FIELD ARTILLERY JOURNAL

January-February 1978

FIELD ARTILLERY JOURNAL

Volume 46 **January-February 1978** **Number 1**

The *Field Artillery Journal* is published bimonthly at the US Army Field Artillery School for the same purpose stated in the first *Field Artillery Journal* in 1911:

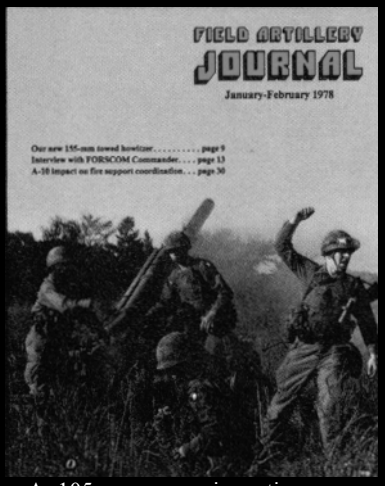
> "To publish a Journal for disseminating professional knowledge and furnishing information as to the field artillery's progress, development, and best use in campaign; to cultivate, with the other arms, a common understanding of the powers and limitations of each; to foster a feeling of interdependence 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."

Funds for the printing of the publication were approved by the Department of the Army, 1 September 1973.

All articles and information submitted are subject to edit by the *Journal* staff; footnotes and bibliographies may be deleted from text due to limitations of space.

All letters and articles should be addressed to Editor, *Field Artillery Journal*, PO Box 3131, Fort Sill OK 73503. AUTOVON 639-5121/6806 or Commercial (405) 351-5121/6806.

Subscriptions to the *Journal* may be obtained through the Field Artillery Association, Fort Sill, OK 73503. The rate is $9 per year to US and APO addresses. Canadian and Mexican addresses should add $2 for postage, and all other foreign addresses should add $3 for postage.

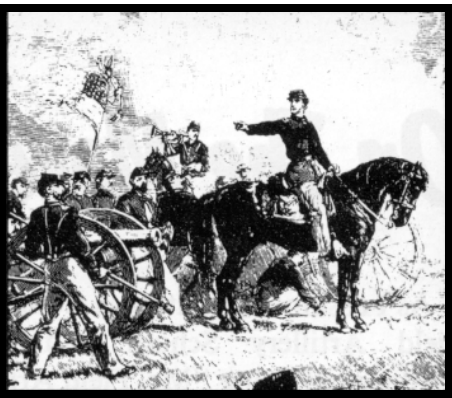


A 105-mm crew in action was caught by photographer Rich Fantozzi at Fort Campbell, KY.

POSTMASTERS: Controlled circulation postage paid at Lawton, OK, Department of the Army, DOD 314.

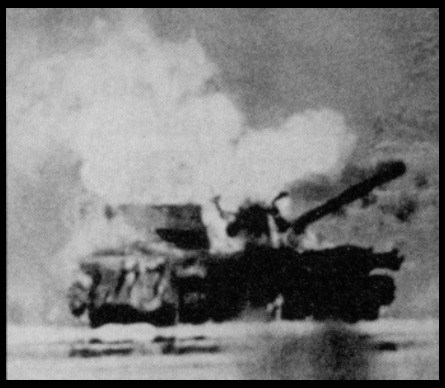
Articles

Features



page 34

page 20



page 30

page 43

We are pleased to announce that the *Journal* has a new Circulation Manager and Editorial Assistant. Ms. Ann Reese.

by MG Jack N. Merritt

On The Move . . .

As I assume my duties as Comandant of the Field Artillery School and address the challenge of being "Mr. Field Artillery," I am impressed with the great strides made in recent years. I have spent the last five years with the 1st Cavalry Division and, during that time, have seen, from the troop level, a revolution in Fire Support in concert with the Combined Arms Team.

I now realize, after having had a chance to involve myself in the details of our activities, that the revolution is far from complete. General Keith mentioned some of the ongoing projects in his last column, but it is nearly impossible to convey in words the exhilarating sense of activity here at Fort Sill.

But, we at Fort Sill must continue to be on guard against the tendency to see Fort Sill as being "the world." If the Field Artillery is to remain "on the move," we have to be on the move everywhere — in the Army's divisions, in our schools, and in our headquarters. I will try to insure that we don't confuse activity with accomplishment and that we continue to listen to your views as we try to develop doctrine and materiel. This, of course, imposes a responsibility upon all of you — to continually engage in a critical analysis of fire support. We can make progress only by working as a team.

Our specific objectives in the near term involve an intense concentration on consolidation and production — on fulfilling the promises of the past three years. I believe Fort Sill has done relatively well in the past, but there is much yet to do. There are many publications which need to be gotten to the field. We also face the challenge of getting equipment to the field (e.g., TACFIRE) and helping to develop an understanding of the

impact of this equipment. And, we must tend to the maturation of other systems (e.g., GSRS) which are yet but a gleam in the contractor's eye. So I see enough to keep us occupied, and, as our understanding improves, I suspect that this period of consolidation will develop new challenges which will require another cycle of innovation.

I assure you that we will also remember the need to train people, the need for good TOEs, good ARTEPs, etc.

In the entire process, I charge all of us to remember that the guys carrying the major burdens are the battery and battalion commanders. We can never forget that they must be considered in everything we do.

As we approach our tasks, I have laid out to the Fort Sill Community several guidelines in the development field which I will share with you:

— Teamwork is the Field Artillery's most important attribute.

Putting a projectile on a target 10 miles away is a triumph of teamwork — this is our strength — exploit it!

— Nobody has a corner on anything.

We can't afford parochialism in the Field Artillery. Everyone has a right (responsibility) to engage at any time in creative thinking *in any area.*

— Look for a better way.

— Challenge the assertion.

— Consider the long term.

We must always be open to change, challenging the "conventional wisdom" and avoiding the attraction of solving today's problem without regard to tomorrow.

— Ten percent for planning — 90 percent for execution. (Get the job done — tidy up the battlefield later.)

There are always cycles of innovation and consolidation. I think we are somewhat in the consolidation phase now. But, our way of doing anything needs to emphasize accomplishment — plans are important but execution is key.

I understand the honor and the challenge that goes with being the Commandant. I firmly pledge myself to support you by meeting your needs. In return, I ask that you continue the invaluable feedback without which we cannot provide what *you* must have. Your input to evolving Field Artillery doctrine and systems will insure that the products devised on Fort Sill blackboards will work when mud is thrown on them.

Finally, I believe we have a great *Journal.* It belongs to the Field Artillery and not the School or Center and I encourage each of you to make it even better by sharing your thoughts and ideas with Redlegs around the world.

General Merritt came home when he assumed command of Fort Sill, for he was born in Lawton 23 October 1930. He married a Lawton girl, the former Rosemary Ralston, and his three sons were born in Lawton.

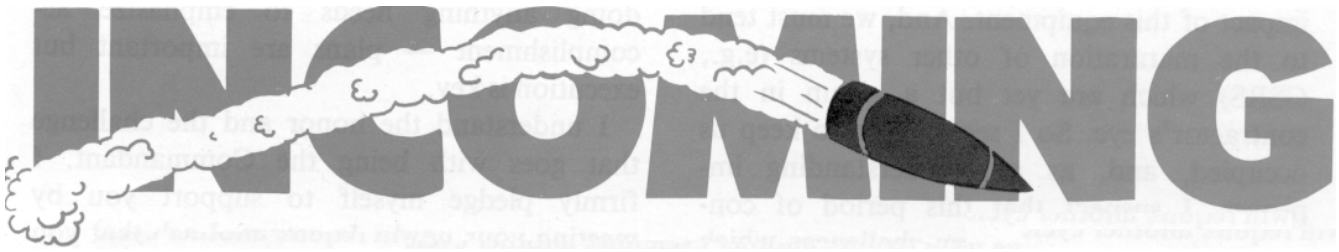
General Merritt attended the University of Oklahoma and received a bachelor of arts degree at the University of Nebraska-Omaha. He later earned his masters degree at George Washington University during a Pentagon assignment.

He entered the Officer's Candidate School at Fort Sill in 1953 and later returned to complete the Field Artillery Officer's Advance Course. He attended the US Air Force Command and General Staff College and the Industrial College of the Armed Forces.

During his many assignments, General Merritt served as an aide-de-camp, USAFAS gunnery instructor, staff officer at DA and DOD, and commanded at battery, battalion, and div arty levels. He also served as Chief of Staff of the 1st Cavalry Division and later as assistant division commander.

Among his awards and decorations are the Silver Star, Legion of Merit with Oak Leaf Cluster, Distinguished Flying Cross, Soldier's Medal, Bronze Star with two Oak Leaf Clusters, Air Medal with 20 Oak Leaf Clusters, and the Joint Services Commendation Medal.

Welcome home, General Merritt!



letters to the editor

"There are improvements to be made in nearly everything we do, if we will but exploit all the resources available to us, including soliciting the ideas of all soldiers, from private to senior general." – GEN Bernard W. Rogers, 17 Aug 76

Direct support or combat support?

Recent ammunition developments are seemingly leading the artillery away from traditional fire support concepts toward an evermore specific role. Particularly, the introduction of precision guided munitions (Copperhead), artillery delivered mines (FASCAM), and artillery-delivered television cameras (ARTEL) should cause us to reevaluate the mission of the field artillery.

Is destruction of point targets a viable part of the artillery mission? What of the proliferation of light, medium, and heavy antitank weapons with the infantry — not to mention the most potent tank killer on the battlefield, our own armor force?

There are many tank killers in the battle, and the artillery plays a key role in neutralization and immobilization (smoke, ICM), but not in destruction of single point targets. It is mismanagement of valuable time and command and control resources for the artillery to perform the persistent destruction fire role as Copperhead would have it.

Interdiction using mines is a fundamental tactic. The Engineers have made great improvements recently with helicopter delivery of mines and mine dispensing equipment. The Artillery has accepted a portion of the role with its share of the FASCAM program. We can now deliver hasty minefields throughout the range of the 155-mm and 8-inch howitzers. Generally, it takes many mines to create an effective minefield, and our TOEs do not include sufficient M548s and GOERs to supply the necessary amount of ammunition. What mission will the artillery battalion have that delivers these mines? How will this battalion effect resupply?

Technology has recently made available an artillery-delivered television camera. ARTEL's picture-taking capability is a great intelligence asset, but another data link to an already overburdened intelligence clearing house at the division. The artillery already has adequate target acquisition devices available in the FATAB, not to mention numerous other sources within the division. Do we need to see enemy bumper markings and/or the "whites of their eyes"?

The most distressing element of this situation is the delivery means. All three of these projectiles are designed primarily for the 155-mm system. This cannon is the workhorse of mechanized and armored fire support and provides a versatile general support weapon in light division configurations. It fires all types of available projectiles. In the debit column, the maximum rate of fire is three to four rounds a minute (that's hand ramming and hustling). The 155-mm ammunition weight and cube is difficult to service and complicates the logistic equation with the GOER and M548. The demand for close, continuous, timely and accurate fires is and always will be upon us. The 155-mm system's rate of fire is relatively slow for a close support weapon and there are some real resupply problems. These factors are compounded with the new families of ammunition which require very specific command and control and imply specific missions other than traditional fire support. We are making a mistake "modifying" direct support, reinforcing, and GS-R battalion missions to include these very specific tasks.

With the many changes in equipment and doctrine in recent years, we need to reflect on how we organize the artillery for combat; specifically, who shoots these projectiles and exactly what is the mission of each battalion on the battlefield? Additionally, we need to evaluate the role of our prime means of delivery — the 155-mm howitzer. Can it be a close support weapon and do all the other things we want it to do? We are seemingly moving away from fire support as the maneuver commander understands it. It is difficult for the field artillery to be the greatest combat multiplier on the battlefield with the missions and tasks implied by these equipment and ammunition developments.

Mike D. Starry
CPT, FA
Fort Benning, GA

The basic question you raise — what is the role of Field Artillery on today's battlefield — is terribly complex and one that hopefully will be agreed upon soon. While not answering your question, some studies have shown that, against the Warsaw Pact, US Field Artillery can do more to aid maneuver forces by keeping enemy fire support suppressed (counterfire), and by attacking enemy formations at greater ranges — 20 kilometers versus 2 kilometers — than can be done in previous applications of close-in fires equated to the direct support mission. This latter implies more GS battalions than DS battalions.

By counterfire we can reduce the enemy's acknowledged artillery capability. By attacking his maneuver at 20 kilometers, we attack him massed before he deploys and have an additional 18 kilometers march time in which to fire on him.

This matter involves our whole raison d'etre and warrants full, open debate. Letters on this subject are welcome. —Ed

Boresighting disc

In the "Right By Piece" section of the January-February 1977 *Journal*, you reported on a Plexiglas boresighting disc

devised by the 1st Battalion, 2d FA.

More than two years ago, MSG William S. Lyons and SSG Donald R. Crawford of our C Battery, fabricated a similar device except that it was placed outside the muzzle and held in place by magnets permanently affixed to the Plexiglas.

Harold M. Goldstein
CPT, FA
1st Bn, 86th FA (VTARNG)
Williston, Vermont

Your disc works well and some units may wish to develop similar devices pending issue of the M140 Alinement Device for "100" series (see item in "View From the Blockhouse"). —Ed.

Battalion ILC is essential

After three challenging and satisfying years in the Field Artillery I am going to school to become a military policeman. Before I become an ex-Redleg, I would like to ask the *Field Artillery Journal* to pass on one message in which I firmly believe. With the Skill Qualification Tests (SQT) now a firm reality, an *effective* individual learning center (ILC) is needed in every field artillery battalion in the Army today. The SQT is going to be of importance to every soldier, and there is no way that SQT preparation can be a once-every-two-years "cram" effort. The individual soldier must be able to train at his own pace, and he must be provided a convenient, well-equipped place to do this. In my unit we have such a place, and it has been described by several high ranking visitors as "the best battalion level ILC in the CONUS."

The center contains both an individual training room with five separate individual learning booths and a mini classroom/conference room that is suitable for section level training. Our ILC is a multimedia facility offering instruction via 16-mm movies, video tapes, cassettes, closed-circuit broadcasts, 35-mm slides, programed texts, field and technical manuals, training circulars, and Army Regulations.

The field artillery Training Extension Courses (TEC) lessons are the heart of the operation. We now have 785 lessons for 34 different MOSs. The ILC is open on a walk-in basis from 0800 to 1600 weekdays and on weekends by appointments. Our center averages 25 to 30 personnel (approximately 72 manhours) per day.

As the learning center operator (LCO), I perform before and after operation checks of all equipment and materials, maintain the schedule for group study, maintain accountability of equipment, obtain films, coordinate viewing of post TV broadcasts, maintain a record of all training programs, insure that the center is manned at all times, and keep individual records of ILC use.

Putting the center together was hard work, but it was a lot of fun. We began the operation in late 1975 and by February 1976 the project was completed. Even though this keeps me very busy, I feel that my work is a great service to my fellow soldiers and the battalion as a whole.

Again, particularly with the SQTs on the near horizon, I feel that every unit in the Army needs an ILC. I hope that this letter will inspire some interest in this area.

SP4 Mickey E. Sexton III
Battalion Learning Center Operator
2d Bn, 37th FA
Fort Sill, OK

204th FA reunion

The 204th Field Artillery Battalion members from World War II will meet 3-5 March at the Showboat Hotel in Las Vegas. For details, contact Pratt A. Smith, 5464 Cortina Avenue, Las Vegas, NV 89122.

New doctrine *works*!

I have read Major General Keith's "Forward Observations" in the July-August edition of the *Journal* and am in total agreement on the necessity to restructure *Corps'* artillery organizations and operating procedures.

I would like, however, to add my own thoughts on this issue and that of the counterfire doctrine which gave birth to these long overdue changes.

First I should say that counterfire was the biggest and most important change to the Field Artillery System in more than 30 years.

Of the five elements of the doctrine outlined in previous *Journal* editions and in TC 6-20-4, the single manager principle is by far the most important. It was this principle, a *single manager* of field artillery assets for both close support and counterfire, which dictated the other doctrinal and organizational changes.

We have long recognized that we could not afford a one-for-one artillery exchange with a numerically superior enemy. One man, the division artillery commander, must be able to suppress and countersuppress the enemy's artillery at the right time and place. To split our artillery by giving half of it to a corps artillery (or corps) commander for the counterbattery mission and half of it to the division artillery commander for the close support function spells defeat on today's battlefield. We must be able to mass our fires for counterbattery or close support as the situation requires!

Of nearly equal importance is the consideration of very wide frontages. A corps sector is simply too large for centralized control of cannon artillery.

VII Corps is moving rapidly to implement all five elements of the Counterfire Doctrine:

- Our target acquisition batteries are rebuilding in both men and equipment and have been assigned to the divisions.
- The use of intelligence for targeting is now a reality.
- Division artillery tactical operations centers *with* the processing section of the TABs are alive and working.
- Our field artillery groups have excellent relations with the division artilleries and *are* responsive to their needs.
- There is no doubt in VII Corps that counterfire and close support are division artillery missions.

Fort Sill's efforts to modernize and streamline the Field Artillery System are right-on.

David E. Ott
Lieutenant General, USA
Commanding, VII Corps

Incoming

Corps and div arty organization and doctrine

Recent changes in both artillery organization and doctrine call for a free wheeling discussion of same.

In the November-December 1975 *FA Journal* (pages 6 and 13), we were informed of a major change in field artillery doctrine. To quote —

- *"We believe that the counterfire function belongs at division artillery . . . ."*
- *". . . the corps artillery commander is going to be removed an unacceptable distance from the scene of battle."*
- *". . . We are changing our field artillery tactical doctrine to habitually place all corps artillery cannons in either a reinforcing role to one of the divisions or attached to the divisions."*
- *"The ability to respond quickly to shifting priorities, to mass where needed and to provide special fires such as air defense suppression are all enhanced by this focusing of control of the guns at division artillery level."*

In the July-August 1977 issue of the *FA Journal* the following changes were announced (pages 3 and 4).

- *"The corps artillery, so familiar in past wars, has been phased out . . . ."*
- *"Headquarters and headquarters battery . . . is being . . . replaced by the corps field artillery section (FAS)."*
- *"The field artillery target acquisition battery has been eliminated."*

One or more FA Brigade headquarters, open to various assignments, will be provided.

The reasons given, briefly, for these changes are as follows —

- The tempo of modern war has dramatically quickened.
- Both corps and division frontages are much greater.
- Battles will be won or lost at division or lower levels.
- Corps artillery headquarters will be too far removed from the battle to effectively control fire support.

The results of these changes mean today —

- The corps artillery commanding general is going to be removed an unacceptable distance from the scene of battle.
- Corps artillery headquarters is reduced to a *section*.
- The corps artillery target acquisition battery (intelligence gathering means) is eliminated.
- *One artillery headquarters* (div arty) is now responsible for support of the maneuver elements, all counterfire (including air-defense suppression), operation of all attached corps cannon, operation of FA target acquisition elements (aided from time to time by an FA Brigade headquarters — either reinforcing or attached).

Is this adequate in the age of firepower? — The answer is *no*.

In a defense, to concentrate artillery operations at division level — really a single line defense, is unsound. A breakthrough would spell disaster.

On the attack, the div arty is too heavily loaded to properly support the present day multi-element maneuver force.

This concept has failed to visualize the size and importance of firepower (including airpower) in today's actions! We are presently restructuring our divisions with added firepower. We are adding a general support rocket system. We have added nuclear, chemical, and, probably, neutron ammunition. We face potential enemies who out-gun us many times over, so further increases are in sight. The outcome of the fire fight (including air) may well be the principal factor in deciding the action today. Our artillery organization and doctrine must be geared to handle this load.

Before discussing specific artillery needs, let's review, briefly, the normal tasks of the Army, corps and divisions.

There's no argument that, nowadays, the tempo of their actions will be greatly quickened; also, in Europe their responsible frontages are much greater. Historically, the corps provides continuity in the occupation of its zone of action. Whereas, divisions may be overrun, replaced, or relieved, the corps has to view them as expendable units. They must be kept mobile and free to maneuver.

Their artillery organization must conform to this role — enough for support but not overloaded or charged with extraneous missions. This has been forgotten in the changes outlined above.

The principal elements needed in today's artillery organization and doctrine are rather obvious and simple. (Note — Since artillery functions at army headquarters are principally logistical, they are omitted)

The corps artillery commander is responsible for the preparation and execution of the corps fire plan for either attack or defense. This includes the plan for all artillery with the corps. This requires an adequate headquarters and headquarters battery commanded by a major general. The rank is dictated by his responsibilities, as well as necessary in a proper artillery chain of command. (In World War I, the French corps artillery staff commanded by an artillery major general was a dominant factor in the allied victory.)

The headquarters battery must be expanded to include a minimum of two FDCs (fire direction centers).

While in the planning stages, the corps artillery headquarters may be located to the rear. In operation this is not so! The corps artillery commander will most likely operate from a forward echelon in the battle zone while the FDCs will be positioned well forward in the battle zone. In Europe, in World War II, when armored divisions were covering corps attacks, corps artillery FDCs operated in advance of infantry divisions.

The artillery target acquisition battalion is vital to corps artillery operations. It operates a screen of ground surveillance radars posted even in gaps between divisions. The necessary continuity of its operations cannot be provided by divisions which principally will be concerned with their countermortar radars. The eyes providing the targets for the whole counterbattery activity of corps artillery are furnished by this battalion and the air observers.

Corps artillery will normally execute all the more distant fires, whether for destruction or neutralization. This will include nuclear, neutron, and chemical fires and also a portion of rocket fire. Their important mission in defense or attack is, of course, counterbattery including air defense suppression. In the changes quoted above, this heavy responsibility has been shifted to division artillery in addition to its primary function.

This deserves some discussion.

The reason given in "Forward Observations," page 3, (July-August 1977) is —

"Since the battle will be fought at the division level, then it is div arty which must have counterfire responsibility in order to quickly and effectively react against hostile fires."

Corps artillery employs the same technical means so it can react in the same time frame.

Also div arty will be heavily engaged with countermortar fires, antitank fires, and infantry defensive fires.

A letter dated 12 March 1976 from the DA DCSOPS had this to say — "Given greater distances and more rapid battle action, it is logical to assign control of counterbattery to the same commander responsible for maneuver support, specifically the div arty commander."

The div arty commander will be heavily engaged in support of the maneuver force against a strong and well-equipped enemy force. Fires demanded for this mission will be in an entirely different area from those required for counterbattery. Countermortar radar will develop other fire requirements div arty must answer. Finally, some of the hostile fire will be coming from areas outside the division zone of action.

This division, furthermore, may have been committed only recently.

The corps artillery intelligence screen will be the only one capable of locating and responding to most enemy artillery fire. The great amount of enemy artillery reported in existence is another factor.

Successful counterbattery, including antiair suppression, will require the concentrated effort of a single, capable artillery command found only at corps artillery. Div arty cannot and should not be diverted from its primary mission — support of the maneuver force.

Restructuring to strengthen divisional artillery is in the works. This is long overdue. Considering his responsibility and the importance of his fire plans and their successful execution, the commander should carry the rank of brigadier general. Certainly he is far more responsible for the division's success than the brigadier general now charged with administration and supply.

Most of the target acquisition equipment, except countermortar radars, should be returned to the corps artillery and div arty should be relieved of its counterbattery mission.

Artillery groups are the only other artillery organization required. FA Brigades are an unnecessary unit in a corps artillery organization as described above. It is my hope that the weak and poorly balanced organization now proposed for field artillery will receive proper discussion and correction.

Along with it will go the necessary changes in doctrine.

R. P. Shugg
Brigadier General, USA (Ret)
San Francisco, CA

6-20 is SUPER!

As a student in the CGSC 77-78 regular course, I had occasion to use FM 6-20 when designated a brigade FSCOORD in a *First Battle* simulation retrograde operation.

As I have never had artillery experience (my arms detail was armor my first two years in the Army), I read the entire FM prior to the exercise. Up to this point in the course, it was my perception that FA officers were conspicuously competent and I frankly feared humiliation!

During the course of the war game and in the feedback session thereafter, I found that I felt most comfortable with the principles of FA management and deployment. I especially applaud those portions of the FM dealing with fire support organization, planning principles, and, of course, FA applications to retrograde operations. Using the well-conceptualized and clearly delineated principles of employment, I was able to develop a set of rules applicable to the simulation which maximized kill probabilities.

In my 13 years of service, this is the first time that I have ever unabashedly applauded *any* Army publication; I tend to be overly critical. The FM is a credit to its authors and, more significantly, reflects the painful thought and resolution procedures that went into its production. Above all, it consolidates and clarifies FA applications and principles in the minds of both the novice and the FA professional.

R.S. Lockwood
MAJ (P), AGC
Fort Leavenworth, KS

Training the troops

The training of our young enlisted men who report to an FA unit fresh from AIT could be vastly improved if we educated junior officers on what the men have learned in basic training and AIT. Today, a new replacement reporting to his unit from AIT is viewed as another warm body to slot somewhere in the battery.

Battery commanders have no idea what the new soldier learned previously, unless perhaps the CO is a former enlisted man. Consequently, it is often assumed that NCOs must teach them everything about an FA unit. This assumption is totally false and leads to a repetition of learning tasks the enlisted man has already mastered.

I recommend that the FA School consider implementing immediately a program whereby officers in the basic and advance courses are given a briefing on the POI of basic training and AIT. A visit to observe this training could enhance the education of our junior officers and thereby give them an appreciation of the training the men have received prior to reporting to an FA unit.

Robert H. Kimball
CPT, FA
University of Houston

The entrance training for our FA soldiers is explained in CPT Paul Green's article in this issue. Battery officers need only pick up a Soldier's Manual for skill level 1 to find out exactly what his new soldier knows. —Ed

Incoming

Hairy ears?

The 7th Field Artillery Association is very interested in obtaining a copy of the book "Cannoneers Have Hairy Ears," Anonymous (but written by Robert Casey), published in 1927 by J. H. Sears Company of New York.

Anyone who has a copy of this book and is willing to sell it, please contact me.

Matthew S. Bronisz
104 Carmen Road
Manchester, CT 06040

Simultaneous observation proves effective

Recently my battalion, the 2d Bn, 92d FA, conducted training and service practice at the Seventh Army Training Center at Wildflecken, Germany.

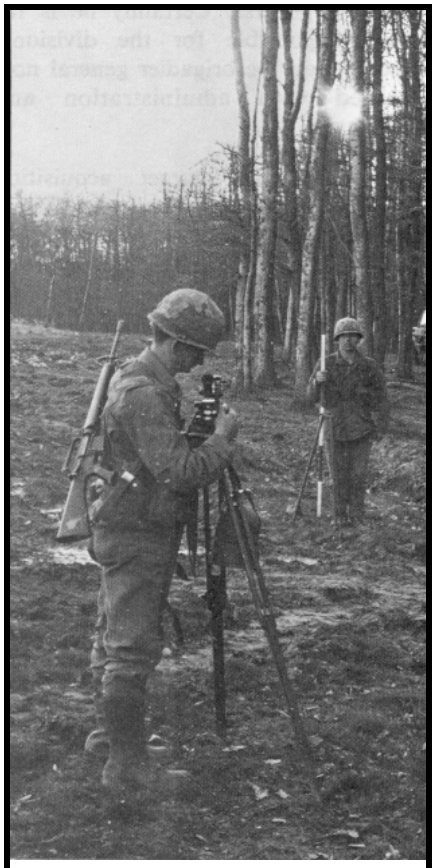
Survey control at the Wildflecken Training Area was not complete for field artillery units located there for training. Due to various formidable circumstances including terrain, lack of SCPs, and a complete revamping of several position areas, the availability of nearby survey control was nonexistent.

Our ARTEP specifically requires a simultaneous astronomic observation of the sun, Polaris, or other celestial body. We began coordinating the efforts of the survey section and the key personnel of the firing batteries. All planning included conducting classes with hands-on practice in observing the sun. The instruction and coordination prevented such errors as the use of unfamiliar commands on the radio, obtaining an incorrect sight picture on the sun, and misunderstanding which procedure was to be used for a given observation.

It was determined that a simultaneous observation could be used to:

- Verify current battery data.
- Extend *directional* control prior to the availability of full survey control.
- Verify survey data at different points within the position area survey.

The most appropriate time to verify or extend directional control is during the initial occupation by the advanced parties, enabling the batteries to fire with more accurate data than that provided by using the aiming circle magnetic needle.



FA surveyors practice simultaneous observation

For verification of directional control, the master station would announce on the radio, "Prepare to observe the sun, for verification." All firing battery observers knew to orient on survey data or magnetic data (whichever was available) and prepare to track the sun. When "tip" was announced by the master station, all flank readings were collected and compared to that of the master station. If one of the batteries did not already have directional control or failed to verify data within a tolerance of 2.0 mils, that element would stand by for a second observation in order to obtain directional control. In that case, the simultaneous observation procedures as described in FM 6-50, chapter 9, "Laying the Battery and Hasty Survey Techniques," were used. By using these techniques, the survey section was able to verify direction to all batteries in less than two minutes. With concentration on abbreviated, clear and concise radio procedures, the survey direction could be transferred in less than 60 seconds per battery. The key to obtaining speed during the process of verification or transfer of direction is prior planning to clarify all terminology and development of a brief smooth flowing format for radio communications.

In summary, the use of simultaneous observation techniques proved successful throughout the training period. The technique provided timely data with the accuracy the Field Artillery needs to fulfill the mission of effectively delivering accurate fires. The effects of the battalion's rounds were outstanding. Many nonbelievers became believers in the employment of simultaneous observation procedures.

A. E. Matthewson Jr.
1LT, FA
Recon and Survey Officer
2d Bn, 92d FA
APO New York

FA history buffs

As my efforts to further document the history of the Field Artillery continue, an idea occurs to me that should attract other FA historians to contribute to the work.

What I have in mind is a series of short (1,000-1,500 words) biographical sketches of the key individuals in our past. We all know the men of great prominence — Knox, Hamilton, Scott, but what about James Duncan, Henry Hunt, George Meade? There are at least a score more.

