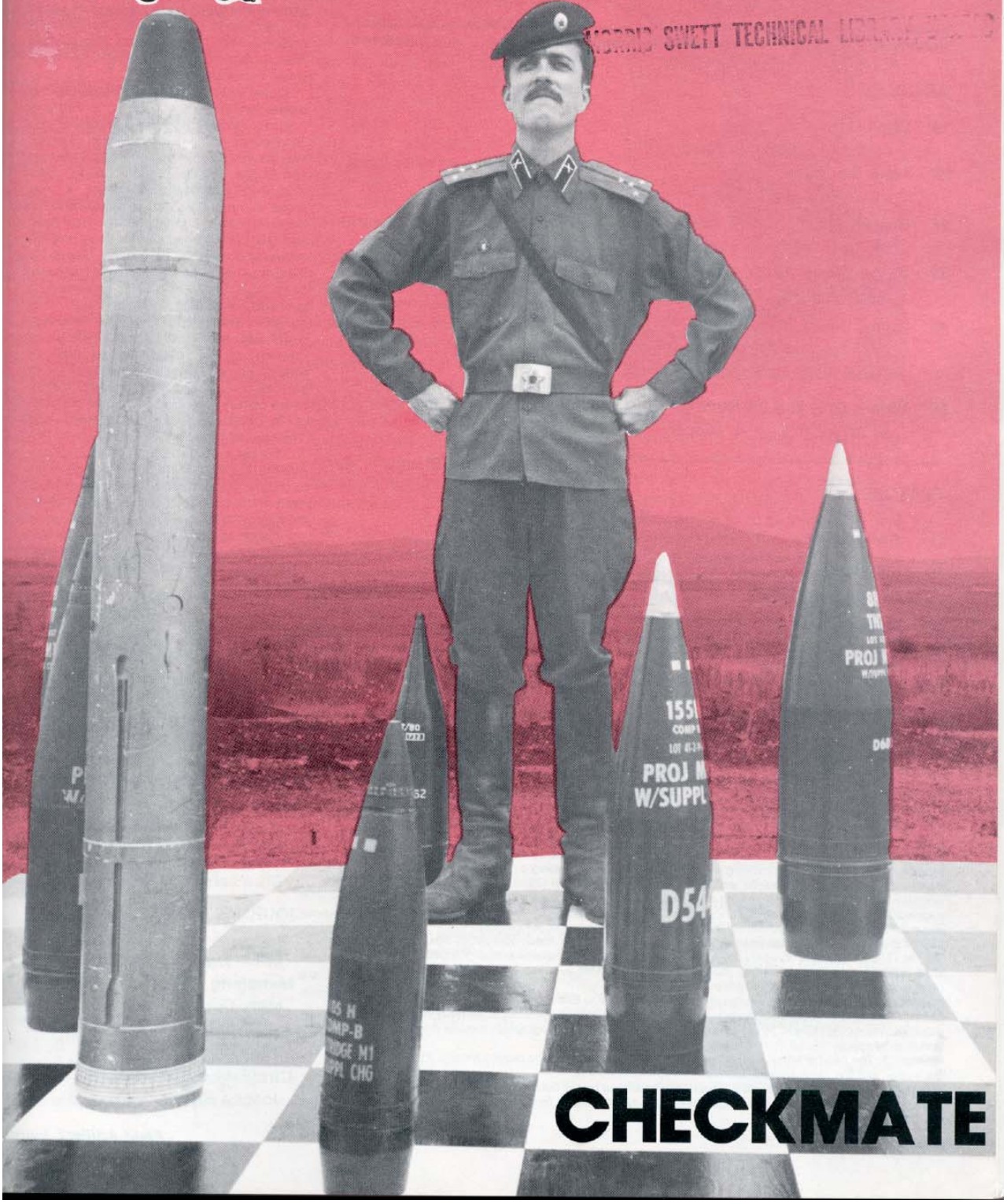
Field Artillery Journal

September-October 1984



CHECKMATE

THE JOURNAL OF FIRE SUPPORT

Volume 52 **September-October 1984** **Number 5**

ARTICLES

FEATURES

Cover photos by Sam Orr

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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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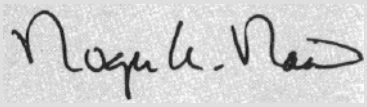
The Age of High Tech is now. From the strategic playing field of a "Star Wars" defense to the tactical chess board of Copperhead, Firefinder, and TACFIRE operations, advanced technology continues to change the way field artillerymen do business. But are Redlegs taking full advantage of the "high tech" era? In "Shell Game," MAJ Joseph Halloran advises us to play it smart, now. The only winner in the old shell game of ammunition procurement as well as in any future game on a high lethality battlefield will be the player who decides today to exploit the potential of "high tech," smart munitions.

Other articles in this issue replay this theme. In "Take the Tech" COL Anthony Pokorny surveys how modern technology has influenced the field artillery to date and how it might do so in the future. CPTs House and Hogue, in their "Doing Cueing," provide some practical suggestions on how smart commanders can win by cueing up the advanced capabilities of the Firefinder, and BG Eckelbarger shares some experiences on how TACFIRE helped "Pump Up the Umps" in Europe by making a war game come alive. MAJ Philip Millis recommends yet another smart idea that can help gunners "Bracket the Dwell Time" of enemy march columns. Finally, MAJ Robert Glacel reminds us that although the name of today's game is advanced applications of state-of-the-art systems, modern cannoneers continue to live, train, and maintain in an often frigid, unsophisticated world "Where Only the Fit Survive."

This issue reaffirms your *Journal's* commitment to the presentation of new frontiers in controversial thought. Rest assured that even in the highly complex and rapidly changing Age of High Tech, Redlegs worldwide can depend on their *Journal* to meet the challenges of providing the most up-to-date ideas and describing the hottest games in town.



EDITOR

On the Move

MG JOHN S. CROSBY

To do our job better, we need to change how and where we make crucial fire support decisions.

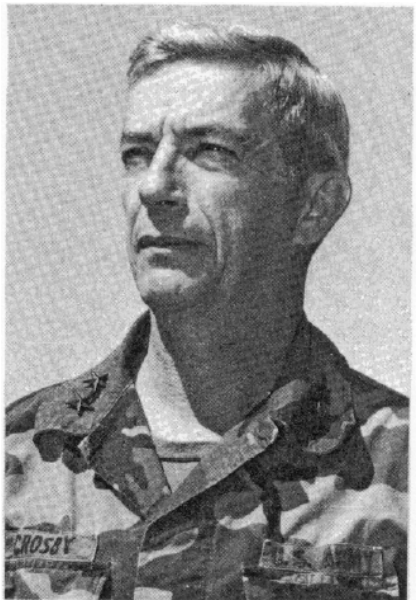
Our primary mission — the very reason for our existence as a branch—is to support the maneuver arms by fire. That means a field artilleryman's responsibilities go far beyond the narrow confines of field artillery tactics and techniques. They extend over the entire realm of fire support. We will have great difficulty accomplishing our diverse fire support tasks in the future if we continue to do business as usual by making vital fire support decisions at the field artillery tactical operations centers and command posts. To do our job better, we need to change how and where we make crucial fire support decisions.

Two aspects of modern combat make the modifying and streamlining of our command and control processes imperative. First, success in future combat will belong to the best synchronized force — the force which exerts the most overpowering, efficient, and effective combat power at the point of decision. As the fire support coordinators for the force commander, we can't synchronize fire support to best ensure the force's success if our critical decisions are made at locations distant from those of the supported maneuver commanders. Second, the rapid tempo of future battles coupled with the increasing lethality, mobility, range, and speed of the weapon systems available to both sides will allow an agile force to achieve dramatic results in a much shorter time and over a much greater distance than has been previously possible. The future battlefield will reward synchronization and agility, and that means we must move beyond the impressive capabilities of TACFIRE to achieve even greater operational flexibility.

The first step in streamlining our decision-making processes is to ensure that we make our decisions at the correct locations. The critical aspects of planning, coordinating, and controlling the use of all fire support assets must be accomplished by the FSCOORD at the maneuver headquarters to ensure that fire support works in harmony with maneuver. The requesting and tasking of sensors as well as the correlation of target data also has to take place at the maneuver headquarters because many of our targets will come from other than field artillery sources. Furthermore, the general planning for field artillery operations requires co-location of the FSCOORD and the maneuver commander if it is to be supportive of the scheme of maneuver and overall fire support plans. Only the details of field artillery tactical, technical, and sustainment operations need be handled at the field artillery TOCs.

The second step in improving our decision-making processes is to provide the resources to each FSCOORD so he can perform those critical functions at the maneuver TOC with the maneuver commander. Today's fire support officer in a brigade or battalion fire support element has virtually nothing automated to assist him in his far-ranging responsibilities. He has only a variable format message entry device (VFMED) which allows him to put information into TACFIRE and receive data back. He can perform neither the crucial coordination nor the planning he must accomplish quickly and independently of the central TACFIRE computer. Moreover, field artillery commanders, fire support team chiefs, and fire support officers need some way to keep abreast of the fire support situation and to make adjustments as necessary as they travel with their supported maneuver commander. Today, they simply do not have that ability.

The third and most important step in revitalizing the fire support decision-making process is to emphasize the



importance of our role as fire support coordinators. Division artillery and direct support battalion commanders must be at their supported maneuver headquarters at those critical times when important fire support decisions are made. In fact, I would suggest that our FA commanders should spend more time at the maneuver TOCs than they do at their own TOCs. This step also means that we must practice in peace what we will do in war: put "battery command experienced" fire support officers with our maneuver units. Fire support officers, from fire support team chiefs to assistant fire support coordinators at corps artillery, must be highly competent, well-practiced professionals who understand all of the nuances of fire support and maneuver and who can seize the initiative when opportunity knocks.

The steps I have outlined describe how we at the Field Artillery School are moving to improve command and control and thus enhance the responsiveness of fire support. The on-going Close Support Study Group III is examining many of these issues in depth. We intend to make some detailed recommendations in the near future, but we need your input. Only with your help can we meet the challenge of providing streamlined, synchronized fire support.

Incoming

LETTERS TO THE EDITOR

Speak Out
The *Journal* welcomes and encourages letters from our readers. Of particular interest are opinions, ideas, and innovations pertinent to the betterment of the Field Artillery and the total force. Also welcomed are thoughts on how to improve the magazine.—*Ed*.

Leadership training

As an Infantry officer stationed at Fort Sill and a new reader of the *Field Artillery Journal*, I could not help but notice that many of your articles are concerned with gunnery and the more technical aspects of the field artillery. While the aforementioned topics are important, I believe that some time and thought should be devoted to the subject of leadership.

During the last three months I have had the pleasure of working with an NCO whom I consider to be a most excellent leader. Sergeant First Class Danny R. Hubbard is the senior drill sergeant for my battery and was selected as Fort Sill's Drill Sergeant of the Year. Anyone who talks with Sergeant Hubbard will quickly learn why he is held in such high esteem — he is intelligent and articulate and possesses a personal leadership philosophy which many of us would do well to emulate. Accordingly, I submit the following comments from Sergeant Hubbard. While his remarks are oriented toward the NCO corps, I believe that he offers good sound advice for leaders at any level.

Today's Army is far more complex than in previous years and requires a well-trained force. The noncommissioned officer corps must meet the challenge of training qualified soldiers to man today's sophisticated equipment. In order to train soldiers, the NCO must be proficient in not only the basic soldier skills, but also in his technical specialty. The section chief must be both tactically and technically proficient and fully committed to training and developing his subordinates. Some of the key attributes for good leadership are to set the example; to give 100 percent to your unit and its soldiers; to be honest and truthful (otherwise known as integrity); to train *hard* but *fair;* to educate your subordinates not only on their job, but also on the responsibilities of their superiors; and to be available to your subordinates to provide help, not only in duty matters, but in all things.

Finally, it is important to remember that good leadership is demonstrated more by what your subordinates do while you are away, than by what they do while you are present.

Kevin A. Leonard
CPT, IN
Fort Sill, OK

Training and the noncommissioned officer

Most senior noncommissioned officers (NCOs) are adequately trained to perform in their MOS; however, many are not adequately trained to perform their primary tasks of training and leading soldiers. Section-level performance and individual proficiency are not what they should be, and the first-line supervisor is one of the principal reasons why. All of us, however, must share the blame and must accept the fact that we all have a key role in reversing the situation. The training problem, as I see it, is focused on education, experience, and environment.

Education is a threefold problem. First, many noncommissioned officers and commissioned officers do not understand exactly what their respective roles are in training. Second, training doctrine developed by the US Army Training and Doctrine Command (TRADOC) is currently being taught at service schools but has not been fully implemented in the field. Finally, noncommissioned officers expect the training center graduate to be fully qualified when he is assigned to a unit.

Officers must understand the role of the NCO in training well enough to let the NCO do his job and to insure that he does it correctly. The role of the noncommissioned officer has changed and is still in the process of changing. FM 22-600-20, *The Duties, Responsibilities, and Authority of the Noncommissioned Officer,* represents Armywide input and is an excellent guide for both officers and noncommissioned officers.

The first-line supervisor — the NCO at the section, team, or squad level — is responsible for the training of the individual soldiers in the skills set forth in the soldier's manual and also the non-MOS soldier skills such as dismounted drill, military courtesy, protocol, and supply discipline.

The platoon sergeant ensures that the first-line supervisors are doing their jobs, which of course, is training their subordinates. The first sergeant supervises the platoon sergeants and first-line supervisors in their training of individual soldiers. The command sergeant major is the principal training supervisor of *all* NCOs, whether they are first sergeants, platoon sergeants or first-line supervisors. Even though this is TRADOC doctrine, it has not necessarily been fully implemented; in fact, there is a gap between what is taught at service schools and what actually is implemented in the field.

Some officers and NCOs expect the soldiers coming to their units from the training centers to be thoroughly trained; the fact is that a graduate of advanced individual training knows only about one-third of the tasks he needs to know to be fully qualified at skill level 1. A noncommissioned officer who has no idea of the actual skills of his subordinates obviously has a problem in determining what training is necessary.

Experience is an important factor since E4s fill E5 jobs, E5s stand in for E6s, and so forth on up the line. A successful training program requires experienced first-line supervisors to train their subordinates; an inexperienced young soldier with three years or less in the Army, who has not even attended a primary or basic NCO course, cannot be expected to perform this difficult mission.

The lack of time to train the trainer is a real problem. In many units today, there is no time made available to get NCOs together to train and develop skills to make our first-line supervisors effective trainers. To solve this problem, platoon sergeants and first sergeants must demand the time for training trainers; and commanders and S3s must ensure that individual training gets a fair share of the time available.

In many units, there is a tendency to assign the extra duty jobs at a higher than necessary grade level. Many section chiefs are given extra duties which could be accomplished by an assistant section chief or another subordinate under the chief. Extra duties must be performed on a "selective neglect"

basis; that is, the NCO who has been assigned extra duty must selectively neglect his primary duties in such a way as to perform his extra duties when he can most afford the time to be away from his section. There are some NCOs who will take an additional duty and make it a full-time job, and there are some commanders who will allow them to do it.

Another environmental factor is what I call the battery commander's dilemma. In most instances, an officer assuming command of a battery has 12 to 18 months to prove himself. He must prepare for, and successfully complete, an ARTEP and numerous other requirements not directly related to individual training in order to succeed. What is important in his success as a battery commander may not enhance individual training or NCO development. The perception of the NCOs to whom I have talked is that collective training requirements at battery level and above receive far greater emphasis in troop units than do individual training requirements.

If we agree that individual training is one of the most important keys to battlefield success, we better start putting it on a par with all the other top priorities we are juggling right now. Commanders, not sergeants, set priorities for units; but NCOs, especially senior NCOs, have the responsibility to let their commanders know what needs to be done in the area of individual training because individual training is primarily an NCO responsibility. Commanders must consider this NCO input when setting priorities for allocating time and resources for training. First sergeants tell battery commanders, who tell S3s; and, just to make sure, command sergeant majors tell battalion commanders and S3s.

The field grade squad leader syndrome — oversupervision — is another problem. If the battalion commander runs his batteries, those battery commanders will have a tendency to run their platoons, and so on down the line. This oversupervision still takes place all too often; and it must be avoided at all costs in order to allow NCOs to do their jobs, even if it means that they will make mistakes.

The next problem is resistance to change. The battalion commander or S3 who views the command sergeant major as being primarily responsible for such menial tasks as police calls and office administration are not going to be overly enthusiastic when the command sergeant major starts to talk about what needs to be done in the area of individual training within the battalion. AR 600-20 and FM 22-600-20 tell the Army what NCO duties and responsibilities are; most NCOs would just like to get on with it and get things accomplished.

The last problem area is the failure to send eligible NCOs to school. We have a good education system which continues to get better. However, some units do not send NCOs to school because the unit cannot spare them. How many "indispensable" NCOs miss the opportunity to attend a primary or basic leadership course because of this rationale.

In conclusion, we need to use our education system to the fullest extent. We must give the noncommissioned officers the authority and responsibility to do their jobs and, therefore, gain experience. If we do not create an environment that will allow them to get the experience, then many of the problems in training the NCOs will continue.

D. R. Hamilton
CSM, USA
Fort Sill, OK

Definition of leadership

Just prior to leaving my command of A Battery, 2d Battalion, 37th Field Artillery, I wrote the following letter to my noncommissioned officers. Even though it may not contain anything new, I feel some might benefit from the thoughts it contains.

Ask soldiers what their definition of leadership is; and their answers will, of course, vary. Some will be complex; others, simple. In the January 1983 issue of *Commander's Call*, the definition of leadership was narrowed down to three short words: "be," "know," and "do."

• *Be* — Be all that you can. This phrase is overworked, but it expresses the true meaning of the word "be." You must strive daily to be a good soldier and never pass up the opportunity to accept responsibility, especially that which comes with leadership. Promotion and recognition are the results of accepting responsibility and doing a job well. Unless NCOs strive to do their best, they cannot expect the soldiers to strive to do their best. When NCOs set the example and continue to strive for perfection, then, in all but a few cases, soldiers will do the same.

• *Know* — Know what? Know everything? Not necessarily, but the NCO must know everything he needs to know about soldiering. He or she cannot effectively lead without the basic knowledge that leadership requires. This means being proficient in the MOS requirements for your rank. It means reading books, magazines, publications, or regulations that will enable you to perform your job better, even if it has to be done on your own time. Know your people; know what makes them tick; know what motivates them; and know what causes them to perform their best. Each soldier is different and must be handled differently; therefore, you must know your soldiers in order to lead them effectively. Lastly, know yourself. Know exactly what you are capable of doing; never set impossible goals, but never settle for anything less than your best effort.

• *Do* — This word means doing what has to be done even though you would rather not do it. It correlates closely with the word "duty." In relation to the NCO, duty means that there are specific tasks, standards of conduct, and functions that are demanded of you because you are an NCO. The NCO sets a moral example for the soldiers, which often means accepting the harder right rather than the easier wrong.

In short, leadership entails being all that one is capable of being, not only for the sake of the Army but, more importantly, for one's own worth and self-esteem. It means knowing all one has to know to get the job done. Lastly, it means doing what has to be done no matter how much time or energy has to be expended and always doing what one knows to be right.

Robert M. Hill
CPT, FA
Fort Sill, OK

Thanks for sharing your thoughts on leadership. The doctrinal definition of the be-know-do philosophy of leadership appears in chapter 2 of FM 22-100, ***Military Leadership,*** *dated October 1983. The framework for "be" is being committed to the professional Army ethic and possessing professional character traits. The framework for "know" is knowing the four factors of leadership and how they affect each other: knowing yourself, knowing human nature, knowing your job, and knowing your unit. The framework for "do" is providing direction, implementing, and motivating. When senior battery-level leaders teach and coach the junior leaders within those frameworks, they increase significantly the likelihood that victory will be ours on the next battlefield. — Ed.*

An issue worth discussing

Captain John L. Hensley's article ("A Fly Paper," May-June 1984 *Field Artillery Journal)* covers a subject which rates a great deal of attention — namely, the coordination of airspace to

enable us to use effectively all fire support assets in support of the maneuver forces while providing some relative safety to our Air Force personnel and equipment. This issue cannot be taken for granted or discussed too much.

Captain Hensley's article conveys, however, the impression that the brunt of airspace coordination is conducted at the battalion level. Totally ignored are the contributions and responsibilities of higher echelons — the division airspace management element and the corps airspace management element — and the coordination which takes place between the tactical air control party and fire support personnel at higher levels (brigade to corps).

I was also dismayed at his somewhat casual treatment of a formal airspace coordination area, the doctrinal purpose of which is to allow us to attack targets in close proximity with a variety of fire support means, one of which is close air support. The formal airspace coordination area provides the time and lateral separation which his article seeks. In fact, his "target box" is actually an airspace coordination area in reverse — that is, it restricts the aircraft and its flight path, but not the projectiles and their trajectories. The airspace coordination area should be the air liaison officer and fire support officer's foremost tool for coordinating the use of airspace.

Captain Hensley relies heavily on gun-target line avoidance. He states, however, that split-battery operations, hipshoots, and shifts of more than a few hundred meters pose significant problems. But, in making this statement, he totally ignores the fact that artillery is most effective when the fires of several batteries or battalions are massed. Also ignored is the artillery's ability to shift and mass fires rapidly over the entire battlefield. Trying to keep all A-10 pilots aware of each and every fire mission in progress would encumber not only the pilot, but also the air liaison officer and fire support officer.

I must also take umbrage with Captain Hensley's contention that the issue of safe separation has been ignored because "who cares we haven't shot one down yet." Army and Air Force schools have discussed this problem a great deal. Many units actively conduct exactly the type of coordination of indirect fire and close air support which Captain Hensley recommends for command-post and live-fire exercises (safety regulations permitting). I think he has been far too parochial in his treatment of the subject.

Vincent R. Bielinski
CAPT, USMC
Fort Sill, OK

"A Fly Paper"

Captain John L. Hensley's article ("A Fly Paper," May-June 1984 *Field Artillery Journal)* was interesting and should provoke some thought about simultaneous fires. It should be noted that with the advent of the battlefield coordination element (BCE), Army and Air Force fires beyond the fire support coordination line should be much better coordinated. Although real time information for the pilot will still be a problem, the BCE and tactical air control center coordination process will provide the pilot more pertinent information on Army maneuver plans and fires before he takes off.

John P. Heffernan
COL, USAF
Fort Sill, OK

How fast is the FISTV?

I recently read articles which stated that the M1 Bradley fighting vehicle has a 500-horsepower diesel engine which can power the vehicle to 41 miles per hour (mph) on roads and 31 mph cross-country. The authors of these articles expressed their happiness over the Bradley's superior speed and mobility as compared to the M113 and M901. My questions are concerned with the FISTV's mobility as compared to that of the Bradley.

- What kind of an engine does the M981 FISTV possess?
- Can the FISTV (on paper) keep up with the Abrams and Bradley vehicles of our maneuver commanders?
- Has a test been conducted to *ensure* that the FISTV can keep up?

I have spent six years in the Field Artillery as a 13F — three of these have been as a company-level FIST chief due to a shortage of officers. One of the concerns which my maneuver commanders have expressed to me is: "Can you keep up with me?" Back when FIST started, many mechanized infantry FISTs were equipped with 1/4-ton vehicles which could not go where the tanks and tracks could go. As a result, many FISTs were left behind at the company trains, and hence the FIST chief could not observe the battlefield and could not effectively coordinate among the commander, the platoon leaders, and the forward observers. If the FISTV cannot keep up with the maneuver troops, I foresee the same problems recurring.

Gordon G. Rick
SSG, USA
APO New York

I consulted subject matter experts from the School's Weapons Department and Tactics and Combined Arms Department. It appears that concerns such as yours have surfaced frequently since the initiation of the FIST concept. The current FISTV, which is basically an M113A2 vehicle with improved suspension, electrical, and cooling systems, does enable the FIST to support maneuver units equipped with the Abrams and Bradley family of vehicles so long as its position is planned with a full knowledge of the scheme of maneuver. Nevertheless, the 1980 study by Close Support Study Group II recognized that the FISTV's reduced mobility and distinct signature was reason enough not to continue it past its 15-year life cycle. After that time, it will be replaced by a FISTV based on the chassis of the Abrams and Bradley family of vehicles. In the meantime, the School is supporting the addition of the RISE Power Pack to the current FISTV. This addition is not yet funded; but, if it were applied to the FISTV, it would provide the current FISTV a mobility close, if not equal, to the mobility of the Abrams and the Bradley.

A 1983 study by the Infantry School showed that FISTV cannot keep up with the M1 or M2/M3 in a cross-country race. But it will not always need to travel cross-country if it is positioned on the battlefield to optimize the support provided to the maneuver commander. For example, the FIST chief could occupy an overwatch position from which he could be both a fire support coordinator and a shooter. Given the necessity of a stationary FISTV for adjusting indirect fire and for laser locating and designating, effective positioning is especially crucial.

An upcoming conference on field artillery mobility will address FISTV mobility concerns in some detail — Ed.

FOs in M2 Bradleys

Second Lieutenant Warren R. Starr's letter to the editor ("FIST and the Bradley fighting vehicle," July-August 1984 *Field Artillery Journal*) recommends eliminating the platoon forward observers in the mechanized infantry because they cannot adequately execute indirect fire missions while buttoned-up in the M2 Bradley fighting vehicle. Lieutenant Starr states that the track commander, who is normally positioned in the cupola of the vehicle, should be the person to conduct these missions and that the field artillery should train him in the correct procedure. (I should note that

the platoon leader is normally a track commander in an M2 unit, but he is not normally a track commander in an M113 unit. Instead, the platoon leader in an M113 unit usually stands in the rear deck hatch with the forward observer.) In any event, I recognize Lieutenant Starr's concerns; but I disagree with his conclusion.

First of all, the forward observer in a unit equipped with M2s will not always be mounted. In most defensive situations, the entire platoon will be dismounted and dug-in. Then the forward observer will be able to accomplish all his missions. In offensive situations in urban terrain or in heavily wooded areas, the infantry will usually be dismounted; and here again the forward observer will be able to accomplish his mission.

Secondly, in situations where the forward observer cannot be dismounted, I think these points need to be made:

• If the M2 is to be used as a platform for the conduct of an indirect fire mission, the track commander and driver must work in concert with the forward observer. The platoon leader must decide as the tactical situation dictates whether to employ the M2 as a fighting element, thus using survivability movement techniques and all organic weapons systems capabilities, or to employ the M2 as a platform from which to allow the forward observer to conduct an indirect fire mission. In the latter case, the track commander and driver must ensure that movement techniques and the position of their vehicle maximize the forward observer's ability to bring effective fires onto the target.

• In those instances in which the track commander must employ indirect fires while on the move and buttoned-up and the forward observer cannot dismount to adjust, the track commander must relay his requirements to the forward observer inside track. The forward observer will then conduct the mission over the appropriate frequency and keep the track commander posted on its execution. This situation currently exists even in M113-equipped units if the platoon leader and forward observer cannot stand up in the rear deck hatch. The platoon leader normally becomes the track commander and makes the same decisions as the platoon leader in the M2 unit, and this flexibility should be viewed as an asset to the platoon.

• The situation in which forward observers are not in position to engage targets while the vehicle is buttoned-up should be examined further. Using standard movement techniques, platoons oriented on a single mission should be able to support each other. While one platoon may be involved in rapid movement, the others may be providing overwatching fires using both direct and indirect assets.

In summary, I feel that the answer to Lieutenant Starr's observations is not the elimination of the platoon forward observer; rather, the Field Artillery School must gather credible data from a variety of sources. Instead of allowing field units to alter the FIST doctrine as they deem appropriate, we must insist that commanders in the field work with the existing deployment options and allow for field input to improve these options as new equipment is fielded.

Stuart G. McLennan, III
CPT, FA
Fort Sill, OK

Copperhead target priority

I would like to comment on Major Joseph C. Antoniotti's article, "Snake Charmers," in the May-June 1984 *Field Artillery Journal.*

• In regards to Major Antoniotti's discussion on Copperhead target priority, I submit that at this time there is no set target priority scheme for Copperhead engagement based on any analytical data. The bottom line is that the target priority for Copperhead is established by the maneuver commander based on the tactical situation; i.e., a BRDM with a Sagger would have priority in a breakthrough operation, whereas the threat's field artillery would have priority in a counterbattery situation.

• Copperhead will not be fired in the manner described by Major Antoniotti in the manuscript — that is, "platoon one round." With only one ground/vehicle laser locator designator (G/VLLD) per FIST, the FIST chief will be able to designate for only one Copperhead round at a time. In order that the designator operator have time to redesignate his target or to shift to another target in the *same* Copperhead footprint, Copperhead rounds will be fired at 20-second intervals. If one had another G/VLLD (if, for example, there was a separate observation lasing team in the same area), two Copperhead rounds might be fired at the same time from two different platoons or maybe even two different batteries.

• Major Antoniotti has described one eight-gun battery system of allocation. Why not take full advantage of Copperhead's potential and responsiveness and have the eight-gun battery laid on four priority targets at one time? By doing this we have increased responsiveness by 50 percent.

Copperhead is here, and it is time we started realizing its full potential.

Jeffrey C. Carter
MAJ, FA
Fort Sill, OK

Employment of Copperhead

The article "Snake Charmers" (May-June 1984 *Field Artillery Journal)* was extremely interesting and thought-provoking. As Major Antoniotti suggests, it is indeed time that we begin to take a hard look at the most effective manner in which to employ this precision guided munition. The recent Fire Support Team Force Development Test and Experimentation held at Fort Riley, Kansas, in March 84 may have surfaced for evaluation many of the employment concerns addressed by Major Antoniotti, to include the types of targets for Copperhead attack, the maximum number of rounds to fire at a target(s), the use of Copperhead in combination with other munitions, and the possibility of having dedicated platoons and forward observers for Copperhead missions.

Major Antoniotti's concern that current doctrinal guidance specifies as a hard and fast rule that a limit of six rounds will apply regardless of the number of targets acquired in a preplanned footprint is not exactly the case. FM 6-20 indicates that this limit of six is a guide only. This limit could be increased if the primary parties concerned in the fire mission process determined an increase was necessary.

The author perceives that the Field Artillery Community's mind-set is that Copperhead is solely a tank destroyer. FM 6-20 and draft FM 6-20(J) indicate that other target categories should be considered for Copperhead attack. Caution and common sense must prevail in the use of this ammunition, however, because Copperhead will comprise only three percent of a direct support field artillery battalion's basic load (approximately 180 rounds) and because a single round now costs approximately $35,000. Clearly, the key for success in this critical area depends on fire support coordinators who fully understand Copperhead capabilities and who are well trained in selecting high payoff targets for attack by this precision guided munition.

Major Antoniotti's employment and allocation method of identifying primary and secondary firing platoons (and related forward observers) to fire

the Copperhead missions will need to be scrutinized. The inference is that such a method would provide maximum flexibility and effectiveness. There are some disadvantages, however, that should be considered. The proposed allocation of Copperhead rounds suggested results in 75 percent of the total battery rounds (50 in his example) being placed in the primary platoon (approximately 38 rounds). Consistent firing of Copperhead missions by the primary platoon howitzers could possibly result in easier detection by enemy counterfire and loss of the majority of the Copperhead basic load. Additionally, the field artillery ammunition support vehicle (FAASV) is scheduled for deployment in USAREUR in 1985. It is designed to carry three Copperhead rounds. With the two rounds of Copperhead carried by each howitzer section, a firing battery will normally carry 30 rounds. The author's allocation method could still be made to work, however, by reducing the number of conventional propellant charges in the FAASV or by utilizing a 1 1/2-ton trailer pulled behind the FAASV to carry powder or Copperhead ammunition. Lastly, the identification of primary and secondary firing platoons could limit the displacement flexibility required to support certain maneuver phases.

