AIR DEFENSE MAGAZINE

OCTOBER - DECEMBER 1977

DUAL DEFENSE MISSION

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AIR DEFENSE MAGAZINE

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.

Articles appearing in this publication do not necessarily represent official policy or endorsement by any agency of the US Army.

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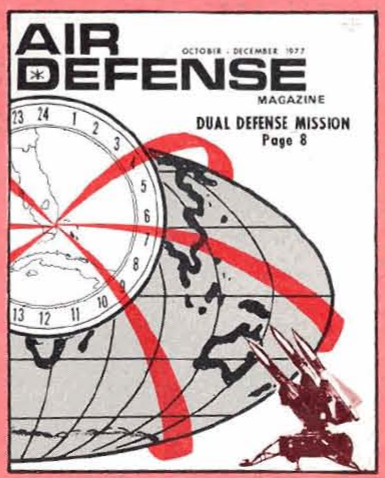
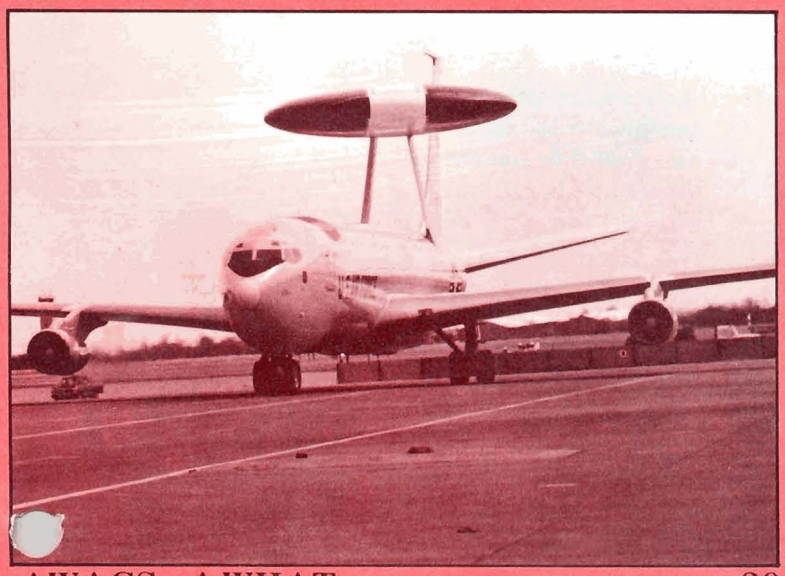
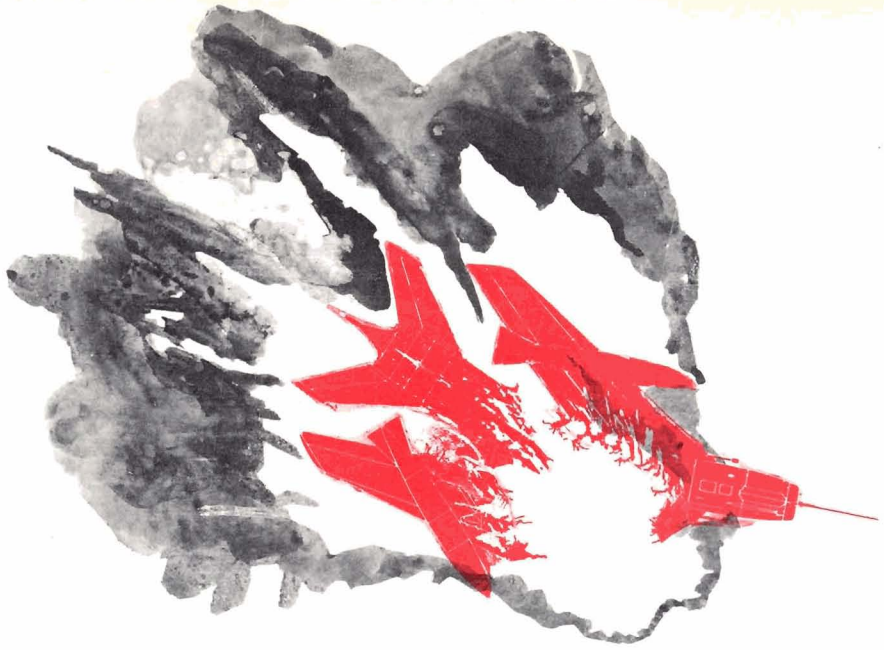


COVER: Our cover symbolizes the unique mission of the 31st Air Defense Artillery Brigade. Its mission includes not only guarding the skies of the south Florida coastal area but also fulfilling a STRAF requirement that may take units anywhere in the world on short notice, both requiring round-the-clock readiness.



ARTICLES

DEPARTMENTS



INTERCEPT

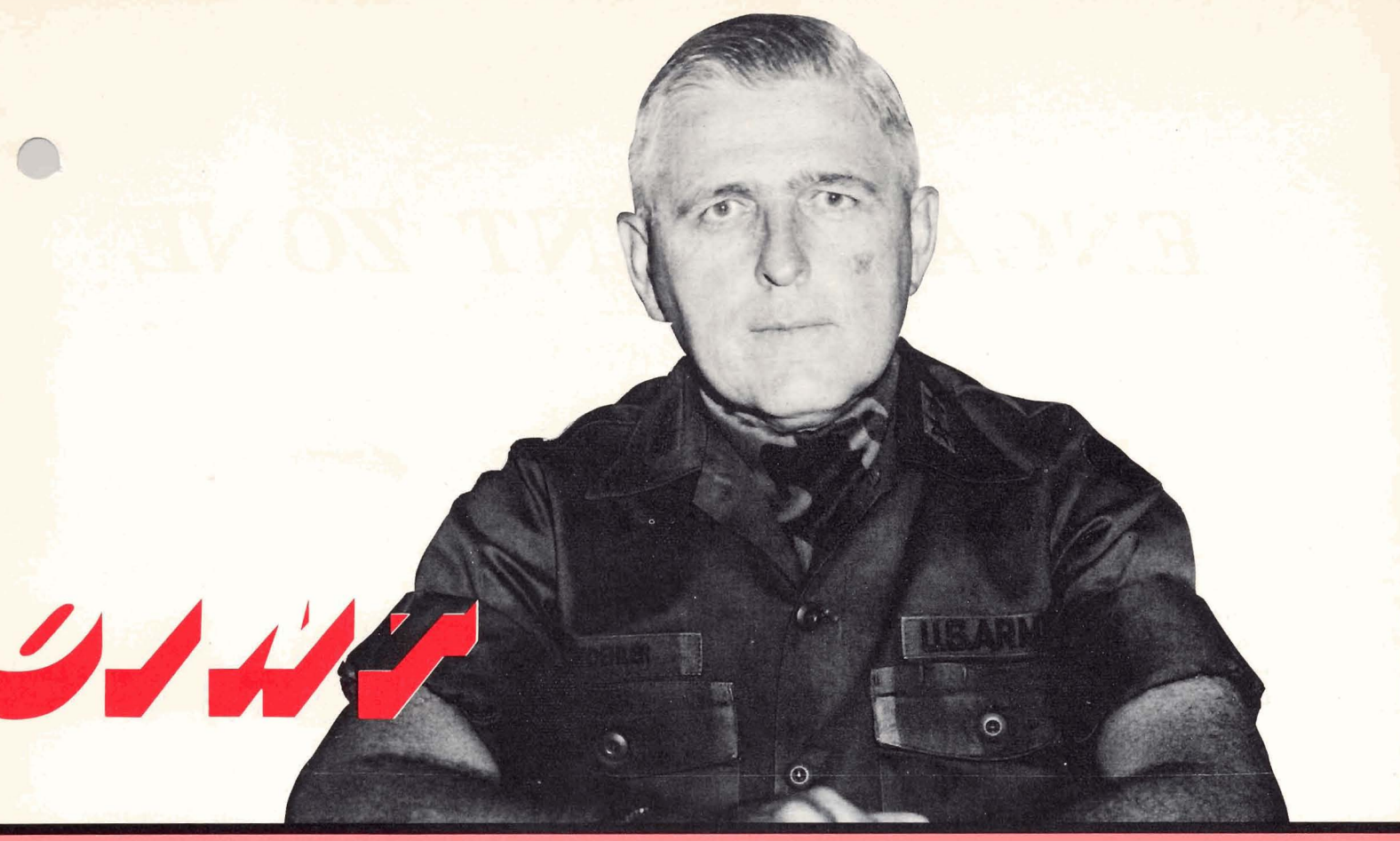
MAJOR GENERAL JOHN J. KOEHLER, JR.

The Air Defense School exists for one primary purpose — to support Air Defense Artillerymen in the field. All School activities are driven by the needs of those serving in Air Defense Artillery [ADA] units around the world. In this, my first Intercept Point for our ADA magazine, I want to reflect briefly on how those needs have changed in the 10 years since I last served at Fort Bliss, the home of the Air Defense Artillery combat arm.

One dominant factor driving change in air defense mission requirements is the changing threat. In the 1960s, the Army's air defense resources were committed, in large part, to the defense of strategic assets within the Continental United States [CONUS]. Nike Hercules missile units, assigned to the US Army Air Defense Command and under the operational control of the North American Air Dense Command, maintained around-the-clock vigilance from fixed sites situated throughout the country. Considering the threat, that is how it should have been at that stage in our evolution as a separate combat arm. Accordingly, mission requirements at that time dictated that much of the energy of the Air Defense School be dedicated to the support of units engaged in the CONUS mission.

In the 1960s, as concerned the field Army, our focus was on defense of assets in the theater and corps areas. However, in those days the capability of potential enemies to inflict damage on forward combat assets was not considered substantial, and this rationale was used to save money for other programs. Efficient management requires that we allocate our scarce resources in response to the perceived threat. Thus, for several years, there was no divisional air defense.

Today, that revised threat combined with changing tactics has altered substantially the mission requirements for our branch. The recognized threat now has the capability to inflict unacceptable levels of damage upon division targets. Further, this capability is projected to increase dramatically over the next 10 years. Consequently, today and in the foreseeable future, increased emphasis must be given to providing low-altitude air defense for our mobile forward combat forces while maintaining our defenses of rear assets. If the enemy is given a preferred attack option because of a defensive weakness, he will capitalize on that weakness. The addition of Chaparral, Vulcan, and Redeye to the force structure helps in providing a balanced defense

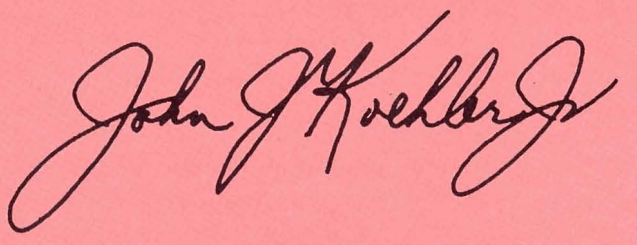


beginning at the forward edge of the battle area. The divisional direct support Hawk Battalion provides additional air defense for our forward deployed units by giving the required area coverage as well as a balanced defense capability at higher altitudes.

Air Defense Artillery has now taken its rightful place as a full-fledged member of the combined arms team. Today, our teammates in the other combat arms — Infantry, Armor, and Field Artillery — recognize the severity of the air threat in a future war and realize the need for Air Defense Artillerymen among their ranks. The 1973 Arab-Israeli War changed many people's minds about the value of ground-based air defense in modern warfare. All are beginning to realize that winning the ground battle while losing the air battle equates to losing the entire battle.

In line with the basic purpose of the Air Defense School, we at Fort Bliss need to know what your needs are. The continual infusion of personnel from the field into the School, both as students and as staff and faculty, is perhaps our best means of keeping current. But we also need and welcome the thoughts and ideas of those of you who are now in the field. You can transmit them to us in various ways — through letters and articles for the AIR DEFENSE Magazine, letters to me, comments on draft publications sent out for review, and through informal contacts with people you know here at Fort Bliss. The dialog between you and your "alma mater," the Air Defense School, must be continued and expanded if we are to advance our ability to fulfill mission requirements.

In the past 10 years, we have made great progress in developing a credible air defense capability for the Army in the field. With new and improved weapon systems on the horizon, and with the continually on-going development of tactics and techniques to optimize the effectiveness of ADA systems [both old and new], Air Defense Artillery is indeed moving forward. I encourage you to join with me in this march to better our capability to defend our nation and our Army from enemy air attack.



ENGAGEMENT ZONE

letters to the editor

SPECTRUM X

Dear Sir:

In your April-June 1977 edition you had an article, "CE for Air Defense," which described an 8th Infantry Division Spectrum X to be used in reporting aircraft locations and airmobile insertions. This particular system is commonly known as the Grid Overlay System, a modification of the Point of Origin Code. Although it may reduce reporting time and speed transmission, it offers absolutely no security and should not be used as a means to encrypt coordinates.

The major drawback to a system of this type is in its basic insecurity. If it was used only to expedite traffic it could be useful; however, invariably someone will attempt to pass coordinates that should have been encrypted, under the mistaken impression that the system is secure.

There are authorized systems that can easily be obtained. I would recommend that if your readers have a need for this type system they contact their local Army Signal Security Support Team, who can assist them in requistioning a code that will give the same results as the Spectrum X and also be secure.

ROBERT G. OLSON
MSG, USA
Chief Instr, SIGSEC Div
US Army Intelligence School

FULL ALERT

Dear Sir:

I would like to take this opportunity to extend my compliments on the article, "C/V Tactical Employment in the 8th Infantry Division." The article was well written and contained some very useful information. The portion of the article that was most enlightening, however, was the photograph of the Chaparral in a state of full alert. You see, we here in the 3d Armored Division have always operated our Chaparrals in a full alert status with the senior gunner inside the launching station, tracking for aerial targets.

CHRISTOPHER K. RASH
CPT, ADA
Commander
Btry B, 3d Bn, 61st ADA
3d Armored Div

BRAVE SHIELD XVI

Dear Sir:

Shortly after our return from Exercise Brave Shield XVI, I received a copy of your April-June issue of AIR DEFENSE Magazine and read LTC Bell's Research Report. It would have been very helpful to have had this prior to the exercise, since, with some exceptions, it reads like a carbon copy of our own after-action report. Space permitting, I would like to address some specifics:

The Exercise

Brave Shield XVI was a joint readiness exercise conducted at 29 Palms Marine Corps Base [MCB], California, during the period 14-20 July 1977. Friendly and opposing forces were comprised of Army, Air Force, and Marine Corps, Active Reserve, and National Guard units. All air defense elements for the opposing force were simulated. Friendly air defense consisted of a Marine Hawk Battalion [-] with its Redeye battery and the 1st Bn, 51st ADA HHB, two towed Vulcan batteries, and one platoon from a provisional Redeye battery. Simulated units included two Chaparral batteries, the remainder of the provisional Redeye battery from the 1st Bn, 51st ADA, an Army Hawk battalion, and an additional C/V battalion.

Staff Level Comments

S1 play. Real world activities such as personnel accounting and reporting, coordination of recreational service, chaplain service, PX service, Article 15s, promotions, emergency leave, and medevac more than compensated for a lack of simulated inputs. S4 play was equally full in the areas of C1 I, II, III, and IX supply; water and ice

delivery; establishment of shower points; vehicular, systems, and communications maintenance; and planning the motor movement to and from 29 Palms MCB.

Aircraft kills should be assessed by controller/evaluator action at the system location. Proper gunner actions in acquisition, identification, tracking, and engagement should govern whether an engagement is successful. Some random system of percentage of kills or damaged aircraft should also be applied. While "instant revival" of enemy aircraft is unrealistic, it is understandable in terms of aircraft availability and cost. Without kill assessment, however, unit/defense effectiveness cannot be evaluated, and unit training proficiency cannot be determined.

Airspace management. The division airspace management element is used mostly as the ADA special staff, rather than the agency coordinating the activity of the various airspace users.

Personnel shortages in the S2 can be overcome by intergrating the S2 and S3 sections and running the 12-hour shifts from the combined sections.

Battery Level Comments

Early warning from any source was virtually nonexistent. The 1st Bn, 51st Ada, has no FAAR. Out of our own hide, we placed people and commo gear with the Air Force command reporting center [CRC] and with an assault fire unit from the Marine Hawk battalion. The personnel with the CRC were equipped with the AN/GRC 106. When the radio did work, we found that the CRC would pass no 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 system is cumbersome and unworkable in a moving situation. The man with the Hawk AFU was provided with an AN/PRC77 and a wire line. Although the distance to the AFU was only 5 km for the radio and 8km 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.

Hostile markings for aircraft were nonexistent. The units were given lists of friendly and hostile aircraft; however, the RF4 was on both, the F-111 was on both, and A-7 did not appear on either, although it was in the air. Later the units were told that camouflaged aircraft were friendly unless in groups of four or more, silver aircraft were hostile, and grey were friendly. In spite of this, the unit "credited" itself with only two friendly kills. One of these, however, dropped tear gas on a friendly unit, constituting a hostile act, so he was engaged.

One battery was placed in support of the maneuver elements of the player brigade. In spite of it being a towed Vulcan battery, it supported both tanks and infatry in the attack. This is difficult at best for the towed system and the tank commander, in his bounding overwatch maneuver, occasionally had the Vulcan as his bounding element.

Heat [temperatures to 110°F] had a devastating effect on the Vulcan radar, and the terrain [steep, with lava rock] caused approximately three flats per Gama Goat. The battalion motor section was able to keep a steady stream of repaired flats moving forward; however, in actual combat this would be impossible.

Redeye was employed by attaching sections to the Vulcan batteries with instructions to integrate them into their air defense. Like their infantry counterparts, the battery commanders tended to forget the Redeye, particularly in moving situations, and rarely credited them with engagements.

JOHN D. CRANDALL
LTC, AD
1st Bn, 51st ADA
Commanding

A MODEST PROPOSAL

Dear Sir:

"What's in a name?" may be a question more appropriate to those unlucky in love than to the modern military, but it's a quandry to be recognized under the current divisional reorganization study underway by TRADOC. Over the past 20 years, the military has devoted great minds and many hours to semantics. We have been "cordon and search'ed," "counterforce'd and counterstrike'd" "team'd," "task force'd" "DIVARTY'd," and "group'ed." Now, with the advent of a new divisional structure, a new abstration arises from the semantics—DIVADA, the DIVision Air Defense Artillery. The question arises, "Why?" Not why the organization; the last Mideast war and the dynamics of modern battle answer that question. The object of this question mark is why invent a new term for an organizaion that already has its name in the dictionary of military terms, namely, the regiment. The size and organization of the proposed DIVADA closely approximates that of the regiment, more so than that of the modern brigade. Also, a regimental structure could help clarify a now obfuscated system [CARS] associated with the modern brigade. In addition, a regimental structure would lend a commanality of

defenders to feel an association with the heroics of regiments' past proud traditions. Moreover, the "Regimental Artillery" concept could simplify the confusion of the CAR system. Organizing the diverse weapon systems under a common flag, crest, tradition, and mission, the uniqueness of the Regimental Artillery could build a strong sense of esprit de corps within all elements of the regiment. After all, what's in a name?

JOHN AA OPIOLA
CPT, ADA
Commander
D Btry, 4th Bn, 1st ADA

AAA GUNNERS BADGE

Dear Sir:

In 1957, while serving in "C" Battery, 91st Antiaircraft Artillery, in Wiesbaden, Germany, I earned the Second and First Class Gunners Badges with the AAA Bar. We had 75-mm Skysweepers. This authorization is entered on my DD Form 214 from 1958. The certificates of award have been burned and my military records were among those burned in the St. Louis fire several years ago.

I joined the Michigan National Guard in 1973 and desire to have my Gunners Badges on my Class A uniform. Every effort I have made to obtain the AAA Bar has met with failure. Nobody seems to be able to get my AAA Bar. Can you help me locate one or more bars? There appears to be no way to get duplicates of the certificates, as much as I would like to have them also.

SP5 TERENCE G. MARION
Bn Career Counsellor
HHC, 3d Bn, 126th Inf
Michigan National Guard
Wyoming, Michigan

The AA Artillery Bar to the AAA Gunners Badge is still authorized for wear according to AR 672-5-1. A copy of your DD Form 214 is ample proof of authority for you to wear the Bar. A replacement can be obtained by writing to: Commanding Gereral, US Army Reserve Components, Personnel and Administrative Center, 9700 Page Boulevard, St. Louis, Missouri. Be sure to include the following Stock Number in your request: 8455 00 256 1844, Advice Code 2F.

- Ed.

RECOGNITION POSTERS

Dear Sir:

In a recent issue of AIR DEFENSE Magazine an article appeared concerning Soviet Air Defense Weapons. Being assigned to a NATO unit located in Germany, I found the article most informative and educational. Working in such close proximity to Warsaw Pact Nations, I was startled by the fact that many of our personnel are not substantially familiar with Soviet Tactical Aircraft and Air Defense Systems. I find this situation disturbing and would request your support in reference to the Air Defense Weapons posters mentioned in your article.

Request that you forward copies of the Soviet Air Defense Weapons and Soviet and Warsaw Pact Forward Area Aircraft Posters. They will be most beneficial to the men and officers of the 69th USAFAD.

THOMAS G. EDWARDS
SSG, USA
Tng NCO
69th USA FA Det

Dear Sir:

Your poster, entitled "Soviet and Warsaw Pact Forward Area Aircraft," has been very popular with my unit, the 3d Bn [Abn] Vulcan, 4th ADA, 82d Abn Div. I have been flooded with requests for additional posters.

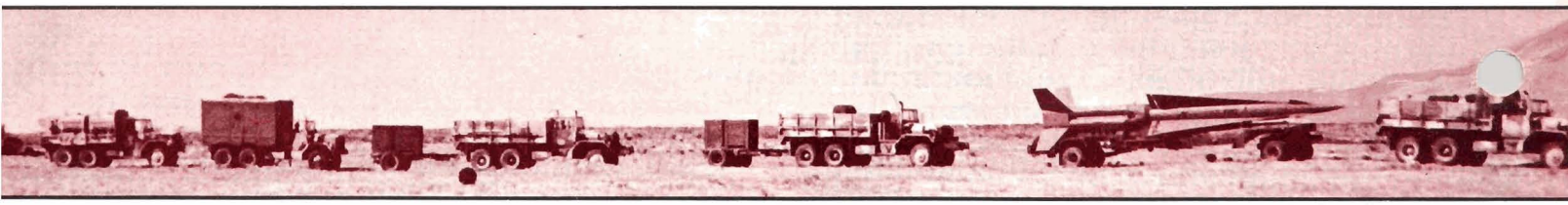
If posters are available, I would appreciate it if you could send a supply of additional copies. Each will be fully utilized by the batteries, the battalion commander, the executive officer, and S2 Section, S3 Section, and battalion tactical operations center.

I second the recommendation made by the Air Defense School that TRADOC convert the poster to an official Graphic Training Aid.

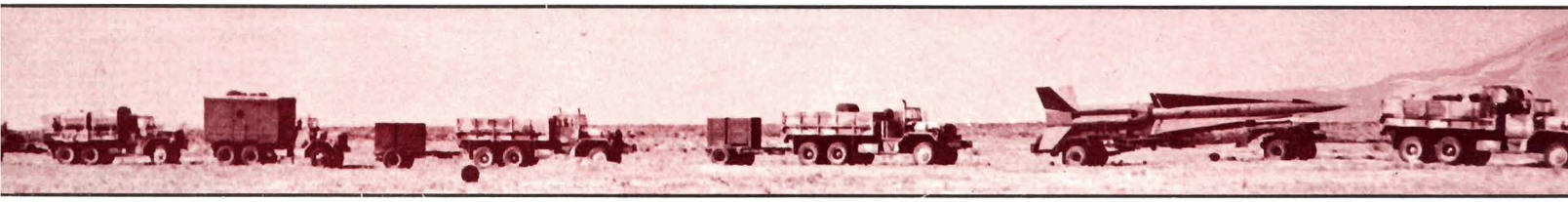
JAMES F. WILLETTS
CPT, MI
S2, 3d Bn, 4th ADA
82d Abn Div

We still have an adequate stock of AIRCRAFT and AIR DEFENSE WEAPONS posters available to all who request them, pending availability of the official Graphic Training Aid. Requests should be addressed to: Commandant, US Army Air Defense School, ATTN: ATSA-TD-LITS, Fort Bliss, TX 79916. Orders for more than 10 posters should include an explanation of their intended use.

- Ed.



THE 31ST AIR DEFENS



CAPTAIN C.E

For decades it has been said that the Air Defense Artillery is the only combat arm of the US Army that performs its full wartime mission during time of peace. Nowhere has this saying held more truth than in south Florida, where the men and women of the 31st Air Defense Artillery Brigade have executed an active CONUS air defense mission on an around-the-clock basis for 15 years—since the days of the Cuban Missile Crisis.

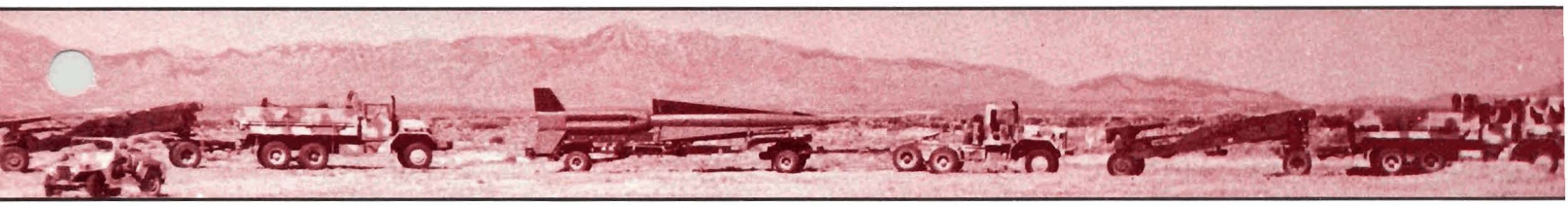
The Brigade today is unique in that it is the only Army Air Defense organization with an Active Continental US [CONUS] air defense mission and the only US Army Forces Command [FORSCOM] unit with a dual mission. Brigadier General William E. Cooper's 3,000 soldiers and more than 200 civilian employees discharge their continental air defense mission under control of the 20th NORAD Region; 25 percent of the batteries are on alert at all times. Simultaneously, all the units train and exercise for a Strategic Army Forces [STRAF] mission, insuring that they are prepared for short notice deployment anywhere in the world in support of contingencies directed by the Joint Chiefs of Staff. The Brigade's mobile STRAF deployment capability is supported by the 2d Bn, 52d ADA, stationed at Fort Bliss, Texas and a maintenance detachment at Fort Gillem, Georgia.

For the execution of its CONUS mission, the Brigade is organized in two defenses. The Homestead-Miami Defense consists of the 2d Bn [Herc], 52d ADA, and the 3d Bn [Hawk], 68th ADA. It has the mission of defending the Homestead Air Force Base complex and of extending an air defense umbrella over the entire Miami metropolitan area. The Key West Defense is manned by the 1st Bn [Hawk], 65th ADA, and has the mission of defending the Key West Naval Air Station and associated US Navy facilities at Key West. Both defenses maintain the required high level of proficiency in their CONUS missions. The high scores consistently attained by all fire units during annual service practice [ASP] at Fort Bliss, Texas, demonstrate the effectiveness of the thorough and carefully implemented unit training programs of all battalions, as well as the high morale and team spirit of the troops. They take justifiable pride in their accomplishments and can point with satisfaction at a long string of additional achievements, including zero point-loss on OREs conducted by FORSCOM, a high percentage of Honor Battery designations from the US Army Training and Doctrine Command following Air Defense Center-conducted ASPs, and four closed-book Defense Nuclear Agency Technical Standardization Inspections in the course of 1 year.

The defensive efforts of all fire units are coordinated and controlled by the Army Air Defense Command Post [AADCP] located at Richmond Heights Air Force Station. Control is exercised by means of the AN/TSQ-51 Missile Mentor fire distribution system. Centralized fire direction inputs are provided by the Tyndall North American Air Defense Command [NORAD] Control Center. Although the 31st is a separate brigade under the command of Headquarters, FORSCOM, and receives all classes of support from FORSCOM, it is under the operational control of Air Defense Command in the execution of its CONUS air defense mission, and is directed in all tactical operations through NORAD.