Each volunteer writer could be given a name to research and a good photo or drawing of each subject might be found. As the individual research efforts are completed, the *Journal* could print them. When the package is complete, a publisher could be located to print a book with the proceeds from sales going to the FA Association or the Museum at Sill.

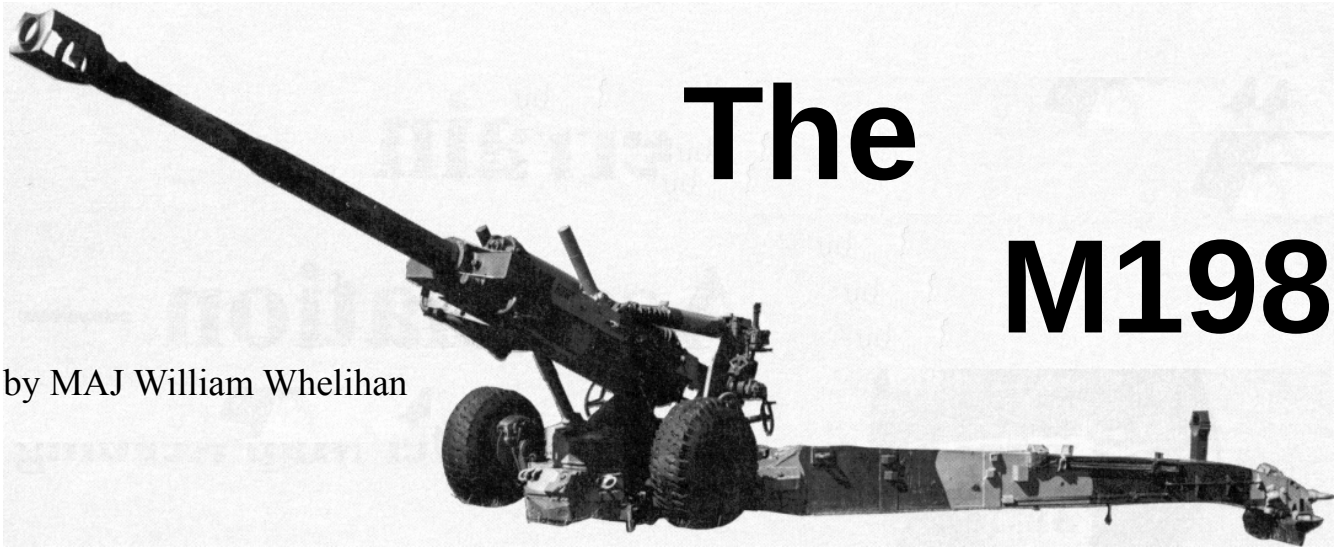
I would be happy to coordinate the subject matter assignments if enough volunteers will contact me.

R. M. Stegmaier
Colonel (Ret)
10052 Peoria Avenue
Sun City, AZ 85351

Colonel Stegmaier is the author of our multi-part historical series, "Winning the West." The Journal *will consider all manuscripts submitted to Colonel Stegmaier. —Ed.*

The M198

by MAJ William Whelihan



Field artillerymen are looking forward to the arrival of the new towed 155-mm howitzer — the M198. Designed originally as a replacement for the old M114A1 (vintage 1942), the M198 is a new development designed to provide conventional and nuclear general support fires for light divisions in the post-1979 time period.

Developmental history

Efforts to develop new 155-mm artillery weapon began in 1964 with work on the XM138, a lightweight, unarmored, self-propelled howitzer with increased range. In mid-1968, the Army decided that it needed both a new 155-mm towed system and a new self-propelled system with more mobility and crew protection. The XM138 was terminated in late 1968 with the remaining resources being applied to a new, armored, self-propelled howitzer, the XM179. The XM179 was terminated in December 1969 because of high development and production costs and design complexity.

It was decided to concentrate efforts on a simple, lightweight towed howitzer with a 30-kilometer range. Design and fabrication of an advanced development prototype was started in 1969 and completed in 1970, after which engineering development began that proceeded to type classification and full-scale production during FY77.

The M198 is a helicopter-transportable weapon that provides significant improvement over the M114A1 towed 155-mm howitzer in range, reliability, availability, emplacement, and movement. The system is composed of the M39 carriage, the M45 recoil mechanism, the M199 cannon, and the required fire control equipment. The readout system associated with the panoramic telescope is designed to use the deflection method of lay. All level vials, reticles, and counters are self-illuminated.

The M198 is designed to use new ammunition items; specifically, the Copperhead, M483A1 ICM, XM712, XM795 (HE), M549 rocket-assisted projectile (RAP), and M203 (zone 8) propelling charge. Other standard 155-mm projectiles and charges may also be used. The gun/ammo system complies with NATO ballistic standardization agreements. The M198 employs a cannon that is ballistically similar to the M185 cannon used in the M109A1.

Most of the problem areas associated with the M198 are propellant oriented. Also, excessive blast overpressures will require the development of a protective helmet with sound attenuation.

M198 Characteristics and Specifications

Range in kilometers:

Munition/charge	*Range*	*Range with RAP*
M203	22-24	30
XM201	19.3	24
XM211	12.6	15
Copperhead	16	NA

Elevation: – 75 to + 1275 mils.
Traverse: ± 400 mils on carriage.
Maximum towing speed: 55 mph (primary roads); 5 mph (cross country).
Prime movers: 5-ton truck or M548.
Helicopter transportability: CH-47C or CH-54.
Reliability: 700 to 1,100 mean rounds between failures.
Maximum rate of fire: four rounds per minute.
Sustained rate of fire: As indicated by thermal warning devices.
Weight: 15,500 pounds.
Crew size: 11.
Tube life: 1750.

MAJ William Whelihan is assigned to the Weapons Team, Directorate of Combat Developments, USAFAS.

Terrain Association —

Key To Better Map Reading

by CPT Michael J. Speltz

Art by Dan Enger

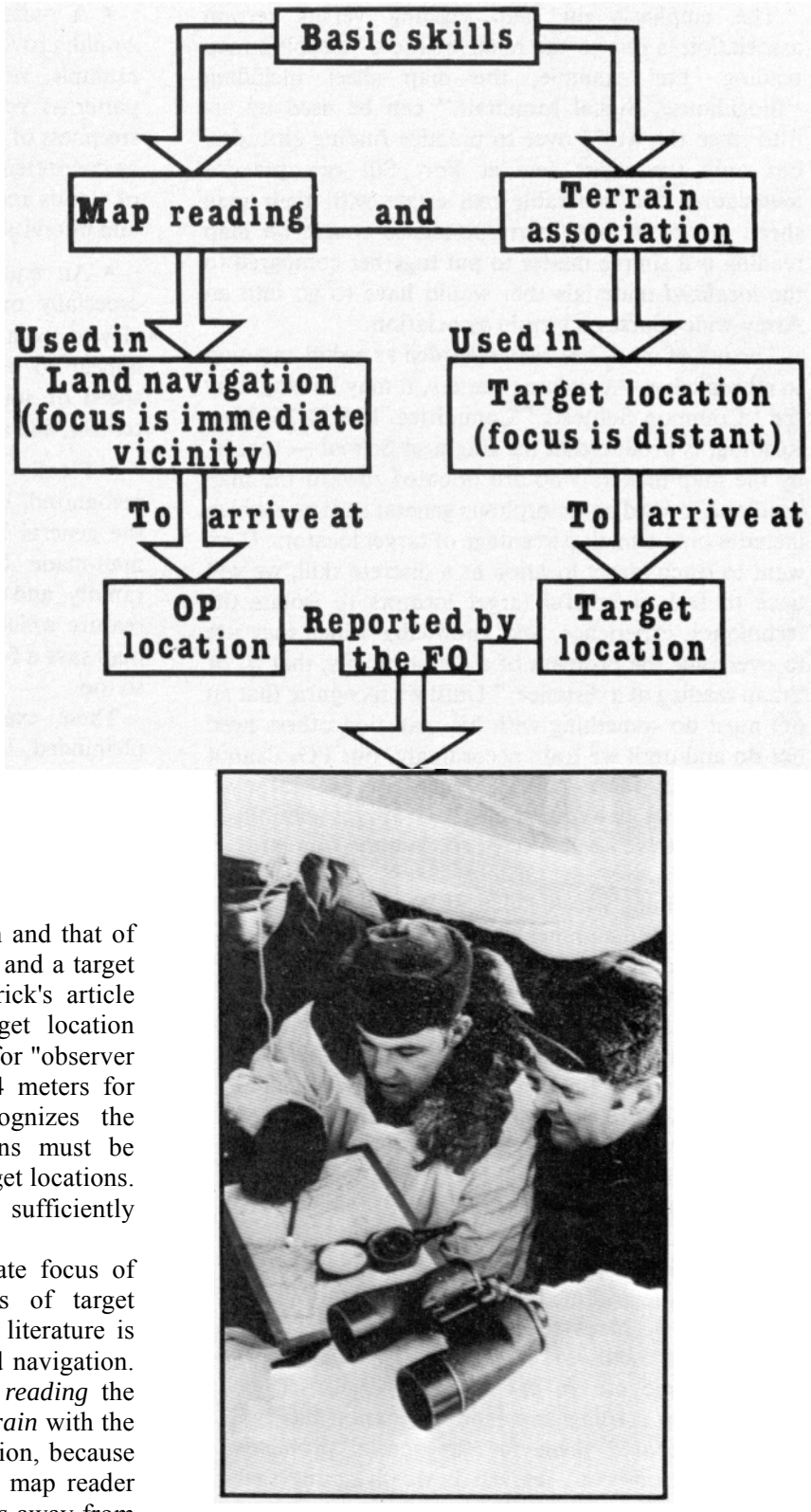
Why can't the FO read his map?

Just as civilian educators have found deficiencies in the reading skills of today's youngsters, LTC Allison Patrick has exposed deficiencies in the map reading skills of our forward observers. In "The Forward Observer: How effective is he?" (*FA Journal*, July-August 1977), Lieutenant Colonel Patrick wrote: ". . . the FO cannot *read* his map . . . ." and he suspected ". . . a lack of adequate map-reading training."

"Map reading" may be an unfortunate choice of words, because the problem is more precisely an inability to associate the terrain with the map. Any FO recognizes that those concentric brown contour lines on his map represent a hill, but only a few can consistently recognize that that *particular* hill is represented by *those* particular contour lines on his map. The difference is that of map reading — the ability to visualize terrain by inspecting a map, versus *terrain association* — the ability to visualize how terrain will be represented on a map.

This distinction is made even more difficult by the term *land navigation* — the skill which uses both terrain association and map reading to facilitate dead reckoning. The immediate purpose of land navigation is to continuously know one's own location during movement to guarantee that the intended route is followed.

To land navigation, we can oppose a skill we could call *target location.* This is a skill which also uses both terrain association and map reading, but, in this instance, to facilitate the attack of enemy targets by indirect fire. The immediate purpose of target location is to determine the accurate grid coordinates of a target (or the ground location of a known point for a shift mission). The essential difference between land navigation and target location is that the land navigator focuses on the terrain *in his vicinity*, whereas the target locator focuses on terrain *in the vicinity of a target* — terrain which may be barely discernible to even the aided human eye.



An FO must know both his own location and that of his target; he must be both a land navigator and a target locator (figure 1). Lieutenant Colonel Patrick's article demonstrates the greater difficulty of target location versus land navigation: mean miss distance for "observer post location" was 213 meters, versus 674 meters for "target location." The ARTEP also recognizes the difference: observation post (OP) locations must be within 150 meters, versus 250 meters for target locations. Unfortunately, our training does not sufficiently recognize this difference.

The difference is rooted in the immediate focus of land navigation versus the distant focus of target location. Most of our training and training literature is based on solving the easier problem of land navigation. Many more training hours are devoted to *reading* the map, than are devoted to *associating the terrain* with the map. This is a bias in favor of land navigation, because the terrain in the immediate vicinity of the map reader looks most like the map. As the focus moves away from the observer, it becomes increasingly difficult for him to mentally shift his horizontal viewpoint to the vertical viewpoint depicted on his map.

Figure 1. Forward observer skills.

The emphasis on map reading versus terrain association is due to the relative ease of teaching map reading. For example, the map sheet including "Blockhouse, Signal Mountain" can be used by artillerymen the world over to practice finding altitudes, but only the select few at Fort Sill can practice associating that venerable real estate with their map sheet. An Army-wide correspondence course on map reading is a simple matter to put together compared to the *localized* materials that would have to go into an Army-wide course on terrain association.

The use of maps has been regarded as a skill common to all branches. At training centers, it may be taught by the "Common Subjects" Committee. FM 21-26, Map Reading, is produced at the Engineer School — that is, by the map-makers who are oriented toward the map itself and toward an amorphous general audience which includes only a small percentage of target locators. If we want to teach target location as a discrete skill, we will have to task successful target locators to isolate the techniques, experience, and knowledge which they use to overcome the problem of a distant focus; that is, of "map reading at a distance." Until we recognize that an FO must do something with his map that others need not do and until we train accordingly, our FOs cannot be expected to meet ARTEP standards of target location. Until we give equal time to terrain association, our FOs cannot even be expected to meet the standards of OP location.

The field training which cadets at West Point receive during their second summer provides a good example. During the preceding academic year, the cadets receive thorough instruction in map reading, but only one outdoor exercise in terrain association. Early in the summer, they receive several hours of land navigation training. Then they are confronted with about eight hours of observed fire training. After a 40-minute class, most cadets have no trouble shooting a mission using a shift from a known point. The call for fire, the formula W = Rm, and the use of binoculars and compass are simple procedures which can be committed to memory. But many cadets have difficulty determining target location using the grid method of target location. They avoid using their maps to estimate ranges, to locate "lost" rounds, and to interpret why subsequent corrections come out in the "wrong" place. Their training in map reading and land navigation has not adequately prepared them for the special problems encountered in observed fire. (It is worth noting that USMA is currently revising its map reading and land navigation instruction programs.)

Here are only a few of the special subjects which might be included in a course called "Maps for Redlegs."

- A rudimentary knowledge of physical geography would provide many clues to the target locator. For example, valleys and ridges usually run in predictable patterns; vegetation and rock formations reflect the steepness of the terrain on which they are found, as well as the presence or absence of water; careful observation of clouds and sunlight provides clues to relative altitude and intervisibility.
- An equally rudimentary knowledge of physics, especially optics, can be useful. For example, when viewed from a plain, mountains are more distant than appear to be; air temperature and density affect the speed of sound in a predictable manner; vegetation, terrain, and weather affect the *quality* of sound.
- Finally, there is an enormous store of widely recognized, but often forgotten, facts which fall under the general heading of common sense. For example, man-made features change rapidly, vegetation less rapidly, and terrain hardly at all; it is impossible to see a feature which is masked by some other feature; if the map says a feature lies due south, the compass must say so too.

These examples may sound homespun and simpleminded, but they may represent more sophisticated facts and techniques which are routinely employed by skilled observers and which should be incorporated into our training. Furthermore, many observers come from urban areas which do not provide the background needed to acquire this "common sense."

Training techniques used in "Maps for Redlegs" might include:

- Sending FOs out to locate maneuver units engaged in field training.
- Moving FOs away from familiar impact areas to locate "new" targets which need not be actually fired upon.
- Moving *all* map related training out of the classroom.

This training should be supported by an improved body of training literature written *by* target locators *for* target locators. It must not be a rehash of what we already know and teach, but rather the collected wisdom of the Army's finest FOs organized into a rational format. Once again, these simple techniques and common sense suggestions can be expanded and improved with a little imagination and research.

I began by asking "why the FO cannot read his map," only to find that he has been reading it too much. It is time to get the FO's nose out of the book and into the woods, where he can learn to "read his map at a distance!"

CPT Michael J. Speltz is an instructor of Russian in the Department of Foreign Languages, Military Academy, West Point, NY. United States

The Journal interviews . . .

GEN Frederick J. Kroesen

Journal: *Sir, have we passed the era of realistic employment of "light" divisions in Europe?*

Kroesen: I've been saying since my latest field command that one of my greatest concerns about Europe is the lack of light infantry and there are jobs that can be done best by them. We should look seriously at employing additional infantry units. I believe defensive warfare is infantryman's warfare.

That doesn't mean that I propose changing the force structure currently in Europe. The heavy divisions obviously have the major role to play in that theater and would require more transport if we had to deploy them from CONUS. But I would have desired an early augmentation of infantry. I gave a lot of consideration to the European terrain and I think there are places to employ the 82d Airborne, the 9th Infantry, and the 101st Air Assault Division where they can do certain jobs better than anyone else. For example, the 82d Division placed in Nuremberg would be a hell of an outfit to fight through, and dropping a few autobahn bridges in that area would mean that all roads lead through Nuremberg. Fighting in built-up areas, in the hill masses, and in the forests continues to be an infantry mission. I do not think infantry combat in Europe is passe'.

Journal: *Are you concerned about the ability of the 193d Brigade to defend the Panama Canal should serious trouble erupt regarding the proposed new treaty?*

Kroesen: The 193d is a combat-ready, well-prepared, and well-trained organization. The problem of defending the Panama Canal raises the controversial problem of whether we are discussing a military operation or a police action. I am certain that the 193d can engage in antiguerrilla operations — the kind of warfare we were faced with in Vietnam — but it can no more guarantee that a sabotage element could not do damage than it can guarantee that a bandit group cannot rob the National Bank of Panama. I have no qualms about the combat readiness or combat effectiveness of the 193d to engage in any emergency that may arise, and to initiate the defense of the canal if it is attacked by an invading force, but counterguerrilla action would be no different there than any other place in the world.

GEN Frederick J. Kroesen assumed command of US Army Forces Command in October 1976. He is responsible for the combat readiness of all the deployable forces of the Army not already stationed in an overseas command—Active Army, Army Reserve, and (after mobilization) National Guard. Prior to assuming command of FORSCOM, General Kroesen was Commander, VII Corps in Germany. He is a former commander of the Americal Division (in Vietnam) and the 82d Airborne Division.

Journal: *How essential are the National Training Centers being discussed for the Forts Drum and Irwin?*
Kroesen: The essentiality of the National Training Centers is still being determined. The studies being conducted are aimed at identifying the benefits provided by the NTCs which cannot be achieved in some other manner. There are no preconceived notions that "this is the way it has to be." There is great precedent for having such things in armies where land is restricted such as West Germany, whose tank battalions go to Canada's national training center. The advantage they gain is training which is far superior to that we receive when we send our battalions to the more limited training areas such as Grafenwoehr. I think there is a need for training our units in a large national training center environment — whether we can afford to establish new centers or try to enlarge current facilities such as Forts Carson and Hood for our heavy divisions — I don't know yet.

Journal: *What is your assessment of the fire support portion of the FORSCOM combined arms team?*
Kroesen: You have to remember that FORSCOM is not an operational headquarters. We are not preparing to go to war as a command — rather we are preparing our units for deployment to war under theater commanders around the world. So we have no FORSCOM combined arms team and fire support for FORSCOM is relevant only in terms of the capability to employ fire support by units deployed to a combat theater. My interest in fire support is that we have that artillery back here in CONUS needed to support the forces we will deploy and that the maneuver battalion commanders and their staffs will be capable of making maximum use, not only of the available artillery, but close support aircraft, gunships, air defense weapons, naval gunfire, or any other kind of fire available.

I have always believed that the maneuver battalion is the key combat echelon and that, at that level, we need to be able to combine all the support necessary for the commander to win. The battalion commander's toughest and most important task is the total coordination of this fire support, and I have long thought that a key training requirement is the live fire combined arms field exercise which causes the commander to *have* to employ and coordinate all of these fires. I am a great believer in increasing the stress and the tempo of requirements on the battalion commander in training so he can do it in combat.

Journal: *Is the National Guard/Active Army affiliation program working?*
Kroesen: It is proving to be of great benefit to the training of the Reserve Components. It is being done better in some places than in others. In those active divisions with "round out" augmentation elements, commanders are recognizing true responsibility for training that Reserve Component organization. We have seen some outstanding training and individual personal relationships developed between Active and Reserve personnel. One National Guard brigade commander told me that he had been attending summer camp for 28 years. For 27 of those years, he thought they had a pretty good operation. This past summer, for the first time, as a "round out" brigade of an Active division and with the help and support of the division, he really saw what could be accomplished in two weeks. In all cases where Active Army commanders and staffs have accepted the full responsibility that is theirs, there have been great benefits. We have to rely on the affiliation program and we will continue to foster its positive evolution and development.

Journal: *What are some meaningful, practical things that Active Army units and schools can do to enhance Reserve Component readiness?*
Kroesen: Establish contact. If the Active Army unit commander and the Reserve commander just get together, get to know each other, discuss their mutual problems and capabilities to support one another, they will form a partnership valuable to each.

We are pressing the ABSAT program — that's Active Battalion Support to Annual Training. Beginning two summers ago, the 101st Division began providing a battalion to a Reserve summer camp site to put on training demonstrations and assist in training management. It was most beneficial to the Reserves and it was a valuable off-post training experience for the 101st. As a result, ABSAT has been expanded.

We find many more mobile training teams being offered by Active Army units to assist Reserve units, Readiness Regions, and Readiness Groups. One of the most successful has been an intelligence training team from Fort Bragg that goes all over the country.

There is much more that can be done if initiative and imagination are applied.

Journal: *In a recent Journal interview (Nov-Dec 77), General Starry indicated he favored an "SQT" type test for officers. Do you see a need for officer MOS tests?*
Kroesen: I have long maintained that one of the four fundamental Army training requirements is to train leaders. When the first SQTs were published, I said that the NCOs and officers must be able to pass the SQT also. It is simply a matter of normal leadership that the platoon leader be able to do everything his personnel have to do. They have to be the trainers — the people who know best how to do the job. So, I believe the SQT

is mandatory for officers — that is, I believe all officers need to perform as the SQT requires the enlisted man to perform. Whether this means the officer must actually "take a test," I leave that to the Training and Doctrine Command to determine.

In a related area, I think the Army needs a method of comparative evaluation for the officer corps. Our efficiency report system has lost credibility and usefulness as a comparative evaluation tool. Perhaps some form of testing might be a good idea for identifying those officers best qualified for advancement, but we will have to guard against its becoming an "only tool," a "class standing" measurement, for promotion.

Journal: *Debate continues over the use of the ARTEP — as a diagnostic training tool or as a major aspect of a commander's efficiency report. What are your personal views on using the ARTEP?*

Kroesen: I see it as a diagnostic tool to identify those weaknesses toward which a commander should direct his training efforts and resources. The ARTEP should not have a pass/fail connotation, but rather provide a matrix to help identify specific problem areas. I think our ARTEPs *are* properly designed and I would hate to see them revert to the old ATT/ORTT "annual test" context.

At the same time, the ARTEP is obviously going to be a "diagnostic tool" for the senior commander. If that matrix I mentioned is so full of poor performance indicators, it is bound to be a reflection on the unit commander. And it may well be a personnel management tool that the senior commander uses to find out he has the wrong man in the job. You can't deny that performance on an ARTEP will reflect on the commander and his staff's capability to get the job done.

But foremost, I think the ARTEP should be designed as a diagnostic tool aimed at improving training and improving the capability of the unit to conduct combat operations.

Journal: *Thank you.*

Commanders Update

MG Jack N. Merritt
Commandant
US Army Field Artillery School

BG Harvey D. Williams
VII Corps Artillery

COL David E. Scales
214th Field Artillery Group

LTC Lewis A. Rice
2d Battalion, 1st Field Artillery

LTC Stanley M. Brown
2d Battalion, 2d Field Artillery

LTC Jerome H. Granrud
6th Battalion, 10th Field Artillery

LTC Leonard D. Miller
1st Battalion, 11th Field Artillery

LTC Willard E. Marlow
1st Battalion, 12th Field Artillery

LTC Fred F. Marty
1st Battalion, 16th Field Artillery

LTC John N. Carboni
3d Battalion, 16th Field Artillery

LTC Gregory W. Mason
3d Battalion, 17th Field Artillery

LTC Charles E. Tilson
1st Battalion, 18th Field Artillery

LTC Robert J. Michela
3d Battalion, 18th Field Artillery

LTC Bruce H. Ellis, Jr.
1st Battalion, 27th Field Artillery

LTC James H. Jobe
1st Battalion, 35th Field Artillery

LTC Harold V. Floody, Jr.
2d Battalion, 37th Field Artillery

LTC John C. Burlingame
6th Battalion, 37th Field Artillery

LTC Robert J. Castleman
1st Battalion, 75th Field Artillery

LTC Roger K. Bean
1st Battalion, 78th Field Artillery

LTC David G. Wilkie
3d Battalion, 79th Field Artillery

LTC Charles R. Weaver
1st Battalion, 94th Field Artillery

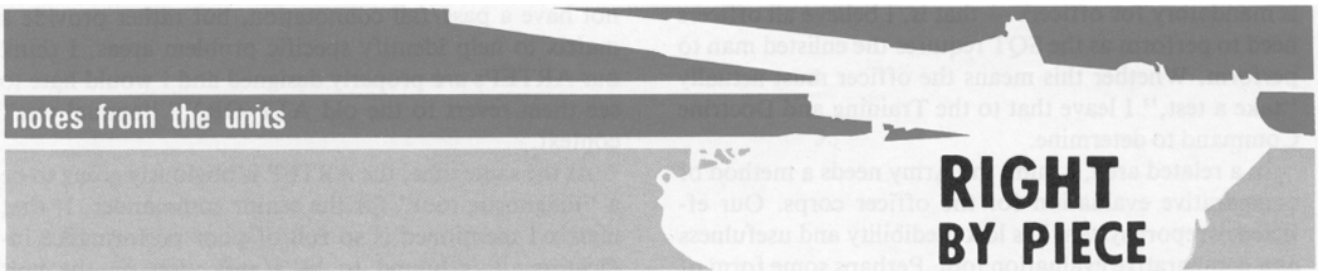
LTC John S. Nettles, Jr.
2d Battalion, 320th Field Artillery

LTC Richard R. Noack
2d Battalion, 377th Field Artillery

LTC Alex J. Johnson
5th Training Battalion
Fort Sill

LTC Seth J. Riegle
Specialist Training Battalion
Fort Sill

LTC Isaac F. Bonifay
Staff and Faculty Battalion
Fort Sill



More big guns to Europe

FORT RILEY, KS — In a move to increase the immediate firepower capability of forward forces supporting the North Atlantic Treaty Organization (NATO) alliance, the Army is adding the equivalent of a field artillery battalion to units in Europe.

The permanent deployment involves the inactivation of the 2d Battalion, 76th Field Artillery, at Fort Riley and restationing about 225 troops from Riley to Europe. A total of 12 eight-inch howitzers, eight from Fort Riley and four from Fort Sill, OK, will be stationed with the 3d Battalion, 35th FA, and the 3d Battalion, 37th FA.

The move is scheduled to take place between January and March of this year at a cost of about $1.5 million.

Artillery driver reups for "clean" machine

IDAR OBERSTEIN, GERMANY — When a USAREUR inspection team looked the Lisa Marie over, the only complaint they had was "this truck is too clean, just too clean."

"Well, I guess the inspectors were looking for dirt and rust," said CPL D. J. Weemes, Ammo Chief, A Btry, 2-81st FA. "I keep the Lisa Marie in tip top shape. I wash her after I drive her, no matter how far I go."

During his assignment to the 2-81st, Weemes has worked as a cannoneer, gunner, and ammunition section chief, but, his desire to drive never left him.

His "desire" was realized recently when he reenlisted for the motor transport MOS. "I have always wanted to be a truck driver since I was just a boy, I guess I'll do anything to drive a truck — even reenlist," said Weemes.

The reenlistment ceremony, with the 2-81st Battalion Commander, LTC Ronald C. Olsen, administering the oath, took place in the 2-81st FA motor pool, next to Lisa Marie.

Weemes says that he has spent up to 20 hours a day working on the truck. He also claims to have spent over a month of continuous after duty work to get the 5-ton beauty ready for inspection.

One troop commented that the 5-ton cargo truck looks more like a show truck than an ammo carrier. Weemes quickly explained, "Some people say the Lisa Marie looks like all it does is sit in the motor pool, but she collects just as much junk and dirt as any other truck. We just keep her spotless, that's all."

In a few months Weemes will leave the Lisa Marie in the hands of PFC Marvin Thomas, his assistant. Marvin comments, "Though I doubt that anyone loves that truck as much as Weemes, I am confident that I can keep it in tip top shape."

"I really hate to leave this truck," Weemes concluded, "the Lisa Marie is somewhat like a symbol to me. It shows that if a man works hard enough his accomplishments will stand out in the crowd." (PVT Tyrinda Dixon, PAO, 8th Infantry Division.)

G/VLLD tested

FORT CARSON, CO — Historically, the problem with artillery adjustment has been to obtain a first-round hit on "point targets" such as tanks and other armored vehicles. Recently, a system designed to achieve first-round hits with laser-guided munitions was tested by the US Army Operational Test and Evaluation Agency (USAOTEA).

The system is called the G/VLLD — Ground/Vehicular Laser Locator Designator.

The G/VLLD system is being developed for use by scouts, flash-and-sound ranging teams, and artillery forward observers and is a visually aimed laser-telescope which can be ground employed or vehicle mounted.

After a target has been observed, the operator obtains the target location using laser energy.

This information is then transmitted to the fire direction center (FDC) which computes firing commands for the artillery firing battery. At the appropriate

time, after the artillery has fired the cannon-launched guided projectile (Copperhead) or an aircraft has dropped a laser guided bomb, the FDC or pilot has the G/VLLD operator place a laser "spot" on the target.

The spot serves as a homing device to guide the Copperhead or bomb onto the target. The G/VLLD is also used for providing terminal guidance information for the Army's Hellfire guided missile fired from the advanced assault helicopter.

Throughout the duration of the testing period, there were 1,250 day and night events to test and assess G/VLLD capabilities under varying conditions.

The 19th Field Artillery, 40th Armor, and the 10th Infantry were the principal player and support units.

The player units serving as friendly forces consisted of five G/VLLD forward observer sections, one G/VLLD-equipped flash-and-sound ranging team, and one G/VLLD-equipped scout squad.