Taft Joseph
Fort Sill, OK

Casting at Copperhead

Major Joseph C. Antoniotti's article, "Snake Charmers," (May-June 1984 *Field Artillery Journal)* is intended to develop dialogue on methods of employing Copperhead. Such open discussion by members of the military can only improve the utilization of new weapons systems and munitions; and, in keeping with Major Antoniotti's principle of open discussion, I would like to make the following comments.

• Major Antoniotti assumes that a single pair of howitzers is the largest number of guns which would normally be diverted for a Copperhead mission. Normally all guns will have Copperhead rounds; and, in an eight-gun battery, there may be a maximum of four Copperhead priority targets (one for each pair of guns). Copperhead priority targets will normally have priority over any type of conventional missions. The commander may designate a specific battery, platoon, or pair of guns to fire Copperhead missions; but such a decision would severely degrade Copperhead capabilities if it were made on a routine basis.

• Major Antoniotti indicates that Copperhead might follow a remotely piloted vehicle mission. But the current thinking (subject, of course, to the maneuver commander's discretion) is that the remotely piloted vehicle will not normally be dedicated to support the field artillery to any great extent. Assets such as air, naval gunfire, and intelligence reconnaissance will play a greater part in the employment of the remotely piloted vehicle.

• It is not tactically sound to use Copperhead in combination with dualpurpose improved conventional munitions. A clear line of sight is crucial for the employment of Copperhead, and a coordinated mission of the type Major Antoniotti suggests could obscure or mask the targets in question. Major Antoniotti himself worries about such obscuration in another part of his article.

• Major Antoniotti is correct to support the development of employment doctrine for a projectile such as Copperhead. But the employment doctrine must evolve from the maneuver commander's needs, not from the projectile capabilities. Draft TC 6-30-1, which appeared in April 1982, evolved from maneuver commander needs and is the real start for the dialogue Major Antoniotti wanted to initiate.

Robert Harrison
SFC, USA
Fort Sill, OK

Reading between the lines

I am neither a field artilleryman nor an expert on the tactics, strategies, or logistics of an extended field artillery action. I am, however, a veteran of the Vietnam conflict and a concerned member of the combined arms team. Captain John Hamilton's article *Coup de Grace* in the January-February 1984 *Field Artillery Journal* is thought-provoking in the area of field artillery tactics and survivability. Also, it is quite interesting that Major General Crosby's call for ideas from the field should appear in the same issue. General Crosby requested that all senior commanders come to the Senior Field Artillery Commanders' Conference prepared to address survivability. I hope these commanders have first read between the lines of Captain Hamilton's article and then balanced their experience with the reality encountered in a high-intensity conflict.

In the Battle of Khe Sanh, with an inexhaustible supply of ammunition (because everyone else was not decisively engaged) and with awesome quantities of strategic and tactical Army, Navy, and Air Force support (because there was no antiaircraft fire to speak of), US forces managed to defeat a numerically superior (?) albeit less technically equipped (?) force. Let's read between a few of the lines:

• Captain Hamilton writes that "North Vietnamese Army (NVA) rockets were launched . . . so that they could be fired at the long axis of the combat base." Do we do this?

• "...guns were heavily camouflaged and protected." Are we protecting our guns in our training?

• "NVA emplaced the 120-mm mortars in tunnels at the precise direction and elevation to hit one specific target." This technique can be applied to crossroads, bridges, and water points. Are we practicing it?

• "Constant dust and shock effects caused serious maintenance problems for . . . communication and radar equipment." Both the Soviets and the US field artillery now have increasingly complex and sensitive electronic equipment. Are our field artillery units training to be able to handle these maintenance problems?

• " . . . communists did most of their maneuvering at night . . . ." Are *we* training that way?

The large numbers of aircraft in the area of Khe Sanh were a luxury we will not have next time. The Warsaw Pact has fielded 7,900 antiaircraft guns, while the US Army and Marine Corps have only 600 to spread over the entire globe. What are the prospects of available air assets in the future? US aircraft at Khe Sanh were restricted largely to daylight operations. Will it be different in the future? Are our fire support coordinators training to bring in close air support at night? I am one of those pilots who flew night gunships; it was very lonely and scary, and that was without the worry of radar-controlled antiaircraft guns or man-portable air defense missiles.

Maybe the Field Artillery Community is already thinking the way the NVA had to. I hope Redlegs are taking advantage of the tactics and techniques suggested by Captain Hamilton's article on the Battle of Khe Sanh.

Joseph R. Finch
MAJ(P), IN
APO New York

"Who fired first?" (Part II)

I thoroughly enjoyed the article. "Faithful and True," by Captain John A. Hamilton, Jr. (March-April 1984 *Field Artillery Journal).* Being a history

buff, I would like to add something on the background of the 5th Field Artillery. On 7 January 1861, a field artillery battery was activated at West Point, New York, under the command of Lieutenant Charles Griffin and sent to Washington, DC, for duty in the Civil War. The West Point battery, which was officially designated as Battery D, 5th Field Artillery, served with distinction from Bull Run to Appomattox and remained as part of the 5th Field Artillery after that war.

But now the *piece de resistance:* For historical accuracy, I submit that the first round fired by American artillery in World War I was fired by Battery C, 6th Field Artillery, at 0605 hours on 23 October 1917 with Captain Idus R. McLendon commanding. The piece, which is now in the museum at the United States Military Academy at West Point, was in position east of Bathelemont in the Luneville sector of France.

The motto of the 6th Field Artillery is *Celer et Audax* (Swift and Bold). The artillery regiments of the First Division (later called the 1st Infantry Division) were the 5th, 6th, and 7th Regiments. The 5th Regiment had 155-mm howitzers, and the 6th and 7th Regiments had French 75-mm guns.

Numa P. Avendano
COL (Ret), FA
Lawton, OK

The Center of Military History is aware of the claims of both the 5th and 6th Field Artillery Regiments, but informs me that "At this time, there is no way to substantiate either claim." — Ed.

A critique

The *Journal's* appeal since its reestablishment in 1973 has been tremendous. Historic articles primarily capture my interest, possibly because of my experience as an infantryman in the 29th Division during World War II. There I developed a special respect, as well as admiration, for the artillery.

I became quite involved in 19th century ordnance while participating in a reactivated Union battery in 1960 (Loomis Battery, First Michigan Light Artillery) and have since obtained and restored a 3-inch ordnance rifle and its limber. As a future project, I hope to locate and restore one of those venerable old French 75s.

The brief "Right by Piece" feature on the Nebraska National Guard Half-Section in the March-April 1984 issue dealing with the 1-168th Field Artillery leaves me somewhat disturbed over its inaccuracies. Permit me to elaborate.

First, the 6-pounder is not and never was a Napoleon. That stately old designation was for the model 1857 light gun-howitzer which was a 12-pounder. Next, a true 6-pounder has a 3.67-inch bore, not a 3-inch bore as stated in the article. Also the 6-pounder had a maximum range of 1,525 yards for solid shot, while the spherical case had a maximum range of 1,200 yards. This data can be verified in the manual, *Instructions for Field Artillery,* published in 1863.

The gun's carriage and limber appear to be an attractive replica; however, the wheels are much too small and appear to be the type commonly used on farm wagons. The gun wheel's diameter should be 57 inches, thus reaching to an average man's shoulder. Limber wheels should be identical to the gun wheels. The wheels on the Nebraska National Guard's Half-Section limber are even smaller and barely reach a man's waist.

Now, in serving the gun, a misfired primer is removed in a special procedure, not to disarm the gun as stated, but to replace the primer for another try. In reference to the duties of the number one cannoneer: a sailor *swabs* a deck, but a number one cannoneer *sponges* the bore! It is the number *four* cannoneer who pulls the lanyard, not the number three cannoneer. Briefly, his duties involve "thumbing the vent" and traversing the piece with the handspike upon the gunner's signals. These procedures are set down in the above-mentioned manual on pages 107 through 117.

Please view this critique as an honest desire to show that the *Field Artillery Journal,* as a valued source of factual and professional information, should avoid perpetuating any misinformation. You are the authority on field artillery and the touchstone of Redlegs everywhere.

John Hooper
Josua, TX

*I appreciate your close reading of the **Field Artillery Journal;** and so, by the way, do the Redlegs of the 1-168th FA, Nebraska Army National Guard. You will no doubt find their comments concerning your critique quite interesting.*

- *The Half-Section is, as the "Right by Piece" feature indicated, a volunteer, non-profit organization which is still a fledgling in the business of historical re-creation. Funds are hard to come by, and so the purchase or fabrication of carriage and limber wheels of the proper size has had to await a future date.*
- *These Redleg volunteers have been told that the US Army/State National Guard in Nebraska used an 1831/1841 six-pounder Napoleon gun during the Indian Wars. Therefore, when they purchased the tube from South Bend Replicas, they asked for and allegedly received a Napoleon six-pounder 1841 model.*
- *When a member of the Half-Section briefs the audience during a demonstration, he always qualifies the cited ranges as "approximate, depending on charge and shell."*
- *The Half-Section crew inserted the word "disarm" into the text of its presentation in order to reassure responsible officials in rodeo arenas that an unsafe act which could cause injury to innocent bystanders would not be allowed to occur. As you suggest, the crew is trained in replacing primers which have misfired; but to call the procedure by the term "disarm" served to allay the fears of concerned civilians.*
- *The cannon drill adopted by the Half-Section does not match that described in the 1863 manual, but it does match the recommended drill proposed by the National Park Service as the best "safe" drill for use in these demonstrations. By the way, when the drill conflicts with the drill described in the manual, the Half-Section ensures that the audience understands the difference.*

What is truly encouraging — both in the efforts of the 1-168th FA and in your attention to detail — is the desire of today's Field Artillery Community to preserve its heritage. — Ed.

Hot spot feedback

Captain Robert D. Lewis ("Logistic hot spot support," March-April 1984 *Field Artillery Journal)* correctly points out that to do his job, the S4 must receive the requirements of those he supports far enough in advance to allow him to react. Too often, the S4 or his representative is forced into a reaction mode — sitting in the combat trains with a POL tanker and a half dozen ammo trucks and waiting for the next battery's call. This procedure works in training with constrained consumption rates; but, in combat the anticipated consumption rate of ammunition alone would doom it to failure. Captain Lewis is telling us that one of the reasons for the success of his technique is the involvement of the S3 and the battery commanders in stating requirements in a sufficiently timely manner so that the S4 can plan for these needs — this point deserves particular emphasis. He makes some other points worthy of mention too:

- This hot spot technique could be

used to support platoon movement schemes just as easily as it supports battery movements.

• The conditions which make this technique entirely workable in one situation may demand its modification in another. For example, the consumption rate of ammunition (estimated to be approximately 350 rounds per tube per day in a mid-intensity European war) will require several resupply operations. Even with this consumption rate, the main elements of Captain Lewis' technique would work if batteries sent M548s and other vehicles to pick up those new supplies for the guns. The possible combinations are endless. The keys to success are attention to detail, planning, training, and the involvement of commanders and their staffs.

John Pedersen
MAJ, FA
Fort Sill, OK

Battery-level maintenance program

The Army is serious about maintenance, and so is the field artillery. New battery commanders quickly learn that there are countless inspections and assistance visits which evaluate a battery's maintenance program and that the effectiveness of that program will be one of the measures of the success of that person's command. I would like to offer some thoughts on how a battery commander can establish a successful maintenance program.

The first objective for the new commander is to assess his battery's maintenance operations. DA Pamphlet 750-1, *Organizational Maintenance Guide for Leaders*, is an excellent reference for inspecting both equipment and maintenance operations and gives the commander a good place to start. Other valuable references are the operator technical manuals for the battery's equipment, the *Maintenance Management Update*, and the *Unit Supply Update*. The battalion maintenance technician and the battalion motor sergeant can turn their experience to the new commander's advantage by observing the battery's maintenance operations daily and advising the commander on the strengths and weaknesses of operator and crew maintenance as well as the operations of the maintenance section. They can also judge the ability of the motor sergeant both as a technician and as a manager and comment on the unit's adherence to The Army Maintenance Management System (TAMMS).

The battery commander should first focus on assessing operator and crew maintenance by conducting an unannounced "maintenance muster," which is an inspection of unit vehicles and their operators. The battery commander should —

• Check the license (SF 46) of each operator to insure that it is up-to-date and is appropriate for the vehicle the operator is driving.

• Check for the presence of the -10 technical manual and lubrication order for each vehicle.

• Conduct a layout of basic issue items with which the operator performs maintenance.

• Check the last DA Form 2404 (Record of Preventive Maintenance Checks and Services) to insure that operators are reporting equipment faults in the proper format.

• Inspect operator maintenance by checking vehicle fluid levels, filter cleanliness, instrument gauges, lights, emergency brakes, trailer air hoses, and brakes.

Next, the battery commander should check on the ability of the maintenance section to take action on the faults reported by the operator or crew on DA Form 2404. These checks include examining whether a mechanic has checked the vehicle faults listed on the DA Form 2404 and has corrected those faults which can be corrected at battery level; whether vehicle shortcomings have been applied to the "deferred maintenance" DA Form 2404; whether deadlining deficiencies have been reported on DA Form 2406 and DD Form 314; and whether the repair parts requested and listed on DA Form 2064 have a valid status or have appropriate follow-up actions.

Problems discovered in these areas probably indicate that the battery maintenance section personnel are not adequately trained to perform their jobs and that the maintenance section is not organized to provide the best response to the operators. In this case, the battery commander must get with the battery motor officer and the battalion maintenance technician and arrange for additional training *outside* the normal work day since the maintenance section cannot accomplish its daily mission if personnel are pulled out for training.

The commander should then make a final check of DA Form 2406 to determine whether the unit is properly identifying, taking action to repair, and reporting equipment which is not mission-capable. He should first compare non-available days reported on DA Form 2406 against the not mission-capable maintenance and supply days recorded on the DD Form 314 (all "down time" should match). Then he should verify those days when equipment was not available because of organizational supply. Each day this equipment awaits parts should correspond with a requisition which uses the highest priority available to the unit. The DA Form 2064 (Document Register) is the record of dates and priorities of requisitions. Finally, the battery commander should verify those days on which equipment is not available due to time spent in direct support maintenance. This time is confirmed by comparing the DA Form 2406 data with the file (blue) copy of the DA Form 2407. The DA Form 2406 shows the days that equipment was unavailable due to a pending maintenance or supply action.

If the commander notes several areas needing improvement, the cause is normally in the overall maintenance system (or lack of a system). In this case, the commander must create a maintenance schedule and "lock it in iron." I have found that the following weekly schedule will work:

• Monday — During the morning, the maintenance section dedicates itself to maintenance of its section equipment. During the afternoon, it begins work on the week's scheduled services.

• Tuesday — The maintenance section continues working on the scheduled services. Each section performs preventive maintenance checks and services on assigned vehicles and turns in the DA Form 2404 to the motor sergeant. The motor sergeant orders these DA Forms 2404 in priority for corrective action.

• Wednesday — The maintenance section takes action on the DA Forms 2404 of the headquarters platoons (i.e., ammunition, communication, special weapons, and supply sections). All personnel from these sections will be present for this maintenance period. Supervision will be provided by the fire direction officer and the gunnery sergeant. As the mechanics troubleshoot the vehicles (based on the preventive maintenance checks and services), parts requisitions and job orders will be processed. The howitzer platoon (gun and fire direction center sections) will be performing training or maintenance at some other location.

• Thursday — The maintenance section takes action on the DA Forms 2404 of the howitzer platoon. All of the platoon members will be present with their equipment under the supervision of the executive officer and chief of firing battery. The actions will be the same as those specified for Wednesday.

• Friday — The motor pool is closed during the morning, and the TAMMS clerk uses this time to update all records entries for that week. During the afternoon, maintenance personnel

give the motor pool a good cleaning.

Once the commander establishes a working maintenance program, he checks the system periodically. He visits the motor pool daily and signs the Daily Deadline Report (the reverse side of DA Form 2406). He notes the deadlined pieces of equipment and ensures that there are appropriate annotations on the DD Form 314. He ensures that requisitions or job orders have been submitted to repair the deadlined equipment. The commander then visits the battalion maintenance office and discusses the deadlined equipment with the motor officer and the maintenance technician; often the maintenance technician will be able to secure the repair parts or support required to repair the deadlined equipment. After this visit, the commander goes to the direct support maintenance element. Although this may prove difficult because of the distance between the direct support unit's location and the commander's home station, these visits always pay dividends. The commander can check the status of his work requests and requisitions in addition to establishing rapport with direct support unit personnel. At the end of these visits, the commander is more qualified to make decisions on the daily operations of his maintenance activity.

Even though a unit's maintenance section is rarely at adequate strength in numbers, MOSs, and grades, a commander can have a successful battery maintenance program. He must establish maintenance as a priority, allot sufficient time to conduct preventive maintenance, schedule events, provide maintenance goals, and actively participate in the maintenance program.

Robert D. Lewis
CPT, FA
APO New York

Subject matter experts within the School's Weapons Department tell me that implementation of the J-series tables of organization and equipment will impact on a battery commander's ability to implement a program such as yours. The maintenance sections will all be assigned to the service battery and will be an asset controlled directly by the battalion motor officer. His allocation of these resources (in accordance with the guidance of the battalion commander, of course) might make it very difficult for a battery commander to carry through all of your recommendations.

One final consideration in a battery-level maintenance program is the training of the prime trainer — the section chief. If he knows how to use DA Form 2404 and the -10 technical manuals and the lubrication orders for his assigned equipment, then his soldiers will learn their responsibilities correctly. — Ed.

Soviet artillery: What is to be done?

"The Soviet Man of Steel" article in the May-June 1983 *Field Artillery Journal* addresses very important issues regarding Soviet artillery and highlights the criticality of that branch in the employment of the combined arms concept by the Soviet army. I suggest, however, that, while a knowledge of the power of the Chief of Rocket Troops and Artillery (CRTA) is critical in understanding how to counter Soviet artillery, the real answer to reducing the effectiveness of soviet artillery may lie in understanding the importance and use of command, control, and communications countermeasures (C^3CM).

The CRTA is certainly a key man in the employment of Soviet artillery. He has overall planning responsibility for fire support measures to support the commander's scheme of maneuver, especially in the formation of regimental and divisional artillery groups from organic and attached artillery. His responsibilities also include computation of ammunition requirements, movement of artillery units to ensure continued fire support during movement of the maneuver forces, and preparation for the use of nuclear weapons. The latter responsibility is especially critical since the Soviet divisions' organic tube, rocket, and missile battalions are becoming increasingly mobile with the replacement of older, towed guns by self-propelled 122- and 152-mm weapons and the replacement of the BM-21 with newer rockets. The FROG replacement, the more mobile and accurate SS-21, has been reported to be in use by the Group of Soviet Forces, Germany; and two new nuclear-capable 152-mm guns, one self-propelled and one towed, are both deployed in eastern Europe. The Soviet divisions and higher levels of organization have experienced a 30 percent increase in artillery since 1978, and the availability of artillery may determine actual maneuver plans. All in all, the CRTA is a most important man. But since there is only one CRTA per Soviet division, army, or *front* and since there are many other cirtical artillery command posts (the loss of which would cause a degradation of Soviet capabilities even if the CRTA could be located or ranged), a closer look at these other Soviet artillery commanders is in order.

The Soviet artillery officer employs his artillery in a different way than does the US artillery officer; the Soviets have drawn extensively on the lessons they learned from the Great Patriotic War, the Mideast conflicts, the US Vietnam experience, and their own developing situation in Afghanistan. For example, since Soviet doctrine calls for the maneuver commanders to be well forward to conduct personal reconnaissance and to infuence the battle directly, the Soviet artillery battery and battalion commanders also position themselves well forward near the maneuver commanders in command observation posts (COPs). These command observation posts combine the functions of command post, fire direction center, and observation post and are located in armored personnel carriers (BMP, BTR-60, or other variants) which provide the artillery commanders with onboard fire direction and communication capabilities. As a general rule, the soviet battery commander's COP will be located adjacent to that of the supported maneuver commander; and the artillery battalion commander's COP will be located adjacent to that of the supported maneuver regimental commander's COP. In keeping with the emerging Soviet tendency to fire battalion volleys, there will be many instances in which the maneuver battalion will have an additional artillery battalion (and hence an additional COP) attached for the duration of the assault. Fire computations are performed simultaneously at the COP and at the fire direction center (often by computers) in order to provide redundancy in command, control, and communications. The battalion COP, for example, can assume any fire mission currently in progress by individual firing batteries and may indeed provide firing data on most missions while the battery COPs cross-check computations.

Clearly there are artillery command and control critical nodes (formerly called high-value targets) at levels below the CRTA. But what is to be done about attacking them? We will not be able to attack with fire all these types of targets: tanks, towed or self-propelled artillery pieces, BMPs, BTR-60s, enemy air defenses, command posts, targets of opportunity, final protective fires, bridge and river crossing points, enemy mortars, and lines of advance through constrained areas. The US artillery planner would do well to assess those targets in coordination with the division G3 and the brigade S3 who have overall responsibility for command, control, and communication countermeasures and attack critical nodes using C^3CM techniques.

These countermeasures — not exclusively electronic warfare — are comprised of the functional missions of destruction, jamming, deception, and operations security. The goal is to neutralize those targets which provide the most "bang for the buck" — in other words, to optimize scarce attack resources on the target-rich AirLand battlefield.

The Soviet war machine is *not* impervious, but it will not fall down like a deck of cards when one CRTA or any single critical node is destroyed. It requires an astute artilleryman to target critical nodes *at all levels*, and to attack them using the command, control, and communication countermeasures available at all levels from the rifle platoon up. This is the challenge, and this is what must be done.

Brian A. Loy
Fort Leavenworth, KS

Targeting officer

I would like to see the *Field Artillery Journal* address the role of the targeting officer in a direct support battalion, to include his responsibilities and his relationship to the S3, S2, and brigade fire support officer.

I have not seen any literature on this subject; even the December 1983 coordination draft FM 6-121(H), *Field Artillery Target Acquisition,* does not discuss the role of the targeting officer.

David W. Grimes
1LT, FA
APO New York

Under the J-series tables of organization and equipment, a targeting officer has been added to 155-mm and 105-mm battalion organic to separate brigades and division artilleries. The targeting officer is a field artillery captain who is trained in field artillery target acquisition, with another specialty in tactical intelligence (MOS 13D35), and is intended to be an expert in target acquisition systems, field artillery engagement capabilities, and threat capabilities and limitations.

Field Circular 6-20-2, ***Fire Support Targeting Analysis,*** *scheduled to be published in July 1984, will address the role of the targeting officer. The targeting officer's duty location will be in the fire support element where he will be able to improve the entire targeting effort, not just counterfire targeting. His proximity to the brigade S2 and S3 will ensure that the targeting officer has a clear picture of the battle and the maneuver commander's requirements. Targets from all sources will be readily available through fire support and intelligence channels. The targeting officer will be responsible for advising the brigade fire support officer on target vulnerability and the vulnerability of the enemy unit to the loss of certain battlefield functions. He will advise the fire support coordinator, the brigade S3, and the brigade fire support officer regarding high-value targets that would provide the greatest payoff for a given resource expenditure. He should assist in the development of attack guidance to expedite control of fires against high-value enemy targets approved by the commander. By detailing enemy vulnerabilities, the targeting officer can help the fire support officer allocate fire support and can specify effects desired against the targets attacked. He should work closely with the intelligence and electronic warfare element to coordinate the fire support and electronic warfare efforts. The position of targeting officer will be a demanding one; and through the Advanced Course curriculum and the new field circular, the School is preparing field artillery officers to meet the challenge. — Ed.*

Do we know how to use MLRS?

Now that we have the Multiple Launch Rocket System (MLRS), do we know how to use it? With its range, accuracy, and killing power, the MLRS is a long overdue addition to the field artillery inventory. Integrated with Firefinder, TACFIRE, and the the Fire Direction System, the MLRS is the deadliest counterfire weapon yet conceived. Additionally, its shoot-and-scoot tactics give it the potential to be the "will of the wisp" of the modern battlefield. If properly employed and augmented by cannon formations, our "force modernized" field artillery can, for the first time, enter into an artillery duel with the Warsaw Pact on even terms. In order to maximize the potential of the MLRS, however, its organizational structure and employment concept must be in consonance with the AirLand Battle doctrine.

Based on lessons learned over a short period of time and the fact that we were looking at the issue purely from the perspective of our wartime mission, many of us in the 2d Armored Division Artillery believe that the Division and Corps '86 tables of organization and equipment (TOEs) and the MLRS employment concepts fail to maximize the capabilities of the weapon system. Specifically, we are convinced that the corps MLRS battalion is a mistake. The MLRS is primarily a counterfire weapon, and the counterfire battle is a division fight. A general support MLRS battalion at the corps level simply lacks the responsiveness to augument the division counterfire program effectively. Additionally, the positioning of each battery across the corps front will be a coordination and communication nightmare. Even with the capability to fire at targets more than 30 kilometers away, the MLRS battalion will be of only limited value in the corps deep battle and will, we believe, wind up firing most of its missions against targets acquired and nominated by divisions.

In the past, the corps commander retained sufficient general support cannon formations to influence the corps battle, execute a counterfire program, fire massive preparations, and respond to unforeseen tactical emergencies in the divisions' sectors. Now, given AirLand Battle doctrine and the assignment of the counterfire mission to the division, a greater share of the corps artillery is being provided to the division. This decentralization not only gives the division commander a powerful counterfire force at his fingertips, but also enables him to mass additional close support fires quickly, suppress enemy air defenses, and interdict second-echelon targets in his area of influence.

Even though AirLand Battle doctrine places the focus of the deep battle at the corps level, this decentralization of control does not really affect the corps' deep battle. Since cannon artillery and MLRS simply cannot range deep enough into the corps area of influence, the only "true" deep attack weapons available to the corps commander are tactical air and conventional Lance. Within the division sector, however, cannon and rocket artillery *are* the most responsive deep attack weapons immediately available to the commander.

Like other divisions, the 2d Armored Division has found it needs a field artillery brigade in either an attached or reinforcing role to provide the firepower required for effective counterfire and other fire support tasks such as the suppression of enemy air defenses and interdiction. A field artillery brigade can provide command and control for as many as six battalions, and our experience has been that a minimum of four battalions is needed. This augmentation has taken on even greater significance since the 8-inch battalion is being stripped from the Division '86 TOE. The 2d Armored Division does not object to the recent decision to pull the 8-inch system out of the division as long as its reinforcing

or attached field artillery brigade contains 8-inch battalions. In the historical debate over the location of the system, the traditional position from both division and division artillery commanders was, "I can't give up my 8-inch because of its nuclear punch; I need it at my fingertips." With 8-inch units attached to the reinforcing field artillery brigade, this is not an issue. The field artillery brigade also has the authority to plan fires, which gives the division commander sufficient guarantee that 8-inch nuclear support will be available in sector. Since the 8-inch system normally cannot range into the corps area of influence, nuclear targets for the system will be provided by the divisions in sector.

Based on the scheme of maneuver, the threat, and the size of the brigade provided by corps, the field artillery brigade commander and the division artillery commander task organize in accordance with the division commander's plan, giving first priority to a direct support cannon battalion for each committed maneuver brigade. In a "two-up, one-back" scenario, the third organic direct support battalion can be given a reinforcing mission in support of the main attack or in the most critical sector in the defense. If required, a nondivisional cannon battalion may also be given a mission of reinforcing a direct support battalion. All other organic, attached, or supporting assets are then organized under the brigade and the division artillery.

Our division artillery normally gives a sector to the field artillery brigade to facilitate command and control. When not actively engaged in the counterfire mission, each headquarters can respond to requests for additional close support fires, suppress enemy air defenses, fire interdiction missions in sector, and fire in support of the division's deep battle.

For the past 12 months, the 2d Armored Division has employed the MLRS in five corps- and division-level command post exercises. These exercises had NATO versus Warsaw Pact scenarios and used the First Battle-War Eagle simulation. In each exercise, we tried a different organizational option — the organic composite battalion (now a dead issue); the attachment of a single MLRS battery from corps; and a pure MLRS battalion of two firing batteries and the headquarters, headquarters and service battery. While we are completely sold on the system itself, we found the composite battalion unwieldy, the single MLRS battery insufficient, and the attachment of a second battery from corps a poor solution.

Besides being unwieldy, the composite 8-inch/MLRS battalion proved difficult to control. Putting two distinctly different systems under one headquarters forced the command and staff — especially the operations, fire direction, and S4 sections — to go in two directions simultaneously. They were required to position both systems across the division front, provide technical firing data for both, and also manage the logistical support. The latter had all the makings of a logistician's nightmare. With the nine MLRS launchers spread across the entire division zone, command and control was extremely difficult. Nowhere else in the field artillery is a commander required to support, move, shoot, and communicate with two different systems over such distances. Experience with the old composite 155-mm/8-inch battalions of the sixties should have been sufficient to preclude any further attempts along the same line.

A single MLRS battery was simply not enough. The same problems exist as with the MLRS battery in the composite battalion and were further exacerbated by the lack of a battalion staff for control and support. In a normal "two-up and one-back" scenario within the 2d Armored Division, the division artillery and reinforcing field artillery brigade each act as a counterfire headquarters in a given sector. Initially we tried keeping the battery intact and having both headquarters pass their requests to the battery fire direction center, but we could not make this procedure work. To balance our counterfire force, we tried the detachment of one platoon to answer directly to the field artillery brigade. This procedure was not much better because command and control and support functions were degraded. Technical fire control was also severely degraded since a platoon cannot accept digital traffic directly from TACFIRE. Fire mission data derived from Firefinder and TACFIRE had to be passed by FM voice from the brigade to the platoon and then reformatted into digital messages for passage from the platoon headquarters to the launcher. Fortunately, software change is being designed to allow for this important interface. Finally, FM 6-60 indicates that the MLRS battery will be practically self-sufficient for autonomous operation; and, while sound in theory, we found this procedure unrealistic in practice. The TOE pushes all the maintenance, supply, and ammunition functions down on the battery commander, denying him access to a battalion staff specifically structured to provide this support to its subordinate units. No battery-sized unit should be left to fend for itself on the modern battlefield.

The pure corps MLRS battalion was also a flawed solution. It is difficult to envision a scenario wherein the corps commander would wish to retain the full 27-launcher battalion in general support. With the MLRS battalion positioned across the corps front and its rockets fired by the corps fire support element, the battalion would be hard pressed to achieve the responsiveness demanded by AirLand Battle doctrine. It would be equally unlikely that the entire battalion would be placed in support of a single committed division. Flexibility to influence the battle in other sectors would be lost through the resulting imbalance of fire support assets. The remaining employment option would be to fragment the battalion. The *Operational and Organizational Plan* states, "The division artillery commander must also recognize the possibility of one or more MLRS batteries from a corps MLRS battalion being attached to the division artillery. These units must either be attached to a cannon battalion under division artillery control or assigned tactical missions of their own and operate relatively independently." While solving the problem of responsive fires to the divisions, this solution will severely tax the MLRS battalion's command and control capability and may degrade system sustainability and maintainability. And it makes us wonder: "If there is a need to . . . attach batteries from the corps battalion to committed division, does the commander really need an MLRS battalion at the corps level?" We think not.

