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AIR DEFENSE ARTILLERY

JULY-AUGUST 1990

ADA in Panama . . . Page 4

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JULY-AUGUST 1990

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Cover art by Frank Hermoso, Fort Ord artist

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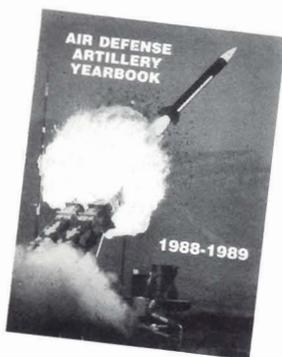
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By vote of the general membership at a meeting conducted the first night of the 1990 ADA Commanders Conference, the association will now have an association president and a council headed by an executive director. The president will be a senior retired ADA officer, and the executive director will run the day-to-day business.

I am proud to announce that Lt. Gen.(Ret.) Richard T. Cassidy has agreed to serve as our association president. Gen. Cassidy is one of the great soldiers of our branch. He served in the Southwest Pacific in WWII and commanded at battalion, region and brigade levels. He was commanding general, USAAD-ACEN from 1968 to 1971 and U.S. Army Air Defense Command until he retired in 1973. His awards include the Distinguished Service Medal, Legion of Merit, Bronze Star and Army Commendation Medal.

This year the Association council consists of myself as executive director, Col. Joseph Garrett (Commander, 11th ADA Brigade), Col. Roy Tate (Commander, 56th ADA Brigade), Col.(Ret.) Mike DiGen-

naro, Lt. Col. Terry Tipton (Commander, 2-6th ADA), Maj. Mike Wilson (NMARNG), CWO 4 (Ret.) Sam Pignatella, CSM William Doctor (11th ADA Brigade), CSM(D) Charles Coon (USAADASCH) and SGM(Ret.) Thomas Barrett.

As of this date, we have processed over 40 awards for our Most Outstanding ADA Soldier in the battalion award. We are also beginning an ADA Association Best Battery Award. This battery will be selected annually by each battalion commander based upon his criteria and a requirement that at least 25 percent of the unit be members of the ADA Association.

It has been another great year. We look forward to FY 91 being a super year for our Association.

First to Fire!

V. J. Tedesco Jr.
COL, AD
Executive Director,
ADA Association

THE WINNING COMBINATION



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Working Side By Side With Air Defense Professionals To Solve ADA Problems

THE #1 SDB HIGH TECHNOLOGY FIRM IN THE UNITED STATES

A CLEAR PATH IN AIR DEFENSE

In striving to modernize air defense capabilities, during this time of decreasing defense budgets, a clear path exists.

High-performance, cost-effective defense systems are a specialty at Hughes Aircraft Company. For the Royal Norwegian Air Force, Hughes has worked with Norsk Forsvarsteknologi A/S (NFT) of Norway to produce the Norwegian Adapted Hawk (NOAH) surface-to-air missile system.

Today, 24 Acquisition Radar and Control Systems, using new-generation Hughes TPQ-36A three-dimensional radars and NFT fire distribution centers, protect Norwegian air bases with HAWK missile launcher elements and short-range anti-aircraft artillery. These advanced systems have provided highly reliable service with significant improvements in firepower and life-cycle costs over the older systems they replaced.

For the future, an even newer generation surface-to-air missile system is being developed with a low-cost, low-risk approach. Expanding on their NOAH success, Hughes, NFT and the Royal Norwegian Air Force are building an even stronger system...

again using the Hughes TPQ-36A radar and the NFT fire distribution center, but adding the Hughes Advanced Medium Range Air-to-Air Missile (AMRAAM) in a ground-launched mode.



Ground-launched AMRAAM, above, and TPQ-36A/NOAH, below.

Called the Norwegian Advanced Surface-to-Air Missile System (NASAMS), it will take advantage of the advanced, proven capabilities of all three systems, including the fire-and-forget capabilities of AMRAAM.

NASAMS will provide Norway with dramatically higher firepower, greater coverage and lower life-cycle costs.

Hughes Aircraft Company and European partners meeting defense needs.

HUGHES

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INTERCEPT POINT

Low-intensity conflicts may be low-intensity for those who plan them, but tend to be high-intensity for the soldiers who fight them. Most contingency operations, including Operation Just Cause, the recent expulsion of Panamanian Gen. Manuel Noriega from power, fall into the low-intensity conflict category. We call them "contingency" operations because they are intended for use in circumstances not completely foreseen. To soldiers dodging the bullets, however, all combat consists of a series of contingency operations. The precise arrows drawn in alcohol pen on acetate map boards adorning the walls of tactical operations centers quickly dissolve into a maelstrom of instant decisions and reflex responses that determine mission success or failure.

PFC Gregory Wootten of the 82nd Airborne Division's 3rd Battalion (Airborne), 4th Air Defense Artillery, discovered the meaning of "contingency" when his Stinger section was directed to help secure the School of the Americas at Fort Espinar. With his section pinned down by automatic weapons fire from a rooftop emplacement, Wootten, arming himself with an AT-4, went forward to an exposed position to engage the PDF position. Shielded only by a small earthen mound, he activated the anti-tank weapon and silenced the PDF emplacement. Wounded by small arms fire during the action, Wootten became one of our ADA casualties.

The "First to Fire" branch has neglected coastal gunnery since its days as the Coast Artillery, but this didn't deter Vulcan gunners of the 2nd Battalion, 62nd Air Defense Artillery, 7th Infantry Division (Light), who engaged and crippled a PDF gun

boat patrolling the canal with 20mm rounds. "The boat was in the wrong place at the wrong time," explained platoon leader 1st Lt. James Leary.

This issue of *ADA Magazine* is devoted to air defenders who participated in Operation Just Cause. Their exploits are further detailed in "ADA in Panama," page 4. While the conflict was short, the soldiers of the 3-4th ADA and 2-62nd ADA encountered and overcame fierce opposition. That they

emerged with few casualties is a tribute to the NCOs and officers who trained and led them. They engaged not a single aircraft, but they fought in the finest tradition of Air Defense Artillery, proving themselves, as always, indispensable members of the combined arms team.

Operation Just Cause symbolizes America's continued commitment to freedom and its undying opposition to tyranny. Perhaps it also offers a glimpse of future conflicts.

The increasing worldwide availability of sophisticated weaponry, precision-guided munitions and the ultimate weapons of terror — chemical, biological and nuclear arms — through international arms sales have increased the danger of low-intensity conflicts. There is no shortage of potential trouble spots:

The United States has announced plans to establish a Green Beret base camp in the Andean jungle to help Peruvian soldiers battle the *Sendero Luminoso*, a Maoist organization that has stepped up its 10-year campaign against the Lima government.

European communism may be in full retreat, but communist insurgents in the Philippines have stepped up their acts of terrorism against U.S. servicemen.



INTERCEPT POINT



In the volatile Middle East, countries such as Iran, Iraq and Syria boast heavily mechanized forces and a reputation for belligerency.

The FBI, using a Fort Bliss operative, recently broke up a plot to smuggle 24 Stingers to Colombian drug dealers. (Evidently they chose to ignore our warnings that Stingers are not very effective without ADA-trained, dedicated Stinger gunners.)

These are some reasons the Army of the future must be versatile, deployable and lethal — three virtues demonstrated by the ADA units that saw action in Panama. The fielding of forward area air defense systems will soon give us a much more versatile, deployable and lethal forward area air defense force for use in high-, mid- and low-intensity conflicts. We are also relooking our ability to deploy quickly with packaged air defense in support of contingency corps operations to provide a lead-ship, first-lift capability against the Third World's growing air-breathing and tactical ballistic missile threat. We will complete that

study and begin a packaged approach to programmatic this year. ADA's contingency capabilities, in short, will improve dramatically during the 1990s.

Weaponry and force structure modifications, however, do not guarantee victory in low-intensity conflicts. In *A Strategic Force for the 1990s and Beyond*, Army Chief of Staff Gen. Carl E. Vuono points out that "We must not forget that the causes of low-intensity conflict generally are political and economic rather than military. Although the military aspect may be crucial, the solutions to low-intensity conflict go far beyond the military dimension. Military action can only be a shield against violent opponents and a source of assistance to the civil authorities responsible for political, economic and social development. Recent history demonstrates that military might cannot substitute for effective nation-building and legitimate political institutions that meet citizens' needs."

Low-intensity conflicts with their moral ambiguities and political undertows require a soldier with sociological as well as combat skills. We must ensure our soldiers are well versed in the rules of engagement, and that they remain aware that a callous and insensitive approach to POWs and civilians can transform strategic and tactical victories into moral and political defeats.

Although Vietnam represents an anomaly, the historic record of U.S. intervention in low-intensity conflicts or counter-insurgency operations from the Philippines to Central America is largely a successful one. By guarding against the "arrogance of power" and by producing the type of multi-dimensional soldier low-intensity conflicts require, we can continue to succeed in this increasingly important sphere of conflict. The U.S. Army, with its mix of racial and ethnic groups and the nation's long-standing reputation for generosity, is uniquely equipped among world powers to deal with both the military and political aspects of low-intensity conflicts wherever they occur.

— Maj. Gen. Donald M. Lionetti
Chief, Air Defense Artillery

Avenger Full Speed Ahead

The Army has approved Boeing's Avenger, the line-of-sight rear component of the forward area air defense (FAAD) system, for full-scale production following a recent Department of Defense Acquisition Board (DAB) review.

Boeing won a candidate evaluation test in July 1987 and delivered the first production model Avenger in November 1988 — just 34 months after the Secretary of Defense approved the FAAD concept. In 1989, the Regimental Stinger Platoon, 3rd Armored Cavalry Regiment, Fort Bliss, Texas, became the first unit equipped with Avenger. To date Boeing has delivered a total of 53 Avenger fire units to the U.S. Army Missile Command. The Army plans to purchase 1,778 Avenger fire units, making Avenger the most proliferated ADA weapon system.

"Avenger, the first forward Army air defense system approved for full-scale production, leads the way for the modernization of the U.S. Army Air Defense Artillery," said Army Chief of Staff Gen. Carl E. Vuono in a congratulatory message addressed to soldiers and civilians of the Avenger acquisition and procurement program. "Your outstanding effort will enable the U.S. soldier to fight with one of the best short-range air defense systems in the world.

"The flawless execution of the Avenger program and preparation for this major Department of Defense review resulted in a 22-minute DAB, a mark that no other program has achieved," the chief of staff's message continued. "This accomplishment was recognized not only

by me, but also by the undersecretary of defense for acquisition (DAB chairman). The defense acquisition executive commented: 'First ever thought through like it should be.' The Joint Chiefs of Staff noted with pleasure the preparedness of the program for review. Once again, accept my sincere appreciation . . . for a job well done."

Boeing now produces about four Avengers a month (a low-rate production schedule) at its technology complex in Huntsville, Ala., but will now gradually increase that number to 12 per month by October 1991.

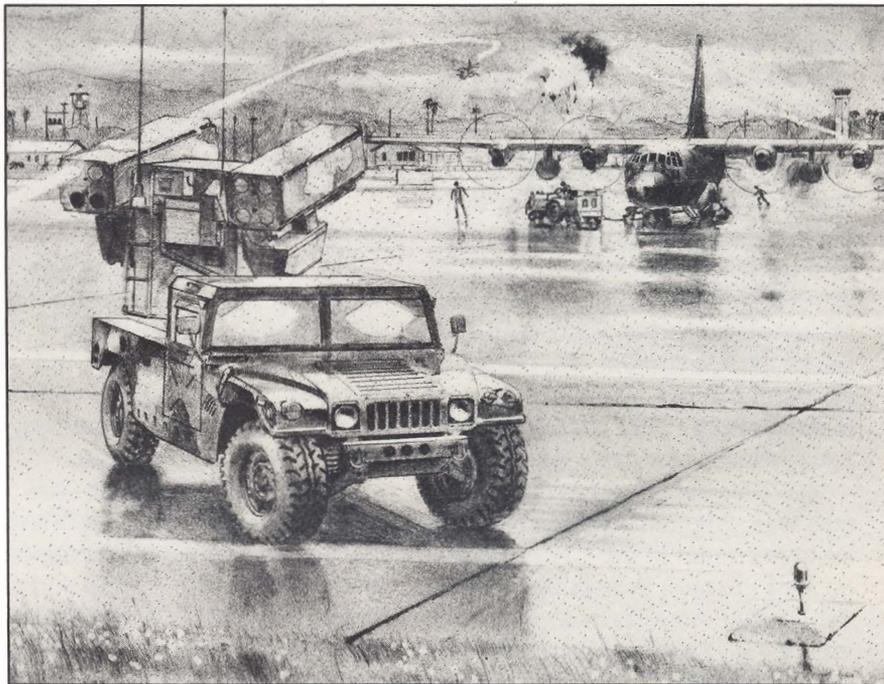
"Full-scale production go-ahead for Avenger is a major milestone in our air defense efforts," said Ross Dessert, Boeing's Avenger program manager. "This means we've successfully met the criteria for introducing a new product into the Army inventory. We've delivered the

Avenger systems ahead of schedule and within budget, and that's something we're very proud of."

The Avenger is the West's first shoot-on-the-move air defense weapon system. Its primary role is to defend against fixed-wing aircraft attacking our command, control and communications centers or other critical assets. It will normally be deployed no farther forward than the battalion rear boundary.

Mounted on a high-mobility multipurpose wheeled vehicle, the Avenger packs eight ready-to-fire Stinger missiles. Avenger features a 360-degree rotatable turret and two missile pods. A machine gun covers the Stinger missile's dead zone and provides close-in self-defense. The Avenger can operate day or night and in adverse weather conditions.

Avenger yields optimum savings in manpower while maximizing the Stinger missile's potential. Its two-man crew can fire Stinger missiles from a gunner's station inside the vehicle or from a remote fire control unit. They can also remove the missiles from their launch pods and fire them in a man-portable mode.



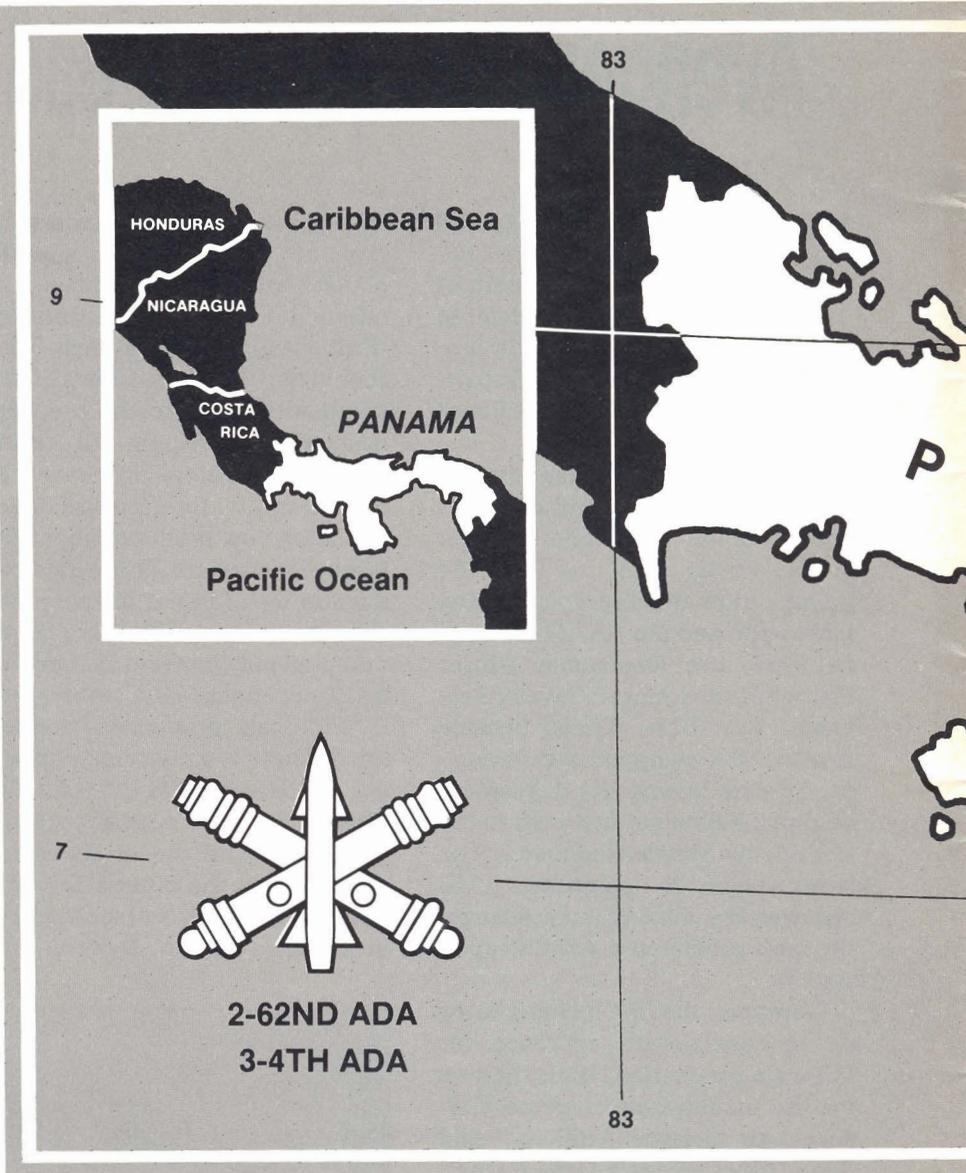
ADA in Panama

Operation Just Cause

0100 Wednesday Dec. 20, 1989. The murky skies over Panama reverberate with the roar of assault helicopters, Air Force fighters and transport planes swooping low over the tropical terrain, dropping heavily armed paratroopers onto their targets. Light tanks, shipped to Panama only in the last month, rumble into the streets of Panama City while Apache attack helicopters, also flown in secretly by transport, circle above. Operation Just Cause has begun.

Operation Just Cause followed two years of steadily worsening relations between the United States and its once-close ally, Panama. Due to escalating tensions climaxed by the killing of a Marine lieutenant and the brutal harassment of a Navy officer and his wife, President George Bush ordered U.S. combat troops into Panama Dec. 19, 1989.

Goals for the mission were to capture Gen. Manuel Antonio Noriega and return him to the United States on drug charges, protect the lives of the 35,000 Americans in Panama, secure the Panama Canal and restore Panama's democratically-



lected government.

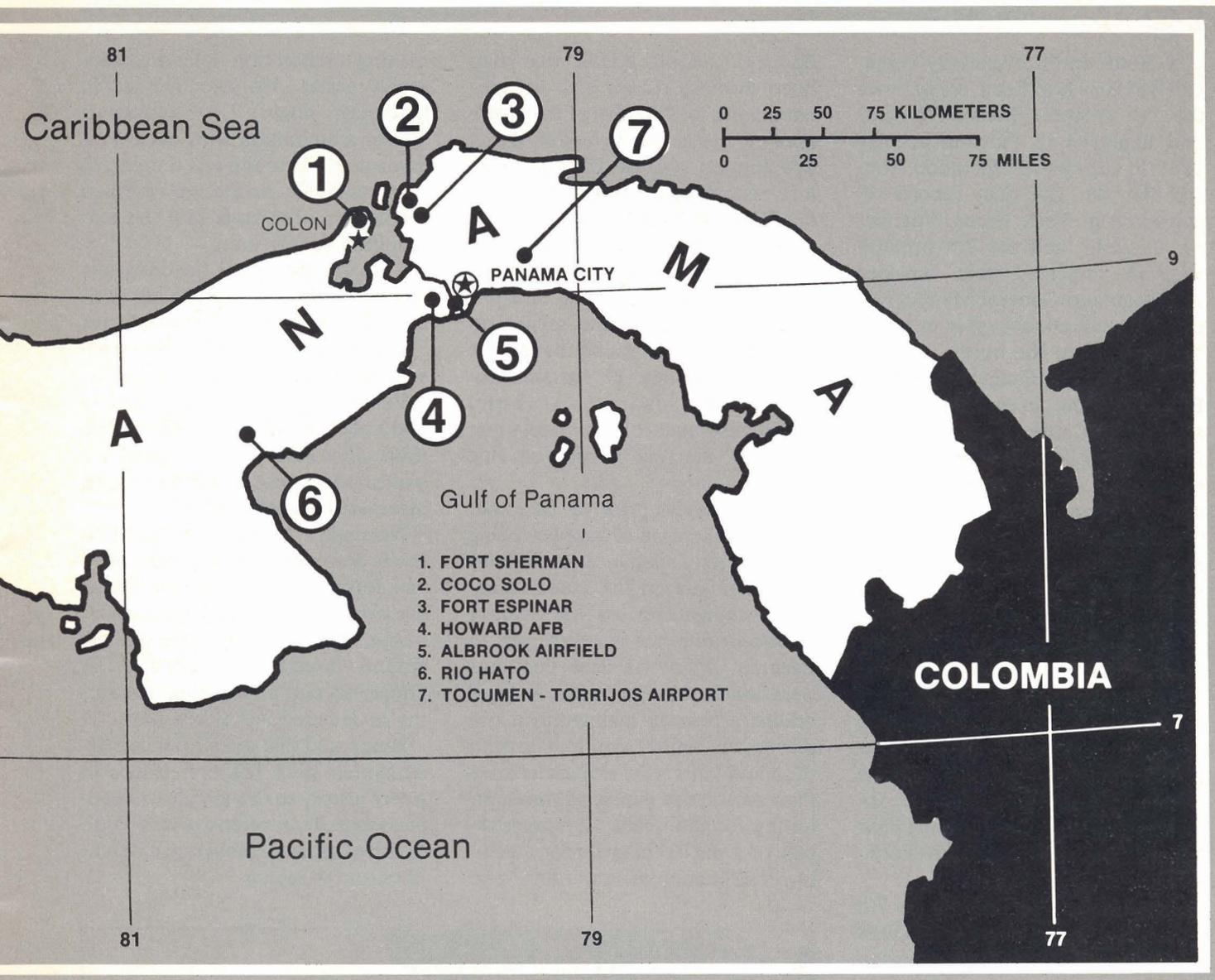
The United States deployed to Panama a large, diversified force of Army Rangers, paratroopers, light infantrymen and Marines with amphibious troop carriers, all supported by helicopter gunships, jet fighters and cargo aircraft.

Operation Just Cause was the largest military airlift since Vietnam and the nighttime parachute jump of 3,000 men by the 82nd Airborne Division from Fort Bragg, N.C., was the biggest combat drop since World War II.