In 1970 the Brigade was assigned its second

Defending The Home



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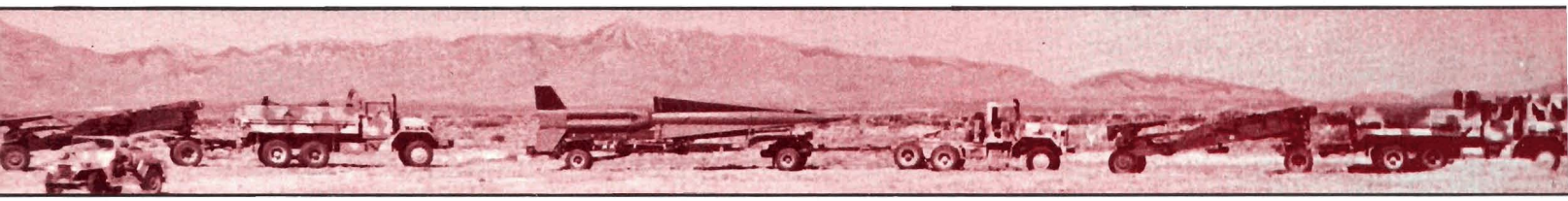


KIRKPATRICK

mission and became a part of the US Strategic Army Forces [STRAF]. That mission requires the battalions to maintain the capability to deploy anywhere in the world as part of the US Readiness Command's strategic forces. Current operational plans allow for unit deployment as battalion packages and provide options for movement by air, rail, sea, or organic vehicles. Recognizing that effective mobile air defense coverage is vital to insure that the Army field forces can maneuver to apply combat power where needed on the battlefield, the 31st ADA Brigade has placed strong emphasis on its deployment readiness mission. Constant training and exercises hone the fine edge of the STRAF battalions; the Brigade is ready to go where it is needed when it is needed.

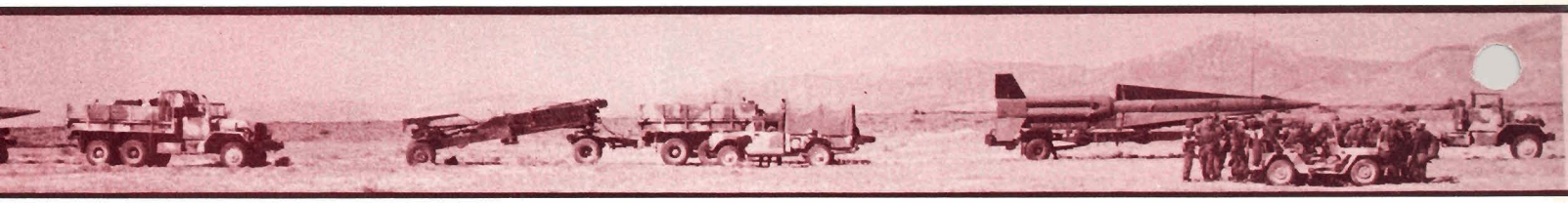
The STRAF mission requires great flexibility and facility in training and personnel management on the part of unit-level commanders. Remaining prepared for both missions requires a delicate balance in training efforts and continous effort in the areas of equipment maintenance and deployment planning. The capacity of each battery to carry out its STRAF mission is tested annually during the Operational Readiness Training Test [ORTT]. The ORTT evaluates battery proficiency tactical convoy procedures, local security, NBC defense, fieldcraft, the establishment of field locations, camouflage and concealment, and the conduct of the air battle from field sites. Satisfactory air defense operations are the prime requirement for the ORTT, and the ORE is an integral part of the testing procedure.

The ORTT is conducted in different areas for each battalion. The 2d Bn, 52d ADA [Herc], conducts its ORTT at McGregor Range, New Mexico, in conjunction with ASP. The 1st Bn, 65th ADA [Hawk], on the other hand, is tested at Key West; while the 3d Bn, 68th ADA [Hawk], undergoes ORTT at the USAF Gunnery Range at Avon Park in central Florida. The Brigade maintains an equipment storage facility at Fort Gillem, Georgia, where both Hawk battalions store a portion of their deployment equipment. Because of the relatively greater amount of equipment required for the movement of a semimobile Hercules battalion, the Brigade has established the 2d Bn, 52d ADA Element, at Fort Bliss with the mission of storing and maintaining that battalion's STRAF equipment.

The 2d Bn, 52d ADA Element, does more than maintain and store STRAF equipment, however, it is tested annually when it joins the battalion for ORTT. The Element provides the equipment and personnel for the battalion operations center, battalion AADCP, signal platoon, transportation motor pool, and all associated services necessary to sustain the unit in field operations. During the balance of the year, the Element provides battery equipment and support for ASPs for Nike Hercules battalions ranging from the 1st Bn [Herc], 43d ADA, in Alaska, to the Hercules battalions of the Japanese Self-Defense Force and the Spanish Army fire units.

In the event a battalion is alerted for STRAF deployment, operational plans call for its release from the CONUS mission and its transfer to the operational control of the US Readiness Command for the duration of the emergency. Brigade units have received valuable deployment training and experience through participation in BRAVE SHIELD IX at Fort Polk, BRAVE SHIELD XIII

Front Southern Flank

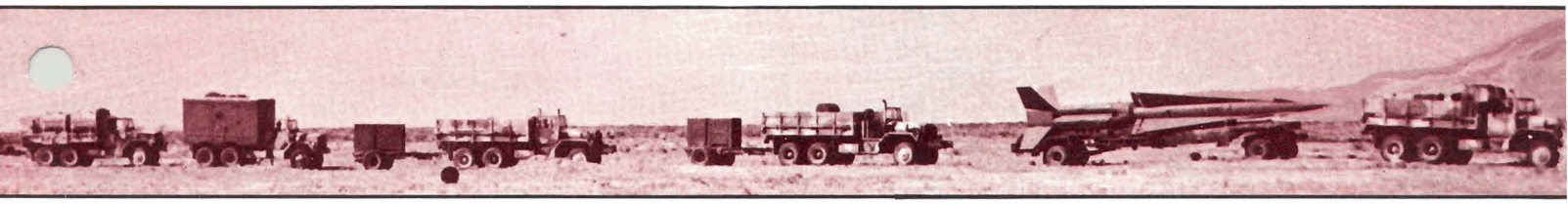


at Eglin AFB, and SOLID SHIELD 77 at Fort Bragg.

Beyond the tests previously discussed, an additional series of evaluations is required of the 2d Bn, 52d ADA [Herc], both in its STRAF and CONUS missions. Being nuclear-capable, the battalion must demonstrate the capacity to store and assemble nuclear weapons and deliver nuclear fires. That requirement entails extensive training in nuclear weapons handling and security procedures and involves the unit in technical proficiency inspections by the Department of the Army and FORSCOM, and technical standardization inspections by the Defense Nuclear Agency, as well as local nuclear surety inspections.

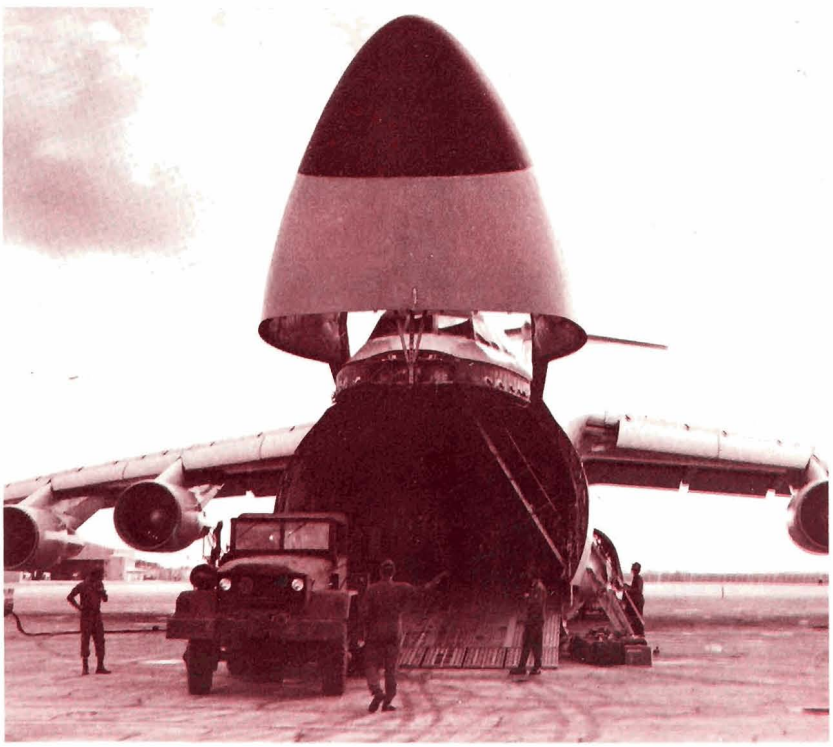
The training involved in assuring the Brigade's preparedness for its dual mission has several highly beneficial spin-offs, and is mutually supporting. The STRAF mission is enhanced through the high degree of tactical proficiency the troops develop as a result of their daily exercise of the NORAD mission. The skills involved in air-transportability loading and mobility and STRAF-related fieldcraft prepare the men for a wide diversity of later assignments. Since the Brigade also serves as the CONUS rotational base for soldiers bound for foreign duty air defense assignments, it is in the position of being able to return them to the oversea commands with vastly enhanced military skills and training. As a result,

CPT George Nelson, C Battery Commander, briefs General Kroesen, FORSCOM Commander, on the field emplacement of a Hawk Battery during the General's visit to the 1st Bn, 65th ADA.



the Brigade is able to contribute to a continual upgrading of the proficiency of the individual soldier on a worldwide basis.

The Brigade has participated in a number of important exercises and tests of new air defense hardware. In 1976 the AADCP and selected fire units conducted a test of the new AN/TSQ-73 fire distribution system. the encouraging results of that test led directly to the participation of the 3d Bn, 68th ADA [Hawk], in the TACS/TADS OED [Tactical Air Control System/Tactical Air Defense System Operational Effectiveness Demonstration] as part of the Joint Training Exercise SOLID SHIELD 77, at Fort Bragg. That exercise demonstrated to Army field commanders and commmanders of the sister services the compatibility of multiple-service air defense and aircraft control systems, and the practicability of air deployment of the Hawk system. The 3d Bn, 68th ADA, deployed by air to Fort Bragg with 650 men and approximately 1,000 tons of equipment in 46 sorties by C-130, C-141, and C-5A aircraft and remained operational through a test of 2 months' duration. No finer exhibition of the capability of Army air defense to participate in extended field operations in the performance of the STRAF mission could have been desired.



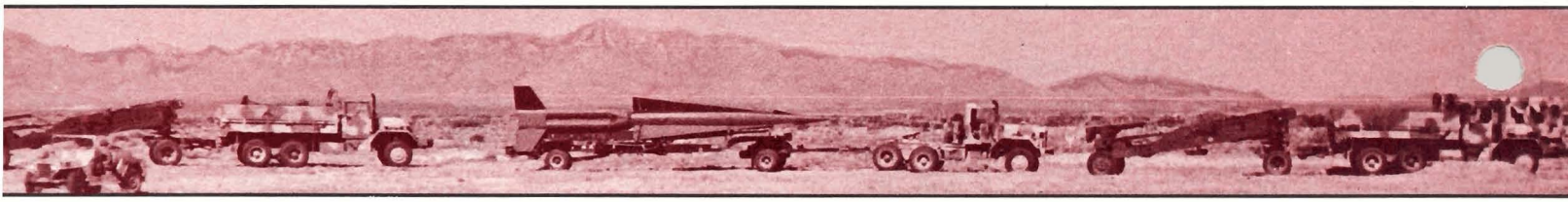
650 men from 3d Bn, 68th ADA, and over 1,000 tons of equipment deployed to Fort Bragg for Exercise SOLID SHIELD 77.

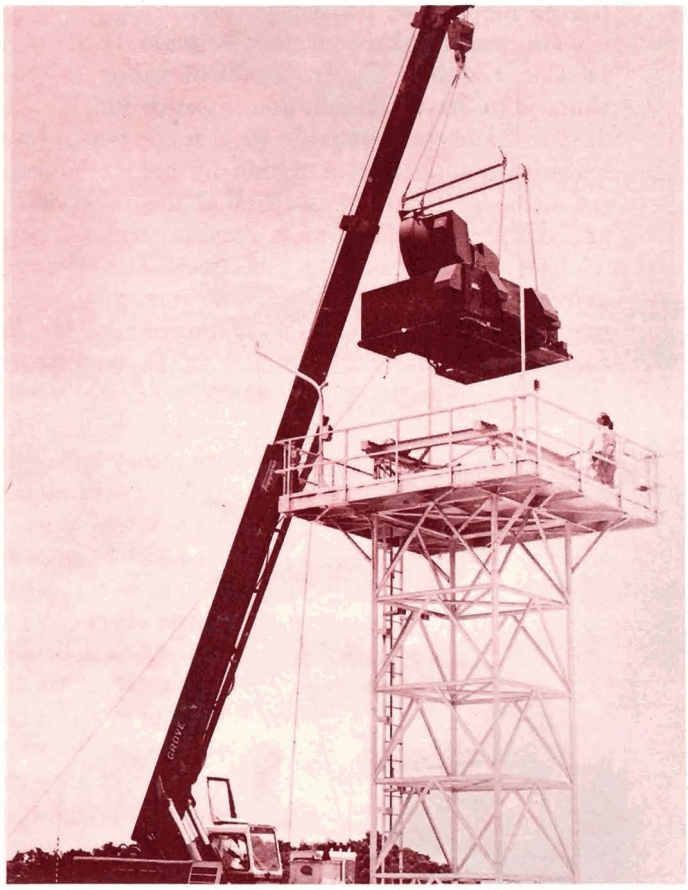
Future concerns of the Brigade include continued testing of the AN/TSQ-73 and the on-site conversion of two battalions to Improved Hawk. That conversion is currently in progress in the 1st Bn, 65th ADA, and is projected in the near future for the 3d Bn, 68th ADA.

The maintenance of the Brigade in its dual mission requires highly technical support. Since there is no Army installation in south Florida, the 31st Brigade must provide all of its personnel and logistical support from within its own resources. As a result, it has assumed all of the functions of an Army post, albeit on a smaller scale.

One of the unique functions the Brigade provides for itself is its general support [GS] maintenance facility. GS maintenance for all assigned vehicles and equipment, as well as for missile-peculiar electronic and mechanical equipment, is handled smoothly by highly trained technicians who are a part of the 200-man professional civilian work force. The Brigade has broken fresh ground in the area of depot maintenance. The maintenance facility has a depot-rebuild capability and does a large measure of depot-type job orders at local level. Because few of these tasks have to be sent to other installations, there is an important savings in money and time, and a critical enhancement of the mission effectiveness of the unit through quick turnaround of job orders. An appreciable portion of the credit for the Brigade's excellent operational record must be accorded the dedicated men and women of the logistics and support shops whose long-standing motto has been, "We can do anything."

Administration and management services are provided by the Office of the Adjutant General,





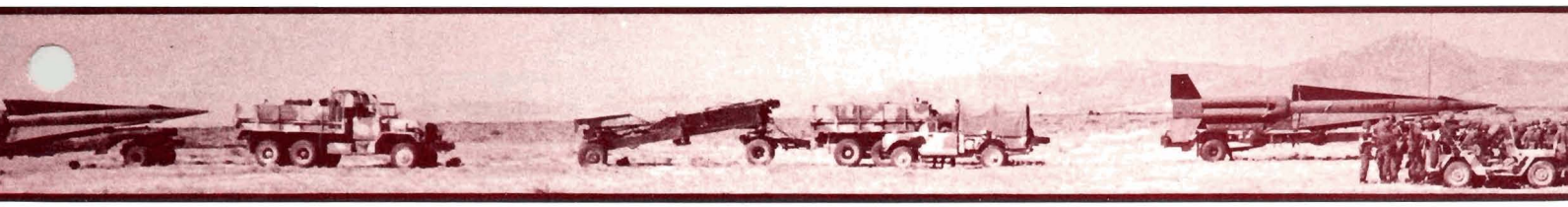
Improved Hawk radar is installed atop a 40-foot tower.

which is staffed to handle personnel procurement through a centralized assignment system and to manage all personnel utilization, separation, and support functions. In addition to its other tasks, the Brigade AG administers the Southeastern Florida Army Retirement Council, supporting a retired military population of more than 18,000. The AG handles its own Standard Installation/ Division Personnel System [SIDPERS] operation, and extends support to Army elements of various joint commands in south Florida as well. The SIDPERS Interface Branch has distinguished itself by a 99.56 percent accurate transaction rate over the past 12 months.

The Comptroller performs a wide range of fiscal functions ranging from the execution of a command operating budget in excess of $10 million to administration of the military payroll and control of the family housing command operating budget, the largest such leased-housing operation in CONUS. The Comptroller's Office discharges responsibilities comparable to those of the largest Comptroller supporting any major Army installation. The Finance and Accounting Office handles all JUMPS-ARMY transactions for the Brigade and other Army personnel in southern Florida, and makes use of the Army's computerized Standard Financial System [STANFINS].

Support of the various automated personnel and finance systems is provided by the Brigade Management Information Systems Office [MISO]. The MISO provides the same support found at any Class I installation by means of its IBM S/360-30 computer system. In its 24-hour-a-day operations, the MISO processes data for SIDPERS, SAILS, STANFINS, a total of 26 MACOM standard systems, the Retired Army Personnel System, and three locally developed systems. The Brigade

Staff members of 2d Bn, 52d ADA, evaluate the tactical situation during Operational Readiness Training Test.



MISO also provides emergency back-up computer support for the 193d Infantry Brigade in the Canal Zone.

Legal support is provided by the Office of the Brigade Staff Judge Advocate [OSJA]. It provides command counsel for the Brigade Commander [who exercises general court-martial jurisdiction] and a wide range of services to both Active duty and retired servicmen in the area. The OSJA also handles all environmental and labor law matters and claims arising under the provisions of AR 27-20.

Aviation support is provided by the Brigade's organic aviation section consisting of two UH 1-H helicopters and one U-8 airplane. Although all of the 12 missile firing batteries have helipads, most of the section's flying is between Homestead and the Key West Defense, a distance of 135 road miles. The section has established an outstanding safety record and recently received its second Department of the Army Award of Merit for Aviation Safety.

With the wide variety of recreational activities inherent in south Florida, the Brigade S1 Recreation Services Section measures up by providing soldiers with all types of sports equipment, but especially that related to water sports. It also operates a free 16-mm film service, bookmobile, and auto craft and hobby shops for the more isolated air defense sites. The recreation directors manage an extensive intramural program leading to participation by Brigade teams in tournaments on the Air Force Base and at FORSCOM, as well as in competition at Fort Bliss and in leagues sponsored by the Air Force and Navy.

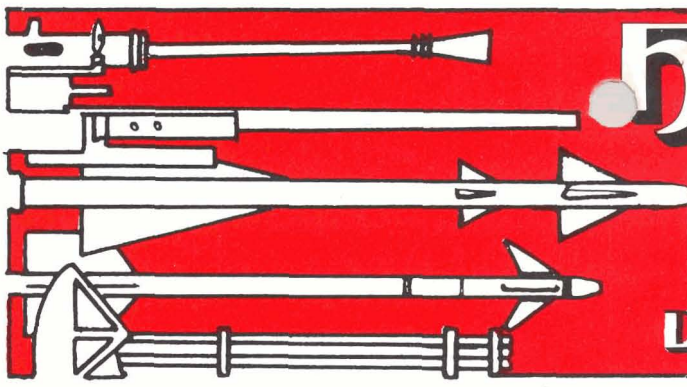
The Brigade has always enjoyed cordial relations with the citizens of the local community, and the Public Affairs Office plans and executes continuing activities designed to enhance the good will with which Floridians regard the organization. The Brigade color guard has participated in more than 100 demonstrations in the past 2 years, and has brought the Army before audiences totaling over 1.3 million in appearances at the Orange Bowl, the Super Bowl, and numerous local festivities.

Troopers of the 31st Brigade are proud of the long-standing tradition of interservice cooperation of which they are a part. Stationed on Homestead Air Force Base, they mingle daily with Air Force, Navy, Marine Corps, and Coast Guard personnel. The men in Key West have equally close relations with the Navy there. In Florida, the air defender has the opportunity to observe what goes on in the other armed services, and can sample the life style enjoyed by his counterparts. Artillerymen in the area take part in competition for the Title of Military Person of the Month, sponsored by the Military Affairs Committee of the Homestead and Key West Chambers of Commerce. Brigade soldiers have shown their mettle frequently over the years, illustrating by their selection for this honor the high state of professionalism and esprit that prevails. In the past 36 months, Brigade soldiers have been selected as Military Person of the Month 19 times; a proud record of over 50 percent selection from less than 30 percent of the total military population in the area.

Highly trained, thoroughly exercised, and well motivated, the 31st Air Defense artillery Brigade executes a complex and demanding mission of air defense and its vital support. It remains now, as it has been for the past 15 years, prpared to live up to its motto, "Ready and Vigilant."

Captain Kirkpatrick is a Distinguished Military Graduate of Wake Forest University. Under a Ford Foundation Fellowship, he attended Emory University, where he earned a Masters Degree in European history. He served in Europe following attendance at the Defense Language Institute and is presently assigned to the 2d Battalion [Herc], 52d Air Defense Artillery.

The previous installment was an introduction to air defense in the Pacific Theater during World War II, along with an accounting of bombers in the Japanese inventory. In this installment we turn to some statistics on US bombers used in the Pacific Theater.



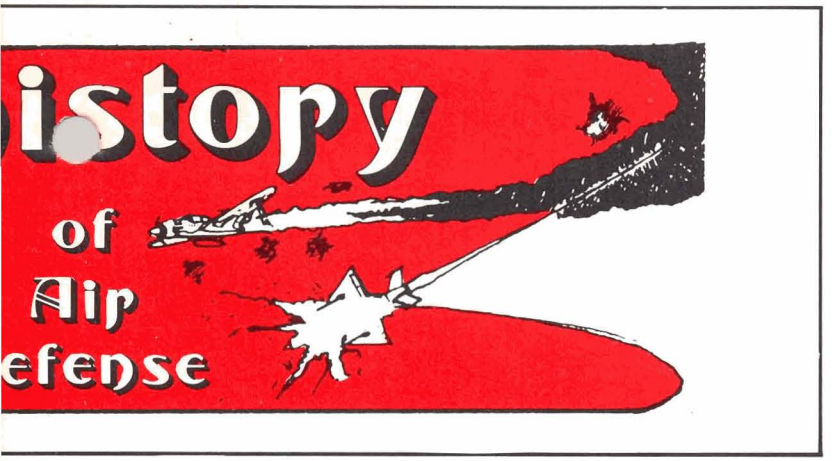
United States Bombers

The United States bombers employed in the Pacific Theater, except for the obsolete types on hand in the Philippines at the start of the war, were the same types employed in the European Theater. The major operational difference in these planes was the reduced bomb load and increased fuel capacity required to fly long distances over water during most of the Pacific operations. Eventually, the B-24 replaced the B-17 in all heavy bombardment units in the Pacific and, although initially considered less strong defensively than the B-17, it proved quite effective.

In 1944, the Boeing B-29 Superfortress was introduced for exclusive use in the Pacific, due to its long range and load-carrying ability. The first Superfortress combat mission over Japan was flown on 15 June 1944. The B-29 had a maximum speed of 358 mph at 25,00 feet, a range of 3,250 miles with a 20,000-pound bomb load, and a service ceiling of 31,850 feet. Its armament consisted of two caliber .50 machine guns in each of four remote-controlled turrets, plus two caliber .50 machineguns and one 20-mm gun in the tail turret.

United States bomber operations in the Pacific were initially handicapped by its D-day losses and by the superior Japanese airpower. Driven back from the Philippines and ousted from Java, General Brereton's B-17s were far too few to contest the command of the air in daylight. Night missions were essential to maintain the slight bomber strength available. Thus, while massive daylight assaults upon Germany were being planned, desperate small-scale night blows were being struck in the Pacific as a matter of necessity rather than choice. Practically all bombing ceased during the rains, but in November 1942 Bangkok, Port Blair, and Rangoon were bombed by B-17s in squadron strength.

By autumn of 1942, B-17's were being led into New Britain by Royal Australian Air Force Catalinas which marked the targets with incendiary bombs and flares. Sometimes, after a medium-altitude bomb run, the B-17s returned at low levels and attempted to destroy antiaircraft positions and searchlights. The accomplishments of night bombers during the first year of the war



in the Pacific were not impressive. More important than the damage done to the enemy was the experienced gained. Because of this experience, Air Force units were better able to deal with the weather and navigational difficulties that they were to encounter in the Pacific during the remainder of the war.

Night-bombing formations normally employed six bombers in each flight, but some single-plane missions were flown against Rabaul. Since the Japanese lacked radar for antiaircraft and fighter control, the bomber formation was not staggered laterally or in altitude.

In many instances, flak suppression raids were flown against antiaircraft and searchlight positions, using B-25s and A-20s. Bombs with time fuzes set to explode 300 feet above the ground were used for this purpose. These bombs temporarily silenced antiaircraft batteries and searchlights.

On New Year's night 1943, targets on New Britain were bombed. Although weather, searchlights, and antiaircraft fire made it very difficult to estimate the results of the raid, large fires were started, and it was assessed that the raid was successful. Night-bombing missions of this type continued until the latter part of 1943 at which time day bombing took priority.

United States bomber forces in the Pacific were allocated to three air forces-the Fifth Air Force, the Thirteenth Air Force, and the Twentieth Air Force. The operations of these Air Forces are described briefly in the following paragraphs.

The US Fifth Air Force was activated at Brisbane, Australia, on 3 September 1942. During its operations in the Southwest Pacific area, its most important contribution was in maintaining control of the air. After its P-38s went into action in December 1942, the American margin of air superiority over the Japanese widened steadily.

The Fifth Air Force, employing B-17s and B-25s, participated with other Allied Air Forces in the Battle of the Bismarck Sea, 2-4 March 1943. their first daylight mission over Hollandia was flown on 30 March 1944, using 235 bombers, escorted by 74 P-38s, and dropping 355 tons of bombs.

Beginning in August 1944, Fifth Air Force bombing operations were directed toward the Philippines. The recapture of Clark Field, on 28 January 1945, gave the Fifth Bomber Force a forward operating base. At the completion of the Philippine campaign, they bombed installations on Formosa and ships in the China Sea, completing

successful day and night missions against airfields, industrial targets, rail lines, and shipping facilities. When the war ended in August 1945, the Fifth Air Force was in the process of moving to Okinawa in preparation for the final assault on the Japanese homeland.

During the period September 1942 to August 1945, the Fifth Air Force flew 83,818 bomber sorties and delivered 140,991 tons of bombs. Aircraft losses during this period were 2,946 aircraft of various types. Personnel casualties numbered 4,135 killed and missing in action. In all operations from 1942 through 1945, the Fifth Air Force destroyed 5,727 enemy aircraft in the air and on the ground. Also during this period of operation, the Fifth Air Force sank 1,731,579 tons of enemy shipping and damaged 1,979,360 tons.

The Thirteenth Air Force, formed in January 1943, included Army air units operating in the South Pacific area, chiefly in the Solomon Islands. Their bombers consisted of B-17s, B-24s, and B-25s and used tactics similar to those employed by the Fifth Air Force. They flew night missions in early 1943, transitioning into daylight operations in the latter part of 1943. After participating in campaigns on Guadalcanal, Bougainville, and other islands, they moved westward, and, in 1944, along with Fifth Air Force, became part of the Far East Air Forces [FEAF]. Their bombers neutralized the Japanese bases of Yap and Truk in the Carolines and other islands in the Palau group and bombed airfields in Leyte, Luzon, Negros, Ceram, Halmahera, and Formosa.

During the period 1 July 1943 to 30 July 1945, the Thirteenth Air Force bombers flew 9,626 sorties and dropped 14,087 tons of bombs on enemy targets, losing 505 aircraft due to enemy action and other operational causes. During the same period of operations, they destroyed 1,206 enemy aircraft.