Scrap the corps MLRS battalions now and create divisional MLRS battalions of two firing batteries and a headquarters, headquarters, and service battery. Put the firepower in the hands of the division commander, the man tasked to fight and win the artillery battle.

Samuel W. Floca, Jr.
LTC, FA
Fort Hood, TX

Nasty thoughts

The following nasty thoughts about our vehicles' swimming ability and about electromagnetic pulse occurred to me during recent months, and I believe they may be of interest to the Field Artillery Community.

The scene is the Fulda Gap, sometime in the mid-1980s. Hostilities have commenced along the inner German border.

How do you withdraw an armored cavalry regiment, several covering force maneuver battalions, and the supporting artillery across the Haune and Fulda Rivers if the Soviets destroy the bridges at the onset of hostilities? You might reply that the Soviets want the crossing points intact. But consider these points:

• The Soviets know we will form a reserve from the units that withdraw successfully across the rivers.

• If the new corps and division reserves are not formed by the time the battle reaches the main battle area, things are suddenly quite dicey for all US units.

• By destroying the bridges, the Soviets put a great strain on our bridging capacity. There is no way other than air to resupply the covering force artillery units.

• We lose all equipment that cannot swim — all the tanks, all the wheeled vehicles, and all the heavy artillery. Maybe the M2s, M3s, M113s, improved TOW vehicles, FISTVs, M548s, M577s, and LAV-25s can make it over, *if* they can be prepared in time.

• The Soviet armored personnel carriers are amphibious, and their tanks can snorkel if they must. The Soviet 122-mm and 152-mm self-propelled howitzers are also amphibious.

Go one step further. Destroy all the major bridges within 100 kilometers of the inner German border. Until temporary bridging can be placed in operations, NATO faces defeat in detail. The worst problem for artillerymen is that only the M109s are amphibious to any degree. Why did the Soviets go to the trouble to make their armored personnel carriers and self-propelled vehicles amphibious?

Now try this one. We put a light division on the ground somewhere. It is forced to withdraw across a river. It does not have much organic bridging equipment. The troops can cross via improvised rafts or helicopters; but we lose most of the equipment, including the fire support, if we do not have the CH-47Ds to lift the M198 towed howitzer. Fifty-four (3x18) is a large number of sorties to lift a division artillery in a mid- to high-intensity environment.

Are there any solutions? For the self-propelled vehicles, the solution might be to find a quicker means of preparing them for crossing — perhaps inflatable bladders that could be attached to the hull lifting points, but each section or platoon would need a compressor. But would a flotation kit allow a fully loaded M109 to make a crossing? Would an M548 with a basic load need a kit? How about the FAASV? What about the HEMTTs or the other wheeled vehicles in a battery? Could they be floated, or would we lose them at the first water barrier they could not ford?

When was the last time somebody actually used a flotation kit in training? Are not these floats vulnerable to enemy fire? What would propel the wheeled vehicles across the water? The floats could be covered with a thin layer of Kevlar to resist punctures. Pneumatic floats would allow for energy dissipation before penetration. Wheeled vehicles could be propelled by all-wheel drive or winching, or else a track could tow them. The key factor for the wheeled vehicles would be keeping the engine dry enough to run. A short circuit as you enter the water would be embarrassing and could be fatal.

Would an M207 MLRS SPLL float? Could it float with a combat load? It is derived from the M2/3 Bradley fighting vehicle which is alleged to be amphibious, but the Bradley fighting vehicle may not have much freeboard when in the water. If a flotation kit is available for the M207, how long does it take to erect it and would an inflatable kit be easier, quicker, and cheaper? One would still have the transportation problem of the HEMTT and the trailers even if the M207 is amphibious.

If we lose our howitzers and rockets because they cannot cross a water barrier without engineering support, our tactical planning and execution must suffer. We do not have the luxury of being able to leave a brigade's worth of weapons on the wrong side of a water barrier every time the water is over two meters deep. Nor can we afford to lose our electronic equipment in the event of a nuclear strike.

How much of our equipment is hardened against the electromagnetic pulse? And how many field artillerymen are wearing those neat, modern, digital watches with the chronographs and calculators? An exo-atmospheric 5-megaton burst will have little physical effect on the ground; but any unshielded, unprotected, transistorized, integrated circuit in any device will be wiped out. Assuming that enough communications and fire direction equipment survives to allow fire missions to be received and processed, one may have a great deal of difficulty in coordinating time on target, illumination, and "at my command" missions without knowing the accurate time.

These problems exist now; I hope they are being addressed.

Larry A. Altersitz
MAJ, FA (NJARNG)
Woodbury, NJ

The 1-3d was part of it all!

Congratulations to you, your staff, and all contributors for having made the *Field Artillery Journal* the splendid publication it is. You have achieved, I think, a commendable mix of articles and features on past, present, and projected matters of interest to artillerymen. Although I have long been retired, reading the *Journal* gives me a sense of still being in touch with the field artillery and with the US Army in general.

Specifically, I write now regarding Lieutenant Philip Sclatter's article on the 3d Field Artillery ("Celeritas et Accuratio" in the January-February 1984 *Field Artillery Journal).* The familiar motto caught my eye at once, for I was privileged to command the 1st Battalion, 3d Artillery (105-mm, SP), from March 1961 to July 1962 and then was S3 of the 2d Armored Division Artillery until mid-February 1963. The unit crest shown on page 51 is *not* the crest which we knew and wore as the 3d Artillery crest. It looks like an amalgam of the crests of the 3d and two or three other units, but it is certainly not the one I knew. I conclude, therefore, that you have either made a mistake or the 3d's crest has changed since 1963 — which?

The inspiring early history of the 3d Artillery is of great interest and, of course, must be preserved and remembered. In my view, however, Lieutenant Schlatter should have devoted at least as much space to the post-World War II period as to the earlier eras. But he passes over the last 40 years in two skimpy paragraphs; and, as a result, his article is out of proportion. Allow me, if I may, to sketch in two of those missing years.

When I reported at Fort Hood in March 1961 the 2d Armored Division, which included the 1-3d Artillery, was functioning as a basic training center. The officer and senior noncommissioned officer cadre strength stood at only about 60 percent, as I recall. Division units and facilities had been adapted to the receipt, processing, training, and graduation of successive cycles of basic trainees. The system was tightly organized and efficiently run; but most of us looked forward eagerly to the day when, as rumor had it, the famous "Hell on Wheels" division would be ordered to resume its normal tactical mission. That day finally came in the summer of 1961.

The last basic cycle was completed; and then, quite rapidly, the entire division was brought up to 100 percent strength in personnel and equipment—a truly remarkable state of affairs.

Immediately, we began a program of intensive training. By early February 1962, we had completed battery and battalion unit training and testing and combined arms field testing. At that time, General Herbert B. Powell, commander of the Continental Army Command, visited Fort Hood and awarded us the elite status of the Strategic Army Corps (STRAC). We were "STRAC ready" and proud of it. As such, we were available on order to the US Strategic Readiness and Intervention Command (STRICOM), headquartered at MacDill Air Force Base in Florida. Chief of Staff of STRICOM was General Paul D. Adams, noted for his command role in the successful US intervention in Lebanon in 1958. His deputy was Lieutenant General Bruce K. Holloway, USAF. Commanding general of the 2d Armored Division was the distinguished cavalryman and tanker, Major General W.H.S. Wright, who delighted in appearing at any weapons range and outshooting all present. The commanding general of the 2d Division Artillery was Brigadier General William W. Beverley, an artilleryman who was seasoned in the armored division campaigns in Europe during World War II; his standard for a firing RSOP (reconnaissance, selection, and occupation of position) from the march was four minutes from observer identification of target to first rounds in fire for effect.

In those days, the 1-3d Artillery was a direct support battalion for Combat Command A; the 1-14th was in direct support of Combat Command B, and the 1-78th was in direct support of Combat Command C. The division was still under the Delta-series tables of organization and equipment (TOEs) in which the major maneuver units, as in late World War II, were three "combat commands." The direct support artillery battalions were equipped with the M52. This vehicle was one of the most awkward armored vehicles ever devised, but it mounted the old reliable 105-mm, and it ran well if properly cared for. The 1-16th Artillery was the division's general support battalion, with one battery each of Honest John, 155-mm self-propelled, and 8-inch self-propelled.

Because of the high priority of our unit, its strength was maintained at or near 100 percent. We spent much time in the field on unit and combined arms exercises, and we were not shorted on training ammunition. All units of the division, and none more so than the 1-3d, developed a state of training and morale far exceeding that of any other peacetime unit known by me. The relationship between the 1-3d and Combat Command A, commanded by Colonel Hugh E. Quigley, was particularly close. Colonel Quigley had been in Thailand and had brought back a number of swagger sticks made of bamboo which had alledgedly been brushed by jungle tigers in the attack. Therefore, he said they deserved to be carried only by "tigers." At the end of every substantial field exercise and while we were still out on Cowhouse Creek, he had a formal ceremony at his command post during which he awarded a tiger stick to one lieutenant from each Combat Command A tank and infantry battalion and also from the direct support battalion (nominated by me). The "Order of the Tiger," of course, had absolutely no official status. It was amusing, but it was serious too; it meant something to the lieutenants and to their batteries.

Also in February 1962, the 1st Armored Division, which until then had been present at Fort Hood as only one combat command, was brought up to full strength and launched into a similar program of STRAC/STRICOM readiness training. It was rejuvenated under the Echo-series of TOEs, which incorporated the brigade organizational form and was otherwise somewhat different organizationally from the 2d Armored Division. Also, the 1st Armored Division received several new equipment models, not all of which aroused our envy; for example, the aluminum jeep. Thus, there were two full armored divisions at the same post, a situation that had not prevailed, I think, since World War II. Fortunately, Fort Hood was large enough to accommodate two divisions; but post support facilities had to be substantially expanded.

Late in 1962, both the 2d and 1st Armored Divisions, in that order, were scheduled to conduct a two-day, division-level, live-fire exercise which would include close air support from the Tactical Air Command and would move from west to east across the whole range area north of the main post. This was one of the largest (possibly, the largest) live-fire training maneuvers ever conducted in the United States up to that time, but it was to be quickly overshadowed by more dramatic events.

The 2d Armored Division deployed and conducted its exercise successfully, although — for reasons which soon became clear — the close air support was cancelled at the last minute. The 2d Division Artillery had borrowed many lieutenants from the 1st Armored Division to act as safety officers and was slated to reciprocate for them. However, by the time we had finished our exercise, all of the 1st Armored Division Artillery lieutenants had been called back to the post. The Cuban Missile Crisis had erupted, and the 1st Armored Division was ordered to move to Florida as part of the buildup to invade Cuba (which, of course, was not executed). The 2d Armored Division returned to garrison but was immediately ordered back into the field, apparently as a deception plan, to rerun the same exercise in lieu of the 1st Armored Division. Don't you know there were a lot of our adjutants, S4s, and motor officers who suddenly found themselves acting as safety officers for the first time in years! But, we did it. In those four days, the 2d Armored Division Artillery fired about 15,000 rounds at designated targets without shooting out of any fan and without one accident at the guns or in the impact area.

When we returned to the post, the 1st Armored Division was *gone;* in 48 hours the US railroads and Army logisticians had moved the whole division — lock, stock, and barrel, except for a small rear party — out of Fort Hood and on the way to its staging area. The 2d Armored Division was part of the contingency plan for Europe. We remained "tied to the flagpole" at Hood, on a four-hour alert to fly all personnel to West Germany to pick up our alternate set of equipment and execute whatever orders might then be received. Transport aircraft were designated, trucks were spotted, personal gear was in order, and personnel records and shots were complete. In short, we were ready.

Gradually then, as the Cuban Missile Crisis wound down, our alert was relaxed; and routine operations were resumed at Fort Hood. Today, I wonder if rail and air logistics and unit readiness could match this episode. I hope so. In any case, what I have related is now history — and (Lieutenant Schlatter, please take note), the 1-3d Artillery was part of it all!

William W. Cover
COL (Ret), FA
Fairfax, VA

Many thanks for your recollections. I consulted with an expert in the Center of Military History to find an answer to your question about the crest. The crest which you sent to me is that of the 3d Artillery, which was in existence between 1959 to 1971. When the Combat Arms Regimental System was established in the 1950s, there was only one Artillery Branch. The first seven

coast artillery regiments were consolidated with the first seven field artillery regiments, and the crests were amalgamations of the former crests of the coast artillery and field artillery units. The crest of the 3d Artillery included parts of the former 3d Coast Artillery's crest and that of the 3d Field Artillery. In 1971 artillery units were separated into air defense artillery regiments and field artillery regiments, and at that time the first seven artillery regiments were "split" to form the 1st through the 7th Air Defense Artilleries and the 1st through the 7th Field Artilleries. The crests were changed at that time to reflect those worn by the former coast artillery and field artillery regiments. Thus, the current 3d Field Artillery crest is that of the former 3d Field Artillery (regiment) and 3d Armored Field Artillery Battalion. For more information on heraldic questions, you can write to The Institute of Heraldry, US Army, Cameron Station, 5010 Duke Street, Alexandria, Virginia 22314. — Ed.

Going Frogging

I enjoyed Captain Scott Gourley's article, "Going Frogging," in the March-April 1984 *Field Artillery Journal.* Targeting the FROG-7 system is a difficult process due to the distance of the FROG launcher positions and support bases from the forward line of own troops (FLOT). While the AN/TPQ-37 is capable of tracking a FROG-7 in flight and of determining the launch location, the only element of information that cues the fire support element that it is in fact a FROG is the distance of the weapon from the FLOT. Radar operators and targeting personnel should be keen to pick up such clues and expedite the transmission of target information to appropriate fire support elements. Because of the FROG's shoot-and-scoot tactics, such targeting information will be useful for only a short time; and so emphasis must be placed on using *all* sources of intelligence to secure targeting data on the *entire* system, including the mobile rocket support bases. In this way, we will be able to select the most efficient of a wide range of targeting options. Intelligence sources and analysis must be keyed to the distinctive signatures of the elements of the system, and analysts must be constantly reminded of the urgent need to pass quickly all such information into targeting channels.

Michael D. Holthus
CPT, FA
Fort Sill, OK

Limber up!

Wagon soldiers!

Many "old" Redlegs are still around and, from what I hear, subscribe to the *Field Artillery Journal.* A couple of years ago I happened upon the Field Artillery Half-Section in action at Fort Sill, and I remembered how big and fun Sunday parades were when I grew up near Fort Snelling, Minnesota, where people came out to enjoy the 14th Field Artillery go through its exciting paces. Here is my nostalgic look at "then" and "now."

About 1923 on a Sunday, my father first took me on the streetcar out to Fort Snelling, Minnesota, from our home in Minneapolis to witness the Third Infantry Parade Day. I was about six years old at the time. The foot soldiers came marching down the parade ground, rifles with fixed bayonets carried at right shoulder arms.

I sat crosslegged, keeping time on the ground to the "Stars and Stripes Forever." In memory, I can still feel the prickle of the new cut grass on my palms, smell it, and see the white puffs of clouds against blue skies. My father stood straight and tall — his hands behind his back, and his feet spread apart. Even then, I knew he was remembering his mandatory army service in Sweden — maybe wishing he was 19 again, marching with these men.

The soldiers passed in review and moved off the field. It became quiet, and no one stirred. The whole crowd sighed in anticipation when the band struck up the Artillery song, "The Caissons Go Rolling Along . . . ." And suddenly, at a gallop, came horses! Horses pulling big guns! Riders and animals and the most terrifying clatter and banging and shouting! I whirled to safety behind my father, clutching his legs, my heart leaping to my throat as they seemed to come directly at me. That was my first glimpse of wagon soldiers.

And then I was 16 and back at a parade. Parades were familiar now. I knew two full sections would burst into a gallop down both sides of the field; but when that Artillery song started, my stomach churned and my fists closed, and I got cold prickles from the coolness of the men who were riding dangerously, arms crossed shoulder high, holding on with their feet hooked under a bar. "Ahhhh . . . ." The crowd held its breath as the caissons thundered down the field, close together, with huge wheels barely inches apart. The music mounted higher, louder, "Counter march, right about . . . ." The words pounded in my ears, "hear those wagon soldiers shout" The rattle and bang and noise of the huge guns careening built up the excitement so much that I didn't think I could stand it. The most dangerous maneuver of all — the "counter march and right about," during which the men drove tight fast arcs, one inside the other — drew gasps from the crowd. Those men with the caissons were the cream of the Artillery — brave, physically tough men with nerves of steel. They were my heroes. Tell-tale white slashes slanted from ear to jaw across their tanned faces. The slashes were really caused by their chin straps, but they wore the slashes like dueling scars. You could even distinguish those wagon soldiers downtown in civilian clothes.

Through the 1930s the 75-mm cannon was the standard light field artillery piece for the United States and French forces. It continued in use until

the last horse-drawn artillery in the United States was replaced by trucks and self-propelled weapons in 1942. Back at Fort Snelling, the horses of the 14th Field Artillery, which I had watched with such excitement, were decimated by a stable fire in 1939. Instead of replacing the horses, the army motorized the 14th at that time. Battery F of the 14th Field Artillery was then redesignated at Fort Lewis, Washington, as a 155-mm howitzer motorized artillery unit.

And now, unexpectedly, I was 65 years old and wandering around the carriage museum in the Old Corral at Fort Sill, Oklahoma, with my grandson by my side. We were peering through the windows at old vehicles when a clatter outside drew our attention. There, to my utter amazement and delight, breaking into a gallop with a long ago familiar rattle and banging, was a unit of wagon soldiers! I thought they were long gone!

This was a rehearsal, a last minute checkup; so there was much backing and getting into position. An "outrider" raced back and forth directing, indicating moves, and checking. The horses and men circled the center structure of the corral, stopped, backed, circled again, and halted. Six horses, all saddled, three of them mounted, pulled a cannon.

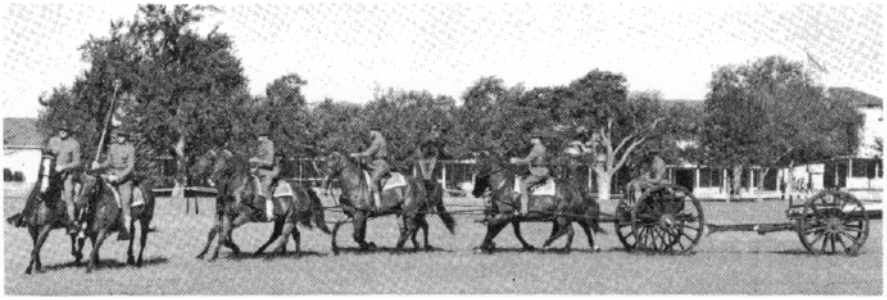
As we walked away, I spotted a young fellow intently watching the show — short haircut, tight jeans with enough flare for cowboy boots, and a T-shirt imprinted "Fort Sill, Oklahoma."

"Know anything about what's going on?" I asked.

"Sure." He told us this was the famed Fort Sill Half-Section, which began in 1963 with the generous help of the businessmen and organizations of the town of nearby Lawton, Oklahoma. The museum dug out old uniforms, pictures of the World War I Artillery, and old manuals to be sure maneuvers and equipment were just like they were for the old timers — even the horses were bought to look just like the former ones.

Three teams of two horses each pull a 75-mm cannon and its limber (the carriage). The horses in the front are the lead team; the swing team is in the middle; and then comes the wheel team. The chief of section and guidon bearer are mounted. I wondered why all six horses were saddled, when only three had riders. I discovered that they were all saddled because, on long marches, the riders change off to rest the horses and save time by not having to re-saddle the horses.

My grandson broke in. "What are the horses' names?" Trust a kid to ask a pertinent question.



Fort Sill's Half-Section on the Old Post Quadrangle.

The young fellow looked down and grinned. "The horses are all named after military posts or generals. There was Laramie I and II, Bradley, Sheridan, Sam Houston, Bliss, Grant, Custer, Riley, Leonard, and Andrew Jackson — those are some of their names."

"Where do they perform?" I wanted to know.

"Since 1967, the year after Fort Sill's Centennial, the unit has been an official part of the post and performs at parades, rodeos, and celebrations all over the United States. The horses canter into an arena and then go into a full gallop around the circle. They keep going halfway around and stop. No one moves in the saddle while the cannoneers stand to the cannon and prepare for firing. It's only a few seconds before the chief makes sure it's safe and drops his arm in a signal to fire the cannon. Those horses are so well trained, the crew doesn't even have to command them — they take exactly one step back to limber up."

"Limber up?"

"Hook up and get ready to pull the cannon again. Takes just a minute. Then the horses race around the circle again and off. Six minutes start to finish!" He sighed: "Neat. Really neat!"

I wanted to know. "Do you live on Post?"

He nodded and with evident pride in his voice said "I'm an Army Brat." My grandson zipped open his jacket and revealed his Fort Sill matching T-shirt. "Me too! And so was my mom and grandfather."

It was hard not to add my childhood story of the full section racing in a double arc in the dangerous "counter march and right about," but I managed to keep my mouth shut. I had my memories; let him have his.

Marion Lillie
Bayview, ID

The Artillery Horse

The artillery horse is obsolete; his job on earth is done.
No more to pull the reel cart, the caisson, and the gun.
No more to don the harness, the bridle, and the bit.
No more to wear the saddle for artilleryman to sit.

Horses, men, then officers—that's what they used to say.
Walk, then groom and water them, by the book—the Army way.
Not too much hay, a little bran, and just one can of oats.
To keep them calm and quiet, they would let us keep our goats.

Their job was pulling canons and the caissons o'ver the land,
To the battery gun positions through the ever burning sand.
The lead, swing, and wheel teams always set battalion's pace.
The horse would pull his heart out just to tighten up the trace.

No more the pat upon the neck for a job well-done.
No bugle calls or taps to hear at setting of the sun.
Gone the boots and spurs ever digging in your side.
Gone the prance when band would play that filled my heart with pride.

The artillery horse is obsolete; his job on earth is done.
Trucks and tanks and halftracks now pull the Army's gun.
So graze now in your pasture, the pasture of the past,
For history has a place for you where you will always last.

John McMahon
McLoud, OK

The second time he saw the drone overhead, the enemy tank commander leaned out of his cupola to yell at the captain in the armored personnel carrier which was just passing. He never had a chance to say anything. A Copperhead round slammed into the tank, exploding the turret and showering the armored personnel carrier with deadly shrapnel. As the burning tank slewed across the road, over 20 more explosions burst over the column. Soon a dozen other tanks were blazing wrecks. The tank battalion's march into battle ended before its tanks ever had a chance to fire a shot. It ended because the battalion's lead company had been decimated by a field artillery attack with smart munitions.

SHELL GAME

by Major Joseph E. Halloran III

Terminally homing, smart, or munitions are the most readily achievable translation of industry's high technology into the high lethality required of the fire support system in battle. They can make an essential contribution to the field artillery system — they can help field artillerymen win the technology battle which, in turn, will provide the edge needed to win the war. An attack in which a remotely piloted vehicle guides a Copperhead round into a lead tank and fire-and-forget munitions destroy the trailing tanks is technically feasible. The Army, unfortunately, is not moving very quickly in this area of development. It still seems to lack a full appreciation for the real value and total significance of these precision munitions.

A clarification of the requirements for smart munitions in the fire support system on the battlefield, however, should improve the general appreciation of terminally homing munitions. The field artillery, of course, has a special interest in understanding these requirements; but it is vitally important that the maneuver arms understand them as well. When FM 100-5 claims that "firepower provides the enabling, violent, destructive force essential to maneuver," it is affirming that the success of the fire support system is essential to the success of maneuver units. The battlefield requirements for fire support underline how terminally homing munitions will improve the lethality of the fire support system so that successful maneuver can occur anywhere.

The Army must be prepared to conduct combat operations in any of the numerous operational areas to which it may be committed. While the worldwide threat runs the gamut from direct confrontation with the Soviets to low-intensity conflict against Soviet-sponsored forces, the greatest threat lies in the direct Soviet confrontation. These armor-heavy formations, supported by substantial artillery and close air support and operating under a sophisticated air defense umbrella, are the best arguments for developing terminally homing munitions. Any deployment of the Rapid Deployment Joint Task Force, an airborne corps, or any other light and fast-moving expeditionary force into the non-jungle, non-mountainous areas of the Eurasia-Africa landmass is also likely to confront relatively large tactical formations with substantial armor forces which generally adhere to Soviet doctrine. When the Syrian Army, for example, moved to attack in the Golan Heights in 1973, it deployed its forces in a virtual duplication of the textbook Soviet scheme of echelonment depicted graphically in figure 1.

In its simplest form, echelonment envisions the sequential positioning of these armor-heavy formations with the clear premise of executing rapid, violent attacks of defenses, rupturing those defenses, developing a penetration, and exploiting the penetration quickly. In conjunction with this doctrine of echelonment, the Soviets have reintroduced the operational maneuver

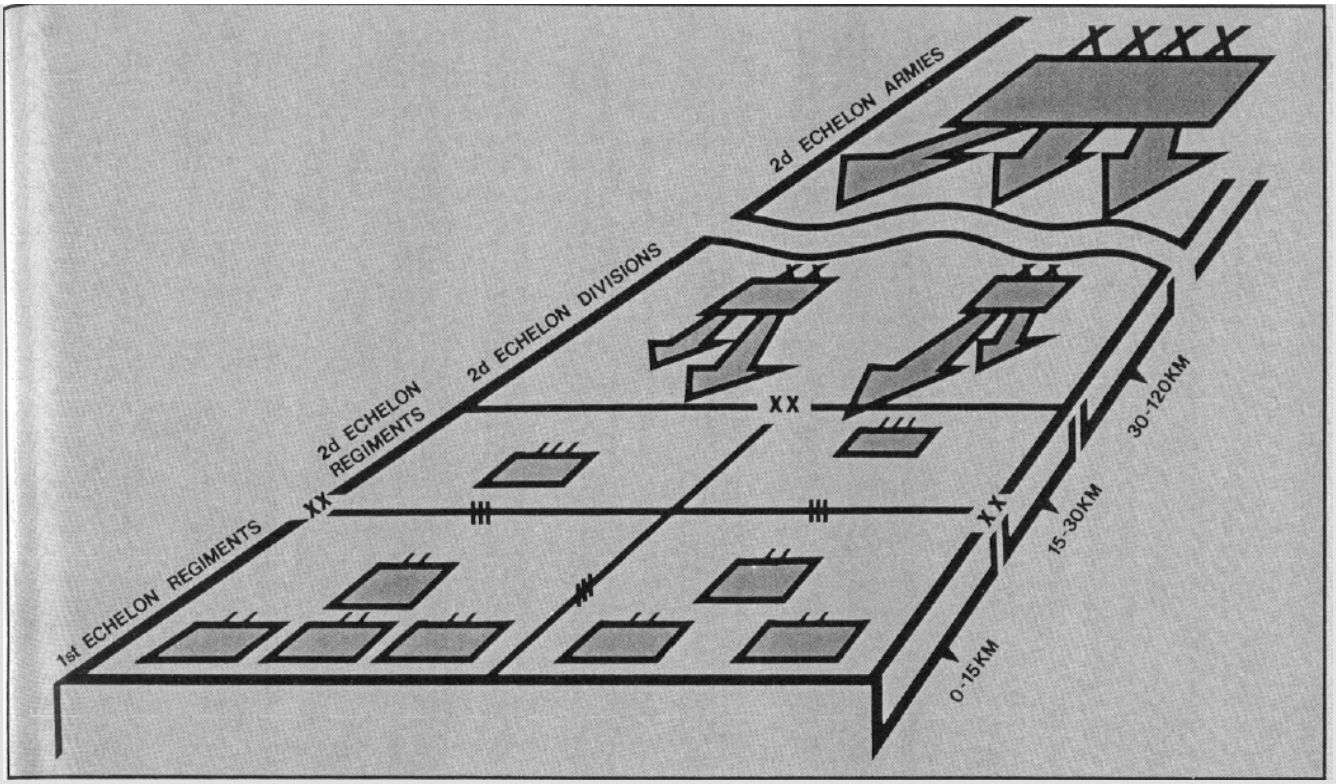


Figure 1. Soviet echelonment.

groups, previously called mobile groups, which will be used for rapid penetrations to seize critical objectives deep within NATO defenses. Operational maneuver groups may exist at Army or front level; the operational maneuver group for a Soviet Army, for example, would probably be a tank division. The concepts of echelonment and operational maneuver groups rely heavily on the maintenance of momentum and the retention of the initiative. The mission of US forces, therefore, is to stop that momentum and seize the initiative. Terminally homing munitions provide a technological breakthrough which should assist in the successful accomplishment of that mission.

It is common to divide this stylized echelonment as shown in figure 2 into a close, mid, or deep battlefield across the forward line of own troops — a partition of the battlefield which translates this threat into US attack requirements. The close battlefield is that area of the battlefield in which the clash of maneuver forces occurs. For targeting purposes, this zone extends to an approximate distance of three to five kilometers from the forward line of own troops. The mid battlefield is that part of the battlefield containing those enemy elements whose main purpose is to support directly the fight at the forward line of own troops. This zone extends to approximately 40 kilometers beyond the forward line of own troops. The deep battlefield extends to the limit of the US corps commander's area of influence — 150 kilometers beyond the forward line of own troops. It contains those enemy elements which orchestrate and sustain the fight in the close battlefield. Each of these zones contains specific targets which are located in particular positions to perform their doctrinal battlefield functions. Given these functions and where they are performed, one can develop a precise rationale for what happens in each zone and what US forces need to do to dominate each zone. Figure 3 outlines the array which comprises the overall close-mid-deep battlefield.