The 20,000 American combat troops used for Operation Just Cause, 13,000 of which were already in Panama, were divided into five task forces:

- **Task Force Atlantic:** One battalion from the 82nd Airborne Division and another from the 7th Infantry Division (Light) secured the Colón area and surrounded the Panamanian Defense Forces (PDF) 8th Company.
- **Task Force Semper Fi:** One Marine armored car company secured the Bridge of the Americas

Air Defense Artillery



1. FORT SHERMAN
2. COCO SOLO
3. FORT ESPINAR
4. HOWARD AFB
5. ALBROOK AIRFIELD
6. RIO HATO
7. TOCUMEN - TORRIJOS AIRPORT

and Howard Air Force Base.

• **Task Force Red:** One Ranger battalion parachuted into Rio Hato to neutralize the 6th and 7th PDF companies.

• **Task Force Bayonet:** A mechanized battalion, a platoon of Sheridan tanks, and the 5-87th Infantry attacked PDF headquarters and eliminated the 1st, 2nd and 5th PDF companies.

• **Task Force Pacific:** The parachute brigade (less one battalion) and the other Ranger battalion secured the airfield and blocked Bat-

talion 2000.

Within hours the American troops leveled the PDF headquarters, smashed the Panamanian air forces on the ground, disabled the navy and surrounded all organized military forces. Navy Seal teams secured the airport where Noriega kept his private plane, plugging one avenue of possible escape, to prevent him from leaving the country.

Among the units deployed were elements of the 3rd Battalion, 4th Air Defense Artillery, 82nd Airborne Division, Fort Bragg, N.C.,

and the 2nd Battalion, 62nd Air Defense Artillery, 7th Infantry Division (Light), Fort Ord, Calif. Both are divisional ADA units.

Air defenders know that basically all soldiers are infantry. As Operation Just Cause proceeded and the air threat lessened, ADA soldiers, when not needed in primary mission roles, took on traditional infantry missions, processed enemy prisoners of war, collected and processed PDF weapons caches, guarded convoys and performed guard duty.

2-62 ADA

N-Hour would eventually come. Our soldiers had been ready since the 7th Infantry Division (Light) had deployed to Panama in May 1989 in support of Operation Nimrod Dancer. The daily reports received from Task Force Atlantic, 3rd Brigade, and the 7th Infantry Division indicated that tensions were high and General Manuel Noriega was not about to give in to the "gringos" from the north.

The notice to deploy troops from Fort Ord, Calif., in support of Operation Just Cause came at 0900, Dec. 19, 1989. The alert message stated that an emergency deployment readiness exercise (EDRE) was underway, so soldiers who had been preparing for the holiday season instead began preparing to deploy to Fort Bragg, N.C., for a three-day exercise. The EDRE would become, for many 7th Infantry Division soldiers, a different kind of Christmas. The Christmas season is a time for giving, and what better gift could the Panamanian people receive than 5,500 7th Infantry Division soldiers putting their lives on the line to help oust Noriega!

None of this was new to the 7th Infantry Division soldiers. EDREs have always been an integral part of the division's operational requirements, and the area of operations was familiar terrain: 3rd Brigade had just rotated with 9th Regiment to move into Task Force Atlantic's area in October 1989. This time, however, the enemy was real and bullets would be flying.

The 2nd Battalion, 62nd Air Defense Artillery, had been a vital part of Operation Nimrod Dancer and would be a vital part of the success in Operation Just Cause. At H-hour, Task Force Atlantic "took down" several Panamanian Defense Forces (PDF) facilities. The three towed Vulcan squads from B

Battery, 2-62nd ADA, that had been working closely with infantry companies in Task Force Atlantic's area of operation, provided direct fire support against PDF facilities and enemy patrol boats. The Vulcan platoon leader, 1st Lt. James Leary, said that "contingency planning was innovative and allowed for flexible use of the Vulcan in a primary ground mode and secondary aerial mode." He added that all Air Defense Artillery in Panama focused training toward the successful accomplishment of the execution plan for Panama known as Just Cause.

In the weeks prior to Dec. 20, 1989, an increase of supplies being shipped to Panama was evident, with emphasis on the communication contingencies for 7th Infantry Division units not yet deployed to Panama. Many tactical decisions were made prior to battle, such as adding a platoon maintenance soldier as the fourth man in a Vulcan squad. A battery-level maintenance man was on the gun at all times, allowing for the quick 10-minute repair of a declutching feeder assembly malfunction to one gun, and

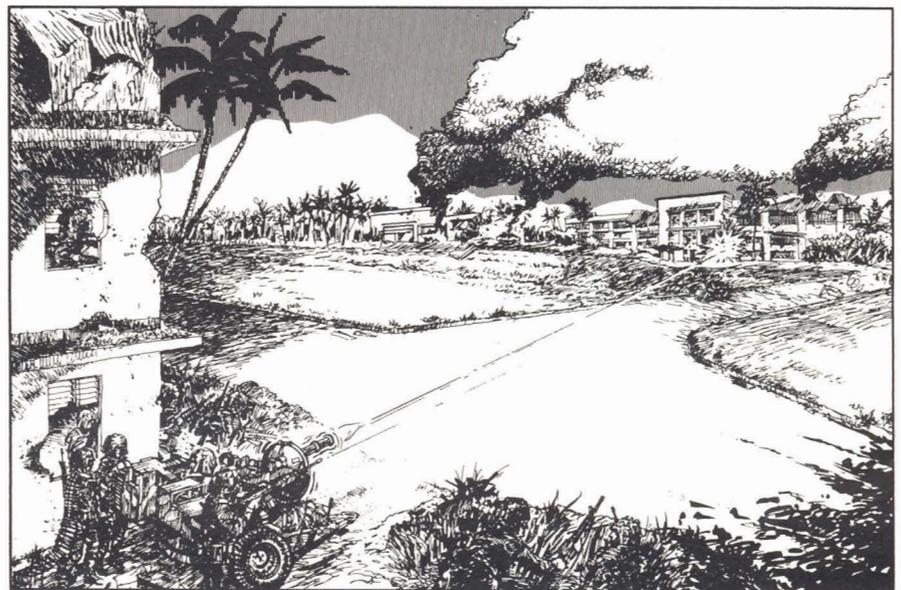
making ammunition upload considerably easier. We also decided to link (daisy chain) 2,000 rounds of 20mm ammunition with each Vulcan squad. This allowed the gun to fire continually as the crew pushed the ammunition belts into the ammunition supply unit.

"We hit the naval headquarters building in Coco Solo with our Vulcans in the direct-fire mode," said 1st Lt. James Leary, a platoon leader with B Battery, 2-62nd ADA. "We did a number on that building and knocked out the PDF guys. We fired on a PDF patrol boat with a Vulcan. The boat was in the wrong place at the wrong time."

Normally, Vulcans are used to shoot down aircraft. But the PDF's "air force" was not a factor during the invasion, and the 2-62nd ADA troops used their Vulcans against ground targets. A 2-62nd ADA Stinger section also beefed up security at Howard Air Force Base.

Leary said that the air defense artillerymen were the first troops in Army history to use a Vulcan weapon system in an offensive role. Vulcans were first employed in a defen-

(Continued on page 8)



The 82nd Airborne Division's mission: conduct a parachute assault on Tocumen-Torrijos International Airport on D-Day, H+45 minutes. They were to block designated PDF and deny reinforcement at La Comandancia, assume OP-CON of all Task Force Pacific forces, establish a lodgement, prepare to support the installation of a U.S.-recognized government in Panama and, on order, conduct a battle handover with the 7th Infantry Division (Light) and redeploy.

At 0900, Dec. 18, 1989, we received the message of an EDRE. The initial warning order specified Fort Bragg as our initial EDRE objective, with an airborne assault to be conducted on Sicily Drop Zone. The last no-notice callout the division had received was when the 82nd Airborne Division responded to the Sandanistas invasion of Honduras — the onset of Operation Golden Pheasant.

The parachute assault involved C-141 personnel, heavy equipment and aircraft conducting simultaneous airborne assaults on the international airport.

We began moving our personnel and equipment to the personnel holding area as soon as possible. Upon our arrival, we noticed the extra security and the many additional pallets of live ammunition being brought in. We also noted that the EDRE message dictated that Stinger missiles would be moved from the ammunition supply point to the heavy drop rigging site. Inside the personnel holding area, the brigade S-3 informed the troops that they would not be dropping on Sicily Drop Zone, Fort Bragg, but would instead be dropping onto Tocumen-Torrijos International Airport, Panama.

Prior to leaving the personnel holding area, the paratroopers removed all extra clothing from the

Alice packs because of Panama's temperature and climate. But Fort Bragg was suffering a severe ice storm! At 1800, Dec. 19, we stood in reverse chalk order in the freezing rain waiting to board the C-141 aircraft, rig up and settle down for an eight-hour ride to Panama. Once aboard the aircraft, however, we learned that the Air Force was having serious problems with de-icing, which delayed our takeoff several times and changed our arrival time on the objective.

During these stress-filled hours of uncertainty, the division and brigade staffs updated and revised their operations orders based on intelligence that was continuously being gathered. The Rangers and the Joint Special Operations Task Force personnel were supposed to neutralize the air threat; however, we were still responsible for providing air defense of the airport, the

(Continued on page 9)



2-62 ADA

(Continued from page 6)

sive role in Vietnam, but never in an offensive role.

"The Vulcan was a pivotal weapon during the invasion," Leary said. He added that the Vulcans and Stingers were also used in an intimidation role directed at 'third party' intervention in the event that an outside 'friend' of Noriega's decided to intervene.

While parts of the 2-62nd ADA were attacking the naval headquarters at Coco Solo, other units were closing in on PDF central headquarters in Panama City on the other side of the isthmus.

"It was like Star Wars," said Sgt. Ronald Bartoli, a squad leader with C Company 4-17th Infantry. "Once the Vulcan and AT-4s began firing, I didn't think they (the PDF) stood a chance." The first-strike force captured the PDF headquarters after 20 minutes of intense fighting.

Other aspects of the Vulcan platoon's execution were far from ordinary. All three Vulcan squads fired with the gun hooked up to the HMMWV and the outriggers down (action on wheels) instead of the normal emplacement. This allowed the platoon to fire on the move, if needed, in response to the fluid nature of the operation. We had tested this procedure previously during quarterly Vulcan gunneries. Our experience indicated that a towed Vulcan can fire while moving, if the gun fires with the barrels perpendicular to the wheel base and if the prime mover does not exceed 10 miles per hour. Otherwise, the gun would be too unstable to fire. While firing on the move we use only the 10- and 30-round burst selections.

All three Vulcan squads engaged at H-hour. One squad directed fire against the headquarters building of the PDF 8th Combat Infantry District at Fort Espinar. The other two

squads, the platoon command post and the maintenance element were attached to infantry companies located at Coco Solo (a PDF naval facility and a U.S. housing area and Cristobal High School). These squads directed fire against the PDF naval infantry headquarters and two 118-foot Vosper gunships.

The Vulcan squad engaged buildings with 10-round bursts using a "Z" pattern to sweep all floors of each building. At the Naval Headquarters building, the squad fired at a known arms room with 30-round bursts before beginning the "Z" pattern sweep.

By dawn of Dec. 20, 1989, a total of 1,420 rounds of high-explosive incendiary and high-explosive incendiary-tracer (self-destruct) had been fired. The PDF at Fort Espinar were easily disarmed. Our soldiers encountered heavy fire at Coco Solo before the naval infantry headquarters and Vosper docks were nullified.

The 2-62nd ADA Stinger teams in Panama at H-hour consisted of

three teams at Howard Air Force Base and two teams in Task Force Atlantic's area of operation providing air defense of critical assets. The teams at the air base had established a close relationship with the Air Force during the early stages of Operation Nimrod Dancer, and it continued throughout Operation Just Cause. The Stinger section sergeant, SSgt. Edward Burch of B/2-62nd ADA, became a mainstay in the air operations center and had access to the airborne radar system, allowing his teams to receive timely and accurate early warning information.

The initial deployment of Stinger missiles to Panama uncovered one logistics problem. The Stinger missiles were transported without protection during dismounted operations, and the jungle's humidity degraded the Stinger weapon system within days. Additional desiccant had to be flown to Panama on "log birds" to correct this problem.

The additional deployment of
(Continued on page 10)



(Continued from page 7)

three different initial tactical objectives and the ground convoys departing the airfield.

While the paratroopers aboard the C-141s droned steadily toward Panama, their counterparts on the ground, the 3rd Stinger Section (already deployed to Panama as part of a composite platoon attached to the 3rd Battalion, 504th Parachute Infantry Regiment) pursued its objective: Fort Espinar.

The 3rd Stinger Section was to secure the buildings that housed the school of Americas while soldiers of the 7th Infantry Division were assaulting other objectives at Fort Espinar. On Dec. 19, 1989, the composite platoon was transported by truck to Fort Espinar around 2200. They were given the operations order, which included the information about our impending airborne assault.

At approximately 0100 the next morning, while the 3rd Stinger Section was moving into their initial attack positions near their objective, a large firefight began at the Coco Solo naval station about three kilometers away. This action alerted

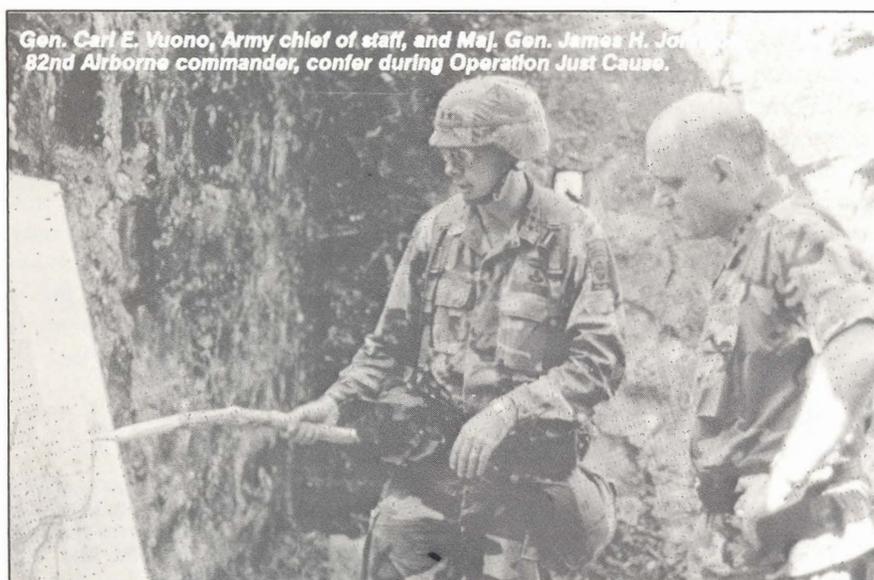
the PDF soldiers to the 3rd Stinger Section's approach as they moved into their attack positions. The PDF immediately began firing at them with small arms. They returned fire with small arms, M-203 and AT-4 weapons for 30 to 45 minutes. The PDF soldiers, although instructed to surrender many times, did so only after their efforts proved futile. The PDF detachment, briefed to us as a 6- to 18-man force, turned out instead to be 43-men strong. After conducting a thorough search, the 3rd Stinger Section established a guard post at the school.

The 1st Brigade (504th Parachute Infantry Regiment), the division's ready brigade (DRB1) on Dec. 18, 1989, had three different objectives to secure immediately after the initial airborne assault on the airport. The relatively low air threat posed by the Panamanian Air Force and our virtually assured air supremacy drove us to tailor the air defense assets that would deploy with the division. We parachuted in a total of 13 Stinger missiles with the two HMMWVs that were heavy dropped into Tocumen.

At 0212 Dec. 20, 1989, the first

82nd Airborne Division paratroopers began filling the sky above Tocumen International Airport. Most of the heavy-drop platforms landed in a small swamp next to the airfield and so, unfortunately, did many of the paratroopers. The Stinger personnel assembled and found one of the two heavy-dropped vehicles almost immediately. We distributed the nine missiles off that vehicle to the different teams moving out with the three task forces. We also kept two Stingers on the airfield to pro-

(Continued on page 11)



Gen. Carl E. Vuono, Army chief of staff, and Maj. Gen. James H. Jones, 82nd Airborne commander, confer during Operation Just Cause.



The 3-4th ADA's Stinger platoon secures this key TV relay tower.

(Continued from page 8)

soldiers from Fort Ord in support of Operation Just Cause consisted of 2nd Brigade (division ready brigade-1) and a contingency division tactical command post. After analyzing the mission, enemy, terrain, troops and time available (METT-T) and aircraft sortie availability, the final plan required A Battery to deploy two Stinger sections with the initial flow: six teams with 2nd Brigade and two teams with the contingency division tactical command post. The Stinger platoon leader, 1st Lt. Brian Higdon, ensured that his light air defenders were thoroughly prepared and that their packing load was adequate, because their organic vehicles would not deploy with them.

At 1600, Dec. 19, 1989, buses began rolling out of Fort Ord en route to Travis Air Force Base, Calif. Tensions were not that high: we all thought Fort Bragg, N.C., was our final destination. But when we arrived at Travis around 2000, reality set in. We were locked in the passenger terminal, briefed on rules of engagement and the tactical situation, and told that we were on our way to Panama. Many of the young soldiers became very nervous; most held their anxiety inside, but some displayed it openly. MSgt. Jose Anguiano, noncommissioned officer in charge of the ADA defense operations section and a veteran of two tours in Vietnam with the 4th Infantry Division (Mechanized), talked to a few soldiers to put them at ease. He recalls, "I told them to think of all the other soldiers going to Panama — they were not alone." How simple that sounds, but what an impact it had.

At approximately 1000, Dec. 20, 1989, the first planes from Fort Ord touched down at Howard Air Force Base in Panama. The weather was hot and muggy and smoke clouds

from the previous night's devastation filled the sky. In preparing for Panama contingencies, we had planned for a limited air threat based on our analysis of METT-T. Fortunately, the air threat had been essentially eliminated by special operating forces during the first few hours of the invasion. In all, approximately 40 enemy aircraft, both fixed- and rotary-wing, were captured or dismantled during Operation Just Cause. After the initial fighting, no viable air threat existed. Therefore, air defenders, except for the Stinger teams at Howard Air Force Base, were given a myriad of other missions to perform based on operational requirements and METT-T. The Vulcan platoon assisted with processing enemy prisoners of war and weapon caches. The Stinger teams located with 2nd Brigade (DRB-1) were used to man roadblocks, guard PDF prisoners, process weapon caches and carry 81mm mortar rounds for some dismounted patrols.

On Dec. 26, 1989, 2-62nd ADA was given the order to begin redeployment to Fort Ord. This decision was based on the lack of an air threat and the desire to reduce the U.S. presence in Panama as quickly as possible. Two days later, the Vulcan platoon, two Stinger teams from Task Force Atlantic's area and two Stinger teams with the division tactical command post departed Panama. Family and friends anxiously awaited the arrival of loved ones. On Jan. 10, 1990, all ADA weapon systems were back at Fort Ord. The liaison officers remained in Panama to provide the brigades with air defense coordination if needed. By Feb. 5, 1990, all 55 soldiers assigned to 2-62nd ADA had arrived back at Fort Ord. Fortunately, 2-62nd ADA suffered no casualties while conducting operations in Panama.

By Jan. 3 the diminutive Noriega had been deposed and now awaits trial on a variety of criminal charges. A legal democratic government is in place and offers the promise of political stability and economic strength.

Operation Just Cause ended on Jan. 31, 1990. The troops remaining in Panama reverted to Operation Promote Liberty.

The low-intensity conflict environment in Panama proved the importance of considering METT-T in all operations. METT-T was analyzed constantly, during the planning of both Operation Nimrod Dancer and Operation Just Cause, to provide the battalion with critical information concerning the proper type and mix of air defense systems. Had we not performed this analysis, we might not have considered deploying towed Vulcans to Panama. That would have proven to be a serious mistake. Not only could the Vulcans perform their air defense role against an unsophisticated array of known enemy aircraft, but they could and would be used to engage surface targets (PDF facilities) and patrol boats. Another consideration of equal importance with METT-T was sortie availability. The variable number and types of aircraft available played a part in determining when and how much air defense would deploy. One "constant," however, does remain. In this operation, the air threat was low; in the next, the air threat may be high. As light air defenders we must remain alert and stay proficient — who knows when our next "EDRE" to Fort Bragg will be.

This article is based on information supplied by Capt. Larry Walsh, 1st Lt. Jim Leary, 1st Lt. Brian Higdon, 1st Lt. David Hudock, SFC Morris Parsons Jr. and Maj. Jim Schaeffer, all with 2-62nd ADA.

(Continued from page 9)

vide air defense of the Tocumen airport.

Late in the afternoon of Dec. 21, the Stinger platoon was given the mission to secure a key TV relay tower to ensure the successful broadcast of President Guillermo Endara's inaugural address to the Panamanian people. With only their individual weapons and a few LAWs, claymores and grenades they air assaulted to the top of the mountain. They immediately secured the relay tower, and defended it throughout the President's nationwide address.

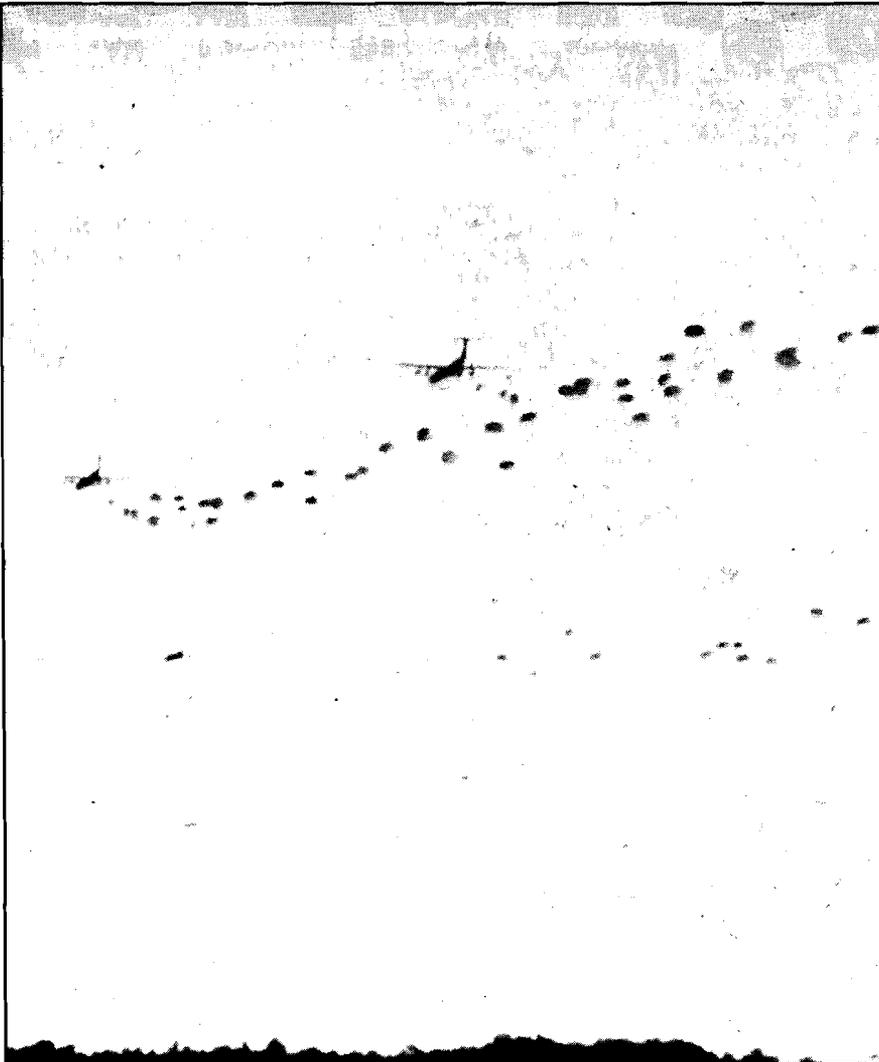
During the invasion of Panama, the air defenders contributed significantly to the highly successful sustaining operations of the 82nd Airborne Division. Elements of the Stinger platoon provided road block support at Panama Viejo and moved to the Marriott Hotel to provide essential protection for the "Cash for Weapons" program. They continued to participate in the defense of convoys as guards. The troopers at Fort Espinar were given a variety of missions such as patrols, guarding POWs, road block support and guarding a large oil refinery north of Coco Solo.