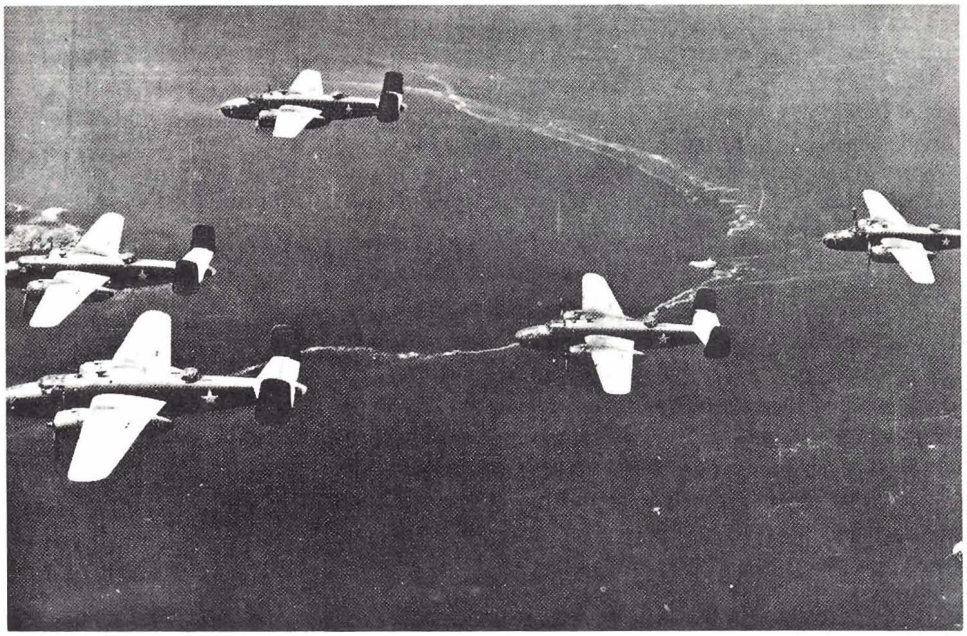
The Twentieth Air Force was established in Washington, D.C., on 4 April 1944, as an independent strategic bomber force of B-29s, operating directly under the United States Joint Chiefs of Staff to make strategic air strikes against Japan. General Arnold commanded this force in addition to serving as Chief of the Army Air Forces. Its initial subordinate command, the XX Bomber Command, had been activated at Salina, Kansas, on 27 November 1943, and, by April 1944, had units strung from Kansas to Chengtu, China. The initial B-29 bases were in India and China from which operations were conducted against Japan, Manchuria, Rangoon, Singapore, and Formosa. XX Bomber Command's first combat mission over Japan was a night bombing of Yawata on 15 June. As the war progressed and after the Marianas were secured, 12 groups of B-29s were based on Tinian, Saipan, and Guam. These 12 B-29 groups were assigned to the XXI Bomber Command over which Major General LeMay, former Commander of XX Bomber Command, had assumed command on 18 January 1945.

The initial combat missions of the XXI Bomber Command's B-29s, which also served as a training and checkout operation, were against the island of Truk. In the first mission of 28 October 1944, 14 B-29s bombed the Dublon submarine pens from 25,000 feet with indifferent success. The Japanese reacted by firing a few rounds of flak and sending up one Zeke which remained out of range. XXI Bomber Command's first combat mission against the Japanese homeland was flown without escort on 24 November with 88 of the original 111 B-29s bombing from altitudes of 27,000 to 33,000 feet through overcast. Of the 125 Japanese interceptors encountered, the B-29 gunners claimed 7 destroyed, 18 probables, and 9 damaged. One B-29 was rammed by a damaged Japanese fighter and crashed at sea. During the next 3 months, XXI Bomber Command made additional daylight bombing raids in Japan together with some strikes at Iwo Jima airfields, a night attack on Tokyo, and experimental incendiary raids on urban areas of Tokyo, Nagoya, and Kobe. Bombing from altitudes of 30,000 feet, the B-29s encountered aggressive and effective Japanese fighter interceptor attacks, especially in the Tokyo-Nagoya areas. XXI Bomber Command losses through February included 29 B-29's lost to enemy fighters, 1 to flak, 9 to a combination of fighters and flak, 21 to operational difficulties, and 15 unknown causes.

The major obstacle to B-29 attacks on the Japanese homeland was weather. In more than one raid, it was found that heavy cloud cover prohibited accurate bombing. Generally, radar bombing was not too satisfactory. After V-J Day, the US Strategic Bombing Survey analyzed the unsatisfactory performance of the XXI Bomber Command during its first 3 months of operation, concluding that its failure stemmed from tactical error and continued adherence to conventional doctrines of very high-level precision bombing not suited for B-29s. The B-29s attained best results in area bombing not suited for B-29s. They attained best results in area bombing from medium to low altitudes, using incendiaries.

One B29 squadron equipped with 15 B-29s specifically modified for atomic bombing, was formed in 1944. After a period of tests and practice

dropping of dummy weapons, it was deployed to the Pacific and assigned to XXI Bomber Command. The first combat mission was flown on 6 August 1945 to bomb Hiroshima. Seven B-29s were used, one to carry the 9,700-pound Little Boy, one as reserve aircraft, three for weather reconnaissance, and two for carrying observers and recording equipment. The bomb was dropped from 31,600 feet and caused an unprecedented amount of destruction. The second atomic bomb, the Fat Boy, was dropped on Nagasaki on 9 August. The Japanese surrendered 5 days later.



B-25 bombers in formation over Australian barrier reef.

Total losses suffered by the XXI Bomber Command throughout its operations in 1944 and 1945 were 74 B-29s lost to enemy fighters, 54 to flak, 19 to combined fighter and flak action, and 267 to other causes.

United States Flak Intelligence, Pacific

Flak intelligence, a new field of military intelligence, was created, explored, and developed during the war as an aid to offensive bomber operations in the Pacific by the 14th AA Command. Flak intelligence has as its mission the translation of information concerning enemy anti-aircraft defenses into intelligence that would assure efficient airstrikes by making possible maximum bomb damage with minimum loss of aircraft and trained personnel. This was accomplished by determining the least exposed routes to and from target areas, and devising proper evasive actions for bomber formations to reduce the effectiveness of enemy antiaircraft fire.

The idea of flak intelligence in the Pacific was conceived by General Marquat early in 1942. He recognized its possibilities and importance and discussed it with General Walker of the Fifth Bomber Command. A series of conferences led to the inauguration of a flak-intelligence service on a trial basis, sponsored by the Bomber Command and supervised by an antiaircraft officer.

At the outset, the lack of information available on Japanese antiaircraft materiel made it necessary to employ the gun circle method, using performance data of United States antiaircraft weapons. Circles of estimated maximum gun range were laid out for planned altitudes of attack. Least exposed routes to and from target areas than were determined by taking into consideration gun density and distances to be travelled through enemy fire. Subsequent capture of enemy weapons and documents containing performance data and instructions in the use of Japanese equipment paved the way for research that made possible more accurate calculations based on actual factors.

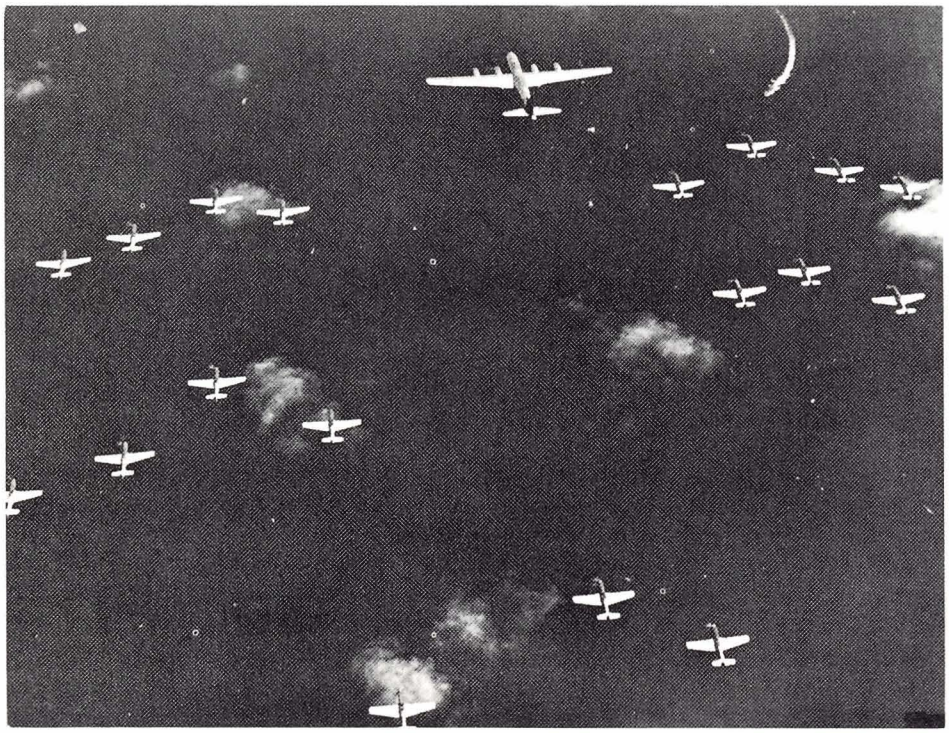
After a trial period, flak intelligence became a permanent theater project. An antiaircraft officer was assigned to Fifth Bomber Command to assist in establishing a flak intelligence section as an integral part of air intelligence. This section worked in close cooperation with the photographic interpretation and target information section.

In disseminating flak intelligence information to aircrews, mosaics replaced maps. This eliminated the process of visualizing the terrain. Coded message SOPs were developed to transmit "hot" flak information.

Collation maps pinpointing enemy antiaircraft defenses were published and distributed to all groups and squadrons, together with plans for evassive action designed to foil enemy fire prediction before and after a bomb run.

In October 1943, special training courses were conducted by the Fifth Bomber Command to train flak intelligence officers to be used for this service with other combat units.

The 14th AA Command developed and



B-29 bombers and P-51 fighter escort en route to Tokyo.

perfected a flak analysis system early in 1944. The system made it possible to determine with mathematical accuracy the relative effectiveness of enemy antiaircraft defenses. The establishment of a flak intelligence section by G2, 14th AA Command, permitted the coordination of all flak intelligence activities in the theater and established uniform procedures. The flak intelligence section at theater level researched and developed new procedures, collected information, and desseminated intelligence which undoubtedly saved the lives of many aircrew members and prevented the loss of much valuable equipment.

Information came from many sources. Much of it came from flak intelligence officers attached for that purpose to assault waves when new landings were made. In the Air Force at planning level, flak intelligence officers made practical application of flak intelligence to tactical plans by giving advice and assistance in plotting routes to and from targets and devising proper evasive action.

In preparation for the Balikpapan raids, intelligence studies indicated the known antiaircraft defense to be 35 heavy and 38 medium automatic weapons. These, plus the guns added since the last time the island was photographed, provided it with undoubtedly the best-balanced antiaircraft protection to be found in the southwest Pacific.

During the Balikpapan raid of 10 October 1942 by B-24s of the XII Bomber Command, action taken to overcome the flak defenses included 1,000 pounds of chaff dropped by a snooper plan [it did not appear to be effective]. The B-24s used the javelin formation flying at altitudes from 8,000 to 20,000 feet to avoid flak.

On one raid, seven B-24s were lost from one group when the sections made individual bomb runs. On the same raid, another group took its section in abreast and suffered no losses. he necessity for maintaining tight formation was forcefully illustrated. In the Balikpapan raids, the Japanese fighters concentrated on planes that suffered damage and so became stragglers from the formation.

United States losses during the Balikpapan raids were 28 planes of which 5 were due to flak, 14 credited to enemy aircraft, and 9 as operational losses.

During the period 18 October 1943 to 30 June 1944, 10.6 percent of all B-24s of the XIII Bomber Command exposed to antiaircraft fire during daylight missions suffered damage. Of these, 0.2 percent were destroyed, 0.9 percent severely damaged, and 9.5 percent lightly damaged. Recommendations of flak intelligence officers included evasive maneuvers which precluded continous tracking until the start of the bomb run. Upon dropping of bombs, other various maneuvers were executed to lessen the hit probability and disperse the antiaircraft fire. During the period from January 1942 until August 1945, the Far East Air Force suffered a total loss of 2,494 planes, which 546 were the result of flak.

Flak intelligence officers were constantly on duty at combat replacement training centers to orient newly arrived aircrews on the nature, purpose, and applications of flak intelligence.

Close liaison was maintained at all times with the enemy intelligence section of GHQ to correlate intercept information collated by that section with photographic interpretation made by flak intelligence. It was found that intercept information frequently located enemy radar in a general area, whereas flak intelligence photos made it possible to mark specific locations.

MAN-PORTABLE AIR DEFENSE SYSTEMS

[A COMPARISON]

CAPTAIN RHOI M. MANEY

Editor's Note: The technical nature of the information in this article would seem to make it more valuable to our technicians than to readers in general. However, the extent of the information is sufficient to capture the interest of virtually all readers, especially airdefensemen.

The wordlwide development of manportable air defense systems since World War II has added a new dimension to modern conventional warfare. These systems are lightweight and can be deployed easily and flexibly throughout the forward battle area. Moving with frontline combat troops, these unique systems can continuously provide responsive local air defense during hours of daylight in good weather conditions. The systems presently in existence throughout the world have many similarities in their configurations, performance, and functioning. However, each system has marked differences in capabilities. Presently, six manportable air defense missile systems are either fielded or under development. They are produced by the United States, Great Britian, Sweden, and the Soviet Union.

The manportable, surface-to-air missile systems are of two varieties, command or passive guidance. Within the category of passive guidance air defense weapons, the three present systems are the SA-7 Grail, produced by the Soviet Union, and the US Redeye and Stinger, the latter of which is still under development. These systems incorporate many commonalities in their design, operation, and basic functioning. Each is characterized as a manportable, shoulder-fixed, clear day-only operation system requiring visual target acquisition. Each system employs contact fuzing with small warheads for target destruction and passive infrared homing guidance through proportional navigation. However, a detailed study of these three systems discloses notable differences in their capabilities and applications. A comparison of their detection systems reveals differences in the operation of their seeker section. The seeker head is a sealed infrared optical tracker containing a folding reflective optical system that functions as a space stabilized gyroscope. The seeker section, which houses an infrared energy detector, senses the infrared energy emitted by aircraft engines and their exhaust plumes. The detector cell converts the infrared energy striking its surface into an audible signal that indicates to the gunner when the missile has acquired the target. Redeye

and Stinger missiles employ Freon and Argon gas-cooled detector cells, respectively, which increase missile sensitivity to the target, especially helpful at angles near the sun. Use of a cooled infrared energy detector also insures that these systems are less susceptible to distraction by reflected sunlight from clouds, aircraft canopys, and other sources. A noncooled detector system is used in the SA-7 Grail, which tends to make the Grail less sensitive to infrared energy emitted by the target. Therefore, the Grail seeker is susceptible to capture by contrasting terrain backgrounds and sunlit clouds. Furthermore, this uncooled seeker can be easily saturated at angles near the sun. However, because the Grail can achieve sufficient target acquisition from specular reflectivity often associated with solar reflections from fuselages, rotor hubs, and canopies on clear days, it has a limited all-aspect engagement capability. An improved Stinger seeker section, called the Stinger POST seeker, may be employed in the Stinger system at a later date. The POST seeker will allow the Stinger missile to track targets in both the infrared and ultraviolet spectrums. This improved tracking capability is designed to counter any infrared jamming techniques employed by an airborne target. In addition, improvements in the infrared detector in the basic Stinger give the system the ability to engage targets in the forward quadrasphere. Redeye and Grail are primarily limited to rear quadrant target engagements.

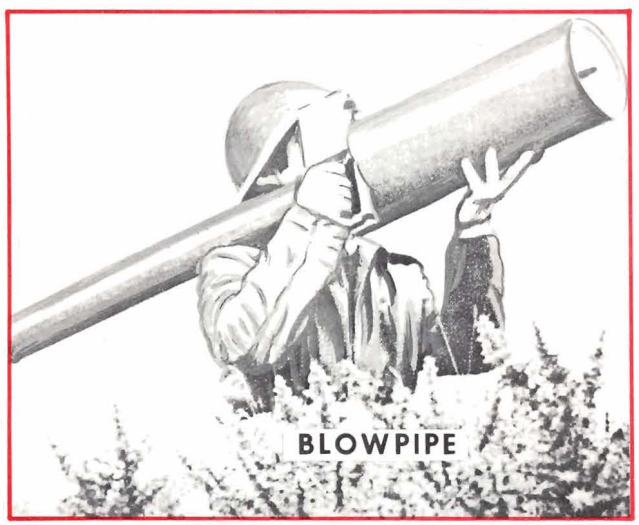
Each of the three missiles employs a control system that uses proportional navigation to guide it to a predicted point of intercept. The functioning of the control section is dependent upon the continual positioning of target infrared energy on the face of the infrared detector cell. This process continues throughout each cycle of the seeker's conical scan pattern. The resulting pattern of infrared energy striking the infrared detector is directly proportional to the angle at which the seeker is tracking the target. Missile maneuvering is initiated by the positioning of a pair of variable incidence wings. These control surfaces are driven by a small servomotor assembly that operates in conjunction with the control section. The control section, sensing the difference in the missile's line-of-flight and the seeker's line-of-sight, transmits guidance commands to the servomotor which changes the attitude of the variable incidence wings. This, in turn, guides the missile to a predicted point of intercept, which is continually computed by the control section throughout missile flight. Both Redeye and Stinger incorporate a pair of fixed wings for missile stability and a pair of variable incidence wings, moving in coincidence with each other, for system maneuverability. The wings are mounted 90° apart on the missile airframe, except for the Grail, which uses only one pair of wings mounted 180° apart on its control section. The wings are alternately commanded and moved between two extreme positions for missile maneuverability. No fixed wings are on the Grail control section.

To provide electrical power to these missiles throughout flight, each has an on-board, squib-activated thermal battery. The missile battery contains a solid electrolyte, which is in a dormant state. The electrolyte is surrounded by a pyrotechnic paper that ignites upon activation and melts the electrolyte to render it active for immediate use just prior to missile launch.

The fuze and warhead sections of all three

missiles are quite similar. All three systems incorporate small warheads that detonate upon impact with, or penetration of, the target. In the event of a target miss, each missile incorporates a self-destruction mechanism in its fuze that detonates the warhead after approximately 15 seconds of flight. The fuze in both the Redeye and Stinger missiles also ignites the second stage of the missile rocket motor. The fuze in the Grail system does not fire the second stage of the missile rocket motor. Instead, a pyrotechnic delay system is used to ignite the missile sustainer motor.

The rocket-motor sections of these missiles are quite similar in that each has a two-stage, three-phase propulsion system. Upon pressing the firing trigger, the eject phase of rocket-motor operation is initiated. The ejector motor propels the missile from the launcher and is completely expended before the aft end of the missile clears the forward end of the launcher. The missile then undergoes a no-power phase and coasts for a short distance to protect the gunner from toxic rocket-motor exhaust gases. At the end of the no-power phase, the second stage, called the sustainer motor, ignites and initiates the acceleration and sustaining phase of missile flight. This phase culminates in the missile achieving supersonic speed. The Stinger rocket motor, which has the same functional characteristics as its counterparts, differs somewhat in its configuration. Stinger's propulsion system, unlike the self-contained system used by the Redeye and Grail, consists of an externally attached launch motor assembly and a flight motor. The launch motor provides the thrust to eject the missile from the launcher. Once the aft end of the missile and the launch motor have cleared the forward



end of the launcher, the launch motor separates from the missile [during the coast phase]. This action, in conjunction with the release of a lanyard and the fuzing mechanism, ignites the flight motor, which functions in the same capacity as the sustainer motor used in both the Redeye and Grail systems.

The tail assemblies, used on all three missiles, have similar functions. Each causes a counterclock wise roll of the missile throughout flight, which adds to flight stability.

In each system, the missile is sealed within a disposable launch tube constructed from a reinforced fiberglass material. The missile can be removed from the launcher only by firing. The launchers, except in the case of Stinger, house the sighting and acquisition indicators, as well as all the necessary operational switches to activate and fire the system. In the Stinger system, while the sighting and acquisition indicators are integral parts of the launcher, a separable and reusable gripstock assembly houses all operational controls. In addition, affixed to the separable gripstock is an identification, friend or foe [IFF], system used to aid the gunner in target identification.

All prelaunch electrical power for each system is provided by squib-activated thermal batteries. The power produced by these batteries allows the gunner to perform all prelaunch and final launch operations. Although the function of these batteries is similar, those in both the Redeye and Stinger systems incorporate a charge of compressed coolant gas. The gas is channeled from the battery into the missile where it cools the infrared energy detector prior to missile launch.

These weapons, characterized as being highly

mobile, weigh between 23 and 35 pounds. This mobility allows the systems to operate in terrain that is inaccessible to other air defense systems.

The remaining manportable air defense surface-to-air missile systems fall into the category of command-guided weapons. These include the Blowpipe and the RBS-70, produced by Great Britain and Sweden, respectively. In addition, a system designated Stinger Alternate has been evaluated by the United States.

Like their passive homing counterparts, each of the command-guided systems is a relatively lightweight, manportable, surface-to-air missile system designed for the protection of frontline troops from low-level air attack. Although the command-guided systems are remarkably similar in their capabilities and principles of operation, each has numerous individual distinctions that become apparent upon close examination. Employing advanced guidance technology, these systems achieve missile guidance through use of a guidance and tracking unit that must be operated by the gunner throughout missile flight. A distinctive example of advanced command guidance is illustrated in the RBS-70 and the Stinger Alternate systems. Each of these weapons employs an optically directed laser beam-rider guidance system. Upon sensing any missile deviation from the center of the projected laser beam, electrical impulses are generated in an on-board receiver and transmitted to a rate sensor assembly. The assembly generates inputs to the missile's automatic pilot. As a result, the autopilot, or computer in the RBS-70 system, generates error guidance corrections that are processed through an integrated control assembly for missile guidance. Incorporated in the Stinger Alternate system, reaction control nozzles located just forward of the missile aft section aid the missile in achieving both stability and realinement with the projected laser beam. In both systems the process of the missile's constant alinement with the laser beam is continued throughout missile flight until target intercept has been achieved. The basic principle involved in these systems is that the missile will ride the laser beam to whatever point it is projected.

A contrast to the laser command guidance system is the optical tracking and radio command guidance system used in the British Blowpipe. In this system, guidance commands from the guidance unit are transmitted to the missile by means of an FM radio frequency link. Reception antennas in the missile receive the guidance commands generated and transmitted by the guidance unit. Guidance commands are processed through a receiver and decoding network in the missile and then passed to the control section in the forward end of the missile. The control system operates on a "twist and steer" principle and provides mechanical movement to two pairs of control surfaces mounted peripherally on the nose of the missile. The control surfaces, while working differentially, produce missile roll and lateral movement. Maneuver commands sent to the missile are generated by the movement of a small, manually operated joystick located on the guidance unit. Aided by detection flares mounted on the rear of the missile, the gunner visually determines what corrections are necessary to insure target intercept, since both missile and target are within the field of view of the sight system. The gunner must actually fly the missile to the target by manipulating the guidance

joystick. The fins, located on the aft end of the missile, serve only to maintain missile stability throughout flight.

To provide electrical power during flight, each system incorporates an internal squib-activated thermal battery that is activated just prior to missile launch. The battery provides the necessary power for all missile electronic functions.

The fuze and warhead section of the RBS-70 and Blowpipe systems are similar in that they employ larger warheads than their passive homing counterparts. The RBS-70 and Blowpipe incorporate selective fuzing mechanisms for either impact or proximity detonations. Although Stinger Alternate, if adopted by the United States, may incorporate a proximity fuzing capability, it is not known whether it will have a selective fuzing system. Each of these command guided systems may be employed against ground targets with some degree of effectiveness.

The propulsion systems in these command-guided weapons incorporate the same basic functional design as their heat-seeking counterparts. Each has an eject phase to propel the missile from the launch tube, a coast [no-power] phase to protect the gunner from toxic rocket-motor exhaust gases, and an acceleration-sustain phase during which the missile achieves supersonic velocity.

Command-guided systems employ a detachable guidance-tracking unit that mates with its respective launcher in a matter of seconds. On the RBS-70 and Blowpipe controls, necessary to perform prelaunch, launch, and guidance functions, are an integral part of the guidance unit. Stinger Alternate has several operational controls on its guidance unit as well as on the launcher for command and control of the system. The RBS-70 and Stinger Alternate both use stabilized sights that attenuate all gunner induced movement during an engagement. Also included in each of these laser guidance units is the laser beam projector, a transmitter assembly, a zoom optical subassembly, and other associated electronics necessary to track and designate a target. In contrast to these laser guidance units is the FM radiofrequency command guidance unit used for generating missile guidance in the Blowpipe weapon system. Contained in the Blowpipe guidance unit is an automatic gathering system, which assists the gunner in situating the missile in the center of the guidance unit field of view immediately after missile launch. In addition, an FM radiofrequency transmitter assembly and a monocular sighting system are housed in Blowpipe's guidance unit.

All command guided systems can accommodate an identification, friend or foe, system. An added safety feature of the Blowpipe and RBS-70 IFF system is its ability to electronically prevent the engagement of friendly aircraft due to incorrect identification by the gunner.

Peculiar only to the RBS-70 is its capability of being electronically linked to a specially designed search radar designated the PS-70/R. By means of radio communications links and an audible tone transmitted to the fire unit from the radar system, as many as five fire units can be directed to the azimuth of approaching aircraft. In addition, all fire units can be simultaneously updated on target speed, flight course, and target position during each engagement.

The power sources necessary for performing prelaunch operations and transmitting guidance commands to these command guided missiles while in flight are varied. For example, a standard Swedish Army battery is the power source for the RBS-70 guidance-tracking unit. The Blowpipe guidance-tracking unit is powered by a thermal battery arrangement located within the launcher canister assembly. The Stinger Alternate system uses a battery power pack contained in the guidance-tracking unit.

Captain Maney is a graduate of St. Mary's University of San Antonio, Texas and of the ADA Officers Advanced Course. He has ADA command and staff experience in the 82d Airborne Division and the 38th ADA Brigade. Having recently served as commander of the Army's only Redeye training battery, he is now assigned as a Hawk battery commander with the 32d AADCOM in Germany.

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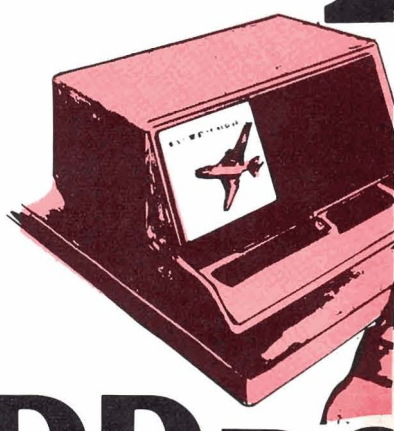

A NEW APPRO

Major Delber

Since the introduction of the airplane as a weapon, the soldier on the ground has been confronted with the problem of determining which airplanes are friendly and which are the enemy. The early means of determining which were "ours" and which ones were "theirs" was usually recognizing the aircraft with the human eye. Today, with sophisticated identification, friend or foe [IFF] systems available, one might think that the visual method of aircraft recognition is obsolete. But the fact is that visual aircraft recognition [VACR] is more important now than ever before. It serves the purpose of not only differentiating between friend or foe, but intelligence reporting as well. Today's forward area air defense weapons require the use of VACR to distinguish friend from foe. Even newer weapons, such as Stinger, which have electronic IFF systems, will require VACR as a source of verification for the IFF system, or as the only means of identification in the event the IFF system is inoperative in either the weapon or the aircraft.

Perhaps the biggest problem in VACR has been teaching it in an effective, realistic, and interesting fashion. Air defenders returning to the Air Defense Center and School [and reports from the field] have stated repeatedly that hours and hours of looking at still slides included in the Ground Observer Aircraft Recognition [GOAR] Kit are boring, unrealistic, and generally ineffective in training crews in VACR. They expressed concern for the numerous deficiencies in the GOAR Kit such as incorrect characteristics shown, wrong variants of aircraft used, and the fact that the GOAR Kit is not kept up-to-date. This, along with the lack of a good, current reference on aircraft recognition made teaching aircraft recognition a real problem.

Realizing the importance of VACR and appreciating that the problems of teaching VACR in the field, as well as at Fort Bliss, were paramount, the Extension Training Branch of the Directorate of Training Developments at the Air Defense School initiated a new philosophy on VACR training. A new development program was promulgated within the Training Extension Course [TEC] program to teach VACR that will replace the GOAR Kit as the primary training method by 1978. The GOAR Kit will become a secondary or back-up means.

The new VACR program is designed to correct most of the problems that have been associated with training using the GOAR Kit. It will add realism through the use of dynamic motion sequences, sound, and color. It will be up-dated annually rather than once every 5 years. It will generate more interest than the still slide approach by combining man-machine interaction, and will allow for individual, small group, or large class training and study.

The new instruction lessons are arranged in a format of 13 lessons. The first will be an introductory lesson that will teach the student the fundamentals of aircraft recognition and the WEFT theory of using Wings, Engine, Fuselage, and Tail components of aircraft to help identify them. This lesson will provide a standard reference of characteristics and terminology for all soldiers who must study and use VACR, and it must be the first taken by the new student. The next 10 lessons each teach identification of five aircraft. This arrangement gives a total of 50 aircraft taught by the lesson package. Provisions are made to add lessons and aircraft as needed during the annual updates. Of these 50 aircraft, 29 are "everyone should know" types and will match the 29 in the 16P and 16R Soldier's Manuals and SQTs. The other 21 aircraft will be used based on the commanding officer's requirements and G2/S2 estimates as to the probability of seeing that aircraft in a theater of operation.

