



Field Artillery

A Professional Bulletin for Redlegs

February 1988

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Strength in Teamwork



February 1988

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PURPOSE (as stated in the first *Field Artillery Journal* in 1911): "To publish a journal for disseminating professional knowledge and furnishing information as to the *Field Artillery's* progress, development, and best use in campaign; to cultivate, with the other arms, a common understanding of the power and limitations of each; to foster a feeling of interdependence among the different arms and of hearty cooperation by all; and to promote understanding between the regular and militia forces by a closer bond; all of which objects are worthy and contribute to the good of our country."

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Moving From Rhetoric to Reality

Why would a professional bulletin targeted at the needs and concerns of the battery-grade officer and NCO choose a theme such as Joint and Combined Operations, which might appear to be out of their realm? We asked ourselves that question long before we began production and answered with the fact that fire support of AirLand Battle is the business of joint and combined operations at every level—and of combined arms operations as well.

If this statement seems obvious to you, consider the following: do the experienced battery commanders in your battalion move on to become battalion fire support officers? Is the most qualified and experienced major in your battalion the brigade fire support officer? Is your training focused almost exclusively on one-dimensional activities—solving the technical fire direction and command, control and communications problems within

the division artillery or Field Artillery brigade? When was the last time your unit trained with our maneuver brothers, a liaison officer from another service or the soldiers of one of our allies? Does your battalion truly make war-fighting a priority or just give it lip service? When was the last time your unit assessed all of the critical skills required for your war plans and then trained accordingly? Does your unit really train to integrate and synchronize fire support—is the entire training cycle focused on the training opportunities and lessons learned at the National and Joint Readiness Training Centers, on the combined training provided by REFORGER and Team Spirit?

The Field Artillery School and Center are working to improve the interoperability of equipment procedures and tactics among services and nations and to shorten the combat developments cycle to get the most advanced equipment into the

soldiers' hands quickly. But yours is the difficult task of translating rhetoric into reality—of synchronizing fire support for the maneuver commander.

This issue, with its doctrinal and tactical treatises, gives every reader the grist with which to mill out increased readiness in today's fast-moving joint and combined arenas. The fire support vision of the Chief of Field Artillery puts us all on a common grid.

Also featured is a hard-hitting interview with a Redleg of distinction, General (Ret) Jack N. Merritt, a former Chief of Field Artillery who just left his active-duty post as US Representative to the NATO Military Committee. His insights about the use of technology and future of the NATO alliance merit your attention. His concerns about fire support in Europe should be of concern to all Field Artilleryman. Other articles range in subject from how to better synchronize forces through joint air attack team planning to a look at the Aquila Remotely Piloted Vehicle—a battery-level perspective.

We hope the theme approach produces a reference you'll keep for many years. The Joint and Combined Operations focus could not be more pivotal to the future of our great Branch, particularly as the total force turns its attention once again to *training*—the 1988 Army theme.



Editor



Incoming

LETTERS TO THE EDITOR

Response to "OBC Restructure Concerns"

Captain [Richard L., Jr.] Stevens' letter, OBC Restructure Concerns," [October 1987, *Field Artillery*] brings out some interesting points. In a nutshell, Captain Stevens states that all Field Artillery officers should aim to be fire support officers (FSOs), and the early specialization proposed for OBC [officers basic course] is fatal to this goal. He supports his thesis with the following arguments:

- A foundation in cannon artillery obtained at OBC is a requirement to be a good fire support officer as a captain.
- An officer who doesn't receive this foundation in OBC and subsequently serves in a non-cannon assignment will be at a disadvantage when he returns to a cannon unit after the officers advanced course [OAC].
- The current option of attending the cannon battery officer course, a

three-week intensive course taught to OAC graduates enroute to a cannon unit, is not a viable solution. Captain Stevens reasons that the course may someday be discontinued because it "...appears to retrain lower-level tasks."

Although the goal of being proficient as an FSO is something all artillerymen strive for, Captain Stevens has overlooked several key points in his analysis. First, according to the office of the Field Artillery branch representative, approximately half of our OBC students are assigned to cannon units upon graduation. The remainder go to missile units or other assignments. Under the current Department of the Army PCS policy, an officer who reports to a Lance or Pershing battalion can expect to remain on station for four years. That officer will then return to Fort Sill to attend OAC for another five months. A period of four and one-half years will have passed between OBC and his first cannon assignment. Whatever "foundation" in cannons an officer

obtained in the basic course is of little use, considering the passage of time and the changes in technology and doctrine.

Next, the stated purpose of the advanced course is to produce fire support officers. This course is five months of intensive Field Artillery tactics, maneuver tactics, fire planning and gunnery. It goes far beyond what is taught in OBC.

Finally the current cannon course taught by the Weapons Department does not retrain lower level-tasks. It trains officers in cannon-specific tasks *for the first time*.

In conclusion, the proposal to halt the restructure of OBC is not warranted by Captain Stevens' arguments. The combination of OAC and the cannon course is more than enough to compensate for the lack of cannon training in OBC.

William H. Ott
COL, FA
Director, Gunnery Department

Response to "The Battery Commander's Method of Fire Direction"

In the article "The Battery Commander's Method of Fire Direction" [October 1987, *Field Artillery*], the author [Captain Frank A. Hollingshead] discussed techniques for a valid form of fire direction. They were replaced by what we now refer to as manual gunnery. Using some form of manual gunnery as a backup to the automated systems was not mentioned in the article. Using manual

gunnery as a backup and keeping the responsibility for technical fire direction in the firing unit position is the preferred procedure.

If the observer must have a method of fire direction to serve as a backup, let him use an M-17 plotting board. The article mentioned this method but dismissed it since the observer would have to carry a TFT [tabular firing table]. For a cost similar to producing

the OTFT [observers tabular firing table], we could give the observer a reduced size copy of table F, G, and Part II (Illumination) for each charge. This would give him a method of fire direction superior to the battery commander's method discussed in the article.

William H. Ott
COL, FA
Director, Gunnery Department

BUCS as a Backup

I am very concerned about one of the "Letters to the Editor" in the August issue of *Field Artillery*. Captain [Richard D., III] Koethe argues in "Response to 'In With the Old'" that manual gunnery is outmoded and does not need to be taught in the US Army Field Artillery School. His arguments make sense when applied to a peacetime army. My concern is that we will not always be at peace, and over reliance on an electrical system (BCS, TACFIRE, BUCS) invites disaster. I do agree that TACFIRE [tactical fire direction system] and

BCS [battery computer system] must be our primary source of target and firing data. BUCS [backup computer system] is an excellent backup to BCS. My concern is about the total elimination of manual gunnery that Captain Koethe advocates.

Many of Captain Koethe's arguments seem to be moot or misdirected at best. He stated that "levels of acceptance" varied according to previous experience with FADAC [Field Artillery digital automatic computer] or manual systems. Acceptance is moot because the TACFIRE system is being fielded regardless of what operators think. Units with TACFIRE will

use the system and become good at operating it.

Captain Koethe also said that manual gunnery is currently used only as a check against the computer solutions. This is a misdirected argument. Manual gunnery does not need to be used to check the computers; it should be used as a reliable backup to BCS and BUCS.

My argument boils down to the fact that our artillery assets are Soviet targets. It is very easy to picture our computer systems failing due to battle damage. If BCS and the BUCS are destroyed, what can we use to compute firing data? Not knowing manual

gunnery, the battery is out of the action. If, on the other hand, the FDC [fire direction center] knows manual gunnery and it can scrape together the equipment, it can put the battery back into the fight. Manual gunnery may not be the most accurate, but it will get steel down range.

Captain Koethe says "There comes

a time when we must move on. We no longer teach crew drills on muzzle-loading artillery pieces because we no longer employ them. Shouldn't we apply the same rationale to manual gunnery skills?" My answer is NO! The analogy is faulty. Crew drills on muzzle-loading artillery are useless because the drills will not work on

today's artillery pieces. Manual gunnery, on the other hand, *does* work today and will work tomorrow. I certainly hope that with the TACFIRE and BCS systems, we won't put all our eggs in one basket.

Wayne L. Mason
2LT, FA
How Btry, 1/3 ACR

MLRS Tactical Options: Shoot, Scoot and Survive to Shoot Again

My "check copy" of an article I authored, "MLRS Tactical Options: Shoot, Scoot and Survive to Shoot Again," [August 1987, *Field Artillery*] did not reach me before it was published. The result is that the article was rife with errors. Naturally, I don't like being tagged for such blatant errors, especially since I'm a subject matter expert in MLRS [multiple launch rocket systems] doctrine for the Field Artillery School [USAFAS].

When I use the terms doctrine or doctrinally in this letter, I am referring to Field Manual 6-60, "MLRS Operations" (Draft), which is now being readied for print, not to any of the MLRS Field Circulars 6-60 (including the December 1986 version).

Since the article focuses on tactics and survivability at all levels, but mostly at the platoon level, there are many references to the platoon leader. The platoon leader, platoon sergeant and reconnaissance sergeant have virtually interchangeable roles. Therefore, the term platoon leader in this letter simply refers to whomever is conducting the planning and the RSOP [reconnaissance, selection and occupation of position] for the platoon. Usually, all three of these soldiers participate.

There have been a few doctrinal terminology changes since I first wrote the article last summer (1986). One is the term platoon command post (CP). It is now platoon headquarters (PLT HQ).

Several inaccurate words used in the editing changed the context. Also, to condense the original text, many explanatory sentences were combined with others or dropped entirely.

Under Platoon Tactics, 1st paragraph, second sentence, each platoon leader doesn't "get a 'goose egg' of 9 square kilometers (sq. km) located about 5 to 15 km from the battery headquarters." This

should read: "Platoon leaders are assigned 'goose eggs' by their commanders based upon METT-T [mission, enemy, terrain, troops available-time] and guidance from the force Field Artillery (FA) headquarters; the size of this operational area (OPAREA) also depends upon METT-T. The large 3 x 3 km (9 sq. km) area recommended in FM 6-60 is the *optimal* size, not the only usable size. These OPAREAs *can* be located *from 5 to 15 km* from the battery headquarters.

The first paragraph's last sentence states "the only guidance he (the platoon leader) receives is the general OPAREA boundaries and the number of hot launchers." The last should read "...the number of launchers he must have in a 'Go/OPER' status (prepared to fire)."

Paragraph two's rewrite changed the original completely. The USAFAS MLRS Cadre course and collective training with USAFATC [US Army Field Artillery Training Center] (for units so trained) teaches the platoon

leaders to disperse their elements within the OPAREA. Dispersal *used* to be taught using the 'platoon wedge,' a *conceptual* template stressing dispersal distances. Neither USAFAS nor USAFATC teaches the platoon wedge anymore; dispersal distances are simply stressed without use of a template. We do this for two reasons. First, because we don't want enemy target analysts to be able to use that template against MLRS platoons; the more random the platoon's deployment, the better. Second, actual terrain is immovable and will not normally allow a platoon to maintain the wedge pattern. Terrain dictates the platoon's deployment operations, usually forcing an unconventional and random pattern upon the leaders. This reduces the chance of enemy templating, thereby increasing survivability.

Paragraph two, second and third bullets should have remained "two to three reload points (RL)" and "two to three survey control points (SCP)." Again, METT-T and the OPAREA's size will determine how many points can be emplaced at the recommended dispersion distances.

One point needs clarification here. I state that the platoon leader chooses the firing points (FP). This is essentially correct. However, the explanatory sentences were removed. He chooses a location and sends that grid to the BOC [battery operation center] for input into the fire direction system (FDS). When a launcher is finished at another FP, it will be sent to this grid by the FDS. However, the launcher chief may fire from anywhere within 150 meters of that grid. Therefore, the launcher chief makes the final selection of the FP. The platoon leader normally will select a FP that has one or more possible hide areas (HA) nearby. The launcher chief will select a place to hide once he has arrived



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Field Manual 6-60 MLRS Operations (Draft) is now being readied for print.

there. Therefore, the edit of paragraph four's first sentence, which begins with "MLRS crewmen..." is incorrect. MLRS crewmen do not plan the traffic flow, designate FPs or ensure the RL has enough maneuver space for the 55-foot combined length of the heavy, expanded-mobility, tactical truck (HEMTT) and its trailer, the heavy, expanded-mobility, ammunition trailer (HEMAT). The platoon leader, platoon sergeant or reconnaissance sergeant does this planning during the map and ground reconnaissances of the goose egg; the traffic plan is integral to the reconnaissance and selection process. The crewmen execute the plan.

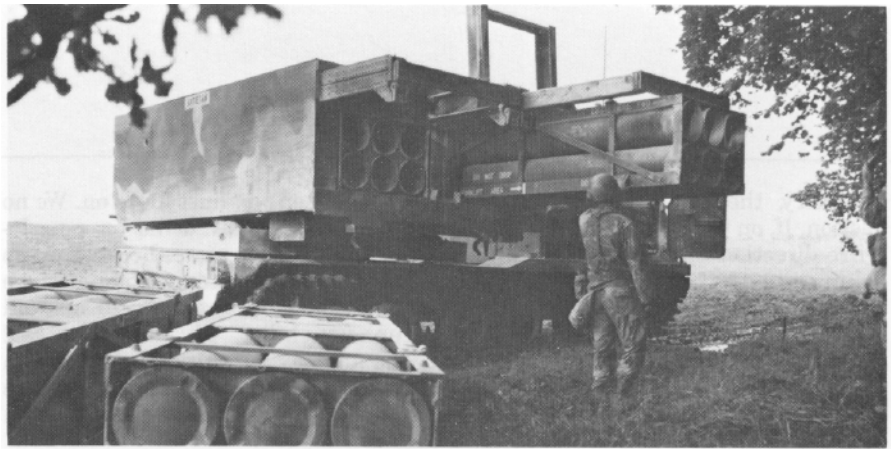
Paragraph four's last sentence should read "...where launcher crewmen can update the launcher's position determining system (PDS) when the launcher goes from 'cold' to 'hot' status (from No go/INOP to Go/OPER) and moves to its first HA."

The edited paragraph one under Ammunition Resupply no longer points out that METT-T and unit SOP dictate where the ammunition holding area (AHA) may be located and how many vehicles will be assigned to the platoon. Doctrine gives the MLRS leader the flexibility to collocate the AHA with the PLT HQ or to separate it by up to 500 meters. This same flexibility applies to the number of HEMTT and HEMATs sent "forward" with the platoons. Doctrine recommends that the platoon select an AHA capable of holding four to six, just in case it's necessary. Likewise for paragraph two; four at the platoon and six or more at the battery AHA are planning factors only.

Paragraph two's last sentence should read "the ammunition transfer point (ATP) in the division support area and/or ammunition supply point (ASP) in the communications zone (COMMZ)."

In the edited paragraph three, the differentiation between two of the many types of resupply options has been lost. The first method is the most common technique and involves the HEMTT crews' simply off-loading launch pod/containers (LP/C) at RLs as directed by the PLT HQ and then returning to the platoon AHA until dispatched to the RLs with more LP/Cs or to the battery AHA, battalion trains or ATP/ASP to get more LP/Cs. The third sentence should read that the crew remains in the HEMTT at the RL to secure it (not the FP) from enemy activity.

Paragraph one, first sentence, under Operations, inaccurately cites the BOC as "exercising tactical and



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METT-T and unit SOP dictate where the ammunition holding area (AHA) may be located.

limited technical fire direction control over" the platoons. The battery FDS performs only automated tactical fire control. All technical fire control is performed by the launcher's on-board computer.

Paragraph one's second sentence should end "...like the standard battalion TOC and trains." This clarifies the edited sentence somewhat.

Paragraph three now implies that MLRS commanders have only two choices when employing their platoons: the "hot platoon" or "leapfrog" techniques. Not so! There are many different methods. These two are discussed because they are unconventional, demonstrating the flexibility of the system.

Paragraph four's first sentence states that in a surge condition "...the remaining platoons can hit the road in about 10 minutes." This should read "...can come to 'hot' status in about 10 minutes." The second sentence has a charging FLOT; it should be a changing FLOT.

Paragraph five's last sentence now makes the paragraph unclear and this very unusual employment requires the utmost clarity. The leapfrog technique has each platoon in a separate maneuver brigade's zone. Each platoon's three launchers are spread linearly, pointed toward the FLOT, with one launcher forward close to the FLOT, one back 15 to 20 km, which can range the FLOT with the other launcher leapfrogging forward or back, depending on the situation. Concentrated MLRS firepower is lost, but continuous firepower is maintained with this technique.

This letter should clear up the most controversial mistakes. I use 'controversial' because MLRS leaders each have espoused their own preferred methods for conducting operations, and many will react unfavorably to

the article as it was printed. MLRS doctrine stresses flexibility and accomplishing the mission based on METT-T and a unit's command guidance. It is a very flexible doctrine, allowing units to 'do what they want' (within certain parameters), tailoring their operations to suit their METT-T and commanders. The bottom line is, of course, they still must meet ARTEP standards and accomplish the mission.

Thank you for allowing me the opportunity to clarify the article. Expect a lot of incoming...

Robert P. Smith, Jr.
CPT, FA
Senior Instructor, MLRS

We sincerely regret the errors and inaccuracies that resulted from a loss of Captain Smith's "check copy." Our Field Artillery School subject matter experts provide fine articles and help by evaluating our letters to the editor (Incoming).

Those who write for us should understand, however, that the editorial process frequently requires shortening submissions to fit the bulletin format. Some loss of detail is always attendant to the process.

Since our authors have to be prepared to "take incoming" when they reveal their thoughts to the Field Artillery Community, the Field Artillery staff can do no less. This time we took a direct hit. Ed.



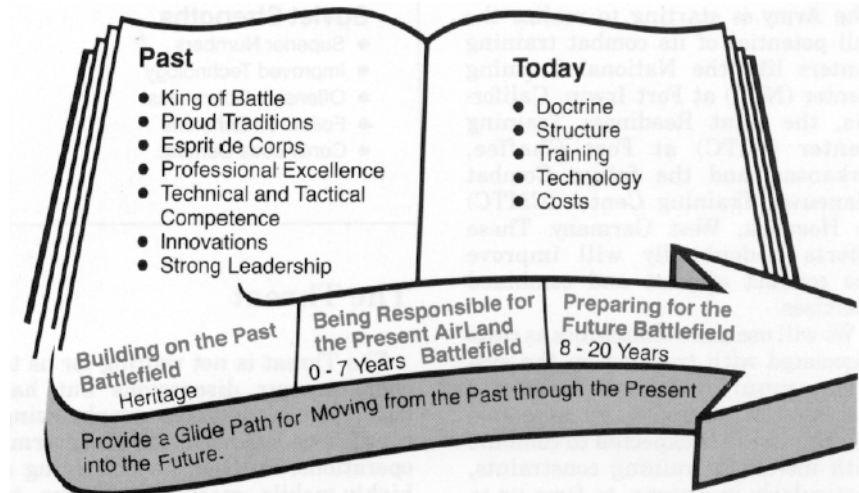
by Major General Raphael J. Hallada

The total fire support system consists of target acquisition, weapons, support and sustainment systems as well as command and control. It is a proud organization that historically has drawn to it the best and brightest the nation has to offer. This team's past provides a rich heritage for its exciting present. Let me assure you that while the past and present of fire support are exciting, our future promises to be without parallel.

This article describes the fire support master plan for the remainder of this century and into the next millennium. It is not a final solution to the complex set of issues confronting us. Rather, it is a starting point from which we can adjust as we move into the future. It is important for us to understand and participate in this master plan as it represents our vision

of where fire support is heading. Your input is critical to ensure the continued

relevance of the vision we are pursuing.



Fire Support Master Plan

The past, present and future are linked closely. The fire support team has a remarkable heritage as the King of Battle. We built our proud tradition and esprit de corps through attention to detail developed by the exactness required to execute the art and science of fire support planning, gunnery tasks and crew drills. The product of this process is a corps of technically and tactically competent soldiers, noncommissioned officers and officers. It is not by accident that we usually set the Army's standard for professionalism and are innovative thinkers and leaders in all areas.

Our fire support vision of the future continues to be built around the professionalism of team members. I expect technology to give us capabilities to allow our fire support organization to adopt new or modified tactics, techniques and procedures. But technology will never replace the soldier. Recruiting, training and retaining quality soldiers is at the center of our vision, and these efforts will determine our success or failure in achieving the master plan. We must never forget that today we are training the leaders who will carry on our great legacy. One of our greatest responsibilities is to prepare these future leaders to assume their duties.

The Army's AirLand Battle doctrine is an expression of how we plan to fight the next battle. We derive our tactics, technologies, organizations, support structure, equipment and training from its principles. In the fire support community, our doctrine is viable and in place. It is flexible and versatile. But to achieve its full potential, we must uniformly understand and apply it on the battlefield.

Fire support training will continue to improve as we move into the future. The Army is starting to realize the full potential of its combat training centers like the National Training Center (NTC) at Fort Irwin, California, the Joint Readiness Training Center (JRTC) at Fort Chaffee, Arkansas, and the future Combat Maneuver Training Center (CMT) in Hoenfels, West Germany. These efforts undoubtedly will improve the conduct of joint and combined exercises.

We will use more simulators as costs associated with training on the systems (munitions and facilities) increase. A decrease in available training areas is expected to combine with increased training constraints, particularly in Europe, to force us to use more simulators. We should

expect to train using simulators on a regular basis, verified periodically with live firing.

At this time, the Department of the Army doesn't forecast any increase in the total end strength of 781,000. In fact, the Army may have to take some force structure cuts—we hope only a few. While the percentage of total end strength allocated to fire support may increase somewhat, I expect the numbers to be insignificant relative to the increasingly complex tasks we have to perform. We must discover innovative ways to do more with the possibility of only a slight increase in personnel. Technology can help, but it is not the whole answer.

The Threat is not waiting for us to complete our plan.

Historically, technology has been a control feature of the fire support organization and will continue to be. The issues associated with technology include funding increasingly complex and costly high-technology systems (although these costs are achievable if the nation will support them) and fielding known technologies for soldiers to use in a timely fashion. The problem is not discovering advanced technologies for future systems but rather getting systems using new technologies into the hands of the soldier before the technologies become obsolete. Our vision requires a concerted effort by leaders throughout the chain of command and the combat developments community to solve this problem. For while we debate, the potential enemy is acting.

Soviet Strengths

- Superior Numbers
- Improved Technology
- Offensive Operations
- Follow-on Echelons
- Continuous Combat

The Threat

The Threat is not waiting for us to complete our discussions but has developed a doctrine emphasizing continuous, offensive combined arms operations. Further, he is fielding a highly-mobile mechanized force to execute this doctrine and achieve the 5-8:1

correlation of forces necessary for success. These ratios may be significantly higher at his areas chosen for breakthrough. He is fielding new, offensively oriented formations at an alarming rate.

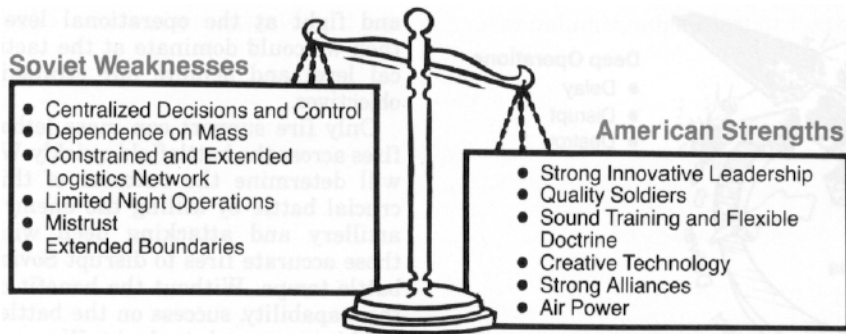
Of equal concern are the large stockpiles of combat service support he is establishing close to the International German Border. These stockpiles can support offensive operations, and their locations seem to reflect a growing Soviet confidence. However, Soviet commanders don't hold all the cards.

The Soviet commander must attack over terrain that restricts his ability to get the ground maneuver forces into battle to achieve the required force ratio. It has been estimated that the Soviet commander can achieve less than half the ratio he needs for success with maneuver forces. Realizing this problem and recognizing that the attacking force will be exposed to the defender's increasingly lethal fires, the Soviets seemingly are pursuing a multi-option solution.

First, he has arrayed his formations in depth. His objective is to achieve superior force ratios approximating 1.5:1, 3:1 and 5-8:1 respectively at the strategic, operational and tactical levels of war. His lead echelons locate and punch through designated areas of the defense with follow-on echelons moving rapidly through the disintegrating defense for the exploitation leading to a quick victory.

Second, he is modernizing firepower at a pace considerably faster than he is his maneuver forces. This thrust is logical; remember, the European terrain is a constant that will not allow him to get more maneuver forces into battle.

The Soviets are not opposed to adopting the good ideas of others to help them overcome their terrain problem. For example, we have no evidence the Soviets were considering the 3x8 structure for Field Artillery when we first began to discuss this possibility in the mid 1970s. While we have been debating and only recently have begun converting, they apparently have completely converted Soviet field artillery to 3x8. They are replacing towed howitzers with self-propelled systems, adding field artillery battalions to tank regiments, developing advanced target acquisition and firing data computation systems and emphasizing automation. New Soviet offensively oriented formations are being fielded with heavy fire support.



We must pit our strengths against Soviet weaknesses at the operational and tactical levels of war.

The Threat is very real. He is not obsolete and, in most areas, is modernizing at a much faster pace than either we or our allies are. Therefore, it is critical we spend more time studying the Threat's tactics, organization, equipment and capabilities to decisively defeat this numerically superior force.

Solving the fire support problem requires that we fight "smart" as members of the combined arms team participating in joint and combined operations across the conflict spectrum. We must avoid focusing exclusively on the enemy's strong points and pit the strengths of the United States and our allies against his predictable vulnerabilities.

Strong leaders across the chain of command think and make decisions quickly within the intent of the commander's mission. These leaders and their soldiers can adapt to changing situations. Our Army trains under as close to realistic conditions as possible to execute a sound doctrine; nations around the globe are adopting many of our doctrinal principles. Training will continue to improve greatly with the infusion of technology. Finally, we are blessed with strong allies who share common goals, values and way of life. These strengths stand in stark contrast to the Soviet weaknesses that we can exploit to our advantage.

Soviet strategic weaknesses include a system of centralized authority and troop control with decisions made at very high levels of command. The process limits Soviet battlefield flexibility, stifles their initiative and makes their actions rather predictable.

Soviet leaders are fanatical in defense of the homeland because of their history of invasion. They are consumed by a commitment never to permit another major war to occur on Soviet soil. As a result of this thinking, they have adopted an offensively

oriented strategy and have dominated neighboring nations to provide a geographical buffer between their homeland and potential invaders.

Soviet military principles of war and doctrine require the massing of overwhelming forces. The force structure reflects an offensive orientation managed by an extensive control apparatus vulnerable to attack.

Soviet military success requires generating and sustaining momentum by using a very large conventional force. The logistical support for these operations is voluminous and must be timely. The means for sustaining Soviet military forces include a limited number of trucks, trains, aircraft and pipelines, which must traverse non-Soviet nations of questionable reliability. The Soviet doctrine of pushing logistics forward over long lines of communication with limited off-road capability combines with a restrictive European terrain to make the support system vulnerable to attack and disruption.

Soviet strategy and doctrine requires capabilities for continuous operations; yet they have not, to date, demonstrated these capabilities. It is likely Soviet forces will be less effective and more vulnerable to attack during darkness for some time.

The Soviet system is built on mistrust that permeates their entire society. Significant differences exist among the various nationalities making up the Union of Soviet Socialist Republics and within the Warsaw Pact nations. One only has to recall the number of times since World War II that Moscow has used the Red Army to "remind" non-Soviet Warsaw Pact nations of their allied status to appreciate the questionable loyalty of these nations.

