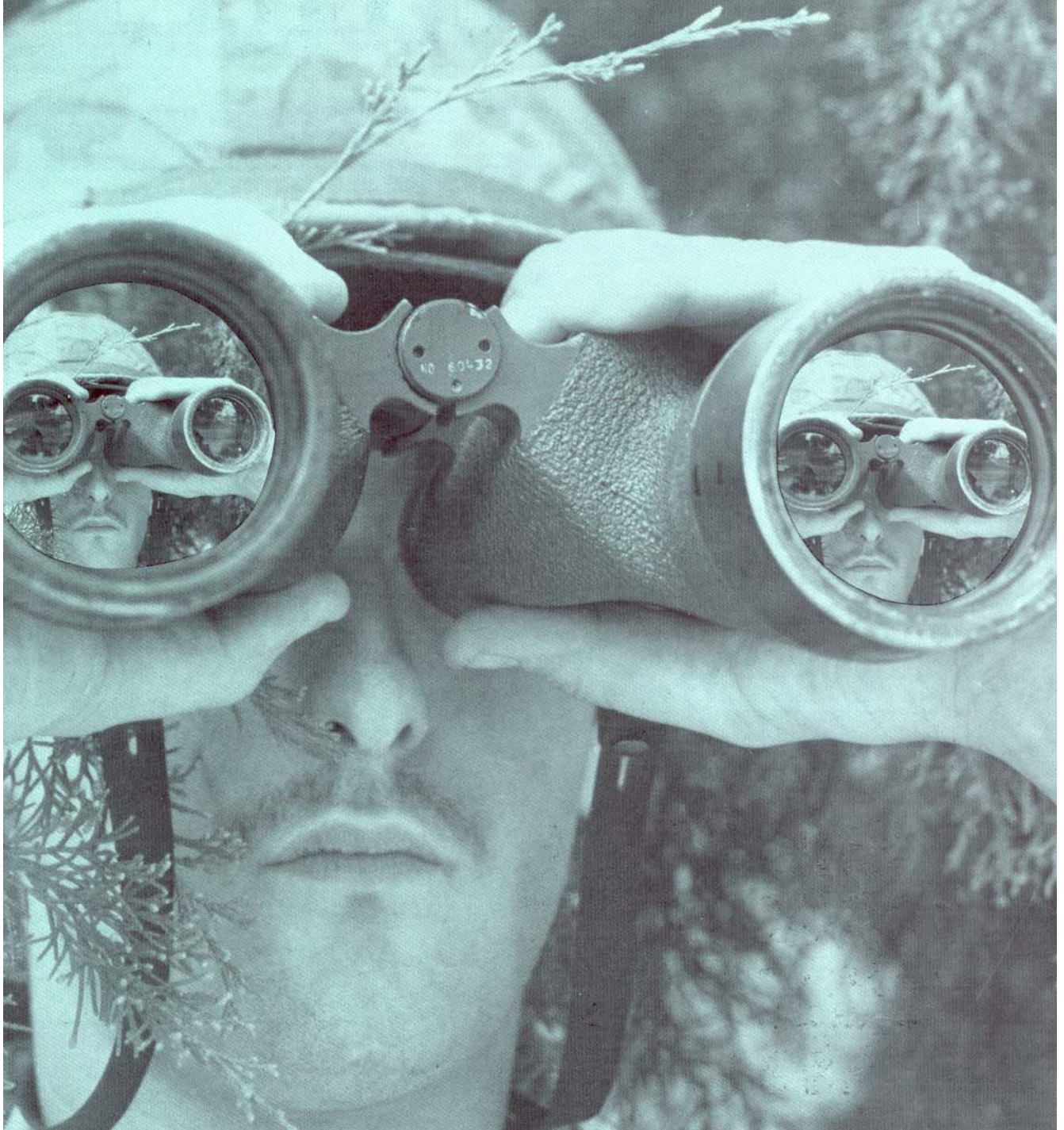


# FIELD ARTILLERY JOURNAL

November-December 1976



# FIELD ARTILLERY JOURNAL

Volume 44

November-December 1976

Number 6

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."*

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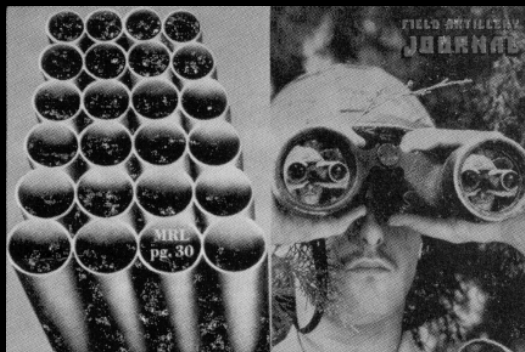
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The photograph on the front cover honoring forward observers was taken by SP5 J. J. Malhalab of the TASO Photo Studio, Fort Sill. The back cover MRL art is by Carl Ewing.

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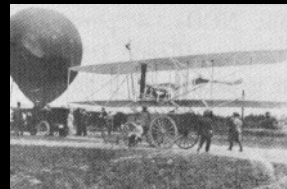
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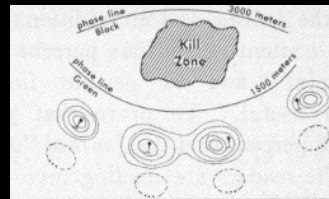
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# Editor's Notes

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The 1976 readership survey results have been analyzed and evaluated. First, a hearty "thank you" for your interest and time in sharing your opinions with us. Some comments on the survey results and our reactions to your comments follow . . .

We mailed approximately 14,000 questionnaires with our May-June issue and received 680 returns. While this is only a 5 percent return rate, it is an *interested* 5 percent, and these opinions are important.

Who responded? Sixty percent are active duty, 8 percent Reserves, 21 percent National Guard and 6 percent retired. The grade structure of the respondents is 75 percent officers, 13 percent NCOs, 4 percent enlisted and the remainder are warrant officers, DA civilians and civilians (ranks were from a private with three weeks service to a lieutenant general). Those responding are assigned to howitzer units (37 percent), missile units (7 percent), service schools and ROTC (14 percent) with the remainder assigned to staff positions. Eighty-two percent have baccalaureate degrees and a third have graduate degrees.

We distribute 93 percent of our copies via free mailing to units and 7 percent of our copies go to readers with paid subscriptions. Of those answering our survey, 67 percent receive free copies and 31 percent subscribe. After reading the *Journal*, 66 percent keep it for reference and the remainder pass it on.

More than half responding indicated an interest in contributing to the *Journal*. When a return address was provided, we wrote letters to offer assistance. (Those who will submit items may want to review the "Editor's Notes" in the September-October issue for some "how-to" tips.)

Thirty-five percent of our respondents read all of the material in the *Journal* and an additional 50 percent read most of the content. Sixty-four percent find the content "highly useful" and 31 percent find the material "moderately useful." To prove that you can't please everyone, 0.8 percent find the *Journal* "useless." Since 85 percent of the readers are reading more than half of the magazine and 95 percent find the content moderately to highly useful, your *Journal* staff must be doing something right!

The recurring features were rated almost exactly the same as during the 1975 survey. Most popular is "Right By Piece," the section with news from the field. Second is "View From The Blockhouse," the report of USAFAS events. Third is the Commandant's column, "Forward Observations" and fourth is the letters to the editor section. "Redleg Newsletter," our section with notes from MILPERCEN, rounds out the five features receiving votes from at least half of the readers.

Popular areas for articles are, in priority, FA tactics, techniques and organization; innovations in FA; foreign armies and equipment; and, future concepts. Tied for fifth

place are history and career information and guidance.

Finally, we asked if the *Journal* is providing a forum for the debate of professional matters. We were answered with a resounding 94 percent "yes."

Comments repeatedly received from readers (and our responses) follow:

Our USMC, Reserve, National Guard, missilemen and noncommissioned readers feel there is not enough material about and for them. The *Journal* will certainly correct this, IF those groups will send the material. Content is reflective of readership and, by looking at the early portion of this column, you can see that the bulk of *Journal* readers are active Army officers in howitzer units.

You asked for an update on the status of School publications (FMs, TCs, ARTEPs, etc.). This was in the September-October issue and we will repeat this service periodically. You asked for an annual listing of *Journal* content and that is in this issue.

It was said we run too few pictures, need more color and have too many abbreviations. The *Journal* does not have an illustrator or photographer; so illustrations are often limited to what authors submit. On the use of color, DA limits service school publications to using black ink plus one other color per issue. As to abbreviations and acronyms, we try to spell these out in their first usage in each article with the exception of common FA terms such as FO, FDC, FADAC, etc. As a professional journal, we assume that our readers know the jargon.

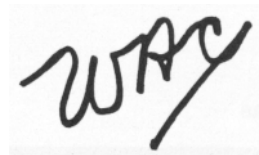
Many of you said you receive too few copies. We use standard distribution formulas which are predicated upon readers passing on their copies to others. We send out far more free copies than the other combat arms publications. The one sure way to insure that you get a copy is to subscribe per instructions on the inside front cover — it's only \$6 per year and that is tax deductible!

Readers asked that we establish a dialogue or forum for discussing/debating battery and battalion problems and print less "theory." The letters to the editor ("Incoming") are printed for that exact purpose. If you have something to say, that's the place! You asked that we publish monthly. Staff size, money and lack of input (to say nothing of gaining DA approval) all preclude this.

Finally, some subscribers complain about late delivery of their individual copies. The FA Historical Association is in charge of all subscriptions. They can be reached at AUTOVON 639-4775.

You seem generally pleased with the magazine and that makes us happy. We will strive to improve the *Journal* in all respects to merit your continued readership.

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# *forward*

## *observations*

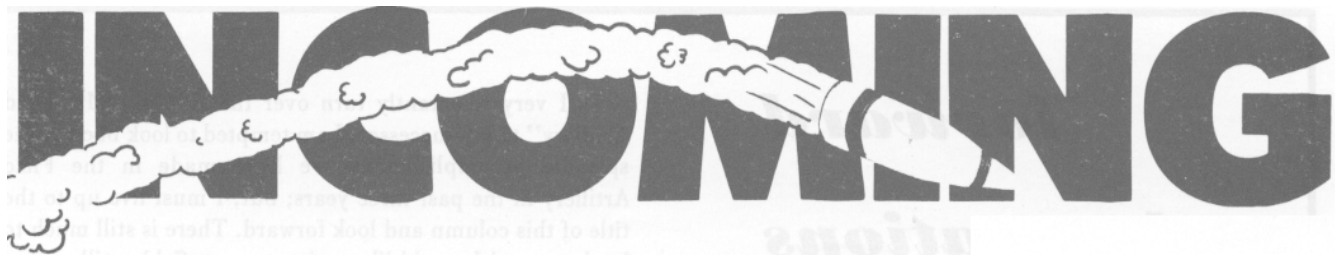
**LTG David E. Ott**



As I very reluctantly turn over the title of "Mr. Field Artillery" to my successor, I am tempted to look back at the splendid accomplishments we have made in the Field Artillery in the past three years; but, I must live up to the title of this column and look forward. There is still much to be done, and I would like to impress on field artillerymen everywhere that we are the men who operate the most powerful firepower in the world. We are not as responsive as we can be; we are not as clever in the use of our ammunition as we can be; and, we do not find all the targets that need to be attacked. We must work to correct all of these. TACFIRE will go a long way toward adding responsiveness, massing fires and making proper utilization of shell and fuze combinations to achieve desired levels of casualties. But we also need to improve the functioning of our forward observers and fire support teams so that targets can be attacked with first round fire-for-effect. This means laser rangefinders, azimuth determining devices, etc. We need to impress upon maneuver commanders the need for developing fire plans and maneuver plans concurrently, and most of all we need to keep always in mind that field artillery is most effective when its fires are massed. There are times when we need fast fire, but usually we need massed fire. Let that be our motto. Let us work with new equipment, new doctrine and new training procedures to mass our fires responsively and accurately where they are needed and when they are needed and to find the targets better and protect our guns better. Keep on sending ideas, keep on trying new training techniques and maintain a dialogue with the Field Artillery School to help the entire branch and the Army.

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*As this issue of the **Journal** was going to press, word was received from Department of the Army that Lieutenant General Ott had been nominated for reassignment to Kelley Barracks, Stuttgart, as Commander of VII US Army Corps. The new Commandant will be MG Donald R. Keith, previously Director of Weapons Systems, Office of the Deputy Chief of Staff Research, Development and Acquisition, DA —Ed.*



## WASTED PAGES

I can not understand why you expended several pages of your (not ours) *Journal* to permit a senior officer to pound his chest. A "Letter to Captain Baxter . . ." [July-August 1976] illustrates one of the major problems facing small unit leaders today and that is, *too much centralized control*.

You can be assured that in the future expanded battlefield there will be no way commanders like the author of the subject article will be able to manipulate commanders like muppets. The manipulation I am addressing, for example, is the author's orders to his small unit commanders to plan training one month in advance and carry it out regardless of the consequences. There is merit in planning ahead but more important is the need for a small unit commander to have flexibility in his training schedule. Unfortunately, the small unit commander is forced into a cone with today's concept of training. For example, today, a commander who finds on a Monday that he scheduled maintenance and classes on maintenance for Wednesday, Thursday and Friday is "stuck" with it when the attitudes and mood of his men may demand a good three day live-fire field training exercise. The opposite could be true also where a field exercise is scheduled but, due to the errors of an S4, there is no ammunition and the maintenance posture is poor.

The commander who reviews his schedule on Monday morning has no alternative but to follow the "outdated" schedule. In most units, failure to follow a training schedule results in an unsatisfactory report. Of course, there is a chance you can change your schedule if your battalion and div arty commander are willing to buck the chain of command and obtain a "general's" approval. Obviously we are teaching inflexibility today and not flexibility, which every officer will need a large dose of in a future war. This inflexibility problem is a disease that spreads bad habits. Recently a young PFC (Infantry) told me that his company commander flatly confessed to

his men that the problems in the unit were not his fault, but were the fault of the battalion commander who kept his foot on the company commander's back every step of the way. This sounds like scapegoating and poor leadership but the fact is that centralized control and oversupervision are becoming unbearable to some small unit leaders who care and can see the damage they do to our once enthusiastic young volunteer enlisted men today.

Robert H. Kimball  
CPT, FA  
ROTC, University of Houston  
Houston, TX

*Appreciate your candid comments. In regard to your opening paragraph, the **Journal** pages are open to anyone with a pertinent contribution. We regret your feeling that the **Journal** is "ours" — assume you mean the FA School and not "yours" (the field). I invite you to reread the Editor's Page (page 2) of the July-August 1976 issue. —Ed.*

## PHOTO ESSAY

I have an idea for a *Journal* article (unfortunately I cannot submit pictures and text at the present time) for a photo essay on a training battery's first live fire. Currently this story is more a query than a finished article.

I think an article about recruits fresh from BCT firing the guns on the training ranges of Fort Sill would be well suited for the *Journal*. However, the potential story would have to include more than pictures of the gunns being fired and loaded by these student artillerymen. It would have to mention the drivers and the motor sergeant being awakened at 0330-0400 hours by the fire guard. They get up and dress in the early morning darkness and then go to the motor pool and draw the vehicles needed for that day's field exercise. It would have to follow the ammo detail as it goes to the dump and picks up the powder, fuzes and projectiles.

## letters to the editor

The story does not have to be limited to 13 Bravos, but should also include FDC and survey students gaining field experience with the instruments of their respective MOSs.

I think this proposed story has a place in the *Journal*. It would grab the eyes of all Redlegs, regardless of the rank, and make them remember their training days at Fort Sill when they experienced the excitement of their first live fire.

PFC Gordon Baker  
HHB, 2d Bn, 92d FA  
APO NY 09169

*Anyone want to try beating PFC Baker in submitting an article like this? The photo possibilities are unlimited. — Ed.*

## WELCOME ABOARD

Thank you for your recent letter. I "joined" the Field Artillery back in 1911 at Fort Leavenworth and "served" at Fort Sill 1919-1920 when my father commanded the 9th Field Artillery and was also Post Commander. I re-visited Fort Sill last fall when the Fellows of the Company of Military Historians met there. I am one of very few sailors, if not the only one, to have my picture in the museum on the post.

The article I have in mind concerns two South Carolina Artillery units, the Charleston Artillery, militia who served in the Cherokee Wars (1759-1761) and the Revolution, and the 4th South Carolina Continentals (artillery) 1775-1780. Both served both in the fortifications and in the field. This proposed article is several months away, as I have a few other projects "booked" ahead of it which take priority over any writing.