The close battlefield contains a number of aimpoints — tanks, armored personnel carriers, accompanying artillery, air defense — all deployed in small elements. These targets also move to accomplish their missions. Tanks and armored personnel carriers are attempting

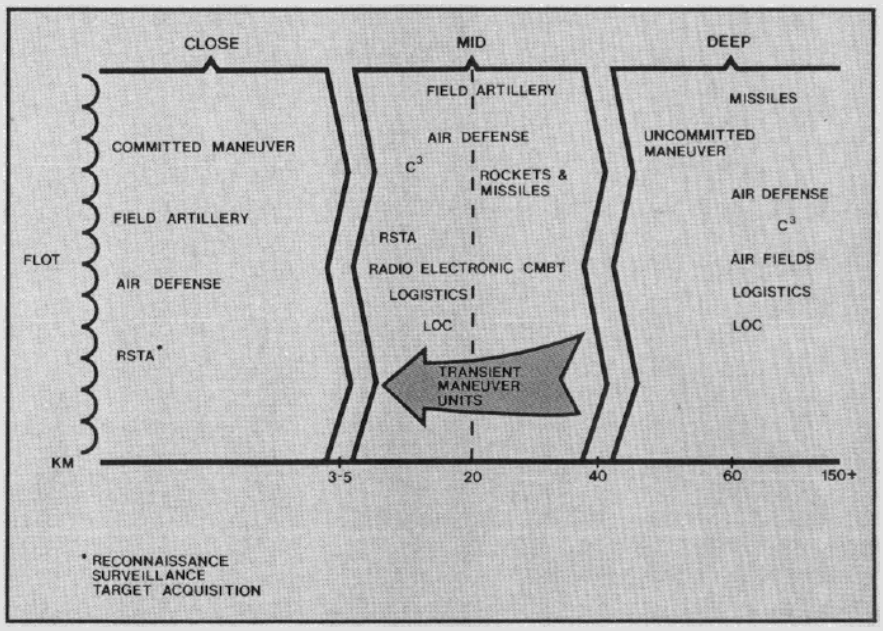
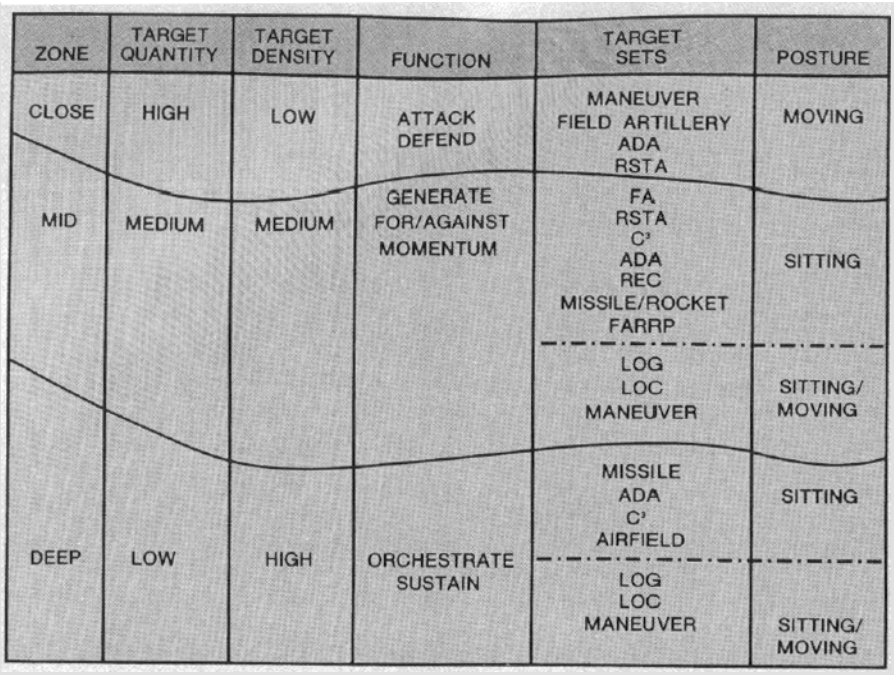


Figure 2. Target array.



ZONE	TARGET QUANTITY	TARGET DENSITY	FUNCTION	TARGET SETS	POSTURE
CLOSE	HIGH	LOW	ATTACK DEFEND	MANEUVER FIELD ARTILLERY ADA RSTA	MOVING
MID	MEDIUM	MEDIUM	GENERATE FOR/AGAINST MOMENTUM	FA RSTA C² ADA REC MISSILE/ROCKET FARRP	SITTING
				LOG LOC MANEUVER	SITTING/ MOVING
DEEP	LOW	HIGH	ORCHESTRATE SUSTAIN	MISSILE ADA C² AIRFIELD	SITTING
				LOG LOC MANEUVER	SITTING/ MOVING

Figure 3. Array environment.

to rupture US defenses. The accompanying artillery and air defense move with those tanks and armored personnel carriers to suppress direct fires and provide a continual air defense umbrella. These targets are also armored, ranging from T-72 tanks and armored reconnaissance vehicles to self-propelled assault guns and howitzers and air defense systems such as the ZSU-23 antiaircraft gun. The target array in this close battle, therefore, is composed almost entirely of individual, moving, armored targets — *precisely* the targets against which field artillery conventional ammunition and the current family of improved conventional munitions have little effect. If the predominant mission of the field artillery — close support of maneuver forces — is to be effective, terminally homing munitions are a necessity. Armed with large forward-firing shaped charges or self-forging fragments, these munitions can defeat the types of target found in the close battlefield. Laser guidance and infrared or millimeter wave sensings give them the capability to search out and defeat moving targets. As the fire support system gains lethality through the use of terminally homing munitions, it enhances the lethality of direct fire systems, allows more freedom of movement for maneuver forces, and allows increased use of Army and Air Force aircraft.

The mid battlefield contains the greatest diversity of targets and, therefore, produces the greatest requirement for flexibility in attack capabilities. Key to establishing requirements here is the understanding that this zone is in a constant state of transition. The quantity and types of targets in this zone fluctuate as the enemy attempts to push his forces forward to surge into the close-in battle. This portion of the battlefield contains homogeneous groupings of elements in field artillery and air defense batteries, command and control complexes, helicopter rearm and refuel points, and logistical facilities. The threat cannon artillery, target acquisition, short-range air defense, and direction finders are located within 20 kilometers of the forward line of own troops to range beyond it. Missiles, rockets, and forward rearm and refueling points are beyond 20 kilometers from the forward line of own troops because of their increased range capabilities. Two critical aspects of these important targets are that they must be stationary and must emit electronic signals to perform their missions. The critical targets in the mid battlefield, therefore, are quite different from the array in the close battlefield; yet the field artillery still requires terminally homing munitions to ensure effective, rapid destruction of these targets through counterfire and interdiction.

Counterfire, the fire support system's second major battle task, focuses on the mid battlefield. If the counterfire campaign is unsuccessful, the threat can use his numerically superior field artillery to suppress friendly indirect fire systems, deny friendly maneuver the tactical mobility critical to success, and silence friendly fire support systems. The threat also requires massive fire support for the commitment of his follow-on forces (be they second echelons or operational maneuver groups). *The counterfire campaign, therefore, forms the linchpin upon which success in both the close and deep battles hinges. By silencing the threat's fire support at the critical time, the friendly direct fire systems become more efficient, effective, and lethal and can finish the immediate fight quicker and reconstitute to meet the next attacking force. Terminally homing munitions will improve this counterfire campaign in two ways.*

• They permit the attack of self-propelled artillery more effectively and efficiently than do conventional munitions. They can defeat artillery targets with approximately one-third the expenditure rate of high-explosive and improved conventional munitions.

• They permit the attack of all threat emitters through devices which home on electronic signals. This capability reduces both the time and expenditure of high-explosive or improved conventional munitions required to defeat these types of emitting targets.

Interdiction of the maneuver forces moving to the fight, illustrated by the arrow in figure 2, is the second category of fire in this mid battlefield which will receive a great benefit from terminally homing munitions. The hypothetical situation which opened this article is a perfect example. Just as terminally homing munitions such as the Copperhead can attack moving targets on the close-in battlefield, so can they attack those mobile targets moving along predictable avenues of approach to that close-in battle. These munitions have this capability since their ability for maneuver can overcome relatively coarse target locations and result in effective target engagement. Figure 4 illustrates the spectrum of integrated systems which can achieve this attack.

The deep portion of the battlefield contains relatively fewer, but significantly larger, targets than do the close and mid zones. These large targets are composed of numerous discrete elements and tend to be static or slow-moving. To perform their doctrinal functions, these deep targets emit distinct and identifiable electronic signatures; they require large attack munition payloads due to their size, range from the forward line of own troops, and resistance to accurate acquisition. Some of these targets, however, need not be attacked while they are in this deep portion of the battlefield. Regiments in assembly areas some 50 kilometers beyond the close-in fight are difficult to defeat owing to the dispersal of their target elements and the hardness of those elements, but they are making no

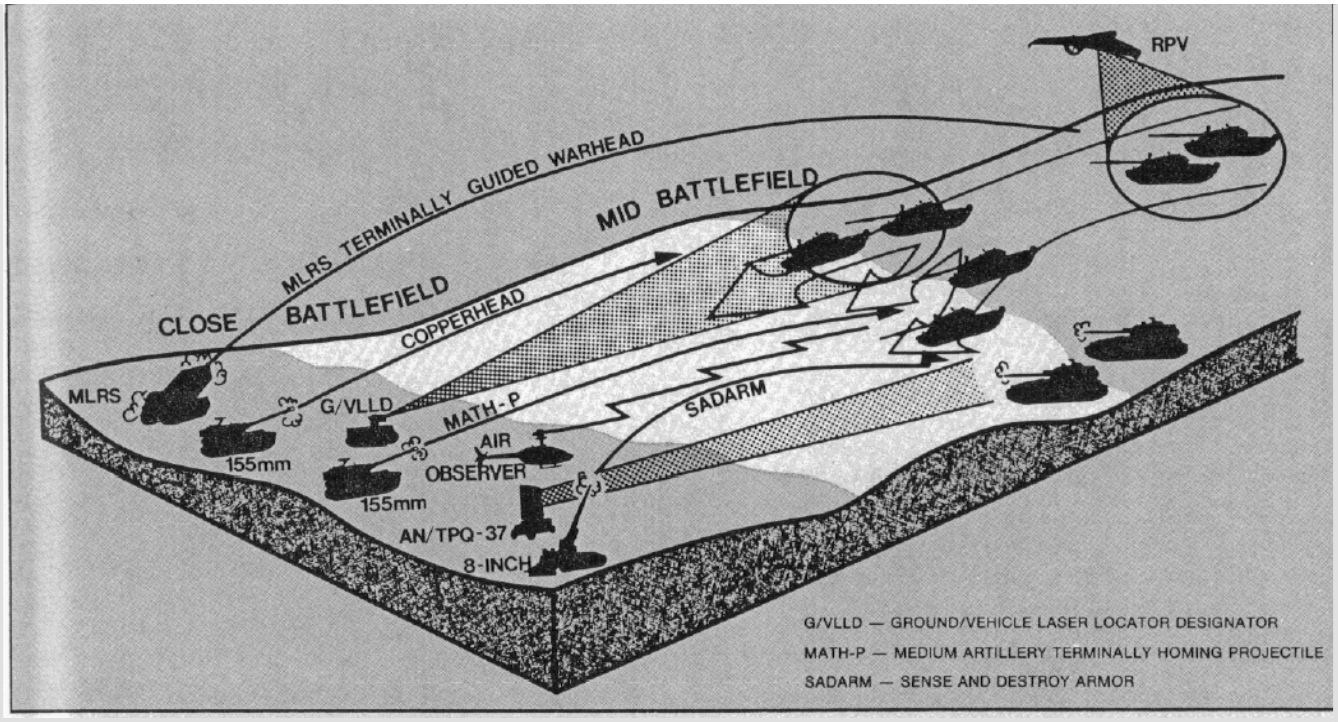


Figure 4. Integrated systems.

contribution to the battle. They need not be attacked until they move out of these areas. Winning the counterfire campaign and blocking chokepoints in the mid battlefield may prevent their commitment. If these targets do move toward the forward line of own troops, they are more easily defeated in mid battlefield as they concentrate along their avenues of approach and move into areas in which they can be more accurately acquired. The critical deep targets can be attacked by systems with longer ranges than the rockets and cannon firing into the close and mid battlefield, but these longer-range systems will seek out their targets much as those systems involved in a counterfire campaign.

The field artillery has been continually improving the lethality of its munitions so that it can attack the targets in all of these zones effectively. The Fire Support Mission Area Analysis produced results which showed that the most significant improvement to indirect fire system effectiveness against the entire range of targets is achieved through the introduction of terminally homing munitions for cannon and rocket systems. The data from the Mission Area Analysis reveal an impressive increase in operational effectiveness when these munitions are added to the force. While the current conventional mix of munitions was able to destroy less than a quarter of the targets it attacked, a mix which included terminally homing munitions generally doubled that effectiveness. Developmental costs of terminally homing munitions are more than offset by the operational costs of not having them. Legal Mix V, a 1977 study which examined field artillery systems in heavy and light divisions, indicated that over 180 155-mm dual-purpose improved conventional rounds were required to defeat a tank at a range of 10 kilometers from the howitzer; yet the same tank could be defeated by two to four Copperhead rounds at a 155-mm Copperhead range of 16 kilometers. These munitions can be used with heretofore unknown levels of cost effectiveness against a wide spectrum of targets. The technology of terminal homing munitions promises an increase in indirect fire system lethality which today can only be met by weapons of mass destruction. These weapons can be a pronounced force multiplier since they can defeat targets which even large numbers of other conventional munitions might not defeat. The capability to defeat a tank company with one battalion volley, for example, is possible. This increase in effectiveness, achieved by a small increase in force costs, will allow the US fire support system to execute its vital role in AirLand Battle doctrine in what must be considered a revolutionary manner.

Terminally homing munitions, unfortunately, will not be fielded in any great numbers soon. Copperhead, an important munition based on positive laser control allowing the discriminatory attack of enemy targets, is only now being fielded in small numbers. The 8-inch Sense and Destroy Armor (SADARM) round is the only other smart munition scheduled for fielding by the end of the decade, but now even its occurrence is in doubt. A terminally homing munition for the 155-mm systems, the medium artillery terminal homing projectile, or MATH-P, and an MLRS terminally homing munition remain in the conceptual stage. Since their potential is apparently enormous, the technological opportunity afforded by these munitions should receive a high priority in development and funding.

Clearly, terminally homing munitions will allow the field artillery to attack more targets with less ammunition from fewer weapons in a shorter time than currently possible. The certainty that fewer resources will achieve operational success against the larger enemy forces is a fact that greatly outweighs any initial costs and will be the ultimate payoff for this smart investment. Terminally homing munitions appear to provide the single most important technological opportunity for fire support development. The time has come, therefore, to stop playing a shell game with our ammunition and to start fielding the munitions we need.

MAJ Joseph E. Halloran III, FA, received his commission from the United States Military Academy. He is a graduate of The Command and General Staff College and received his PhD from the University of North Carolina. He is currently the Chief of the Concepts Branch, Directorate of Combat Developments, USAFAS

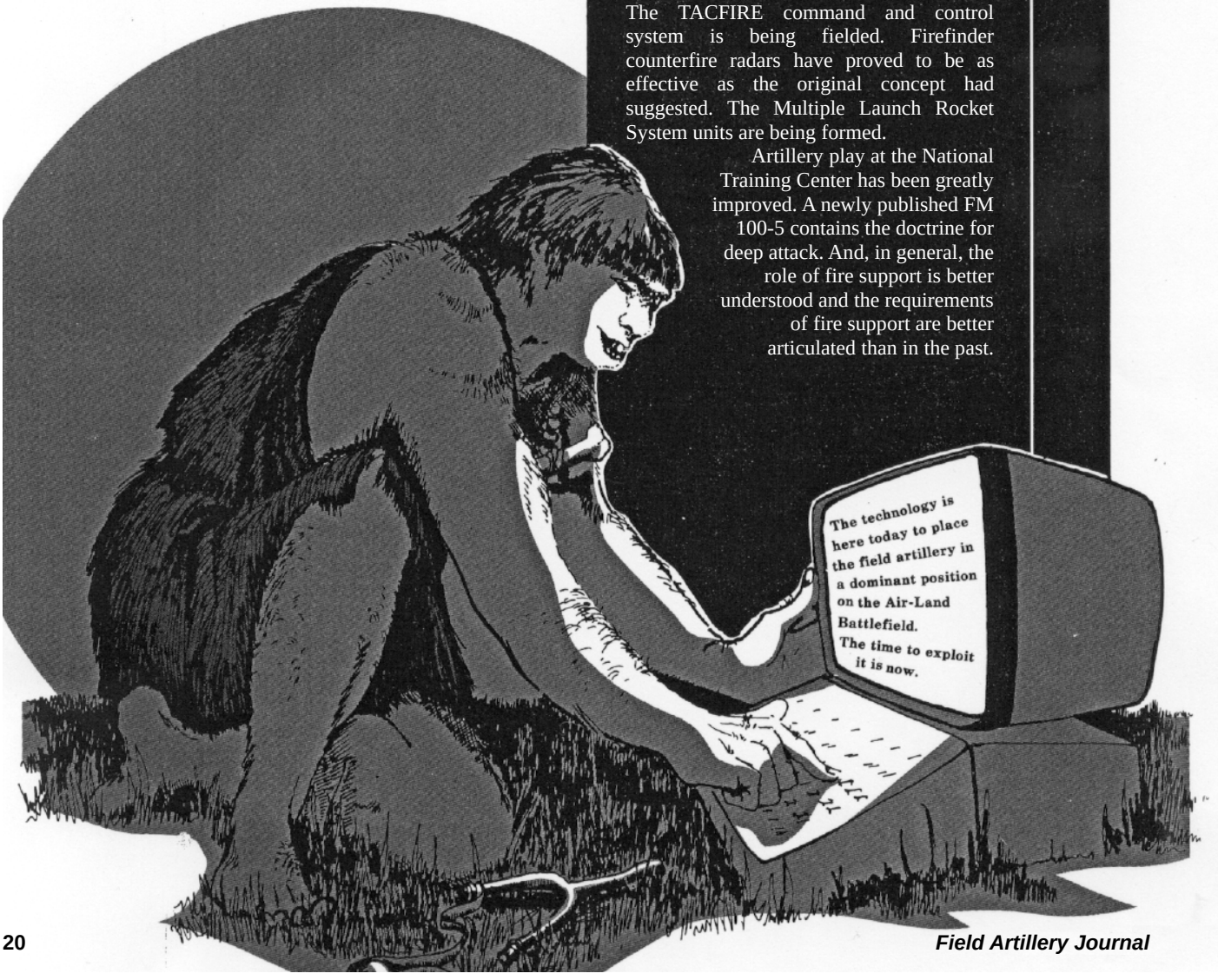
TAKE THE TECH

by Colonel (Retired) Anthony G. Pokorny

In January 1981 — over three years ago — the Field Artillery School put its completed Fire Support Mission Area Analysis (FSMAA) out on the street. The purpose of that comprehensive set of documents was to identify deficiencies affecting the fire support system's ability to accomplish its battlefield tasks. Once the deficiencies were determined, potential opportunities for improvement came to the surface in the areas of materiel, doctrine, force structure, and training.

In June of that same year, the Field Artillery System Program Review (SPR) was held at Fort Sill. More than 40 general officers in key decision-making positions of the Army met to discuss, modify, and endorse the Fire Support Mission Area Analysis. Since then, there has been much activity in the combat developments community to try to implement the recommendations of the Mission Area Analysis and the System Program Review. The TACFIRE command and control system is being fielded. Firefinder counterfire radars have proved to be as effective as the original concept had suggested. The Multiple Launch Rocket System units are being formed.

Artillery play at the National Training Center has been greatly improved. A newly published FM 100-5 contains the doctrine for deep attack. And, in general, the role of fire support is better understood and the requirements of fire support are better articulated than in the past.



It is intriguing that the most significant strides in fire support developments have yet to be seen in tactical units because they currently reside in the engineering laboratories of defense industry. Whether or not these technological opportunities were triggered by the Fire Support Mission Area Analysis is difficult to ascertain. But it is logical to assume that the defense industry is better able to focus its research in those areas determined to be the highest priorities in the Mission Area Analysis. This analysis, or set of analyses, served as a guide to what is important to the future of fire support and where the greatest needs can be found. The remainder of this article will visit several of the technologies which offer near-term solutions to the fire support problems stressed in the Fire Support Mission Area Analysis.

Cannon artillery

As pointed out in the President's assessment of *Soviet Military Power* published last year, the Soviet's program to upgrade and expand their fire support capability has resulted in a 30 percent increase in cannon artillery, multiple rocket launchers, and mortars since 1978. In other words, the Soviet Army has an initial fire support force advantage of roughly four to one. To offset this disparity of quantity, the US Field Artillery fire support system must be designed to achieve optimal results against the threat elements within the target array. Cannon systems must be capable of continuous operations, in spite of the fact that their dual conventional and nuclear capability makes them a first priority target for Soviet counterfire. Cannons must also achieve rapid rates of fire with shell and fuze combinations appropriate to both point and area target engagements. But current howitzer system deficiencies are many, and they degrade the fire support capability.

The concept for the Division Support Weapon System (DSWS) was to solve cannon problems in the following areas: responsiveness, terminal accuracy, survivability, resupply, commonality, deployability, crew size, training, cost, and growth potential. That the Howitzer Extended Life Program (HELP) will be beneficial to the force is unquestioned. But that program will fix only a few of the existing problems of the M109 howitzer. The Howitzer Improvement Program (HIP) is the current attempt to reach the DSWS concept objectives. It, too, will fall short. What the leadership of the Army has been searching for is a "great leap forward" in cannon technology. Some think it can be found in rapid rates of fire, but the analytical arguments to prove this need have been difficult to put together. Some believe the breakthrough will come in the form of new materials that are lighter and stronger. Here again the rationale has not been convincing enough to warrant the "great leap forward" label. What does appear to be the best candidate is robotic technology and its application to a crewless howitzer.

The biggest cost driver in the life cycle of a weapon system and the most fragile link of a system in combat are people. Robotic technology for autolaying and autoloading is here today and can be substituted for soldiers on the battlefield. It truly would be a giant leap forward if the new howitzer could be made to operate in a totally automatic mode. Ammunition resupply personnel would constitute the only manning requirement.

The heavy armor of the current M109 could be significantly reduced since crew protection would no longer be a problem. In fact, a towed howitzer to be used with both light and heavy forces might be in order. A "soft recoil" mechanism could be used to further lighten and streamline the design. The prime mover could be an ammunition resupply vehicle which would also provide collective nuclear-chemical-biological protection and ballistic protection for an ammunition handling crew of three or four soldiers. One such vehicle and crew might service two or three howitzers. This type of vehicle exists in prototype today.

An automatic, towed howitzer of 155-mm caliber for use in the direct support role in heavy and light divisions is a logical solution to the requirement for rapid deployability which has been substantiated in very recent military conflicts around the world. The time is right to apply the available technology to the backbone of field artillery in a way that simplifies operations, logistics, and training and takes cannons into the new century.

Munitions

Perhaps the most exciting and unexpected technological breakthroughs in recent years have developed in the area of fire-and-forget munitions that solve the lethality problems so strongly voiced in the Fire Support Mission Area Analysis. What was thought impossible for the near term only a few years ago is now a reality. The technology exists which can provide an operational capability to acquire and engage hard targets that are moving, sitting, hot, or cold — all within one self-contained, highly lethal submunition. The fact that these submunitions can be packaged in standard artillery projectiles which are ballistically similar to ammunition within the Army's current inventory further underscores the significance of the program.

Sense and Destroy Armor (SADARM) technology is the leader in this regard and comes in two significant parts — sensor packaging and penetrator lethality. SADARM has been designed to contain not one or two, but three different sensor types in each individual submunition. Microelectronic techniques have allowed cross-channel correlation between the active millimeter wave, passive millimeter wave, and infrared sensors to provide target sensing data with a phenomenally high probability of detecting real targets and eliminating false targets. It is difficult to believe that the three sensors, a power source, and a powerful processor have been amalgamated into a single, relatively low-cost submunition. These submunitions are not only appropriate for 8-inch, 155-mm, and 105-mm projectiles, but can also be used very effectively in rocket and missile warheads. The short sensor-to-target range combines with the multi-sensor capability of SADARM to all but preclude effective countermeasures by the enemy.

The explosively formed penetrator technology has also taken huge strides in the SADARM program in the last year or so. Tests have successfully demonstrated the capability to perforate over six inches of rolled homogeneous armor — a capability sufficient to defeat all known and anticipated top-armor protection.

An artillery direct fire application, in a munition technology similar to SADARM, is available with STAFF (Smart Target Activated, Fire and Forget). AirLand Battle doctrine mandates a requirement for field artillery units to possess the means to defend themselves from armor and subsonic or rotary-wing aircraft attacks. STAFF innovations applied to cannon projectiles offer the first coherent approach for providing this defensive capability. STAFF is a breakthrough which allows the field artillery to talk seriously in terms of autonomous operations and offers the force commander the opportunity to consider cannon artillery antiarmor capabilities in his overall plan for defense in depth.

Tactical missiles

Of all the recent changes in tactical doctrine, the most significant is the introduction of the concept of deep attack. This doctrine is promulgated in FM 100-5 and in joint documents

published by the US Readiness Command, the US Army Training and Doctrine Command, and the US Air Force Tactical Air Command. Deep attack by artillery systems is essential to the success of the operational concept of the AirLand Battle. There are four ways in which the deep attack can influence the outcome of combat:

• First, delaying th enemy forces in depth by long-range fires delays their arrival at the forward line of own troops and allows the defeat in detail of the forces in contact.

• Second, these fires block reinforcing enemy units from entering the battle and prevent interference with friendly force counterattacks.

• Third, the coordinated application of firepower against follow-on echelons prevents enemy massing and dilutes enemy momentum.

• And finally, deep attack is necessary against specific, high-value targets that have the potential to hinder seriously friendly force operations.

The Fire Support Mission Area Analysis recommended the development of the Corps Support Weapon System (C SWS) to replace the aging Lance and provide a sound capability for the deep attack. The deficiencies identified in the area of deep attack included insufficient lethality; inability to acquire deep targets; long-range system inaccuracies; and unresponsive, complex, unreliable ground support equipment. The program for the Corps Support Weapon System evolved into a joint program with the Air Force, called JTACMS (Joint Tactical Missile System) — a good idea for reasons of commonality, affordability, and many operational considerations. After all, deep attack is truly a joint air and land forces effort.

Significant progress has been made by industry to give the military services the deep attack system they need. The Joint Surveillance and Target Attack Radar System (JSTARS) will be able to provide the capability to look deep. System accuracies have improved greatly. Warheads can now be engineered to use the devastating submunitions mentioned earlier. Propulsion advances will get the extended ranges required for AirLand Battle purposes. All in all, the missile technology for deep attack seems well on track.

Command and control

The proper command and control of battle remains the most complex aspect of modern warfare. The most lethal of weapons, the most efficient organizations, and the most motivated and courageous soldiers cannot be effectively orchestrated to win without a sound means of commanding and controlling the force.

In order to develop and continue to refine the appropriate command and control to implement its doctrine, the US Army recently adopted a conceptual, tactical command and control system. The Army command and control system is characterized by distributed data bases and the interoperations of the five functional segments of combat: maneuver, fire support, air defense, intelligence/electronic warfare, and combat service support.

TACFIRE is the current control system of the fire support functional segment but, as the Fire Support Mission Area Analysis pointed out, has inherent deficiencies that must be corrected. The Advanced Field Artillery Tactical Data System (AFATDS) will replace TACFIRE on an evolutionary basis with state-of-the-art components. AFATDS appears to be leading the way in command and control developments for the entire Army. The AFATDS organizational and operational concept designed at Fort Sill is extremely sound. It incorporates progressive ideas that will provide the foundation for innovative approaches to command and control requirements for many years into the future. The software and hardware solutions being developed by industry are equally as impressive.

Some of the offerings by industry include such state-of-the-art items as powerful, battery-operated, briefcase-size terminals for artillery command posts and fire support elements that can do multiple processing without the need for auxiliary processing, memory, or communication control. Also available are electroluminescent displays and large plasma screens for visually portraying the significant aspects of the battle. Unique data management architectures have reduced automated data processing response times considerably. Decision aids for the commander and his staff to use in battle are being designed to take advantage of the artificial intelligence era we are entering. Of course, without good target acquisition systems providing target input data, an artillery command and control system would be highly ineffective. The programs for the remotely piloted vehicle and the elevated target acquisition system will soon join Firefinder to round out that important capability. The progress in command and control and target acquisition has been truly remarkable; and the fire support team will be able to recognize, evaluate, select, and direct more fire on the enemy targets than ever dreamed possible just a few years ago.

So, it appears that the principal deficiencies uncovered in the Fire Support Mission Area Analysis can be corrected by judicious application of technological advances achieved by the defense industry. But one area covered by the Mission Area Analysis that has not progressed too well has to do with the analytical underpinnings for targeting — the methodology for target value analysis.

Target value analysis

The methodology for target value analysis was used in the Mission Area Analysis to link the artillery mission on the battlefield to the combat development and training development requirements through a process that identified the highest value targets for a variety of scenarios and conditions. The methodology included the development of a set of doctrinal, logical flows for a Soviet force which was embedded in a rapid response, cause and effect, combat simulation. The product consisted of a set of spread sheets that displayed a great deal of information on target priorities, target descriptions, and attack criteria. The target value analysis was useful in focusing the Mission Area Analysis — it was an analytical tool that had the potential to be used in tactical units to help plan and execute combat operations. In fact, numerous copies of the target value analysis have been distributed to, and used by, tactical units around the world. It has been a handy reference source for much of the targeting cell experimentation that has been happening serendipitously throughout the Army. Unfortunately, that version of the target value analysis was only the beginning.

The authors of the target value analysis discovered very quickly that they had only scratched the surface of a very complex problem. They recognized that their work was just a point of departure for unlocking the intricate elements of combat. They hoped that further analysis would be done to a level of detail that would give target value analysis credibility and acceptance for training and operations applications throughout the Army. Then this important tool could be institutionalized and used to its greatest potential.

There seems to be no question about the need for such a tool. And the technology in computers and video disks to automate the target value analysis is readily available. Here is the perfect entry point for the Army's use of artificial intelligence for battlefield decision aids. But to date, the Army has failed to resource a follow-on effort,

probably because manpower and dollars for this type of project have been channeled to areas where specific system training problems must be solved in order to field our newest systems. It is understandable how the current priorities have developed; however, adequate resources need to be allocated now to upgrade the methodology of target value analysis. The long-term impacts and implications are too important to ignore any longer.

Conclusion

Basic to the defense of our nation is the need for a credible, conventional land force response to threats around the globe. The major elements of such a response are four: maneuver, fire support, command and control, and sustainment. Recently the maneuver element has been strengthened considerably by the fielding of new tanks, fighting vehicles, and antitank weapons. The result has been positive for the total force, of course; but the combined arms team is now out of balance and needs to be put back in order. The Fire Support Mission Area Analysis highlighted areas that needed work before fire support would again be brought in balance with maneuver. Industry has been addressing those areas vigorously in the past several years. Industry has the right technology for the really essential fire support systems at hand. All that remains is for an enlightened leadership to take the technology and get it into the hands of its soldiers.

COL (Ret) Anthony Pokorny, FA, served as the Training and Doctrine Command's Director of Analysis, the Director of Combat Developments at the Field Artillery School, and the Commander of the 2d Infantry Division Artillery in Korea. He is currently a management consultant with LB&M Associates in Lawton, Oklahoma.

Command Update

NEW REDLEG COMMANDERS

BG Raphael J. Hallada
Assistant Commandant
US Army Field Artillery School

BG Raymond E. Haddock
56th Brigade (Pershing)

COL Charles R. Hansell
US Army Field Artillery
Training Center

COL William T. Zaldo III
1st Infantry Division Artillery

COL Marc A. Cisneros
2d Armored Division Artillery

COL Phillip Kitchings, Jr.
2d Infantry Division Artillery

COL Creighton W. Abrams, Jr.
3d Infantry Division Artillery

COL David C. Meade
7th Infantry Division Artillery

COL Robert G. Sausser
25th Infantry Division Artillery

COL Benson F. Landrum
1st Basic Training Brigade
Fort Jackson, South Carolina

COL Harold V. Floody, Jr.
Eight US Army Special Troops
Command (Provisional)
Yongsan, Korea

COL Charles M. Hood, Jr.
210th Field Artillery Brigade

COL Carl P. Morin, Jr.
212th Field Artillery Brigade

COL Richard M. Biondi
558th US Army Artillery Group

LTC William S. Stanley
Staff and Faculty Battalion
Fort Sill, Oklahoma

*MAJ(P) Helmut R. Kiessling
2d Battalion, 29th Field Artillery

*Listed in July-August 1984 issue as commander of 1st Battalion, 83d Field Artillery, which is now the 2d Battalion, 29th Field Artillery.