The last two lessons will be evaluation and self-test lessons. All 50 aircraft will be presented in motion sequences so that the student may be

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ACH TO VACR

W. Shaw III

tested on his VACR skills in a representative environment.

Each of the 10 training lessons will begin with still presentations of the aircraft where the WEFT characteristics will be described and visually demonstrated. As the lesson progresses, motion sequences will be used to provide the student with realistic image recognition practice and will include paired comparisons of the aircraft with similar-looking aircraft. Aircraft presented in the lesson will provide the student with the visual presentation of a plane actually flying in toward him, or moving from side to side as he identifies the aircraft or discerns it from others. By the time the student completes the training lessons, he will be accomplishing visual recognition entirely from motion sequences. These sequences will include sound and background scenery to stimulate the soldier's interest and recall, thus adding realism to the training program.

The motion sequences, sound, and backgrounds contained in the lessons are being designed for use with the Beseler Cue/See Audio Visual Equipment. This equipment uses a film cartridge and audio cassette to provide the visual effects and sound. It can be used by individuals or for large classes. By automatic "cuing" of the advance on the film, individual still photographs or motion sequences can be obtained.

The aircraft displayed will be models as in the GOAR Kit. But the models will be different in several ways from those in the Kit. They will be more detailed and care will be taken to insure that the correct variant of the aircraft is used in respect to the one most likely to be seen by a ground air defense observer. For example, there is a pure interceptor variant of the MIG-17 as well as the standard fighter version. Since the interceptor version is used only in air-to-air missions, it would be the wrong version to use in VACR for ground-based air defense. Another difference from the GOAR Kit will be that the models will show armament pylons on the aircraft. This added detail on the model will add realism, and the student will be shown how armament could alter the appearance of the aircraft. Normally, the pylons will not have ordnance attached since load configurations could vary greatly from sortie to sortie, But it will be pointed out that ordnance should be expected on the pylons, and care must be taken when observing WEFT characteristics on a loaded aircraft versus a clean aircraft. There will be some cases when ordnance will be attached to the aircraft. This will be in cases when the ordnance is standard regardless of mission. An example would be the AIM-9 Sidewinder missile on the wingtips of the F-16. All of this will add realism to the appearance of the aircraft in relation to how it would be seen in combat.

The lessons are designed to teach visual aircraft recognition but not insignia, markings, or camouflage schemes. Since aircraft markings and camouflage schemes vary so widely from nation to nation, even on the same type of aircraft, no attempt is made to represent a standard scheme. Therefore, the aircraft will be painted an overall gray, with no markings or insignia.

The TEC lessons will be in the field in 1978. The concepts used in their production, coupled with an effective unit training program, will enhance the air defender's ability to selectively identify and engage airborne targets. As TEC replaces GOAR as the primary means for teaching VACR, the training benefits to be derived from the lessons will far exceed what has been possible in the past.

Major Shaw is a graduate of the University of Nebraska at Omaha and holds a Master of Science in Education and Doctorate of Education from East Texas State University. He is presently serving as Chief, Extension Training Branch, Directorate of Training Developments, US Army Air Defense School at Fort Bliss, Texas.

SOVIET HE

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THE FORWAR

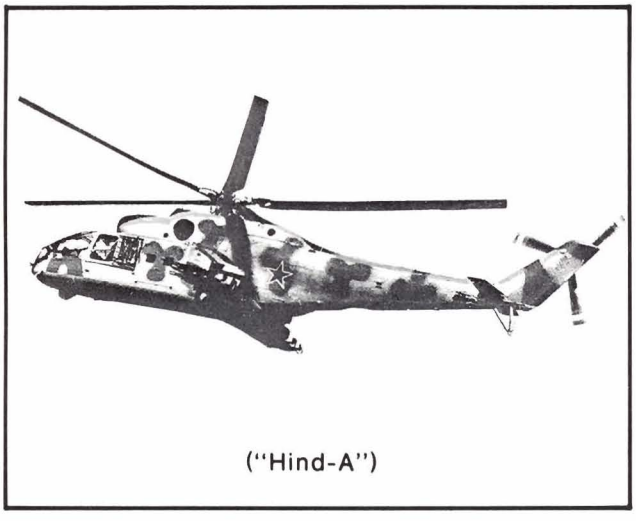
Captain Kenne

Some may find what they consider to be a small number of technical descrepancies in this article due to differences that appear among varying sources of information. However, these minor variations do not detract from the value of the article as a comprehensive accumulation of information on the subject of Soviet helicopters.

"Mobility and high tempos of combat operations bring success in a battle of operation." This comment by a leading Soviet military author reinforces our belief that Soviet military doctrine places strong emphasis on swift, decisive offensive operations. Speed, flexibility, surprise, and superior firepower are Soviet bywords in planning and training to flight. They have closely studied the successes of modern armies and have ably adapted their techniques to the development of tactics to enhance the principles of their doctrine. The use of the helicopter in combat operations in Vietnam by the United States is a primary example of success that has not gone unnoticed in the Soviet Union. Operations by airborne landing parties, including helicopter landings, have become a wide-spread phenomenon in the Soviet Army.

This recent interest in the use of the helicopter in military operations in the U.S.S.R. is not new. As early as 1953, Russia was using the helicopter to land troops. Also, in 1959 the Soviets described how they used helicopters to adjust artillery fire at night.

Despite these early experiments in integrating the helicopter into military operations, the Soviet production policy has long regarded the helicopter more as a logistics and support means than a factor in the fire fight. With the development and production of the Mi-24 Hind gunship in 1972, the Soviets began to realize the full potential of integrating the helicopter as a primary means of combat and to develop integrated tactics based on helicopter mobility and firepower. Now, helicopters are being tested to lift troops to the battlefield and to support them with fire.



("Hind-A")

The Soviety component comparable to US Army aviation has been receiving steadily increasing attention as evidenced by force structure changes and equipment modernization efforts. As the Soviets increase their development and use of the helicopter, especially in the forward army area, it becomes increasingly important that commanders at all levels, and air defense artillerymen in general, become aware of that types of helicopters could be used against them and how they might be employed.

The table that follows is a listing of the current helicopters available in the Soviet Union for deployment in the forward army area, along with some of their characteristics. Although Soviet helicopters have been designed primarily for transport, most can be armed with a variety of weapons, thus providing some measure of self-defense and fire support. Also noteworthy, Soviet helicopters have an extremely large cargo capacity not commonly found in US Army and Western nation helicopters.

In 1975, the Soviet military helicopter force consisted of over 2,500 machines, most of which

HICOPTERS

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ARMY AREA

M. Matwiczak

could be found in the helicopter regiments that are subordinate to the tactical air army. [It is generally believed that in wartime a tactical air army would be assigned to each Soviet army front, thus giving the front commander flexibility in his employment of helicopter forces.] Each helicopter regiment includes sufficient assets to conduct a tactical lift of a complete motorized rifle battalion [MRB], relying mostly on the medium helicopters such as the Mi-6 Hook, Mi-8 Hip, and Mi-24 Hind.

In developing tactics and training for airmobile operations, Russia had previously concentrated on using a small number of specially trained airborne troops. Today, however, probably because of US successes in Vietnam, the Soviets have begun conducting airmobile operations using units equivalent to an MRB after these units underwent only a few hours of training in loading, landing, and deployment. This capability of conducting airmobile operations make the already formidable MRB a significant threat and increases the number and types of missions that can be assigned to the MRB.

As a result of this increased flexibility, the front commander could assign units up to the size of an MRB various missions including:

- Delay the arrival of enemy reserve forces.
- Destroy enemy nuclear weapon sites.
- Seize, establish, and hold vital watercrossing sites.
- Disrupt enemy communications and destroy command and control points.
- Occupy vital areas and key terrain.

Of these specific missions, Soviet planners consider the seizure of water-crossing points and the destruction of enemy nuclear delivery means the most important. Since these same planners postulate a minimum sustained advance of 70 miles a day, we can expect the Soviets to conduct airmobile operations at a consideralbe distance behind the forward edge of the battle area. Soviet sources also claim that the reinforced MRB, conducting this type of independent operation behind enemy lines, could operate for up to 48 hours, even with the absence of fire support.

Since destruction of enemy nuclear delivery means is a primary Soviet airmobile mission, and considered by them to be one of the most difficult to execute, let us examine this operation in detail to gain an understanding of how a typical Soviet heliborne operation would be planned and conducted. The Soviets believe that a tactical heliborne operation can be planned and launched in a matter of hours.

During the early planning stages, because of the high mobility of enemy delivery systems, every effort will be made through reconnaissance to locate enemy nuclear delivery sites, and the effort will continue up to the last possible minute before the operation is launched.

The assault force would be organized according to the size and type of target and duration of the operation. A typical organization for a battalion-size operation against a missile complex might be:

- 2 or 3 motorized rifle companies.
- 2 combat engineer platoons.
- 1 or 2 antitank sections.
- 1 or 2 batteries of mortars and/or light artillery.

Mi–8 HIP

Elements of the force, especially the assault elements, would be equipped with armored personnel carriers for rapid deployment and advance.

Once the force has been organized and the operation briefed, helicopters are boarded in dispersed departure areas under the cover of tactical air support, which may include helicopter gunships. En route to the objective, the helicopter force will use flythrough zones over friendly and enemy areas under the cover of the same tactical air support. This air support comes from the helicopter forces' parent tactical air army and remains with the assault force through the initial landing phase of the operation. Whenever possible, flythrough zones are areas not occupied by enemy troops, or areas that have been neutralized by conventional or nuclear fires.

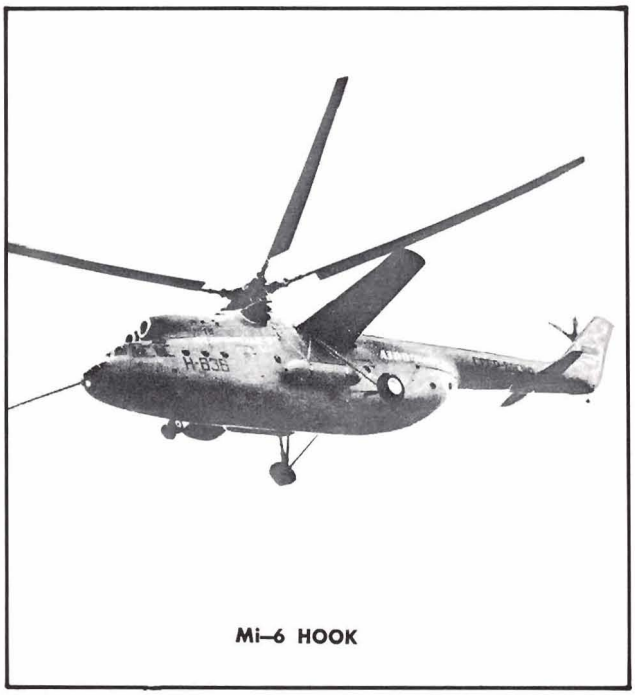
Again, under tactical air cover, the force would land, unload, deploy, and attack or approach in only 10 to 15 minutes, at which time its helicopter transportation would withdraw. The attack would be conducted in the standard Soviet manner, mounted in APCs, bypassing enemy strongpoints, and supported by the assigned mortars and artillery. The bulk of the attacking force [1-2 companies with supporting engineers] would engage and defeat the enemy security forces and subsequently destroy the missiles, launchers, and ammunition. Another element would be assigned the destruction of the enemy's transportation means, radars, and communications. One attacking element of at least platoon strength, reinforced by antitank sections, would cut off enemy withdrawal routes and intercept any possible reinforcements.

Once the above tasks are accomplished and the mission complete, the force would attempt to return to friendly lines [using organic transportation], secure the objective, and await the arrival of friendly link-up forces or carry out subsequent missions. The extraction of a force of this size by helicopter is not considered as a practical option by Soviet planners.

The operation just described calls for the temporary assignment of a considerable number of helicopters to the reinforced MRB. However, in spite of their comparatively small number of helicopters, the Soviets are prepared to assign these and smaller units airmobile missions of equal importance. The deployment of the Mi-24 Hind increases immeasurably the Soviet ability to conduct such operations as infiltration, armed reconnaissance, minefield exploration, tactical air

DESIGNATION	NATO CODE NAME	LENGTH (Ft.)	HEIGHT (Ft.)	MAX SPEED LEVEL FLIGHT (MPH)	MAX RANGE FULL LOAD (Mi.)	SERVICE CEILING (FT)	CARGO CAPACITY (LBS)	PASSENGER ACCOMMO-DATIONS	ARMAMENT	REMARKS
Mi-1	HARE	NA	NA	106	147	9,900	5,000	--	NA	OLDER A/C, COUNTERPART TO OH-58A.
Mi-2	HOPLITE	39.1	12.3	136	105	13,755	1,543	8	CAN CARRY UP TO 2600 LBS OF CHEMICALS	REPLACING MI-1
Mi-4	HOUND	55	NA	130	265	11,800	15,900	16	MACHINE-GUN IN NOSE	OLDER, WIDELY EXPORTED, UTILITY HELICOPTER
Mi-6	HOOK	108.7	32.3	186	404	14,750	26,450	65	TWO MACHINE-GUNS IN NOSE	TROOP CARRIER AND HEAVY TRANSPORT
Mi-8	HIP	60	18.5	161	264	14,760	8,820	32	UP TO 8 EX-TERNAL ROCKET PODS	WIDELY-EXPORTED TROOP CARRIER
Mi-10	HARKE	107.8	32.2	124	155	9,843	33,075	28	NA	FLYING CRANE, ALSO TROOP CARRIER VERSION
Mi-12	HOMER	122	41	163	310	11,500	66,000	50	NA	WORLD'S LARGEST HELICOPTER, CARRIES TROOPS AND CARGO TOGETHER
Mi-24	HIND	65	14	190	112	14,500	6,380	8-12	MG IN NOSE, ATGM's, ASM's AND/OR BOMBS	SOVIET ATTACK HELICOPTER
Ka-25	HORMONE	32	17.6	137	405	11,500	NA	9	ASW TORPEDOES, DEPTH CHARGES	ASW AND TROOP CARRYING ROLE
Ka-26	HOODLUM	25.5	13.4	106	215	11,500	NA	7	POSSIBLE ASW.	RECONNAISSANCE, AIR AMBULANCE

SOVIET HELICOPTERS - SELECTED CHARACTERISTICS



Mi–6 HOOK

Mi–12 HOMER

support, and convoy escort. The increased stay-time, potent array of weapons, and troop carrying ability of the Hind, make it well suited for closing gaps in friendly lines or for quick reaction to enemy penetrations.

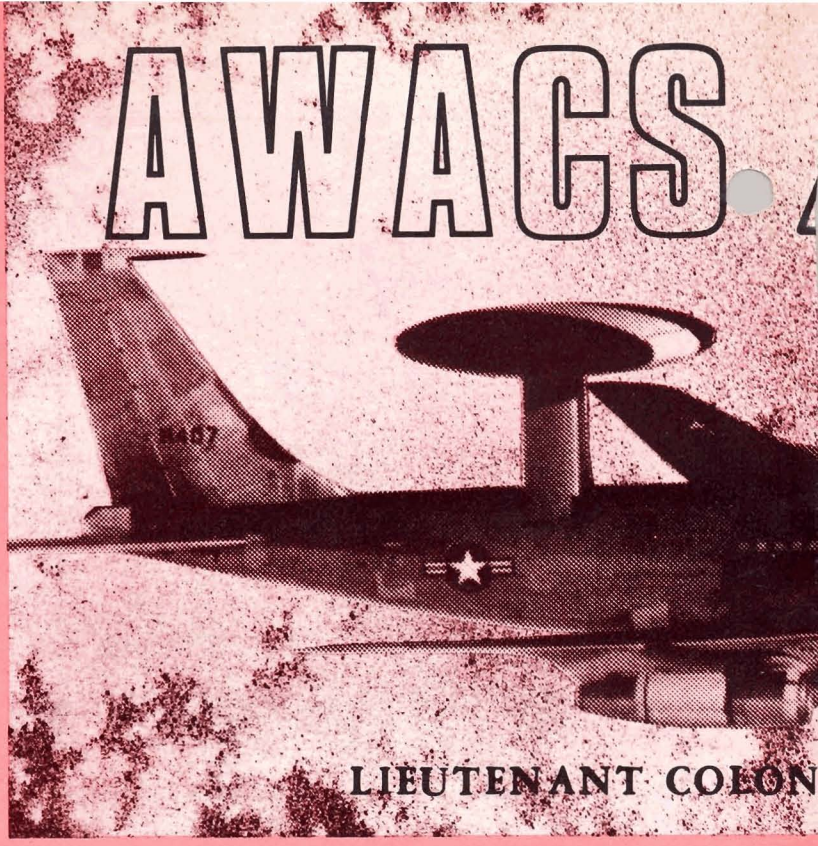
Other missions considered by Soviet planners for helicopters include communications relay, ESM/ECM, psychological operations, airborne command posts, medical evacuation, resupply, and NBC reconnaissance.

Despite heavy armament and flexibility, the Soviets are aware that "the problem of helicopter survivability in all-arms combat remains vital, because it cannot be ignored in the conditions of rapid development of air defense weapons." Accordingly, the Soviet helicopter can be expected to avoid heavy troop and weapons concentrations to the maximum extent possible, unless sufficient tactical air and artillery suppressive fires are available to significantly reduce the risk. Risk would be further reduced by using masking terrain wherever possible, neutralizing the enemy by conventional or nuclear fires prior to overflights, and engaging targets by "popping up" outside the range of enemy weapon systems.

Although the Soviets have produced a smaller number of helicopters than the United States [we had over 10,000 in 1975], this should not be construed as an indication that helicopters and heliborne operations play only a small role in Soviet military doctrine. The increased number of articles appearing in Soviet military journals over the past 3-4 years reinforces the increased emphasis being placed on airmobility in the Soviet Union. Colonel M. Belov, a leading Soviet authority on airmobility, notes three main trends in the development of airmobilization in the Soviet Union.

Captain Matwiczak graduated from the US Military Academy in 1971. Also a graduate of the Air Defense Officer Advanced Course. He served with a Nike Hercules unit in Germany and commanded a self-propelled Vulcan battery in the 2d Armored Division at Fort Hood, Texas. He is currently studying for a Master of Science Degree in Industrial Engineering at Purdue University.

AWACS



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What is the AWACS and what impact will it have upon the Army? Since assuming my duties as the TRADOC Liaison Officer at the 552d AWAC Wing, Tinker AFB, Oklahoma, I have noticed that numerous people in the Army run the gamut from a complete void of information to a "wealth" of misinformation concerning the newest major addition to the Air Force operational inventory. The purpose of this article is to provide general information about the AWACS and to attempt to alleviate the apprehensions of some Army air defenders concerning the system.

The AWACS was not designed to replace the Hawk Battalion AADCP in close control of fire units. It was not built or intended to usurp any Army command authority. The Airborne Warning and Control System [AWACS], designated by the Air Force as the E-3A, is an airborne radar platform capable of providing all-altitude serveillance, warning, and airspace control.

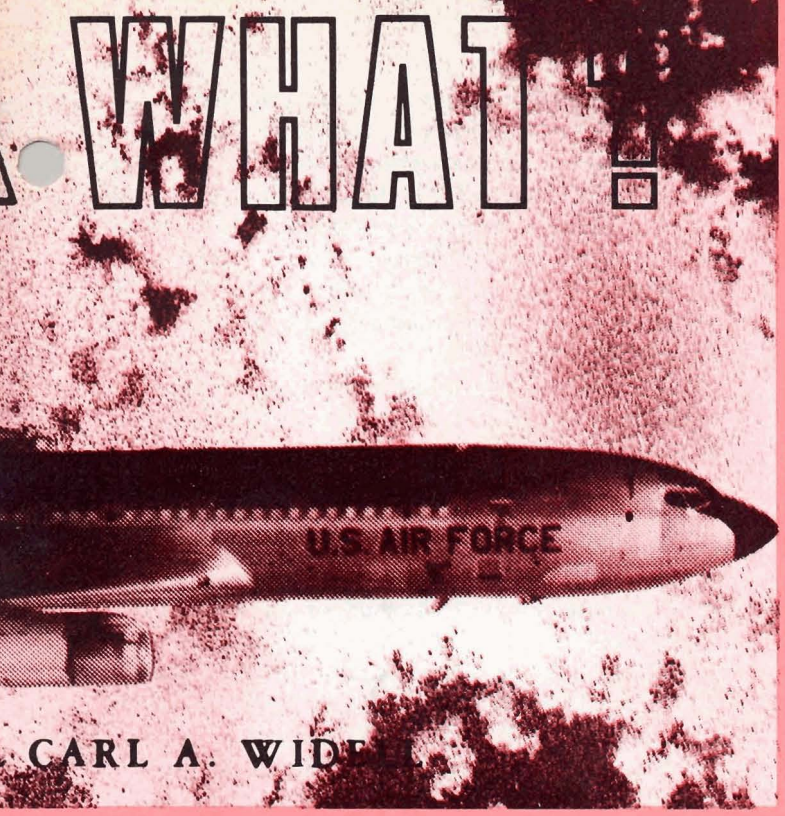
E-3A operation with Army air defense systems will vary according to the threat encountered, tactical mission being conducted, and other systems available for use. Operating as an integral part of the Tactical Air Control System [TACS], AWACS can significantly increase the efficiency and coverage over enemy territory, reducing the effects of topographical masking which limits ground radars, and can provide low-altitude coverage well beyond that of the ground system. The E-3A will augment Air Force ground control elements that are degraded or destroyed and will provide assistance during periods of increased activity that may saturate the ground elements. For contingency situations where ground control elements are limited or do not exist, AWACS may be required to provide all the TACS functions until ground elements are established or for the duration of the contingency when it is small scale and of short duration. Operating autonomously, the E-3A can perform selective functions of the tactical air control center [TACC] and the control and reporting center/post [CRC/CRP] of the TACS. It can also perform limited direct air support center [DASC] functions on an interim basis until the traditional DASC is established. Operating as part of the TACS, AWACS will interface with the elements of both ground and air command operations management, air surveillance and control, and air support coordination and control.

The AWACS is a new dimension in surveillance and control systems. Its most remarkable feature is its new technology radar system. The phase-arrayed, pulse doppler, narrow beam radar can look down and distinguish low-flying aircraft from ground clutter.

The E-3A provides timely detection, tracking, and identification of aircraft at extremely long range, in all kinds of weather, and above all kinds of terrain. Radar returns received by the surveillance antenna from airborne targets are converted to digital form, correlated with navigational data in a data processor, then displayed to the mission crew at nine multipurpose consoles. Each console presents a pictorial display on a map background. Any of the current air or surface situations in the vicinity of the E-3A can be shown as required by the operator's assigned responsibility.

Onboard communication gear can receive, transmit, and relay a wide variety of signals, both digital and voice, to and from ground and air stations. However, the primary advantage of the E-3A is that it centralizes the coordination of complex, diverse, and simultaneous air operations. It can command and control the total air effort: strike, air superiority, support, airlift, reconnaissance, and interdiction. In short, the airborne commander has, in a mobile platform, all the information that he needs to detect, assess, and counter enemy threats.

On 31 December 1976, the Air Force Test and Evaluation Center [AFTEC], an independent test agency, completed a 16-month E-3A operational evaluation. During this period, 4 E-3As accumulated over 1,800 flying hours in 451 flights to



satisfy the objectives of both engineering testing and AFTEC-directed operational testing.

To culminate that extensive test effort, the E-3A was evaluated in three complex, demanding exercises: Brave Shield XV, a US Readiness Command joint exercise; Vigilant Overview 77-1, a large-scale North American Air Defense Command Exercise; and a specially designed Tactical Operations Test.

Perhaps the most demanding of these was the Tactical Operations Test conducted 8 and 10 November 1976. The major test objectives were to evaluate E-3A capability to detect, track, and identify aircraft in clear and ECM environments, perform battle management functions, survive in a intense hostile environment, and counter ECM activity.

The test was specifically designed to be representative of a major conventional attack such as the Warsaw Pact might stage against NATO. An airspace measuring 300 by 180 miles was used to simulate the battle area and a forward edge of the battle area [FEBA] was established in the Nellis range complex. Extensive ECM, including both ground and airborne devices of the most sophisticated available, was employed against the E-3A. Two E-3As were used in mutually supporting roles—the primary E-3A controlled the air battle and the secondary aircraft controlled friendly force refueling rendezvous and provided cooperative data to the primary aircraft. On November 8, 127 aircraft were flown in red and blue operational procedures. On November 10, the E-3A was evaluated in its tactical role in a 75-minute air battle involving 274 red [Aggressor] and 134 blue [friendly] aircraft. The test incorporated the heaviest and most varied ECM yet employed against the E-3A.

AFTEC determined that the E-3A has the capability to successfully perform its tactical operations role in an intense ECM/threat environment and can provide a new and powerful dimension to command and control systems. Dedicated E-3A attackers controlled by a red force control facility were unsuccessful in their attempts to locate and intercept the E-3A. The E-3A successfully controlled fighter aircraft in its own defense while directing both offensive and defensive air operations. Finally, the E-3A successfully demonstrated that it could give the air component commander on the ground the kind of information he needs to make the right decisions.

In all three exercises, a television camera was installed in front of one multipurpose display console to enable relaying the overall [air] picture portrayed on the display to the commander on the ground in real time. This feature was so successful that it will be incorporated into future aircraft.

The system is installed in a currently produced, high-performance jet aircraft—the Boeing 707-320. Modifications of the standard aircraft configuration are minimal, consisting of only those changes required for effective installation and integration of the subsystems; i.e., These structural changes:

- Most fuselage windows have been deleted for radiation shielding purposes.
- A bailout escape chute has been added through the floor.
- The cabin floor has been strengthened.
- The fuselage has been strengthened to support the dual struts and antenna rotodome.
- Modified C-141 Starlifter engines are used.
- An inflight refueling receptacle and single point ground refueling system have been added.
- Extra air conditioners and communications antennas have been added.

In appearance, the dominant feature distinguishing the E-3A is the rotating dome, 30 feet in diameter and 6 feet thick, elevated above the aft fuselage.

The radar antenna, housed on one side of the dome center piece, is a phased array type from which the radar beam be electronically steered in elevation to provide height information. As the

entire dome rotates, range and azimuth information is provided.

For surveillance operations, the entire dome assembly is hydraulically driven at 6 rpm. For other conditions, such as cruise to station or ferry flights, the dome is rotated at ¼ rpm to maintain bearing lubrication.

The surveillance radar, with its various modes of operation, is the key sensor in the E-3A system. On any 360° scan, the surveillance volume can be divided into sectors and subsectors, each with its own set of radar modes and operating conditions. The process of using this flexibility in the radar is called SENSOR MANAGEMENT. The radar modes are:

■Pulse Doppler Nonelevation Scan [PDNES]. The PDNES mode provides surveillance of aircraft down to the surface by using pulse doppler radar, with narrow doppler filters and a sharply defined antenna beam. Target elevation is not measured in this mode.

■Pulse Doppler Elevation Scan [PDES]. Radar operation in the PDES mode is similar to PDNES, but target elevation is derived by an electronic vertical scan of the beam.

■Beyond-the-horizon [BTH]. The BTH mode [pulse radar without doppler] is used for extended range surveillance where ground clutter is in the horizon shadow. This mode gives the E-3A the capability of looking deep into hostile territory—a feature no other airborne radar can claim.