During the redeployment to Fort Bragg, some of the troopers air-landed with the missiles and vehicles, but most of the air defenders returned the same way they went: they jumped out of C-141 aircraft in true paratrooper form. The reunions were memorable and the return jump was especially impressive. Although two of our soldiers received Purple Hearts because of wounds and injuries sustained during the initial hours of the invasion, we brought everyone home alive, and every Airborne air defender eventually returned to duty.

The 82nd Airborne Division owes much of its success during this operation to its frequently rehearsed contingency plans. The division is ready to deploy anywhere in the world on a moment's notice to execute many divergent contingency plans. Although many of the plans' objectives are predictable, others, such as the 1983 liberation of the Caribbean island of Grenada, come as a complete surprise upon deployment. The events leading up to the execution of Operation Just Cause were not unique in many ways to our normal contingency plan development, rehearsal and execution cycle.

The Airborne air defenders lived up to our greatest expectations of them as warriors and air defenders, in keeping with the finest traditions of our branch and our Army. Once the possibility of a Panamanian air threat was removed, the 3-4th ADA paratroopers were integrated into each part of the 82nd Airborne Division's combat sustaining operations. The air defenders performed each diverse and demanding mission magnificently.

This article is based on information supplied by Lt. Col. Don Kirk, Capt. Bob Bestian, 1st Lt. Ira Hamm, 1st Lt. Ken Hubbard, SSgt. Michael A. Nash and Maj. Greg Parlier, all with 3-4th ADA.





VAPOR TRAILS

Renegades Set Standard

There is no secret to the 4th Battalion, 5th Air Defense Artillery's record of solid performance in support of the 1st Cavalry Division during National Training Center (NTC) rotations. Their success stems from a proven training program that task organizes a battery to the brigade approximately eight months prior to NTC deployment. The first step in the train-up consists of simulated exercises where the leadership tunes their coordination skills and refines the orders process. The platoon leaders coordinate and integrate the platoon into their supported task forces to ensure that the battery familiarizes itself with the task force standing operating procedures and personnel, and becomes an active member of the combined arms team.

Stinger teams assigned to various platoons participate in maneuver situation training exercises (STXs) at the platoon level, followed by company-level STXs in which Vulcans provide air defense for maneuver elements.

Vulcan platoons demonstrate their capabilities by participating in both Bradley and tank table XII's with the maneuver companies. During these exercises the Vulcans engage both ground and aerial targets while maneuvering with the evaluated ground platoons. The battery then undergoes an Army training and evaluation program (ARTEP) conducted by 4-5th ADA personnel who participated in the most recent rotation to the NTC. This allows the evaluators to share their NTC experiences with the training unit. In conjunction with the ARTEP, the ADA battery and task forces also spend a week in offensive and defensive combined arms live-fire exercises refining their combat skills.

The brigade leadership, which includes the air defense officers of the supporting battery, deploy to Fort Irwin, Calif., for a training exercise without troops. Terrain association, battle plans and land navigation are the key training events.

Prior to the unit's departure the battalion ensures that the battery has complied with all the requirements in preparation for overseas movement. With all personal matters having been taken care of, and a solid battalion family care plan in effect, the soldiers of 4-5th ADA begin loading vehicles and equipment.

Months of preparation and dedicated training culminate with the deployment of soldiers to Fort Irwin where their knowledge, battle skills and confidence will be tested and fine-tuned.

— by 1st Lt. Vincent G. Jacot

Radar Revolution

Using laser light and sound waves, the U.S. Army Strategic Defense Command (USASDC) has developed a way to make radars that see better and are almost impossible to jam.

As a radar searches for targets, it is constantly bombarded by thousands of electronic signals — communications waves, jammers, civilian broadcasts and even radiation from space.

A strategic defense system's task is to isolate from the rest of the "electronic noise" those signals that have bounced back from its radar, identify incoming missile warheads, decode and then process the signal into information that a commander can use to decide how best to defend against the threatening warheads. The commander must have access to target and tracking information quickly to engage the warheads before they can reach their targets — at best, only 15 to 30 minutes.

Finding the real target among decoys, penetration aids, chaff and other random-noise signals detected by radar is similar to looking for a needle in a haystack. Just as a large diameter pipe can carry more water than a small diameter pipe, an ultra-wideband radar signal can return larger amounts of data from a target object, which helps make the identification process more reliable. However, even the fastest of

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today's digital electronic computer systems can't keep up with the data glut that results. USASDC's breakthrough in radar signal processing technology promises to make the ultra-wideband radar possible.

The key to this achievement is a high-speed, electro-optic computer that uses laser light to simultaneously process and pattern-match random-noise signals as fast as they occur. This acousto-optic process uses the interaction of laser light and sound waves within a crystal, rather than digital electronics, to process the signal.

The interaction is accomplished by splitting a single laser beam and using acousto-optic technology to place the pattern of the radar's transmitted signal onto one beam and the pattern of the target's return-signal onto the other beam. The two beams merge and a transparent acousto-optic crystal instantly detects the distinctive pattern created by the target.

Significantly, this ability to match or correlate random sets of signal frequencies that have no set pattern demonstrates that any type of signal pattern can be compared.

Using this technology, an electro-optic computer, built by Dynetics, Inc., Huntsville, Ala., under contract with the USASDC, can parallel-process hundreds of these signals in one billionth of a second. Thus, this compact computer can perform the billions to trillions of operations per second that would be required for a ballistic missile engagement.

According to USASDC's electro-optics contract manager, Dr. Michael J. Dorsett, this research into pattern recognition also may contribute to the development of "neural networks" for artificial intelligence. These are large interconnecting networks similar to the human brain.

The high-speed parallel processing capability of the electro-optic computer allows the implementation of such "neural" computer networks. These concepts may provide the basis for continued research on a sixth-generation computer.

— U. S. Army Strategic Defense Command

Trans-Pacific ADA

Members of the 1st Battalion, 62nd Air Defense Artillery, continue to be among the most-often exercised ADA unit. From the sun-kissed, lava-strewn ter-

rain of Hawaii to the outback of Australia, these soldiers train to meet any contingency. These accomplished marksmen, the product of numerous live-fire exercises, are tactically and technically able to not only defend Australia's northern territory, but also to recover from an accidental explosion at an ammunition depot.

Disaster in Hawaii. A deafening explosion rips the relative calm of the morning. Brittle lava rocks, harmless reminders of Hawaii's volcanic history on any other day, are transformed into deadly missiles by the force of the blast. Twenty soldiers given the dangerous mission of working at an ammunition supply point have seen their worst fears realized. No one is left unharmed. The detachment's casualties range from severe psychological shock to life-threatening eviscerations. Several soldiers face death or permanent disability.

The senior officer quickly grabs the nearest radio and requests help, but the situation is still dire. The devastated ammo point is located in Hawaii's Pohakuloa Training Area, a remote section of the island. The nearest hospital lies more than 30 miles away, accessible only by a narrow, twisting mountain road. Evacuation may take a long time, but time is something the soldiers no longer have enough of.

This disaster is an exercise, but each soldier is aware that it could, one day, be real. With that sobering thought in mind, members of the 1-62nd ADA, defenders of the air battlefield for the 25th Infantry Division (Light), participated in the Hilo Hospital - Pohakuloa Training Area Mass Casualty Exercise designed to validate the mass casualty procedures used by the Hilo Hospital as well as giving the medical personnel an opportunity to practice and refine these procedures.

The exercise tested the mass casualty SOPs in use at the Hilo Hospital and Pohakuloa Training Area. Twenty ADA soldiers played the focal role in the exercise. Covered with fake blood and burns provided by Health Clinic doctors and medics, and strewn about the landscape in an all-too-realistic display of human suffering, these soldiers were the victims of the simulated explosion.

Casualties included three "immediates," who were evacuated by MEDEVAC helicopter, and six "de-

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lays" who were evacuated by ambulance. The remaining soldiers were considered stable enough to evacuate by bus. Two members of the group were pronounced dead on arrival and were taken to the hospital's morgue, while their counterparts were rushed to the emergency room.

A reaction force of doctors, nurses and support personnel met the battered contingent, quickly performing the vital task of triage and prioritizing casualties for medical help. The casualties varied from a gaping abdominal wound to severe smoke inhalation to psychological shock.

The exercise was conducted with few artificialities and exercised every facet of the mass casualty SOP. As a result, all members of the 1-62nd ADA have a renewed confidence in their ability to receive responsive aid in a crisis whenever training at Pohakuloa. 2nd Lt. Mark Burtner, who "suffered" psychological shock, said "it was comforting to know" that the hospital could respond so quickly. Certainly any soldier deploying to the remote training area would agree.

The most formidable obstacle to effective evacuation was the long, winding mountain drive from the training area to Hilo Hospital. 2nd Lt. Rodney Faust, who was evacuated by bus, felt that the long, bumpy ride would be very debilitating to a soldier with real wounds and suggested the use of more MEDEVAC helicopters. Identifying possible improvements such as these, before a genuine crisis occurs, proved to be a major benefit of the exercise.

The exercise was a success for the battalion, the Pohakuloa Training Area and Hilo Hospital. Although the lessons will not be forgotten, members of the 1-62nd ADA will use its excellent safety program and leader involvement to ensure that these procedures will never be put to use.

Kangaroo '89. The Stinger missilemen of B Battery, 1-62nd ADA, participated in the largest Australian military exercise since World War II — Kangaroo '89. The exercise tested Australia's White Page Initiative, which focuses on the ability to defend Australia's Northern Territory against a low-level threat Kamarian force and highlighted ADA's role in a low-intensity conflict.

The ADA section deployed as part of Task Force

Catamount, comprised of more than 1,200 soldiers from the 25th Infantry Division (Light). The Stinger soldiers, who arrived by air in Darwin, were soon on their way across 400 kilometers of the Australian Outback to an area just south of Katherine.

During Phase I of the exercise, the soldiers were given orientation briefs and survival classes on the unfamiliar Northern Territory. These classes dealt with surviving in the harsh land where the soldiers learned methods of getting water from the surrounding vegetation, medical treatment of heat injuries and snakebites, and information on the social and cultural lives of the native Aborigines. Following the briefings, the soldiers cross-trained for a day with the Australian air defenders of the 16th Air Defense Regiment. The Australian's primary SHORAD weapon system is the Swedish-made RBS-70, similar to the Stinger in employment and missile capabilities, but using a laser guidance system that requires the gunner to continuously track the target until intercept.

The next phase of the exercise, the actual operation, was to counter the threat from a fictitious state known as Kamaria. The Kamarian intent was to disrupt the normal day-to-day operations of the Australian population and gain control of the oil and fishing rights in the Timor and Arafura Seas. The enemy aircraft threat was negligible, but the air defenders were challenged by the flat, unchanging terrain that made distances very deceiving.

In the desert terrain, the Stinger teams practiced and enhanced their skills in battle drills, troop-leading procedures, land navigation, air mobile operations, operations planning and battlefield reporting. The teams proved their worth by repeatedly providing air defense coverage for the infantry throughout several air assaults, convoys and foot movements that covered more than 4,000 kilometers of desert.

Stoking Volcanic Fires. How often can leaders honestly say that their training was realistic? Does your training revolve around range control coordination, ammunition guard details, range cleanup and the myriad of other tasks that burden our units in the field or on the range? The 1-62nd ADA has a solution: the support battery concept.

During four days of Vulcan live fires, crew drills and other battery-level tasks, 1-62nd ADA's A and

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B Batteries conducted uninterrupted training and weapons firing at Pohakuloa Training Area, Hawaii.

Two line batteries rotated to PTA's training areas and ranges as entities. The battery remaining in base camp provided all administrative support to conduct range firings (range personnel, ammunition guard details and range police details). The "fielded" battery and its Vulcan platoons did not have to concern themselves with any administrative or non-tactical support requirements. Detailed coordination was necessary, but the coordination occurred prior to the unit's deployment to the local training areas.

The PTA Range Control Officer added realism to the exercise by broadening the scope of the Vulcan range fan for "action on wheels" firings. Previously, firing platoons could only stop and fire while on a specified 100-meter stretch of road, and always knew exactly where and when they would be attacked. The new clearance allowed firing at any point along a 1.5- to 2-kilometer stretch, increasing the Vulcan platoons' alertness and exerting less administrative pressure on leaders to conform to canned scenarios.

The United States Army Support Command, Hawaii Target Section, personnel added realism to Vulcan firings by flying the remote-controlled MiG-23 Flogger aircraft in a two-stage handoff. Launched from a distant location, the RCMATs' noise did not alert the Vulcaneers. The aircraft flew in pairs toward the range area, where an enemy pilot (another RCMAT operator hidden in the rocks and trees) picked them up on the remote transmitter and then maneuvered and swooped the planes toward the Vulcan platoons in convoy. The results of these surprise attacks proved beneficial: Vulcan crews learned a new meaning to the term *speed*, because *speed* now meant *survival*.

When the Vulcan platoon concluded its live-fire, it departed for its new mission at the base of Puu Ahi. Only minutes after departure, the support battery rolled into the abandoned campsite for cleanup. Fifteen minutes later, the battleground was cleared of debris and prepared for another "battle."

The total support concept may not be new. Remember, though, that unit leaders do not readily embrace the support requirements of range details, coordination and execution for another unit. But what if the

tables were turned and your unit had to perform only its air defense mission while the other unit performed all range coordination, details and execution? This sells the support battery concept. This concept, in fact, allowed 1-62nd ADA to not only achieve, but also to exceed, its training standards.

— by 1st Lts.(P) Dave DiMeo, Mark Visosky and Gary R. Arnold

Clearing the Smoke

A recent training effectiveness analysis (TEA) study revealed a strong indication of confusion in the Chaparral and Stinger communities on the modes of operation for the AN/PPX-3 IFF interrogator. The AN/PPX-3, designed primarily for a Mode 4 IFF capability, also has a Mode 3 (bracket decode) IFF capability. This interrogator can operate in either mode or both modes. This is where the confusion begins.

Normally the AN/PPX-3 is programmed (via the AN/GSX-1 programmer/battery charger) to operate in Mode 4 only or a combination of Mode 4 and Mode 3. The crypto-secure Mode 4 capability can be programmed for a maximum of four days.

During the four days of programmed operation, if Mode 4 was selected, the interrogator operates only in Mode 4. After an internal four-day clock has timed down and the Mode 4 code has expired, the interrogator will continue to operate in Mode 3 for as long as the battery holds up.

If Mode 4/Mode 3 is selected, Mode 4 is the normal or first interrogation mode; if a Mode 4 reply is not received, a Mode 3 interrogation automatically follows. Again, when the Mode 4 code expires, the interrogator will continue to operate in Mode 3 for as long as the battery holds up.

Mode 3 is built in and does not require programming. If Mode 3 is the only operation desired, just connect a fully-charged battery to the AN/PPX-3. Remember, however, that Mode 3 is limited to a bracket decode operation.

For more information on this subject contact CWO 2 Kenneth J. Price, U.S. Air Defense Artillery School, AV 978-4590.

President's Day Run

This year, for the first time, the Rainier Chapter of the Air Defense Artillery Association and the 1st

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Battalion, 52nd Air Defense Artillery, organized the President's Day 5K Run at Fort Lewis, Wash.

More than 800 soldiers, dependents, civilians, Canadians and Britons joined in the run; of these, 620 finished. Col. John Costello, commander of the 35th ADA Brigade, presented trophies to the finalists of each category.

SSgt. George Gillis of the 47th Support Hospital clearly out-distanced the competition, setting a blazing pace of 5.3 minutes per mile for a completion time of 16:26. Gillis also received top honors in the men's 20 to 29 age group. Overall second place was earned by Sgt. Jeffrey Levinson of the 2nd Ranger Battalion, in 16:35, winning the gold medal in the men's 30 to 39 age group and proving that you don't have to be young to be fast. PFC Don Wesley of C Company, 1-33rd Armor, took third place overall and first place in the men's 19 and under age group in 16:53.

The five-man team from Great Britain, whose members had traveled to Fort Lewis for a joint exercise, finished second in the team category.

In the women's competition, Jolean Stalley took top honors in the 19 and under age group. 2nd Lt. Melanie Shearer of 1-52nd ADA outran her peers in the 20 to 29 age group with a time of 20:15. Mary Ann Eusteman's time of 22:11 earned her the gold medal in the 30 to 39 age group.

The 1-52nd ADA took first prize (\$300) for most participants entered with a total of 348. 3-2nd ADA took second place (\$200) with 248. The 109th Military Intelligence Battalion won \$100 by entering 51 competitors.

All proceeds benefit the Rainier ADA Association Chapter. Founded in 1989, the chapter boasts 125 members and welcomes air defenders (past or present) interested in joining. Contact the 35th ADA Brigade adjutant at 206-967-7252/7253 (AV prefix 357) for further information.

— by 1st Lt. Marc E. Gonick and SFC Tony L. Beaty

New Avionics System

General Dynamics Pomona Division recently unveiled an avionics system that will enable military helicopter pilots to fly at very low altitudes in reduced visibility or inclement weather and "see" obstacles in their flight paths.

The system, Pomona's candidate for the U.S. Army's Obstacle Avoidance System, uses ultra-high-range resolution millimeter-wave radar and custom software to detect obstacles such as small multistrand wires used in electrical or telephone systems. The radar will be enclosed in a small radome mounted on a helicopter. Wires and other obstacles will be electronically projected on a "heads-up" cockpit display, or HUD.



The division first demonstrated the feasibility of using millimeter-wave radar to detect wires and other obstacles in 1983. Since then, it has concentrated on improving performance and reducing the size and cost of the system's millimeter-wave solid-state components. Obstacles have long been a problem to low-flying helicopters and aircraft. With the increased use of nap-of-the-earth flying techniques, detecting and avoiding such obstacles, especially power lines, have become increasingly important.

In a demonstration conducted for the U.S. Army's Communications and Electronics Command Center for Night Vision and Electro-Optics, a brassboard version of the Obstacle Avoidance System detected very small diameter wires in clutter and during adverse weather. The obstacles were processed and displayed with wires painted in red and indicated by three-dimensional line segment symbols. The radar performance exceeded the preliminary requirements set by the Army Aviation Center at Fort Rucker, Ala.

— General Dynamics News

Giants in Air Defense:

Thomson CSF

As air defense weapon systems become more advanced, the threat environment in which they must perform becomes more complex. The battlefield environment has become one in which the enemy can maneuver in all weather and densely cluttered conditions. In modern warfare, an effective air defense weapon system must withstand the threat under these conditions. Its sensors must detect and overcome both natural and man-made obscurants, and its missiles must have superior range, speed and accuracy. And it must offer a highly reliable system with extensive logistical support.

For 25 years the Division Systems Electroniques (DSE) of Thomson-CSF's Systems and Weapon Systems Group has concentrated its research and development efforts on two vital elements of air defense: weapon systems and their command, control and coordination. These systems cover air defense needs from very short to medium range.

New Generation Crotale

The most prolific of DSE's missile systems is the Crotale family of short-range systems which includes

Thomson CSF's Crotale NG short-range (10-kilometer) system protects stationary sites and troops.

by Mr. Bertrand de Fouchier

Crotale, Crotale Naval, Shahine and Crotale NG. DSE delivered the first unit in 1970, and has since de-

livered 550 systems and 5,500 missiles to armed forces throughout the world.

Crotale NG is currently being built for the Finnish defense forces and has been selected by various armed forces around the world.



The most advanced of Thomson CSF's missile systems, Crotale NG protects stationary sites as well as troops on the move. This short-range (10-kilometer) system protects against heavy saturation air attacks from very low-altitude fixed- and rotary-wing aircraft, cruise missiles, drones and anti-radiation missiles. The system has been specifically adapted to meet the threat of highly maneuverable helicopters that pop up using nap-of-the-earth flying techniques. It operates under all weather ECM and visibility conditions.

Technological advances in helicopter radars and aircraft technology have revolutionized their ability to perform under all weather conditions. This achievement has made it imperative for air defense weapon systems to be able to perform in those same conditions.

The advanced multi-sensor Crotale NG uses both radar and optonics to perform in all types of weather and to counter obscuring and sophisticated enemy jammers.

Crotale NG locates incoming targets using an S-band pulse Doppler surveillance radar. Its tracking process relies on a Ku-band pulse

Doppler radar that can monitor threats at up to 18 kilometers. It also has opto-electronic, daylight or FLIR systems and a dual-TV deviation sensor, making it a 100-percent passive system that does not send out powerful electronic signals to be picked up on enemy radar. Crotale NG tracks incoming threats at a wide range of velocities, from hovering helicopters to missiles flying at more than Mach 2. The system tracks-while-scanning up to eight targets and carries out automatic threat evaluation. During tracking, a sophisticated software package allows the system to automatically choose the best sensor with which to track the target.

Crotale NG ensures the shortest possible reaction time, not only

through automatic choices in sensor designation but also in automatic console operation.