Fitzhugh McMaster  
CAPT, US Navy, (Ret)  
North Chatham, MA

*Captain — We welcome you to our select group of historical writers. "Full speed ahead" with your efforts. — Ed.*

### **WINTER TRAINING FOR RESERVES**

Nearly everyone is familiar with Napoleon's classic defeat in czarist Russia. The cause? The Russian winter. And, what about Hitler's fate during World War II? We have seen pictures of the frozen bodies of German soldiers who died, not from enemy bullets, but from exposure. A climate too savage for his ill-prepared and ill-equipped soldiers contributed to Hitler's defeat. During the Korean War, American soldiers suffered extensive hardships because they were not prepared for the bitter Asian winters. How many of us have seen a veteran of that war with a missing finger, hand or foot — lost from the combined effects of exposure and frostbite?

Unless we recognize the need to prepare and train our troops to operate effectively in cold weather with a minimum of hardship and suffering, then we are ignoring a fundamental duty to our soldiers and our nation.

The Reserve unit that I belong to is headquartered in Lansing, MI, and destined for central Europe in times of mobilization. Central Europe has weather very similar to Michigan's; yet, I have never been on a cold-weather exercise. Cold-weather training is nonexistent. How combat-ready can we be if the battalion has never trained in a cold-weather environment?

The reasons cold-weather training does not take place seem very valid and reasonable. First, our site is not properly staffed or equipped to handle an artillery battalion during the winter months. Second, a great deal of money and time would be required to equip properly the battalions to function in cold weather. Cold-weather uniforms would have to be issued; vehicles would have to be prepared for near-arctic conditions. And third, tradition dictates that since we have never done it before, why start now? In short, no ranges, no equipment and no desire are the main reasons our battalion spends its winters in the classroom instead of on the firing points.

The United States can no longer enjoy the luxury of an unprepared Reserve. With Active Army forces greatly reduced in number, the need for a responsive Reserve force has never been greater. The time has come to recognize that our Reserve forces must be trained and equipped to fight a war in a frigid climate. We must determine how to overcome those obstacles which have prevented a

realistic winter training program for the Reserve.

The lack of artillery ranges is not the real problem; the lack of staff and equipment at these ranges is. Howitzers, vehicles (i.e., M548, M577) and ammunition could be drawn on the Friday prior to the weekend firing exercise and turned in on the following Monday. Most units could get volunteers to arrive early and leave late, if they were given equivalent time off at a future drill. Another problem is range control officers. If the training sites are unable to furnish them, the battalion could supply their own to perform this task. Rations would not be a problem, since most units draw them at the home station. Barracks would be unnecessary, since properly equipped units are capable of sustaining themselves in the field for several weeks.

A major stumbling block is the high cost of transporting a battalion to a suitable site. It is indeed an expensive proposition, but one solution would be to transpose training dates. Most artillery battalions are scheduled for two weekends of firing in addition to their two-week annual training. The two weekends of live fire could be scheduled in the winter months, instead of the spring and fall as they currently are. This would not result in additional expenditures and would greatly increase the effectiveness of the Reserve.

The third problem is by far our biggest. Every individual in the unit must be properly outfitted with winter clothing. Commanders have much of the necessary clothing in their supply system. TOE authorizes many of these items but, because of limited use, they are seldom issued to the individual and are rarely inspected. Winterizing vehicles would involve more effort; trucks, jeeps and additional vehicles would need proper heating systems installed, tested and inspected. Obviously, a great deal of lead time is required, since work can be accomplished only on weekends. It seems reasonable to assume that most artillery battalions could install proper equipment modifications in four months, once the items are on hand. A further responsibility would be the proper instructions in cold-weather training. Since very few Reservists have undergone this unique training, we must brief all personnel in what to expect. Commanders must insure that proper tentage and heaters are on hand and operational. Our logistical problem can be solved, then, by accurate planning and preparation. All items

necessary to insure successful cold-weather operations are available through regular Army supply channels; it is simply a matter of ordering and installing them.

Our fourth problem involves motivating individuals to accept and relish the challenges inherent in this type of training. Reserve commanders are aware of the common complaint that classroom training is boring and dull. In fact, retention of qualified personnel is often hampered by this problem. What better way to stimulate the minds and bodies of our troops than conquering a hostile environment? By spending two weekends a year in the field in a cold-weather environment, we will accomplish three things. First, we will stimulate interest in the Reserve. Second, we will develop and perfect certain skills inherent with the preparation of the unit. And, finally, we will provide the nation with a fully trained Reserve capable of an all-weather environment. The slogan, "Strength in Reserve," will be more fitting.

Peter M. Mott  
1LT, USAR  
Grosse Pointe Farms, MI

### **BIBLIOGRAPHIES**

Reference the Morris Swett Library bibliographies noted in your "View From The Blockhouse" column of the July-August 1976 issue, the following bibliographies have been provided to the Defense Documentation Center, Cameron Station, Alexandria, VA 22314. They are available in paper copy for the prices indicated:

SB31 ADA024106  
Historical listing of schematic developments in artillery-\$4.

SB32 ADA023999  
Revolution, the American Experience-\$4.

SB33 ADA024348  
Historical listing of artillery, mortars-\$3.50.

SB34 ADA024294  
Historical listing of artillery, guns and howitzers, periodicals-\$3.50.

SB35 ADA024295  
Development of Shrapnel-\$3.50.

SB36 ADA024296  
Development of Artillery-\$3.50.

## Incoming

SB37 ADA018668  
1973 Middle East War-\$3.50.  
SB37R ADA025169  
Middle East War, revised-\$3.50.

Lester Miller  
Reference Librarian  
Morris Swett Library  
Fort Sill, OK

*I have seen these bibliographies and they are comprehensive indeed. —Ed.*

### **RESERVE COMPONENT TRAINING**

I have just completed a two year tour in a Readiness Group and prior to that, I spent three years as a branch chief in the then Target Acquisition Department at USAFAS.

During these two tours I have had the opportunity to see a great deal of the new training technology arrive. We must find a way to *adequately* train the trainer to use this technology. Brigadier General Pearson's letter ["Incoming," May-June 1976 *Journal*] provides an excellent solution for the Active Army — but what about the Reserve Component? Some help for the latter can be developed through establishing the Readiness Group and advisor positions as Master Instructors but these are Active Army personnel.

If we are truly to support the "one-army" concept, then for every improvement in the active units we must determine a way to apply this same improvement to the Reserves. Since General Pearson suggests borrowing ". . . an idea from the British Army and adapting it to our situation . . .," let me suggest we borrow another idea from the Canadian Armed Forces and adapt it to our situation. The Canadian Armed Forces Instructor Course provides the means to train the Master Instructor for the field units. The service schools can teach a short course to personnel prior to assignment to either active units or Readiness Group and advisor duty. They can also develop a course which can be taught by the USAR schools and/or training divisions for members of the Reserves who fill those Master Instructor positions.

Key problem areas that would have to be faced: It is one more requirement for the Reserves' already overloaded schedule. The USAR schools would have to be allocated the instructor spaces and equipment to teach the classes. There would have to be command emphasis on

the importance of attendance. Much of this emphasis is there if one sees this need as a part of the current subject of training management which has such a high priority at present. The last requirement which I feel is critical is a provision for evaluation of graduates prior to award of the "H" [instructor] suffix.

Peter T. Zielenski  
MAJ, FA  
HQ, USARR V  
Fort Sheridan, IL

### **SECURITY LEAK**

In the July-August 1976 *Journal* you carried an article by LTC Justin LaPorte titled "Lance Testing in the European Environment."

As a member of the 3d Battalion, 79th Field Artillery, I found the article interesting in finding out how our operational readiness training test was developed. But I feel somebody make a mistake by printing a map of our training area.

In Europe, a great deal of emphasis is placed on security and ways to prevent security leaks. Every time our unit goes to the field we are constantly on the watch for SMLM (Soviet Military Liaison Mission) vehicles so that they are not able to find our positions. I think that the printing of a map of our training area is a security leak in the worst way. Other than that I thought it was a good article.

Lewis C.J. Mills  
Specialist 4  
Service Battery  
3-79th Field Artillery

### **NO PROHIBITION**

My battery commander and I have been discussing a policy that seems to be universal in the units that have 8-inch or 175-mm weapons. The policy is that all firing will be done between the track headlamps and all reporting of right and left limits will be done similarly.

During the Vietnam War, I was told that a technical bulletin was published prohibiting the firing of the weapons left or right past the headlamps because it caused a lot of torque on the vehicle chassis, thereby causing the spade or fuel cell to be damaged or cracked.

I am sure, if you could give a yes or no concerning the limits of traverse of these weapons for firing, it would enhance our training and prevent possibly

unnecessary relaying of the weapons if we have a large left or right traverse.

Mills C. Rodgers  
SFC, B Btry, 2d Bn  
5th Field Artillery

*The experts here respond to your stated problems: There is no known prohibition against firing outside the headlamps. This firing from lateral limits does not cause spade damage if the spades have been properly emplaced. Damage to the fuel cell can result from lateral limit firing and is a problem that must be lived with until one of two things happens: either a scheduled overhaul at which time all 8-inch and 175-mm weapons are having their fuel cells modified (this modification will show up on the DA Form 2408-5); or, when new 8-inch weapons reach the field with factory-installed protected fuel cells. —Ed.*

### **FO VEHICLE**

Last July I wrote your publication extolling the findings of the FIST study group's "Quick Fix" solution (Sep-Oct 1976 *Journal*). A major component of the Quick Fix is the selection of an M113 for the primary FO vehicle. This August my battalion, 2d Battalion, 27th Field Artillery, conducted an evaluation of the M113 as a FIST vehicle, comparing it against an M60A1 and M60A2 tank. I believe that many will find the conclusions and impressions of some of the participants interesting.

Each evaluated FO team (FIST) took its entire battery ARTEP in its assigned vehicle. The only unanimous conclusion was that all three vehicles provided vastly superior mobility and convenience to the 1/4-ton. My own FIST, operating in the M60A2 tank, enjoyed many advantages over the M113 and even the M60A1. Since the tank is a much harder vehicle than a 113, we were able to function up front in an artillery-heavy environment. In such an environment, facing a tank-heavy enemy employing heavy concentrations of artillery, the ability of the APC to function up front is questionable — and a 1/4-ton unthinkable. Our tactics involved the use of the organic weapons of the tank in a purely defensive role, as their employment would draw unwanted attention to ourselves.

It was found quite feasible for the



gunner, who is a tanker, to be the crew member primarily concerned with defending the tank. We routinely adjusted artillery and live fired the tank simultaneously. It is noteworthy that the M60A2 features a target designate system which enables the tank commander, who is the artillery lieutenant, to put the gunner's weapon and sight on a threatening target, then allowing the gunner to take over from there. This process involves only a few seconds. The artillery lieutenant can then return to his mission of coordinating and adjusting fires. Even the M60A2 tank, which has less interior room than the A1, was found to offer adequate space for the team to function for an extended period.

FIST team organization:

- FIST Leader/Tank Commander — Artillery FO lieutenant.
- Asst. FIST Leader/Loader — Artillery recon sergeant trained as a loader.
- Tank gunner — (trained as an RTO/FO).
- Tank driver — (also trained in artillery procedures).

One conclusion which emerged from the test is that a tank offers the greatest protection for the FIST, which often controls as much or more firepower than that commanded by the maneuver commander. These enormous assets are thus protected at a cost of only a small fraction of the company direct fire capability.

The FIST operating out of an M113 rarely was able to go far enough forward to actually direct and adjust fires. Usually maneuver personnel sent in spot reports which were fired upon either as fire-for-effect or untrained observer missions. The tank-mounted FISTs usually were able to actually observe and adjust on the enemy, as well as coordinate closely with the maneuver commander.

In Europe, the FO tank, which is present in every tank company and already slotted by TOE as the company FO vehicle, should be at the disposal of the artillery FO as his FIST vehicle. It is noteworthy that the M60A2 offers a laser rangefinder to the FO right now. We had excellent results using it to achieve first round fire-for-effect on targets up to five kilometers away.

Roger J. Buffington  
2LT, FA  
Battery A.  
2-27th Field Artillery

## REPUBLIC OF CHINA

The Deputy Commanding General of the Army of the Republic of China has requested available information pertaining to employment, utilization and tactical procedures of US artillery from WWI to the present.

It has been noted the *Field Artillery Journal* has been publishing a series of articles by MG David Ott entitled "The Field Artillery in Vietnam." It would be of considerable help if the issue of the *Journal* in which this series appeared could be made available to the Chinese Army.

George P. Kelly  
COL, USA  
Senior Advisor, CA  
MAAG, Republic of China

*Your Journals are en route. —Ed.*

## URBAN WARFARE

"The Battle of Aachen" (Sept-Oct 1976 *Journal*) rates outstanding as a contribution to the growing body of literature on urban warfare.

There is much grand talk currently about the Soviet intention to bypass cities in western Europe so that we may conveniently combat them in the "open," Major Parrish's article correctly interprets the data to show that, given the German pressure on the encircling forces, the bypass plan was *not* viable — how much less so a generation later with all of western Europe virtually urbanized!

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## THE LATEST TPI

I have experienced numerous Technical Proficiency Inspections (TPIs) at all levels while assigned to a 155-mm battalion in Europe, and am currently a student in the Officer Advance Course.

The following is submitted for publication in the *FA Journal*.

"Captain Prefire, how are you coming with the development of the psychological plan to be used in conjunction with our TPI of the 9-19th FA next week?"

"Fine, Major Deficiency. We nearly have it finished, and let me tell you it is one of which we can be proud. We have

pulled no punches whatsoever this time."

"Good, good. Let me hear some of its salient features."

"We have begun by supplying all members of the team with a few new items. Each of us will have pocket notebooks with brilliant fluorescent covers that can be seen for miles on the many occasions when we ceremoniously extract them from our breast pocket. And along with them we are issuing retractable ballpoint pens that make an incredibly loud click when the point is extended. They are bound to distract even the most stoic assembly team."

"Excellent, excellent. Modern technology is amazing. I do hope, though, that you haven't overdrawn our paper account in issuing those notebooks."

"Oh, no, Sir. Each notebook only has two pages—a blank one on top and our usual crib sheet of AR references underneath."

"That's fine. What else do you have planned?"

"This time each of us is going to carry *two* cigarette lighters instead of one. The unit found them all last time and we don't want to be embarrassed like that again. Also, we have arranged with the G2 to have a change-of-policy directive issued the morning of the inspection. The distribution system can't possibly get one to the 9-19th before we get there. I can't wait to see the look on that S2's face when I refer to it and ask to see his copy."

"That will be interesting, indeed. I'd like to be there when you pop it on him. Did you find an appropriate vehicle inspector?"

"Sir, we found the perfect man. He is an E6, 55 years old, totally deaf and strong as an ox. With one hand he can loosen the tightest battery cable with no apparent effort. His head is completely shaved, and the soles on his boots are three inches thick. He is an awesome sight, to say the least."

"Captain, I'm impressed. This should be one of our best efforts ever. It stands to be a real learning experience for the battalion."

"That is the way we designed it, sir. After all, they have another TPI next month from our higher headquarters and you know the dirty tricks those guys pull."

Robert A. Strong  
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Student, FAOAC

# Ste. Barbara



According to legend, Saint Barbara was the beautiful daughter of Dioscorus, a nobleman of the Roman Empire believed to have lived in Nicomedia in Asia Minor in the third or fourth century AD. To bring Barbara up a zealous pagan like himself, Dioscorus kept her shut up in a tower, lighted by only two windows. From the windows of her tower she looked out upon the surrounding countryside and marveled at the growing things: the plants, the trees, the animals and the people. She decided that all of these must be part of a master plan and that the idols of wood and stone worshipped by her parents must be condemned as false. She obtained instruction in Christianity and was baptized. In token of her faith, while her father was away, she had a third window pierced in the tower to symbolize the Trinity. On his return Dioscorus asked why she had made this change, and Barbara acknowledged her conversion. Dioscorus threatened her with his sword, pursued her across the countryside, and captured and imprisoned her. She refused to renounce Christianity and to be married. Dioscorus delivered her to the judge, Marcian, who also failed to persuade her and finally subjected her to torture. Dioscorus himself then took her to a high mountain, where he beheaded her. Afterward, as he was returning from the mountain, a storm arose and lightning descended and consumed him entirely.

Saint Barbara was honored by Christians as early as the fourth century and came to be regarded as the sainted patroness of those in danger from thunderstorms, fire, explosions — sudden death. She was early invoked as the special protector of artillerymen, possible because the old pieces frequently exploded when fired.



*Evolution —  
The FO*

# *My Beautiful Balloon*

by Ronald W. Shinn

*Europe. Dawn has just broken and a heavy mist still lies in the valleys and hangs in the trees.*

*The forward observer (FO) motions his driver to head toward a wooded area near the top of the hill. As his specially designed tracked vehicle moves away from the combined arms team, he quickly compares the coordinates displayed by his onboard position determining device with his map. Late yesterday a*

*television equipped drone had been shot down in this area and the FO wants to check the other side of the ridge. As he dismounts he grabs his laser rangefinder, laser target designator and field glasses. The driver brings along the digital message device which allows the observer to enter the TACFIRE or the battery computer system.*

*The FO scans the valley. Nestled in a treeline are two camouflaged enemy tanks with the crews performing maintenance. The observer inputs the fire mission to the TACFIRE computer, and receives a display indicating when laser designation should begin. Twenty seconds later he gets the message that fire-for-effect rounds are on the way — he knows chances of a first round hit are better than 90 percent. All that's left for him to do is visually insure the required amount of damage has been inflicted, fire again if necessary, and report final damage assessment.*

This scenario is technologically possible now and the necessary equipment will be in the field sooner than most of us realize. At long last the "eyes" of the field artillery are getting the attention necessary to keep pace with events on the modern battlefield.

