraft flying at various speeds, ranges, and altitudes. The tests are being conducted under both clear and adverse weather conditions.*



## AD MAGAZINE SUBSCRIPTIONS

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# ENLISTED CAREER NEWS

## OJE EFFECTS ON PROMOTION

Considerable flexibility in certifying on-the-job experience (OJE) in lieu of formal schooling has been granted commanders. NCOES completion (either OJE or formal schooling) is mandatory before a soldier can be awarded the next higher skill level—a prerequisite for E-5 or E-6 promotion. If the soldier under consideration has not attended formal schooling, he may qualify for promotion consideration with OJE. To qualify, an E-4 must have at least 4 months and an E-5 at least 5 months OJE.

Commanders will certify the soldier's OJE and may award OJE credit when the individual is satisfactorily performing PMOS duties at his current or higher grade. OJE may be awarded under the provisions of AR 351-1 when the soldier is excess to the unit's authorizations as long as he is still performing the major duties of the PMOS. A TDE/TDA authorized position is not essential to the OJE process. Also, a review of the soldier's personnel records may reveal creditable OJE obtained during previous assignments. Such time can also be considered by commanders when determining credit for soldiers.

## DOLLAR DEVALUATION

The Department of Defense has acted to reduce the financial hardships on oversea-based Armed Forces members caused by recent devaluation of the dollar in world money markets.

Junior enlisted personnel who are accompanied by their dependents are now eligible for the higher "with dependents" rate for housing allowance (HA) and cost-of-living allowance (COLA), instead of the lesser "without dependents" rate for unaccompanied personnel.

The Army has already initiated a program to allow the dependents of lieutenants, warrant officers, and all enlisted personnel to buy meals at Army dining halls. They were formerly limited to two monthly visits. The Air Force is studying a similar plan. Navy regulations currently permit dependents to eat in Navy dining facilities.

Another planned action—the Junior Enlisted Travel Transporation Entitlement—requires Congressional approval but it has been included in the FY 79 DOD budget submitted to Congress. Under this plan, junior enlisted personnel, who currently must pay the cost of taking their families overseas, would receive travel and transporation assistance for their dependents.

## SOLDIERS AND LEVIES

Levies are as much a part of a soldier's life as eating, sleeping, or getting paid but probably less understood by the individual soldier. In most cases, levies place the soldier in an oversea assignment. Some believe it's the work of some less than compassionate computer or just plain luck—good or bad. What many soldiers don't know and should is that all levies are determined by very specific Army regulations and definite guidelines, as are deletions or deferments.

While deletions or deferments from a levy are possible, it is the exception rather than the rule. In all cases, the needs of the service is the determining factor. Once an individual is placed on levy and notified of his assignment, paper work requesting a change in the levy must be received by higher headquarters within 30 days of initial notification of levy assignment.

Requests for change or deletion from a levy for hardship reasons must meet the following three conditions:

- The problem cannot be resolved through

use of leave, correspondence, power of attorney, or by other interested parties.

■ The problem is temporary and is resolvable within 1 year.

■ The problem neither existed nor was reasonably foreseeable at the time of latest entrance on Active duty.

All areas of the problems must be properly documented with doctor's or lawyer's statements included if applicable.

In addition to hardship actions, a unit commander may submit an operational deferment from levy if the soldier is needed badly enough in his present position and no replacement is anticipated. This, too, is bound by tough guidelines, one being proof that the soldier is needed in his present unit more than the oversea command needs him. Individuals cannot initiate operational deferments and, if approved, the deferment is temporary in nature.

Soldiers with enough time to complete 1 year or more overseas before reaching their ETS dates may be forced to accept the tour without extending or reenlisting, but their families won't be brought to the new assignment at Government expense if the soldiers won't complete a full tour.

Personnel with less than 12 months remaining in service at the time of their proposed arrival month don't have to come up with justification to get out of the levy, although the procedures differ, depending on how much time in service the soldiers have completed. Those who have completed less than 6 years in the service for pay purposes face no penalties if they decline the levy. It affects neither their promotion nor reenlistment eligibility.

Soldiers with 6 years or more who try to avoid a levy assignment this way face a more difficult and costly decision. Any soldier with that much time in service must sign a declination statement to avoid the levy. But in signing the declination statement, he not only gets out of the levy but out of the Army as well. Signing a declination statement forces the soldier to leave the Service at the end of his present enlistment and makes him ineligible for promotion during that time. If he plans on getting out and joining again immediately, he can give up that idea. He must wait a minimum of 93 days before he's eligible to reenlist. Then he needs a waiver, loses stripes when he returns to Active duty, and is limited in his MOS selections.

A declination statement is hard to take back once it's been signed. Soldiers who sign the declination statement to get off levy will find it's virtually impossible to get that statement withdrawn.

Officials counsel personnel considering declination statements and observe that many soldiers aren't aware of all their options. A lot of times soldiers can get what they want in reeenlistment options. It won't get them off levy, but many times they're satisfied with what they get and continue their military career.

## MORE ON BEAR

Many soldiers are not aware of the CONUS-to-CONUS and Bonus Extension and Retraining (BEAR) Reenlistment Programs. The CONUS-to-CONUS program allows first term soldiers to reup for a one-year stabilized tour within CONUS. The option is available to soldiers in certain MOS who are currently assigned in CONUS and whose last digit in their social security number is 1, 3, 5, 7, or 9. The option is subject to vacancies at the CONUS post selected.

The BEAR Program allows soldiers in overstrength MOS to reenlist for an understrength MOS and draw the full bonus for the new MOS. Soldiers may extend their current enlistment by 12 months to receive training in the new MOS. Once trained, they qualify for the bonus at reenlistment. About 12 MOS are now open in the program and are subject to change as reenlistment in certain MOS improves or is dropped. Information on which MOS qualify for the BEAR Program may be obtained from the unit reenlistment NCO. Vacancies for MOS under the CONUS-to-CONUS option may also be determined through local reenlistment channels.

## DA PROMOTION BOARDS

A DA Promotion Board will select E-8s for promotion to E-9 and also screen for subpar performers at Ft. Harrison, Indiana, in September. Primary zone candidates include E-8s with a date of rank of 31 August 1974 or before. Secondary zone candidates include E-8s with a date of rank from 1 September 1974 through 31 December 1975. Both primary and secondary zone candidates must also have a basic enlisted service date of 1 December 1968 or earlier.

E-8s being screened under the qualitive management program (QMP) for identification as unsatisfactory performers include all those with a date of rank of 31 December 1975 or earlier and a basic enlisted service date effective on or before 1 December 1968. E-8s not subject to QMP include those already on E-9 recommendation lists, those already barred from reenlistment, and those with approved retirements effective on or before 1 November 1978.

Additional information may be obtained through local personnel offices.

# BARS to STARS

## OPMD UPDATE

Following are some answers to questions that are frequently asked of Chief of the Company Grade Air Defense Branch at MILPERCEN. Also provided is a list of CONUS locations and the assignment frequency, which will assist the company grade officer when filling out his preference statement.

Q. When will I receive reassignment instructions?

A. You can expect reassignment instructions between 90 and 120 days before departure from your present station. The Air Defense Branch does not publish orders but rather issues assignment instructions to the losing command. Your assignment officer will mail you a copy of your Request for Orders (RFO) on the day after the RFO is processed. This is the same information your command gets by teletype over the Autodin Network. Your orders will then be published by your local command based on these instructions.

Q. How much control does the AD Branch have over my specific duty assignment at my next station?

A. Branch normally assigns officers to a major command in overseas areas (USAREUR, EUSA, etc.) and to major units or posts in CONUS (21st Replacement Detachment, Fort Hood; USAADS, Fort Bliss; 9th Infantry Division, Fort Lewis; etc.).

We usually cannot guarantee that you will be assigned a particular duty or even that you will go to an AD unit in many cases. Such decisions are the prerogative of the commanders concerned. We recommend that you write your new commander as soon as possible after receiving orders and tell him what you have done and what kind of job you desire. This may help you get the position you want, but remember that your new commander must meet his mission requirements.