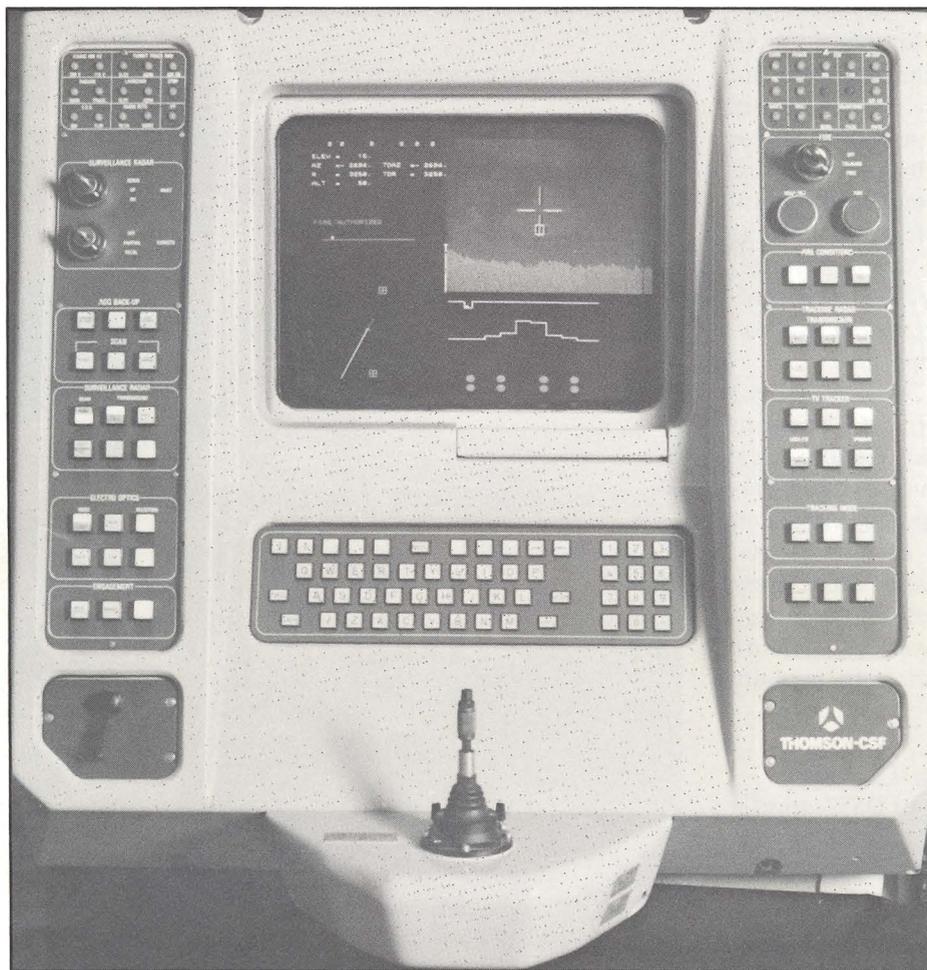
Because of this high degree of automation, one operator can man Crotale NG's firing sequence console. The console houses both the surveillance and fire control data on the same panel, allowing the operator to concentrate on one screen and not rely on an additional operator for information.

Advanced battle management software allows Crotale NG's easy integration with air defense systems already in place. The software facilitates coordination with other air defense units to optimize the use of the various systems and avoid overkill or underkill.

The turret can be installed on a number of various carriers. Crotale NG is a modular system that can be fitted onto vehicles such as the M-2 or M-3 Bradley or the M-113 A3S.

The system can also be coordinated with close-in anti-aircraft artillery units.

A naval version of the Crotale NG provides a unique anti-sea skimmer capability using the VT-1 missile. The French Navy has decided to equip its new frigates with this system.



Automated console allows one-person control of Crotale NG's firing sequence.

VT-1 Hypervelocity Missile

Because time is crucial in situations requiring short-range air defense systems, the missiles on the system must have very short flying time. Crotale NG is armed with eight VT-1 hypervelocity air defense missiles traveling at Mach 3.5.

Under contract from Thomson CSF, the Missiles Division of LTV Missiles and Electronics Group has been developing the VT-1 since 1986. The VT-1 successfully completed extensive test firings in France in March of 1989.

The VT-1 missile's advanced technology has its foundation in the successful development and production of the Crotale and Shahine missiles. The all-weather missile uses the same guidance technology and delivers the same lethal payload as Shahine, with a faster, smaller and more efficient airframe.

Weather-penetrating RF line-of-sight commands from the Crotale NG guide the missile to the target while the receiver/transponder al-

lows for maximum ECM resistance. Steel fins, which fold back for easy storage in small launch tubes, control the rocket in flight. The high-pressure blowdown control system controls the aerodynamic movements of the fins, ensuring reliability, low weight and a long storage life.

The missile's 35g maneuverability, 10-kilometer range and Mach 3.5 speed allow it to intercept a target maneuvering at up to 9g at eight kilometers in approximately 10 seconds. The VT-1's focused fragment warhead and fuze operate with an electronic time delay, placing the missile's warhead in the most lethal position before it detonates. The RF-proximity fuze detonates the warhead near the target to increase its effectiveness. The command-to-line-of-sight guidance system's narrow beam is impervious to clouds and other visual obscurants.

Industrial production of the VT-1 began in mid-1989. The first series will be shipped in 1991 under a contract LTV signed with Thomson CSF in 1988.

Sol-Air, Moyenne Portee

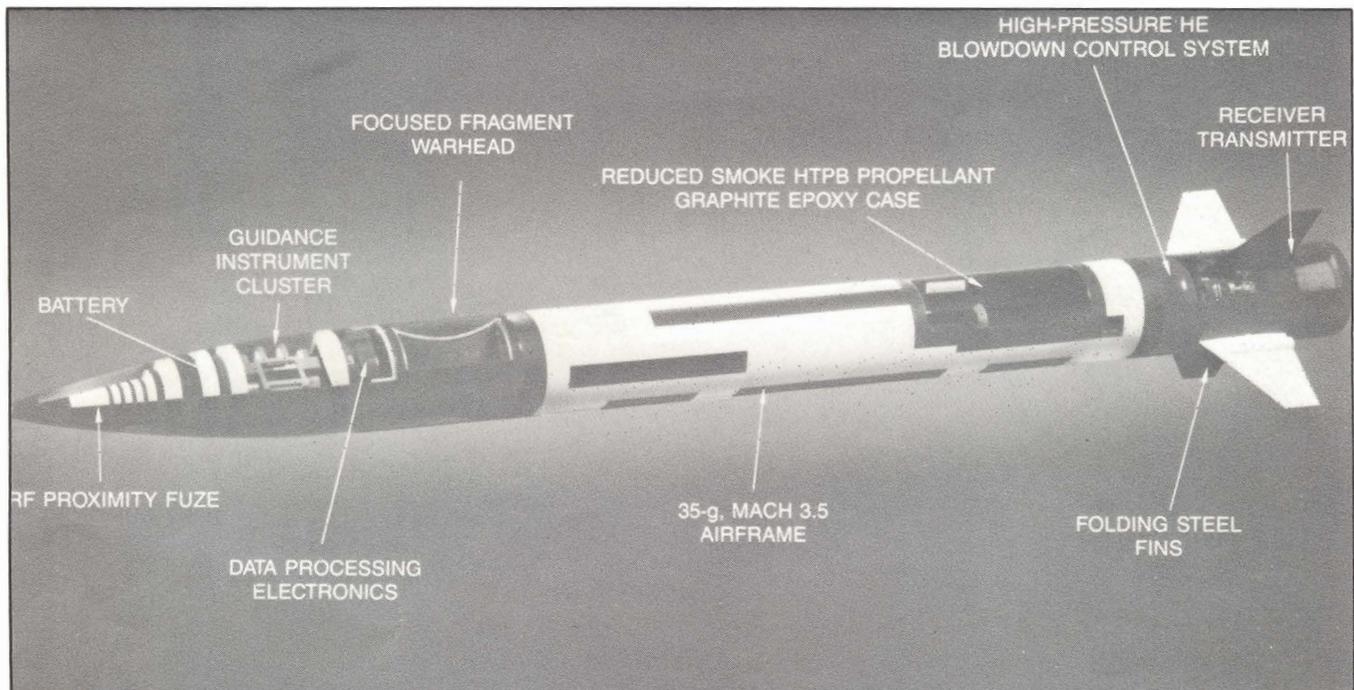
Technological progress continues, and nowhere is this more true than in the weapons systems field. Strategists foresee future air attacks consisting of heavy saturation attacks of high speed missiles maneuvering at very-low altitudes. Meeting this threat will require fully automated air defense systems with increased anti-missile and anti-aircraft firepower.

Thomson CSF, Aerospatiale of France and Selenia of Italy have created the Eurosam consortium to design, produce and market the Sol-Air, Moyenne Portee (SAMP) ground-based and the Surface-Air Anti-Missile (SAAM) naval missile systems to meet the full range of air defense requirements.

Each system in the new missile family will be based on two modular elements used for both naval and land requirements: a new fire control unit with a multifunction radar and the Aster high-agility terminal missile.

The Aster 30 has a longer booster than the Aster 15, giving it a range

Crotale NG fires eight missiles at Mach 3.5 (8km/10 sec). The VT-1 missile combines speed with maneuverability.



of at least 15 kilometers against highly maneuverable supersonic missiles and a range of more than 30 kilometers against aircraft. The Aster 15, tailored for naval operations, has a range of about eight to 10 kilometers against supersonic missiles and 15 to 17 kilometers against aircraft. The missile will be highly maneuverable, up to 50g, using the new direct-thrust and aerodynamic control (PIF/PAF) guidance system.

The system will be able to track up to 50 targets and simultaneously engage up to 10 targets, with a four-second reaction time from first detection to the actual launch of the Aster missile.

The two-element Mygale system meets very short-range needs of air defense artillery and works independently and in tandem.

Mygale Missile System

To meet very short-range battlefield needs and to increase the effi-



ciency of very short-range air defense artillery, Thomson CSF developed the Mygale very short-range weapon system. Two main elements comprise the Mygale system: a warning and control center named Samantha and several fire control posts named Aspic. Both elements are independent but are designed to work in tandem.

The Samantha warning and control center is a dedicated tactical command post for battle management of close-in air defense units. Samantha ensures early threat detection and can track as many as eight targets at a time, while protecting friendly aircraft. It relies on the new generation Griffon pulse Doppler search radar with frequency hopping and integrated IFF features for surveillance, detection,



identification and evaluation of incoming threats at ranges of eight kilometers for hovering rotary-wing aircraft and 18 kilometers for fixed-wing aircraft.

The Mygale, a close-in weapon system, integrates Samantha via a two-way data link with up to eight

Aspic automatic firing units, which comprise the weapon system element of the overall system. The Aspic firing units use television cameras and infrared equipment to provide automatic target acquisition and tracking. Aspic seeks, locks on and monitors the target, waiting for

the appropriate time to engage. The firing unit then immediately engages the next target.

The system uses the Mistral short-range surface-to-air missile, for example, and can be adapted for use with other surface-to-air missiles such as the Stinger, RBS-70 or SA-7.

The Aspic firing unit may be operated autonomously using the ARES target designation aid helmet. The helmet allows the operator to remotely control the firing unit from a distance of up to 50 meters.

Future Developments

Advanced research and development and dedication to state-of-the-art manufacturing have made Thomson CSF a leader in air defense weapon systems. According to company figures, DSE currently has approximately 37 percent of the market share and is rivaled in the European market by Euromissile, with 17 percent, and British Aerospace, with 15 percent.

Presently Thomson CSF and British Aerospace are in advanced stages of negotiations to form a joint venture missile company, Eurodynamics Project. Eurodynamics Project will become the number-one producer of missiles and anti-aircraft systems worldwide.

Mr. Bertrand de Fouchler is vice-president of U.S. Operations, Sales Department, Electronic Systems Division, Thomson CSF, in France.

Editor's Note: Thomson-CSF is the first major air defense contractor covered in our "Giants in Air Defense" series. Other giants will be featured in upcoming issues.

Consortium Wins COBRA Contract

A consortium comprised of Thomson CSF of France, Siemens of West Germany, Thorn EMI Electronics of the United Kingdom and General Electric of the United States recently won a development contract for the Counter Battery Radar System (COBRA). The award follows the recent signing of a memorandum of understanding by the French, German and British Ministries of Defense.

COBRA is designed to accurately locate enemy weapon positions in heavily dense combat environments and can operate despite enemy electronic countermeasures. The EURO-ART concept for COBRA is based on an advanced multifunction radar with

an active solid state technology antenna. Thomson CSF, with the aid of the French Délégation Générale pour l'Armement and its own internal resources, has developed the gallium arsenide technology needed for the new active antenna concept.

The European tri-national cooperative program's development phase should last three years. Two additional years are scheduled for testing the prototypes, to be followed by a production contract between the three nations.

General Electric has been working with the consortium, providing its expertise in the radar industry. A large market for COBRA is foreseen in the United States.

*An off-the-wall
(but on-target)
look at air defense*

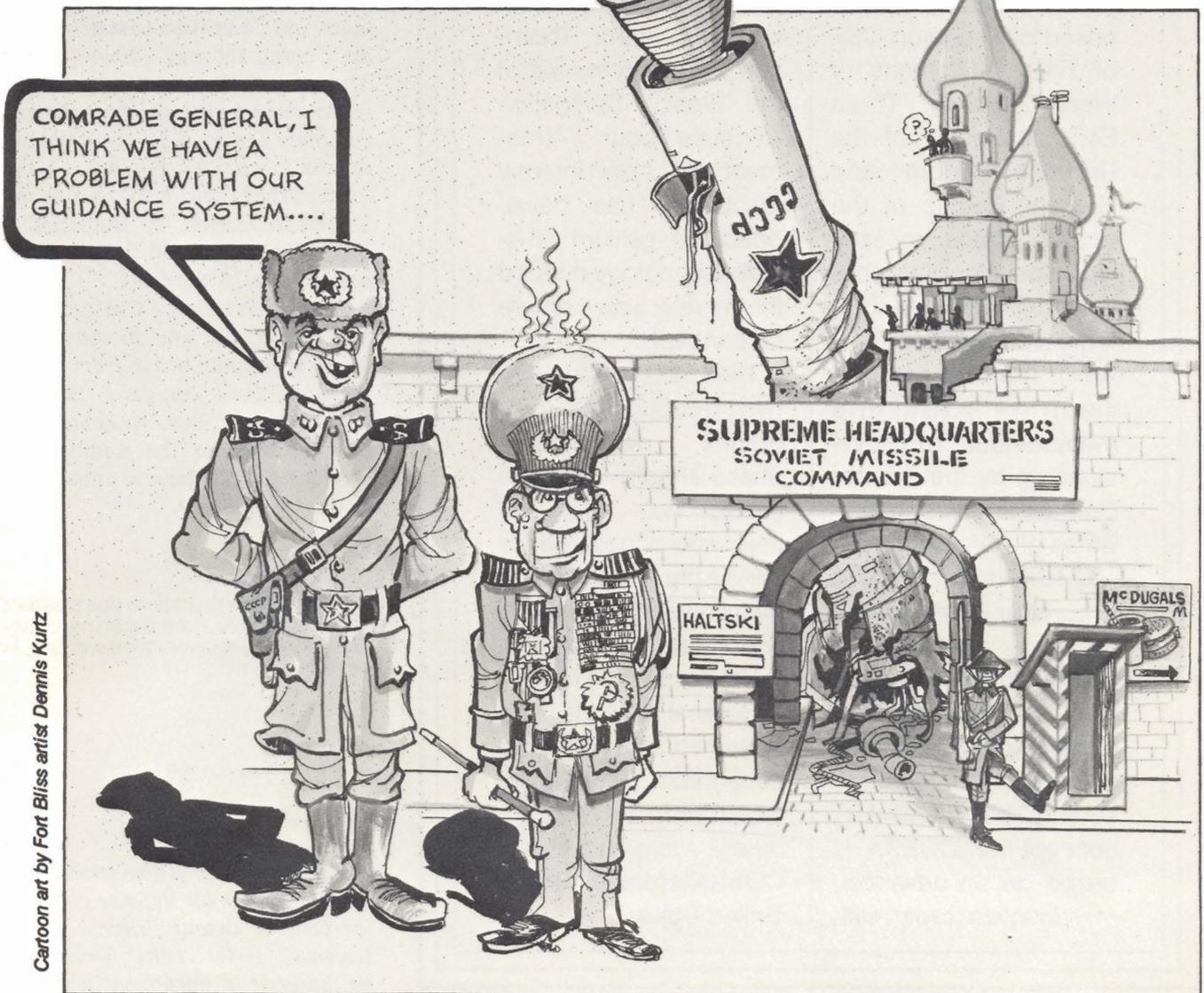
Hangfires, Misfires & Duds

by 2nd Lt. James D. Crabtree

If you're like most present-day air defenders, you grew up watching Wily Coyote trying to outsmart the Roadrunner on morning television. Remember how the elaborate booby traps and fantastic weaponry the coyote devised always back-fired? Probably you thought they were the sort of thing only a "Toon" could dream up. Wrong. The military-

industrial complex has its own version of *Looney Tunes*, and many of them featured air defense weapon systems.

During World War I a new problem came along that soldiers had to deal with. In addition to bugs, mud, artillery barrages, nasty food and generals (it doesn't matter whose), the doughboy of the Great War had to deal with aeroplanes. At first they sort of just flew around and scouted for the enemy; that was bad, but nothing the soldier couldn't live with. Then the flyboys started to direct artillery fire; that was *really* bad, and the doughboys felt like



Cartoon art by Fort Bliss artist Dennis Kurtz

something ought to be done about it. Then the flyboys mounted machine guns on their planes and got into the nasty habit of strafing the trenches when they got bored. It was when some doughboy looked to the sky and said, "That sucker (or some other expletive) has got to go!" that the first air defense weapons were born.

The first guns were field artillery pieces that someone got the idea to rig up at a high angle. Now they could fire into the sky, but they still needed a reliable aiming method. So they invented a sophisticated aiming device to solve the problem: a bottle opener with string across the open end to provide a reason-

able guess at an aiming point.

These jerry-rigged antiaircraft guns were less notable for their accuracy (it took thousands of rounds to shoot down a single plane, statistically speaking) than for their nuisance value. After all, one can't underestimate the effect on the Red Baron when he saw a single gun pointed straight at him . . . and a soldier holding a bottle opener in one hand and an empty bottle in the other saying "ready, aim, . . ."

Barrage Mortars

When Japan became involved in the Pacific War their air defenses got lowest priority when it came to defense spending. The Japanese fig-

ured, "Why worry about air attack? Don't we have an ocean to protect us?" They should have paid more attention: that was the same mind set we had when Pearl Harbor took place.

After the Doolittle Raid on Tokyo it rapidly became obvious that the previous policy toward air defense was wrong, and that it might actually be a good idea to get something to shoot down all those American planes that were giving Tojo fits. In addition to the conventional antiaircraft guns (none of which worked very well), the Japanese developed a unique antiaircraft weapon: the barrage mortar.

The weapon consisted of a crude



mortar tube with a wooden base and spike and a specialized mortar shell. The 70mm or 81mm tube had no settings, controls or adjustments to make; the tube was simply planted into the ground and fired. The barrage shell reached an altitude of 1,700 feet, where the main container would release seven explosive charges. The mortar shell and the charges, dangling on cords, floated toward the ground on parachutes.

The main drawback of this early attempt at man-portable air defense was an overall lack of effectiveness. When used against Allied planes, it could hardly be aimed or directed with any accuracy. In fact, the chances of a charge striking, much less effectively damaging, an aircraft (even with enthusiastic mortar crews dropping dozens of shells into their tubes) were slight at best. Even if a pilot was unfortunate enough to hit a cord, the explosive charge was so small that it rarely caused critical damage.

This made the barrage mortar almost totally ineffective as a weapon. It neither destroyed aircraft, nor was it able to discourage attacks as a nuisance weapon: pilots rarely knew they were even under attack!

As first lord of the British Admiralty, Winston Churchill came up with much the same idea as the Japanese. Churchill's brainchild was the naval wire system (NWS), a deck-mounted air defense system that looked something like an umbrella. The NWS launched bomblets, dangling by wires from parachutes, above naval task forces to protect them from attacking aircraft.

In theory, the NWS worked fine; in practice, the bomblets tended to rain down on the very vessels they were designed to protect! "Everyone but Winston thought NWS was pure lunacy," said an Admiralty staffer, "but it was the price of keeping him going."

Wind Gun

Germany is renowned for its secret weapons. The V-1, the V-2, the first jet fighter . . . all of which worked. But Germany had a lot of weapons that *didn't* work: the V-3, a manned version of the V-1 "Buzz Bomb" that suffered from a lack of volunteers; the Maus (a tank that was so heavy it could only move at five miles per hour); and, finally, the Wind Gun.

The concept behind the Wind Gun was that compressed air could damage aircraft. As designed, the weapon used a combination of oxygen and hydrogen to project a plug of air at an enemy aircraft. Amazingly enough, the scientists who designed it thought that such a plug could damage an aircraft. In practice, it could barely break wooden boards at close range; it doesn't take much imagination to figure out what effect (if any) it would have on metal-skinned aircraft.

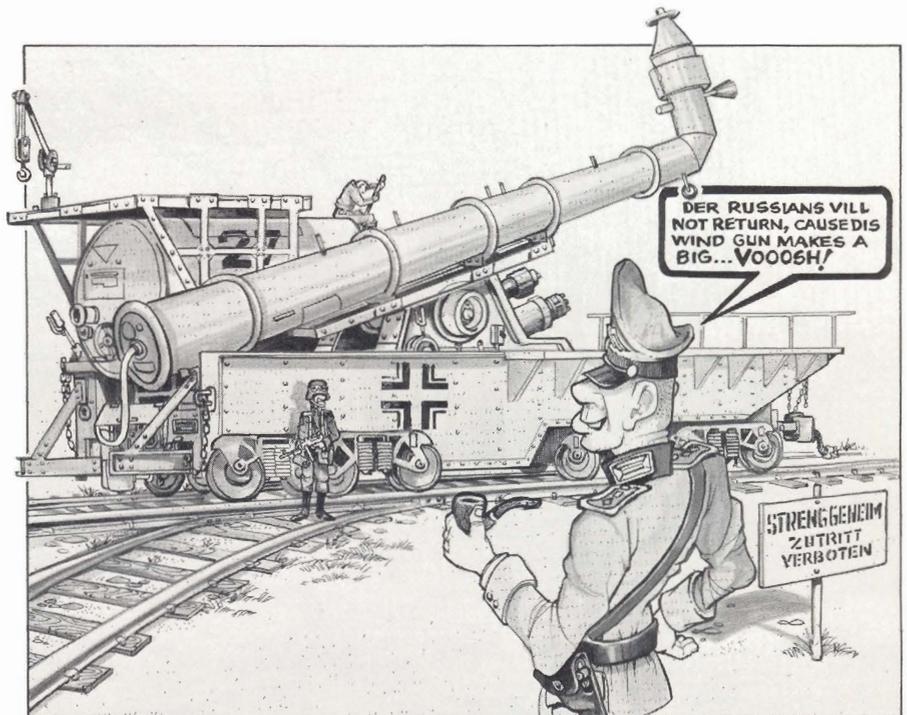
Nevertheless, the situation was so desperate that this huge, ungainly, unlikely air defense weapon was actually deployed on the Eastern Front. There is no record of its use

from either side: the Germans probably never filed one out of embarrassment and the Russians probably never noticed its use at all!

