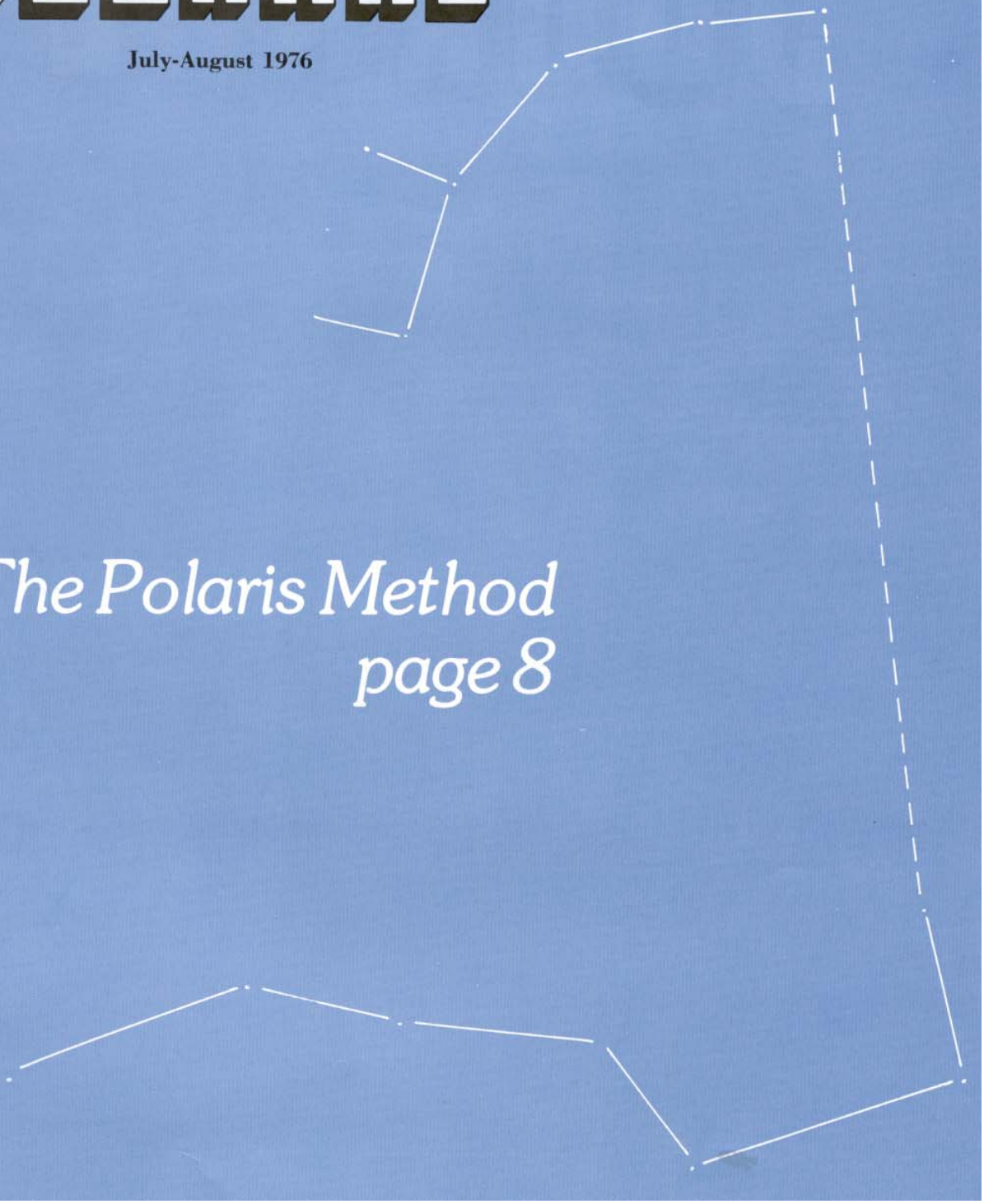
FIELD ARTILLERY JOURNAL

July-August 1976



The Polaris Method

page 8

FIELD ARTILLERY JOURNAL

Volume 44 **July-August 1976** **Number 4**

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:

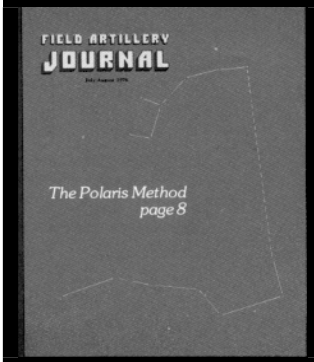
> ***"To publish a Journal for disseminating professional knowledge and furnishing information as to the field artillery's progress, development, and best use in campaign; to cultivate, with the other arms, a common understanding of the powers and limitations of each; to foster a feeling of interdependence 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 will 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 Historical Association, Fort Sill, OK 73503. The rate remains $6 per year.



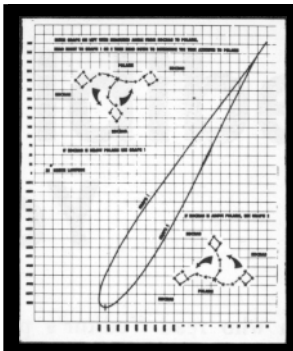
The front cover highlights the Polaris method of obtaining directional control for position area. The back cover photo, by SP5 James Oskam, salutes this issue's two Lance articles.

PRINTER
Impress Graphics, Inc.
Oklahoma City, OK

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

Articles

Features



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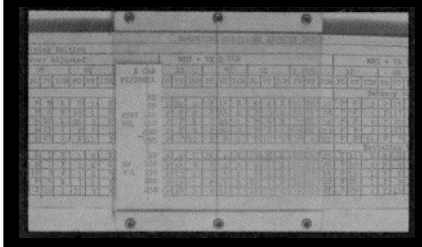

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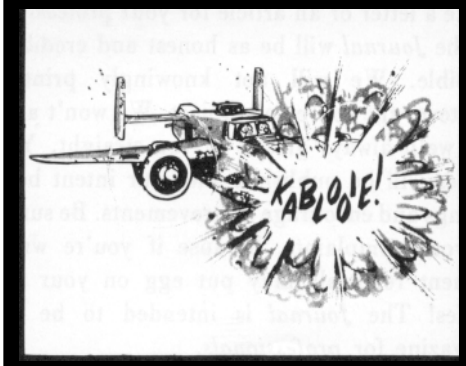

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Credibility - - Honesty
Your Journal

For those of you who read "editor's pages," let me outline policies for *Journal* operation under my editorship.

First, this is **your** *Journal* — published for *you* and, hopefully, written by *you.* Its content will be of interest and value in expanding your knowledge of the many facets of field artillery and its essential relationship to our fellow combat arms.

We are not an official voice of the School and have been directly ordered by the Commandant and Assistant Commandant to stay that way. A simple fact of life is that the *Journal* is physically located at Fort Sill and since Fort Sill is the place most FA doctrine and materiel originate, it is a prime source of pertinent information. We allocate space ("Forward Observations" and "View From The Blockhouse") for School material and clearly identify the material as such.

Ideally, the remainder of the material for publication would come from the field. Alas, this is not the case! Our readers are apparently not writers, or think they are not. When there are 64 pages to fill and the material is not forthcoming from the field, we naturally look to local experts for articles. Before you criticize the *Journal* for the amount of Sill-originated copy, ask yourself when you last wrote a letter or an article for your professional magazine.

The *Journal* will be as honest and credible as humanly possible. We will not knowingly print propaganda, whatever the source or subject. We won't always be right, but we'll always give it to you straight. Your legitimate gripes will be published with our intent being to correct wrongs and encourage improvements. Be sure you are right in your complaints, because if you're wrong, the subsequent rebuttals may put egg on your face in 17,000 copies! The *Journal* is intended to be a *professional* magazine for *professionals.*

A couple of random comments:

1) This is my first tour at Sill in 10 years and I am truly amazed at the spirit, candor and open-mindedness of the top echelon here. Believe me, people here are anxious to hear any and all views, and the old, parochial view of "field artillery first" has been subordinated to "what's best for the combined arms team to win the battle."

2) I want to continue to publish material of interest to our Reserve Component partners. They are of great importance to our nation's defense and deserving of quality support.

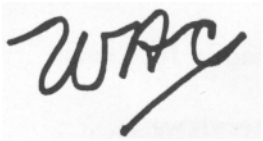
3) Also, I would like to publish material for and by NCOs and EM, but we don't get material from them. Who knows more about the real inner workings of the firing battery, ammo-handling, vehicle/radio operation, maintenance, etc., than they. I encourage them to write.

4) The readership surveys, inserted in the May-June issue, are arriving and there are a few comments I want to make about the early returns. (We read and react to them, so try to find one and send it in.) There is some reader criticism that *Journal* articles are too frequently authored by senior officers. I touched briefly on this earlier, but we can only print what we receive. "But," you say, "I only finished the ninth grade. I can't write." I say "Bull!" Write on! Give us the *meat*, your good ideas — we'll correct the spelling and punctuation.

5) One thing has been made very clear to me since I arrived. Training is being decentralized. Fewer and fewer of you will be coming to Sill. Unit training is the new #1 priority and will be for several years. A lot of money and time are going into this effort. Recent issues of the *Journal* have discussed unit training and we will continue to publicize this vital subject. Send us your successful innovations so we can spread the word — and give you credit!

6) As a last note, there is a great debt owed by all field artillerymen to MAJ Al Word, my predecessor. He has moved on to FORSCOM to be on General Roger's staff, but he brought the *Journal* to life, nurtured it and turned over to me a thriving, respected journal. Thank you, Al.

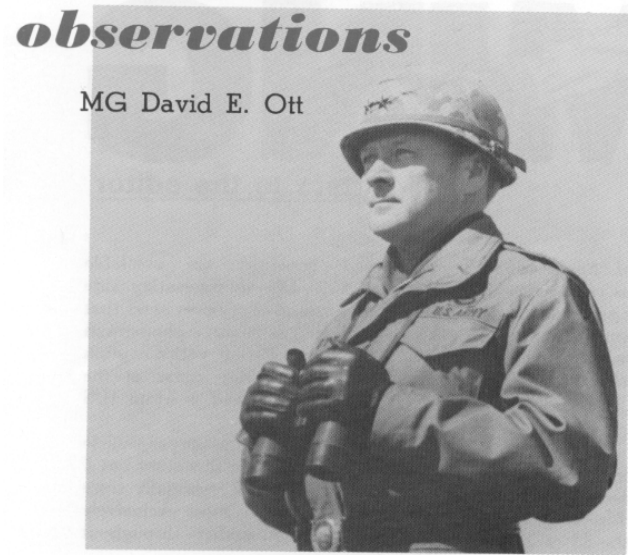
I'm glad to be here. I look forward to the challenge of challenging you with the *Journal.* Write, call or drop by. We're interested in what you have to say.



WILLIAM A. CAUTHEN JR.
MAJ, FA
Editor, *FA Journal*

forward observations

MG David E. Ott



The Department of the Army has approved our Counterfire doctrine and orders have been published for activation of target acquisition batteries in every division artillery. So the biggest change in artillery doctrine in 30 years is well underway. With this and the many other changes over the past couple of years, the need for high quality training has never been greater. Thus, training is my focus in this edition's column.

We are making every effort in the Army today to train as we will fight. Within our own system we have need to insure that the new doctrine, tactics and techniques are well understood and practiced by all. In the past couple of years, training circulars (TCs) provided the base for this training. We are now bringing these TCs together into field manuals (FMs) that will show a total picture of the field artillery as part of the combined arms team. These FMs should help you a lot because they not only include the new doctrine, but also some suggestions on how to train as well.

FM 6-40-5, *Modern Battlefield Gunnery Techniques*, will be distributed in August/September of this year. It brings all the latest gunnery techniques together under a single cover. Later, as TACFIRE is introduced, FM 6-40-5 and our old standby, FM 6-40, will be revised and melded into a single manual.

FM 6-50, *Field Artillery Cannon Batteries*, also to be published in August/September 1976, is most significant because it provides a one-step reference for cannon battery tactics and operational techniques. We feel it is so critical that all cannon battery officers and NCOs know and understand the material in FM 6-50, that arrangements have been made with DA to have the manual printed in sufficient copies for each firing battery to have 12. (Each unit, however, will receive through pinpoint distribution only the number of copies listed in blocks 44 and 72 of its current DA Form 12-11A. Units will have to request additional copies using DA Form 17 after they receive their initial distribution. This would be a good time to get out AR 310-2 and DA Pam 310-10 and update your pinpoint accounts.)

Your continued efforts to insure quality section and unit training will help us move toward the high state of readiness our smaller army must have. But I still notice one major area that needs the attention of field artillerymen everywhere — that is the need to introduce better combined arms training, more field artillery integration and utilization during maneuver forces training. We have got to put the combined arms team together better in training so that it will stay together in combat.

From a doctrinal literature viewpoint, our new FM 6-20, *Fire Support for Combined Arms Operations*, is designed to push a combined arms view throughout. It will be published before the first of the year as the field artillery's basic "How to Fight Manual," and is the capstone for our operations on the battlefield. This manual is written for maneuver leaders as well as field artillerymen, and I encourage you to get it into the hands of your maneuver associates.

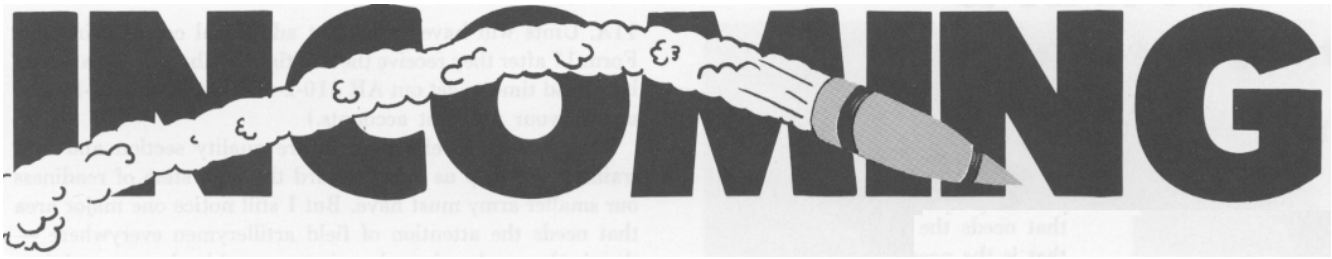
However, good words and good books won't get the job done by themselves. We need to drive toward a true combined arms training environment at every opportunity. Some of our outfits are stationed where this is relatively easy and have worked out excellent programs.

They have found some of the answers to the numerous challenges of conducting combined training: scheduling to bring maneuver and field artillery units together in the same training areas; adapting training to fit available areas; designing safe, yet realistic live fire training, to name just a few. Some even make extensive use of simulators and training devices — here at Fort Sill we use radio controlled demolitions to simulate large amounts of artillery fire. From those of you who have solved a lot of these problems, we need ideas and suggestions that can be exported to units less fortunate in training areas.

Another ongoing effort is the development of a truly combined arms ARTEP that will join maneuver forces with field artillery in training and evaluation as a complete team. The problems in working this out are so difficult that I see no quick solution. On the other hand, if we don't get it into a formal training program such as the ARTEP, we will have difficulty in getting it into training everywhere.

So this continues to be one of our high priorities. Unless maneuver arms train regularly with their field artillery counterparts, they will not think in terms of fire support and thereby will not be training as they must fight. The challenge is up to the artilleryman to make certain that the maneuver elements he works with train with him, think of him and use him. Please send us ideas that can be exported worldwide.

I would like to express thanks for field artillerymen everywhere to MAJ Alan A. Word who is the key man in the republication of the *Field Artillery Journal.* He "pulled it all together" and set a standard of excellence of which we can all be proud. Thank you, Al, for a job superbly done, and best wishes in all your future endeavors.



letters to the editor

Missile Info Void

I have just completed a review of USAFAS letter, "Implementation of Revised Field Artillery Doctrine in Training," dated 14 October 1975. Having been assigned to missile units for several years, one fact leaped out of this letter — of all the information being sent to the field from USAFAS, only one directly related missile document (the Lance ARTEP) had been scheduled for publication. The article on page 28 of the September-October 1975 *FA Journal* also reflects the same general trend of providing absolute minimum guidance to the field artillery missileman.

This apparent lack of interest on the part of USAFAS in missile systems, whether intentional or accidental, manifests itself into a growing split between the cannon artilleryman and the missile artilleryman similar to that experienced during the period when the Field Artillery and Air Defense Artillery were combined into one branch.

There continues to be a serious void in missile tactics and doctrine. This void is demonstrated every time key unit personnel, who have the "institutional memory," rotate. With approximately 10,000 field artillerymen assigned to Pershing, Sergeant and Lance units, this lack of current doctrine and tactics is a serious omission. From my observations the situation can only be remedied if USAFAS will take a positive attitude toward field artillery missile systems; not passive disinterest. Missile systems must not become the forgotten stepsons of the Field Artillery but integrated into the modern battlefield as equal, productive members of the fire support team.

Alan L. Moore Jr.
MAJ, FA
Operations Officer
1st Bn (Lance), 12th FA
Fort Sill, OK

*Contents of the **Journal** should not be construed in any way as representative of School interest in any particular field. **Journal** content is determined, to a large degree, by material received. However, note missile articles in this issue. —Ed.*

Army Radar?

The *FA Journal* article concerning the Battle of Khe Sanh [March-April 1976] was most interesting. However, since I was "on-the-scene" as the S3 of 1-40th FA, I believe that I should bring to your attention a significant omission in the article.

As the battle was developing, the 3d Marine Division's 12th Regiment tasked the US Army's 1-40th FA to sling-lift one of its six attached countermortar radar detachments from the C-1 fire support base south of Gio Linh; the order, which I received, was to ". . . get that radar to Khe Sanh ASAP." Using various expedients, since we had never airmobiled a Q-4 before, the radar detachment departed C-1 within a few hours of receipt of the order.

The detachment (I think the 251st) acquired its first targets about *three hours* after hitting the ground at the Khe Sanh Combat Base (KSCB). As the tempo of enemy attacks increased, the detachment had to routinely use the polar-plot technique to pass targets to the USMC FADAC operators in order to save the "compute time" and thus permit them to acquire the next of the many available targets.

The Marines' opinion of the efficacy of this radar operation was clearly demonstrated by the Marines' demand that the FA detachment be retained as one of the final elements to be extracted when the KSCB was closed during the summer of 1968.

The details of this narrative (numerical designation of units, dates, times, etc.) are contained in the 1-40th FA "Operational Report Lessons Learned" (ORLL) for the period; these reports were at ACSFOR, DA, in late 1971 and hopefully are available elsewhere now. As an interesting side note, I understand (but never saw) that *Leatherneck* magazine ran a photograph during the spring of 1968, with a caption citing the US Marines' radar at the KSCB — the radar had a white (US Army) star on it.

I am not sure what the proper vehicle would be to pass along this story but I think it should be told, especially since the detachment was almost exclusively manned by enlisted soldiers throughout the action . . . .

James E. Thomas
LTC, FA
FA Coordinator
Readiness Region V
Fort Sheridan, IL

*The **Journal** staff contacted the **Leatherneck** staff, which refused to confirm the photo of an Army radar. — Ed.*

Research Arty

I would like to see the Historical Society of the Field Artillery Museum form a group on the history of artillery. Each member of the group would be assigned a period of history to research. In some cases, like the Civil War, battles alone would constitute a subject. When all subjects were covered, then get some established writer like Fairfax Downey to publish a book. One great effort would be the assembly of pictures of guns used in the various wars. For Fort Sill, it appears to be an appropriate research problem.

COL(Ret)
Robert M. Stegmaier
Sun City, AZ

Your letter has been forwarded to the Director of the Field Artillery Historical Association. (Colonel Stegmaier is author of the serial "Winning The West," see page 51.) —Ed.

Hostile Training Environment

The training environment is hostile! Of that there can be little doubt ("Trainers, Rise Up!" January-February 1976 *Journal*). Military leadership is defined as the process of influencing men in such a manner as to accomplish the mission. How better to influence men than through the proper application of the principles of training management to upgrade the quality of training and, thus, the ability of those men to accomplish the mission. This application is difficult and requires ingenuity to overcome the hostile training environment in the most effective manner. The problem exists in both the Active Army and Reserve Components.

One solution to the problem is the conduct of unit schools. These schools can be conducted at any level from battalion through division artillery and at any training level from basic through advanced subjects. This . . . is a discussion of the application of this technique by the 257th Field Artillery Group, Wisconsin Army National Guard. Recognizing the training weaknesses of its subordinate battalions and batteries in fire direction and survey operations, the unit requested assistance from the FA Team of the Readiness Group, USA Readiness Region V, in solving the problems.

Several meetings were held between Readiness Group personnel and members of the unit to develop the program of instruction (POI), locate the instructor assets and prepare the instructional materials. A POI was developed using the Army Training and Evaluation Program (ARTEP) tasks, together with the FA Training Support Catalog from Fort Sill. The instructors were carefully selected based on background and present duty positions, as well as related civilian work experience. An instructor committee was developed for each school (FDC and Survey). Each committee consisted of four to six Reserve Component instructors and one Readiness Group instructor. The instructional materials were selected and ordered from Fort Sill or through the local TASO as appropriate by the reserve unit operations and training officer. These materials included instructor and student packets, training films, TV tapes and the appropriate equipment to show the materials. The two battalion learning centers with the Besler Cue/See assets were also planned as resources.

The current doctrine on training management as contained in FM 21-6, TC 21-5-1 and TC 21-5-2 was applied to the development of POIs for the two unit schools discussed . . . Based on this doctrine, the POI was developed from section-level-2 tasks in the ARTEP, as this was felt most appropriate. The comments contained in the units' annual evaluation reports were considered, in the POI development. Based on the doctrine in FM 21-6 and TC 21-5-2, maximum emphasis was to be placed on performance-oriented instruction.

The instructional committees were organized to rotate the responsibility as primary instructor, while the rest of the committee acted as assistant instructors. The Readiness Group instructors' functions were to act as resources at all classes and to teach selected new or advanced subject material.

To insure uninterrupted MOS training, it was decided that the classes should be held as two four-hour unit training assemblies each month per unit school. The students then received equivalent training credit for a multiple unit training assembly-2 (MUTA-2) from the monthly MUTA-4 that the unit conducted.

Upon receipt of the instructional material, several additional meetings were held to discuss methods of presentation and rehearsals and to allow the instructors time to obtain assistance from the Readiness Group instructors. This also provided time for the NG instructors to learn to operate the new instructional aids such as the Sony Rover TV playback unit and the Besler Cue/See.

Some of the lessons learned from these unit school experiences should prove valuable to other units and personnel:

- Reserve Component instructors can present good prefessional instruction when given sufficient instructional material, planning guidance and preparation time.
- The part-time soldier instructors presented the bulk of the instruction, but all mentioned that the presence of an Active Army officer from the Readiness Group gave them additional confidence and had a positive effect on the quality of their instruction.
- Since this was the first substantial use made of the ARTEP for training by either Readiness Group or unit personnel, some difficulties were experienced in management of time for accomplishing specific training objectives. Training under performance objective criteria must be *performance* driven, not time driven, yet time must be considered.
- In a few cases, students found it difficult to get to the evening classes on time because of work and travel schedules. They agree, however, that the uninterrupted training was worth the inconvenience.
- TV tapes proved to be much superior to 16-mm training films as today's soldier grows up in a TV-oriented world and is much more attentive to TV than films.
- Both Active Army and NG instructors found that selected subjects which, because of time, money or other resources, did not lend themselves to performance-oriented instruction.
- In survey operations there is a definite need for instructor manuscripts from Fort Sill to conduct training on astronomic observation. If we continue to stress the importance of accurate direction for our weapons, then we must provide the supporting instructional materials to train the Reserve Component on this aspect of survey operations.
- In survey operations great difficulty is often experienced in obtaining military grid reference starting control. This problem is peculiar to the Reserve Component unit training in an area away from any military complex. Federal, state and local highway departments or engineer elements can often provide geographic coordinate data which must then be converted. The Counterfire Department of USAFAS was particularly helpful in this respect.
- While the survey school training was completed with a final field exercise, the FDC school training was not. Hindsight points out the possibility of conducting a final field exercise for the FDC school using the M31 Trainer. This was not incorporated into the original planning because of the lack of an M31 range.
- These unit schools provided an excellent chance to improve individual MOS qualification, as well as section level survey and FDC activities. They also provided an opportunity for close cooperation between the Active Army and

Incoming

Reserve Component forces, allowing each to learn extensively about the other. The close working relationships developed between the members of the instructional committees were outstanding and continue to this day.

In summary, while the unit school improperly used (i.e., required quota fill, nonmission-essential subjects, etc.) can be a savage beast and do much to contribute to the hostile environment, it can also provide a vehicle to tame that same hostile savage beast. Through the proper use of unit schools, together with instructor committees, a unit can make the most effective use of available time and instructional expertise within the unit to upgrade the ability of the unit to accomplish its mission.

Peter T. Zielenski
MAJ, FA
FA Branch Advisor,
ARRV
Fort Sheridan, IL

The January-February 1976 *Journal* carried an article entitled "Trainers, Rise Up" contributed by CPT Lee Baxter, which presents in fairly good detail some of the conceived detractors to unit readiness training. It is a bit misleading, however, to say that on-duty education is a narrow-based program. In FY 75, 39 percent of the total recruits did not possess high school level educations (hardly a narrow base); they were guaranteed by their recruiters the opportunity to obtain a diploma. AR 621-5 states that this opportunity will be extended on duty time. In view of this, the question of whether we have "assumed" the obligation to educate the soldier or are "tasked" with the obligation becomes history.

It is agreed that something important is missing when the proper atmosphere for effective training is absent. I saw this manifested many times as a director of education in USAREUR. Additionally, when recruits continually were denied the education they were guaranteed, something equally important came up missing — reenlistments!

William G. Malan Jr.
Education Specialist
Directorate of
Course Development
USAFAS

Artillery Commander?

I commend you on your fine magazine and want you to know how much I look forward to each issue. The articles are interesting and help me to keep ties with the Corps which otherwise might be difficult to maintain.

It was with a great deal of pride that I recently took command of Fort Monroe, VA. For many years it was the home of the Artillery School before it departed for the West, leaving behind the Coast Artillery School.

In regard to that last point, I wonder if two cannons, Model 1841, 12-pounder field guns (ceremonial unit), two 77-mm pack howitzers (reveille and retreat) and one 4-piece, 105-mm howitzer salute battery under my command might qualify me as an artillery commander? On second thought, I guess it probably wouldn't. But, they are nice to have around and whenever I feel nostalgic, I can at least go out and touch them!

B. M. Hayward
COL, FA
Commanding
Fort Monroe, VA

Old And New

With all of today's fuss about the "modern battlefield," the ominous threat and the many "buzzwords" flowing from the pens of military authors and mouths of new tacticians, I recently decided it was time to take one step backward and look at "this moving train" whose purpose is alleged to be "getting up for the first battle." I reflected on:

- Where has the FA been?
- Where is it now?
- Where is it going?

Recognizing that some new concepts *are* needed and that new weapons and capabilities often "drive" the FA's direction, I found that many of the "old" ideas are still (and will continue to be) productive. One in particular came to mind — the four FA standard tactical missions.

The FA is one of the few branches in the Army wherein a *ground-gaining* commander with organic or attached FA can assign one of these tactical missions (direct support, general support, reinforcing or general support reinforcing) and the receiving *FA* commander immediately inherits seven areas of responsibilities *without* further command guidance. His mission answers the following questions for him:

- To whom do we give priority fires?
- Who displaces the unit?
- Who plans the fires?
- Who gets FOs?
- Who gets liaison (or FSOs)?
- What is my general zone of fire?
- With whom must I establish communications?

While changes for the modern battlefield may be needed and should be implemented if they produce visible improvements, change for the sake of change should not be tolerated. Let's look at the "old scene" and the "new scene" and use the best of both worlds. *Fire-for-effect.*

Charles W. Montgomery
LTC(Ret), FA
Lawton, OK

How — Not Why

I have watched the series of articles appearing in the *Journal* during the past two years with interest. They have been most informative and I have used them in designing battalion ATTs while a div arty S3. But, the articles continue to show a continuing interest in only three areas: history, ongoing weapons development and technical fire direction.

The name of the game is the first day of the next war. I would sincerely like to see a series of articles dealing with practical fire support techniques based on the European scenario. The emphasis should be on the *how to* rather than the *why* we do it this way. The articles could address a range of subjects: How to counter the fire assault; how to provide fire support to fast-moving reserve elements countering breakthrough operations in a brigade area; how to position to support an overextended brigade; how to provide fire suppression on fast-moving air defense elements; and, how to attack high density tank and APC columns. These are only a few but should indicate the importance attached to fire support of maneuver forces operating at a disadvantage.

I would hope that the above subjects might spark the interest of both the Artillery School and operational units.

Brian R. McEnany
MAJ, FA
Office of the
Joint Chiefs of Staff
Washington, DC

ABCA Method

I request your assistance in responding to an official request from the Spanish Army for information concerning the ABCA method of correction of fires. The Spanish Army Artillery Academy has noted that the above method is the result of a new agreement among Australia, Great Britain, Canada and the US. Any references, information or contacts concerning this new method or change in the adjustment of artillery would be greatly appreciated.

Robert E. Brown Jr.
MAJ, ADA
JUSMG-MAAG (ASO)
APO New York

Your request has been forwarded to the Gunnery Department and you should be receiving the information. —Ed.

MRLs For Flak Suppression

In Army circles, a mild controversy has long existed as to whether the US Artillery should acquire multiple rocket launchers (MRLs) similar to those used by the Soviets since the early 1940s. As I understand it, arillerymen have generally been against the idea, citing a lack of accuracy. The Soviets love MRLs. They consider them plenty accurate for their purpose — mass fires against area targets, which supports the basic principles of mass and surprise.

I think the Soviets have a point. Compared to cannon artillery, MRLs are cheap, light, mobile and require few personnel. A one-battery salvo of six 40-tube launchers equals 13 cannon *battalions* firing one round. [This could be] very handy, especially when cannons and Tac Air are otherwise engaged or are restrained by enemy defenses.

Views may be changing. Views may be changing. Japan and Germany (FRG) have new MRLs, and in 1973 Israel used some of her previously captured 140-mm booty. Reportedly, the Israelis are producing their own replacement rocket ammunition, modified for better accuracy than the Soviet variety. The *Field Artillery Journal* has also recently published a couple of MRL advocate articles.

I think MRLs might be very useful to suppress heavy air defenses such as the Israeli Air Force encountered in 1973. That war caused general recognition that artillery will have to play a major role in flak suppression in future conflicts. There are two problems, however, with depending on cannon artillery for this mission. First — effective simuiltaneous fires on sizable areas would require a massive number of guns. Second — firing the guns would expose battery positions to the enemy's increasingly sophisticated target detection units and draw counterbattery fire. Some batteries would have to pack up and move, resulting in a temporary decrease in available assets. At times, these considerations would tend to make ground commanders justifiably reluctant to commit artillery to flak suppression. By contrast, MRLs require considerable time to reload so, after firing, they might just as well drive off to a prestocked, presurveyed, alternate firing position and load there. MRLs could very greatly increase saturation fire capabilities of the artillery and simultaneously increase security for their guns.