Hotline

QUESTIONS AND ANSWERS

Your "Redleg Hotline" is waiting around the clock to answer your questions or provide advice on problems. Call AUTOVON 639-4020 or commercial (405) 351-4020. Calls will be electronically recorded 24 hours a day and queries referred to the appropriate department for a quick response. Be sure to give name, rank, unit address, and telephone number.

Please do not use this system to order publications. Consult your FA Catalog of Instructional Material for this purpose.

Question: *Can the M548 fuze be used with the M107 high-explosive* projectile?

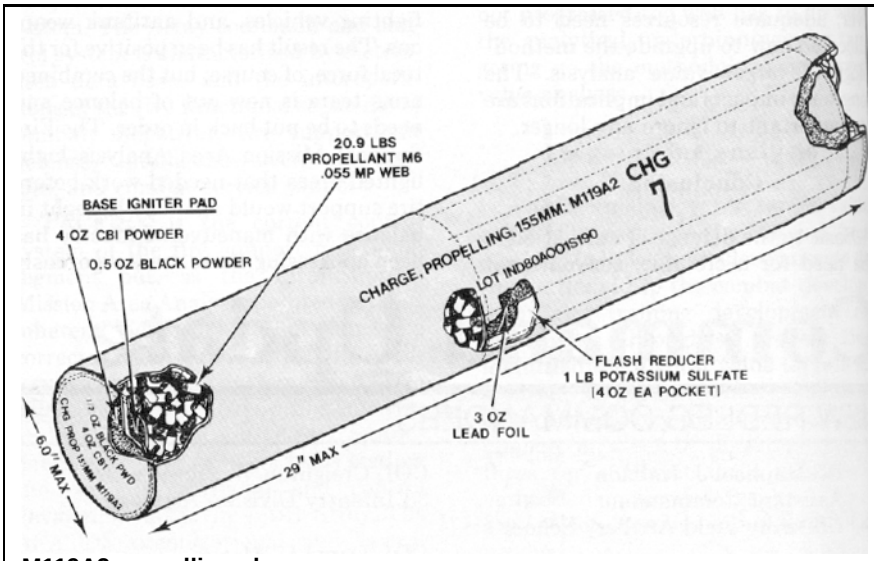
Answer: No; the M548 fuze is for use with base ejection rounds.

Question: *During last year's skill qualification test, the 13Es in my unit were allowed to use hand-held calculators; but they were not allowed to use them this year. What is the approved policy?*

Answer: Tested individuals can take their skill qualification test using whatever equipment is available in the unit's fire direction center, to include the TI-59 hand-held calculator or personal calculators. Future notices for skill qualification tests will include a statement that calculators will be allowed during testing.

Question: *In the "Hotline" section of the May-June 1984* ***Journal,*** *you listed the Lear-Siegler manual TDM 2100 as the appropriate reference for the radar chronograph M90. When I wrote to the US Army Armament, Munitions, and Chemical Command, I was told that this manual has been replaced by two technical manuals. What is the correct reference?*

Answer: The Lear-Siegler manual was the correct reference when the May-June 1984 issue went to press and remains correct until October 1984. At that time, the US Army Armament, Munitions, and Chemical Command (ATTN: DRSMC-MAS-TB, Rock Island, Illinois 61299) will publish TM 9-1290-359-12&P and TM 9-1290-359-34&P as replacement references.



M119A2 propelling charge.

Question: *What is the difference between the M119A2 and M119A1 propelling charges?*

Answer: Actually, there are three different M119-series propelling charges for use in the M185 and M199 tubes of 155-mm howitzers. These are the M119 white bag charge 8 with a muzzel velocity of 675 meters per second, the M119A1 white bag charge 8 with a muzzle velocity of 684 meters per second, and the M119A2 red bag charge 7 with a muzzle velocity of 686 meters per second.

The basic difference between the M119 and M119A1 models is that the M119A1 has a donut-shaped flash reducer that insures ignition of the rocket motor of the M549/M549A1 projectile. The M119A1 also has a new molded center core igniter tube, a 360-degree base igniter seam lacing jacket, and a pull strap to provide easier removal from the metal container.

The M119A2 red bag charge 7 was produced to comply with a Memorandum of Understanding with NATO countries which set certain minimums for muzzle velocities. Although the M119A2 is a red bag charge 7, it can be used interchangeably with the M119 or M119A1 charge 8 in the M185 and M199 cannon tubes only. The M119A2 does not have the outer lacing jacket that is used to wrap the M119 and M119A1, but at the forward end of the charge the M119A2 has a three-ounce lead foil liner and four pockets sewn longitudinally to the circumference. Each of the four pockets contains four ounces of potassium sulfate which acts as a flash reducer.

Question: *In Change 1 (page 27) to TM 9-2350-217-10N, one of the warnings for misfire procedures indicates that a 50-foot lanyard should be used if a round has remained in a cold tube longer than 15 minutes. Is this necessary?*

Answer: Yes. A 50-foot lanyard NSN 1095-00-610-9018, parts number 6006780-19207, is required whenever a round has remained in *either* a hot or cold tube longer than 15 minutes. This is a new procedure, implemented by Watervliet Arsenal, manufacturer of the cannon tubes.

Correction

My thanks to Major James Taylor, Mr. Theophil A. Kuriata, and other close readers of the *Journal.* They took time to point out to me that the NCO pictured on page 47 of the May-June 1984 issue is not performing an end-for-end test, but rather is determining or setting the elevation using the M1-series quadrant. I would also like to thank the Weapons Department for the copy of TM 9-2350-303-10 with pages 3-66 and 3-67 marked—I get the hint. — Ed

Fragments

FROM COMRADES IN ARMS

The Avenger is mounted on a high mobility multipurpose vehicle.

The Excalibur mounts a modified M167A1 20-mm Vulcan cannon.

Avenger and Excalibur

Pieces of scrap metal and wreckage pelted the desert landscape of the Yakima Firing Center in Washington after soldiers of the 9th Infantry Division (Motorized) Air Defense Artillery fired two new prototype pieces of air defense equipment. The two prototype systems, which were provided for evaluation at no expense to the government, were the Boeing Avenger missile system and the Standard Manufacturing Company Excalibur self-propelled cannon.

The Avenger, a modular system, fires the Stinger heat-seeking missile and is mounted on a high mobility multipurpose wheeled vehicle; it can be detached and fired from a ground-mounted configuration. The Avenger features a forward-looking infrared sight which allows engagement at night and during adverse weather. A turret stabilization system provides a shoot-on-the-move capability with high first-hit probabilty. The Stinger missiles can be removed from the Avenger and fired from the shoulder if required.

The Excalibur gun system is a prototype, high-speed, all-terrain, hydrostatically-driven carrier which mounts a modified M167A1 20-mm Vulcan cannon. At the Yakima Firing Center, the Excalibur successfully engaged radio-controlled aerial and ground targets and demonstrated cross-country mobility and speed greater than that of current tracked vehicles.

A track-width, mine-clearing roller has been developed which can be mounted on an M60 tank to clear pressure-fuzed, antitank or antipersonnel mines. The special kit used to mount the mine-clearing roller permits the driver to disconnect the roller from within the tank after its mine-clearing mission has been accomplished. The kit is being adapted to permit mounting the roller on the Abrams tank.

New battery being tested

A new low maintenance, lead-acid battery, which is under test at the Army's Belvoir Research and Development Center, may be a major step in the development of a practical power system for electrical vehicles. This gelled electrolyte battery differs from standard wet cell batteries because its sulfuric acid electrolyte is suspended in a gel of fumed silica and phosphoric acid. This feature eliminates the need to add water and increases the life of the battery.

In addition to low maintenance and longer life, the new battery requires less time to recharge — only 5 hours compared to 10 hours for a wet cell system. Also, the wet cell battery has a limited life of about 180 recharge cycles, whereas the gelled electrolyte battery is expected to endure 290 or more recharge cycles within the same driving range.

BRACKETING THE DWELL TIME

by Major Philip J. Millis

The notion of deep attack, or interdiction of the enemy's follow-on forces, is a key to success in the AirLand Battle. The Fire Support Mission Area Analysis showed convincingly that a successful attack of enemy forces *before* they join the frontline battle will degrade the enemy's strength, reduce his attack momentum, and thereby provide time for friendly forces to defeat engaged echelons and to make the transition from defensive to offensive operations. Field artillerymen are now faced with the challenge of implementing AirLand Battle doctrine in an environment of scarce resources and with less than perfect information. They must take the lead in developing the procedures that will allow the delay, disruption, and destruction of enemy second-echelon targets.

Many forward-thinking fire supporters have already managed to stamp out the brush fires of everyday mission requirements long enough to apply their talents to the challenge. The evidence is the innovative work which has addressed the thorny issues of target value analysis, target location error, enemy templating, and target cell operation (to name just a few of the items discussed in articles appearing in the *Field Artillery Journal* within the past year). With the publication of each issue of the *Journal*, the state-of-the-art advances another step; and yet there remains much to address. One such issue involves target dwell time, or the anticipated duration of a target's residence at a given location. How, for example, can the fire support officer be confident, even after he has acquired, analyzed, and assigned an attack priority to a second-echelon target, that the target is still where it was last reported? Or, stated another way, when does a target become stale? Directing an attack on a vacated target area is not only embarrassing, but is a terrible waste of resources. Fortunately, there are some possible approaches to this problem that may yield a workable solution in the absence of better information.

The concept of dwell time is not one which lends itself well to precision because of the multitude of variables which influence an enemy commander's choice of a time for movement. One of the most significant constraints in this regard is the sheer number of enemy units competing for road space at any given time. A threat unit commander's options for a starting time are limited in that he is generally obliged to move his unit according to a movement plan developed by some higher headquarters. Thus, it is impossible to predict a unit's departure time with absolute certainty without a detailed knowledge of the enemy force's movement tables.

It is possible, however, to approximate or bracket the window of time during which movement is most likely to occur. If, for example, one knows that the enemy generally prefers to conduct road marches under the cover of darkness, then one can use light data [beginning of morning nautical twilight (BMNT), sunrise, sunset, and end of evening nautical twilight (EENT)] for

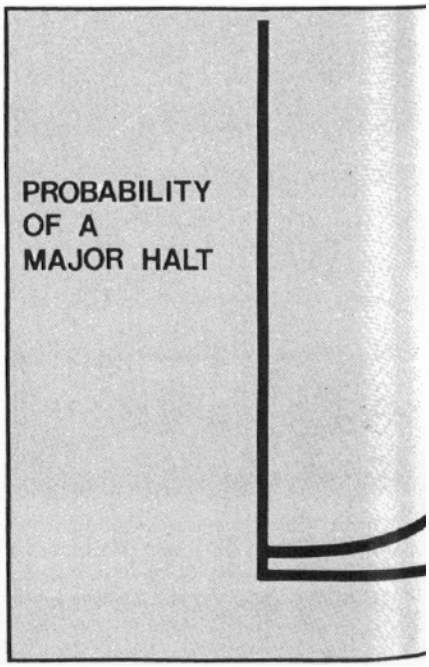
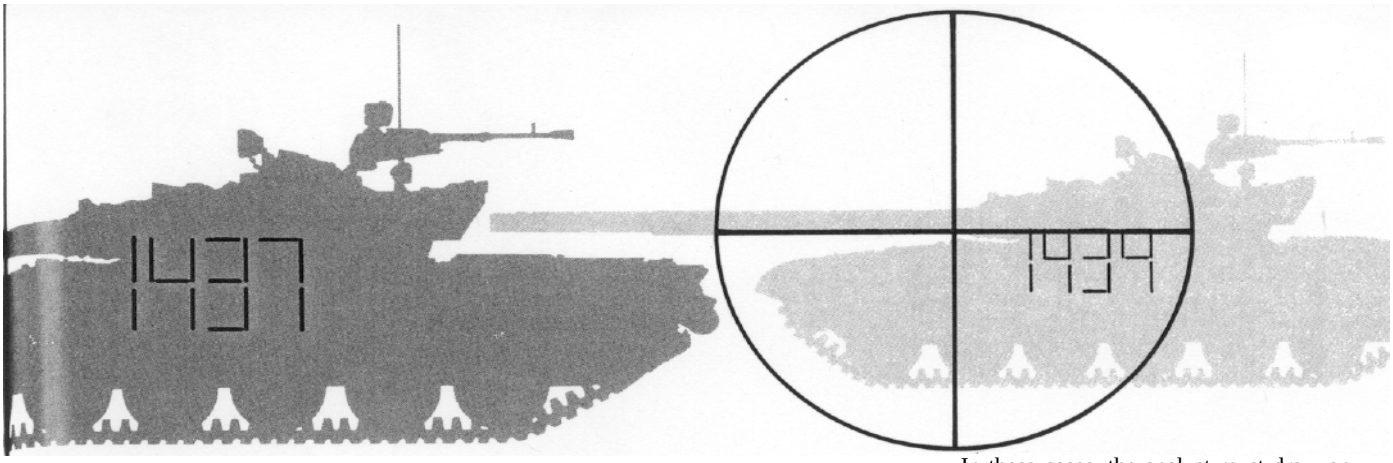


Figure 1. Probable movement window.

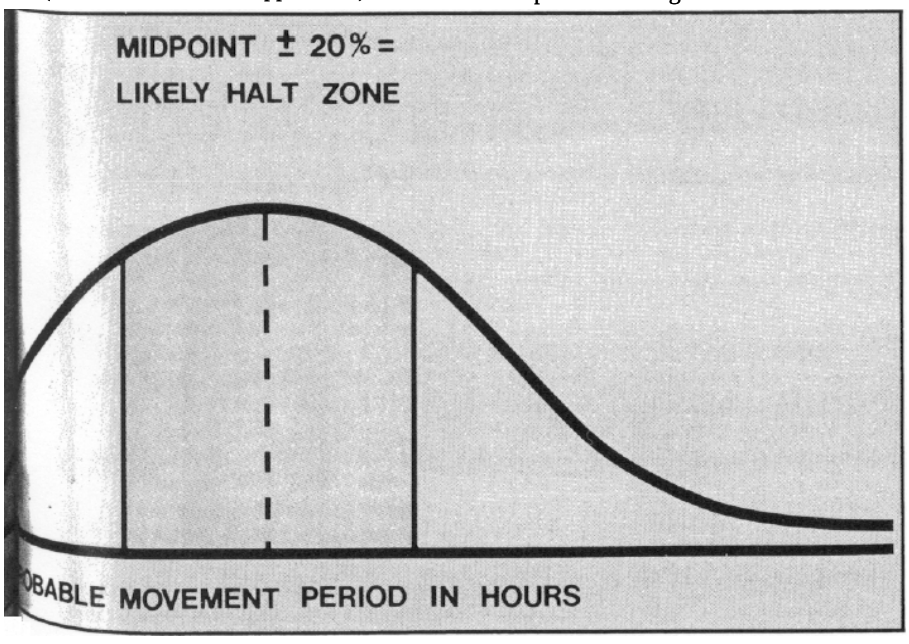


the appropriate latitude to determine those hours during which the enemy's second echelon would probably be moving and those hours during which these forces would more likely be resting or hiding in assembly areas. If one assumes that the targeted unit is likely to depart its assembly area and begin its night movement within two hours of darkness and if the end of evening nautical twilight will occur at 1800 hours and the target is sighted in an assembly area at 1400 hours, one can determine that the unit is unlikely to move within the next four to six hours. To account for the possibility that the unit will move in less than two hours of EENT, one can subtract an hour from the upper limit, thus making the estimated dwell time four to five hours. The formula for this calculation would be:

EENT – sighting time =
shortest probable dwell time
(add one hour for the upper limit)

Once an estimated dwell time has been established for the targeted unit, attack assets may then be coordinated for an interdiction operation.

This example works well enough if an enemy unit prefers to move at night and is spotted during the day, but what about the more difficult case in which the unit prefers to move under the cover of darkness and is reported halted during its night movement? Here the question is primarily whether the sighted unit is at a halt of short or long duration. If the sighting is made visually (e.g., by a pilot returning from a mission), a description of the unit's activity may accompany the report, thereby allowing analysts to distinguish between a temporary halt and an extended halt for rest, food, fuel, and maintenance. Typically, however, sightings at night more often come from indirect sources such as radar, signal intelligence, or remote sensing devices which may not give the analyst a very good description of the target unit's activities.



In these cases, the analyst must draw on common sense and his knowledge of enemy doctrinal norms with regard to the conduct of road marches. Standard threat references [e.g., FM 100-2-1, FM 30-102, and *Soviet Army Operations* (the well-known "Red Book")] report that Warsaw Pact forces will typically make one two- to four — hour stop during a road march of 24 hours or longer, with shorter halts of 20 to 30 minutes occurring every two to three hours, but no halts at all are made during the night. But this knowledge is really of little use in solving the problem of dwell time because a march in excess of 24 hours at an average speed of 30 kilometers per hour could move the unit more than 500 kilometers and would thus apply only to forces having to travel a very great distance from their garrison locations (e.g., from the western districts of Russia) to the line of contact. It would not apply, therefore, to second-echelon forces advancing across East Germany and Czechoslovakia. Thus, the references bring the analyst no closer to determining the dwell time for second-echelon units than before; so common sense must be applied. The consideration ought not to be what standard texts say the Soviets *should* do, but what analysts intuitively know they *must* do.

• First, it seems reasonable to accept a rest period averaging 10 minutes out of each hour, which equates to the 20- to 30-minute halts discussed above. The threat commander could use this time to issue any additional instructions while his drivers stretched their legs and checked their vehicles' engine oil, water, and fuel levels. Such a halt would probably entail only pulling off to the side of the road to allow other traffic to pass and would rarely require support from outside the unit's immediate assets.

• Second, it seems fair to assume that, at some point near the midway mark of a longer march, the column would halt in an off-road rendezvous area to feed troops, change drivers, refuel, and service the unit's vehicles.

A road march of any substantial length would likely occur only during periods of extended darkness, say 10 hours or greater. A movement occurring during these hours would likely involve one or more short rest halts and one major halt. The long halt may vary in length depending on the unit type and weather conditions; but a base value of 30 minutes might be added to allow for tightening track tension if the column has armored vehicles, 15 minutes more added to account for poor road conditions (ice or snow), and perhaps some additional time (say 5 to 10 minutes) added for a major halt caused by poor visibility conditions.

• Third, it seems likely that, as daylight approaches, a threat commander will become increasingly anxious about being observed by a passing aircraft and will hasten his arrival at the planned assembly area so that the unit will have time to prepare adequate concealment before the sun rises. It seems doubtful, then, that he would call a halt within two hours of BMNT; rather, he would elect to press on, knowing that he can better rest his personnel and service his vehicles in the relative safety of an assembly area. Therefore, if the unit has stopped moving and there are less than two hours of darkness remaining, it can be assumed that the unit has already occupied an assembly area. (The two-hour cutoff figure is merely a reasonable figure to use for analysis.)

Now it is possible to start focusing on whether the unit is at a minor or major rest halt by dividing the hours of darkness into time blocks. As an example, take the case of a road march in the dead of winter when there are 14 hours between EENT and BMNT. If one accounts for the movement preparation and occupation periods by subtracting three hours (the sum of EENT plus one hour and BMNT minus two hours) from the 14-hour darkness total, there remains a working figure of 11 hours in which the move is most likely to occur. Because the total period of darkness exceeds 10 hours, one can assume that the column will indeed be making a major halt and that the halt will take place at the appropriate midpoint of the movement period, plus or minus 20 percent of the total period. Halts observed outside the combined 40 percent are assumed to be of the 20-to 30-minute minor halt variety.

Here is a sample problem based on the preceding discussion.

Situation: *Date/time group — 192330Z December 1986. A Warsaw Pact armored unit of the second echelon is reported at a halt from a march. Skies are clear. Roads have a snow-packed surface.*

Problem: *Approximately how long can one expect this unit to be in the target area?*

Answer: *The first step is to determine which of the dwell rules are relevant to this situation. By consulting a light data reference for this region and counting the number of hours between EENT and BMNT, one learns that there will be 13 hours of darkness tonight, which means that the rules for extended periods of darkness will apply.*

The assumption is that the unit will make a major halt. Three hours are subtracted to account for preparation and occupation time which leaves 10 hours for the movement period. Multiplying the 10 hours by 20 percent (two hours) will determine whether 2330 hours falls into the middle 40 percent area in which a major halt is more likely to occur. In this case, it does; so the following factors are appropriate:

0.5-1.0	hours (base value for long halt)
plus 0.5	hours (armored-vehicle factor)
plus 0.25	hours (unfavorable road factor)
1.25-1.75	hours (anticipated total halt or dwell time)

Now, as the common-sense check on the dwell time determined, it is safe to assume that the unit will halt for 20 to 30 minutes at other times during the march, probably once before and once after the major halt. Thus the unit would not halt more than three hours (1.75 + 0.5 + 0.5), which leaves seven hours for movement at an average rate of approximately 30 kilometers per hour. The unit, therefore, could advance more than 200 kilometers during the extended hours of darkness, which is more than enough distance for it to keep pace with or close on first-echelon forces in contact along the forward edge of the battle area.

This solution of the dwell time problem is far from perfect in that it is really only an educated guess, however well founded in logic. It does not, for example, address the fact that there may have been a time lag between the unit's stopping time and its acquisition by a sensor system. If one has reason to believe that the sighting was made at some time subsequent to the unit's actual halt time, halving the total calculated dwell period may be appropriate to account for that uncertainty, which in the sample problem would result in an anticipated total halt time of only 45 to 60 minutes. This time may be enough for a Lance mission if the target were appropriate and in range, but would be too little time for an effective airstrike.

Other considerations would be those unlikely situations in which a second-echelon unit is sighted at a halt during a daylight move, even though the enemy commander's wish was to confine his movements to hours of darkness. In this case, one must assume that the unit will spend as little time halted as possible — certainly not more than 20 or 30 minutes for rest.

Some readers may feel that the validity of this approach has been excessively diluted by the numerous assumptions made throughout the analysis. But, without making those assumptions, it is impossible to tackle the very problems that heretofore were confined to the "too-hard box." Armed with the result of this analysis, targeting specialists can now apply statistical techniques to determine the probability that the target will still be in the target area upon arrival of the designated attack system. Fire support agencies can now establish some probability "drop dead" value which would represent the lowest acceptable figure below which expenditure of ammunition would not be justified. And, if the procedures seem too cumbersome for manual operations, they easily lend themselves to automation on any of several microcomputer systems.

Whatever its merits, however, this approach is hardly a panacea. The problem of bracketing the dwell time will continue to plague targeters until the Army fields a real-time target acquisition and guidance system capable of observing the entire battlefield to the limits of the commander's area of influence. Even though the proposal presented here may be an imperfect solution, it does allow fire support targeters to reduce the problem to somewhat more manageable proportions and, by so doing, better serve those whom they support.

MAJ Philip J. Millis, FA, USAR, received his commission through ROTC at Colorado State University. His active duty experience includes ROTC instructor duty, two battery commands, and target analyst responsibilities at both division and corps levels. He is currently employed by a major defense contractor as an operations analyst specializing in intelligence, surveillance, and target acquisition. He also serves as an exercise development officer for the 80th Division's Maneuver Training Command in Richmond, Virginia.

Pump Up the Ump

by Brigadier General Donald E. Eckelbarger

Over the past few years the Army has invested significant time and effort in determining how to use new technology to make peacetime field training exercises and command post exercises more realistic. The Computer Assisted Map Maneuver Exercise and the Multiple Integrated Laser Engagement Simulation System (MILES) are only two examples of how such technology has provided a greater opportunity for the ground-gaining arms to achieve combat realism during training exercises. The National Training Center has integrated the MILES into a computerized battle damage assessment system. Until recently, however, the available technology has not permitted field artillerymen to incorporate the realistic effects of indirect fire into training exercises. The effects of indirect fire weapons, as all artillerymen who have been fire support umpires can testify, are for several reasons—time limitations, the inherent unreality of simulated fires, and maintaining accurate locations for firing and target units when both are making frequent displacements — especially difficult to assess. The lack of timeliness, in particular, has made it extremely hard for our maneuver comrades to gain an appreciation of the devastating effects of artillery fire. During the Confident Enterprise portion of REFORGER '83, however, the staff of the VII Corps Artillery furnished that realism by pumping up the umps with the technology of TACFIRE. The realism made the entire exercise a better learning experience for the 61,000 American and Allied forces — Redlegs and maneuver soldiers alike. As the 3d Infantry Division commander, who was the senior umpire, later emphasized, "The important point of a field training exercise is not that the force punch through; it's that the learn something — and unless the impact of the artillery is completely assessed, they're not going to learn." Here is how VII Corps made it happen.

The VII Corps Artillery engineered a major breakthrough in indirect fire battle damage assessment by harnessing the technology inherent in the TACFIRE system. In past exercises, battle damage assessment was a slow, cumbersome process which involved

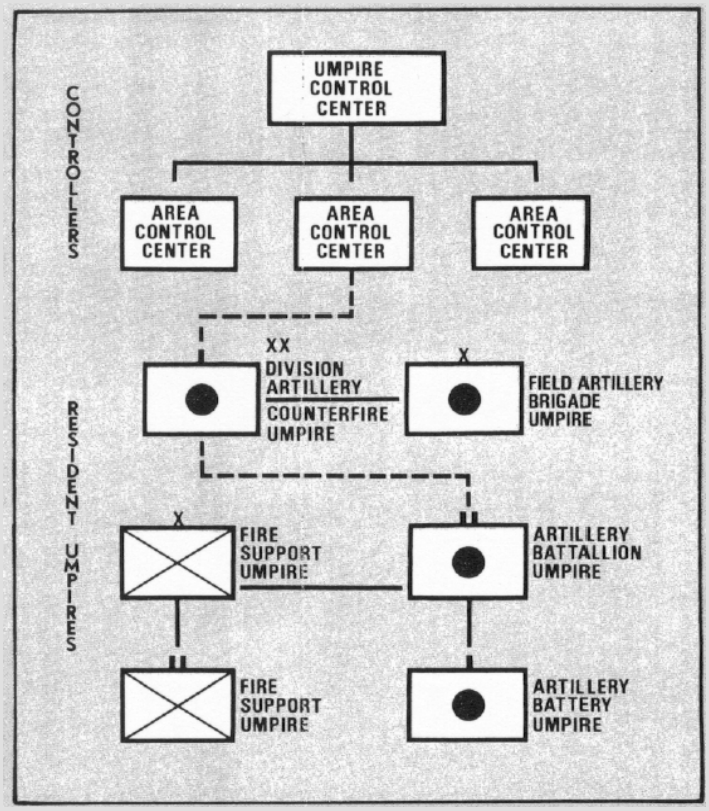


Figure 1. VII Corps Artillery umpire structure for REFORGER '83.

FM voice communications and manual recording procedures. The old system could not keep up with the flow of the battle. TACFIRE's rapid digital transmission of fire mission data allowed umpires in REFORGER '83 to assess battle damage to both maneuver and artillery units within minutes of actual engagement.

The VII Corps Artillery, which was not TACFIRE-equipped at the time, was able to borrow the necessary TACFIRE hardware from V Corps Artillery units, which did not participate in the exercise. This first largescale use of TACFIRE as an umpiring aid meant that the umpiring system would be traveling uncharted waters.

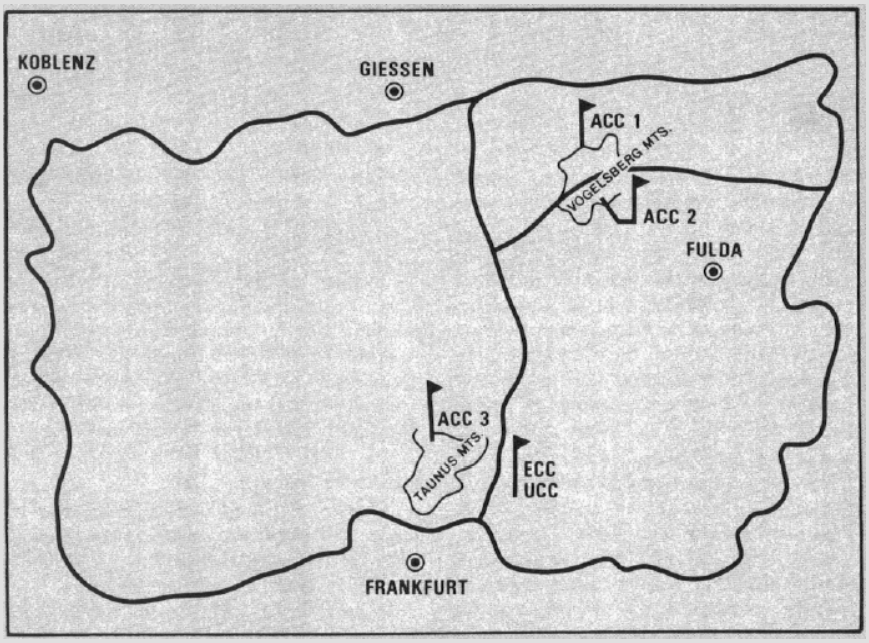


Figure 2. Sketch of the Confident Enterprise exercise area.

While it was not necessary to invent a completely new umpiring system, some revisions were necessary to accommodate TACFIRE-peculiar techniques. Figure 1 depicts the basic umpiring structure. Despite TACFIRE technology, the system was still equipment-and manpower-intensive. It required 118 officers, 448 enlisted soldiers, and approximately 170 vehicles. The umpire system was organized in two tiers — resident umpires and controllers. Resident umpires were located at each level from firing battery to division artillery and at each maneuver battalion and maneuver brigade. Their responsibilities were to arbitrate the battle, assess battle damage, and forward reports to the area control centers (ACC). As indicated by their title, the controllers orchestrated the pace of the war from three area control centers and the umpire control center.

Based on an extensive study of communications within the maneuver box, the VII Corps Artillery staff positioned the three area control centers as shown in figure 2 — one in the north, one in the center, and one in the south of the exercise area. It was at these area control centers that the key activities of the REFORGER umpire system took place. Using a variable format message entry device, personnel manning these centers monitored player message traffic in their respective areas of responsibility.

Controllers passed information to and from an umpire control center (figure 2) and made decisions concerning developments on the battlefield. The artillery controllers at the umpire control center were responsible for monitoring the activities of the three area control centers, providing mobile umpire assessment teams to troubleshoot, and collating all indirect fire information for use by the chief umpire. The umpire control center was adjacent to the player's exercise control center to help keep the exercise director abreast of the dynamic battlefield situation that characterized the free-play exercise. Controllers frequently used a 3d Infantry Division training aid, called the Wonder Map, for this purpose. This 20- by 40-foot, 1:7,500-scale map was color-coded according to terrain features and displayed one-tenth the size scale models of tactical vehicles (tanks, howitzers, Lance launchers, etc.) which represented the location of company-sized units on the battlefield.