If you desire a particular position at your present station, discuss your desires with your commander. Your best chance to be selected for a key job, including battery command, is to convince your current commander that there is no better officer for the job.

Q. What about DA Form 483, Officer Preference Statement?

A. Send us one. We will carefully consider your desires, and we will try to come as close as possible after comparing your desires with Army requirements and your career needs.

Ask for what you want, but:

- Consider the list of possible stations and consider how often an AD officer(s) is assigned to each. It is recommended that you include at least two frequently labeled stations on your list.
- Make the stations you ask for agree with the type of duty you need. As an example, do not say, "I want AD duty," then proceed to list Okinawa, England, Japan, Fort Devins, and Fort Belvoir.

Fill in the remarks section or add additional comments on a blank sheet of paper if there are any special considerations you want your assignment officer to know about or if you cannot express your desires clearly in the boxes provided on the form.

If overseas, you should send us (AD Branch, MILPERCEN) your preference statement about nine months prior to the time you will be eligible for reassignment.

**Assignment Locations [Company Grade Air Defense Artillerymen]**

(See AR 614-30 for complete oversea tour area listing including exact tour lengths)

| Station/Area | Type Jobs Usually Available | | | | Assignment Frequency** |
|---|---|---|---|---|---|
| | ADA Trp Dy | ATC | AVN* | Other | |
| 1. CONUS | | | | | |
| Ft Benning GA | X | | | X | very infrequently |
| Ft. Bliss TX | X | | | X | frequently |
| Ft Bragg NC | X (82d Abn & XXVIII Abn Corps Arty) | | XX | X | frequently |
| Ft Campbell KY | X (101st Abn) | | XX | X | frequently |
| Ft Carson CO | X (4th Inf Div) | | X | X | frequently |
| Ft Dix NJ | | X | | X | very infrequently |

| | | | | | |
|---|---|---|---|---|---|
| Ft Eustis VA | | | | X | very infrequently |
| Ft Hood TX | X (2d Armd & 1st Cav) | | XX | X | frequently |
| Ft Jackson SC | | X | | X | very infrequently |
| Ft Knox KY | X | X | | X | very infrequently |
| Ft Lewis WA | X (9th Inf Div) | | X | X | frequently |
| Ft Ord CA | X (7th Inf Div) | | X | X | frequently |
| Ft Polk LA | X (5th Inf Div) | | X | X | very infrequently |
| Ft Riley KS | X (1st Inf Div) | | X | X | frequently |
| Ft Rucker AL | X (1 Det) | | | X | very infrequently |
| Ft Sill OK | X (III Corps Arty) | X | X | X | very infrequently |
| Ft Stewart GA | X (24th Inf Div) | | X | X | frequently |
| Lang Sch CA | | | | X | infrequently |
| Other stations (includes USAR, ROTC Regions, Recruiting Stations, etc.) | | | | X | very infrequently |

2. OVERSEA (Short tour areas)

| | | | | | |
|---|---|---|---|---|---|
| Italy | X (USA Arty Gp & 509th BCT (Abn) ) | | | X | infrequently |
| Korea | X (38th Bde & 2d Inf Div) | | X | X | frequently |
| All others | | | | | very infrequently |

3. OVERSEA (Long tour area)

| | | | | | |
|---|---|---|---|---|---|
| Alaska | X (1 Bn) | | X | X | infrequently |
| Europe | X (USAREUR, Italy, Greece) | | X | X | frequently |
| Hawaii | X (25th Inf Div) | | X | X | infrequently |
| Panama | X | | | X | very infrequently |
| All others | | | | X | very infrequently |

* Since aviation assignments are possible at almost every location, only the areas where AD LTs/CPTs are usually assigned as aviators are checked. The three posts marked XX (combined) normally have about 70% of the CONUS aviation openings.

** Based on the past year's experience plus anticipated requirements. Assignments can be made only if there are actual openings for your availability period. This means that some "frequent" areas will not have any openings when you are reassigned. The following Company Grade Air Defense Artillery population guide applies:

| Assignment Frequency | Approximate Number Assigned |
|---|---|
| Frequently | more than 30 |
| Infrequently | 10 to 20 |
| Very Infrequently | less than 10 |

## FLIGHT TRAINING [AR 611-110]

To be eligible for flight training, officers must have at least a 155 composite score on the FAST-OB test and pass a Class 1A physical. ROTC and USMA flight program participants require only a class II physical.

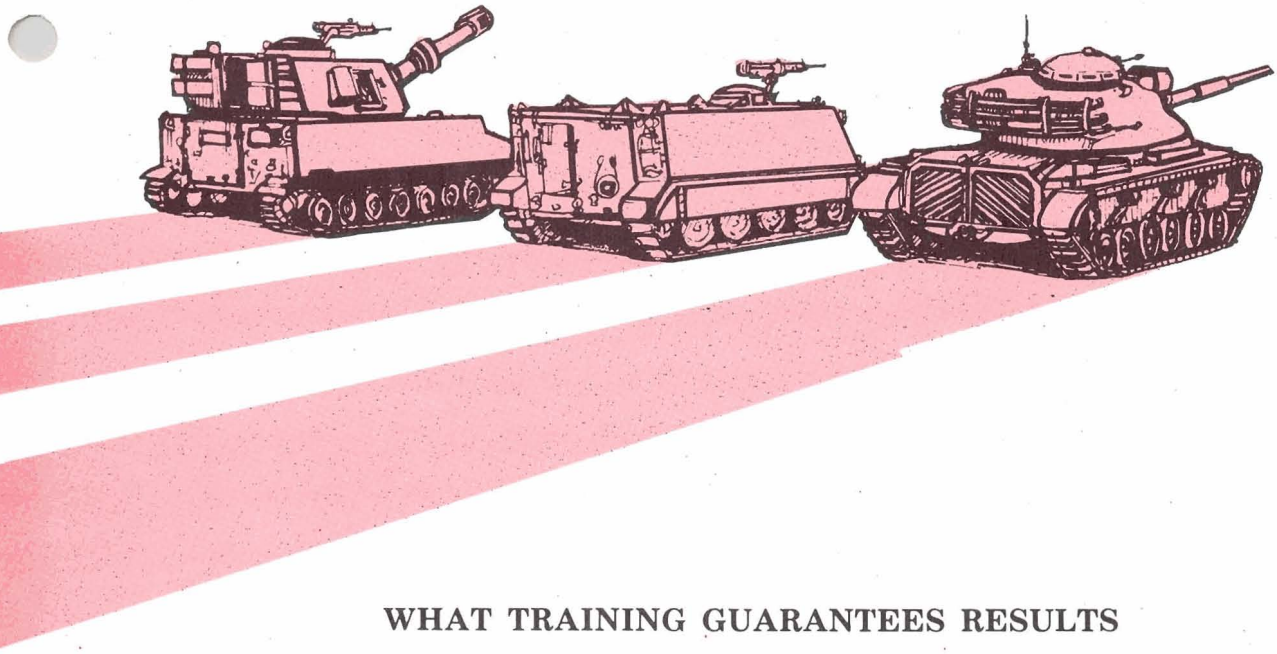
USAR and ARNGUS officers must apply for voluntary indefinite (VI) status. A 3-year aviation service obligation is incurred after completion of flight training.

Officers must be basic course graduates with a minimum of 12 months troop duty and less than 60 months active Federal commissioned service upon entry into flight training.

An increased number of quotas is anticipated for FY 79. If you are interested, check it out. Combat Arms officers can write MILPERCEN, DAPC-OPE-P-AVN, 200 Stoval Street, Alexandria, VA 22332, or call AV 221-7818/7819 or 7820 for assistance.

Officers must have a high manner of performance and concurrence of their career branch for selection.

# COMBINED ARMS CORNER



## WHAT TRAINING GUARANTEES RESULTS

Following are some findings the Army Research Institute (ARI) surfaced during an intensive study of the Training Extension Course Program, more popularly known as "TEC."