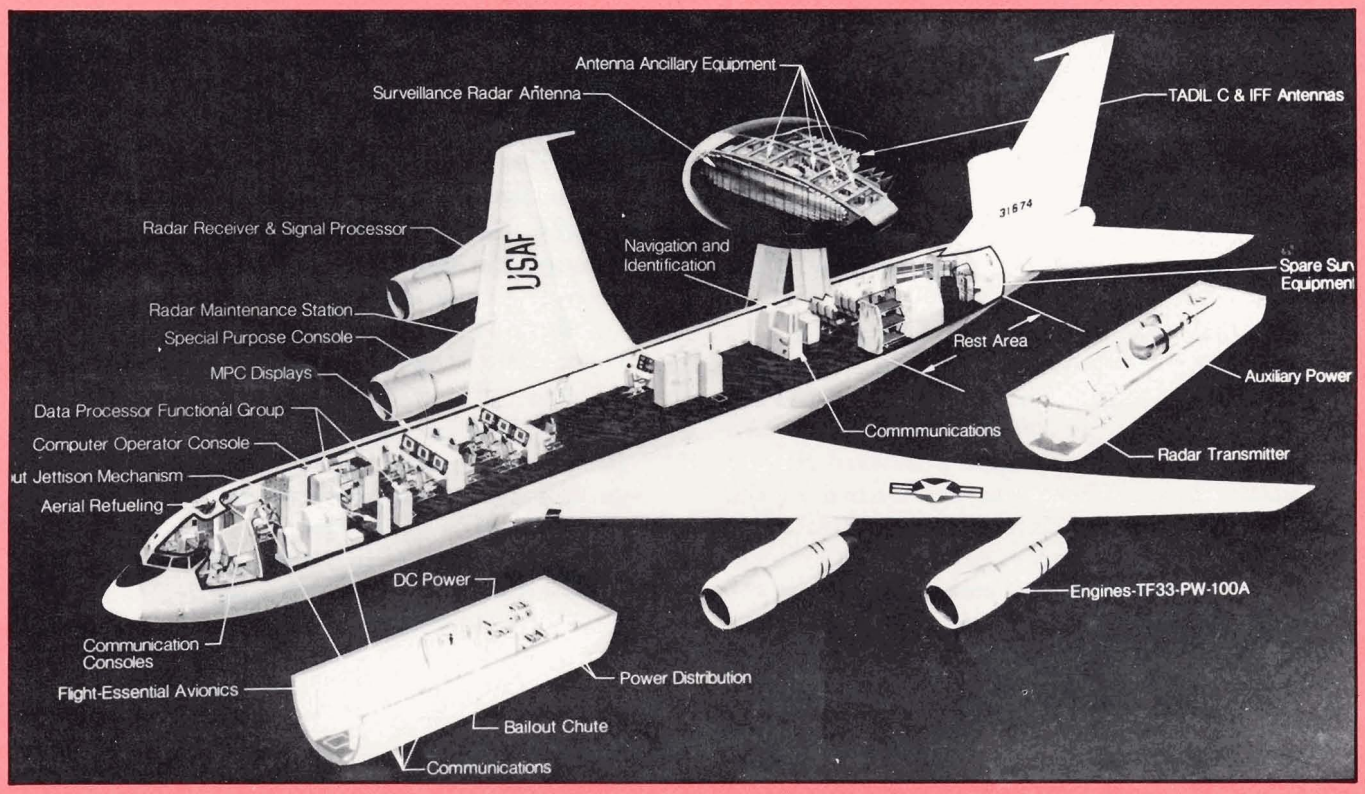
■Passive. The radar transmitter can be shut down in selected subsectors while the receivers continue to process ECM data. A single, accurate strobe passing through the azimuth of the jammer is generated on the display consoles. There are situations in which this mode provides greater information to the operators than can be provided by any existing radar.

■Maritime. This mode is currently undergoing test and development. When it is available, a very short pulse will be used to decrease the size of the sea clutter, making it possible for the E-3A to detect and track moving or anchored surface ships. The maritime mode uses periodic single scans mixed with other modes to permit nearly simultaneous air and sea-surface surveillance.

■Interleaved. PDES and BTH can be used simultaneously or alone; either or both can be active or passive, as desired. PDNES must be used alone or with the maritime mode.

■Standby. The radar is held in a warmed operational condition ready for immediate use. The receivers are inactive and no power is on the transmitters.

Resistivity to jamming is an extremely important characteristic in the radar system. The E-3A has demonstrated that jamming tactics have significantly less effect on its total system capability than on any system yet devised.



The primary reason for the E-3A's superior performance is that the antenna is uniquely directional with extremely low side lobes. The techniques used to achieve low side lobes, the specific data processing software, and precise quantification of E-3A performance are classified.

The E-3A has repeatedly demonstrated its capability to use jamming strobe azimuth data to locate ground-bases and airborne jamming sources.

Located on the opposite side of the rotodome centerpiece from the radar antenna is the IFF SIF antenna array.

Located on the opposite side of the rotodome centerpiece from the radar antenna is the IFF/SIF antenna array.

The identification function is capable of interrogating the following modes:

SIF Mode 1 [selective].
Mode 2 [airframe specific].
Mode 3 [selective].
Mode 4 [encrypted interrogation].
Mode C [altitude readout].

Readouts from any combination of modes are available to all situation display consoles upon request from the computer system.

The data display and control system provides the man-machine interface between the operators and the computer. Two types of data display and control equipment, situation display consoles [SDCs] and auxiliary display units [ADUs], are used directly by the mission crew to perform the E-3A mission. The SDCs provide the mission crew with all display and control features required to carry out their surveillance, weapons direction, and battle staff functions. The ADUs support the communications, maintenance, and data processing functions of the mission crew. The E-3A has nine SDCs and two ADUs on board.

The mission crew, to accomplish its assigned surveillance and control tasks, can configure the SDCs [in flight] to serve as battle staff consoles, surveillance consoles, or weapons direction consoles. The SDC presents the appropriate pictorial representations to support the function assigned the SDC by the operator. The pictorial representations of the situational data range from individual symbols transmitting only sensor-type and target position information to a combination of symbols and tabular notes that display information such as target type, speed, direction of flight, bearing, mission [if friendly], and altitude. Supporting tabular data are presented in the lower 20 percent of the display screen. From these data, and from background pictorial information such as maps, landmarks, and unsafe areas, the SDC operator can determine the appropriate command in response to a developing situation.

The following SDC design features describe the range of control and display options available to the SDC operator:

- Simultaneously display the position of many targets superimposed on a geographical background.
- Recall and display flight-profile information stored in the E-3A computer.
- Edit displayed information to enhance surveillance and control tasks.

Additionally, the operator can communicate surveillance and control information to other E-3A operators and to ground or airborne units.

While the eyes of the AWACS are the radar and IFF system, the brain of AWACS is the data processing functional group. The data processing computer programs execute mainteanance programs and utility computer programs in the performance of major system computational functions.

A key component of the DPFG is the IBM 4 Pi CC-1 computer, which is a large-scale, high-speed data processing system capable of supporting real-time interfaces, man-machine interfaces, and semiautomatic reconfiguration.

Another key element is the interface adapter unit [IAU]. The IAU is the integrating element interconnecting functional data among E-3A

avionics subsystems—specifically DPFG, radar, communications, navigation/guidance, display, azimuth, and identification. The IAU also provides the central system timing.

Significant capability features of the DPFG include:

Processing speed	740,000 operations/second
Input/out data rate	710,000 words/second [max]
Main memory size	114,688 words [expandable to 180,224]
Mass memory size	802,816 words [expandable to 1,204,224]

The E-3A airborne operational computer program [AOCP] consists of programs associated with the data processing functional group and interfaces with separate computers associated with the radar data correlator and the navigation/guidance subsystem. The AOCP uses data received from all onboard avionics subsystems. Processing of this information enables E-3A to detect, track, and identify aircraft; communicate with and relay messages to and from external sources; record, analyze, and display data; and perform onboard training.

The E-3A has fully developed conventional communications capabilities including:

CAPABILITY	FREQUENCY RANGE
Air-to-Air Voice	FM HF VHF UHF
Air-to-Air Data Link [TADIL-A, TADIL-C]	[A] HF UHF [A&C]
Air-to-Ground Voice	FM HF VFH UHF
Air-to-Ground Data Link [TADIL-A]	HF UHF
Airborne Direction Finder [ADF]	UHF
Secure Voice [Encrypted] Mode	HF UHF
Secure TADIL-A Mode	HF UHF

TADIL-C is used to control aircraft by digital data link. TADIL-C has a directional antenna for control of specific aircraft [located next to the IFF antenna in the rotodome] and an omnidirectional antenna elsewhere on the fuselage.

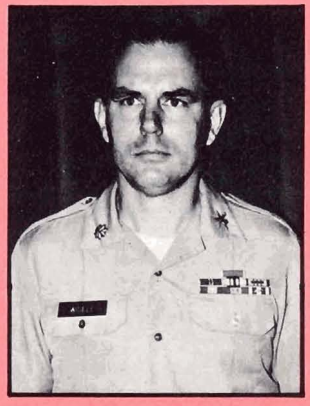
TADIL-A is used to exchange surveillance and other tactical information with other E-3As and ground control elements.

The current version of the E-3A is TACS/TADS compatible. When the E-3A functions as a CRC/CRP, data link interface with Army air defense units will be through an Air Force buffer called the message processing center [MPC]. TADIL-A downlink from the E-3A will be converted to TADIL-B at the MPC. The group level AN/TSQ-73 will interface with the MPC and distribute TADIL-B data through battalion AN/TSQ-73 systems to firing batteries.

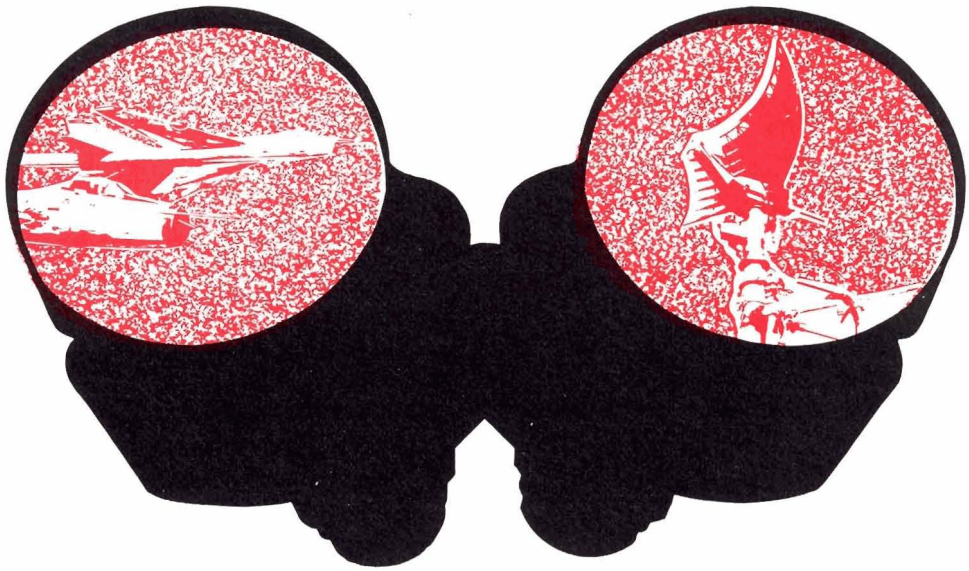
In the future a versatile, high-speed digital transmission network called time division multiple access [TDMA] will provide the communications for E-3A. The joint tactical information distribution system [JTIDS] is expected to replace current communications and data links in the 1980 time frame. If the Army puchases JTIDS for the AN/TSW-73, a direct exchange of real-time data among E-3A, Hawk, and Patriot units will be possible.

The first production E-3A aircraft was turned over to the Tactical Air Command's 552 AWAC Wing in ceremonies at Tinker AFB, Oklahoma, 24 March 1977. TAC, the Air Force's single operational manager for the new system, received the E-3A from Air Force Systems Command, which managed its development and production.

Although all E-3As will be assigned to the 552d Airborne Warning and Control Wing at Tinker, some will be deployed by the Wing to separate operating locations in the United States and overseas.



Lieutenant Colonel Widell is a graduate of the University of Florida and of the Command and General Staff College. He has served with Hawk units in Korea and Vietnam, and commanded the 2d Battalion, 52d Air Defense Artillery. His command and control experience includes assignments as 32d ADCOM Operations Officer and in the Exercise and Evaluation Directorate at Headquarters NORAD. He is currently assigned as the TRADOC AWAC Systems Officer at Tinker Air Force Base, Oklahoma.



VIEW from the FIELD

INNOVATIONS IN FAAR EMPLOYMENT

FIRST LIEUTENANT MANUEL E. GONZALEZ

HELICOPTER THREAT

The 1st Bn, 68th ADA [C/V], one of the hardcharging units of the 1st Cavalry Division, recently provided forward area alerting radar [FAAR] support for the attack helicopter instrumentation test [AHIT] conducted by TRADOC Combined Arms Testing Activity [TCATA]. The test was conducted to determine the effectiveness of the scout helicopter in designating targets to both attack helicopters and ground maneuver units in the defense. The Blue Force [on the defense] consisted of a small element using a combination of wire-guided missiles and tanks. The Red Force [on the offense] consisted of a large force incorporating a mix of wire-guided missiles, tanks, and air defense weapons. The FAAR platoon, which I commanded, was assigned to the Red Force with the mission of providing alert warning to the air defense assets supporting the offensive operation. Since the Blue Force was constantly on the move, and its support helicopters were flying their missions using nap-of-the-earth [NOE] techniques, problems were experienced in passing relevant early warning to the Red Team air defense units. For the opposing force's air defense units to effectively engage helicopters that were using NOE tactics, precise data on the location of all aircraft in the area were needed by the crews.

The 5-km by 5-km grid unit used by the target alert data display set [TADDS] could not provide the precise information needed due to the relatively large area covered by each grid square and the inability of the TADDS to display exact locations of helicopters within the square. This is critical when one considers that most of the avenues of approach could easily fit into one or two of these squares. The problem is compounded by the difficulty a crew has in orienting the TADDS while maneuvering with a combined arms force. Orientation becomes extremely difficult due to the heavy concentration of metal in the vehicles. Noting these problems, the members of the FAAR platoon developed a system by which one could transfer the exact location of the helicopter from his plan position indicator [PPI] to the firing units. This enabled the air defense crews to scan the area where the aircraft was reported to be located. First attempts to devise the system were through the reporting of range, direction, and heading of the helicopter from a given position. This proved to be ineffective because the firing units were not able to correlate the information from their constantly changing directions when on the offense. Personnel involved were able to design and develop the LOLAMY early warning [EW] system. The name came from the 1st Bn, 68th ADA, motto "LOLAMY" which is an Indian word meaning "can do." Success was achieved by using the same map sheet the maneuver units carry [1/50,000] to extract from it the most prominent

terrain features. The axis of advance was divided into numbered sectors separated by prominent terrain features. In the test, streams and roads were used for this purpose. Other terrain features such as ridges, hills, and depressions were assigned a letter designator. The axis of advance, with numbered sectors and lettered terrain features, was then transferred to an acetate overlay from a 1/250,000 map. The acetate overlay, made with an ink pen for precise lines, was then compatible with the 1/250,000 scale gride on the PPI. With the location of the FAAR in the center of the scope, the overlay was then oriented and precise information was passed as to the location [checkpoint] of as many helicopters as were detected. The LOLAMY system so greatly improved the capability of the FAAR that the air defense crews detected most of the helicopters. When they used the TADDS alone, they could not do this. The advantages of the LOLAMY system are numerous:

- It frees the maneuver elements of the ADA force from having to know the locations of the FAAR.
- It gives the ADA units the added advantages of not having to orient any equipment.
- It gives other combat units accurate EW, thus enabling them to use their organic weapons against the helicopter threat.
- It gives exact locations of aircraft by readily identifiable terrain features.
- It identifies for the radar operator the high threat areas to which he should direct his attention.

There is a great advantage to combining the ADA units and other combat units into an effective EW network. Using the LOLAMY system, it can be done effectively in any offensive as well as defensive operation. The entire system is quickly set up and effectively used as demonstrated by the FAAR crew in the test. Low-altitude EW is essential for a Chaparral/Vulcan unit to perform its mission, and the FAAR radar is the only radar organic to the division that can satisfy the requirement. After all, the most effective low-altitude weapons we have cannot function unless the aircraft is seen, and the FAAR can provide the "eyes."

The FAAR platoon also improvised a mock-up radar made by attaching a false radar dish made from chicken wire and steel tubes to a long mast made from the poles provided by the camouflage netting. This assembly was attached to our two maintenance goats and placed on hills next to our actual positions. The false sets were improperly camouflaged and acted as excellent bait to lure helicopters away from our positions.

HIGH - PERFORMANCE AIRCRAFT THREAT

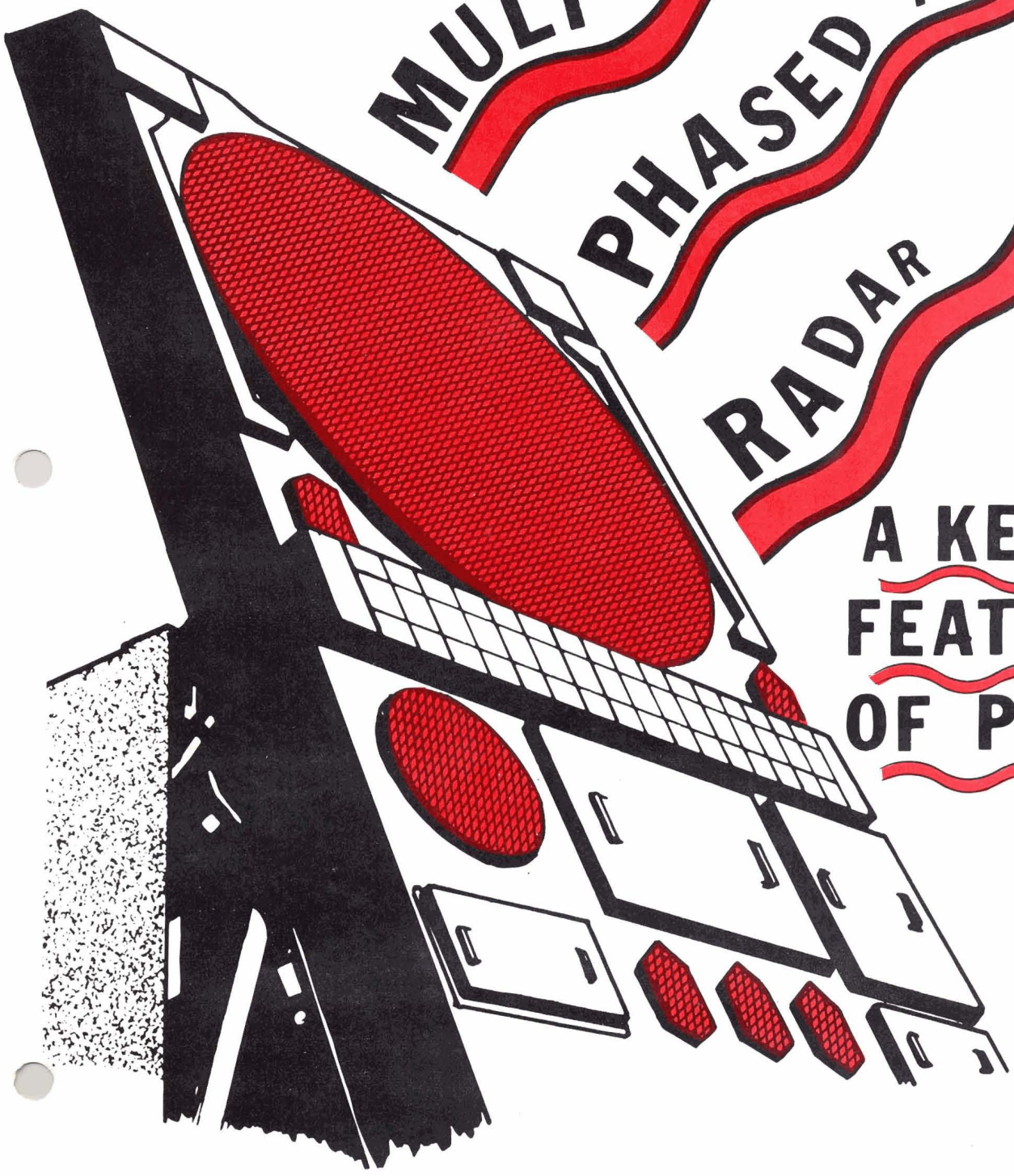
The foregoing discussion dealt with the use of the FAAR in a microsense, the range of the FAAR being 20 km. Joint Readiness Exercise Gallant Crew 77 revealed that there was a real need to develop a system to tie in the early warning net providing high-performance threat information to the Chaparral/Vulcan battalion with the FAAR low-altitude alert warning net. A simple way was needed to determine whether the aircraft was hostile and the direction from which the aircraft would enter the scope. This requirement was met by monitoring the battalion EW net from the Air Force control and reporting center [CRC]. All information supplied was ignored except the two letter designators given in the location information. This permitted determining the map sheet on which the aircraft was located. By drawing a sketch of all the map sheets surrounding the one in which the crew was operating, it was possible to determine the general direction from which the aircraft would appear on the scope. This is shown in the illustration below.

OJ	PJ	QJ
	PK	
OK	FAAR radar	QK
OL	PL	QL

Lieutenant Gonzalez attended the University of Miami and Miami Dade Junior College for 2 years before entering the United States Military Academy from which he graduated in 1975. His first assignment was to the 1st Bn, 60th Air Defense Artillery, where he has served 1 year in C Battery and 1 year as the FAAR platoon leader in Headquarters and Headquarters Battery.

MULTIFUNCTION PHASED ARRAY RADAR

A KEY FEATURE OF PATRIOT



LIEUTENANT COLONEL EUGENE L. NAEGELE, USA (RET)

INTRODUCTION

The multifunction phased array radar is one of the key features of the Patriot air defense missile system. This feature is one of the principal technological breakthroughs that enables Patriot's high firepower and electronic counter-counter-measure capability with few major hardware items in comparison to the Nike Hercules and Improved Hawk systems. The fundamentally different operation of multifunction phased array radars from earlier radars results in the necessity for different employment concepts. Therefore, it is important for air defense artillery commanders and planners to acquire a basic understanding of how multifunction radars work. This article provides an introduction to multifunction phased array radars.

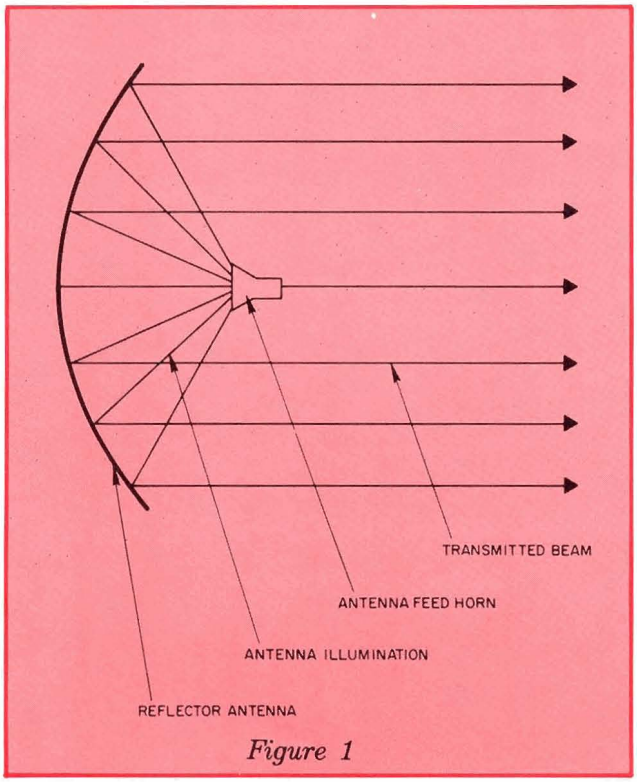


Figure 1

EARLIER RADARS

All radars require a transmitter, an antenna, and a receiver. The transmitter generates a relatively high-power waveform that is focused and projected into space by the antenna, much in the manner of an ordinary flashlight, where the transmitter is the light bulb and the reflector is the antenna. Figure 1 illustrates this basic relationship. Generated energy is piped to a feedhorn, which illuminates a reflector antenna, which in turn transmits a focused beam into space. Any given feedhorn-reflector combination produces only one type of beam. Conventional radars were designed to produce either a fullyfocused tracking beam [commonly termed "pencil" beam] or a semifocused search beam ["fan" beam] [Fig 2]. The former produces a beam narrowly focused in two dimensions so as to give accurate directional information. The latter generates a beam that is narrowly focused in azimuth but only partially focused in elevation so as to simultaneously cover the entire range of altitudes to be searched. To track a target [pencil beam] or to search a volume of space [fan beam], the antenna and feed combination must be moved mechanically to move the beam in space.

PHASED ARRAY RADARS

Phased array radars also have a transmitter, an antenna, and a receiver. The transmitter and

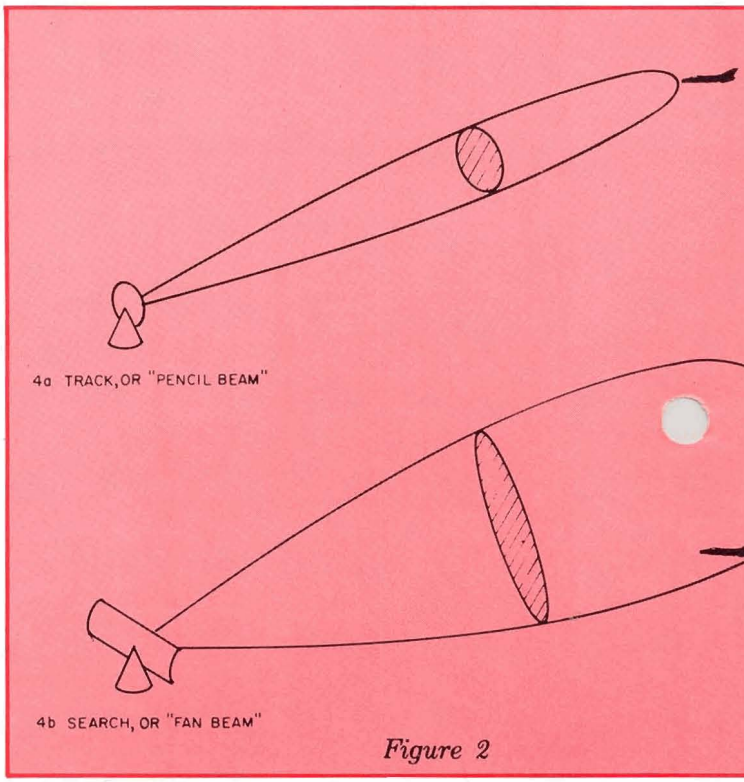


Figure 2

the antenna perform the same functions as in the earlier radars, namely the generation of a relatively high power waveform and the focusing and transmission into space. However, the antenna, instead of being a passive reflector, consists of a number of elements called phase shifters. Each of these phase shifters can be individually controlled to delay its portion of the beam by different lengths of time. Figure 3 shows a focused beam that is produced by a phased array when each element has a fixed amount of delay more than the adjacent element. The delays and

wavefronts of all elements are depicted in Figure 3, but only those from each element combine to produce a beam that is at an angle from the array axis of symmetry, in this particular case. It is not necessary to move the antenna and feedhorn to move the beam in space as in earlier radars. By controlling the relative delay times in each phase shifter, the beam can be directed by any desired angle up to 90°. Furthermore, the changing of beam directions can be accomplished in millionths of a second. There is yet another capability. By appropriate patterns of delay times over the array antenna the same antenna can produce pencil beams, fan beams, defocused beams, multiple lobe beams, or almost any desired radiation pattern [Fig 4].