The Twin 57mm

One of the major air defense problems uncovered during World War II was the need for a gun system that would cover the altitude between the heavy guns, such as the American 90mm and the German 88mm, and the automatic weapons, like the American Quad 50. No satisfactory solutions were ever found, but many attempts were made. One of these attempts was the British 57mm gun.

This gun, called the 6pd 6cwt, is probably the classic example of an air defense weapon designed by committee. A dozen different versions appeared: one version shot at motorboats (I didn't make that up), one version had an automatic loader bigger than the gun itself, a rapid-traverse version (which got stuck a lot and was less reliable than the manual traverse version), as well as sprung, partially sprung and un-sprung versions.



This would not be unusual in itself except that practically none of these guns were ever actually deployed. Every time the latest modification was incorporated (or squeezed in, as the case may be), production was held up . . . until a new specification was met. It was declared obsolete in 1948 . . . something no one ever doubted.

Griffon

The Soviets have always been rather secretive about their defense technology. Therefore, it is not surprising that we in the West have very little information on a missile deployed around Leningrad in 1960 and tentatively given the code name "Griffon."

The missile was considered a disaster. We can't be sure exactly why, because the Soviets are notably reluctant to admit to failure (see "Chernobyl Brand Glow-in-the-Dark Watches"), but this lack of information allows us to speculate. Perhaps a Griffon missile went ballistic and destroyed the 3rd Patriotic Peasants and Workers Grenade

Factory, or maybe the missile had an unfortunate tendency to lock on to Volga limousines (it would be a tragedy for the Soviet Union to have a Party member meet Lenin).

It is a pity the Soviets aren't more open . . . people in the West seem to make up worse things than could possibly actually happen.

In any case, the Russians rapidly began to dismantle the missile bunkers only a few years after they were constructed. Its radars seemed to have never been installed at all. Within a short time the Soviets had dismantled all of the Leningrad sites with an eagerness they seem to reserve only for obsolete or unreliable weapons.

Sergeant York

The concept of the Sergeant York gun was sound: a system to provide divisional air defense and to replace the Chaparral and Vulcan air defense systems, which were supposed to be interim weapons until a dedicated ADA system came along. But after that, the whole idea went sour and Sergeant York ended

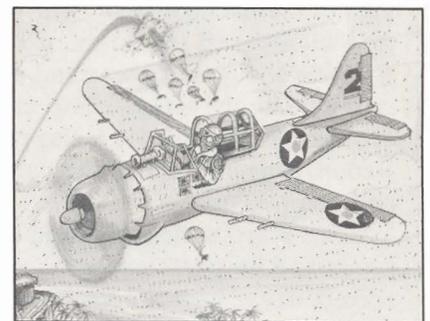
up doing for Air Defense Artillery what Three Mile Island did for nuclear energy.

Ford Aerospace won the Army competition with a hybrid: it used a Swedish L/70 40mm gun, an M-48A5 tank chassis and the tracking radar from the F-16. By using off-the-shelf components, they hoped to reduce maintenance and development costs. The equivalent would be the design of a helicopter . . . using a Volkswagon engine, a windmill for blades and a Piper Cub for the fuselage. The built-in problems with Sergeant York ended up costing the taxpayers \$1.8 billion dollars.

What was worse, the Soviets had a new standard missile for their helicopters, the AT-6, with a range of about six kilometers. The Sergeant York's maximum range was four kilometers . . . assuming the computer could "see" it to hit it.

In Conclusion

To expect no mistakes in the development of future air defense weapons systems would be the height of hubris — which would assume that humans are incapable of error. Until perfect humans somehow materialize, we must expect and accept that mistakes will be made. As air defenders, we must simply remember that it is okay to make mistakes — as long as we learn from them.



2nd Lt. James D. Crabtree is an assistant platoon leader in B Battery, 2nd Battalion, 1st Air Defense Artillery, Fort Bliss, Texas.



ADA FORUM

Color Guards

Fully clad in their dress blues with armed guards on their left and right, they march along with timely precision, boldly bearing the United States flag and the flag of the United States Army. They are the specially chosen few — they are the color guard.

The color guard is a team of soldiers dedicated to upholding the tradition of posting the colors in a sharp military manner. Their hard work and diligence is an art form worthy of recognition by their unit, their division, the Army and the nation.

A color guard consists of two or three sergeants and two specialists or privates. It is a special honor to be selected as a member of the color guard. The senior sergeant, the color sergeant, carries the national color and commands the color guard. He gives the necessary commands for movements and for rendering honors.

The national and organizational flags the color guard carry are called the national color and the organizational color. When used singularly, the term "color" implies the national color. The term "colors" means the national and the Army or organizational colors.

Traditionally, the command sergeant major is responsible for the safeguarding, care and display of the organizational color. He is also responsible for the selection, training and performance of color bearers and color guards.

Color guard uniforms should be the same as those prescribed for participating troops. There is only one correct way to wear the Army uniform — as described in AR 670-1. There is only one correct way to post colors — according to FM 22-5. Let's do it the correct way.

The color guard forms and marches in one rank at close interval, the bearers in the center. They do not execute rear march or about face. The color guard marches at right shoulder arms and executes facing movements by wheeling to the right or left.

Before the Civil War, in lieu of a national color, the U.S. soldiers carried a blue silk color embroidered with the arms of the United States and an American eagle. The eagle bore a shield on its breast and held in its talons an olive branch and arrows, signifying peace and war. After the national color was authorized to be carried by Army regiments, the organizational color with the eagle became the regimental color. Today, the colors, with battle streamers attached, join their unit formations during ceremonies to signify their presence during past battles.

The command for a facing movement is **right (left) wheel march**. To execute a wheeling movement, the guard nearest the direction of turn serves as the pivot point and

executes the movement by marching in place and simultaneously turning in the new direction. Other members shorten their steps and turn in an arc, keeping abreast of each other to maintain alignment. When the movement is complete, each member automatically marches in place until the command **halt or forward march** is given.

During ceremonies, the color guard remains at right shoulder arms except when presenting arms.

Formal indoor assemblies begin with presentation of the colors, referred to as posting the colors, and end with retirement of the colors.

The color guard forms outside the entrance to the dining area, auditorium or meeting hall. The audience



ADA FORUM

stands until the colors are posted. If the playing of the National Anthem (or other appropriate music) and the invocation are scheduled, the audience will remain standing until they are completed.

When the arrangements include a head table, the color guard enters in a line formation (preferable) or forms in a line immediately inside the room and moves to a position centered on and facing the head table.

When the colors arrive at the predesignated position, the color sergeant commands **colors, halt and present arms** and reports "The colors are present." The host acknowledges the report and directs, "Post the colors." The area should allow adequate space for the color guard to move between the head table and the flag stands.

The color sergeant then commands **order arms, right face and forward march**. On the command of execution **march** the color guard marches to the rear of the head table.

Once the color guard is centered on the flag stands, they mark time and the color sergeant commands **colors halt and right face**. The color guard should approach the flag stands from the right to position the national color bearer in front of the flag holder on the right, facing the audience.

The color bearers, without command, place the colors in the stands. The color bearer with the Army flag, without command, makes sure that the first (Yorktown) and last (Panama) battle streamers are side by side and visible. When the colors are in the

stands, the color sergeant commands **present arms and order arms**. The guards return to right shoulder arms, the color sergeant commands **left face and forward march**, and the color guard exits the area.

At the end of the assembly or evening's activity, before the host leaves, the colors are formally retired (the audience stands while the colors are retired).

The color sergeant commands **color guard halt, left face and present arms** and reports to the host, "Sir, request permission to retire the colors." The host acknowledges the report and directs, "Retire the colors."

The color sergeant commands **order arms, right face and forward march** and moves the color guard until they are centered on the flag stands where they mark time.

The color sergeant commands **color guard halt, right face and present arms and order arms**. The color bearers then, without command, retrieve the colors and assume the carry position. The color sergeant commands **left face and forward march**. The color guard exits the area.

Few areas show the state of a unit's training faster than the public performance of the unit's color guard.

I charge each ADA organization's command sergeant major to select, train and field a color guard that will enhance the unit's public image.

— CSM Robert W. Harman
U.S. Army Air Defense Artillery School



Army Considering XM-293

by Mr. George Kontis and Mr. Sal Fanelli

Recent trends in air defense system development concentrate on the use of missiles as the primary anti-aircraft weapon, guns having been relegated to serve as secondary armament against aerial threats and as the primary armament against ground targets. However, proper selection of the type and caliber machine gun can provide accurate anti-air capability in addition to formidable ground-to-ground firepower.

A new .50-caliber, single-barrel weapon system, presently under consideration by the U.S. Army as part of the secondary armament for at least one of the new forward area air defense vehicles, has been developed and produced in Belgium by FN Herstal s.a. (FNH). The United States has already adopted two other FNH developments, the 5.56mm M-249 Squad Automatic Weapon and the 7.62mm M-240 machine gun. The new .50-caliber weapon, designated the M-3P by FNH, is known as the XM-293 in Army circles.

The M-3P is a derivative of the United States' AN-M3 aircraft machine gun and has many components in common with the venerable .50-caliber M-2 heavy barrel vehicle and infantry model machine gun. The modifications from the original AN-M3 design increase the reliability at a rate of fire considered to be the maximum for this caliber in a recoil-operated weapon of this design. Similarities between the M-2 and M-3P are such that the M-3P can be co-produced on the

same production line as the M-2.

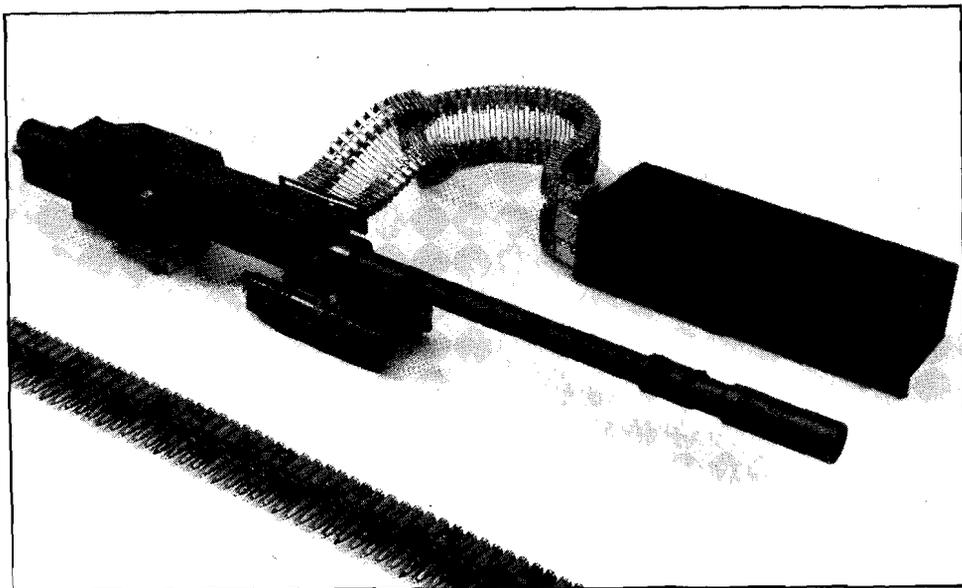
The M-3P delivers accurate fire at an effective range of 1,850 meters with maximum range out to 3,000 meters. Engineering studies have confirmed what common sense would indicate, that for the short time on target experienced in ground-to-air combat, hit probability increases as the rate of fire increases. The M-3P develops a rate of fire of up to 1,100 rounds per minute — more than twice that of an infantry M-2.

While the merits of larger calibers are certainly worth consideration, certain important advantages accrue to the .50-caliber system. The .50-caliber ammunition has excellent ballistic characteristics and a relatively short flight time. Ammunition impulse is low compared to larger calibers, resulting in lower re-

coil loads — a must for deployment on lightweight structures. The M-3P is a self-powered weapon, eliminating the need to provide drive power from the turret — another weight-saving measure.

Another advantage to the .50-caliber system is its ability to share the ammunition supply with members of the armored vehicle community, such as the M-1 tank and M-113 armored personnel carrier, which use the M-2. System cost is another consideration. Not only is the ammunition less costly than larger calibers, but the M-3P system itself is about one-quarter to one-third the cost of 20mm or .50-caliber Gatling systems.

An air defense system becomes vulnerable to aerial threats if there are no missiles ready to fire or if the threat enters the airspace where the



missile is arming. This distance, known as the "missile dead zone," can range out to one kilometer. In this region the gun becomes the primary armament; thus, it is important to meet the threat with more than a low rate of fire machine gun aimed using tracers with the tactic appropriately nicknamed "spray and pray."

Effective machine gun engagement of aerial targets is best achieved when an accurate weapon is precisely mounted on a turret having predicted fire capability. That is where target range and air-speed are considered along with ammunition velocity and bullet drop such that the weapon will be aimed and fired at a point where the aircraft will be hit.

The trend to lighter composite material aircraft structures and redundancy in flight controls greatly reduces the vulnerable areas for effective anti-aircraft fire. Armor-piercing and even some of the older incendiary ammunition provide marginal effectiveness against these aircraft. The new HEPI ammunition has been shown to be far more effective against these structures since the armor-piercing capability is followed by fragmentation and incendiary effects.

The M-3P weapon system is a mature non-developmental item currently used in a lightweight gun pod, designated HMP, used with both fixed- and rotary-wing aircraft in NATO and by many U.S. allies. The requirement for accuracy, high rate of fire and durability for the podded weapon are similar to those required in a modern air defense system. Required system accuracy can only be achieved when gun system inaccuracies are minimized. This means that the ammunition dispersion from the weapon, weapon mounting and recoil effects of the weapon on the structure must all be minimized lest their cumulative effect result in a system too in-

accurate to be tactically useful.

System Characteristics

The M-3P system is comprised of the M-3P machine gun with solenoid sensor assembly, elastic cradle, boresight assembly, remote charger and ammunition box. These system components provide effective, reliable functioning of the weapon in either a gun pod or an air defense vehicle.

Gun and Solenoid Sensor Assembly. The M-3P machine gun is a Browning short recoil cycle operated, air cooled, belt-fed weapon 66 inches long and weighing 76 pounds. Rate of fire is operator-adjustable from 950 to 1,100 rounds per minute. The modifications from the AN-M3 machine gun allow for right or left hand feed, reduced weapon signature, a modulated rate of fire and increased weapon reliability. Historically the AN-M3 has been a reliable weapon, demonstrating 4,000 mean rounds between failure in U.S. Air Force testing. This high reliability and the AN-M3's widespread availability combine to make it the selection as the baseline for modification into the M-3P.

A 28-volt DC signal activates the solenoid sensor assembly, which is mounted on and used to remotely fire the weapon. The sensor assembly also provides an electrical signal to the on-board fire control unit, used as a means of counting rounds fired, to indicate the rounds remaining.

Elastic Cradle. This device attenuates the recoil loads produced by the weapon, an important advantage for weapons mounted on lightweight structures. Since the weapon is recoil-operated, this mechanism provides the required recoil dampening effects while at the same time allowing the recoiling barrel machine to function. Besides a critical spring balance design, this precision device minimizes motion of the

weapon in all directions perpendicular to the recoil direction to minimize weapon dispersion.

Boresight Assembly. This device adjusts the machine gun in azimuth and elevation to properly harmonize the aiming point of the weapon with the sights of the air defense system. The boresight assembly is designed to mount the remote charger.

Remote Charger. This device charges the weapon for loading and in the event of a misfire or weapon jam. The remote charger also restrains the gun bolt rearward as an added safety measure when the gun is not in use.

Ammunition Box. This stainless steel container stores 250 rounds of .50-caliber ammunition linked with the M-9 link — the same link used with the M-2 machine gun. The ammunition box has attachment points for a flexible ammunition chute.

System Maintenance

Lack of maintenance has been shown to be a major factor in equipment failure. A maintenance program for the M-3P system, developed only after exhaustive studies involving firing tests to develop realistic component life, takes into account the life expectancy of system components.

As a result of these studies a "kit" concept was developed for parts replacement. These kits, provided for each 2,500-round interval, contain all necessary parts.

A detailed manual covers care and cleaning of the M-3P machine gun. Following the regularly scheduled maintenance program outlined in the manual reduces downtime and assures that the system is available when needed.

Mr. George Kontis, FN Herstal's sales manager North America, introduced the M-3P into the U.S. Army. **Mr. Sal Fanelli**, FN Herstal's technical sales manager, has been involved with the M-3P since the beginning of its use by the Army.

The ADA battalion couldn't survive without

Early Warning by

by Capt. William H. Philbrick

The balloon has gone up. The division must provide timely, gapless early warning of enemy air attacks over a 3,600-square-kilometer area to ready ground troops, maximize air defense and mass small arms for air defense.

The improved high frequency radio (IHFR), AN/GRC-193A and AN/GRC-213, using the near vertical incident skywave (NVIS) method of communications, provides the answer. This gapless long-range communication is critical to the success of timely early warning and other key division-type contingency area communication requirements.

The Army, beginning with the fielding of this "user friendly" radio in 1987, faced many problems in developing a dependable system. Lt. Col. Jewell W. Jeffrey Jr., who assumed command of the 1st Battalion, 5th Air Defense Artillery, Fort Stewart, Ga., in June 1988, realized that AM communi-

cation was a necessity for successful division early warning: "AM communication is critical to all contingency missions for early warning. We can't survive as a battalion without it. We simply must get serious

about AM communications!"

The main problem? Training air defenders, or any other non-31-series military occupational specialty (MOS), in the forgotten science of high-frequency (HF) communications. Unclear technical manuals and a vague materiel fielding plan only complicated matters. The lack of institutional knowledge in this area, coupled with hurried fielding, led to initial equipment failures in the field and a subsequent "bad name" for the system.

Since July 1988 the 1-5th ADA, with initial assistance provided by the Single Channel Ground-to-Air Radio System Program Man-

test results support the same findings: using properly installed equipment operated by properly trained personnel, both the AN/GRC-193A and AN/GRC-213 can do the job.

Training is the primary key! Non-signal MOS personnel will become proficient with the IHFR radios only if properly trained. The average battalion in a divisional element focuses on FM very-high frequency (VHF) communications. With HF (AM/single sideband [SSB]) communications, the assistant division signal officer and division frequency manager occupy key roles. Prioritizing nets and providing proper operating frequencies are essential to success. Once they have the proper frequencies, radio telephone operators (RTOs) must understand the basic principles of HF communication to operate the equipment.

In the 1-5th ADA we have overcome the training problem by initiating a two-day "RTO certification" program that teaches these basic principles to the operator. Only after the operators are armed with an understanding of how, why and when atmospheric changes will affect their radio system can we expect them to operate

The Army made a very smart investment in a dependable system when it purchased the IHFR family of radios.

ager and Army Communications-Electronics Command (CECOM), Fort Monmouth, N.J., and the Communications-Electronics (C-E) Test Board, Fort Gordon, Ga., has tested the IHFR many times. All

AM Communications

it under harsh battlefield conditions. The half-day of basic instruction on the ionosphere and antenna propagating principles helps operators avoid many problems. The remaining day and a half of hands-on training reinforces the principles discussed in class.

With VHF radios, field expedient ideas often have maintained communications at key points of battles. In our course we stress proper installation because of the sensitivity of the IHFR equipment. The AN/GRC-213 technical manuals fail to stress several vital areas that may cause an apparent equipment failure. The first major problem centers around the radio frequency (RF) cable. None of the technical manuals mention specifications of the RF cable length as an important issue. The only guide to the user is that the installation kit lists a 40-inch RG-114 cable for commercial utility cargo vehicles and a 60-inch RG-114 cable for high-mobility, multipurpose wheeled vehicles. What the instructions fail to say is that if you locally fabricate an RG-114 cable at a length greater than 60 inches, you lose the majority of your output power before the

signal even reaches the antenna. The RG-114 RF cable, made of an extremely fragile hair-like single-strand copper wire, tends to break easily in a field environment. The internal insulation also stops approximately five millimeters short of the soldered connection to the center conductor pin, often resulting in a recession of the center conductor pin and prevention of contact between the RF cable and antenna base.

During one test conducted in conjunction with the C-E Test Board, we substituted regular VHF RG-58 antenna cables with an adapter (connector NSN 5935-00-

the AS-2259(NVIS) antenna.

Equipment ground was the second major maintenance-related problem. The snap-link ground straps that connect from the mount to the RT-1209 and the amplifier power supply are often removed or broken because of the need to remove the AN/GRC-213 when the vehicle is stored in a motor pool. Also, the grounding strap must be removed from the back of the RT-1209 when placed into the AN/PRC-104 configuration or the attaching screw prevents connection of the battery box. Absence of one or both of these grounding straps significantly reduced or even prevented successful operation of the equipment.

Location of the whip antenna ground strap was also a major issue. If the hose clamp type end of the ground strap is connected to the base of the antenna mount (vs. being placed over the end of the RF cable after attachment), it will preclude actual connection

of the center conductor pin of the RF cable to the antenna base. Improperly installed, the radio will still appear to operate correctly but will suffer greatly reduced transmission capabilities.

None of the technical manuals mention specifications of the radio frequency (RF) cable length as an important issue.

259-0205) for the RG-114 cables with no noticeable degradation of performance. Length of the cable was always 22 feet or less. The cable proved harder in a field environment and also aided in setting up

NVIS operation is another key to success with the IHFR. Any ideas the Army entertains in the area of low-power HF communications must focus in this area. The prioritization of nets and consequent proper frequency management in the 24th Infantry Division (Mechanized) (24th ID) has ensured our repeated success. In NVIS communications division frequency managers should, at least quarterly, review close frequency planning of the

maximum usable frequency, lowest usable frequency and frequency of optimum transmission for both daytime and nighttime operations.