■ TEC-training is more effective than conventional training.

■ After only one day of instruction, TEC-trained soldiers retain their learned skills better after 8 weeks than conventionally trained soldiers do.

■ TEC-training can raise soldier skills 27 percent higher than baseline trained soldiers.

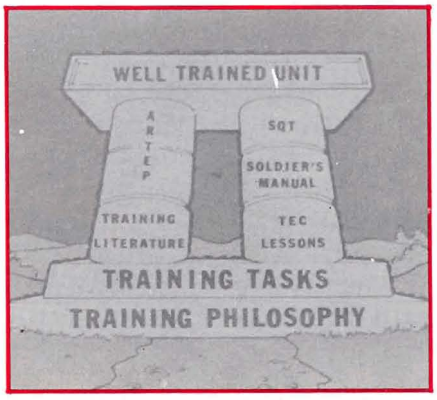
■ TEC pretests and post-tests prove that only one exposure to a TEC lesson can improve soldier performance by 9.4 percent.

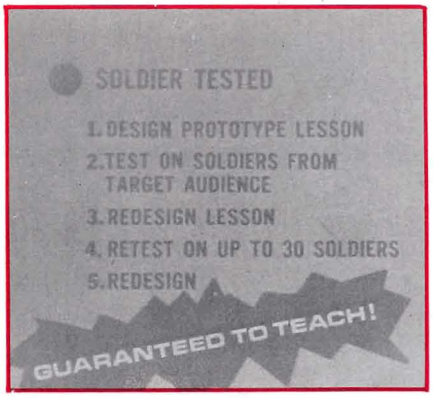
■ TEC users score higher on the Skill Qualification Tests (SQTs) than nonusers.

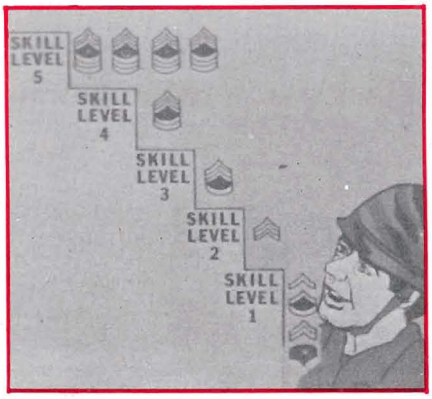
The purpose of the study was to determine TEC cost and training effectiveness and TEC usage; i.e., does TEC really teach well and at reasonable cost; and does the soldier use it? Soldiers from 24 combat arms battalions, both Active Army and Reserve Components, participated in the TEC effectiveness study. These soldiers (660 of them) represented eight different MOS (11B, 11C, 11D, 11E, 13B, 13E, 16P, and 16R) in numbers proportionate to the total number of soldiers Army wide holding these MOS.

Selected groups were given instruction in subjects related to their combat arms branch and one subject common to soldiers of every branch. Some soldiers were taught using TEC lessons and others by their conventional live instructors. Other soldiers received routine training to develop a base-line group against which performance could be scientifically measured, following pretesting, instruction, and post-testing. TEC came out ahead in all categories, suggesting rather strongly that the TEC-trained soldier learns better and remembers more of what he has learned even 8 weeks later. The conventionally trained soldier couldn't perform as well only 1 day after receiving the instruction.

Soldiers from 32 CONUS Active Army battalions, 61 Reserve battalions, and 17 TRADOC installations participated in the TEC usage study.



The study of use patterns, attitudes, and problems involved 27 CONUS and 13 USAREUR Active Army battalions and 26 CONUS Reserve Component battalions. TEC users scored significantly higher on their SQTs than did nonusers. Soldiers and unit trainers who used TEC regularly praised it, and 65 percent of the soldiers and 87 percent of the trainers wanted TEC to continue to grow and to expand.

The ARI study recommended that commanders, trainers, and soldiers make more use of TEC to make it even more cost effective than it is today.

With the SQT and the Army Training Evaluation Program (ARTEP) so closely linked with individual and team performance, TEC use is sure to grow. We feel certain that TEC can do the job, and the ARI study justifies our confidence. However, TEC works only when it is used, and the study recommended that soldiers surveyed who had never heard of TEC "get with the program." Remember, TEC training guarantees to teach and guarantees results.

Comments from the field on TEC usage and individual or unit performance are welcome. Address questions or comments to Commander, US Army Training Support Center, ATTN: ATTSC-TP-ATECP-TECSPT, Fort Eustis, VA 23604. The point of contact is MAJ Bullock, AV 927-2141/3728.

## BRIEF ITEMS

MODIFIED M16A1 RIFLE . . . The Weapons Committee of the 1st Advanced Individual Training Brigade at Fort Benning noted after about a year's study that approximately 50 percent of the soldiers undergoing training in the use of the M16A1 rifle in the automatic rifle role were failing to qualify. Upon investigation, it was concluded that the current automatic rifle firing position (and the fact that the M3 bipod attaches directly to the barrel of the M16A1 rifle) could be causing the problem.

In the current automatic rifle firing position, the shooter exerts a firm pressure down and to the rear on a loop formed with the rifle's sling. It was found that the firer's pressure was causing the barrel to flex or bend.

Committee instructors suggested that other firing positions be used or at least tried and that the M16A1 rifle be modified to add a bipod standoff attaching device and a hinged shoulder rest. Three new firing positions as well as the M16A1 rifle modifications were tested. It was found that a modified M60 machinegun firing position provided significant improvement for both automatic rifle qualification and for hit probability. It was also determined that the bipod standoff device experienced a high frequency of failure.

- Infantry

RESTRUCTURED BATTALION TESTED. . . A live-fire exercise conducted by the 1st Battalion, 7th Cavalry, 1st Cavalry Division, at Fort Hood recently was the first of its kind involving a tank battalion under the Division Restructure Study. The 1-7th Cav was supported by A Battery, 1st Battalion, 7th Field Artillery.

Under the division restructure concept, the composition of units in a division would be changed and divisional firepower would increase dramatically.

The speed and efficiency of a restructured battalion and its ability to integrate fire and maneuver in a combat situation were evaluated in the exercise. Plans call for each maneuver battalion to conduct similar exercises before the 1st Cavalry Division moves on to larger unit trials.

- Field Arty Journal

LIVE-FIRE EXERCISES . . . According to officials at Forces Command (FORSCOM) Headquarters, the 82d Airborne Divison has completed the first successful adoption of the new policy of including a combined arms live-fire exercise (CALFEX) with the evaluation of units under the Army Training and Evaluation Program (ARTEP). The recent evaluation of the 2d Battalion (Airborne), 504th Infantry, and its supporting units was more realistic as a result of the addition of the CALFEX. It is the intention of the FORSCOM Commander that such exercises be conducted whenever resources permit.

MINI-LASER . . . A new mini-laser rangefinder has been designed for the US Army's new XM1 main battle tank. The mini-rangefinder will provide instantaneous range information to the tank's fire control computer. The rangefinder, although smaller than its predecessor, is much more efficient.

Under a recent $10-million contract, Hughes Aircraft Company will set up a production line to manufacture the first 110 laser rangefinders for delivery to Chrysler Corporation, builder of the new US Army's main battle tank. First deliveries of the mini-laser are expected about October 1979. Hughes is also manufacturing an infrared night vision system and a fire detection system for the XM1 tank.

# IMPROVING A-10 SURVIVABILITY

Captain Taylor, 1-17th Cavalry, Fort Bragg, North Carolina, an Army aviator, has presented a proposal for consideration that, in his opinion, would increase the survivability of the A-10 in a mid-intensity environment.