Two mechanized infantry platoons and one tank company played the agressor forces with additional support provided by elements of many other Carson units.

Realism added to training

FORT HOOD, TX — A gun crew of the 1st Battalion, 92d Field Artillery, 2d Armored Division, recently fired the 1,500th round under a new safety NCO program designed for more realistic training.

Before the safety NCO program started, firing data settings had to be checked by a safety officer. Since such a practice is unheard of under combat conditions, a complete program was prepared at Fort Sill to give the responsibility back to the section chiefs.

The program adds realism to training and reduces the section chief's dependence on safety officers to catch mistakes, according to CPT Robert Marshall, C Battery Commander.

The section chief of each gun, usually an E5 or E6, receives the same training that safety officers had been getting. After this specialized, intensive training, the NCOs must "max" a series of tests, both written and practical. Each NCO fires three practice missions while being observed by a safety officer. He is then certified by his battery and battalion commander as a safety NCO and must requalify every six months.

The 92d has been under the safety NCO program for the past year and all guns now have at least one qualified safety NCO. The section chief who supervised firing of the 1,500th round, SGT Edward Blado said, "I feel this is the best thing that could happen for artillery training. This is more constructive because this is the way it will be if we're ever in combat."

FORT CAMPBELL, KY — Artillery action is caught during a recent 101st Airborne Division (Air Assault) readiness force alert. A 105-mm howitzer from Battery A, 1-321st FA fires after being landed by a Chinook helicopter. The battery had 15 minutes to deploy, set up, shoot, and get out before the enemy could react. (Photo by Rich Fantozzi.)

9th Infantry Div Arty holds an "ETS breakfast"

FORT LEWIS, WA — Senior 9th Infantry Div Arty officers and NCOs gathered recently at an "ETS breakfast" to bid farewell to soldiers who were leaving the artillery battalions for the civilian world.

The breakfast was the brainchild of MAJ Albert E. Slucher Jr., div arty adjutant, who stated, "The breakfast was designed to say thanks to the good soldiers upon their departure from the service." The breakfast will be a monthly event.

Slucher's thoughts were seconded by COL David B. Lucke, div arty commander, in his speech at the breakfast.

"As you approach the end of your military service, I'd like to thank you for your faithful service to the United States," Lucke said.

"Some of you will go on to do other things but, no matter what you do, you will always retain the memories of the years you've spent in the service."

Lucke ended his speech by drawing attention to VA benefits and advised the men to take full advantage of the benefits.

"I really hate to see you take the green uniform off and put on 'civies,'" Lucke concluded. "Some of you will probably grow you hair long, grow mustaches, sideburns, etc. All I can say is 'go at it'."

The meal was hosted by the 1-84th FA and served in the battalion dining facility.

Leaders in the 8th Div Arty

GRAFENWOEHR — An 8-inch artillery battalion usually goes unnoticed, because all they do is provide *general* support and they only have four guns to a battery. They do not have the glamour of the more rapid firing 155-mm units.

But the Baumholder-based 3d Battalion, 16th Field Artillery, has done a lot to change that impression in the 8th Infantry Division.

The battalion captured both the best gunnery team and best howitzer section competition and then went on the achieve the best results out of five artillery battalions participating in Division Artillery-conducted ARTEPs.

PVT Theodore O'Donnel, Battery C, 3-16th FA, performs post-firing maintenance while perched on the end of one of his unit's 8-inch howitzer tubes. O'Donnel's unit scored well on an 8th Infantry Division Artillery ARTEP, conducted at Grafenwoehr. (Photo by SP4 T. L. Harmon.)

Army "backbone" straight in artillery exercise

FORT SILL — "NCOs only" was the word as the 4th Battalion, 4th Field Artillery, held a four-day field exercise here recently to demonstrate NCO capability to run batteries in the field.

During the exercise, the only officers in sight were those needed to fill range control safety requirements. All problems and decisions were handled by the battalion's command sergeant major, acting as battalion commander. First sergeants acted as battery commanders.

The participants in the exercise reflected enthusiasm and a desire to repeat the experience. 1SG Harold Childers of A Battery said, "We're showing the Army the NCO is still its backbone. I think the exercise helped the young NCOs a lot and proved to them how much they could really do. It built their confidence . . . we could always use more of this kind of experience."

According to 1SG Frank Rankins of B Battery, ". . . it gave us a great opportunity to show that NCOs can and do run the batteries in the field . . . it reminded the officers that they're in command — but the NCOs are running things."

CSM Rafael Torres, battalion commander during the exercise, said "The operation in general really pleased me. The whole operation was planned and organized by NCOs. I visited all the batteries and gave the first sergeants guidelines which they executed well. Esprit and morale were high. We had a few minor difficulties but the NCOs solved them all.

"I can honestly say that I encourage all other units on post to let the NCO take charge in the field. This exercise helped raise the prestige of the NCOs and restore trust in their abilities. It's good for the NCO because it makes him feel he can do it all on his own if necessary," Torres said.

The battalion commander, LTC William Kelly, was pleased with the operation and said "I've always wanted to give the NCOs the authority and responsibility we talk about them having. NCOs seldom get the chance to be in charge of overall coordination of a unit's activities . . . how to get five batteries out of a motor pool and on the road to the field in 45 minutes. They had to coordinate staff support, get showers set up, and take care of getting the unit resupplied with ammo and fuel."

Comments from other battalion NCOs who filled various officer slots during the exercise were also enthusiastic about the exercise. The capper was supplied by a battalion PFC who moaned that "nothin' really changed because the NCO's were runnin' things."

Training goes down better in the field

FORT SILL — Three weeks in the field is the perfect prescription to round out a year's training according to LTC William Kelly, Commander of the 4th Battalion, 4th Field Artillery. That being the case, the 4-4th took its medicine recently and completed a busy three weeks training away from the distracting influences of garrison routine.

During the first week each man zeroed in and qualified with his weapon. These included M16 rifles, .45 caliber pistols, and submachine guns. After the weapon ranges, chemical warfare protective equipment was tested and everyone ran through the confidence course.

Planning the base camp was an exercise in itself, aimed at the unit's junior leaders and NCOs, according to Kelly who said, "A lot of them haven't had the chance to make plans for 400 people. They've never been to Europe, Vietnam, or advanced courses where they learn this."

A large number of the cannoneers and FDC personnel had the opportunity to run through the hands-on portion of their SQTs while in the field and prime time was devoted to SQT preparation.

Training time in the field did not become a dull grind. The second week saw firing sections hit the ranges for a direct fire shootout. The best section then met the 4-4th's National Guard sister unit, the 1st Battalion, 158th FA, Oklahoma Army NG, in a showdown. The guardsmen lost the match by three seconds.

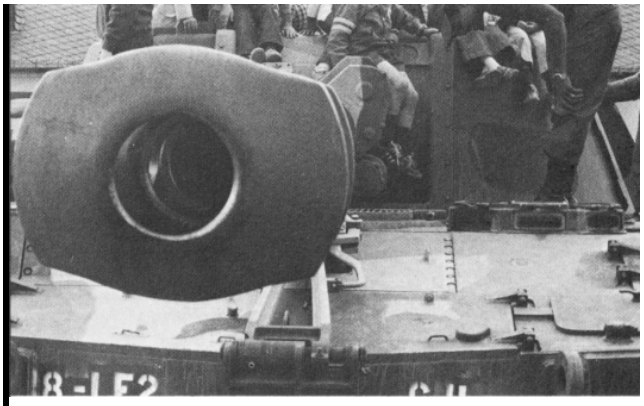
A section rally followed the shootout. This was a competitive 3,000-meter, 8-point compass course with a timed event at each point. At one station the troops pitched a small tent. Another event was a boat race across Lake Elmer Thomas, paddling without oar locks.

Focal point in this prime training period was the section chief. "I wanted to give him the time to do things he normally can't do in garrison or in short field exercises," said Kelly.

In the final week of field training, 4-4th's command sergeant major took howitzer section chiefs through Field Artillery section chief readiness evaluations.

It wasn't too Spartan — the battalion carried a few TV sets and arranged for hot showers, free movies, a beer tent, and periodic visits by a PX barber and snack truck.

On the final Saturday an open house for wives and children of the battalion's members gave the families a chance to watch the artillerymen during fire missions.



BAUMHOLDER, GERMANY — Children from the Jack 'n Jill preschool nursery in Baumholder explore the 155-mm howitzer. The 1st Bn, 2d FA, recently hosted 60 children from the community's preschool nursery, giving them an insight into the interesting aspects of modern field artillery. (Photo by Mark Eller.)

4th Div Arty shines

FORT CARSON, CO — The 4th Division recently completed an intensive week of competition involving all units on the post in scores of contests related to sports and military skills. The 4th Division Artillery received praise for its outstanding achievements during "Iron Horse Week."

Div Arty, with only four battalions, took more than its share of awards, a few of which are listed below:

Swimming (overall) —	20th FA, 2nd place
Combat swimming —	20th FA, 1st place
Poncho raft —	19th FA, 1st place
Air mattress relay —	20th FA, 1st place
Chariot race —	27th FA, 2d place
	29th FA, 3d place
Military events — (overall)	20th FA, 3d place
.45 caliber pistol —	20th FA, 1st place
M60 machine gun —	20th FA, 2d place
Bowling (singles) —	Div Arty, 3d place
	27th FA, 4th place
Golf (team) —	Div Arty, 3d place
Golf (individual) —	20th FA, 3d place
Racquetball — (singles)	Div Arty, 3d place
Overall field events —	20th FA, 1st place
100-yard dash —	20th FA, 2d and 3d place
220-yard dash —	20th FA, 1st and 2d place
440-yard dash —	20th FA, 3d place
880-yard run —	19th FA, 1st place
1-mile run —	19th FA, 1st place
Long jump —	20th FA, 3d place
1-mile relay —	20th FA, 3d place
2-mile relay —	19th FA, 1st place

1-20 — POP YOUR CHEST UP! — Ed.

BCT/OSUT MAJOR REQUIREMENTS (BASIC SOLDIERING SKILLS)

- APPLY FIRST AND PROCEDURES.
- EMPLOY NBC DEFENSE PROCEDURES.
- PASS PHYSICAL CONDITIONING EVENTS.
- PASS BPFT/APFT.
- PERFORM DRILL AND CEREMONIES.
- DEMONSTRATE MILITARY CUSTOMS AND COURTESIES.
- PERFORM INTERIOR GUARD DUTY.
- INSTALL, OPERATE AND MAINTAIN INTERNAL WIRE COMMUNICATIONS.

BCT/OSUT MAJOR REQUIREMENTS (COMBAT TACTICS AND INTELLIGENCE)

- REPORT ENEMY INFORMATION.
- USE CHALLENGE AND PASSWORD.
- DEMONSTRATE COVER, CONCEALMENT, SUPPRESSION, AND TEAMWORK (OFFENSE AND DEFENSE).
- CONSTRUCT INDIVIDUAL DEFENSIVE POSITION.

BCT/OSUT MAJOR REQUIREMENTS (INDIVIDUAL AND CRED SERVED WEAPONS)

- QUALIFY WITH THE M 16 RIFLE.
- PASS HAND GRENADE QUALIFICATION COURSE.
- ENGAGE A TARGET WITH THE M203 GRENADE LAUNCHER.
- ENGAGE A TARGET WITH THE M7242 LAW.
- ENGAGE A TARGET WITH THE M60 MACHINEGUN.

13B10 OSUT MAJOR REQUIREMENTS (M101A1 AND ASSIGNMENT ORIENTED)

- PERFORM SECTION DUTIES DURING EMPLACEMENT AND DISPLACEMENT.
- PERFORM SECTION DUTIES DURING FIRING.
- MAINTAIN HOWITZER AND FIRE CONTROL EQUIPMENT.
- ENGAGE A TARGET WITH THE 50 CALIBER MACHINEGUN.

USAFATC-

Where it's happening!

by CPT Paul Green

It has long been a widely held opinion that commanding a TOE unit is more professionally rewarding than commanding a training unit. Having commanded both types of batteries, I feel qualified to make some observations regarding this point.

During my first assignment to Fort Sill in 1971-72, I was fortunate enough to command a firing battery in III Corps Artillery. It was an outstanding experience! The unit I commanded was originally a school support unit with the added mission of being combat ready. Also, during my command, the battalion converted from an 8-inch/175-mm to an M109 unit. Adjusting to the new weapons system was further complicated by the continued requirement to shoot for the School, support the then prominent volunteer Army concept, and live with greatly reduced manpower resulting from the early discharge programs of that era. Certainly, it was a difficult time which required careful management of a small amount of resources just to accomplish the mission. It was not unusual for CQs to get off duty just in time to take their sections to the field or for battery officers and first sergeants to help unload ammunition. That was before the days when minimum crews were required on howitzers, and it was not uncommon to find two or three men manning an M109.

After a short tour in Korea, I was again assigned to Sill to command a training battery in the US Army Field Artillery Training Center (USAFATC). I had heard a lot about this kind of command and agreed, somewhat reluctantly, to accept what I was convinced was basically an administrative assignment with the principal duty of overseeing boring, repetitive, and mundane training. Now that I have completed that command, I can say that nothing could have been further from the truth. But before I go into that, let me bring you up-to-date on some of the changes that have occurred in the FA Training Center in the last year and a half.

The Training Center today

The entire system of training has been revolutionized. The old basic combat training (BCT) and advanced individual training (AIT) methods have been replaced

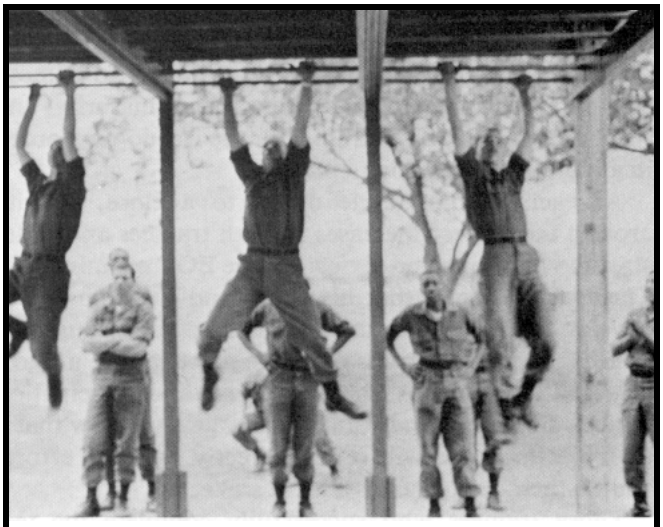
by one station unit training (OSUT). During OSUT, the trainee goes through his entire basic and advanced training in a combined program, under the same cadre, and on the same installation. This has a number of obvious advantages. First, it eliminates a costly move after BCT. It also gives the cadre longer to observe the trainee, evaluate him, identify his weaknesses, resolve his problems, and drop those trainees who are unable to meet the standards. The soldier also benefits directly because he advances through a structured program without the disruption of moving and having to readjust. OSUT has proved to be both efficient and effective. The required tasks that a basic entry artilleryman needs to know have been identified and extraneous material has been eliminated. Soldiers are taught all skill level 1 tasks, using the Soldier's Manual as a guide. Core subjects are taught by committees and reinforced by the unit cadre who also assist in the teaching. All training is hands-on and performance-oriented. The old boring lecture technique is gone.

At the end of each cycle, the trainee, is tested by an element not involved in the actual training. In other words, it is an objective test, patterned after the Skill Qualification Test (SQT). The test reveals whether the individual soldier has actually learned and can perform *all* skill level 1 tasks. The battery commander has roughly the same stake in the end-of-cycle (EOC) test that the TOE commander had in the old ORTTs or TPIs. The EOC just comes around more often.

Critical to the program is the concept that the individual must also be a soldier. That is, he must demonstrate that he has learned the discipline and self-control expected of the professional soldier.

In peacetime, the job of the Army is readiness and training — unit training for TOE units, and initial entry training for the training base. Both jobs are equally demanding and tough to accomplish. The training battery commander must manage resources and plan training as surely as does the TOE commander. The training battery commander is assisted by committees who present most of the formal instruction, but he is responsible for making sure that each individual learns the essential subject matter and can pass the end-of-cycle test. He does this by using "check-out tests" after each training period and maintaining records of those individuals who are weak in each area. Later, during reinforcement training and review, he insures that each individual who is weak in an area receives additional exposure to that particular area. This becomes a complex management problem because there are more than 200 soldiers in each cycle and there are approximately 30 tasks to be mastered.

The OSUT training cycle is divided into four command managed phases. Phasing and progression are used to challenge the trainees by increasing incentives and privileges. The commander decides when the battery is to advance to the next phase.



Trainees must pass the end-of-cycle advanced physical fitness test to graduate.

- The first phase, the indoctrination phase, begins when the trainees reach the training battery from the reception station and concludes at the end of three weeks. The soldier is taught the fundamentals of soldiering and learns what it means to be a member of the Army. During this phase, the soldier qualifies with his M16 rifle and spends from first call to lights out with his drill sergeant. It is a time of heavy emotional adjustment, strict control, and total immersion in the training process.
- Phase II, weeks four through six, is known as the assimilation phase. During this period emphasis is placed on basic combat and specialty skills. The trainee is expected to demonstrate motivation and discipline as he progresses in his training.
- Phase III, usually weeks seven through nine, is the development phase. The trainee has by this time demonstrated the essential knowledge and ability to function within the military society. As the trainee demonstrates individual responsibility, the commander will normally relax restraints and grant passes to outstanding soldiers. Combat skills (e.g., hand grenade, machinegun, rifle, tactical communications, and principles of offensive/defensive combat) are emphasized early in this phase. Specialty skills (e.g., duties of the cannoneer, operational maintenance of the howitzer) become dominant during the latter part of the phase.
- Phase IV is the qualification phase. It commences in the tenth week of battery training and continues until graduation in the twelfth week. During this phase, the training is mainly concerned with MOS technical skills.

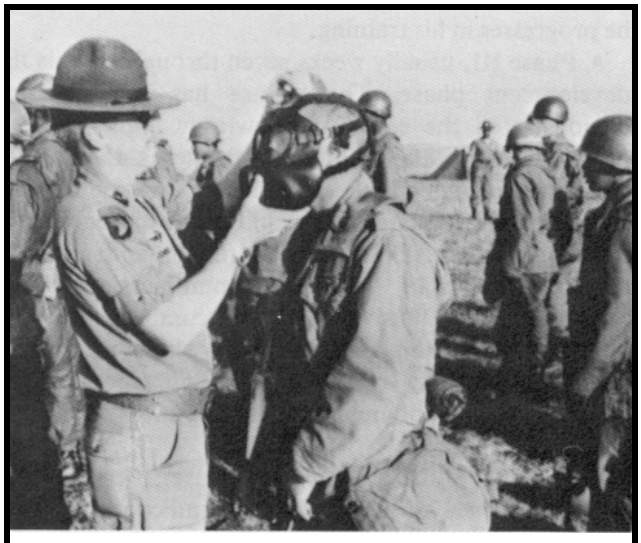
Realistic training is accomplished in the field to the greatest degree possible. During the final portion of the qualification phase, the trainee is required to demonstrate that he can exercise self-discipline, maturity, and responsibility commensurate with the freedom afforded in a typical unit environment.

As each training cycle draws to a close, activity around the battery increases as both trainees and cadre strain to reinforce and review for the EOC examination. The trainee knows that his cadre and the committees have done all they can and that he must go through the 18 EOC test areas on his own. He must receive a "go" at *every* test station. The excitement and anticipation mount. The commander and drill sergeants know that a poor performance will reflect directly on their efforts and on their unit. There's a lot at stake.

Those trainees who successfully complete the test come away with a deep sense of personal accomplishment. Failures begin preparing for a retest.

Upon completion of the EOC test and the final PT test, the trainees participate in their final training activity — the graduation parade. In this stirring ceremony, the trainee is welcomed into the ranks of the professional Field Artillery family. Various individual achievements are recognized, and awards are presented to the distinguished graduate and the high scorers in rifle markmanship and physical training. The parade marks the transition from trainee to soldier. As expected, the unit cadre are as proud as their men. Friends and families come great distances to witness and congratulate the new soldiers.

During the week after graduation, the battery commander presents his training results in a statistical portrayal and briefing to the Training Center Commander, the battalion commanders, and the Training Center staff. This post-cycle critique completes the feedback loop and problems which impacted on training are addressed and resolved.



Drill sergeant instructs a trainee on the wearing of a gas mask.

Tactical road marches challenge the young soldier and contribute to physical fitness.

In addition to managing training, the commander, with the expert help of his drill sergeants, must identify those men who need individual attention. Some soldiers lack the attitude, motivation, maturity, or personal qualities to become effective soldiers. These men must be identified, the problem corrected, or the soldier dropped from training. Most often, soldiers who develop problems simply need counseling or assistance in personal affairs. The 200 to 250 young men in each group entering OSUT come from a wide range of social, educational and economic backgrounds, which presents a myriad of problems. Each problem must be solved so that the trainee can devote his full attention and effort to his training and the transition from civilian to soldier.

The key to effective OSUT success is the drill sergeant. Like the section chief in any other unit, the drill sergeant is the man who carries the real burden in mission accomplishment. The drill sergeant performs a unique job in many ways. To the homesick trainee facing the demanding indoctrination period, the drill sergeant must not only know where each man stands in PT and rifle qualification, but he must be father figure and counselor as well. Once the trainees become more adjusted, his role shifts toward disciplinarian and trainer. By the end of the cycle, he may well have become an idol his men will seek to emulate.

Having commanded both a TOE battery and a training battery, I can say that each is a rewarding experience in its own way. Each has its own challenges and problems to overcome. The TOE battery commander must deal with TPIs, ARTEPs, and maintenance problems, but the training battery commander also has unique problems, to include:

• Training a new group of men every 12 weeks.

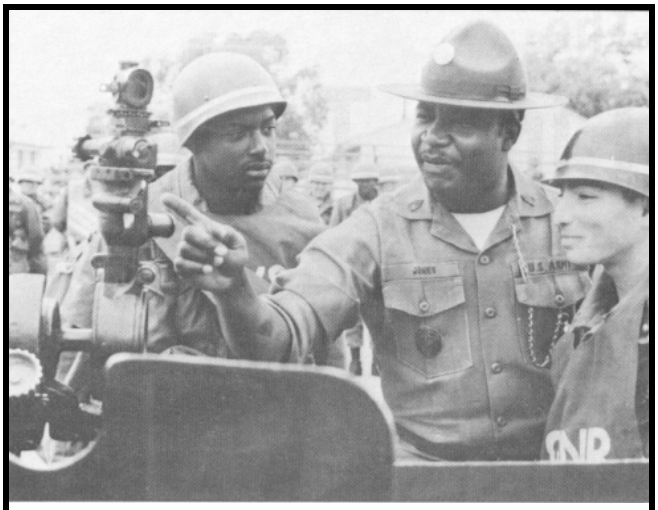
• Administering normal personnel actions and military justice for a large fluid unit.

• Manipulating limited training resources so that they are available at the critical moment in training.

• Motivating cadre to perform repetitive tasks over and over again without losing professionalism or lowering the standards.

The drill sergeants are truly outstanding! Because of the enormous importance of their work, the Army habitually selects its best men for this duty. After six weeks of intensive training, drill sergeant candidates are awarded the brown campaign hat which symbolizes their commitment. But it's not all fun and glory. The distinctive hat and new prestige bring heavy responsibilities. The drill sergeant works many extra hours, weekends, and holidays. When others are with their families and friends, the drill sergeant is often with his soldiers, molding and teaching, motivating and caring. He must cope with the worst recruits, those who never make it to units. He must teach respect and discipline to young men who never picked up a dirty sock or mowed the family lawn. He must recognize immaturity and treat it for what it is. Despite all this, the drill sergeant often extends or returns to drill sergeant duty. He does this because he knows that he is needed and can make a real contribution. His reward is the simple satisfaction derived from doing a difficult job professionally. The drill sergeant is the Army's standard for excellence.

The battery commander, through his drill sergeants and with the counsel of his first sergeant, can have a direct influence on the quality of the training as well as the discipline and motivation of the soldier. As a consequence, the impact of the training unit commander on the quality and training of the Army itself becomes tremendous. After all, he provides 200 qualified men to the Field Artillery every three months. That's the equivalent of eight firing batteries a year! I doubt that a company grade officer in any other capacity can have so great a direct influence on today's Army.



Drill sergeant conducts reinforcement training to insure that each trainee is proficient in skill level 1 tasks.

The misconception that commanding a training unit is less professionally rewarding than commanding any other type unit needs to be put to rest, once and for all.

CPT Paul Green is Assistant S3 of the US Army Field Artillery Training Center.

Military Pay Commission

Organization and staffing of the Presidential Commission on Military Compensation is being completed and hearings are in progress.

Charles J. Zwick, chairman of the nine-member commission, said "We will be getting out and talking to active people at military installations. Our major thrust is to get the current mood of the military, understand the issues, and try to integrate them into a total package."

The views and opinions of active and retired military personnel are being sought by the commission, whose work will serve as the basis for either validating the existing system or creating a new one.

Completion of the commission's review is scheduled for 15 March 1978 when it will report its findings and recommendations to the President.

Those who wish to express their views may write the President's Commission on Military Compensation, 666 11th Street, N.W., Suite 520, Washington, DC 20001.

The First Team and TACFIRE

by LTC Craig Leyda

The "First Team" is currently involved in testing and implementing many organizational, equipment, and doctrinal changes for the Army. The 1st Cavalry Division Artillery (the Red Team) is at the forefront of these efforts with their involvement in implementing the target acquisition battery (TAB), fire support team (FIST), and counterfire doctrine and in testing the Division Restructure Study (DRS) and the Tactical Fire Direction System (TACFIRE). The Red Team plans to submit a series of articles to outline its experiences in these areas. In this way, we hope to share some "do's" and "don'ts" and offer suggestions to other units on new concept implementation and outline tactics and techniques which may be helpful in improving the professionalism of field artillery units worldwide.

The 1st Cavalry Division has a long and colorful history with many "firsts" to its credit. This article on TACFIRE is the first in a series of articles to be written by the members of the "Red Team" to share their experiences with the Field Artillery Community.

The Army will evaluate the TACFIRE system in Operational Test III (OT III) at Fort Hood, TX, in January 1978. This computerized field artillery fire support command and control system performs a series of functions to help commanders and their staffs make the best use of available fire support. These functions, or programs, are summarized in figure 1.

The TACFIRE computer used at div arty and each field artillery battalion are similar; however, the div arty computer has more memory, display, and communictions capability than the battalion set. Another key difference is that the div arty computer is capable of performing only tactical fire control (ammo and fire unit status and other command and control functions) while the battalion set is capable of performing both tactical and technical fire control (fire unit selection and firing data).

Program	Div arty computer	Battalion computer
SYS (operating system)	X	X
M&D (Maintenance and diagnostic)	X	X
AFU (ammunition and fire unit status)	X	X
ATI (artillery target intelligence)	X	
NFP (nuclear fire planning)	X	
NNFP (nonnuclear fire planning)	X	X
CFO (counterfire)	X	
TFC (tactical fire control)	X	X
TTFC (tactical and technical fire control)		X
MET (meteorological data distribution)	X	X
SURV (survey)	X	X
SPRT (support)	X	X
FSE (fire support element)	X	

Figure 1. TACFIRE programs.

These computers receive data from, and transmit data to, a variety of remote devices used by elements of the FA system.

- The Digital Message Device is used by fire support teams (FISTs), aerial observers, and sound and flash personnel with the div arty target acquisition battery (TAB) to input fire missions and battlefield intelligence.
- The Variable Format Message Entry Device (VFMED) is used to receive and transmit information for maneuver brigade and battalion fire support officers, the FA battalion operations and intelligence section, the div arty fire support element, liaison officer, and counterfire section.
- A Battery Display Unit (BDU) is located in each firing battery for receiving fire commands, meteorological data, and battlefield geometry.

The basis of issue for a typical div arty TACFIRE set and the using agencies is shown in figure 2.

Personnel of the 1st Cav Div Arty began formal TACFIRE training at the US Army Field Artillery School (USAFAS) four months before the first TACFIRE equipment arrived at Fort Hood in June 1977. A total of 118 personnel attended one or more of the three TACFIRE courses offered at the School. These courses were designed to develop both officer and enlisted personnel skills in the use and maintenance of the TACFIRE equipment. Selection criteria for these personnel initially centered around security clearance, retainability, rank, availability, and general field artillery experience. Later it became apparent that previous FDC experience, ability to adjust to new concepts, and a genuine willingness to undertake a detailed, devoted study program should also be considered.

The most important of these factors proved to be a knowledge of basic fire direction and fire support procedures, since the USAFAS courses are not designed to teach both TACFIRE and basic fire support skills at the same time. If necessary, personnel designated to attend TACFIRE training should receive basic fire support and fire direction instruction in their units before attending the TACFIRE course.

To supplement the formal training, the USAFAS sent a 14-man TACFIRE Technical Assistance Team (TTAT) to Fort Hood to assist in the training for OT III. The TTAT proved to be invaluable in reinforcing formal training by conducting on-the-job training (OJT) in the units. The TTAT provided an on-site source of technical expertise for the newly trained TACFIRE equipment operators and was the link between institutional and field training. They also helped to integrate the individual skills into team drill and FA system operations. Formal and OJT training is shown graphically in figure 3.

The total amount of formal and OJT training required to develop operator proficiency on the various TACFIRE devices is shown in figure 4. The amount of training required to operate the various pieces of TACFIRE equipment has a direct correlation to the complexity of operation of the various devices. For example, the Artillery Control Console (ACC) — the device used to control the operation of either the div arty or battalion computer — is the most complex TACFIRE device to master.