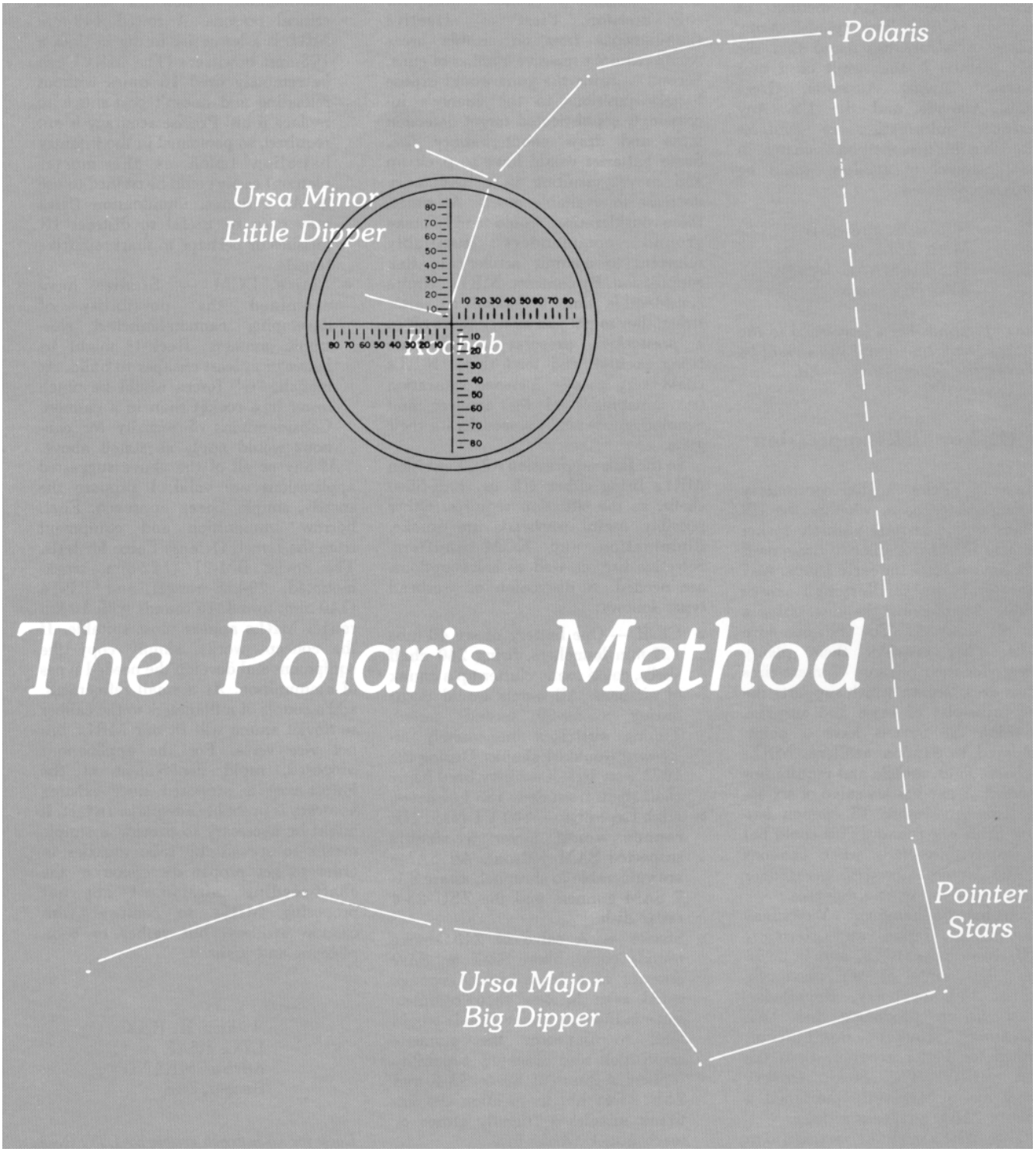
In the flak suppression role, I envision MRLs firing either HE or chaff-filled shells, as the situation requires. Other possibly useful warheads are smoke, illumination and ECM emitters. Selective fire, as well as salvo options, are needed. A discussion of warhead types follows:

- Chaff — One battery of six 40-tube 122-mm launchers, firing 240 chaff shells, could really clutter up a chunk of airspace. All bursts would occur during a 10-20 second period. Timing airstrikes immediately afterward would be simple. During the 1973 war, Israeli artillery fired many chaff shells from their 155 howitzers.
- High Explosive — 240 VT-fused HE rounds would cover a sizable suspected SAM hideout. All SAMs are vulnerable to shrapnel, as are SA-7 SAM gunners and the ZSU 23-4 radar dish.
- Smoke — A salvo of 240 smoke rounds could blind SA-7 or SA-9 gunners in a large area. Coverage could even be less than complete since individual smoke clouds would tend to interrupt the gunner's acquisition and tracking capability (optical section) of SA-6, SA-8 and ZSU 23-4; not to mention the antitank missiles a friendly armor or mech attack would face.
- Illumination — Because of improving Soviet target acquisition capabilities, our artillery units in Europe would often have to displace after firing. It might therefore be a hard decision whether to fire an illumination mission for less than critical reasons. A towed 140-mm MRL is a lot easier to dig in than a 105-mm howitzer. [The MRL] can be remotely fired 16 times without reloading and doesn't cost much to replace if hit. Precise accuracy is not required, so personnel in the infantry battalion (such as the mortar platoon) easily could be trained to use it. As a bonus, illumination flares may even be useful to distract IR missiles or perhaps to mark airstrike targets.
- Active ECM — Studies have examined the possibility of developing cannon-launched electronic jammers. Rockets might be better or at least cheaper to build. At launch, "G" forces would be much lower in a rocket than in a cannon. Considerations of security for cannons would apply as stated above.

If any or all of the above suggested applications are valid, I propose the speedy, simple, cheap approach. First, borrow ammunition and equipment from the Israeli Defense Force for tests. The Soviet BM-21 (122-mm, truck-mounted, 20-km range) and RP-14 (140-mm, towed, 16 rounds with 10-km range) MRLs appear most suitable. If the concept works, simply copy the equipment and develop the needed types of ammunition. As a small refinement, add a couple of millimeters to the caliber so Soviet ammo will fit our MRLs but not vice versa. For the applications proposed, rapid deployment at the lowest cost is proposed since existing accuracy is probably adequate. In fact, it might be necessary to provide a simple means to spread the tube muzzles in order to get proper dispersion in the chaff-seeding mission. I am not proposing MRLs to compete with cannon artillery, but rather to complement and assist it.

William H. Rees
LTC, USAF
Advisor MEANG
Bangor, ME

Look for an indepth article by LTC Rees on MRLs in a future issue. —Ed.


Polaris
Ursa Minor
Little Dipper
Kochab
The Polaris Method
Pointer
Stars
Ursa Major
Big Dipper

by LT James G. Taphorn

In recent months, the American field artillery community unquestionably has made great strides in enhancing the ability of the firing battery to perform on the battlefield of the future. The proposal and subsequent adoption of new tactics and techniques have underlined the philosophy that time, ammunition and battery firepower are precious commodities indeed. In light of these considerations, the importance of accurate and timely survey control at the battery level appears greater than ever. Yet, ironically, the fluid nature of the modern battlefield, as we invision it, will rarely permit the battery the luxury of occupying a surveyed firing position as we know it. Use of the magnetic needle, as an alternative, is undesirable, particularly in a rapidly moving situation where the timely declination of instruments will be nearly impossible. In addition, the amount of magnetic variation, which is difficult if not impossible to determine, causes the accuracy of the needle to vary from position to position. At Fort Sill, for example, variations of up to 80 mils from the post declination station have been recorded. It is imperative that the firing battery be placed on a common grid with the battalion as soon as possible. The magnetic needle of the aiming circle is one of the least desirable methods of accomplishing this.

To this end, the Survey Division of the Counterfire Department, USAFAS, is implementing a series of hasty survey methods (soon to be published in FM 6-50) in its instruction to supervisory firing battery personnel. These methods are sufficiently accurate to maintain the battery on the battalion common grid. Moreover, these techniques are *simple* and *rapid*, and may be done with the equipment presently organic to the firing battery.

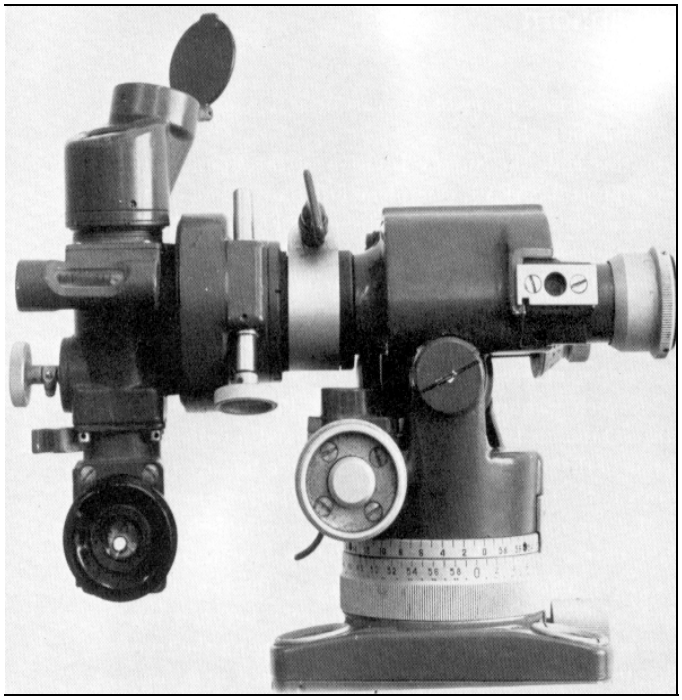
One such technique, known as the Polaris Method, utilizes tabulated data on the fixed and predictable motion of the stars to establish an orienting line accurate to two mils. The method involves the observation with the M-2 aiming circle of two of the most prominent stars in the northern sky, Kochab and Polaris (see diagram, this page). The horizontal angle between the two stars, which is measured with the aiming circle, becomes the entry to a precomputed Polaris table producing the true azimuth to Polaris which is easily extracted and converted to grid with the help of the declination diagram on the user's map sheet.

Laying by Polaris, although new to the US Field

Locating Polaris and Kochab

A brief exposure of the Polaris Method to firing battery personnel at Fort Sill indicated that the only area of difficulty was the ability to locate Polaris and Kochab [pronounced coCOB, similar to kabob] in the night sky and within the aiming circle telescope. Use of the diagram at the beginning of this article should alleviate this location problem.

Polaris is the last (and brightest) of three stars forming the "handle" of the Little Dipper, known as Ursa Minor. Polaris may be found by use of the Big Dipper (Ursa Major) and its two "pointer" stars, as illustrated. Kochab is the only other bright star in the little Dipper. If you visualize the Little Dipper's handle as an arc, Kochab is the last star of that arc, at the base of the "cup."



Soviet aiming circle with the Stargazer device.

Artillery, hardly can be considered a recent development. Soviet artillery forces have had this same capability for several years, with the aid of an attachment to the Russian aiming circle. This device, commonly referred to as a Stargazer, accomplishes optically what the Polaris tables do with a series of graphs. The Stargazer attachment consists of a series of prisms which allow the instrument operator to place both Kochab and Polaris in his field of view simultaneously. (This is not possible with the US M-2 aiming circle.) The operator then orients the Stargazer by placing each star on its corresponding crosshair within the specially-designed reticle pattern. The resulting position of a third crosshair indicates the position of true north.

Lacking the optics of the Soviet Stargazer for finding true north, the Polaris Method uses precomputed graphs for determining the azimuth to Polaris. The aiming circle is used to measure the horizontal clockwise angle *from* Kochab *to* Polaris, reading directly off the horizontal scales. The use of the appropriate Polaris table and declination diagram then rapidly converts the angle into the grid azimuth to Polaris. The specific steps are outlined:

Measuring The Angle

(1) Set up and level the aiming circle over the selected station.

(2) Using the upper motion, set 0.0 mils on the horizontal scales.

(3) Place the vertical crosshair on Kochab, using the lower motion and the elevation micrometer knob.

(4) Turn the azimuth micrometer knob (upper motion) so the vertical crosshair is centered on Polaris (the telescope may also have to be elevated or depressed).

(5) Read the value on the horizontal scales to the nearest mil.

(6) Depress the telescope to ground level and have an aiming post emplaced along the vertical crosshair line of sight. The post will serve as the end of the orienting line (EOL).

Extracting True Azimuth To Polaris

(1) Determine which of the four Polaris tables (20°N, 35°N, 42°N or 50°N latitude) corresponds most closely with the observer's own latitude. [The new FM will contain all four tables. Due to space limitations, we show only one. —Ed.]

(2) Enter the appropriate table on the left side with the value off the horizontal scales of the aiming circle (interpolate visually as necessary).

(3) Determine whether to intersect with Graph 1 or Graph 2, based on whether Kochab is above or below Polaris, as illustrated in the table. When in doubt, compare the vertical angles to the two stars.

(4) Read directly from the point of intersection to the bottom of the table and extract the true azimuth to Polaris to the nearest mil, interpolating for odd-numbered values.

Convert from true azimuth to grid azimuth using the declination diagram from a local map sheet.

The grid azimuth to the EOL is now known and can be considered accurate to two mils. The battery may now be laid by the orienting angle method.

The computation and plotting of the Polaris table in this article was performed by the Survey Division of the Counterfire Department using FADAC and Survey Tape Number Two. Four graphs, rather than one, have been produced in all because of the effect of latitude on the azimuth to Polaris. The only significant (that is, measurable) error in the Polaris Method is introduced by the difference between the latitude of the observer and that of the closest table. The Survey Information Center (SIC) within each division artillery has the capability, with its FADAC and Survey Tape Number Two, to refine the accuracy of the Polaris Method by computing a table at an optimum latitude for local artillery units. The

FADAC, programed with the survey tape, is used to compute azimuths to both Polaris and Kochab by hour angle method. The declination (or celestial "latitude") and right ascension (or celestial "longitude") for each star may be average values selected from the current Army *Ephemeris.* A value of 0.0 mils should be entered as the horizontal angle. An azimuth to each star should be computed for every 30 minutes throughout a 24-hour period. This requires entering only a new sidereal time from one computation to the next. Once all azimuths to both stars have been computed, they are paired together by sidereal time and compared mathematically to determine the corresponding clockwise angle from Kochab to Polaris. An arbitrary example follows:

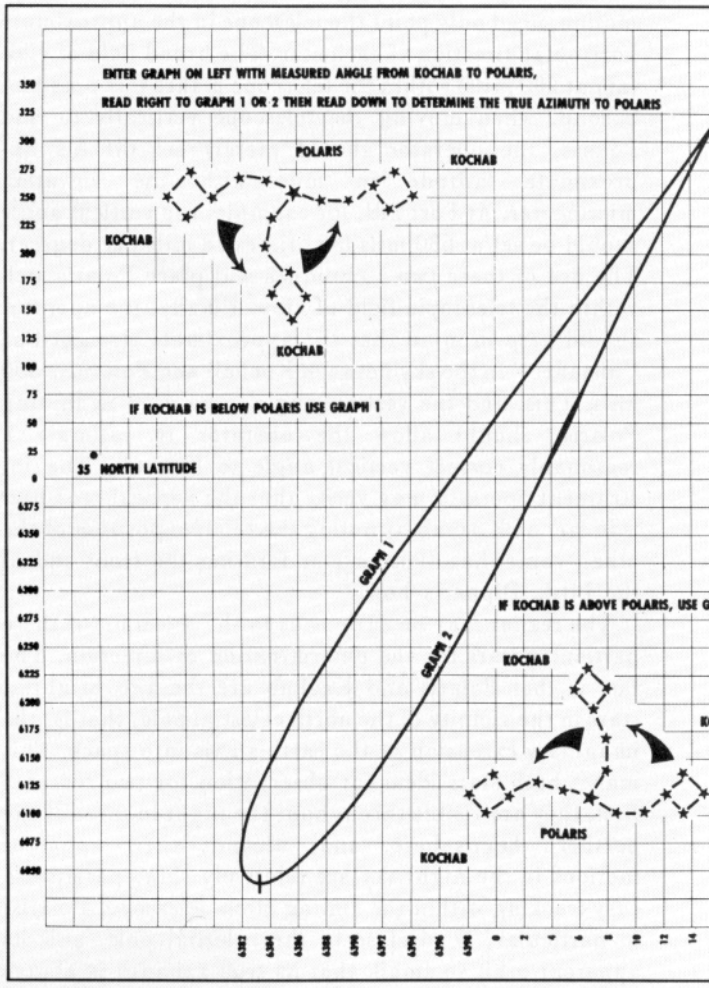
Sidereal Time	Azimuth To Kochab	Azimuth To Polaris	Clockwise Angle
0030	200	6390	6190

With the use of a grid sheet, each of the computed azimuths to Polaris may be plotted as a function of its corresponding clockwise angle. The graph itself may be drawn by using French curves to connect the individual plots.

It should also be emphasized that the grid convergence listed on each map sheet is computed only for the geographic center of that map. As the observer's distance from the center of his map sheet increases, his actual grid convergence will vary from that on the declination diagram. This may introduce an additional error at higher latitudes of up to three mils in the final accuracy of the orienting line. To eliminate this error entirely, the nomograph in Table 6a of the Army *Ephemeris* may be used in place of the map sheet declination diagram. Battalion surveyors have copies of this table and can train battery personnel on its use in a few minutes.

Sill Test

The Polaris Method was tested in January at Fort Sill throughout a 12-hour night. The observations were made at latitude 34° 40′ with an M-2 aiming circle and a T-16 theodolite, both of which were positioned on a line of fourth order accuracy. In this way, the tabulated azimuth to Polaris (extracted from the 35° table to the nearest 0.5 mil) could be compared against the known azimuth. The test results indicate a high degree of accuracy, the *worst* error being 1.6 mils and the *average* error well under 0.5 mil. A summary of test data is compiled here:



Polaris Method

Time Of Observation	*Extracted Azimuth To Polaris*	*Known Azimuth To Polaris*	*Error*
1900	6395.5	6395.3	0.2
2000	6391.0	6391.1	0.1
2100	6387.5	6387.3	0.2
2200	6384.0	6384.4	0.4
2300	6382.5	6382.6	0.1
2400	6382.0	6382.0	0.0
0100	6382.0	6382.4	0.4
0200	6385.0	6383.4	1.6
0300	6387.0	6387.3	0.3
0400	6391.0	6391.0	0.0
0500	6395.0	6395.2	0.2
0600	6399.5	6399.7	0.2

Guidelines

Locating the stars with the aiming circle is also made easy with the help of a few guidelines. First, the instrument

operator, using the appropriate horizontal motion, need only point the telescope in the approximate horizontal direction of each star. The broad field of view (about 200 mils) within the telescope makes this possible. Second, when moving the telescope vertically to find Polaris, the operator should merely set off his approximate latitude in mils with the elevation micrometer. At Fort Sill, for example, the vertical angle should be set at 630 mils (35° times 18 mils per degree). The use of these two techniques will place Polaris well within the telescopic field of view. Finally, the operator should keep in mind that the approximate straight-line "distance" in the sky between Kochab and Polaris is 350 mils. This, and the vertical angle to be used in finding Polaris, should allow the operator to estimate a reasonably correct vertical angle to Kochab. The instrument operator may verify that the vertical crosshair is in fact on Kochab by noting the relative position of the other, somewhat dimmer star forming the front end of the Little Dipper's bowl.

The reader may be curious as to the selection of these particular stars for the determination of direction. The fact is that Polaris and Kochab are the two brightest stars in the vicinity of the north celestial pole, that is, the imaginary extension of the earth's axis into space. This makes both stars ideal for observation for two reasons: first, they are visible throughout the night in most of the northern hemisphere; and, second, their apparent motions in the night sky are relatively slow, permitting easy tracking within the aiming circle telescope. Polaris, in particular, is so close to the celestial pole, and its apparent orbit so small, that its true azimuth is always within a few mils of zero. It is for this reason that Polaris is commonly referred to as the North Star. This has also allowed computation of the Polaris tables based on the assumption that the instrument operator can observe both Kochab and Polaris simultaneously. The tiny fraction of a mil that Polaris will have moved in azimuth since the operator "zeroed" on Kochab is insignificant for indirect fire purposes. Indeed, the movement is not even measureable with the aiming circle.

While Polaris remains relatively fixed in the night sky, Kochab appears to move around it in a counterclockwise orbit. Consequently, the vertical angle to Kochab at any given latitude can vary by approximately 700 mils. At latitudes just above the equator, this will cause Kochab to dip below the horizon during part of its orbit. If the observation occurs above 18°N, however, Kochab will always be visible, even during the lowest portion of its orbit. At higher latitudes, the Polaris Method is limited, not by the horizon but by the maximum vertical angle of the aiming circle. At the present time, the crosshairs in the telescope will elevate to approximately 805 mils. The Counterfire Department Survey Division has, however, submitted an equipment improvement recommendation that would increase the maximum elevation of the crosshairs to approximately 1100 mils. (The recommendation (EIR) was made initially to permit simultaneous observation of the sun at higher vertical angles.) This EIR has been approved by Frankford Arsenal in Philadelphia and the expected completion date for the resulting modification work order is July 1976. Given a modified aiming circle, the observation of Kochab, even at the high point in its orbit, will be possible as far north as 50° latitude. It should be emphasized here that there is no requirement to place the horizontal crosshair on either star; consequently, the observation can take place even though Kochab may only appear toward the top of the reticle pattern at maximum vertical angle. Before making the observation, the instrument operator should also ensure that the aiming circle is as level as possible. This will keep the vertical crosshair truly vertical and the EOL exactly below Polaris.

Finally, it should be mentioned that the celestial "latitudes" and "longitudes" of both stars are not fixed. Rather, they are constantly changing by small amounts, usually fractions of mils. Over a period of years, this will cause the present Polaris tables to become obsolete and necessitate new computations. Research predicts the future accuracy of the current tables. By 1980, for example, their overall accuracy will have deteriorated by approximately 0.5 mil in azimuth. The Russian Stargazer accounts for this change by allowing the instrument operator to position Polaris along a hairline marked with graduations every five years.

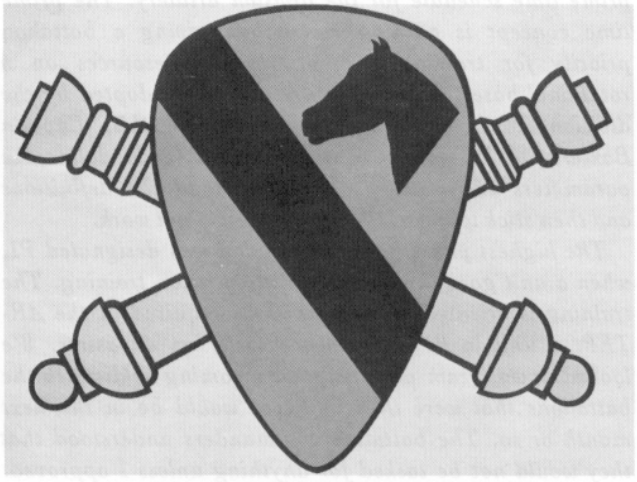
The Polaris Method is not a cure-all for the firing battery's problems in obtaining accurate direction. In addition to the limitations described (which the author regards as slight), this technique can be used only at night, during periods of clear weather and in the northern hemisphere. Nevertheless, it is a useful tool heretofore not available to the battery. Unlike simultaneous observation, for example, the Polaris Method requires no existing survey control within the battalion and is not dependent on radio communications.

It is hoped that the Polaris Method, as well as other hasty survey techniques, will soon be outdated by other developments. Artillerymen may look forward to obtaining accurate direction in *every* position someday — probably through the use of a gyroscopic device. This will permanently free the battery from the errors in lay introduced by using the magnetic needle and greatly increase the battery's responsiveness on the modern battlefield.

However, until that day arrives, the Polaris Method and simultaneous observation are your best bet for ensuring an accurate azimuth of lay at night in the absence of survey control.

1LT James G. Taphorn, FA, is an artillery survey instructor, Survey Division, Counterfire Department, USAFAS.

A Letter To Captain Baxter . . .



Captain Baxter,

Right on! I read your article in the ***Journal*** *[*"Trainers, Rise Up!" January-February 1976*] and it came through like a bugle note late at night. The battalion and battery/company commanders that I have served with during the past four years in the 101st Air Assault Division and the 1st Cavalry Division have many of the same frustrations that you have. They realize we must have, and they want, an army that is trained to fight and to win.*

A battalion commander hit it on the head when he said, "These are exciting times for field artillerymen." I think it is an exciting time for the Army! The maneuver brigade commanders I have worked with have been superb. They embraced the new doctrine with a healthy degree of challenge and are now training their units using this doctrine. For our part, we cannot let the frustrations we feel overcome our desire to do everything we can to support the "grunts" and the tankers.

One of our jobs is to overcome that feeling of frustration and meet the problem head-on. As you wrote, "The commanders must have a burning desire to have a trained unit." I am of the opinion that, like it or not, we have to live in the hostile training environment and have well-trained units. That's not to say that we shouldn't do everything we can to eliminate the hostile environment. If we can't minimize it, we can minimize its effect. People like you and I do that. We can minimize the effect by ***good*** *planning and good execution. In my view many battalion and battery commanders do not use the time available for training efficiently. They do not plan and because they do not have training objectives, they "hip-shoot" their training. I feel that this is a more serious hindrance to good training than the hostile training environment.*

There are many fine methods of organizing for training but all have one thing in common — ***you have to plan.*** *It takes a lot of hard work to do it right. I would like to explain a method that worked for us in the 1st Cavalry Division Artillery.*

We started our program by having the battalion commanders and key members of the division artillery staff meet in a series of conferences to decide on a training program. Everyone had a vote — a say in what was to be done. We tried to have everyone participate in the decisions so each would be fully committed to the program. The first order of business was to discuss a sequence for planning our training. The sequence we used was a familiar one: analyze the problem, establish objectives, set priorities, schedule the training program, execute the program and review periodically.

Out of these meetings came three key points. First — battalion commanders were responsible for all training conducted by their units. They were responsible for planning and for supervision. The staff took care of preparing and producing the training schedule. The S3 was the chief gunner. The battery commander had input as to what he wanted to do and when, but his main job was to insure that the schedule was executed and that it was good training. Next — each battalion commander developed a set of training objectives for the training year. We wanted everyone to know what was expected of him. Last — key events such as ARTEPs and TPIs would be scheduled by division artillery. These events required a lot of coordination and commitment of resources and I reserved the authority to say when they would take place and what resources would be used.

We decided to take a couple of weeks and analyze our situation to include many of the items you wrote about in your article. We all decided that two weeks was sufficient time for the analysis and establishment of objectives. We wanted to make sure that everyone had the time required to do a good job. Once we decided how long we needed for the analysis, everyone was expected to meet the schedule.

This first step is the key. Unless you know the exact training status of your unit, the personnel situation and the requirements, you really cannot plan. Everyone has to be forthright and make an in-depth study during this phase. The decisions made as a result of this analysis required the commitment of scarce resources, necessitating discussions of alternatives and trade-offs between what was desired, what was available and what we could afford. Because it is the basis for all that follows, it is essential that the analysis be done well.

While the battalion commanders were making their analyses, the division artillery S3 was working to set up a

prime time schedule for the division artillery. The prime time concept is nothing more than giving a battalion priority for training and priority on resources on a rotational bases. This procedure was later adopted by the division. Most units use something like this, Captain Baxter, but let me say that unless you really define the parameters and make people understand the definitions and then stick to them, the procedure will not work.

The highest priority training period was designated P1, when a unit goes through its prime mission training. The training is oriented toward the skills required in the ARTEP. A unit in P1 was given priority on all assets. We looked downstream and assigned incoming soldiers to the battalions that were then in P1 or would be in the next month or so. The battalion commanders understood that they would not be tasked for anything unless I approved. They were instructed to refuse any tasking by anyone else. This was great and they made the most of it. The P2 battalions accomplished battery and section training and underwent all of those inspections you were talking about. (By the way, if the P1 unit were scheduled for one of the inspections by division, our procedure was to inform the division staff that the unit was not available to stand the inspection. It worked, and the entire division chain of command indorsed it.) In P2 only tasks requiring entire batteries or the battalion were assigned in order to maintain unit integrity as much as possible.

The P3 unit was "nickel and dimed" to death with police details, guard and funeral details, soldier education programs and non-mission related activities. They were subject to being raped on short notice. At the same time however, the unit training activities focused on the individual soldier. School allocations, use of the local professional development center (MOS study) and maintenance formed the guts of the battalion training program during P3. With careful planning and stubbornness, the ***good*** *commanders really got with it during P3 and spirited "skinny" sections and reduced batteries to the field for some additional training. One battalion even administered some practice battery tests during this period. It broke the P3 syndrome and eliminated some of those frustrations I mentioned earlier. All of this helped alleviate the hostile environment.*

All of the above arrangements were used to protect the P1 unit. The P1 unit had first call on firing points, personnel, direct support and general support maintenance. The commander had the freedom to conduct his training when and where he wanted to. He trained to meet standards. We checked those standards.

At our next meeting everyone was ready to go. The battalion people, having decided on their training objectives, briefed us on the objectives and how they planned to meet them during the next three months. The purpose of the three-month schedule was to pin down the exact activities each battery would have and what objectives it would meet. We wanted each battery commander to know what was expected of him.

We committed ourselves to these objectives and schedules and, based on the commitment, allocated resources for training. Naturally, we had some skeptics. They had been down this road before, and they expected the program to fizzle out. A few months later, they were believers. The first battalion into the P1 phase started in mid-October 1974 and finished up with a combined TPI and ARTEP in December. As you know, taking a TPI is tough enough, but taking the new ARTEP concurrently was quite a bit to attempt. The battalion did a great job and exceeded most of the standards in the ARTEP by wide margins.

A key to any success we achieved was our system of periodic reviews. Every 90 days we met to see what objectives we had achieved and which ones we did not achieve. We reprogramed shortfalls, revised objectives and once again allocated resources. Within the battalions the same sequence of planning and execution was carried out. A series of "green tab" seminars were scheduled with battalion and battery commanders to discuss programs and training. One shortfall noted was that some of the battery commanders were planning and scheduling activities within their units at the last minute although they knew long before what the training activities were to be. As you wrote in your article, training time is scarce and unless you plan the most efficient use of the time available and make everyone aware of what is required you really are not doing your job. To utilize our time properly, we established two requirements for the battery commander. The first was that each battery commander had to plan and schedule training one month in advance. Next, when training was conducted it would be performance oriented, and objectives, conditions and standards would be explained to every man in advance. In addition, the training would be supervised and critiques would be held during training and at the conclusion of training to see if the objectives had been met.

We took a lot of time to discuss these points and explain what was expected — battery commanders being tough guys to convince. The planning for the first two weeks was relatively detailed, the third week was planned in general and then the fourth week, by necessity, really got loose. As we progressed through the training month, the later schedules were tightened up. The main purpose of the schedule was to force the battery commander to plan and to notify individuals responsible for training on specified days and, most importantly, to let the troops know what they would be doing a week or two in advance. This part of the training plan is crucial to any real success that you can achieve. It is the part of the plan that lends stability and certainty to the everyday functioning of the battery and is absolutely essential if you are going to have a superb unit.