In his proposal, Captain Taylor recommends that artillery fire illumination rounds (flares) in daylight to form an IR curtain along the A-10's attack axis. This, of course, would require coordination among the attack pilots, FAC, helicopter pilots, and artillery to include attack axis and timing. Captain Taylor explains that such coordination needs to be studied as well as evaluating the effectiveness of the artillery flares. In this concept, the optimum spacing of the flares would have to be determined. Consideration of the candle power for the illumination rounds carried as the standard load of the 82d Airborne Division would have to be taken into account and they are:

- 105-mm Howitzer - 450,000 candle-power
- 155-mm Howitzer Towed - 400,000 candle-power or 1,000,000
- 81-mm Mortar - 500,000 candle-power
- 107-mm Mortar - 850,000 candle-power

The 15-mm tube is a XVIII Airborne Corps artillery asset capable of supporting the 82d Airborne Division.

To exemplify his concept, Captain Taylor furnishes the following information on an upcoming exercise.

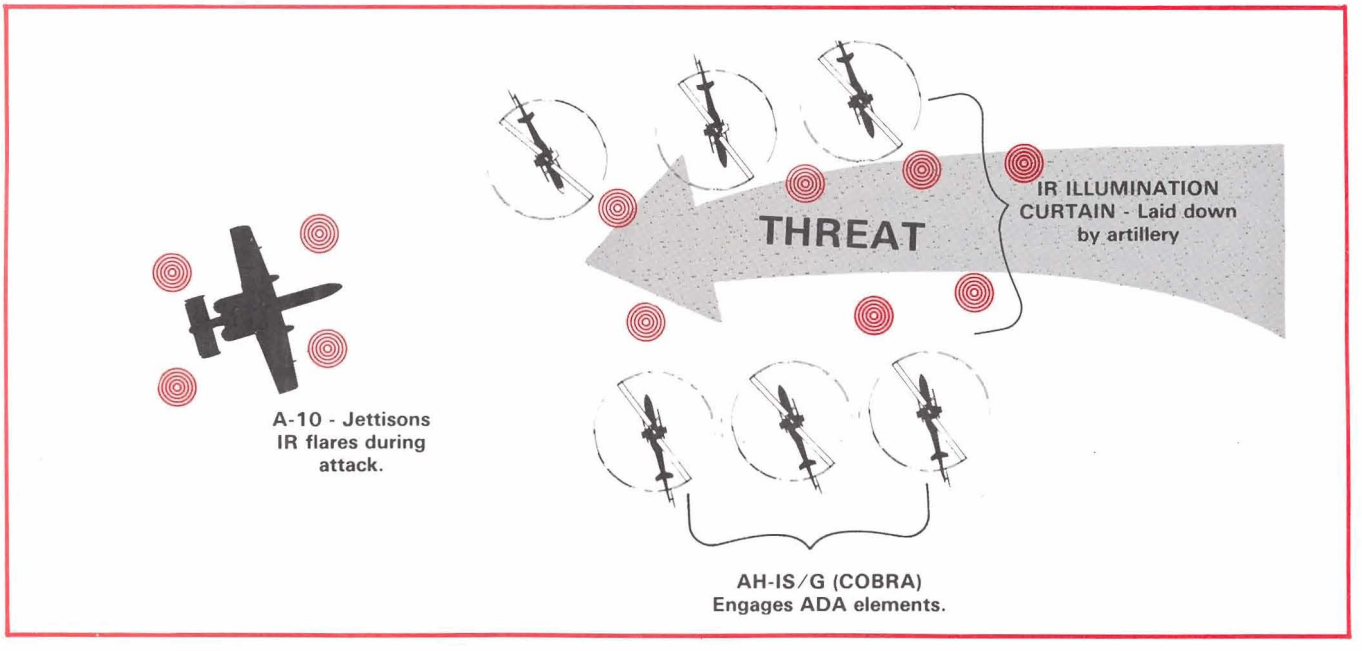
The 1st Squadron (Air), 17th Cavalry at Fort Bragg has 85 helicopters, of which 27 are AH-1 Cobras and 30 are OH-58 Scouts. The Cavalry is the 82d Airborne Division's aerial tank killer, thus sharing the mission of the Air Force A-10. During August of 1978, the Cavalry anticipates conducting live-fire antiarmor training as a joint operation with Air Force A-10 crews. This concept has already been tested and labeled JAWS (Joint Attack Weapons System).

The purpose of the joint operation is to improve survivability as well as the kill ratio. Soviet armor units move with a high density of air defense weapons, which poses a substantial threat to fixed-wing aircraft. Attack helicopters, using nap-of-the earth flight and firing techniques, can effectively combat this threat. Attack helicopters cannot carry the ammunition loads of the A-10 and mutually supportive operations appear to be the answer.

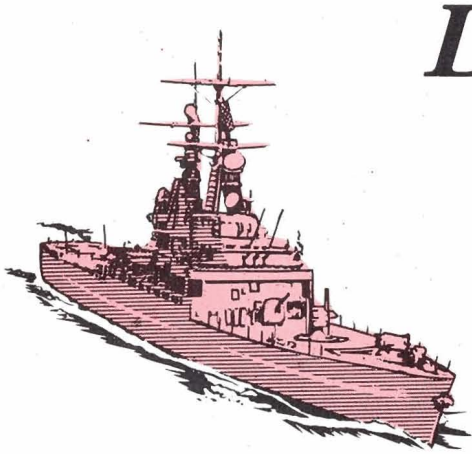
Under this concept, the Scout helicopters identify the threat ZSU-23-4 antiaircraft weapon systems and these are engaged by the Cobras. Helicopters require about 30 minutes to effectively engage ADA elements. A-10 aircraft are then brought up from rear area holding positions to engage tanks. Artillery preparation will force armor crews to fight from within their vehicles. This reduces their visibility and denies the use of turret top-mounted .51 caliber air defense machineguns.

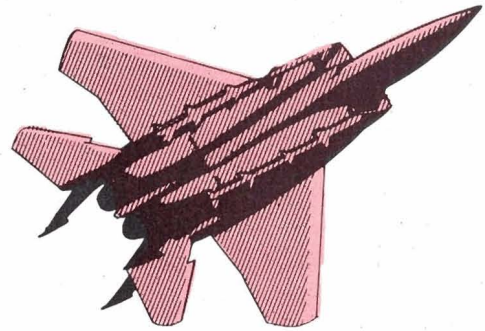
Even with this improved situation, heat-seeking missiles still pose a substantial threat on the battlefield. Modifications to the A-10 will provide for flare jettisoning during the attack to provide bogus targets. The Cavalry proposes the firing of artillery illumination rounds during daylight attacks to provide further bogus hot targets. These illumination rounds would be fired to form an infrared curtain on each side of the threat axis of approach. Current infrared weapons have difficulty separating aircraft from other heat sources and it is hoped that this method will reduce threat effectiveness.

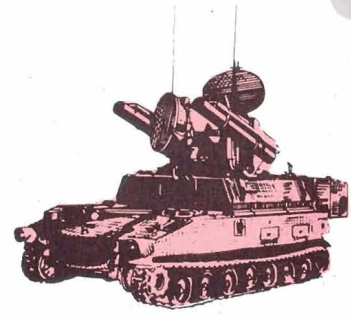
The details for the safe conduct of this training are being prepared at Fort Bragg. The actual firing exercise is scheduled for 21-27 August 1978.



# DEVELOPMENTS







## NEW MONITORING DEVICE

A sensing device designed to detect accidental damage to military ordnance is now being tested at White Sands Missile Range, New Mexico. The sensor monitors electromagnetic radiation and warns when it approaches a level that could affect the operation and reliability of a weapon. Radars, military radios, and even CB radios give off electromagnetic radiation. The sensor will enable engineers and technicians to determine when these communications devices are operating too close to a missile or other ordnance site.

Loaded with electronics, today's missiles and ordnance can be susceptible to the energy in electromagnetic fields. The new sensing device is designed to provide 24-hour-a-day remote monitoring at missile and ordnance sites.

Currently, energy levels are monitored by teams from the Electromagnetic Engineering Office of the Army Communications-Electronics Engineering Installation Agency at Fort Huachuca, Arizona. However, the present staff of less than 50 technicians and engineers is barely able to monitor the Army's entire worldwide network of installations.