Target acquisition emphasis remains on the individual despite the plethora of devices being developed to help him detect, identify and locate artillery targets. The evolutionary process which has brought us to this point looks like a hodgepodge of changes and developments which usually came into being only after bullets started flying. Development of weapons, ammunition, fuzes and tactics has historically commanded the most attention while observation procedures were generally left to individuals in the field to figure out for themselves.

The development of artillery can be traced back several hundred years, but until the second half of the 19th century, the range at which targets could be *engaged* was generally limited to the observer's depth of vision.

#### 15th Century

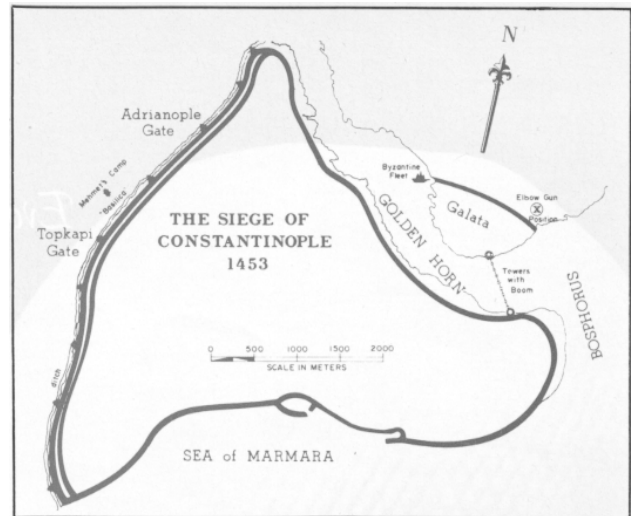
An isolated use of indirect fire utilizing an FO was recorded in April 1453 during the siege of Constantinople. Sultan Mehmet, who has been called the "first real great gunner in history," devised a large cannon and the first hollow cannon balls filled with stone and metal fragments for his siege of the great walled city. During the siege Mehmet grew impatient with the lack of progress and ordered his commanders to fire on the Byzantine fleet in the harbor. This proved impossible because a series of walls blocked the flat trajectory of their cannons.

Mehmet drew a sketch of a new type cannon which would fire at great heights into the air, explained the mathematical theory to his gunners and ordered the cannon built. When it was finished, he placed an officer on a hill where the ships could be observed. The first shot was a near miss. The observer relayed corrections by hand signals and the second round struck the vessel amidships, sinking it immediately.

One of the biggest factors spurring the development of indirect fire techniques was the increased range of small arms. Cannons using direct fire had heretofore engaged the enemy at ranges greater than that of the infantryman's weapon. To solve the problem of cannoner's safety, guns were moved to defilade positions.

#### 18th Century

The French probably were the first to use balloons for military observation. The first balloon was flown at Annonay, France, in 1783. A Balloon Company was formed in 1794 with two officers and 24 enlisted men and was used to gather intelligence at the Battle of Fleurus. Messages were dropped from the balloon observer to French commanders on the ground. There is no evidence that any of these messages pertained to employment of artillery.



Other early European experiments indicated a reluctance to separate the observer from the firing battery. A favorite was to raise the hitching shaft of the ammunition wagon, install climbing spikes and a seat on top, and adjust fire from the battery area. Another design was a 25-foot steel tower. These methods divulged the battery position.

#### 19th Century

An early system of indirect fire was proposed in 1888 by a British officer. With his battery in a defilade position, he sent two cannoners from each gun forward with pickets. When cannoner number 1 could see the target he put his picket in the ground. Number 2 proceeded about 30 yards, number 1 guiding him into position. Then the gunner would sight the end of his tube on the two pickets and place a reference stone for aiming in front of the gun. The pickets were removed so that they would not be hit by the guns firing directly over them.

In the United States, ballooning remained a civilian sport until the Civil War. In August 1861 Professor T. S. Lowe made a reconnaissance of Fort Corcoran by balloon. On September 24, 1861, he ascended with a telegraph connected to artillery units three miles away and adjusted artillery fire. Later, flag signals were devised to replace the telegraph.

Artillery pieces were equipped with sights, but these were only to see the target. A Confederate gunner complained in 1893 that, "Among our original gunners were some almost illiterate men, selected because they had great reputations as marksmen with the mountain rifle, men who could 'hit a squirrel's head (at) 50 yards', or who had been known to 'kill a deer (at) 200 yards.' Now a good eye is, indeed, a necessity, and the ability to align sights at a near object is certainly of some use to a gunner, but these qualifications alone amount to very little." The same writer later added that Confederate artillery would have been more effective if it had been equipped with telescopic sights.

Between the Civil War and World War I the United States actions in developing artillery consisted of acquiring smokeless powder, improvements in controlling recoil and

some steps toward achieving indirect fire. In 1885, when the first regulation breech loading field gun was adopted by the US Army, it had no on-carriage traverse and its sights were suitable only for direct laying at targets the crew could see.

Coast artillery was the main concern at the turn of the century. An 1887 gunnery book describes an observer removed from the battery and at least 60 feet above the water with a sighting instrument. Target practice was frequently against moving targets.

Coast artillerymen of that era were calling for electric rangefinders to aid their target acquisition. One writer said, "Our forts will not be fully equipped or fully efficient until all are supplied with the best rangefinder that is to be had, so that we can at any time, by day or night, locate and track an enemy's vessel, and by signals if we must, automatically if we can, indicate to the guns the proper azimuth and range to each target.

"When this becomes possible, and that it is impossible who will say, the gun captain may then direct his piece as absolutely and accurately without seeing the target as if it were in full view. Indirect fire thus becomes a possibility; it is now simply a great desideratum."

Naval targets were generally located by two observers, positioned so that the line of sight through the telescopes passing out over the water crossed at approximately 90 degrees.

The coast artillerymen took the lead in developing indirect fire systems. They laid out their areas of fire on grid maps, developed codes to transmit target locations in relation to the grid and overcame poor visibility with sentinel boats.

"Vertical fire with mortars will probably begin at long ranges," wrote a coast artilleryman in 1893. "When vessels are concealed by smoke or other causes it may be necessary for advanced sentinel boats to plot their position and transmit it to the mortar batteries."

### 20th Century

Forward observation took a "flying" leap forward in the 20th century with the advent of the airplane. A curious

assortment of flying machines — without armament and too small to carry even the radios of the era — were adapted to military use.

The French were first to assign aircraft to artillery commanders for exclusive use in controlling artillery fire.

While the Europeans were slugging it out in the early stages of WWI, United States artillery was still primarily concerned with coastal defense.

Lieutenant Samuel McLeary of the coast artillery wrote in 1915 that, ". . . using aircraft at high altitudes (above 4,000 feet) would be the answer to not being able to see the splashes of artillery rounds hitting the water." With better observation to allow concentration of fires, ". . . long range bombardment becomes a more menacing character than heretofore," he reasoned.

McLeary said that the ideal "aeroplane" for artillery observation would have a variable speed of 40 to 90 mph so it could quickly get to and from the area of operations but cruise slowly while adjusting fire, would be able to operate at low altitudes, would have armor to resist small arms fire, and would have two seats. He wrote that it should not have a machine gun because that would require a third crewman. He urged that a radio be developed for the aircraft.

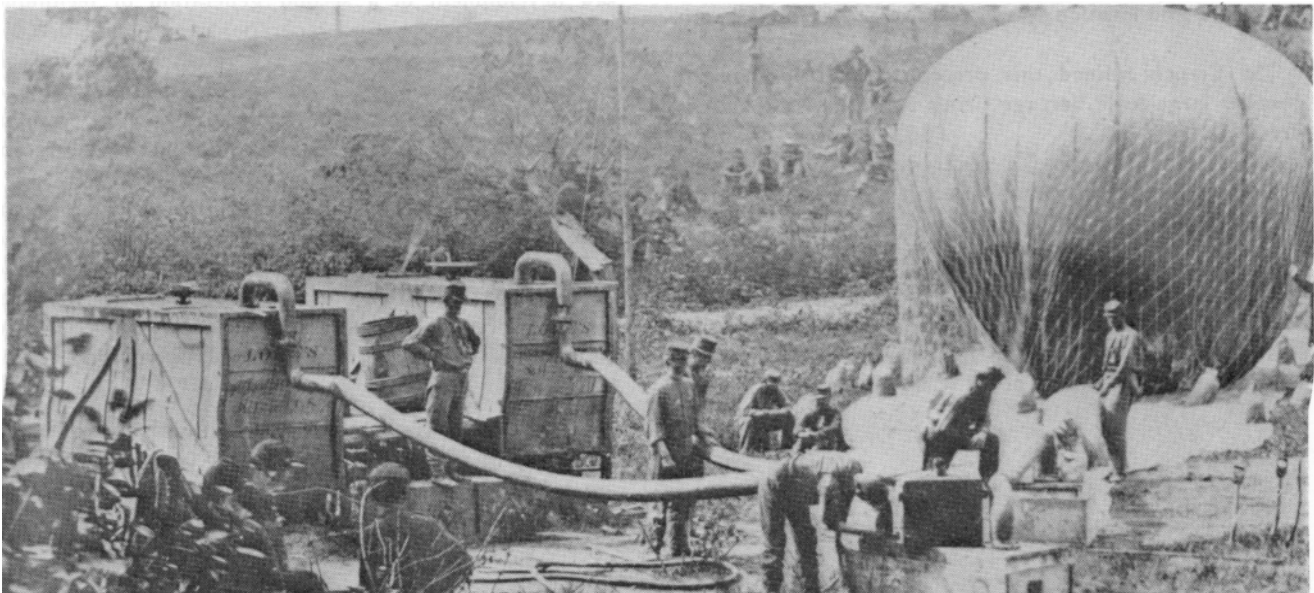
### Communication — Biggest Problem

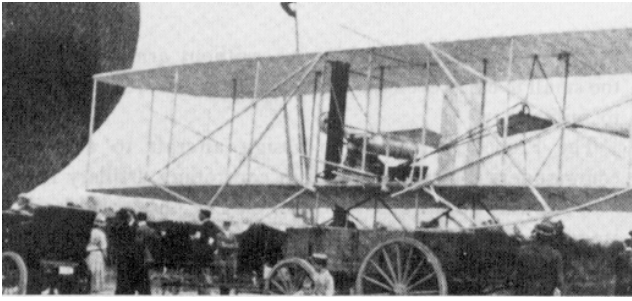
McLeary wrote that, ". . . until the aeronautical engine can be completely silenced, there appears little prospect of receiving radio messages at the aeroplane." All radios of the day were bulky and unidirectional. In 1917 a 75 pound radio with a range of 25 miles was developed, but in the meantime messages were dropped from the observer to the battery. Smoke signals, light signals and "wing waggles" were also tried.

### World War I

German artillery in WWI scored significant victories with long-range heavy field guns. The French were not prepared for this new kind of warfare and suffered heavy losses.

**Professor Lowe's balloon, the *Intrepid*, being inflated during the Battle of Fair Oaks, VA, May 31-June 1, 1862.**





**First Army airplane being transported at Fort Myer in August 1908.**

Employing aerial reconnaissance and heavy artillery, the Germans were able to halt an advancing force at six to eight miles and cause it to deploy. This rendered the light artillery of the French nearly useless since it was not yet in range.

Trench warfare in WWI brought significant changes in the US employment of field artillery. For the first time stabilized battlefield conditions dictated artillery be placed to the rear of the lines, away from observation and counterbattery fire. Gunnery techniques which enabled cannoneers to fire at targets they could not see (i.e., determination of elevation, deflection and charge by mathematical procedures based on observer spottings) became a necessity. By the end of WWI, direct fire had been relegated to defense of the battery position.

Trench warfare found the ground observers well forward with telephone communications to their battery. The early stages of the war also saw balloons used extensively by both sides. The Germans had an especially effective sausage-shaped captive balloon which they sent up during all daylight hours at altitudes of 400 to 800 yards. The observers had powerful glasses and telephone communications. These balloon observers were especially effective in directing artillery fire.

The large German siege guns, such as the Paris Gun which fired on Paris from 70 miles away, did not use observers. The slow rate of fire and long distances made adjustment by observers impractical, so a system of "mapshooting" — applying all possible corrections and firing at a grid location — was used in WWI, as well as in WWII.

The French refined this procedure in 1917, making possible large-scale barrage firing as well as massing of fires.

Observed fire became a reality in WWI but it was hampered by poor communications and a lack of trained observers and established correction procedures.

### **World War II**

Although crude aerial observation procedures were developed by the US as early as 1912, they were not successfully applied until WWII. In December 1941, the War Department ordered a test of the feasibility of using aircraft in the field artillery to provide short-range air

observation for the adjustment of artillery fires. By March 1942, the first class of volunteer pilots/observers and mechanics was graduated from Fort Sill. The newly trained observers participated in tests at Fort Sam Houston and Fort Bragg, and their success caused the War Department to establish organic aviation in field artillery units in June 1942.

The aircraft selected was a civilian model modified for military use, the LH-4 Cub which came to be known as the "Grasshopper."

Observers were taught to make all sensings on the gun-target line. In normal area fire missions, the observer called all the shots exactly as he saw them and the fire direction officer kept track of the bracket and ordered fire-for-effect.


The Grasshopper proved to have good survivability. Antiaircraft warning nets were established to give the pilots advance notice of approaching enemy aircraft. They could then leave the area or head for a mountain base which offered aerial camouflage. The slow flying cub also had an important advantage of maneuverability over the larger enemy aircraft.

Night aerial observation — using a smoke round which burst in a shower of flame — proved to be very successful for the US pilots.

Air observers were first used by the US in the invasion of Africa in November 1942. They played an important role in Sicily the following year and were used extensively in Italy. In June 1944, air observers were at Normandy and from then on they became the primary means of observation in Europe, accounting for more than 75 percent of all observed fire adjustment.

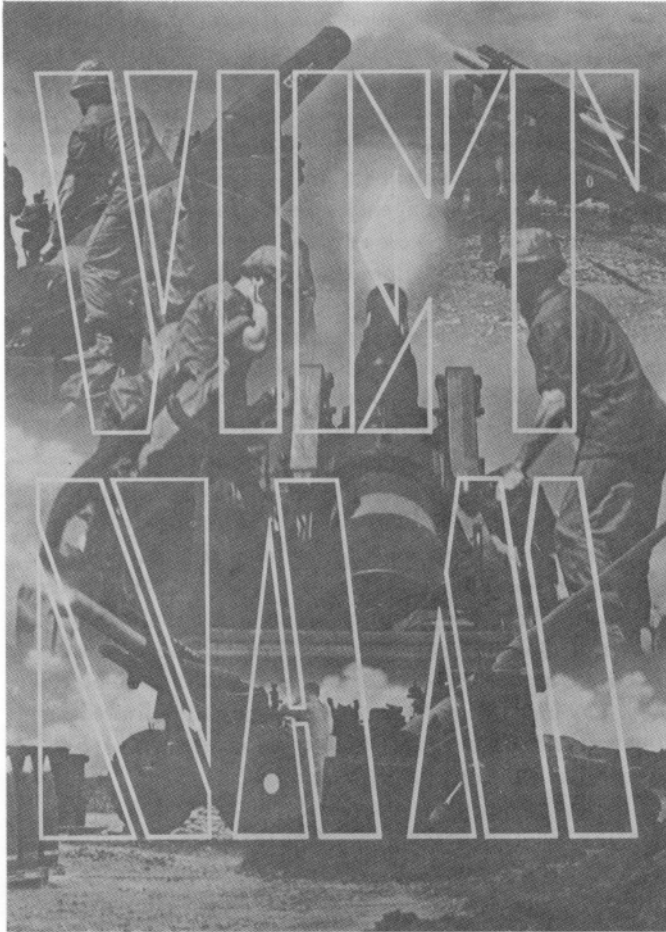
Aerial observation in the Pacific theater was not as successful because of dense jungle and the great distances between islands. The cub was discarded and Navy bombers were generally commandeered to fly Army observers. The high speed of these planes was a significant limiting factor for artillery adjustment.

The first generation of observed fire was the hit-or-miss attempts prior to WWI. Dramatic changes in the battlefield saw development of a second generation of techniques during that war. The third generation came of age in WWII and was characterized by heavy reliance on aerial observation. The next generation will feature a wide range of electronic devices, including the position determining devices, special FO vehicles, extensive use of lasers and exotic observation devices not yet conceived.