A computer program on frequency management, MINIFT.Z4, developed by Dr. Thomas Damboldt of the West German *Deutsche Bundespost*, has proven its value by providing very accurate frequency predictions. Initially acquired from Mr. Frank Gorman, a CECOM electrical engineer, this program has since

been adopted by the 24th ID's division frequency manager.

The program requires the following input data: latitude and longitude of stations, month and year, sun spot number, transmitter power and antenna gain. It then provides a decibel-scaled signal-to-noise ratio of 11 predesignated frequencies for the 24-hour period in universal time (see the sample printout below). Results of these predictions may then be used to frequently up-

MINIFT.Z4 Frequency Predictions

Input Data:

Circuit: ADCO - 02
 Location: 35.0N 83.0W 33.5N 82.3W
 Azimuth: 158.7 deg.

Distance: 179 km
 Min-Ang: 3.0 deg.
 Mo/Yr: June 89

SSN: 165
 Power: 0.400 kw
 TX-Gain: 0.0 db

Predictions:

R	UTC	MUF	DBU	FOT	3.0	4.0	5.0	6.0	8.0	10.0	12.0	15.0	18.0	22.0	26.0
000	1	8.4	25	6.9	22	29	32	31	27	14	4	-4	-9	-13	-14
100	2	8.3	26	6.8	25	31	33	32	27	14	3	-4	-9	-13	-14
200	3	8.4	26	6.8	27	32	34	33	28	14	4	-4	-9	-13	-14
300	4	8.4	27	6.8	29	33	35	34	28	15	4	-4	-9	-12	-14
400	5	8.3	27	6.7	31	35	36	34	28	14	3	-4	-9	-12	-14
100	6	8.1	27	6.5	31	35	35	34	27	13	1	-5	-10	-13	-15
200	7	7.8	27	6.2	31	35	35	33	25	11	-1	-6	-11	-13	-16
300	8	7.6	27	6.0	31	34	34	33	23	10	-2	-7	-12	-13	-17
400	9	7.3	26	5.7	31	34	34	32	19	7	-3	-8	-13	-14	-18
500	10	7.3	26	5.7	31	34	34	32	19	7	-3	-8	-13	-14	-18
600	11	7.4	23	5.6	15	24	27	26	17	5	-4	-8	-13	-14	-18
700	12	7.7	20	5.9	-1	14	20	22	18	7	-5	-8	-13	-14	-16
800	13	8.2	18	6.3	-12	7	16	20	19	8	-2	-7	-11	-13	-15
900	14	8.4	17	6.6	-20	2	13	17	18	8	-1	-7	-11	-13	-14
000	15	8.6	17	6.8	-26	-2	10	16	18	9	0	-7	-10	-13	-14
100	16	8.7	16	7.0	-29	-5	8	15	17	9	1	-7	-10	-14	-14
200	17	8.8	16	7.2	-31	-6	8	14	17	9	2	-7	-10	-14	-14
300	18	8.9	17	7.5	-31	-6	8	14	18	10	3	-6	-9	-14	-14
400	19	8.9	17	7.4	-30	-5	9	15	18	10	3	-6	-9	-14	-14
500	20	8.8	17	7.3	-26	-2	10	16	19	10	3	-6	-9	-14	-14
600	21	8.6	18	7.3	-20	2	13	16	20	11	3	-6	-9	-13	-14
700	22	8.6	19	7.1	-12	7	16	20	21	11	2	-6	-10	-13	-14
800	23	8.6	21	7.0	-1	14	21	24	23	12	3	-5	-9	-13	-14
900	24	8.6	24	7.1	15	24	28	29	26	14	5	-4	-8	-13	-14

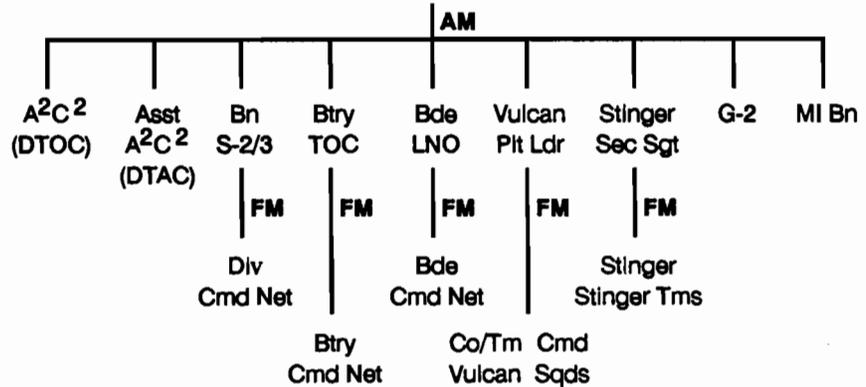
date signal operating instructions to keep up with changing atmospheric conditions. The Army needs to adopt the use and education of NVIS techniques as doctrine and incorporate them into unit training programs. In areas where frequency management is not under their control, units practicing this method of communication miss valuable training opportunities. Deployment to areas such as the National Training Center, Fort Irwin, Calif., is a perfect example of this.

The air defense community's needs have driven the employment of the HF communications previously mentioned. Distribution of these assets according to modified tables of organization and equipment — 45 in a divisional Vulcan/Stinger battalion — attest to the critical requirement for success of the IHFR systems for long-distance early warning. The figure at top diagrams the dissemination of early warning from the "broadcast station," the air defense coordination officer (ADCO), to the listed outstations and also exhibits the subsequent flow of information over maneuver force command nets via VHF. The 24th ID commander, Maj. Gen. H. G. Taylor, recently added other personnel, such as the G-2 and Military Intelligence battalion, as recipients of the division early warning broadcast. The direct reception of early warning by all outstations over the chain of VHF retransmission saves immense time. The illustration at right graphically represents the ADA AM/SSB users' locations in a brigade sector of operations. Double this area by placing two brigades abreast with a third in reserve and place the broadcast station (ADCO) 60 kilometers to the rear at a collocation with the corps ADA radar support, and the necessity for HF communications is evident.

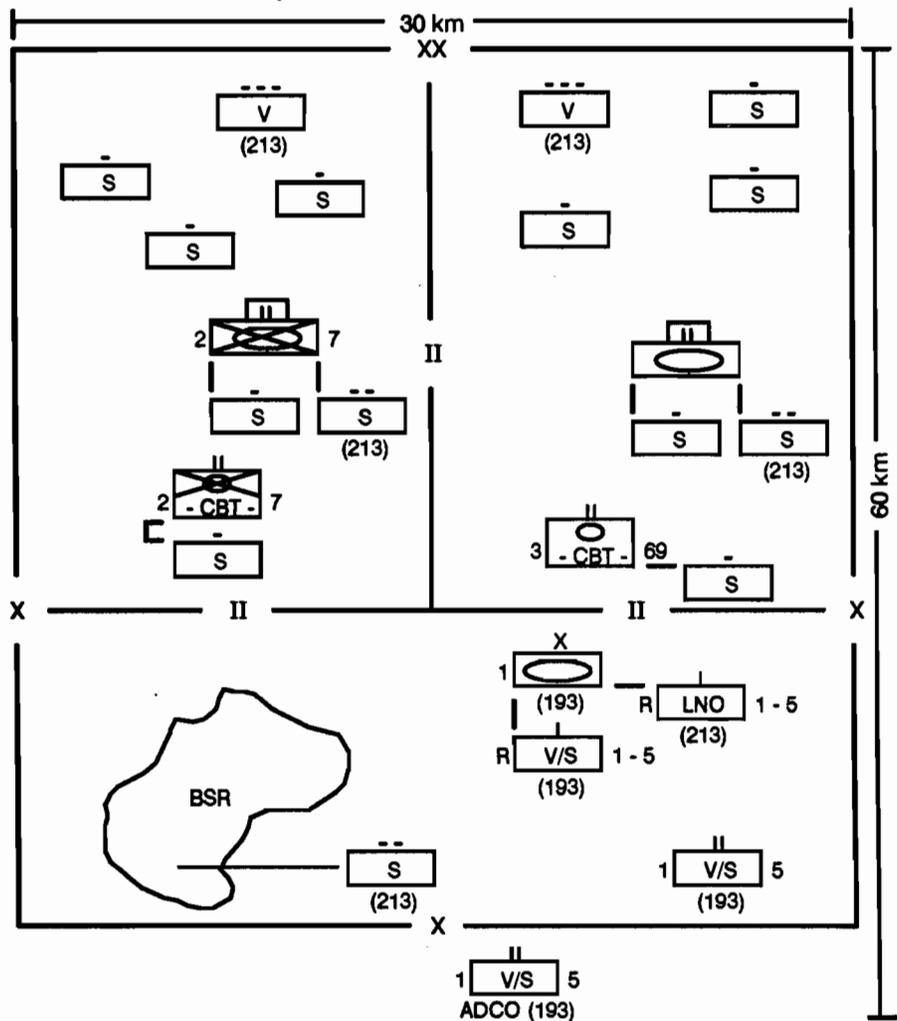
Two major performance tests, coupled with repeated use during

Early Warning

ADCO (Hawk LNO, AWACS)



AM/SSB Users' Locations



quarterly division command post exercises, validate use of both the AN/GRC-193A and AN/GRC-213. The initial performance test proved reliability to a distance of 92 kilometers, where the test was halted due to time constraints. A second test conducted during an expanded 24th ID Signal battalion exercise, Mountain Fighter '89, exhibited the radio's ability to perform on a 24-hour basis to a distance of 415 kilometers. The figure below lists the radio/antenna configurations and distance from the net control station for each site deployed on the Mountain Fighter '89 exercise. During the 96 consecutive hours of early warning broadcast, at a rate of four tracks per hour, 384 total tracks were broadcast to all outstations with a better than 98 percent accuracy rate. Hourly radio checks from the AN/GRC-213 and AN/PRC-104 outstations reported the same results.

Tactical communicators are striving for success with these IHFRs. Still, several shortcomings severely hinder use of this equipment to its fullest potential. The AN/GRC-193A, which comes with a remoting kit equipped with an 80-foot cable reel for remoting the AS-2259 (NVIS) antenna, is also issued with an AN/GRA-39C remote. The AN/GRC-213 does not have the AN/GRA-39C as a component. This severely hampers effective use of the AN/GRC-213 as most users of the radio are located inside tactical operations centers.

The other major shortcoming is the need for a whip-tilt adapter like the one mentioned by Lt. Col. David M. Fiedler in his article on low-power HF radios (*Army Communicator*, Spring 1989). Alan S. Christinsin, U.S. Air Force (retired), has already developed a whip-tilt adapter for the Marine Corps that has been tested and proven effective at Camp Lejeune, N.C. The Marine Corps has acquired these adapters at an approximate cost of \$170 each. Christinsin has also recently developed one for use with the U.S. Army's IHFR family. Without the whip-tilt adapter, we currently break approximately 25 percent of the mast bases each time we deploy for a major field exercise. At \$215 per mast base, the Army stands to save a great deal of money by acquiring whip-tilt adapters. This would also allow HF communicators Army-wide to take advantage of bent-whip NVIS communications.

The Army made a very smart investment in a dependable system when it purchased the IHFR family of radios. As we grow into the most efficient use of this equipment, a small additional monetary investment will assure us of optimum performance from equipment already purchased and in the field. The tactical communicator is increasingly looking toward HF communications as the solution to spanning the great distances between elements that the modern AirLand battlefield presents. Taylor recently added an HF

net, secured with the TSEC/KY-65, as a redundant division command net. 1-5th ADA also depends on HF communications to provide required early warning to the 24th ID.

We must not be lulled into a false sense of security through VHF communications that meet the communications requirements on many restricted-size military training installations. To be prepared as a complete Army ready for any contingency operation, we need to listen to what these tactical commanders are saying through their current training programs: "AM/SSB communication is critical to all contingency missions for early warning. We can't survive as a battalion without it!"

Capt. William H. Philbrick spent 23 months as the 1-5th ADA battalion signal officer. He is a graduate of the Citadel, Military College of South Carolina, and has a BA in political science.

Author's Note: Special thanks to Mr. Frank Gorman, electrical engineer, CECOM, Fort Monmouth, N.J. Without his initial guidance and tutelage, none of the aforementioned successes would have been possible. Alan S. Christinsin, USAF(Ret.), of ASC & Associates Ltd., O'Fallon Ill., also provided a great deal of operational suggestions through his papers and many telephone conversations. Thanks also to SSgt. Jose T. Gomez, 24th ID division frequency manager, whose cooperation and technical competence were instrumental. Sgt. Andrew J. Bliss' and Pvt. Samuel M. Mundell's technical abilities were also key in making major advances in this area. Finally, thanks to the chain of command for their support and to the 1-5th ADA soldiers for their drive; our successes (and this article) would not have been possible without them.

Radio/Antenna Configurations

System	Location	Antenna	Distance
AN/GRC-193A	Highland, NC	AS-2259(NVIS) 16' bent whip	NCS
AN/PRC-104A	Ashville, NC	AS-2259(NVIS)	80 km
AN/GRC-213	Greenville, SC	16' bent whip	40-120 km
AN/GRC-213	Augusta, GA	AS-2259(NVIS)	184 km
AN/GRC-193A	Fort Stewart, GA	AS-2259(NVIS) 16' bent whip	415 km

My Life Among the Duck Hunters OR . . .

ADA shoots down aircraft. This must be clearly understood if anything wondrous is to come of this story. (If Charles Dickens were alive today he would probably slap me for liberally borrowing the above from his work, *A Christmas Carol*.) The truth of the matter, however, cannot be changed.

The more planes that Air Defense Artillery destroys, the fewer aircraft can strike at U.S. forces. To the Air Defense Artillery, the ground threat is only as important as the friendly maneuver unit's ability to manage it. So to be successful, an intelligence officer's attention must be toward the heavens.

Whether you buy that or not, it quickly became clear to me in my first two weeks in the 5th Battalion, 52nd Air Attack Artillery (now changed to 1-5th ADA [Air Attack]). I got an opportunity to strut my stuff in those first two weeks. Believe me, up to this point my record was not too good. Put yourself in the place of the battalion S-3 who welcomes you to the battalion. Your first words to him are that you want to take the leave that was promised

by Capt. Kevin R. Austra

to you before you left the Military Intelligence (MI) battalion. Well, I could take the leave as long as I did a good job at the next operation plan (OPLAN) briefing.

The battalion was due to have an evaluated emergency deployment readiness exercise (EDRE) and my contribution was to be the OPLAN threat briefing. *No problem*. I spent the Saturday before the EDRE reviewing everything I could about the OPLAN. By Saturday afternoon I had 21 note cards ready to go. The S-3 wanted a practice briefing, so I gave him one. I carefully covered events leading up to the current situation, terrain, weather and enemy order of battle, and concluded with the enemy's most probable course of action.

When I finished, the S-3 said, "Good. But what about the air threat?"

"Sir, I covered the air threat at the beginning of the briefing," I said. (I guess he wasn't paying attention.)

"Lieutenant, you told me how

many aircraft they have and showed me some big arrows drawn on the map, but that won't tell the battalion commander anything."

"Well, what else do you think I need to put in the briefing?" (There went what was left of my weekend.)

"The commander needs to know how many of those aircraft are close air support aircraft. How many will we see in our area? What kind of ordnance will they be carrying? What is their combat radius and where are their ordnance release points? Where will the rotary wings be coming from?"

I was shocked. Where was I going to get all this stuff?

The Intelligence School never taught me anything about the air threat. The most my class was treated to was an over-copied slide of an Mi-24 Hind-A during the threat class.

Not much was available on threat close air support tactics. What few references the battalion had vanished when the old S-2 left.

Fortunately I had 40 hours left. But, where to go on a Saturday to find intelligence? The post library initially didn't seem to have a lot on

... OR, how ADA taught

the subject, but their microfiches of the weekly news magazines provided a wealth of information on Soviet air operations in Afghanistan. That one trip to the library provided two-thirds of my briefing.

What I couldn't find at the library became my next year's tax deduction. It was amazing how much information is available in the shopping mall bookstores! By Sunday evening I had more than enough material to build a briefing.

The resultant briefing was well received by the commander and EDRE evaluators. The S-3 (who didn't see the second version of my briefing before the presentation) was visibly relieved. I really earned my pay that weekend and, at the same time, set the tone for my next two years in the unit.

In the ADA battalion, I quickly found that the intelligence officer must tailor his intelligence to the needs of the commander. In the air defense battalion, for instance, intelligence preparation of the battlefield (IPB) is geared toward the air threat. Air IPB was a new one on me. Yes, the S-2 must be prepared to brief the ground threat, but the ADA bat-

talion earns its pay shooting down aircraft, not chasing BMPs. After that first briefing, for every field and command post exercise I kept

the ground threat and all those standard parts of the intelligence briefing to a two-minute summary. The air threat occupied the remaining 10 minutes. In each scenario, the unique capabilities of the Soviet T-72 in the attack were overshadowed by the presence of Su-25 Frogfoot ground attack aircraft.

Frustrations into Challenges

Being in a "line" unit had its advantages. One was that you commanded respect. Guns command respect. Let's face it, Air Defense Artillery has missiles and guns that

much easier in that I could identify myself as being part of the air attack artillery: an advantage I didn't have in the MI battalion. Electronic warfare systems don't have such a visible or audible effect as guns. The only audible sound a TLQ-17A puts out is the noise from its generator. In addition, limitations placed on the light jammer operator prevent him from using his system as a jammer at all. MI might be "Always out Front," but electrons are invisible. Guns, however, impress people.

Though the ADA battalion was respected, that didn't stop the S-2 from being frustrated. In fact, the MI community provided much of the additional stress. Most of this came from the G-2's collection management and dissemination (CM&D) and all-source production session (ASPS). For example, before every division exercise, the CM&D tried to task the ADA battalion to locate and identify enemy ADA systems. The division intelligence's perception of Air Defense Artillery was confused to say the least. In the ADA battalion, we shoot at planes, not other ADA systems.

Another recurring problem was that the ADA battalion got shortchanged when it came to getting new intelligence products. Air defense battalions, like MI battalions, are sepa-

The Intelligence School never taught me anything about the air threat. The most my class was treated to was an over-copied slide of an Mi-24 Hind-A.

send rounds "down range." I'll never forget the sound of Vulcan 20mm Gatling guns at night. My briefings at other units were made

me to be MI

(Reprinted from *Military Intelligence*)

rate battalions. As a separate battalion, we came directly under the control of the assistant division commander for support. But the G-2 operations and training people didn't believe that. So, whenever I found that we didn't get an intelligence product, I complained. In most cases, the action officer would say something like, "Your division artillery (DIVARTY) S-2 should have given you yours," or "Brigades are responsible for their own battalions."

I couldn't blame those officers for not recognizing us for what we were. In fact, the real culprit behind the lack of understanding was the ADA S-2 himself. I used these opportunities to remind myself that it was my job to educate my MI peers in the needs and capabilities of Air Defense Artillery. This was not hard to do. I simply made sure that I made more trips to G-2 and talked with the people who produced the materials I wanted. Not only did the distribution improve, but I often returned to the battalion with intelligence products no one else had.

Not all the inappropriate taskings were wasted. One time, an NCO phoned from G-3 Plans. He wanted to know some of the capabilities of the "Lance air defense missile." After I got back into my chair (I had

laughed myself onto the floor), I directed the NCO to phone DIVARTY for better information. He replied that he had just called

the two-stage Stinger missile streak up into the sky and find its target. And, finally, I knew that the division would always be safe from hostile ground attack aircraft when the Chaparral achieved tone and locked onto its target.

After two years I returned to the "MI community." I am happy to say that my experience in the ADA battalion added the experience of dozens of briefings and reports that I had to present while assigned to the G-2 ASPS. I also take satisfaction in that the CM&D chief asked for my assistance in preparing the collection plan as it pertained to the ADA battalion.

An assignment to an ADA battalion is one of the most rewarding in the division. You have plenty of opportunities to work for people who keep their eyes focused on the ground — the ADA battalion may be your only opportunity to add a third dimension to the battlefield and defeat a fast-moving enemy from the sky.

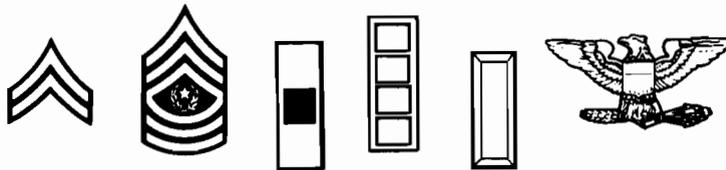
The only audible sound a TLQ-17A puts out is noise from its generator. MI might be "always out front," but electrons are invisible. Guns, however, impress people.

DIVARTY S-2, and they gave him my number. Well, not wanting to turn a customer away empty-handed, I took out some of my reference books and gave him more appropriate information about the missile.

Take the Experience and Run

My two years in the battalion gave me the chance to work with people who trained with three air defense systems. The rapid burp of the Vulcan's Gatling gun always impressed me. It was amazing to watch

Capt. Kevin R. Austra completed a four-year assignment with the 24th Infantry Division (Mechanized), Fort Stewart, Ga. While there he served in the MI and ADA battalions and in the G-2 Plans. He has a bachelor's degree from Seton Hall University and a master's degree from Central Michigan University.



CAREER NEWS

Drill Sergeant Program

During the last year, few ADA soldiers were selected for the Drill Sergeant Program because of the overstrength status of air defense drill sergeants. This overstrength situation has been reduced, allowing qualified ADA soldiers to again apply for selection.

Most ADA drill sergeant positions are at Fort Bliss, Texas. Because of permanent change of station constraints, soldiers currently assigned to Fort Bliss and soldiers serving overseas who will return within one year have a better chance for acceptance than soldiers serving elsewhere within the continental United States (CONUS). All interested soldiers, however, should apply for these positions, referring to AR 600-200, *Enlisted Personnel Management System*, for application preparation details.

For more information contact SFC Jimmy Cribb, U.S. Total Army Personnel Command, at 703-325-8052 (AV 221-8052).

MOS 14D Update

MOS 14D, Hawk Missile System Crewmember, was approved as a new MOS on Nov. 27, 1989. Changes to future updates of AR 611-201 will reflect this new MOS.

MOS 14D soldiers will operate Hawk PIP III missile systems. This system, currently fielded at Fort Bliss, Texas, will be completely fielded to all remaining Hawk battalions over the next six years.

MOS 14D will replace MOSs 16D and 16E as units convert to the PIP III system. Soldiers can become a 14D in one of three ways: new equipment training (NET), advanced individual training (AIT) or transition training. Beginning in FY 90, new soldiers will receive MOS 14D upon completion of AIT. MOS 16D and 16E soldiers completing NET as the PIP III system is fielded in their unit will be awarded MOS 14D. MOS 16D and 16E soldiers who, for any reason, were not able to participate in NET can receive

MOS 14D upon graduation from a transition course at Fort Bliss (16D, five weeks; 16E, two weeks).