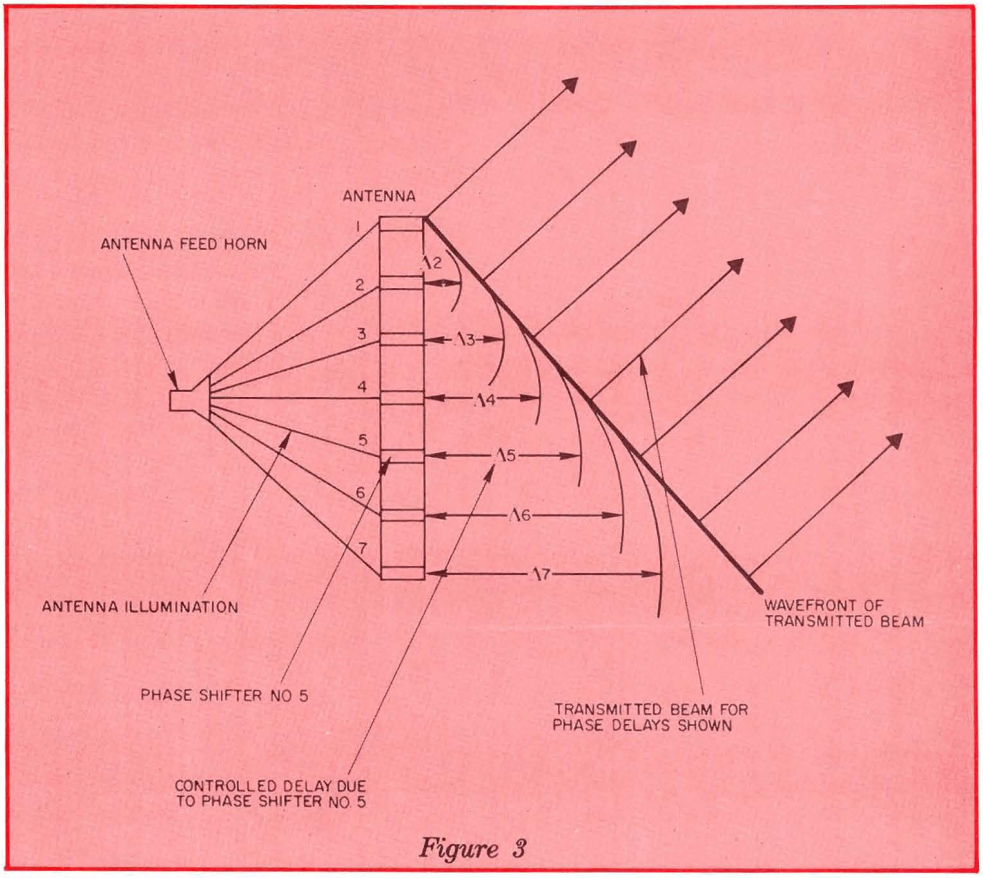


Figure 3

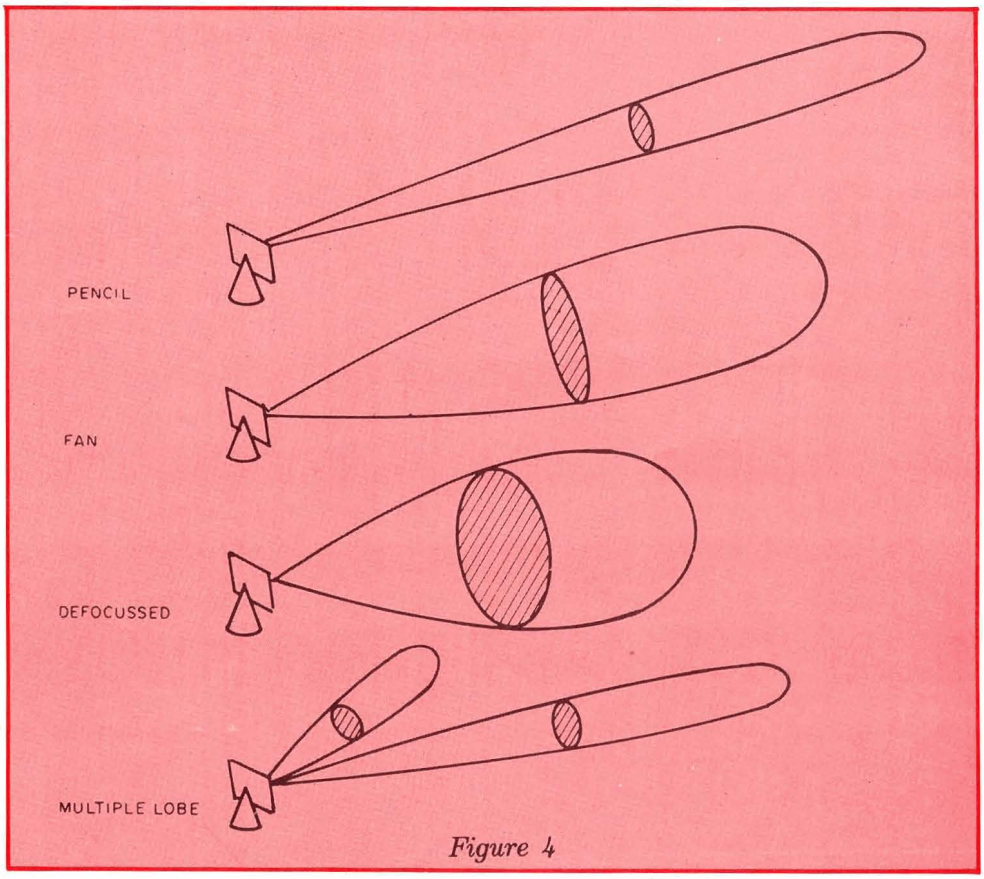


Figure 4

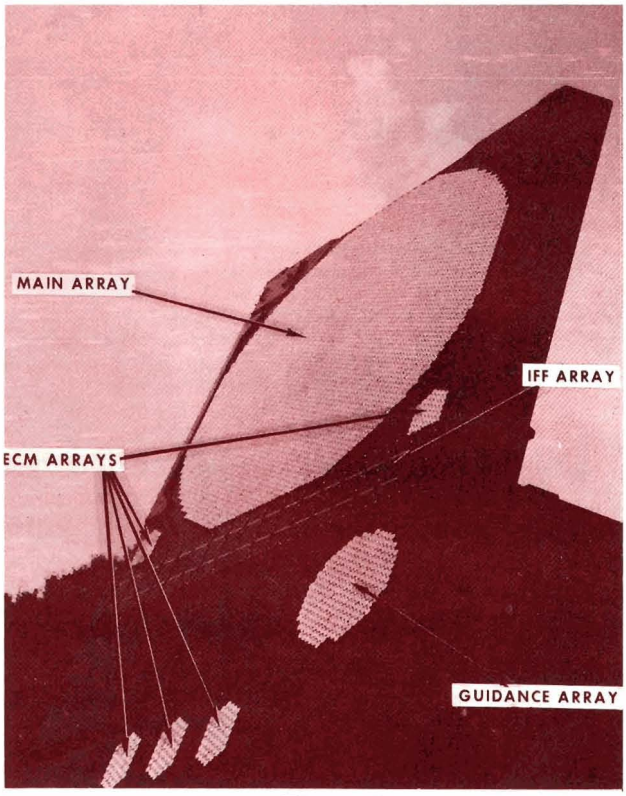


Figure 5

Lieutenant Colonel Naegele is Requirements Research Manager for Raytheon Company's Patriot Program Office, Plans and Requirements. He graduated from Case Institute of Technology with a B.S. in Physics and from the University of Arizona with and M.S. in Electrical Engineering. He is a Vice President and Director of Yankee Chapter, American Defense Preparedness Association; and a senior Member of the IEEE, in which he is past chairman and member of the Air Defense Systems Panel, Aerospace and Electronic Systems Society.

PATRIOT MULTIFUNCTION PHASED ARRAY RADAR

The Patriot multifunction phased array radar [Fig 5] performs all of the functions that are required of the collective radars in the Nike Hercules and Improved Hawk systems. The main array, shown in Figure 5, performs the surveillance and tracking function. The guidance array is used in guidance of the missile and the ECM arrays are used in various ways to counter electronic countermeasures. Because the beam is electronically scanned, the functions of search, detection, track, identification, guidance, and counter-countermeasures can all be performed concurrently with the required data rates. Beams can be tailored for long range, short range, horizon and clutter, guidance, and counter-countermeasures in power, waveform, and physical dimensions. Data rates for each function can be selected independently, since the phased array radar is not tied to a fixed rotation rate. For example, long-range search coverage may be accomplished over a longer time frame than the horizon search for low-altitude popup penetrators [Fig 6]. Midcourse guidance does not require a data rate as high as terminal guidance. Furthermore, none of the functions requires a rigid schedule adherence. This permits a random sequence of radar actions in any given time interval, resulting in a very difficult posture to would-be antagonists. The bottom line here is that the use of a multifunction phased array radar with Patriot results in fewer system-peculiar major items, substantial reduction in parts and logistic support, savings in manpower and money and, most important, high firepower with multiple simultaneous engagements at all altitudes in a severe electronic countermeasures environment.

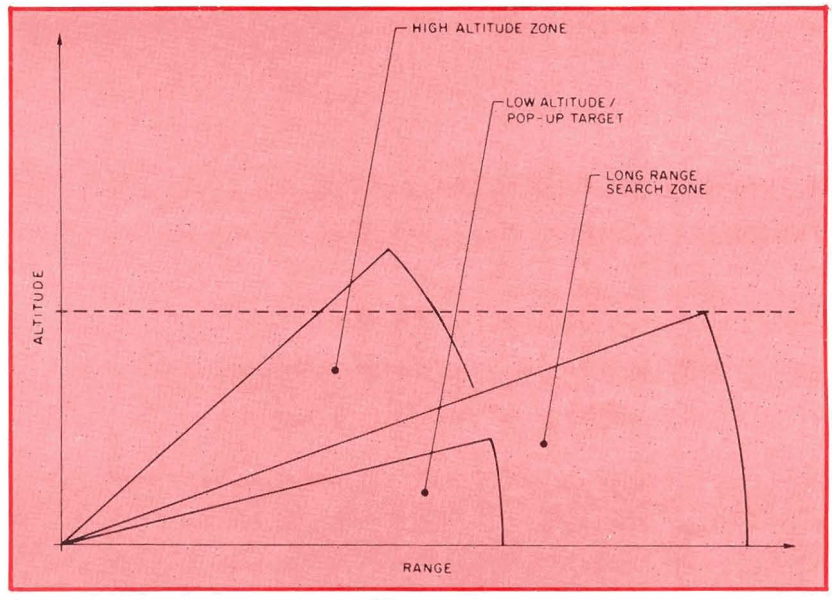


Figure 6

WHAT DO YOU DO NOW,

LIEUTENANT?

Prepared by Tactics Department, USAADS

SITUATION

You are the platoon leader of the 1st Platoon, Battery A, 4th Battalion [Hawk], 7th Air Defense Artillery. The battalion is in direct support of a mechanized infantry division that is defending in sector. The battery commander has been informed that his unit will move to a new position as part of a division night withdrawal where it can provide a battery defense of its area of responsibility.

Your platoon will be released from its present air defense mission for movement at 1445. The platoon should cross the start point [SP] at 1530 and the release point [RP] at 1605. The platoon should be operational as soon as possible and be prepared to assume "Battle Stations" at 1800.

The battery commander will lead the reconnaissance party, which will depart from the main battery area at 1300. As platoon leader of the deployable platoon, what actions should you be taking in preparation for the move and occupation of the new position?

SOLUTION

After receiving the battery commander's instructions, you should immediately initiate a warning order to your platoon by the most expeditious means. The warning order should include as a minimum the new mission and the time and place of issue of further instructions. You should then begin formulating the required actions to be accomplished prior to, during, and after the move. Your thought processes should include an analysis of the enemy situation. Some items to be considered are:

What is the possibility of enemy activity interfering with your movement?

Might your platoon be subject to air attack or other forms of ambush?

Have enemy air assault teams been active?

Are there any points along the primary or alternate routes that would be likely areas for ambushes?

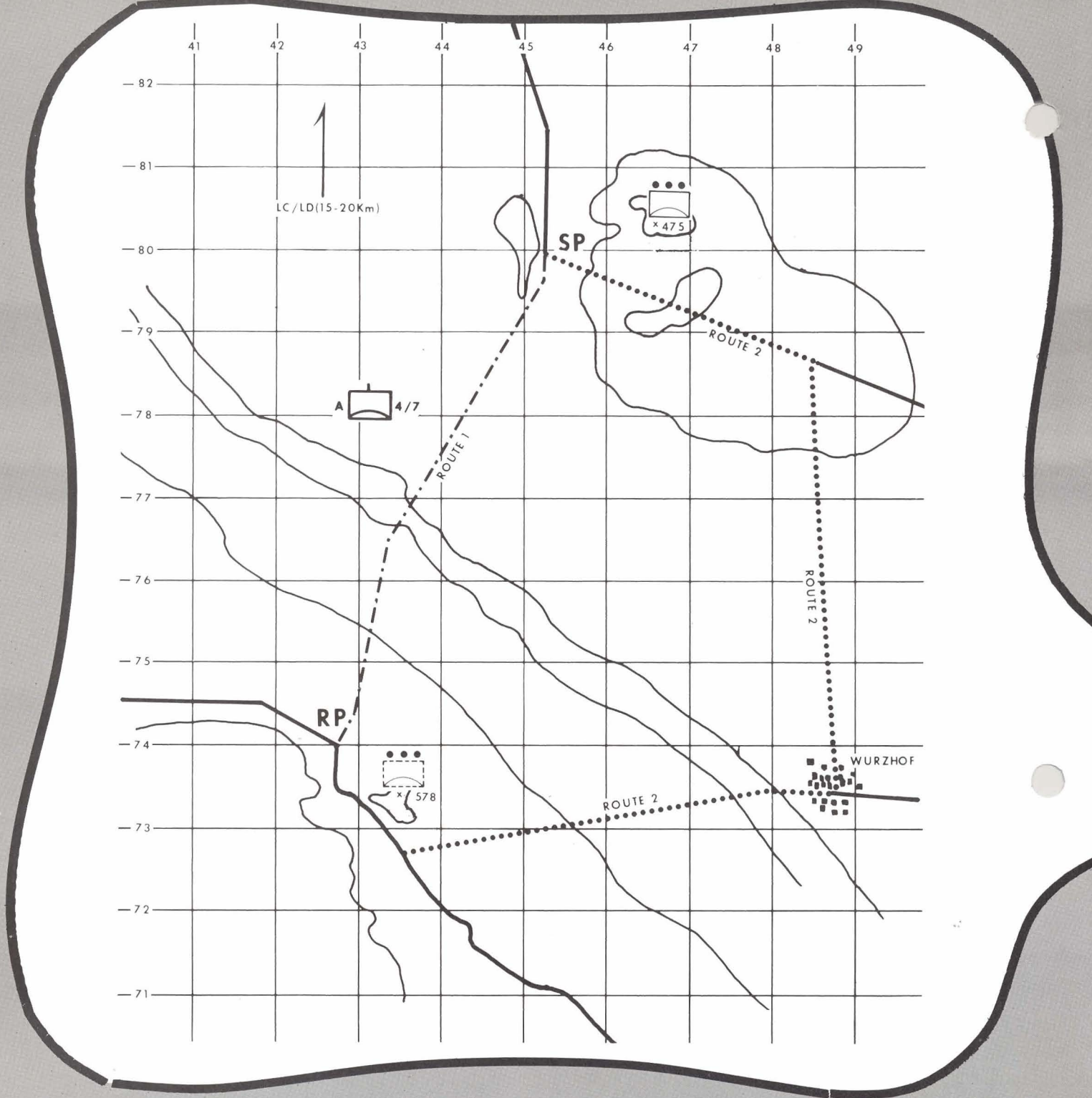
Are there choke points where your vehicles may bunch up and present a more lucrative target for enemy attacks?

After considering the enemy situation, you should review and update the friendly situation:

Are there friendly units located along the route of march? If so, who are they and where are they? How can you contact them, or have you coordinated with them? Remember, you could need assistance, such as artillery or engineer support, along the way.

What units are in the vicinity of the new location?

OK, you've considered both the enemy and friendly situation; now what? You have your mission; how will you accomplish it? Do you have personnel or equipment shortages that will hamper your platoon's capability to get the job done? Will you need additional support to correct people shortages or equipment outages? Will you need any special support to assist in overcoming obstacles imposed by the weather, terrain, or the enemy? Don't forget to consider such basic needs as rations, fuel, and ammunition; and, very importantly, communications requirements.



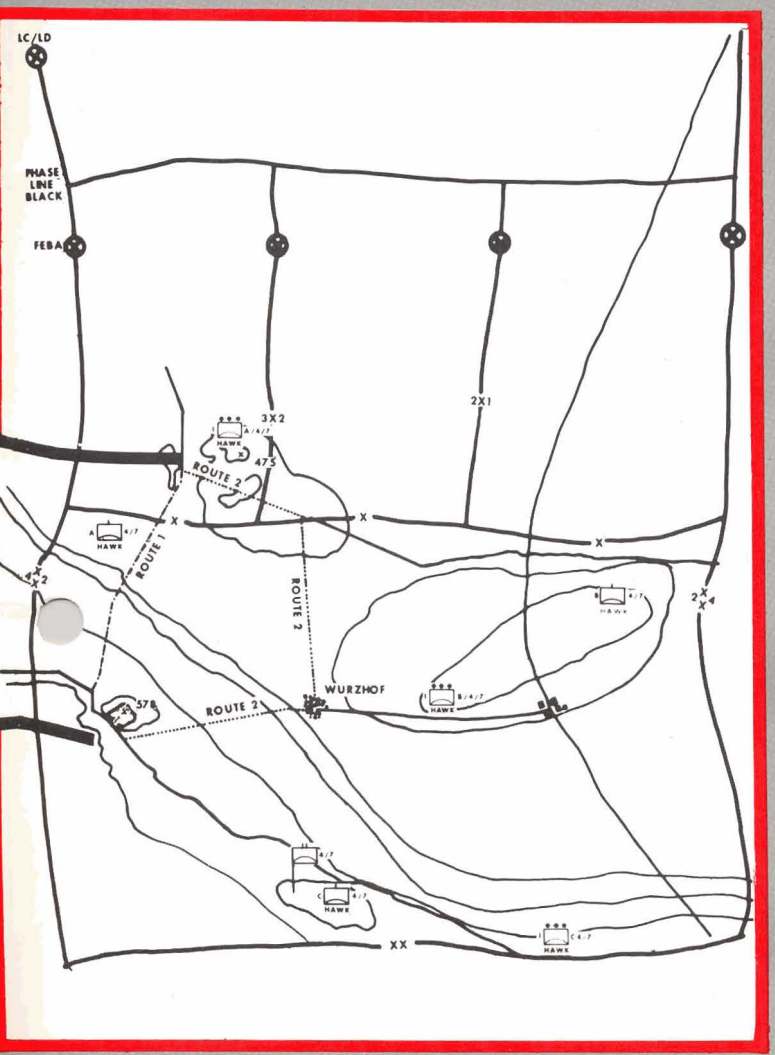
Once you have considered all the foregoing factors and noted problem areas, it's time to develop a concise statement to present to your platoon sergeant and section chiefs that will identify who, what, when, why, and where concerning the upcoming mission. This statement should be presented in such a way that members of your platoon will understand exactly what is to be accomplished. In developing this statement, your task is to determine and describe how your platoon will go about accomplishing the tasks at hand. An example of what you might present to your key personnel follows:

■Enemy air activity has been increasing. The enemy has the capability of inserting company-size air assault teams into our area of operation. The division is conducting a night withdrawal to more defensible terrain. This move is being made to buy time to permit a build up of forces for an attack. Our battalion is shifting positions to provide air defense for the division as it withdraws and sets up in its new defensive positions.

■We will move at 1530 from this position to the vicinity of Hill 578, get our equipment operational there as quickly as possible, and be

prepared to assume BATTLE STATIONS no later than 1800.

■ We will be released from our present air defense mission at 1445. The start point is the road junction at 453799. The release point is the road junction at 427740 which must be cleared by 1605. Route 1 is primary and Route 2 is the alternate. Equipment guides for the RSOP party report to the platoon sergeant here at 1230. Platoon Sergeant, you are to meet the battery commander at 1300 at the battery CP. We will move in a



convoy of one serial. Convoy speed is 25 mph with an interval of 100 meters. Catch-up speed is 35 mph. In case of ambush or air attack, follow battery SOP. Preload all nonmission equipment on vehicles and position them near their towed loads. Do not line up the convoy prior to start time. Check the hookups of all towed vehicles to insure they are secure.

■ We will carry a 3-day supply of "C" rations but I will try to get hot chow ASAP after the system is operational at the new location. Insure all vehicles are topped off with fuel before the move.

■ I will be in the lead vehicle during the move.

■ Frequencies, call signs, and challenges/passwords will be according to current COEI.

■ Are there any questions?

At this point, you have completed a logical thought process in preparing your platoon for movement. Probably without even realizing it, you have followed the sequence of a five-paragraph operations order. The operations order is a time-tested guide for developing an effective plan for mission accomplishment. The five paragraph operations order is normally presented orally at battalion level and below. Whether oral, written, overlay, or any comination thereof, the basic format remains the same—

1. Situation.
2. Mission.
3. Execution.
4. Service Support.
5. Command and Signal.

The process of moving a platoon to a new location requires that all personnel involved be trained and briefed prior to movement. Along with the operations order sequence above, the battery SOP is your guide and should include such items as:

■ Who comprises the RSOP party.

■ What items of equipment are mission essential.

■ Vehicle loading plans for each vehicle as an annex or appendix.

■ Convoy procedures, to include security actions.

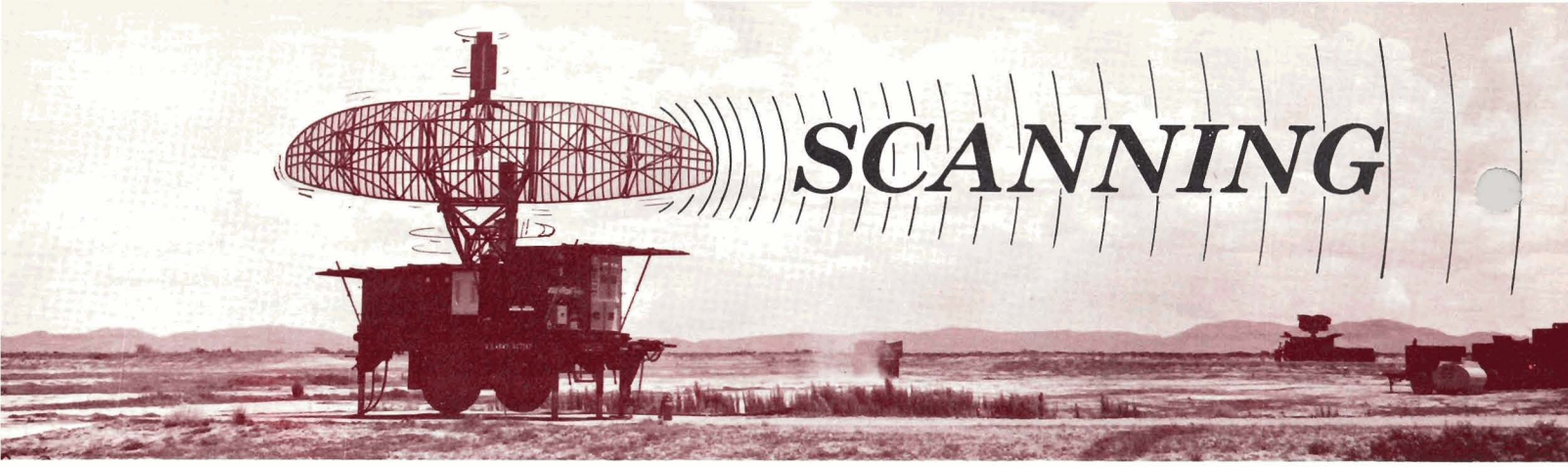
■ Key personnel duties and responsibilities [e.g., NBC monitor, mine detector operator, mechanic, medical aid man, etc.].

■ Normal order of march and a typical battery/platoon position diagram.

■ Procedures upon entering a new position.

Because of day-to-day mission [manning] requirements, training your troops may be difficult. Use every opportunity to practice march order and emplacement techniques and procedures. Require your soldiers to hook up an item of equipment to its prime mover and have your drivers and assistant drivers drive around the tactical site so they can get the feel of towing a load and backing or otherwise manipulating equipment into position. Don't forget to emphasize maintenance—not only on your Improved Hawk equipment, but also on vehicles, trailers, and support equipment.

The effectiveness of your platoon depends upon your supervisory techniques and how well you train your troops.



SCANNING

PATRIOT PROGRESS

Patriot climaxed its most recent test series at White Sands Missile Range last June. Patriot intercepted a jet fighter while the system's single-phased array radar simultaneously supplied acquisition and tracking data for an Improved Hawk missile battery that successfully intercepted a second target. The test was conducted in a severe electronic countermeasures environment. The test also demonstrated the compatibility of Improved Hawk, the Army's current medium-altitude defense capability, and Patriot, its eventual successor.

The Patriot system acquired the first target at long range and high altitude, then fired and controlled an unarmed missile that passed the pilotless jet within the lethal radius of the missile warhead. Simultaneously searching, the Patriot radar fingered the tiny Firebee drone, streaking in at low altitude on the Improved Hawk battery, which scored a direct hit.

Patriot began a long string of test successes starting in 1973, with 9 successful shots out of 10 in a controlled test vehicle missile firing phase that proved the design of the missile airframe, control system, autopilot, and propulsion system. In 1975 the system was required to prove its unique guidance concept in a series of flights against live targets. Only the first 6 shots of a planned 16-missile firing series were required to meet the test objectives.

The most recent series of tests began in December 1976 and proved the system's capability to perform its mission successfully despite use of a wide variety of countermeasures attempting to degrade system effectiveness. There were 8 successful flight tests and 24 search/track tests that validated Patriot's capability to counter the airborne threat of the 1980s and beyond. Test operations at White Sands have been suspended pending arrival of Fire Platoon 2, the second set of tactical ground equipment.

IMPROVED CHAPARRAL MISSILE

Lieutenant General Eugene D'Ambrosia recently accepted the first improved Chaparral missile at Red River Army Depot, Texarkana, Texas. General D'Ambrosia is the Deputy Commander for Materiel Readiness at the Army Materiel Development and Readiness Command. In accepting the improved missile, he said, "This improved missile will keep Chaparral abreast of the air threat for many years to come."

The improved Chaparral missile features a new guidance section that gives the missile a 360° intercept capability. Older missiles had no target head-on capability. The new missile also has a new fuze.

The Chaparral missile is of the infrared heat-seeking variety. Mounted on a tracked vehicle, it complements other air defense artillery weapons in providing protection for high-priority assets of the ground force commander against air attack.

A LOGIC PROBE

IHawk maintenance technicians will be receiving a logic probe to assist in troubleshooting the ICC/IPCP. The logic probe will be made available under MWO 9-1425-525-50-15, which will be reflected in changes to TMs 9-1430-527-12-3 and 9-1430-535-12-3. These TM changes are now under review by the US Army Air Defense School. Chances are good that the probe will be in troop use by April 1978. The TM changes, along with the logic probe [LP], will enhance ICC/IPCP fault isolation by providing a signal loop and indicating a specific checkpoint for the LP. These procedures are not designed to replace the use of other test equipment, but will allow fast reaction to a failure indication and will aid the experienced technician in the training of newly arrived, school-trained personnel. This ICC/IPCP LP technique can be easily adapted to the new Branch and Flow procedures now in development.

HOW-TO-FIGHT MANUALS

The CG TRADOC has established a program to develop and publish 42 How-To-Fight [HTF] field manuals, which are to carry the latest in doctrine, tactics, and combat techniques to the Army's combat forces. The US Army Air Defense School was charged with preparing four of these HTF manuals; a capstone manual [FM 44-1], carrying broad ADA doctrine, principles, and tactics; and three system-specific manuals—one addressing Chaparral and Vulcan [FM 44-3], one for Redeye [FM 44-23], and one for Hawk [FM 44-90]. The Air Defense School is nearing completion of its HTF manual program. FM 44-1, US Army Air Defense Employment, was published in March 1976. FMs 44-3, ADA Employment, Chaparral Vulcan; 44-23, US Army ADA Employment, Redeye; and 44-90, ADA Employment, Hawk, have been distributed in final draft form and will be published by Department of the Army before the end of this year.

REVISION OF CTA 23-103

CTA 23-103, Dummy and Inert Ammunition, Special Weapons and Supporting Missile Training Equipment, is under revision. Revision will include dummy and inert missiles and missile components for Hercules, Hawk, and Chaparral ADA units. Authorization for the Monitoring Set AN/TSQ-T3 is included for Chaparral units. Redeye authorizations are as follows:

Field Handling Trainer M46:

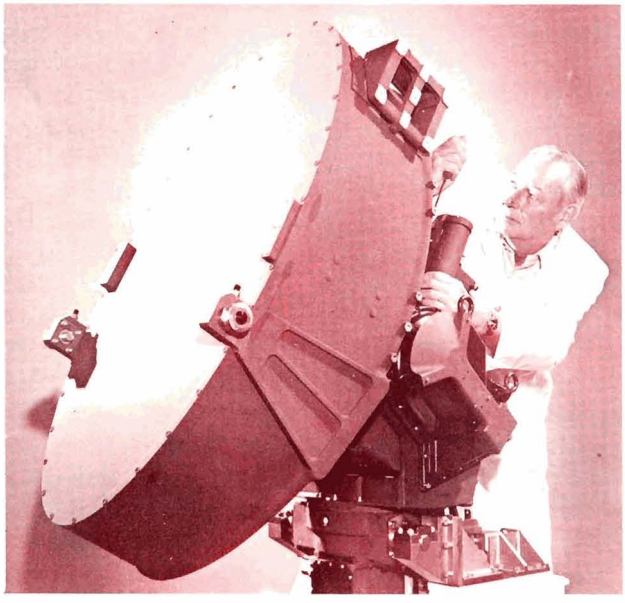
3 per ADA Btry, Chaparral, TOE 44-328
2 per ADA Btry, IH, TOE 44-247
3 per ADA Btry, IH, TRIAD, TOE 44-267
2 per ADA Btry, Nike Hercules, TOE 44-537
1 per TOE designated Redeye Team.