From the very beginning, reliance has been on the individual. The original gunners sighted down the end of their cannon barrels and fired at any target they could see. Today's cannoneer relies on a separate observer, removed from the battery location. The artillery forward observer remains the most prolific acquirer of targets on the battlefield. 

**Ronald W. Shinn is a reporter with the *Beacon Journal* in Akron, OH. This article was written before he left active duty when he was a captain on temporary assignment to the *FA Journal*.**

## Part VI Vietnamization (continued)



# Operations Into Cambodia

by LTG David E. Off

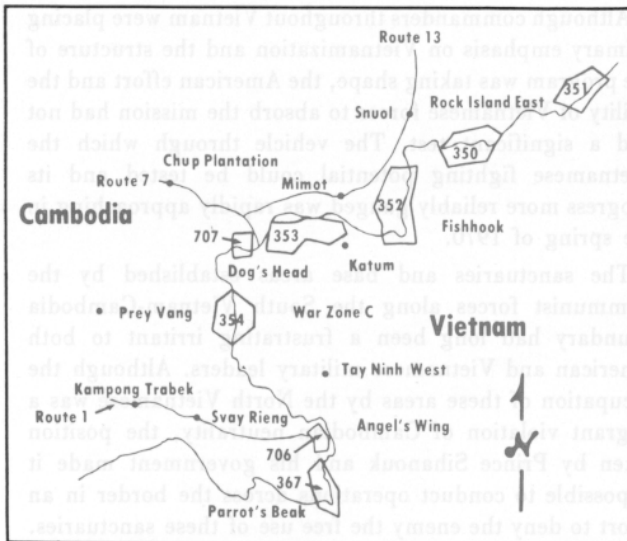
Although commanders throughout Vietnam were placing primary emphasis on Vietnamization and the structure of the program was taking shape, the American effort and the ability of Vietnamese forces to absorb the mission had not had a significant test. The vehicle through which the Vietnamese fighting potential could be tested and its progress more reliably gauged was rapidly approaching in the spring of 1970.

The sanctuaries and base areas established by the Communist forces along the South Vietnam-Cambodia boundary had long been a frustrating irritant to both American and Vietnamese military leaders. Although the occupation of these areas by the North Vietnamese was a flagrant violation of Cambodian neutrality, the position taken by Prince Sihanouk and his government made it impossible to conduct operations across the border in an effort to deny the enemy the free use of these sanctuaries. Sihanouk's neutrality was flexible, ranging from open hostility toward South Vietnam and her allies to a more agreeable tolerance of the North Vietnamese and the Viet Cong. Over the years, this tolerance permitted the establishment and maintenance of these base areas.

In the spring of 1970 the political atmosphere in Cambodia changed drastically and erupted into a violence which culminated in the overthrow of the Sihanouk regime. With the formation of the Lon Nol administration, the attitude of the Cambodian government changed completely; its hostility was directed away from the South Vietnamese and against the Communists. This reversal of position made possible the subsequent incursions into Cambodia.

Intelligence reports had been indicating a massive logistics buildup in the Cambodian sanctuaries in the Military Region (MR) III area for some time. Evidence was strong that the Communists were planning a major offensive—possibly similar in intensity to the 1968 Tet offensive. In addition, military intelligence had pinpointed the location of the Central Office of South Vietnam (COSVN), the major North Vietnamese headquarters for South Vietnam, in the "Fish Hook" region of Cambodia. The intent of the Cambodian incursion was to forestall an enemy offensive, despoil the sanctuaries and, if possible, capture COSVN. At the same time, the achievement of these objectives would so disrupt Communist plans and capabilities that the Vietnamization program would greatly benefit from the time gained.

South Vietnamese operations into Cambodia commenced 14 April 1970 with several limited penetrations into the "Angel's Wing" area. These penetrations were followed by a major Vietnamese thrust launched on 29 April. Operation TOAN THANG 42 (Rock Crusher) was initiated by the Vietnamese III Corps attacking with three task forces into the Angel's Wing area and then south into the "Parrot's Beak" area of Cambodia. Each task force was supported by



### Enemy base areas.

one battery of 105-mm howitzers, augmented by US self-propelled medium artillery as needed. II Field Force (FF) Artillery supported the attack with six batteries of medium and heavy artillery, initially deployed to the north and east of the area of operations in order to provide maximum support for the maneuver units. To further insure timely support, liaison was established with all Vietnamese task forces, III Corps and IV Corps. All US artillery fires in TOAN THANG 42 were coordinated and controlled by a forward element of the 23d Artillery Group, which was colocated with the Vietnamese III Corps tactical operations center at Go Dau Ha (later at Tay Ninh). During the latter phases of this operation, two medium and two heavy batteries displaced into Cambodia to keep pace with the rapidly moving Vietnamese forces. These batteries provided close and continuous support to the maneuver elements but were not allowed to displace west of Svay Rieng, the westernmost limit of the politically imposed US operational boundary.

On 27 April, the 1st Cavalry Division was given the mission of planning and executing a campaign to eliminate the North Vietnamese base areas in the Fish Hook region of Cambodia. To accomplish this mission, elements of 11th Armored Cavalry Regiment (ACR) and the Vietnamese 1st Airborne Division were placed under the operational control of the 1st Cavalry Division. Task Force SHOEMAKER was formed to carry out the attack.

The maneuver plan was simple and direct. The Vietnamese 1st Airborne Division's 3d Brigade would occupy blocking positions north of the objective area, and elements of the 1st Cavalry Division and the 11th ACR would make a four-pronged attack from the south. Artillery would be provided from all the elements involved in the attack, and additional fire support would come from IIFF Artillery units.

The fire support available was formidable and included the largest concentration of artillery, tactical airstrikes and B-52 strikes committed in support of an operation of this size in Vietnam. The fire support coordination planning required to support the operation was extremely complex and detailed. Initially, targeting information was limited; however, after the operation was approved, additional information became increasingly available from IIFF and Military Assistance Command sources. After the basic fire support annex and artillery fire support appendix were prepared, detailed coordination of fires with other fire support assets was conducted. Care was taken to insure that the various fire support agencies did not interfere with each other, times-on-target were adjusted to insure flight safety for ordnance-carrying aircraft and definitive air corridors were established.

Ninety-four cannon artillery pieces were positioned to support the initial phases of the attack: thirty-six 105-mm howitzers, forty-eight 155-mm howitzers, four 8-inch howitzers and six 175-mm guns. By 30 April (D -1), the IIFF heavy and medium artillery, the direct support artillery for the 3d Brigade, 1st Cavalry Division, and one Vietnamese airborne artillery direct support battery were in position and prepared to support the operation.

At 0600 on 1 May, D-day, an extensive 390-minute planned artillery and air preparation was initiated and a total of 2,436 artillery rounds was fired. These fires were effectively integrated with 48 tactical airstrikes to complete the D-day preparation. The total fire support delivered for D-day operations included 185 tactical air sorties, 31 B-52 missions and 5,460 artillery rounds.

During the period 2-5 May, the detailed fire support planning paid handsome dividends as many lucrative targets were engaged. The heavy concentration of cannon artillery and flexible fire support coordination allowed fires to be massed again and again with relative ease. Artillery moves to support advancing friendly forces began on 2 May and were subsequently made whenever necessary to insure continuous artillery coverage. IIFF Artillery units alone moved 198 times during the 60-day operation to maintain pace with the maneuver forces.

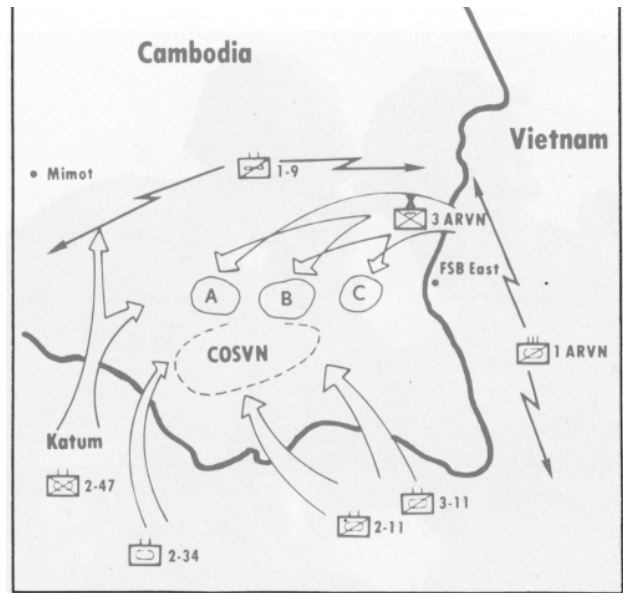
With the initiation of Operation TOAN THANG 45 (northeast of Bu Dop by the 2d Brigade, 1st Cavalry Division; in Base Area 354 by elements of the US 25th Infantry Division; and, in Base Area 350 by the Vietnamese 9th Regiment), fire support coordination activities were expanded but did not change significantly from the smooth-functioning procedures previously established. Positioning IIFF Artillery units centrally and well forward had facilitated the support of the additional maneuver units as they attacked into Base Areas 354, 707, 350 and 351. Except for a few batteries located in critical areas of III Corps, virtually all remaining units of IIFF Artillery were moved to the Cambodian border or across it. During one



three-day period, 32 artillery moves were conducted to place the firing elements in the best positions to support the expanded operations.

During the withdrawal phases of both TOAN THANG 43 and TOAN THANG 45, extraction support plans were formulated to derive maximum benefit from all available fire support. The purpose of these plans was to deny the enemy access to the extraction sites and air corridors. Each direct support artillery battalion planned the extraction fires for the supported brigade, and the division fire support coordination center cooperated closely with the Vietnamese airborne division artillery commander to establish the fire scheme for the withdrawal of the Vietnamese forces. These plans were so effective that continuous fire was maintained around the extraction sites and air corridors during the entire operation. By 1800 on 29 June, all American units were withdrawn from Cambodia.

At the same time that the well-publicized campaign across the Cambodian border was kicking-off in the MR III area, the 4th Infantry Division, located in the central highlands of II Corps Tactical Zone, received a warning order to be prepared to conduct operations across the border into Base Area 702. The mission was to locate and destroy enemy resources, installations and command facilities. Planning was initiated immediately for the two-brigade assault. Fire support was provided by division artillery units reinforced by medium and heavy elements of the 52d Artillery Group. Division artillery established a forward tactical command post at New Plei Djereng and developed the fire support plan for the operation, called BINH TAY I. Because South Vietnamese elements were involved in the operation, it was necessary to form the additional liaison parties to support Vietnamese units. A special fire support team was established with Special Forces and Civilian Irregular Defense Group units to insure timely clearance of fire requests. Firing units were positioned in forward areas on 4 May to facilitate joining the maneuver forces and reduce the time required to lift the units into the selected fire support bases. With one exception,



**1st Cavalry Division operations.**

all artillery units remained in their initial positions throughout the Cambodian operation. Although artillery support of the operation was adequate, ammunition resupply problems hampered the total effectiveness of the firing units. A temporary ammunition supply point was established at New Plei Djereng; however, its stockage was not in accord with the recommended stockage objective. A critical shortage was avoided only because the initial combat assaults of the maneuver forces were delayed one day.

Although significant amounts of materiel were captured and destroyed, Operation BINH TAY I was less than a total success. Because of other commitments and operational requirements in II Corps, 4th Division elements were withdrawn 10 days after the operation started and substantial areas were left unexploited. The lack of air assets, artillery

**In the Vietnamese excursion into Laos (LAM SON 719), US cross-border support was limited to aerial artillery and tactical air.**





**Though ARVN artillery units were able to master the smaller caliber weapons, the self-propelled 175-mm proved too complex for the infant Vietnamese maintenance and supply system to support. (US Army photo by SP4 Tony Hallas)**

resupply problems and heavy initial contact severely hampered the efficiency of the operation. Although Vietnamese forces continued to operate until 25 May, the major tactical effort was complete with the withdrawal of the 1st Brigade units on 16 May.

The Cambodian incursion was an overwhelming success in materiel captured or destroyed. During the two-month assault, friendly units expended 847,558 rounds of which 261,039 were fired by Vietnamese artillery units.

The Cambodian operation measured in terms of Vietnamization revealed continuing weaknesses in Vietnamese fire support techniques. Vietnamese artillery was not employed to its full effectiveness by task force commanders. Repeatedly, these commanders waited too long for tactical air, gunships and light fire team support when direct support artillery was within range and ready to provide immediate fire. Task force commanders called for tactical aircraft and light fire team strikes without regard to the nature of the target being engaged. Light fire teams often were called to engage well-fortified positions — targets better suited for artillery engagement. This failure to engage the enemy expeditiously materially reduced the effectiveness of the combat mission. Often, Vietnamese artillery liaison officers and forward observers were not properly utilized. On numerous occasions the maneuver element commanders personally adjusted artillery fire and Vietnamese Air Force airstrikes, although

trained observers were available. On several occasions, Vietnamese fire support officers were intimidated by their supported unit commanders to the extent that they would not approach the commanders with recommendations on the use of artillery. These failings resulted in lowering the effectiveness of the fire support and removed the commanders from their more immediate responsibilities of command. In addition, some coordination and liaison problems emerged between US and Vietnamese forces. These problems were most acute whenever US units were under the operational control of Vietnamese commands, and the difficulties manifested themselves in displacement, emplacement and security arrangements. At times, slow reaction by the responsible Vietnamese headquarters in target clearance matters hampered the ability of the American artillery units to provide responsive fire support to elements in contact.

One of the most significant successes of the Cambodian incursion was really a byproduct of the action. With Vietnamese troops committed in such large numbers to the operation, territorial security became the primary responsibility of the Regional and Popular Forces. Their reaction to the challenge was surprisingly good and, more important, the confidence they gained from their successes served as a valuable psychological boost.

#### **Toward Vietnamese Self-Sufficiency**

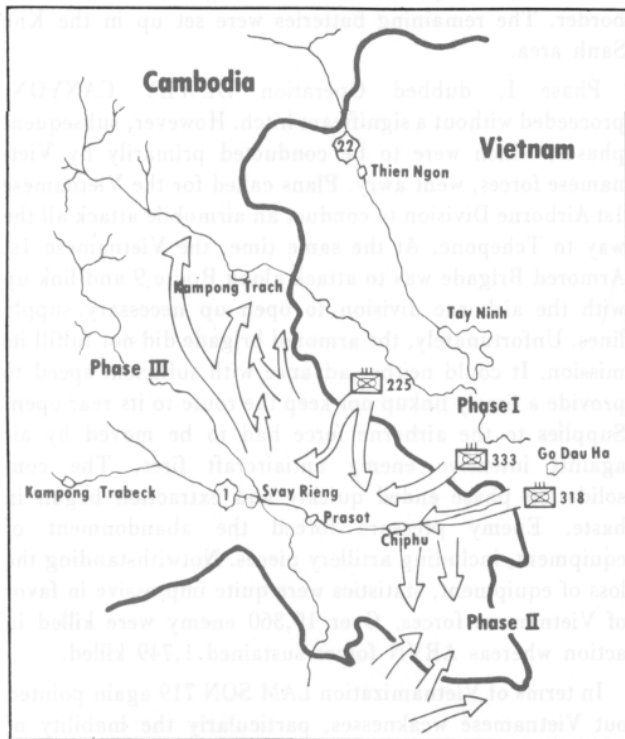
With the termination of the Cambodian operation, primary attention was returned to Vietnamization. The performance of Vietnamese units during the Cambodian fighting was carefully scrutinized, their strengths and weaknesses were analyzed and emphasis was placed on those areas in which improvement was necessary. It also became apparent that the ability of ARVN artillery units to support maneuver forces adequately was substandard. Although the deployment of territorial artillery, as projected and approved by Military Assistance Command, was considered the ultimate answer, it was evident that, because of the physical limitation of training and equipping them, these platoons could not deploy rapidly enough to release Vietnamese artillery units to provide standard tactical support. At the same time, the redeployment of American artillery was progressing so rapidly that the "repositioning tactic" employed earlier in the year was losing its validity. It became apparent that immediate stopgap measures were required. More and more senior artillery commanders admitted that the platooning of American artillery for extended periods of time to increase area coverage was the best solution. Though it had been common practice in Vietnam to separate US batteries into platoon positions, the practice had been viewed as a short-term expedient only. In the fall of 1970, BG Thomas J. McGuire, IFF Artillery commander, summed up the feeling of most artillery commanders when he said, ". . . even

though US artillery is prepared to respond rapidly by moving and shooting to destroy the enemy, we are prepared to replace ARVN artillery platoons and batteries which are on LOC [lines of communication] missions so that these ARVN batteries may move with the ARVN maneuver elements and support them on operation."

This tactic became standard procedure for American artillery units during the latter phases of the war. It also magnified the myriad problems that had plagued Vietnamese artillerymen when they platooned their guns. US commanders found that the problems — command and control, technical proficiency, maintenance and apathetic personnel — they had attributed to the "personality" of the oriental were, in fact, the result of the fragmented employment of artillery units. Diminishing assets made logistical support of these subunits difficult; the lack of qualified fire direction personnel limited the efficiency of the platoons; the absence of well-defined missions caused morale problems; and, battery commanders were often out of touch with major parts of their units.