Many of the battery and company commanders let their frustrations get in the way of good training or making the best use of the time they have available. Consequently, they fall into the habit of living a couple days in advance.

A good deal has been said and written about how to train and I am going to add my bit. No matter who you train or where you do it the men involved must understand the objectives, know what is expected of them and know how well they did. We spelled out four things in every training situation: state objectives, train, provide guidance and critique.

You really can't turn someone loose after you explain what the objectives are. You must provide guidance and encouragement. As the soldier becomes more skillful in his job, the guidance can become a pat-on-the-back or a suggestion as to how to increase his skill. And, lastly, feedback or critique is a continuous thing. Everyone should know how he performed — the good as well as the bad.

We have discussed training planning at battalion and battery level and the last part of the triad is individual training. I saved this till last because this, in my estimation, is one of our prime missions and one where the "Young Turks" like you, Captain Baxter, are really in charge. We haven't been doing very well in this area, and I guess if I had to quarrel with anything you wrote about in your article, I would pick on your comment about individual training and on-duty education. First, let me say that I agree with you about sending everyone to on-duty education courses. I do not think it should be done. I do think we should send our ***good*** *soldiers to finish their high school educations or allow them to master reading so they pass GED tests and read manuals and understand basic military skills. This is what is important to you and me. We need soldiers who comprehend written instructions and are able to carry them out. As you say, "The mission to train is one with which we are* ***tasked****." We need to educate our soldiers so they can comprehend what we want them to do and do it. A soldier has to be able to read a "dash-10 Manual" to maintain his howitzer.*

MOS training is one of our major responsibilities. Each MOS test has 125 questions and, for a 13B4, the average number answered correctly Army-wide during the February 1975 testing was 69. The average 13B4, then, answers only 56 percent of the questions correctly. Although the Army accepts that as average, I don't believe we should. Something is wrong. Either we are not teaching our soldiers what they should know or we are asking questions that are not relevant. I think it is both. In any event, we decided to do our best in preparing our soldiers for the MOS tests in February 1975 to upgrade our individual training.

In early November all commanders met again to discuss MOS training. Again we established objectives and scheduled the training in much the same way as we have already discussed. This time, however, we did a lot of research ahead of time. We studied February 1974 MOS test results to see how our soldiers compared with the rest of the Army. The Army-wide figures and unit figures were provided by the MOS Test Center at Fort Ben Harrison, IN. These people provide a great service and any unit in the Army can obtain this information.

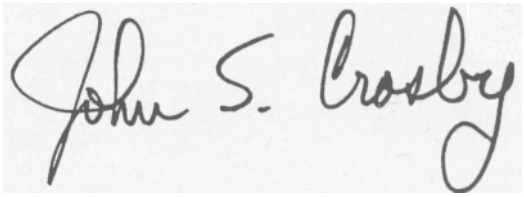
We really were not doing very well and had our work cut out for us. This was a great program to get the command sergeants major involved with and they were of major help in keeping this program moving.

After designing the program, we selected "godfathers" within units to insure that everyone was present for testing and that each had studied for the test during our mandatory study periods.

The results were super. We had less than a one percent no-show rate for MOS testing. Our policy was simple. During the month of the test there were no leaves and, if anyone did not show up for the test, he was AWOL. That is the Army's policy but it is not enforced. It worked and the results indicated that the methodology of analysis, establishing objectives and then training to meet the objectives was a good system. In the February 1975 testing period our 13B4s were above the Army average in all eight tested areas. The year before, the 13B4s were below average in four of the eight tested areas and, upon direct comparison from one year to the next, we improved in five areas. The NCOs in div arty had more favorable comments about this program than any other single program we had going. It paid off for the individual soldier — and it paid off for the Army.

Although I do not agree with all you wrote, I think we all owe you thanks for getting this business of the hostile training environment out in the open for discussion. You probably will not agree with all of this letter either.

Make no mistake — the "hostile training environment" is a very tough opponent. Although much remains to be done at all levels of the Army to alleviate the problem, there is much that ***can*** *be done at the unit level. Sure, sometimes you are going to lose. Even the best trainer's schedules are succeptable to violation. But with dedicated people and a thorough planning process you will win more often than you lose and that's pretty damn good whether you are training or in combat, especially when you win the first and the last battle.*



COL John S. Crosby, FA, former Commander of the 1st Cavalry Division Artillery, is the Director of Course Development, USAFAS.

Responses

In the May-June issue of the Journal we published the major portion of the Close Support Study Group's final report of the Fire Support Team (FIST) concept. At that time, we made a commitment to publish responses we received on the FIST concept. A word of explanation. There were some Redlegs who obtained early copies of the study and addressed themselves to it. In the case of Lieutenant Colonel Muhlenfeld, the draft report he is responding to placed all members of the FIST, including the officers, in maneuver units. The final report recommends that only the enlisted members be assigned to the ground-gaining units. Even so, we feel his comments merit publication.

Colonel Samouce does not address the FIST concept directly; however, we believe he has touched on a vital aspect of fire support. —Ed.

Muhammad Ali's right fist photographed by Pierre Houles. Reproduced by permission of *Esquire* Magazine © 1974 by Esquire Inc.

"There is a fatal flaw, to be sure."

LTC William F. Muhlenfeld

We heard about it way out here. We weren't quite sure what the Close Support Study Group was all about — it could have been about a number of things — but now we know. It is about forward observers and fire support officers, and about doing a better job of fire support coordination.

We read what the mission was: "to optimize observed fire support for maneuver forces on the modern battlefield," and we weren't quite sure about that. We decided, however, that in general the task was to make it better than it is, and so we asked ourselves, "What's wrong with it?" Well . . .

- The battlefield is too big. Today's battalion and company frontages are very wide, and a single forward observer team now has too much to cover.
- There are communications problems, generated by greater mobility, greater distances and — in airmobile operations — by specialized tactics.
- In aggregate, we are not well trained. Fire support coordination may be the most specialized of artillery trades. It is practiced principally by company grade officers and enlisted men, neither of whom receive much formal training or much practical experience, at least in peacetime.
- We are not making the most of what we have. The 4.2-inch and 81-mm mortar platoons have plenty of observers, and they are soldiers who ought to have the same basic skills as their artillery counterparts. Yet, all too often, it is as though the two groups lived on separate planets.
- In general, maneuver commanders are as bad about fire support as they ever were. The only thing they understand about it is that they need it — but not now — when the war starts.

There is no question that these problems, two of which are new and three of which are traditional, are serious. No question that they should be solved, because we depend more and more on firepower to support more ambitious schemes of maneuver on a wider, deeper, more fluid battlefield. It simply is not like it was in World War II anymore and yet, today's army in the field *is* much like it was when it comes to fire support. So, it is agreed something should be done — should *have* been done around 1960 — and it further is agreed better late than never.

The study group seems to have done a great job. There is a fatal flaw, to be sure. *That* is the recommendation to take the fire support sections out of the direct support battalion, and it threatens to make alphabet soup out of everything else, but there are some splendid ideas. Reading them, one finds himself regretting that the more obvious ones cannot be put into effect forthwith. For example:

- Creation of a fire support MOS for all enlisted men who do that line of work, whether they are mortarmen or artillerymen, whether they are observers or fire planners. There is great potential here, for it recognizes the distinction between fire direction and fire support coordination *and* the reality that fire planning, by whomever practiced, is in fact a separate and highly specialized skill.
- Centralizing fire support training at Fort Sill. That means, one gathers, that in the future there will be no instruction at Fort Benning or Fort Knox — instruction that is really a subset of something else and the object of no particular emphasis — which purports to teach forward observation and fire planning. This would be so because, by definition, these subjects become part of the new MOS taught at Fort Sill and the province exclusively of the Field Artillery School.
- Inclusion of specific fire support requirements in the training test of maneuver units. Obviously — and appropriately — this recommendation recognizes a truism, too obvious to restate.

There are two other ideas having to do with training. One hopes they will find their way and be adopted. It appears the first one, at least, will be:

> Fire support coordination as a major instructional block in the Basic Course. There is important significance to this. Consider that many direct support battalions have few or none of their authorized fire support officers. In such cases, the usual recourse is to appoint a forward observer to this position, and today's new lieutenants have received no real instruction on the subject. Moreover, they do not understand the nature of the job or how it works. Of all the mysteries of indirect fire, how it works in fire support coordination is most difficult to explain. You have to do it to understand it.
>
> Fire support coordination as a major instructional block in the Advanced Course st Fort Benning and Fort Knox. The time has come to make a successful grade in fire support a condition of survival for the captain of infantry

or armor. One senses, and one must believe if he is of this generation, that tomorrow's maneuver battalion commander *also* must know how it works. If he does not, he will accord the mission no more importance than he does today, and everything done to improve the system will languish — as too often it does today.

Let us now consider the problem of organization. The solution to that problem drives most of the other recommendations produced by the study group, and there is a body of opinion that holds the solution to be wrong — very wrong. But first, the problem:

You have before you a group of forward observers. There are . . . how many do you wish? In a maneuver battalion, let us decide upon 24. They are the observers from the artillery, the 4.2-inch and 81-mm mortar platoons, their assistants and drivers. They are all artillerymen, all trained at Fort Sill; the enlisted men possessors of MOS 13F and the officers graduates of the Basic Course. The question is, what to do with them? Where should they live, with the maneuver unit or with the artillery? How should they be organized, as a platoon or as individual members of the organization they normally support?

The study group would create clusters of observers (and fire planners) at company level, organizing them into fire support teams called FISTs. They would be organic to the company or troop, part of the MTOE. The advantages are these:

- Integration. The fire support troops would be part of the maneuver troops — lock, stock and OF fan.
- Stability. Every company would have its FIST, and every battalion would have its fire support element.
- Professionalism. Specialists would be present at every fire planning echelon.
- Flexibility. The FIST would provide enough people and equipment to enable the small unit commander to task organize for fire support just as he does for maneuver.
- Coverage. There would never again be a shortage of observers. The reconnaissance squadron and the maneuver battalion with the fourth rifle company would never have to scrounge for a forward observer section. It would be right there in the MTOE.

Are there any disadvantages? Yep. Sure are. Big ones. But, to examine them at least subjectively, you have to make a transition from the theoretical to the real world. In that world, there are never enough people — and, among the people we have, one finds differences in aptitude, intelligence and motivation. There are equipment problems, command pressures, competing priorities and *time* — never enough time. There are few maneuver battalion and company commanders who awake in the morning with fire support coordination uppermost in their minds. In the complex of things such commanders think about, fire support is off in the ozone some place. They hope, and in some cases expect, that we will do that for them. And we do. In addition, we may train their mortar forward observers, firing sections and fire direction personnel. We may teach them tactics and administer their training tests. Without fail, when *they* go to the field, *we* go to the field. All of that is as it should be.

The real world also predominantly is one of inaction for the armed forces. Not inaction in the sense that nobody does anything, but inaction in the sense that far more time is spent training for a war than fighting it. Consequently, whatever we decide to do in training must be as workable in a world of duty rosters and firing ranges as it is on battlefields. If it is not, the battlefield training will never be given successfully.

Now, about the FIST concept:

- The young 13F20, being bright and hardworking, becomes the company clerk. No? Well . . . how many chart operators and radiomen have you seen plying away in somebody's orderly room?
- The lieutenant, a forward observer and a graduate of the artillery Basic Course, also is company supply officer and aggressor platoon leader. There is a shortage of officers in the company, and then what happens? You guessed it . . . he becomes a *rifle* platoon leader.
- The lieutenant's vehicle, not regularly needed by him during the typical training week, becomes an excellent company runabout. It is not well maintained and its state of maintenance is not a subject of universal concern.
- The lieutenant's radio, an AN/GRC-160, is found to be an AN/PRC-77 in vehicular disguise. Such radios are needed all over the company, and this particular one becomes the company maintenance float.
- The captain, battalion fire support officer and a former battery commander, is assigned a primary duty of battalion assistant S3. He is informed he is to discharge his fire support responsibilities as an additional duty — and he does, attempting periodically to assemble artillerymen for training. Attendance is poor, particularly among enlisted men: they have fallen prey to implacable first sergeants.

Meanwhile, back in the direct support battalion:

- There is a necessary and proper mission (recommended formally by the study group) to coordinate and supervise all technical fire support training within the maneuver brigade. Who is to do that? The fire support officers are gone; so are the forward observers. And so are the enlisted men now organic to those secitons.
- There is another mission to provide training guidance, assistance and some supervision for the mortar platoons. Further, the battalion will administer training tests to the mortar platoons, critique the results and furnish a written report. Who is to do that?

Finally, the war begins:

- The direct support battalion commander, charged with coordinating all fire support and planning artillery fire support, finds he is ineffective. The people who must act in his name and respond to his direction do not work for him. Moreover, they hardly know each other.
- Forward observers are sluggish and imprecise in their calls for fire. Their professional development has been blunted because they have not been part of a field artillery battalion and have not benefitted from the day-to-day experiences such duty provides.
- There are casualties. The maneuver commander must replace his own losses or do without. His choice may not be the best. After all, he is not an artilleryman.

Enough?

There will be readers, serious and professional artillerymen all, who will claim the preceding is an overstatement of the case. It may be an *understatement* of the case. Fortunately for the contending sides, there is another way. Consider this: Establish as doctrine a proposition that says, "The artillery will initiate all calls for ground-to-ground indirect fires. At the option of the maneuver commander, the artillery will plan for and integrate all indirect fire sources."

Organize the fire support officers, the forward observers — all of them — their sections, baggage and paraphernalia, into fire support platoons. Make them part of direct support battalion firing batteries. And lastly, change nothing else.

The solution overcomes all of the problems above mentioned and it preserves intact all of what is being sought. You lose the concept of the live-in forward observer. That, however, is worse than a dubious virtue — it is frightening. You might have an occasional coverage problem; there is always the reconnaissance troop that requires additional support for which there is no organizational provision. There is no need to lose stability, flexibility or professionalism. Given the resources, these are functions of command.

Long ago, one had the privilege to hear a distinguished former director of Gunnery talk about doctrine and command. He was incisive.

"Doctrine," he said, "is about how things work. We figure out the best way to do things — professional things — and when we are certain one way is the best way, then that becomes doctrine. Command is about *making* things work. That is altogether different. No commander can permit himself to be bound by doctrine which proves infeasible. If *he* fails, he is fired. If *we* fail, we reexamine our doctrine."

One notes that the study group's recommendations are being staffed at the several service schools — citadels of doctrine — which are involved with what is being proposed. They might well be staffed, at least as profitably, among the division artillery commanders who worry about fire support every day of their lives.

LTC William F. Muhlenfeld, FA, has been a fire support officer at various levels in Vietnam and Korea. A former division artillery S3, and commander of the 1st Battalion, 38th Field Artillery, a direct support battalion of the 2d Infantry Division, he is now attending the Army War College.

". . . the recommendations of the CSSG are right on target."

MAJ EMIL E. Steed

Finally! It was gratifying to note that positive action has been initiated in an area that has required attention for some time. My hat is off to General DePuy, Major General Ott, Brigadier General Pearson and the members of the Close Support Study Group (CSSG).

I first became aware of the CSSG from the summary of its activities in the November-December 1975 issue of the *Field Artillery Journal.* This aroused my interest and I followed up by acquiring a copy of the CSSG Final Report during a trip to Fort Sill.

I must say that the recommendations of the CSSG are right on target. They reach to the heart of the problem. The field artillery cannot afford to be lax in any area, especially that of maneuver unit and FA interface. As I see it, this study addresses one-third of the FA problem. If we are to accomplish our mission, we must meet three requirements. First, provide an effective organization designed to deliver fire support. Second, have an effective system of providing a sufficient number of these organizations to a force commander. Third, provide an efficient system of interface between the force commander and the field artillery. Field artillerymen have traditionally worked hard on the first requirement and have studied and understood the second; however, there has been constant neglect of the third.

I became painfully aware of this neglect while serving as

an artillery liaison officer to the 5th Battalion, 7th Cavalry, in 1966. The reality of how poorly I was trained in fire support coordination was a bitter pill to swallow. The fact that I had taken very little personal initiative in this area did not make it any easier. I also noted that all newly assigned forward observers and liaison officers (those whom I had the opportunity to observe) experienced the same lack of expertise as I. It was necessary to provide a period of intense training to orient the new FO and LNO to their responsibilities and to insure that the proper relationship was established with the maneuver unit commander. I submit that we can no longer afford this extra training time. Our maneuver units must be ready for immediate commitment to battle and so must the field artillery. Complete professional expertise and established relationships must be the order of the day.

I fully support the recommendations of the CSSG. In addition, I urge every other field artilleryman to voice his concern and support. It's discouraging to read letters such as the one that appeared in the January-February 1976 issue of the *Field Artillery Journal* by SGT James O'Laughlin. He says that the Recon SGT is dead and he isn't far from wrong. We cannot afford to ignore a most important part of our mission. Implementation of the recommendations of the CSSG will be a significant step toward elimination of a primary weakness in our current system.

MAJ Emil E. Steed, FA, is serving as a Field Artillery advisor with the Readiness Group Atlanta, Fort Gillem, GA.

"Sounds a little British? You're bloody right."

COL Warren A. Samouce

As a direct support field artillery battalion commander in Vietnam, my greatest problem was that I didn't have officers with enough maturity, judgment and experience to accomplish well the difficult fire support coordination tasks for the brigade and the infantry battalions I supported. During most of my command, fire support officers were lieutenants (good ones) instead of seasoned, experienced senior captains. As a division artillery commander, I still find that there are never enough mature, experienced officer resources to give the infantry what it needs and deserves, to command the batteries and to serve as field artillery staff officers.

Obviously, good training helps offset the experience and maturity shortfall; and, we are doing this training. But this still does not fill the gap. Therefore, I have attacked the problem from another direction.

First basic fact of military life: FA Commanders at battalion level and higher can do little to influence the quantity or quality of officer personnel who arrive in the unit for assignment of duties. Commanders must work with what they are given. To be sure, once new officers arrive, FA commanders expend extensive efforts to improve, to train, to expand, to maximize and to develop the potential of those assigned to their care. In addition, commanders must minimize the influence of those who are below average and eliminate those who do not meet minimum standards. Nevertheless, the fact remains that FA commanders must work with what the personnel system supplies.

Second basic fact of military life: FA commanders must use assigned assets to fill authorized requirements. For battalions this means that assigned captains must be used as battery commanders, fire support officers (brigade and battalion) and battalion staff officers.

Where do all the good guys go? During expansion and contraction, in peace and war, in combat theaters and CONUS, every FA battalion commander will insure, above all else, that his batteries are commanded by the best, most mature, most experienced people available. On rare occasions a battalion commander may slightly deviate from this position because of external pressures. But the deviation will always be slight because, for numerous reasons — too extensive to list and already well known to experienced commanders — a battalion's capabilities rest primarily on the abilities of all its batteries to perform well.

Well, what's left over? After stripping out the best captains for battery commanders, what's left? What's left is a mixed bag:

- First, there are those who may not be good enough to command — they may never be.
- Next, there are those who are smart enough — maybe even brilliant — but who (because of lack of experience or lack of something else) aren't ready to command. Someday they may be ready, but right now they aren't. They lack something that is needed for command.
- Another type of captain may be around. He's the man who has just been assigned. He looks good, he has the experience and he will probably get a battery when one becomes available. In the meantime he will learn the ropes, the people, the situation and he will be watched

closely.

- Next — and this person is very rare — there is the captain who has completed command, successfully. He is rare because he is probably on orders to the advanced course or because he has been reassigned after command to higher headquarters — division artillery, or post, or division, or group or corps artillery — or because he has been selected for civilian schooling or promotion.
- Finally, whatever happened to the crusty old captain LNO who had had years of experience at battery level and who was so prevalent in the 1950s? He may be around in the structure somewhere, but he sure isn't to be found in many field artillery battalions.

What happens with the leftovers? There are only two things to do with the leftovers, be they good or bad. They can serve as battalion staff officers or as fire support officers. Which jobs get the best of the leftovers? Probably battalion S1 or assistant S3 gets high consideration for the better men. Brigade fire support officers are also terribly important to the direct support battalion commander.

What does all of this have to do with improving close fire support? Simply this: The best, most experienced, most mature field artillery captains are not assigned as fire support officers. The captains with the most experience, the battery commanders, don't even get close to the infantry TOC.

What does the battery commander do during combat? The battery commander is, of course, responsible for everything. He supervises, corrects, administers and troubleshoots. These are all important. However, in combat he is essentially responsible for only one thing that other officers and NCOs who work for him are not responsible for — reconnaissance and selection of new positions. This job is, by the way, probably one of the easiest to learn and do. And another side point — under our present system the battery commander will rarely see his forward observers in combat.

So what? So this. We've got our best, most mature, most experienced captains doing a specific job (reconnaissance and selection of positions) that does not require tremendous maturity and experience. We've got most of our other captains doing a specific job that requires tremendous maturity and experience — coordinating fire support, coordinating lethal assets — some of which are not under the command of any artilleryman, and some of which are not under the command of any Army officer, i.e., armed helicopters, tactical air support and naval air and gunfire support.

So what can we do about it? Here's one thing we can't do — we can't change the fact that the best captains will be battery commanders. However, we can do this — reorganize our existing assets and reassign tasks — at no extra cost.

How? The battery commander would still be the battery commander. He would still be the best captain. He would still be responsible for all his unit does and fails to do. He would still exercise his command through his subordinate officers and NCOs. But, in combat, the battery commander would also be the infantry battalion fire support officer. He would live with and for the infantry battalion commander. He would give to the infantry battalion his experience, his expertise and his maturity.

The current infantry battalion fire support officer would be deleted from the artillery battalion staff. These captains and their slots would be reassigned to the firing batteries. These officers would be redesignated battery executive officers (or, if we want to borrow a good thing from the Air Force, we would call them vice commanders). They would become true executive officers and accomplish all those good things that must be done in the absence of the commander. In combat, they would reconnoiter and select positions. And in this new role the young, not-so-experienced captain would learn and become experienced so that one day he would be ready to take full command.

What we now call the executive officer would become an assistant executive officer — a better title would be "firing battery officer." He would do what the current executive officer now does. The other battery officers would continue to do what they do now. The FDO would direct fire; the FOs would observe.

There will, on occasions, be times when it would be better (because of the tactical situation, personalities, personal experience, etc.) for the captain executive officer, instead of the battery commander, to be located with the infantry TOC and perform the FSO functions. On these occasions the direct support battalion commander should be allowed to decide on the modified arrangement.

How did we get something for nothing? We put the talent, the experience, the maturity where they are needed — the battery commander is in command of the battery — he is also with the infantry battalion commander. We put the not-so-experienced captain where he can best acquire the experience.

Oh! And something else we get in the process is proper supervision of the FOs. Today the FOs are rated and indorsed by the officers in the battery. But, the FOs — when the time comes to do their thing in combat — work for the FSO. The FSO is not a rater or indorser. Our new system corrects this anomaly.

So you don't like captains rating captains? Neither do I; although, today, captain brigade FSOs rate captain battalion FSOs. I'd rather live with this solution than with the will-o-the-wisp notion that we can produce top-notch FSOs by devising better training methods. Maturity and experience come from maturity and experience — we can't get these from the training aids support office.

Sounds a little British? You're bloody right. But the

[*continued on page 33*]

Universal Tractor In Final Testing

Moving small hills in a single scoop, the final prototype Universal Engineer Tractor (UET) is now undergoing final acceptance testing at Aberdeen Proving Grounds, MD. Pending approval, the full-tracked vehicle promises the combat engineer new degrees of battlefield mobility and versatility through the use of soil as ballast to temporarily increase its weight and earthmoving capacity.

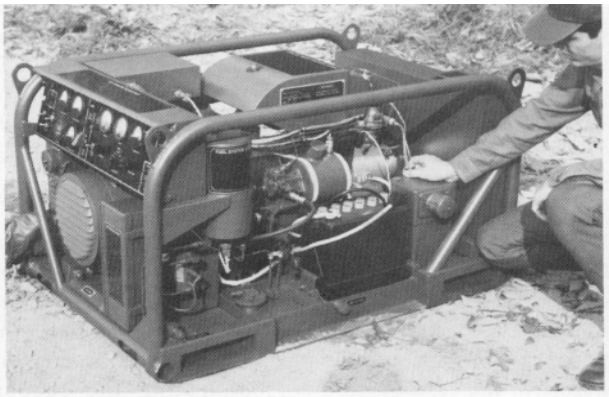
The tractor's scraper bowl operates by means of a hydraulic apron and positive load ejector. Dozing and scraping are accomplished by raising and lowering the vehicle's entire front end. A 285-horsepower diesel engine provides sufficient power for many tasks including rough grading, towing, dumping and hauling.

At 32,000 pounds (unloaded), the UET remains within air transport and air drop weight limits. With cross-country speeds ranging up to 30 mph and a limited swimming capability, the UET also affords engineer units the mobility to easily pace the rapid movement of armored and mechanized operations. The UET is fitted with light armor plate for survivability and employs a steering wheel guidance system, rather than the usual levers, for responsive maneuverability.

Loading up to eight cubic yards of soil as ballast to counterweight earthmoving requirements, the Universal Engineer Tractor affords the combat engineer new degrees of mobility and versatility.

The four current pilot models built by Pacific Car and Foundry Company completed MASSTER testing in December 1975. Test results to date indicate that reliability problems encountered with earlier prototypes have been eliminated. A final production decision will follow the conclusion of the Aberdeen Proving Grounds tests in July 1976.

Turbine Generator



Component testing has been completed on a 10-kilowatt gas turbine generator under development by the US Army Mobility Equipment Research and Development Command and the Solar Division of International Harvester. Designed to provide field units with reliable, low-maintenance (10,000 hours between overhauls) power sources, the set operates on unleaded gas, jet or diesel fuel at temperatures from 125 degrees to 65 below zero (Fahrenheit). The generator weighs 50 percent less than currently used gas and diesel models and is tentatively slated for production in the 1977 time frame.

CDEC Measures Suppressive Effects

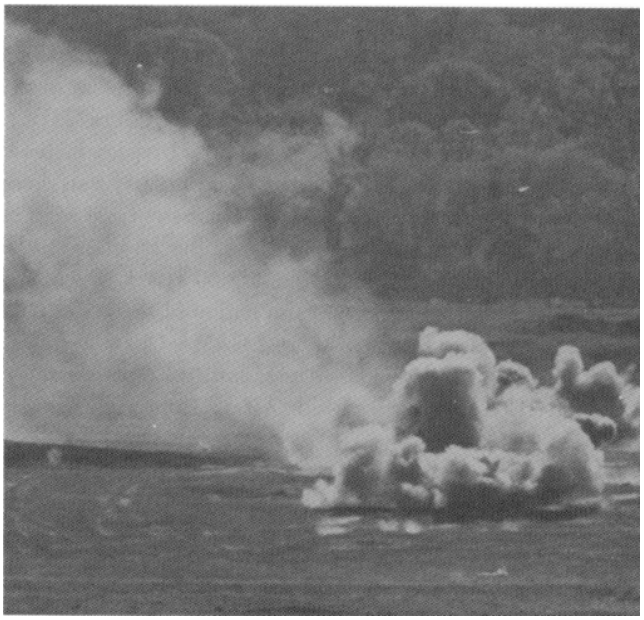
The US Army Combat Developments Experimentation Command (CDEC) measured the suppressive effects of various weapons systems during a series of exercises recently conducted at Fort Hunter Liggett, CA, and Fort Sill.

Safely positioned in a protected foxhole under simulated battlefield conditions, player-soldiers were instructed to perform given tasks only when they believed safe to do so. The soldiers' reactions, usually related to the volume and type of incoming fire, were recorded and analyzed in detail. Subsequent data will be used in the development of

Soldier-players peer through periscopes to observe incoming fire directed at their protected foxhole.

techniques enabling the commander to achieve the maximum suppression effect of available fires. The experiments evaluated the effects of 15 weapons ranging in size from the M16 rifle to the 8-inch howitzer.

In addition to providing critical information on the suppressive capabilities of prototype weapons systems, the experiments have generated information affecting materiel and doctrinal trends and have established the experimentation methodology for future studies. Though the final results will not be available for several months, some



Exploding on impact, 40-mm rounds were included in the recent CDEC suppression experiments. Field exercises evaluated the effects of 15 weapons ranging in size from the infantry rifle to the 8-inch howitzer.

of the information is being used by the US Army Training and Doctrine Command in determining the suppressive effects of automatic and semiautomatic weapons systems currently competing for integration into the inventory.

Effectiveness has traditionally been measured in terms of accuracy, range, rate-of-fire and hit-to-kill probabilities. Suppression, on the other hand, has always been regarded as quite important but rather elusive to conventional analysis. CDEC's activities finally provide suppression data in a hard form useful to field commanders and research and development managers.

Improved Antiarmor For Airborne

General Weyand has approved recommendations for organizational changes to the 82d and 101st Airborne Divisions to improve their antiarmor capabilities. A joint TRADOC/FORSCOM working conference has concluded that changes to the structure of these two divisions can best be accomplished by developing new TOE and MTOE changes to existing documents.

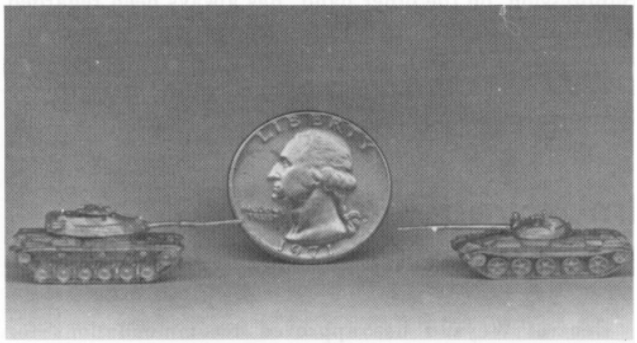
Principal changes to the 82d Airborne Division included: the addition of three DRAGONs to each infantry battalion; the development of a new three-platoon antiarmor company containing 18 TOW (basis of allocation, one company per brigade); the deletion of the 4.2 mortar

platoon and one-half of the scout platoon from the airborne armor battalion; the deletion of the ground cavalry troop from the air cavalry squadron; and, the replacement of the 33 AH-1G (Cobra/Rocket) with 33 AH-1S (Cobra/TOW).

Principal changes to the 101st Airborne Division include: the addition of nine DRAGONs in each infantry battalion; the deletion of the attack helicopter company from each of the two assault helicopter battalions; the addition of an attack helicopter battalion containing 60 attack helicopters and 27 scout helicopters; the elimination of the aerial field artillery battalion; the addition of GAMA Goats as prime movers for all 105 towed howitzers; and, the replacement of the AH-1G Cobra/Rocket with AH-1S Cobra/TOW.

Models Created For War Gaming

The company that created the original 1:285th-scale "Micro Armour" military vehicles, GHQ, has been contracted by the US Army to produce a variety of armored vehicles and soldiers for war gaming. Fourteen pea-sized models of the latest Soviet and American tanks and armored personnel carriers (APC) have already been designed and produced for use at the US Army Command and General Staff College with several more divisions of the cast-metal miniatures awaiting parcel post deployment to other activities.