Tracking Head Trainer M76:

1 per ADA Bn Chaparral/Vulcan, TOE 44-325 or 44-725
1 per ADA Bn Improved Hawk, TOE 44-245
1 per ADA Bn Improved Hawk, TRIAD, TOE 44-265
1 per ADA Bn Nike Hercules, TOE 44-535H
1 per TOE designated Redeye Section HQ.

US ROLAND RADAR

The first US—built Roland track radar antenna, produced by Hughes Aircraft Company, will soon be integrated into the short-range, all-weather air defense system. The radar provides precise, fully-automatic tracking and engagement of high-speed, low-level air attackers at night and in virtually any weather condition. The US Roland system is virtually identical to the European [NATO] version; therefore, Roland missiles produced in the US may be fired from NATO Roland fire units, and vice versa. Additionally, more than 90 percent of the modules in the American fire unit are completely interchangeable with the European modules. This interchangeability was demonstrated recently when the signal data processor for the European track radar was flown to the US and successfully tested in an American track radar.



MISSILE DECOY CONCEPT

The US Army Air Defense Board is currently testing the concept of using rubberized decoys to deploy with the IHawk missile system. The decoys would be located in proximity to actual IHawk positions. Phase I of testing in 1976 used West German fabricated models with conventional camouflage. The current Phase II will use domestic ELINT [Electronic intelligence] deception studies. The decoys and simulators will be subjected to detection, identification, and ruggedness tests. High-speed aircraft, helicopters, and ground-based observers will be used in the detection portion. If the concept is proven, decoys could provide an additional deceptive means to improve tactical effectiveness and survivability. Further information on survivability techniques can be found in TC 44-1-1, March 1977.

ENLISTED CAREER NEWS

CMF /= SKILL QUALIFICATION TESTS

Recent visits to the field by US Army Air Defense School personnel have revealed that there are still some questions and problem areas concerning Career Management Field [CMF] 16 Skill Qualification Tests [SQTs]. The following is an abbreviated report of the School team's observations, along with information further explaining the CMF 16 Skill Qualification Test Program.

■ Distribution of Test Notices. Some 3-4 weeks after SQT notice distribution was completed from TRADOC Training Support Center, Fort Eustis, receipt of test notices and related SQT publications was sporadic and varied greatly from unit to unit, even within some battalions. In some instances, notices were present at battery level but no aggressive attempts had been made to place the notices in the hands of the soldiers who needed them. At one CONUS post, the notices were on hand, but a post-level determination had been made that distribution to the soldier should not occur until 60 days prior to test. Distribution to every soldier eligible for testing should be accomplished at least 60 days prior to the test date, but can occur earlier than 60 days. If test notice shortages occur, aggressive action must be taken through test control officers [TCO] to rapidly secure more test notices. As of 1 September 1977, Training Support Center had on hand 900-2,000 copies of each CMF 16 SQT notice to cover shortages that might exist in the field.

■ Identifying Soldiers Eligible for Skill Qualification Testing. Some units are under the erroneous impression the E-4 is the lowest grade required to take the SQT. All soldiers, regardless of grade, who have 12 months of active Federal service and have held the MOS for 90 days on their SQT testing date are required to take the SQT. USA Training Support Center message, DTG 121544Z Apr 77, contains the details.

■ SQT Scoring Input. Some soldiers have asked whether their EER scores were part of their finalized SQT scores because the introductory section of their Soldier's Manual advised that final SQT scores were comprised of 60 percent SQT results and 40 percent EER scores. The introductory sections of the 16J, 16R, and 16P Soldier's Manuals do include this comment, which states the intention at the time these manuals were drafted. That method of computation no longer applies. Soldiers must be advised that finalized SQT scores reflect test performance only. The obsolete comment will be deleted from these Soldier's Manuals when they are revised.

■ Accountability for SQT Notices. When test notices are distributed to individual soldiers, records must be maintained to verify the date each soldier was issued his SQT notice. This procedure is necessary to insure that each soldier receives his notice at least 60 days prior to his test date.

■ Malassigned Soldiers. Soldiers who are not working in their PMOS will nevertheless be tested in their PMOS. They must take the written and performance certification of their SQT and should take the hands-on component if equipment for hands-on testing is reasonably available. The decision to waive all or part of the hands-on component of an SQT due to equipment nonavailability, or infeasibility of testing at another location where equipment is available, will be made by an 05 or above in the chain of command in coordination with the supporting TCO. DA Pam 350-37, Handbook for the Conduct of Skill Qualification Tests, provides the details.

■ SQT Testing for MOS 16R. SQTs for 16R are not tracked into different versions for self-propelled and towed Vulcan crewmen. Tasks selected for the hands-on component of the SQT are performed in the same way on both systems. The written component of the SQT contains approxi-

mately the same number of tasks pertaining to each system. The decision not to track the SQT was made because the performance of many tasks are the same on both systems. Also, there is a need for the crewman to maintain proficiency on both systems.

■Requisitions for Soldier's Manual Shortages. Shortages of varying quantities of Soldier's Manuals were reported by units. Single copy requisitions should be forwarded to the Comdt, USAADS, ATTN: Extension Training Management Division, P.O. Box 5300, Fort Bliss, TX 79916, using the tear-out order form at the back of each Soldier's Manual. Bulk quantity requisitions should be forwarded on DA Form 17 to US Army Publications Center, 2800 Eastern Blvd, Baltimore, MD 21220.

■Redeye Aircraft Ranging—SQT 2, 3 16P. Reports received from some test control officers indicate that the numbering sequence stamped on the slide holders is in error in some cases. Test control officers should verify that the slides are arranged in the following order by aircraft type to insure correct scoring of this task: Mi-6 Hook, Yak-28 Brewer, An-12 Cub, Mi-4 Hound, MiG-21, Fishbed, Ka-25 Hormone, An-14 Clod, MiG-21 Fishbed [head on], I1-14 Crate, and An-2 Colt.

■Visual Aircraft Recognition Slides—SQT 2, 3, 4 16P and 16R. Slides provided to TCO may be rearranged at the discretion of the test site manager during testing to preclude compromise of the order of appearance of the aircraft. Test site managers must insure that the answer key is rearranged accordingly to coincide with the slide sequence.

■Changes to FAAR Operators Manual. After publication of the final draft of the SQT for MOS 16J, 2, 3, TM 9-1430-588-10 was amended by changes 3, 4, and 5. Changes 3-5 modified some of the performance measures in the hands-on component for Track Two [FAAR] for SQT 2 and 3, MOS 16J.

ASSOCIATE DEGREE PROGRAM

Soldiers can now earn an associate degree in management or general studies under a program sponsored by the Servicemen's Opportunity College [SOC], beginning this fall. College credit for military schooling and experience and transfer of credit among 32 colleges are available under the SOC Associate Degree Program.

The program, for example, gives 7 credit hours to an 11B10 [Infantryman] and additional credit for higher skill levels. When the soldier is transferred to another major installation, his credits are transferred to a participating institution, allowing his education to continue uninterrupted. Credit is also given for successful completion of the College-Level Examination Program [CLEP], US Armed Forces Institute [USAFI], and Defense Activity for Nontraditional Educational Support [DANTES] courses.

An associate degree is earned by completing a maximum of 65 semester hours. No more than 15 semester hours need be completed by attending on campus courses.

Tuition assistance [financing 75 percent of education costs] is available through education centers, and 100 percent financing is available to qualified GI Bill recipients.

Participating colleges are located near major US installations. The Army plans to expand the program to oversea areas next year and hopes to extend it to additional US areas as well.

COMMANDER'S "REUP OVERRIDE"

Overstrength MOS continue to be a problem for some first-term soldiers who want to reenlist. DA officials have recently announced a new policy called "Commander's Reenlistment Override" for first-term soldiers, which may make it easier for outstanding soldiers to reup.

DA has modified the reenlistment procedures to allow senior commanders [major general or higher] to authorize the reenlistment of first-term soldiers in their present primary MOS, even if they have been directed to be retrained in a new MOS by MILPERCEN.

Before reenlistment can be authorized under this new policy, the soldier must be:

- Serving on a first term of active Federal service.
- In an authorized TOE or TDA slot.
- Eligible for reenlistment.
- Willing to reenlist in present duty assignment.
- Serving at an installation which is not overstrength in the soldier's grade and MOS.

DA staffers caution that this "override" authority should only be used for outstanding soldiers who are highly recommended by their unit commanders to remain in their current PMOS.

The Commander's Override does not apply to soldiers who have been denied reenlistment or extension for qualitative reasons.

If the Commander's Override is initiated, the request must be forwarded through the Personnel Management Branch and the Reenlistment Office of the local MILPO to verify the TOE or TDA position and determine the soldier's eligibility for reenlistment. All of this must be completed before approval by the commanding general. Senior commanders may not delegate the "override" authority to subordinate commanders.

MOVING EXPENSE DEDUCTIONS

Soldiers who had a PCS last year probably can deduct reasonable expenses from their income tax for that move even if they don't itemize their deductions.

Reasonable expenses include such items as:

- Travel to new location.
- Movement of household goods and personal effects.
- Premove househunting trips.
- Temporary quarters at the new station.
- Disposition of the old residence and the acquisition of a new home.

These amounts are subject to a ceiling of $2,500 for 1976 and $3,000 for 1977 and after. The moving expenses are summarized on Form 3903 and are reduced by travel pay and dislocation allowances. For civilians there are distance and length of work requirements that are waived for military with PCS orders.

Travel expenses include meals and lodging for yourself and your family while enroute from your old post to your new station. Family means all members of your household.

The cost of moving the household goods and personal effects of both you and the members of your family is deductible. This includes the actual cost of hauling, as well as packing and crating and storage, within 30 days of the move. What the Government pays the movers directly under a Government bill of lading does not enter onto the Form 3903.

Premove househunting trips, after obtaining work, include transportation, meals, and lodging while in the general location of your new station.

Temporary quarters costs are limited to meals and lodging during any period of not more than 30 days and can be deducted. Temporary quarters do not include the cost of entertainment, laundry, transportation, or other personal living expense.

Costs of selling or acquiring a residence include real estate commissions, attorney fees, title fees, and points and/or loan placement fees [not prepaid interest of loan processing fees though]. If these items are used as moving expenses, they cannot be used again as an adjustment to the basis of the property; e.g. when you sell and buy a house not in conjunction with a PCS.

HOUSING WAITING LISTS

It's not too early to start thinking about your next PCS. Soldiers who haven't moved during the last year should be aware of a few changes in the procedures for applying for housing waiting list consideration.

Soldiers may now be placed on the waiting list at the new post with an effective date the day they departed their previous duty station.

The procedure is simple. Go to the family housing office and ask for a DA Form 1746—the application form for family housing. The personnel officer will validate it and send it on your next duty station.

If this isn't done, your name will not be placed on the waiting list until you apply for housing at the new station.

If the application forwarded by the MILPO at the last station gets lost, a copy should be in your 201 file and can be verified by the MILPO at the new station. Then you will still be eligible for the waiting list as of the date you departed the former station.

Plan on a 30- to 180-day average waiting time for family housing at most military installations, unless you arrive at a new stateside installation during June through August. Estimates of waiting time depend on the time of year, because 60 to 75 percent of housing assignments are made during June through August.

All changes to the family housing regulation are designed to work to your advantage. But keep in mind that a short cut through procedures may cause a short circuit that can delay processing.

SQT LESSONS LEARNED

Preliminary test reports from field units completing record SQT hands-on testing indicate encouraging results and some lessons to be learned about performance of some critical tasks. The pass rate for the task—Don the Protective Mask—has been about 75 percent. The two primary causes for NO-GO ratings have been improper fitting of masks, which prevented proper seating and sealing of the masks on the face, and failure to correctly clear the mask.

Some soldiers faired poorly on their SQT because they did not properly use their SQT notices to prepare for the tasks tested. They failed to study the tasks listed in their SQT notice and practice hands-on tasks listed step-by-step in the SQT notice.

An excellent article in October 1977 Soldiers provides enlightening and informative insight into SQT programs. The most important aspect of SQT is not the testing that measures a soldier's ability to perform a critical task, it is the training that makes him proficient. Training for SQT should not be thought of as a crash effort initiated by the receipt of test notices and testing schedules, but rather maintaining proficiency by periodic mini-SQTs during the year, which emphasize hands-on performance to soldier's manual standards.

OPMD UPDATE

LIEUTENANT COLONELS DIVISION

Development. The new Department of the Army Pamphlet 600-3, Officer Professional Development and Utilization, has been published. If you do not have one—get one. This pamphlet is the "Bible" for the professional development of the officer corps. It presents the philosophy and management practices of the Officer Personnel Management System [OPMS] and discusses each of the OPMS specialties.

Your Files. ADA lieutenant colonels are encouraged to review their official files on a regular basis. We recommend that it be every 3 years or, as a minimum, 6 to 9 months prior to any board action that may affect you. Appointments to review your official file must be made 72 hours in advance by calling AUTOVON 221-9619/9618 or commercial 202-325-9619/9618 or writing: Commander, USAMILPERCEN, ATTN: DAPC-PSR-SR, 200 Stovall Street, Alexandria VA 22332.

An alternative to a trip to Washington to review your official file is available. Official files are being converted to microfiche. You can request a copy of your file by writing to the same address that makes appointments. If you write, be sure to include your full name and SSAN in the request. The first fiche will cost $2.00 and each additional sheet will cost $.05.

C&GSC Selection Procedures. The Command and General Staff College selection process began with a listing of officers eligible, regardless of availability, to attend the academic year [AY] 1978-79. Next, a Department of the Army screening board was convened by DCSPER to review the records of all officers independently, except last year's eligibles year group [YG 63 and 64], and to prepare a nomination list. The Major AUS Promotion Board designated an additional lists of C&GSC nominees. This list is merged with the screeing board nomination list and the consolidated nomination list was then presented to the Department of the Army Selection Board. In addition, the records of all last year eligibles [YG 63 and 64] were forwarded directly to the selection board. The selection board prepared a selected and alternate list, by order of merit, in accordance with the letter of instruction from DCSPER. Following approval of the Selection Board report by the DCSPER, the approved list was forwarded to Commander, MILPERCEN, for school assignment and for release to all commands and the public news media.

Officers selected, except those in their last year of eligibility, who have not completed the minimum time on station required by DA stabilization policies were deferred. Officers were also deferred for exceptional reasons. Those deferred for any reason will be scheduled to attend C&GSC during the next academic year provided they meet stability criteria and are revalidated by the next year's selection board. The board will review the records of each deferee solely to determine whether there has been any material change since selection.

As a one-time exception to policy, school year group 1963 was granted an additional year of eligibility. This changes total years AFCS to 16 for the AY 78-79 Selection System.

MAJOR DIVISION

Civil Schooling. Civil schooling for an advanced degree is a topic that frequently surfaces during officer interviews. Officers considering civil schooling should take a hard look at its ramifications on their career development. The majority of the civil schooling programs require immediate utilization. This often causes a conflict between the officer's professional development needs and his requirement to be employed in the discipline studied.

Under the provisions of AR 621-1, three programs available are: degree completion program [DCP], advanced degree program for ROTC instructor duty [ADPRID], and advanced civil schooling [ACS]. Each requires utilization after achieving the degree. DCP and ACS each require a 3-year Army Education Review Board [AERB] utilization, which is normally served

immediately following the schooling. ADPRID offers 2 years of study followed by 3 years of ROTC duty. Majors should consider these years of utilization and schooling in relation to their career development prior to applying. Professional Development, Majors Division, is available to assist you when considering an application.

Organizational Effectiveness. Organizational effectiveness [OE] is the systematic military application of selected management and behavioral science skills and methods to improve how the total organization functions to accomplish assigned missions and increase combat readiness. An organizational effectiveness staff officer [OESO] is a commissioned officer or civilian employee, qualified by approved training or the Army alternate qualification procedure, and appropriately designated with the additional skill identifier [ASI] 5Z. The US Army Organizational Effectiveness Training Center [USAOETC], Fort Ord, California, provides a 16-week OESO course, which qualifies officers for the ASI 5Z. There are two methods for attendance at the course:

- TDY Enroute to a PCS. Officers are nominated by Majors Division, based on a validated requirement, to the MILPERCEN OE Selection Board. Funding is a responsibility of DA.
- TDY and Return to a Parent Unit. Officers are selected by the appropriate commander after obtaining clearance from Majors Division. This clearance implies that the officer will be stabilized at the parent installation for a minimum of 12 months following graduation from OETC.

Selection Criteria.

- Grade of Captain, Major, or LTC.
- Assigned, or projected assignment, to an authorized OESO position.
- A graduate of an officer advanced course.
- A BA level college degree.
- Promotion potential to the next grade.
- Troop experience at platoon, company, or higher.
- A volunteer is desired but not required.

COMPANY GRADE

RA Integration Board. A Regular Army Integration Board will be convened in March 1978. Interested applicants should familiarize themselves with AR 601-100 and DA Circular 601-64 for details. Applications must be received by MILPERCEN no later than 27 January 1978. In-service officers must have completed 2 years active Federal commissioned service by the convening date of the board and 3 years at the time of appointment. Commisioned officers who previously have applied for RA appointments and were not selected may reapply for consideration by another RA selection board that convenes not earlier than 1 year from the date of the board that considered his previous application.

Alternate Speciality Designation. The alternate specialty designation process for basic year group 1971 was begun in October. Each officer in this year group should have received a specialty packet during October explaining the procedures and citing appropriate references that should have been reviewed for those alternate specialties available for the Field Artillery Officer.

In the packet was a specialty preference form to be completed with the four specialties desired by the officer. These must be returned to MILPERCEN no later then January 1978. This is important to the designation process. All officers will be notified of their alternate specialty by April 1978. If you have not received your specialty packet, write or call MAJ Richard F. Timmons, 200 Stoval Street, ATTN: DAPC-OPE-P, Alexandria, VA 22332, AUTOVON 221-7818/7819.

Service Obligations. Military personnel with promotion and/or service obligations should be advised that except for fully defined hardship or compassionate circumstances they can expect to complete such obligations prior to separation/retirement, are outlined in AR 635-100, AR 635-120, and DA message DAPE-MPC-C, 032158Z May 76.

Department of the Army policy has continuously required individuals to complete periods of obligated service prior to separation. However, during the recent periods of force reduction, a liberal waiver policy was used. The relative stabilization of the Army end strength no longer requires this liberal waiver policy. Compassionate or hardship circumstances must be fully defined and documented establishing that the circumstances did not exist when the obligation was incurred and will be clearly assisted by the service member's release.

Students Attending ADAOAC 78-1. The Air Defense Artillery Officer Advanced Course, Class 78-1, has been selected to test a procedure that will provide early information to students on their post-graduation assignments. Air Defense Artillery Branch plans to provide this assignment information to most students prior to their arrival at the advanced course.

The test will project and establish officer requirements prior to normal requisition cycles. To allow for unanticipated requirements, a reserve pool of students will be established. Officers in this pool will not receive advanced assignment information by specific command and location prior to departure for the advanced course.

You should be aware of the increased importance of the Officer Preference Statement. Under the test, the tentative assignment will be made without benefit of the face-to-face exchange

with an assignment officcer normally associated with post-advanced course assignment. The preference statement will play a critical role in the assignment process. Send your completed DA Form 483 to Commander, MILPERCEN, ATTN: DAPC-OPE-A, 200 Stoval Street, Alexandria, VA 22332.

Airborne and Ranger Training. Effective 1 October 1977, airborne training is available only to those officers on assignment to airborne units and as voluntary precommissioning training for USMA and ROTC cadets. As an exception to this policy, USMA and ROTC cadets in classes 1977, 1978, and 1979, and graduates of OCS classes through FY 78, will continue to be eligible for airborne training after commissioning regardless of anticipated assignment.

Ranger training will be available only for officers commissioned in Air Defense Artillery, Armor, Field Artillery, Infantry, Engineer, and Signal Corps Branches who are eligible for assignment to Category I units or scheduled for Ranger assignments.

WARRANT OFFICERS

Professional Development. A new edition of the warrant officer's career planning guide has been issued. It is DA Pamphlet 600-11, dated 7 July 1977. Special arrangements have been made with each MILPO to furnish a copy to each warrant officer served by that MILPO [see HQDA message 251105Z Apr 77 from DAPC-OPP-S]. The effective date of the pamphlet will be 1 April 1978. Individulas who have not received their copy by 31 December 1977 should contact their MILPO to acquire one so they can familiarize themselves with the forthcoming changes affecting their MOS.

Managed Tenure Program [MTP]. The MTP is the system by which HQ DA selects nonregular warrant officers for retention on active duty for periods past their 20th year of active Federal service [AFS]. In the absence of such selection, nonregulars must be released from active duty upon completing 20 years AFS. Impacting upon the MTP is the continuing growth of the Regular Army warrant officer corps. At its current rate of growth, the Regulary Army will provide fill for all of the Army's "over 20" vacancies in the foreseeable future. Consequently, HQDA is currently studying a proposal to abolish the MTP and rely on the Regular Army as the only means for warrant officer retention beyond 20 years AFS. A specific feature of the proposal envisions the creation of an "RA decision point" for warrant officers, similar to the career decision point outlined in DOPMA for commissioned officers. For warrant officers, the proposition is that individuals must accept a tendered appointment in the Regular Army no later than their 15th year of AFS or their completion of OBV [whichever is later] or be mandatorily released from active duty upon completing 20 years AFS. Individuals would still be able to apply for an RA appointment up to their 14th year of AFS or 2d-year of OBV [whichever is later] but, at those points in time, all nonregulars would be considered by the HQDA Regular Army Selection Board. Those selected by the board would be tendered an RA appointment to be consummated no later than the decision point; i.e., the later date of either their 15th year of AFS or completion of OBV. Individuals in OBV status who are not selected or who decline appointment would still have the option of applying for a Volunteer Indefinite service agreement that would cover the period between OBV expiration and their 20th year AFS. These proposals are still under study. Meanwhile, HQDA is making arrangements to convene what may be its last MTP board. The board has been tentatively scheduled to meet 29 November 1977 to consider for retention all nonregular warrant officers whose current release date [i.e., completion of their 20th, 23d, or 26th year AFS] falls in fiscal year 1980. Announcement of the board and rosters of personnel in the zone of consideration will be provided by DA Circular 135-10, which is now pending publication.

Warrant Officer Senior Course [WOSC]. HQDA has scheduled the next WOSC Selection Board to meet 29 November 1977. It will select students to attend in 1979. Operation of the selection system is described in DA Circular 351-75 dated 22 August 1977. Preparation of the rosters of warrant officers eligible for consideration is currently in progress. All eligible personnel will be considered by the board. In addition, all previously selected warrant officers whose attendance was deferred will be reviewed by the board to validate their selection status. It is anticipated that selection results will be published in January 1978.

Appointment Vacancies Announced. Watch for two new circulars that will soon be distributed to the field. DA Circular 601-73 outlines the FY 78 warrant officer procurement program, lists the MOS in which vacancies are anticipated, and gives procedural guidance for submitting applications for initial appointment and/or call to active duty. Potential WO applicants and their counselors will find this circular a compendium of useful information. For warrant officers now on active duty, DA Circular 601-72 outlines the Regular Army WO accession program for FY 78 and lists the MOS that are open to applicants seeking integration into the Regular Army. In view of the pending abolition of the Managed Tenure Program, all nonregular warrant officers who contemplate filing an application for RA appointment should consult this circular.

COMBINED ARMS CORNER

NEW SQUAD AUTOMATIC WEAPON

A new automatic prototype weapon for infantrymen is being developed called the XM235 squad automatic weapon [SAW]. The SAW is being developed to meet the need for a new, lightweight, one-man automatic weapon that is capable of delivering automatic, accurate, and sustained fire at long ranges.

The new weapon is expected to be one-half the weight and costs about one-half as much as the current US Army standard M60 weapon [the SAW weighs less than 20 pounds, complete with 200 rounds of ammunition] and has 40 percent fewer parts. The XM 235 will replace the M16A1 in the automatic fire mission and may replace one or more M60 machineguns in the infantry rifle platoon.

The Army Armament Materiel Readiness Command has already contracted for the production of an XM235 prototype designed with metric measurements.

FIVE-MAN TANK CREW

One of the most significant of the 83 recommendations of the Army Tank Forces Management Study Group was a recommendation to beef up tank crews by adding a fifth crew member. Consequently a fifth man will be added to existing tank crews and will be trained as a totally integrated crew member.

During FY 78, additional tankers will be assigned to selected units in Europe and FORSCOM for an evaluation of the new program. The extra man will be trained in all aspects of the tank to which he is assigned. Training will take place on a rotating basis to foster proficiency in such functions as gunnery, communications, driving, and commanding.

DA planners believe the program will increase tank crew efficiency. Operationally, the extra crew member will be able to perform in any position, filling in for another when a crew member is absent. In wartime, if a member of the crew is wounded or otherwise taken out of action, there will be a man standing by to replace him. A major advantage of the program is that the additional crew member will have trained with the unit and will not require "break-in" time when replacing a loss or casualty.

ALLIED TRAINING

Interoperability training will be an integral part of Exercise REFORGER 77 for 1,500 troops of the 1st Infantry Division, the BIG RED ONE. During the second half of the Exercise, selected personnel from the 1st Bn, 28th Inf.; 4th Bn, 63d Armor; 1st Bn, 7th FA; 1st Bn, 2d Inf.; HHC 2d Bde; the 1st MI Bn; and the 121st Signal Bn will move in lock, stock, and barrel with German Bundeswehr units.

Canadian and British forces also will host soldiers from most of the same units, while members of the 1st Eng Bn will team up with French organizations.

During the exchange, American soldiers will eat, sleep, socialize, and train with the host unit, experiencing the same conditions as the Allied troops.

BIG RED ONE troops will also have an opportunity to complete a tough physical training test, a swimming evaluation, and a forced road march to qualify for a German sports medal.

Interoperability training was developed by USAREUR to improve the working relationship between American soldiers and troops of the NATO alliance by promoting understanding of each other's living and working conditions.

NEW MORTAR FOR INFANTRYMEN

Infantrymen who have wrestled with the baseplate or carried the tube of the 81-mm mortar will welcome the Army's 60-mm lightweight company mortar system [LWCMS]. The new infantry weapon system will be added to the inventory of field units in Fiscal Year 1980.

The LWCMS replaces the 81-mm mortar in light infantry, airborne, and airmobile units. The new mortar and ammunition weights are: pounds new ammunition—3.75 pounds per round].

Basic components of the new 60-mm mortar include the tube, mount, baseplate, a small auxiliary baseplate, an indirect fire sight, and a combination carrying handle and elevation indicator.

The mortar can be fired in a conventional mount-supported mode or a hand-held mode. The required to connect one bay to another and can be either of the modes. It has a maximum effective range of 3,500 meters.

One of the most desirable features of the new mortar—45 pounds, ammunition—3.75 pounds per developmental breakthrough in low-cost electronic fuzing for mortars. It provides a single fuze with four options: proximity, near-surface burst, impact, and delayed bursting. The new fuze may be set by hand, and the setting on the fuze can be changed from one burst option to another. The new fuze will eliminate seven different fuzes from the inventory.

Lightweight aiming stakes and a new plotting board, designated M19, have been developed for use with the LWCMS. The whole system can be easily transported by two men, or by one man for short distances.

OXYGEN GENERATOR

How do you make oxygen from air at 23,000 feet? The US Army Aeromedical Research Laboratory [USAARL] at Fort Rucker has the answer according to aviation medical staffers.

AMSOG [Army Molecular Sieve Oxygen Generator] is being developed for use in Army aircraft by the Aviation Medicine Research Division of USAARL.

The Director of the Aviation Medicine Research Division calls the AMSOG development a major breakthrough in providing oxygen to aircrews under the limitations of weight, space, and power available in Army aircraft. The AMSOG has been installed in a U-21 aircraft for testing. It is the only operational system being evaluated under actual flight conditions in civil and military aviation today.

The AMSOG uses a device called a molecular sieve that absorbs nitrogen from air. Air has essentially 80 percent nitrogen and 20 percent oxygen. In operation of the AMSOG, a flow of air is forced across the molecular sieve. The device removes the nitrogen, providing the oxygen for breathing at high altitude.

A wide range of applications for the AMSOG in support of missions ranging from combat aviation and aeromedical evacuation to the emergency supplying of oxygen to tactical medical units and Army hospitals is being investigated.