The Soviet commander's reluctance to report "bad news" to superiors and his inclination to follow orders even when confronted with certain defeat

are also understandable as he remembers the fate of those who failed during World War II. The Soviet military's solution to overcome mistrust and the lack of integrity has been to develop a rigid command and control mechanism designed to compensate for the system's deficiencies.

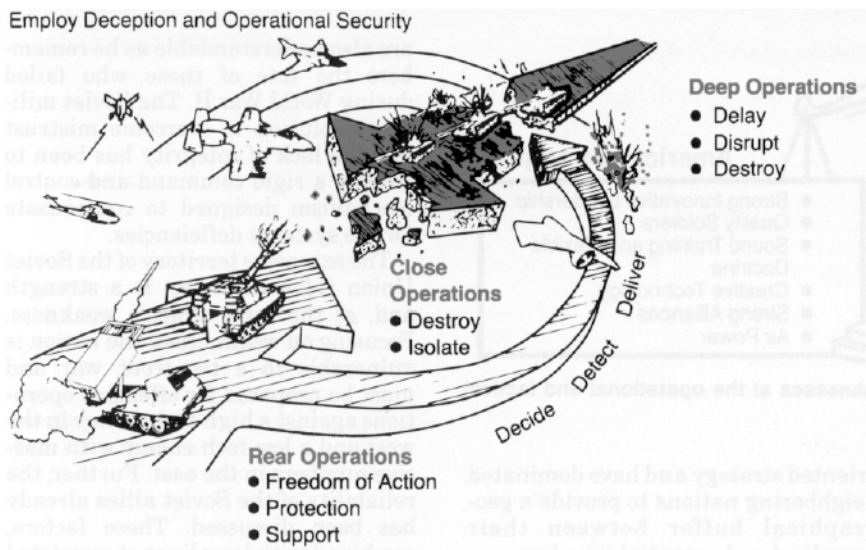
The extensive territory of the Soviet Union (11 time zones) is a strength and, at the same time, a weakness. Focusing on weaknesses, the nation is vulnerable to a two-front war and must be prepared for offensive operations against a high-tech enemy in the west and a low-tech enemy with massive numbers in the east. Further, the reliability of the Soviet allies already has been discussed. These factors, combined with long lines of restricted communications, make it difficult for Soviet military commanders to shift assets rapidly from theater to theater. This difficulty presents predictable vulnerabilities for us to exploit.

Defeating the Threat

It is imperative that allied forces defeat the Red Army; one way is by not allowing the Soviet commander to use his primary advantage of mass. We must disrupt the tempo of Soviet offensive operations at the operational level of war. The Soviets need to generate and sustain a force ratio of 5-8:1 at the main point of attack. Therefore, in places like Europe, we must take advantage of the restrictive terrain to attack maneuver forces concentrated at the main point of attack and follow-on echelons. We must employ high-tech target acquisition and weapon systems on lead echelons, while simultaneously disrupting and destroying follow-on forces.

Defeating the enemy's artillery is of primary importance since it figures most heavily in the Soviet's correlation of force at the main point of attack. The Soviet army is an "army of artillery"—like the Czarist armies of the past. As such, we must attack his weapon, target acquisition and logistical systems to strip these assets from the force relationship equation. Fire support is the principal Army

We need to exploit Soviet vulnerabilities to dominate tactical operations while fighting and winning at the operational level to achieve strategic objectives.



Fire Support for the AirLand Battle Deep Operations

capability for attacking and exploiting the rigid Soviet command and control system, restricted logistical system, key battlefield weapon systems, air defense networks and helicopter air operations with preemptive strikes directed against staging areas.

The solution for defeating the Threat must link the three levels of war in a single effort to dominate tactical operations while winning at the operational level to achieve strategic objectives. The United States and its allies have fielded forces that can dominate tactical operations, if we

can keep the Soviet follow-on echelons from entering the battle in accordance with the Soviet campaign plan.

Fire Support Mission

The greatest threat to our success was described as the Soviet artillery by a senior American general with extensive on-the-ground experience. If the opponent degrades our artillery, we are in danger of losing the battle. Conversely, if we can kill his artillery

and fight at the operational level, then we could dominate at the tactical level and achieve our strategic objectives.

Only fire support can mass lethal fires across the battlefield quickly. We will determine the outcome of this crucial battle by killing the enemy's artillery and attacking deep with those accurate fires to disrupt Soviet battle tempo. Without the benefit of this capability, success on the battlefield is very much in doubt. We must understand and accept the challenge. In fulfilling our responsibilities, we can expect the fire support mission to remain essentially the same: destroy, neutralize or suppress the enemy by cannon, rocket or missile fire and integrate all available fire support.

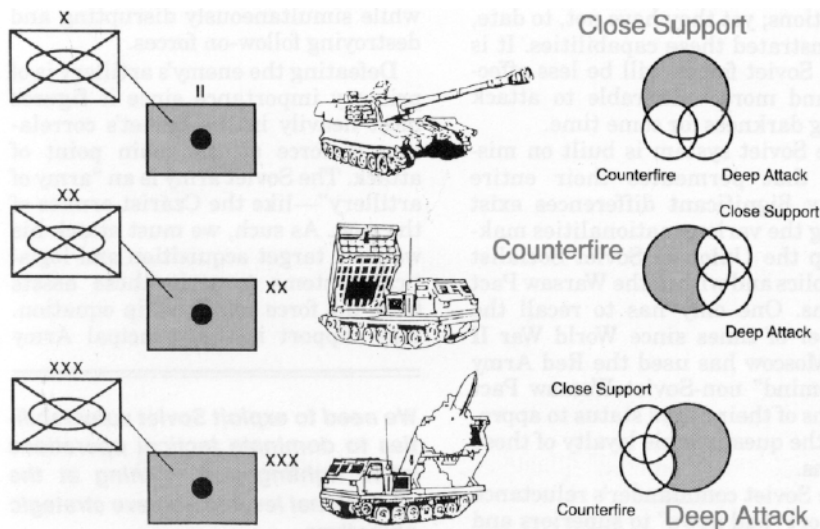
To shoot and coordinate other available means of fire support—tactical air, Naval guns, Army aviation, mortars and electronic warfare capabilities—is a difficult task indeed, but achievable. The fires of Field Artillery will continue to provide the preponderance of around-the-clock, all-weather fire support.

We will continue to perform close support, counterfire and interdiction roles.

Fire Support of the Future

Technologies are moving rapidly to give us greatly enhanced target acquisition and data-processing systems as well as increased weapon lethality and ranges—possibly at reduced costs. The battlefield is becoming increasingly transparent which, when combined with those target acquisition, data processing and weapon capabilities, will make it even more intertwined and lethal.

We'll use robotics to perform certain manual tasks. This trend to offset manpower with robotics where possible will continue and expand. Machines, rather than men, will perform certain dangerous tasks such as mine clearing, patrolling and flying



Fire Support Roles

Moving to the future will be evolutionary—not revolutionary.

reconnaissance over enemy-held terrain.

The trend toward joint and combined operations will continue as nations seek greater efficiencies for common efforts. We must expect adjustments in battlefield tasks, weapon systems and force structures as we introduce more efficient divisions of labor into defense establishments.

Our fire support role increasingly is recognized as the dominant element of the combined arms team. We are becoming the most efficient killing force on the battlefield as we move from firing multiple rounds to kill a single target to firing a single round to kill multiple targets. The transition will take time and, in the process, shift the balance between fires and maneuver in the direction of fires.

Balancing Fires and Maneuver

The impact of fires on the mid- to high-intensity battlefield is too often forgotten when the battle is over. Our nation has a history of supporting maneuver at the expense of fires during peace and, regrettably, has to correct this neglect after conflict occurs, and we relearn the relative impact of fires on the battlefield.

However, it is encouraging to report that a number of factors suggest a more balanced view of fires and maneuver is emerging. First, senior Army leaders recognize the importance of fires and are supporting programs to offset the Soviet's renewed emphasis on fire support. Second, technologies are emerging to provide capabilities for looking and killing deep with multiple, hard-target kills being achieved with a single round. Third, demographics show that developed nations forecast a continued decline in the available military manpower pool into the early 21st Century. Western nations are searching for efficient ways to reduce manpower requirements and decrease danger to military personnel. These societies prefer to kill indirectly rather than with the bayonet.

We must continue working hard to help others fully appreciate the impact of fires on the battlefield and the potential of fire support in the future. Keep in mind that today's budget allocations are determining our future force. Care is necessary to ensure we can field a balanced force capable of fighting and winning on the future battlefield.

Future Battlefield

The future battlefield will involve continuous, joint and combined operations of unprecedented violence and lethality. Conventional systems will approach the lethality of small nuclear weapons, and the battlefield will become increasingly transparent, automated and three-dimensional with the maturing of space missions. Survival will be even more difficult. Forces must expect to operate from an austere support base in an increasingly urban setting. We can expect the distinction of rear, close and deep operations logically to blur. Battles can occur anywhere, at any time and in any weather.

Characteristics of the Future Battlefield

- Continuous Operations
- Violent and Lethal
- Austere Logistical Base
- Transparent
- Automated
- Fluid
- Urbanized
- Three-Dimensional
- Joint and Combined

Only in war do we really understand the true impact and importance of fire support.

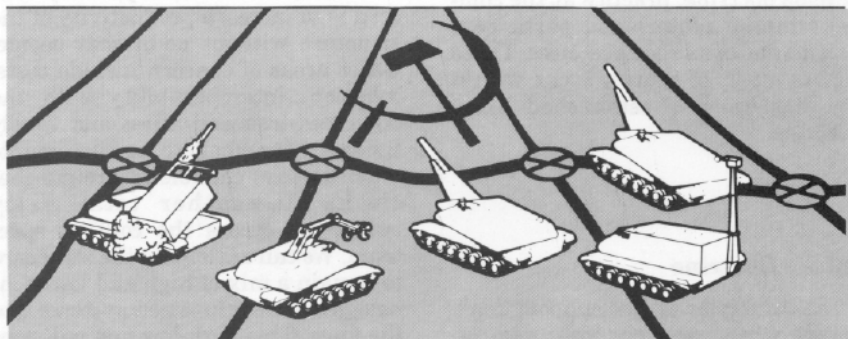
We must be able to mass fires quickly across the entire width, depth and height of an expanded battlefield. Further, emerging technologies may allow Field Artillerymen routinely to engage target sets now destroyed by other means as the Army moves to field necessary future force capabilities.

Future Force Characteristics

The future total force will continue to be a mixture of active and reserve components with an appropriate mix of combat, combat support and combat service support organizations. Strategic and tactical mobility will be an essential requirement as the Army continues to have a mission for rapid deployment anywhere in the world. We can expect to consolidate some combat, logistical and administrative functions but anticipate the combined arms team to remain the basic fighting organization. Combat units may be leaner to gain increased agility and firepower. Technologies are being exploited to provide increased firepower; enhanced command, control and communication (C³) and use of automation and robotics. The combination of these force capabilities and characteristics of the future battlefield provide a number of imperatives for fire support in the future.

Future Force Characteristics

- Balanced
- Mobile
- Consolidated Combat, Logistical and Administrative Support
- Technology
 - Increased Firepower
 - Enhanced C³
 - Developed Robotics and Automation



Fire Support Imperatives

The future battlefield will be extended in time and distance as automation increases the pace of the fight. Weapon systems combined with target acquisition and communication means will expand the commander's area of influence. The battles in Afghanistan provide a glimpse of the increased lethality expected on the future battlefield.

Technology must be exploited to provide organizations and systems with greater productivity and survivability. It will become increasingly difficult to balance requirements for survivability and perform battlefield tasks. We also must take advantage of technologies to improve the training and performance of soldiers as well as units. We can expect the counterfire battle to continue to be a critical element of the successful campaign. Early victory in counterfire will certainly turn the tide of battle.

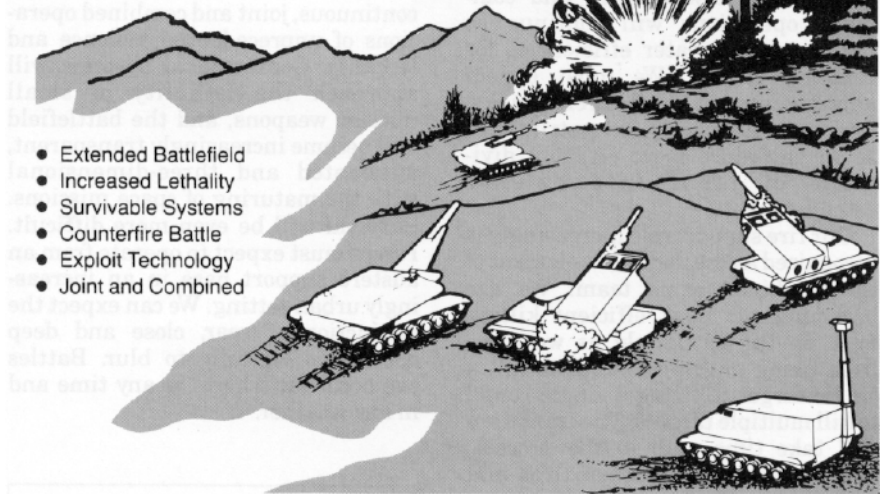
We must be able to fight with other Army branches alongside other services and our allies. We must make a concerted effort to expand and institutionalize tactics, techniques and procedures. Finally, it is critical that, under all circumstances, we maintain superior force agility relative to the enemy.

Maintaining superior force agility has both mental and physical components. Mentally, we must be able to visualize objectives, conceptualize the battle and understand the battle as it unfolds, so the commander can make the right decisions. Physically, we need to move and concentrate at the proper time and place to strike the enemy from a position of decisive advantage while preparing for the next fight. Systems such as the howitzer improvement program (HIP) M109, advanced Field Artillery tactical data system (AFATDS) and the multiple launch rocket system (MLRS) will support the physical aspects of agility. The mental component will occur as we leaders further develop doctrine, practice at the combat training centers and participate in joint and combined exercises. These efforts must, of course, occur within the framework of established Army doctrine.

Future Doctrine

The principles of fire support don't change when you fight low-, mid- or

Maintain Superior Force Agility



Imperatives for Future Fire Support

high-intensity conflicts and should not change in the future. Doctrinal efforts are expected to focus on three broad areas. The first will be to continue refining and building on AirLand Battle doctrine and further embed its tenets in the total Army's effort to fight and win as a combined arms team in joint and combined operations worldwide. The second is to assess our war-fighting doctrine against the perceived requirements on the battlefield of the future. The third is to apply emerging doctrinal trends in training and force structure as part of the Army's evolution into the 21st Century.

Future Force Structure

Current force structure modernization will continue. The focus will be on fielding organizations that increase the potential of high technology in the hands of quality soldiers and leaders. As stated earlier, it is not practical to expect significant personnel increases; therefore, a primary concern is to increase productivity of the structure without additional people. Other areas of concern include costs, cohesion, interoperability with the other services and allies and timely fielding of technology for sustainable organizations capable of around-the-clock, all-weather total Army operations across the conflict spectrum. We can anticipate the structure to remain a mix of high and low technologies as we infuse new systems into the force. This high-low mix will continue

to complicate future training requirements.

Future Training

Training remains the key for realizing the potential of doctrine and materiel. We must train to operate as the vital link to exploit predictable enemy vulnerabilities and fulfill its responsibility on the future battlefield. Leader development across the chain of command will be critical as systems and the battlefield increasingly assume 21st Century characteristics. We have to be prepared for combat across the conflict spectrum on short notice around the globe as part of a combined arms team participating in joint and combined operations. Mobility and agility are important to our light as well as our heavy forces. Simulators will be more prominent as resources become increasingly more restrictive and hands-on training costs rise. We must focus on using better technologies wherever possible in training the soldier and leader. By the 21st Century, it is quite possible we will reserve live exercises primarily for validation training.

Evolving doctrine—continue to build, assess and apply AirLand Battle doctrine and develop a family of future concepts.

Force Structure

- Agility
- Survivability
- Continuous Operations
- Productivity
- Flexibility
- Strategic and Tactical Deployability
- Technology

NOW

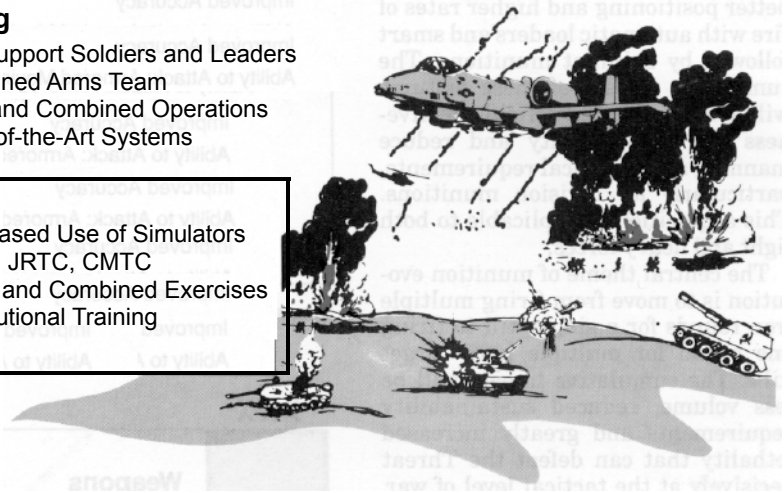
Complete 3x8 Conversion
 Complete MLRS Growth Initiatives
 Fill Pershing Force Structure Void

Training

- Fire Support Soldiers and Leaders
- Combined Arms Team
- Joint and Combined Operations
- State-of-the-Art Systems

NOW

- Increased Use of Simulators
- NTC, JRTC, CMTC
- Joint and Combined Exercises
- Institutional Training



Training translates the potential of doctrine and materiel into capabilities.

our survivability, sustainability and all weather, around-the-clock dependability.

Fire support is a high-payoff investment that we must help others understand and support. Help will be available to those who can articulate clearly the potential for success. Therefore, we are pursuing a balanced acquisition program that is explainable and defensible.

among all components is necessary to realize the potential of the team on the battlefield. Balancing the program and maintaining a coherent strategy are major challenges in the years ahead as we move to field advanced weapons for the division.

Division Acquisitions

Key features of future weapons for the division include better mobility, which increases battlefield survivability, increased ranges through improved propellants and better cannons, and improved responsiveness achieved through a combination of robotics and automation. The division weapons must have greater lethality

Future Materiel

Among our many challenges, few have proved more difficult than getting materiel into the hands of troops. The process of programming, budgeting and acquiring materiel is complex and lengthy. We must understand this process and work to ensure everyone understands and supports our requirements. This effort involves the entire fire support organization as we strive to integrate doctrine and training initiatives in fielding the latest technologies in a timely manner.

Increased lethality and productivity are central themes we must highlight. We must understand and explain fire support's potential for efficient use of resources. For example, we must emphasize the potential of single rounds with multiple, hard-target kills. Also, we must point out we are reducing manpower requirements as we increase range and accuracy and still are accomplishing the mission. The position and azimuth determining system—PADS (as compared to traditional survey parties), the multiple launch rocket system (MLRS) and future howitzer crewmanning levels are but three examples. Further, we are enhancing

Acquisition Strategy

The fire support acquisition program provides a proper balance among different components of the team. Synchronized functioning

Materiel

- Survivability
- Lethality
- Productivity
- Interoperability
- Man and Machine Interface
- Simulators

NOW
 A Balanced Acquisition Strategy

resulting from improved accuracy, better positioning and higher rates of fire with automatic loaders and smart followed by brilliant munitions. The cumulative impact of these features will help improve battlefield effectiveness and survivability and reduce manning and logistical requirements, particularly for division munitions. This acquisition is applicable to both light and heavy forces.

The central theme of munition evolution is to move from firing multiple iron rounds for a single kill to firing one round for multiple hard target kills. The cumulative impact will be less volume, reduced sustainability requirements and greatly increased lethality that can defeat the Threat decisively at the tactical level of war. At the same time, the corps will fight with an MLRS family of munitions.

Corps Acquisitions

Lance is, at present, the only missile system available for the corps commander to influence the fight. Work is on-going to extend the life of this system until the mid 1990s; however, the conventional Lance does not have the lethality required for defeating the Threat. There is an ongoing study to determine the requirements for a follow-on Lance. The Army tactical missile system (ATACMS) is planned to replace the conventional Lance. ATACMS will have greater range and increased lethality, be more responsive and survivable as well as require fewer soldiers for operation. Successful AirLand Battle operations require a capability to attack deep. ATACMS, armed with advanced technologies, will continue to be the Army's primary capability for conducting deep operations on the future AirLand battlefield.

XX

	Weapons Improved Mobility, Survivability, Accuracy, Rate of Fire, Range, Reliability, Availability, Maintainability and Commonality Reduced Manpower and Logistics	Munitions Increased Range Ability to Attack Armored Moving Targets and Indirect Fire Systems Improved Propellants Electronic Fuzing
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Acquisition Strategy for the Division

XXX

	Weapons Improved Mobility Improved Survivability Improved Responsiveness Reduced Manpower	Munitions Increased Range Improved Accuracy Ability to Attack: Armored Moving Targets, Indirect Fire Systems, Air Defense and Emitters
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Acquisition Strategy for the Corps

ATACMS, with follow-on Block II technology, will provide the corps commander a reliable capability to attack enemy follow-on echelons and other suitable targets. Major efforts are underway to ensure appropriate target acquisition capabilities will be available also as we field these improved firing systems for the division and corps.

counterbattery target acquisition capabilities. But target acquisition is becoming increasingly complex and dangerous to perform. Success on the future battlefield may very well go to the commander that strips this capability from his opponent. Therefore, we must make our systems more survivable, responsive and mobile. Additionally, as evidenced by the joint surveillance and target attack radar system (Joint STARS), these capabilities are becoming increasingly joint and must extend in distance and become more automated. The linking of target acquisition with firing systems requires equally responsive and

Other Systems Acquisitions

Acquisition systems like the Q36 and Q37 Firefinder radars have given us tremendous countermortar and

Target Acquisition	C ³ Systems	Support Systems	Sustainment Systems
Accurate Target Development	Automated	Improved Survey	Increased Ammunition Resupply
Multiple Target Processing	Integrated Fire Support	Improved Meteorological and Target Area Meteorological Data	Improved Mobility
Acquisition for Counterfire	Distributed Processing	Reduced Manpower	Improved Survivability
Acquisition of Deep Targets	Improved Mobility	Improved Survivability	More Rapid Return of Damaged Systems to Combat
Improved Mobility		Developed Autonomous Operations	
		Improved Mobility	
		Improved Responsiveness	

Acquisition Strategy Requirements

survivable command, control and communication systems.

The AFATDS will provide automated tactical and technical fire control for the entire fire support system, not just Field Artillery. This system is essential for responsiveness and survivability on the future battlefield. AFATDS and a number of supporting systems will combine to enhance fire support effectiveness on future battlefields and provide real-time data distribution to light and heavy forces.

The lethality needed to support future battlefields largely depends on having accurate position location and meteorological data from the firing location to targets at extended ranges. A family of supporting systems is planned to meet these requirements. They will be lighter, smaller and more efficient. In a similar manner, efforts are underway to keep pace with sustainment needs.


Like the other battlefield systems of the late 1990s and early 21st Century, sustainment systems must also be more productive, particularly in terms of manpower requirements, responsiveness and survivability. The palletized loading system will reduce the time required to load and off-load cargo. We can expect rearming and refueling vehicles to be

easier to operate and repair and to be protected by advanced, light armor. We are planning separate maintenance and recovery vehicles that will allow us to perform functions rapidly and well forward on the battlefield. They will ensure our continuous operation in the future.

Summary

This brief vision of fire support is a point of departure that will improve with your input. We have a balanced, dynamic master plan, consistent with the requirements of tomorrow as currently projected. It is one that will allow us to exploit Soviet vulnerabilities to achieve the combined arms victory on the future joint and combined battlefield. As we learn more, we will adjust the master plan.

Your help is essential if we are to realize the vision. You must take every opportunity to explain fire support—its past, present and future, its potential and our vision for achieving the full impact of this deciding factor on the battlefield. Just as we fight as one on the battlefield, we must now move forward together to fulfill a future that promises to be even more exciting than our rich heritage. I look

forward to your input and to participating in this journey with you. 

Major General Raphael J. Hallada is Chief of Field Artillery and Commander of the US Army Field Artillery Center. He has spent more than 13 years in troop assignments with three different Army divisions. He has served in both light and heavy artillery, has had assignments in Europe and CONUS and has had two tours in Vietnam. In the 82d Airborne Division, Fort Bragg, North Carolina, he served as a battalion executive officer, commanded the 2d Battalion, 321st Field Artillery, and was the Division Artillery Commander. Additionally, he served as the 82d Airborne Division Chief of Staff, Assistant Division Commander and, for a short period, was the Commanding General. Other important assignments include serving on the Army Staff in the Office of the Deputy Chief of Staff for Operations and Plans and serving as Director of the Command, Control, Communications and Intelligence Directorate of the United States Army Combined Arms Combat Developments Activity at Fort Leavenworth, Kansas.

Fort Sill Hotlines Improve

• *ARTEP and Redleg Services*

The Field Artillery 24-hour Army training and evaluation program (ARTEP) Hotline has expanded its services. In addition to ARTEPs, the Hotline now answers unit questions about and solves problems with skill qualifications tests (SQTs), ARTEP mission training plans (AMTPs) and operations at the National Training Center, Fort Irwin, California, and the Joint Readiness Training Center, Fort Chaffee, Arkansas. For questions concerning general artillery-related subjects, call the Redleg Hotline, also a 24-hour service. After duty hours, these Hotlines will take your message, and the personnel from the Directorate of Training and Doctrine, US Army Field Artillery School (USAFAS), will respond as quickly as possible. To use the ARTEP Hotline, call AUTOVON 639-2064; for the Redleg Hotline, call AUTOVON 639-2520.

• *The Fire Support Feedback System (FS)²*

In August 1987, the Center for Artillery Lessons Learned (CALL) changed its name to the Fire Support

Feedback System, (FS)², to avoid confusion with Fort Leavenworth's Center for Army Lessons Learned (CALL).

(FS)² receives feedback from many sources in US Army Field Artillery School (USAFAS), including the Redleg and ARTEP Hotlines. (FS)² personnel staff the feedback to the appropriate agency to resolve problems and identify trends in training, doctrine, materiel or force structure. Then the Directorate of Evaluation and Standardization monitors to ensure corrective action is taken. Soldiers with feedback can call (FS)² during normal duty hours (0730-1630 Central Time) or call the ARTEP or Redleg Hotlines after hours.

AUTOVON: 639-3809 or 5644

Civilian: (405) 351-3809 or 5644

Message: CDR USAFAS Fort Sill OK//ATSF-OA//
Commander

Mail: United States Army Field Artillery School
ATTN: ATSF-OA
Fort Sill, OK 73503-5600

General Jack N. Merritt, Retiring US Representative to the NATO Military Committee

Exploit Technology to Defend NATO



Paul Bearce

General Merritt retired from the Army on 23 October 1987 after more than 35 years of service. Among his many prestigious assignments, he represented the United States on the North Atlantic Treaty Organization (NATO) Military Committee, Brussels, Belgium, for two years. *Field Artillery* interviewed General Merritt, a former Chief of Field Artillery, shortly after his retirement.

General Merritt, what is the health of our NATO alliance?

Fundamentally, the NATO alliance continues to be strong. But right now, we're going through some trials. There are always problems with getting the proper conventional defense, trying to get our nuclear strategy to make sense and dealing with antinuclear elements in Europe. But also, the INF [intermediate nuclear force] decision [to remove mid-range nuclear missiles from Europe, including the Pershing II] has raised questions, and the alliance is going to have to work through them. The real question is, "Can I conceive of the 'Western World' without NATO?" The answer is, of course, I can't. So, we're in for some turmoil, but the basic health is good because the basic need is there.