To offset diminishing long-range fire capabilities, heavy artillery raids were planned and conducted frequently. These raids normally were coordinated: The targets were carefully planned, the ammunition was fired quickly and the guns were returned to their normal positions.

By the end of the year, the Vietnamese artillery posture had increased substantially and further deployments were planned. A total of 1,116 tubes were providing artillery



III ARVN Corps operations.

## ARVN ARTILLERY POSTURE 31 DECEMBER 1970

<i>Units</i>	<i>Authorized</i>	<i>Activated</i>	<i>Deployed</i>
105-mm bn	40	40	40
155-mm bn	15	15	15
175-mm bn (separate)	2	0	0
Sector artillery platoon (105-mm)	176	100	53

support throughout the country.

With the approval of Project ENHANCE in the fall of 1970, XXIV Corps was directed to prepare a comprehensive training program for presentation to cadre personnel of the 101st Artillery Battalion, the first Vietnamese 175-mm gun unit scheduled for activation. Corps artillery began this mission by carefully scrutinizing the composition of the proposed unit to insure that each facet of 175-mm gun employment received sufficient coverage in the program of instruction. Added emphasis was placed on maintenance, since this was to be the initial experience of ARVN forces with self-propelled artillery. Meteorological training received special consideration because, by TOE, the Vietnamese gun battalions were assigned meteorological teams. Fire direction and firing battery procedures were taught at Fire Support Base CARROLL, meteorology was taught at Fire Support Base NANCY, and driver and maintenance procedures were taught at numerous locations throughout MR I. Although instruction was conducted by the newly trained cadres, American experts were available to supervise and advise as necessary. Deployment of the first 175-mm gun unit was scheduled for July-August 1971.

The year 1971 brought another shift in the Vietnamization concept. Since the promulgation of the Vietnamization program in November 1969, the basis for Vietnamization had been training programs and combined operations conceived and controlled by Americans. By 1971, the American troop strength in Vietnam had been halved and it became apparent that the capability of US units to support training programs directly was rapidly diminishing. At the same time, American commanders felt that if Vietnamese forces were to become self-reliant, they would have to provide the training impetus for themselves. Assistance was offered only as needed and required. This shift in policy produced some hopeful indications as the Vietnamese began to assume the initiative in meeting most

of their requirements.

In 1971, Military Assistance Command reviewed the Vietnamization program and divided it into three phases:

Phase I — Turn over ground combat responsibilities to the Republic of Vietnam Armed Forces.

Phase II — Develop air, naval, artillery, logistics and other support capabilities of the Republic of Vietnam Armed Forces to the degree that effective, independent security could be maintained.

Phase III — Reduce the American artillery presence to a military advisory mission and, finally, withdraw as the South Vietnamese became capable of handling the Communist threat without US military assistance.

Although these phases were rather definitively stated, work was being done in both Phases I and II because it was impossible to achieve any success in the first phase without substantial gains in the second.

Having examined and approved the feasibility of providing self-propelled 175-mm guns to Vietnamese forces, Military Assistance Command began studies relative to the turnover of self-propelled 155-mm howitzers. The concept called for the activation of three battalions armed with the M109 howitzers. The study was continued until 23 August 1971, when General Abrams informed General Vien, Chief of the Vietnamese Joint General Staff, that the activation of the three new battalions was not feasible and that ". . . introduction of this new weapon into ARVN will overtax the training base and the logistics system, which is not now prepared to cope with the maintenance difficulties presented by this weapon . . . ."

Meanwhile, in January 1971, US and ARVN commands planned an operation across the border into Laos from Quang Tri Province in northern MR I. Both US and South Vietnamese intelligence estimates had strongly indicated that the enemy was preparing to conduct an intensified resupply and reinforcement operation in southern Laos as well as to build up supplies and equipment in MR I. Sources estimated enemy strength across the Quang Tri Province border to be 13,000 line and 9,000 support troops. In view of the successful Cambodian sanctuary operations of 1970, the logical tactical follow-up would be an effort to disrupt North Vietnamese supply and reinforcement operations.

The operation, termed LAM SON 719 and commanded by the commanding general of the Vietnamese I Corps, did not call for the employment of American ground forces in Laos. However, US air assets augmented the South Vietnamese Air Force in supporting ground operations. To permit a greater Vietnamese effort, American ground units provided extensive ground support in northwestern Quang Tri Province.

US and Vietnamese forces estimated a four-phase offensive:

Phase I — US units would open fire bases in Khe Sanh Plateau and secure Route 9 as well as staging areas and artillery positions from which to support subsequent operations.

Phase II — Vietnamese forces would attack into Laos on three axes, with the major axis along Route 9. Attacks would carry no farther west than Tchepone, about 30 kilometers into Laos.

Phase III — Gains would be consolidated.

Phase IV — Friendly forces would be extracted.

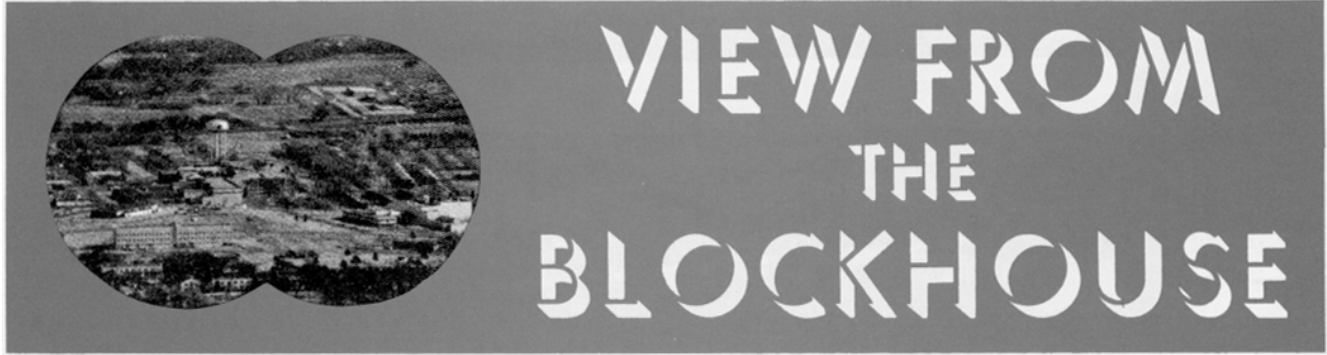
Planning for the employment of US artillery to support Phase I was extensive. Although ARVN maneuver units had their own light and medium artillery, they needed augmentation by heavy US artillery operating from the border. To this end, fire support was planned between the I Corps fire support element and the XXIV US Corps fire support element through I Corps Artillery, the I Corps G3 and the I Corps Artillery adviser. In addition, plans included coordination with the 108th US Artillery Group, the control headquarters for heavy US artillery.

The 108th Artillery Group consisted of the 8th Battalion, 4th Field Artillery, and the 2d Battalion, 94th Field Artillery, each with four 8-inch howitzers and eight 175-mm guns, as well as Battery B, 1st Battalion, 39th Field Artillery, with four 175-mm guns. The 4th Battalion, 77th Aerial Field Artillery, 101st Airborne Division, was also available to support the operation and, being an air asset, was not restricted by borders. Three 175-mm batteries and one 8-inch battery were situated along the Laos-Vietnam border. The remaining batteries were set up in the Khe Sanh area.

Phase I, dubbed Operation DEWEY CANYON, proceeded without a significant hitch. However, subsequent phases, which were to be conducted primarily by Vietnamese forces, went awry. Plans called for the Vietnamese 1st Airborne Division to conduct an airmobile attack all the way to Tchepone. At the same time, the Vietnamese 1st Armored Brigade was to attack along Route 9 and link up with the airborne division to open up necessary supply lines. Unfortunately, the armored brigade did not fulfill its mission. It could neither advance with sufficient speed to provide a timely linkup nor keep the route to its rear open. Supplies to the airborne force had to be moved by air against intensive enemy antiaircraft fires. The consolidation phase ended quickly and extraction began in haste. Enemy pressure forced the abandonment of equipment, including artillery pieces. Notwithstanding the loss of equipment, statistics were quite impressive in favor of Vietnamese forces. Over 19,360 enemy were killed in action whereas ARVN forces sustained 1,749 killed.

In terms of Vietnamization LAM SON 719 again pointed out Vietnamese weaknesses, particularly the inability of units to coordinate fire support. ☒

## Notes from the School



### FA School Leadership Changes

This summer and fall the US Army Field Artillery School underwent significant changes in key personnel. BG Albert B. Akers, Assistant Commandant, remains at the School helm, but many leadership changes have taken place in the directorates and departments. The Deputy Assistant Commandant, COL Niles J. Fulwyler, arrived in August after turning over command of the Field Artillery Missile Group Number 9. COL John J. Ridgway Jr. became the school Secretary after his graduation from the Army War College and completion of his masters degree from Shippensburg State College.

COL John S. Crosby succeeded BG (then Colonel) Paul F. Pearson as Director of Course Development. Colonel Crosby recently completed duty as the Commander of the 2d Armored Division Artillery. The Director of Evaluation is COL Myron J. Longmore who reported for duty from Korea where he served as Deputy Assistant Chief of Staff, J1, Headquarters, United States Forces. The Director of Training is COL Eugene S. Korpala, former 3d Infantry Division Artillery Commander and Chief, Human Resources Division, ODCSPER. Colonel Korpala is slated to become Director of the Tactics and Combined Arms Department in January 1977 when the current director, COL H. R. Guffey, assumes command of the 212th Artillery Group at Fort Sill.

Three academic departments have changed directors since the reorganization. COL James P. Holley assumed duties as the Director of the Counterfire Department after a successful tour as Commander, 4th Missile Group, Korea. COL (then LTC) Russell L. Parsons moved from Deputy Director, Gunnery Department, to Director. COL Jack L. VanPool became the Director, Weapons Department, after gaining his masters degree at Shippensburg and graduation from the Army War College.

The Field Artillery School Brigade changed commanders in June. COL Michael A. Stevenson received the guidon from COL Robert G. Arciero who retired with

more than 23 years service.

Only three directors remained in their former duties after the reorganization: COL James T. Barron, Combat Developments; COL Sam A. Brown, Training Developments; and, COL Edwin W. Chandler, Communications-Electronics. With the new leadership team, the Artillery School is fully prepared to accomplish its TRADOC mission.

### Artillery Observer Trainer

The evaluation of a Swedish trainer for artillery observers is progressing satisfactorily.

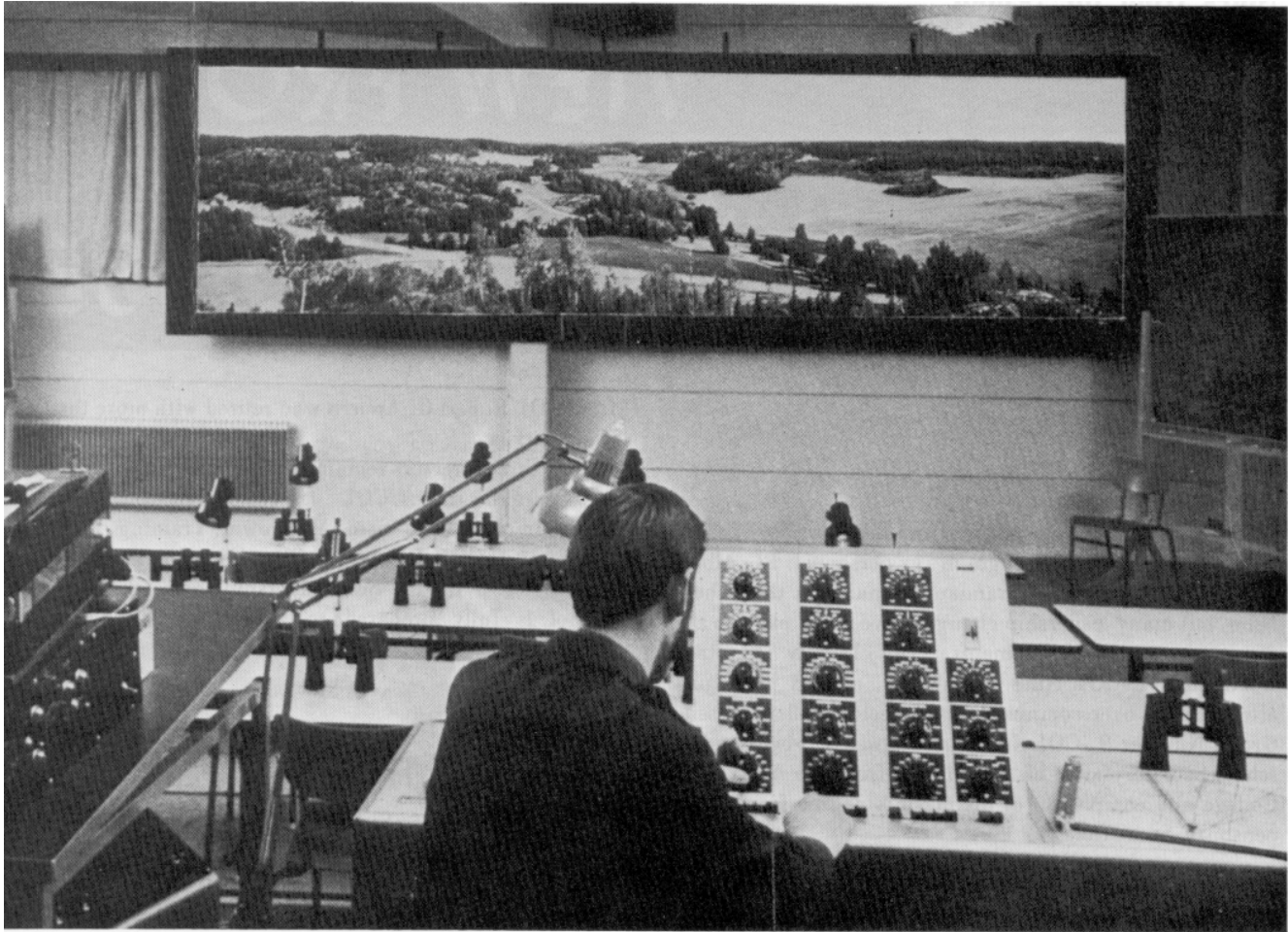
The Field Artillery School (USAFAS) is the proponent for evaluating the BT-33 Fire Control Simulator, an electronic training device capable of projecting various terrain scenes onto a panoramic screen and simulating artillery engagement of targets within those scenes. The BT-33 has been made available to USAFAS through a lease agreement with SAAB-SCANIA of Sweden.

The primary objectives of the USAFAS evaluation are to validate simulation as a method of training observers and to document the degree simulation can effectively be substituted for observer live fire training in the current program of instruction. The BT-33 evaluation parallels the on-going development of a US observed fire trainer that is similar in technology to the SAAB device. However, the US version will be a self-contained portable unit in its final configuration.

The core of the evaluation assesses training effectiveness through examination of FA Officer Basic Course (OBC) classes when the BT-33 is substituted for various amounts of the current training program. The final analysis will be a comparison of individual versus group scores based on all test conditions.

Additionally, subjective data are being collected by questionnaire through the sampling of Officer Advance Course students, personnel from III Corps Artillery and the

## View From The Blockhouse



**The BT-33 fire control simulator consists of a target area display, a control unit and observer areas.**

USAFAS Staff and Faculty. Maximum exposure of the device is being made to obtain the largest data base possible in support of the observed fire simulation test effort.

Results to date indicate that simulation is a viable technique for training forward observers. Preliminary OBC data show students receiving BT-33 training do as well as those trained with live fire. Data analysis and the evaluation will be completed before the end of the year.

The BT-33 is currently used in the training of artillery observers by the military forces of Denmark, the Federal Republic of Germany, Norway, Sweden, the United Kingdom and Yugoslavia. In addition to the United States, countries interested in the BT-33 include Canada, Japan, USSR and Iran.

## Distribution Of Soldier's Manuals

Response from the field indicates apparent confusion about what to do with Soldier's Manuals when the initial issues arrive at the unit for distribution.

Commanders and other responsible unit personnel should be familiar with DA Circular 310-87, dated 22 June 1976, describing the Soldier's Manuals program. In addition to this circular, each Soldier's Manual has a commander attention page at the front which indicates to whom that manual is to be distributed.

Initial distribution of Soldier's Manuals will be "pushed" down to the unit level, based upon assigned strength in the particular MOS and skill level for active Army and National Guard. For the ready Reserve, Soldier's Manuals will be distributed to units based on the authorized strength.

Should additional manuals be needed by the unit for MOS study, libraries or other training needs, DA Form 17 (Request For Publication) may be sent through normal publication requisitioning channels to the US Army Publication Center, 2800 Eastern Boulevard, Baltimore, MD 21220.