Project officials believe these remote sensors will make our monitoring much more efficient and free our manpower and resources for use where they are needed most.

The radiation monitor now being tested at White Sands is an engineering model designed and constructed by the National Bureau of Standards. It features five interchangeable antennas to monitor various electric and magnetic frequencies. Up to five local subsystems can be tied into one monitor system.

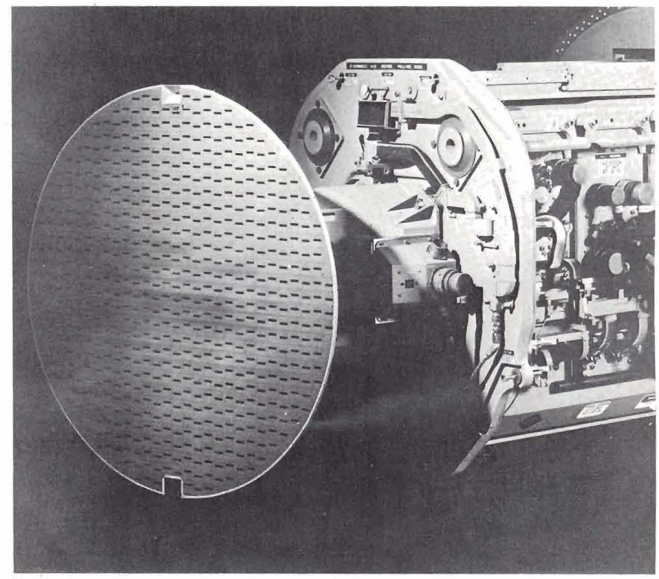
The engineering model now being tested cost $380,000 to develop but, according to the NBS project engineer, production models will cost under $30,000, the exact figure depending on the quantity purchased.

Following calibration testing at White Sands, 14 prototype models will be purchased through a civilian contractor and tested at various installations. It is estimated that it will take at least 5 years before the device will be fielded Army-wide.

## THE AN/APG-65 RADAR

*A successful first light test was conducted recently of the AN/APG-65 radar designed for the Navy and Marine Corps F/A-18 Hornet strike fighter. The all-digital, multimode radar system is designed to achieve a new level of reliability—more than 100 hours between failures.*

*The AN/APG-65 provides information for control of the aircraft's guns, bombs, and missiles and will be used in the full spectrum of fighter and attack missions by the F/A-18 Hornet.*



## LASER TARGET DESIGNATOR

The Army Missile Research and Development Command (MIRADCOM) recently awarded approximately $17.2 million for production and engineering services of the Army's new laser target designator (LTD), the shoulder-held "flashlight" that illuminates targets for laser-guided missiles and projectiles.

The 16-pound LTD, one of two laser designators under development for the Army at MIRADCOM, is the first selected for production. Resembling a stocky, short-barreled rifle, the LTD projects an invisible laser beam that can guide any weapon equipped with a laser seeker—such as Copperhead, Hellfire, Maverick, Navy gunfire, and laser-guided bombs. The LTD can identify friendly forces, hand off targets to aircraft for attack with conventional weapons, and pinpoint drop zones and helicopter landing zones for rescue, resupply, and reinforcement operations.

In addition to Army ground laser designators, the Redstone Project Officer is developing a unit for the Marines.

*The Army's laser target designator [LTD] [shoulder-held flashlight] illuminates targets for laser-guided missiles and projectiles.*

## LASER RIFLE SIGHT

The feasibility of using the American rifle system with laser LOK sight is currently being investigated for use with certain types of Special Forces by the US Army Institute for Military Assistance. Being compared is the American 180 system with laser LOK sight and the standard rifle, 5.56-mm, M16A1, that had a laser LOK sight attached below its barrel.

The American 180 rifle system consists of a .22 caliber American 180 rifle and a laser LOK sight. The rifle fires the .22 caliber, long rifle cartridge both semiautomatically and automatically (over 25 rounds per second) and is equipped with either a 16-inch or a 9-inch barrel. The laser LOK sight is a helium-neon gas laser that emits a red laser light with a beam width of approximately 6 inches at 100 yards. The system is aimed by placing the dot made by the laser sight on the target at night, or by using the rifle's iron sights during daylight.

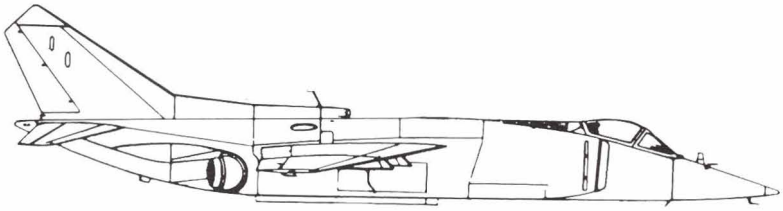
Comparisons of the firing effectiveness of the two weapon systems consisted of dispersion, hit probability, time to first hit, cyclic rate of fire, maximum effective range, and optimum battle sight zero range. The weapons were fired in both the semiautomatic and automatic modes in the shortest possible trigger-manipulated bursts. A limited amount of firing was done against hard targets (1/4-inch steel plate, concrete blocks, sandbag wall, armor vests, and steel helmets) to provide data on the system's capability to penetrate, damage, or destroy these targets.

Test results indicated that the maximum effective range of the American 180 rifle system with laser LOK sight, while achieving 100 percent hit probability, was 50 meters using automatic fire and 100 meters using semiautomatic fire. The maximum effective range of the M16A1 rifle with the laser LOK sight, while achieving 100 percent hit probability, was 25 meters using automatic fire and 100 meters using semiautomatic fire. The optimum battle sight zero for the test system was 100 meters.

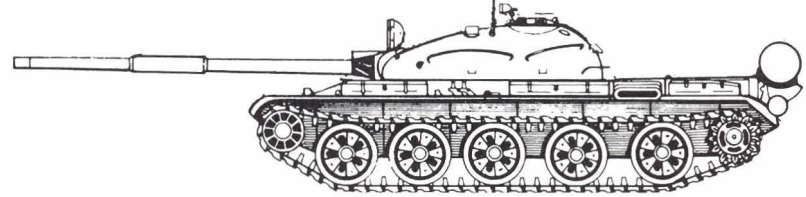
While the American 180 rifle system is an effective weapon in a quick fire environment against stationary and moving targets during low light level conditions, the laser LOK sight spot cannot readily be seen in sunlight beyond 20 to 30 meters; this requires the firer to shift to the weapon's iron sights to engage targets beyond 30 meters.

The cyclic rate of fire of the rifle is 1,500 to 1,800 rounds per minute, or 25 to 30 rounds per second. The fact that the low recoil of the rifle permits a shooter to hold his burst on target during automatic fire contributes to the rifle's ability to penetrate hard targets—a concrete block wall at 100 meters, for example. In addition, the American 180 was found to be extremely reliable.