Is the United States carrying more than its fair share of the load in NATO?

That's always a problem that Senator [Sam] Nunn [Chairman of the Senate Armed Services Committee] and others raise. I have never been certain that the problem was as great as suggested.

In the first place, I don't know how you define "share." If you define it as a percentage of budget invested in the Department of Defense (or the equivalent in the other nations) then, yes, we contribute more of our GNP [gross national product] each year than most of the European countries do.

But you can define "share" in a number of ways. Is it the percentage of population you have under arms? If so, the United States is not the leader. Is

it the amount of materiel you have on the battlefield and the age of that materiel? If so, then maybe our modern technology is contributing more than our share.

If it's the population immediately at risk at the outbreak of war then we're not contributing our share. The Europeans do so many things in terms of host-nation support—we just had a great REFORGER [return of forces to Germany] exercise, the biggest exercise since the Louisiana maneuvers in the United States. In an area the size of Southwest Oklahoma, tens of thousands of soldiers, tanks, artillery vehicles and so forth ran at will across the German farm land and through the forests. That's inconceivable to us, and that's a tremendous contribution the Europeans make to the alliance. Of course, the US reinforcement, also

important, is what is being tested in REFORGER. We insist on REFORGER to make sure NATO forces are interoperable, and we can work with our allies.

Our allies make all kinds of other hidden contributions. But rather than try to measure them, our concern ought to be with the total strength of the western alliance. NATO troops in Europe are for the defense of the Western World, and we are part of the Western World. At the same time, I want our NATO allies to do more about ammunition, conventional defenses and other defense issues. But I wouldn't focus on the idea that they aren't doing their share.



Jill Ponto

What is the state of fire support in NATO?

We don't have enough artillery in NATO. We have modernized somewhat, and the ubiquitous M109 howitzer is in Europe in large number. We are starting to get the MLRS [multiple launch rocket system] in. But we still don't have enough artillery.

Because of the cost of people and other programs, Field Artillery has fallen behind. And it isn't just that we have fallen behind, the Soviets also have surged ahead. A few years ago while the Soviets had a great deal of artillery, it was all towed. We had less artillery, but we could neutralize theirs pretty quickly. That's not true anymore.

Not only is their artillery now self-propelled, they have large numbers of artillery pieces. Depending on the conflict scenario, we can be outnumbered at least five to one and up to 10 or 12 to one. Their massive firepower makes it very difficult to conceive of implementing our tactics.

Do you consider the Soviet artillery the most severe threat we face in NATO?

I absolutely do. The Soviet artillery is the most serious threat to our ability to prosecute conventional war in Europe. It is something we're working on—developing smart and brilliant munitions—and that's helpful. But the Soviets also are developing more modern munitions, and they have the advantage of sheer numbers.

One of the impacts of war that's hard to prepare for is the force of an artillery shell landing near you—tons and tons of high explosive and metal falling on you when you're trying to move troops. I think counteracting that threat is a big, big problem.

If the Intermediate Nuclear Force Treaty is ratified, what will be the impact on US Field Artillery?

The most obvious impact is Pershing II goes out of the European inventory. For that matter, it could be hard to justify maintaining any Pershing systems, because Pershing II goes out and the German Pershing IA goes out—we forego the right to use the full range of Pershing IA. [INF Treaty limits missile ranges to 500 kilometers, which dips into the Pershing IA short range.]

The secondary impact is that it's a real challenge for the Field Artillery to modernize Lance with ATACMS [Army tactical missile system] and MLRS to give us the range to handle the battle without Pershing. On the other hand, with the INF agreement, while we lose military capability, we also reduce the Soviets capability and, by the way, in pure numbers we get the better of the deal.

The exchange is okay as long as we follow through with certain developments. One is to modernize our nuclear force by replacing the aging Lance. Another is to develop smart and brilliant munitions for ATACMS to give us a better conventional capability. Nationally, we have to continue to negotiate seriously with the Russians on conventional systems to reduce the

imbalance—across the board. Finally, we must draw the line on the reduction of nuclear weapons in Europe until we are sure we have conventional parity. We must not forget nuclear weapons are still the foundation of the deterring force preventing war in Europe.

What can we do to achieve conventional parity?

If I were "King," I'd buy conventional ammunition for our European allies who don't have the stocks they ought to have. I would continue to aggressively field the MLRS. I'd also add more tube artillery in Europe.

In the out years, our best technological investments are in the things that give us the capability to prosecute AirLand Battle—that is TACMS and related systems. Developing advanced warheads, acquisition and guidance systems is part of this effort.



Jill Ponto

What roles do you see for remotely piloted vehicles [RPVs] and robotic systems in NATO defense?

The RPV is absolutely vital to NATO's defense. We needed the real-time, on-site intelligence and targeting data and other capabilities of the Aquila RPV 10 years ago. That requirement is no less valid today than it was then.

I'm glad you asked about Aquila in connection with robotics. Both can go beyond the battle lines without exposing a soldier to enemy fire. When I was the Commandant [of the US Field Artillery School] here 10 years ago, I thought there would be just a few people in each gun. With robotics, we can think about having no people in a moving gun. Of course, robotics are

already developed for materiel handling. That's helping to solve our logistical support problems.

What do you see as the major differences between the US AirLand Battle doctrine and NATO's follow-on forces attack [FOFA] doctrine?

Well, there really shouldn't be any. It's a matter of degree. The Army's AirLand Battle doctrine is more generic—we have worldwide application for US forces. The FOFA doctrine is just specifically tailored for NATO.

Some Europeans voiced concern that NATO was getting away from being a defensive alliance because AirLand Battle [deep attack] sounded terribly offensive. Well, nobody reasonably argues anymore against attacking beyond the immediate main battle area. It is something we will and must do, and being prepared to do that is not an offensive act.

There were European elements who spoke of contradictions in terms of defensive versus offensive weapons. With our modern weapons, I don't understand what a purely defensive weapon is.

But most of that conflict has faded. We all understand what FOFA and AirLand Battle are, and that they are not and cannot be inconsistent with each other.

There are 16 nations in NATO. Can US forces effectively operate within a joint and combined structure with our NATO allies?

There can be only one answer: we must! But, we can't operate in the joint and combined structure if we don't practice it. NATO has operated as a joint and combined force for a long time. Part of my concern is that we Americans frequently don't understand NATO nearly as well as we ought to. Most European military establishments don't have worldwide interests; they don't have other military activities distracting them. So understanding the integrated force structure is second nature to Europeans and not second nature for us. The focus of most NATO nations is intensely and narrowly on Europe, and Europe is NATO.

US forces will integrate into that command structure. After all, the Supreme Allied Commander [SACEUR] is an American officer as well as an international officer.

What is NATO doing to improve command, control, communications and intelligence systems compatibility among the allied forces?

Of course, compatibility has always been a problem. Sometimes I think there is an unlimited number of coordinating committees in NATO, but they all work toward standardization and interoperability. We and the principal NATO nations with whom we operate have a good many bilateral discussions to make sure our computer systems, radios and so forth are interoperable.

There is an organization called NACISA, which stands for the NATO Communications Information Systems Agency, that centrally develops and contracts for NATO computer, communication and other systems. NACISA ensures we have interoperable systems, including air defense. The SACEUR has immediate control of the forces and must have timely reaction for air defense during war.

Obviously, the United States is the biggest contributor to the intelligence systems in terms of information. We do have intelligence systems integrated with Allied Command Europe's. That's one of the areas we focus on a great deal.

What is NATO doing about interoperability of procedures and other equipment?

There are many NATO committees working on STANAGs [standard NATO agreements] and other procedural agreements. But most important, to the extent that we're the leader, others tend to model US equipment and tactics or at least adjust to it because of the size of the forces we will eventually bring into Europe in case of war.

We have done a great deal ourselves by emphasizing standardization and interoperability. The Joint Chiefs of Staff have opened a major office in the Joint Staff. Its objective is interoperability within US forces and with our allies. General [Glenn K.] Otis [Commander, US Army Europe (USAREUR) and 7th Army] really led the way by creating an interoperability office in USAREUR to keep track of the myriad of details involved in this problem.

What is the greatest challenge your successor on the NATO Military Committee faces?



Jill Ponto

His challenge is to help NATO face turbulent times. There are political forces that would have us denuclearize and, perhaps, demilitarize Europe, which is an invitation to ultimate disaster. There are those who look at the United States and are uncertain about our motives—uncertain as to whether we are cutting our NATO connection in favor of the ultimate strategic deterrence of the United States. My successor must make clear that the INF Agreement and, further, the potential reduction of strategic arms do not lessen our commitment to NATO. The essential connection between the United States and the Alliance rests with 300,000 soldiers, sailors and airmen in Europe. Add their families, and we have something like three-quarters of a million American citizens on European soil.

The United States must talk with the Soviets in the hope of reducing strategic nuclear weapons and reducing the conventional imbalance. Our allies must understand our motives include them. But one of our biggest problems is the Soviets have learned how to "play" the Western press very well. And we have to make our commitment clear.

But in the final analysis, I believe going through all this turmoil will make NATO stronger. It's an alliance of sovereign nations where conflict in discussion is permitted and necessary.

As a senior general officer and former Chief of Field Artillery, what advice would you give Redlegs as you retire?

I think the particular challenge to the Field Artillery is to re-establish our role as "King of Battle." I frequently refer to the Field Artillery as the "Once and Future King." It is very clear in history that we were the King of Battle. It has been less clear recently. But taking advantage of technological opportunities will ensure Field Artillery is the branch of the future. Let your creativity loose to exploit this technology, and the Artillery will be the King of Battle again.



General Jack N. Merritt was commissioned a second lieutenant through the Field Artillery Officer Candidate School in 1953. He commanded the 3d Battalion, 34th Artillery, 9th Infantry Division, Vietnam, where his unique operations included floating conventional artillery pieces mounted on barges to support the Joint Army-Navy Mobile Riverine Force in the Mekong Delta. He commanded the 1st Cavalry Division Artillery and later served as the Assistant Division Commander at Fort Hood, Texas. General Merritt also commanded

the US Army Field Artillery Center and Fort Sill and the Combined Arms Center and Fort Leavenworth at Fort Leavenworth, Kansas. Among many other high-level assignments, he served as Commandant of the US Army War College, Carlisle Barracks, Pennsylvania, and as Director of the Joint Staff, Organization of the Joint Chiefs of Staff. In 1985, he represented the United States on the NATO Military Committee until his retirement in October of 1987. General Merritt is married and has three sons.

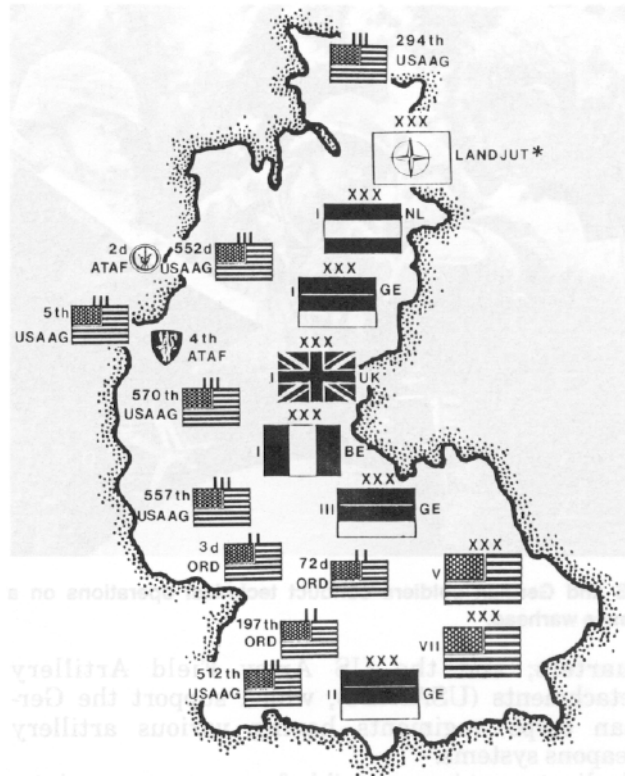
The 59th Ordnance Brigade A Vital Link in the NATO Alliance

Five out of the 59th Ordnance Brigade's 10 battalion-sized elements are Field Artillery groups; and with over 7,000 soldiers dispersed in 58 locations throughout West Germany and the Netherlands, it provides a vital link between US and NATO forces in Europe. A major subordinate command of US Army Europe (USAREUR), the Brigade supports NATO corps assets as well as various NATO Air Forces.

The Brigade's five Field Artillery Groups provide dedicated support to seven NATO corps. The Brigade's 72d and 197th Ordnance Battalions support the two US corps, whereas the 3d Ordnance Battalion supports weapons systems throughout the theater. The 5th US Army Artillery Group provides air defense artillery support to the Allied Tactical Air Force (ATAF). The Headquarters Support Battalion, located in Pirmasens, Germany, has the Brigade headquarters and staff.



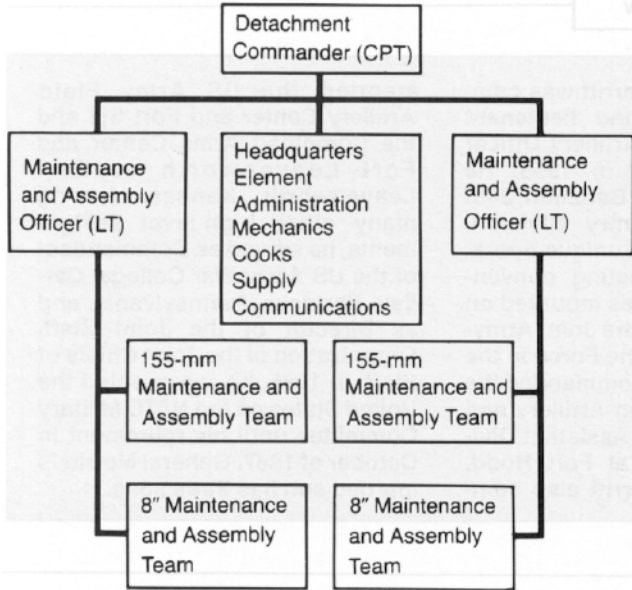
Security forces exit the site security control center to defend a special weapons storage site.



*Combined NATO Corps

Major NATO Commands and Supporting 59th Ordnance Brigade Units.

The Brigade Artillery Groups are tailored to match the NATO organization they support. For example, the 557th US Army Artillery Group (USAAG) supports a German corps with six subordinate units: an ordnance company, collocated with the group headquarters, which provides maintenance support for the weapons systems; a headquarters detachment, also collocated with the group headquarters;



Cannon Artillery Detachment

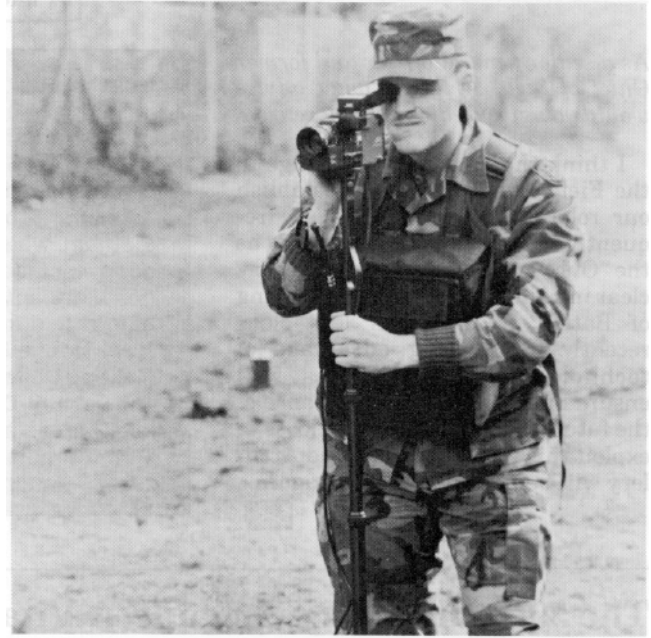


US and German soldiers conduct technical operations on a Lance warhead.

and the US Army Field Artillery detachments (USAFADs), which support the German corps' regiments having various artillery weapons systems.

The lieutenant is responsible for one or more maintenance and assembly teams, each capable of independent operations. The typical detachment supports 8-inch and 155-mm weapons systems.

The US artillery detachment commanders also act as technical advisors for the employment of artillery weapon systems. The NATO division commander relies on the knowledge and experience of the detachment commander to provide the information necessary for crucial decisions on weapons safety, custody and security. The NATO Corps commander has the specialized experience of the US artillery group commander and his staff to help coordinate fire support at corps level.



Portable cameras supplement surveillance cameras synchronized by computers to video tape force-on-force exercises.

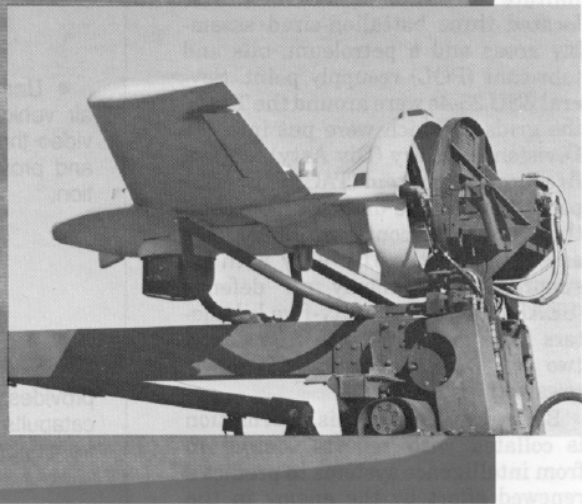
Although detachment composition varies among units, the organization of a typical cannon artillery detachment remains the same. The commander, responsible for detachment operations, accompanies the first sergeant and headquarters element to the division tactical operations center. The remainder of the detachment is subdivided into separate field locations, each under the supervision of a lieutenant.

To maintain proficiency in custodial agent skills, the 59th Ordnance Brigade has an innovative training program. The Security Mission Training Center at Fischbach, West Germany, uses force-on-force training scenarios to test peacetime and wartime security of munitions, convoy procedures, exclusion area procedures for two-person control materials, emergency destruction of sensitive items and other skills. Computer-synchronized video and audio systems along with MILES (multiple integrated laser engagement system) equipment provide realistic training with meaningful after-action reviews. The Brigade operates the Training Center weekly throughout the year for US and NATO Army and Air Force units.

The Brigade also has a semi-annual tactical operations tournament (TACOPS), which brings together custodial agents from the US, West Germany, Great Britain, Belgium and the Netherlands to demonstrate their proficiency in conducting their peacetime and wartime missions. TACOPS 87-1 brought 500 soldiers to Fischbach last May to compete in eight rigorous events that ranged from marksmanship and custodial agent skills to force-on-force engagements on fixed and field storage sites.

Providing a critical link in the NATO defense chain, which acts as a deterrent to Soviet aggression in Western Europe, soldiers of the 59th Ordnance Brigade perform a necessary peacetime mission as well as a vital wartime function.

RPV: Above the Threat



by Captain Timothy J. Northrup

It's 0530 hours; the weather is cool and damp. The Division tactical operations center (DTAC) is changing from a night to a morning shift. The G2, G3 and fire support element (FSE) sections are briefing the morning shift personnel. The battle had been gradually slowing down in the past 12 hours, the enemy seemingly losing momentum in his attack. The enemy's main battle effort for two days had been against the armored division on the right flank, and most of the Corps intelligence assets were committed to support that sector. The 2d Brigade had seen little action on our left flank, and the action against the 3d Brigade holding our right flank was more of a spill-over from the battle against that armored division than a true battle in our division zone. 1st Brigade is still a division reserve, to be committed for defense when needed.

As the morning progresses, the traffic on the intelligence net starts to increase. The G2 staff, using information gathered

by the organic intelligence assets of the combat electronic warfare and intelligence (CEWI) battalion, starts to put together a fuzzy picture of activities beyond the forward line of own troops (FLOT). The G2 requests support from Corps to help define the activities beyond the FLOT more clearly, but is denied. The G2 and G3, along with the FSE, approach the Assistant Division Commander for Maneuver (ADC-M).

The G3 starts off, "General, it looks like the enemy is increasing his efforts in the 2d Brigade sector, but we can't be sure of his intentions until we can get a look across the FLOT. All requests for air reconnaissance flights have been denied. Our plan is to use the remotely piloted vehicle (RPV) forward control section attached to 3d Brigade to send the RPV deep across the FLOT to see what the enemy is up to. We have some general locations from radio direction finding (RDF) equipment and prisoner of war

interrogations. Since the Corps commander gave us an RPV battery with two forward control sections (FCSs) and one central launch and recovery section (CLRS), it means 3d Brigade will be without RPV support while we're using it.

"Sounds good, Mike," the ADC says. "With the action slow in 3d Brigade's sector, I think we can afford to pull their RPV support for a while. Make it happen."

It's one hour later, and the G3 is briefing the RPV mission commander (MC). The G2 gives the MC the general locations of possible enemy TOCs and assembly areas picked up by RDF equipment. The MC takes his mission order back to his ground control station (GCS). He plans for loiter maneuvers (way points) over the areas indicated by the G2 and linear searches for possible enemy movement towards the FLOT. He requests an air vehicle (AV) from the CLRS.

At 1030 hours, the CLRS launches the AV and flies it out to the hand-off

point. The FCS takes control of the AV and flies it across the FLOT to begin accomplishing the first element of the mission.

At 1330, the CLRS recovers the air vehicle. Over at the FCS, the mission commander is finishing his flight report; the information has been transmitted in real time to the TOC by FM radio during the mission. During the flight, the crew had confirmed the location of four enemy TOCs within 10 kilometers of the FLOT. It had discovered two of the suspected TOC locations were actually dummy TOCs, having no more than one vehicle equipped to produce signals to imitate a complete TOC. It also located three battalion-sized assembly areas and a petroleum, oils and lubricant (POL) resupply point. Several ZSU 23-4s were around the TOCs, the grids of which were put into the Division Artillery (Div Arty) tactical fire direction system (TACFIRE) computer files by the digital link within the RPV ground control station. These assets helped the Div Arty with its suppression of enemy air defense (SEAD) mission. Twenty-five kilometers from the FLOT, the RPV found two armored columns moving slowly toward the FLOT.

Back at the DTAC, this information is collated with reports coming in from intelligence systems to predict a renewed effort by the enemy in the Division sector. DTAC issues orders to prepare for this attack. The RPV mission orders include using precision-guided munitions on moving and stationary armored targets. A quick fire channel is set up for the RPV to direct conventional and multiple launch rocket system (MLRS) attacks on the enemy TOC. The Division Commander plans to cripple the enemy before he has a chance to bring his forces into the battle. By using the RPV, he can locate and destroy or disrupt the enemy behind his own lines and, in the ensuing confusion, counterattack with the reserve brigade, turning the tide of battle for the Division.

This is just one scenario where Field Artillery can use the remotely piloted vehicle, Aquila, to determine the enemy disposition, influence the battle by accurate location of enemy forces and direct fire support on those locations. The RPV battery is a true combat multiplier for the maneuver commander.

The RPV's daylight mission payload with its on-board laser rangefinder can accurately locate moving or stationary targets. We now have the software to adjust conventional artillery onto these targets. The RPV's

laser designator has proven itself effective in guiding 155-mm Copperhead artillery-fired projectiles onto moving and stationary targets. It also has successfully guided Hellfire missiles onto moving and stationary targets. The forward-looking infrared (FLIR) payload is moving forward in its development phase.

The day when remotely piloted vehicle batteries are in the field is drawing near. Currently, we are planning to assign these RPV batteries to the corps and attach them to whichever

division the corps commander thinks is the most critical.

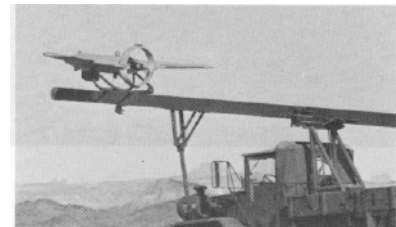
The organization of the RPV battery lends itself to a variety of task organizations. The corps commander may keep one CLRS and FCS to support his rear area missions or use them as a flank screen, freeing ground troops (such as an armored cavalry regiment) for use elsewhere. When the entire RPV battery is attached to a division, the division can have up to five air vehicles in the air at one time. Each CLRS can launch an

Aquila RPV Components

- Unmanned, computer-piloted air vehicle that transmits real-time video through a jam-proof data link and provides laser target designation.



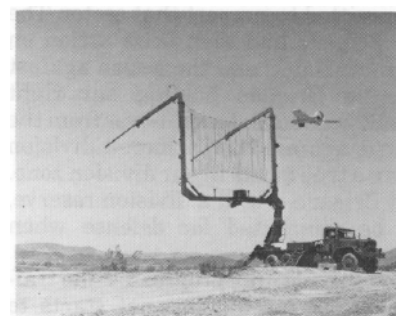
- Truck-mounted launcher that provides built-in preflight tests and catapults the air vehicle into flight from unprepared sites.



- Ground control station that houses troops and instruments to control the flight.



- Truck-mounted recovery system that automatically recovers Aquila from flight in a vertical net.



air vehicle, hand it off to an FCS and then launch one to control for its own mission. When the FLIR mission pay-load is fielded, it will give the battery 24-hour support capability.

To task an RPV section, the S2, S3 and FSO coordinate the mission objectives and pass them on to the mission commander in an order format. The objectives may include reconnoitering the area or points on the ground and routes of attack or movement, as well as directing fire support assets such as conventional artillery, precision-guided munitions or laser-guided bombs and missiles. The mission commander plans his mission tactically and technically and enters it in the ground control station's computer. Once launched, the AV can fly the programmed flight path or divert in flight to a new location. This highly versatile system allows the crew to fire on targets of opportunity or planned targets.

The Army has an early operational capability (EOC) unit today. Some members of the RPV Battery, assigned to the 214th Field Artillery Brigade and attached to the 2-2 FA, III Corps Artillery, Fort Sill, Oklahoma, have used and tested the system since 1984.

The first test was the four-month developmental test at Fort Huachuca, Arizona, in early 1986. This test proved the system technically capable of performing its missions. The test ended with the Aquila's designating targets for Hellfire missiles after a 350-mile road march to Yuma Proving Grounds. A US Marine Corps Supercobra helicopter launched Hellfire missiles, demonstrating not only Aquila's compatibility with the Hellfire missile, but also its cross-service abilities.

The RPV battery spent the summer of 1986 in a collective training phase at Fort Sill preparing for the operational test. This training ended with a 72-hour field exercise and the Directorate of Evaluation and Standardization certification of the battery in an Army training and evaluation program (ARTEP)-based test.

The battery moved to Fort Hood, Texas, in early November of 1986 for the four-phase operational test (OT). These phases consisted of a four-week period to integrate with the 1st Cavalry Division, a two-week pilot test to determine the adequacy of the data collection effort, the nine-week OT, and one week of side tests and demonstrations. During the four phases, the battery flew 143 flights for more than 310 hours. It flew a maximum of six flights in one day. Many of these flights were dual flights with two air

vehicles in the air at one time.

Aquila successively demonstrated it, was "soldier friendly" in the operational test. The ground control station provided ease of operation for troops. The automated programs for preflight tests, launch, flight, reconnaissance and recovery allowed operators to concentrate on their mission, not on the mechanics of the system. No pilot skills are required to operate Aquila.

Soldiers demonstrated their ability to operate the system in the field for up to nine days at a time. They detected more than 3,400 targets of military significance during 36 days of simulated combat.

Troops encountered realistic threat simulations. Aquila was flown during all weather conditions, including conditions when manned aircraft were unable to fly.

Linear, point and area searches were performed during the tests. While performing area searches, operators had difficulty detecting controlled targets and some lost track of the area of the battlefield that had been searched. Software enhancements now provide operators an automatic search mode. The system automatically tells the air vehicle where to fly for the optimum payload downlook angle and field-of-view. The automatic search mode breaks the search area into one-kilometer squares. It ensures that one area is thoroughly searched before moving on to the next.