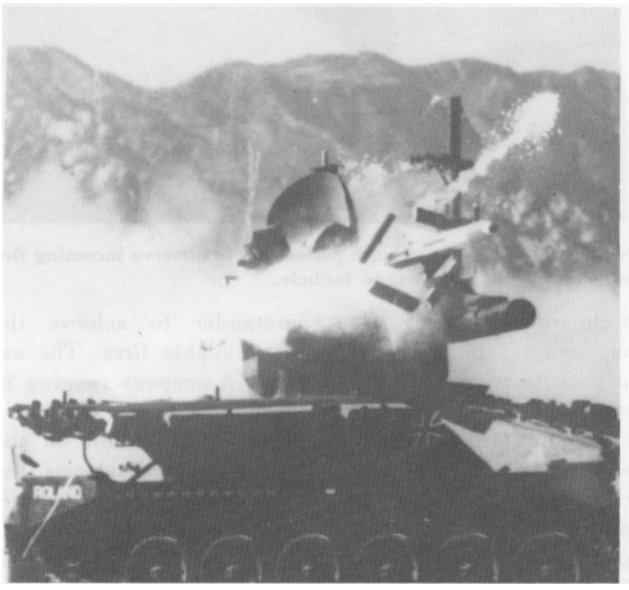
Currently in use at the Command and General Staff College, 1:285th-scale models provide practical battlefield experience without the excessive cost of going to "war."

The 14 vehicles produced in quantity include the American M60A1 and A2 tanks, M113 APCs and the M125 and M106 mortar carriers. The M113 is also being supplied with a TOW missile modification along with an extensive selection of tiny US infantrymen.

Soviet vehicles include the PT76 assault vehicle, two antitank missile carriers, self-propelled antiaircraft weapons and the T62 tank.

Roland II

Roland II, the West German antiaircraft missile system ("Comrades in Arms," March-April 1976 *Journal*), sends a 2.4-meter long supersonic projectile downrange during recent US Army test firings at White Sands Missile Range, NM. The all-weather version of Roland was designed by Messerschmitt-Boelkow-Blohm of West Germany and SNI Aerospatiale of France. The system was selected in January 1975 to fill the US Army requirement for an all-weather, short-range air defense system.



AAF's Flying Artillery

The 75-mm Baker Two-Five

by LTC (Ret) Jim Beavers, USAF

The B-25G evoked a variety of expressions — mainly of awe — when it first appeared at Columbia Army Air Base, SC, in the early spring of 1943. Small wonder: In its funny-shaped nose it carried a 75-mm cannon, surely one of the biggest pieces of armament ever mounted on an airframe.

Most expressions were in the form of slack-jawed questions:

"Who fires that thing?"

"Holy mackerel! Doesn't the airplane almost stop when you fire it?"

"Who loads it?"

"What's it sound like in the airplane when the cannon fires?"

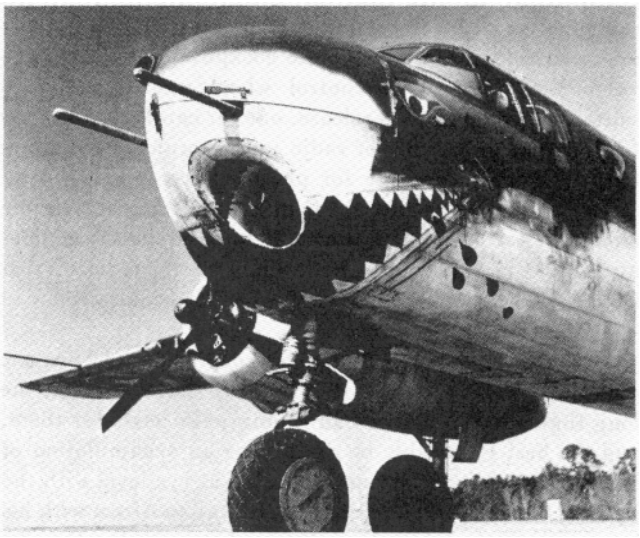
And most relevant of all: *"Can you hit anything with it?*" Somebody always had to get that one in.

In sequence, the answers to the foregoing were: the pilot; no; whoever's in the navigator's compartment; loud; and, occasionally.

Those of us who were volunteered to train in the airplane certainly thought at the time we could hit things with the cannon. We flew practice gunnery missions in which we shot an occasional hole in a large, nonhostile wooden target at point-blank range while skimming over an uninhabited section of Myrtle Beach. There were annoying times on those flights when everything said that the shell should have gone into the target but didn't. Maybe we had been jolted by a thermal during the gunnery run or distracted at the last minute — something more practice and experience would explain.

After a year of combat in the "G," as it came to be called, I was still asked those same questions since the airplane remained an oddity. With real experience behind me, the question of our ability to hit anything irritated me because it was simultaneously too difficult and too easy to answer, but more because it should have been asked before the model was ever built.

Depending on how I felt from time to time, I may have replied "No," and let it go at that. For all practical purposes, that was an accurate answer. Or I may have said,



One of the biggest pieces of armament ever mounted on any airframe was the 75-mm cannon on the B-25G. It turned out to be more impressive in appearance than in application.

"Yes, under the right circumstances." However, that was not only evasive but open-ended. It was an invitation to ask what were the right circumstances, and the answer to that was a can of worms. If pressed about it, I had to say, "On the ground, in a secure area with the parking brakes set and the muzzle pressed firmly against the target."

Looking For A Mission

My crew and six others were the first to take the G to combat in May of 1943. Another small contingent left close behind us, and by the time we had flown the South Atlantic and collected ourselves at Souk el Arba in Tunisia, we numbered about a baker's dozen. We were assigned to a somewhat bewildered 47th Bomb Wing (M) that normally stocked conventional B-25s, and were dubbed the "47th Gun Squadron."

We didn't know specifically what it was we were supposed to do. And despite a certain amount of officious bustling around our airplanes, it quickly became clear that the staff of the 47th Bomb Wing didn't know either . . . which gave rise to the question: What was the G for?

There should have been clues in its configuration. At the outset, the G was really a model C with its nose chopped off, eliminating the bombardier's compartment. The 75-mm cannon was installed in what had been the bombardier's crawlway, and the nose was reconstructed around it and two fixed .50-caliber machine guns.

Losing the nose meant losing part of the bombing system. Bombardier, bombsight, bomb bay door control and intervalometer were lost to the hacksaw.

Somebody decided that the pilot would absorb what remained of the bombardier's functions. The bomb bay door control was moved into the cockpit, as was the intervalometer. The pilot's control wheel was ringed with buttons — one for bomb release, one for cannon firing, one for machine guns, one for radio and interphone operation and, in a few cases, one for photography.

The arrangement gave the G pilot pretty much the same chores an A-20 pilot had. Since the latter managed without a copilot, equal justice required removing the copilot's seat from the G. His control wheel and rudder pedals remained — but no seat.

It follows, of course, that we had copilots, and I for one was glad we did, though they weren't much help on the long flight to Africa. We had to improvise seats for them, and the best I was able to rig up was an accumulation of luggage that left my assistant roughly at eye level with the parking brake handle. He rode all the way to Africa with his knees up around his ears. When I required relief, he reached up in simian fashion to the control wheel and steered chiefly by instinct. I returned to the cockpit occasionally to find us wandering casually around the South Atlantic.

Other modifications based on combat experience were made to the airplane soon after we joined the 47th. They consisted of dropping useless equipment like the lower turret and adding good things like waist and tail guns and seat armor and two more .50s in the nose. Oh, and a copilot's seat.

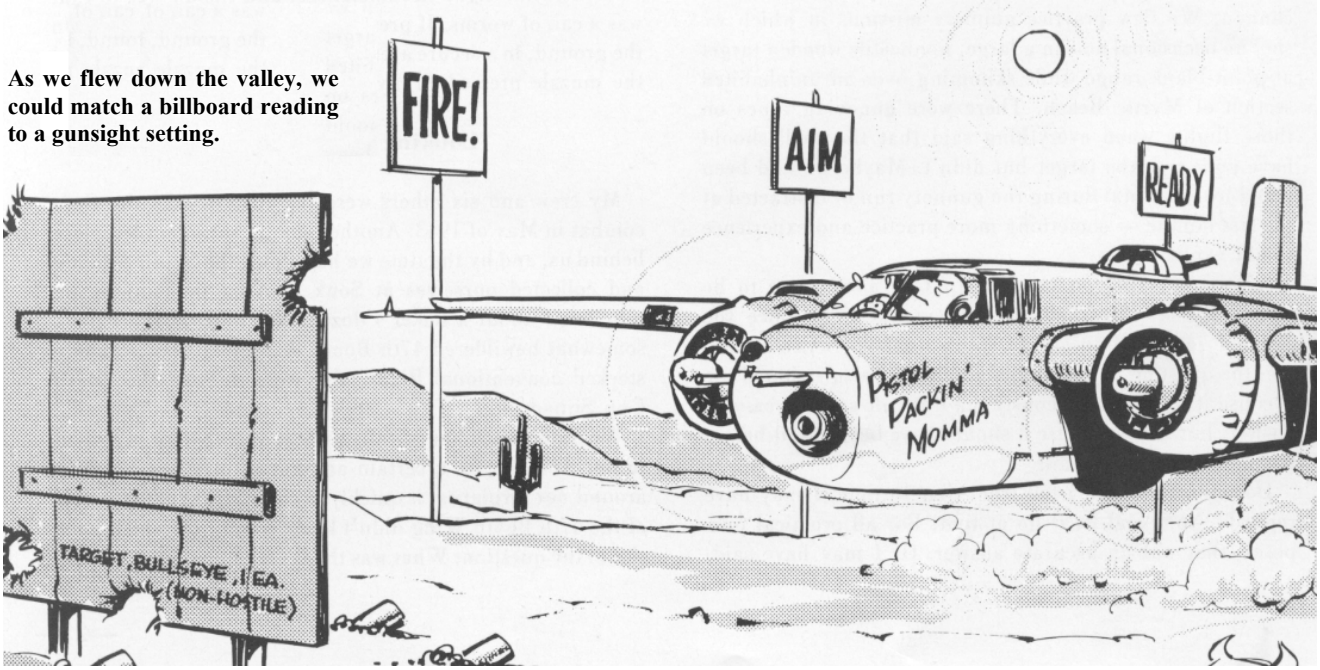
The configuration resulting from these alterations was a gun platform with superficially impressive firepower. However, one critical deficiency was never overcome. With the equipment available at the time, there was no way to estimate range for a cannon moving at better than 200 mph and accelerating, and hence no way to aim it at any distance from the target. So what was the airplane for?

We, of course, had our share of rumors at Columbia. The straight word was that the G was designed for attacks against enemy shipping, that its cannon was intended to suppress antiaircraft fire during low-level skip-bombing runs. There were other straight words but this one dominated.

Skip-bombing had been done with conventional B-25s, armed with one flexible and sometimes one fixed forward-firing .50, during Rommel's evacuation from Cape Bon. They were reportedly real hair-raisers. It was necessary to fly directly over the target vessel in order to skip-bomb, and since the B-25 was extremely vulnerable in making that transit, relative success depended on whether the ship was being defended by antiaircraft fire. The assumption was that the G's cannon would constitute a great equalizer. So much for rumors.

If At First . . .

My crew drew a bye for the first G combat mission. Unaccountably, the target was a German radar station on Sardinia, a selection that seemed to suggest uncertainty in high places about the airplane's intended purpose. The



As we flew down the valley, we could match a billboard reading to a gunsight setting.

mission was not exactly a turning point in the war. The Gs drew a shower of small-arms fire and, except for the language barrier, the station might have provided radar vectors home.

That sort of thing was the first among many that the G was apparently not designed to do. A significant precedent was set on that first mission, though. It was flown in a standard four-ship fighter formation that became the norm for us.

... that left my assistant roughly level with the parking brake.

A comparative history of the G's use in the ETO and in the Pacific seems to point at that tactic as a basic error on our part, which became pretty much set in concrete as the only way to fly. As a result, we never discovered the available massed firepower of larger formations. Our combat tactics also evolved largely from the fighter formation and they diluted even the collective firepower of the four-ship flight.

After Sardinia, it was decided that we would fly conventional missions at medium altitude while people gave the G some more thought and we were distributed among the squadrons of the 321st Bomb Group. Doing routine bombing was a simple matter of presetting the intervalometer and dropping on the lead ship. Then command of the 47th Bomb Wing changed hands and the new incumbent perceived that we were not exploiting the airplane. The next experiment was low-level operations against shipping.

We had already flown several generally meaningless missions of that kind when we weren't needed for medium-altitude operations — long, tedious drills that covered hundreds of miles of open Mediterranean where, it turned out, enemy shipping was least likely to be found at that stage of the war. But one of those missions had gone right up the Italian coastline and in a small harbor had encountered more floating armed hardware than it could handle. So that was where the action was.

The wing commander decided to see for himself if the G could be used effectively against shipping. As it happened, he gave us our first opportunity to put to the test an awful lot of theory, some of it running all the way back to the drawing board. It was our first encounter with a surface vessel of any size, alone and — it turned out — unarmed.

We took off in the early morning. The wing commander, a brigadier general, was flying copilot in the lead ship. Other than that, it was a flawless Mediterranean day. Flying the four-ship formation we had adopted, we angled northeast past Sicily, then east to intercept the coast of Italy. We turned north about a mile offshore and began a search for shipping. Within a few minutes, we stumbled onto an old tanker.

The flight commander signaled echelon left and we complied briskly. After a moment's hesitation that surely included second thoughts about all this, he peeled off and thundered down that long and lonely run that would come to dominate our thinking. Individual attacks seemed a natural outgrowth of the fighter formation, and they too became standard. With the benefit of 20-20 hindsight, I can say with some authority that they were another fundamental mistake.

I was last in line. I rolled out of my turn, flipped up the cannon and machine gun safing switches, set the gunsight at some value and began firing. After these attacks, the ship was not visibly damaged by anything other than the ravages of time.

If I can reconstruct this accurately, my airplane was moving toward the tanker at about 260 miles per hour, which is about 380 feet per second, which is about 127 yards per second. Which is relevant only because the hand-adjusted gunsight was calibrated in yards. The bad thing was that it was calibrated in thousands of yards, at one click per thousand.

And therein lay the G's fatal flaw as an aimable standoff weapon. Setting the gunsight to the nearest approaching thousand yards was sheer guesswork. There were calibrations intermediate to the clicks — 10 subdivisions, I believe — and estimating range to the nearest tenth of a thousand yards was guesswork compounded by an order of magnitude. Since the difference between hitting and missing the tanker was at most a matter of 20 yards in slant range, the tanker was never in serious trouble. Like the other pilots, I fired round after round without coming near it.

The general reached the limit of his forebearance during the four uniformly ineffective runs at the tanker. He turned in wrath to the navigator, an apple-cheeked, imperturbably farm boy from Missouri, and demanded a withdrawal course.

The navigator was stripped to the waist and streaming

sweat from loading the cannon. He stood calf-deep in expended casings and clutched a provisional next shell at the ready. Without blinking, he said, "Fly west, General."

This struck the general as flippant, and he snarled something to the effect that when he asked for a course, he wanted one a little more precise than a hot-dang cardinal point on the compass.

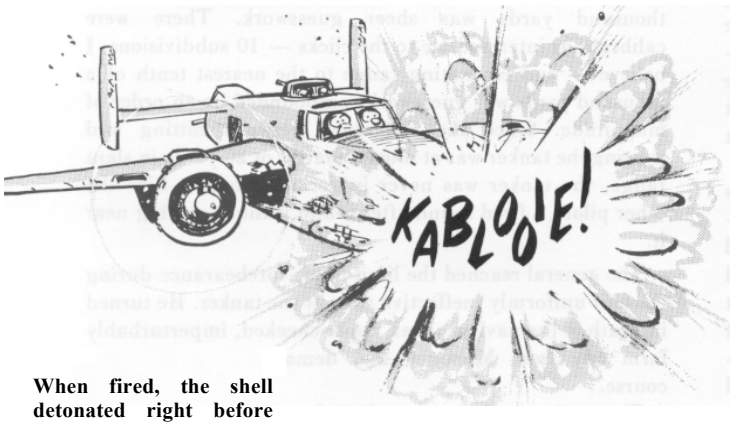
The rosy-cheeked lieutenant listened, then turned around and returned the shell to its storage rack. He clattered and clanged through the casings to reach his chart, consulted it briefly and clanged and clattered back to the edge of the flight deck. He tapped the general on the shoulder. "Don't fly west, sir," he counseled. "Fly 272 degrees."

It was an eminently forgettable day.

Assaulting The Symptoms

Nobody could really fault the general's peevishness, I guess, because an impressive amount of effort had gone into training us, only to have us go to the plate and come away 0 for 4. Much of it had been instigated by the man he replaced. And there had been those Myrtle Beach outings back in the States. What about those?

Realistically, our Stateside training had taught us only a little more than how to fly the airplane, which, in its cannon-carrying configuration, was heavy and not too stable, judging from the number of sandbags lashed into the tail section. That training had familiarized us with the optics, mechanics and circuitry of the cannon, but that's about all that could be expected in light of the fact that instructors and instructees laid eyes on the first G simultaneously. If the former were less than aggressive about making students press home attacks on the wooden targets along the beach, that was understandable, too. The combination of newly winged pilots, newly configured airplanes, 10 feet of altitude at speeds of about 260 mph and recurring explosions in the navigator's compartment as the cannon went off unexpectedly was enough to moisten any IP's armpits.



When fired, the shell detonated right before his eyes!

What little Stateside experience we got with the cannon was limited to use of armor-piercing shells. We didn't know the HE (high-explosive) variety existed until they were handed to us, without enlightening comment, in Africa. Figuring out the difference was an individual problem. The HE shell had a safing pin and a bright aluminum disk in the nose with flat edges on two sides that accommodated a wrench we found with the ammunition. Some mysterious little numbers around the disk were intended to tell us something, I'm sure, because after the safing pin was removed we could turn the disk to align an arrow with any of them.

We had one G replacement pilot who reported that he was drawing heavy, accurate flak during every training mission against an old beached hulk we sometimes used as a practice target. It evolved that he was using HE shells and was "winding up the fuze to make it go" before heaving each shell into the cannon. Without realizing it, he was cutting the fuze to its minimum setting. When fired, the shell detonated right before his eyes. Putting two and two together, he concluded that an unseen gun battery was matching him shot for shot.

While I wouldn't categorize that man as your basic Rhodes Scholar, it's only fair to reaffirm that nobody gave us any instructions on the HE shell. That little omission typified our training as artillerymen when we brought the G to combat.

Early in our tour, before anybody fully recognized the enormity of the rangefinding problem, we flew training missions predicated on the assumption that it could be learned. The scruffy mountains south of our Tunisian base contained a little horseshoe valley in which the previous wing commander had built a series of billboards approaching a monster bull's-eye right in the toe. They announced the distance in thousands of yards to the target, and as we flew down the valley we could match a billboard reading to a gunsight setting, fire a round and observe the results. Our collective marksmanship remained poor despite being told when to fire by a passing roadsign.

In frustration, the wing commander finally gave us permission to experiment and innovate. I think I was the one who suggested that, since range was the apparently insurmountable difficulty, we might try to get around it by dive-gunnery. The thought here was that a vertical attack would eliminate the range question, since target and ocean would be essentially the same distance from the airplane at any point (what this proved is a little obscure, in retrospect). Diving straight down on the target would reduce the gunnery problem, it was argued, to a two-dimensional matter of azimuth and elevation. That it had never been anything else was lost in the semantics somewhere.

The next day, several of us flew out to sea to try dive-gunnery,

using an uninhabited rock as a target.

The obvious had already occurred to us: (1) a truly vertical attack was not feasible in a B-25, and (2) anything approaching a vertical attack would have to be conducted with engines idled and landing flaps full down. What should have been obvious was not. Throttling back the engines to idle at 12,000 feet in cold, moist air, dropping like a safe with the door closed to less than 500 feet, then opening the throttles for a fast getaway wasn't feasible either.

The tests showed that landing flaps did not serve as dive brakes. Before I had lost 500 feet I had exceeded the allowable flap-down speed. To hang onto the flaps, I put them up and promptly exceeded the maximum allowable speed in any configuration. This proved to be a blessing in disguise as I eased the airplane out of the dive and found both engines dying from carburetor ice. Trying to get them going again during the long run-out while the airspeed bled off to believable numbers, my copilot and I established new time records for four-handed exercises.

That was it for dive-gunnery.

We also briefly examined formation gunnery, on the theory that in a salvo many errors might average into a hit. What we got was a lot of average errors. To my knowledge, only four of us made a brief stab at formation gunnery and quickly dismissed it. Ironically, it was close to a tactic that proved successful in the Pacific, even if not quite the same.

Meanwhile, In The Pacific

New Gs and crews began pouring in from the States as if the airplane were a godsend. Soon there were so many that it was decided to reequip the 310th Bomb Group with them. To those of us who had brought the originals over, it meant we were now flight commanders, for lack of anybody more experienced. My squadron was detached soon thereafter and sent to the Libyan coast for operations with the RAF against German shipping in the Aegean Sea. The other three squadrons of the 310th remained in Tunisia in a quasi-training status, flying an occasional four-ship combat mission that still doggedly involved aiming the cannon — and without notable success.

On the other side of the world, the Fifth Air Force was taking a much more pragmatic view of the G. It concluded early that aiming the cannon was a waste of time. Depending on target size, it put six, nine or 12 Gs in a line abreast and used them as a covering force for strafing A-20s and other B-25s with forward-firing .50-caliber machine guns that were used as gunships. The G pilots were briefed not to aim at individual targets but to fire as many rounds as fast as possible. It was not unusual for each G to get off 18 to 20 rounds in a single run. The resulting barrage was intended to do one thing — suppress defenses for the strafers to follow. It worked.

GEN Richard H. Ellis, now Commander-in-Chief, US Air Forces in Europe and then one of the A-20 or B-25 pilots (he flew both) who came in for the kill behind the Gs, recalls that it was very comforting to follow them into a heavily defended complex such as an airfield. The barrage tactic was used successfully against enemy shipping and even to soften up beachheads.

Why didn't we think of that — the barrage tactic? There are several answers. General Ellis suggests one. Targets in the Pacific were different from those in Europe, he points out, and were such that low-level attack was a major Fifth Air Force tactic throughout the war. It was uncommon in the Mediterranean.

There was something else. All our early experimentation with the airplane had the objective of finding a way to aim the cannon effectively. It had nothing to do with tactics as such but with technique, and involved a sort of naive GI faith. The airplane was issued to us with a cannon and gunsight for it calibrated in thousands of yards. To our uninstructed minds, it followed that it was possible to hit a target thousands of yards away. Since that reasoning precluded consideration of the inadequacies of a rapidly moving and not always stable airplane as a gun platform, the problem was to discover what we pilots were doing wrong when we missed. One high-ranking officer concluded it was a disciplinary matter. He proposed that pilots be required to sign statements of charges for shells that went astray. That, too, may have been a major difference between ourselves and the Fifth Air Force.

In early 1944, my squadron was recalled from Libya to a new base on Corsica where we were to finish out our tours doing conventional bombing. It had been a full year since we first began flying the G, and few of us ever flew it again.

The B-25 remained in the Air Force inventory for years after World War II for administrative and pilot proficiency uses. It was a solid, stable, dependable old bird that could be trusted in fair weather and foul. Two versions of the airplane that were junked immediately at war's end, however, were the G and its successor, the J. It seemed nobody could find a peacetime application for an airborne 75-mm cannon. I don't find that surprising. Nobody in my theater of operations could figure out what to do with one in wartime.

LTC (Ret) Jim Beavers, USAF, spent the majority of his Air Force career in R&D, specializing in nuclear weapons applications. At the time of his retirement in 1963, he was serving on the Air Staff in War Plans.

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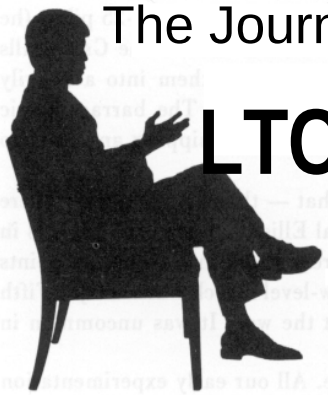
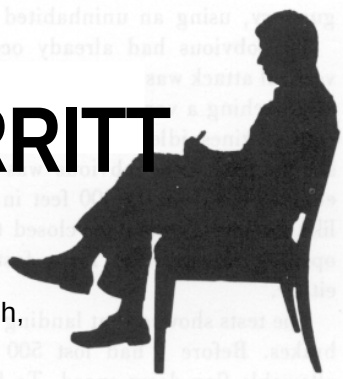
Cartoons by Bob Stevens

The Journal Interviews . . .

LTC WILLIAM D. MERRITT





Chief, Field Artillery — Air Defense Artillery Branch,
Combat Arms Division Enlisted Personnel
Management Directorate, MILPERCEN

Lieutenant Colonel Merritt was born in Searcy, AR, and was graduated from Arkansas State University in 1958. He has served with artillery units in Germany, Vietnam and CONUS. Most recently, he commanded the 1st Battalion, 73d FA Battalion, XVIII Airborne Corps Artillery, Fort Bragg. He is a graduate of the Command and General Staff College and a recent selectee for the FY 77 Army War College. Prior to assuming his current duties, Lieutenant Colonel Merritt was the Deputy Chief, Enlisted Personnel Management System Task Force, US Army MILPERCEN.

Journal: What does the Field Artillery Branch want the soldier to accomplish early in his career?

Merritt: Well, ideally he would serve his initial enlistment in a field artillery unit, i.e., firing section, survey section or fire direction center. He should become highly proficient in all aspects of his primary MOS (PMOS) — using the MOS study guide, taking correspondence courses and attending any MOS-related schools or leadership schools available at his installation.

Attend primary noncommissioned officers course (grade E4), acquire Skill Level 2 (see March-April 1975 *Journal,* "The Journal Interviews . . .") as soon as practical and continually seek duties requiring a high degree of leadership and responsibility.

Strive for an above-average MOS evaluation score and/or a "higher passing score" when the Skill Qualification Test (SQT) is implemented under EPMS. The PMOS evaluation is an essential management tool and is often the most important document in consideration for promotions, reenlistments, schooling and assignments. Here I might add that the NCO and the officer must accept as one of their basic responsibilities the training and developing of junior soldiers. We must imbue the officers and NCOs at the troop level with this sense of responsibility for the professional development of their subordinates. They must conduct unit training to prepare and better qualify the soldier and take maximum advantage of the new training extension course (TEC).

Journal: What are the career objectives?

Merritt: Field artillery is our primary business. The best preparation for a successful career is to become fully qualified in your primary specialty. During the initial tour the FA soldier's duty MOS must be his PMOS. If the soldier finds himself assigned for prolonged periods outside his PMOS, he should use the chain of command to facilitate returning to duty in his PMOS. AR 600-200 directs that the first-term soldier be utilized in his PMOS. The needs of the combat arms dictate that combat soldiers be utilized in their MOSs. The soldier who seeks out administrative or supply-type duties is only hurting himself. Reclassification to a combat support or combat service support MOS is seldom supported unless a fully justified medical reason dictates the action, and then only if the reason precludes his performance in another type combat MOS.

Journal: What about the secondary MOS (SMOS)? Does it benefit the soldier or is it detrimental to his career?

Merritt: Let me answer the last part of your question first. Skills and knowledge possessed by the soldier in addition to his primary specialty certainly do not serve to the detriment of the soldier, managers or the Army. The current policy requires a soldier who does not have an SMOS when promoted to E6 to select one. There are exceptions to this policy, especially for MOS implemented

under EPMS. We here at MILPERCEN are reviewing the SMOS in its entirety and are considering having each soldier select an SMOS immediately following the first reenlistment and be tested before his sixth year of service. In this decision, consider an MOS that will enhance your future in field artillery — one that will increase your overall value to the combat arms team. This is especially important to the soldier and to his commander because it permits assignments to duties other than his primary when accomplishment of the mission dictates.

Journal: What can the career soldier do to enhance his promotion potential?

Merritt: First, always seek to be assigned to the duty position for which you are trained. Ideally, your duty position should be as follows: primary MOS, secondary MOS or an MOS within your career management field (CMF) (AR 611-201 identifies each CMF and the related MOS). Qualify in your SMOS as soon as possible. As mentioned, attend MOS related courses, off-duty civilian schooling and other types of training to improve your overall value to the service. Remember, promotions are based on your demonstrated potential to perform at the next level. Redlegs are going to have to prove they are qualified at the next level before being eligible to compete for promotion — this means completion of NCOES or on-the-job experience (OJE) and a higher passing score on the SQT. Promotion to grades E7-E9, centralized at DA, is based on a DA selection board. The qualitative criteria for selection are very stringent, and the board compares each soldier to others in his CMF using the same criteria. Length-of-service and time-in-grade do not qualify a soldier for promotion; these only determine who will be considered by the selection board. Boards are instructed to identify those soldiers who, in the board's collective judgment, possess outstanding histories of past performance and the highest potentials for continued outstanding performance at the next higher grade. To better explain the degree of competition, during the last E7 selection board, while 1,090 soldiers in CMF 13 were in the zone, projected vacancies would only allow for the selection of 323. In reviewing the files of some of the nonselections, I noted that MOS evaluation scores received while performing duties outside of their CMFs were lower than the average of other soldiers serving in CMF 13. Likewise, recent trends of declining scores in recent reports were often noted. Here I might point out how the soldier may make a self evaluation using his MOSE and EER. Compare your Enlisted Efficiency Report Weighted Average (EERWA) with the Army average. The current Army averages are:

E9 - 123.8	E6 - 115.9
E8 - 122.5	E5 - 111.15
E7 - 120.8	E4 - 102.4

Then compare your MOSE with the following:

100 - Average (50 percentile group)
110 - Top 30 percentile
120 - Top 20 percentile
130 - Top 10 percentile

Journal: What about the Noncommissioned Officers Education System (NCOES) — who should attend and what are the prerequisites?

Merritt: We currently have three levels: Basic, Advanced and Senior. However, under EPMS this will be expanded to four levels with a Primary NCO Course/Combat Arms (PNCOC/CA) being added at the E4 level. Under EPMS, the primary course will be a must for all soldiers in MOS 13B and 13E before being promoted to E5 and should certainly be an objective for all other MOSs. The PNCOC/CA and the Basic NCOES for the combat arms will be taught at the installations and will replace the existing NCO academies. Officials at TRADOC, other major commands and MILPERCEN are currently analyzing details of a plan which not only will upgrade the quality of Basic NCOES training and instruction, but also will permit a greater number of E5s to participate in the revised program. The plan, which already has been given concept approval, calls for relocating all combat arms Basic NCOES instruction from five TRADOC service schools to the NCO academies in the field. This would establish common training sites for both the combat arms Primary and Basic courses, which follow sequentially under the NCOES system. Even more important, however, is the wide-ranging prospect of improved professionalism throughout the NCO corps. Ultimately this will permit more soldiers to benefit from quality training. Now to address the existing courses. Selection for the Basic course for grades E4-E5 is handled by the unit with annual allocations made to the installations based on school seats available. Here, commanders are encouraged to send the outstanding young soldiers who have MOS scores of 100 or above and who have demonstrated strong leadership potentials. Attendance at the Advanced NCOES (ANCOES) is by DA selection on an annual basis. Soldiers selected must have evaluation scores of 100 or above to be considered. Selection is based on the soldier's overall record and demonstrated high potential value to the Army — the whole-man concept. This past year 320 were selected for ANCOES with FA MOSs. The average MOS score for those selected was 116 and the average EERWA was 119. Attendance at the Senior NCOES, United

States Army Sergeants Major Academy (USASMA), is also determined by DA selection and is extremely competitive. As an example, the latest selection list included 16 field artillerymen with an average PMOS score of 128, an average SMOS score of 103 and an average EERWA of 121. Of the 16, 15 had served one or more years as first sergeants. Fourteen had previously served as chiefs of firing battery, missile platoon sergeants, chiefs or FDC or survey chiefs. Ten had served as instructors or drill sergeants and 12 had performed staff duties in operations/intelligence.