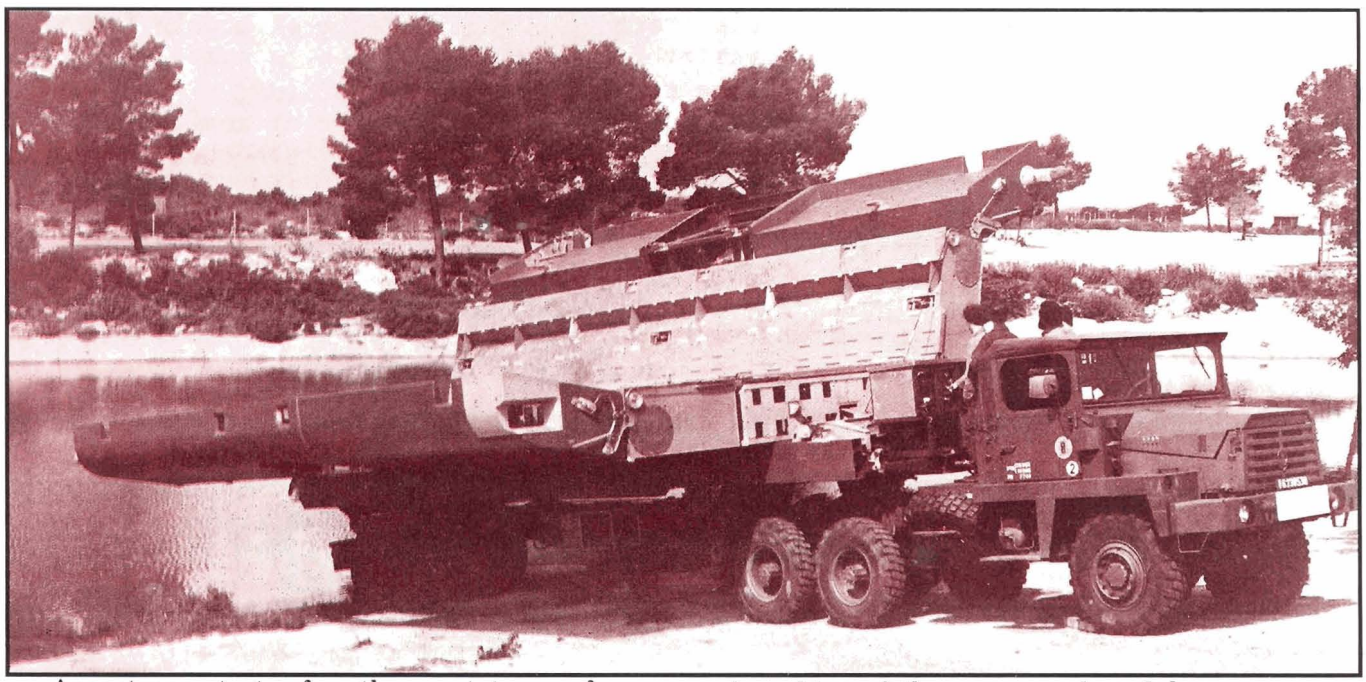
- Infantry



# INTELLIGENCEWATCH



## MOTORIZED PONTOON BRIDGE

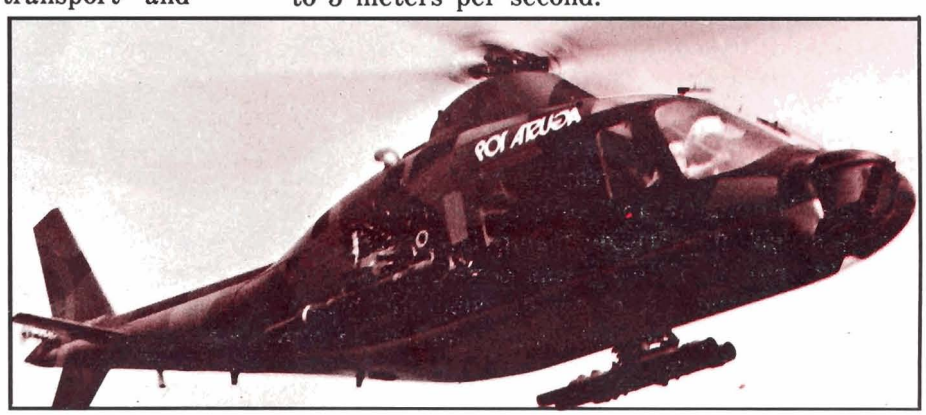


Acceptance tests for the prototype of a motorized pontoon bridge (MPB) were conducted late in 1977 by France. The tests were to verify the water manageability of the equipment with its outboard motors and the quick module assembling possibility of its prehooking system. Acceptance tests will continue through 1978.

The MPB can be used as a bridge or a raft. It consists of three main elements: a 10-meter long floating module, 12-meter long approach ramp, and a special semitrailer for transport and launching of the ramps and modules.

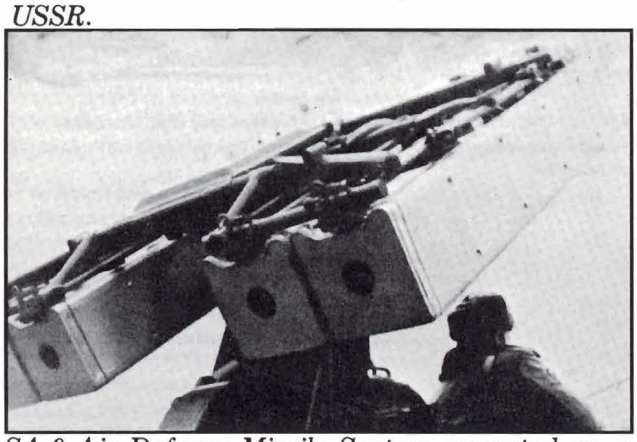
After unfolding, the modules are launched on the water and the outboard motors started. They are then assembled as a continuous floating beam. No crane is used to assemble the MPB and it is designed to meet strict operational requirements. These requirements include erection of a 100-meter long bridge in less than 1 hour, with a team of less than 50 personnel, and assembling from banks up to 2 meters high with a current up to 3 meters per second.

*Recently 33 TOW missiles were fired successfully from an Italian Agusta A109 helicopter [similar to one at right] at an Italian missile range, Sardinia. Each of the 33 missiles was fired from a different attack angle.*



*SA-8 Air Defense Missile System is a self-contained fire unit, recently deployed outside the USSR.*

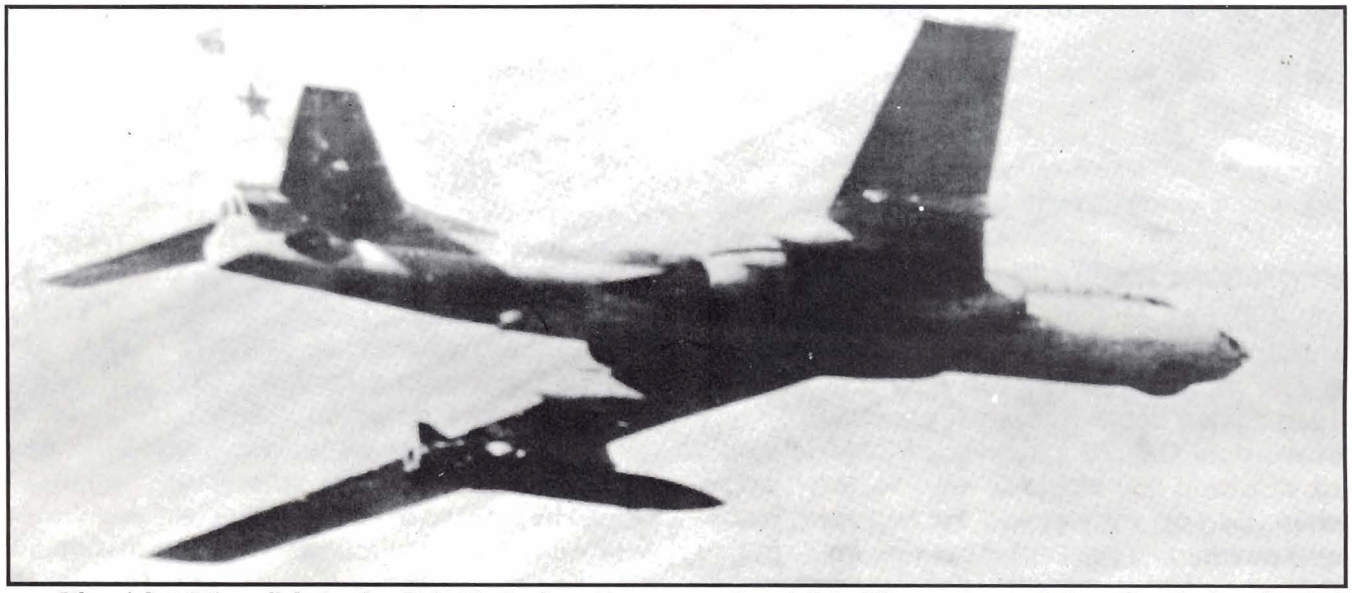
*ZSU-23-4 Self-Propelled Air Defense System has a self-contained shoot-on-the-move capability.*