In April 1987, the unit sent soldiers out to White Sands Missile Range, New Mexico, to participate in an RPV survivability test. This consisted of flying the RPV against a variety of air defense weapons.

The test results show Aquila will survive, ensuring its availability for repeated missions. Although it can be heard, it is difficult to spot. It generates a low-heat signature and is rarely detected by radar. Its ground system is nuclear, biologically and chemically hardened, and it operates well with our maneuver forces. Aquila testing included survivability against aerial

intercepts, anti-aircraft artillery and surface-to-air missiles. Survivability will be improved to counter any threat advances.

During early testing, Aquila could not be recovered consistently with a manual system. Aquila developers created the totally automatic, infrared recovery system that works day or night. Since the integration of the recovery guidance aid, there have been no air vehicle recovery crashes. That is 173 flights for 373 hours without a crash. No other RPV system in the world is known to have been flown and recovered at this level of consistency and be useful for repeated missions.

During training for the upcoming force development test and experimentation that will validate Aquila's improved detection capability, troops have consistently demonstrated detection rates of more than 80 percent for stationary targets and more than 90 percent for moving targets.

The US Army Training and Doctrine Command recently completed a cost and operational analysis update for Aquila. It considered other systems the Army might use instead of Aquila and reached several conclusions. First, Aquila represents the most effective system available to accomplish the required operational capability. Second, Aquila represents a significant improvement in the Army's ability to locate the enemy and engage him before he meets the forward edge of our troops. And finally, Aquila is a system that can be used effectively against currently engaged and follow-on enemy forces.

Aquila's capabilities are essential to defeating the enemy. The system offers real-time information and high-kill ratio in a reliable, survivable package that soldiers can operate easily. Aquila makes the maneuver commander a giant on the battlefield with extended vision and precisely aimed firepower. It gives him the tools he needs for the battlefield of today and tomorrow.



CPT Timothy J. Northrup graduated from New Mexico Military Institute in 1976 and Cameron University, Lawton, Oklahoma, in 1984. He was commissioned Field Artillery in 1978 and has attended the Field Artillery Officers Basic, Target Acquisition and Survey Officers and Officers Advanced Courses. CPT Northrup's assignments have been in a target acquisition battery in the 8th Infantry Division in Germany, the US Army's first Remotely Piloted Vehicle Battery and the Field Artillery School, where he is currently assigned to the Target Acquisition Department.

Certain Strike— REFORGER 1987 An Artillery Overview



by Captain Francis L. Mayer and Major Daniel D. Parker

The deployment of 35,000 American soldiers of the Third Mobile Armored Corps (III Corps) under the command of Lieutenant General Crosbie E. Saint in September 1987 marked the beginning of US involvement in the 30-day exercise *Certain Strike*. *Certain Strike* involved more than 78,000 North Atlantic Treaty Organization (NATO) troops from six nations—France, the United States, Britain, Germany, Belgium and Holland—20,000 vehicles, 700 tanks and a host of aircraft under the command of British General Sir Martin Farndale, Commander of Northern Army Group (NORTHAG).

Certain Strike or REFORGER '87 (return of forces to Germany), an integrated NATO exercise, was the largest deployment of US forces to Europe since World War II. The exercise broke new ground in four other ways. It was the first time an entire US corps participated in a NATO exercise in Europe and the first time a US air cavalry combat brigade saw "action" in middle Europe. US troops took the most equipment ever, off-loading it at large depots in the Netherlands, Belgium

and on the Lower Rhine in Germany. Finally, NATO conducted the exercise in accordance with the regulations set by the conference for arms reduction in Europe for the first time.

At the beginning of the exercise, the German 1st Panzer Division delayed the enemy's coming from the northeast on the banks of the Aller River, Federal Republic of Germany. The delay allowed the III Mobile Armored Corps to pass through the German positions and launch a massive counterattack with its main elements from the Aller River. The AirLand Battle Doctrine came to life as the US Air Cavalry Combat Brigade bore the 45th Separate Infantry Brigade into a deep attack of the enemy's rear to support the main effort on the banks of the Aller River. This maneuver required coordination across corps boundaries during a multi-national passage of lines. The fire supporter's task was not only to coordinate fire support for the passage of lines but also to integrate both the tactical fire direction system (TACFIRE) equipped units with units not having TACFIRE from the American and allied

sides. To add to the difficulty, the distances and complexity involved in such a bold counterattack stressed the command and control systems to the limit.

Soldiers tenaciously kept the TACFIRE system running in spite of the problems of operating a communications system challenged by distance, complexity and the sheer mass of a system reaching from the company fire support team to the Corps main tactical operation center (TOC). The innovative artillerymen helped NCOs and officers to supervise operations better and concentrate on maintaining 24-hour fire support for the Corps.

In addition to integrating the assets of air power of the Air Force and Army aviation and the fire power of an Army corps, the Redlegs had to ensure they suppressed the enemy's fire support systems. To do this, they employed targeting assets ranging from the firefinder radar (Q36 and Q37) to joint surveillance and target attack radar system (JSTARS) to feed critical information about the enemy's indirect fire assets into the TACFIRE system. The Field Artillery (FA) Brigade

assigned the counterfire mission not only had to receive and process the missions but also had to clear fires in a fast-paced operation.

Many units quickly found themselves in front of the forward line of own troops (FLOT) before the FLOT could be changed in the TACFIRE system. This required the Brigade to clear fires with the Division FSE, which, in turn, had to contact the fire support officer (FSO) with the commander on the ground for clearance to fire. Even though this process took extra time, it was the only way to fire on the enemy assets without endangering NATO troops.

Usually, TACFIRE's message of interest processing can quickly handle this problem. However, TACFIRE cannot relay the message of interest through more than one computer and can take only 12 message-of-interest subscribers at a time—hardly enough to handle the traffic in the area.

Similar problems occurred across Corps boundaries. In a large-scale operation with many radio nets, the FSO had trouble monitoring every fire mission in Corps, even using TACFIRE's message-of-interest capability.

These challenges highlight the importance of speeding up fire support coordination for the safe delivery of fires. Control and update of fire support coordination measures is "a must" if we are to be effective. In TACFIRE, these measures are entered coordinate by coordinate, which requires a lot of key punching to enter the data. Field Artillery

must be even more aggressive in keeping fire support coordination measures current.

A critical aspect of fire support is communications. This is traditionally one of the "Big Three:" Shoot, Move and Communicate. TACFIRE no longer enjoys its monopoly of being the only automated command and control system on the battlefield. We must link with new systems as they are fielded, not only technically but also tactically. During large-scale operations, we could be tempted to program the computers with the commander's criteria and let the computers "run with the ball." But smart tacticians make these systems effective by not just relying on automation.

We also must look realistically at the difficulty of providing combat service support to a corps. Getting large quantities of ammunition, not to mention other critical supplies, forward is a severe challenge on a complex battlefield.

These problems will not be solved by any one branch. We must work with our sister branches and services to develop well-coordinated solutions. During Certain Strike, we saw how fire support systems dovetail with seven other operating systems, particularly command and control.

If we are to provide effective fire support under all conditions, we must use every large exercise to practice and refine our doctrine. By doing this, we will

maintain our tradition of being the best trained and employed artillery in the world.



Captain Francis L. Mayer is an instructor in the Gunnery Department at the US Army Field Artillery School. He received his commission from Widener University, Chester, Pennsylvania, and is a graduate of the Field Artillery Officers Basic and Advanced Courses and the Tactical Fire Direction System (TACFIRE) Fire Support Course. Captain Mayer spent two weeks evaluating TACFIRE at Certain Strike on the Field Artillery Team for the Combined Arms Training Activity, Combined Arms Integration and Standardization Directorate, Fort Leavenworth, Kansas.

Major Daniel D. Parker, Deputy Director of the Fire Support and Combined Arms Operations Department, US Army Field Artillery School, served as Chief of the Field Artillery Team evaluating Certain Strike. He commanded the 8th Artillery Detachment, Netherlands, and the 32d Artillery and 85th Artillery Detachments, both in Germany. In addition, Major Parker served as Chief of the Nuclear Surety Section for the 59th Ordnance Brigade, Germany. He's a graduate of the Command and General Staff College, Leavenworth, Kansas, and the Defense Language Institute in Dutch and German, Monterey, California.

III Corps Redlegs on REFORGER

by Captain Michael P. McLaughlin

Nearly 400 soldiers from III Corps Artillery, Fort Sill, Oklahoma, participated in the 1987 REFORGER exercise, Certain Strike. The exercise tested the deployability and combat readiness of III Corps Active and Reserve Component units. Fort Sill participants included soldiers from Headquarters and Headquarters Battery (HHB), III Corps Artillery, HHB 75th Artillery Brigade, and HHB 212th Artillery Brigade. The 631st Artillery Brigade, Mississippi National Guard, sent an operations and intelligence cell with the Corps Artillery as well.

During the exercise, Corps Artillery executed reinforcing and

general support missions in support of III Corps offensive formations. The Corps achieved particular success in evolving procedures for indirect fires to support the maneuver deep battle engagements and for employing conventional Lance missiles in the deep attack.

III Corps Artillery has been working on several potential solutions to the special problems caused by the Corps' deep battle requirements. III Corps' primary maneuver deep battle attack assets are the AH64 Apache helicopters of the 6th Cavalry Brigade (Air Combat)—6 CB(AC). The Apaches are particularly well suited for deep operations

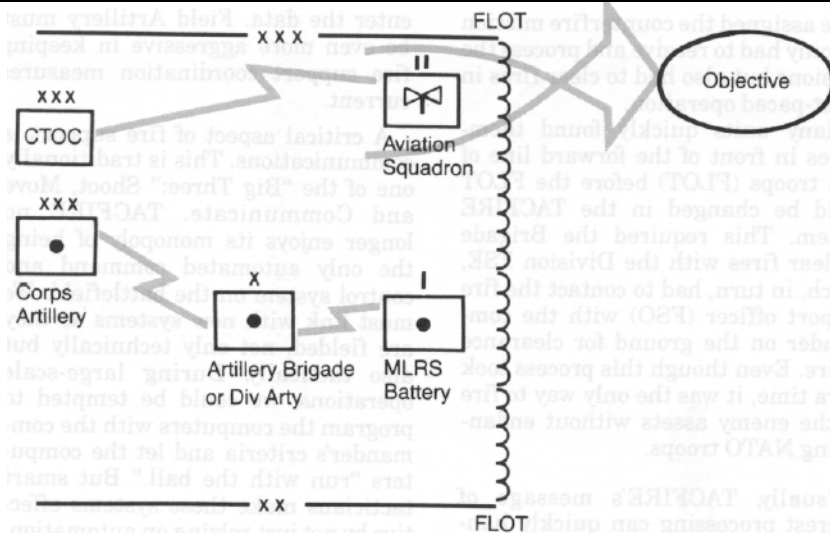
because of their extended range and night-fighting and anti-armor capabilities. However, their vulnerability to enemy air defense creates the need for responsive indirect fire support to suppress or destroy this threat. While the helicopters could defeat these targets, it is critical they arrive in their engagement areas as rapidly as possible and with maximum ordnance to concentrate on armor targets.

On previous exercises, the Apaches had sent their calls for fire to the Division Artillery Headquarters in the sector directly facing the engagement area. The Division Artillery selected the unit to fire and

placed the target in the file of missions to be fired. With this arrangement, there was no dedicated direct support for the attack helicopters. This approach caused two problems. First, with no units immediately responsive to the attack formations, their fire missions received no priority over the Division's internally generated missions. Second, the helicopters rapidly outdistanced the maximum range of the cannon systems in place.

The Certain Strike solution was to dedicate one of the Corps' multiple launch rocket system (MLRS) batteries to the 6th Cavalry Brigade and post a liaison officer (LNO) from the Cavalry Brigade at the Corps tactical operations center (CTOC). The Corps Artillery fire support element (FSE) detailed a variable format message entry device (VFMED) and operator to support the LNO and provide a digital link to the dedicated firing unit. The Apaches then initiated the calls for fire, sent them to their LNO at the CTOC and relayed them digitally by the VFMED through the Corps Artillery and affected artillery brigade tactical fire direction (TACFIRE) systems to the waiting MLRS battery. This procedure worked very well during Certain Strike.

The concept of the dedicated battery exercised during Certain Strike provided two distinct advantages over other tactical missions. First, the Corps could position the dedicated




Calls for fire to a III Corps MLRS Battery from Apache attack helicopters

battery to most effectively support the attack. Second, the battery had greater flexibility in processing fire missions. For example, in addition to the method previously described, the calls for fire could be processed through the Division Artillery or Artillery Brigade TACFIRE system, bypassing the Corps Artillery computer. The missions could then be transmitted through the MLRS battalion fire direction system (FDS) or sent directly to the battery FDS.

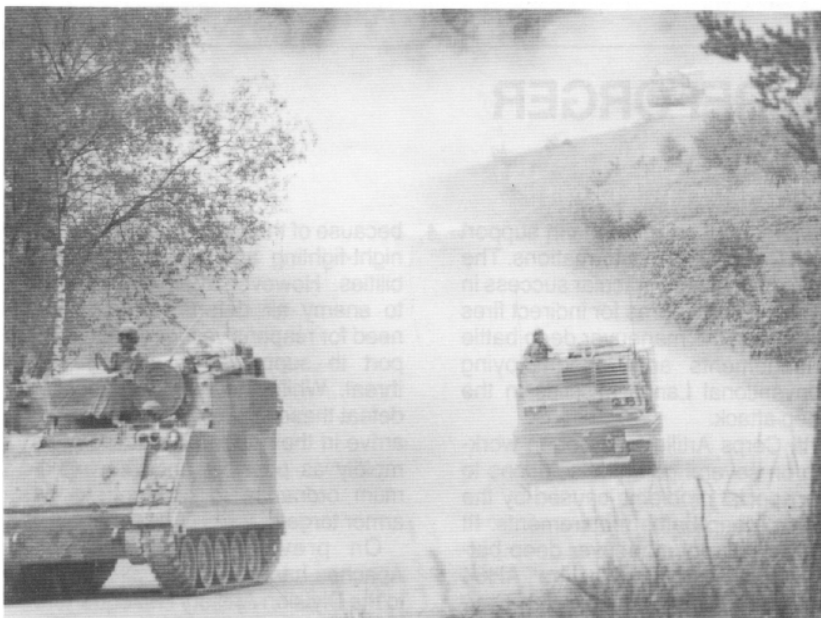
Another alternative was to provide the air observer with a digital message device (DMD) and a radio

powerful enough to reach the MLRS battery FDS. This alternative provided the most rapid response.

We employed conventional Lance missiles against the enemy force's command and control centers and assembly areas acquired by the Corps all source production center (ASPC). The target information was passed to Lance employment specialists at the Corps Artillery FSE who developed the attack scenarios and coordinated the strikes. Their efforts proved very effective in disrupting enemy follow-on-force command and control throughout the exercise as Corps Artillery destroyed several headquarters and light vehicle target formations.

REFORGER 87 was a resounding success for the III Corps Artillery. Soldiers gained invaluable deployment and command, control and communications experience and the satisfaction of a job well done. 

Captain Michael P. McLaughlin served as an operations officer with the III Corps Artillery Fire Support Element, III Corps Main, during REFORGER 87 and serves on the Corps Artillery plans and force development team. He is a graduate of the Field Artillery Officers Advanced Course and the Combined Arms Services Staff School. Captain McLaughlin commanded the Headquarters Battery, 212th Artillery Brigade, also in III Corps. He is currently enroute to an assignment as the operations officer for the Combat Pictorial Detachment, Fort Meade, Maryland.



LTV Missiles and Electronics Group

III Corps dedicated one MLRS battery to the 6th Cavalry Brigade for air defense of its Apache helicopters.

Joint STARS Looks Deep to Win



orola Inc.

by Captain Kent S. Sanderson

The scenario is very familiar. NATO forces oppose an overwhelming Warsaw Pact force of tanks, armored personnel carriers and self-propelled artillery in the European theater. How can NATO defeat a massive armored assault on the West without resorting to tactical nuclear weapons, which many people regard as the prelude to full-scale nuclear war? To counter the Warsaw Pact's numerical superiority, AirLand Battle doctrine emphasizes the ability to command and control a fast-moving, complex battlefield and to strike deep into enemy territory.

This approach places the premium on gathering intelligence concerning enemy activities well beyond the forward line of own troops (FLOT), first locating and then engaging the second and following echelons before they join the close-in battle. The Army and Air Force have joined forces to develop the joint surveillance target attack radar system (Joint STARS) as the means to detect, track and control the attack of deep targets.

The system consists of an airborne radar and associated command, control

and communications equipment on an aircraft and ground stations. As an airborne early warning platform designed to detect and track ground vehicles, Joint STARS is intended to do for the land battle what the E-3 airborne warning and control system (AWACS) does for the air battle. It will allow ground and air commanders to jointly plan the battle areas where forces from both services fight.

Ancestry

Joint STARS is the outgrowth of two previous programs. The Army recognized the need for some means of deep target acquisition in the late 1960s and developed the standoff target acquisition system (SOTAS). SOTAS consisted of four Bell UH1H helicopters, each carrying a moving target indicator (MTI) radar mounted in a rotating boom and a ground control center. The MTI radar is able to see and track moving targets and ignore stationary ones. SOTAS was field tested in 1979 and proved successful enough for interim fielding in Europe until the program ended in 1982.

During the same period, the Air Force was developing the pave mover target acquisition weapons delivery

system. Pave mover was mounted on an F-111 and contained a synthetic aperture radar (SAR) in addition to an MTI radar. Pave mover had the added feature of a "spotlight" mode for a close look at a small area. The SAR can detect stationary targets. The two capabilities together allow for the attack of both stationary and moving targets. Another difference between SOTAS and pave mover was the Air Force system could get accurate range and angle measurements to guide missiles or other aircraft to the target.

In 1981, a third program, known as Assault Breaker and a forerunner of the Army tactical missile system (ATACMS) program, proved that near-real-time target acquisition and guidance of aircraft and missiles to that target were possible. In 1982, the Army and Air Force combined operational concepts from SOTAS and technical capabilities from pave mover into the Joint STARS program. At first, efforts were concentrated on developing two separate radars that had some commonality but served each service's clear-cut geographical areas.

However, the services realized that with AirLand Battle doctrine those boundaries had been blurred, and both services would be working in the same battle area, using the same information and coordinating their attacks to avoid duplicate efforts. Therefore, they agreed on the concept of one radar system, containing both MTI and SAR, on a single platform. The final Joint STARS would combine moving and stationary target indicators and weapon guidance for direct attack of detected targets.

The System

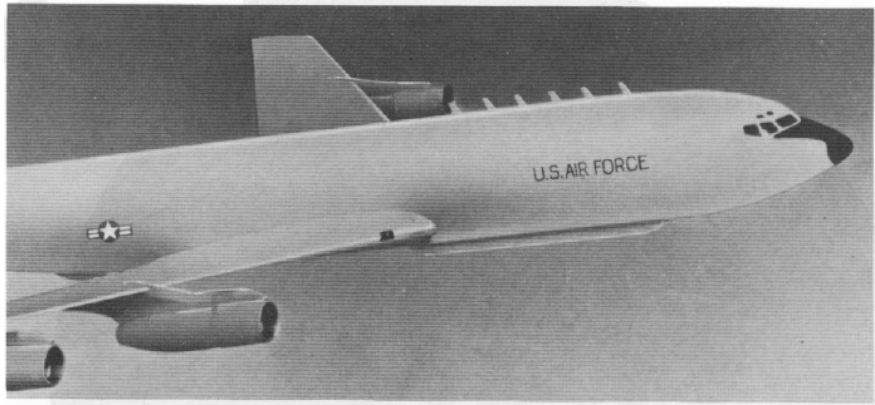
The airframe selected to become the aerial platform for Joint STARS was the C-18, the military version of the Boeing 707, and will be designated as the E-8A. It will carry a side-looking radar, signal- and data-processing equipment and operations and control consoles. It is designed to have 10 operator stations with room to expand to 15 when required. The radar will have both MTI and SAR modes along with a spotlight ability. The antenna will be mounted on the forward underside of the E-8A. Although performance capabilities are classified, the radar is estimated to be able to track targets up to 320 kilometers behind the FLOT.

The heart of the system will be the data processors on the E-8A and on the ground. It is the power of these high-speed computers to make millions of calculations per second that will allow us to track vehicles at long ranges. These computers will take the raw radar data, separate both moving and stationary target indicators from the radar clutter and process the data in real time. Operators will view the processed information on full-color, cathode-ray tube tactical displays. The command and control information from these operators will be passed to ground-based Air Force command centers by the joint tactical information distribution system (JTIDS), exactly as is target information from an E-3 AWACS.

The Army's AN/TSQ-132 ground station modules (GSMs) will be two-operator, S-280 shelters carried on a 5-ton truck. A smaller version is being designed to install on two high-mobility, multipurpose wheeled vehicles (HMMWV). The 5-ton version will have a 100-foot telescoping antenna while the HMMWV will use a 40-foot antenna. The GSMs also will receive raw radar data from the E-8A, process it and send target information to Army command centers. Currently, twisted-pair cable will be used to reduce radiation signatures. Although in the future, a fiber-optic landline is a preferable alternative. A radio link, using a single-channel ground and airborne radio system (SINCGARS) radio, is another option but a last resort.

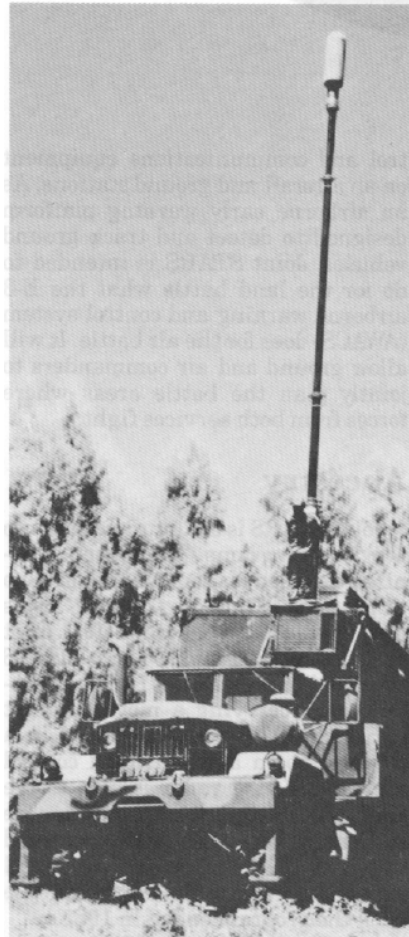
The Contractors

The entire Joint STARS program is estimated to cost \$4 billion. The prime contractor and system integrator for the Air Force portion is the Grumman Corporation with facilities in Melbourne,



The E-8A, the C-18 or military version of the Boeing 707, was selected to be the aerial platform for Joint Stars.

Florida. Grumman is designing the system architecture and subcontracting for subsystems such as the radar displays, processors and communications links. As such, Grumman's three major tasks are to write the software that will operate this complex system, integrate it into the 707 airframe and flight test the system. Norden Systems is building



GSMs will process data from the E-8A and send target information to an Army command center.

the side-looking radars while Boeing will modify two used 707s for the flight test program and eight more if production is approved. The Army portion of the program for 107 ground stations is estimated at \$115 million. Motorola is the prime contractor for the GSMs.

Operational demonstrations in the European environment should begin in FY 1990. The time schedule currently points to 1994 for full operational capability, barring any funding delays.

Operations

Joint STARS is designed primarily for the European theater, and the E-8As will patrol in tactical patterns well behind the FLOT, although not as deeply as the E-3 AWACS. The proposed 10 aircraft will fly two patterns, each roughly 480 kilometers long, around the clock with time allowed for maintenance and training. Consider that a single aircraft would have a radar coverage of 480 by 320 kilometers or about the size of England. In a time of war, the number of enemy armored vehicles in that area will be quite substantial. The incredible targeting accuracy of Joint STARS will be indispensable to the ground commander.

Joint STARS will obtain deep targets for the ground commander at the division, corps or theater level. That commander has both Army and Air Force resources at his disposal and may choose to engage targets in any of the following ways:

- Air interdiction against ground targets, using F-15 and F-16 aircraft and, in the future, using weapons developed by the Air Force for deep interdiction.
- Multiple launch rocket system (MLRS) and, in the future, ATACMS,

which will have enough range to cover the corps area of interest.

- Army missile and attack systems or attack helicopters (AH64 or AH1S).

- Maneuver or counter-maneuver within 30 to 40 kilometers of the FLOT.


Use of the Joint STARS data will differ in the Army and the Air Force because of their respective command, control, communications and intelligence (C³I) requirements. Since Joint STARS is intended primarily to support the ground commander, it is designed to support a corps-sized element. The Air Force has a small, relatively constant number of C³I nodes to support a corps while the Army's number will vary with the number of divisions in the corps. There are four C³I nodes per division that need access to Joint STARS data, and a GSM will be assigned to each. These GSMs will provide the

division and division artillery commanders information about the levels of enemy activity to their immediate front and beyond.

The Air Force, in contrast, will process and control its operations from the E-8A. The operators can opt to direct aircraft already in flight with a set of time and space coordinates to the target or send the targets to ground command center that would generate a mission to complete the attack.

Conclusion

Joint STARS will provide both the ground and air commanders an unprecedented real-time ability to accurately detect, track and engage targets at long ranges before they can influence the close-in battle. It supports the AirLand

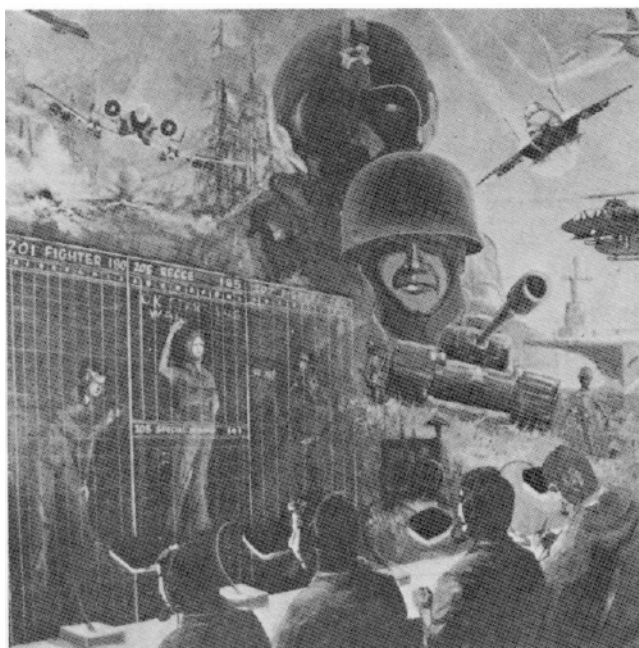
Battle tenet of depth by providing reconnaissance and target acquisition throughout the enemy's formations. By increasing the effectiveness of tactical aircraft, rockets, non-nuclear missiles and "smart" weapons to engage these deep targets, Joint STARS can help raise the nuclear threshold between NATO and the Warsaw Pact. 

Captain Kent S. Sanderson graduated from the US Military Academy in 1983. He wrote this article in 1987 while attending the Field Artillery Officers Advanced Course. Captain Sanderson is the assistant S3 for the 2d Battalion, 31st Artillery at Fort Campbell, Kentucky.

Fragments

FROM COMRADES IN ARMS

The US Air Force Air Ground Operations School



Effective tactical communications between ground forces and air support elements gives an added advantage to today's dynamic, high-tech battlefield. Teaching that advantage is the primary mission of the Air Force's Air Ground Operations School (USAFAGOS) at Hurlburt Field, Florida. Established in 1950, the School is currently the only US service

school teaching coordinated, joint air-ground communications principles.