Journal: What assignments are available and what should the artilleryman seek?

Merritt: For the younger soldier, stay within your CMF. This is quite akin to the philosophy of telling the young officer to "go to the sound of the guns."

As mentioned earlier, any assignment outside of your PMOS may result in lowering your proficiency and, thus, lowering your MOS test score. Instructor duty and/or drill sergeant (DS) duty are considered ideal assignments at grades E6-E7. Branch considers this as the ultimate assignment for the outstanding young NCO after having proven himself in a TOE unit. Upon completion of an assignment as an instructor or DS, you should be prepared to return to troop duty as a section chief or chief of firing battery. The senior E7 should never miss a chance for duty as a first sergeant. In addition, NCOs in the grades of E6-E8 should seek staff assignments in operations or intelligence to better prepare for future utilization in positions of high responsibility. The E7 or above may request assignemnt to ROTC or Readiness Regions. Assignments of this type are highly competitive and normally go to personnel with EERWA and PMOSE scores in the top third.

Journal: What geographical areas are available?

Merritt: All too often we get preference statements (DA Form 2635) from soldiers asking for places in which we do not even have military units, much less artillery units. Then, when we assign them elsewhere, we hear how we disregarded the "dream sheet." I encourage every soldier to submit a preference statement, but be realistic. Don't ask for Paris, London, Japan or Los Angeles. Determine where the artillery units are located and ask for your choice from that. We currently have requirements in Germany, Korea and Hawaii for 13 series personnel. We have one battalion in Alaska and one battery in the Canal Zone. Also, we have artillery detachments in Turkey, Greece, Italy and the Netherlands. In CONUS we have requirements at Forts Bragg, Stewart, Benning, Polk, Knox, Campbell, Hood, Sill, Riley, Bliss, Carson, Lewis, Huachuca and Ord. NCOs seeking ROTC or Readiness Region duties may request any of the states.

Journal: How long a time period should the soldier expect between overseas tours?

Merritt: This varies by grade and MOS, but basically the following is true:

13B - 24-30 months
13E - 24-26 months
13Z - 30 months
15 series - 18-24 months
17 series - 24-26 months
82C - 24-30 months

I should expand on this. As shown here, the time varies by MOS and also by grade. This happens because of stabilization, changes in organizational structure and many other variables. The 15 series is compounded by the space imbalance; that is, the ratio of requirements in CONUS and overseas. The majority of the 15 series positions are in Europe and this results in a shorter turnaround time. To offset this, we have been using the Controlled Secondary MOS (CSMOS) program in which we take selected personnel from other MOSs and place them through training in 15 series MOS and assign them to Europe in the CSMOS program. The individual serves in his SMOS while in Europe and returns to CONUS in his PMOS. Each time we place a soldier overseas in his CSMOS, it permits a 15 series soldier to remain in CONUS for a longer period of time. The goal is a minimum of 24 months between overseas tours.

Journal: When should the soldier expect to receive assignment instructions?

Merritt: The individual should receive his assignment instructions 90-120 days before departure date from his present duty station. Here at the MILPERCEN we operate as follows: Personnel eligible for reassignment are identified for assignment through the Centralized Assignment Procedure (CAP III). Each individual's three position MOS (13B) is checked against a block of requisitions. If there is a match, a check is made for command eligibility. Following this check comes a test to determine if the soldier has the special qualifications called for by the requisition. These basic checks establish eligibility. The determination of eligibility is based on the individual's area of preference

(taken from SIDPERS), grade, sex, skill level, SQI, security clearance, last PCS, acquired skill indicator (ASI), promotion status, VRB, etc. When this is accomplished and the individual's name is nominated for assignment, the career branch manager then reviews the Career Management Individual File (CMIFs are currently maintained on E6 and above) to determine if the assignment is valid. This is where the "personal" is put into personnel; that is, your career manager will screen your CMIF to determine if other information which should be considered is available. There are numerous reasons for this. Suppose the individual nominated has made application for special schooling or has volunteered for another type of assignment. For professional development reasons, it is possible the soldier shouldn't be assigned to the type of assignment [being considered]. These are all addressed before the assignment is finalized. Once finalized, assignment instructions are issued to the losing command with information to the gaining command through CAP III, where the MILPO notifies the soldier and issues orders.

Journal: How much control does the FA Branch have over specific duty assignments?

Merritt: Branch normally assigns soldiers to a major command. We cannot guarantee a specific unit or type of duty since this is the prerogative of the commander concerned. However, we do monitor to insure that personnel are assigned within their CMFs and, where we note a soldier being malutilized, we contact the field to request proper utilization or justification as to why not. In this case the individual soldier should request proper utilization and, if the soldier can't be utilized properly, he must be reported excess.

Journal: One final question. What about concurrent travel when the soldier is placed on orders?

Merritt: Europe is currently studying this to attempt to increase the number of approvals. At one time, approval was based on the availability of government quarters. However, if the individual now indicates on his application that he is willing to accept economy quarters, dual availability checks are made for both government quarters and economy quarters in the location of assignment. When quarters are predicted to be reasonably available in either category within 30 days after arrival, concurrent travel is normally approved. If quarters are predicted to be available between 31 and 140 days, deferred travel is approved. Deferred travel allows the soldier's dependents to remain in CONUS government quarters until such time as the sponsor is provided quarters overseas. USAREUR is currently placing great emphasis on the sponsor program and, if economy quarters can be located through the sponsor, concurrent travel is authorized.

Journal: Thank you, sir.

FIST!

[*continued from page 21*]

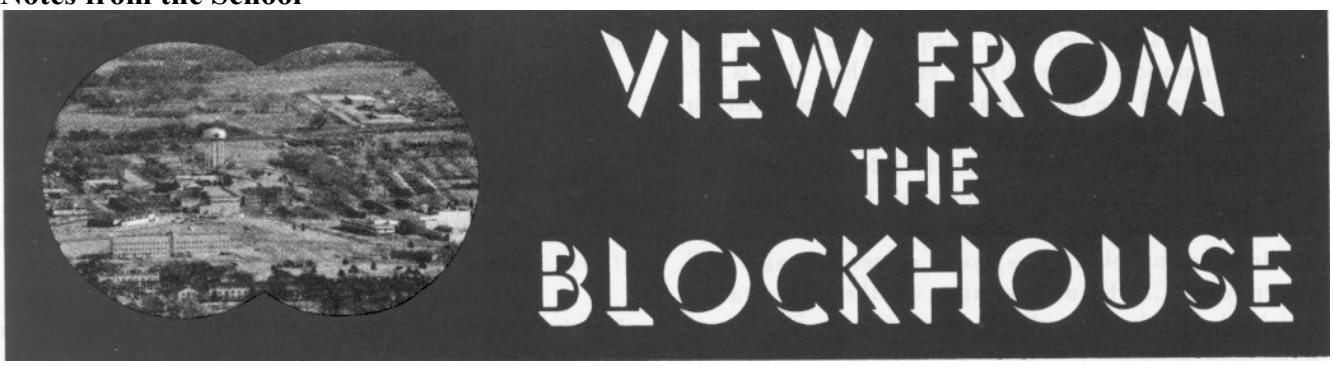
British don't even stop at this quick fix. They recognize that the proof of fire support is not at the battery position — it is at the maneuver force. And they think enough of this to put a major — battery commander — there.

Problems? Sure there are problems with the new organization — just as there are problems with any organization. Here are a few that need some working on: What do you do with a newly arrived captain who is senior to all the battery commanders or the very senior captain who really isn't good? Chances are he is now an infantry battalion fire support officer or a battalion staff officer. If he happens to be a fire support officer he can't very well be subordinated to a cracker-jack, front runner, battery commander who is junior in date of rank. There should be enough "static" in the system to find a home for the new man or the under-achieving senior captain. What does the battery commander do when the infantry battalion he is with goes into a reserve mission? Right now we generally leave the FSO and FOs with the infantry battalion so that they can be rapidly committed. This problem can be solved fairly easily, but new school doctrine must be developed.

Be careful!! Don't do this — don't transfer the current captain FSO space to the firing battery and concurrently or subsequently downgrade it to a first lieutenant space. This leaves everyone in bad shape — sometimes in even tragic shape. There isn't enough maturity and experience in all the captains we now have. Reducing the number of captains will assuredly reduce the firing battery's proficiency and fire support coordination as well.

One last question? Why isn't the brigade fire support officer a major?

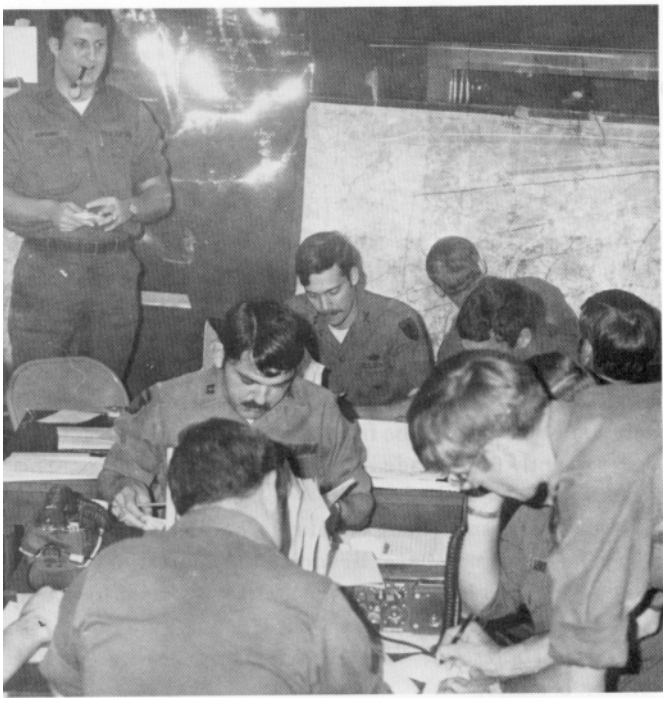
COL Warren A. Samouce, FA, is Commander of the 101st Airborne Division Artillery, Fort Campbell, KY.



New CPX For FAOAC

Training for resident students of the Field Artillery Officer Advanced Course (FAOAC) has been revised to include a new computer-assisted command post exercise (CPX). Providing a practical application for principles and techniques taught in the classroom during FAOAC Phase I, the exercise allows for direct student participation in the operations of field artillery units engaged in actual battle.

The CPX is conducted from two sites — the CPX control facility in Knox Hall and the actual field artillery unit positions on Fort Sill's East Range. Representatives from the School's Gunnery and Weapons Departments act as advisors during the field portion of the exercise. The CPX control facility is manned by advisors from the Tactics and Combined Arms, Counterfire, Communications and Electronics and Gunnery Departments as well as US Air Force personnel.



Staffed with advanced course students, the CPX div arty command center reacts to counter new threats on the East Range.

A grim scoreboard — player-controller moves Warsaw Pact unit deep into "allied" territory.

Instructors assume the roles of division artillery, brigade and battalion commanders, lending a degree of realistic interplay as the exercise progresses. The immediate presence of advisors and instructors alike enhances the CPX as an effective vehicle of instruction.

Actual battlefield conditions are approximated whenever possible. Camouflage netting hangs above entrances to all control centers and the space available to each center is the same allotted to a field unit. Students in the field call for and receive live fires on East Range targets while serving at levels of command ranging from forward observer to intelligence and operations officers.

There are no prepared solutions to the exercise. The interaction between predesignated "enemy" and "allied"

teams produces an element of free and unpredictable play. Students tasked with the command of "enemy" forces frequently employ Warsaw Pact doctrine and tactics thereby giving all players a taste of action from both sides of the modern battlefield.

USAFAS And ASA Publish TC

The Field Artillery School and the Army Security Agency (ASA) have published TC 6-121-2, "FA and ASA — A Targeting Team." The training circular is for use by both field artillerymen and intelligence personnel at the division level. For the field artilleryman, it identifies the capabilities of ASA's listening and locating stations to acquire targets. For ASA personnel and other members of the G2 staff, the TC illustrates the nature of field artillery fires and stresses the need for timely, accurate targeting data.

ASA units have acquired targets for attack by the field artillery for many years but procedures to make the system work have never been stated clearly, other than in local SOPs. TC 6-121-2 establishes a set of procedures that can be adapted for use by any division that has an ASA Tactical Support Element (ATSE) provided by the division ASA direct support company. For divisions without ASA support, the TC provides a basis for simulating the type of targeting data available in a tactical situation.

The TC is published in two parts — the basic TC and a classified supplement. The basic portion identifies the procedures the G2, G3, field artillery personnel in the fire support element (FSE) and the ASA company commander can use to establish a responsive targeting system. The classified supplement contains a list of selected targets that would be present on the modern battlefield for attack by field artillery (e.g., 122-mm howitzer battery, artillery command observation post), the radios and radars associated with each target and the capabilities of ASA units to locate these devices.

The classified supplement should be used as a guide for personnel in the FSE, especially artillery intelligence officers, to develop targeting requirements that can be translated into tasks for ASA assets. The directing step of the intelligence cycle is outlined to assist field artillerymen requesting ASA support through G2. The circular emphasizes that the division commander should become personally involved in deciding priorities for intelligence collection, as there may be conflicting requirements and limited intelligence collection resources.

The competing demands for the employment of ASA assets and the requirements for analysts to produce diverse, all-source intelligence present difficult choices at all levels of command. TC 6-121-2 stresses that ASA listening and locating stations can acquire targeting data for the field artillery and intelligence information for decision-making at the same time. Requirements must be stated clearly. Intelligence analysts must understand their multi-purpose role in developing intelligence and predicting targets.

Targeting data produced and identified by personnel in the special intelligence facility (All-Source Intelligence Center) must be disseminated quickly to the G2/G3 element and the FSE in the division TOC. Security procedures cannot be so stringent as to impede the transmission of perishable targeting information. If security restrictions prevent the rapid flow of targets during training exercises, then it is unlikely ASA information will be timely when the shooting starts.

On balance, the TC formalizes a system for developing timely targets for the field artillery from ASA-acquired listening and locating information. The procedures are applicable to maneuver brigades as well as the division artillery. The fluidity of the next battlefield will require the development of targets and intelligence much quicker than ever before. TC 6-121-2 is intended to help achieve that objective.

Clip And Save

Redleg writers at a loss for a research topic, take heart! The School's Morris Swett Library (March-April 1976 *Journal*) has prepared a number of bibliographies on selected military subjects for the use of interested personnel.

Sample available listings include:

- The History and Development of Fort Sill
- Military Heraldry, Insignia, Decorations, Crests, Medals
- Guerrilla Warfare
- ROTC, A Bibliography
- Artillery of the United States
- Development of Field Artillery
- Night Operations
- Counterinsurgency
- Vietnamese Conflict, 1961-1973
- The 1973 Middle East War

Additional information regarding the content and availability of these and other bibliographies may be obtained by writing: US Army Field Artillery School, ATTN: Morris Swett Library — Reference Librarian, Fort Sill, OK 73503.

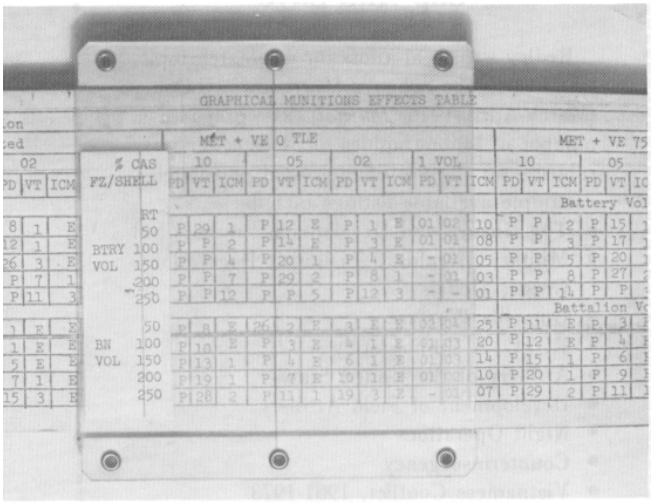
GMET Series Now Available

The School's Tactics and Combined Arms Department has developed a series of graphical munitions effects tables (GMET). Constructed on the familiar slide rule format, the device is designed to aid the fire direction officer in selecting the most effective method of fire on given personnel targets.

In operation, the GMET is aligned on the percentage of casualties desired and the radius of the target to determine appropriate combinations of fuze, shell and number of battery or battalion volleys. Marginal data will provide parameters considered in GMET construction.

The device has been produced in four versions and is currently available through normal supply channels.

National Stock Number	GMET	Classification
1220-01-021-7277	Training Edition	Unclassified
1220-01-021-7278	105-mm, M102 howitzer	Confidential
1220-01-021-7279	155-mm, M109A1 howitzer	Confidential
1220-01-021-7276	8-inch, M110 howitzer	Confidential



Recommended basis of issue is:

Classified GMET:

One per firing battery and battalion operations/fire direction center per weapon caliber authorized.

One per caliber for div arty TOC.

Two per caliber for div arty FSE.

One per caliber for corps arty FSE.

One per caliber for corps arty operations/intelligence section.

One per caliber for FA group operations/intelligence section.

Unclassified GMET — As required for training.

Obtain Forms Through Pinpoint

Previously distributed on a trial basis by the Field Artillery School's Gunnery Department, the following field artillery forms are now available through the AG Pinpoint Distribution system:

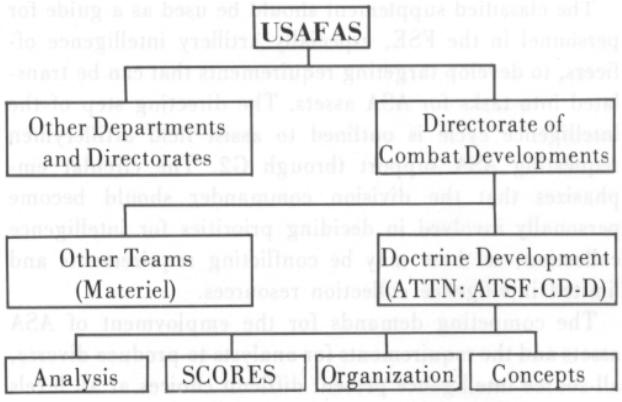
- DA Form 4504 — *The Record of Fire.* (This form replaces DA Form 3622, *The FDC Computer's Record* and DA Form 4007, *Firing Battery Section Data Sheet*.)
- DA Form 4505 — *155-mm Nuclear Computation — Met Correction Technique*
- DA Form 4506 — *1:25,000 Template.* (Used to expedite fire plan plotting procedures.)

The forms will no longer be distributed by the School. All field artillery units should insure they have current pinpoint accounts.

Doctrine — Where It's At

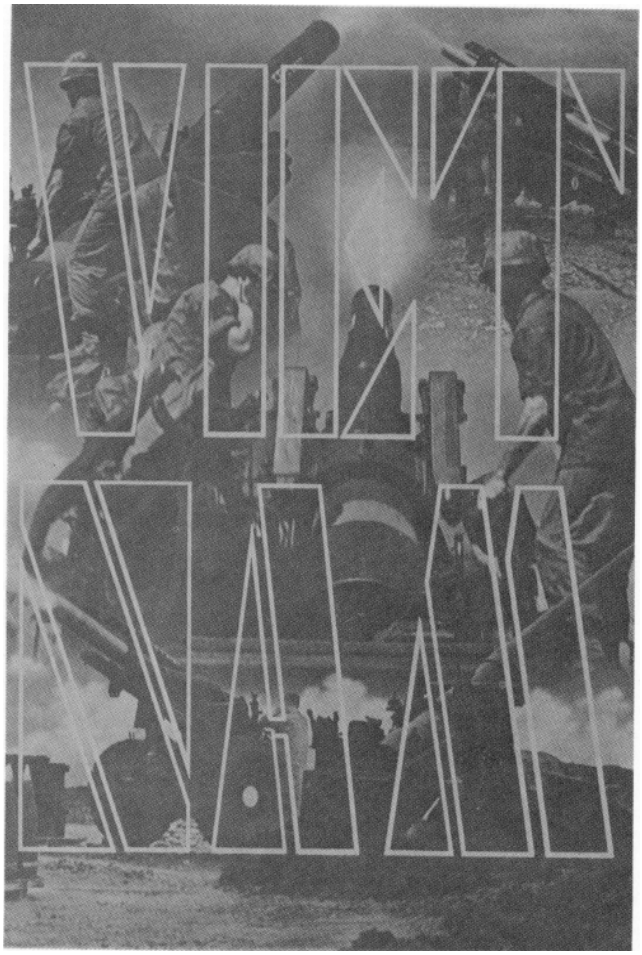
As a result of the recent reorganization of the school (*FA Journal,* March-April 1976, pages 57-59), overall doctrine development responsibility has returned to the Directorate of Combat Developments (DCD). This is a logical placement of the function within the School as doctrine and organizational developments are inextricably tied to materiel development.

Within DCD, the Doctrine Team has responsibility for doctrine and organization developments. The Doctrine Team presently consists of four branches: Analysis, SCORES, Organization and Concepts.



[*continued on page 50*]

Part V The Hot War (Conclusion)



Operations And Raids

by MG David E. Ott
Commandant, USAFAS

Various organizations were adopted for the field artillery in Vietnam during the Tet offensive to meet both the peculiarities of certain short-term operational requirements and long-term needs. Artillery commanders at all levels were flexible and innovative in organizing their subordinate units to provide the best possible support.

At the start of the Tet offensive 34 US Army artillery battalions were in Vietnam. For the most part they were organized to provide dedicated support to divisions or separate brigades or to provide area coverage. Units in I and II Field Force Artilleries served primarily in the latter role. I Field Force Artillery, with two artillery groups — the 41st and 52d — and two separate battalions, provided force artillery in the II Corps areas. II Field Force Artillery, with two groups — the 23d and 54th — provided force artillery for both III and IV Corps areas. The 108th Artillery Group was not assigned to either field force. Before Tet the 108th had been placed under the operational control of III Marine Amphibious Force to provide artillery support in the I Corps area. The group was reinforced with the 1st Battalion, 83d Artillery (8-inch and 175-mm), from the 54th Artillery Group.

This organization served US maneuver forces and augmented South Vietnamese artillery when needed during Tet; however, some reorganization took place thereafter. During the first half of 1968, General Westmoreland created two new headquarters to coordinate the actions of US forces in I Corps and in the Capital Military District. In March the Provisional Corps, Vietnam (later changed to XXIV Corps), succeeded Military Assistance Command Forward, which had been operational since 9 February; and, in June, the Capital Military Assistance Command reestablished the coordination which existed during the brief existence of Task Forces WARE and HAY. The command paralleled that of the newly established Military Governor of the Capital Military District, who controlled all South Vietnamese Army, Regional and Popular Forces, National Police and General Reserve in the district. This reorganization prompted, in turn, a reorganization of artillery. In I Corps a provisional Corps Artillery, Vietnam, was formed. No separate US artillery command was formed to serve the needs of the Capital Military Assistance Command, but artillery units around Saigon could look to a single centralized clearance and coordination activity.

Fourth Firing Battery

Despite the amount of artillery in Vietnam, the old cry that there were not enough artillery units to support the maneuver elements was heard again and again. The creation of a fourth firing battery in some artillery battalions, particularly with the division artillery direct support battalions, dramatized the requirements and the

response. There were generally two reasons for the extra battery. First, in a brigade, it was not uncommon to have a fourth maneuver element resulting from the use of the divisional armored cavalry squadron as a separate maneuver force. A fourth firing battery was essential to insure the timely delivery of fire to this fourth maneuver element. Second, the large areas of operations assigned to division were often difficult to cover by division or field force artillery under conventional organization. A fourth firing battery alleviated this condition. Otherwise, the desire to keep maneuver elements within the range of a 105-mm battery restricted operations.

The requirement for additional firing batteries could be satisfied in a number of ways. In one instance, Headquarters, US Army, Vietnam, authorized a fourth battery for the 3d Battalion, 319th Artillery, 173d Airborne Brigade. The 3d Battalion supported five maneuver elements and badly needed the additional artillery. Additional firing batteries in all other cases were organized from existing assets. Typical was the artillery reorganization in the Americal Division. Each of the division's direct support battalions was reorganized into two five-tube and two four-tube batteries. The 1st Infantry Division had a more unusual solution. One or two 4.2-inch mortar platoons were attached to each of the division's direct support artillery battalions and designated Batteries D and E. Although attached to the headquarters battery for administration, these platoons functioned tactically as separate fire units. The range of the mortars limited their employment in the direct support role. Consequently, they defended base camps or covered fire support bases that were out of range of other field artillery. The particular situation of many artillery battalions did not require the formation of a fourth battery. Even so, contingency plans often were developed to permit the reorganization on a moment's notice if the situation were to change. II Field Force Artillery, for instance, required all light and medium battalions to have contingency plans for forming a fourth battery from organic assets. None of these reorganizations made the support rendered less effective. The nature and size of targets most frequently encountered in Vietnam (six or less personnel) could be engaged effectively with four (rather than six) howitzers per battery. In fact, four-tube batteries frequently were more compatible with the small position areas available.

One of the most interesting organizations was that of Battery D, 2d Battalion, 13th Artillery. This was a composite 105-mm and 155-mm battery which was formed temporarily on two occasions for a specific purpose. Battery A, 2d Battalion, 13th Artillery, provided three 105-mm tubes and Battery B, 3d Battalion, 197th Artillery, provided three 155-mm towed weapons toward the formation of the battery. The regular gun crews were transferred along with the weapons. Other battery personnel and equipment requirements to flesh out Battery D were filled by both contributing batteries. The unit capitalized on the advantages of both calibers for jungle operations. Whereas the 155-mm howitzer was more effective for firing in the triple-canopy jungle, the 105-mm was more effective for close-in defense and for delivering fire at high rates. Battery D, known as the Jungle Battery, operated in direct support of the 3d Mobile Strike Force, a joint US-Vietnamese Special Forces command during operations in War Zone D.

Target Acquisition

Targets must be found and their locations pinpointed if field artillery is to be effective. In Vietnam, as in past wars, forward observers (augmented by aerial observers) served as the principal means to identify artillery targets. Despite the development and improvement of other target acquisition means, observers were, and promise to be for some time to come, more reliable, flexible and responsive than any other system. This does not mean that other target acquisition means are not valuable: radars, sound and flash ranging and sensors were employed profitably in Vietnam.

Three target acquisition batteries were deployed to Vietnam. They were Battery F, 2d Target Acquisition Battalion, 26th Artillery; the headquarters batteries of the 8th Target Acquisition Battalion, 26th Artillery; and, the 8th Target Acquisition Battalion, 25th Artillery. Each of the headquarters batteries was assigned to a field force headquarters to coordinate field force level target acquisition activities. Battery F established sound and flash bases in the XXIV Corps area to monitor the Demilitarized Zone. This was the only sound ranging equipment employed, and, though the equipment failed to detect a large number of targets, all sound-located targets that were engaged resulted in secondary explosions.

FADAC computer with back-up chart and radio communications.

Radars

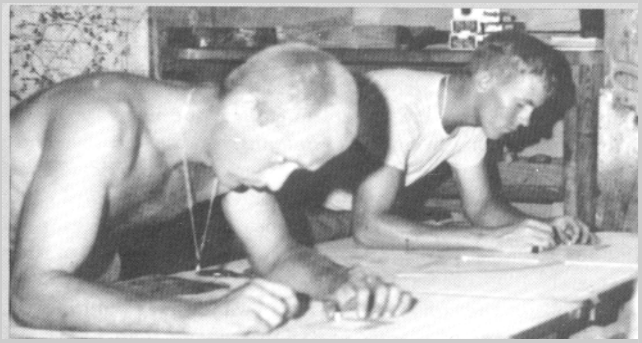
Two field artillery radars — the AN/MPQ-4 countermortar radar and the AN/TPS-25 ground surveillance radar — were deployed throughout the country. The AN/MPQ-4 was assigned to every direct support battalion, and the AN/TPS-25 was assigned to every division artillery. Both radars were also assigned to field force radar detachments.

Most units believed that the AN/TPS-25 did a good job and was a valuable piece of equipment. However, units identified two major shortcomings of the AN/MPQ-4; the radar had a small sector of scan, and it could not locate low-trajectory weapons, specifically rockets. The first shortcoming could be alleviated significantly where several radars were available to provide mutual and overlapping coverage. The second could not be corrected because the radar had been designed solely to detect high-trajectory weapons.

An evaluation of the effectiveness of the AN/MPQ-4 was conducted in 1969. The study revealed that out of 1,759 attacks over a six-month period the radar determined only 342 confirmed launch locations for an overall effectiveness average of 19.44 percent. For the months of May and June, the study singled out the limited sector of scan as the foremost disadvantage. The set could scan only a 445-mil sector at a time, which accounted for many nonsightings. Of 537 attacks by fire during these two months, 253 occurred out of sector, 56 during normal off-time for the crews and 20 while the set was down because of mechanical failure. In the remaining 208 attacks in which sightings were possible, 89 sightings were made, for an overall operator efficiency of 42.8 percent. The enemy, aware of these limitations, initiated mortar and rocket attacks from positions outside the scan of the radar; he first noted the orientation of the radar and then selected the axis of his attack. In order to cope with this handicap, US troops employed a screen to conceal the direction in which the radar was oriented.

As with any sophisticated equipment, the value of the Q-4 was directly related to the degree its use was emphasized by commanders. When careful consideration was given to its positioning and employment to realize its maximum effectiveness, the radar crews felt that their work was important. They, in turn, strived to obtain maximum effectiveness from their radars. On the other hand, lack of command interest often resulted in a radar being positioned on the corner of some installation where it was ignored, and its crews became bored and indifferent.

The radar was valuable in fulfilling certain tasks for which it was not specifically designed, such as registering batteries, locating the limits of friendly villages, determining the battery center when survey was not available



1st Battalion, 8th Artillery, FDC. Primary plotting chart with check chart.

and directing friendly aircraft in bad weather or at night. Hamlets within range of an AN/MPQ-4 radar were located by hovering a helicopter over the hamlet while the radar computed an eight-place coordinate. On frequent occasions the 2d Battalion, 9th Artillery, used its Q-4 to establish the location of firing units within range. After the base piece had fired a round with charge 1, high angle, because of the low muzzle velocity of the round, the Q-4 could compute an accurate location within 50 meters. A good example of the radar's use in directing aircraft occurred during Operation WHEELER in October 1967.