Upon reclassification or promotion to grades E5, E6, E7 or E8, the soldier must order his next higher level manual directly from the preparing agency identified in this manual. Regardless of skill level, the individual soldier is responsible for retaining and maintaining his manual.

## Missile Instruction Goes To Weapons Department

In ceremonies held at the Weapons Department, USAFAS, MG David E. Ott, then USAFAS Commandant, presided over yet another internal School reorganization. At that ceremony, the Guided Missile Division was transferred from the Gunnery Department to the Weapons Department.

The reorganization brought all field artillery weapons — from the 105-mm howitzer to the Pershing missile — instruction and materiel expertise under one department. This will aid in ending the persistent myth that cannoners and missileers are members of two different and distinct "branches."

The art of warfare has progressed to such a point that the back-up punch for the armor and infantry is needed at far greater ranges and with greater lethality than ever before. Today, the field artillery weapons are able to give the combat commander that punch with increased missile capabilities and improved cannons, doctrine and techniques. The transfer of the Guided Missile Division to the Weapons Department will continue to improve the training, interchange of ideas and cooperation of all artillerymen, missilemen and cannoners.

## Firing Tables For M110A1

Starting in January 1977, 8-inch M110 units will begin converting to the "long tube" M110A1. The project manager for this conversion has prepared a fire direction aids kit to be issued to each battalion/battery by a new equipment team at the time of conversion.

A battalion kit consists of the following items:

- Five complete sets of graphical firing tables (GFTs), (low angle): NSN 1220-01-021-7272.
- Five complete sets of GFTs (high angle): NSN 1220-01-021-7273.
- Five graphical site tables: NSN 1220-01-021-7274.
- Two FADAC tapes: NSN (not yet available).
- Twelve tabular firing tables, 8-Q-1.

Action is underway to incorporate these items into the Army inventory.

## 8-inch OJT Packet Available From USAFAS

Has the termination of the 8-inch Atomic Projectile Assembly Course (#4F-F5/041-F2) given you heartburn? If you are an 8-inch battery commander it probably has caused you some concern. The Field Artillery School has developed a classified job-aid packet to assist you in developing a viable on-the-job training program to train new assembly personnel.

The packet consists of five instructor manuscripts, with

accompanying Vu-graph slides (both classified and unclassified) and a classified examination. The subjects cover the full spectrum of the technical assembly process and parallel the former resident course. Units are urged to use the packet as an intensive, semiformal course taught over a relatively short period. A significant loss of value will result if individual manuscripts are used separately.

Requests for the packet from reserve units must be routed through a unit's Active Army Regional Advisor who must certify that the unit has the capability to store CONFIDENTIAL RESTRICTED DATA. Requests and certification should be sent directly to Commandant, USAFAS, ATTN: ATSF-CA-NW, Fort Sill, OK 73503.

## The ARTEP Is Not A Test

Some commanders have the impression that the Army Training and Evaluation Program (ARTEP) is a test along the same lines as the obsolete Army Training Test (ATT) and even go so far as to place a "pass or fail" label on units that are evaluated under the ARTEP system. In reality, the ARTEP is not a test but a diagnostic tool which commanders and section leaders use to evaluate informally and continuously the state of training of their units or sections. These evaluations are then used to develop training programs to correct weaknesses noted in unit operations. The ARTEP tells the training manager *where he is* in respect to his present state of training and *where he needs to be* relative to a specific level of training proficiency.

The ARTEP contains a list of realistic combat tasks that must be accomplished under certain conditions according to specified standards. It is performance-oriented and very definitive. The ARTEP is not a scenario in itself, nor are the tasks necessarily listed in any mandatory chronological sequence for testing purposes.

It is recognized that there are people in the Army, reared in the ATT philosophy, who feel that a formal evaluation is necessary. If this is the case, the commander directing the formal test of a unit should use the tasks in the ARTEP as a basis for formulating his own test. A formal evaluation based *solely* on the ARTEP is a contradiction of the concept of the program. The only product of this type evaluation is the verification of what the unit commander already knows about his unit.

We recognize, however, that it is a new and innovative approach to training and obviously will go through some growing pains. The real meaningful changes to the ARTEP will happen as a direct result of input from the field.

If you question any of the tasks, conditions and standards of the ARTEP, drop the Field Artillery School a letter (USAFAS, ATTN: ATSF-TD-CT, Fort Sill, OK 73503) or call on the 24-hour-a-day "Hotline" (AUTOVON 639-2064).



by CPT Gary N. Grubb

Advanced air defense weapons systems manned by well-trained crews in Vietnam brought an end to the practice of adjusting field artillery from high above the target area. The very real problem at hand was to determine if the aerial observer could perform essential tasks and still survive in such an air defense environment.

This situation was addressed by the 1st Cavalry Division Artillery (Red Team) in March 1973 by development and implementation of the Pilot-Observer Team concept of aerial observer (AO) training as presented in the May-June 1974 issue of the *Field Artillery Journal*.

Comprehensive information has been collected on the threat forces as assumptions relative to the modern battlefield have been more clearly defined. As a result, significant modification of field artillery procedures and specific aviation terrain flying tactics have been published.

Aerial observation training within the Red Team has remained current with contemporary doctrine and ideas. In January 1975 a comprehensive evaluation of the existing package produced a more streamlined Aerial Observation Program (AOP) to achieve the recognized objective. The basic concept of survival through teamwork between the artilleryman and the aviator remains paramount.

AOP training is conducted by the aviation section of the division artillery. Three assigned aviators, with a field artillery officer as the senior member, form the instruction group. Personalized instruction is considered essential to instill a "team attitude" between the instructor and his

students. The two observers per instructor ratio provides the ideal training situation for both classroom discussion and in-flight practical exercises. Three-day programs of instruction, tailored to correspond to the actual skill level of the observer group, have been developed for both aviation and non-aviation personnel. Topic areas presented to aviators are heavily weighed with field artillery observation procedures, while qualified artillery observers receive a program which concentrates on communication, navigation and crew coordination techniques.

Each rated aviator assigned to the aviation section, regardless of branch, must become proficient in aerial observation and adjustment procedures. Primary students of AOP training have been forward observers from the direct support battalions. After course completion, each observer is scheduled for periodic refresher exercises whenever the AO's unit conducts field operations. Final evaluation of observer team training is consummated by unit Army Training and Evaluation Program (ARTEP) performance.

Numerous AOP demonstrations of varying complexity have been presented to foreign dignitaries, allied officers and senior US Army officers. Demonstration objectives include the conduct of a live fire mission with the visiting official in the aircraft functioning as an aerial observer.

Members of Fort Sill's 14th Aviation Battalion, III Corps Artillery, received a briefing on the AOP, to include a



demonstration of the flying tactics used. The purpose was to determine if a similar program could be initiated to train forward observers assigned to the US Army Field Artillery School support units. A program of instruction and selected lesson plans were provided to serve as a point of departure. Subsequent reports indicated that pilot-observer teams, trained by the 14th Aviation Battalion, demonstrated outstanding results during ARTEP events using AOP tactics.

A sharing of ideas and discussion of mutual capabilities with elements of the 6th Air Cavalry Combat Brigade (ACCB) [*Journal*, September-October 1975] identified an opportunity to reinforce artillery adjustment procedures to this lucrative source of aerial observers. Six members of the ACCB have been qualified as AOP instructors to serve as a nucleus for dissemination of AOP tactics within this separate brigade. Use of the M31 Trainer was encouraged to provide an economical means of demonstrating and practicing basic field artillery adjustment procedures. Results of this experience have been encouraging and were used to augment the MOS reclassification program conducted by the ACCB.

During the fall ROTC branch selection period, unit aircraft and AOP qualified aviators accompanied Red Team FA branch representatives to local college campuses. The challenges which confront aerial observation team members became an important recruiting vehicle during these visits. A detailed briefing concerning the role of the FA aviator, with special emphasis on the AOP, was an integral part of the total presentation. In addition, each cadet was afforded the opportunity to participate in a comprehensive demonstration flight of a simulated tactical observation mission.


Increased concern regarding the potential enemy air defense environment prompted an invitation from the Field Artillery School Gunnery Department for personnel familiar with AOP tactics to view the conduct of aerial observation training presented to FA Officer Basic Course (OBC) students. This mission was an extremely valuable experience for AOP instructor personnel, presenting a detailed overview of all aspects of AO instruction, and was highlighted by the successful conduct of a graded area fire mission by an OBC student using AOP tactics. Distribution of personnel in the aircraft was modified to achieve a more tactical configuration. The Gunnery instructor completed mission grading requirements from the passenger compartment while the student occupied the observer's station. An AOP-qualified aviator served as pilot in command. The observer entered fire-for-effect after two adjustments with rounds confirmed within 10 meters of the adjusting point. The initial observation area was in excess of four kilometers and 2,500 miles from the site occupied during the final adjustment. The observer agreed that the techniques were similar to a "walking shoot" with an aircraft.

A draft training memorandum, "AOP Techniques," was compiled as a vehicle to share the aerial observation ideas and successes experienced by the Red Team. It was distributed to Fort Sill and commands possessing similar assets. Several unit training programs designed to achieve comparable objectives have been identified by correspondence from those receiving the memorandum. Mutual problem areas have been experienced which require further research and solution:

- Terrain flying altitudes essential to survival significantly reduce the communications reliability of current line-of-sight radios. Red Team aviators will participate in a nap-of-the-earth (NOE) communications test to evaluate the effectiveness of improved retransmission systems when used by Army aircraft operating in the NOE flight profile.
- The AO's ability to traverse the battlefield rapidly and use multiple observation areas has placed increased demands upon fire direction center response time. As the player unit for the TACFIRE Operation Test III, the Red Team awaits the opportunity to integrate more completely the AO into contemporary concepts.

Clearly, the need exists to pursue all areas of potential AO use. Activities such as the following provide a broad base for continuous program development:

- Participation in NOE navigation tests utilizing a variety of experimental topographic aids.
- Use of night vision devices during the conduct of terrain flight training.
- Mutual training with other organizations.

Pilot-observer teams of the 3d Armored Division Artillery have conducted research in applying the capability of organic countermortar radars in coordinating AO fires. Several additional areas of interface application are being investigated as potentially useful in the European environment. 

**CPT Gary N. Grubb, FA, is Assistant S3, Headquarters, 1st Cavalry Division Artillery, Fort Hood, TX.**

**Teamwork, the essential ingredient of successful aerial observer operations, is improved by thorough coordination among operations officers, pilots and observers.**



## Sill's Salute Battery Assumes New Mission

Fort Sill's salute battery has traded spit and polish for sweat and camouflage paint. The battery is in training to assume a higher level of combat readiness as part of the US Army Forces Command.

Bravo Battery, 2d Battalion, 2d Field Artillery, has become well known throughout the southwest United States while firing artillery salutes at county fairs, Independence Day picnics and other gatherings.

Now firing battery personnel are getting a taste of mud-smearred trucks, howitzers draped in weeds and helmets covered with dry grass and leaves as they train for a new mission. The mission requires that the unit be operational and ready for deployment with as little as 24 hours notice.

"It's a 100 percent change from what these guys have been doing," said SSG Jesse Jordan, chief of firing battery. "Most of them have never done this before. We move the whole battery to the field — the orderly room, administrative work, supply . . . and function the same way we would in the rear, in a tactical way."

The battery has 12 howitzers — six M101A1s used only for salutes and six M102s for firing USAFAS support

**Training for a tactical situation, B Battery men practice camouflaging themselves and their howitzer. (US Army photo by SSG Rick Hayeland)**



missions and combat training.

"You can read it in a book, but there's nothing like getting down and doing it, and that's what this training is all about," said SGT Cody May, battery motor sergeant. His mechanics, along with the battery cooks and clerks, now perform their jobs in the field as well as providing battery area security.

The chart operators and other fire direction personnel have also been busy polishing their skills and practicing computing firing data. The battery did not provide an FDC when firing school support missions but must now have that capability in order to be combat ready.

## Div Arty Leads In 1st Armored Division

ANSBACH — Recent awards ceremonies in Ansbach, West Germany, headquarters of the 1st Armored Division, were dominated by division artillery.

MG William L. Webb, "Ironsides" division commander, presented fiscal year 1976 reenlistment trophies to div arty in the "major units" category and to the 1st Battalion, 94th Field Artillery in the battalion-sized unit competition.

The 1-94th FA was also honored by having its battalion FDC chief, Staff Sergeant Harold F. Shrewsbury, named Division "Trooper of the Year" for FY 1976. The West Virginia native commented, "This is the honor that tops off a junior NCO's career." Sergeant Shrewsbury was also honored recently by being named to the Sergeant Morales Club, a VII Corps distinction presented to NCOs who have excelled in leadership.

## Radar Consolidation

SCHOFIELD BARRACKS, HI — The 25th Infantry Division "Tropic Lightning" Redlegs are in the spirit of putting to practice what the Field Artillery School is teaching. They recently consolidated the AN/MPQ-4A Weapons Locating Radars from the direct support battalions into Headquarters and Headquarters Battery, Div Arty, in what is intended to be the first step toward forming the Target Acquisition Battery (TAB). Additionally, this

centralization of expertise, experience and equipment should result in an increase in both training and maintenance proficiency.

Although the concept has only been in effect for a brief time, it is already proving to be very successful. The Q-4 section and the TPS-25 form the radar platoon which is a part of the Provisional Target Acquisition Element (PTAE). The PTAE also includes a survey platoon. Each platoon is at full strength and has both a platoon leader and sergeant. The PTAE is supervised by a captain (formerly the target acquisition platoon leader).

Training and maintenance, as well as troop morale, have been greatly increased. In addition to their associated direct support role, the radars are being tasked to perform missions not normally associated with the Q-4; i.e., supporting general support artillery during field training exercises and Army Training and Evaluation Programs and providing flash data for mortar and artillery training and evaluations. Due to this added emphasis, radar personnel have developed a feeling of importance in their work. Thus, not only has training taken on a new interest, but a willingness to maintain the equipment has developed. One of the major undertakings of the PTAE is to conduct an intensive two-week training program for the Q-4 section of the "roundout" field artillery battalion, the 1-487th. This will not only provide the best possible training environment for the National Guard but also allow their integration into the radar platoon for a more complete evaluation of the PTAE concept.

Anticipating that the Target Acquisition Battery for the 25th Division will be activated in FY 78, the radar consolidation is the initial step that can be taken immediately to give the division artillery commander a target acquisition organization commensurate with the division artillery's firing capability.

## Fort Sill Battalions Transferred

The 1st Battalion, 30th Field Artillery, has been a traveling battalion since activation in 1918 as Battery A, 30th Field Artillery. The present unit arrived at Fort Sill from Fort Lewis, WA, in April 1971 after serving five and a half years in Vietnam with the 1st Cavalry Division.

Once again the battalion (now assigned to the 212th Field Artillery Group of III Corps Artillery) is on the move and departed for PCS to Germany in early October as part of the Brigade 76 increase in combat capability in Europe. The 8-inch battalion will be a non-divisional unit under control of VII Corps and the 210th Field Artillery Group, the Army's largest artillery group with seven battalions.

The 1-30th will be stationed at *Sheridan Kaserne* in



**Personnel of the 1-30th Field Artillery load personal equipment on sea-going container vans as they prepare for unit PCS to Germany. (US Army photo by SP5 Larry O. Belt)**

Augsburg. The men of the unit will be joined by their families as housing becomes available.

Joining the 1-30th in going to Germany is the 1st Battalion, 18th Field Artillery. The two Sill battalions will replace the 1st Battalion, 17th Field Artillery, and the 2d Battalion, 18th Field Artillery, which are returning to Fort Sill after a temporary duty stint in US Army Europe.

## Howitzer Battery Honored

FORT ORD, CA — The MG William Nelson Gillmore Award has been presented by 7th Infantry Division Artillery Commander, COL Robert D. Hammond, to C Battery, 2d Battalion, 8th Field Artillery, honoring the unit as the outstanding howitzer battery in div arty.

Selection for the award is based on an evaluation of unit performance as demonstrated on battery and battalion-level Army Training and Evaluation Programs administered to all howitzer batteries. Battery C, 2-8th FA, commanded by CPT Phillip A. LaHaye, is the first recipient of the Gillmore Award. Colonel Hammond stated the battery demonstrated outstanding proficiency in all phases of tactical and technical operations which, combined with a "can-do" attitude, enabled them to meet and surpass the numerous challenges encountered during the evaluations.

General Gillmore, now retired, donated a captured North Korean rifle to the 7th Infantry Div Arty in December 1975

## Right By Piece



**LTC William Breen, Commander of the 2-8th Field Artillery, and COL Robert Hammond, Commander of the 7th Infantry Div Arty, jointly present the Gillmore Award to CPT Phillip LaHaye, Commander, C Battery, 2-8th Field Artillery.**

to serve as an annual award honoring the combat readiness achievements of div arty cannoneers.