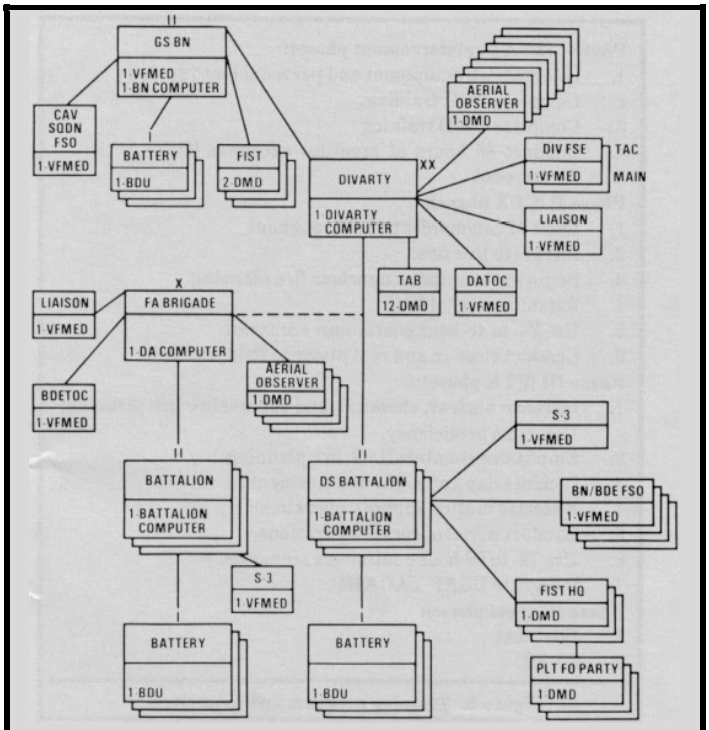


Figure 2. Basis of issue for TACFIRE equipment.

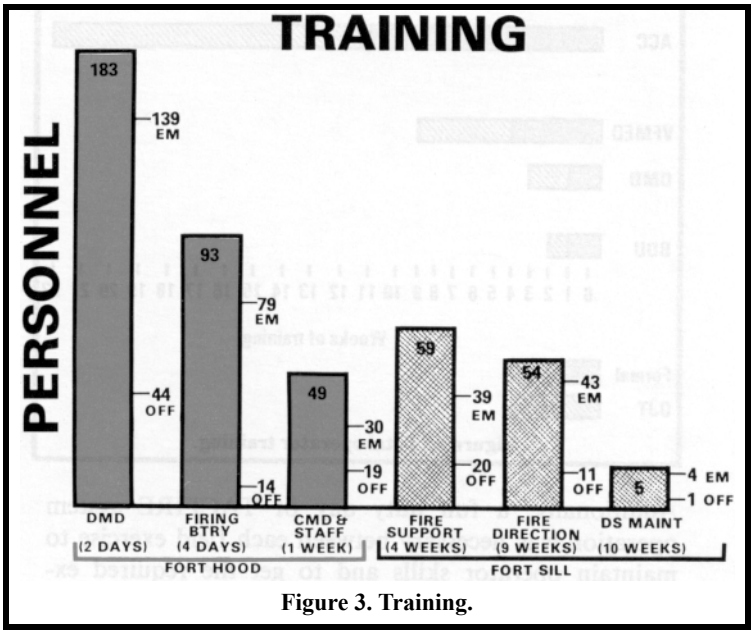


Figure 3. Training.

The amount of OJT needed to supplement formal training will vary from unit to unit based on trainee experience, adaptability, and dedication. The training requirements shown reflect the 1st Cav Div Arty experience.

The reinforcement of individual skills was integrated into a four-phase training program oriented toward training the div arty team and preparing for OT III. This training program and the objectives of each phase are outlined in figure 5.

- Phase I was a hands-on training and individual skill integration phase conducted under the direct guidance of the TTAT.
- Phase II involved increasingly complex command post exercises (CPXs) which prepared the div arty to enter full scale div arty exercises in phase III.
- Phase III field training exercises (FTXs) consisted of up to 96 hours of round-the-clock operations and fully stressed the TACFIRE equipment and operating personnel.
- Phase IV involved the TRADOC Combined Arms Test Activity (TCATA) Pilot Test and OT III.

While conducting this training program, one thing became evident. *TACFIRE operator proficiency is a very perishable skill.* Some of the rapid skill erosion is certainly due to getting used to different equipment and techniques. It remains to be seen how much TACFIRE training is necessary to maintain operator and team proficiency over the long haul. During preparation for OT III, the 1st Cav Div Arty conducted a three-day CPX or FTX every other week. These exercises consisted of 72-hour non-stop scenarios with realistic battlefield distances between TACFIRE devices in order to exercise radio and wire communications systems.

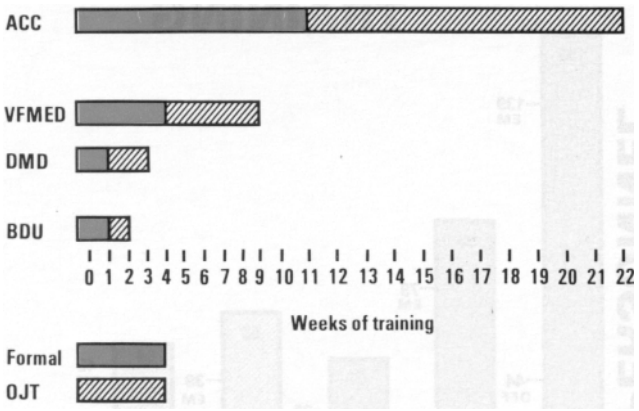


Figure 4. Total operator training.

Additionally, a full duty day of TACFIRE system operation was necessary between each field exercise to maintain operator skills and to get the required experience on the TACFIRE equipment. Long periods away from the system during early TACFIRE training can result in skill regression.

The training program must be carefully integrated with the receipt of the TACFIRE equipment to insure that school trained individuals returning to their unit will have the equipment for them to enter the OJT phase. The minimum equipment needed for a worthwhile div arty training program is a div arty computer, a battalion computer, three BDUs, two VFMEDs, and one to three DMDs. Arriving TACFIRE equipment should be issued to fill one battalion to full TACFIRE TOE at a time. The other battalions can then train on this complete set. Within a div arty, one direct support (DS) and one general support (GS) battalion should be filled first before issuing equipment to the other DS units. This equipment issue pattern allows early training in the technique of continuity of operations.

Continuity of operations (also called mutual support) involves actions to continue operations in the event of normal computer displacement or a total TACFIRE computer failure. Continuity of operations is supported by both battalion and div arty. At battalion level, continuity of operations consists of having two computers (e.g., a reinforcing battalion and a DS battalion) exchange data, each being prepared to assume the duties of the other at any time. Continuity of operations at div arty level is provided in the same manner. The FA group's (brigade's) div arty-type computer provides mutual support for div arty. Continuity of operations has proved to be one of the more difficult TACFIRE techniques to master and also one of the most important. In any event, a TACFIRE-equipped unit must always be ready to provide continuous and timely fire support. If a TACFIRE mutual support system is not available, manual/FADAC fire support techniques must be used.

Key to the training program success is equipment availability. The USAFAS-trained TACFIRE equipment specialist (warrant officer) is essential to be an effective maintenance program. This warrant officer (one authorized per div arty) is trained in the maintenance of TACFIRE hardware and problem diagnosis. The individual selected to attend this training should possess a strong background in the principles of generator/power plant troubleshooting. During field exercises in the 1st Cav Div Arty, he is normally located at the div arty message center. The DS contact maintenance team from the divisional maintenance battalion is also located at the message center and under the control of the TACFIRE equipment specialist. This DS maintenance team should travel with the unit, insuring its availability 24 hours a day. The advantages of locating the TACFIRE equipment specialist and the maintenance contact team in the div arty message center are:

- Centralized control of maintenance capability.
- Maximized use of personnel and equipment.
- Segregation of organizational and DS maintenance responsibilities.
- Prompt repair of TACFIRE components.

One of the most significant equipment problems encountered during our TACFIRE training dealt with FM radios. Although the radios worked well for voice

Phase I (TTAT reinforcement phase):

1. Integrate all equipment and personnel into system.
2. Complete BDU training.
3. Complete DMD training.
4. Conduct 86 hours of practical exercises (OJT) in the motor pool.

Phase II (CPX phase):

1. Use FM communications throughout.
2. Integrate live fire.
3. Begin nuclear and nonnuclear fire planning.
4. Establish digital VHF.
5. Use 24- to 48-hour continuous scenarios.
6. Conduct close-in and real-distance field training.

Phase III (FTX phase):

1. Increase nuclear, chemical, and counterfire fire planning; fine tune proficiency.
2. Emphasize counterattack fire planning.
3. Conduct day and night displacements.
4. Exercise mutual support operations.
5. Conduct aerial observer operations.
6. Use 72- to 96-hour continuous scenarios.
7. Integrate USAF TACAIR.

Phase IV (Test phase):

1. Pilot test.
2. OT III.

Figure 5. Training program and objectives.

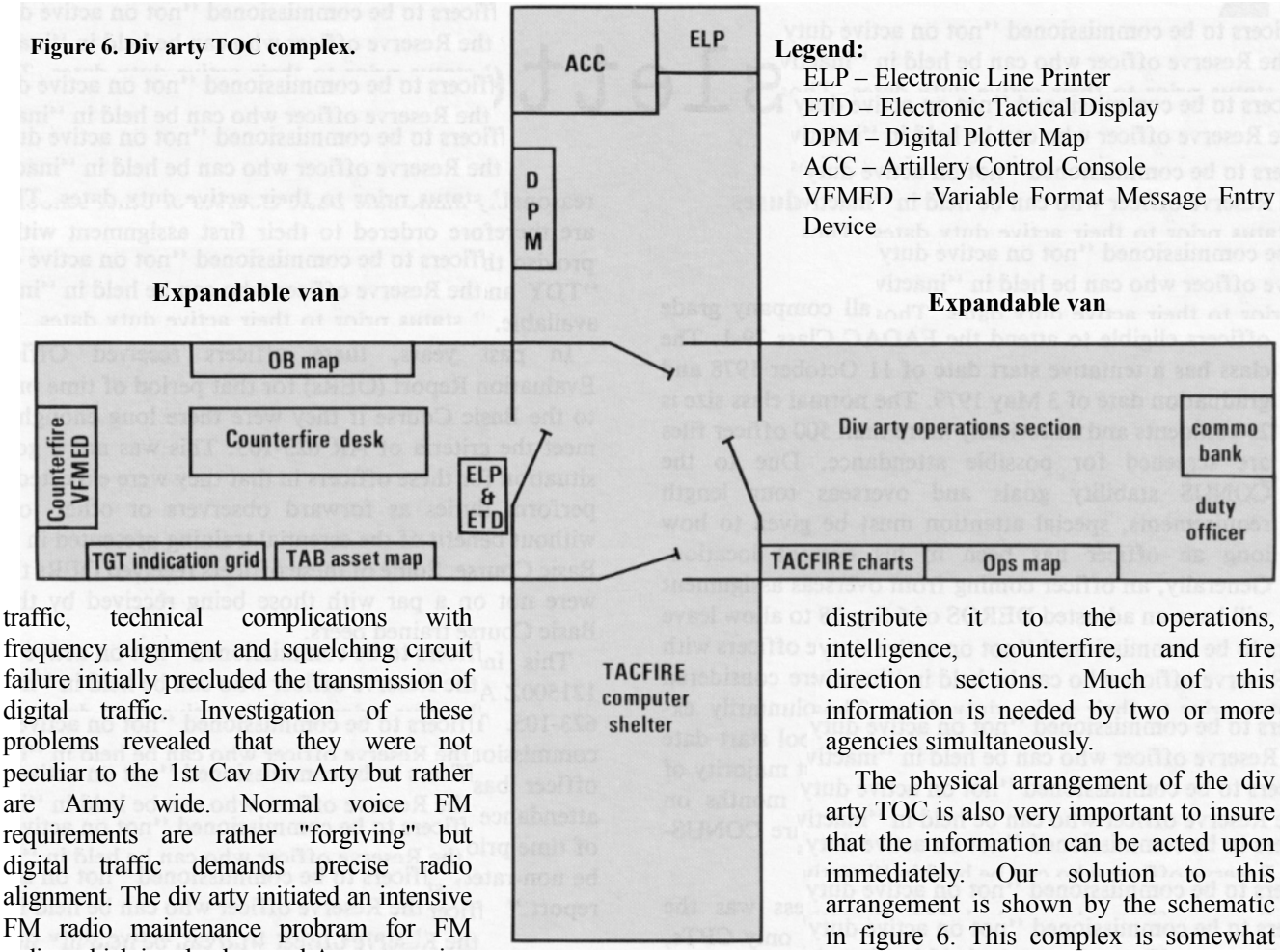


Figure 6. Div arty TOC complex.

Legend:
ELP – Electronic Line Printer
ETD – Electronic Tactical Display
DPM – Digital Plotter Map
ACC – Artillery Control Console
VFMED – Variable Format Message Entry Device

traffic, technical complications with frequency alignment and squelching circuit failure initially precluded the transmission of digital traffic. Investigation of these problems revealed that they were not peculiar to the 1st Cav Div Arty but rather are Army wide. Normal voice FM requirements are rather "forgiving" but digital traffic demands precise radio alignment. The div arty initiated an intensive FM radio maintenance probram for FM radios which involved several Army agencies. By November, nearly 90 percent of the div arty radios were suitable for digital operation.

Once trained in team drill, the div arty concentrated on performing the FA mission using the TACFIRE system. This system provides a tremendous tool for managing fire support on the battlefield. Recent improvements in the areas of target acquisition battlefield information, meteorology, fire support coordination, and firing battery procedures have resulted in the generation of such a volume of data that putting it all together has become increasingly difficult. TACFIRE allows the FA commander to use these data on a real-time basis to provide a fire support system with a responsiveness never before experienced. Of particular significance is the amount of timely information made available to the div arty commander to aid in executing the counterfire mission.

Using the data produced at the div arty tactical operations center (TOC) is a real challenge requiring the full attention of the S3. This vast quantity of printed information requires the dedication of one individual to distribute it to the operations, intelligence, counterfire, and fire direction sections. Much of this information is needed by two or more agencies simultaneously.

The physical arrangement of the div arty TOC is also very important to insure that the information can be acted upon immediately. Our solution to this arrangement is shown by the schematic in figure 6. This complex is somewhat unique in that we were able to obtain expendable vans to combine with the standard TACFIRE shelters.

Displacement of the TOC in a timely manner, either in daytime or nighttime, requires extensive training. Transfer of div arty control to a field artillery group, powering down the div arty computer and rolling up heavy power cables requires teamwork and organization. Every member of the div arty TOC must have a specific task. One officer must be in charge of the displacement. Hurrying the displacement only leads to chaos and delay. Detailed organization is the key to an acceptable displacement.

This article was written to recount some of the experiences of the 1st Cav Div Arty as the first TACFIRE-equipped and TACFIRE-trained div arty. Hopefully, some of these "lessons learned" will enable your unit to execute a smooth transition into the TACFIRE system.

LTC Craig Leyda is the S3, 1st Cavalry Division Artillery.

FAOAC 79-1 screening procedures

FA Branch is screening files of all company grade officers eligible to attend the FAOAC Class 79-1. The class has a tentative start date of 11 October 1978 and graduation date of 3 May 1979. The normal class size is 230 students and historically more than 500 officer files are screened for possible attendance. Due to the CONUS stability goals and overseas tour length requirements, special attention must be given to how long an officer has been in his current location. Generally, an officer coming from overseas assignment will have an adjusted DEROS of 6 Sep 78 to allow leave and travel time to the Oct 78 course. Those officers with a DEROS of Mar 78 through Oct 78 were considered and either curtailed one month or involuntarily extended up to six months to meet the school start date (long tour areas only). In CONUS, the vast majority of officers will have completed at least 36 months on station by 6 Sep 78 and only in rare cases are CONUS-located officers excepted from that policy.

Another facet of the screening process was the promotion status of the officer. We send only CPTs, 1LTs on promotion lists, and a few 1LTs who will be promoted during the course. Consequently, the demonstrated manner of performance as reflected in the officer efficiency reports are carefully reviewed for promotion potential. If you have specific questions on your Advanced Course scheduling, contact FA Branch, Combat Arms Division, MILPERCEN, 200 Stovall St, Alexandria, VA 22332.

No OERs prior to Basic Course

Each year there are a number of newly commissioned Regular Army officers who are ordered to their first unit prior to attending the Basic Course. This occurs because of the statutory provisions that Regular Army officers are on active duty as of the time they are sworn in as a commissioned officer. There is no provision for these officers to be commissioned "not on active duty" as with the Reserve officer who can be held in "inactive reserve" status prior to their active duty dates. Those Regular Army officers who can not be scheduled for reasonably immediate Basic Courses or other schooling are therefore ordered to their first assignment with a proviso that Basic Officer Course attendance will be a "TDY and return" basis as soon as a class quota is available.

In past years, these officers received Officer Evaluation Report (OERs) for that period of time prior to the Basic Course if they were there long enough to meet the criteria of AR 623-105. This was not a good situation for these officers in that they were expected to perform duties as forward observers or other jobs, without benefit of the essential training presented in the Basic Course. Some of these officers received OERs that were not on a par with those being received by their Basic Course trained peers.

This inequity has been corrected. DA Message 121500Z Aug 77 implemented an interim change to AR 623-105. This change states in part that "a newly commissioned officer programmed for attendance at an officer basic course will not be rated . . . prior to attendance at the Officer Basic Course . . . . the period of time prior to attending the Officer Basic Course will be non-rated time accounted for in the initial academic report."

Report cards

Policies for preparing Academic Evaluation Reports (AER) for soldiers participating in civilian and military schooling have been revised. The revision of AR 623-1 provides the guidance for submission of AERs on individuals in formal resident and nonresident professional development, career progression, and specialty training at service schools, NCO academies and civilian schools.

Features of the revised policy:

- introduce a revised service school (DA Form 1059), civilian education (DA Form 1059-1) and senior service school (DA Form 1059-2) academic report.
- establish the requirement for submission of an academic report for those granted constructive or equivalent school credit.
- provide for the submission of a DA Form 1059-1 for active duty soldiers participating in after duty degree programs.
- require referral of an adverse AER to the student.

One of the major changes which this revision permits is the submission of the report for those officers who complete degree requirements during after duty time. If requested by the officer, the installation education services officer (IESO) will initiate and review DA Form 1059. The academic report will be included in the officer's OMPF. Duplicate grade transcripts must be attached to the AER. Officers who previously have obtained a degree on an after duty basis may request an AER be initiated through the IESO to the appropriate career management division.

ROTC accessions

Field Artillery Branch congratulates those ROTC cadets recently selected for active duty in the Field Artillery. Of prime concern to you now is your initial assignment. The assignment process for new lieutenants relies heavily on preferences as stated in the DA Form 4255-R, that you complete with your PMS. These are forwarded to FA Branch where assignment action is initiated. Since that is the only document which states your preference for geographical location, type of duty and other important data, it is imperative for you to review AR 614-185 (CONUS Installations) and AR 614-30 (Oversea Locations) for geographic location of the various tours. Also be sure to include information on marriage plans, dependents, additional military schooling, and willingness to extend active duty obligation for overseas assignments. If you have any questions concerning FA assignments, feel free to call or write FA Branch, Combat Arms Division. (ATTN; DAPC-OPE-F, 200 Stovall St, Alexandria, VA 22332, AV 221-7817/0187)

USMA Prep School requirements stated

The United States Military Academy Preparatory School at Fort Monmouth, NJ, is now accepting applications for the class of 1978-79.

The basic eligibility requirements are simple. An applicant must be:

• A US citizen prior to entering the Military Academy at West Point.

• At least 17 and not over 21 years old on July 1 of the year he or she enters the prep school.

• Unmarried and have no legal obligation to support a child or children.

• In good health, have no disqualifying physical defects, and have vision correctable to 20/20.

• A high school graduate, or the equivalent, with a solid academic background. An individual with obvious leadership potential and a weaker academic background should not be discouraged from applying, since factors other than academics are considered.

• Applicants should be highly recommended by their commanders, counselors, and teachers.

Application should be completed as soon as possible, since final selection will be made in early June.

For further information, call the USMAPS admission officer at AUTOVON 992-1807 or commercial 201-532-1807, or write to the Commandant, US Military Academy Preparatory School, ATTN: MAPS-AD-A, Fort Monmouth, NJ 07703.

Where are the LTs?

An informal survey was conducted by the Directorate of Course Development and Training to determine if lieutenants who graduate from entry level training courses are being properly utilized in their first assignment. The survey traced graduates of the Field Artillery Cannon Battery Officer, Field Artillery Target Acquisition/Survey Officer, Lance Officer, and Pershing Officer courses for the period December 1976 through August 1977. Complete data was available on 530 of 619 graduates. The remainder were either in route to their first duty station or attending another course prior to assignment. Results of the survey indicate that:

Course	Percent properly assigned
FACBOC	94
FATASOC	59
LOC	98
POC	100

Some examples of malassignment are:

a. FACBOC graduates assigned as recon and survey officers, "Redeye" platoon, communication platoon, and flash platoon leaders.

b. FATASOC graduates assigned as fire direction officers, forward observers, training battery/company XOs, and even a medical staff officer.

All education is somewhat perishable; therefore, it is extremely important that a newly commissioned officer be given the opportunity to reinforce the skills he has learned through on-the-job experience. As the percentages indicate, we are doing well; but there is still room for improvement.

The A-10 and Fire Support Coordination

by Lt Col J. W. Philipp, USAF

Art by Tommy Balambao, Fighter Weapons Review

To quote a much used statement, "The A-10 is the first Air Force aircraft designed specifically to provide close air support for the Army." Tests have proved that the A-10 can provide flexible, massed fire and that it has an antiarmor capability previously unobtainable with other systems. As is true of most weapon systems which have been optimized for a particular spectrum of warfare, the A-10 can readily accomplish the task for which it was designed, but with some attendant drawbacks.

Let's examine the strengths and weaknesses of the A-10, look at some ways of exploiting those strengths and minimizing those weaknesses, and finally determine what effect such actions might have on fire support coordination.

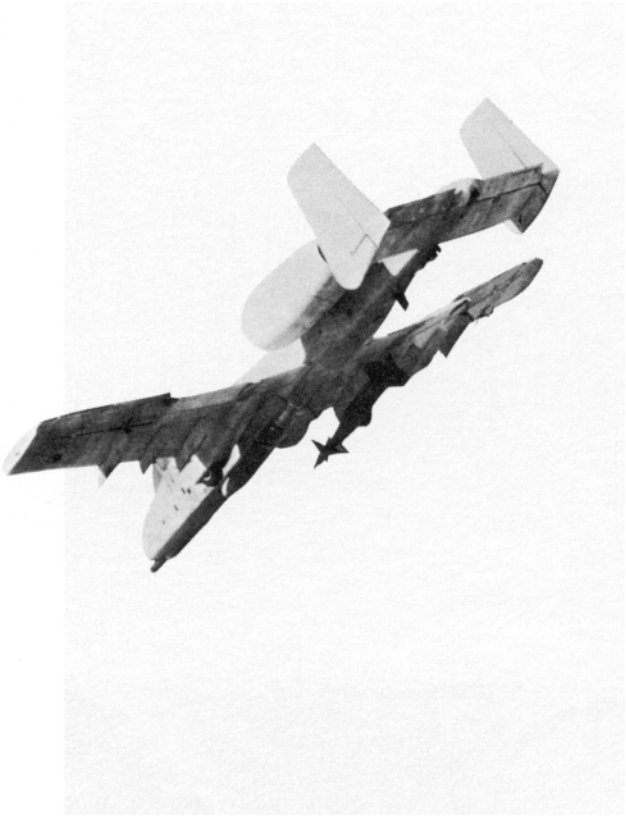
The strong points of the A-10 are already well documented. The aircraft can carry extremely large ordnance loads externally. It has a 30-mm cannon that fires a depleted uranium round which can "kill" virtually all modern armor. Built around rugged and simple systems, the A-10 has demonstrated sortie rates previously unheard of; e.g., 34 sorties by only two aircraft in one dawn-to-dark period. Theoretically, it can return from a mission with one engine destroyed. Engines are mounted on either side of the fuselage which strongly reduces the possibility that catastrophic destruction of one engine will affect operation of the other. The A-10 can remain airborne with half the tail section gone. Fuel tanks are self-sealing and will not explode, burn, or suffer serious degradation after direct 23-mm hits. Titanium armor protects the cockpit and major portions of the flight control system. All flight control surfaces have manual backups in the event of loss of hydraulic pressure. The list is long and the statistics are impressive.

The A-10 compares favorably in the close air support role when pitted against other aircraft. Arriving in the target area after travelling comparable distances, an A-10 can remain in the fray more than 10 times longer than an F-4. A-10s can carry 2½ tons more ordnance than a combat equipped A-7. Moreover, the A-10s effective strafing range is two to four times that of any other aircraft, and it is the only aircraft that can kill a tank with the gun.

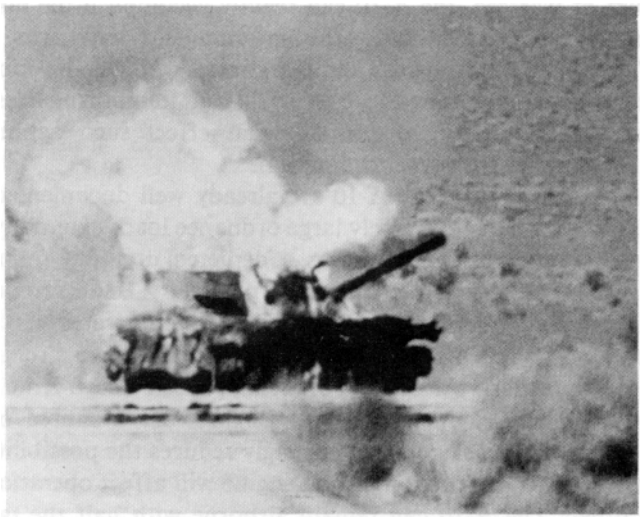
But what are the weak points? The main drawbacks of the A-10 weapons system are:

- By comparison with current operational fighters and attack aircraft, the A-10 is slow. Design speed was sacrificed in favor of greater ordnance bearing ability and increased on-station time in the target area.
- The aircraft is large, which increases the probability of a hit from enemy ground fire.

To exploit the strengths of the aircraft, we must get the A-10 to the target and allow it to remain in the target area long enough to effectively use all its ordnance. Then we must get it back to a base where it can be refueled, rearmed, and launched again. The ingress and egress problems lend themselves to rather simplified solutions. Air Force liaison officers and fire support coordinators at all levels of command can coordinate to determine minimum risk routes for the aircraft based on such factors as known or suspected concentrations of enemy forces, friendly gun-target lines, maximum



The A-10 unleashes a burst of 30-mm ammunition during successful lethality tests against armored targets at Nellis Air Force Base, NV. (USAF photo)



The lethal effects of the A-10's 30-mm GAU-8/A gun system are vividly shown in these two photographs. At left, a Soviet Union T-62 main battle tank bursts into flames after being strafed with a two-second burst of 30-mm ammunition. Numerous secondary explosions were caused by the ignition of the tank's internal ammunition. On the right, the aftermath of the A-10's strike is visible. The tank was assessed as totally destroyed by vulnerability experts from the Office of Secretary of Defense. (USAF photos)

ordinate data, etc. Attacking aircraft will fly these routes at very low altitudes to deny the enemy effective use of his radar facilities.

The major handicap for the A-10 will occur in the target area. Even a relatively light load of 800 rounds of 30-mm armor-piercing ammunition and four Maverick electro-optically-guided, air-to-ground missiles equates to about nine or ten passes at separate armored targets. Lack of ordnance is not a problem. The ability of the aircraft to remain in the target area long enough to effectively make those nine or ten passes and still survive becomes the dominant consideration.

How, then, can we use this awesome tank-killing power and yet minimize the combat losses of a relatively large and slow machine? Perhaps the answer lies in the phrase "fire support coordination." Without dwelling on a classical definition, most will agree that an important element of fire support coordination is the integration of various means of fire support into an overall plan which will optimize the effects of each and hopefully provide synergistic results. Such coordination has received token acceptance for some time. There is a reason. In the Southeast Asian conflict, except in a few instances, we had a preponderance of fire support, both on the ground and in the air. Since we had more support than we needed, fire support coordination was frequently perfunctory or nonexistent. The unfortunate result is that we now find outselves in that habit. It could be disastrous to continue in that vein in a future European conflict where *all* the fire support available might not be enough.

Adding the A-10 to the fire support equation sheds some light on the point of the previous discussion. Here is a major source of fire support for maneuver forces. We face a problem in employing the aircraft because of a preponderance of hostile air defense systems. If the postulated enemy force possesses a massive armored assault capability, then we should concentrate on that threat; i.e., use the fire support system with the most reasonable probability of kill against armored targets. The A-10 has an ability to kill tanks that other systems do not have. With a full load of 30-mm cannon ammunition, and no other ordnance aboard, one aircraft has the potential to kill 10 tanks, if it can survive over the target long enough to do the job.