According to Air Force Regulation 23-20, the Air Ground Operations School trains the concepts, doctrine, tactics, techniques and procedures for joint and combined operations. Using Department of Defense guidelines, the School's curriculum emphasizes the skills necessary to win AirLand Battle. The multi-service staff of Air Force, Army, Marine and Navy instructors serves as a team under an Air Force commandant and an Army deputy.

All of the courses are open to both officer and enlisted personnel serving in the active Army, Reserve, National Guard, other service branches and civilian personnel whose jobs require tactical knowledge of joint air-ground operation techniques.

To ensure both broad practical experience and technical expertise, the School's Army instructors teach tactical operation methods for all Army branches involved with air-ground operations. These branches are Field Artillery, Air Defense Artillery, Signal Corps, Military Intelligence, Armor, Infantry and Army Aviation.

The School's curriculum centers on the Battle Staff Course, the Joint Firepower Control Course and non resident instruction. The courses train students to perform joint air-ground coordination on the integrated battlefield.

The three-week Battle Staff Course (BSC) teaches the fundamentals of battle management for the

Army air ground system (AAGS) and the tactical air control system (TACS). The academic portion of BSC focuses on the systems and procedures at the Army division level combined with the Air Force's air support operation levels and higher. With students serving as members of the battle staff management team, the class culminates with a joint tactical Army and Air Force command post exercise.

The completion of BSC adds the additional skill identifier of Q8 (Tactical Air Operations Specialist) for NCOs and 5U (Air Ground Operations) for officers. Five BSCs are scheduled for FY 88.

The Joint Firepower Control Course (JFCC) emphasizes the control systems and equipment required in coordinating firepower requests to support tactical ground operations. The class is primarily for soldiers who hold positions at the brigade level and below. The JFCC runs two weeks for Army personnel and three weeks for Air Force. Ten JFCCs are scheduled for FY 88.

Beginning in early 1988, the School will add a five-to-six-day, interservice Joint Combat Airspace Command and Control Course (J-CACC) to the curriculum. This course will teach in-depth procedures for joint tactical airspace operations. Students will include field grade officers,

senior company grade officers and senior NCOs who have already completed the Battle Staff Course within the last two years. Four J-CACCs are scheduled for FY 88.

In addition to the core instruction, USAFAGOS offers a three-day joint service Senior Tactical Battle Commander's Course (STBC) to general officers, colonels and selected lieutenant colonels who hold key positions in operations and intelligence sections. The Army has six slots out of a class of 14 for each STBC. Eight STBCs are scheduled for FY 88.

Although the nonresident courses offered by the school are not substitutes for the resident instruction, they provide practical procedures for solving operational requirements unique to a specific organization. The School presents nonresident seminars for military service schools, many civilian organizations and military personnel stationed in Turkey, Japan, Korea, Australia, England, Canada and Germany.

For further information about USAFAGOS eligibility requirements and nonresident instruction guidelines, check Department of the Army Pamphlet 351-4. Submit all requests for nonresident instruction directly to the school at USAFAGOS, Hurlburt Field, Florida 32544-5000 or call commercial (904) 884-6655 or 6884 or AUTOVON 579-6889 or 7610.

Italian Mountain Artillery

The Alpini, Italy's principal force for defending its rugged Alpine borders, has a unique organization—the Mountain Artillery. Its primary weapon is an Italian-made 105-mm howitzer designed to break down into smaller parts and move over the rugged mountains on mules. This field piece has been adopted by armies around the world that must operate in similar terrain, such as Chile, Peru, Pakistan and others.

It takes 12 mules to carry each howitzer and its parts. The last two mules haul 10 rounds of ammunition, the basic load. Each Mountain Artillery Battalion has about 70 mules. Highly respected by the soldiers, the mules are strong, loyal, smart and sure-footed. But they also have delicate stomachs, and the Alpini must take special care to ensure they get plenty of fresh water and the right kind of food.

The Alpini are revered by soldiers throughout the world as the masters of mountain maneuver. They

play a vital role in NATO's defense plans, guarding the main corridors for Warsaw Pact advance through Austria and Yugoslavia into the southern flank.



Mountain artillerymen set up an Italian 105-mm howitzer to fire in support of the Alpini.

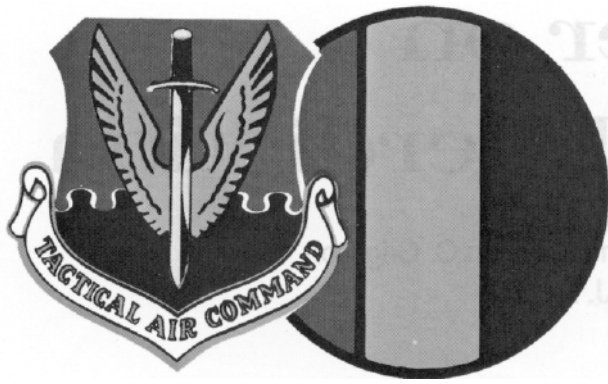
ALFA Agency: Bridging the Interoperability Gap

The Air Land Forces Application Agency, known as ALFA and located at Langley, Virginia, has been a bridge between the Army and Air Force in development of AirLand Battle concepts since its inception in 1975. This bridge has expanded over the years, and ALFA has evolved into a joint agency for unifying war-fighting doctrine among all services. The resulting relationship has enhanced

the development of AirLand Battle concepts and improved multi-service interoperability.

Organization

ALFA is a jointly manned agency of the Air Force's Tactical Air Command (TAC) and the Army's Training



and Doctrine Command (TRADOC). By agreement, the Marine Corps and Navy also participate in ALFA projects through the Marine Corps Combat Development Command (MCCDC) at Quantico, Virginia, and the Atlantic Fleet (LANTFLT) at Norfolk, Virginia. The joint actions steering committee (JASC) is ALFA's governing body and is composed of a general officer from each of the four commands.

Missions and Roles

The agency's mission is to develop, coordinate, integrate and improve concepts and procedures for coordinated, joint war-fighting—to help win future conflicts. Also, ALFA defines joint needs in terms that enhance resource decisions.

ALFA's work centers on the priority concerns of the commanders of the participating major commands. Any activity may recommend joint work to the JASC; however, the JASC must agree jointly to a program before ALFA can become actively involved.

ALFA's role, therefore, is managing and coordinating JASC-directed joint work. Consequently, the action officers (AOs) have broad operational backgrounds rather than narrow technical expertise. ALFA has the authority to form joint working groups from within the staffs and subordinate organizations of the JASC, since this is where the technical skills exist. To obtain direct field input, these groups also include worldwide representation down to squadron and battalion level.

The final ALFA product is normally a four-service joint procedures pamphlet. The information contained within these pamphlets is then further field tested and validated in multi-service and joint exercises. Efforts are currently underway to incorporate these procedures into such training vehicles as Army training and evaluation programs (ARTEPs), and National Training Center and Joint Readiness Training Center exercises. If two or more service chiefs approve an ALFA pamphlet, it may become a joint service agreement (JSA).

Completed Programs

Some of the most successful ALFA pamphlets used throughout the joint operations community are: Joint Suppression of Enemy Air Defenses (J-SEAD), Joint Attack of the Second Echelon (J-SAK), Joint Laser Designation Procedures (J-LASER), Joint

Upcoming Programs

- Joint Application of Firepower (J-FIRE). A reference so units of one service can rapidly and correctly request fire support from another service. The original J-FIRE pamphlet was published in July 1985. ALFA is revising the procedures to make it NATO compatible and is updating the technical data.
- Joint Coordination of Fires Forward of the Fire Support Coordination Line (J-FSCL). A project for joint coordination of deep fires focusing on Army doctrine, FSCL procedures and long-range Army weapons (Lance, multiple launch rocket system—MLRS, Army tactical missile system-ATACMS).
- Joint Army and Air Force Tactical Air Control Party and Fire Support Team (J-TACP/FIST) Close Air Support (CAS) Operations. A study of the interrelationship of Army fire support teams and Air Force tactical air control parties in the control of close air support missions. It includes J-FIRE, J-LASER, joint authentication, integration of artillery and CAS, and night CAS capabilities and limitations.
- Joint Deception Operations (J-DO). A pamphlet of deception procedures for joint and component levels on the battlefield.
- Joint Rear Battle (J-RB). A defensive framework to secure the rear area.
- Joint Air Attack Team (JAAT). Tactics, training programs, equipment descriptions and scenario options plus a section on planning, coordinating and organizing JAAT (a revision of the 1983 pamphlet).
- Joint Base Defense (J-BD). Operating procedures and security precautions for commanders to protect their units at joint bases outside US territory.
- Joint Radar Beacon Procedures (J-BEACON). Joint tactics, techniques and terminology for the tactical employment of ground radar beacons during combat operations.
- Joint Communication Procedures for Have Quick Radios (J-TALK, VOL I). A standardized, four-service procedure for worldwide operation of the various HAVE QUICK jam-resistant radio systems.
- Single Channel Ground and Airborne Radio System, SINCGARS (J-TALK, VOL II). A standardized, four-service procedure for the joint operation of the SINCGARS radio systems.

Application of Firepower (J-FIRE) Reference Guide and Joint Air Attack Team (JAAT) Operations. All of these pamphlets are available through normal publications distribution channels.

Summary

ALFA is a small organization with a large mission. Twelve of the 14 programs the agency is developing involve at least four services. Since ALFA coordinates with all the services at the major command level and below, its products are typically more tactically oriented and geared for the user than other joint publications. ALFA is performing a valuable function to enhance joint war-fighting by attacking interoperability problems at the operator level.

HQ TAC/XP-ALFA		ALFA Agency
Langley AFB, VA		HQ TRADOC
23665-5001	or	ATTN: ATDO-ALFA
AUTOVON 574-5934		Fort Monroe, VA
Commercial		23651-5000
(804)764-5934		

A NATO Primer on Battlefield Air Interdiction

by Lieutenant Colonel Gordon C. Crighton
and Major Timothy J. Baker

The US Army's AirLand Battle has as one of its cornerstones the concept of depth: see the enemy deep and strike him there. By disrupting orderly introduction of enemy follow-on forces, the corps commander shapes the battlefield for his divisions. The divisions can deal with the enemy's first echelon and have time to redeploy to meet subsequent echelons that have been bloodied and disorganized by deep strikes. Once the attacking enemy is defeated in detail, the initiative passes to friendly forces.

The Army's forward-deployed corps in the US Army Europe (USAREUR) with their organic assets are not currently equipped to carry out deep strikes with enough accuracy and lethality. The corps commanders' only dedicated surface-to-surface weapons system, the Lance missile, is neither numerous nor lethal enough to do the job alone. Consequently, deep fires must depend on a joint approach where air support provides the range, accuracy and lethality required. But to speak only of joint operations would oversimplify the problem. This article is a V Corps Artillery perspective of the challenges inherent in this mission and concentrates on the organizations and procedures used to employ air assets at the right time and place on the battlefield.

The nature of NATO's military structure in the European Central Region is such that joint operations are inevitably combined operations as well. USAREUR's V and VII Corps, while themselves US commands, are subordinate to NATO's Central Army Group (CENTAG). CENTAG's air support is provided by 4th Allied Tactical Air Force (FOURATAF), a component of Allied Air Forces Central Europe (AAFCE). AAFCE apportions air assets to FOURATAF for support of CENTAG based on the overall situation in the Central Region. These air assets could come from virtually any NATO member in the Region, although it is likely that US, German and Canadian aircraft will support

CENTAG because of their locations and support infrastructure.

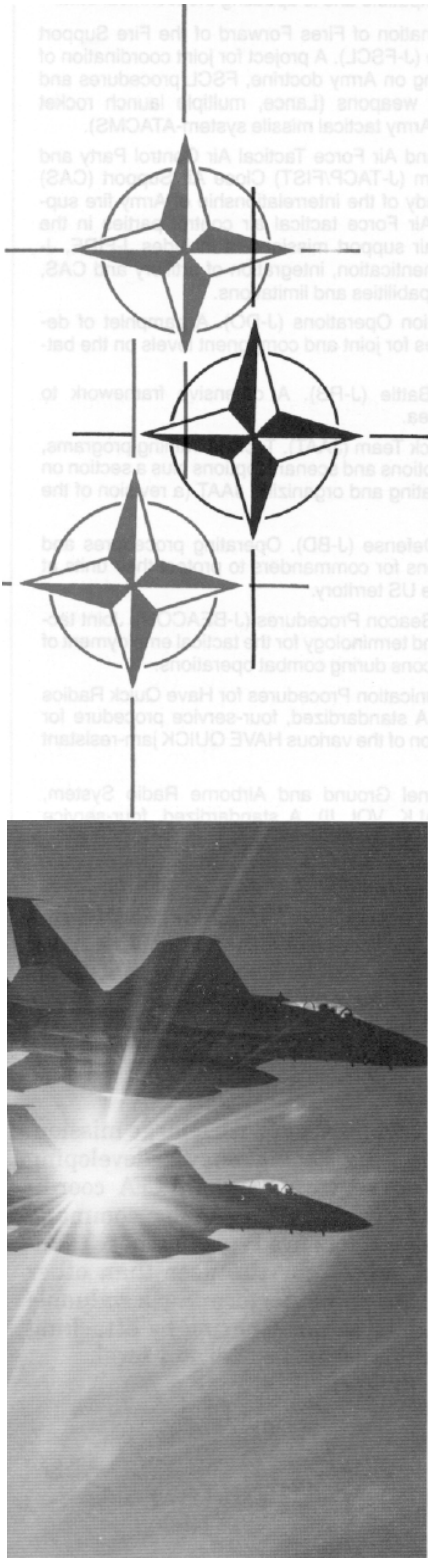
American fire support coordinators must always be prepared to employ allied air support. Moreover, that air support is provided by elements and agencies not recognized in US joint doctrine. For example, the US Tactical Air Control Center (TACC) is replaced by the NATO Allied Tactical Operations Center (ATOC). The close coordination required for these joint and combined operations makes clear-cut planning and control procedures essential. Once developed, the fire support community must understand and practice them.

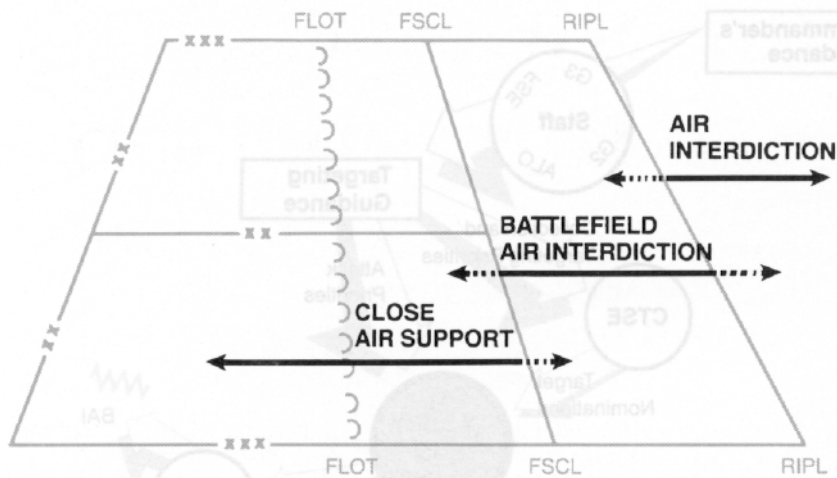
Types of Support

The corps benefits from three types of offensive air support: close air support (CAS), battlefield air interdiction (BAI) and air reconnaissance (AR). The corps allocates CAS to the divisions, which use it to destroy enemy forces near the forward line of own troops (FLOT). The corps itself uses BAI to delay and disrupt the introduction of follow-on forces to the close-in battle while they are still moving between the vicinity of the reconnaissance and interdiction planning line (RIPL) and the fire support coordination line (FSCL). CENTAG uses another form of air support, air interdiction (AI), to delay the forward movement of enemy forces beyond the RIPL.

Assets and Availability

Remember, BAI assets in the Central Region are "dual role" aircraft. These aircraft may be used in a counterair role during the first few days of hostilities to attain or maintain a desired degree of air superiority, thus precluding their availability for BAI missions. From a US point of view, planners must understand also that aircraft tasked to support a corps will not necessarily be US Air Force





CENTAG's air interdiction to delay the forward movement of enemy forces beyond the RIPL

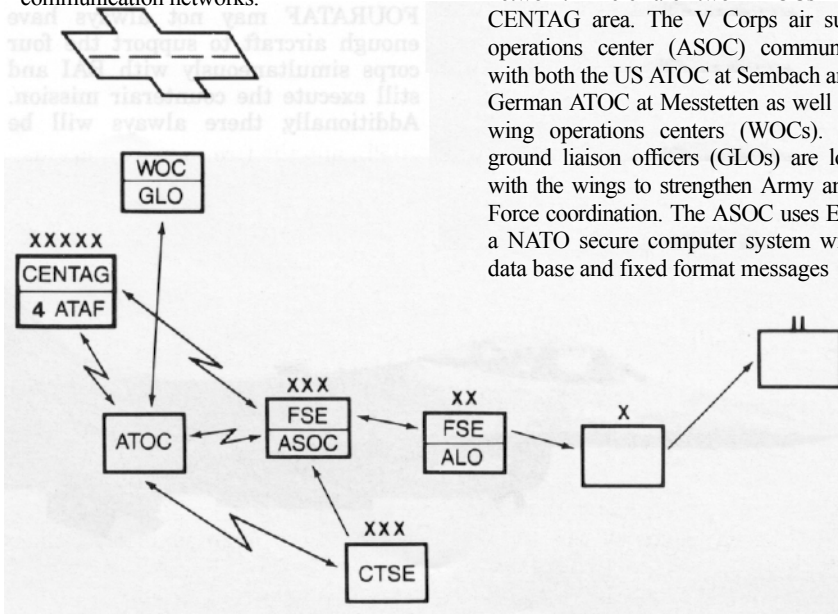
assets. The fire support coordinator must be familiar with the capabilities and armaments of all NATO aircraft.

The Players Involved

There are several significant organizations and key people who plan for, allocate, coordinate or direct air assets available to the corps. At the lowest level, maneuver battalions have fire support officers (FSOs) and tactical air control parties (TACPs) that communicate via secure radio networks to their respective next higher echelons. The fire support coordinator (FSCOORD) and the air liaison officer (ALO), located at brigade, division and corps levels, are all interconnected by radio and multichannel communication networks.

Overlaid on these networks are secure telephone lines, the tactical fire direction system (TACFIRE) and the staff planning and decision support system (SPADSS). SPADSS is an off-the-shelf, automated tactical command and control information system unique to V Corps.

The corps tactical operations center support element (CTSE) uses a computerized target analysis planning system (TAPS) to refine, collate and nominate targets by direct data link to the fire support element (FSE). The corps FSE communicates with the air tactical operations center (ATOC), CENTAG and FOURATAF headquarters and the flank corps, using both voice and data transmissions over the secure multichannel network. There are two ATOCs in the CENTAG area. The V Corps air support operations center (ASOC) communicates with both the US ATOC at Sembach and the German ATOC at Messtetten as well as the wing operations centers (WOCs). Army ground liaison officers (GLOs) are located with the wings to strengthen Army and Air Force coordination. The ASOC uses EIFEL, a NATO secure computer system with its data base and fixed format messages



Significant organizations and key personnel who plan for, allocate, coordinate and direct corps air assets



to request, coordinate and direct air support for the corps.

V Corps uses a dispersed command post concept with the staff separated into four modules for survivability. The corps fire support module (FSM) consists of the ASOC, the corps fire support element, the corps army airspace command and control element and representatives from the corps air defense operations liaison team.

The Process

Corps planners must include air support in their considerations. However, their planning cycle starts well before they know if they have air support, how much they have or what time it is available. The challenge is always to be ready to use offensive air support (OAS) yet stay flexible enough to allow the plan to succeed should OAS not be available.

Offensive air planning begins when the corps commander issues his concept and guidance to his staff. The G2, G3, FSCOORD and ALO formulate the priority intelligence requirements and targeting guidance working in close coordination. This coordination produces targeting priorities that assure the engagement of priority, high-payoff targets and support the commander's scheme of maneuver.

BAI and other offensive air assets required to support the corps plan are requested through the daily submission of the commander's assessment report to Commander, Central Army Group (COMCENTAG). The assessment report states the corps' requirements for air support for the next 96 hours, the intended use of each category of support requested and the possible consequences of not receiving all or part of it. Such reports from each corps give COMCENTAG and COMFOURATAF the information to make a joint decision on how to allocate the air resources apportioned to them by Allied Air Forces Central Europe.

Concurrently, FSE and ASOC personnel refine a BAI campaign plan that also may look as far out as 96 hours. They prepare a different plan each day based on the commander's guidance and corps planners' view of how the battle will evolve. As each BAI campaign plan is finished, it is



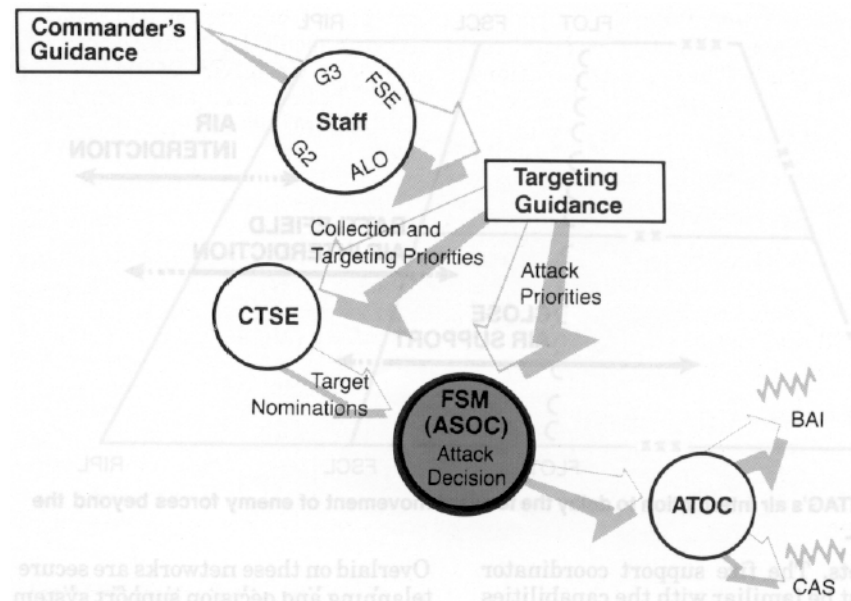
forwarded to the ATOC, FOURATAF and the wings. As COMFOURATAF makes assets available for a given time, the ATOC performs weaponeering and organizes aircraft into "packages" to accomplish the corps' mission in accordance with the BAI campaign plan for that time.

The "packages" consist of the bombers, electronic warfare aircraft, fighter escorts and aircraft needed to suppress enemy air defenses for the targets selected for engagement. The corps can normally update the target information and enemy situation two to four hours before launching the aircraft. Air Force and ground-based Army electronic warfare systems, cannon, rocket and missile artillery conduct joint suppression of enemy air defense (JSEAD) missions in support of BAI and AI packages as they penetrate the FPLOT enroute to their targets.

It is still important for the fire support personnel to understand the capabilities and possible compatibility problems among aircraft of the different NATO allies, even though the ATOCs and WOCs do most of the detailed aircraft planning. The flexibility built into the system by the collocation of the fire support element, the air defense element, the airspace command and control element and the ASOC at the corps fire support module pays big dividends as BAI progresses from initial planning to execution. Face-to-face exchange of updated information on flight routes, time-over-FLOT (TOF) and friendly air defense status permits more timely dissemination of the data. It is possible to pass the latest target and threat information to an incoming BAI package as it crosses the corps sector enroute to the FLOT. Range, terrain and the electronic warfare situation determine the ability to do so.

Challenges

USAREUR corps deep strike capabilities can be improved by further development of offensive air support concepts and procedures and the development of alternate deep strike capabilities. Improvements must evolve in a NATO context, however, to avoid future incompatibilities between the US and its allies.



The Battlefield Air Interdiction Process

CENTAG and FOURATAF have made great strides during the past few years in streamlining command, control and planning procedures for BAI. This has increased responsiveness to the corps, which depends on air assets for deep battle, the ATOCs which coordinate the assets and the wings that actually fly the missions. Reporting requirements have been streamlined, and targeting planning is being simplified and better coordinated. Most importantly, BAI procedures are thoroughly practiced or rehearsed during all corps and higher-level exercises.

The most distressing problem remaining is inter-ally communications. In CENTAG, a German corps can expect to work with a US ATOC, and a US corps will have to coordinate with a German ATOC. As in so many other aspects of NATO combined operations,

incompatible communications systems make this more complicated. Although we routinely "work around" this situation, the problem is serious and requires a comprehensive long-range solution.

Aircraft capabilities continue to improve, as they must. NATO's air support must be as accurate and effective at night as in daylight. Soviet doctrine cites night movements and resupply operations as highly desirable. NATO BAI must be able to penetrate darkness and strike enemy columns and assembly areas.


Outside the BAI process itself, the key question is one of having enough assets. COMCENTAG and COMFOURATAF may not always have enough aircraft to support the four corps simultaneously with BAI and still execute the counterair mission. Additionally, there always will be



The F-16 Fighting Falcon—a multi-role aircraft frequently used for battlefield air interdiction missions.

times in Central Europe when the weather will seriously degrade air operations. These considerations challenge the wisdom of relying only on BAI for deep strikes. NATO commanders need an additional surface-to-surface weapons system with the range, accuracy and lethality to inflict serious damage on enemy forces out to the full depth of the corps areas of responsibility. The Army tactical missile system (ATACMS) should fulfill that role but will never totally replace BAI in the corps deep battle operations.

Joint operations in the NATO environment are complex and require study and perseverance. Corps fire supporters must be well versed in BAI to best use our scarce deep attack air assets.

No one system or branch of service should be expected to do the job alone. Until ATACMS is fielded in quantity, BAI will remain a corps commander's primary deep attack asset. 

Lieutenant Colonel Gordon C. Crighton, Chief of the V Corps Fire Support Element, is a graduate of the Field Artillery Officers Basic and Advanced Courses, the Command and General Staff College and the Foreign Area Officers Course. He holds a masters degree from the University of Vermont. He has commanded batteries in the Continental United States and US Army Europe and has served as a battalion S3, brigade operations and intelligence officer

and as S3 of V Corps Artillery.

Major Timothy J. Baker has spent the last year as Chief of the Air and Electronic Warfare Section, V Corps Fire Support Element. He received his commission from the Citadel and is a graduate of the Field Artillery Officers Basic Course, Infantry Officers Advanced Course and Command and General Staff College and has a masters degree from the University of Southern California. Past assignments include battery commands at Fort Bragg and in Alaska and a tour at Field Artillery Branch at the Total Army Personnel Center in Washington, D.C.