Sensors

Sensors were employed extensively in Vietnam to determine targets. The sensors were not part of the field artillery target acquisition equipment, but the intelligence elements responsible for their employment and the artillery worked closely together. Pre-positioned field artillery was the only fire support means that could respond immediately to sensor activations. The first family of sensors sent to Vietnam were air- and land-emplaced types. They sensed intrusion by enemy vehicles or foot troops either seismically, accoustically or magnetically. The sensors, planted in strings, had several important advantages. The direction of movement, the size of force and the length of the columns could be determined. Once the direction of movement was determined, mortars and artillery were prepared to fire on another sensor further along the string when that sensor was activated. A mixture of sensors eliminated erroneous readings and verified readings for more accuracy; alone, readings of the basic seismic sensor could be of questionable value, but acoustic and magnetic sensors mixed in the sensor string produced more valid data. Sensors first gained notoriety when they were used in the creation of the so-called McNamara Wall, a 40-kilometer-long barrier system extending across the Demilitarized Zone into Laos. The system consisted of sensors to detect enemy intrusion, physical barriers to impede enemy movements and tactical troop units to strike at enemy incursions. Most of the firepower to support the

system came from artillery, tactical air and naval gunfire. The aim of the system was to cut down the need for costly search operations in an area constantly subjected to enemy artillery and mortar fire from adjacent sanctuaries. Work on this project began in mid-1967 and continued until early 1968, when the buildup of US forces in I Corps preempted the logistical support needed to supply the construction material.

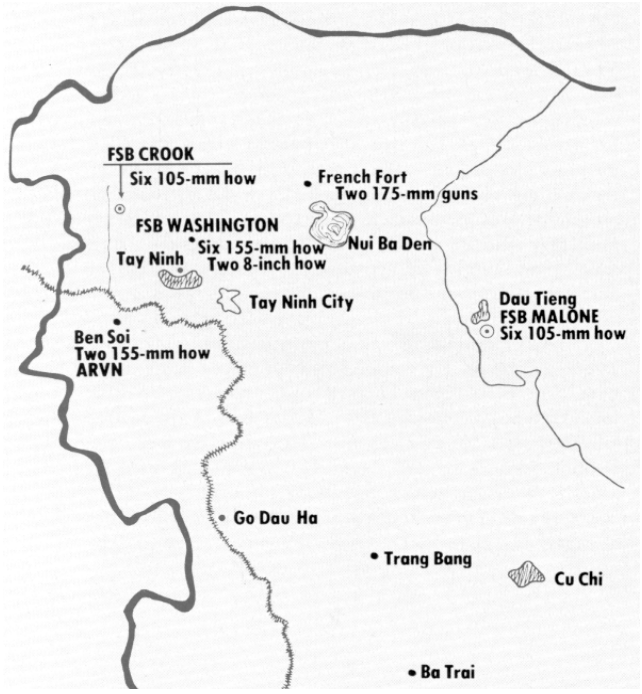
Although the physical barrier was never completed, certain portions of it were sufficiently developed to permit use. South Vietnamese forces manned the complete static defense positions and thereby freed the American troops for mobile operations. A part of the early warning system was used during the siege of Khe Sanh and proved to be effective. Although the sensors were no deterrent to enemy movement, they did enable friendly forces to bring the enemy under fire by providing targeting data for bombing and artillery strikes.

Once the McNamara Wall was shelved, sensors were made available to units in Vietnam. The experiences of the 25th Infantry Division provide two examples of their value.

MALONE

On the morning of 15 March 1969, sensors were activated near Fire Support Base MALONE, a relatively secure troop recuperation area near Dau Tieng. The monitor alerted the command group and the fire support element to the

Fire Support Bases MALONE and CROOK



possibility of enemy presence. The command group soon determined that an enemy force had assembled in a bamboo thicket several hundred yards from the base. Artillery and mortar barrages covered the area. At daylight a patrol searched the area and found 21 enemy dead and four wounded, 129 rounds of heavy weapons ammunition, three rocket-propelled grenade launchers, a mortar and a flamethrower. A pending attack had been thwarted.

CROOK

The attack against Fire Support Base CROOK on the evening of 5-6 June 1969 serves as a second example. The base, established in April 1969 northwest of Tay Ninh City, hampered enemy operations and served as a springboard for American operations near the Cambodian border. Anticipating an attack, US forces emplaced sensors along all possible approaches. On 5 June the sensors exposed enemy activity 950 meters east and 550 meters northwest of the base. Simultaneously, a tower-mounted radar picked up enemy movement along the wood line. Artillery and small-arms fire engaged the enemy. The North Vietnamese forces responded with a fierce mortar barrage and several probing attacks but never managed to reach the perimeter. At dawn the enemy withdrew and left 75 dead. The Americans suffered one killed from an enemy mortar round. The next night sensors heralded a renewed attack in greater strength. This time the American defenders, alerted by the sensors and aided by their night vision devices, accounted for 323 enemy dead and 10 captures without a single American loss. On the night of 7 June the Viet Cong launched another, much weaker, attack but then withdrew and left three dead on the battlefield. The early warning provided by the sensors on these occasions had stripped away the element of surprise.

Survey and Met

Ground surveys and meteorological data determination traditionally have been considered by field artillery to be target acquisition activities, though in the strictest sense they are not. Ground survey and meteorological data provide accuracy to fire on targets that have already been acquired.

Survey increases accuracy by determining the exact location of firing units in relation to other firing units and, where possible, in relation to the forward observer and the target. The Vietnam environment made survey difficult. Survey control points were scarce and those that were available often had been disrupted; areas which survey parties were required to cover often were excessive and insecure; and, field artillery often displaced so frequently that there was no time for survey. The most common method for determining position location consisted of a sun

shot taken by survey personnel at the battery location. The shot would provide accurate direction and the position location was then determined by resection or map shot.

If local meteorological data are available, weapons accuracy can be further improved because weather effects can be applied by fire direction centers to the computation of fire missions. Accordingly, meteorological stations were established throughout Vietnam. Station sites were evaluated continuously and sections were relocated when necessary to provide optimal coverage. Where a large difference in altitude existed between a fire base and the servicing station, the use of a supplemental mountain meteorological team at the fire support base proved effective.

Artillery Raids

A principal offensive operation employed during this period was the artillery raid. It was a combined arms effort, but, unlike other types of offensive operations, the entire effort supported the field artillery rather than the maneuver force.

The artillery raid was designed to extend available combat power into remote areas and to mass fires on enemy units, base areas and cache sites beyond the range of artillery at a fixed fire base. Artillery raids involved the displacement of artillery to supplementary positions, engagement of targets with heavy volumes of field artillery and other supporting fires and withdrawal from the supplementary positions. The entire operation was conducted as rapidly as possible to achieve surprise and take maximum advantage of the airmobility, aerial observation and target acquisition capabilities of the division. The majority of the raids were conducted with 105-mm and 155-mm howitzer units of division artillery; however, field force artillery, particularly 155-mm towed batteries, frequently was employed in raids or in support of divisional artillery raids.

Experience demonstrated that artillery raids were conducted and controlled best by a brigade headquarters. The decision to conduct a raid normally was made at division level. Target area selection was based on all available intelligence, and a specific area of operation for the raid was assigned to the brigade headquarters. Divisional or nondivisional artillery supported the operation with the requested or available number of firing batteries. The controlling brigade headquarters tasked a subordinate battalion to provide security, and the division made the required aviation lift available. A typical package included one 105-mm howitzer battery, one understrength 155-mm howitzer battery (three howitzers), one rifle company for security, aerial observers from division artillery and, when available, air cavalry assets for target acquisition and damage assessment.

In order to conduct artillery raids on short notice, divisions developed and published standing operating procedures in the form of operations plans. Contingency loads, assembled to support all quick reaction operations, were available immediately to support artillery raids. Particularly during the monsoon period, raids served the important secondary purpose of maintaining airmobility expertise in artillery units that otherwise would remain static for extended periods. As troop strength declined, Americans were defending increasingly larger areas with few forces. This, in turn, resulted in the increased use of artillery raids as a method of making US combat power more widely felt and denying the enemy the unrestricted freedom of movement he otherwise would have enjoyed beyond the range of the guns.

Logistics

Logisticians were kept busy delivering ammunition and supplies to field artillery units and providing required maintenance support. From the logistician's point of view, the preferred method of supplying field artillery units was by truck convoy, augmented by helicopter delivery. Truck convoys were more economical and dependable and could move more supplies at one time than those helicopters normally available for resupply. The enemy situation and operational needs, however, dictated the manner in which units were supplied. Light firing batteries which moved frequently often were supplied entirely by helicopter. Other units which moved less frequently generally were supplied on occupation of a fire base initially by helicopter and later by truck if roads were available and could be cleared of mines and secured. Heavy units moved by road and thus could bring initial supplies with them and be supplied by convoy thereafter.

Supply by road in insecure areas frequently was accomplished every two or three days. On those days the road was swept for mines in advance and secured by ground forces long enough for the convoy to complete its run. Daily needs, such as rations, water and ice, could then be supplied by helicopter.

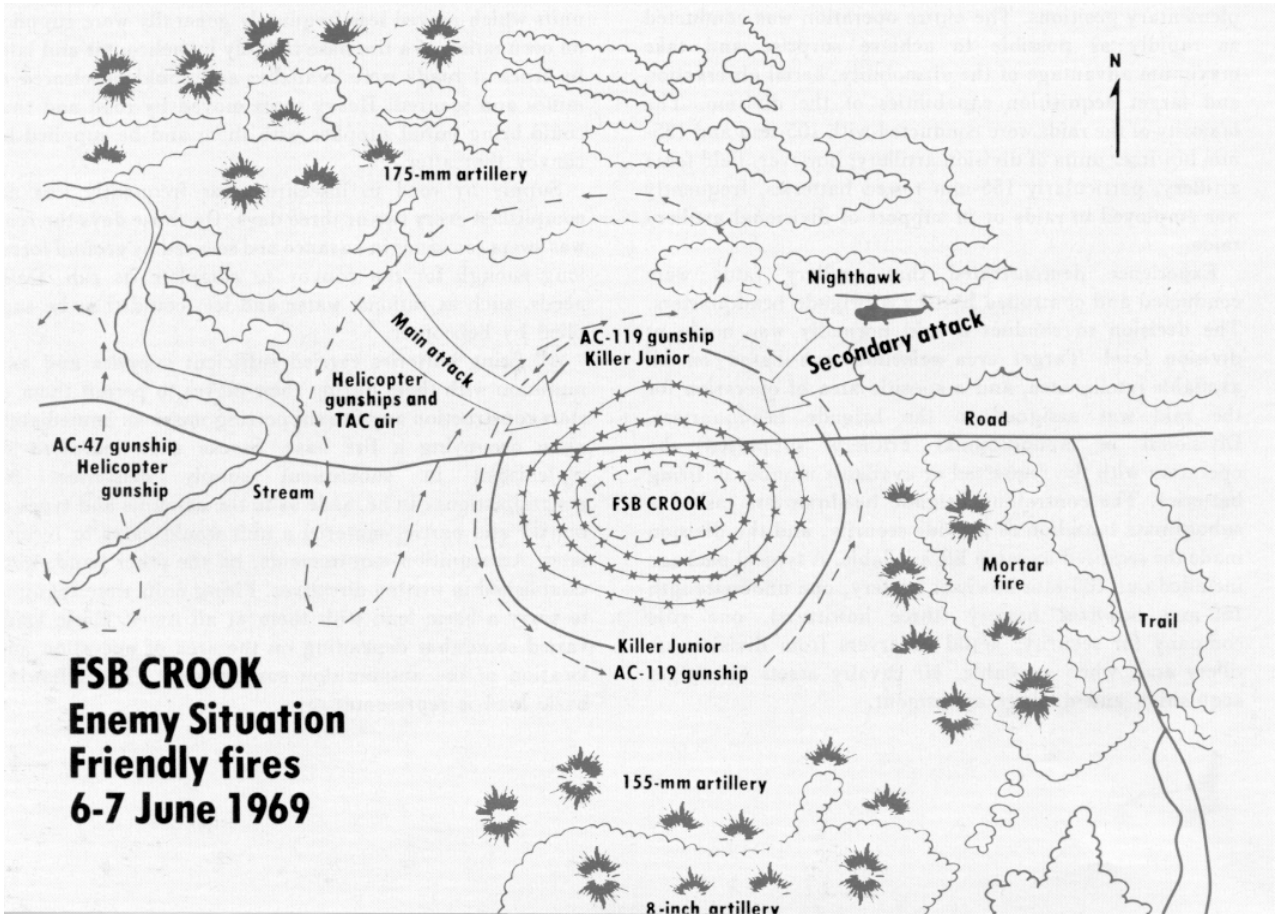
All firing batteries carried sufficient supplies and ammunition with them during their moves to permit them to start construction and fire supporting missions immediately upon occupying a fire base. Stocks were increased or replenished in subsequent supply deliveries. No generalizations can be made as to the amounts and types of bunker and barrier materiel a unit would carry or receive later. Ammunition requirements, on the other hand, were established in written directives. Firing units were required to carry a basic load with them at all times. Basic loads varied somewhat depending on the area of operation and location of the ammunition supply point. The following basic load is representative:

Ammunition	Number of Rounds
105-mm howitzer battery	
High explosive (HE)	1,600
Illumination (ILL)	320
White phosphorus (WP)	60
Antipersonnel or "Beehive"	36
Improved conventional munitions (ICM) or "firecracker"	24
155-mm battery	
HE	1,200
ILL	400
WP	48
ICM	18
8-inch howitzer battery	
HE	600
ICM	8
4.2-inch mortar platoon (infantry)	
HE	2,000
ILL	300
WP	50

While occupying a position, a firing unit was supplied continuously at a rate which allowed it to maintain a prescribed stockage objective. The stockage objective was established above the basic load and was used as an aid in ammunition supply management. A typical stockage objective for high explosive ammunition is:

Ammunition	*Number of Rounds*
105-mm	2,00
155-mm	1,600
8-inch	800
4.2-inch	1,600

Maintenance support requirements varied with the type of unit and were satisfied in several ways. Units with towed howitzers generally experienced no unusual maintenance problems because the weapons had relatively few moving parts to malfunction. On those occasions when towed weapons needed to be repaired, they could be picked up quickly by helicopter from the fire base, brought to the repair facility and returned quickly when repairs were completed. Self-propelled weapons were more troublesome. They were more sophisticated, more likely to break down and too heavy to move by helicopter. It was necessary to make arrangements to evacuate the equipment by road. Either a separate convoy for that purpose was formed or the weapon was held until it could be linked up with a convoy of some other unit. If the malfunction was in the weapon mobility system, additional arrangements were made to secure a tank retriever to tow the weapon.



Whenever possible, maintenance contact teams were sent by helicopter to the fire base to attempt repairs on inoperative weapons. The teams, informed of the nature of the problem by the unit requesting their support, were able to limit their load to only those tools and spare parts required to make the repair. Still, all repairs could not be made on site, and, though the maintenance contact teams alleviated the problem, they did not solve it.

In 1968 US Army, Vietnam, recognized that user level and direct support maintenance were difficult to perform on site and were often neglected because of operational needs. As a result, a repair and return program for 8-inch and 175-mm units was established. A weapon and its crew stood down in a direct support maintenance facility for complete maintenance service of the weapon.

Harassing And Interdiction

One topic of much discussion in Vietnam was the effects of harassing and interdiction (H&I) fires. These were unobserved fires placed on likely or suspected enemy locations or routes. Targets were most often chosen from aerial and map reconnaissance.

LTG Frank T. Mildren, Deputy Commanding General, US Army, Vietnam, stated, "In my estimation, pure H&I fires in Vietnam environment have little, if any, value while doing practically no damage to the enemy. I have requested that tactical commanders reduce their H&I fires." There were many who agreed with General Mildren, but there were many who did not. Numerous reports indicated that the Viet Cong feared the artillery firing at night and that this firing was inflicting damage and casualties. Even so, no one could deny that, if not employed judiciously, H&I fires could result in extremely large ammunition expenditures.

Intelligence And Interdiction

During General Mildren's tour, the use of H&I fires was reduced and a program of intelligence and interdiction (I&I) fires was instituted. Whereas targets for the H&I fires were often based on map reconnaissance alone, targets for the I&I fires were less arbitrary in that some type of enemy intelligence had to justify the firing.

The 4th Division set the example in executing the I&I program. The largest portion of the unobserved fires delivered by the artillery with the 4th Division was fired on targets acquired by one or more intelligence means. Interdiction fire was used successfully in conjunction with the road security missions of the division. The division developed a road firing program that covered likely approaches to areas in which repeated mining incidents had occurred and approaches to key bridge and culvert crossings along Highways 14N and 19E. The fires, which were delivered periodically throughout the night and early morning, resulted in the reduction of mining and bridge incidents along these major highways.

I&I fires were effectively employed using the time-on-target technique. Instead of firing single rounds on a target over a period of time, one or more batteries would time the rounds so that all arrived on the target at the same time. These fires created shock and achieved maximum surprise.

Civic Action

Field artillery units throughout South Vietnam supported the government's pacification program through a number of civic action programs. Short-term projects included food and clothing distribution, rodent and pest control and medical assistance. Long-term projects included construction and follow-up support of schools, markets, hospitals and orphanages.

Firing batteries normally carried out only short-term projects. They generally moved too frequently to do otherwise. Their usual contribution was in connection with the Medical Civic Action Program (MEDCAP). Battery aidmen, supervised by the surgeon of the parent battalion, visited local hamlets daily to treat the sick and to educate local medical personnel. The seriously ill or injured were evacuated to civilian hospitals or, sometimes, to US military hospitals. On one occasion the 1st Battalion, 44th Artillery, assisted an eight-year old girl and her grandmother, each of whom was missing a leg. The two were evacuated to the German hospital ship *Helgoland* where they were fitted for artificial limbs.

Long-term civic action projects were accomplished by the headquarters and service batteries of field artillery battalions and higher. Their accomplishments were impressive. The civic action project in Vietnam recognized as the most outstanding was Gadsden Village, accomplished by a field artillery unit — the 23d Artillery Group. The citizens of Gadsden, AL, adopted the 23d as their sponsored unit in Vietnam. They offered financial assistance to the group for any project to help the men. Instead of accepting the Alabama goodwill for themselves, the artillerymen decided to channel the aid to the homeless refugees in the Phu Loi area.

With land donated by the Vietnamese government and the more than $21,000 contributed by the citizens of Gadsden, the artillerymen set out to help the refugees build a village. Houses were built with self-sufficiency in mind. There was enough space between the houses for a vegetable garden for each family. But the Redlegs did not stop with building houses. They constructed a six-room schoolhouse and hired trained teachers, built a community center building and established a cooperative sewing center, a large dispensary, a soccer field, a hog-raising complex and a water distribution system. Gadsden Village was exemplary of the goal of civic action — to help the people help themselves.

Lance
testing in the European environment

by LTC Justin LaPorte

In July 1973 the phase-in of Lance missile battalions began in USAREUR. All corps artillery Sergeant missile battalions and Honest John rocket battalions were to inactivate and reactivate with the Lance missile system. In conjunction with this reorganization USAREUR division artillery Honest John battalions were deactivated. The entire phase-in was completed by October 1974. The resultant organization gave USAREUR a more flexible and versatile missile capability than had ever existed in Europe.

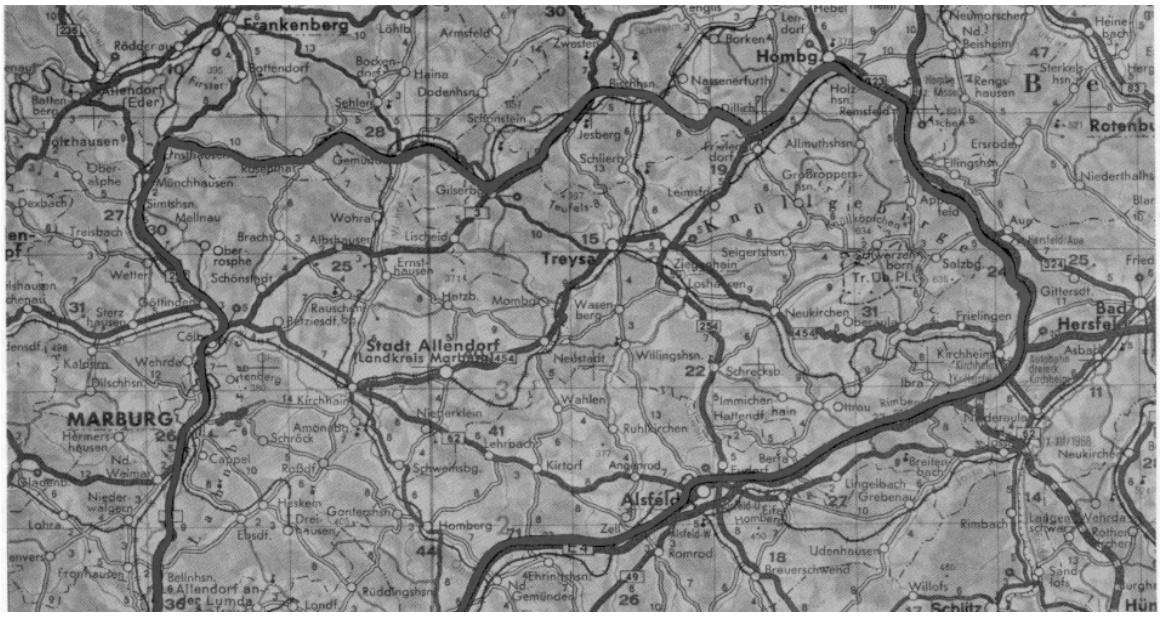
Corps artillery was tasked with developing a realistic operational readiness training test (ORTT) for Lance which would tax the limits of the missile's capabilities. The evolution of a series of Lance tests in V Corps Artillery illustrates the problems and rationale which have resulted in a demanding test which assures combat readiness of Lance in V Corps.

1-333d FA

The 1st Battalion, 333d Field Artillery, a former Sergeant unit, was first to certify in V Corps. The battalion deployed to the Grafenwoehr training area in July 1973 to prepare for testing. Generally the test was oriented east to west, using the entire Grafenwoehr reservation, an area approximately 20 kilometers east to west and 12 kilometers north to south. To avoid interfering with ongoing live fire, coordination of the airmobile operation was restricted to positions along the periphery of the range. The unit was required to move as a battalion and, since distances were short, command and control offered little challenge to the battalion commander. Heavy traffic by other units on the range caused congestion and traffic tie-ups along the routes of march.

Following the test, a reevaluation of the testing concept was made. Numerous disadvantages of the Grafenwoehr range were considered. Transportation for displacing the battalion from Wiesbaden to Grafenwoehr was costly. Since Lance firing on the European Continent is prohibited, Grafenwoehr's capability for accommodating live fire for howitzer and rocket battalions was not applicable. The range was too small to allow realistic deployment of the battalion commensurate with its long-range capability or to accommodate independent firing battery operations. Position areas were limited for the battalion since it did not have a live fire requirement and did not receive priority for those position areas. The prohibition of long-term bivouac on the range required the battalion to return to its base camp repeatedly and lose valuable training time.

3d Battalion, 79th Field Artillery, test area.

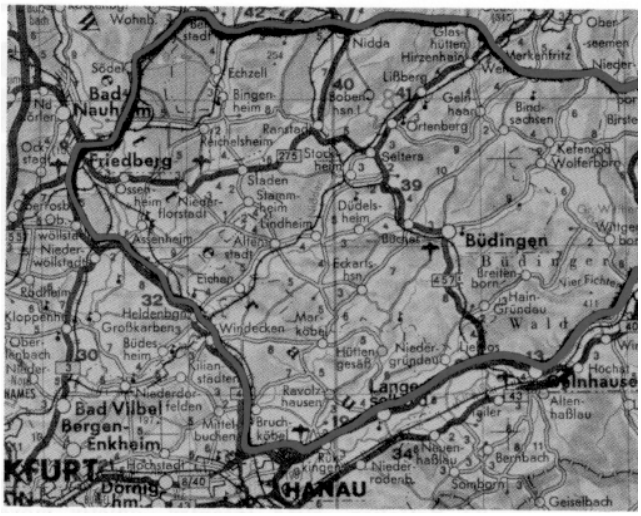


These disadvantages triggered a study to determine the feasibility of conducting Lance tests in the German countryside rather than at the major training area. German environmental agencies had curtailed most of these operations for US military units during recent years; therefore, such a course of action had not been considered seriously for the first Lance test. The Lance launcher and loader transporter are relatively light-tracked vehicles and do not cause the degree of maneuver damage which is experienced with medium and heavy self-propelled artillery. Large wooded areas, populated sparsely with small German communities, are located in the vicinity of the V Corps Lance battalion home stations at Wiesbaden, Giessen and Hanau. Intensive training for the test in local areas, with the battalion remaining in the field for 30 consecutive days, would provide much better test preparation for the battalion than the field-garrison cycle necessary at Grafenwoehr. Additionally, a great fuel savings would be realized. German authorities approved this plan with the stipulation that maneuver damage would be monitored closely and held to a minimum. The US Government, of course, would be liable for those damages which did occur.

3-79th FA

The 3d Battalion, 79th Field Artillery, prepared for its test in areas near Giessen, Germany. The test site selected was a triangular area northeast of Giessen covering 1,600 square kilometers. Full utilization of this area would test the limits of the Lance system capabilities. Battery position areas were selected 20 to 30 kilometers from one another. These distances required the battalion commander to conduct reconnaissance by helicopter and use helicopter for command and control. Routes of march were in excess of 40 kilometers to new positions; thus, careful planning was necessary for orderly and controlled road marches. Also, careful selection of positions was necessary to assure communications among the units of the battalion. Emphasis was placed on concealing all elements of the battalion from aerial observation. Natural camouflage was abundant and there was great leeway given by mission-type orders requiring the battalion to move to new locations during the hours of darkness and be in position capable of receiving fire missions by dawn the following day. The battalion was further required to maintain a continuous missile-launching capability throughout displacements. The concept required displacement of Lance every 24 hours with all moves conducted at night. The long distances involved required some elements of the battalion to be on the march from dusk to dawn.

Following this test, the concept was reevaluated. The test provided excellent realism. The battalion operated exactly as it would in combat with respect to terrain and distance factors. The test was superb as a training vehicle for the battalion. However, umpire control was difficult. Umpires



1st Battalion, 32d Field Artillery, test area.

were scattered and could only observe isolated portions of the battalion's operation. Communication among umpire personnel was sporadic. A compromise between the first and second test would be best for the succeeding evaluation of the 1st Battalion, 32d Field Artillery.

The ideal testing area, about 1,000 square kilometers, would fully exercise the battalion's capabilities and provide control by the chief umpire. A balance between umpire control limitations and tactical realism was considered an ideal solution for the Lance battalion ORTT.

The emphasis for testing Lance battalions differs from tests of howitzer and gun battalions. Lance tactics, and hence positioning, is not governed as much by range limitations as tube artillery. The great range capability allows Lance in support of the corps to be positioned almost anywhere within the corps area and still provide fire. Likewise, the fire direction problem is not so complex as the numerous variations associated with cannon gunnery.

In V Corps Artillery the emphasis for Lance testing is placed on command and control of the battalion over an extended area of operation. The major Lance problem is coordination of battalion activities, including warhead mating; missile transfer from loader transporter to launcher; timely selection of, and movement to, the proper firing point; and, rapid execution of firing sequence procedures. The highest standards of training are necessary to accomplish these actions satisfactorily when the battalion is operating throughout an extended area where communications and time-distance factors become so critical to success. Concealment of the battalion is also important, along with frequent displacement under cover of darkness which is imperative for Lance survivability. All of these features are stressed during tests of V Corps Lance battalions in what is considered one of the most realistic and demanding tests of an artillery battalion in the US Army.

LTC Justin LaPorte, FA, is Commander of the 2d Battalion, 12th Field Artillery, III Corps Artillery.

RIGHT BY PIECE

3-319th FA — Fast and Close!

FORT CAMPBELL, KY — A task force from Charlie Company, 2d Battalion, 503d Infantry, quietly moves through the trees toward the objective, only 450 meters away. The impact of the artillery and mortar prep at close range is ear-splitting. As the maneuver force approaches the line of departure, a squad leader can be seen getting his people dispersed while a heavily camouflaged 106-mm recoiless rifle moves into firing position. Artillery from Battery C, 3d Battalion, 319th Field Artillery, is dedicated to the task force. Each howitzer is laid on the supported firing data and the charges are cut. The US Army combined arms team is ready.

A single round of white phosporous impacts on the objective signaling the end of the artillery and mortar preparation. Flying nap-of-the-earth, Cobras of the 4th Attack Helicopter Battalion, 77th Field Artillery (Provisional), suddenly clear the treeline and send a barrage of 2.75-inch rockets downrange forward of the infantry. Smoke rockets are fired to the left of the objective and a gentle wind blows to shroud enemy positions under a dense, acrid fog. The infantry crosses the line of departure and the forward observer calls for fire on target C1.

This is not someone's visualization of future combat but performance-oriented training at its best conducted through the rigors of "The Platoon In The Attack." Enhanced by the use of live ammunition, the exercise demands a high degree of professionalism from each participant.

All units operate in a strict tactical fashion. Concealed by the dark of early morning, the firing batteries move quickly into position. Unusual attention is given to the matter of camouflage and standard ammunition shelters are distributed to ensure uniform powder temperature for all six howitzer sections. Gun crews become increasingly aware of their responsibility to provide timely and accurate fire support.

The unit is placed in a dedicated status during the exercise. The battery operations center and the fire direction center (FDC) monitor the maneuver force command net; the FDC is also assigned a special fire net. In addition to the preparation of the objective, the unit fires at least two planned suppression targets identified by the forward observer. Originally created to lend realism to training, the exercise offers a special challenge to the dedicated artillery battery.

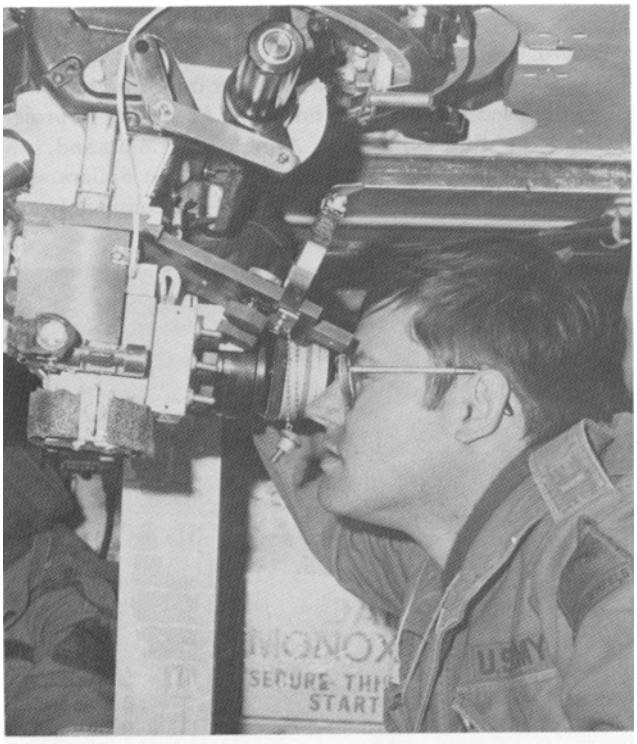
White phospherous round impacts during 101st's live fire training exercise.