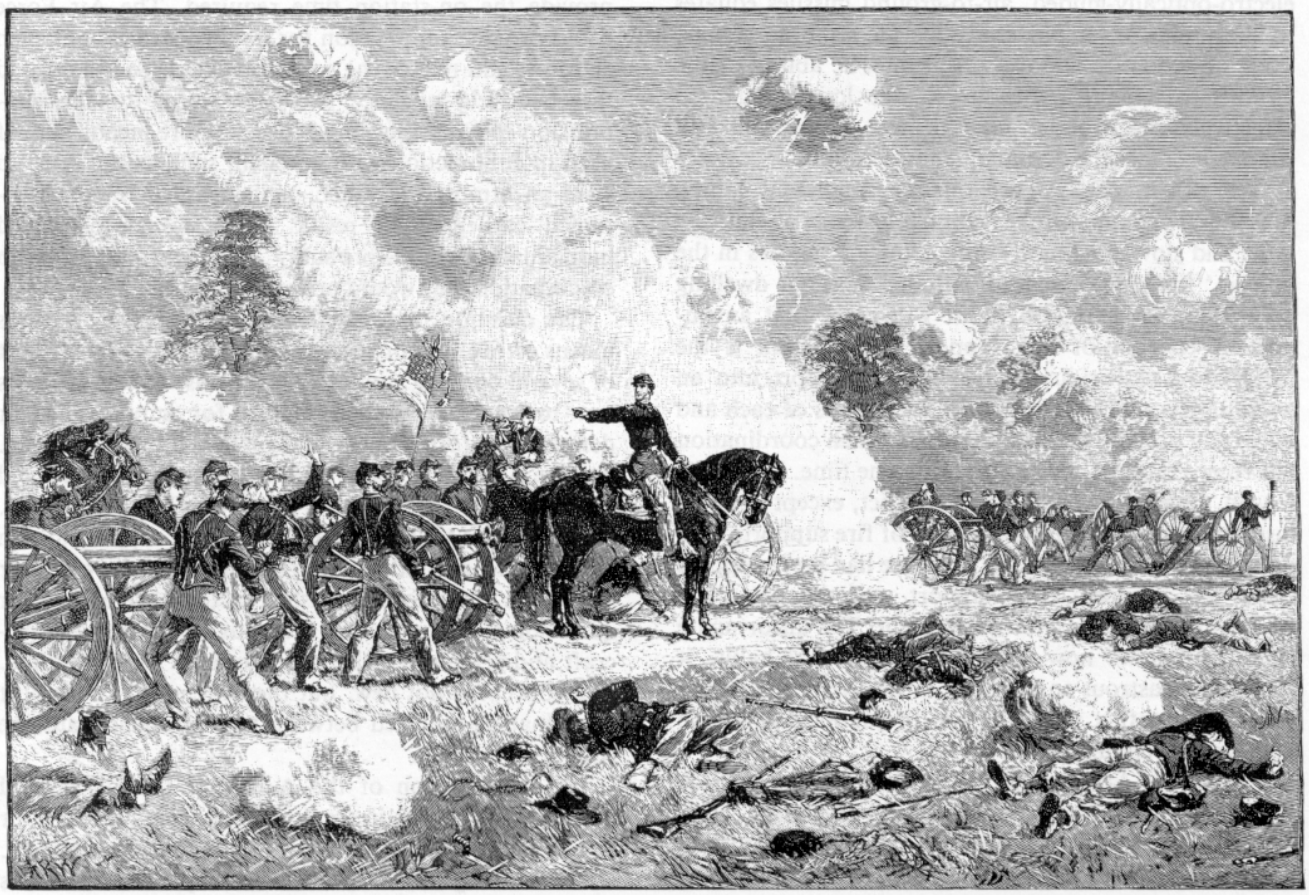
Some means of suppressing enemy air defenses can provide the on-station time required. The Air Force could provide suppression for its own strikes, but such action would reduce the sorties available to kill ground targets. Field artillery is better suited to the suppression mission than most fire support means and, if used in conjunction with a system such as the A-10 to stem an armored advance, the synergistic effect mentioned earlier might result. Each system employed individually would probably fail, whereas used in combination they would probably succeed.

The question of air defense suppression by various means of fire support is very complex and is the subject of several ongoing studies. The purpose of this article is not to present detailed tactics for suppressing air defenses nor form conclusions on how it might be done. But the A-10 is here now and, if war in Europe erupted next week, we should have some aces up our sleeves. Why not plan to use artillery to provide suppression on and around massed armor formations when close air support is requested? Published tactics have existed for quite some time detailing methods for employing aircraft and artillery on the same target at the same time. The concept is not new, but the degree of fire support coordination required between two very elaborate fire support systems is.

The introduction of the A-10 into the US arsenal necessitates changes in traditional concepts of close air support for both Army and Air Force commanders. Understanding the demonstrated capabilities of this system and devising joint tactics to optimize it might mean the difference between success and failure.

LtCol J. W. Philipp is a United States Air Force Representative at Fort Sill.

REDLEGS
IN



LT Bayard Wilkeson holding his battery (G, 4th United States Artillery) to its work in an exposed position (A. R. Waud).

BLUE AND GRAY

by CPT Karl W. Volk

Students of Civil War field artillery actions will instantly recognize the names Pelham, Pogue, and Cushing, but how many will recall the heroic actions associated with the names Dilger, Cook, and Bigelow? Much has been written of the well-known actions of the more famous gunners of both the North and the South, but few authors have attempted to compile the details of lesser-known, but equally herioic, personal triumphs.

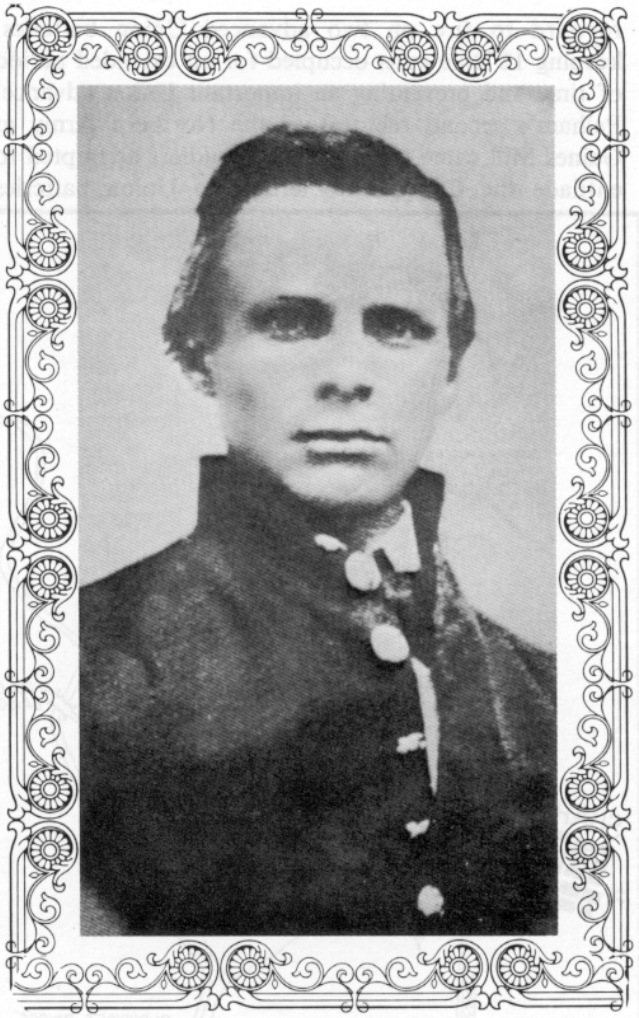
LT Alonzo H. Cushing was one of hundreds of Redlegs engaged in the battle of Gettysburg. As the battery commander of A/4th US Artillery, he employed double and triple canister to shred Pickett's charge at "The Angle" on Cemetery Hill. After the preliminary Rebel bombardment from Seminary Ridge, Cushing ran a single howitzer forward to the stone fence marking the high-water mark of Lee's waves of attackers. He died in the incredible fury and destruction, serving his lone gun while suffering from wounds to the head, shoulder, and spine. At the end of the flight, his cannoneers found that he had stopped the red-hot vent on his cannon without the use of a protective thumbstall, searing his thumb to the bone.

CPT Hubert Dilger, known by his comrades as "Leatherbreeches," conducted a rear-guard action

unparalleled in the history of the field artillery during the aftermath of "Stonewall" Jackson's flank march at Chancellorsville. As the commanding officer of I/1st Ohio, Dilger stemmed the tide of Jackson's late afternoon attack on Howard's XI Corps by bowling solid shot down the turnpike and using shell and canister on the Rebel forces attempting to turn the flanks. Dilger's infantry support and two sister batteries retreated, leaving him with only his six guns. Blunting the Rebel masses, he retired five pieces and fought with a single weapon until nearly overpowered. Hopscotching backward, unlimbering, and firing to slow Jackson's Gray wave, he finally halted it west of Fairview Hill. Dilger, who gave up a commission in the German Mounted Army to come to America when the Civil War broke out, was repeatedly recommended for promotion, but remained a captain to the end of the war. He received a Congressional Medal of Honor in a little-known action at Chancellorsville when he and three other Federal soldiers rescued a wounded Rebel officer from between Union and Confederate lines.

Not all the heroic actions took place at the end of a battle. LT Bayard Wilkeson, the 19-year old commander of the four guns of G/4th US, was posted by his division commander, GEN Francis Barlow, in an exposed position on the Union right during the first day's fighting at Gettysburg. Confederate General Gordon, finding it impossible to advance because of the galling fire of Wilkeson's battery, advanced two Confederate batteries, totalling nine guns, to eliminate the four Union howitzers. The Blue outfit provided some uncomfortable moments for the Rebels, but was slowly decimated, Wilkeson, mortally wounded, allegedly used his own knife to amputate his shattered left leg and was subsequently carried by the Confederates to a house between the lines, where he died an agonizing death. Wilkeson's father, a *New York Times* correspondent attached to General Meade's headquarters, wrote his son's obituary that night.

Heroism was not confined to the company-grade officers in the armies. LTC William T. Pogue, the commander of Jackson's famous Rockbridge Artillery, used his Parrott guns at the battle of Port Republic, VA, on 9 June 1862, in support of Winder's withdrawal from the devastating fire of 16 Union guns posted at the Lewiston coaling, two miles east of Port Republic. During the withdrawal, Pogue's troops, with a single Parrott gun, halted, unlimbered, and, without infantry support, held back two Union brigades for the precious minutes it took to rally the 7th Louisiana and two Virginia regiments. By his own admission, however, Pogue's proudest moment came during the Wilderness Campaign at dawn, 6 May 1864, near Spottsylvania Courthouse. His 12 guns were all that stood between six

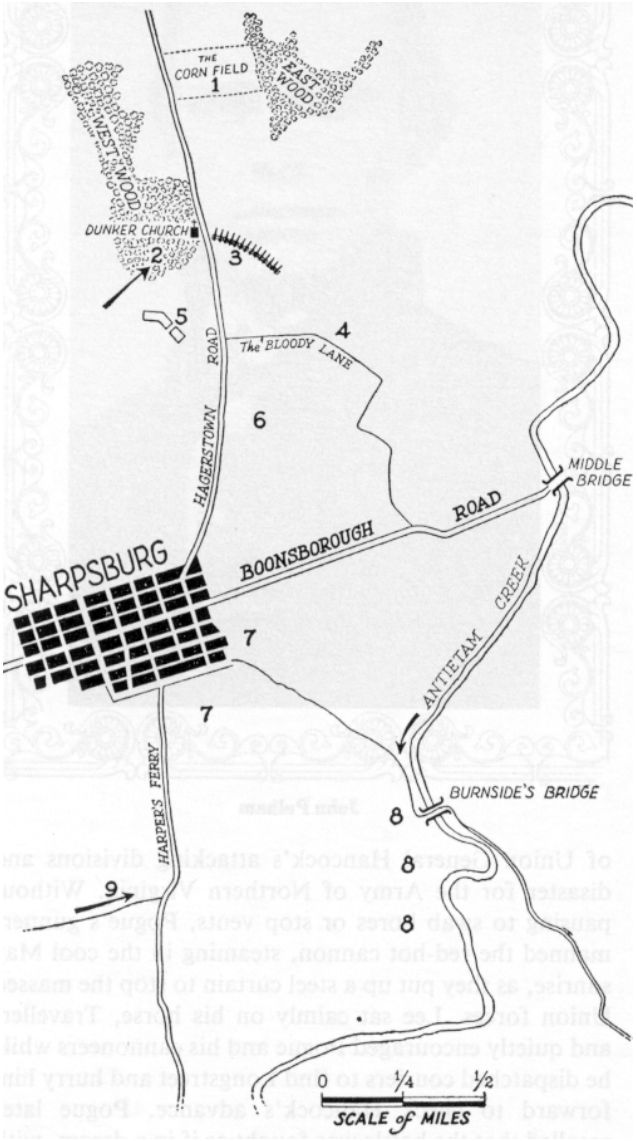


John Pelham

of Union General Hancock's attacking divisions and disaster for the Army of Northern Virginia. Without pausing to swab bores or stop vents, Pogue's gunners manned the red-hot cannon, steaming in the cool May sunrise, as they put up a steel curtain to stop the massed Union forces. Lee sat calmly on his horse, Traveller, and quietly encouraged Pogue and his cannoneers while he dispatched couriers to find Longstreet and hurry him forward to check Hancock's advance. Pogue later recalled that the battle was fought as if in a dream, with the sound and fury reduced to noiseless images and movements. He noted that having Lee by his side, watching the sweating, bleeding cannoneers in their valiant efforts, filled him with "immense, unforgettable pride."

CPT John Pelham, regarded by the South, in general, and the southern ladies, in particular, as almost a saintly figure, is a legend in the history of cannons and cannoneers. At the battle of Gaines Mills, 27 June 1862, Pelham took a rifled Blakely and a Napoleon cannon

forward to fire on two advanced Union batteries, keeping 12 Blue guns occupied for an extended period of time and preventing an important Union advance. Pelham's second rebuttal of the Northern Army at Gaines Mill came when the Blue soldiers attempted to enfilade the Confederate left. Two Union batteries



Legend:

1 – The corn field into which first Lawton and Hays and then Hood and the subsequent reinforcements advanced.
2 – McLaw's line of advance.
3 – First position of S. D. Lee's artillery battalion.
4 – The scene of Rodes's disaster.
5 – Position from which John R. Cooke charged.
6 – General zone of D.H. Hill's defense.
7 – Main body of Longstreet's troops on right.
8 – Toomb's advanced regiments.
9 – The line of A. P. Hill's advance.

The Battlefield of Sharpsburg, 17 September 1862.

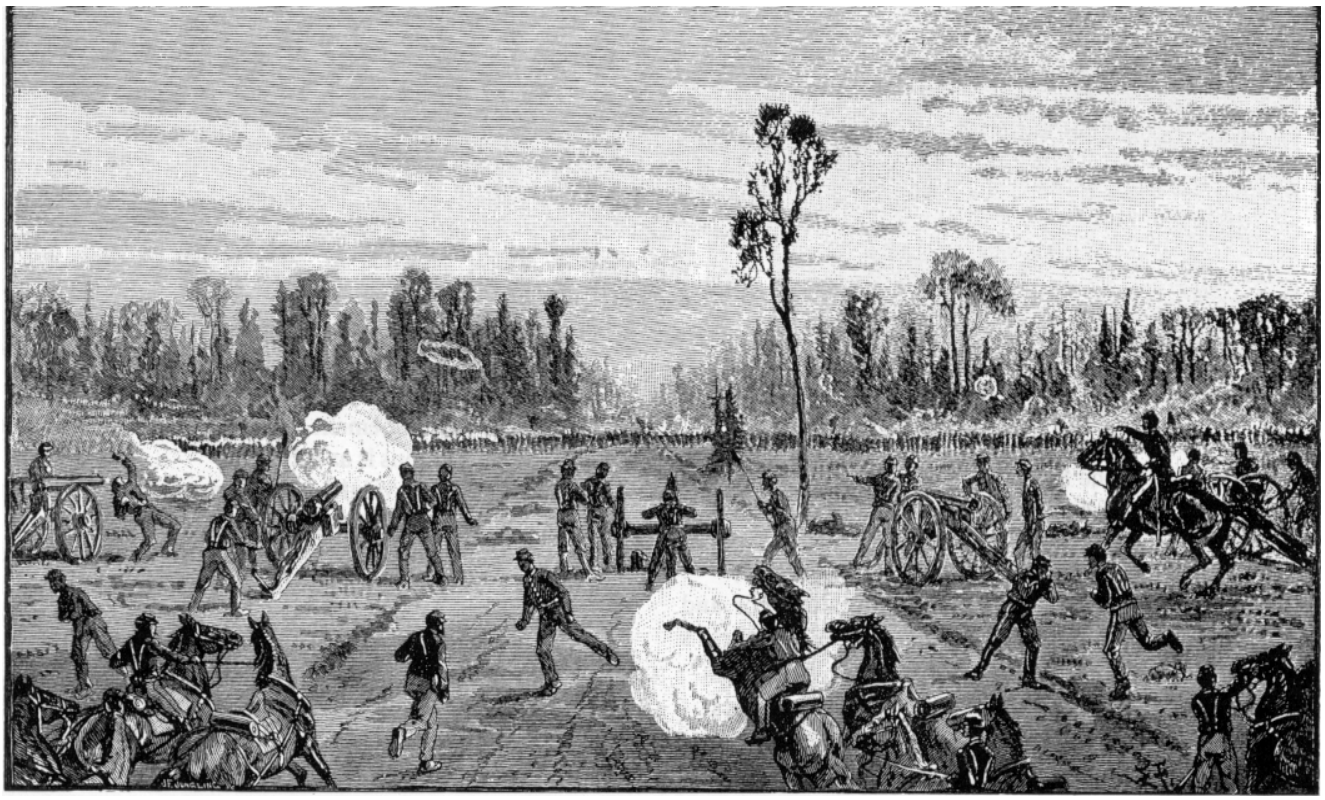
(Weed's I/5th US and Tidball's A/2d US; eight pieces total) opened on Pelham and his single Napoleon. He and his crew would not retreat, but continued firing with bulldog tenacity. After this action, Pelham was described by MG James Ewell Brown ("Jeb") Stuart as an officer of "signal ability."

Pelham's perhaps most famous engagement occurred at the opening of the battle of Fredericksburg. With two guns (a rifled Blakely and a 12-pound Napoleon), Pelham opposed Burnside's division at Hamilton's crossroads on the right flank of Lee's army. After the Blakely was put out of commission, Pelham opened with the 12-pounder at 400 yards and was ultimately opposed by six light and heavy batteries emplaced across the river on Stafford Heights. Twice refusing Stuart's order to retire, Pelham held 10,000 men at bay for almost an hour. A fellow officer in the Stuart Horse Artillery described Pelham as ". . . the bravest human being I ever saw." Pelham was killed at the age of 22 on 17 March 1863 at Kelly's Ford on the Rappahannock River while participating in a cavalry charge with Fitz Lee. The entire South mourned his death.

A comrade of Pelham's, William (Willie) J. Pegram, a near-sighted boyish-looking, slightly-built officer, was another Rebel accustomed to and unafraid of danger. As a Confederate battery commander at Beaver Dam Creek during the battle of Mechanicsville, Pegram, whose artillery was posted closest to the Union lines, had only six guns to challenge 30 Union guns. By dark, four of his six howitzers had been fouled or disabled, 47 gunners had been lost, and his battery had to be hauled off by hand. Pegram, a colonel at age 23, was killed at Five Forks on 1 April 1865, attempting to protect Pickett's infantry from Sheridan's marauding Union cavalry.

Another heroic outfit was CPT John Bigelow's 9th Massachusetts Battery. In its first fight, the Battery was charged with the responsibility for protecting GEN Dan Sickle's retreat from the Union's left flank salient at Gettysburg. Standing alone near the Trostle House and the Peach Orchard, Bigelow's Battery slowed Barksdale's 21st Mississippi and Kershaw's Alabamians, while losing 37 of 71 cannoneers, 80 of 84 horses, and four Napoleons in a two-hour fight.

Gettysburg was a proving ground for more than rookie batteries. CPT Charles E. Hazlett, Battery Commander of D/5th US (the old Alexander Hamilton Battery) was ordered, along with the V Corps infantry, up to the summit of Little Round Top to prevent Lee's troops from capturing it and enfilading the Union positions on Cemetery Ridge. Through a Herculean effort, Hazlett's sweating gunners manhandled their six 10-pounder Parrotts up the back face of the thickly wooded, boulder-strewn hill. Reaching the top scant



Staying Jackson's advance, Saturday evening 2 May, with artillery placed across the Plank Road (from a wartime sketch).

seconds before Lee's Alabama regiments, Hazlett's battery and the V Corps infantry waged hand-to-hand combat with pistols and rammerstaffs against infantry muskets and bayonets and finally drove the Rebel infantry down the hill. Hazlett died from a bullet fired by a sharpshooter. At the time of his death, Hazlett was assisting his former D/5th battery commander, BG Stephen Weed, who had risen from captain in the Regular Army to a general of volunteers.

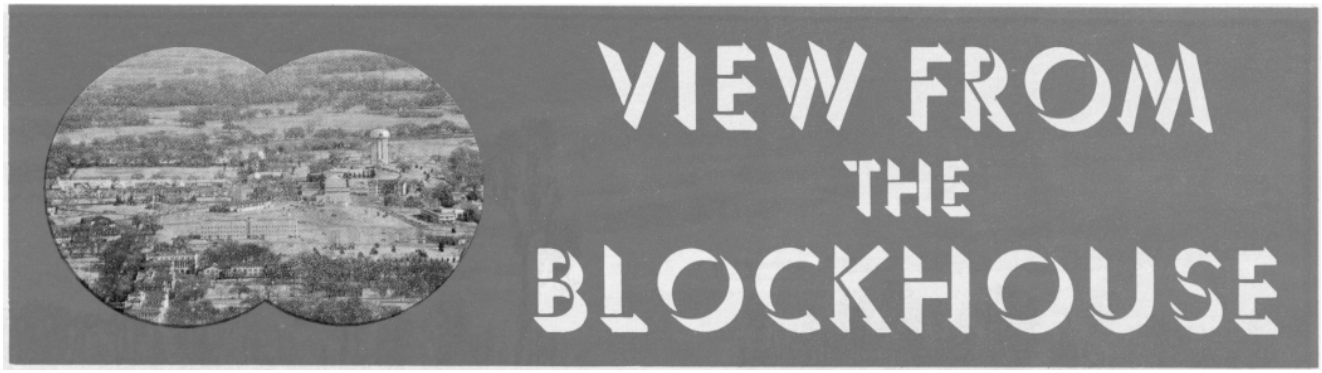
All of the action at Gettysburg was not on the southern flank. On the first day of fighting, 1 July 1863, three guns of B/4th US, commanded by LT James Davison, were stationed on the south side of the railway, north of the Chambersburg Pike. Opposing Lee's troops, Davison and his badly outnumbered unit were subjected to murderous fire. Davison, wounded in the ankle, hobbled from gun to gun, encouraging his bleeding cannoneers to delay the inevitable as long as possible. Under threat of complete decimation, Davison and his powder-blackened gunners stood their ground, ramming double-shot canister down red-hot muzzles to fire at the swarming Confederates. Only after the half battery was virtually destroyed did the shattered remnants of personnel drag the howitzers off to safety.

Richmond, the seat of the Confederate Government, supplied the personnel for CPT W. W. Parker's "Boy's Battery" of Stephen D. Lee's battalion. At Antietam, the boys, ages 14 to 17, fought until literally shredded by Union infantry. Collecting enough boys to make up a crew, Parker placed them at what is now Burnside's Bridge with instructions to hold at all costs. Hold they did, keeping the desperate Union soldiers contained until A.P. Hill's gray-clad, footsore soldiers arrived from Harper's Ferry, crashed into Burnside's flank, and saved Lee from defeat. Among those given funeral honors the next day were several 14-year-old boys.

When his former battery, B/4th US, had been virtually destroyed by Rebel forces at Antietam, the "Iron Brigade" Commander, GEN John Gibbon, sighted howitzers, carried ammunition, swabbed bores, and stopped vents on the bucking guns which poured canister at targets less than 100 feet away. At the general's side that day fought PVT John Cook, the bugler of B/4th US, who became the youngest Congressional Medal of Honor winner in US history. Cook served a howitzer in the bloody fight that earned his unit the dubious distinction of losing more cannoneers in a single day than any other battery in the Civil War. Starting with 74 officers and men, the battery was able to muster only seven gunners at the day's end, barely enough to man two pieces.

In November 1861, Robert Preston Chew organized the first Confederate horse artillery for Turner Ashby,

(Continued on page 47)



13F AIT coming

In support of the FIST concept, USAFAS will begin formal 13F10 Advanced Individual Training in March. The course has two objectives:

- Produce a competent radiotelephone operator.
- Produce a 13F soldier capable of calling for and adjusting field artillery and mortar fire. The course's 143 hours are divided as follows:

Map reading	32 hours
Observed fire training	88 hours
Tactics (FIST employment)	11 hours
Communications	32 hours

The majority of this training will be "hands on" in the field, including eight observed fire shoots. The first 13F10s are scheduled to graduate in April.

M140 alinement device update

Fielding of the M140 alinement device for boresighting is currently in progress. M102 units are the first to be equipped with the device; to date, organizations in Italy and Korea and at Forts Bragg and Campbell have been supplied. Completion of the M102 program, to include all Active and Reserve Component batteries, is expected by the end of calendar year 1978.

The M140 has been approved and funded for application to the entire M109-series fleet. Installation will be accomplished concurrent with the mid-life product improvement program (PIP) retrofit at depot level that will convert the M109A1 to the M109A3. The newly manufactured product-improved howitzer — designated M109A2 — will be built with the M140 as a basic issue item.

Application of the M140 to the M110A1/A2 has been approved as a separate PIP. Procurement funds have been approved for FY78, and conversion will begin in FY79 and be complete by FY82. Sufficient kits will be procured to equip the current fleet and new production howitzers.

Status of the alinement device with respect to the other towed weapons is as follows:

- There is no valid requirements document for conversion of the M101A1, and none is planned.
- Application of the M140 to M114A1/A2 units is in abeyance. Although mounting hardware has been developed and approved, procurement has not been funded.
- The M198 155-mm howitzer will be issued with the M139 alinement device, developed for use with that weapon and the XM204 105-mm howitzer.

The new FM 6-40

FM 6-40, "Field Artillery Cannon Gunnery," has been rewritten to keep pace with the ongoing changes in artillery hardware and doctrine. Distribution was made to the field in September.

Students from FAOAC 1-77 who validated the gunnery subcourse were selected to assist in the massive rewrite effort. A chapter outline was developed and sent to the field for review and comment in March. Many of the field's comments were incorporated into the initial draft which was staffed within the Field Artillery School in August.

The manual is divided into two volumes; Volume I concerns observer procedures and Volume II deals with fire direction procedures. The procedures are written for the FADAC/manual FDC. FADAC step-by-step procedures are not discussed, but the integration of FADAC and manual procedures is. Step-by-step FADAC procedures will be covered in the soon to be fielded FADAC User's Manual.

The entire text has been rewritten to facilitate understanding and serve as a teaching vehicle. More examples, more illustrations, and more detailed discussions of difficult procedures are included. The following major changes have been incorporated:

a. *Volume I, Observed Fire.* This volume is designed to be the *technical* fire support team (FIST) manual and

is written for all FIST members. The illumination and smoke calls for fire have been simplified and air observer techniques have been updated. Abbreviated registration, high burst/mean point of impact registration, and mortar, close air, and Naval gunfire procedures have been incorporated.

b. *Volume II, Fire Direction.* Tactical, as well as technical, fire direction procedures are discussed. The relationship between the battery and battalion FDC and the processing of battalion missions are described in detail. Special techniques for the attack of large or irregular shaped targets are outlined.

The registration chapter now includes: discussions of abbreviated, offset, and registrations to the rear; methods for determining usable rounds in a HB/MPI registration; calculator, slide rule, and logarithmic solutions for HB/MPI computations; and a discussion of the tactical considerations for when and how to register.

Computation of data for new munitions (DP ICM and FASCAM) and new products (velocimeter) are included. M17 plotting board procedures for terrain gun position corrections and special corrections have been simplified.

The appendices now include explanations of nonnuclear effects, use of the Graphical Munitions Effectiveness Table, and the interchangeability of NATO ammunition.

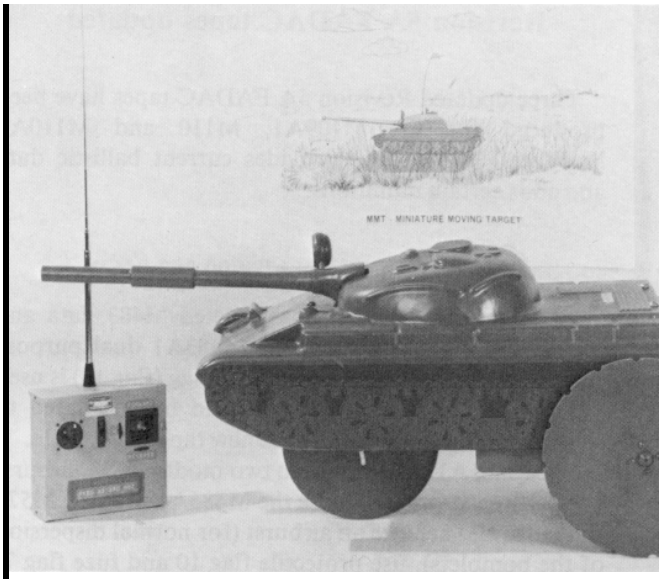
Field review of the coordinating draft was completed last November. It is anticipated that the new FM 6-40 will be ready for distribution this summer.

New correspondence course coming

The Army Operations/Intelligence NCO/Specialist Correspondence Course is projected for fielding in the spring of 1978. This course is expected to fill a gap in the training materials available for those performing operations and intelligence duties at battalion level.

Subcourses will be offered on Field Artillery, Air Defense Artillery, Armor, and Infantry specific items, as well as common subjects. The course format calls for the participation of a job-knowledgeable supervisor along with the student in completing course requirements. This unique feature is expected to greatly enhance the training value of the subcourses taken.

All Field Artillery battalion-sized units throughout the Active Army, Army Reserve, and National Guard will receive a separate announcement in advance of the fielding of the course which will provide further information. Application forms will also be furnished.



Six miniature moving target (MMT) tanks like the one above are being used for training at Fort Sill's 14.5-mm M31 range. The unit, which resembles a Russian-built T62 tank, was designed by the Army Tank Automotive Research and Development Command. It can travel at speeds up to 1.6 miles per hour in a 600-meter radius from its remote control device shown at left. MMTs have been purchased for use at Fort Sill only, but specifications are available for local Training Aids Service Centers.

FA surveyor apprenticeship program started

Field artillery surveyors, MOS 82C, may now begin applying their hours of work toward certification as qualified journeymen under the Army apprenticeship program. The program was started in 1975 in cooperation with the Department of Labor to provide a way for soldiers leaving the service to have a certified record of training in a skilled trade or craft. To date, 22 MOSs have been certified for the program.

To qualify for the program, a soldier must be at least 17 years old and on active duty. He must have a primary or secondary 82C MOS and be performing satisfactorily in it. Credit is given for previous experience and for related instruction. Details on the program are available at Army Education Centers which also handle registration. Upon successful completion of program requirements, soldiers receive a US Department of Labor certificate recognized by labor unions and all companies working under US Government contracts.