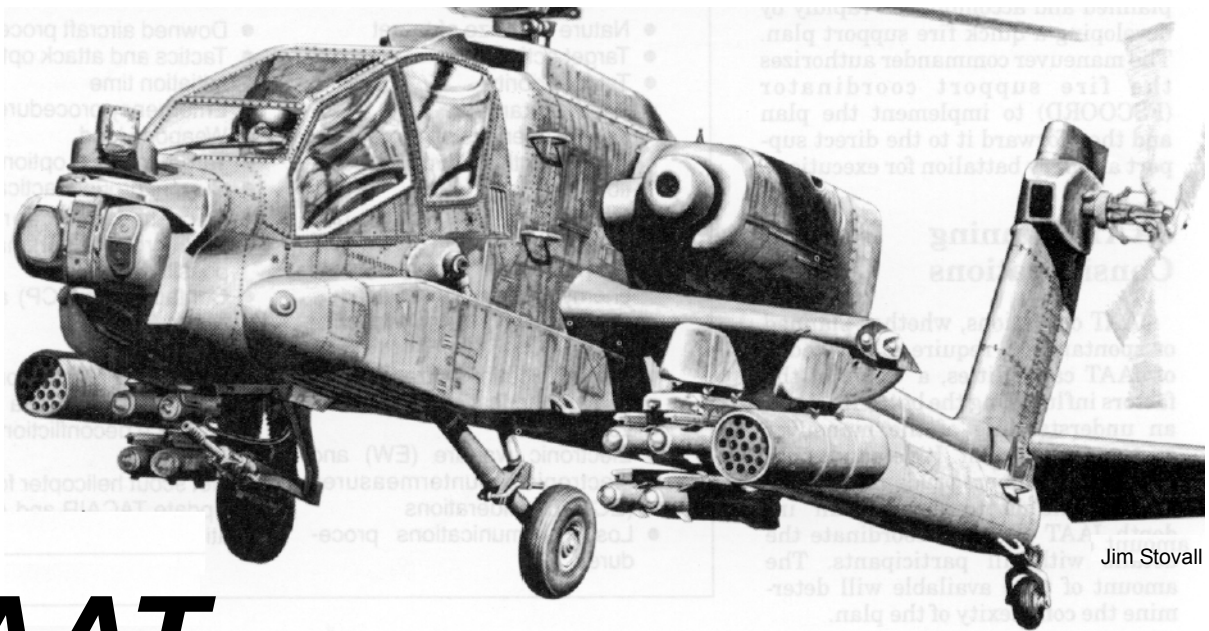
Cannon MOS Career Guide

Field Artillery published the "Redleg's Career Update" in the December "Redbook—An Annual Report." However, that update did not address specific MOSs for Field Artillery soldiers. This is the first of a three-part series with the duties and career-developing assignments for Field Artillery MOSs.

MOS & Skill Level	Duties	Typical Assignments
13B10	A Cannon Crewman most often starts his career as part of the advance party and becomes an ammunition handler or assistant gunner. He also may serve as a howitzer or truck driver.	Cannon batteries or cannon battalion ammunition sections.
13B20	After graduating from the primary leadership development course (PLDC), a crewman has more responsibilities. He sets firing data on the gun as a howitzer gunner or maintains accountability and reliability of artillery positions as an ammunition team chief. Each	
13B30	A staff sergeant serves as howitzer or ammunition chief of section. A howitzer section chief maintains one howitzer and ammunition vehicle and trains the crew. An ammunition section chief maintains the unit's basic load of ammunition and ensures the unit's rounds are properly secured and accounted for. He should prepare his records for the advanced NCO course (ANCO) Department of the	
13B40	A sergeant first class in the MOS serves as chief of firing battery, platoon sergeant or gunnery sergeant. He is responsible for three to six howitzers, the battery ammunition section and a fire direction section. As platoon sergeant or gunnery sergeant, he supervises firing platoon operations in the field and takes the advance party forward to prepare the next firing position.	

Cannon MOS Career Guide (continued)

MOS & Skill Level	Duties	Typical Assignments
13C10	A tactical fire direction system (TACFIRE) Operations Specialist spends his first few years mastering the variable format message entry device (VFMED) and becomes an artillery control console operator (ACCO). He also learns to maintain and operate the 5-ton truck and 15-kw generators.	Battalion or brigade fire direction center (FDC); division or corps artillery fire control section.
13C20	After graduating from PLDC, a TACFIRE specialist learns to schedule fires with the operations and intelligence section's VFMED. He learns to coordinate all indirect fires, anticipate what kind of fire support the maneuver commander's plan needs, plan ahead for ammunition needs and get authorization for specific firing positions. He should attend BNCOC at the earliest opportunity.	
13C30	A staff sergeant spends most of his field time inside the TACFIRE shelter and continues to observe and learn from the operations sergeant and fire control NCO. He should prepare to attend ANCOC.	
13C40	A TACFIRE operator in this grade serves as the operation NCO's primary assistant. He is responsible for maintaining the unit's TACFIRE equipment and training the fire direction section personnel.	
13E10	A Fire Direction Specialist learns to operate the radio, update situation maps, record fire commands on the record of fire and determine firing data using a graphic firing table, graphic site table and firing chart. He also learns to operate and maintain the 4.2-kw generators and the fire direction center (FDC) vehicle.	Battery FDC in TACFIRE units; in non-TACFIRE units, at battery or battalion FDC or in the fire control section of light infantry division artillery.
13E20	After graduating from PLDC, a 13E NCO may be the chief of the FDC section. He is responsible for the training, welfare and operational readiness of the FDC crew. Additionally, he learns to operate the battery computer system. He should attend BNCOC as soon as possible.	
13E30	A staff sergeant is responsible for maintaining section equipment and vehicles assigned to the FDC. Moreover, he is responsible for the firing data the FDC personnel produce because many times the fire direction officer will not be present. He should prepare to attend ANCOC. We have no 13E40s on active duty, so a soldier promoted to E7 will become a 13C40.	
13F10	A Fire Support Specialist first learns his duties as the eyes of the artillery by spending extensive time in the field with his Field Artillery unit and the armor or infantry company it supports.	A unit supporting an armor or infantry company, battalion or brigade as part of a fire support team or combat observation lasing team.
13F20	A soldier in this grade can concentrate on leading soldiers and taking responsibility for employing the indirect fire systems the maneuver unit needs. He works with the maneuver platoon leader on integrating fire support. He should attend BNCOC as soon as possible.	
13F30	A staff sergeant fire support specialist is responsible for as many as eight soldiers and the fire support team vehicle. He must be proficient in planning and controlling all fire supporting measures for the company he supports. He must prepare to assume the duties of the Field Artillery lieutenant, who will spend most of his time with the maneuver company commander. He should prepare to attend ANCOC.	
13F40	A sergeant first class serves as a fire support NCO. He is responsible for three or four fire support teams and as many as six vehicles. He will run the fire support element (FSE) alone because the battalion fire support officer will spend most of his time with the supported maneuver commander.	FSE at the maneuver battalion or brigade supported by the Field Artillery battalion.



Jim Stovall

JAAT

Planning: Getting the Most from Synchronized Forces

by Majors James A. Kelley and Alan Kim Huffman, USAF

Modern battles must be fought and won by air and land forces working together as a coordinated team. Synchronization—the arrangement of battlefield activities in time and space to produce the maximum relative combat power at the decisive point—is one tenet of Air-Land Battle doctrine.

One asset to achieve this combat power is the joint air attack team (JAAT): a combination of attack and scout helicopters and tactical aircraft (TACAIR) supported by Field Artillery, operating together to simultaneously attack a single target or target array. The maneuver commander is responsible for employing JAAT. When his maneuver forces need increased firepower against a target array or they identify a battlefield target for engagement, he identifies the need for a JAAT and requests attack helicopters and TACAIR to support his scheme of maneuver.

Preplanned JAAT

The focal point for planning JAAT

activities is usually no lower than brigade level. The various liaison officers are all present at this level: the brigade S3 air, S2, fire support element (FSE) representative, air liaison officer (ALO) and combat aviation brigade (CAB) liaison officer (when CAB elements are under operational control of the maneuver brigade). This group, particularly the maneuver S3 air and FSE, must be thoroughly familiar with JAAT capabilities, employment options and advantages. Once they have completed this initial planning and coordination, the aviation commander (formerly known as the air battle captain) is the key to orchestrating, sequencing and executing JAAT in the target area.

Spontaneous JAAT

We must assume that on a dynamic battlefield we will have instances where prior coordination is not possible, but JAAT assets are available (or can be made available). An example of this spontaneous or opportune JAAT would be during defensive operations (deliberate enemy

attacks, choke points, etc.) when JAATs will develop out of immediate necessity.

Avenues exist for immediate requests for TACAIR through the Air Force air request network to the air support operations center (ASOC) that can launch or divert available CAS alert aircraft. This immediate CAS request should be flagged by adding JAAT to the standard format.

Communication among the spontaneous JAAT participants is vital to successfully accomplish the mission. The daily air tasking order (ATO, Air Force) and communications-electronics operation instruction (CEOI, Army) must specify JAAT common frequencies to ensure timely radio contact between the aviation commander and TACAIR flight. This frequency most likely would be one of the CAS secondary frequencies already allocated. The tactical air control center (TACC) and battlefield coordination element (BCE) interface would be the critical node for designating and distributing the JAAT common frequency to the TACAIR and helicopter units through the ATOs and CEOIs.

Indirect fire support for the spontaneous JAAT operations can be planned and accomplished rapidly by developing a quick fire support plan. The maneuver commander authorizes the fire support coordinator (FSCOOD) to implement the plan and then forward it to the direct support artillery battalion for execution.

JAAT Planning Considerations

JAAT operations, whether planned or spontaneous, require a knowledge of JAAT capabilities, a vision of the factors influencing the battlefield and an understanding of the maneuver commander's intent. It demands that key JAAT members prudently use the time available to develop an in-depth JAAT plan and coordinate the details with all participants. The amount of time available will determine the complexity of the plan.

Intelligence.

Staffs at all levels influence JAAT planning through their intelligence preparation of the battlefield (IPB). IPB is a systematic approach to analyzing the enemy, weather and terrain in a specific geographic area. Through this analytical approach, appropriate targets and areas for employing JAAT can be identified. Essential to employing JAAT effectively is identifying key intelligence events that signal the buildup of a likely enemy target. Also, intelligence on threat air defense by type, amount and location is vital to the success of a JAAT operation.

Maneuver Commander's Tactical Plan

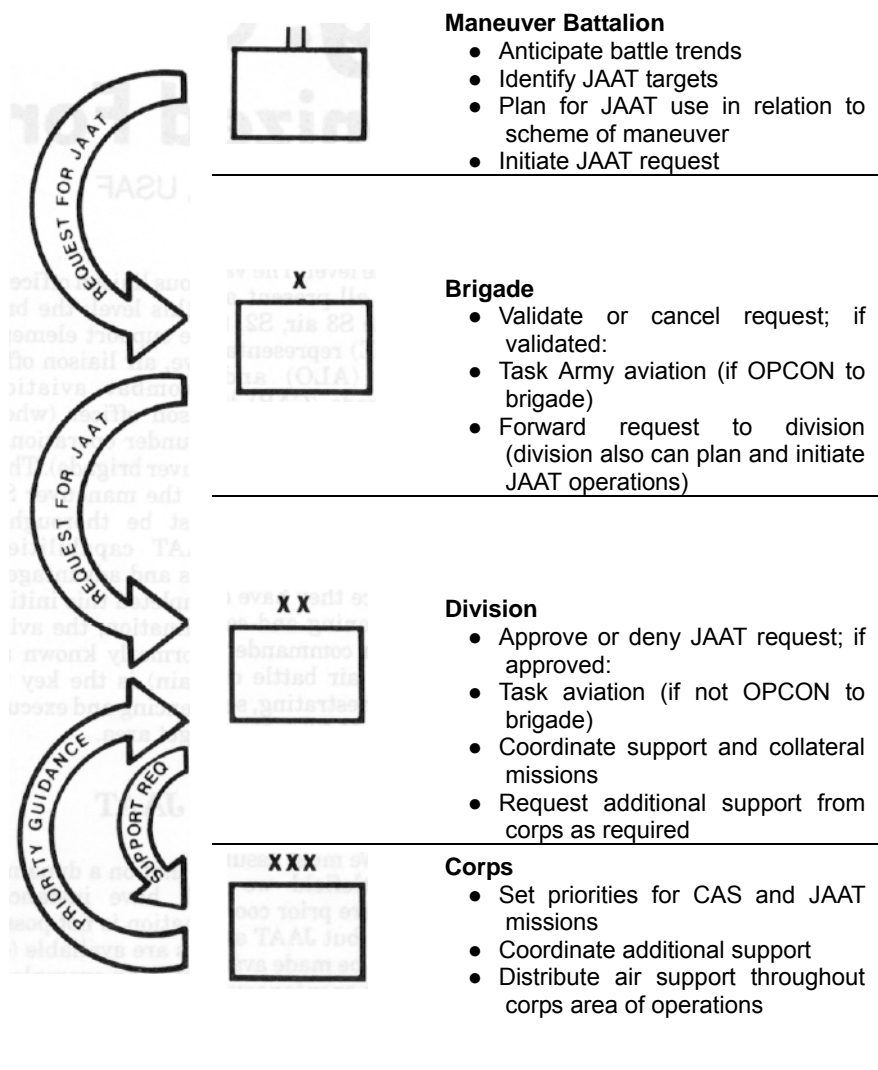
The foundation of a successful JAAT operation is the maneuver commander's tactical plan around which JAAT plans are based. The maneuver commander's tactical plan specifies actions in the objective area to ultimately accomplish the mission and to prepare for subsequent operations. JAAT should be planned for and used in support of this overall mission. JAAT mission considerations include:

- Has the enemy massed its armor and mechanized vehicles?
- Is the enemy on the move?
- What JAAT assets are available?
- Can we flank the enemy, seize local air superiority or suppress enemy helicopters?
- Can we employ offensive operations: counterattacks, exploitations and pursuits?

Minimum Coordination Considerations for a JAAT Operation

- Nature and size of target
- Target activity
- Target priority
- Alternate targets
- Enemy avenues of approach
- Enemy air threat type and location
- Fire support coordination (airspace coordination areas, etc.)
- Provisions for suppression of enemy air defense (SEAD)
- Friendly air defense weapons control
- Communications (frequencies and authentications)
- Laser codes
- Electronic warfare (EW) and electronic countermeasures (ECM) considerations
- Lost communications procedures
- Downed aircraft procedures
- Tactics and attack options
- Initiation time
- Emergency procedures
- Weapons load
- Target marking options
- Current ground tactical plan
- Face-to-face coordination with ground commander (if possible)
- Contact points (CP) and initial points (IP)
- Egress routes
- Location of friendly forces
- Mission-abort criteria
- Airspace deconfliction
- Weather
- Get scout helicopter for FAC
- Update TACAIR and Army aviation assets

Preplanned JAAT Request Channels



- Can we employ defensive operations: reinforce committed ground maneuver units and destroy enemy penetrations?
- Can we attack follow-on elements?
- Can we gain combat intelligence?

Fire Support Plan

JAAT planning requires total coordination and integration with the fire support plan. All JAAT members need to know about friendly artillery assets available, control measures and command relationships.

Request Procedures

Though actual request procedures may vary slightly among major commands, the flow described below applies to all requests.

Attack Helicopter Requests

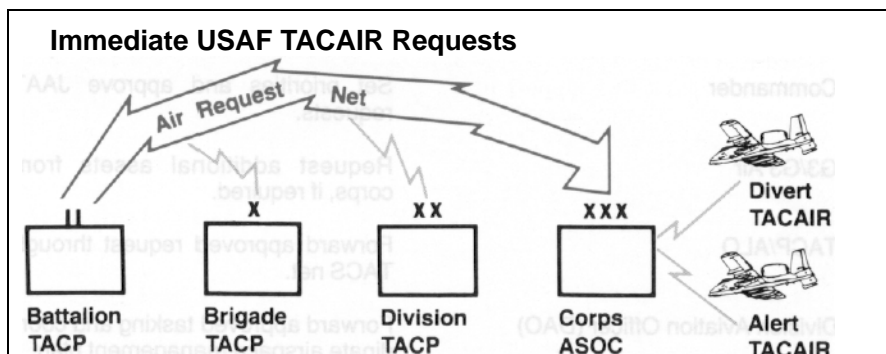
When attack helicopters are under the operational control (OPCON) of a ground maneuver unit, the commander coordinates their employment with the attack helicopter battalion commander, usually through the attack liaison officer.

When attack helicopters are not OPCON to the maneuver unit, the commander must request their support. The normal request channel follows the chain-of-command up to the division level. The request should emphasize the JAAT mission, so the attack helicopter commander may begin planning the operation.

TACAIR Requests

Preplanned TACAIR Request. When adequate planning time exists (usually a minimum of 36 to 48 hours), a commander requests TACAIR support through standard TACAIR request channels. Normally the request is sent up the Army chain-of-command to corps level for approval. The request should state the JAAT mission, so the tactical air control center (TACC) knows the commander prefers JAAT-capable aircraft. As the request is sent, the air liaison officer (ALO) helps the commander plan the operation.

Immediate TACAIR Request. When the recommended planning time is not available, the commander submits an immediate TACAIR request. This method usually requires the ALO send the request directly to the corps ASOC via the Air Force air request network. The tactical air control parties (TACPs) at intermediate



JAAT Planning Responsibilities

The following people at corps level and below (for Army) and TACC level and below (for Air Force) have specific planning responsibilities for employing JAAT:

Maneuver Element

Commander
S2
S3
Fire Support Element (FSE)
Tactical Air Control Party (TACP)
(Air Liaison Officer (ALO)/Airborne and Ground Forward Air Controllers)

Identify requirement/targets for JAAT.

Brigade

Commander/S3

Approve JAAT request and forward to division.

S3 Air

Coordinate airspace and fire support plan.

S2

Prepare intelligence preparation of the battlefield, develop intelligence, brief commander and S3 on likely enemy targets and coordinate electronic warfare.

TACP/ALO

Forward tactical aircraft (TACAIR) request through tactical air control system (TACS) net. (Specify JAAT and include frequencies, callsigns, laser codes, authentication and communication and security procedures.)

FSE

Coordinate fire support and suppression of enemy air defense (SEAD).

Combat Aviation Brigade Liaison Officer (CAB LNO)

Suggest best employment for Army aviation assets; coordinate with and pass missions to the operationally controlled (OPCON) aviation unit. (if Army aviation unit is not OPCON, request support through division.)

Communications Electronic Warfare Intelligence Liaison Officer (CEWI LNO)

Request and coordinate EW considerations (if OPCON to brigade).

Air Defense Artillery Liaison Officer (AD LNO)

Coordinate air defense weapons control.

Division

Commander	Set priorities and approve JAAT requests.
G3/G3 Air	Request additional assets from corps, if required.
TACP/ALO	Forward approved request through TACS net.
Division Aviation Officer (DAO)	Forward approved tasking and coordinate airspace management plan.
Fire Support Coordinator (FSCOORD)	Coordinate SEAD and fire support.
Air Defense Element (ADE)	Coordinate air defense weapons control.
Electronic Warfare Section (EWS)	Coordinate EW activities.

Corps


Commander G3/G2/ALO/FSCOORD	Set priorities for close air support (CAS) and JAAT and consider JAAT requirements for deep and/or rear operations.
Air Support Operations Center (ASOC) Fighter Duty Officer	Forward requests for additional TACAIR JAAT assets to tactical air control center (TACC).
FSE	Coordinate requests for additional fire support or SEAD assets.
Aviation Officer	Provide additional Army aviation assets as tasked.
Army Airspace Command and Control (A ² C ²) Section	Coordinate airspace control and air defense plan.
EWS	Coordinate additional EW and electronic warfare countermeasures (ECM) requirements as needed.

TACC, Battlefield Coordination Element (BCE) or Airborne Command and Control Center (ABCCC)

BCE Plans	Coordinate JAAT requests and specific mission requirements.
TACC Plans	Task TACAIR assets by air tasking order.
BCE Operations	Coordinate immediate tasking requirements with TACC duty control officer and fighter duty officer after publication of the air tasking order.
TACC Operations	Coordinate execution of the air tasking order.

levels monitor the transmission and inform the corresponding commanders of the requests. They are allowed time (usually 10 minutes) to consider the mission request for disapproval. A lack of response during that time translates into approval—silence is consent. Once the allotted time has expired with no disapprovals, the mission is valid, and the ASOC scrambles or diverts available TACAIR to perform the mission. The requesting ALO is the point of contact for mission information—coordinating frequencies and call signs.

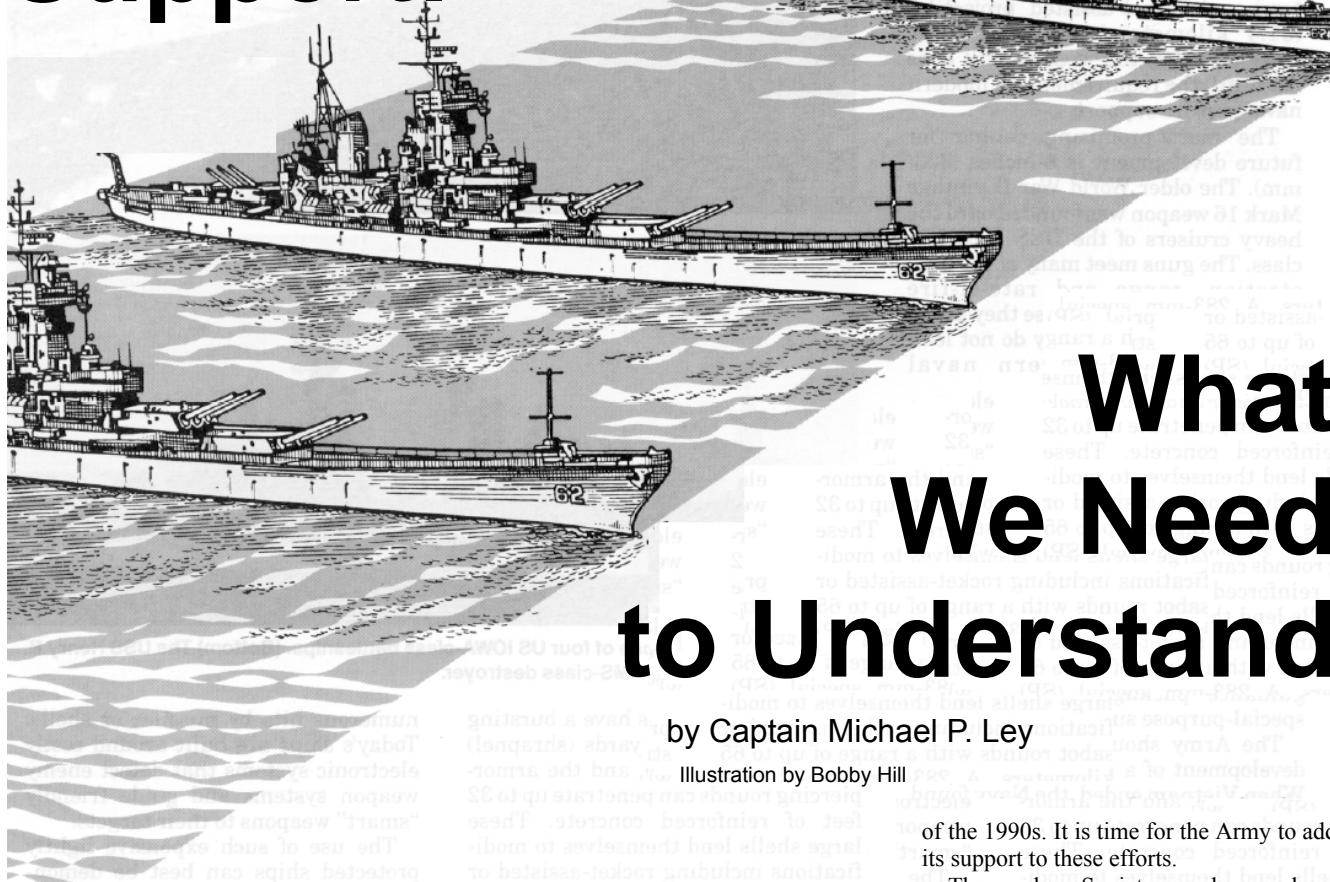
Summary

JAAT is a devastating combat multiplier we can apply throughout the spectrum of the AirLand Battle arena. Its potential on the battlefield relies on the team's ability to come together as a synchronized force over the target area. But to realize its full potential, JAAT operations must be properly planned, coordinated and executed. 

This article is a summary of one by the same name appearing on 30 September 1987 in the "Air Land Bulletin" (ALB), a quarterly newsletter of the Air Land Forces Application (ALFA) Agency, a jointly manned directorate under the Tactical Air and Training and Doctrine Commands. The ALB is published at Langley AFB, Virginia.

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Naval Gunfire Support:



What We Need to Understand

by Captain Michael P. Ley

Illustration by Bobby Hill

"A continuing issue since World War II has been the future role of naval gunnery. In fact, many senior leaders in the Navy and Marine Corps have concluded that we have lost our corporate memory on the use and effectiveness of naval gunnery."

These few words written by Major General Donald M. Weller (USMC, Retired) in his publication "Naval Gunfire Support of Amphibious Operations: Past, Present and Future" seem to summarize

accurately the position in which the Navy found itself in 1978. Since that time, the Navy and Marines, backed by a pro-military President, have been able to partially rectify the problem by recommissioning three IOWA-class battleships and approving reactivation of a fourth.

These fine ships embody the requirements to support amphibious operations—survivability, firepower and flexibility. For all their might, the IOWAs are only a temporary and limited fix for the fire support requirements of the future. There are only four such ships in existence, and during times of conflict, they will be thinly spread.

Future fire support must be provided by other, smaller ships with smaller but still effective weapons. The Navy and Marine Corps have devoted time and funds to help find answers for the fire support requirements

of the 1990s. It is time for the Army to add its support to these efforts.

The modern Soviet navy has, as have the NATO members, opted for lightly armored, missile-firing surface combatants. Unlike the NATO navies, the Soviet Union has taken advantage of the lessons learned during the Falkland Islands War and has fielded a new 130-mm gun. While it has not released details about the gun, a range of 35,000 yards would not be beyond Soviet capabilities.

NGS Weapons Systems

The US has evaluated many weapons to fill the naval gunfire support (NGS) gap. These weapons vary in size from 3 to 16 inches and, with the exception of the battleships, must be tailored to fit the lightly armored hulls of today's ships. There have been several designs in the 6-inch class, but these have been ruled out (at least for the present) as they offer only a marginal improvement over the current 5-inch guns.

Perhaps one of the most respected weapons ever developed was the US 5-inch, 38-caliber (127-mm) Mark 12 gun. This weapon fires a 55.2-pound shell 16 kilometers. The follow-on weapon is the 5/54 Mark 45 that fires a 69.45-pound shell 24 kilometers. Extended range has been provided with the use of special (27.7 kilometers) and rocket-assisted projectiles (31.4 kilometers). Despite these improvements, the weapon still does not fulfill the requirements of modern naval gunfire support.

The most promising caliber for future development is 8-inches (203-mm). The older World War II vintage Mark 16 weapon was found aboard the heavy cruisers of the DES MOINES class. The guns meet many of the penetration, range and rate-of-fire requirements. But because they are in heavy triple turrets, they do not lend themselves to modern naval construction.

The gun that showed the greatest promise was the 8-inch, 55-caliber (203-mm) Mark 71 major caliber lightweight gun (MCLG). This gun fires the shell that provides good penetration and range and was designed for use aboard small ships. The Mark 71's heavy shell lends itself to numerous modifications. The shell can be converted to a rocket-assisted projectile (RAP), can be given a laser guidance package and can carry special-purpose submunitions.

The Army should support further development of a gun of this caliber. When Vietnam ended, the Navy found itself on a much smaller budget, and interest in the project waned. The weapon's high cost and the stability problems associated with the hull of the test vessel contributed to the project's cancellation in 1978.

The most powerful NGS weapon available today is the 16-inch, 50-caliber Mark 7 gun, which is found on the IOWA-class battleships. The gun fires a 1,900-pound high-explosive (high capacity) round and a 2,700-pound, armor-piercing round which can range up to 42 kilometers. The IOWAs carry 1,080 high-explosive and armor-piercing rounds and also carry 12 5-inch, 38 caliber guns. IOWA can place 90 rounds of 16-inch and 450 rounds of 5-inch shells on a target in five minutes, the equivalent of 12 to 16 air sorties. Because the system is partially automated, a maximum rate of two rounds per 16-inch tube per minute can be maintained for short periods. This rate-of-fire cannot be sustained for more than 15 to 20 minutes; however, the sustained rate of fire is approximately one round per tube per minute. The 16-inch high



(Top) the USS IOWA—one of four US IOWA-class battleships. (Bottom) The USS Henry B. Wilson (DDG-7), an ADAMS-class destroyer.

capacity (HC) rounds have a bursting radius of up to 200 yards (shrapnel) with an impact fuse, and the armor-piercing rounds can penetrate up to 32 feet of reinforced concrete. These large shells lend themselves to modifications including rocket-assisted or sabot rounds with a range of up to 65 kilometers. A 283-mm special (SP) sabot round with a range of up to 106 kilometers has been evaluated along with a 13-inch sabot round. Other possible improvements include a laser-designated guidance system, the impulse maneuver technology that corrects rounds during flight and the Mark 19 Mod O grenade-dispersing round for an anti-personnel capability.