MOS 14D authorizations will, eventually, completely replace MOS 16D and 16E authorizations. During the transition period, however, use of all three MOSs will allow PERSCOM to determine where to assign soldiers and whether or not to send soldiers to 14D training en route to future assignments.

For more information contact Capt. Bloomer, U.S. Total Army Personnel Command, at 703-325-8052 (AV 221-8052).

Free Transcripts

Enlisted soldiers and veterans who entered the Regular Army (for the first time) on or after Oct. 1, 1981, are eligible for the Army/American Council on Education Registry Transcript System (AARTS) *free* transcript service.

This service is one of the Army Continuing Education System's newest benefits for enlisted personnel. To date, AARTS has issued more than 40,000 requested transcripts to soldiers, veterans, Army education centers and colleges.

AARTS is the only central repository for transcripting soldiers' military experiences and educational testing achievements. Official sources (including PERSCOM, the Army Training Requirements and Resources System, Army service schools, the Educational Testing Service, the American College Testing Program and the American Council on Education) report transcript data directly to the AARTS Operations Center via computer tapes. The transcripts document Army course completion, experience in military occupational specialties, skill qualification test scores, additional skill identifiers and special qualification identifiers. They also document scores for CLEP tests, DANTES Subject Standardized Tests, SATs, ACTs and ACT-PEP.

The AARTS transcripts describe the skills, knowl-

CAREER NEWS

edge and abilities expected of soldiers completing military courses and working in military occupational specialties. The descriptions and relative college credit recommendations are the same as those the American Council on Education publishes in the Guide to the Evaluation of Educational Experiences in the Armed Services.

Eligible soldiers and veterans can request AARTS transcripts for personal reference and for use by college registrars, potential employers and Army education center counselors. Veterans find their transcripts valuable as they prepare resumés explaining military experience to civilian employers.

Eligible soldiers or veterans may obtain a transcript by submitting a completed DA Form 5454-R or a written request to the AARTS Operations Center. Include the individual's name, social security number, basic active service date, signature and mailing address.

For more information write the AARTS Operations Center, Fort Leavenworth, Kansas 66027-5073 or call 913-684-4211 (AV 552-4211).

Choice Assignments

Many soldiers call PERSCOM concerning their next assignment. Here are a few pointers that may help you get the assignment you want.

First of all, contact PERSCOM *before* you receive assignment instructions. The chances of changing issued orders are very slim. If you are in the continental United States, you may submit a DA Form 4187 personnel action volunteering for assignment to Germany or Korea eight to 10 months before becoming eligible for assignment. First-term soldiers are eligible for reassignment overseas with a minimum of 12 months on station. Usually all other soldiers are eligible once they have a minimum of 24 months on station. Although a DA Form 4187 will not assure you of the assignment of your choice, we will consider your desires in the assignment process.

Other options open to qualified CONUS-based soldiers include assignments to Recruiting Command, becoming a drill sergeant and limited assignments to the United Arab Emirates and Crete. Rarely will a soldier be moved CONUS to CONUS under circumstances other than those listed above.

Soldiers based outside the continental United

States (OCONUS) should also submit a DA Form 4187 listing their top three assignment choices about eight months before their date eligible return from overseas (DEROS). OCONUS-based soldiers are also eligible to become recruiters and drill sergeants, and may apply according to AR 601-1 or 614-200.

Many soldiers list only one choice of assignment on DA Form 4187. Give us more to work with so we can try to place you at one of your top three choices.

Timing is a key aspect in the assignment process. Contacting us around the times suggested is best because that is when you will first be eligible for reassignment. Contacting us too early probably will result in no action, because we do not project replacements that far in advance. Contacting us late may mean that you have already been assigned. A DA Form 4187 at the right time is preferable to a telephone call; however, you are welcome to call anytime.

For more information contact Capt. Bloomer, U.S. Total Army Personnel Command, at 703-325-8052 (AV 221-8052).

Recruiters Desired

Every month ADA receives a number of quotas for recruiters. Air Defense Artillery has nearly 300 NCOs assigned within the U.S. Army Recruiting Command at any one time. These soldiers are part of the nearly 4,000 "detailed recruiters" from throughout the Army who have the task of recruiting soldiers. An assignment as a recruiter can be both challenging and rewarding.

There are two ways to become a recruiter: the ADA branch can nominate an NCO who meets the prerequisites or an NCO can volunteer. Since the monthly quotas greatly outnumber the qualified volunteers, many NCOs have been nominated. The branch needs more qualified volunteers. *Assignment of Enlisted Personnel to the U.S. Army Recruiting Command* (AR 601-1) covers the prerequisites summarized below:

- Be a U.S. citizen.
- Be a high school graduate (or have GED) and have at least one year of college.
- Meet height and weight standards according to AR 600-9, *Army Weight Control Program*.
- Meet the age requirements (21 to 35).

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- Meet the grade requirements (sergeant to sergeant first class).
- Meet the maximum dependents criteria (sergeant, two; sergeant(P), three; staff sergeant, four; sergeant first class, five).
- Have a general technical (GT) score of at least 110 (waiverable to 100 if standard technical is equal to or greater than 100).
- Meet the training requirements (sergeant, Primary Leadership Development Course; staff sergeant, Basic Noncommissioned Officer Course; staff sergeant(P) or sergeant first class, Advanced Noncommissioned Officer Course).
- Meet the maximum time in service requirements at the time of selection (sergeant, eight years; sergeant(P), 10 years; staff sergeant, 12 years; sergeant first class, 14 years).
- Not be a sole parent or have maximum dependents with enrollment in the Exceptional Family Member Program.

For more information contact SFC Jimmy Cribb, U.S. Total Army Personnel Command, at 703-325-8052 (AV 221-8052).

MANPRINT Training

The Manpower Personnel Integration (MANPRINT) Staff Officer Course (MSOC) and MANPRINT Senior Training Course (MSTC) train military and civilian personnel to integrate manpower, personnel, training, human factors engineering, health hazards and system safety considerations throughout the materiel development and acquisition process. Participants are recruited from Army Materiel Command (AMC) and Training and Doctrine Command (TRADOC), other services and industry.

The three-week MSOC, designed for active duty Army officers (03 to 04), warrant officers (CWO 2 through CWO 4), NCOs (E-7 through E-9), civilians (GS-09 through GS-12) and industry representatives, is directed toward action officers. Typical attendees are assigned or on orders to a combat, training or materiel development DA staff, materiel acquisition staff officer position or industrial assignment in a MANPRINT functional area. MSOC training takes place at Fort Belvoir, Va. The remaining MSOC classes in the FY 90 schedule are open to students:

- Aug. 6-24, 1990.
- Sep. 10-28, 1990.

The one-week MSTC, designed for TRADOC or AMC senior leadership positions, senior industry managers, active duty Army officers (04 to 06) and civilians (GS-13 through GS-15) assigned to combat, training or materiel development positions, is directed toward managers of the acquisition process.

A TRADOC or AMC command hosts the course, and TRADOC or AMC senior leaders and their primary staff attend the first day. The host and counterpart commanders lead the system workshop. They emphasize MANPRINT implementation using actual system development, materiel change and procurement examples for an ongoing (or recently completed) acquisition program at the host command.

The remaining MSTC classes in the FY 90 schedule are open to students:

- Aug. 20-24, 1990 (Aberdeen Proving Ground, Md.).
- Sep. 24-28, 1990 (Warren, Mich.).

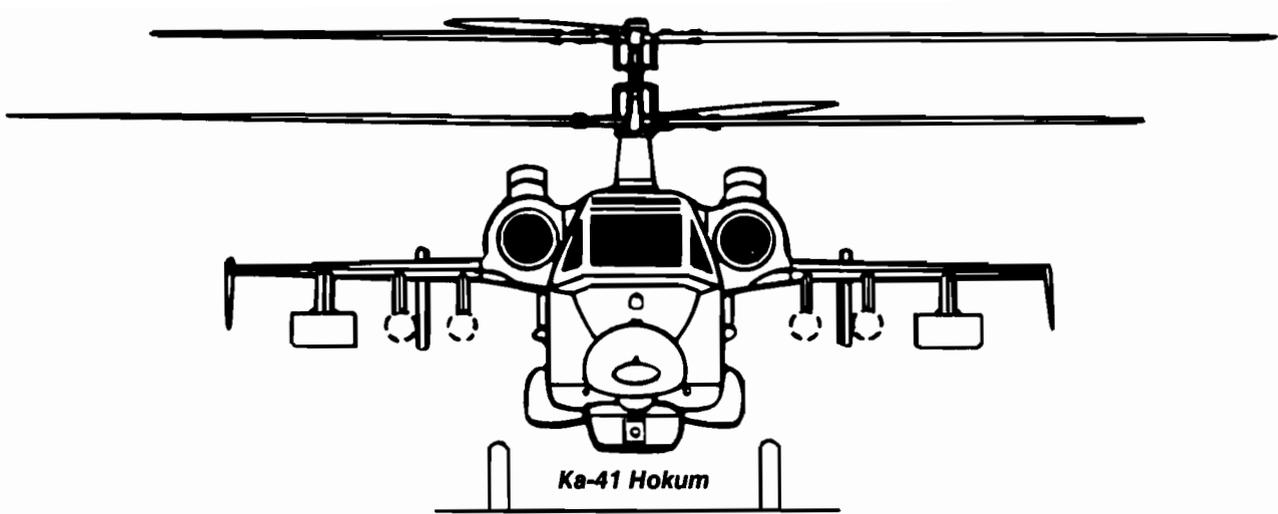
For more information contact Mr. Ashley or Dr. Engler at 202-325-3707/3709 (AV 221-3707/3709).

Transferring Article 15s

Non-judicial punishment in your performance fiche will greatly endanger your chances for promotion. According to the December 1989 update to AR 27-10, *Distribution and Filing of DA Form 2627 and Allied Documents*, staff sergeants and above may now request transfer of non-judicial punishment (Article 15s) or administrative punishment (memorandums of reprimand) from the performance fiche of their Official Military Personnel File to the restricted fiche.

The transfer process is very lengthy, so you should initiate the transfer action long before you enter the promotion zone of consideration. You must submit substantive evidence that the intended purpose of the Article 15 or memo has been served and that the transfer is in the best interests of the Army. Understand, however, that the DA board that reviews your request may not grant it depending on the nature of the offense and when it occurred.

Transferring an Article 15 is not justification for reconsideration for promotion if you were a previous non-select.



Command and Control

Soviet Combat Helicopters

by 1st Lt. Mary E. Hillman

When helicopters first entered the Soviet military in 1955, their primary role was moving men and supplies rapidly to the forward area. Initial helicopter doctrine and employment, with command and control assumed by the senior air force commander, was obscure. Although this poor organization survived for several years, it was never tested in combat.

As American forces increased in Vietnam in the early 1960s, the Soviets observed the United States' employment of helicopters. Realizing their command and control organization was inadequate, the Soviets implemented several developments and changes during the late 1960s and early 1970s.

They first developed the Hind attack helicopter, which entered service in 1973. This new helicopter



The MI-28 Havoc

provided the heavy firepower needed to support the movement of men and supplies. The Hind suppressed enemy troops in the drop zone, allowing the Soviets to attack ground targets, including tanks. The Hind's accurate and intense direct fire greatly enhanced the flexibility of forward operations. Since 1973 the Hind has developed into two basic forms, one configured for optimum efficiency as an assault transport while retaining heavy armament

and the other as an advance gunship, able to engage in air-to-air combat with other helicopters, with a secondary transport capability. However, due to its poor maneuverability, the gunship was not well suited to air-to-air transport.

The Soviets reorganized in the late 1970s, giving the ground commanders direct tasking authority of helicopter assets and organizing helicopter assets into helicopter regiments subordinate to the field army. The regiments consist of 40 Hinds and 20 Hips. Divisions were given a direct support squadron consisting of six Hinds, six Hips and six Hoplite helicopters.

The Soviets also continued research and development on new helicopter platforms and munitions at a brisk pace. Research and development expenditures increased more

than 15 percent over five years.

Most important, perhaps, is the Soviets' development of a defined command, control and intelligence (C²I) doctrine. Helicopter C²I closely coordinates with all offensive ground operations to provide time-sensitive, guaranteed results.

Soviet C²I Operation

Soviet army and division commanders have their own aviation staffs that monitor all helicopter assets in their area of operations. Aviation command posts are collocated with forward command posts, allowing real-time evaluation of requirements for close air support.

Ground- (fixed or mobile) or air-based control and target identification posts, established in their own area of operations, have all assets necessary to accomplish their mission.

Air direction officers (ADOs), the equivalent of our own forward area controllers, are experienced senior helicopter pilots who are attached to the ground unit from the attack helicopter regiment or squadron. ADOs control all aspects of the air mission including planning, control procedures and attack profiles.

Flight leaders command the air assets dedicated to a particular mission. All communications with the ADO go directly through the flight leader. Should the flight leader be incapacitated during the mission, an alternate flight leader immediately assumes command, thereby reducing disruption or confusion.

Typical Mission Profile

At 0700 the motorized rifle division aviation command post receives a request for close air support from a motorized tank regiment ADO. The operation involves a motorized rifle battalion engagement at 1500. Planning requests more attack assets than the division's squadron can provide, requiring a

A Comparison Between

Mi-28 Havoc & AH-64 Apache

The Mi-28 Havoc is the Soviet's newest operational attack helicopter. The Havoc is believed to have made its first flight on Nov. 10, 1982, but to date has not entered the Soviet army. Estimated time frame to enter service is 1991-1992.

The Havoc is comparable to the United States' AH-64 Apache attack helicopter. The primary role of the

Havoc, like that of the Apache, will be anti-tank combat. Both the Havoc and the Apache have all-weather, self-deployment and 24-hour capabilities.

Both the Havoc and Apache have a two-seat, copilot/gunner and pilot configuration that gives the pilot greater flexibility while the gunner controls the weapons. The Havoc



Havoc photos by J. E. Fricker, Air International

request to Army for additional attack helicopter regiment support. The request is approved, with an additional six helicopters attached to the squadron for the operation. At 1300 the flight leader receives final briefing instructions from the ADO, including such details as target type, general location, ordnance to be used, mission flight profile, attack time, initial point (IP), attack points, probable attack profiles and enemy ADA assets. The flight will

depart at 1420 with dedicated time on IP at 1445. The attack helicopter squadron cell arrives on the IP at 1445. The flight leader reports flight call-sign, number and type of aircraft, and ordnance status. The ADO issues the attack briefing, including target location, ordnance to be used, attack profile and formation, attack position and time. The flight leader repeats the briefing details and the ADO verifies accurate receipt. Just prior to the mission ex-

can also operate at nap-of-the-earth heights. Both helicopters are designed for greater crew survivability. Composite armor and armored glass, which can survive 6.7mm, 12.7mm and possibly larger caliber rounds, protect the crew compartment. The crew seats and landing gear can absorb vertical impacts of 15 miles per second. The Apache's cockpit floor, sides and between cockpits are protected against armor piercing and 23mm high-explosive rounds. The Apache's seats and structure give the crew a 95-percent chance of surviving ground impacts of up to 12.8 miles per second.

The Havoc is slightly larger than the Apache and has a five-blade main rotor (vs. a four-blade on the Apache). Both helicopters have an X-shaped tail rotor to reduce noise.

The Havoc carries one 30mm cannon, up to 16 AT-6 Spiral antitank guided missiles and a variety of rockets. The

Apache matches this armament with a 30mm chain gun, Hellfire laser-guided missiles and 70mm rockets. The Apache can also carry up to four Stinger missiles and has an airborne target handover system that allows it to transmit or receive target acquisition

information automatically by coded signal (no voice communications).

The Havoc's 30mm cannon is the same cannon mounted on the BMP-2 infantry fighting vehicle, which facilitates field maintenance and exchange. The 30mm cannon fires 250 or 500 rounds per minute and has a dual-feed system, so the gunner can switch immediately from armor-piercing ammunition, for armored vehicles, to high explosive, for aircraft and soft targets. The gun turret traverses 110 degrees in azimuth, 13 degrees up and 40 degrees down.

The proposed missions of anti-helicopter and anti-armor will be threats to NATO units. The Havoc could disrupt key aspects of the U.S. military's AirLand Battle doctrine by suppressing mobility. The Havoc will probably not operate on its own, but augment the Soviet Hind helicopter in its battlefield fire-support missions.



Photo courtesy of Soldiers magazine

ecution, the ADO will issue a final situation update consisting of friendly location, enemy location, type and location of ADA and final attack authorization. The flight leader reports to the ADO when the aircraft are within 400 meters of attack positions. At this point the ADO directs the flight leader to climb and acquire the target. Once the flight leader identifies the target, he receives final attack authorization or abort directives. In either

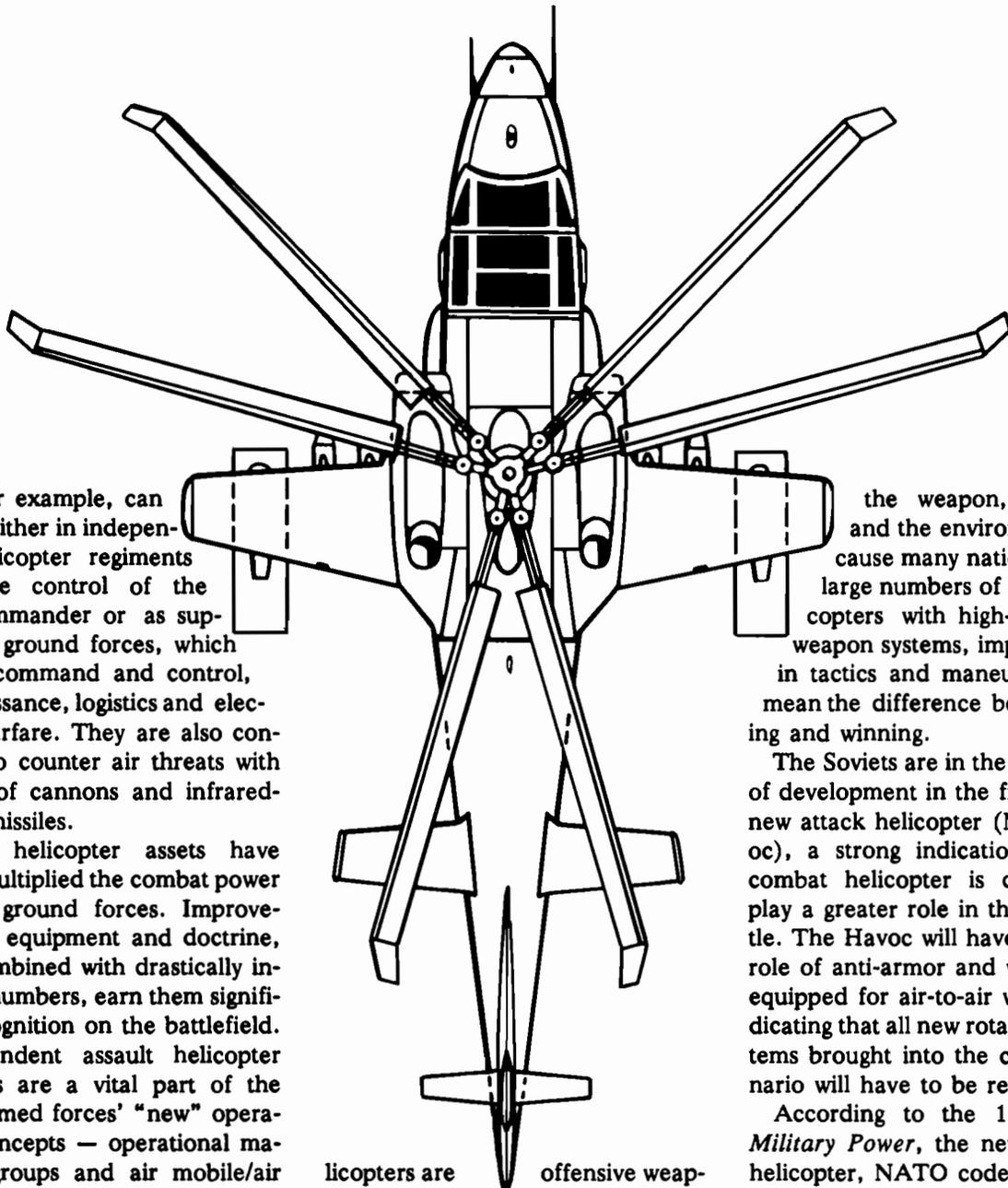
case, after carrying out instructions, the pilots return to IP for strike assessment and further instructions. These can include a second attack, alternate attack profiles or return to a forward area refueling point.

Control of air assets is absolute and inflexible. Although this mission profile allowed adequate time for preparation, an urgent request would be handled in a very similar manner — and exactly the same manner once the flight leader re-

ports from the IP to the ADO.

Tactics change and continue to improve as the Soviets plan how to use their helicopter assets to achieve decisive results in combat. Their tactics emphasize speed, mobility and firepower, and the helicopter is well-suited to this scenario.

Modern tactics call for simultaneous attack of enemy positions in depth, using surface and air elements in which the assault helicopter plays a significant role. The



Hind, for example, can be used either in independent helicopter regiments under the control of the front commander or as support for ground forces, which includes command and control, reconnaissance, logistics and electronic warfare. They are also configured to counter air threats with the use of cannons and infrared-sensing missiles.

Soviet helicopter assets have greatly multiplied the combat power of their ground forces. Improvements in equipment and doctrine, when combined with drastically increased numbers, earn them significant recognition on the battlefield.

Independent assault helicopter regiments are a vital part of the Soviet armed forces' "new" operational concepts — operational maneuver groups and air mobile/air assault brigades. The operational maneuver group, tailored for the situation, moves deep into the enemy's rear area to seize critical objectives (enemy nuclear weapons, air defenses and command, control and communications assets), normally before second-echelon Soviet formations are committed to combat. Early in an engagement, the operational maneuver group and airmobile/air assault brigades (with 50 to 60 helicopters) would be dispatched quickly to the rear of the enemy's defensive formations.

With new missile technology, he-

licopters are offensive weapons systems rather than just support vehicles. Newer helicopters are lighter, faster and longer-ranged with more accurate missile and gun systems. Offensive missions such as anti-armor, anti-submarine, light attack, antiship and antiaircraft (air-to-air) are now possible. Additional missions include combat logistics, battlefield reconnaissance, medical evacuation and search and rescue.