Also mentioned is the possible use of AMSOG in the future Army aeromedical evacuation helicopter, the Blackhawk, formerly know as UTTAS. With the addition of the AMSOG to its specialized medical care equipment, the Blackhawk could provide advanced aeromedical care to the combat soldier.

RESERVE COMPONENT TESTS

Department of the Army has begun two tests to improve the readiness levels of National Guard and Reserve units. The test programs are a result of a House Armed Services Committee Report, which stated that the overall readiness of Reserve Component units could be increased with additional full-time manning.

Objectives of the test programs are to:

■ Determine the possibility of a "Training Assistant" and a "Training Readiness Noncommissioned Officer" program in Reserve Component units to improve training.

■ Evaluate the impact of tested units on the overall readiness and deployment/employment status.

■ Compare the training readiness status of the tested units against similar units not in the testing program.

■ Compare the recruiting and retention for tested units against similar units not in the testing program.

■ Determine the full-time training readiness strength level that provides the best unit response.

The tests began 1 October 1977 and are expected to continue for 2 years. Because of currently imposed funding limitations, the test program will involve only 100 Reserve Component "high-priority" battalions and company-size units in the following categories: early deploying, early employing, late deploying, and those units needed early. In accordance with the initial plan, testing will be concentrated on the early deploying category.

THE RIBBON BRIDGE

After 7 years of prototype fabrication and testing, initial production of the Ribbon Bridge was accomplished. The 814th Engineer Company, 559th Engineer Battalion in Hanan, Germany, was issued the first Ribbon Bridge for intensive testing.

The Ribbon Bridge was developed in response to the realization that, with the introduction of the PMP bridge, the Soviet Union and other Soviet Bloc countries had tactical bridging capabilities that far exceeded those of the United States in terms of deployment time. The M4T6, mainstay of US bridging equipment, was slow and cumbersome to erect. Since it took over 6 hours to erect a 120-meter bridge, the element of surprise was virtually eliminated and the bridge was vulnerable to enemy fire. The PMP, on the other hand, could be erected at rates of up to 6 meters per minute, allowing a bridge to be built before opposition could be mounted. This capability was subsequently demonstrated by the Egyptians in the Mideast War of 1973.

The American Mobile Assault Bridge could compete with the PMP in terms of erection speed but due to its high cost it could be used only in limited quantities to provide assault capabilities. The Ribbon Bridge was developed by the US Army Mobility Equipment Research and Development Command [MERADCOM], Fort Belvoir, Virginia, and, not surprisingly, it looks and works almost exactly like the PMP. The principle difference is that while the PMP is a steel bridge, the Ribbon Bridge is made of aluminum to save weight and permit a 5-ton truck to transport it. The main advantage of the ribbon-type bridge is that it is essentially preassembled and each 6.7-meter long module or bay is transported on a modified M812 5-ton truck chassis, which can automatically launch a bay in less than 1 minute in most conditions. A minimum of manpower is required to connect one bay to another and can be accomplished in about 1 minute.

After the bay, which is transported in the folded condition, is launched, a bridge erection boat ties up to the bay and moves it to the bridge center line where it is connected to other bays to form a bridge. Another means of erection includes constructing a series of rafts and then connecting them together to form a bridge along one shore and swinging the whole bridge into position. Erection rates of from 3 to 6 meters per minute are possible, depending on conditions and the method of assembly. The end or ramp bays are equipped with hydraulic cylinders that allow the tip of the ramp to be raised about 1.3 meters above the water line to adjust to various bank conditions. The bridge bays can also be connected into rafts for ferrying material across the water. A bridge or raft can be disassembled almost as quickly as it is assembled since the transporter virtually self-loads a bridge bay in 2 or 3 minutes. A complete bridge can carry a 60-ton load in currents up to 2.5 meters per second and a five-bay raft can carry up to 75 tons in similar currents. Due to its streamlined shape, little anchorage is required and, normally, end anchorage or bridge erection boats are sufficient to maintain bridge alinement.

A special cradle was developed to permit the bridge transporter to carry, launch, and retrieve the bridge erection boat without the use of cranes. The boat can be launched in 1 minute and retrieved in 5 minutes or less. A pallet was also developed to allow the transporter to haul cargo when it is not carrying bridge bays or boats. The pallet can be launched and retrieved while loaded with cargo.

The Ribbon Bridge has been subjected to a grueling 7 months of intensive use by American and German troops under a wide range of conditions. The response of the troops using the bridge was generally very favorable. This bridge, like any other, has its defects, mainly related to retrieval in swift currents and adapting the ramp section to varying shore conditions. The advantages far outweigh the defects, however, and the Ribbon Bridge will provide the US Army, and possibly other armies, with the capability to bridge rivers in a fraction of the time it now takes. By any definition, the Ribbon Bridge is a giant step forward in the field of river-crossing equipment.

-The Engineer

AMMUNITION CONTROL

On 1 October 1977 the Army became the single manager for conventional ammunition in the Continental United States. The army assumed management of naval ammunition depots at Hawthorne, Nevada, and McAlester, Oklahoma, and has established a single manager activity at the Naval Weapons Support Center, Crane Indiana.

The single manager mission as defined in DOD Directive 5160.65 is to eliminate overlap and duplication in procuring and producing ammunition items accepted by the services. The mission has been assigned to the Army Armament Material Readiness Command, Rock Island, Illinois.

As single manager, the Army will serve as wholesale manager for inventory, maintenance, renovation, demilitarization, and disposal of assigned ammunition items.

-Field Arty Journal

DEVELOPMENTS

MARINE CORPS BACKPACK RADIO

The US Marine Corps' single-sideband [SSB] backpack AN/PRC-104 [nucleus of a new family of high frequency radio sets] is in full production after successfully completing extensive environmental, laboratory, and field tests conducted on prototypes by the manufacturer, the Marines, US Air Force, and Naval Electronics Laboratory Center. Several thousand radios in varying configurations are being built under a US Naval Electronic Systems Command contract. The bulk of the equipment is scheduled for the Marine Corps; however, considerable quantities are earmarked for the US Navy and Air Force, and for Sweden's national defense forces. The US Army is conducting separate tests of the equipment as a possible replacement for the larger and heavier AN/PRC-74.

The first all solid-state HF SSB backpack radio set was put into production in 1964 and standardized as the AN/PRC-74. It was widely used by the US Army in Vietnam. More than 5,000 PRC-74s have been built for the Army and Allied forces. The new PRC-104 is about a third the size of the original radio, and weighs less than half as much. It is 12½ inches wide, 10½ inches high, and 2 inches thick [31.75 x 26.67 x 6.665 cm], and weighs 14 pounds [6.4kg], including battery. This newest generation radio set is virtually automatic, and is described as almost a "hands-free" transceiver. The operator simply turns on the power, selects a frequency, and hits the press-to-talk switch. The antenna is tuned and the transmitter comes up to full power automatically. These electronically performed actions are almost noiseless, an advantage for patrols operating near or behind enemy lines.

The PRC-104's 280,000 channels range from 2 to 29.9999 MHz in 100 Hz steps. It has a 20-watt power output, compared with the PRC-74's 16,000 channels from 2 to 18 MHz in KHz steps and 15-watt power output. The 100 Hz increments and dual sideband selector make the set compatible with the frequency allocations of any high frequency single-sideband transmitter worldwide.

During its development phase, the contractor employed advanced circuit design and microminiaturized solid state devices to achieve high performance, reliability, and ruggedness in an extremely small package.

XV-15 TILT ROTO AIRCRAFT

Bell Helicopter Textron of Fort Worth, Texas is working under a joint contract with NASA and the US Army to design, manufacture, and test two VTOL tilt-rotor research aircraft. The tilt-rotor is expected to combine the best features of helicopters and conventional airplanes for fast point-to-point transportation.

Under current testing is the first of two XV-15s. The XV-15 looks like a conventional twin-engine turboprop airplane with the exception that the engine nacelles and rotors are mounted at the wing tips. The nacelles tilt from a vertical position for take off and landing and to a horizontal position for forward flight. The rotors are 25 feet in diameter providing efficient thrust in both hover and forward flight.

With the nacelles vertical in the helicopter mode, the aircraft's handling qualities are similar to a tandem rotor helicopter. Control is accomplished like a conventional helicopter and no auxiliary devices are required. The downwash velocity, maneuver capability, and hover endurance are equivalent to those of a helicopter.

With the nacelles in the airplane mode, the speed and range of the aircraft are more than double that of conventional helicopters. Complete conversion or reconversion can be accomplished in 12 seconds.

Test results to date of the XV-15 are all positive and testing is expected to continue through 1978.

NEW TOW VEHICLE

The Tank-Automotive Research and Development Command [TARADCOM] is awaiting delivery of a new vehicle for the TOW antitank missile system. The vehicle, called the Improved TOW Vehicle [ITV], is basically a Mll3Al armored personnel carrier [APC] that has been modified to carry an armored cupola or weapon station. The ITV is designed to provide increased mobility and improved armor protection for the TOW and its crew.

When the TOW was first introduced, it was vulnerable to attack because it had to be launched from a stationary land-based tripod. Later systems involved placing the TOW on a pedestal mounted in an M113 APC. This arrangement gave the weapon mobility but offered no protection to the gunner who was exposed from the waist up while firing.

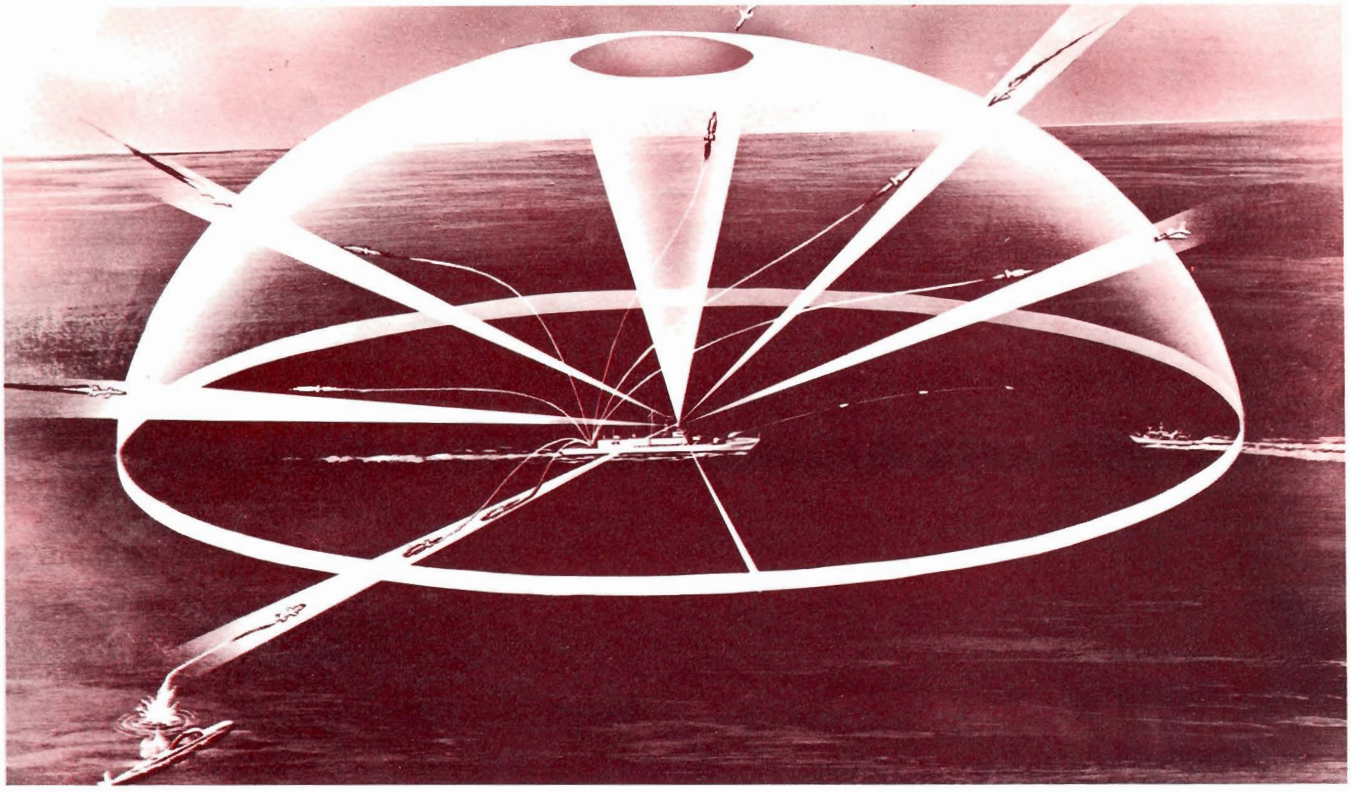
With the vehicle under development, a large pod containing two TOW launchers, a day sight, a night sight, and a target acquisition sight is attached to the base of the cupola by lifting arms. When not in use, the pod rests on the rear deck of the vehicle. The new version allows the gunner to fire the TOW from inside, protected by the armor of the vehicle.

The entire cupola is equipped with hand-operated power controls that allow the gunner to raise and lower the pod and rotate the cupola a full 360 degrees. In addition, the gunner has an optical system of lenses and prisms that lets him look into the pod-mounted TOW sights. The gunner simply looks into the TOW sights, aims at a target, launches a missile, and guides it to the target.

The Army will take delivery of 10 initial production vehicles by August this year. These vehicles will be tested at White Sands Missile Range, New Mexico, and Fort Hood, Texas.

If the test results are good, the Army will decide this December whether the contractor should produce additional ITVs for delivery to the troops begining late in 1978.

NEW NAVY RADAR



The above artist's conception [not to scale] illustrates how a new Navy radar system can defend ships against attacks from all altitudes. A Flexible Adaptive Radar [Flexar] weapon control system, designed to provide warships with the high firepower needed for defense against aircraft, cruise-type missiles, and surface targets, is under development for the US Navy. Flexar will automatically track multiple air and surface targets in three dimensions anywhere in a ship's hemisphere and will simultaneously control multiple engagements with ships, guns, and missiles. It can search in critical reaction regions such as the horizon and zenith to complement long-range surveillance radars. The lightweight system generates pencil beams and realtime adaptive waveforms throughout the hemisphere for accurate multiple-target, track-while-scan weapon control. An advance prototype of Flexar will be built and demonstrated under a recently awarded contract from the Naval Sea Systems Command. Concept demonstration is expected to begin in late 1979.

JAM-RESISTANT TERMINAL

A jam-resistant radio terminal for a flying surveillance command and control center has been delivered by Hughes Ground Systems Group [GSG] to the Boeing Company in Seattle. The terminal will permit the exchange of secure real-time information over a single network on a time-ordered basis.

This Time Division Multiple Access [TDMA] terminal was developed in the Systems Division of GSG and is the first to be built for the US Air Force's E-3A airborne warning and control system [AWACS] aircraft.

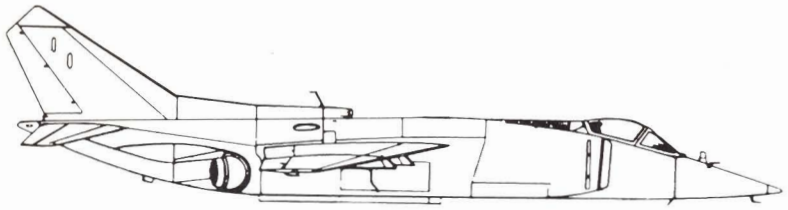
Under the contract, GSG will build 11 TDMA radios as the initial equipment of a new communications system called the Joint Tactical Information Distribution System [JTIDS].

The TDMA terminals, designated AN/ARC-181, will provide a continuous communications exchange resulting in an information pool constantly updated by participants' contributions and which is available to all members of the network.

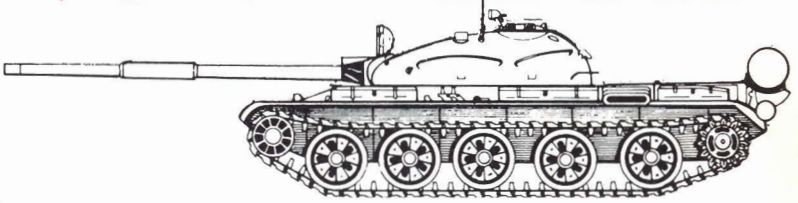
Because TDMA uses the time spectrum in addition to the frequency spectrum, it permits the transmission of more data with more jam protection than conventional systems.

Each of the TDMA terminals consists of a communications processor, signal processor, transmitter, receiver, high-power amplifier, and control and display panel.

JTIDS eventually will be used to exchange communications and relative navigation information among tactical aircraft, fighting ships, and command centers, with varying-size versions planned for missile and manpack applications.



INTELLIGENCEWATCH



US TOW TO BRITAIN

Britain's Ministry of Defense has chosen the TOW antitank missile system for its Lynx helicopter, making the United Kingdom the second NATO nation to buy the airborne, tube-launched, optically-tracked, wire-guided [TOW] system.

Ten other NATO nations have bought the infantry version of TOW. In fact, TOW has been deployed with the air and ground forces of more than 20 nations.

The Ministry of Defense said that competing with the US TOW system was the Franco-German HOT. Operationally, either weapon would meet Britain's requirements, but the TOW system was selected because it is cheaper both overall and in foreign exchang costs.

Helicopter-borne TOW is a proven weapon system and it should be in service with the British Army in the early 1980s.

USSR NIGHT TRAINING

The Soviet Army has always attached great importance to preparing its troops to fight effectively in combat under cover of darkness. Recently, this type of training has been intensified. Probably some of the reasons for this increased emphasis are a consideration of the climatic conditions that would prevail in probable areas of future conflict and because saboteur and commando operations can be carried out better in potential enemy rear areas during darkness.

Soviet soldiers are being supplied with new and sophisticated equipment for night operations. Armored and motorized units have infrared devices for seeing in the dark, and an efficient communications network [including the use of communications satellites] allows units to remain in constant touch with each other. Both optical and electronic devices are used for the identification of enemy positions at night.

The ability of the Soviet soldier to perform his individual tasks effectively and to consider darkness as a definite assist in combat is being stressed in the new Soviet Army training program.

THE CHARIOT

An unusual main battle tank is under development in Israel. Called the Chariot, the new tank is reported to cost half as much as the British Chieftan and less than the proposed new generation of US and German main battle tanks.

In addition to its crew, the tank will transport 10 soldiers. Since the engine is in the front end of the vehicle, the 10 soldiers can depart the tank from an opening in the rear, adding a degree of safety under battle conditions.

Designed with a low silhouette, the Chariot weighs about 56 tons and is equipped with a 105-mm cannon. It is expected that the new tank will double as a personnel carrier in the field. The US is assisting Israel in the development of the Chariot.

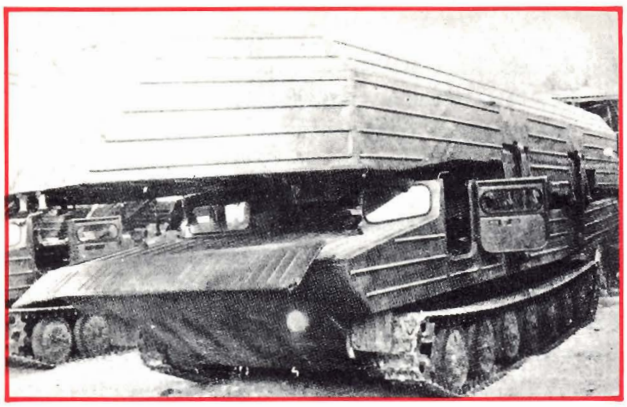
NEW RUSSIAN AIRCRAFT

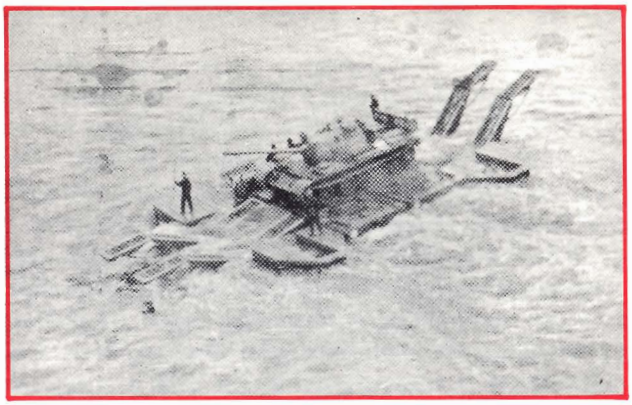
The USSR is reportedly developing three new combat-type aircraft consisting of a fighter, a close air support aircraft, and a long-range bomber. All three are believed to be in the prototype stage.

The fighter being considered has possibly been tagged the MiG-29 and is expected to eventually replace the older MiG-21 Fishbed. The new aircraft will probably be used in an intercept role against low-flying, attack-type aircraft and cruise missiles. The MiG-29 is a single seater with dual engines and a wing configuration similar to the F-15.

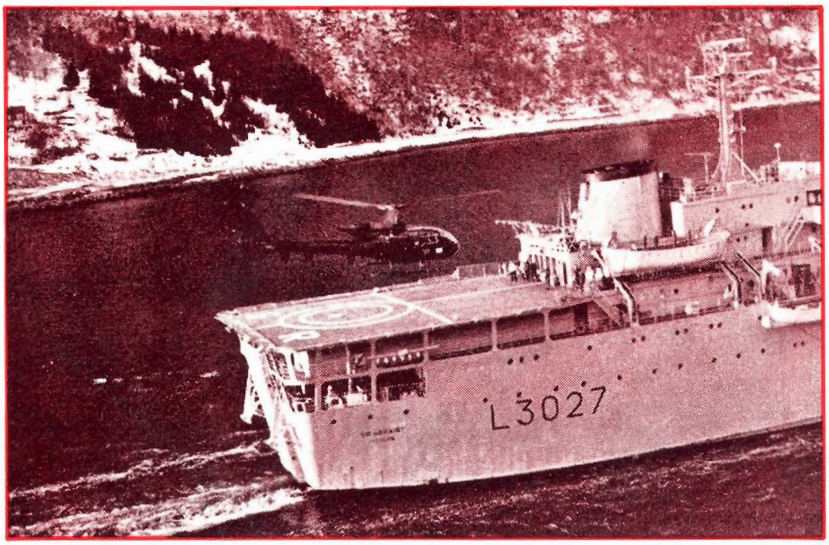
The close air support [CAS] prototype is being referred to as the T-58. This aircraft will be capable of carrying a sizable load of ordnance that will include conventional bombs as well as a series of air-to-surface missiles of the AS-8, AS-9, AS-10 type. The aircraft is in the design stage and may be built by the same company that produced the SU-15 Flagon.

A supersonic long-range bomber is also under consideration. This bomber is expected to be of the TU-144 Concordski class with a range similar to the Backfire.

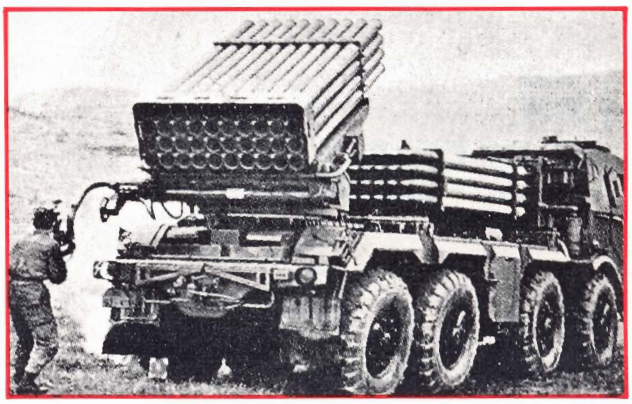




The pictures above show a before and after launch of the Russian GSP heavy ferry. With their capability of ferrying tanks over water, the GSP ferry units are likely to be in the forefront of an assault. Of such distinctive appearance as vehicles, they present little problem identification, especially when it is appreciated that two such vehicles as seen above left transform into a craft as shown on the right.



A British Army Air Corps Gazelle lands on the deck of the Norweigan logistic landing ship RFA Sir Geraint new Vlvek in Norway during Exercise Hardfall, where Gazelles were used for the first time in Arctic exercises.



A series of free rocket over ground [FROG] missiles and their carriers are in the Russian Army inventory. Pictures here show a BM-21 standard artillery rocket launcher of the Warsaw Pact armies that is widely exported. The 122-mm rockets are fired from 40 cell launchers mounted on a URAL-375 6 by 6 truck. Czechoslovakia has the launcher mounted on a Tatia 813 8 by 8 vehicle with reload carried.

The joint Services Recognition Journal, London, is credited for above material.

LASER FIRE CONTROL FOR LEOPARD

The Federal Republic of Germany has selected Krupp Atlas-Electronik, Bremen, Germany, to provide the latest tank fire control system for its production version of the Leopard 2 tank. The system will be manufactured in Germany under a US company license.

The tank fire control system controls the angular difference between the gun line and sight line by processing information such as range, meteorological conditions, and tracking rate. The addition of a laser range finder and a stabilized sight to the tank fire control system will enable a gunner to direct the firing of the main gun more accurately and more rapidly.

The American drawings will be furnished the Germans who will convert them to German standards. Although it will be an entirely German-produced system, the US contractor will give technical support.

The Leopard 2 tank fire control system consists of a laser range finder, a stabilized sight, a periscope/telescope, computer, meteorological and a provision for thermal night vision. The first order is for 1,800 systems, with deliveries scheduled from 1979 through 1981.

AIR DEFENSE

Book Review

The Last European War. John Lukacs. Anchor Press-Doubleday, 562 pages indexed; $15.00

"The Last European War" is a useful chronicle of the first 2 years of the Second World War. The author debunks many of the myths, military and political, that still fog the history of that war. The book causes the reader to relive some of the exciting events of World War II as well as revealing some of the puzzling and mysterious coverups concerning this world war.

The Last European War began when German Panzer Divisions slashed into Poland on 1 September 1939. It ended when the Imperial Japanese Navy attacked the United States Fleet at Pearl Harbor on 7 December 1941. On that infamous Sunday morning, the Last European War became World War II. John Lukacs has written an informative, insightful and yet highly unorthodox history of the military and human adventures of that time. Lukacs goes behind the facades of the prominent personalities and presents us with human beings, who avariciously pursue power, glory and, in some cases, dignity. Through diligent documentation Lukacs has come up with some eye-opening conclusions. A must reading for historians.

Monitoring Underground Nuclear Explosions. *Ola Dahlmon and Hans Israelson. Elsevier Scientific Publishing, 440 pages; $49.00*

The achievement of a comprehensive ban on all nuclear weapons testing is one of the key issues in today's arms control negotiations. In this new book, the authors present a complete summary of all the arguments put forward on this issue, reviewing both the technical capabilities and the political requirements of monitoring a comprehensive test-ban treaty.

They start with a survey of the background to the test-ban negotiations and include a short historical review and presentation of the positions currently adopted by some of the parties to the negotiations. The military, technical, and political significance of conducting tests, and the testing activity undertaken by different countries are considered. Comprehensive discussion is given to various seismological methods and the capabilities of detecting, locating and identifying underground nuclear explosions. In addition, the estimated yields of explosions conducted during 1963 to 1976 are recorded.

Because the use of nuclear explosions for peaceful purposes is an important aspect of the problem, such projects carried out so far, as well as their future prospects, are discussed. Lastly, the authors suggest a monitoring system for a comprehensive test-ban treaty consisting of a seismic station network, a communication system, and an international center for data analysis and assessment.

Throughout the book, much attention is given to international cooperation, with particular regard to the exchange of data acquired at various stations. For the benefit of readers who are unfamiliar with elementary seismology, the authors give a brief summary of the fundamental concepts and definitions of earthquakes and seismic waves generated by earthquakes and explosions. An interesting, informative, and up-to-date analysis of a current world problem.

Conscription: *A select and annotated bibliography by Martin Anderson and published by the Hoover Institution Press, 453 pages, hardback $15.00.*

This book is a comprehensive, up-to-date guide to the literature of military conscription. It contains 1,385 annotated entries. The book is indispensable to all those concerned with the ongoing study of how to raise an armed force in a free society. It treats the debatable question of military conscription in much detail.

The public policy issue of how to man the armed forces of the United States in the years ahead is almost certain to be controversial and prolonged. After more than two decades of relying on the draft, the United States switched to an all-volunteer force in 1977. Today it's working, but what about the future? Some leaders suggest the establishment of a universal national service for all young men and women.

This book will be essential to those who will participate in that debate. Within Conscription there are seventeen chapters, each representing a major subject area. The book is easy to read and for the readers' convenience contains a detailed table of contents and an index of authors, as well as an index of titles.

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