As mentioned, Confident Enterprise, was characterized by fast-moving situations; consequently, if fire missions were to have any significant impact on the outcome of engagements, they had to be processed rapidly. The

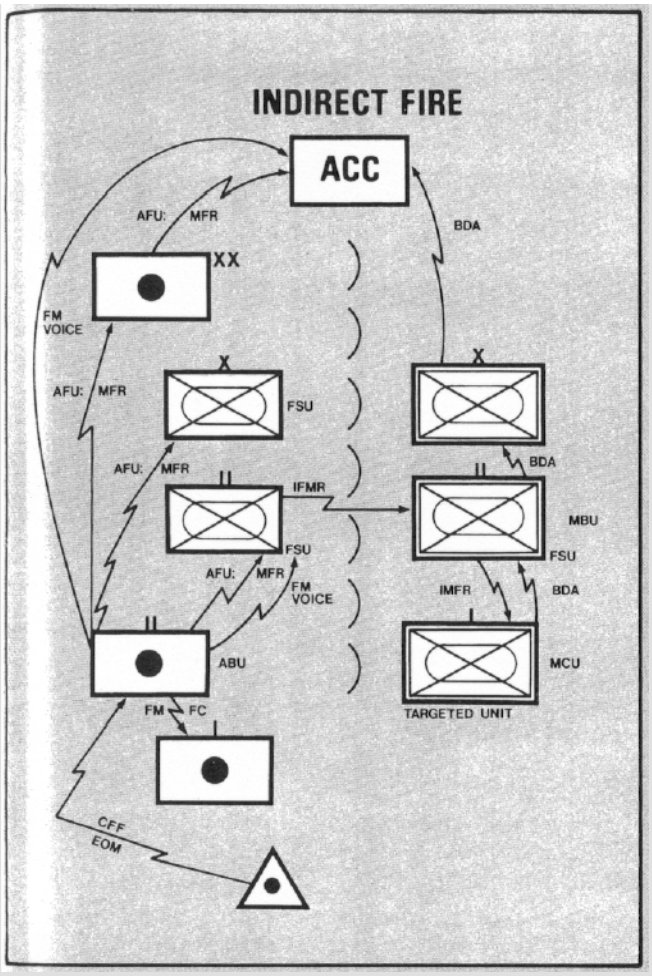


Figure 3. A typical indirect fire scenario.

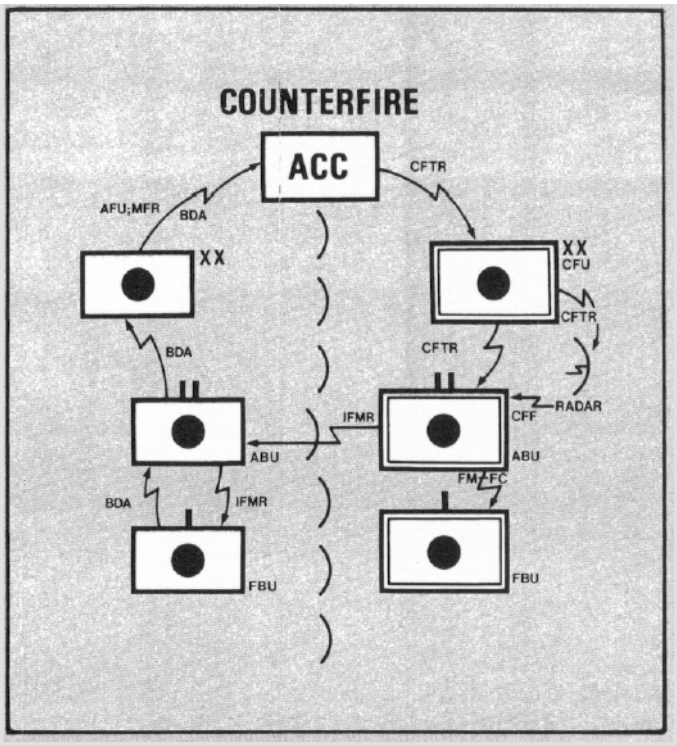


Figure 4. A typical counterfire scenario.

expeditious processing of fire missions and the determination of battle damage were enhanced by dividing missions into three categories — observed fires within 500 meters of the target grid, unobserved missions within 200 meters of the target grid, and counterfire. Counterfire targets were accepted if, in the judgment of the counterfire umpire, a firing unit could be detected based on the player's target acquisition radar cueing schedules, sectors of search, and operational status of sound and flash systems.

Processing of observed and unobserved fire missions followed similar procedures. A typical umpiring scenario for an observed fire mission would unfold as depicted in figure 3. A Blue forward observer would initiate a call for fire with his digital message device. Upon completion of the firing, the Blue observer would transmit an end-of-mission message. Once this message was processed at the Blue battalion TACFIRE computer, the artillery battalion umpire located there would ensure that all variable format message entry devices located with the fire support umpires received the "ammunition fire unit; mission fired report" (AFU;MFR). The AFU;MFR contained the data required for entering the umpires' table for battle damage assessment. If the AFU;MFR transmission did not occur, the artillery battalion umpire would immediately send the report to the Blue maneuver battalion fire support umpire and to the area control center by radio voice transmission. The Blue maneuver battalion fire support umpire, after receiving the AFU;MFR from the variable format message entry device at the Blue maneuver battalion (or by FM voice), would use the brigade fire support umpire net to forward the fire mission data (indirect fire mission report) across the forward line of own troops to the opposing Orange maneuver battalion fire support umpire. The Orange fire support umpire would use this data to determine whether the target grid met the established criteria for observed fire. If there was no target within 500 meters of the target grid, the umpiring mission sequence was halted. If, however, an element of the Orange battalion was within 500 meters, the Orange fire support umpire would immediately give the attack data to his Orange maneuver battalion umpire in order to place the artillery mission into maneuver umpire channels. The Orange maneuver battalion umpire would then pass this information to his maneuver company umpire at the targeted Orange unit. The culmination of this process occurred when the maneuver company umpire passed the battle damage assessment through channels to the area control center.

Counterfire missions differed slightly in that they remained totally within artillery umpire channels. As shown in figure 4, the counterfire mission sequence would begin when the area control center received the AFU;MFR from the Blue division artillery on the variable format message entry device. The AFU;MFR would be passed to the opposing Orange artillery controller at the area control center where appropriate counterfire information for a counterfire target report would be extracted and passed to the counterfire umpire at the Orange division artillery. If, in accordance with previously-mentioned criteria, the firing Blue unit could not be detected, the umpiring procedures would be terminated. When a Blue unit could be detected and located by radar and when an Orange artillery battalion was sent a call for fire, the Orange counterfire umpire would contact the Orange artillery battalion umpire with the firing battalion and provide the counterfire target report of the acquired Blue unit. The artillery battalion umpire of the Orange counterfire unit would pass the target engagement data

(indirect fire mission report) across the forward line of own trops to the acquired Blue artillery battalion umpire, who in turn would notify his resident Blue battery umpire of the artillery attack on them. These resident umpires would complete the counterfire process by informing the unit of the incoming fire and accessing the battle damage.

In all cases, battle damage assessments for observed fires, unobserved fires, and counterfire were fed back to the umpire control center where the data was compiled to determine the artillery effects on the battle. Because the artillery umpires were literally "taped into" the player unit's TACFIRE system, processing of fire missions averaged 10 minutes from target identification to battle damage assessment — a significantly shorter time than was achieved by previous artillery umpire systems. The same average processing time held true for counterfire missions. Both maneuver soldiers and Redlegs were thereby given a deeper appreciation for the effects of enemy artillery.

Preparation for implementing this new umpire system included a three-day school sponsored by the 3d Infantry Division. All personnel were required to have a thorough understanding of the umpiring system, but the field artillery umpire's job was especially difficult. Not only did he need to learn the intricacies of the maneuver system (e.g., calculating battle damage for direct fire weapons, air attacks, and minefield damage), but he also needed to know the specifics of a TACFIRE system on which he probably had little previous experience. Of course, learning TACFIRE was also a beneficial training experience for the umpires.

As with any untested system, field artillery umpires experienced TACFIRE start-up problems that hampered their immediate success. For example, maneuver and fire support umpires often failed to coordinate closely their activities, assess the current battle damage, or, at times, agree on the location of the forward line of own troops. Technical problems also hampered umpire operations to a certain degree. Sufficient FM frequencies were not available for umpire use, which resulted in overcrowded umpire nets and delayed mission processing. Also, the failure of player units to enter the "end-of-mission" code required to initiate TACFIRE message traffic was a frequent irritation in the beginning; but it ceased to be a major problem as the exercise continued. In an effort to correct these unforeseen deficiencies, both Blue and Orange artillery umpires conducted several work sessions during the exercise. All umpires then assumed a more extensive role in assessing the effects of artillery fire and were thereby very successful in remedying the initial difficulties.

The overall results of the two-week exercise were encouraging. The majority of the more than 2,000 fire missions shot during this period were assessed by the umpires. Discussions with maneuver commanders and umpires indicated that indirect fire was responsible for disabling, neutralizing, or destroying (primarily by FASCAM and DPICM) about half of the tracked and wheeled vehicles. Nearly 75 percent of the assessed casualties were caused by indirect fire. At one point during the exercise, 15 umpires in quarter-tons gathered together to assess the results of a recently completed battle. The fire support umpire played a major role in interpreting the damage. When the smoke finally cleared and the meeting broke up, the player maneuver commanders walked away shaking their heads as they realized just how many casualties and equipment losses were caused by indirect fire alone. Offensive forces used artillery fires repeatedly to break strongpoints and support attacks, while defensive forces reciprocated by blocking, blunting, and canalizing their foes with invisible "incoming." More than one major attack was halted or slowed significantly by massed artillery fires. By the end of the exercise, it was apparent that field artillerymen now had an artillery umpire system with the potential to make the force of the field artillery felt on the training battlefield.

BG Donald E. Eckelbarger received his commission from the United States Military Academy. A graduate of the Industrial College of the Armed Forces, he has an M.S. degree from George Washington University. He has served in Korea, Vietnam, Germany, and the United States. His previous field artillery command positions include battery command of A Battery, 1-22d FA, battalion command of the 1-78th FA, and command of the 3d Armored Division Artillery. The Assistant Commandant of the US Army Field Artillery School from 1981 to 1983, Brigadier General Eckelbarger is now the Commanding General of the VII Corps Artillery.

View from the Blockhouse

FROM THE SCHOOL

Journal notes

The *Journal* has tabulated the results of the biennial readership survey. Over 38 percent of the subscribers polled responded, and their comments confirmed the soundness of the *Journal's* editorial policy to publish a wide variety of articles, letters, and features addressing the most controversial issues in the fire support arena. In fact, the vast majority of the sampled readership found the *Journal* useful, attractive, easy-to-read, and stimulating. They favored the publication of an increasing number of pieces that provided solutions to the problems that fire supporters confront daily. It was, therefore, not surprising that the readership selected Captains Patrick C. Sweeney and Joel A. Buck's "Split-Battery Defense," which appeared in the January-February 1983 issue, as the best article of the year. Captains Sweeney and Buck will share the accompanying $200 award provided by the United States Field Artillery Association. Lieutenant Colonel Clayton R. Newell's "The Fog of War" from the September-October *Journal* won the votes of the editorial staff. He too will receive a $200 prize. The most popular cover, "Steal the Night Away," was from the November-December 1983 issue.

Individual comments provided by responding readers have proved most helpful to the *Journal* staff which remains dedicated to providing the very best in thought and image to its highly professional readers.

Journal Staff

On 2 July 1984 Mrs. Joanne Brown joined the Journal as its Circulation Manager and Secretary. She will manage the constantly changing mailing list and produce the voluminous correspondence that the *Journal* exchanges with fire supporters world-wide.

Address Verification

The some 1,800 units, offices, and individuals who receive DOD-provided copies of the *Journal* will need to return promptly the request for address verification mailed in early August. Failure to respond by 1 October 1984 will result in removal from the *Journal's* mailing list. This requirement does not apply to individuals who subscribe to the *Journal* through the United States Field Artillery Association.

Fire Support Conference

The Field Artillery School plans to hold the annual Fire Support Conference from 30 October to 1 November 1984.

The Order of Saint Barbara

The gala season of field artillery balls and Saint Barbara celebrations is fast approaching. Commanders who intend to present the Order of Saint Barbara to the "very best of stonehurlers, archers, catapulters, rocketeers, gunners, and their military and civilian supporters" should act soon to request appropriate certificates and accouterments from the United States Field Artillery Association. The Association's address is P.O. Box 33027, Fort Sill, Oklahoma 73503; its commercial telephone number is 405-355-4677. Requests should conform to the format outlined in the "Order of Saint Barbara and Artillery Order of Molly Pitcher User's Packet" mailed around 1 August 1984 to all field artillery commanders in of the rank of Lieutenant Colonel and above. All requests must be accompanied by fully completed applications and advanced payment.

This year for the first time the United States Field Artillery Association is offering, in addition to the official medallion, an 8-inch statue of the Patron Saint of Artillery for presentation to members of the Order of Saint Barbara. The large anticipated demand for these statues when coupled with an early November contractor production date may result in significant delays in initial deliveries. Patience, however, will be rewarded; the quality of this handsome statue is first rate.

The Artillery Order of Molly Pitcher

Mary Ludwig Hays — better known as Molly Pitcher — like so many other artillery wives, shared the rigors and rewards of her husband's military career. But, unlike virtually all other artillery wives, she also distinguished herself in battle. The day of 28 June 1778 was hot and dry, and the patriot cannoneers who serviced the pieces on the battlefield at Monmouth needed water both to cool their guns and quench their thirst. Mary Ludwig Hays earned her nickname "Molly Pitcher" for bringing pitcher after pitcher of refreshing water to the parched troops. Soon after she had carried a wounded Continental soldier on her back to the rear — out of reach of hard-charging Britishers — she saw her husband fall wounded. Without hesitation she stepped forward and took the rammer staff from his hands. Resolutely she stayed at her post in face of heavy enemy fire, ably acting as a matross (gunner). For her heroic role, General Washington himself issued her a warrant as a noncommissioned officer. Thereafter she was widely hailed as "Sergeant Molly." A flagstaff and cannon have been erected at her gravesite at Carlisle, Pennsylvania, and a sculpture on the Monmouth battle Monument memorializes her courageous deeds.

Today the spirit of the gallant "Sergeant Molly" lives on in the Artillery Order of Molly Pitcher, a military society which occupies a central position in the traditions of the United States Field Artillery (this term includes the United States Army Field Artillery and the Marine Corps Artillery). Its membership is limited to those women whose service to the Field Artillery Community exemplifies the spirit of sacrifice and devotion of Molly Pitcher. It links these women in a sisterhood of voluntary contribution which perpetuates the essence and significance of Molly Pitcher, in whom the Order finds its symbolic heart and soul.

An English-finish medallion with neck chain and appropriately annotated certificate constitute the award of membership in the Artillery Order of Molly Pitcher. The certificate will bear the signature block of the senior field artillery commander (full colonel or above) in a given field artillery community. An attractive red presentation folder which is suitable for framing is an optional part of the award packet. One does not need to be the wife of a field artilleryman to receive the award. An individual can receive this honor only once in her lifetime.

The Commanding General of the United States Field Artillery Center and Fort Sill has decentralized the award authority for the Artillery Order of Molly Pitcher to the field artillery commanders (full colonel or above) in the field (i.e., division artillery commander, field artillery brigade commander, Army artillery group commander, or corps artillery commander). Commanders in the field can approve the award for ladies in their communities ("in the field" includes the field artillery commanders and major activity directors in the rank of full colonel or above at the Field Artillery Center and Fort Sill). When there is no field artillery commander (full colonel or above) available, the Commanding General of the United States Army Field Artillery Center and Fort Sill is the approving authority for bestowing the honor of membership in the Artillery Order of Molly Pitcher.

When, either through personal knowledge or through the recommendations of members of his chain of command, a field artillery commander in the field becomes aware of an individual who may be worthy of admission into the Artillery Order of Molly Pitcher, he must first verify that the individual does indeed meet the criteria. Having done so, he must decide on which elements of the packet he wishes to present (medallion with chain, certificate, red presentation folder). Then he must send a *fully completed* request, including the full name of the candidate, the projected date on which the award is to be made and *payment in advance* for desired award paraphernalia and postal and handling charges through the Executive Director of the United States Field Artillery Association.

There is no special format for the letter of justification required to accompany those nominations of women who are not members of a chain of command supervised by a field artillery commander (colonel or above), but it obviously must contain enough specific detail about the candidate to enable the Commanding General to make an informed decision. If the Commanding General decides that the justification does not merit the honor, then the Field Artillery Association will refund the full payment to the requestor.

The routing of requests within some USAFACFS agencies requires special mention. Department or Directorate directors within USAFAS must submit their nominations of spouses of military personnel to the Field Artillery School Brigade Commander through the appropriate battery commander and battalion commander of the spouse. The Field Artillery School Brigade Commander will forward the *fully*

completed order form and *payment in advance* to the Field Artillery Association. Major activity directors (with the exception of the Deputy Assistant Commandant) in the rank of full colonel or above within USAFACFS must submit their nominations of spouses of military personnel to the Deputy Installation Commander through the appropriate battery commander of the spouse and the Headquarters Commandant. The Deputy Installation Commander will forward the approved *fully completed* order form and *payment in advance* to the Field Artillery Association. Nominations of women not married to military personnel within USAFACFS must be submitted through the appropriate channels to the major activity director, who will forward the approved *fully completed* order form and payment in advance to the Field Artillery Association.

Members of the Artillery Order of Molly Pitcher should wear their award with intense pride and decorum. They must, however, be extremely judicious in their choice of occasions for wear in order not to demean the dignity of the Order and solemnity of the tradition.

The "Order of Saint Barbara and Artillery Order of Molly Pitcher User's Packet" mailed around 1 August 1984 to all field artillery commanders at battalion level and above contains a model order and a price list. The anticipated heavy demand for the Molly Pitcher Award places a premium on early submission of requests.

Lance and TACFIRE

Lance now has its own tactical data system — the Fire Direction System (FDS) — which will fully interface with TACFIRE. The Fire Direction System uses components from the same Battery Computer System used for cannon artillery but with a program especially designed and tested for the Lance missile. The first Lance software version, which is part of Package 5 for the Field Artillery Tactical Data Systems, was released on 11 June 1984.

Telos Federal Systems, developer of the Lance Fire Direction System program, and the Field Artillery School's Weapons Department have formed New Equipment Training Teams to train Lance personnel worldwide in the use of the new equipment.

To complement the Fire Direction System, a version of the Backup Computer System is on the drawing board, and fielding should start in September 1985. Refinement of the tactical data systems software is continuously being sought, and the results of these efforts are package tapes which are sent to the field to provide the user a better system.

The Field Artillery School solicits input from the field concerning anomalies discovered in fielded systems or suggested improvements for future package tapes. Send comments to Commandant, US Army Field Artillery School, ATTN: ATSF-CT, Fort Sill, Oklahoma 73503 or call the 24-hour Software Reporting Hotline on AUTOVON 639-4867.

Training at Fort Chaffee

Units seeking a suitable training area within the Continental United States might wish to consider Fort Chaffee. Located in northwest Arkansas near the Oklahoma border. Fort Chaffee offers a wide variety of terrain which provides a challenging and realistic training environment. In addition to the more than 70,000 training acres, Fort Chaffee has enough barracks and other facilities to fulfill the training needs of more than 30 battalions. A tactical, earthen C-130 airstrip and two drop zones are available for units desiring to conduct emergency deployment readiness exercises. Three prepared bridge training sites are available for river crossing operations.

A publication entitled *A Guide to Training Opportunities* provides a listing of ranges, firing points, observation posts, and other training and administrative facilities available for use at Fort Chaffee. The training guide can be obtained by writing to Headquarters, US Army Garrison, ATTN: ATZR-Z-OPS, Fort Chaffee, Arkansas 72905 or by calling AUTOVON 962-2206/2466 or commercial (501) 484-2206/2466.

The old "75"

The 75-mm pack howitzer can be converted to a saluting weapon M120. Those units who wish further information on applicable publications, conversion instructions, and a listing of parts may contact USAMCCOM DARMC-MAL-S(R), Rock Island, Illinois, 61299; AUTOVON 793-5061 or 6304.

Correction

In the interest of promoting historical accuracy, the Center of Military History routinely reviews historical articles which appear in the *Field Artillery Journal.* It appears that "Faithful and True," the history of the 5th Field Artillery Regiment which appeared in the March-April 1984 issue, erred in reporting the following facts:

- The senior regiment in the Regular Army is the 3d Infantry, not the 5th Field Artillery. The 1st, 3d, and 5th Field Artillery Regiments — all organized on 31 May 1907 — are the senior Regular Army field artillery regiments.
- Colonel T. N. Dupuy commanded the 5th Field Artillery Battalion, not the 1st Battalion, 5th Field Artillery.
- The claim concerning who fired the first American artillery round in World War I is still open for debate.
- After occupation duties in Germany, it was Battery D which was designated as the 1st Battalion, 5th Field Artillery.

DOING CUEING

by Captain John M. House and Captain James K. Hogue

Only the hum of the generator breaks the stillness of the quiet night. A soft glow from the light over the map drum fills the inside of the Firefinder radar shelter. Suddenly a radio crackles to life with a message: "Neutralize." Faint rumblings are heard over the power unit noise as the radar operator quickly presses buttons to energize the Firefinder system. A light appears on the map drum as the target alarm sounds inside the shelter. The Firefinder locates four targets and ceases radiating — waiting patiently to pounce on another unsuspecting hostile target.

The AN/TPQ-36 and AN/TPQ-37 Firefinder weapon locating radars are awesome. Their ability to locate hostile indirect fire weapons is astounding. Virtually nothing escapes their detection — multiple batteries or multiple weapons are quickly and accurately located. However, the wealth of data generated by the Firefinder radar can easily overwhelm the targeting system. That is why radar cueing must evolve from the commander's attack criteria, which is itself the result of a careful consideration of factors such as the counterfire goals, target value analysis, ammunition haul capability, and hostile capabilities to acquire friendly weapons and radars. A unit simply cannot afford to fire on every target detected and then run out of ammunition as a lucrative target appears. Also, any weapon firing is subject to hostile counterfire; and any electronic emitter risks detection and subsequent destruction when it radiates. Cueing, therefore, is the key to effective and efficient acquisition.

A cueing plan for radars is more complex than a similar plan for cueing sound ranging systems. After all, sound cueing can be accomplished easily if the sound observation post is far enough in front of the microphone base to key the AN/TNS-10 in sufficient time to print the data received from the microphones. Nevertheless, there are several cueing options for a Firefinder cueing plan. Here are two of them:

• Cueing the radar at the same moment that the hostile weapon fires would of course be ideal; but without an ear in the hostile fire direction center, it is not achievable. In order to ensure that the radar emits only when a hostile weapon is firing, one might think that sound, flash, intelligence elements, or even fire support team (FIST) elements should cue the radars. But coordination of this cueing effort would be very difficult.

Sound and flash elements can cue only a limited number of radars. Practical experience suggests that a sound and flash platoon can cue only one radar; more than this number makes for a very complicated system since some elements must determine which radar to turn on for a given sector based on the hostile weapon location. Flash ranging has all but disappeared from a target acquisition battery's bag of tricks with the reduction of observation posts per sound and flash ranging platoon from four to two. Complicated coordination processes often take too much time in the confusion associated with a fluid, mechanized battlefield. Time is the enemy because, if the radar is not cued quickly, the hostile weapon may cease firing before it is detected. Additionally, this technique sacrifices detection of the first volley because it would be very difficult indeed to cue the radar quickly enough to detect the rounds on the ascending trajectory if the cueing process began when some element detected the hostile weapon firing.

Intelligence (S2 and targeting elements) can also be used to cue radars when information shows that hostile indirect weapons will be operating in a given sector or during a certain time period. Positive control of cueing in which some non-radar element tells a radar when to radiate and when not to radiate ensures that a radar only emits a signal when a hostile weapon fires or intelligence indicates such an event is likely. While this type of cueing is definitely worthwhile, it will often fail to achieve the overall mission of target acquisition which is to find enemy indirect fire weapons so they can be destroyed by counterfire.

Intelligence may show where hostile elements are located but will rarely be able to predict that a hostile battery or mortar platoon will fire at 0817 or any other specific time. Massing and movement of forces should indicate that certain types of maneuver and fire support operations are likely, but continuous radiation by radars must be limited due to the electronic warfare threat.

FIST personnel crowded inside an armored personnel carrier or tank bouncing through the countryside trying to keep up with a battle being fought by a maneuver commander in a similar vehicle have too much to handle without having to try to cue a radar.

• Another option for cueing the radars is scheduling, which fixes cueing at certain time intervals or at random time intervals spread within a certain time window. The duration of radiation is important, because too much emission time can result in electronic detection. Judging what cueing duration is "too much" is difficult since various classified and unclassified reports indicate different definitions for a maximum radiation time and an allowable total radiation time from one location. And concern about radar detection may tend to obscure the equally dangerous electronic detection of lengthy, repetitious radio transmissions. Such detection can also result in destruction or jamming. Scheduling provides a manageable number of targets to be engaged by friendly firing elements and limits the electronic signature produced by the radars, thus ehancing survivability. The scheduling technique is also achievable. Equipment, unit, and personnel authorizations and assignments in the real world can make this method of cueing work. The method reduces confusion and obtains targets and intelligence. Limited radio frequencies for voice communication are not overwhelmed as they might be if a controlling element on the net were constantly telling a radar when to turn off and on.

Figure 1 is an example of a time schedule. It shows the time intervals between radiation periods and the radiation window (shaded area) allowed the operator. The operator determines when to execute the two-minute radiation period during the radiation window. Such random selection inside the designated window

enhances electronic warfare survivability by precluding a regular pattern of radar activity which could lead to detection and destruction.

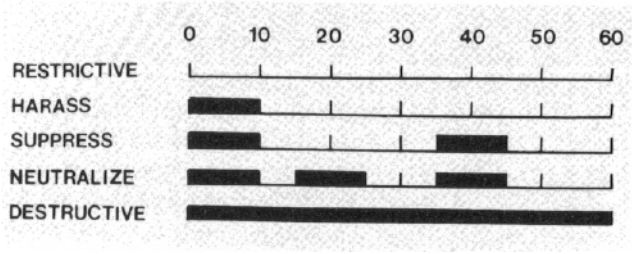


Figure 1. Example of a time schedule.

Given the constraints limiting the number of possible counterfire missions, the first action to take in determining a cueing schedule is to determine the number of targets that can be engaged. It makes little sense to go after all targets since lengthy target processing could permit many of the located hostile batteries to fire one or more missions or move before they could be effectively attacked. Clearing an excessive number of targets for fires inside and across maneuver boundaries would be extremely time-consuming. Coordinated fire lines and fire support coordination lines could speed the process somewhat, but not enough to keep pace with and penetrate the fog of war. Counterfire would be relatively useless; it would really only serve to enable friendly artillery to be detected and subjected to hostile counterfire. Radars should cease radiating once the target goal in the commander's attack criteria is achieved or the number of radiation periods per hour is met. (Firefinder radars could provide valuable information on the enemy order of battle if they are allowed to radiate for that purpose, but such additional radiation increases tremendously the risk to a radar's survivability.)

The following cueing options have proved useful in transforming commander's guidance or attack criteria as to the number of targets into a cueing system.

Mode proword	Radiations per hour	Target goal
RESTRICTIVE	0	0
HARASS	1	2
SUPRESS	2	3
NEUTRALIZE	3	4
DESTRUCTION	Constant or as specified	As specified

Each radiation period lasts for two minutes or until the target goal is reached, whichever is shorter. Maximum radiation time allowed per position is a total of 20 minutes. Destruction radiations per hour, radiation time length, and the target goal are specified by the processing and controlling headquarters. The target goal is set by balancing the commander's desire for hostile weapon destruction with the limitations imposed by ammunition, crew fatigue, hostile counterfire threat, and tube availability.

In a target-rich environment, the cueing mode instructions can also be modified to maintain the same number of radiations per hour but increase the standard target goal. For example, the controlling headquarters could send "Neutralize, six targets" to the radar operator, who would follow the time schedule for "Neutralize," but would set the larger target goal of six targets.

Additional standardized messages have also proved useful in establishing an effective cueing system. (Since TACFIRE has only recently been fielded in the 1st Armored Division Artillery, this discussion does not address digital communications.) When a target has been detected the following communication sequence occurs:

Radar: *(Call sign), this is (call sign), target, over.* **(Note:** *Sound and flash elements also use this message.)*
Processing: *(Call sign), this is (call sign), target, out.*
Radar: *Grid (numbers), altitude (numbers), over.*
Processing: *Grid (numbers), altitude (numbers), out.*
Radar: *Time (numbers), over.*
Processing: *Time (numbers), out.*

If more than one target is ready for transmission, the number of targets is inserted before the word "target." The second transmission then becomes a series of grids (this is an adaptation of the cannon artillery call for fire discussed in FM 6-30 and FM 6-40). If positive cueing control over a radar is to be exercised by an element so that cueing occurs based on actual weapon firings noted by target acquisition or intelligence sources, this message is used.

Processing: *(Call sign), this is (call sign), look, over.*
Radar: *(Call sign), this is (call sign), look, out.*

Radiation is stopped by substituting the word "hide" for the word "look" in the above message. Sectors of search can be indicated by the following transmissions:

Processing: *(Call sign), this is (call sign), search, over.*
Radar/OP: *(Call sign), this is (call sign), search, out.*
Processing: *Azimuth (numbers in mils) to azimuth (numbers), range (numbers) to range (numbers in meters), over; or grid (numbers) to grid (numbers), over.*
Radar/OP: *(Read back transmission), out.*

Photos by CPT John M. House

Standard message formats such as those proposed above and a carefully planned radar cueing program can significantly increase target acquisition efficiency and survivability. Intelligent cueing should be the end product of a chain of considerations that starts with the counterfire mission, proceeds to the commander's attack criteria, and then moves to the assignment of a counterfire mission to each target acquisition element. Once every radar element of the counterfire system has a mission, a cueing plan can be produced which will efficiently employ them in detecting hostile indirect fire with the minimum danger to friendly acquisition and firing units.

A frequent contributor to the *Journal,* CPT John M. House, FA, received his commission through the ROTC at Auburn University. A graduate of the Field Artillery and Infantry Advanced Courses, he also has a master of science degree in business. He served as commander of Service Battery, 6th Battalion, 14th Field Artillery, and also B Battery (Target Acquisition), 25th Field Artillery. Currently, he is assigned to the US Army Combined Arms Operations Research Activity at Fort Leavenworth, Kansas.

CPT James K. Hogue, FA, is a graduate of the United States Military Academy. He served with the 1st Battalion, 22d Field Artillery as an executive officer, fire support officer, and FIST chief. He was also executive officer for F Battery, 29th Field Artillery. In his present assignment, he is commander of Battery B, 1st Battalion, 30th Field Artillery.

Right by Piece

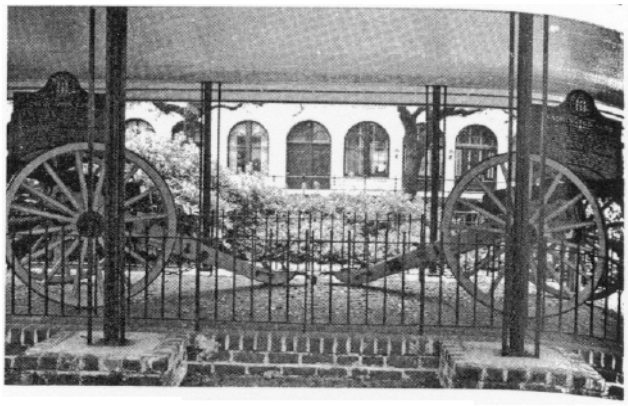
NOTES FROM UNITS

Soldiers from Battery C, 6th Battalion, 37th Field Artillery, replace a power plant on an M578 recovery vehicle. Their battalion was a contender for an Army-wide maintenance award. (Photo by Mark LaMarche)

Redlegs excel in maintenance

WASHINGTON, DC — In a ceremony last March, two Redleg units received the Army Chief of Staff Award for Maintenance Excellence. General Maxwell Thurman, Army Vice Chief of Staff, presented plaques to Battery A, 2d Battalion, 78th Field Artillery, from Bamberg, Germany (runner-up in the intermediate category) and to the 6th Battalion, 37th Field Artillery from Camp Essayons, Korea (runner-up in the heavy category). A total of 20 units from the Active Army, National Guard, and Reserve received awards. These units were selected from 37 entries, representing 10 major Army commands in the United States, Europe, and the Far East.