General Gillmore, a 1925 graduate of the US Military Academy, was commissioned in the Field Artillery. He is a veteran of WWII and Korea and has commanded five div artys including the 7th Infantry Division Artillery during 1949-1950.

## 2-6th FA Gives FO Training

GRAFENWOEHR — The 2d Battalion, 6th Field Artillery, recently conducted training in forward observer techniques for 56 soldiers of the 2d Brigade, 3d Armored Division.

The training, conducted in two distinct phases — a day of classroom instruction and a day of live firing — highlighted future demands for expanded FO coverage. The training recognizes that all combat arms leaders must be capable of calling for and adjusting indirect fire.

Upon completion of the training, a staff sergeant from the 3d Battalion, 12th Cavalry, said, "It is through training like this that the term 'combined arms team' really takes meaning." A tanker said, "I thought I knew a great deal about FO procedures before I got here. This was a real eye opener." An infantry specialist four said, "I came here not knowing a thing about field artillery. This morning I put a round on the target after only five rounds."

CPT Perry Baltimore, assistant operations officer of the 2-6th, explained that the training program was in keeping with the battalion policy of insuring expert integration of maneuver and fire support.

## Div Arty Takes Fitness Honors

FORT CARSON, CO — Division artillery continues to lead the 4th Division in physical fitness. The 1st Battalion, 27th Field Artillery, commanded by LTC Dennis Reimer, recently beat the old record held by another artillery battalion, the 2-20th FA. In fact, the last three record holders in the division competition have all been from div arty.

The test is conducted by randomly selecting a representative number of officers and enlisted personnel from a divisional battalion, administering the test and computing the scores. The testing includes all battalions organic to the division.

## 101st Airborne Adds Battalion

FORT CAMPBELL, KY — Division Artillery of the 101st Airborne Division has been beefed up by the addition of a general support 155-mm battalion, the 2d Battalion, 31st Field Artillery.

The battalion, reactivated in December 1975, is currently awaiting fill in personnel and equipment and is expected to be operational early in 1977.

The unit is equipped with the towed version of the 155 which can be airlifted by sky crane helicopter or the "Super C" Chinook helicopter. [Welcome back 2-31st. You have been added to the distribution list for the Journal. —Ed.]

## General Support Rocket System

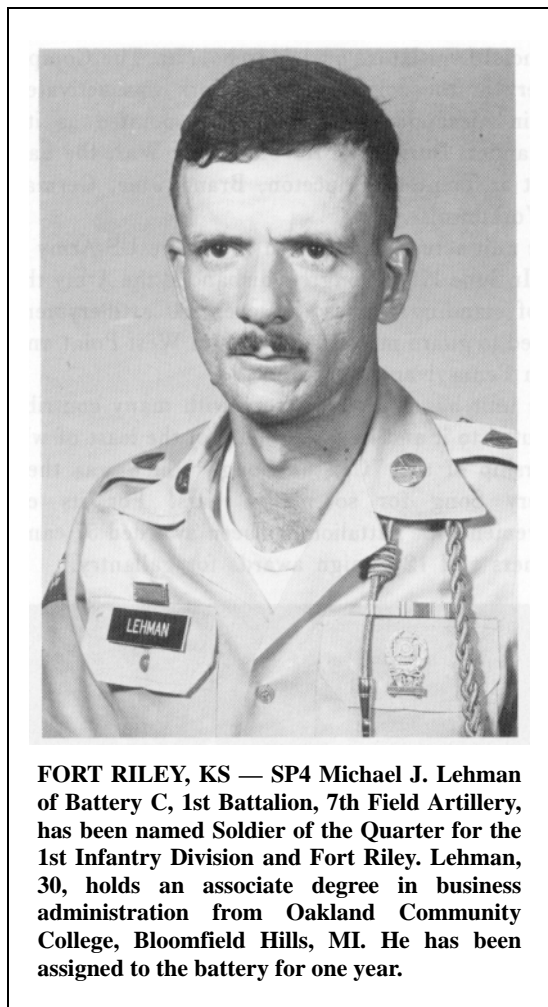
REDSTONE ARSENAL, AL — The Army Missile Command (MICOM) has established a provisional project office at Redstone Arsenal to develop the General Support Rocket System (GSRS), a new multiple launch artillery rocket system planned for the 1980s. Establishment of a provisional office means that formal acceptance and approval by the Department of Army are pending.

COL Kenneth S. Heitzke, GSRS Special Assistant for the past four months, has been named GSRS Project Manager.

GSRS is intended to be a simple, rugged, reliable artillery rocket system which can be deployed rapidly and deliver a high volume of fire. Present Army concepts envision the weapon system as being a mobile launcher, carrying several rockets which can be fired in rapid ripples.

In March, MICOM awarded concept definition study contracts to Boeing Aerospace Company, Emerson Electric

Company, Martin Marietta Corporation, Northrop Corporation and Vought Corporation for their ideas on developing the free-flight artillery rocket. From these studies, the Army will determine the best technical approach for the GSRS.



**FORT RILEY, KS — SP4 Michael J. Lehman of Battery C, 1st Battalion, 7th Field Artillery, has been named Soldier of the Quarter for the 1st Infantry Division and Fort Riley. Lehman, 30, holds an associate degree in business administration from Oakland Community College, Bloomfield Hills, MI. He has been assigned to the battery for one year.**

## Dignitaries Visit 3-16th FA ARTEP

GRAFENWOEHR — MG John R. D. Cleland, Commanding General of the 8th Infantry Division visited the 3d Battalion, 16th Field Artillery, while the battalion was participating in its Army Training and Evaluation Program (ARTEP) here. The general said the artillery sections were some of the "best organized crews I've seen."

The 3-16th made some valuable innovations during the Grafenwoehr training by arranging for visits by NATO allies. The 8th Infantry Division Artillery unit and its "Project Partnership" sister battalion, the 51st German Artillery Battalion, exchanged entire batteries, selected

crews and several individuals. Also, 13 officers from the 1st French Division Artillery visited the unit to observe a US ARTEP in progress.

## 2-78th FA Joins Project Partnership

BAMBERG — The 2d Battalion, 78th Field Artillery, stationed in Bamberg, and its German partner unit, the 125th Panzer Artillery Battalion from Bayreuth, recently held three "partnership" activities. Project Partnership is the program sponsored by US Army Europe (USAREUR) to establish close unit associations between USAREUR soldiers and troops of other NATO member nations. Associations are based on geographical proximity and similarity of unit organization and mission.

The units' first event was an escape and evasion maneuver with 52 American troops and 16 German soldiers participating. The soldiers were divided into teams with seven or eight American and two German soldiers.

Each soldier was carrying full field gear and his individual weapon. One PRC-77 radio was given to each section. The men traveled a total of 125 kilometers in two days.

Sergeant Robert Shady, a team leader, said, "We had eight men on our team and we all made it, but it wasn't easy. We walked the first day until 10 pm, then slept until six the next morning. We didn't have any problems finding any of our checkpoints. Our squad came from the northeast and we had hills, cliffs and wooded areas to travel. Along the way one German farmer even gave us all a beer to drink. Our only problem was all of us had very sore feet."

The pains and aches were soon forgotten after arriving at the German *kaserne* in Bayreuth because there was plenty of food and beer for all.

The second partnership activity was a German-American shooting competition. Twenty German NCOs and officers and 20 US NCOs participated in shooting the American .45 caliber pistol and the American M-16 rifle. The soldiers shot for trophies: best individual shooter and best team in each weapon category.

The third joint activity between the artillery battalions was a biathlon hosted by the Germans. This event consisted of running a distance of 1,800 meters, falling to a prone position and shooting five rounds with the 7.62 German rifle, getting up and running another 2,000 meters, taking a standing position and firing another five rounds, then running another 200 meters to the finish — a total of three kilometers. The soldiers who complete the event in the least time are the winners. But the soldier must also shoot well, because for each shot that misses the target, one minute is added to his time.

## Right By Piece

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ORLANDO, FL — The Florida National Guard's 1st Battalion, 116th Field Artillery, has assisted in development testing of the 155-mm cannon launched guided projectile (CLGP). The test consisted of firing inert CLGP projectiles on a tiny range at Martin Marietta's Aerospace Plant here. Charge 5 GB was fired in the unit's M109A1 at an impact area just 80 feet from the howitzer's muzzle. CLGP, also known as the "smart round," is a maneuverable projectile capable of overcoming target location errors and hitting moving targets or stationary hard point targets through the use of reflected laser energy.

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## Oldest Unit — It's Official

FORT RILEY, KS — The battle for the title of "Oldest Artillery Unit On Active Duty" is over and Department of the Army has declared the winner to be the 1st Battalion, 5th Field Artillery, currently assigned to the 1st Infantry Division.

At a ceremony in Washington, DC, the Undersecretary of the Army presented documents and campaign streamers to the battalion. The 1-5th is the only active duty unit which has been on continuous active duty since the Revolutionary War, according to the Fort Riley Post newspaper. Also honored at the ceremony were 30 National Guard units with lineages traceable to 1776 or earlier. Some lineages went

back to 1636. The Center of Military History conducted the documenting research.

Among those dignitaries attending the ceremony was Major General C. G. Rogers who earned the Medal of Honor while serving as battalion commander of the 1-5th in Vietnam.

The 1-5th began with an act of the New York State Provincial Legislature on 1 March 1776. The Company of Artillery of the colony of New York was activated and Captain Alexander Hamilton was appointed as its first commander. During the Revolutionary War, the battalion fought at Trenton, Princeton, Brandywine, Germantown and Yorktown.

The unit actually comprised the entire US Army at one time. In June 1784, Congress disbanded the Army through fear of standing armies; however, 80 artillerymen were retained to guard military supplies at West Point and Fort Pitt in Pennsylvania.

The unit has a proud history with many contributions attributed to it and its personnel, not the least of which is authorship of the "Caisson Song" which was the Field Artillery Song for so many years. For its combat achievements the battalion has been awarded 57 campaign streamers and 12 foreign awards for gallantry.



## Army Begins GLLD Testing

REDSTONE ARSENAL, AL — The Army has started performance and field tests of a prototype engineering-development model Ground Laser Locator Designator (GLLD), built by Hughes Aircraft Company, at the Army Missile Command (MICOM) facility here.

The GLLD is a precision laser rangefinder and designator for use by ground troops. It will guide laser-homing missiles, such as laser Maverick and HELLFIRE, or

## Right By Piece

projectiles such as the cannon-launched guided projectile, to their targets.

Laser-homing weapons sense the laser light being bounced off the target by a designating GLLD, and guide themselves down the cone of reflected invisible pulsed light with aerodynamic control surfaces or other steering systems.



**Laser light rays can pinpoint targets to help guide missiles, projectiles or artillery shells to bull's-eye hits with the aid of a GLLD. The US Army Missile Command is now testing the 48-pound device at Redstone Arsenal, AL.**

GLLD also may be used to pinpoint the range and bearing of fixed and moving targets for artillery. The 48-pound device, mounted on an adjustable tripod, combines high-power optics with a viscous fluid damper tracking unit, providing the accuracy to work against rapidly moving distant targets.

Deliveries of engineering-development model GLLDs, plus support hardware and four system trainers, to MICOM are scheduled to begin in November. Operational testing of the device will follow the evaluation at Redstone Arsenal.

## Div Arty Sponsors Family Day

FORT HOOD, TX — The sights and sounds of life in the artillery came alive for the wives and children of 2d Armored Division Artillery soldiers recently.

The men who man the cannons hosted a Family Day which began with static displays in the garrison and proceeded through demonstrations of numerous types of fire missions and a div arty time-on-target, a live-fire contest and a meal in one of the battalion dining facilities.

MG George S. Patton, commander of the 2d Armored Division, presented a trophy to C Battery, 1st Battalion, 78th Field Artillery, for achieving the best score in the live-fire contest.

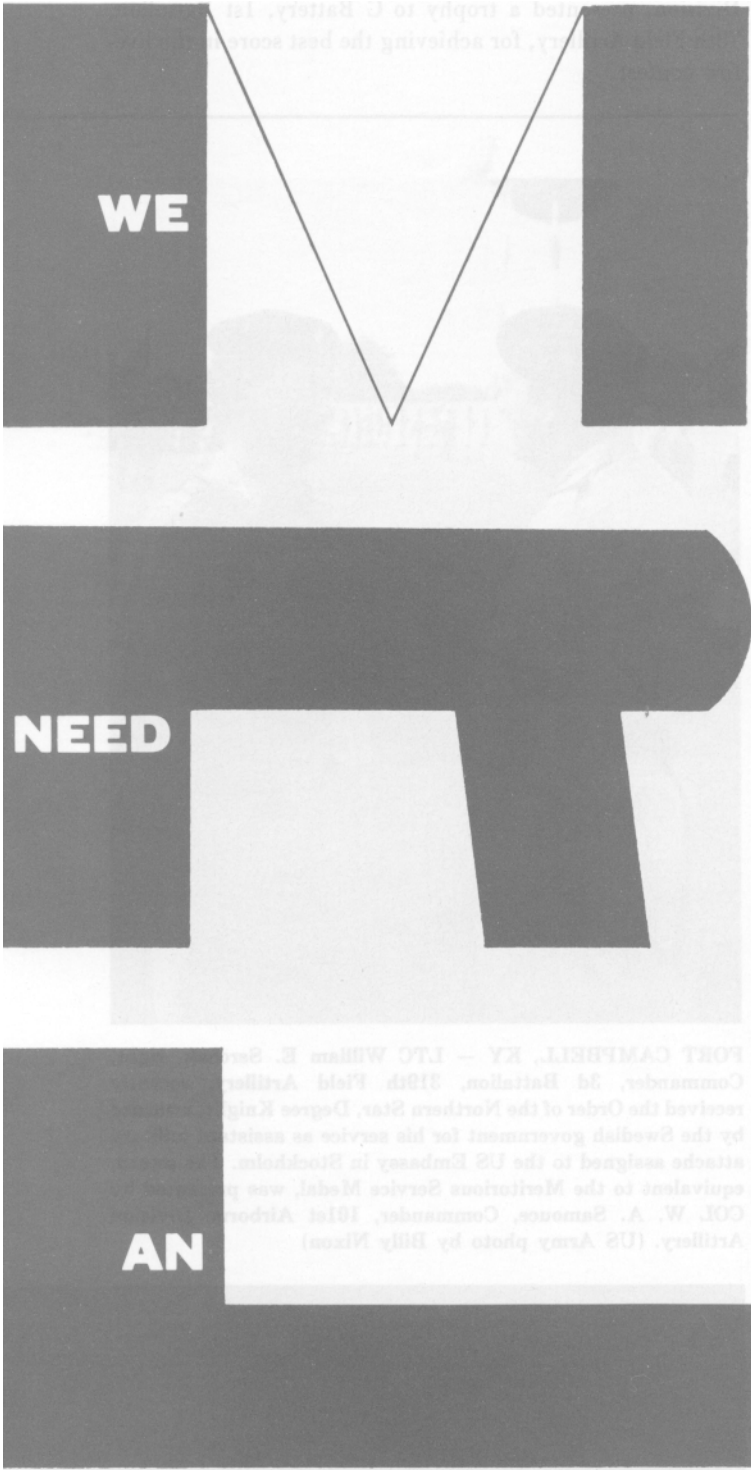


**FORT CAMPBELL, KY — LTC William E. Serchak, right, Commander, 3d Battalion, 319th Field Artillery, recently received the Order of the Northern Star, Degree Knight, awarded by the Swedish government for his service as assistant military attache assigned to the US Embassy in Stockholm. The award, equivalent to the Meritorious Service Medal, was presented by COL W. A. Samouche, Commander, 101st Airborne Division Artillery. (US Army photo by Billy Nixon)**

# Part I

## An Airman's View

by LTC W. H. Rees, USAF



"As a result of a [rocket] volley, only 12 persons remained alive in our company out of the 120 it had formerly," recalled Wehrmacht Private Hart after he became a POW near Stalingrad. Writings of many other German veterans of the Russian Front have also described the awesome terror and destruction inflicted by Soviet multiple rocket launchers (MRLs). Recently, Angola was overrun by Cuban troops marching to the ripping thunder of "Stalin's Organs."

At age 35, the multiple rocket launcher is alive and well.

The Soviet Army has relied continuously on MRLs since 14 July 1941 when the first combat volley was fired by a battery of BM-13 launchers. That volley consisted of one hundred and twelve 132-mm projectiles, and the targeted German troops "took to their heels." Later in the year, nine rocket regiments with more than 300 launchers participated in the defense of Moscow. By the end of 1942, approximately 2,000 launchers were in the field, and, in 1943, six divisions of rocket forces were added. Each division could supposedly produce a volley of almost 4,000 projectiles with a weight of 230 tons. By the end of 1943, the equivalent of 3,500 sixteen-tube launchers was in Red Army service.

Although comparatively primitive, the early MRLs were apparently quite versatile. One battery supposedly used its launchers in direct fire when it was finally surrounded, and other units successfully engaged tank forces on several occasions.