Naval Ships for Artillery Support

The use of naval vessels, regardless of size, is always limited by their availability, the range and lethality of the enemy coast and air defense, the range and power of their own weapons and local topographic and hydrographic limitations. Modern naval construction does not lend itself to heavy, large caliber guns, and modern ships are not designed to withstand

numerous hits by missiles or shells. Today's ships are built around costly electronic systems that detect enemy weapon systems and guide friendly "smart" weapons to their targets.

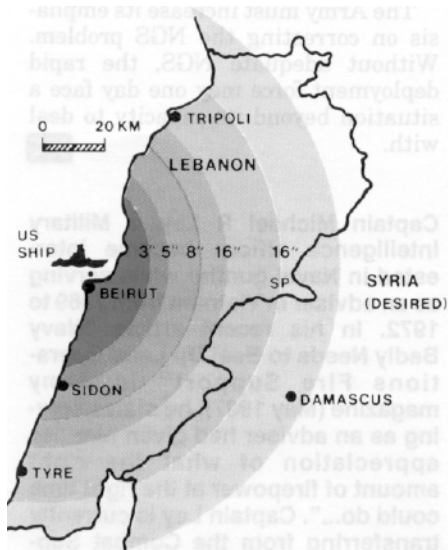
The use of such expensive lightly protected ships can best be demonstrated by a NGS mission in Lebanon when the USS TICONDEROGA, a \$1-billion cruiser equipped with the Aegis air defense system, was called on to provide NGS with her two 5-inch weapons. The ship is lightly armored and is not designed to withstand either numerous cruise missile or 122-mm artillery hits. Had the Syrians and militia used these weapons on her, the Navy would have been forced to leave the NGS mission to its one armored ship, the USS NEW JERSEY. In a future conflict with a foe having the capability of Syria, Iran or Lybia, using such expensive, lightly protected ships, equipped with relatively short-range guns may force the Navy to limit its NGS. Additionally, any confrontation with a power that has a viable naval and air threat could force the Navy to devote its limited assets to higher-priority missions. Again, if this were to occur, the Navy could use only its battleships for NGS. Since we only have four of

these battleships, the land forces would be forced to rely on scarce air assets or Army artillery. What we need is an adequate gun for small warships, which is capable of all weather operations, has a high sustained rate of fire and is reliable and durable.

Naval Gunfire Support Ships

The Navy and Marines have submitted numerous designs for special NGS vessels, all of which have gone by the wayside. These designs included rocket-armed landing craft and "mini-battleships" with three 16-inch guns in a single turret. The major problem with such ships is that they are usually capable only of limited missions or, in the case of the Mark 71 gun, too small to accept the weapon. What we need is a ship that can carry a mixed armament to meet most of the NGS requirements (both rocket and gun), can withstand hits from cruise missiles or medium-caliber guns (152-mm to 203-mm), is fast enough to support a mobile, tactical land battle and can perform a secondary role when not on an NGS mission.

These secondary roles could be supplementing an anti-submarine warfare mission, carrying Harrier aircraft for the protection of surface action groups and convoys or even carrying a Marine battalion landing team (BLT). Because of limited money and people available to the Navy, it



This map of Syria and Lebanon shows the US Navy's gunfire ranges and limitations.

COUNTRY	GUN	MODEL	SHELL WEIGHT (pounds)	RANGE (meters)	RATE OF FIRE (rounds per minute)
USA	16/50 406mm	Mark 7	2,700 (AP) 1,900 (HC)	39,046(HC)	2
USA	8/55 203mm	Mark 71	335 (HC)	35,000 to 40,000(RAP)	12
USSR	7.13/57 180mm	1933	214.9	36,342	5 to 6
USSR	6/50 152mm	MK-5-5YC	110.2	30,000	7 to 10
USA	6/47 152mm	Mark 16	130 (AP) 105 (HC)	24,092	5
USSR	5.1/58 130mm	Unknown	73.8 (HE)	29,000	15 to 17
USA	5/54 127mm	Mark 45	69.4 (HC)	24,000	20
			Rocket assisted projectile	31,385	
			New conventional projectile	27,692	
USA	5/38 127mm	Mark 12	55.2 (HC)	16,800	15 to 20
USSR	5.1/130mm	New	Classified	30,000 + (RAP) estimate	Classified
USSR	3.94/56 100mm	1934	29.76	16,000	15
USA	3/62 76mm	OTO Melera	13.7	16,000	85

Naval gunfire support weapons (1985)



The lightly armored USS TICONDEROGA cruiser (CG-47) used her Aegis air defense system in Lebanon.

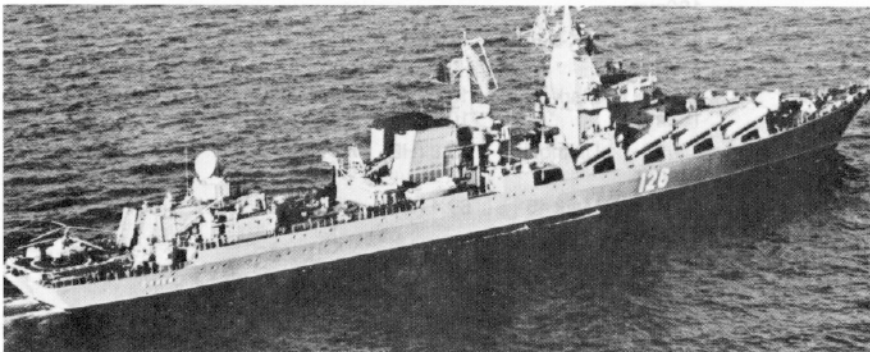
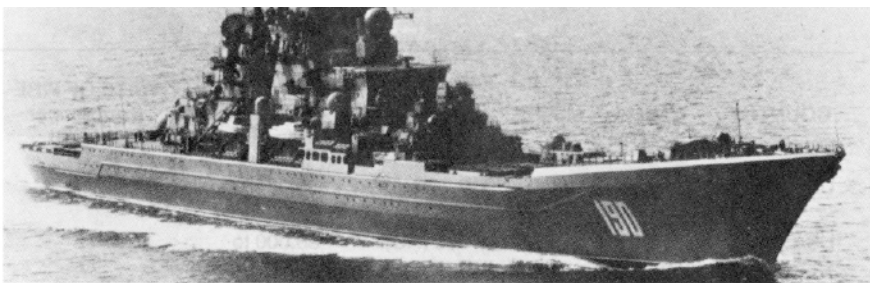
must design a ship that will perform at least one critical role besides that of NGS.

Soviet NGS Capabilities

No study of NGS would be complete without analyzing the Soviet NGS capability. They have taken the lessons of the Vietnam Conflict and the

Falkland Islands War to heart and have begun to emphasize developing heavier naval guns. They have 140-mm rocket launchers mounted aboard amphibious assault ships to support their marine operations.

Additionally, they have four guns of three calibers with which to provide limited NGS. The first of these guns is the 3.94-inch, 56-caliber (100-mm)



(Top and bottom) Soviet KIRVO-class cruisers with nuclear-powered missiles. (Mid) Soviet SLAVA-class cruiser with guided missiles.

gun that fires a 19.76-pound shell to a range of 16,000 meters and has a rate of fire of 15 rounds per minute. The second is the 5.1-inch, 58-caliber (130-mm) gun that, when mounted on a caisson, has proven successful in Field Artillery and coastal defense. This gun fires a 73.8-pound shell to a range of 29,000 meters and has a rate of fire of 15 to 17 rounds per minute. There is now a newer version of the 130-mm gun, which equips the new SOVREMMENY-class destroyers and one of the large KIROV-class battle cruisers. Little data is available on the gun, but the range probably exceeds 35,000 meters, and rocket-assisted technology is probable. The fourth is the 6/50 (152-mm) gun on the SVERDLOV-class cruisers. It fires a 110.2-pound shell to a range of 30,000 meters and can fire 7 to 10 rounds per tube per minute.

Before the Falkland Islands War, the Soviet trend was to employ the light 100-mm gun; however, the importance and limitations of the British 4.5-inch (114-mm) gun in the Falklands have changed Soviet thinking. The result has been the new, more

powerful 130-mm gun in a dual mount.

Some naval theorists feel the Soviets may return to one of two larger weapons in the future. The first is a possible modernization of the World War II-vintage 7.13-inch, 57 caliber (180-mm) Model 1933 gun that equipped some older cruisers. This weapon fired a 214.9-pound shell to a range of 36,342 meters. The size of the shell lends itself to modifications and automation and, at the same time, is small enough to be fitted in a single mount and placed on large destroyers, cruisers and the new KIROV battle cruisers.

The second weapon would be an adaptation of the Soviet army's 8-inch (203-mm) gun or howitzer. Since data on this weapon is classified, we can only look at the American 8-inch, 55-caliber gun on the DES MOINES heavy cruisers. This gun fired a 335-pound shell to a range of 30,000 meters. A Soviet-designed system probably would give the naval version of the gun a range in excess of 34,000 meters, and it would be adaptable to all of the modifications found on the US Mark 71 gun.

Conclusions

Because of the status quo in the nuclear arena and the increasing likelihood that conventional military operations will take place in Third World nations, the role of NGS must be better understood by the forces that will be called upon to fight there. In the case of the rapid deployment force, the bulk of the ground combat forces are Army, not Marine. With the exception of certain artillery personnel,

the Army has little knowledge of current NGS capabilities.

The Army has paid only lip service to supporting the Navy's developing a suitable NGS vessel or gun. In some cases, certain high-level officers have resisted spending funds for the recommissioning of the four battleships. What we cannot argue is that the Navy must buy some type of NGS weapon to supplement the four battleships and to provide the flexibility we need to meet the requirements of the 1990s.

Probably the three best weapon systems available to support the US and NATO NGS missions are the 16-inch gun, the rapid-fire, 8-inch Mark 71 gun and the Army's multiple rocket launch system (MLRS) with its long range, heavy-payload capability. The advantages of the 16-inch gun already have been discussed. The primary disadvantage is its weight, which is far too heavy for modern ships. Since buying a special heavily gunned NGS ship is the least likely possibility, this means NGS-capable weapons must fit the new frigates and destroyers. This brings us back to the 8-inch mark 71 guns and MLRS.

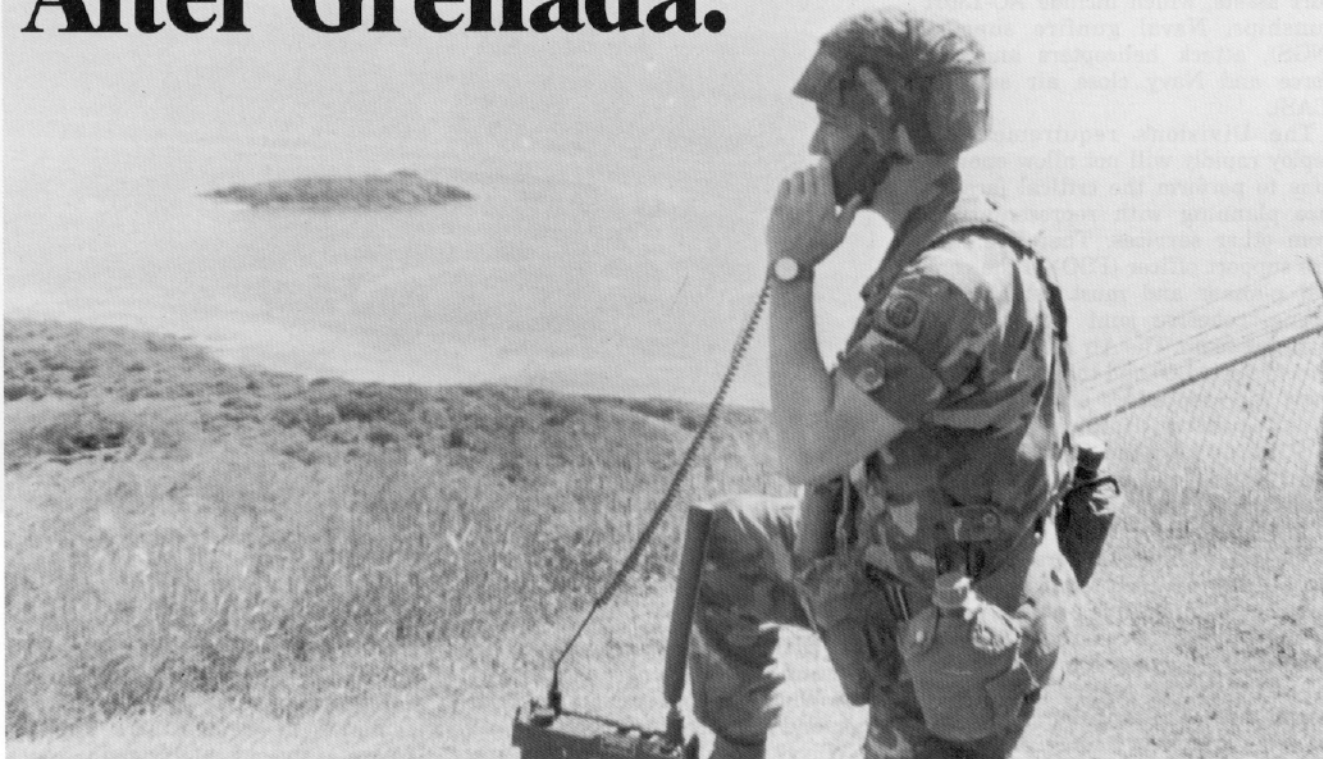
Another possible solution would be to modify some of the older destroyers with modern NGS weapons and place them in the Naval Reserve. This would allow them to be ready for sea within 30 days and would allow for the limited procurement of new weapon systems and for updating shipboard fire control equipment without maintaining a full-time crew. Additionally, it would give the Navy 10 to 15 ships that could be rapidly placed in commission.

The Army must increase its emphasis on correcting the NGS problem. Without adequate NGS, the rapid deployment force may one day face a situation beyond its capacity to deal with.



Captain Michael P. Ley, a Military Intelligence officer, became interested in Naval gunfire while serving as an adviser in Vietnam from 1969 to 1972. In his recent article "Navy Badly Needs to Beef Up Land Operations Fire Support" in Army magazine (May 1987), he states serving as an adviser had given him "an appreciation of what the right amount of firepower at the right time could do...". Captain Ley is currently transferring from the Combat Support Coordination Team III, Eighth Army Headquarters, South Korea, to the US Army Military Intelligence Center and School, Fort Huachuca, Arizona.

After Grenada:



Joint Operations in the 82d Airborne Division

by Captain Jay F. Grandin

Joint operations continuously have played an important role in American military history. During the War of 1812, Naval operations by Captain MacDonough were a key factor in the American victory at the battle of Lake Champlain. His defeat of the British naval forces helped General Macomb's outnumbered maneuver elements defeat Sir George Prevost's British forces and led to their retreat to Canada. At the D-Day invasion in World War II, the coordinated attack of the beaches and fields of Normandy by airborne, glider and amphibious forces was the turning point of the war. The Inchon landing by General MacArthur during the Korean War used a joint task force consisting of elements from the Marine Corps, Navy and Army. More recently, Army, Navy, Air Force and Marine forces conducted the joint operation, Urgent Fury, to relieve Grenada in October 1983.

This article examines how the 82d Airborne Division fire support personnel plan and coordinate fire support for joint operations. The article discusses the primary considerations when planning for joint fire support and the lessons learned during the recent joint operation in Grenada. Additionally, the article highlights the training programs implemented by the 82d Airborne Division fire support element (FSE) to enhance the ability of Division fire support personnel to be successful in the joint environment.

Planning for Joint Operations

The 82d Airborne Division will rely heavily on other services for a significant amount of its fire support during the initial phases of an operation.

Separate ground, sea and air warfare is gone forever. If ever again we should be involved in war, we will fight it in all elements, with all services, as one single concentrated effort.

**General
Dwight D. Eisenhower
at the end of World War II**

Division fire support personnel will have to plan and integrate all fire support assets, which include AC-130H gunships, Naval gunfire support (NGS), attack helicopters and Air Force and Navy close air support (CAS).

The Division's requirement to deploy rapidly will not allow enough time to perform the critical face-to-face planning with representatives from other services. Therefore, the fire support officer (FSO) is the central planner and must establish a strong, cohesive joint fire support planning team. The Air Force air liaison officer (ALO) and the Marine and Navy representatives of the air and naval gunfire liaison company (ANGLICO) help the FSO. He must "quarterback" the team as he is the maneuver commander's primary point of contact.

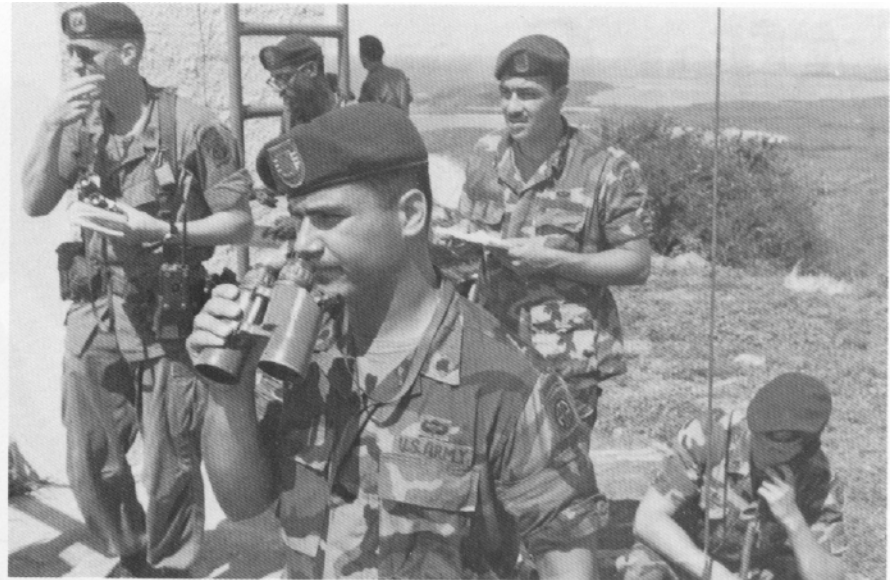
The team must understand the capabilities of each other's assets. Because planning time is short, especially during stressful 18-hour deployments, increased pressure falls on the planning team. To develop quickly a successful fire support plan, the team frequently must plan and train together.

Fire support planning for joint operations involves the same principles and considerations as other operations. However, the additional planners and fire support assets increase the complexity of joint planning. There are four primary considerations critical to the successful planning of a joint operation: command and control, simplicity, synchronization and flexibility. When the joint task force (JTF) properly considers these, the joint fire support team can rapidly plan and expertly control the assets available.

Command and Control

The fire support planners request vital planning information early, using a standard list of questions for joint operations. The 82d Airborne Division FSE has incorporated these questions into its fire support handbook as requests for information (RFI) for joint operations. These questions are as follows:

- Who is the combined joint task force commander?
- Who controls the air? (tactical air control center [TACC], airborne battlefield command and control center [ABCCC], airborne warning and control system [AWACS], battlefield coordination element [BCE], air support operations center [ASOC]).
- What is the joint communications plan? (call signs, frequencies



82d Airborne fire support personnel call for and adjust naval gunfire from Vieques Island, Puerto Rico.

[HF/UHF], communications section software)

- What joint fire support coordination and airspace control systems are in effect? (Air Force, Navy, Marine)

- When, where and how will coordination be effected with the following elements? (ANGLICO, USMC, ALO)

- What are the rules of engagement for indirect fire and close air support assets (to include AC-130H)?

- Is ABCCC or joint air control center and command post (JACC/CP) available? (link up time, station time)

- What joint fire support assets are available for the initial assault (pre-assault fires) and for subsequent operations? The responses to these questions become the foundation for streamlined planning of joint fire support. The team's understanding of the command and control of fire support assets enhances its ability to support the maneuver plan.

Simplicity

Simplicity in joint fire support planning information allows planners to disseminate information quickly to their executing elements. A joint fire support matrix helps; it is easy to understand and simple to portray. The matrix uses the information from the fire support annex of an operations order. It saves time because a simple fire plan results in more responsive fires.

Synchronization

Synchronized operations achieve maximum combat power and promote decisive, violent execution—the goal

of all fire support planners. In a joint operation, synchronization, an inherently difficult task for the planner, demands he control fire support assets for the safety of friendly troops while still allowing for responsiveness of fire support. Since command and control of each fire support asset occurs early in the planning process, success hinges on detailed planning and *rehearsal* of the coordination of fire support assets and airspace by all key players of the joint fire support planning team.



A combat observation lasing team from the 82d Airborne Division is controlling A-10s and lasing the target at England Air Force Base, Louisiana.

Effectively organizing the fire support cell in the tactical operations centers (TOCs) of the maneuver elements promotes an efficient and synchronized joint fire support team. All primary players collocate in the TOC so they can give instant input.

They can make decisions without delay. Additionally, to reach the right decision quickly, each player must continuously update the FSO on the status of his assets, so the FSO can update the commander. For this reason, the matrix changes in response to the dynamics of the joint battlefield.

The joint fire support matrix will change as fragmentary orders come in and as the situation changes to modify the scheme of maneuver. For example, weather sometimes cancels out planned CAS assets, or NGS units may not be on-station as planned. A decision tree must portray the status of each asset and reinforce the team concept with the FSO as the one who provides the link to the maneuver commander. The fire support planners should war game possible scenarios at all levels from company to division, ensuring the system is not too cumbersome to react to changes.

Synchronized operations require the team to plan early and integrate assets into the operation continuously. The goal is to maximize each asset's capabilities while minimizing its limitations. The FSO at each level has the difficult and important task of recommending the fire support plan to the maneuver commander.

An integrated plan must reflect input from the various service fire support agencies. Coordinated at all levels, joint operations involve the responsive engagement of targets by the appropriate asset at the lowest echelon.

Flexibility

Flexibility is the last of the four considerations for joint fire support planning and is probably the most challenging to achieve. With the number of planners and joint assets involved, it is difficult to make the plan flexible and still maintain control. The plan can't be so rigid that it inhibits modifications during the execution phase. For example, Army fire support personnel can't expect an ANGLICO or ALO to be available every time an emergency arises that needs NGS or CAS. Therefore, the FSO must develop a plan to control these assets during emergencies. Army personnel need to know the call signs, frequencies, variables and codes necessary to coordinate the use of Naval or Air Force assets.

To exploit fully the joint fire support system, planners must consider innovative changes to established procedures. These changes provide flexibility in the joint fire support

system and enhance joint interoperability among the services. An example of this is a streamlined CAS brief used by Army personnel in emergencies. We must develop and practice joint procedures for different fire support contingencies to ensure smooth execution in combat operations.

Command and control, simplicity, synchronization and flexibility form the foundation for a streamlined, but organized, planning process to maximize combat power. The team should apply the principles taught by the Field Artillery School with increased emphasis on these four keys to a successful joint fire support plan.

Grenada

The 82d Airborne Division's most recent joint operation was Urgent Fury in Grenada, October 1983. It was highly successful and provided some lessons learned in joint fire planning. Moreover, it was truly a joint fire support operation using assets from three services. These assets included Air Force AC-130H gunships, Naval destroyers and CAS and Army organic mortars and artillery.

One of the early lessons learned was the importance of including fire support planners from all services early in the predeployment planning. During the Grenada operation, some key planners did not participate. For example, no division fire support element representatives took part in the initial planning at the joint level; no Navy representative assisted in ranger fire support planning to coordinate NGS and air support; and the ANGLICO and TACP personnel came in late. The compressed time sequence resulted in the late integration of ANGLICO representatives during the planning and execution phases, which created problems employing NGS. A

similar problem existed with the late arrival of TACPs from Shaw Air Force Base, South Carolina. The Division ALOs filled the TACP slots at the maneuver battalions, but this affected the planning and coordination of Air Force assets at division level.

The JTF Commander and his staff must clearly define the control of joint airspace. In joint operations like Urgent Fury, a component must be responsible for theater airspace management early in the planning sequence. There must be a high-level decision on the joint control of Navy and Air Force airspace, clearly identifying supporting roles.

During operation Urgent Fury, the AC-130H gunship acted mainly as a fire support asset and intelligence gathering source. Special operation forces have long recognized it as a valuable asset. Its effective use by 82d fire support personnel and ALOs demonstrated the outstanding support the Spectre gunship can provide ground forces on a low-air-defense-threat battlefield. Urgent Fury clearly identified the need for more AC-130H training by conventional forces and the establishment of joint procedures and doctrine for AC-130H operations.



Fire support personnel of the 82d Airborne Division receive a ship orientation on board the USS PATTERSON.



The USS O'BRIEN (DDG 987) fired in support of 82d Airborne personnel during joint training.

Asset	Type	Pre-Assault	Phase I	Phase II	Phase III
Army Field Artillery Attack Helicopter	105(T), 155(T) AH64		105(T)	105(T) 155(T)	105(T), 155(T) AH64
Air Force CAS	AC-130H, A-10 (Night) (Pave Penny)	AC-130H	A-10	A-10	A-10
Navy CAS NGS	A-7, A-6 DD 977 (5"54) FF 1078 (5"54)	A-6	A-7 DD 977 FF 1078	DD 977 FF 1078	DD 977
USMC CAS	AV-8	AV-8			
Fire Support	1	NFA #1 82d			
Coordination	2	RFA #1 82d	FSCL (Corps)	FSCL (Corps)	FSCL (Corps)
Measures	3	RFA #2 82d	CFL 82d		
	4	NFA #1 Corps			
Airspace	Who Controls	ABCCC JTF	TACC/SACC	TACC	TACC
Coordinating Instructions	Communications: Callsigns, Frequencies, COMSEC Rules of Engagement: Emergency Control of Assets: Laser Codes: Ammunition: Field Artillery scatterable mines (FASCAM), Copperhead, Hellfire, LGBs, Maverick Targeting Guidance: Air defense; command, control and communications; artillery Airspace: Coordinating altitudes				

Joint Fire Support Planning Matrix

82d Airborne Division's Joint Operations Training	
<ul style="list-style-type: none"> Naval Gunfire Spotter Course, Naval Amphibious Warfare School, Little Creek, Virginia. Ship orientations, Norfolk, Virginia. Ship-to-shore, live-fire gunfire, Vieques Island, Puerto Rico, or Bloodsworth Island, Maryland. Integration of 2d ANGLICO, Camp LeJeune, North Carolina, into battalion ARTEPs and brigade and division exercises. Development of joint operating procedures among XVIII Airborne Corps and I and II Marine Amphibious Forces. Joint airborne communications center and command post (JACC and CP) training, McDill AFB, Florida. Airborne battlefield command and control center (ABCCC), Keesler AFB, Mississippi. 	<ul style="list-style-type: none"> Tactical air control center (TACC) and air support operations center (ASOC) training, Shaw AFB, South Carolina, and Fort Bragg, North Carolina. Naval gunfire terminal procedures course and supporting arms coordination center (SACC) training. AC-130H classes and aircraft orientations, Hurlburt Field, Florida. Semi-annual AC-130H live-fire exercises, Fort Bragg. Air Force close air support (CAS) training, Fort Bragg and Shaw AFB. Night CAS and joint laser systems training with the 23d Tactical Fighter Wing, England AFB, Louisiana. Development of joint procedures for CAS and laser systems with Air Force, Navy and Marines.