Units competed in broad categories of Active Army MTOE units (combat, combat support, and combat service support), Active Army TDA units (training and support), Army Reserve MTOE units, and National Guard organizational maintenance shops. Within these major categories were subdivisions of light density (50 to 700 items of equipment to be maintained), intermediate density (701 to 1,000 items), and heavy density (over 1,000 items).



Washington Guns. (Photo by PFC Chris Herl)

The Chatham Artillery

FORT STEWART, GA — The hardy English, Scotch, Irish, and German colonists that settled the coastal region around Savannah, Georgia, in the early 18th century, knew the importance of self-defense. Not only did they have to contend with marauding Indians, but they also had to guard against the encroachment of the Spanish to the south and the French from the west and north. For this reason, volunteer militia units began forming shortly after James Oglethorpe founded the city of Savannah.

One such unit, organized on 16 April 1751, is still in existence as part of the Georgia National Guard. It was the parent unit of today's 230th Field Artillery Regiment and consisted of four independent companies of volunteer militia, three of foot and one of horse.

Throughout the next 100 years, until the Civil War. this unit was composed of such groups as the Savannah Volunteer Guards, the Republican Blues, the Phoenix Riflemen, the Irish Jasper Greens, the German Volunteers, the DeKalb Rifleman, and the Chatham Artillery.

Although the official birthday of the Chatham Artillery is considered to be 1 May 1986, its actual formation was some 10 years earlier in April of 1776, when a unit of volunteers was commanded by Captain Thomas Lee. In 1778 the command passed to Captain Joseph Woodruff, but in December of that year the unit was destroyed by the British in a battle near Savannah.

Seven years later, in late 1785, the volunteers were reorganized into what is now the Chatham Artillery under the command of its first captain, Edward Lloyd, a one-armed veteran of the Revolution. Since it was the military practice at that time for such units to take 1 May as their organization date, the official records list 1 May 1786 as the organization day for the Chathams.

It was under the second captain, Thomas Elfe, that the two brass cannons surrendered by Lord Cornwallis

at Yorktown were presented to the Chathams by President George Washington when he visited Savannah in May of 1791. These cannons, known as the Washington Guns, were received early in 1792, after being hauled the greater part of the distance from Philadelphia by oxen. The journey took two months. The Chathams donated the two cannons to the city of Savannah where they stand today in a small park near City Hall.

Throughout the peaceful years between the War of Independence and the Civil War, the Chathams stood muster, paraded in Savannah, and rendered military honors on ceremonial occasions. As an example, funeral honors were paid to the great General Nathaniel Greene on 20 June 1786 when the Chathams marched in the cortege and fired salutes at his burial in Colonial Cemetery. Six artillerymen, in uniform, acted as pallbearers.

The Chathams first saw actual combat during the Civil War. Mustered into the service of the Confederate States on 31 July 1861, a detachment of the unit was part of the command which captured Fort Pulaski. While stationed there, they were inspected by Robert E. Lee, who declared that there was no better battery in the Army of the South.

During the war, the Chathams served in the defense of Savannah, supported the defenders of Fort McAllister, and served brilliantly at the Battle of Olustee in Florida and in the defense of Charleston. The battery, known as "Wheaton's Battery" for its commander, John F. Wheaton, retreated through the Carolinas and surrendered to Sherman at Greensboro on 1 May 1865.

The Chathams were mustered in during both the Mexican border trouble in 1916 and the First World War, but did not see action in either conflict. They arrived in Europe in 1919, after the war had ended.

Their next chance to serve their country came when the Chathams were inducted into Federal Service with the National Guard in September of 1940. This time, the Chathams arrived in Europe for the actual fighting and reached the greatest heights in their long and honorable history.

Subsequent to returning to the States, the Chatham Artillery was inactivated on 20 November 1945 at Fort Jackson. Descendant units of the Chathams were mustered into the Georgia National Guard on 15 October 1948 as Headquarters and Headquarters Battery, 118th Field Artillery Regiment.

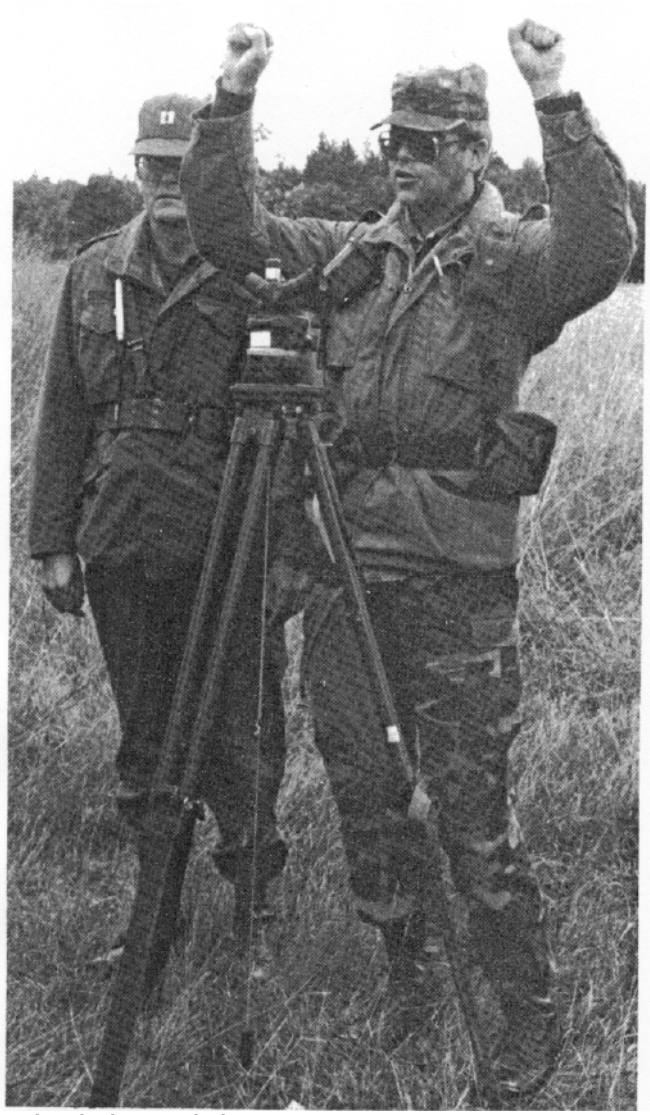
The Chathams have stood by their oath for almost two centuries. On the day of the organizations's birth, 1 May 1786, the members pledged themselves as follows: "We do hereby pledge our honor, of which our signature is witness, that we will, to the best of our ability and understanding, devote ourselves to the advancement of the Corps to which we have voluntarily attached ourselves, by all honorable means, and ardently cooperate in the increase of its strength and respectability and discipline, and that we will foster and maintain sentiments of respects and affection towards each other as soldiers and citizens and, united as a band of brothers, devote ourselves, when the occasion requires it, to the service of our Country." (Bob Goodenough, Public Affairs Office, Fort Stewart, Georgia)

A soldier from the 6-5th FA practices with a collimator during exchange training with the 2-78th FA.

A soldier from Battery B, 2-78th FA, sights through the pantel on an M110A2 howitzer belonging to the 6-5th FA.

Soldiers exchange training

BAMBERG, WEST GERMANY — In an innovative training exercise, two US battalions — the 6th Battalion, 5th Field Artillery (formerly 1-75th FA) and the 2d Battalion, 78th Field Artillery — exchanged their howitzer section crewmen. The 6-5th FA is equipped with M110A2 8-inch howitzers, and the 2-78th FA is equipped with 155-mm M109A2 howitzers. The section chiefs from both units stayed with their weapons to familiarize their new crewmen in the differences between the two weapon systems. (Story and photos by SP4 Steven Hoover)



Laying the battery during 13B course.

NCO's dream turns into reality

WEBSTER, SD — What was a dream of Sergeant First Class James O. Nelson, former training NCO for Battery C, 2d Battalion, 147th Field Artillery, has become a reality even though it happened after Sergeant Nelson retired from the National Guard.

Sergeant Nelson's dream was to develop a 13B (cannon crewman) NCO Unit School. One of his main selling points was the fact that, like soldiers in other MOSs in the National Guard, after a 13B soldier receives his advanced individual training, it is up to him to improve his skills as he is promoted in his career field. Sergeant Nelson also pointed out that, even though Fort Sill offers NCO 13B courses, the courses last 13 weeks and most guardsmen cannot take that much time off from their civilian jobs to attend school.

After convincing his superiors that such a course was necessary, Sergeant Nelson initiated a request in 1980 for a short, consolidated, locally tuned course for 13B soldiers and forwarded it through proper channels. Although all levels of command thought it was a good idea, the request was turned down for lack of funds.

In 1982, after Sergeant Nelson's retirement, a similar request was again submitted by the 2d Battalion, and this time it was accepted, providing that funds were available at the end of the fiscal year.

Those accepting the challenge of getting the school started obtained a program of instruction from the Field Artillery School and met with representatives from the 1-14th FA, the 2-147th FA, and 147th Field Artillery Brigade to cut the 13-week program of instruction to two weeks. The first course was taught in August 1982 to 31 students. All 31 students completed the course by attaining scores of at least 70 percent.

Some improvements were made in the program of instruction, and the second course was taught in 1983 to 23 students who had a class average of 88.5 percent. Another addition was the presentation of the SFC James O. Nelson Outstanding Graduate Plaque to the individual who maintained the highest average for the course. The first plaque went to Staff Sergeant Thomas A. Gilbert from Detachment 1, Battery A, 1st Battalion, 147th Field Artillery, who completed the course with an average of 96.7 percent.

Sergeant Nelson's dream had come true. (CPT Orville D. Roberts, 2-147th FA, and SSG Kim N. Smith, 129th Public Affairs Detachment)

OPSEC training in the 1-209th FA

ROCHESTER, NY — Operations security (OPSEC) training in the tactical Reserve units has always seemed to take a back seat to other field artillery or firing tasks until recent years. The increased Soviet first-strike capability and the Soviet ability to strike deep using helicopter assaults into our main battle area (specifically keying on field artillery units) have underscored the upswing in security awareness for all components.

The 1-209th Field Artillery has worked during the past two years to increase training in OPSEC and other security precautions. There were a number of important considerations involved in mapping out an OPSEC plan. First, did the battalion have the internal and external instructional material to support such a program? Could it realistically integrate OPSEC with other training and expect increased performance? Would concern for OPSEC dampen enthusiasm for the field artillery training in an otherwise crowded training schedule? The solutions to all of these concerns became apparent as the battalion proceeded to investigate the issue.

The first step involved increasing battalion instructional material by consulting readiness group personnel and then seeking information from other sources, to include commands listed in the FORSCOM OPSEC training aids guide. Some of the best sources were produced by the United States Air Force. *RED THRUST* material from the Fort Hood OPFOR Detachment also helped strengthen the battalion's holdings of OPSEC training aids.

The 1-209th FA enlisted the help of the FORSCOM Mobile Intelligence Training Team (whose program includes a common-sense approach to OPSEC), USAR counterintelligence personnel (whose mission includes actual OPSEC surveys), and readiness group officers and NCOs who were familiar with security as it related to the field artillery.

After these resources had been tapped, the primary trainers amended the unit's training plan for the year so that it included a monthly OPSEC subtask. Basics such as camouflage, cover, and concealment were presented by battery personnel in-house and then practiced at the local training site and during annual training.

There was no question that field artillery tasks came first, but the planned integration of those OPSEC bits-and-pieces gave all the troops a training direction and simple activities to be evaluated. Rather than relying on once-a-year lectures, the battalion constantly reinforced OPSEC. The first year's annual training saw the posture of OPSEC and related security matters improve, but the second year saw the battalion receive very positive comments from Active Component evaluators. The fallout of the program was even more rewarding because the OPSEC training prompted the execution of other intelligence and security training events. For example COMSEC and SIGSEC improved significantly.

The 1-209th involved everyone in OPSEC, from the commander on down. The end-product was that the battalion sent steel downrange with minimum security interruptions from the enemy. (CPT Richard P. Ugino)

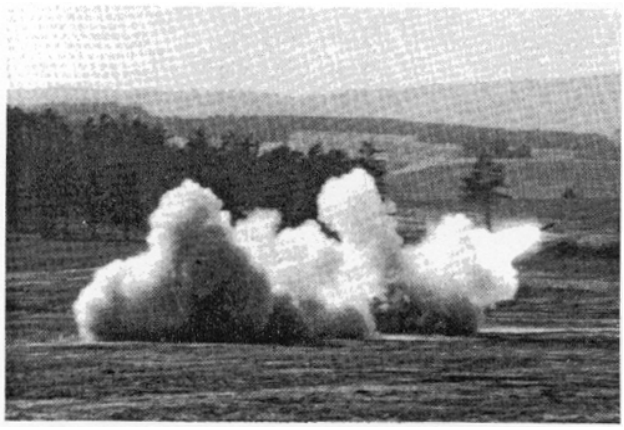
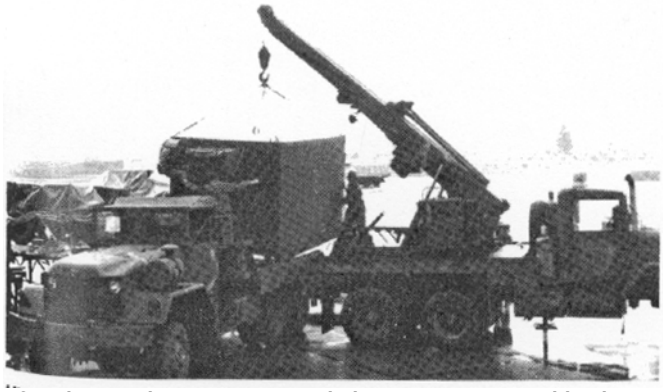


Photo by SSG Frank Cox

GRAFENWOEHR, GERMANY — Last fall, Multiple Launch Rocket System crewmen from Battery C, 3d Battalion, 16th Field Artillery, 8th Infantry Division (Mechanized), fired their weapons for the first time on German soil. The crewmen launched three unarmed rockets which hit the main impact area with pinpoint accuracy.

Photo by SP4 Hugh Clare



After the 1-84th FA's TACFIRE shelter was transported back to McChord Air Force Base in Washington on a C-141 aircraft, it was reunited with its prime mover.

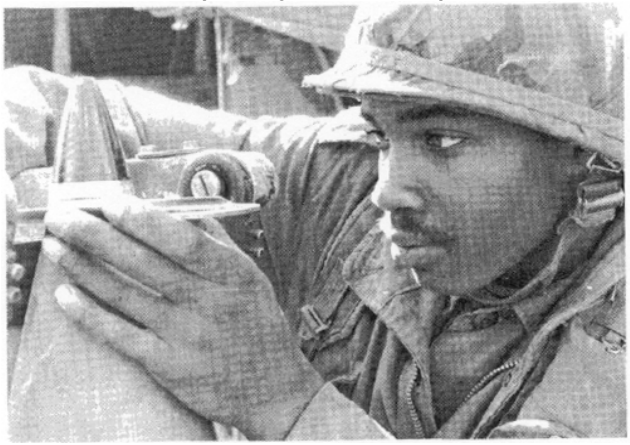
Cascade Rain

FORT LEWIS, WA — Cascade Rain was an I Corps exercise which featured the fly-away emergency deployment readiness exercise of a 140-man task force from the 1st Battalion, 84th Field Artillery. The task force deployed from McChord Air Force Base (adjacent to Fort Lewis, Washington) via C-141B aircraft; conducted a four-day, live-fire field training exercise at Fort Bliss, Texas; and then redeployed to Fort Lewis. The task force consisted of command and control elements, a survey party, the battalion S3, a fire support team, a drop zone recovery team from Service Battery, and all of Battery A.

Deploying elements practiced the strategic deployment and tactical integration of TACFIRE, the battery computer system, the position and azimuth determining system, the ground laser locator device, and the M198 howitzer. Of special significance was the strategic deployment of the battalion TACFIRE set. To fit in a C-141B aircraft, the TACFIRE shelter had to be separated from its prime mover and secured on Air Force pallets. The relatively simple, 30-minute operation required two 436L pallets, one pallet interconnection kit, eight 10,000-pound chains and locking devices, three pieces of 4- by 4- by 88-inch plywood for dunnage, and an M816 wrecker to lift the shelter off its prime mover and place it on the pallets. Air Force forklifts and K-loaders did the rest.

After being rejoined to its prime mover at Fort Bliss, the TACFIRE performed flawlessly during the four-day exercise. Battery A fired over 200 rounds during Cascade Rain. The exercise provided the 1-84th FA an opportunity to demonstrate its ability to make a strategic deployment within 24 hours of notification with all elements necessary to deliver accurate fire. (MAJ Ross L. Nagy, 1-8th FA)

FORT STEWART, GA — Sighting in on the collimator is Sergeant Edward Kyler, Battery A, 1st Battalion, 13th Field Artillery, during a recent field exercise. (Photo by Mark P. Bersani)



FORT STEWART, GA — Sergeant Daymon Salters of Battery A, 1st Battalion, 13th Field Artillery, checks the fuze of an artillery round before it is loaded into an 8-inch howitzer. (Photo by PFC Mark P. Bersani)

FORT JACKSON, SC — Soldiers from Battery B, 4th Battalion, 178th Field Artillery, of the South Carolina Army National Guard, position their howitzer during field training exercises. (Photo by SP5 Donna Barber)

Smoke target course

CAMP STANLEY, KOREA — A cool breeze blows softly across Rodriguez Range as the mechanized infantry company commander and his forward observer scan the rugged terrain to the north where enemy activity has reportedly increased. The company has dug in and is prepared to defend in place. The forward observer nudges the commander: "There they are, sir." The forward observer quietly begins his first call for fire: "Sierra 93, this is Foxtrot 24, immediate suppression, grid 443100, over; enemy tanks in column, over." The commander is peering through his binoculars and quickly turns to his forward observer: "These guys are closing fast; can we get some rounds out there?" "Don't worry, sir, we have a priority target at the road junction; we will stop them," says the forward observer as he initiates his second call for fire. About 1,000 meters away, the 2d Platoon identifies a target of opportunity: "Sierra 93, this is Foxtrot 27, immediate suppression, grid 450983, over; enemy observation post, over." The forward observer checks with his fire support team chief and notifies the platoon leader: "Sir, we will get mortars on this one." The scene seems to be one that takes place all the time as Indianhead Redlegs train as they will fight. But this event was a little bit different. It took place last winter; and, while the men and equipment were from the 2d Infantry Division, the targets were only smoke.

Soldiers from the 2d Battalion, 17th Field Artillery, and the 1st Battalion, 31st Infantry, were demonstrating a new training device — the artillery smoke target course — which was developed by the 2d Infantry Division in conjunction with the Training Support Activity, Korea (TSAK). The TSAK designed an inexpensive, yet reliable, system which could be remotely activated and easily emplaced and protected from actual artillery and mortar fires. It consists of the M31 Ground Target Control System currently in the Army's inventory and a smoke release system designed by TSAK.

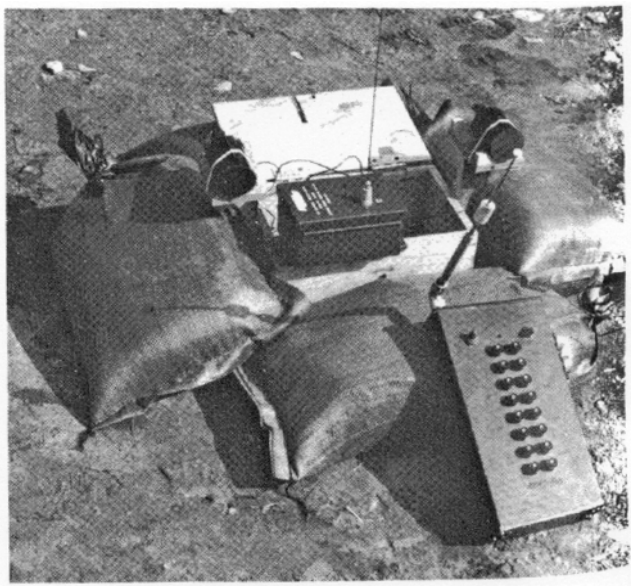


Figure 1. Smoke release system.

The operation of the system is quite simple. The M31 transmitter sends a signal (up to 1,800 meters away) to the receiver in the impact area which, in turn, burns through a rubber band holding a smoke grenade. This action allows the smoke grenade to roll free and detonate, and the ensuing smoke identifies the target. The entire smoke release system (figure 1) is enclosed in a wooden case and weighs approximately eight pounds. Sandbags are placed around the smoke release system to provide protection in the impact area.

A 12-man smoke target emplacement team (equipped with smoke devices, radios, a diagram of the target arrays, sandbags, and marking stakes) can emplace a battalion-size target array in approximately three hours. Before entering the impact area, the emplacement team is given a safety briefing on the appropriate actions to take if dud rounds are discovered; i.e., marking and avoiding.

Since many units, to include the 2d Infantry Division, do not get the opportunity to train at the National Training Center, the smoke target course can add a very real dimension to artillery training in local training areas. The course is designed to test the fire support team's ability to identify, acquire, evaluate, and engage multiple targets. The multiple targets exist in time; have length and width; show movement; and provide maneuver commanders, fire support officers, fire support teams, fire direction centers, forward observers (aerial observers and aero scouts), mortar platoons, and firing batteries the opportunity to perform critical operations and make rapid decisions. The fire support team and the fire support officer must decide how to integrate the available fire support assets (mortars, artillery, close air, and attack helicopters) in order to provide the maneuver commander with the required firepower. The fire direction center must compute data and decide how to attack a moving target 1,000 meters long. The fire direction officer must comply with the maneuver commander's attack guidance and priorities as well as determine the proper shell and fuze combination. Since these targets are "alive," accurate and timely descriptions and locations by the forward observer are critical to the success of the entire fire support team.

The course provides the fire support team an opportunity to get out of the "I know every target location in the impact area" syndrome and into a very exciting and fast-moving training environment. The artillery smoke target course provides the unit commander with a dynamic tool for training and evaluating his fire direction centers, fire support teams, and forward observers to ARTEP standards. (CPT(P) Gary L. Adam and CPT Eugene E. Shaw, 2d Infantry Division Artillery)

Soldiers of Battery B, 4th Battalion, 3d Field Artillery, fired their last round as members of a COHORT battery last January at the Oksbol, Denmark, training area. (Photo by SP4 Richard D. Clay)

COHORT unit completes cycle

GARLSTEDT, WEST GERMANY — Battery B, 4th Battalion, 3d Field Artillery Regiment, the Army's first Cohesive Operational Readiness and Training (COHORT) battery, completed its three-year life cycle last March. The soldiers, noncommissioned officers, and officers spent the last three years together as a unit — 18 months at Fort Carson and the last 18 months in Germany as part of the 2d Armored Division (Forward).

The soldiers attended basic training together at Fort Knox and then were flown to Fort Carson where they were met by the noncommissioned officers who formed the cadre for the conduct of advanced individual training (AIT) of MOSs 13B and 13E and who, at the completion of AIT, became their section chiefs.

After the battery completed AIT, it officially became Battery C, 1st Battalion, 19th Field Artillery. For the next 13 months, personnel trained on collective and individual skills, to include a Technical Validation Inspection, a battery ARTEP, and two combined arms live-fire exercises. It also participated in Exercise Desert Raider with the 1st Brigade, 4th Infantry Division (Mechanized), at the National Training Center.

On 30 September 1982, the battery was assigned to the 2d Armored Division (Forward) in Europe. Within three weeks of its arrival, the battery participated in a battalion ARTEP and won the "Best Battery" competition. The young soldiers continued to excel as they took on additional responsibilities and received promotions. The noncommissioned officers likewise showed improvement in their ability to teach, coach, and lead their soldiers. The battery has now disbanded to make way for a new COHORT unit, but it is evident by this first experiment that the ideas and procedures under which the battery was formed are viable, realistic, and highly successful. (CPT Leslie K. Cavanaugh)

Marine's fulfill dual role

BEIRUT, LEBANON — Since leaving Camp Lejeune, North Carolina, on 18 October 1983, Battery H of the 3d Battalion, 10th Marine Division, has participated in two major actions in two different roles. The battery is assigned to support the 2d Battalion, 8th Marines, a battalion landing team which is part of the 22d Marine Amphibious Unit.

During Operation Urgent Fury on the island of Grenada, the battery landed as a provisional rifle company. Its mission was to reinforce the Marines of Fox and Golf Companies of the 2d Battalion, 8th Marines, which had captured the capital city of St. Georges. Battery H performed a variety of missions, to include combat patrols, roadblocks, perimeter defense for the battalion landing team command post, setup of resupply leanding zones, resupply of the line companies, and evacuation of noncombatants. During its road blocks and patrols, the battery netted numerous prisoners, the most famous being Bernard Coard and his staff. Coard, along with General H. Austin, had led the coup that ended in the murder of Prime Minister Maurice Bishop.

After the successful completion of Operation Urgent Fury, the 2d Battalion, 8th Marines, continued on with its primary mission — to relieve the 1st Battalion, 8th Marines, in Beirut, Lebanon. Here, Battery H was in action as artillerymen against antigovernment forces around the Beirut International Airport. The battery's primary role was to provide counterbattery fire against hostile mortar and multiple rocket launcher firing positions. Also participating in this action were naval gunfire spot and liaison teams of the 3d Battalion, 10th Marines. All fire missions (both artillery and naval) were controlled by the battery's forward observers, but the US Army radars furnished by the 214th Field Artillery Brigade played a valuable role in counterbattery target location. Battery H saw action on five separate occasions, engaging one mortar and six multiple rocket launchers; all seven targets were neutralized or suppressed.

Battery C, 1st Battalion, 10th Marines, is credited with being the first American artillery battery to fire the M198 howitzer in a combat action. Battery H, which relieved Battery C, is the first Marine artillery battery to be employed in combat in the eight-gun, two firing-platoon configuration.

It has been said that "artillery conquers and infantry occupies," but Battery H did both. In Grenada, they were infantrymen; but, in Beirut, they quickly assumed their primary role as artillerymen. (1st Lt Jeffrey Acosta, USMC)

FRANKFORT, WEST GERMANY — A group of German civic and business leaders from Hanau, West Germany, visit the 2d Battalion, 6th Field Artillery, during training last September at Grafenwoehr, West Germany. The German group came from the community which hosts the 3d Armored Division Artillery; the 2d Battalion, 6th Field Artillery; and the 1st Battalion, 40th Field Artillery. (Photo by Hans-Peter Merlau)

A long, hot summer

LAUREL, MS — Last summer the 3d Battalion, 83d Field Artillery's annual training spanned three months. During July training at Camp Shelby, Mississippi, the battalion became one of the first Reserve Component units to undergo an external Army Training and Evaluation Program (ARTEP). The Active Component evaluators were a team composed of Redlegs from the 3-83d FA's affiliated Active duty unit, 2d Battalion, 36th Field Artillery, and from the III Corps Artillery staff from Fort Sill, Oklahoma. Evaluated under ARTEP 6-445 with no exceptions allowed for its Reserve status, the 3-83d FA amassed an overall 94 percent satisfactory rating in conventional fire missions and a 100 percent satisfactory rating in nuclear tasks.

Annual training did not end, however, when the unit returned to its home base — it still had to complete the required nuclear Technical Validation Inspection subsequent to the external ARTEP. In mid-autumn, an inspection team from the US Army Forces Command Inspector General's Office assessed the unit and found no failing deficiencies.

For the Redlegs of the 3-83d FA, these events marked the end of an intensive three-year training cycle and of a long, hot summer and fall. (CPT Henry J. O'Connor, 3-83d FA)

The assembly and transport section carefully mates the two sections of the Lance missile.

Annual service practice at Crete

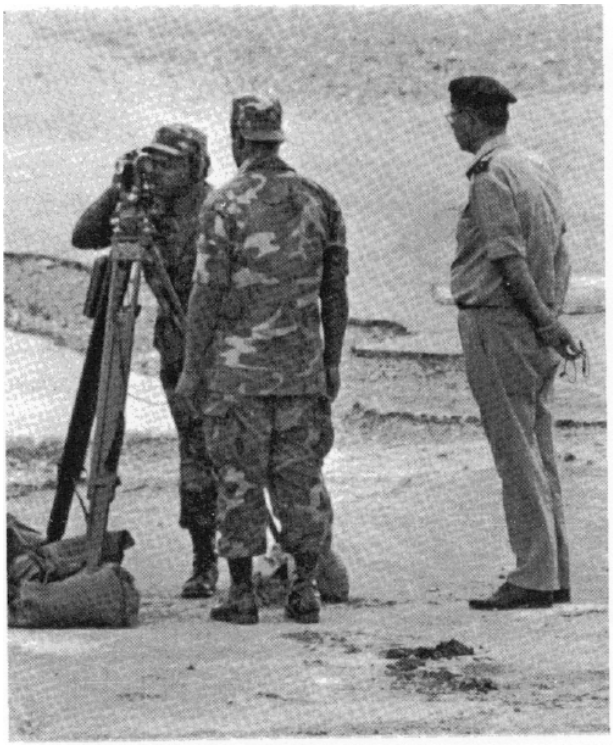
HERZOGENAURACH, WEST GERMANY — Conventional field artillery battalions in Germany train at Grafenwoehr three or four times a year, but Lance battalions in Germany must travel to the Greek island of Crete for their annual service practice. Competition is keen; for only a part of the Lance unit actually goes to Crete, and only one firing platoon per battery is allowed to conduct a live-fire mission. The lucky battery selected last year to represent the 2d Battalion, 377th Field Artillery, was Battery A.

The importance of the trip to Crete goes far beyond doing a live-fire mission. First, Lance units must train for the intense, detailed evaluation. Second, the evaluation is conducted under NATO standards; and there is the international aspect to be considered. Third, platoons within a battery compete for the honor of conducting the live-fire mission, batteries compete for the high score within a battalion, and battalions compete for top honors within the corps.

For a Lance unit, the annual service practice is its report card. It is the one measurable evaluation which all Lance units go through — not only American Lance units, but also British, German, and other NATO Lance units.

How does a battery prepare for this most important evaluation of the year? It practices, practices, and practices some more. The soldiers of Battery A simulated the NATO Missile Firing Installation conditions at their home base — Herzo Artillery Base at Herzogenaurach, West Germany. They trained at a base parking lot during the day and in the battalion maintenance facility at night until procedures became routine.

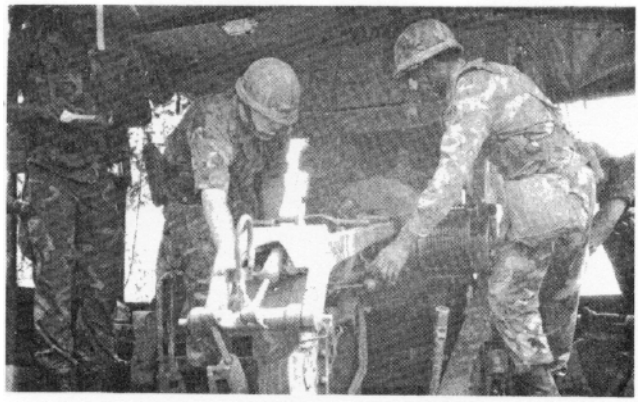
After the initial evaluations, Battery A had achieved an overall score of 97.87 percent. The platoons were actually competing against raw scores — it was a friendly competition in which platoons encouraged one another.