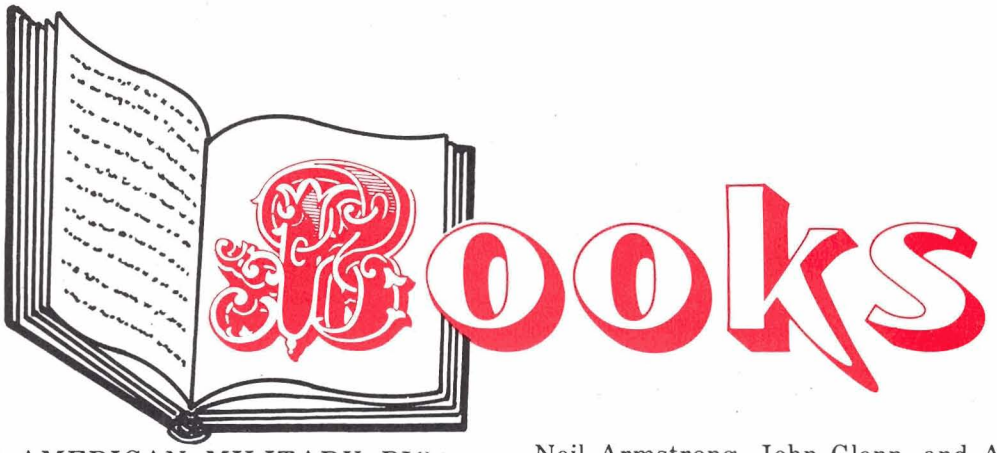
*SA-9 Air Defense Missile System, mounted on a BRDM vehicle, is a short-range tactical system that employes the wooden round concept.*

*T-72 Medium Tank, with 125-mm smoothbore gun, is not as yet known to be deployed outside the USSR.*

## AS-6 KINGFISH



The AS-6 Kingsfish is the NATO designation for a new air-to-ground missile recently seen carried under the wing of a Soviet TU-16 Badger in the vicinity of the Japanese Peninsula Noto. The missile is most likely an improved version of the AS-4. The estimated length of the AS-6 is approximately 10 meters, with a 1-meter diameter. The missile has been designed primarily for use with the new strategic bomber Tu-26 Backfire as its carrier. - Soldat und Technik




WEBSTER'S AMERICAN MILITARY BIOGRAPHIES, *edited by Robert McHenry. G. & C. Merriam Company, Springfield, Massachusetts, 1978. 560 pages, $12.95*

Reviewed by Joe P. Dunn, Ph.d.

The remarkable men and women who have contributed to America's colorful history through their association with the military now have their own book. WEBSTER'S AMERICAN MILITARY BIOGRAPHIES contains 1,033 detailed biographies and covers nearly 366 years of American military history from 1607 to the end of American involvement in Vietnam. Included are not only generals and popular military figures, but astronauts, frontier scouts, explorers, Indian warriors, nurses, military engineers, aircraft designers, foreign adventurers, and even one or two renegades.

In addition to the A to Z biographical section, which is the heart of the book, it also contains a chronological listing of every important military campaign in which the country has been involved, and with each the places and names associated with it. Thus, the book becomes a comprehensive chronicle of American military history as well as an important biographical work.

According to McHenry, the biographies of each of the 1,033 subjects are full and accurate treatments of their lives, written in narrative form, and not just a recitation of names and dates. The biographies range in length from a few paragraphs to a page or more. A great deal of information on battles, campaigns, tactics, politics, and other topics is worked into each life.

The people included in the book are a "who's who" of American military history. Marching through the book are such notable figures as Dwight D. Eisenhower, Douglas MacArthur, George Custer, Zebulon Pike, Kit Carson, Tecumseh, Sylvanus Thayer, the "father of West Point," aviator Jacqueline Cochran, Father Duffy of the "Fighting 69th" of World War I, Buffalo Bill Cody, Robert E. Lee, Davy Crockett, heroes Alvin York and Audie Murphy, and the man who invented the Gatling gun.

From more recent history there are astronauts Neil Armstrong, John Glenn, and Alan Shepard along with James H. Doolittle, Admirals Nimitz and Halsey, Hyman Rickover, Robert S. McNamara, William Westmoreland, Creighton Abrams, and even Gregory "Pappy" Boyington, World War II pilot recently celebrated in TV's "Baa, Baa Black Sheep."

McHenry describes the special reference section of the book as one of the most useful of its kind ever devised. The bulk of the section is the main chronological listing of wars and battles, with references to people and places of importance. In addition, however, there is a similar listing for each of the four services.

At the date "September 18-20, 1863" in the Army list, for instance, the reader will find a reference to "Chickamauga" and the names "W.S. Rosecrans; G.H. Thomas; G. Granger; B. Bragg; J. Longstreet; S.B. Buckner." Every name listed is given full biographical treatment in the A to Z biographical section.

A consultant interested in the Revolution, for instance, or in the Seminole War, the Philippine Insurrection, or a single battle like Brandywine or Fallen Timbers or Papua, New Guinea, simply has to look it up by date to locate the names of all biographies in the book who played a significant role. The separate Army list under "Revolution" notes over 80 separate actions, with from 1 to 6 biographical references each.

Also listed in this section are the Army group, Army corps, fleet, or squadron commanders during the Civil War and the two World Wars. There are also lists of commanding generals and Chiefs of Staff of the Army, Commandants of the Marine Corps, Chiefs of Naval Operations, and Chiefs of Staff of the Air Force through the present incumbents.

WEBSTER'S AMERICAN MILITARY BIOGRAPHIES, in addition to being just plain good reading, is a broad and effective reference work for military historians, students, teachers, researchers, librarians; even war game buffs. It will prove especially useful to those who treasure American history.

CORPS COMMANDER, *by Sir Brian Horrocks with Eversley Belfield and Major General H.*

*Essame. Charles Scribner's Sons, New York, 1977. 265 pages, $14.95.*

Reviewed by Joe P. Dunn (Ph.D.)

In the extensive literature on World War II, no subject is covered more thoroughly than the Normandy Invasion and the Allied offensive across Western Europe from D-Day to VE-Day. Library shelves overflow with volumes of official histories and literally hundreds of other accounts by historians, biographers, journalists, and participants. New studies appear annually. Cornelius Ryan's outstanding works brought the subject to the best seller lists. Many of the participating generals authored memoirs: Eisenhower, Montgomery, Bradley, Gavin, Ridgeway, Ismay, Patton, Bedell Smith, to name but a few of the more prominent. Fine biographies of all of these individuals swell the literature.

Legitimately one could question the value of another memoir; however, over 30 years after the events, Sir Brian Horrocks, Commander of the British XXX Corps and one of Britain's most distinguished living soldiers, adds his reminiscences to the abundant field. Horrock's earlier autobiography, **A Full Life** (1960), briefly covered his activities during this campaign; now he expands his coverage offering, he asserts, "new unpublished material."

This is a difficult book to evaluate; it is a strange work both in conception and in format. Horrocks explains the effort as "a personal account of the trials, tribulations, and very occasional triumphs of one man," a Corps Commander. Yet the coverages goes beyond this memoir to tell the story of Canadian and Polish units fighting on the left flank of XXX Corps. Thus, the book emerges as a limited military history of a small portion of the Western offensive.

The evolution of the book is unusual, which partially explains the unorthodox nature of the work. During the early stages of the project, Horrocks engaged noted military historian General Hubert Essame, a Brigade Commander under Horrocks in XXX Corps, as collaborator. Essame suggested broadening the memoir and persuaded another distinguished military historian, Eversley Belfield, to join the team. Belfield served with Canadian forces during the campaign and had maintained a very detailed diary. From his diary, he added sections of chapters that expanded the story beyond XXX Corps activity. Essame died during the project, leaving Horrocks and Belfield to finish the book. The final product is a slightly awkward composite of chapters and sections written by the various authors.