The importance of the fire support officer or element from company to division as the *single point of contact* for coordination of all fire support assets is paramount. Although it is a team effort, maneuver commanders should rely on their Field Artillery fire support coordinators (FSCOORDs) as their primary advisor for fire support planning. The ALO and ANGLICO remain critical players in joint fire planning, yet the FSO must coordinate their participation.

Training for Joint Operations

After reviewing lessons learned from Grenada, the Division FSCOORD has implemented an aggressive joint training program to enhance interoperability. This program improves the 82d Airborne Division's fire support planning and control of joint fire support assets. The

program strives to improve existing relationships with sister service fire support organizations.

Conclusion

Since operation Urgent Fury, the Division has improved training programs to enhance joint fire support planning and control. Of course, there is still much to be accomplished in joint fire support planning. Continued integration of ALOs and ANGLICOs into both planning exercises and field training exercises will improve the joint planning proficiency. The Division will schedule joint live-fire training as often as possible to maintain the skills of the fire support personnel critical to the success of the next joint operation.



Captain Jay F. Grandin is the Field Artillery Intelligence Officer in the 82d Airborne Division Fire Support Element, Fort Bragg, North Carolina. Captain Grandin received his commission from ROTC at Elon College, North Carolina. He is a graduate of the Field Artillery Officers Basic and Advanced Courses and the Combined Arms Service Staff School. His previous assignments include battery commander, battalion adjutant and battalion and brigade fire support officer.

View from the Blockhouse

FROM THE SCHOOL

BATTLEKING

BK 7-87, NATO Taillight Bracket (Source: Mr. C. W. Tanner, US Army Field Artillery Board, Fort Sill, Oklahoma.) The M200A1 generator chassis trailers manufactured before 1973 use a taillight with the national stock number (NSN) 6220-00-669-5623. The height of this taillight is approximately 5-1/4 inches and is mounted to the frame of the trailer. A newer NATO taillight, NSN 6220-01-093-4439, is also available for use with this trailer. It is approximately eight inches high. Because of the height difference, however, mounting the NATO taillight to the pre-1973 trailers requires drilling new mounting holes approximately 1-1/4 inches lower than the original mounting holes. Once the bracket is mounted in

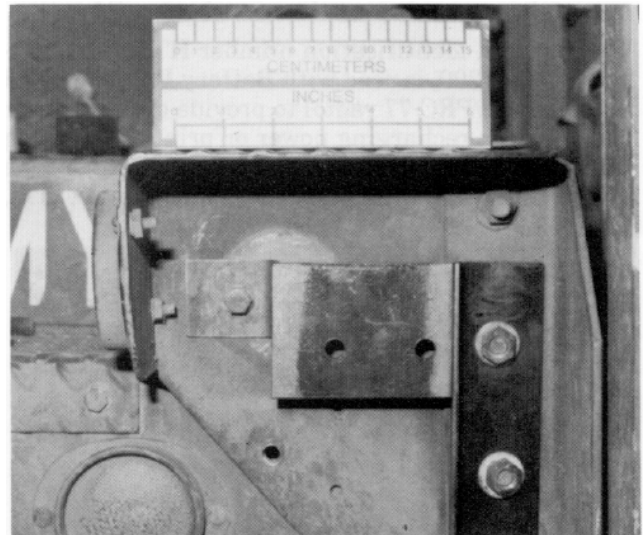
these holes, the electrical wires tend to crimp and short out. The M200A1 trailers manufactured in 1973 and later have brackets that allows you to mount the NATO taillight without damage.

Mr. Tanner locally devised a bracket to mount the NATO taillight to the pre-1973 M200A1 trailers. You mount the bracket to the trailer, using the existing taillight mounting holes. This bracket allows room for the electrical wires, thus reducing damage to the wires.

The Field Artillery Board evaluated the bracket and determined a unit can make a bracket for a pre-1973 trailer and safely secure the new taillight to it.



Current NATO Taillight



New NATO Taillight Bracket



February 1988

Document MTOES Before Receiving SEDME-MR

All tables of organization and equipment (TOEs) will be documented to include the new survey electronic distance measuring equipment-medium range (SEDME-MR) in 1988. However, units won't get the SEDME-MR until they document their modified TOEs (MTOEs).

The SEDME-MR measures short- to mid-range slope distance for conventional survey for Field Artillery and topographical engineers. The system consists of an infrared distance meter, two sets of retro-reflectors, an external vehicle power cable, rechargeable NiCad batteries, a battery charger and a user's guide.

The initial distribution strategy was to have the SEDME-MR replace the microwave distance measuring equipment (DME) on a one-for-one basis and the DM-60 on a wear-out basis. However, the SEDME-MR now will replace both systems immediately, providing the unit's MTOE is updated to reflect the new system.

The Army will buy the SEDME-MRs over the next 15 months. To receive the system quickly, commanders must document the MTOEs properly and promptly.

If the units have questions about documenting the SEDME-MR, they should call Materiel and Logistics Division, Directorate of Combat Developments, US Army Field Artillery School, at AUTOVON 639-2352 or 3652.

BUCS Printer DC Adapters Used with BA 4386 Battery or Vehicle Battery

The BUCS HP2225B Printer uses two new separate DC adapters available in the supply system. Units can requisition them through normal supply channels for approximately \$75.00 each.

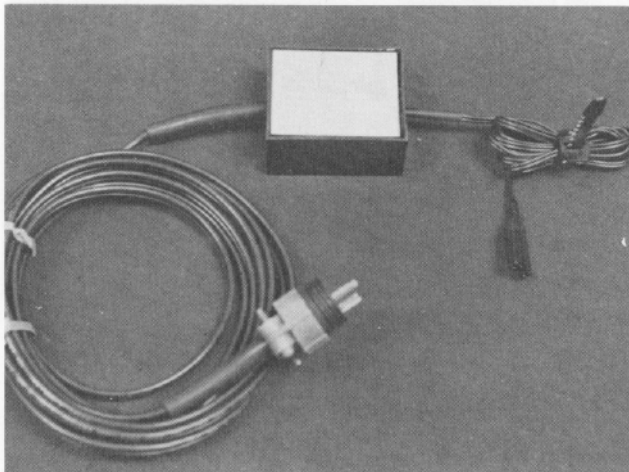
- Adapter, identification number Horizon Technologies, Inc. (HTI), part number 104-007-100, is used with a 12-volt vehicle battery to recharge the battery pack or to provide printer operating power.

- Adapter, identification number HTI, part number 104-007-200, is used with Battery BA 4386 (used with the AN/PRC 77 radio) to provide either printer battery pack recharging power or printer operating power. The following equipment is required to use the adapter with a BA 4386 battery: one adapter, HTI,

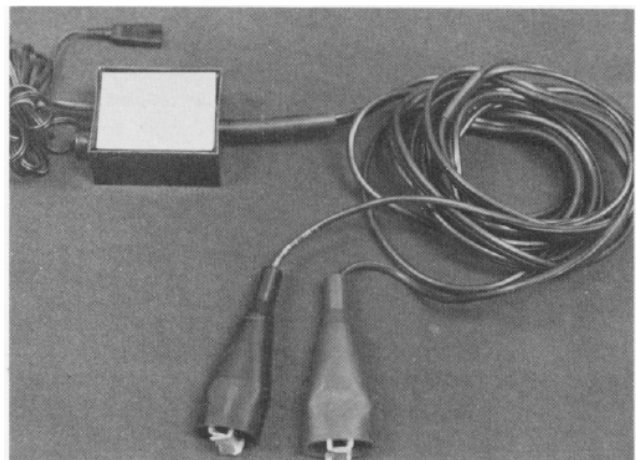
part number 104-007-200; one BA 4386 battery; and one BUCS printer battery pack, HP82199A.

Cross-reference of HTI Part Numbers and National Stock Numbers (NSN):

<u>ITEM</u>	<u>HTI</u>	<u>NSN</u>
Power Supply (BA 4386 Battery DC Adapter)	104-007-200	6130-01-241-8267
Power Supply (Vehicle, DC Adapter)	104-007-100	6130-01-241-8266
Printer Automatic D (Printer, HP2225B)	104-001-103	7025-01-199-8707
Battery Assembly (Battery Pack, Printer, HP82199A)	104-001-113	7010-01-201-5858



HTI 104-007-200 printer adapter for the AN/PRC 77 radio battery.



HTI 104-007-100 printer adapter for a 12-volt vehicle battery.

Polaris 2 Update

The Polaris 2 Reticle for installation in the M2A2 aiming circle is available for Field Artillery cannon units, though few have taken advantage of it. The Reticle allows units to use the Polaris 2 hasty survey technique to establish direction (within ± 2 mils). The technique is fast, simple and requires no radio or

wire communication. It replaces the Polaris-Kochab method as the primary means of determining direction using the M2A2 aiming circle. In addition, this technique will be part of the Cannon Battery Army Training and Evaluation Program (ARTEP) 6-100 during FY 88.

Units requisition the Polaris 2 Reticle (NSN 1240-01-152-8516) and have their intermediate rear maintenance shops (general support) replace the old reticle with the new one. TM 9-1290-262-24P, April 1983, and message, Commander, ARRCOM, DRSAR-MAL, dated 041414Z February 1983, authorize the installation of Polaris 2 Reticles in M2A2 aiming circles.

The US Army Field Artillery School (USAFAS) is shortening the installation turn-around time at the

maintenance shops with the help of logistics channels. With more than 1,000 Polaris 2 Reticles in stock, the Field Artillery goal is to have 100 percent of the units install the Reticles and take advantage of the new technique. FM 6-50, Field Artillery Cannon Battery, Change 1, describes the purpose and operation of the Polaris 2 Reticle.

Units should direct questions about the Polaris 2 Reticle to the Survey Division, Target Acquisition Department, USAFAS, at AUTOVON 639-4144.

Copperhead Firing Procedures

The Copperhead call for fire in FM 6-30 Observed Fire Procedures confusingly states a unit will fire one more round than the number of targets at an aimpoint. The spirit of this guidance always has been to *prepare* one additional round. Preparing the extra round

increases fire-mission responsiveness. The observer fires the additional round *only* if one of the rounds fails to destroy its target. The new TC 6-30-XX Copperhead Firing Procedures published in January 1988 clarifies the guidance.

Transporting Copperhead in the M109A2 and M109A3 Howitzers

When mission requirements dictate, units may remove the M712 Copperhead projectile from the shipping container and place it in the storage bag. The bag protects the round against the direct effects of water, sunlight, dirt and debris. However, it will not protect the round from the elements for more than 30 days. You must repackage unfired Copperheads within 30 days and turn them in to the battalion ammunition section.

You may drive your 155-mm self-propelled howitzers with two M712 projectiles in protective bags stowed in the crew compartment on the right side sponson. *To move all*

other Copperheads, repackage them in their shipping containers and transport them in an ammunition carrier vehicle.

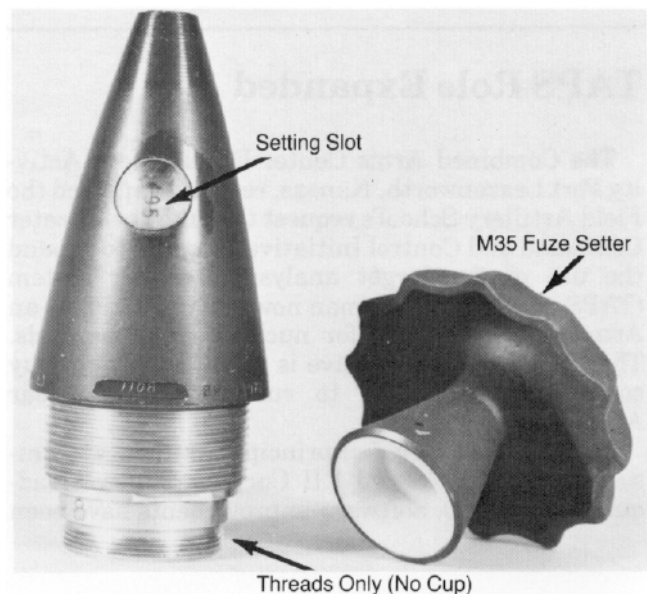
This information on transporting Copperhead will appear in the next change to TM 9-2350-311-10 Operator's Manual for Howitzer, Medium, Self-Propelled 155-mm, M109A2 and M109A3. If units have questions about transporting Copperhead projectiles, call Mr. Doug Converse, New Systems Division, Weapons Department, Field Artillery School, at AUTOVON 639-6590 or 5523.

SAFETY: M577 and M582 Fuze Identification

This article answers some of the more common safety questions the Field Artillery School's Weapons Department (AUTOVON 639-5523 or 6590) receives about the M577 and M582 series fuzes.

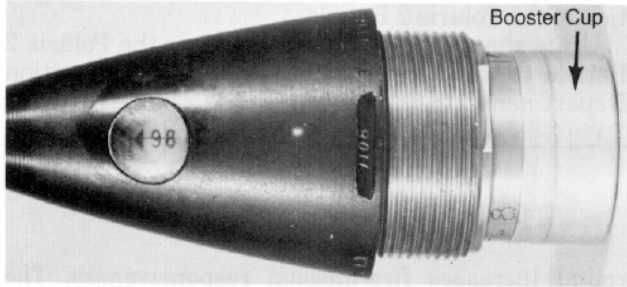
The M577 series MTSQ fuzes were designed to replace the M565 series MT fuzes. The M577 fuze is used with payload-carrying projectiles that expel the payload during flight. This fuze does not have a booster cup mounted to the base. *If mated with burster-type projectiles, this fuze will cause a dud round.*

The M582 and M582A1 fuzes are designed to replace the M564 MTSQ fuzes. These fuzes are used on burster-type projectiles. Each has a booster mounted to the base of the fuze that explodes the



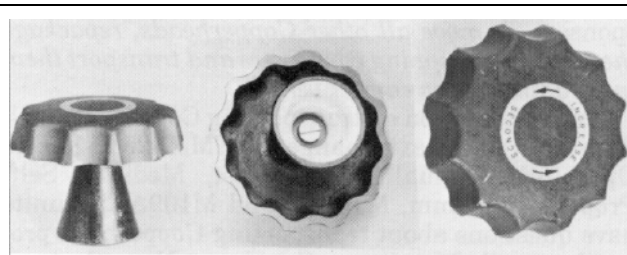
Fuze M577/M577A1

filler in the projectile. The projectile filler would be either composition B or TNT. *If the fuze is used with payload-carrying rounds, it will malfunction by failing to expel the cargo.*



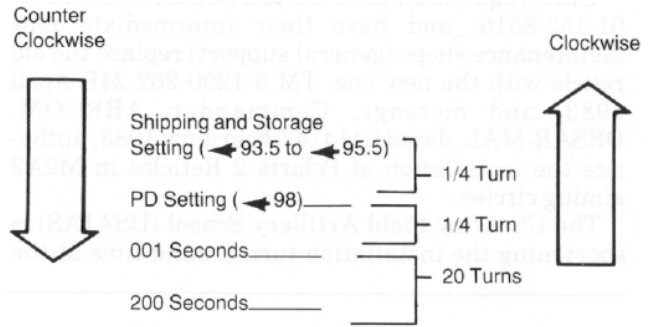
Fuze M582/M582A1

The M577 series fuzes have identical viewing windows and scales. The time is set at the nose of each fuze, using an M35 fuze setter or a flat-tipped screwdriver. You view the time setting on the fuze's three dials through a window in the side of the ogive. The closest dial to the nose displays hundreds of seconds, the middle dial indicates tens of seconds and the third dial shows seconds and tenths of seconds.



M35 Fuze Setter

NOTE: To set a lower time on a fuze already set, you must reseal the fuze setter and turn clockwise (numbers get smaller) to a setting at least one second lower than the required setting. Next, move the setter counterclockwise until the required time is under the hairline.



Direction of Setting or Resetting Fuze M577 or M582

CAUTION: Do not attempt to set these fuzes below 93.5 when setting them in the clockwise direction or above 200 seconds when setting them in the counterclockwise direction. The settings of 000 and 200 are not authorized service settings.

The Army Research and Design Engineering Command (ARDEC) is requesting the M582 series fuzes be marked with white lettering. The $\frac{5}{16}$ -of-an-inch lettering will be placed under the viewing window. Once the fuze is lettered, soldiers will be able to differentiate between the M577 and M582 fuzes after they are on a projectile. Currently, they can see no difference when the fuze is in place.

M577 and M582 inert fuzes can be drawn from ammunition supply points using the Department of Defense Ammunition Code (DODAC) for explosive fuzes. After the DODAC, the requestor must write the word "INERT." M577 inert fuzes are available now, and the M582 inert fuze will be available in March of 1988.

TAPS Role Expanded

The Combined Arms Center Development Activity, Fort Leavenworth, Kansas, recently approved the Field Artillery School's request through the Theater Command and Control Initiative Program to expand the use of the target analysis planning system (TAPS). Field Artilleryman now can use TAPS as an Army interim system for nuclear target analysis. The thrust of the initiative is to allow units to buy commercial hardware to run Defense Nuclear Agency (DNA) software.

TAPS, a DNA proof-of-principal system, was initially fielded in V and VII Corps Artillery Headquarters in 1980. Software improvements have been continuous, and a

second hardware upgrade to a PC-AT-class computer is nearing completion. TAPS employment is being expanded to include the 17th Air Force Air Tactical Operations Center (ATOC).

The Field Artillery School distributed TAPS information packets to active and reserve component corps and division fire support coordinators in January of 1988. Address requests for additional packets to: Commandant, US Army Field Artillery School, ATTN: ATSF-CTA, Fort Sill, OK 73503-5600. The Project Officer is Mr. Roy Penepacker, Tactical Data Systems, Directorate of Combat Developments, AUTOVON 639-4867 or 6067.

Regret

Correction: The 1987 Red Book had a picture of an M102 howitzer beside the M101A howitzer description, p. 57. The staff regrets the error.

We also regret we inadvertently left the 402d FA Brigade off our list of Army Reserve FA Commanders:

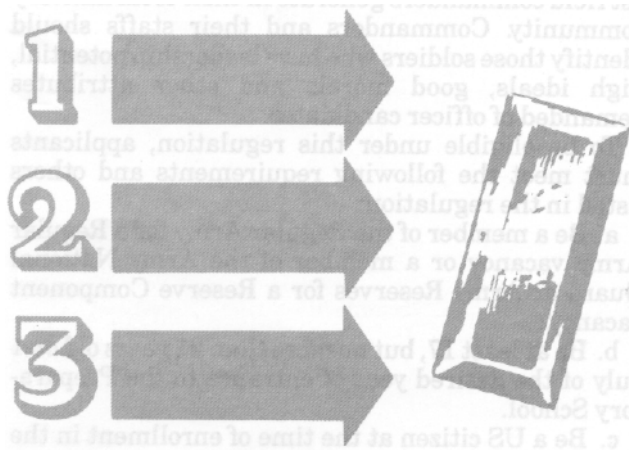
COL	Honeycutt, Ronald G. 402d Bde (Training) FA
MAJ (P)	Sloan, Steven K. 1st Bn, 89th FA
MAJ (P)	Bradford, Jerry J. 2d Bn, 89th FA
LTC	Burdett, Norman B. 3d Bn, 89th FA
LTC	Stenger, Thomas M. 4th Bn, 89th FA
LTC	Crain, Albert L. 5th Bn, 89th FA
LTC	Fobrick, Terrance L. 402d Trng Gp



Field Artillery's M101A1 105-mm light, towed howitzer.

Redlegs News

ITEMS OF GENERAL INTEREST



1 Green To Gold

Have you ever seen exemplary enlisted soldiers leave the service because, for them, the challenge wasn't there? Have you ever looked at an enlisted soldier and thought "He'd make a fine officer"? Do you have high-quality, high-caliber soldiers like this in your unit today? If you come close to answering

Three Enlisted Paths To a Commission

Attention:

All commanders and senior NCOs

"yes" to any of these questions, you need to know about Green to Gold—a major recruiting initiative for your soldiers who have the ability to become officers.

Through the Veterans Education Assistance Program (VEAP), the GI Bill or Army College Fund, more soldiers can afford a college education, and by combining the Army reserve officer training course

(ROTC) with their academic work, a soldier can complete college with an officer's commission as well as a degree. These men and women are excellent candidates to fill leadership roles in our active Army, Army National Guard and Army Reserve units. These soldiers, particularly minorities who will serve as role models, can bring to their units the experience gained through both ROTC and their enlisted service.

Interested soldiers should contact their continuing education office or career counselor. There, they will receive a complete briefing on the ROTC program as well as help in completing a college application. A copy of the complete admissions packet and the unit commander's recommendation is then forwarded to the professor of military science (PMS) of the respective university or college for review. The PMS will contact the soldier and provide more information regarding that school's ROTC program.

For more details, contact Headquarters, United States Army ROTC Cadet Command, Fort Monroe, Virginia 23651-5000; your post education center; or the nearest ROTC region, brigade or battalion headquarters. Working together, Cadet Command and the active Army can make Green to Gold an excellent tool to continue to provide our Army the officer leadership it needs.

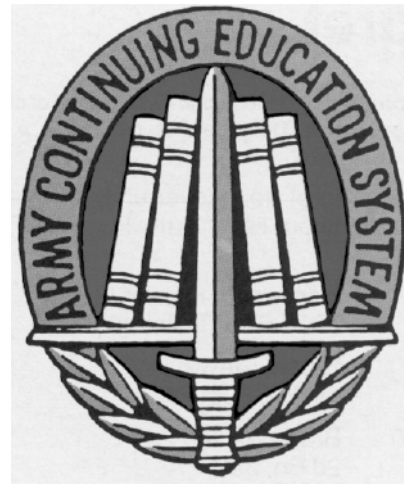
2 *Officer Candidate School*

OCS provides the smallest total number of second lieutenants to the Field Artillery, but it is the one source on which we, as leaders, have the greatest impact. Within nearly every Field Artillery battalion there is at least one soldier who meets the entrance criteria for OCS. As with our fellow combat arms branches, we always need motivated and dedicated junior officers. To correct this shortage, "Redleg" leaders at all levels, but particularly battery and battalion commanders, should seek out those young soldiers who have the potential to be a successful officer. Below are some of the eligibility requirements outlined in AR 351-5 US Army Officer Candidate School Subscription Form:

- a. Be a citizen of the United States.
- b. Be at least 18 and less than 30 years old at the time of enrollment.
- c. Have completed at least 60 semester hours of college study.
- d. Pass the Army physical readiness test (APRT) and meet the Army height and weight standards.
- e. Achieve a GT score of 110 or higher and an Officer Selection Battery Subtest Two score of 90 or higher.

A thorough review of AR 351-5 provides complete instructions and the criteria for application.

OCS is a rigorous, demanding course that tests a leader's mettle. Unit commanders should encourage eligible soldiers to apply for OCS. We need all the junior officers it can provide.



3 *United States Military Academy Preparatory School*

The third method of commissioning is through enrollment in the US Military Academy Preparatory School (USMAPS) and eventual nomination to the US Military Academy (USMA).

Usually, soldiers apply to the USMAPS so they may compete for admission to West Point. However, they may compete directly for admission to USMA by applying for a congressional nomination at least one year before admission. If a soldier does not receive an appointment to the Academy, his only option is to apply to the preparatory school.

The success of this program depends on the interest field commanders generate in their local military community. Commanders and their staffs should identify those soldiers who have leadership potential, high ideals, good morals and other attributes demanded of officer candidates.

To be eligible under this regulation, applicants must meet the following requirements and others listed in the regulation:

- a. Be a member of the Regular Army for a Regular Army vacancy or a member of the Army National Guard or Army Reserves for a Reserve Component vacancy.
- b. Be at least 17, but no more than 21 years old on 1 July of the desired year of entrance to the Preparatory School.
- c. Be a US citizen at the time of enrollment in the Academy.
- d. Not be married.
- e. Have satisfactorily completed a college-preparatory secondary school education or its equivalent by the time of enrollment.

For more information on applications and eligibility requirements, consult AR 351-12 Nomination to USMA—Enlisted Categories, or contact the Director of Admissions, US Military Academy, West Point, New York 10996.

Wanted: Redleg Rangers

by Sergeant First Class
Thomas D. Clutter

Have you ever wondered what it would be like to be a Ranger in one of the ranger battalions? I mean, is it that tough?

What are the fitness requirements to get into a ranger battalion? If you can score 60 points in each event of the Army physical readiness test (APRT), do six chin-ups and pass the combat water survival test (CWST), you've met the minimum requirements.

Now, what schools must you attend to give you the basic technical abilities? First is the airborne school at Fort Benning, Georgia—a fairly strenuous course. After three weeks of training and five jumps, you wear the highly coveted airborne wings. After jump school, you attend either the ranger indoctrination program (RIP) or the ranger orientation program (ROP), depending on your rank. RIP and ROP are each three weeks long and basically the same. During RIP or ROP you complete a five-mile run in 40 minutes and a 12-mile road march with rucksack, load-bearing equipment and weapon. You also take another APRT and CWST and receive classes on ranger skills such as patrolling, land navigation, knot tying, rappelling, hand-to-hand combat, camouflage, etc. After completing the course, you'll wear the black beret, the distinguished headgear of the Ranger Regiment. As a Ranger you enter a whole new world of challenges.

Where will you be assigned? There are four possibilities: Ranger Regimental Headquarters or 3d Battalion, both located at Fort Benning, Georgia; 1st Battalion at Hunter Army Airfield near Savannah, Georgia, and 2d Battalion at Fort Lewis, Washington. In your assignment, you work with artillery and mortars and call for and adjust close air support, attack helicopters, AC130 gunships



and naval gunfire. Also, you aren't on the same observation point on the same hill day after day.

In the past 24 months, the 2d Ranger Battalion fire support element (FSE) has trained in Puerto Rico, Honduras, Panama, Germany, Jordan, Louisiana, North Carolina, Georgia, Arizona, Utah, Texas and California. Generally, we deploy for less than two weeks, but the training is performance intensive.

What can you expect as far as military schooling is concerned while in the Rangers? Obviously you attend the NCO educational system schools, but you also can attend schools like naval gunfire, joint firepower control, ranger, pathfinder, jumpmaster, military free fall, scuba, landing force tactical air control party, emergency medical technician and others.

So what are the bad points of being in a Ranger unit? Since we don't have many vehicles (the battalion motor pool consists of two high-mobility, multipurpose wheeled vehicles—HMMWVs), we carry everything on our backs. Also, not everyone enjoys river crossings at 0200 on a December morning, 16-mile roadmarches and "high and tight" haircuts every week.

What do we have that's special? We promote differently than the rest of the Army. If we recommend an E-4 with a Ranger Tab for promotion to E-5, he only has to have 450 points for promotion, regardless of the cutoff score for his MOS. He doesn't have to wait 90 days after we board him; he pins on his

rank the next month. An E-5 may have his time-in-service requirement for promotion to E-6 waived to 48 months.

There are many reasons people want to be Rangers. If you want to be one and can meet the standards, nothing else will do. There's something about being a part of the proud Ranger tradition.

Come and join us; we've got a new pair of jungle boots just the right size for you and a job that will never let you down. For more information, contact the 2d Battalion, 75th Ranger Regimental FSE at AUTOVON 357-7665 or 7621 or the 75th Regimental FSE at AUTOVON 835-1260 or 7896.



Sergeant First Class Thomas D. Clutter is the Senior Fire Support NCO with the 2d Battalion, 75th Ranger Regiment, Fort Lewis, Washington. His previous assignments include drill sergeant with E Battery, 4th Training Battalion, Fort Sill, Oklahoma, and a member of the Ceremonial Drill Team, Marine Barracks, Washington, D.C. He is a graduate of the ranger, airborne, jumpmaster and pathfinder schools and the joint firepower control and landing force tactical air control party courses.