The 3d Battalion, 319th Field Artillery, fired the exercise several times during 1975. To prevent the degradation of the experience into the drudgery of routine training, battalion policy does not permit a battery to fire the exercise twice in succession.

The 101st Airborne Division (Air Assault) conducts the exercise regularly with positive results. All participants have emerged with a taste of battle and a finer appreciation of the nature and power of the combined arms team.

Modified APC Evaluated As FO Vehicle

FORT HOOD, TX — A specially modified M113A1 armored personnel carrier (APC) was recently evaluated as a testbed forward observer (FO) vehicle during a series of tests recently conducted by Headquarters, TCATA (formerly MASSTER). Equipped with the LNS-517 land navigation system and an AN/GVS-5 laser rangefinder mounted to an M36 tank periscope, the vehicle was



Looking for a target, 2LT Dave Barry scans the area through a M36 tank periscope equipped with an AN/GVS-5 laser rangefinder during recent FO vehicle tests.

designed to enhance FO performance through the availability of accurate positional and target location data under a minimum degree of light armor protection.

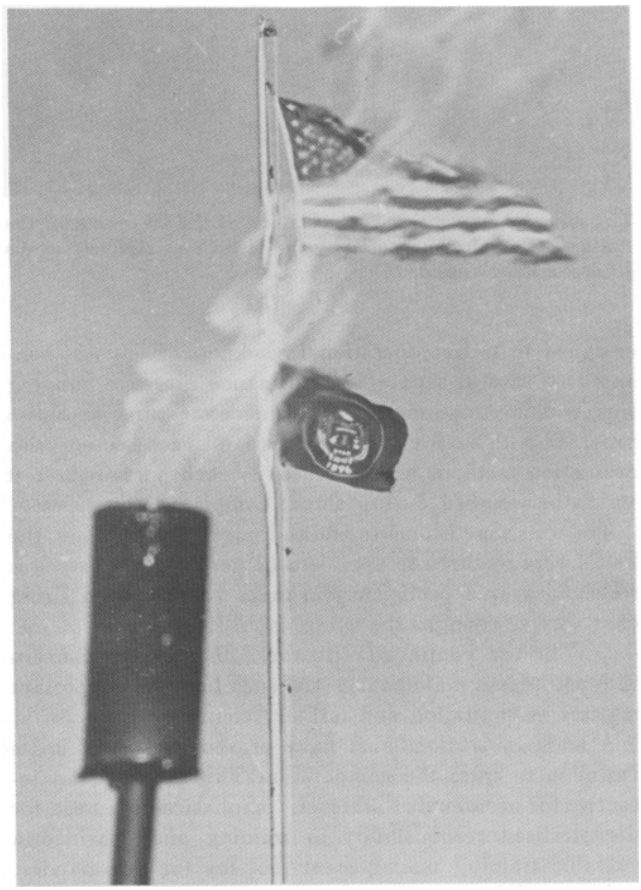
The concept was put to the test by comparing the performance of the FO party in the testbed vehicle to that of parties operating from a 1/4-ton truck, M60 tank and an unmodified APC. Each of the four vehicles was crewed by standard three-man FO teams. The teams rotated periodically so that performance data could be collected on each FO party in each vehicle.

The test was conducted in three phases which included limited field exercises, night operations and live fire exercise supported by the 2d Armored Division Artillery.

Results of the test are being compiled and will be used to determine the impact of the various vehicles on the FO's ability to perform his mission and to identify shortcomings in the testbed vehicle kit.

NG Conducts Artillery Olympics

CAMP WILLIAMS, UT — Under the direction of BG Max A. Greer, Utah's XI Corps Artillery (UARNG) has created an imaginative training program which breathes life into the constant effort to maintain a high level of reserve operational readiness. The program utilizes the time-proven principle of competition to stimulate leaders at all levels to reach for new heights of proficiency in the same manner the international Olympics incites excellence in athletics. Hence, the title: *Artillery Olympics.*

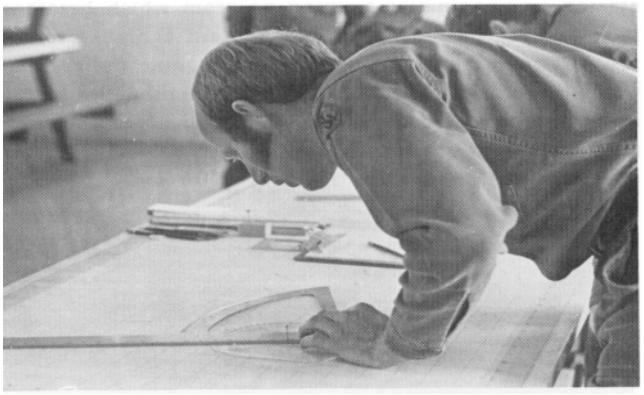


The Artillery Olympics began with the lighting of a propane torch.

The first year of competition is now history. The actual inter-unit competition was conducted in 1975 to give units time to reorient for annual active duty for training periods. Units were briefed on arrival at Camp W. G. Williams and took care of housekeeping chores before the competition began.

A propane torch had been erected above the commanding general's reviewing stand. The torch runner appeared in Indian dress, symbolic of XI Corps' emblem, and was driven around the drill field on a motorcycle modified to the shape of an artillery missile. The first Artillery Olympics had officially begun.

Months of preparation had preceded that moment. Participating units were given advance copies of the 25 tests



Fire direction crewmen compete in one of the 25 events of the Artillery Olympics sponsored by the 11th Corps Artillery of the Utah National Guard.

designed to reflect operational readiness. Each test consisted of several separate performance exercises ranging from cooking to gunnery. Performance measures were also provided with each exercise to acquaint each section with evaluation methods and how heavily each part of the test would be weighed during actual competition.

The tests were extensive and thorough. For example, the FDCs were required to complete 12 performance exercises which measured proficiency in tasks varying from firing chart preparation to the more sophisticated uses of met data. The test continued with the FDC section's concern with equipment maintenance and such basic but important matters as sanitation and military courtesy.

A team or section must have proved itself best in its battalion to enter the competition. This provided an incentive for personnel at all levels, emphasized the need for decentralized responsibility in training and provided a valuable training management tool for the commander.

Army advisors and personnel from Army Readiness Region VIII were available to help umpire the tests and arrange useful concurrent training. In one location several advisors prepared demonstrations of the latest training equipment available to the Army.

After the competition, winning team members were given distinctive uniform patches and unit plaques. Those who participated are not likely to forget the first Artillery Olympics.

M110A1 Enters FA Inventory

ROCK ISLAND ARSENAL, IL — Culminating several years of system development and testing, the M110A1 8-inch self-propelled howitzer was recently classified as standard equipment in the field artillery inventory.

The weapon was designed as a major improvement to the currently-used M110 8-inch howitzer. According to project officials at the US Army Armament Command, the modification saved the Army several million dollars when compared to the expense of developing a completely new weapon system.

Now classified as a standard item in the field artillery inventory, the M110A1 8-inch howitzer will replace the M110 and M107 by 1979.

Conversion of the M110 to the M110A1, at a cost of less than $80,000 per vehicle, will begin within the year. The process involves replacement of the older cannon and gun assemblies with a longer tube and new firing hardware. The M110A1 is scheduled to replace the M110 and the M107 175-mm howitzer in the inventory by 1979.

Production Line Set For Artillery Fuze

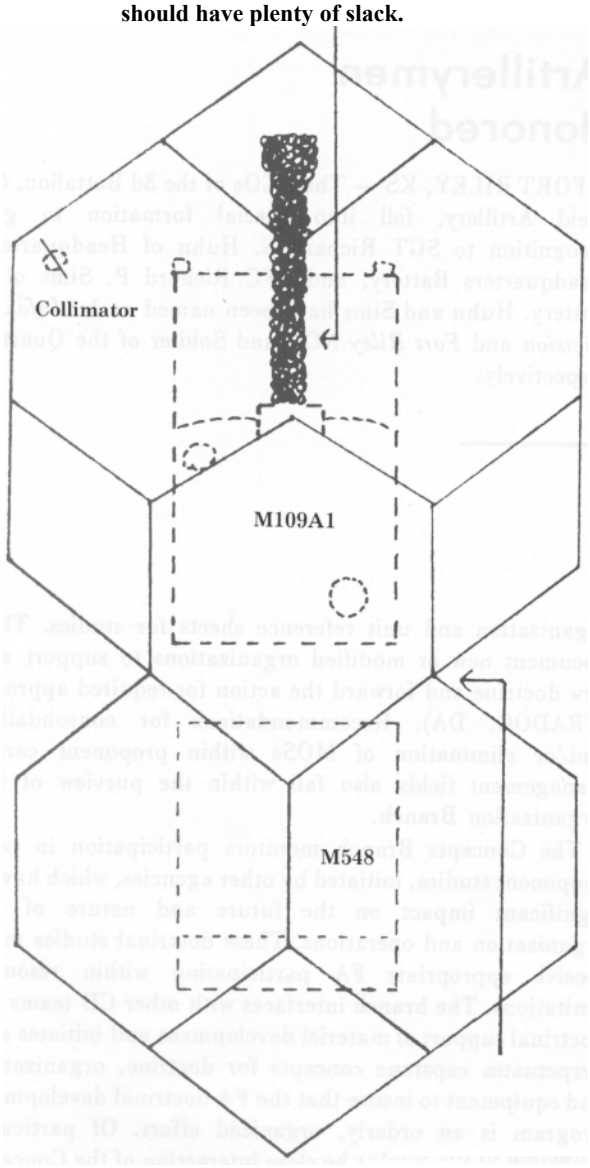
ADELPHI, MD — A multi-million dollar contract has been awarded to Lockheed Electronics, Inc., for the design and fabrication of an integrated production facility for the M732 Artillery Proximity Fuze (May-June 1976 *Journal*).

The $5,386,705 contract is for two years and will result in an integrated fuze production line supervised by the Harry Diamond Laboratories, capable of fabricating 5,000 fuzes per 8-hour day.

The M732 is the most recent addition to the Army's inventory of proximity fuzes. It was accepted for production in January of this year after a successful R&D program at the Harry Diamond Laboratories.

Unit Develops LWSS Method

GELNHAUSEN, GERMANY — The 2d Battalion, 6th Field Artillery, 3d Armored Division (Spearhead), has developed a method of LWSS (lightweight camouflage screening system), net erection for M109A1 sections that has several distinct advantages.



LWSS panel layout for M109A1.

M109A1 camouflaged using 2-6th FA system.

The method used by 2-6 FA solves the problem of blast damage during firing, and does not require "drop time." Once erected, the net may be left emplaced until march order is given. Additionally, the system allows the M548 to carry its own net so that it may be camouflaged separately if necessary.

The camouflage plan requires the use of five net sets, assembled as indicated. One small diamond net is wrapped around the tube of the howitzer. During firing lulls, part of this net may be draped over the muzzle brake. The seam directly above the tube is left open to allow complete elevation. Sufficient slack is left in the front portion of the net to allow for 400 mils of traverse either side of center. The slack effectively counters the effect of the blast. The M548 net may be attached to the main net or simply draped over the end of the main net.

AN/TPQ-37 Contract Let

FULLERTON, CA — Hughes Aircraft Company has been named winner of a four-year competition for further development and limited production of the AN/TPQ-37 artillery locating radar (ALR).

The AN/TPQ-37 ALR was designed to answer the centuries-old need of the foot soldier to locate the source of enemy shellfire so counterfire could be directed against it.

The ALR reportedly can pinpoint enemy artillery sites even before the first shell hits the ground.

In tests, incoming shells have been tracked in flight and the trajectories "back plotted" to determine the precise location of the firing weapons miles away. This occurs automatically and within seconds.

Right By Piece

Phase I of the contract calls for a modification and refurbishment of the system that completed initial operational tests at Fort Sill in December 1975. It will spend six months being readied for two months of operation and maintenance training, followed by four additional months of field tests and two months of maintainability demonstrations.

Phase II of the contract is an option for the Low Rate Initial Production (LRIP) portion under which Hughes will build 10 ALR systems. The first system is scheduled to be delivered 24 months after the start of LRIP with one system per month delivered thereafter. After LRIP, the Army may enter full-scale production with an eventual purchase of approximately 60 systems to be deployed with US forces throughout the world.

The radar transmitter is sufficiently powerful and the receiver sufficiently sensitive to illuminate and detect the very small artillery projectiles over a 10-kilometer distance, while the computer software is intelligent enough to decipher returns from artillery projectiles while eliminating returns from birds, planes, clouds, rain and other sky clutter.

The ALR has two main units:

- *An antenna trailer* towed by a five-ton truck on which the power generator is mounted. The antenna folds down on the trailer for transport. This unit also contains the transmitter and receiver.
- *The operations unit* installed in a standard military S-280 shelter mounted on a two-and-a-half-ton truck. The shelter has room for two operators and a supervisor (although one man can do the job if necessary), and a control panel to monitor computer-controlled self-testing and self-diagnostics providing easy maintenance.

Development of the new system is under the direction of the US Army's MALOR (Mortar and Artillery Locating Radars) Project Office, Fort Monmouth, NJ.

Artillerymen Honored

FORT RILEY, KS — The NCOs of the 3d Battalion, 6th Field Artillery, fell into special formation to give recognition to SGT Richard S. Huhn of Headquarters, Headquarters Battery, and PFC Richard P. Sims of C Battery. Huhn and Sims have been named as *1st Infantry Division* and *Fort Riley* NCO and Soldier of the Quarter, respectively.

View From The Blockhouse

[*continued from page 36*]

The Analysis Branch is primarily concerned with the DA-directed study, LEGAL MIX V, a two-phase operation with reports addressing the 1975-76 time frame and the 1981-86 time frame. Some of the doctrinal implications of this study are readily recognized when general areas of analysis are examined: towed versus self-propelled, survivability measures, requirements beyond cannon range, increased range, battery antiarmor defense, artillery suppression, burst rate of fire, nuclear requirements and logistical support.

SCORES (Scenario Oriented Recurring Evaluation System) Branch is a TRADOC-directed activity that provides the combat development community with a technique for identifying required improvements and addressing questions concerning organization, doctrine, training and materiel (*Journal, March-April 1976, pages 55-56*).

The Organization Branch is primarily concerned with the maintenance of proponent TOEs, to include changes, revision updates and recession actions as required. The branch also provides advice and assistance to other activities involved in the development of conceptual organization and unit reference sheets for studies. They document new or modified organizations to support any new doctrine and forward the action for required approval (TRADOC, DA). Recommendations for consolidation and/or elimination of MOSs within proponent career management fields also fall within the purview of the Organization Branch.

The Concepts Branch monitors participation in non-proponent studies, initiated by other agencies, which have a significant impact on the future and nature of FA organization and operations. These doctrinal studies must receive appropriate FA participation within resource limitations. The branch interfaces with other CD teams for doctrinal support of materiel development and initiates and perpetuates capstone concepts for doctrine, organization and equipment to insure that the FA doctrinal development program is an orderly, organized effort. Of particular importance also will be the close interaction of the Concepts Branch with the Directorate of Training Developments. Doctrinal innovations and developments can be supported only if trained soldiers are available to implement them. Early coordination will insure this support.

Chapter Three

Winning The West

by COL (Ret) Robert M. Stegmaier

In the Revolutionary War and the War of 1812, the British controlled most of the Indians of the then West. Joseph Brant swayed the Iroquois against the Americans. American intrusion into the Indian lands of Kentucky made enemies of many tribes enjoying hunting privileges there. In addition, the British manned Detroit and, from that central base, armed and incited tribes to be hostile to American encroachments.

A further contribution to Iroquois dislike of the Americans was the Tuscarora tribe. In 1712, their stronghold at Cateckney, NC, was besieged by COL John "Tuscarora Jack" Barnwell and troops from South Carolina. The Indians, terrified by the cannon, asked for a truce in order to save the lives of women and children captives. In the following year, COL James Moore Jr., with 100 militia and 600 Indian allies, attacked the Tuscaroras again and this time drove them out of North Carolina to New York, where they became the sixth tribe of the Iroquois nation.

It looked bad for the Americans in the Midwest in 1775 and in New York in 1779.

The British controlled Detroit in 1775 and in December captured Vincennes. George Rogers Clark, at Kaskaskia, learned that British General Hamilton, releasing his Indians for the winter, guarded Vincennes with a few regular soldiers and artillery. Clark sent a large oared barge armed with two cannons and four swivels to Vincennes via the Mississippi, Ohio and Wabash Rivers. With 170 men Clark marched across the icy plains and forded flooded rivers to arrive at Vincennes ahead of the barge; there, hidden in the buildings, the frontier marksmen concentrated on artillery portholes, killing the gunners. Hamilton, reputedly a hair-buyer, offered to surrender but was given no promises for his personal safety. Clark told him: "You may depend upon such treatment justly due to a murderer." Hamilton surrendered and was escorted to Virginia for trial.

Meanwhile (1779), in the East, the Iroquois ravaged western Pennsylvania and New York. General Washington's instructions to General Sullivan were that the Indians were not to be merely overrun, but destroyed. COL Thomas Proctor, commander of the 4th Artillery, had two 6-pounders, two 5-1/2-inch howitzers and four 3-pounders; in addition, CPT John Lamb, 2d Artillery, had two 3-pounders. In the subsequent battle at Newtown, present day Elmira, artillery proved its effectiveness. Shells burst among and behind Joseph Brant's braves in their fortifications. Feeling they were surrounded, the Indians broke; the power of the Iroquois was destroyed and three Americans were killed.

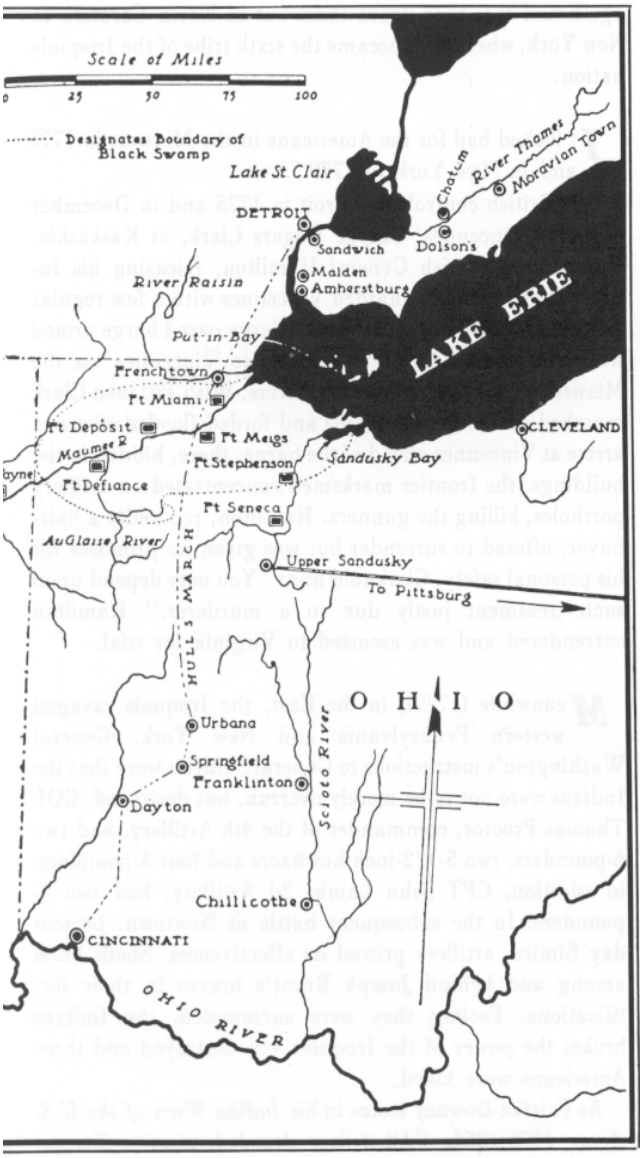
As Fairfax Downey states in his *Indian Wars of the U.S. Army 1776-1865:* "All tribes dreaded cannon fire —

roundshot, grape, canister and, most of all, bursting shells. A few field guns could rout masses of warriors, or light pieces on walls [could] stave off an attack on a burning fort til flames were quenched."

When Indians had artillery support, they, too, could be all-conquering. In 1780, British Colonel Bird and his Indian allies, supported with artillery, quickly shattered the log blockhouses at Riddle's Station and at Martin's Station in Kentucky. It appeared Kentucky was doomed. Fortunately, the British demanded prisoners while the Indians screamed for scalps; over this conflict in interests, the expedition soon broke up.

George Rogers Clark, using artillery against Piqua, a Shawnee fortified town, later displayed American aptitude for artillery warfare. Forts guarded by artillery were always difficult for Indians to attack. When St. Louis was threatened by 750 warriors in 1780, a fort was erected hastily for protection and a cannon was dragged up to provide defense; 29 Spanish and 281 hastily recruited Frenchmen manned the fort. A half-hearted attack was easily beaten off. Then, the Indians faded northward into the mists of the forests as they heard the rumor that Clark was coming to the rescue.

In 1782, Clark outfitted a barge carrying three small cannon for patrol purposes on the Ohio River. The experiment lasted only a short time. The crew preferred a "row on the ground" to a "row of the boat."



In the War of 1812, variation in belief in defense by American leaders was evidenced by General Hull at Fort Detroit and Captain Croghan at Fort Stephenson. At Detroit (1812) British cannon fired upon Fort Detroit from the Canadian shore. On August 16, Tecumseh and British General Brock crossed over to the American-held ground. An artillery duel ensued. Without defending desperately, General Hull surrendered his 1,000 men. Against him were 730 British and 600 of Tecumseh's warriors. At Fort Stephenson, the commanding officer, Captain Croghan (having only one 6-pounder in his garrison) sent this message to General Harrison: "I have determined to maintain this place; and, by heavens, we can!" With his 6-pounder located in what he considered the weak spot of his fortifications, Croghan and his men awaited the attack. On 1 August, Proctor began his bombardment; his British regulars, 400 strong and reinforced with some of Tecumseh's men, prepared for attack. Tecumseh, with 1,200 warriors, guarded every road to prevent rescue or escape. At 5 pm the charge came; two showers of grape repulsed the British, leaving 100 or more killed or wounded. Tecumseh, seeing the effectiveness of the lone cannon, refused to furnish more warriors to continue the attack. The British and their allies retreated.

When Oliver Hazard Perry defeated the British fleet, he prevented supplies coming by water to western British forts. Fort Malden was abandoned; the British with their Indian allies began an eastward retreat. Perry moved 3,000 of the more mobile troops of the American Army across Lake Erie. At the Thames, Tecumseh demanded a halt and a fight. In the ensuing encounter, the Kentucky cavalry broke the British line; Tecumseh and his men fought valiantly but were overcome. Tecumseh was killed. The war in the British West was won. Artillery had helped in loosening the British stranglehold on western territory.

A Success Story

I visited the ARRI operation site last fall and observed the training conducted for Battery B, 2d Battalion, 197th FA, at Plymouth, NH. The program is a unique application of audio-visual techniques, personalized additional instruction and assistance and a practical field application — all in one package. By taking the package to a reserve component home station training site, countless administrative man-hours normally lost in movement are utilized for productive training. In addition to being an outstanding training program for reserve component units, the program may well have application for active army unit training. —LTC Robert T. Fischer, Chief, Field Support Division, Directorate of Training, USAFAS.

Army Readiness Region I (ARRI) was selected last spring to take part in a two-concept test application of the individual learning center (ILC) equipment, philosophy and techniques to improve the readiness of reserve component units throughout the six New England states and New York State. The ARRI learning center was to be based at Fort Devens, MA, but was to be transportable (not mobile or permanently arranged in vans) for use throughout New England and New York State. Another region was to test at a permanently fixed learning center site. The Field Artillery Branch Assistance Teams of the three readiness groups (RGs) in ARRI greeted the news with mixed emotions ranging from doubt about the prospective effectiveness of such new gimmickery to anticipating future use only for self-improvement. That detached thinking was quickly reversed after the RG teams received some far-sighted command vision and guidance, plus the fact that a wealth of field artillery training audio-visual slide material and tapes were available because of Fort Sill's early implementation of the ILC concept and technique. Immediately, the field artillerymen in the RGs of ARRI were heavily involved in the development of their own future success story.

The command guidance was simple, direct and right on target: "Come up with a neat, manageable training package which addresses the immediate needs of the reserve component units related to section and battery level refresher training; make it transportable and take it to the troops; organize the preponderance of the package into practical, hands-on training following the audiovisual presentations; tailor it to a two-day unit training assembly; and, field artillery, you do it."

The Fort Devens RG was to research possibilities for package development since the learning center was to be located there (when it was not on the road) because the preponderance of artillery units in the region was located in the group's area of cognizance (New England). In addition, the group was "close to the flagpole," i.e., across the street from ARRI.

The end result was the ILC/reconnaissance selection

ILC

by COL Edward P. Metzner

and occupation of position (RSOP) training exercise which emerged in final form in March 1975. The ILC/RSOP exercise offers reserve unit commanders a progressive training vehicle for direct and general support field artillery batteries, stressing current field artillery doctrine and techniques while utilizing the latest audio-visual equipment combined with hands-on field training. The inclusion of survey and radar is optional. The highlights of the training package include:

- Dedicated RG team counterpart (one-on-one) assistance in all battery functional areas.
- Tailoring the program to meet the needs of a unit.
- Operational checks of battery TOE equipment.
- Flexibility, permitting training during a weekend (16 hours) at home station and a close-in training area or during the annual training.
- Improved readiness.

The program is performance-oriented and can be readily adapted to an officer/NCO cadre exercise. It can also be structured to concentrate on specific areas requiring improvement, i.e., FDC, firing battery, communications, etc. If the exercise is used as a cadre training vehicle for selected officers and NCOs, these key personnel will return to their respective units more qualified and prepared to instruct and supervise members of their sections in subsequent unit training assemblies.

The ILC/RSOP exercise is conducted in three phases: Phase I takes place at night and is a coordination meeting between the reserve component unit commander and RG personnel. The meeting is held two to three weeks prior to the training exercise to finalize details, such as specific training to be conducted, equipment required to support the desired training and training areas required, to include field locations.

Phase II (eight hours) begins with the battery arriving at the predetermined training area with all required equipment. The battery is divided into TOE sections, and RG personnel provide detailed instruction using individual/group learning center techniques with current service school television tapes and audio-visual presentations. This first day's training is concentrated at section level with emphasis on practical application. The specific subjects covered provide the doctrinal foundation required to participate in Phase III, the practical field exercise which takes place the second day.

Phase III (eight hours) begins with the battery in a tactical firing position. After a unit self-critique, the battery is required to conduct a reconnaissance and displace to a new firing position area. The exercise can also be structured to include a night move to a final position area. All elements of the firing battery are exercised, one-on-one assistance is provided and the interaction of all sections is stressed toward producing an effective, functional unit. In those training areas permitting, live firing may be conducted from the final position area under battery or battalion control.

No formal evaluation is made of the unit but informal critiques are continuous. When errors occur, instruction is backed-up allowing correction of actions during the conduct of all practical exercises and the field exercise. An overall constructive critique covering recommended unit follow-on actions is given to the unit by the RG Field Artillery Branch Assistance Team Chief.

Figure 1 depicts hours of ILC instruction using audiovisual material, hours of practical exercise and assignments of RG personnel throughout the exercise.

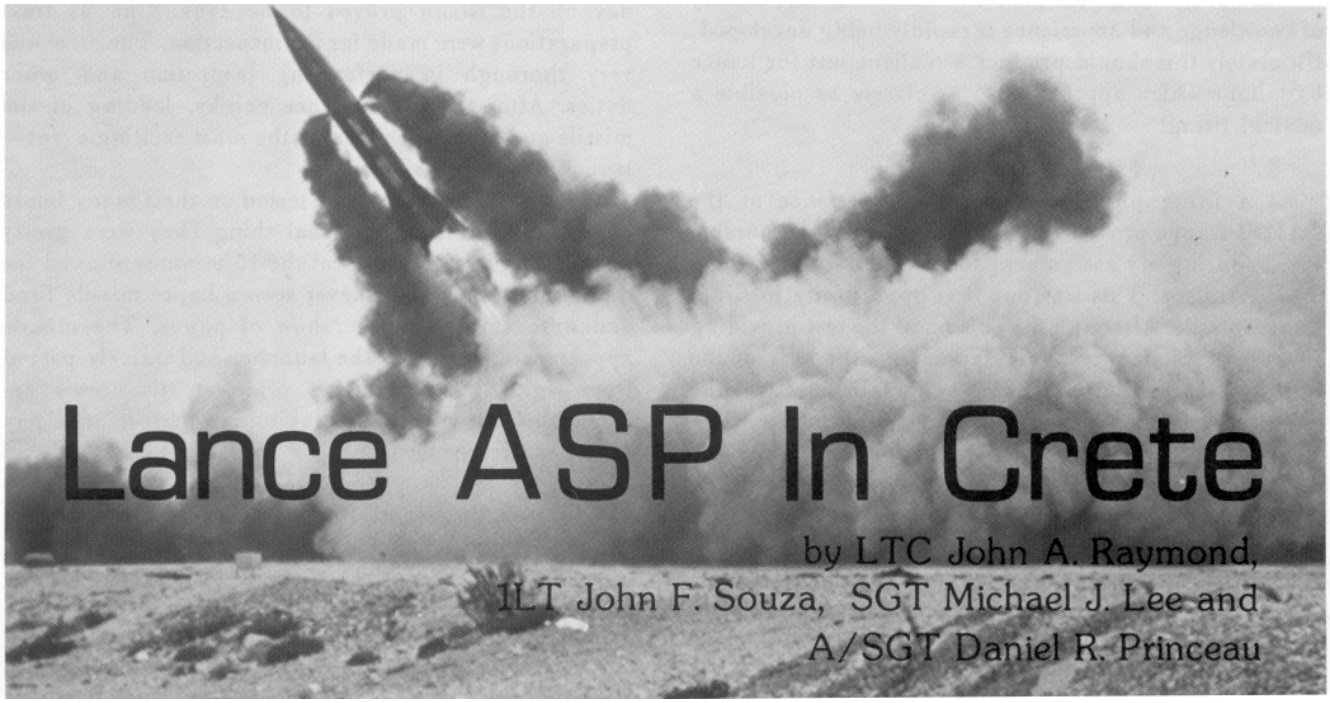
Figure 1.