The platoon sergeant checks the laying of his platoon's Lance missile.

The 1st Firing Platoon, Battery A, 2d Battalion, 377th Field Artillery, fires a Lance missile at the NATO Missile Firing Installation, Souda Bay, Crete.

After the evaluations were completed, the 1st Firing Platoon of Battery A was selected to fire the missile. The platoon achieved a record for a timed fire mission — 10 minutes, 15 seconds. (Story and photos by Ruthann M. Sprague)



A howitzer section from Battery B, 3d Battalion, 5th Field Artillery, Merrell Barracks, Nuremburg, West Germany, carries out a simulated fire mission.

Brigade Stakes '83

HERZOGENAURACH, WEST GERMANY — The 210th Field Artillery Brigade evaluates all the different types of training done by individuals, sections, and units during an annual, organized competition called Brigade Stakes.

The Brigade Stakes competition encompasses all areas of soldiering skills, not only for field artillery personnel, but also for cooks, medics, communications, and maintenance personnel. The basis for Brigade Stakes is the evaluation of 19 areas of competition for the five brigade units and an evaluation of a section's or an individual's performance as compared to ARTEP standards. Evaluations are conducted using the appropriate field and training manuals.

The competition is a good morale booster because each section and each individual want to get the title of "best in the brigade."

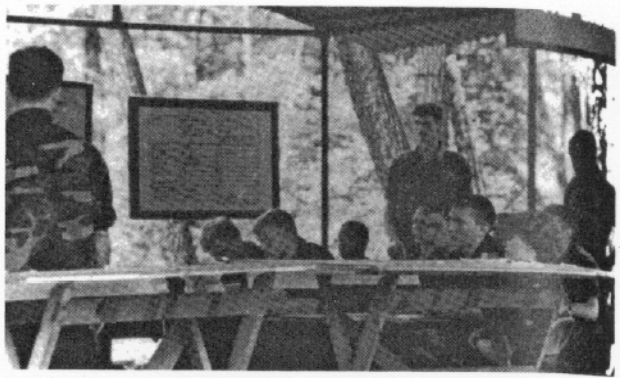
At the end of the recent Brigade Stakes, the 2d Battalion, 377th Field Artillery, walked off with the Commander's Trophy for 1983, while the Headquarters and Headquarters Battery placed second. (Story and photo by Ruthann M. Sprague)

"Top Guns" train West Point cadets

FORT CAMPBELL, KY — The "Top Guns" — 1st Battalion, 321st Field Artillery, 101st Airborne Division (Air Assault) — spent last summer at West Point training third-class cadets on field artillery procedures. Most of the instructors were noncommissioned officers and junior enlisted men.

Each of eight cadet companies spent a total of 2 1/2 days with the battalion. The first day included a general introduction to field artillery which covered howitzer crew drills, fire direction procedures, and observed fire procedures on a 14.5-mm range. Other days of instruction covered reconnaissance, selection, and occupation of position (RSOP) procedures; live fire of howitzers (cadets rotated between the guns and the fire direction center); and forward observation of artillery live fire.

Fire support team soldiers from the 321st were also attached to the 1-506th Infantry as part of the Mortar Committee. They gave instruction on map reading, the use of compasses and binoculars, and calls for fire. While walking platoon and company lanes, cadets received instruction on fire planning for offensive and defensive operations, close air support, naval gunfire, communications channels, and coordination with adjacent units. The cadets validated their instruction during mortar live fire and were critiqued by fire support sergeants from the "Top Guns."



Third Class Cadets from the United States Military Academy receive training in fire direction from the "Bravo Bulls" of the 1st Battalion, 321st Field Artillery, 101st Airborne Division (Air Assault).

The "Alfa Dogs" trained cadets on the aiming circle and the theory of lay, crew drills, actions during firing, and march-order techniques. Included in this presentation were the duties and responsibilities of the fire direction center personnel and howitzer crews and the importance of the executive officer, fire direction officer, chief of firing battery, gunnery sergeant, and section chiefs. The cadets then manned the guns and fired a total of 8,000 rounds.

The "Bravo Bulls" were in charge of the 14.5-mm range and RSOP techniques. The 14.5-mm range consisted of seven separate 14.5-mm trainers and fire direction centers. The cadets fired approximately 12,000 14.5-mm rounds during this phase of the training — they were selected and critiqued on their observed fire procedures in accordance with Field Artillery Officer Basic Course standards. During the RSOP training, cadets were selected by their tactical officer for key leadership positions in the battery; and they received one-on-one orientations with their actual counterparts in B Battery on the duties and responsibilities of their assigned positions. Each group of cadets made two RSOP moves, and the fastest lay of the battery during the RSOP earned cadets points toward a commander's trophy. Following the training, each cadet was critiqued individually on his or her performance; and then the platoon as a whole was critiqued.

During their stay at the Academy, the 321st also participated in two July 4th ceremonies. The "Alfa Dogs" marched in a July 4th parade in Cornwall, a community about 10 miles from West Point; and the

Bravo Bulls" fired a 50-gun salute to the nation at Trophy Point during West Point's July 4th ceremony. CPT Jerry E. Sullivan, 101st Airborne Division (Air Assault) Artillery)

Cannoneers of the 2-6th FA punch the tube during a lull in firing for exercise Confident Enterprise. (Photo by SSG Dominic J. Dinatale)

Confident Enterprise

HESSE, GERMANY — Field atillerymen from the 2d Battalion, 3d Field Artillery; 2d Battalion, 6th Field Artillery; and F Battery, 333d Artillery (Target Acquisition) traveled to the German state of Hesse last fall to participate in the 3d Armored Division's 1983 REFORGER field training exercise — Confident Enterprise.

2-3d FA

The command "march order, march order, march order" echoed across the line of fire as soldiers of A Battery, 2d Battalion, 3d Field Artillery, shook off the morning haze and rolled up their camouflage netting. The march order had been passed through the battalion tactical operations center down to Battery B, one of the three self-propelled 155-mm howitzer batteries in the battalion. In minutes, the Redlegs were on the move during the offensive phase of Confident Enterprise.

At the tactical operations center, soldiers checked maps and discussed plans. The battalion S2 received information on two enemy battalions, and the fire direction center hummed with activity. The battalion NBC NCO received a downwind message for a simulated chemical attack.

Batteries B and C were hit by simulated chemicals and were required to wear protective clothing based on Mission Oriented Protective Posture level 4. After the attack, the howitzers had to be decontaminated in the Equipment Decontamination Center.

During the final phase of confident Enterprise the war got hot and heavy for the 2-3d FA.

2-6th FA

The watch words of the field artillery — shoot, move, and communicate — were on the minds of the Centaurs of the 2d Battalion, 6th Field Artillery, as they fulfilled their mission of providing direct support to the 2d Brigade. Even though there was no live firing, the Redlegs practiced artillery procedures and techniques such as occupying a firing position and laying the battery.

F TAB

During Confident Enterprise, the radar operators from 3d Armored Division Artillery's F Battery, 333d Artillery (Target Acquisition) — known as F TAB — did not have live enemy rounds to spot; nevertheless, they did get into the play of the problem. For example, if a particular set was radiating in the direction of Orange Forces during a simulated fire mission, the radar section would get credit for acquiring the target. Controllers would give the radar section the grid coordinates of the enemy target, and the radar section would send them to the tactical operations center where the counterfire mission was processed. Despite frequent displacements, radar section 5 could occupy a position and be ready to operate within 30 minutes. All of the soldiers from F TAB honed their skills during Confident Enterprise.

National Guardsmen from the 1st Battalion, 168th Field Artillery, clean the tube of a 155-mm howitzer after the field training exercise at Fort Carson, Colorado.

Challenging winter training

FORT CARSON, CO — Nebraska National Guardsmen from A and B Batteries, 1st Battalion, 168th Field Artillery, travelled to Fort Carson, Colorado, last winter to participate in a joint winter training exercise with the 1st Battalion, 19th Field Artillery.

Despite a winter storm which left several inches of snow, the men spent two days and one night in the field. Temperatures plummeted to 10 degrees below zero. The Guardsmen usually train during the summer months; so this was a new experience for them.

The live firing was followed by a harrowing 15-mile convoy movement which took several hours because the tracked vehicles were extremely difficult to handle on the ice-covered roads. On steep hills and passes, the vehicles inched their way to the top, one at a time, and often slid down a slope faster than they could climb up. Even though the Guardsmen used unfamiliar equipment in unfamiliar terrain and under severe weather conditions, they proved they could work out these problems in a short time — overall, it was a good weekend. (Story and photos by SP5 Les Nepper)

Where Only the Fit Survive

by Major Robert A. Glacel

In the Yukon, only the strong and the sane survive; and nobody knows the truth of the law of the Yukon better than the cannoneers of the 1st Battalion (Arctic), 37th Field Artillery.

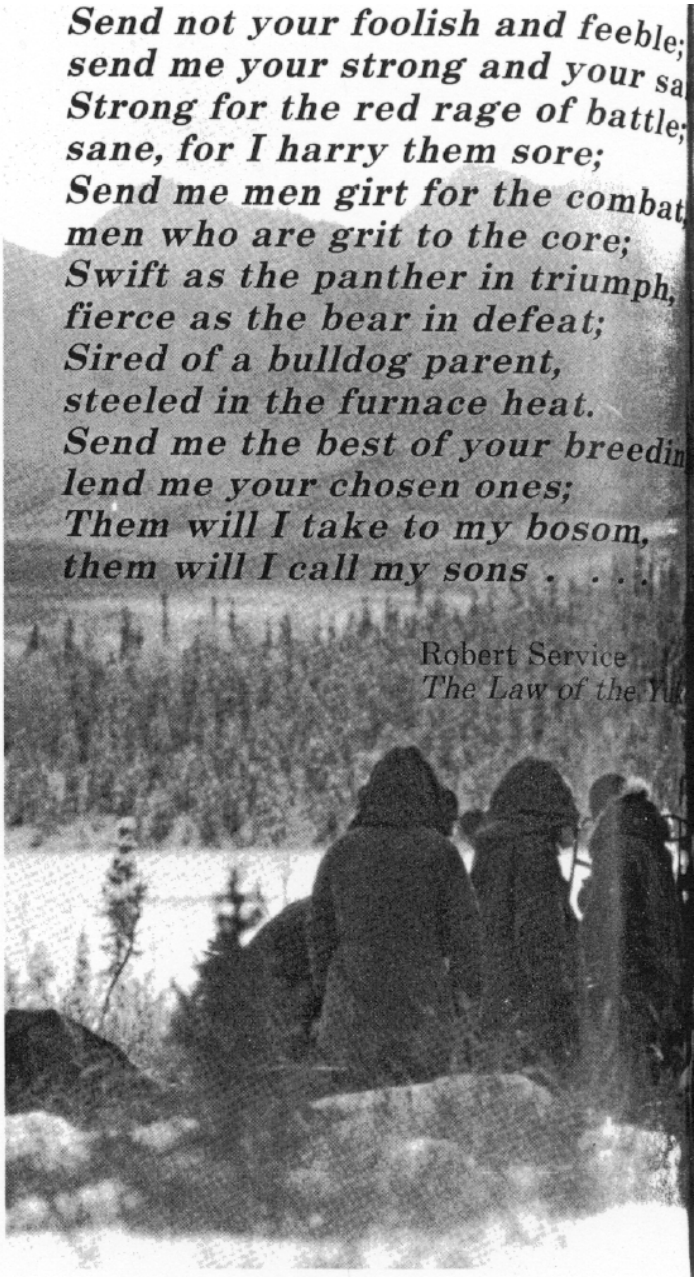
In addition to being the only separate field artillery battalion with strictly a combat mission, the 1-37th FA is the only field artillery battalion stationed in the Arctic. Except for C Battery, the battalion is based at Fort Richardson; C Battery is stationed 355 miles north at Fort Wainwright. Recently, in the wilderness 50 kilometers west of Fort Greely, Alaska, where the frigid winter temperatures reached minus 45 degrees Fahrenheit, the battalion demonstrated its proficiency in tactics, techniques, gunnery, sustainment, and survivability as it supported the 172d Light Infantry Brigade (Separate) during exercise Golden Trace.

The 1-37th FA deployed to Fort Greely by air and land. Two firing batteries loaded on Air Force C-130 aircraft and flew north, air landing at an assault strip near Fort Greely. The remainder of the battalion made a 350-mile road march over America's highest mountains, the Alaska Range. The trip north, which followed the Alaskan Highway and the route of the Alaskan pipeline, was scenic but treacherous. It included the crossing of Sheep Mountain and the traversing of Isabella Pass.

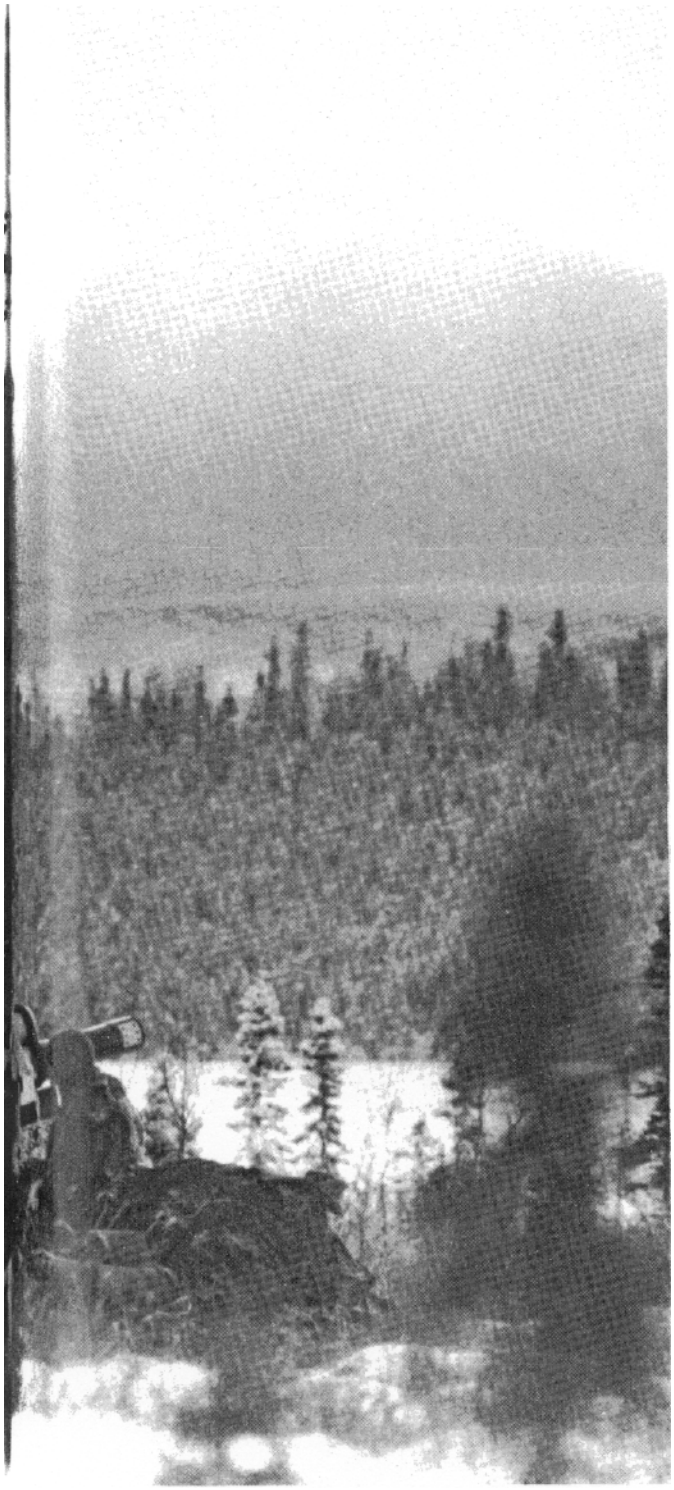
After reaching Fort Greely, the battalion moved west, deploying by helicopter to an area fully accessible only by air and partially accessible by a winter trail which crossed a tenuous ice bridge over the Delta River. The river is a major obstacle in the summer; but, in the winter, the engineers take advantage of the subzero temperatures and construct an ice bridge which supports vehicular traffic as heavy as loaded 5-ton trucks.

The firing batteries trained for 10 days and shot over 1,200 rounds of 105-mm ammunition into an impact area extending beyond maximum range in any direction from any battery position. The firing batteries fired all ARTEP missions using both the fire direction center (housed in a built-up 1 1/2-ton trailer) and the battery operations center to provide technical fire control. The unique training area allowed the three M101A1 batteries to deploy in spread positions which enhanced survivability and allowed them to fire out of traverse missions in any direction. In addition to ARTEP missions, the batteries fired self-illumination, beehive from tactical positions, and preparations for sister battery insertions.

This is the law of the Yukon, and ever she makes it plain:



Since there are only four hours of light available each day during the Arctic winter, proficiency in movement by air at night is essential. To maintain this proficiency, the firing batteries and elements of headquarters battery made 10 air movements and conducted several live air assault two-gun raids during Golden Trace. The howitzer crews became very proficient at loading on their gun everything which they needed for firing and survival.



Air movement

Special techniques and equipment have been developed for air movement in the snow and were practiced by the batteries during these operations. For example, the howitzer sling is attached to the CH-47's hook while the helicopter is on the ground and the gun crew is boarding the helicopter. This procedure is necessary since blowing snow under the hovering helicopter causes a white-out condition which severely limits the pilot's visibility. An extra long (60-foot) sling allows the helicopter to remain above the blowing snow so that the pilot can maintain a clear view of landing zone operations. Skis are attached to the helicopter's landing gear to enhance its footing on the snow when it lands.

During Golden Trace the frigid December temperatures averaged well below zero. Under these conditions the rotor blast under hovering helicopters can create a wind-chill factor of minus 100 degrees. These temperatures can cause instant frostbite for the unprepared; therefore, ground guides and advance party men use M17-series protective masks and Arctic mittens to cover exposed flesh to prevent injury.

In frozen conditions the tundra heads in the muskeg become rocklike, and the movement of any equipment is extremely difficult. During air movement, a length of sling is attached to the lunette of the howitzer and a "bump-and-lift" technique is used to orient the howitzer on the landing zone. The advance party man grabs the loose length of sling as the howitzer nears touchdown. The pilot touches the wheels of the howitzer to the snow to stop any spinning, and then lifts it again so the advance party soldier can turn the howitzer toward the azimuth of lay. The howitzer is then lowered fully into position. In snow and muskeg, a misoriented howitzer cannot be laid expeditiously.

Two-gun raids

The limited range of the M101A1 howitzer makes two-gun raids a tactical necessity. In a standard air assault raid, the battery executive officer and the advance party depart the battery's main position in a UH-1 two minutes ahead of the guns. After the guns are in position and while firing is in progress, the lift helicopters move to a defilade position awaiting the signal for pickup. The battalion's standard for this type of operation is 10 minutes from the landing of the guns to their extraction.

The fire support teams (FISTs) relished this unique training during Golden Trace. One infantry battalion's FIST participated in an external evaluation; the 37th FA's airborne FISTs jumped in; and the remaining forward observer teams were inserted by UH-1 throughout the area. Positions were chosen to allow observed fire 6,400 mils around the battery positions. The FISTs were able to call for fire on any target they could observe in any direction. Their only restriction was to stay clear of the moose and caribou herds in close proximity. The limited hours of daylight required maximum use illumination. Night observation devices were employed as an alternate means to bring steel on the target during hours of darkness.

Survey, radar, and met data

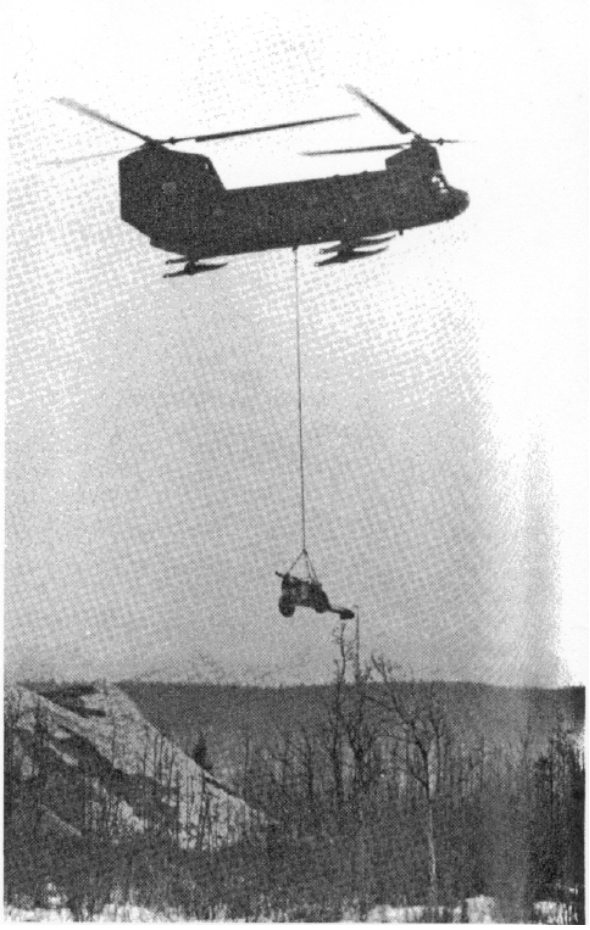
The battalion's fourth- and fith-order survey teams were inserted by a UH-1 helicopter ahead of the batteries and used snow machines to carry survey control 2,000 meters through the muskeg to the batteries' initial positions. The 37th's AN/MPQ-4

Photo by MAJ Terry Hulin

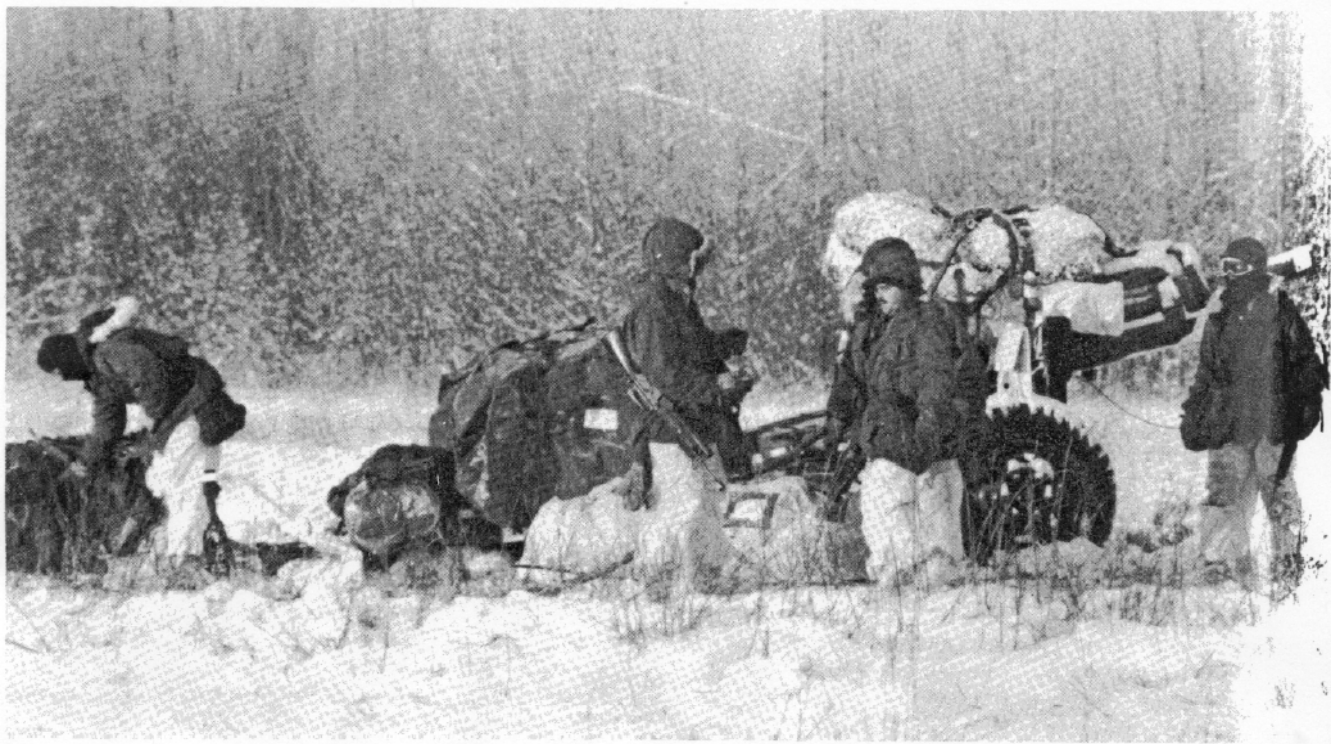
radar was rigged and sling-loaded across the Delta River to a position from which it could observe fire. Since the availability of survey control is severely limited in the Arctic, radar assumes a very important role in the control and massing of friendly fire. After emplacement, the radar operated for six days at temperatures below minus 20 degrees Fahrenheit. The battalion's organic meteorological section provided data from Service Battery's location every four hours.

Resupply

Resupply is a vital element of any combat exercise, but in the Arctic its importance is accentuated. Increased fuel and water use in subzero temperatures increases resupply requirements. The lack of roads and the difficulties in cross-country trafficability necessitate the use of varied logistical techniques. During Golden Trace, CH-47 helicopters delivered ammunition, rations, fuel, and water to battery positions daily. UH-1 helicopters and snow machines



pulling Ahkios (sleds) over the snow resupplied the FISTs. Container delivery-system drops of survival rations and water in the form of ice blocks were made by C-130s onto the tundra next to the battery



Photos by CPT Michael G. Edrington

positions. Most means of resupply in the Arctic rely on good flying weather; therefore, each battery deployed with enough survival equipment and rations to carry them through those periods when aircraft were grounded. In fact, survival equipment stays with the soldier at all times in the Arctic. In addition to a soldier's personal gear, each section moves with an Ahkio loaded with sufficient equipment and supplies to sustain ten men for three days in the harshest environment.

The primary benefit of Golden Trace was the increased experience it provided the men of the 37th Field Artillery in soldiering in the harsh Arctic environment. Like all artillerymen, these soldiers endured long days and often back-breaking work without complaint. But unlike most, they performed in extremes of temperature during long periods of limited visibility. Like true artillerymen, they never forgot their first priority — preparing the piece to fire. The warming tent and the comfort it provided came last. In an environment where one job undone could result in dire consequences for many men, the soldiers of the 1-37th FA worked harder and more tirelessly the more the temperatures dropped, despite the lure of the glowing Yukon stove. They honed their artillery and Arctic skills to razor sharpness and proved again that they deserve the coveted title of "Arctic Soldiers."

Robert Service described the law years ago, and any cannoneer who expects to win the battle in the colder regions should learn his words by heart:

This is the law of the Yukon, that only the Strong shall thrive;
That surely the Weak shall perish, and only the Fit survive.

MAJ Robert A. Glacel, FA, received his commission through the United States Military Academy and is a graduate of the Command and General Staff College. He served with the 3-319th FA in Vietnam and with the 1-10th FA in Germany as a battery commander. He has been an instructor and assistant professor in the Department of Engineering at USMA. He served as the S3 and is now the executive officer of the 1-37th FA at Fort Richardson, Alaska.

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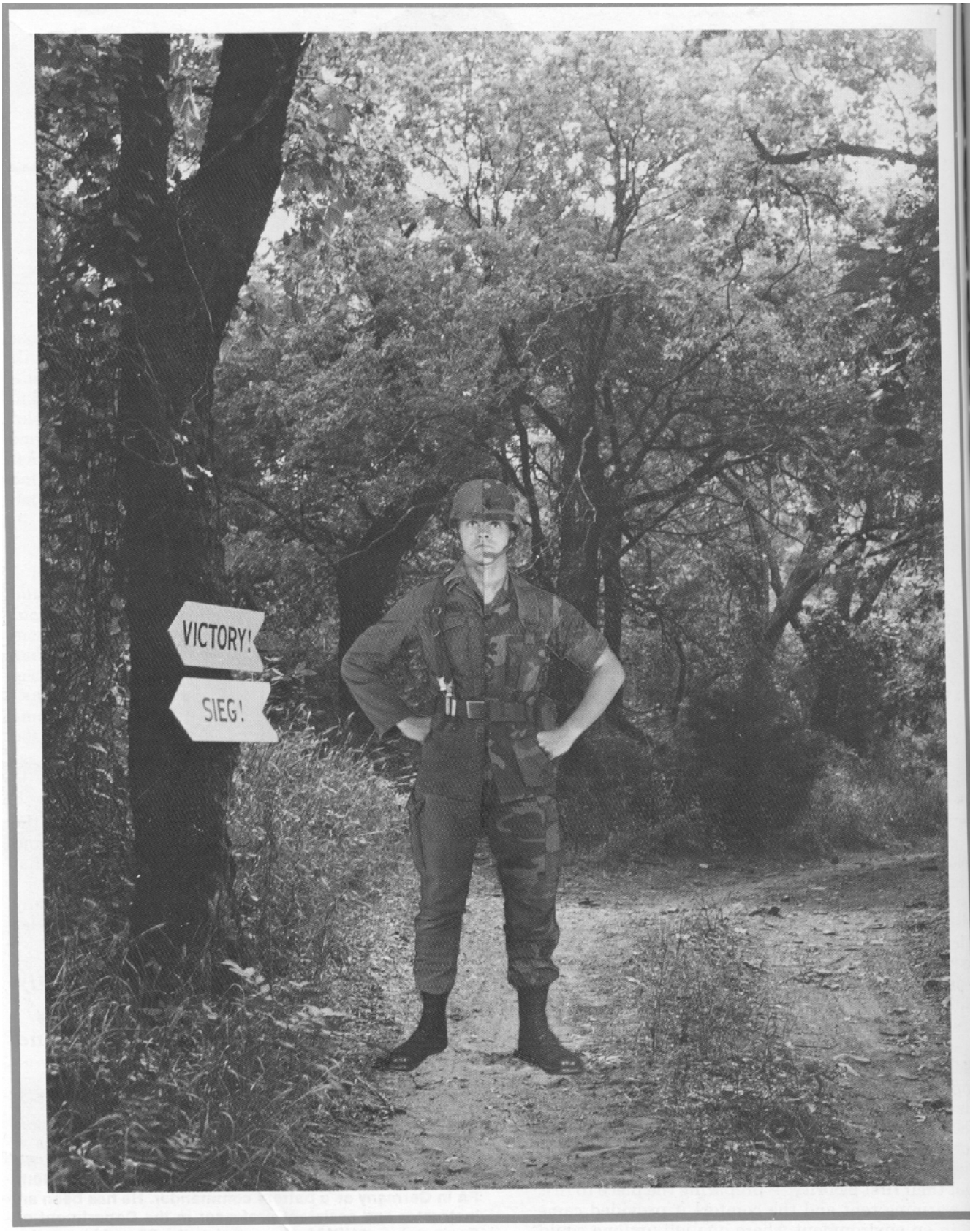

HEAD FOR THE NOVEMBER-DECEMBER ISSUE:

Der Weg zum Sieg ist Hand-in-Hand