Additional artillery MOSs being reviewed for the program are 15J (Lance/Honest John Operations/Fire Direction Specialist) and 21G (Pershing Fire Control Specialist). Establishment of the 82C apprenticeship is expected this September.

Revision 5A FADAC tapes updated

Three updated Revision 5A FADAC tapes have been produced for the M109A1, M110 and M110A1 howitzers. The update provides current ballistic data and adds certain munitions.

M109A1 tape (NSN 1290-00-207-9462)

The new M109A1 tape has deleted M483 data and replaced it with data from the M483A1 dual purpose ICM projectile. The same projectile flag (flag 10) is used for the M483A1. Flag cards should be annotated to reflect the change as soon as the new tape is available.

The M483A1 can be fired in two modes, ICM airburst and self-registration. To use the M483A1 with the M577 time fuze and achieve an airburst (for normal dispersion of the bomblets), use projectile flag 10 and fuze flag 7. To register with the M483A1 and the M577 and cause a "high order" burst on impact, use projectile flag 10 and fuze flag 6.

At the conclusion of Program Test 1, the updated M109A1 tape will display the figure 1000000005100255. The number "1" in the eleventh position idenfities the tape as the updated version.

M110 tape (NSN 1290-00-229-4736)

The new M110 tape has deleted M422 NUC and M424 HES data and replaced it with data for the M422A1 NUC and the M424A1 HES projectiles. Projectile and fuze flags are unchanged, however flag cards should be annotated on receipt of the new tape.

At the conclusion of Program Test 1 the updated M110 tape will display the figure 1000000005100008. The number "1" in the eleventh position identifies the tape as the updated version.

M110A1 tape (NSN 1220-01-021-4125)

Data for the M422A1 NUC and the M424A1 HES are included on the new M110A1 tape. Projectile and fuze flags remain unchanged, however flag cards should be annotated on receipt of the new tape. The updated M110A1 tape will display the figure 1000000005100108 at the conclusion of Program Test 1. Number "1" in the eleventh position identifies the updated version and number "1" in the fourteenth position identifies the M110A1.

Part number for the three updated tapes are:

- M109A1 REV 5A PN 8213330-113B
- M110 REV 5A PN 8213330-114A
- M110A1 REV 5A PN 8213315-123A

These part numbers are the only unique identification of the updated Revision 5A tapes. All older Revision 5 tapes in the supply system will be replaced when production scheduled for March 1978 is completed.

These program tapes are stock funded items to be purchased from OMA funds. Requisitions must include "B14" as the routing identifier.

Questions about skill qualification tests?

A Department of the Army pamphlet, "SQT — A guide for Leaders," has been written to help leaders — from squad leader through the chain of command — better understand Skill Qualification Tests.

This pamphlet is currently being distributed throughout the Army. Comments are solicited and should be directed to: Director, Individual Training Evaluation Directorate, US Army Training Support Center, Fort Eustis, VA 23604.

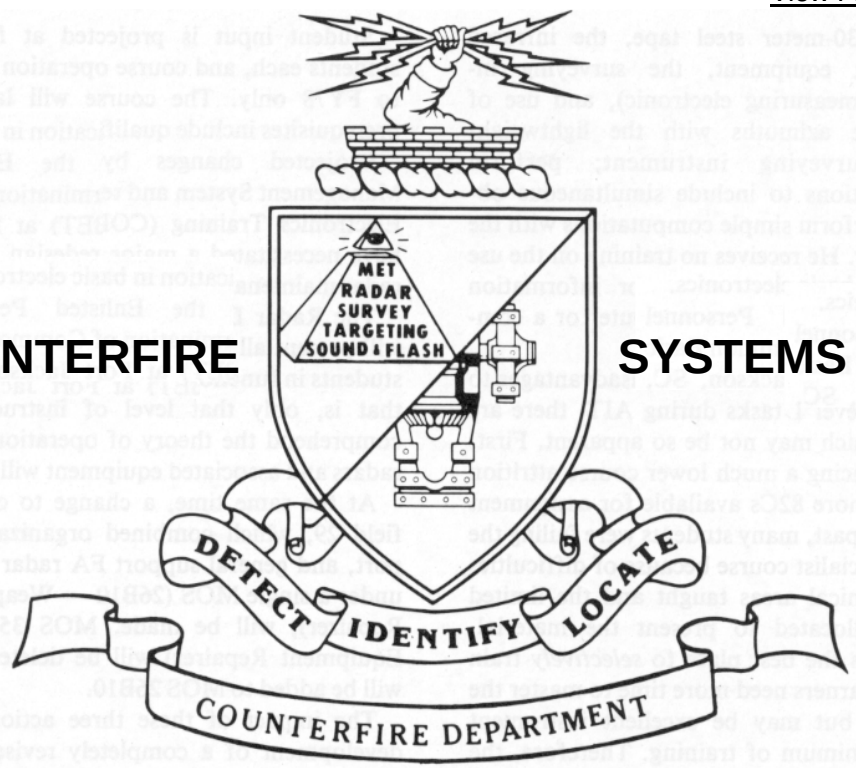
Training the German Air Force

During FY 78 more than 100 Federal Republic of Germany Air Force (GAF) personnel will receive instruction at USAFAS. At the request of the German Government, the Weapons Department is presenting two new courses of Pershing missile instruction.

Previously, German Pershing-trained airmen were integrated into the predominantly US Pershing System Maintenance classes. In an effort to further perfect the skills of their personnel, the German forces will send groups of about 20 students to each of the new, entirely German classes.

The Pershing Operators (GAF) Course is 10 weeks long and is designed for lower ranking, career-oriented airmen. The other course, the Pershing Operations and Maintenance Supervisors (GAF) Course, is unique, encompassing technical and operational material which has not been taught at USAFAS. It will be 32 weeks long — the longest course presented here. Two classes of senior sergeants and officers will attend this course annually. These new courses are projected to continue through FY 81. Because the courses are taught in English with the incident exchange of ideas and operational concept in that language, a cross-attachment of German and US Pershing units within the NATO Strike Force would be greatly facilitated, if required during hostilities.

COUNTERFIRE SYSTEMS REVIEW



DM-60 ready for issue

The old familiar field artillery survey exclamations, "STICK" . . . . "STUCK," are leaving us. The long awaited day has arrived! The Survey Distance Measuring Equipment-Infrared, DM-60 is now available for issue to troop units. Authorized units may now submit their requisitions. DA advises that deliveries will begin as soon as requisitions are recieved. In order to expedite delivery, LIN Z 76739 is authorized for documentation in unit authorization documents. Authority for this request is DA Message//DAMORQA//, dated 251526Z Oct 77, subj: Required MTOE for Surveying Set, Distance Measuring Equipment-Infrared (SDME-IR) LIN Z 76739.

Addresses of this message are advised to use the DA approved BOIP, and approved unit ALO, as guides for submission of requisitions.

Counterfire training films

Further efforts to disseminate counterfire doctrine to units have resulted in the recent production of television and motion picture films. The Counterfire Department has completed two TV cassettes (¾-inch) on the employment of the divisional target acquisition battery (TAB). Part I is on the employment of the TAB's radar platoon and part II is on the employment of the sound and flash platoon. Both films were designed to familiarize officers and NCOs with position planning to achieve optimum tactical coverage. The films can be requisitioned through Fort Sill's TASO, ETV Branch. USAFAS Film number is 2E 041-061-0623B, and specify "Part I," or "Part II," or "both parts."

Two DA films are now in production (16-mm, color) on the employment of the TAB. Each film will be 20 minutes long and should be distributed to the field in February. The first film deals with the organization, mission, and employment of the TAB, and the second film discusses counterfire functions in the div arty TOC. The target production and processing functions are depicted through a realistic situation with a division performing an active defense in Europe. DA film numbers are 12047 and 12048, respectively.

AIT training for 82C

Recent communications from field units indicate some misconceptions on the type and amount of training the MOS 82C student receives while attending Advanced Individual Training (AIT) at Fort Sill.

Doctrine established by TRADOC and concurred in by the major field commanders stated that only critical skill level 1 tasks would be taught during AIT. The Commanders Manual, FM 6-82C/CM, lists the critical tasks for MOS 82C, identifies the tasks associated with each skill level, and tells where each task is to be trained.

In broad terms, the new surveyor has been trained to: measure angles with the M2 aiming circle and the T-2 and T-16 theodolites; record field notes; measure

distance with the 30-meter steel tape, the infrared distance measuring equipment, the surveying instrument (distance measuring electronic), and use of subtense; determine azimuths with the lightweight azimuth gyro surveying instrument; perform astronomic observations to include simultaneous observation; and to perform simple computations with the hand-held calculator. He receives no training on the use of logarithms, functions of angles, or information which would prepare him to be a computer or a computer/recorder for the survey party.

Although there appear to be certain disadvantages to teaching only skill level 1 tasks during AIT, there are some advantages which may not be so apparent. First, USAFAS is experiencing a much lower course attrition rate, which means more 82Cs available for assignment to field units. In the past, many students were failing the Artillery Survey Specialist course because of difficulties with the more technical areas taught and the limited amount of time allocated to present the material. Secondly, the unit is the best place to *selectively* train individuals. Some learners need more time to master the use of logarithms, but may be excellent instrument operators with a minimum of training. Therefore, the goal of USAFAS is to train the individual to be an effective rodman/tapeman, instrument operator, or recorder. Consequently, the graduate of the new AIT can become an effective surveyor instead of being a loss during AIT, as was the case in many instances under the old program.

Under the new concept most of the training for skill level 2 tasks are a responsibility of the individual's unit. The Soldier's Manual is available now through AG Publications Center and is an excellent reference for setting up a unit training program which should include logarithms and computations with manual forms, since they will be a requirement during the MOS 82C SQT.

New radar courses

The implementation of the counterfire doctrine and the resulting reorganization of target acquisition assets into division level batteries has reemphasized the importance of the Field Artillery Radar Technician. A resident course of instruction is being initiated to train Warrant Officer Direct Appointment Program selectees in the skills of MOS 211A.

The Field Artillery Radar Technician Course (4C-211A) will begin in early 1978. Warrant officer students will receive instruction in target acquisition operations, survey techniques, and the operation and organizational maintenance of AN/MPQ-4A, AN/TPS-25A, and AN/TPS-58 radars.

Student input is projected at four classes of 15 students each, and course operation is currently limited to FY78 only. The course will last 17 weeks, and prerequisites include qualification in basic electronics.

Projected changes by the Enlisted Personnel Management System and termination of Common Basic Electronics Training (COBET) at Fort Jackson, SC, have necessitated a major redesign of the resident FA radar maintenance instruction program.

The Radar Division of the Counterfire Department will present all basic electronics instruction to FARMC students in functional context to equipment application; that is, only that level of instruction necessary to comprehend the theory of operation of Field Artillery radars and associated equipment will be included.

At the same time, a change to career management field 29, which combined organizational, direct support, and general support FA radar maintenance skills under a single MOS (26B10 — Weapon Support Radar Repairer), will be made. MOS 35D30 (Meteorology Equipment Repairer) will be deleted, and these skills will be added to MOS 26B10.

The impact of these three actions has caused the development of a completely revised self-paced Field Artillery Radar Maintenance Course (104-26B10/1T). This 26-week training program, scheduled to begin 1 April 1978, includes basic electronics and maintenance techniques employed at all echelons for FA radar, Rawinsonde, and associated equipment.

Rawinsonde PIP

A product improvement proposal (Met Data Processing Group, OL-192/GMD-1) has been developed as an interim improvement to the current Rawinsonde system which has been in the inventory for more than 25 years, but is not scheduled to be replaced until the mid-1980s.

The OL-192 is an "off the shelf," commercial minicomputer interfaced with a compatible commercial teletype paper tape reader/perforator.

Field Artillerymen will see two significant improvements in the met data they receive.

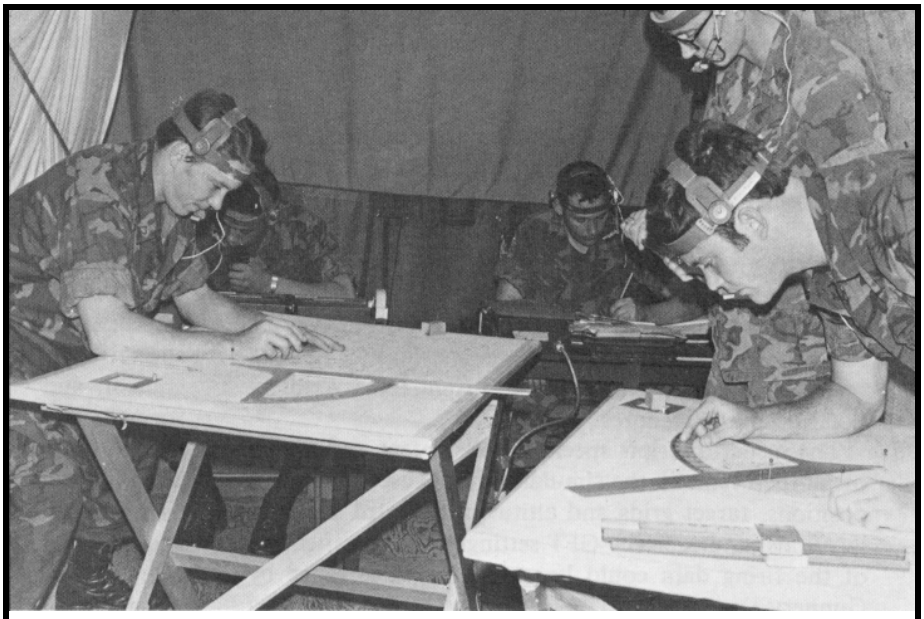
- It will be *more timely*, as the OL-192 automates most of the heretofore manual processing of raw data into met message formats and provides a pre-punched met data tape, eliminating manual preparation for transmission.
- *More accurate* data will be received by user elements due to the reduction of manual processing and transmission errors.

The OL-192 should be available to met sections during the third quarter of FY78.

A War For Science

by LTC J. W. Stokes, MC, and Dr. L. E. Banderet, Ph.D.

"No Army is efficient unless its field artillery is efficient." — MG William J. Snow, 1 March 1942.



An 82d Airborne Division, battery fire direction center in a climate chamber. The FDC was at the US Army Research Institute of Environmental Medicine (USARIEM) at Natick, MA, participating in a sustained, combat simulation. Communications with the "rest of the world" were with three radio nets and a telephone line to another room at USARIEM. There, role players read their "lines" from scenario scripts and interacted dynamically with the FDC. The headband and microphone worn by each man were connected to a small radio transmitter in his fatigue pocket. Remote monitoring and recording of each man's communications were made possible by the transmitter, the size of a pack of cigarettes. (Photo by Mr. Robert Goguen.)

"This is J54 — immediate suppression B32!" shouts the forward observer (FO) into his radio. The computer in the battery fire direction center (FDC) instructs the guns, "Left Platoon suppress B32!" Guns thunder outside the tent. The FO calls for a shift closer to the enemy and soon the target is suppressed. The fire direction officer receives a tactical situation update from the fire support officer over one radio while the radiotelephone operator copies down an encoded target list from a second FO. The chart operators plot the preplanned targets, call out chart range and deflection, and change the situation overlay to reflect the new unit positions and restricted fire areas. The FDC computer calculates the firing data, using the latest GFT setting, and calls the hot platoon over the battery phone and orders them to lay on the priority target.

And so the "war" goes on.

But there were no casualties in this war. No actual guns fired. Instead, this was part of a research project on environmental stress and sleep deprivation conducted at the US Army Research Institute of Environmental Medicine (USARIEM). USARIEM, located at Natick, MA, is one of the research institutes of the US Army's Medical Research and Development Command. The goal of the project was to simulate a sustained combat operation and study how highly trained teams of professional artillerymen could cope with the physiological limits of high information load, fatigue, and climate.

The FDC was selected by USARIEM scientists as a model Army team for study. FDCs are common and their accuracy and timeliness are relied on in all ground combat operations. Technical fire direction provides objective measures of operational performance, and tactical fire direction and ROE (rules of engagement) play permit assessment of judgment, decision making, and initiative. Since this team performs a wide range of task functions, assessment of both team and individual efficiency at several levels of functioning is possible. The FDC's compactness and dependence on radio and telephone communications make it especially suited for simulation in the laboratory. Laboratory study of this critical team permits collection of data for a wide range of medical disciplines.

For a four month period, four 5-man FDC teams (all volunteers) from the 82d Airborne Division, Fort Bragg, NC, came to Natick for the studies. An FDC tent had been set up inside a climate chamber and outfitted with the equipment of these airborne battery teams who rely exclusively on manual fire direction. Role players in another room in the building served as artillery forward

observers and as firing battery, battalion FDC, and fire support officer shop personnel. These personnel read their "lines" from a detailed scenario script developed for the exercise with assistance from the Departments of Tactics and Combined Arms, Communications and Electronics, and Gunnery of the US Army Field Artillery School (USAFAS) and the 82d Airborne Division Artillery.

The events in the scenario script were written to portray a plausible, sustained combat operation across real maps. The US task force was constantly "moving to contact" and used the most current Field Artillery doctrine and procedures.

The scenario scripts specified the content and timing of all the events in the simulation. Because the battery positions, target grids and altitudes, forward observer locations, and even the GFT settings were specified, all of the firing data could be computed in advance by Gunnery Department, USAFAS. The scripts were also organized so that standard statistical and graphical techniques could be used in analyzing the data. In an average 24-hour period, the test FDC was called on to fire numerous suppression, immediate suppression, and targets of opportunity missions — many, simultaneously. Other missions such as smoke, high-angle, time-on-target, ICM, and illumination were also requested. In addition to these activities, each day the FDC was called on to move four times, receive eight GFT updates from battalion, compute data for 400 pre-planned targets, and execute 100 priority target changes.

Sound effects were also used during the simulation. When the guns were fired, one, two, four, or six gun blasts were heard by the FDC. Appropriate delays between the sending of quadrant and the blast were played depending on the mission involved. The extraneous communications that exist on radios during a field operation were also simulated. About 20 recorded messages per hour were sent in over the two administrative radio nets. The static and hiss, all too common on field radios, were also incorporated. When the battery "airmobiled" to a new location, the team heard sounds from a CH-47 as they "traveled" in an adjacent climate chamber configured like the inside of a Chinook.

Precomputed data permitted the exercises to go at a rapid pace and still maintain a dynamic interaction between forward observers and the FDC. For example, if a 1000-mil gunnery error was fired, the forward observer informed the FDC, "Round not observed; check data and repeat." If the FDC took a long time in processing requests for fire support, the forward observer inquired, "Request nature of delay," or something more demanding if he were in a hot situation.

Army doctrine recognizes that US Forces may be deployed under short notice to distant battlefields. They will be committed immediately to stop a well-armed, numerically superior enemy who is prepared to wage intensive sustained combat. The research program at USARIEM was undertaken to determine the effect of sustained operations under biological, medical, and phychosocial functioning of military personnel. Of special interest were the Army's critical command, control, and communications teams. They must perform in adverse environments with high information loads, noise, loss of sleep, and other operational stresses. It is important that military planners have usable medical and scientific information on how functional disabilities, physiological disruptions, and overt illness can be minimized with available resources.

Scientific investigators from USARIEM, the Walter Reed Army Institute of Research (Washington, DC) and the Naval Health Research Center (San Diego, CA) collected medical, physiological, and operational performance data. Electroencephalograms (electrical measures of brain activity during sleep) were recorded from each FDC team member on evenings before and after challenges in the simulation. During the challenges, FDC task activities, team interaction, and communications were recorded on video and audio tape for subsequent analysis. Each FDC member wore a small physiological tape recorder and a radio transmitter. Heartbeat signals, individual voice communications, and movement were recorded and monitored by these devices during the sustained operation. Teamwork, alertness, morale, movement, and biochemical factors were also studied.

During the studies all four teams were highly motivated and continued to get rounds out. With increased fatigue, errors increased and output slowed on some tasks. Preplanning and maintaining platoons with current "dedicated" information decreased as teams strove to meet immediate demands or used lull periods to rest.

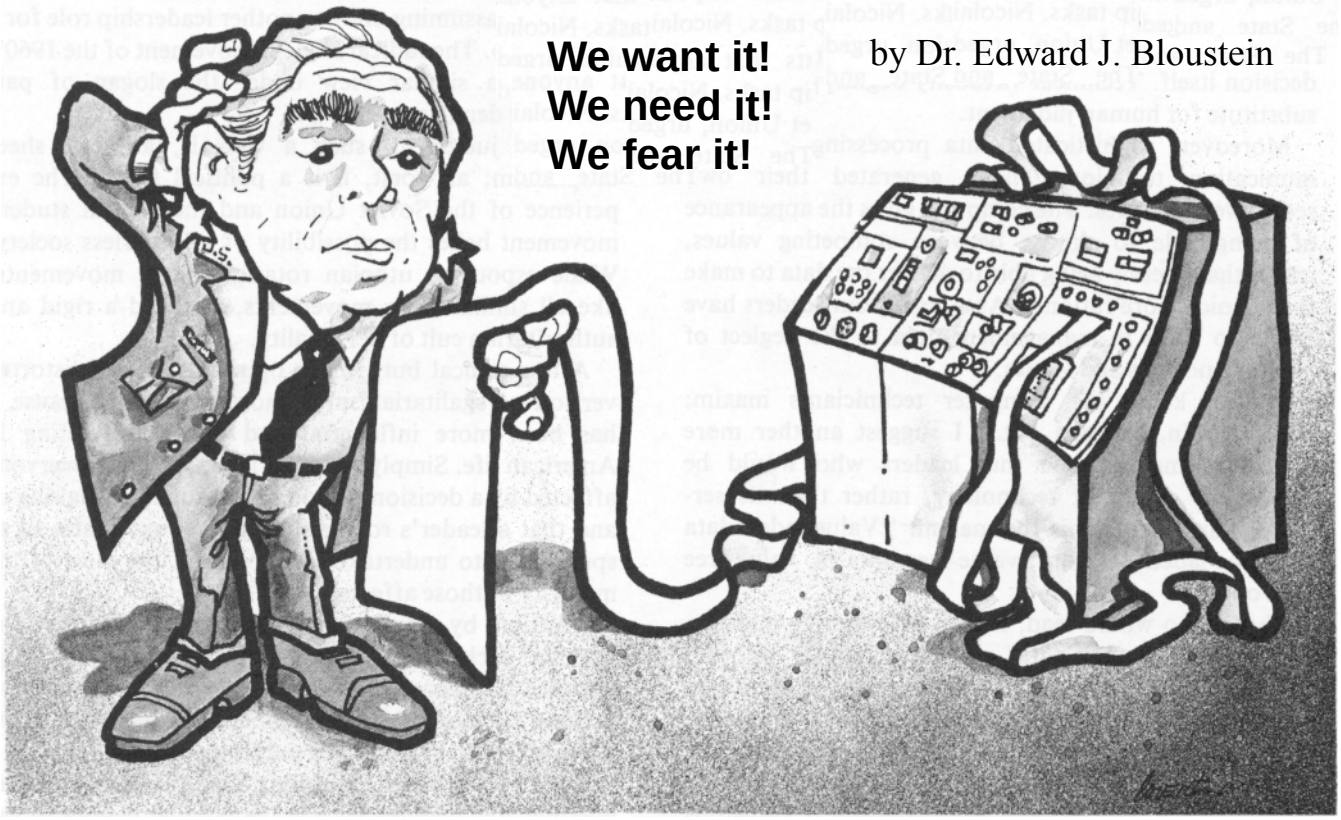
Currently, the project's scientific-medical team is involved in an intensive analysis of the results from the studies. They are confident that the data obtained from this project will aid in determining the impact of sustained operations in adverse conditions on military personnel. Future work will assess strategies to sustain health, well-being, and operational efficiency. Such information should be of value to soldiers of the future.

LTC J. W. Stokes, MC, and Dr. L. E. Banderet, Ph.D., are employed at the US Army Research Institute of Environmental Medicine in Natick, MA. Lieutenant Colonel Stokes is a physician with a background in biological functions of people exposed to challenging conditions. Doctor Banderet is a research psychologist primarily concerned with identifying correlates of human dysfunction.

Leadership—

We want it!
We need it!
We fear it!

by Dr. Edward J. Bloustein



Art by Donna Covert

We have some curiously contradictory national dispositions. We are enthralled by the trappings of aristocracy, but we repudiate aristocrats. We yearn for absolutism and moral certainty, but we are cynics and skeptics. We profess a profound political ideology, but we practice a highly pragmatic politics.

Each of these ambivalences is to be found in contemporary attitudes toward authority at every level and in every walk of our national life. On the one hand, we long for someone to help renew our faith in ourselves and our purposes. On the other hand, the memory of the English monarch we overthrew two centuries ago still lingers and our recent narrow escape from the clutches of a man who almost transformed the Presidency into an imperium is vividly with us.

Our national dilemma is that we want and need leadership, but we fear it profoundly. In my view, we can only resolve this dilemma if we allow — no, require — our managers to become leaders.

Two related reasons explain why we do not have the leadership we require. The first is that we live in what some writers call the postindustrial age, what other writers call the technetronic age. The second is that we have begun to honor a false sense of egalitarianism.

The technetronic society uses electronic technology, not only as a means to produce more goods, but also as a means to control that production and to calculate and communicate decisions about it. As a new phase of our social development, it holds out great promise.

However, it involves at least one peril to humane goals and purposes. The capacity of the technetronic society to gather, store, manipulate, correlate and communicate data has enlarged human sensitivity to the interrelatedness and complexity of the natural and social order. As a result, a form of scientific determinism reminiscent of that of the 18th century has tended to turn the attention of our managers from ethical choices to factual calculations.

The fulfillment of multiple, diverse and conflicting purposes in a world of untold interrelated factual variables has grown to be — and, as importantly, has seemed to have grown to be — extraordinarily difficult.

At certain times, and in relation to certain issues, making a rational decision seems beyond human capacity.

Under these circumstances, collecting, manipulating and communicating the data necessary to make the decision provides a form of emotional comfort that tends to displace the painful moral necessity to make the decision itself. Technical virtuosity begins to provide a substitute for human judgment.

Moreover, sophisticated data processing and communication techniques have generated their own seductive mystiques. The computer gives the appearance of being able to choose between competing values, rather than merely being able to deliver the data to make such choice more rational. As a result, our leaders have begun to trade in management data to the neglect of human emotions and values.

We all know the computer technician's maxim: "Garbage in, garbage out." I suggest another more important maxim, one that leaders who would be masters of computer technology, rather than its servants, must learn. It is the maxim: "Value-laden data in, value-laden data out; value-free data in, value-free data out."

Those who would lead, rather than merely manage, must recognize that data — even computer printout data — is no substitute for the anguish of choice as between competing human goals.

Besides the technetronic revolution, a second explanation of the triumph of management over leadership is a false sense of egalitarianism. I know this assertion sounds elitist and I know it runs contrary to the antiauthoritarian climate of our time, but so be it.

I believe an elite is necessary to the success and survival of the democratic state. In a more mundane, but no less important, sense, such an elite is necessary to the functioning of our schools, our churches, our businesses, our trade unions and to every other facet of our life.

I am not urging a hereditary elite, nor one of wealth, class or race; nor, indeed, am I urging an elite of the educated or the technically skilled. I also repudiate a governing elite, whatever its principle of selection, which is not subject to accountability and to recall by the people it serves.

But there must be leaders. Someone must assemble the factual data and sound the diverse strains of moral conviction. Someone must discern the common good out of the welter of complex data and conflicting interests. Someone must inspire people to see beyond their own special interests and to act in the general interest. Finally, someone must stand accountable before the people for the success or failure to enlist their general will.

One form of egalitarianism suggests that anyone among us could perform these leadership tasks. Nicolai Lenin, the founding father of the Soviet Union, urged as much in his political tract, "The State and Revolution," in which he envisaged a rotating elite with each of us assuming one or another leadership role for a year or two. The radical student movement of the 1960's espoused a similar view under the slogan of participatory democracy.

In my judgment, such a view is, at best, sheer utopianism; at worst, it is a political fraud. The experience of the Soviet Union and the radical student movement belies the possibility of a leaderless society. While espousing utopian rotation, these movements, like all similar mass movements, installed a rigid and authoritarian cult of personality.

A less radical but, in my opinion, no less distorted version of egalitarianism is more troubling because it has been more influential and more debilitating in American life. Simply stated, it is the view that everyone affected by a decision should be consulted in making it, and that a leader's role is simply to count noses, so to speak, and to undertake to implement the view of the majority of those affected.

Decision by opinion poll, by referendum and by popular acclaim has become the order of the day. Detailed daily accountability for decisions reached has become a fetish. And all deliberation has now to be undertaken in the glare of a public meeting hall.

As a result, hard decisions are avoided wherever possible, and acquiescence in the popular clamor of the moment too often substitutes for rational choice in the long-term public interest. In such a context, successful managers keep their ears to the ground on both sides of the fence on which they sit. They manage to make no decisions and thereby avoid all responsibility.

It is one thing to repudiate hereditary rulership, to be skeptical of tests of innate intelligence or ability, to seek affirmatively to open opportunity to all and to limit the influence of race, birth, class, sect or wealth in politics and life generally. These are egalitarian tenets that carry full conviction.

But a commitment to such principles is not to be confused with the belief that everyone is as wise, knowledgeable and skilled as everyone else; nor is it to be confused with the belief that everyone is as capable of assuming positions of authority as everyone else. We do not choose and reward plumbers, surgeons or basketball players on such a distortion of the egalitarian spirit. Nor should it be the basis for choosing and rewarding political, business, social or educational leaders.

As a nation, we have just lived through the gravest abuse of Presidential power we have ever known. In law

enforcement, medicine, education, business management and the labor unions, we have recently witnessed serious forms of irresponsibility. As a result, the entire range of our political, social and economic leadership is now rightly subject to increased scrutiny.

But it would be folly in my judgment to go from one extreme to another. We must not completely shackle the hands of all of our leaders because some of them debased their offices and betrayed the people's trust.