Aerial combat helicopters have become more threatening because of their increasing survivability and firepower. Effective air combat depends on four factors: the vehicle,

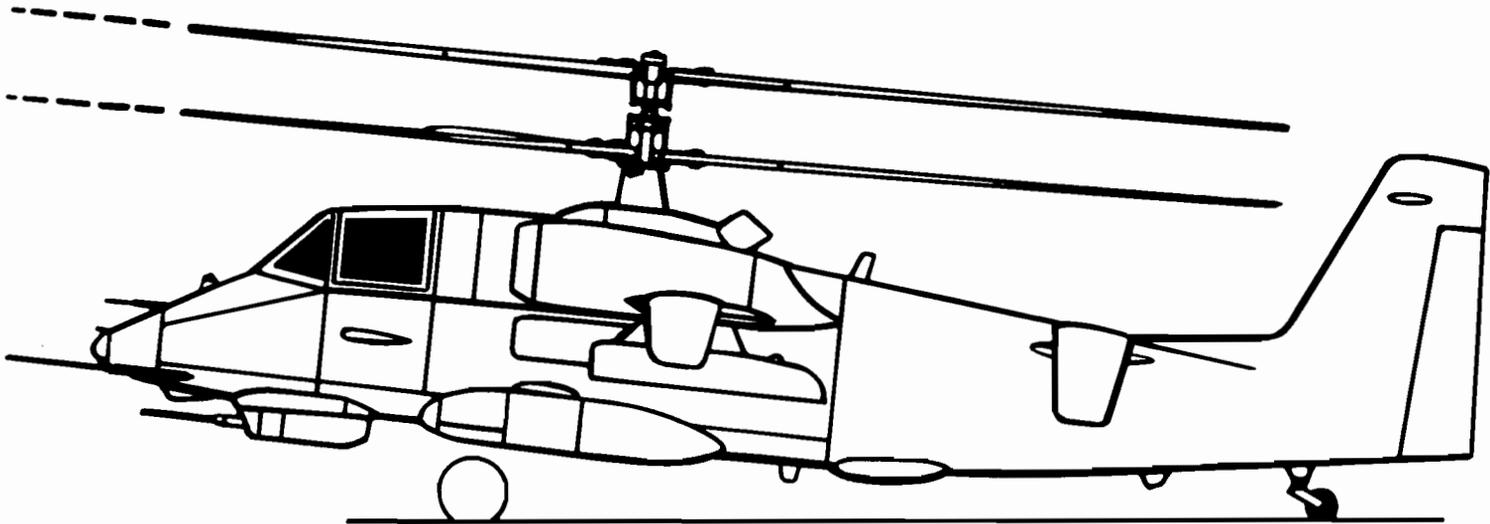
the weapon, the crew and the environment. Because many nations employ large numbers of attack helicopters with high-technology weapon systems, improvements in tactics and maneuvers could mean the difference between losing and winning.

The Soviets are in the final stages of development in the fielding of a new attack helicopter (Mi-28 Havoc), a strong indication that the combat helicopter is destined to play a greater role in the land battle. The Havoc will have a primary role of anti-armor and will also be equipped for air-to-air warfare, indicating that all new rotary-wing systems brought into the combat scenario will have to be re-examined.

According to the 1989 *Soviet Military Power*, the newest Soviet helicopter, NATO code name Hokum, will have a primary mission of battlefield air defense against anti-tank helicopters and lower performance fixed-wing ground attack aircraft. The Hokum can also perform in a ground attack role as a secondary mission. The Hokum can be used in a variety of roles such as countering enemy attacks, preparing for and executing counter-offensives and supporting combined arms offensives.

The Changing Threat

Threat forces constantly develop new doctrine and equipment to



maximize the flexibility and lethality of their air power. The ability to control the airspace and protect the maneuver force is vital at all levels of conflict. Recognizing the contribution of air power to strategic, operational and tactical success, the Soviets continue to expand their air forces qualitatively and quantitatively.

While Soviet fixed-wing aircraft strength remains fairly constant, Soviet rotary-wing strength has increased by hundreds of aircraft (as reflected by the creation of divisional helicopter squadrons and army attack helicopter regiments in the mid to late 1970s). Soviet helicopter forces have evolved from a cargo and utility force to a major combat force. New helicopters, designed for nap-of-the-earth flight and optimized for long-range, stand-off attacks, reflect the advanced technology the Soviets are applying to their helicopters. New Soviet helicopters, armed with the latest ordnance, have become some of the most lethal tank killers in the Soviet inventory.

Future generations of Soviet aircraft will have improved capabilities. Ordnance, ordnance delivery systems, navigation devices and flight characteristics also show improvement. Air threat advance-

ments include improvements to tactical ballistic missiles, cruise missiles, drones and remotely piloted vehicles. Improvements in Soviet tactical ballistic and cruise missile accuracy and range enhance the flexibility and lethality of these systems. The proliferation of remotely piloted vehicles and drones with improved payloads increases Soviet reconnaissance and attack capability and presents an engagement dilemma for defending forces. The multinational export of weapons and technology is improving the capabilities of threat forces worldwide. Additionally, many regional powers are developing their own capability to produce weapon systems for successful air operations.

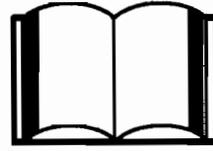
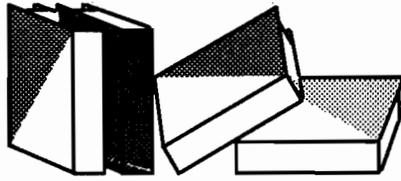
1st Lt. Mary Hillman is a threat analyst at the Directorate of Combat Developments, Fort Bliss, Texas.

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Air Threat Handbook

The threat continues to change and grow more sophisticated. Understanding the threat is vital to maximizing the capabilities of our counterair systems and is the focus for our mission and training requirement. The *Air Threat Handbook*, produced by the Threat Office, U.S. Army Air Defense Artillery School, clarifies the abilities of a potential enemy to limit, neutralize or reduce the effectiveness of our current or projected equipment. To obtain a copy of the *Air Threat Handbook*, contact 1st Lt. Mary Hillman at 568-5810/5730 (AV 978-5810/5730) or write Commander, Directorate of Combat Developments, ATTN: ATSA-CDT, Fort Bliss, Texas 79916.



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Readers will benefit by reading the books reviewed below in tandem. While one concentrates on the men and their traits, with some tactics, the other focuses on small-unit tactics and equipment. One is set on the North German Plain, the other takes place in the Bavarian forests. Study of both will give readers a more rounded picture of the forces of the U.S.S.R. and how they might be employed in western Europe.

If the illustrations provided by both *Red Army* and *Red Thrust* are correct, the inescapable conclusion is that the Soviet Union's military forces are incapable of defeating properly employed NATO forces because of poor training, lack of cohesion and poor equipment. The Soviets would initiate a war, whether against NATO (increasingly unlikely) or elsewhere (still possible) only out of desperation. However, the current torrent of political change in eastern Europe could result in instability that could produce just such a state in the Soviet government. Khrushchev's relaxation of Stalinist repression in the 1950s led to unrest and pressure for additional freedoms in Poland and Hungary relatively similar to what we are seeing today. Hungary pressed especially hard and the Soviets responded by invading the country with tanks.

If the current political turmoil within the Warsaw Pact leaves the Russians feeling threatened, they might again respond with tanks. This possibility keeps the premise of each of these books believable and provides us with a purpose for reading them.

RED ARMY: A Novel of Tomorrow's War by Ralph Peters. 337 pages. Pocket Books, New York. 1989. \$18.95.

Red Army, the second novel of this experienced U.S. Army military intelligence officer, reflects his attempt to portray the members of the Soviet Army as flesh and blood men possessing the unique traits and characteristics conferred upon the Russian peoples.

The plot reflects a scenario familiar to all graduates of the Army's officer professional development courses — a Soviet invasion of West Germany. The book even uses many of the same unit designations found in TRADOC materials. Its principal characters are Russian with lesser mention of natives of other Soviet republics, mostly from the western parts of the Soviet Union. The story follows an individual at each level of command from theater commander down to motorized rifle company private. Character development is generally good and the reader soon begins to care what happens to them — almost to the point of rooting for each to win as they engage British, Dutch and West German forces on the North German plain.

The descriptions of combat and its effects upon both combatants and civilians are graphic, even unsettling, and convincingly communicate the ugliness of war. Peters' use of tactical language rings true and professionals will be comfortable with his appropriate (albeit, American) use of terms. One wonders whether the Soviets use the Russian form of the same words. However, laymen will puzzle over the definition of some of them; e.g., the meaning of the term "battalion minus." Peters should have included a glossary to eliminate this potential source of reader confusion. More detailed maps would have been helpful as well.

Tactical air support and air defense both have significant roles and air defenders will read these passages with interest. Peters, however, discusses air defense in fairly general terms and does not include an air defender as a major character. Armor, artillery and infantry, on the other hand, are well represented and tactical play is good throughout.

In this scenario, the Soviets achieve their objective of gaining possession of all West German soil from the inter-German border to the east bank of the Rhine river. They win, however, more through exploitation of NATO political disharmony and German fears of national ruin than through military success. This as-

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pect of the book takes on the dimensions of a cautionary tale.

Peters believes NATO has the military ability to defeat a Soviet attack, but fears a lack of political unity hobbles its potential combat effectiveness. This point is especially timely as, suddenly, we see some reduction in the Soviet threat in Europe as great political changes sweep the Warsaw Pact. These changes have increased questions within NATO about its role as individual member governments seek to adjust to the new political realities according to their own interests. The more discord, the weaker the alliance. And nothing guarantees the permanence of reform in communist countries (e.g., Hungary, 1956; Czechoslovakia, 1968; China, 1989).

— 1st Lt. James Starling

RED THRUST: Attack on the Central Front, Soviet Tactics and Capabilities in the 1990s by Steven J. Zaloga. 274 pages. Illustrated. Presidio Press, Novato, Calif. 1989. \$18.95.

Red Thrust is civilian military analyst Steven Zaloga's attempt to portray Soviet small-unit tactics (company and below) and the capabilities of their equipment in a readable and entertaining format. He uses a fictional scenario in each chapter to describe an isolated engagement featuring a particular aspect of the Soviet armed forces; e.g., a motorized rifle company, and then follows with a detailed analytical essay on its limitations and capabilities. *Red Thrust* is an easy and readable way to gain knowledge of Soviet equipment and tactics.

The general setting for these fictional portrayals is 1993 Bavaria, West Germany, during a Soviet invasion. Russian elements depicted include (among others) artillery, armor, attack helicopters and *spetsnaz*. Air defense gets some mention but is not the focus of any of the chapters.

The *spetsnaz* chapter is the most interesting. Zaloga writes that *spetsnaz* troops are, for the most part, short-term draftees, like the rest of the Soviet ground forces, and are not super soldiers as some would have us believe. Zaloga likens them to corps-level reconnaissance troops.

Zaloga is best in his factual discussions, weakest in

his fictional scenarios. His dissertations on Soviet forces are clear, well-organized and provide much interesting information. Although the book as a whole is readable, informative and entertaining, his fictional scenarios have faults — minor plot inconsistencies, incorrectly used acronyms (such as thermal sights on tanks are not called FLIR) and a lack of impact.

— 1st Lt. James Starling

ABOUT FACE by Col.(Ret.) David H. Hackworth. 875 pages (with index). Simon & Schuster, New York. 1989. \$24.95.

About Face covers Col. (Ret.) David H. Hackworth's career from post-war Italy to Vietnam to retirement. He uses the last chapter to voice his opinions on changes needed in the current U.S. Army.

Hackworth, to his credit, reveals the man that he was and is, and does not try to hide his flaws. Nor does he dilute his strongly-held opinions. His candor is refreshing and should be applauded, although most readers will condemn many of his actions.

The book reads well and is hard to put down. Although Hackworth shows a considerable prejudice for infantry-type "studs," he gives others their due. The first half of the book recounts his service from Trieste, Italy, where he started his career as a private in 1946, to deployment to Vietnam. He devotes the remainder of the book to Vietnam, retirement and his criticisms of the Army as it is today.

In general, his criticisms of the prosecution of the Vietnam War seem to have merit; veteran infantrymen who fit Hackworth's definition of "stud" have voiced similar thoughts. Their comments give Hackworth's considerable validity even though he often does not agree with current conventional wisdom. His lack of experience with mechanized forces, however, is evident in his comments about the M-1 Abrams tank and the M-2 Bradley.

Those who read between the lines will find that Hackworth's only real love in life has been the U.S. Army. For most of his life it was his home, and its structure provided an outlet for his abilities as well as an emotional anchor. But the Army never really met his expectations. When he finally realized it never would and would continue going in directions he felt

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were wrong, Hackworth cut his emotional ties. Disillusioned, he went his own way until the command structure could no longer ignore his activities and unsuppressed comments to the press; he was a loose cannon. Hackworth generated controversy throughout his career because of his lack of orthodoxy and his strong personality. All of that comes through in *About Face*, and reviews of this book and reader responses continue to reflect strongly diverse opinions. I recommend *About Face* for what it says about combat leadership and for the questions it generates about the Army's direction. However, most readers will find Hackworth strident in voicing his convictions and will question the validity of many of his comments.

— 1st Lt. James Starling

RED FOX: Stand Watie's Civil War Years by Wilfred Knight. 320 pages. The Arthur H. Clark Company, Glendale, Calif. 1988. \$27.50.

Red Fox covers a little-known and poorly understood chapter of the Civil War. It is the story of Stand Watie, Cherokee warrior, Indian politician and, ultimately, Confederate general — the only Indian from either side to become a general officer.

To shed some light on just why Stand Watie and many other Indians from the five nations decided to fight on the side of the South, Knight goes into some detail of Indian politics. These politics involved treaties with the Federal government, the westward movement to the Indian Territory and, later, the bitter rivalries that developed among the Indians in their new home. *Red Fox* successfully illustrates the effects these events had on Watie and other Indians and how their loyalties were affected on the eve of the Civil War.

Knight tells of the exploits of Watie and the other Confederate Indians who fought in the west. The battles in the Trans-Mississippi Department tend to be forgotten, obscured as they are by the images evoked by Gettysburg, Chattanooga and Vicksburg. Yet men who fought for the same ideals in those places fell for the same causes in such places as Wilson's Creek, Pea Ridge and Prairie Grove, and with no less conviction. The Indians of the Five Civilized

Tribes participated in all of these battles and more, receiving little recognition for their valor until this book.

Knight explains how, in an Army whose name is almost always associated with deprivation, Watie was able to lead his ill-clad and often starving Cherokees, Creeks, Seminoles, Chickasaws and Choctaws to victory over the Union troops operating in Kansas, Missouri, Arkansas and the Indian Territory itself. Confederate Indians managed to keep the thousands of Union troops pinned down, a feat disproportionate with the numbers Watie had available.

Red Fox was well-researched. Knight includes meticulous details on even the smallest events covered in the book. The detail, however, tends to bog down much of the story, parts of the book seem to repeat itself, and there are unfortunate technical defects in the text. But make no mistake: *Red Fox* is a story of epic proportions, well worth the time of any Civil War historian who wants to get a good idea of the war out West.

— 2nd Lt. James D. Crabtree

SWORD OF THE SHAHEEN by M. E. Morris. 321 pages. Presidio Press, Novato, Calif. 1990. \$18.95.

Sword of the Shaheen is a fast-paced, dramatic portrayal of our nation's response to a terrorist attack on American soil.

Morris' techno-thriller excellently choreographs the terrorists' plot against the United States, leading readers through the subsequent international crisis and bonding of American, Soviet and Israeli forces against the terrorist group.

The terrorists' coup on a naval carrier points out the United States' need to relook its "Good Samaritan" approach.

The final confrontation, set atop San Antonio's Tower of the Americas, and our nation's planned retaliation, is a fitting climax.

Worthwhile reading for ADA soldiers wishing to gain background on terrorism, international politics and possible ramifications of a terrorist nuclear attack.

— Hubert L. Koker



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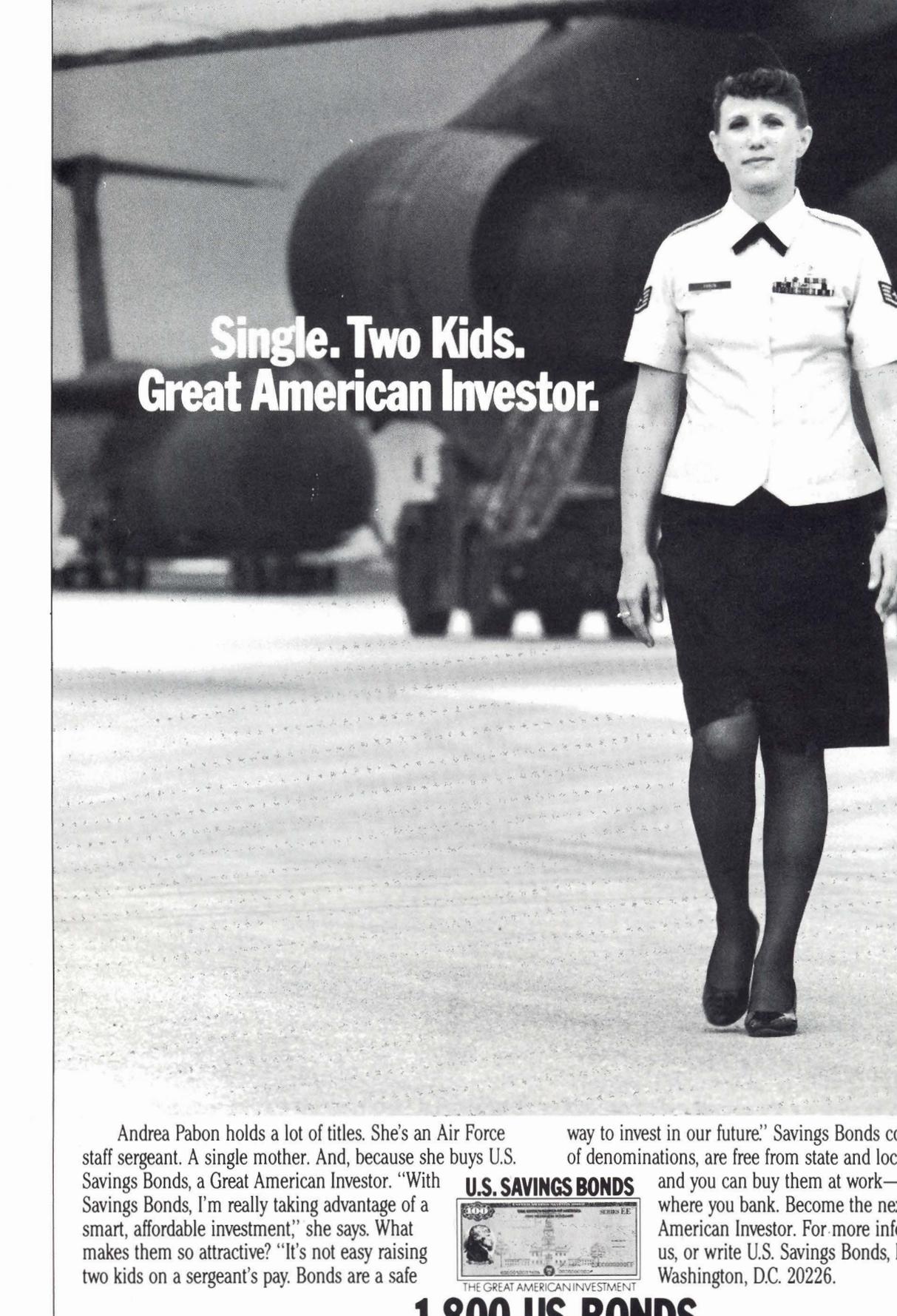
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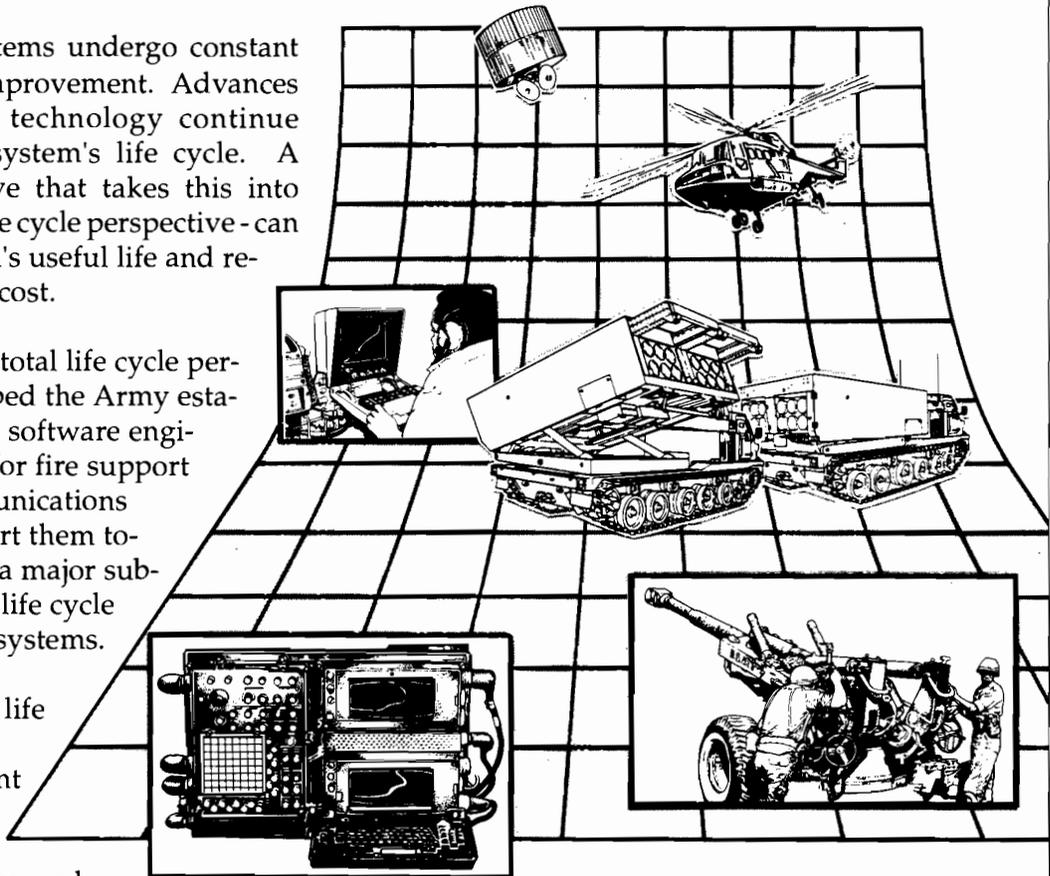
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