The authors briefly treat Normandy, the Falaise Pocket, crossing the Seine, the advance to Brussels and Antwerp, the little-known Battle of Geilenkirchen, the Ardennes Offensive, crossing the Rhine, the final liberation of the Netherlands, and a postscript on occupation duty in post-war Germany. The best chapters focus on the Battle of Arnheim, one of the most difficult and frustrating of the campaign.

These events have been covered more than adequately previously and Horrocks' accounts are terse, at times almost simplistic; still, the book is interesting reading and makes a contribution.

It offers a brief introduction to the Allied campaign for those not well versed in the larger literature. Horrocks' account is more manageable for the layman audience than more comprehensive studies. Indeed, he explains that his purpose was to reach a wide popular audience. Scholar and layman alike will find the author's vignettes on personalities such as Eisenhower, Montgomery, Patton, Gavin, and others, interesting. And the British general's perspectives on the trials of tactical command, the frustrations and successes of Anglo-American cooperation, and a few personal asides rank among the book's merits. Finally, the book is well illustrated and contains helpful maps and diagrams throughout.

In sum, the book deserves mixed reaction. It will have greater appeal in Britain where it was published; however, it will have appeal to the American military buff as well. Essentially, it is a book for laymen that scholars may find of some smaller value.

*Dr. Joe P. Dunn is Chairman of the Politics Department, Converse College, Spartanburg, South Carolina. He has published over 35 book reviews as well as research articles in professional journals. He is a Vietnam veteran and a member of the South Carolina National Guard.*

THE KAISER: WARLORD OF THE SECOND REICH, *by Alan Palmer. Charles Scribner's Sons, New York, 1978. 276 pages, $13.95.*

Reviewed by Captain Franklin C. Johnson

For many people, the catastrophe of 1914-18 remains "the Kaiser's War." More than any other man, Kaiser William II has been singled out as the person who was most responsible for the tragedy of World War I. Many of these accusations are justified, but if one searches through the life history of Kaiser William II, many are not.

Alan Palmer's book, **The Kaiser: Warlord of the Second Reich**, does just that. It starts with the birth of Prince Frederick William Albert Victor in 1859 and follows the people and events that had an influence on the man who, in 1888, became Kaiser William II.

William's birth as a healthy child was a cause for rejoicing in Berlin and in London. In addition to being a Prussian prince, he was also lauded by the

British public as Queen Victoria's firstborn grandson. However, more than 60 years later, the Kaiser himself wrote: "One definite disability I did suffer from. At birth my left arm had received an injury unnoticed at the time, which proved permanent and impeded its free movement." The physical and psychological effects from this crippled arm undoubtedly left their mark on his character, but the damaged left arm was merely the outward physical form of a deeper disability. In the early months of William's life, the doctors discovered that a neck injury at birth had caused the paralysis of the arm. At the same time, the hearing labyrinth of the left ear was harmed so that the young prince suffered from deafness in one ear. As he grew older, it became clear that his balance was also affected, presumably by damage to that part of the brain that lies closest to the inner ear.

Palmer proceeds to fully document the early life of the prince and the struggle that carried him from a boy who could not sit atop a horse to a regimental officer who handled the cavalry faultlessly on maneuvers. These impressionable years of William's boyhood also coincided with the wars that enabled Chancellor Otto von Bismarck to create his united Germany and William looked with starry-eyed admiration at the genius who raised the German empire to this high pinnacle.

One by one, Palmer introduces the different characters who take a part in William's life. The dominant figure in the young prince's schoolroom was a civilian, Dr. George Hinzpeter, who was given charge of William in 1866. As it turned out, William could not concentrate on anything academic. To the disappointment of his parents, he became and remained an arch-dabbler, a dilettante who showed promise but never fulfillment. The prince's 18th birthday marked the end of Hinzpeter's direct responsibilities.

On 27 February 1881, William married Princess August Victoria, a woman who started out docile but, as time passed, influenced more and more of William's decisions.

After William started his reign as the Kaiser (Emperor) in 1888, Germany spent many happy and restless years under his leadership. As the Kaiser, William spent more time and concern over "his cavalry," "his Guards Regiments" and, above all, "his Navy" than he did over everyday problems with the government at home. He bothered himself at times with trivialities such as the cut of a new jacket for naval officers more than he did with more important matters such as the reform of the military justice system. As a result, he was surrounded by military and political leaders who tried to keep him busy with less important matters and out of their planning as much as possible. It is this period of William's reign that Palmer goes to great detail to document, emphasizing the events that led up to and followed the initiation of World War I.

In the end, William is characterized not as the inspired leader of the Reich but as a mirror of Germany's strengths and weaknesses. It was Edward VII who once described his young nephew as "the most brilliant failure in history." It was a cruel anticipatory epitaph. Unfortunately for William and for Europe, it proved to be true. The final years of William's life were spent at his exile home in the Netherlands, and he was saluted by a generation that had been taught that the last Hohenzollern sovereign had "meant well for Germany," but had failed her at the crucial hour. He died on the morning of 4 June 1941.

To the individual who likes the "blood and guts" type of action novel, Palmer's book will not provide interesting reading; however, to the individual who wants to discover the driving force behind the man held most responsible for World War I, Palmer has written an informative, chronological history of Kaiser William II.

*Captain Johnson, a Vietnam veteran, holds a Masters Degree from Webster College. Also a graduate of the major Air Defense Artillery courses, he is currently commander of Headquarters and Headquarters Battery, Staff and Faculty Battalion, US Army Air Defense School.*

ON REVOLT, *by J. Bowyer Bell. Harvard University Press, Cambridge, Massachusetts, 1976. 237 pages, $15.00.*

**On Revolt** is a study of contemporary revolts (seven in all) committed under the banner of national liberation beginning after 1944 and extending to the present, as carried on by the IRA.

The author draws a comparison between revolt and revolution. According to Bell, a revolt is neither a coup nor a mutiny, it is narrower than a revolution but is a violent continuing reaction to centralized authority. A revolution, on the other hand, implies substantial change and transforms or transposes basic values.

From the book, the reader learns of the many causes and patterns of revolts, and that most revolts are stopped short of their original purpose, mainly because men either overestimated their assets, missed the sure tide of events, or started what they were unable to finish.

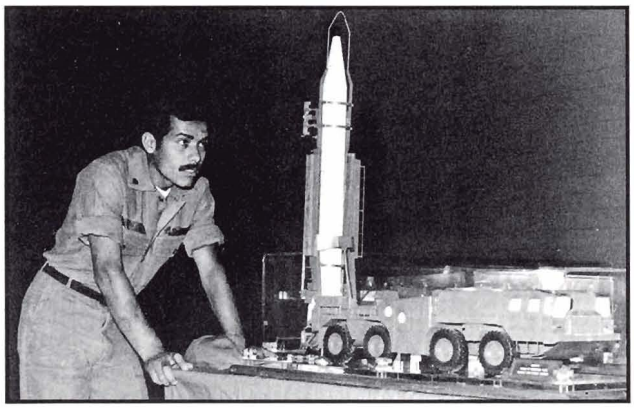
**On Revolt** helps explain the variety of human decisions and character tests that surface during rebellions. The nature of the rebel is examined as are his tactics and techniques. To the reader they are revolting, but to the rebel they exemplify a dedicated service done in the name of national liberation.

# RUSSIAN EQUIPMENT EXHIBIT

A TRADOC travelling team recently visited Fort Bliss, displaying various items of Soviet military equipment, some models and some the real thing. Here are but a few of the items viewed by personnel at Fort Bliss.

*SA-7 launch tube and GRAIL missile.*

*7.62 assault rifle AF-47 [upper right] and 7.62 assault rifle PKM-DGM [held by soldier at left].*



*Model of the SCUD-B missile on its launcher/carrier.*

*Models of the Hind-A helicopter, SCUD-B missile, and truck-mounted scissors bridge.*