Even the most skilled and morally responsible leaders must be subject to public election, scrutiny and recall. But reposing faith and confidence in leadership and maintaining the discipline to allow them to exercise their responsibilities without undue fetters is as vital to the strength and success of democracy as are the principles of election, representation, equality of opportunity and accountability. A democratic people must delegate responsibility freely, and without undue restraint or impatient clamor for results, if it is to receive the leadership it requires.

My plea is that we abandon contemporary distortions of democracy and of egalitarianism and that we require our managers to become leaders. This does not mean the adoption of authoritarianism or the neglect of technical skills.

It means, rather, that a democratic people must recognize that it cannot govern itself directly if democracy is to succeed. It also means that even in — indeed, especially in — a technetronic age, vision and creative judgment must be wed to the electronic manipulation of data if our electronic skills are to serve our humane purposes.

The truest revolutionary force is a population animated by an exalted purpose. People will squander their substance and lay down their lives for things they love and believe in. They would rather work tirelessly for the vindication of an ideal than purchase comfort in a humdrum routine.

Those who would lead us and rekindle our national grandeur must reawaken and harness the energies of the will and spirit that now lie dormant in our nation. We require leaders who will lead, rather than merely gather data and seek consensus; we require leaders who will excite our people's enthusiastic effort and commitment, rather than merely mirror their momentary distemper or enthusiasm. Above all, we require leaders who will dream great dreams, aspire to large goals and deal in hope once again.

This is the challenge of leadership which will insure the survival of our national genius; this is the challenge of leadership which I present to you.

This is an abbreviated version of a commencement address given by Dr. Edward J. Bloustein, the president of Rutgers, the State University.

(Continued from page 37)

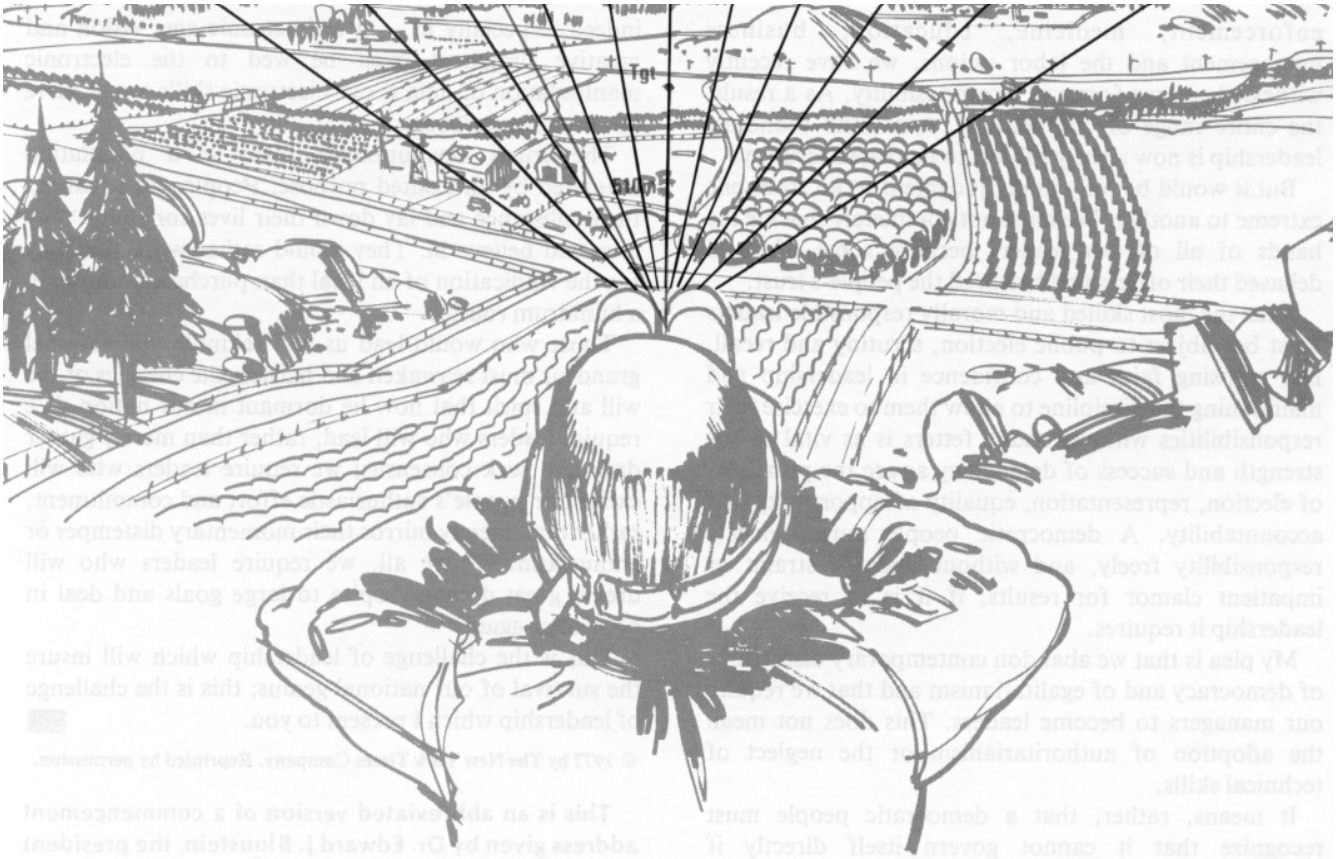
Jackson's chief of cavalry, and immediately was catapulted to fame as the commander of the famous "Chew's Horse Artillery." During the Valley Campaign of spring 1862, Chew advanced upon Union forces by charging down the Valley Pike behind a cavalry screen. Abruptly abandoning the cavalry protection, Chew's gunners, unlimbering at 100 yards, bounced canister off the Pike and bordering stone walls and turned the Union position into a bloody slaughter ground.

Chew's feat was virtually duplicated by LT Henry A. DuPont, the number one graduate of his USMA Class of 1861. As the commander of Battery B, 5th US Artillery, at the Battle of New Market on 15 May 1864, DuPont leapfrogged two platoons of howitzers down the Valley Pike macadam, putting up a wall of shrapnel that stopped 18 Rebel guns for four hours. DuPont was awarded the Congressional Medal of Honor for resisting enemy attacks at Cedar Creek, VA, with his battery in 1864 when friendly infantry pulled out.

MAJ James Breathed, who had been a lieutenant in Pelham's old battery, achieved fame at Spottsylvania Courthouse when, as a battalion commander, he assisted his old unit. Captain Johnston, the battery commander, was retiring his unit piece-by-piece before the attacks of Wilson's Union Horse Artillery and had pulled back all but one howitzer. With the lead and swing horses dead and Union cavalry scant yards from the gun and intent upon capturing it, Breathed galloped up, cut the traces from the downed horses, and brought off the weapon using the wheel horses. In spite of a volley of near point-blank fire, Breathed escaped injury. This heroic action caused the troops of both sides to momentarily cease fighting and let forth a thunderous cheer.

The brave actions of these Redlegs and countless other unrecognized heroes can be summed up by the commander quoted in Stern's *End To Valor.* Speaking of the horse artilleryman, the tribute could be applied to all cannoneers, regardless of their mobility, "The cavalry had no better soldiers than the battery commanders and their lieutenants (in the horse artillery) . . . . Where the sharp fighting was, they could be found . . . . All the horse artillery was spendid, commanded by young and dashing fellows."

CPT Karl W. Volk is the only Redleg assigned to the 854th Engineer Battalion, Kingston, NY.



Improving The Adjustment Of Fire

by COL (Ret) Salvo Rizza

Some 30 to 35 years ago, the artilleryman was noted for his wizardry in adjusting fire on a target. He developed and used all sorts of geometric and ballistic factors, which (to his delight) confused his doughboy friends and enhanced his ego. Thus, when the target grid was introduced, there was considerable resistance and all kinds of counter-arguments. However progress could not be restrained. The observer's "mysterious" know-how had to go and, as a result, adjustment procedures were simplified to such an extent that grade school arithmetic was enough.

The only observer computations remaining were those involving the use of the mil relationship; i.e., multiplying the range in thousands of meters by the angle in mils to obtain a deviation shift in meters, which was sent to the fire direction center (FDC). As a matter of fact, the method of adjustment became so simple that it is still unchanged after all these years. Now it appears that the time is ripe to get rid of the last vestige of observer adjustment computation.

Proposed procedure

This article describes and justifies a very simple modification of the observer's procedure and, concomitantly, the follow-on actions at the FDC. The whole operation has few (if any) interactions outside the fire direction system and, therefore, should create no problems nor make any waves. In fact, the modification was used successfully by I Corps Artillery in Korea in 1953-1954 and by the 101st Airborne Division Artillery in 1956-1958. Because it was more accurate, faster, and simpler for the observer, it is difficult to understand why the Field Artillery School did not endorse and standardize the modified techniques. Perhaps there were good reasons then; but, before we draw any hasty conclusions, let's take another look at the suggested procedure, examine some of the previous objections, bring events up-to-date, and then determine whether past arguments are still valid.

The sketches and explanations in figure 1 illustrate the new procedure and, for comparative purposes, the

present one. Basically, the modification results in only two changes.

• On the observer side, the procedure is modified only for deviation corrections. These are given in mils exactly as measured through field glasses — no longer is it necessary to use the mil relation for small angle shifts or sine factors for large angle shifts.

• At the fire direction end, the procedure requires the location of the observer so that the FDC can follow the same deviation corrections, using a grid with radial lines for deviations and concentric circles for changes in range or distance.

The observer-FDC relationship can be understood if one visualizes the new grid centered at the observer's ground location while, at the same time, a scaled-down version of the same grid is centered at the observer's chart location. We might say the grids are synchronized.

So far, all this appears simpler, faster, and more accurate, particularly for the observer who, once located, gives the deviation precisely as he sees it with no estimated range factor — no calculations. At this point we might wonder: What, or where, are the problems?

Let's look at some of the previous objections and perhaps some of the reasoning why the suggested procedure never caught on. The strongest objection focused on the necessity to locate the observer and emanated from two sources: the observer element and the fire direction element.

The observer element

The observer felt that locating himself was not always possible and frequently too difficult or unfeasible. There was even concern about the observer being burdened with extra effort.

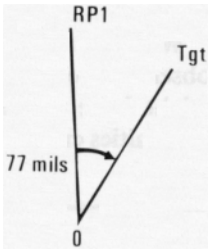
The people who objected the most seemed to be oblivious to the fact that, in order to be responsive and locate targets quickly and accurately, the observer always has to have a fairly accurate idea of where he is. Generally, this is an important part of his job and has never been too difficult. Maps, photomaps, photos, resection from two or more points or bursts, back-azimuth polar plot, etc., have always been used effectively.

On the other hand, in the past during periods of near-zero visibility, such as at night or in the triple canopied Vietnam jungle, it was difficult to make even a rough location. However, with the development of the sound interval method in 1968 and such motion technical achievements as the Position Azimuth Determining System (PADS), AN/PSN-6 Position Locating System, laser devices, etc., it appears that the observer will always be located well enough to effectively adjust fire using the new method. This level of FO standing operating procedure is not overly demanding, and to condone anything less would be embarrassing.

Sample Problems

Small angle deviation corrections:

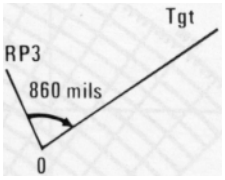
Estimated O-RP 1 range = 2,400 meters.
Angle from RP to target = 77 mils.



	Present procedure	New procedure
1. Deviation correction	= range x mils = 2.0 x 77 = 154 meters = R 150	= R 77 mils
2. Precise correction	= 2,400 x sin 77 mils = 2,400 x 0.07552 = R 181	= R 77 mils
3. Accuracy/error factors	a. Requires computation and possible math error. b. Range estimation might be several hundred meters off. c. Beyond 1,000 meters, ranges rounded to nearest thousand. d. Possible angle measurement error.	Possible angle measurement error.

Large angle deviation corrections:

Estimated O-RP 3 range = 1,600 meters.
Angle from RP to target = 860 mils.



	Present procedure	New procedure
1. Deviation correction	= range x rough sine factor = 2,000 x sine 900 mils = 2,000 x 0.8 = R 1,600	= R 860 mils
2. Precise correction	= 1,600 x sine 860 = 1,600 x 0.74751 = R 1,196	= R 860 mils
3. Accuracy/error factors	a. Requires computation and possible math error. b. Range estimation might be several hundred meters off. c. Angle rounded off to nearest 100 mils. d. Sine factor is rounded off to nearest tenth. e. Possible angle measurement error.	Possible angle measurement error.

The fire direction element

While we are prone to give little or no sympathy to the observer's location problem, the arguments at the FDC might have had some validity. These emphasize the difficulties created by:

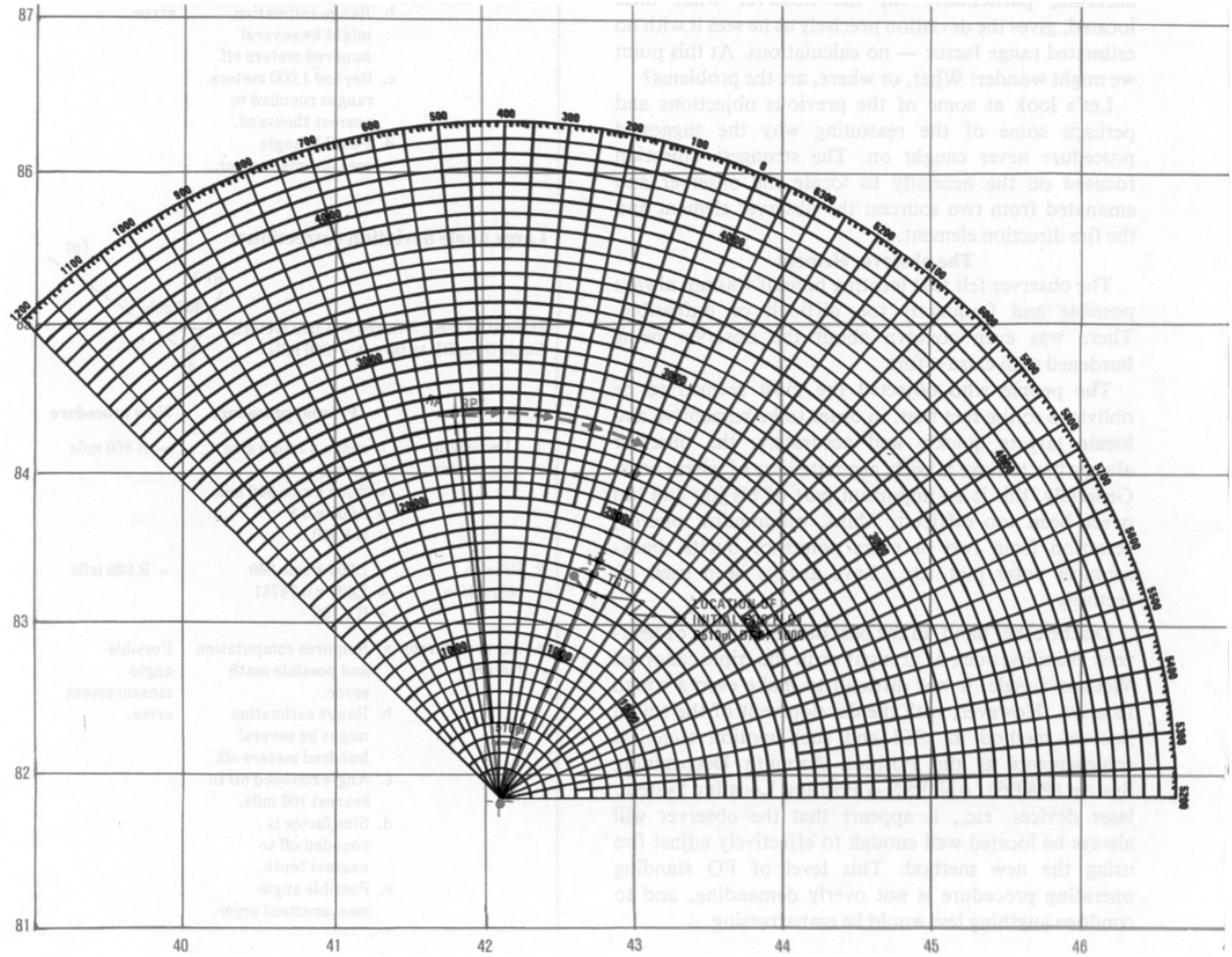
- Shifting the new grid from one observer location to another, or by operating a separate grid at each location.
- The graphical or computational effort required for resecting, back-azimuth plotting, or sound interval techniques.

Figure 1a. New target grid procedure.

Scenario: The observer has located his position and given it to the FDC; he has also identified an RP which has been located on the FDC chart. The azimuth to the RP is 6290, and he estimates his distance to the RP as 2,400 meters.

A target appears at an estimated distance of 1,600 meters and measures 510 mils to the right of the RP. Since his position is known, he decides to use the new mil-shift procedure for initial fire.

Using this procedure, he locates his target with the following shift: From RP, right 510 mils, drop 1,000 meters. The right 510 mils is exactly as measured through his field glasses; and, although the difference between estimated distances is 800 meters, he asks for drop 1,000 meters to expedite getting a bracket. Note that the FDC chart pin will be on the OT line and, if the FO's estimates are close, should be short.



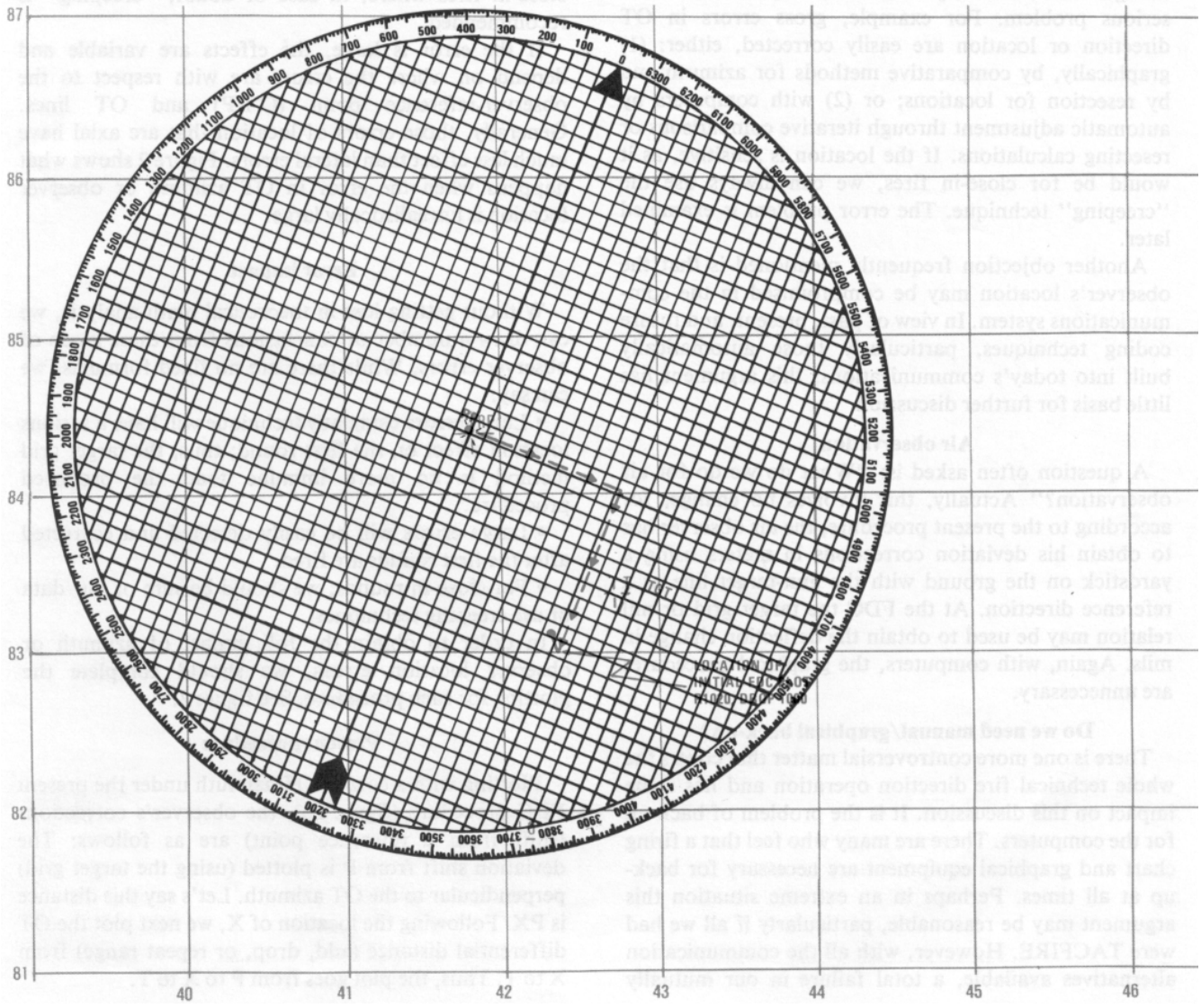
As a result, the FDC chart could be messy and difficult to use, and thus the chart operation often raised the question of whether the dividends were worth all the extra effort. This writer believes they were; however, the point is valid.

The computer

But, while these issues were debatable yesterday, do they have any basis today with the TACFIRE system? Since computers are far superior to manual or graphical operations and also because computers can be

Figure 1b. Present target grid procedure.

Scenario: Using the old target grid procedure and current doctrine, the observer would give an OT azimuth of 400 and ask for a shift from the RP or right 1,020 meters, drop 1,000 meters. The right 1,020 meters is derived from the mil relationship by multiplying 2 (distance to RP to closest 1,000) times the angle (510 mils), or 1,020 meters. The drop 1,000 is derived as indicated in the new procedure. Note that the plot at FDC (right 1,020, drop 1,000) is a considerable distance from the survey location of the target. The reason for this difference is due primarily from rounding off the 2,400 meters to 2,000 to get the multiplying factor. Also, for an angle of 510 mils, the mil relationship is not precisely accurate. Thus the combinations give right 1,020 instead of right 1,250. The difference in distances between the initial plot and the target comes from a combination of the above erroneous shift and the false assumption that the distances from 0 to RP, and from 0 to the intersection of the deviation shift with the OT line, are equal.



programed to handle resection, back-azimuth polar plot, and sound interval techniques, the firing chart is an unnecessary part of the FDC. The above mentioned chart problems should just vanish.

Minor objections

While the necessity to locate the observer dominated the "scene of resistance to change," a number of minor negative comments also surfaced. One of these focused on location accuracy requirements. Although these were minimally stated, an ill-founded conclusion somehow emerged to indicate that the location must be fairly accurate. This is unwarranted as the problem is little different than it is with the present techniques where an observer, possibly because of poor location, misses his observer-target (OT) direction by 100 mils or more. The key point here is that the effects of a poor OT direction, or a poor location under any technique, certainly derogate the initial adjustment of fire; but it is not a serious problem. For example, gross errors in OT direction or location are easily corrected, either: (1) graphically, by comparative methods for azimuth and by resection for locations; or (2) with computers by automatic adjustment through iterative comparisons or resecting calculations. If the location is sensitive, as it would be for close-in fires, we can always use the "creeping" technique. The error problem is examined later.

Another objection frequently mentioned is that the observer's location may be compromised in the communications system. In view of past, present, and future coding techniques, particularly those automatically built into today's communications, this argument has little basis for further discussion.

Air observation

A question often asked is: "What do we do for air observation?" Actually, this involves no change, for according to the present procedure, the air observer has to obtain his deviation corrections in meters using a yardstick on the ground with the gun-target line as a reference direction. At the FDC the target grid or mil relation may be used to obtain the deflection change in mils. Again, with computers, the graphical procedures are unnecessary.

Do we need manual/graphical back-up?

There is one more controversial matter that covers the whole technical fire direction operation and has some impact on this discussion. It is the problem of back-up for the computers. There are many who feel that a firing chart and graphical equipment are necessary for back-up at all times. Perhaps in an extreme situation this argument may be reasonable, particularly if all we had were TACFIRE. However, with all the communication alternatives available, a total failure in our mutually structured system would appear to be rare.

This does not mean that FD personnel should not be trained in manual/graphical methods. Such training is necessary for an understanding of the artillery problem and as a capability to handle back-up fire direction and unforeseen contingencies.

Observer-target relationship

Under the present and proposed methods, errors in the relationship of the observer to the target will be reflected most in the plotted location of the initial round.

If the error is small (100 mils or less in azimuth in the target grid method, or 200 meters or less in the observer's location in the proposed radial grid method), the adverse effect on the firing will not be worth bothering with. This will hold true for all firing except close-in fires where, in case of doubt, "creeping" is recommended.

If the error is large, the effects are variable and depend on where the errors are with respect to the observer-reference point (O-RP) and OT lines. Generally, those errors of location that are axial have much less effect than lateral errors. Figure 2 shows what happens when the error in OT azimuth or observer location is unrealistically large.

Error impact

Without getting lost in theoretical math analysis, we can draw a number of conclusions from these kinds of observer errors. While there are no fixed formulas, we can say:

- Large errors using any technique will have a serious location effect on the first round; thus, the target grid method is no more immune than the proposed procedure.
- Large errors will be easily detected and corrected after the first rounds are fired.
- For close-in rounds, we should be sure of our data or use creeping techniques.

In order to obtain the full impact of azimuth or observer location errors, we should complete the plotting for each procedure. See figure 2.

Present procedure

Plotting with a correct OT azimuth under the present FDC procedure (figure 2a), the observer's corrections (shift from a reference point) are as follows: The deviation shift from P is plotted (using the target grid) perpendicular to the OT azimuth. Let's say this distance is PX. Following the location of X, we next plot the OT differential distance (add, drop, or repeat range) from X to T. Thus, the plot goes from P to X to T.

In the FDC plotting with an incorrect azimuth, the basic deviation and OT differential distances are plotted precisely as indicated for the correct azimuth except that:

1) The deviation shift PY, which is the same distance as PX, is misoriented in direction by an angle (or a number of mils) equal to the difference between the correct and incorrect azimuths.

2) The OT differential distance from Y is plotted along the given (incorrect) azimuth of T′. Again, YT′ is equal to XT. The plot goes from P to Y to T′.

Note that the location difference between T and T′ is due to:

1) A different direction for the plot PY.

2) Using Y as the point of departure, a different direction and point of origin for the distance YT′ along the perpendicular through Y.

Proposed procedure

For FDC plotting with a correct observer location, see figures 2b and 2c. The plot is a polar one using an angle and a distance. Using observer-reference point (OP) as the basic reference for the angular plot, the location is plotted by laying off the angle or ray and then, along this ray, the distance OT.

Now let's look at the FDC plotting with an incorrect location. In order to visualize the error relationships, a circle is circumscribed about the points O, P, and T.

No matter where the observer is mislocated, the basic reference for the polar plot (angular plot) becomes the line O′P (O′ is the mislocation of the observer). Note that:

1) If point O′ is mislocated anywhere on the circle, the polar angle will be such that the plotting ray will always pass through the point T. However, the polar plot distance O′T′ will normally locate T′ short of or beyond the point T.

2) If the point O′ is inside or outside the circle, the plotting ray will never pass through T. For the purpose of comparing the ray directions, the plotting ray through O′ will always be parallel to the line ZT that passes through point T and the point of intersection Z, which the line through O′ and P makes with the circle. This is shown in figures 2b and 2c and will permit visualization of what happens as we move O′ about. Note that the errors in locations of O are exaggerated to a degree that is totally unrealistic and hardly credible.

Is there now any basis left for keeping the observer tied to the mil relation?

Legend:

O – true ground observer location.
O′ – FDC's mislocation of observer, resulting from azimuth or location error.
T – true ground target location.
T′ – FDC's plotted target location, resulting from azimuth or location error.
P – reference point.

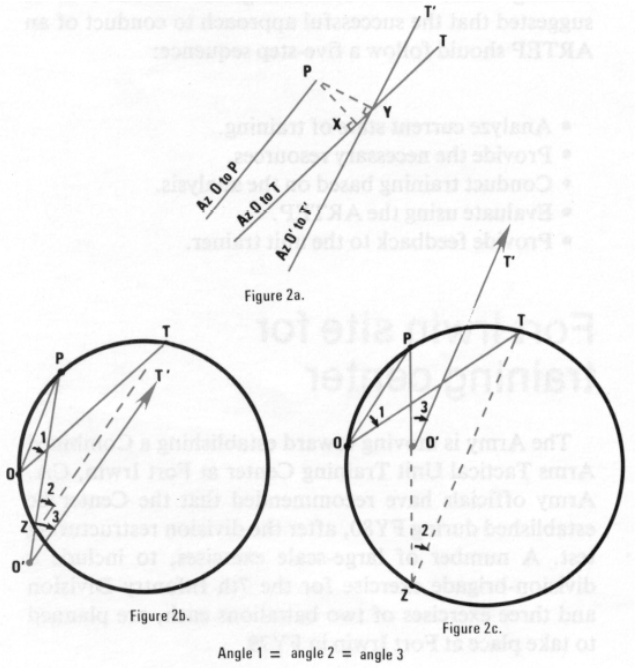


Figure 2a.

Figure 2b.

Figure 2c.

Angle 1 = angle 2 = angle 3

COL (Ret) Salvo Rizza is a former director of the Gunnery Department, USAFAS, and is well known for his Rizza (GFT) Fan. He is also the inventor of helicopter survey methods and simultaneous celestial observations and is a former commander of the 101st Airborne Division Artillery. Colonel Rizza is now employed by Litton Industries.