Personnel	Exposure Hours ILC	Exposure Hours PE	RG Advisor Personnel
CO, 1SG	2	14	1 Officer, 1 NCO
XO, CFG	4	12	1 Officer
C/S, Gunners	4	12	1 Officer, 1 NCO
Cannoneers	3	13	1 NCO
AXO, FDC	5	11	1 Officer
Ammo	4	12	
Maint	6	10	1 NCO
Supply	6	10	1 NCO
Mess	1	15	1 NCO
FO	6	10	1 Officer
Survey*	2	14	1 NCO
Radar*	2	14	1 NCO

*** Optional**

Initial reactions and responses by reserve component commanders to the initial concept and final exercise package were overwhelmingly enthusiastic. From mid-April 1975 to date the ILC/RSOP training exercise has been requested and conducted for 34 batteries throughout the ARRI area, both during weekend training assemblies and during annual training. In addition, using the cadre battery configuration, a three-day program exercise was developed and conducted for 40 junior officers of the 42d Div Arty, New York ARNG. This realistic, meaningful training and resultant improved readiness were achieved by the employment of RG Field Artillery Branch Assistance Teams in the role of accepted and respected members of a real one-army team, in the true sense of the term; the use of professional and dedicated artillery team members along with audio-visual learning techniques made this possible. That's the field artillery success story in ARRI, and the program is still growing.

COL Edward P. Metzner, FA, is the Field Artillery Coordinator of Army Readiness Region I, Fort Devens.



Lance ASP In Crete

by LTC John A. Raymond,
1LT John F. Souza, SGT Michael J. Lee and
A/SGT Daniel R. Princeau

With the advent of combat operational Lance battalions in USAREUR has come the rare opportunity for those involved to participate in what has become an extended field test. Although the principles of employment and the techniques of Lance operations are delineated in some detail, the newness of the system and its considerable potential allow a degree of freedom for exploration which probably is unsurpassed by any other field artillery weapons system. Those fortunate enough to be assigned to a Lance battalion seem to be making the most of this opportunity. The current USAREUR Lance Annual Service Practice (ASP) conducted at the NATO Missile Firing Installation (NAMFI) in Crete proves a good example. Views of the Lance ASP are offered from three perspectives—that of a battalion commander, a firing platoon leader and firing section crewmembers.

Battalion Commander

From my viewpoint as a battalion commander, an ASP at the NAMFI Range generates more enthusiasm than any other aspect of the battalion's training cycle. Although the figures vary with the funds available, a battery complement averages about 40 men. Three C-130 aircraft are provided per firing battery with an additional aircraft alloted to the advance party.

The ASP can be divided roughly into three phases:

- The preparation and movement to Crete.
- Battery evaluations and firings.
- A long weekend in Crete and the return to Germany.

Since the on-site support system for the Lance ASP is not as extensively developed as for other missile systems, batteries carry what they need to do without. Also at this writing, as an example, inherent in the service practice is the requirement for the battalion to provide its own survey control. Similarly, in the absence of a direct support maintenance facility, a modified prescribed load list must be developed and carried along. In effect, the movement of three firing batteries with the requisite support equipment represents a staff exercise of some sophistication. Although the bulk of the effort usually falls to the S3, this is a battalion operation heavily involving the S1 and the S4 as well.

It is difficult to visualize a piece of terrain more ideally suited as a range facility than NAMFI. Occupying a bluff overlooking the Mediterranean Sea, the NAMFI setting provides a natural amphitheater with unlimited observation of firing point activities. From the vantage point of the glass-walled observation buildings, one gets an unobstructed view of the Nike Hercules, Hawk, Chaparral and Sergeant/Lance firing areas. The range control building is manned by a joint Hellenic staff which is professional in every respect. From here the senior evaluator and the battalion commander control the firing. Systems available for their use include a closed circuit television coverage of the launch area, integrated telephone circuits to each firing point and a visual display of launch point activities and missile flight data.

The site and facilities, in conjunction with the

prevailing spirit of cooperation with Greek range control authorities, produce an environment particularly conducive to Lance testing. Range authorities are generous with their time and equipment to permit the conduct of mock shoots and to accommodate the needs of the firing battery. Although launch times are constrained to some extent by the passage of ships through the impact area, interference from range authorities and other outside agencies is held to an absolute minimum. In effect, when a battery is ready to fire, the range belongs to the battalion commander.

The final aspect of the current Lance ASP which merits comment is the evaluation and administration of the test itself. To date, within USAREUR, there is no standard Lance evaluation. The scope of the test and, hence, the scores vary widely among the six battalions. Prior to the inactivation of the corps artillery headquarters, the mandate to test Lance battalions fell to that organization. Within V Corps this mission has now been passed to the field artillery groups. The obvious drawback to this system is that an artillery group headquarters is not staffed to conduct such a test, and battalions often end up testing each other. This practice is not without its positive aspects, since a definite training value accrues for those administering a test, allowing an unparalleled opportunity for combat battalions to improve the structure of their tests. Under the supervision of the 42d Field Artillery Group, several modifications to Field Artillery Missile Systems Evaluation Group procedures have been tentatively identified. Although the process is in its infancy, a body of knowledge and experience is rapidly being developed. Ultimately this should produce a realistic test for Lance battalions which approximates as closely as possible a tactical firing.

Firing Platoon Leader

As a firing platoon leader, my experience at the NAMFI Range proved to be one of the truly memorable events during my assignment to the 1st Battalion, 333d Field Artillery. This was our first opportunity to fire a Lance missile. Although the portion of the test providing the most excitement was the launching, the bulk of the test involved the inspection and systematic checks of the firing and assembly and transport platoons as they checked their equipment and prepared the missile for firing. If the checks are not performed correctly, a firing platoon can be rated unsatisfactory even before the launcher reaches the firing point. The competition among the platoons was keen as each tried to launch its missile in the shortest period of time and achieve the best score. A sense of urgency among the crew was evident as each man strained to perform his specific duty, with a goal of speed and accuracy. The apprehension mounted as the remote theodolite operator finally called out to the gunner, "Missile is laid." The crew hurried to the firing pit. The excitement mounted during the countdown to liftoff. The cheers of the crew in the pit signified a successful launch. The long hours of training and preparation were overshadowed by our sense of accomplishment and feeling of pride. The comments ranged from "fantastic" to expressions of relief that the mission was successfully accomplished. Those who knew they would be returning to fire again next year began to talk about ways to improve preparation and firing procedure to better the platoon's score. The ASP did a lot for the morale of the platoon and certainly helped to develop the unit's confidence in the Lance system.

Assistant Section Chief/Gunner

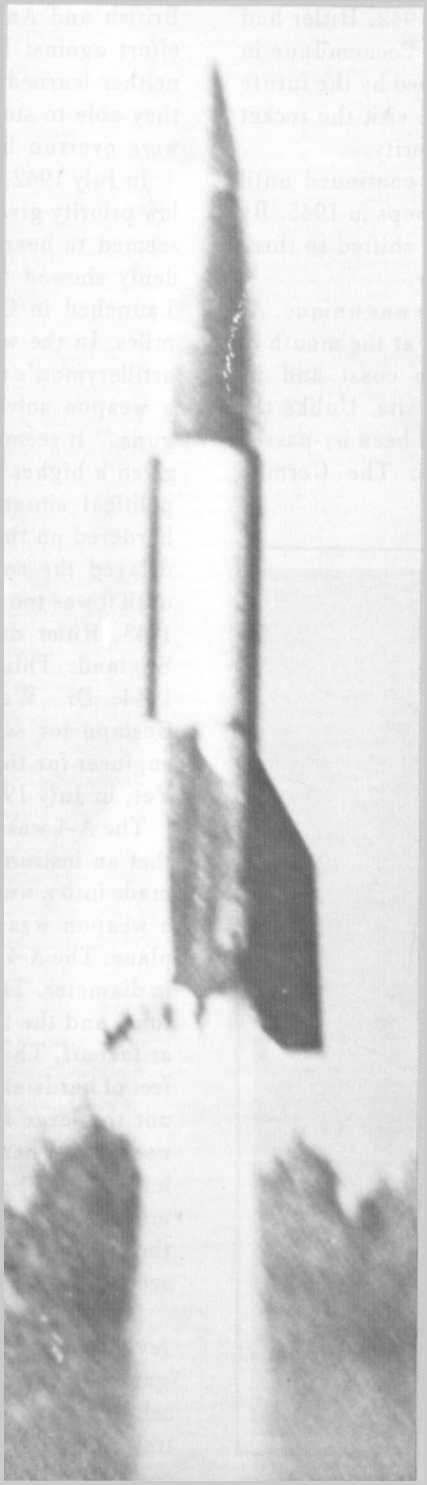
Going to Crete for an ASP is one experience we won't soon forget. As the C-130 began to taxi down the runway, all one could think, while the loadmaster was giving his briefing, was whether or not we would get off the ground and land safely in Greece. When the plane had gained altitude, one could picture the launcher trembling as the tie-down chains tightened and wonder what could happen if the chains pulled loose. While thinking of the bad things that could happen, one could also visualize the good things — seeing a Lance missile fired. This would be a truly great experience after all the field trips and Operational Readiness Training Tests the platoon went through without actually firing a live round.

The gunner of the firing platoon surely had his work cut out for him, as did the rest of the platoon. The first day on the island proved to be exhausting as final preparations were made for the inspection. The crew was very thorough in performing inspection and other duties. After the maintenance checks, loading of the missile and mock shoots came the most exciting event—launching the missile.

The men were going to be tested on their many hours of training by firing the real thing. They were pretty wrapped up in trying to beat the 15 minutes allowed for the mission. Some had never seen a Lance missile fired and were amazed at the show of power. The missile appeared to leap from the launcher and quickly passed from sight. Each man felt pride at the crew's accomplishment, seeing our day-to-day performance pay off by a live firing.

LTC John A. Raymond, FA, is serving as Commander, 1st Battalion, 333d Field Artillery, in Wiesbaden, Germany; 1LT John F. Souza, FA, is B Battery Commander, 1st Battalion, 333d FA; and, SGT Michael J. Lee and A/SGT Daniel R. Princeau are assigned to A and B Batteries, respectively, 1st Battalion, 333d FA.

The First Field Artillery Guided Missile System



by CPT Benjamin D. King

By July 1943, it was evident that Germany was no longer capable of winning the war. In January of that year, the German 6th Army had been destroyed at Stalingrad; in May, the Axis Forces in Africa had surrendered; and, in July, Sicily had been invaded and the disasterous offensive at Kursk had run its course. Although the Luftwaffe was capable of offering fierce resistance when it chose to do so, its power was declining rapidly and its influence was being felt less and less in the combat zone. Small wonder, then, that the physically and mentally ailing Adolf Hitler desperately sought ways to alter dramatically the course of the war and bring about victory. Ironically, the methods he chose were those he had summarily rejected two years before. One of these weapons was the German Army experimental rocket A-4, which was later rechristened by Dr. Goebbels' propaganda ministry *Vergeltungswaffe Zwei* (vengence weapon two) — the V-2.

The V-2 was the result of many years of research and development. During the late 1920s and early 1930s numerous groups throughout Germany experimented with rockets. Perhaps the most important of these groups was the *Verein für Raumschiffsfahrt* [*VFR*] — the Society for Spaceship Travel. The majority of the people who would dominate rocket and missile research through the 1960s were originally members of the VFR. The other major group was, of course, the German Army. Rockets were especially attractive to the German military since they were not restricted by the Versailles Treaty. In 1930, a special experimental unit, organized to explore the feasibility of using rockets for purposes other than signaling, was established under CPT (later MG) Walter Dornberger. In 1932, the Nazis attempted to take over the VFR. They were unsuccessful, but the effort need not have been made. In August of that year, Werner von Braun and other top members of the VFR began working for Dornberger and the German Army. By 1933 all the VFR rocket experts either had been enlisted by Dornberger or had fled the country.

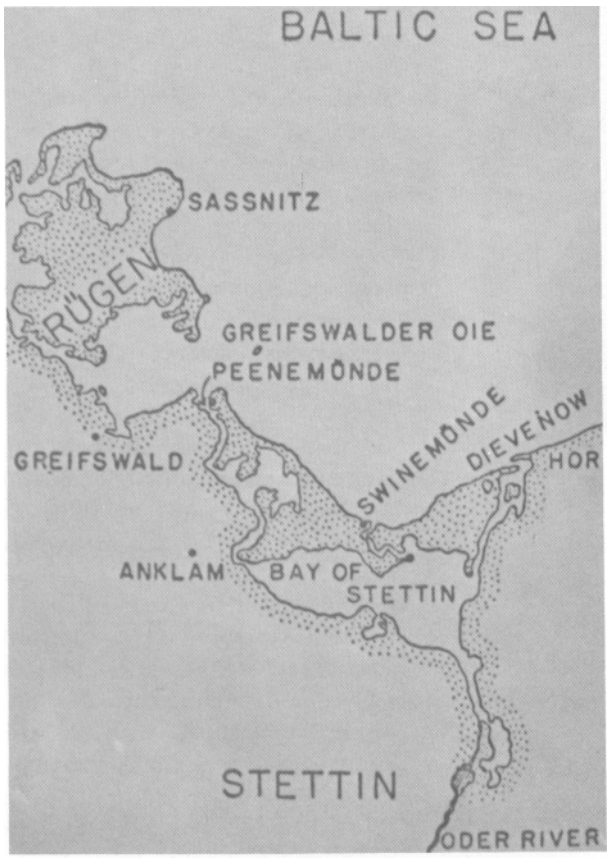
The center of small V-rocket research and development in Germany shifted from the VFR club ground in Berlin to the army testing grounds at Kummersdorf and Borkum. For the first time in history, rocket research and development were given organization and direction. No longer were there dozens of similar experiments being carried out simultaneously throughout Germany. Solid and liquid propellant experiments were separated, and in 1933 the liquid-fueled *Aggregate Eins* (A-1) was designed, built and flown. The A-1 was about five feet long and weighed about 300 pounds. A year later it was modified and redesignated A-2. This version reached an altitude of 6,500 feet during one of its firings.

The A-3 was a giant step forward. The rocket itself was 20 feet long and 2.5 feet in diameter. Fueled for takeoff, it weighed 1,650 pounds and its motor developed 3,300 pounds of thrust for 45 seconds. In 1938, A-3 reached an altitude of 40,000 feet when fired vertically. When fired at an angle, its range was 11 miles.

Although the sight and sound of A-3 roaring through the sky were impressive, its performance by military standards was not. However, A-3 showed that further research was justified and, in 1940, after a year on the drawing board, A-4 was built. Compared to its predecessors, A-4 was a behemoth — over 40 feet tall and five feet in diameter. Unfortunately for Germany, A-4 would not leave the launch pad until 1942. Hitler had visited the new rocket research center at Peenemünde in 1939 and obviously had not been impressed by the future of military rockets. Shortly after Hitler's visit the rocket research program was given a low priority.

Begun in 1937, the research projects continued until the testing site was overrun by Soviet troops in 1945. By that time, however, V-2 production had shifted to three different factories throughout Germany.

The rocket test ground at Peenemünde was unique. As its name implies, Peenemünde is located at the mouth of the Peene River on Germany's Baltic coast and its complete isolation made it an ideal test site. Unlike the rest of the Baltic coast, Peenemünde had been by-passed by the prosperity of the resort areas. The German government purchased the area in 1937. Almost at once the Nazi Party "Strength Through Joy" movement began building a hotel at Peenemünde, presumably to bring prosperity to the region; but no one would vacation there. Except for the Manhattan Project, Peenemünde became the most purely experimental and progressive scientific area in the world. Although the British and Americans directed a massive intelligence effort against Peenemünde and twice bombed it, they neither learned a great deal about V-2 itself nor were they able to stop production of V-2s until the factories were overrun by the Allies.



The Peenemünde area.

In July 1942, A-4 testing began in earnest, despite the low priority given to the program. The initial A-4 firings seemed to bear out Hitler; but, A-4 number four suddenly showed the full potential of the guided missile. Launched in October 1942, it covered a range of 170 miles. In the words of Colonel Dornberger: "From the artilleryman's point of view, the creation of the rocket as a weapon solves the problem of the weight of heavy guns." It seemed that at his point A-4 would have been given a higher priority, but this was not the case. The political situation in Nazi Germany during the war bordered on the insane, and its effects on the program delayed the commitment of A-4 as a combat weapon until it was too late to save the Third Reich. In March of 1943, Hitler dreamed that a rocket would never reach England. This delayed the program four months. In 1944, Dr. Werner von Braun was arrested by the Gestapo for sabotage, and Colonel Zanssen, the chief engineer for the project, was sent to the Russian Front. Yet, in July 1943, Hitler turned to A-4 to win his war.

The A-4 was still basically a test vehicle. Few realized that an instrument so massive and intricate could not be made into a weapon of war overnight. Converting A-4 to a weapon was like reinventing gunpowder or the airplane. The A-4 was 46 feet long and five feet, five inches in diameter. The takeoff weight of the rocket was 12-1/2 tons, and the motor developed 60,000 pounds of thrust at takeoff. The launching platform required only a few feet of hardstand on which to set the four massive fins — not the large launching ramp the British thought was needed. When set for maximum range, the rocket burned for 71 seconds, reaching an altitude of about 22 miles and a velocity of 3,600 miles per hour. In its ascent the A-4 burned approximately 275 pounds of fuel per second.

If any part of A-4 could be considered more revolutionary than the rest, that part would be the guidance system. The rocket was guided by accelerometers which sensed the drift in the missile's trajectory and transferred impulses to the servomotors controlling the fins. Operating parallel to the fins were

jet vanes of pressed graphite inserted directly into the exhaust. These gave the same control in rarified atmosphere at high altitudes as that given initially by the fins. The range was also controlled by an accelerometer. At a specific velocity the accelerometer would send a signal to a valve that would cut off the fuel supply to the motor. After a drift period the rocket would plunge earthward.

The effect of A-4 (rechristened V-2) at the target area was devastating. Although the warhead contained approximately a ton of explosive (about the same size as the American "Blockbuster"), the rocket arrived at the target at Mach 3 velocity. The Mach 3 bow wave is enough to cause major damage to buildings over a large radius. Together, the warhead and bow wave were capable of causing havoc far in excess of that created by a bomb of similar size.

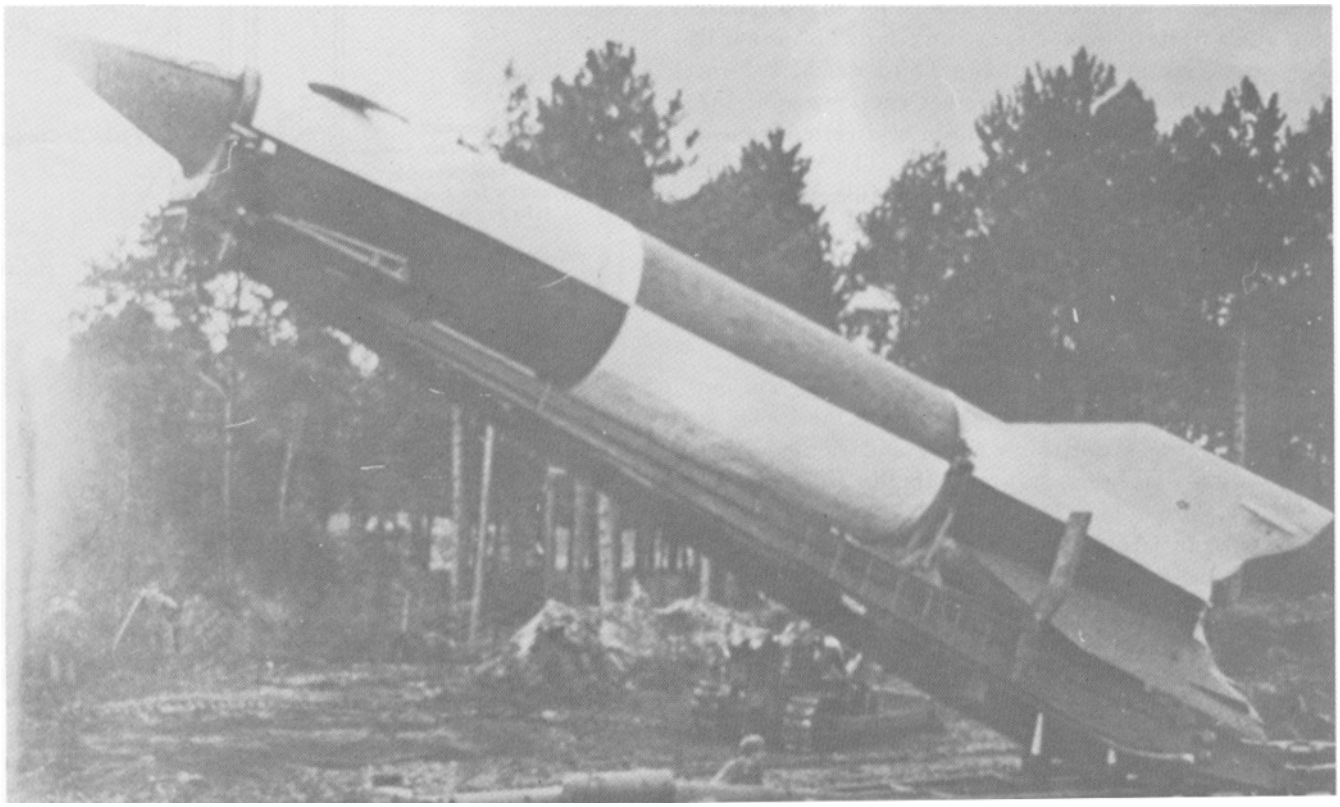
The decision to commit V-2 created two major problems. The more important was training crews to fuel and fire the rocket. Up to this point, only the scientists and specialists at Peenemünde had been involved in the firing. This Herculean task was left to the army, which accomplished it in a few short weeks.

Firing sites also were a problem because Hitler, as usual, was entranced by the thought of huge concrete emplacements. Despite the urgings of Dornberger and others to convert V-2 into a mobile system, two huge sites were begun in France: one at Wizernes and one at Watten. It was estimated that over 100,000 cubic meters of reinforced concrete were to be used in each of these works. Neither was completed, however; the Allies attacked both sites severely and they had to be abandoned, forcing employment of the mobile system upon Hitler.

In the mobile mode, V-2 was employed in two ways: on the erector launcher-transporter built by the Meiller company and on railroad flatcars. Both methods proved successful. When not firing, the detachment or battery would hide in a well-camouflaged position. Upon receipt of fire orders, the crew would move the launcher to the firing position and fuel and launch the rocket. The crew and launcher would then leave as soon as possible for the camouflaged position or another firing site. The success of these tactics speaks for itself. Despite total Allied supremacy in the air, the V-2 was not stopped until the firing positions themselves were overrun by ground troops. The V-2 offensive didn't cease until the end of March 1945, after the total collapse of the Western Front.

After numerous delays, the first V-2 was fired at the enemy in September 1944. The target was London. Hitler had demanded that his vengeance weapons be used to bring Britain to her knees. The V-2 was an answer to the lack of German airpower, but it was wasted in a useless terror campaign against a city inured by four years of terror. The British were, in fact, war weary, but

V-2 in preparation for launching.



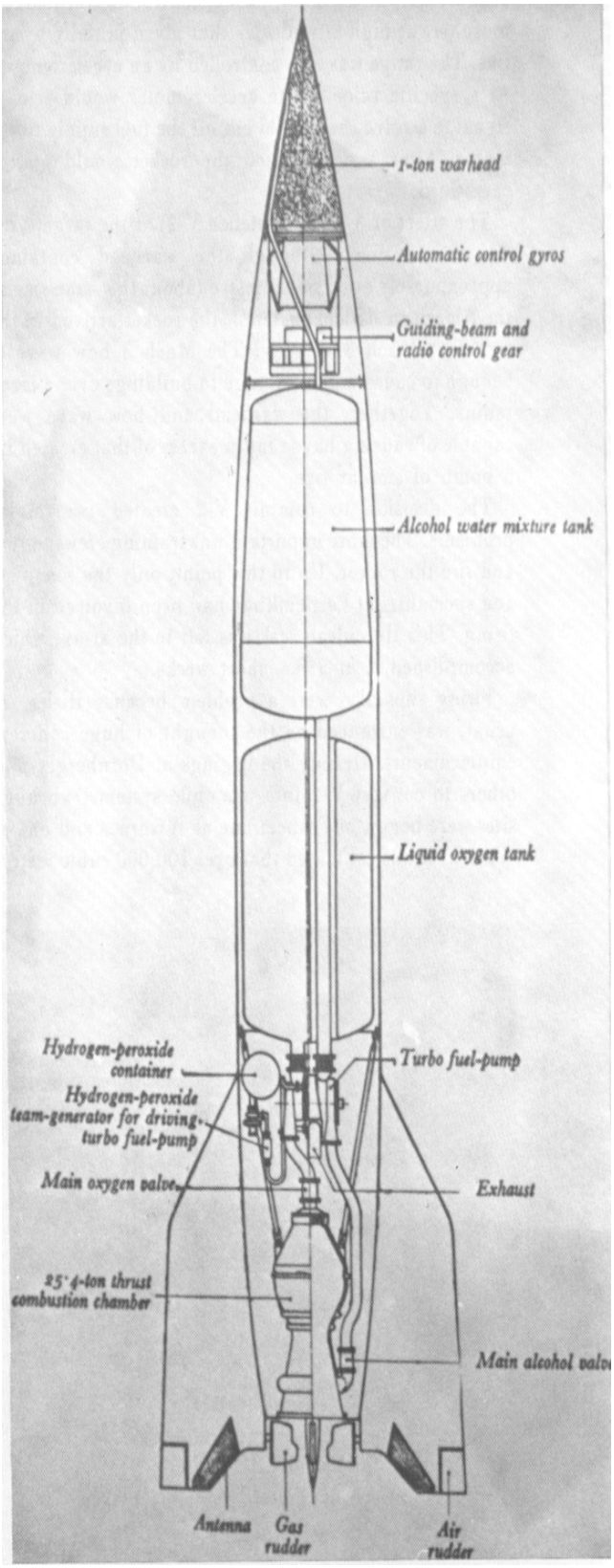
the main effort on the Western Front had already passed to the Americans. Hitler had made his final blunder.

Only one effort demonstrated what V-2 could have done if used correctly. In December 1944, the closest port to the Allied line was Antwerp, Belgium. In preparation for their last offensive in the west, the Germans turned V-2 against Antwerp. By the end of December more than 900 V-2s had landed on Antwerp. This amount was sufficient to disrupt the operations of the port. By the end of the war nearly 1,300 V-2s had fallen on Antwerp. Even though V-2 was not committed until September 1944, it is not difficult to imagine what could have happened to the Allied war effort had V-2 been used against the overworked ports on the coast of France. Also, by September the Allied logistic situation in France had become critical. It is doubtful that the V-2 would have won the war for Germany, but it could have done much to balance air superiority. Even General Eisenhower said in his *Crusade in Europe:* "It seemed likely that, if the German had succeeded in perfecting and using these weapons [V-2s] six months earlier than he did, our invasion of Europe would have proved exceedingly difficult, perhaps impossible. I feel that if he had succeeded in using these weapons over a six-month period and, particularly, if he had made the Portsmouth-Southhampton area one of his principal targets, Overlord might have been written off." Thus Hitler wasted another superior German weapon.

The story of V-2 did not end with the fall of the Third Reich. Many articles have been written since the end of World War II to prove that V-2 was not only a failure, but also a waste of time, money and effort. This is hardly the case. Even in the crumbling Third Reich, V-2 cost less than 1/30 of a manned bomber and crew and, once on its way, could not be shot down or diverted from its target except by system malfunction. The V-2 was the first mobile field artillery guided missile system employed. It performed well. The main fault with V-2 was not mechanical — it was human. Considering the nature of the Nazi regime, the Allied Forces were fortunate that V-2 was not used more extensively. It is also fortunate that V-2 was never mated with the atom bomb.

The V-2 is now a museum piece. It did serve, outwardly unchanged, in Soviet hands until the 1960s. Its progenies have grown both larger and smaller, more devastating and more accurate. In the US Army the "grandchildren" of V-2, Lance and Pershing, make V-2 seem old and feeble. Lance and Pershing mobility and striking power are extraordinary. In peacetime they act as deterrents to would-be aggressors. Should war be declared, they, as the V-2, will become mobile artillery capable of delivering crushing blows to the enemy in the battle area regardless of the situation in the air.

A-4 (V-2) long-range rocket.



CPT Benjamin D. King, FA, is a personnel staff officer at Headquarters, TRADOC

Commanders Update

Colonel Joseph Leszczynski
2d Infantry Division Artillery

Colonel John B. Tanzer
3d Armored Division Artillery

Colonel Joe S. Owens
3d Infantry Division Artillery

Colonel Larry L. Cook
82d Airborne Division Artillery

Colonel John E. Donohue
9th Field Artillery Missile Group

Colonel Kenneth R. Bailey
41st Field Artillery Group

Colonel William F. Burns
42d Field Artillery Group

Colonel Sidney Davis
72d Field Artillery Group

Colonel Edward R. Coleman
75th Field Artillery Group

Colonel Dan H. Ralls
214th Field Artillery Group

Colonel Joseph J. Skaff
4th Missile Command

Colonel William R. Owel
TUSLOG Detachment 67

Colonel John R. Martina
Special Forces Detachment
Europe

LTC Arthur F. Mace
2d Battalion, 1st Artillery

LTC Lawrence Ondecker
2d Battalion, 2d Artillery

LTC Joseph Patterson
2d Battalion, 3d Artillery

LTC John C. Tompson
3d Battalion, 3d Artillery

LTC Kenneth Norman
1st Battalion, 11th Artillery

LTC Justin LaPorte
2d Battalion, 12th Artillery

LTC Eugene Madigan
1st Battalion, 14th Artillery

LTC Jerry Griffith
3d Battalion, 17th Artillery

LTC Robert Adair
1st Battalion, 18th Artillery

LTC John O. Neal
3d Battalion, 18th Artillery

LTC Philip A. Walker
1st Battalion, 19th Artillery

LTC Christian Thudium
1st Battalion, 20th Artillery

LTC Joseph Manganard
2d Battalion, 20th Artillery

LTC Clifford D. Clay
3d Battalion, 21st Artillery

LTC Raymond Hawthorne
1st Battalion, 25th Artillery

LTC Dennis J. Reimer
1st Battalion, 27th Artillery

LTC John W. Carson
2d Battalion, 34th Artillery

LTC Al Robb
2d Battalion, 36th Artillery

LTC Maynard Forbes
1st Battalion, 38th Artillery

LTC Heyward Hutson
2d Battalion, 39th Artillery

LTC George F. Kraus
2d Battalion, 42d Artillery

LTC Harold L. Brown
3d Battalion, 79th Artillery

LTC Ronald C. Olson
2d Battalion, 81st Artillery

LTC William Parnel
1st Battalion, 82d Artillery

LTC Ross W. Crossley
3d Battalion, 84th Artillery

LTC George F. Kaiser
1st Battalion, 94th Artillery

LTC William Serchak
3d Battalion, 319th Artillery

LTC Frank Rauch
1st Battalion, 320th Artillery

LTC William Vanherpe
2d Battalion, 320th Artillery

LTC Frederick Nuffer
2d Battalion, 377th Artillery

LTC William Kuhn
5th Battalion, 4th Training Bde.
Fort Leonard Wood, MO

LTC Ellis D. Parker
82d Aviation Battalion

LTC Robert Evans
210th Aviation Battalion

LTC Herschel B. Murray
222d Aviation Battalion

LTC Turner Griffin
223d Aviation Battalion

LTC Harry Dull
1st PSYOP Battalion

LTC Robert Weekley
96th Civil Affairs Battalion