USAFAS agrees that Colonel Rizza's method is procedurally correct. However it is not recommended for adoption as a replacement for the current means of computing data to adjust fire. The major disadvantage to the proposed system is that the observer's location must always be known by the FDC. This requirement could become an extreme burden to the observer, especially in a mobile situation. This is not to say that the observer does not always need to know his location — the observer must be able to locate himself accurately! The burden is in the requirement to continually report and/or update his location, compounded with the implementation of FIST and a large increase in the number of observer locations that must be reported to the FDC. — Ed

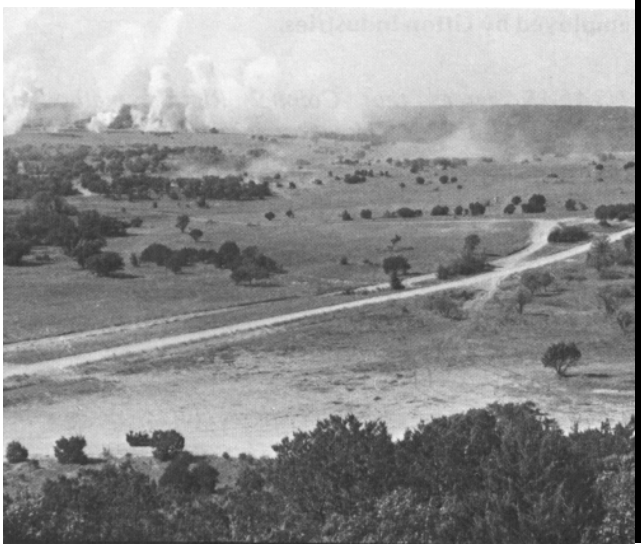
Restructured battalion tested

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

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

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

Fort Hood's Tank Platoon Battle Run Range as seen during a recent live-fire exercise to evaluate the "restructured" battalion in a combat situation. Tank and artillery fire plus smoke and TNT charges provided battlefield realism. (Photo by Tim Rogers.)



ARMOR looks at the ARTEP

The September-October 1977 issue of *ARMOR* magazine has two articles of interest to everyone interested in the Army Training and Evaluation Program concept. In that issue, there is a feature "Forging the Thunderbolt" which outlines the Armor School philosophy and discusses several key aspects of the evaluation process so that the maximum training benefit can be derived.

The second piece worth reading is an article entitled "Put the T Back in ARTEP". The authors detail systematic procedures to follow in maximizing the training value from conducting an ARTEP. It is suggested that the successful approach to conduct of an ARTEP should follow a five-step sequence:

- Analyze current state of training.
- Provide the necessary resources.
- Conduct training based on the analysis.
- Evaluate using the ARTEP.
- Provide feedback to the unit trainer.

Fort Irwin site for training center

The Army is moving toward establishing a Combined Arms Tactical Unit Training Center at Fort Irwin, CA. Army officials have recommended that the Center be established during FY80, after the division restructuring test. A number of large-scale exercises, to include a division-brigade exercise for the 7th Infantry Division and three exercises of two battalions each, are planned to take place at Fort Irwin in FY79.

AN/PRC-104 backpack radio in action.

USMC tactical radio in production

The US Marine Corps' single-sideband backpack AN/PRC-104, nucleus of a new family of high frequency radio sets, is in full production.

Several thousand radios are being built under terms of a $22-million contract with considerable quantities earmarked for the US Navy and Air Force, and for Sweden's national defense forces. The US Army is conducting separate tests of the equipment as a possible replacement for their larger and heavier AN/PRC-74.

The PRC-104 is about a third the size of the PRC-74 (approximately 12″ x 10″ x 3″) and weighs less than half as much (14 pounds with battery).

This newest generation radio set is virtually automatic. The operator simply turns on the power, selects a frequency, and hits the press-to-talk switch. The antenna is tuned and the transmitter comes up to full power automatically, and almost noiselessly — an advantage for patrols operating near or behind enemy lines.

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

The backpack version of the transceiver features a 20-watt amplifier, an antenna coupler unit, and a silver-zinc battery that provides at least 16 hours of service before needing a recharge. Field repair can be accomplished without tools by replacing any faulty unit.

The PRC-104 uses ground wave propagation for communications out to the horizon and sky wave propagation to bounce transmissions hundreds of miles with the 20-watt set and thousands of miles with the 400-watt sets. Normal use would include ranges up to 300 miles for the back-packed PRC-104.

Roland on board

The first Roland air defense fire unit to be produced in the US was recently accepted by the US Army. The Roland is the first major European designed weapon system selected for production in the United States for deployment with the US Army.

The system consists of a fire-unit module armed with 10 missiles, mounted on the M109 self-propelled howitzer tracked carrier. On the module are a fully traversable turret (360 degrees) with twin launchers, tracking and surveillance radars, and an optical sight. The entire module can be transported by helicopter and operated from ground emplacements if necessary, or it can be mounted on wheeled vehicles.

About 30 Rolands will be delivered initially. The system is expected to replace the Chaparral missile system in the 1980s.

US Roland air defense system.

The FIST Works

Art by SP4 Donald S. Laster.

by 2LT Luther J. Dunn III

So you didn't think FIST would work!

To most old Redlegs the idea of revamping the forward observer (FO) system was *extreme.* But the system has been revamped, the once wily fox lieutenant FO has become the FIST (fire support team) leader of the maneuver company. The FIST (May-June 1976 *Journal*) is a relatively new concept in fire support that the 82d Airborne Division has been employing for more than a year. The 2d Battalion (Airborne), 321st Field Artillery (Fort Bragg, NC), has successfully met the demands of transition from the old FO system to the FIST system.

The FIST system is a more efficient means of providing fire support. FIST provides all the benefits of the old FO system — and more — by allowing the previous lieutenant FO to act as a fire support officer at maneuver company level. Each platoon is then alloted its own forward observer party consisting of one sergeant (E5) FO and a radiotelephone operator (RTO). Thus, the monitoring and coordination of fire support can be provided for each platoon by its respective FO party.

The FIST headquarters consists of the FIST leader or chief (LT), a fire support sergeant (E6), and a driver (SP4). In addition, there are three platoon FO parties, each consisting of one sergeant FO and an RTO. The purpose of these elements is to provide continuous, accurate, timely fire support to the maneuver platoon level.

In our communications system (figure 1), the platoon FO parties monitor the 81-mm mortar frequency with the 105-mm battery frequency preset. The 4.2-inch mortar unit then monitors the 81-mm

mortar frequency of the unit receiving priority of fires. While all this is going on, the FIST lieutenant is monitoring platoon requests for fire and directing those requests to the appropriate element. This system is a good one, but it requires continuous effort to implement.

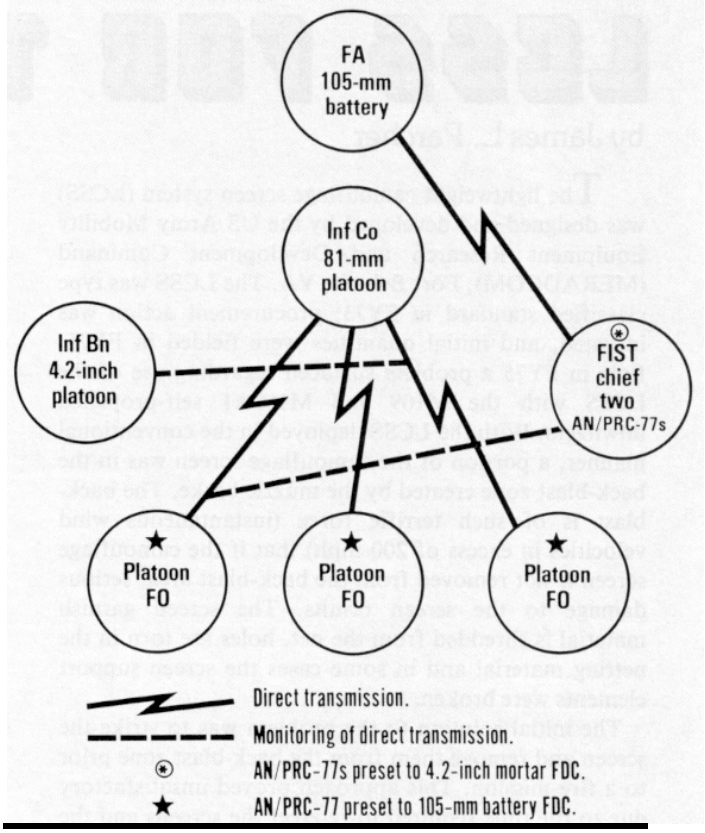
When the 2-321st FA was given the mission of implementing the FIST concept, we immediately employed the quick-fix technique; that is, using those assets on hand. The infantry mortar FOs were subjected to one week of rigorous, intensified FO training, *al la* Fort Sill style. After that one week of artillery-conducted training, the mortar FOs were head and shoulders above their previous level of expertise received from their infantry training. The Infantry has no more business training FOs than the Artillery has training riflemen.

For the transition to be a success, it was essential that all FIST personnel slots be filled — this would be a priority throughout the transition. Since there is always a shortage of officers, particularly lieutenants, it was necessary to operate without an assistant executive officer (AXO). So we did, and quite successfully. The lieutenants were needed as leaders for the three FISTs in each battery. Our batteries have operated for 11 months without AXOs.

After one week of quick-fix training, the FIST FOs were subjected to intensive field training. The training was continued throughout the summer and fall of 1976. By the middle of November, the FIST FOs were more than ready, and eager, to try their skills during a combined arms ARTEP. Only the sergeant FOs could shoot; no lieutenants were to adjust fire during the ARTEP. The results were remarkable. The sergeant FOs called for and adjusted fire with the brass and audacity of veteran FOs.

But the ARTEP would not be the final test, for the late winter would bring the DART (Division Artillery Readiness Test). In preparation, we again took to the field and peppered this field training with a well-known garrison technique — team drill. Team drill allows the FDC to exercise its skills while the FOs exercise their ability to call for and adjust fire. The team drill, in conjunction with intense field training, prepared the FIST personnel for the DART in March. For the DART, as with the combined arms ARTEP, the sergeant FOs fired all the missions. And again we were not disappointed — the FIST FOs could hold their own. The average number of adjustments for 15 separate missions was only 3.3 rounds — statistics speak for themselves.

The FISTS must go to the field whenever their respective infantry companies go to the field. They must become as permanent to their supported infantry companies as the lieutenant FOs once were. Only by



training with its infantry company can a FIST gain the necessary expertise and, more importantly, the respect of the infantry unit. This must be a priority, if FIST is to remain a success.

The FIST concept is not all roses. There are problems — unique problems — but these can be solved. When we received our FIST personnel, most of them were 11C MOS and very infantry oriented. To these men, living with the artillery was bad enough, but becoming an artilleryman was regrettable. They still experience moments of nostalgia, but with the pride of a job well done, these men may even forget their infantry days. Besides training, this was probably our biggest problem.

The FIST has brought about an increased level of training in all personnel involved — from private to lieutenant. In the near future, the FIST system's full potential will be realized — an increased responsiveness and quality of fire support that strengthens the entire combined arms team.

For the present, we have accomplished our mission — FIST is working well!

2LT Luther J. Dunn is a FIST chief with B Battery, 2d Battalion (Airborne), 321st Field Artillery, Fort Bragg, NC.

LCSS FOR THE M109

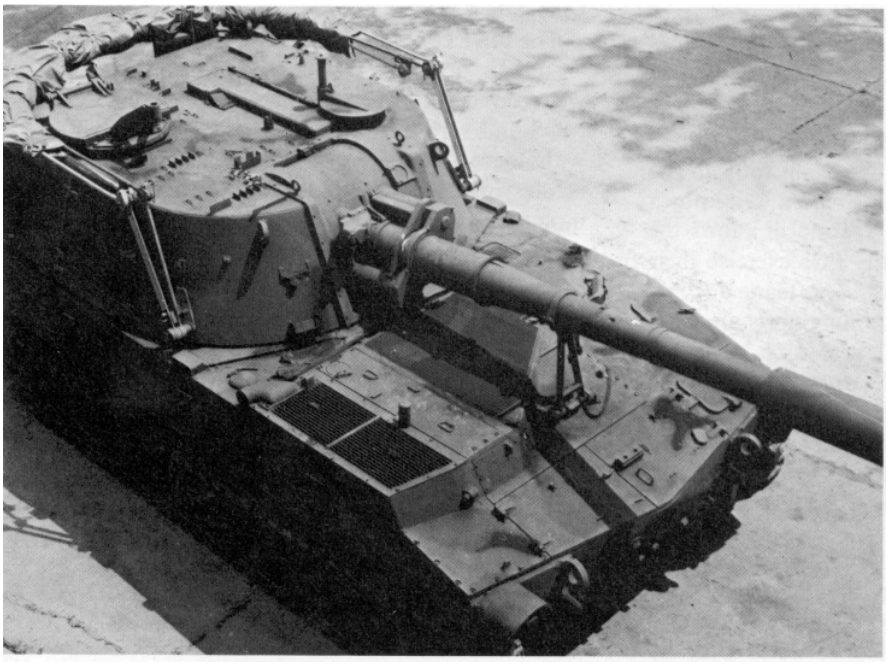
by James L. Parcher

The lightweight camouflage screen system (LCSS) was designed and developed by the US Army Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA. The LCSS was type classified standard in FY73; procurement action was initiated, and initial quantities were fielded in FY75. Late in FY75 a problem surfaced regarding use of the LCSS with the M109 and M109A1 self-propelled howitzers. With the LCSS deployed in the conventional manner, a portion of the camouflage screen was in the back-blast zone created by the muzzle brake. The back-blast is of such terrific force (instantaneous wind velocities in excess of 200 mph) that if the camouflage screen is not removed from the back-blast area, serious damage to the screen results. The screen garnish material is shredded from the net, holes are torn in the netting material and in some cases the screen support elements were broken.

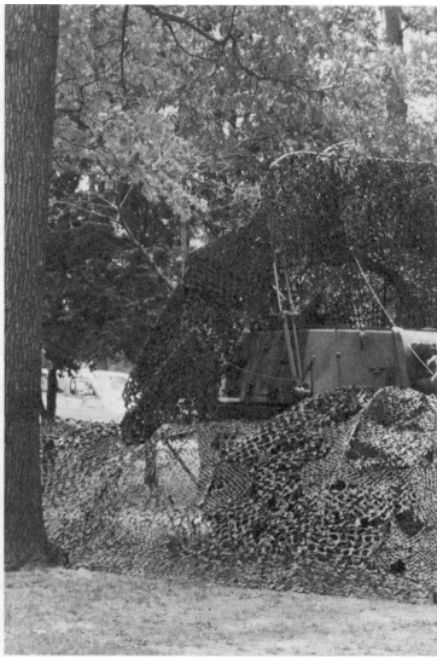
The initial solution to the problem was to strike the screen and remove them from the back-blast zone prior to a fire mission. This approach proved unsatisfactory due to the time required to re-erect the screens and the frequency of fire missions under projected combat conditions. Investigations were made into the feasibility of developing a more durable screen system. It was determined that a screen which would withstand the 155-mm back-blast was not feasible. However, the need for a more durable screen system has been established and efforts are proceeding to develop and field an improved system.

In the meantime the Camouflage and Topographic Laboratory of MERADCOM initiated an in-house effort to develop a camouflage support system specifically for the M109/M109A1 howitzer. A concept was developed which would rapidly remove the camouflage screens from the back-blast zone prior to the fire mission and quickly replace them to conceal the howitzer at the conclusion of the fire mission. This concept consists of two components — a retractable canopy to conceal the turret area, and a stationary structure to conceal the tracked hull. The canopy consists of several iron hoops which pivot about a mount attached to the front of the turret. The standard, hexagon shaped screen is placed over, and secured to, the hoops. The canopy is raised and lowered by manually pulling ropes at the rear and front of the howitzer. The lower portion of the howitzer is concealed by four standard diamond shaped screens placed over a stationary support structure.

In April 1977, two concept models of this type system were provided to the US Army Field Artillery Board



For road march, the canopy is stowed at the rear of the turret. The redesign effort will permit stowage of the barrel disrupter and front and side support structures in this same area.



For firing, the canopy is retracted manually removed from the back-blast zone.

(USAFABD) for evaluation. These tests demonstrated the durability of the system and the ease and speed with which the system can be deployed and stowed for road march. The tests also determined that the camouflage material could be removed quickly from the back-blast zone and the screens replaced to conceal the weapon at the conclusion of the fire mission. As a result of these tests, the Artillery Board and the Artillery School have recommended that this system be adopted for use by self-propelled artillery units. It was also recommended that in addition to the M109A1, the concept should be adapted to the 8-inch M110A1 howitzer and the M548 tracked communication carrier. Engineering efforts are underway at MERADCOM to redesign the system to correct shortcomings identified during the April 1977 tests.

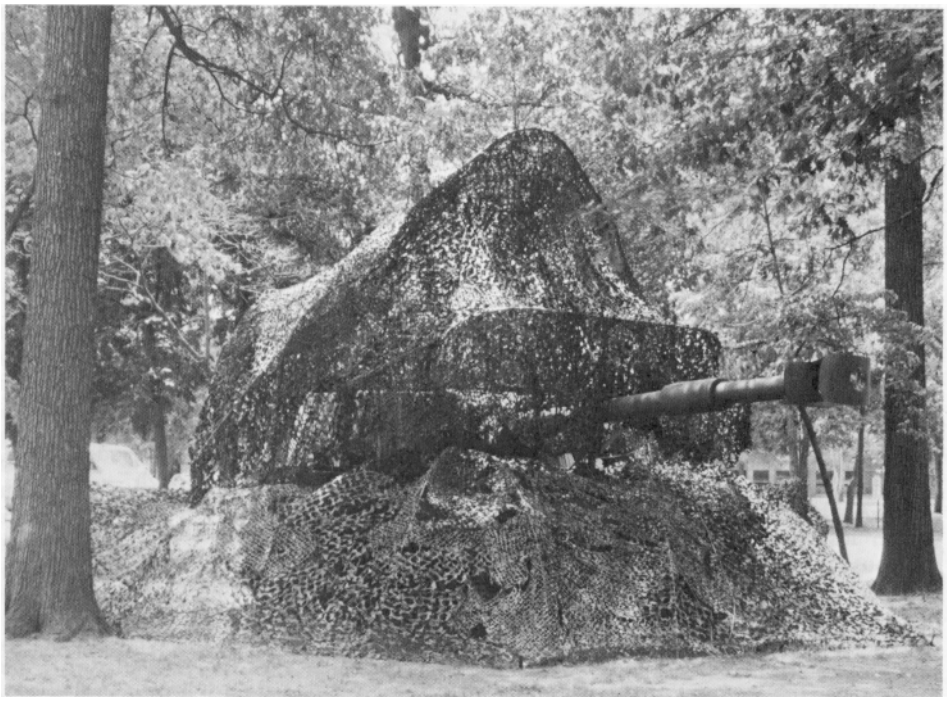
The following are the major features and advantages offered by this approach to camouflaging the highly mobile M109A1:

- The system is designed as a kit to be mounted and carried on the M109A1. It is not necessary to modify the howitzer, and the camouflage is always with the vehicle.
- The April 1977 tests demonstrated that the system can be deployed from its road march configuration in nine minutes (daylight hours) and can be stowed for road march in seven minutes (daylight), 15 minutes (nightime). The MERADCOM redesign effort is expected to reduce these times by at least one-half.
- The canopy can be retracted for firing in 2 to 3 seconds and can be replaced over the turret area in seconds.
- The redesigned system will permit crews to meet the 60-second rapid displacement requirements and take the camouflage with them.
- The turret can rotate a full 360 degrees with the camouflage deployed.
- The system, deployed or stowed, will not interfere with crew duties or howitzer operation.
- The system uses the standard LCSS and by avoiding back-blast damage to the screens, significantly reduces repair and replacement costs.
- The system is extremely durable and will require little or no maintenance.
- The new design will provide protection against enemy surveillance sensors operating in the visual, near-infrared and radar portions of the frequency spectrum.

It is planned to correct those shortcomings identified during the April 1977 tests and accomplish a USAFABD evaluation of the redesigned systems by second quarter FY78. After engineering efforts are completed, prototypes produced, and final testing initiated, procurement action will then be initiated, hopefully by FY79. This special adaptation provides an operationally efficient system to meet the needs of the highly mobile, self-propelled Field Artillery.

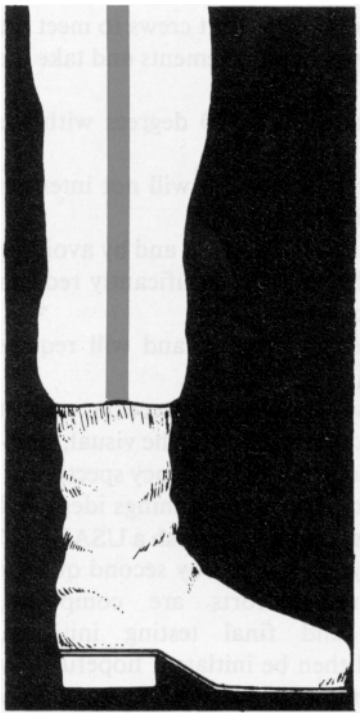
James L. Parcher is a physical scientist at the Camouflage and Topographic Laboratory, US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA.

??hree seconds. Camouflage material is



During deployment, the retractable canopy rotates 360 degrees with the turret. The tracked hull is concealed by a stationary structure. A special disrupter is being developed for the gun tube.

Redleg Review



RISE, AND FIGHT AGAIN, by Charles Bracelen Flood, Dodd, Mead & Company, New York, 1976, 464 pages, $12.95.

This book tells of four catastrophic American military defeats of the Revolution and describes the spirit that overcame such disasters and won the final victory.

Colonel Benedict Arnold's march to Quebec in an effort to cut Canada out of the war was doomed from the start. With only one map, wholely inaccurate, the distance was twice for which the rebels had planned. Ill supplied for the cruel winter, the force made tactical blunders and poor use of intelligence, causing the capture of those not killed in the attack.

One of the greatest losses was at Fort Washington where one-fourth of the field army was lost. This defeat alone almost broke the back and spirit of the American cause. Only by skillful maneuvering was the Army able to regroup when retreating across New Jersey.

The Americans lost 40 ships while the British lost none in a forgotten amphibious fiasco at Penobscot Bay, ME. With no unity of command, there was no cooperation or coordination between the Naval and Army forces. Upon the survivors return to Boston, many were brought to trial for incompetence, including LTC Paul Revere, the commander of the force's artillery.

The surrendering at Charleston, SC, was a manifestation of many problems in the south. Problems of leadership, supply, and health led to the capture or destruction of complete units. Rallied by GEN Nathaniel Greene, the Americans suffered several defeats which conversely served to wear down the Redcoats, paving the way to Yorktown.

The battles were lost, but we won the war. This is an excellent book with many lessons which will hold true today. Highly recommended.

SFC Robert R. Cordell is assigned to the US Army ROTC Unit, Northwestern State University, Alva, OK.

THE GUNS: 1939-45, by Ian V. Hogg, Ballantine, New York, 1976, 160 pages, $2.50 (paperback).

Despite the credentials of the author, *The Guns: 1939-45* leaves much to be desired in the way of a general survey of the artillery of all nations in World War II. This edition has poor coordination between the text and the otherwise excellent photographs and diagrams, and does not measure up to other volumes of Ballantine's paperback military series.

The introductory technical description of artillery is embarassingly amateurish, a fault I am sure of the author's intentions for the book, not of his personal knowledge. His frustrating habit of skimming over some points will probably only confuse the lay reader. His basic plan is simple enough — to take each general category of weapons in turn. He makes a fair attempt to be internationally-minded by including the British, Americans, Germans, Russians and Japanese in almost every category.

Once he plunges into a chapter, his writing becomes cramped and chatty. There are tidbits of useful information here and there: An explanation of the numbering system for Japanese artillery models, a good discussion of the development of armor-piercing ammunition and a useful data table on 118 guns. But these rewards are meager for such a highly touted book.

There are several shortcomings which weaken this work. First, Hogg makes no attempt to relate artillery to the tactics of the war. He is correct in pointing out that most nations fought with an astonishing variety of weapons, but is it enough simply to state this, almost without comment? Was not Patton's use of artillery in August-September of 1944 vastly different from Haig's in July of 1916? What of the Wehrmacht problems in matching horse-drawn artillery with mechanized divisions, or the impact of the shell shortage on the German defense of Stalingrad? Do not look in this book for any light on questions such as these.

Second, I believe the author understated the importance of a national perspective when examining weapons systems. US artillery weapons had more in common with each other and could be more intelligibly studied together than with weapons from similar nations. Perhaps in this light the research, development and production strategies each nation pursued would not appear as chaotic as Hogg describes it.

Finally, I believe the author has failed to organize his material properly — or to put the complex story of guns into perspective. The end result is that the average reader will put this book down with his head buzzing with anecdotes and calibers, but with no clear conception of the relative importance of the different types of guns. Perhaps the fault is the breadth of the subject matter and the requisite brevity of the book, but *The Guns: 1939-45* has many flaws and covers a subject which has been better covered before.

1LT James C. McNaughton, FA, is Assistant Executive Officer, C Battery, 2d Battalion, 83d Field Artillery.

THE BUFFALO WAR, by James L. Haley, Doubleday & Company, Inc., Garden City, New York, 1976, 221 pages, $7.95.

In his history of Fort Sill, COL W. S. Nye cited personal glory and the desire to avenge relatives killed by the enemy as the primary motives for the 1874 uprising by the Southern Plains Indian tribes. This is disputed by James Haley who pinpoints the primary reason for the uprising was the accelerating slaughter of the buffalo that were the Indians' primary source of food, shelter, and clothing. This was aggravated by inefficiency and corruption in the provision of food promised the Indians by the government and by suspicion and distrust on both sides.

The Medicine Lodge Treaty of 1867 provided for the Kiowa, Commanche, Cheyenne, and Arapaho tribes to live on reservations that would be established for their exclusive use in the western part of the Indian Territory. As partial compensation for agreeing to live on the reservations, the Indians were granted hunting rights in Kansas on all lands south of the Arkansas River.

In his account of the aftermath of the treaty, Mr. Haley describes how the rapid encroachment of professional buffalo hunters into the Indian reservations, southern Kansas, and the Texas panhandle were essentially ignored by the Army commanders responsible for enforcing the treaty. Many Indians believed that they were faced with a choice of eventual starvation or a fight to the death.

The author has painstakingly reconstructed the details of a war that involved four major tribes; Army expeditions from forts in Oklahoma, Texas, New Mexico, and Kansas; and more than a dozen battles spread over 60,000 square miles. Despite the scarcity of maps, the book relates the details and overall aspects of the uprising quite clearly.

Mr. Haley describes the effects of the terrain and climate on the various battles. Anyone who has soldiered at Fort Sill will have no difficulty relating to the agony of Army scouts pinned down in a buffalo wallow without water or shade and will appreciate the account of thunderstorms that came so close together that no one ever dried out. The storms were the dominant feature in a running skirmish the Kiowas called the "Wrinkled Hand Chase."

The callousness of many whites is evident in the book but so are the sufferings of those killed and captured by the Indians. The Indians, soldiers, settlers, and even the buffalo hunters, whose depredations contributed so much to the uprising, are generally treated with compassion and understanding, especially in descriptions of individuals.

The involvement of Fort Sill's garrison and the Indians on the nearby reservation make this an especially interesting book for those who have lived in the region. Serious historians will find the author's notes particularly worthwhile.

The most notable feature of this book is its treatment of the Buffalo War's participants, not as villains and heroes but as men and women who, caught up in events over which most had no control, responded as best they could.

LT Robert R. Edwards, FA, is assigned to Headquarters, 3d Support Command (Corps), Frankfurt, Germany.

INFANTRY WEAPONS OF THE WORLD, by Christopher F. Foss and T. J. Gander, Charles Scribner's and Sons, 1977, 141 pages, $7.95.

Infantry Weapons of the World, by Christopher F. Foss and T. J. Gander, is one of nine military equipment books introduced by Schribner's and Sons.

The book does not contain comprehensive data and disassembly instructions on the world's Infantry weapons, but it does contain an up-to-date comprehensive survey, with photographs, of the Infantry weapons currently in use by most countries in the world, including such weapons as the Israeli *Galil* assault rifle, the US *American 180* automatic rifle, and the Soviet PK machinegun. Even a few Western experimental weapons, such as the Hughes 5.56-mm Lockless Light Machinegun and the Sterling AR-18BP, are covered. With few exceptions, all weapons have accompanying good-quality photographs.

Infantry Weapons appropriately includes light recoilless rifles and rocket launchers, but the equally appropriate light antitank guided missiles have been excluded.

Mortars, rocket launchers, and recoilless rifles are discussed, but the book lacks some basic information, especially ammunition characteristics; i.e., bursting radii and maximum armor penetration. Metric weights and measurements are used for all weapons.

When unfairly compared to expensive Infantry arms books, this book cannot stand up. But, for its low price, it is a very reasonable buy for the artilleryman interested in weapons familiarization rather than detailed analysis.

1LT John L. Plaster is Public Affairs Officer for the Minnesota Army National Guard.

THE U.S. MARINE CORPS STORY, by J. Robert Moskin, McGraw-Hill Book Company, New York, 1977, 1,039 pages. Maps, photos, appendices, and index, $29.95.

Billed by the publishers as the first "independent" history of the Corps, this massive work records the deeds, and many of the names, of Marines from the Corps' birthplace at Tun Tavern, Philadelphia in 1775 through Vietnam and the *raisons d'etre* for the Corps in 1975.

The author, who spent a good part of 15 years in the preparation and writing of the history, was not a Marine himself and the work is the first major one of its kind not written by a Marine.

While the Marine Corps story is about those battles fought by Marines from the revolution onward, the author notes that it mirrors the "entire violent sweep of American history. It is also the story of what America is really like: how it has thrust its power outward around the globe — spearheaded repeatedly by United States Marines."

The atmosphere of battle is captured in much of Moskin's text through the use of direct quotes from the participants. For example, during the First Marine Division's Pyrrhic assault on Peleliu in September 1944, "One sergeant, trying to rally his exhausted remnant, said, 'Let's get killed on that high ground there. It ain't good to get it down here.' The men went."

Those who have served in the Corps will doubtless appreciate this work more than others. However, the story explains the Corps' relationships with its sister services throughout the more than two centuries of its existence as well as the politics and policies involved in its evolution and survival. For this reason, anyone interested in military history, or simply American history, will find the book valuable. — Asst. Ed.

☆ US GOVERNMENT PRINTING OFFICE: 1978 — 771 — 103/1