Even if we allow for the usual propaganda, it is obvious that the MRL was, and is, an extremely important part of the Soviet firepower establishment. *Air Force Magazine* credits the USSR with 8,000 mortars and MRLs (no breakdown provided) of 120-mm or larger and the other Warsaw Pact members with nearly 900 MRLs.

Perhaps one reason the Soviets have placed great faith in MRLs over the past 30 years, while we have not, is that they understand the principles and advantages of massed firepower better than we. Marshal Zhukov, acknowledged master of the art of mass warfare, was "not simply excessive with his use of massed artillery; he believed in the dense, shattering effect of firepower overkill," according to Martin Caiden in "The Tigers Are Burning." When he prepared for a decisive move, he lined his guns up hub-to-hub, supplemented them with all the mortars, rockets and tactical air he could muster, and turned them all loose at once.

*Massed firepower works!* The Soviets repeatedly proved that in WWII where their gun density sometimes exceeded *one per 10 feet* of front, and they still remember. We proved it at Khe Sanh, An Loc, Hanoi and many other places with scores of heavy bombers, hundreds of fighter bombers and concentrated artillery when we had it. In October 1973 Israeli artillerymen discovered that they could stop battalion-size



tank attacks with concentrations of thirty-six 155-mm howitzers firing 10 rounds fire-for-effect as fast as possible.

The Soviets have been consistent in their emphasis on massed fires and materiel. Consider the following quotes from a February 1976 *Air Force Magazine* article, summarizing comments by General Robert J. Dixon, Commander of USAF Tactical Air Command:

"The paramount challenge to US general purpose forces is the vast numerical superiority of Warsaw Pact over NATO forces, dramatized by these approximate ratios:

- A four-to-one lead in tanks;
- A nine-to-two lead in artillery;
- A three-to-two lead in air defense weapons;
- A three-to-two lead in tactical aircraft;
- A four-to-one lead in electronic jamming equipment; and,
- A three-to-two lead in combat troops . . . .

"Compounding the problem of numbers is the likelihood that Pact forces would be used in *blitzkrieg* fashion along a narrow front, with a strong assault echelon opening the way for one or more follow-on echelons."

Our problem is to stop a major Pact assault in the face of such overwhelming odds. To do this, NATO would have to gain local air superiority rapidly (which is reasonably hopeful) and supply massive tactical air support to its ground forces. General Dixon also emphasized that, ". . . the firepower of both the tactical air and ground forces has to be able to fight together as a team — the Air Force helping the Army with close air support and the Army helping the Air Force in air defense suppression, for example."

In fact, air defense suppression is a prerequisite for conducting effective close air support, with tolerable losses, on any battlefield jammed with sophisticated Soviet weapons. For example, the Israeli Air Force (IAF) had to go it alone on the Golan Heights during the first four days of the 1973 War to blunt the 1,000-tank Syrian assault. During the first afternoon they lost about 35 aircraft to anti-aircraft fire, or about eight percent of its fighter strength and about one third of its combat losses during the entire 18 days of war. The drastic decline in loss rate after the first day was primarily due to air defense suppression, part of which artillery provided. To be sure, cooperation worked both ways, with mutual profit; jets destroyed enemy artillery, and jet pilots sometimes acted as air observers to adjust artillery fire on enemy surface to air missile (SAM) sites and other targets.

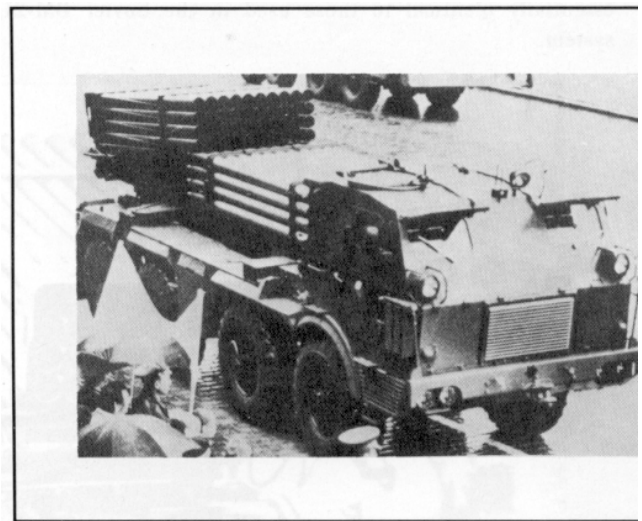
Cooperation is absolutely essential in modern warfare. Tactical air can and must help the ground forces stay on the battlefield, but ground forces can and must help tactical air stay in the air above the battlefield. The role of artillery in

this partnership is far more important than ever before.

The demands on artillery are also increasing in practically every other regard. Friendly armor or mechanized attacks require artillery support for immediate suppression of enemy antiarmor forces. During enemy attacks our artillery must protect our antiarmor forces from enemy artillery, and in the near future our artillery will be expected to engage directly enemy armor with the cannon-launched guided projectile (CLGP). Pact forces are superbly equipped for night attacks, but most of the TOWs, Dragons, tanks, forward observers (FOs) and tactical air, upon which our defense depends, must have illumination in order to counter them. "Spooky" will not be overhead launching his mighty flares, and the 4.2-inch mortar may phase out; so artillery will have to provide continuous illumination at a time when close support and counterfire are also needed.

Speaking of counterfire, what missions are more likely to attract accurate enemy counterfire than sustained illumination or perhaps multiple CLGP engagements? In fact, since NATO's artillery is grossly outnumbered and since the Pact forces have superior target acquisition capability in the field and would concentrate firepower at the critical place and time, who would be the likely favorite in a counterfire bout? What percentage of its effort would our artillery have to devote to counterfire just to survive on the battlefield? Would enough cannon power be left over to provide our other forces with the support they need to do their jobs?

Unnoticed by many, our ability to deliver massed firepower has steadily eroded. We will probably never again have the routine luxury of massive B-52 strikes and a surplus of tactical air for close air support; certainly not on the scale we enjoyed in Vietnam. A European battlefield would be a target-rich and airplane-poor environment. At



**Soviet 122-mm rocket launcher (40-round) M1972.**

the critical points there would probably be a greater density of targets than in any action during the 1973 Mideast War. Everyone will depend on artillery and tactical air for vital support, but much of their supporting power would be consumed in a simple battle for survival. Simply said, we all need help.

One solution is an MRL system to replace *part* of our lost ability to deliver massed fires. MRLs would suppress enemy direct, indirect and air defense weapons and supplement the fires of cannon and tactical air and substitute for many cannon and tactical air missions. Substitutions would either free cannon and aircraft for other missions or reduce their exposure to enemy fire — or both. The MRL could not replace any weapon, but it could supplement and complement almost every weapon. In short, the MRL offers very significant advantages to everyone on the battlefield.

### Useful MRL Characteristics

What are the useful characteristics, unique advantages and potential of a modern MRL system? Possibly the best example is the Soviet BM-21 system — the result of almost 40 years of research, development and practical experience with MRL systems. The BM-21 fires 40 spin-and-fin stabilized, unguided, 122-mm rockets to a maximum range of 20.5 kilometers. The high-explosive warhead weighs a little over 40 pounds. The complete rocket is just over nine feet long and weighs approximately 140 pounds. Dispersion is about one percent of range. In Soviet service, BM-21 launchers are mounted on Ural 375 trucks. Czechoslovakia has mounted the basic BM-21 launcher on the Tatra 813 truck and added a 40-round, quick-reload capability (RM-70 system). Romania is using a 21-round, truck-mounted MRL which probably employs the same tubes and ammunition as does the BM-21. In this section, we will assume a launcher and rocket essentially identical to those used in the Soviet

BM-21 system.

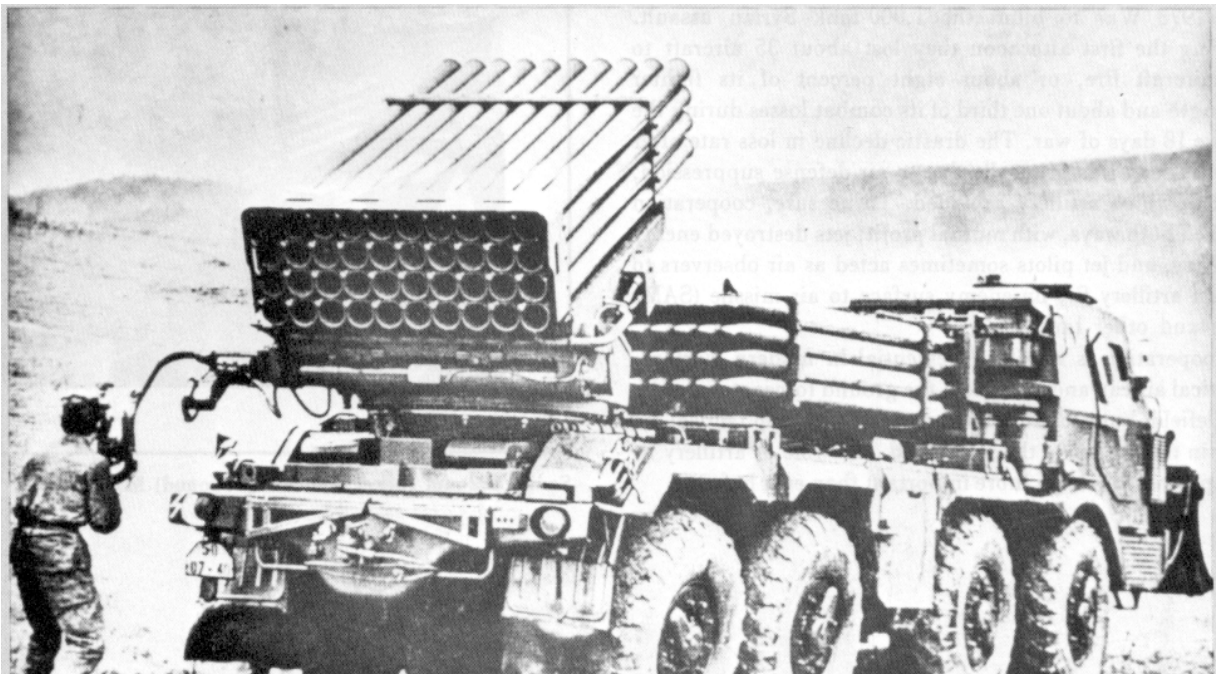
*Rate and volume of fire* — One six-launcher battery can salvo 240 projectiles in 20 seconds, which roughly equals a one-round volley by 40 cannon batteries. The weight of 240 warheads would total more than 9,600 pounds; concentration and surprise would magnify their effect on the enemy. The warhead weight of a battalion volley roughly equals the typical bomb load of eight F-100 fighter bombers.

*Dispersion* — When friendly troops are not too close and when individual targets cannot be pinpointed, the shotgun-like patterns of MRL fires are no less useful than the more precise impact patterns of cannon fires. This is particularly true for targets vulnerable to fragmentation, which include all surface-to-air missiles, the ZSU-23-4's radar dish, artillery crews, dismounted infantry and antitank guided missile (ATGM) troops, support and logistics elements and others. The MRL cannot match a cannon in close support or against individual hardened targets, but it can do at least as well against most other targets.

*Security* — The MRL completes its mission within 20 seconds after exposing itself and immediately drives off to a hide position or an alternate firing point. A cannon unit, however, would have to stand fast and face the counterfire threat for several long minutes while firing as many rounds.

*Mobility* — MRLs easily adapt to air transport, and they move more rapidly on roads than can self-propelled artillery. Their mobility would permit a very rapid buildup of reinforcing firepower. For example, on a non-stop flight (with inflight refueling) from the US to Germany, a single C-5A could probably carry a battery of six MRLs, all personnel with their equipment and 400 to 500 rounds of ammunition. If offloaded at Frankfurt, the six MRLs could drive to Fulda in an hour and a half, on their own wheels, traffic permitting.

### Czechoslovakian 122-mm RM70.



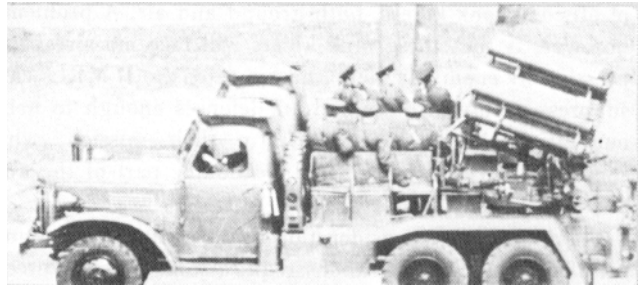
*Rocket launch stresses* — A rocket sustains acceleration forces of less than 100 Gs during the launch phase. Cannon shells experience as much as 9,000 Gs when fired. Consequently, non-bursting rocket warheads can be designed with lighter structures than equivalent cannon projectiles. The resulting weight savings can be translated into longer range or greater warhead capacity. The design criteria for internal components can also be less stringent. For example, launch forces posed a difficult problem in the development of CLGP, so a rocket-launched guided projectile might be less costly to produce and more reliable. The same theory applies to many existing, and potential, artillery-delivered payloads. Several types are discussed in Part II (January-February 1977 *Journal*) under "Warhead Types," and still others are possible within the limits of existing technology.

*Simple launchers* — Compared to cannon, rocket launchers are simple and inexpensive to manufacture. It should be possible to produce a launcher like the BM-21 in six months and, when mounted on an existing truck, with a unit cost of less than half that of a self-propelled howitzer. Moreover, it should be fairly simple and inexpensive to develop a launcher like the BM-21 into a truly sophisticated weapon system without sacrificing its basic simplicity. The launcher has a powered elevating and traversing system which would be easy to adapt to remote control. Loaded rockets are accessible for electrical connections, which makes feasible such innovations as electronic time fuzes and instant measurements of propellant temperature. If the launcher-control, fuzing and firing systems were managed by an on-carrage digital control system, each launcher could easily be operated by section, battery or battalion personnel, or by a central fire control computer such as TACFIRE. The necessary electronic systems would be add-ons to the basic launcher system and could be bypassed for entirely manual operation.

### Why Not MRLs?

Why don't US ground forces have an MRL system? Well, tactical air has always been available for the really massive support, and critics disliked MRLs because of their inaccuracy, greater ammunition costs and weight and long reloading times. Besides, this is the space age and MRLs are sort of primitive. One study ("GSRs, More Than The MRL," September-October 1974 *Field Artillery Journal*) ". . . reconfirmed that area saturation fires [such as MRLs deliver] are not effective against armor; and, in addition, MRLs cannot compete with cannon weapons on a cost effectiveness basis in the antipersonnel role." If all these points are true and significant, why do the Soviets persist in deploying new MRLs with their highly sophisticated army?

Perhaps we misunderstand the MRL. Have we thought of the MRL as an inferior cannon and thought no more? MRLs are not cannon. They are weapons that can perform



**BM-14 Soviet artillery rocket launcher (16 rounds). Note protective shields which inclose cab compartment during firing are folded on top when not in use.**

many missions almost as well as cannon and some missions a lot better than cannon.

Regarding the accuracy question, most older MRLs such as our 4.5-inch system of WWII had too much dispersion. Times have changed. In 1970, a noted Soviet military theoretician wrote that, "[Modern rocket artillery] is not inferior to tube artillery in its accuracy of fire." He makes an important point, especially when talking about an MRL's longer ranges. MRL range errors normally *decrease* as range increases, due to the higher angles of shot-fall. Consequently, some rockets have circular errors probable (CEP) at maximum range that are little larger than at two-thirds of maximum range. Equally important, the center of an MRL's shot-fall pattern can be placed just as accurately as can a cannon's. Generally, modern rocket CEPs are about one percent of range and, even by cannon standards, a CEP of 200 meters at a range of 20,000 meters is very respectable. Now consider the maximum target location error which is acceptable for artillery attack of soft targets. Of 10 target types listed in TC 6-121-2, *FA and ASA Units . . . A Targeting Team*, three require 150-meter accuracy, four require 200- to 300-meter accuracy and three require 500-meter accuracy. Obviously, the MRL can be an effective player in this league.

MRL ammunition weight does cause a problem for logisticians, but there are compensating aspects. The MRL normally loads in a hide position and then moves to its firing point. After firing, it moves back to the hide position or to a new, unexposed firing point and reloads there. It is a lot easier to handle artillery ammunition in peace than under fire, regardless of weight and bulk.

It takes 10 minutes or so to reload a typical 40-tube MRL. True — but a 105-mm howitzer would require about 13 minutes to fire 40 rounds at the *sustained* rate-of-fire and a 155-mm howitzer would require 40 minutes for the same task. It is perhaps just as well that MRLs cannot reload faster or they would *really* create a logistics problem. (The more sophisticated Czech RM-70 can load and fire a second volley in less than three minutes.)

Doubtless, it is also true that MRLs are not *efficient* tank killers, but we already have a wide and growing selection

of efficient tank killers, both ground and air. A problem, however, is that these tank killers will face massive suppression by enemy artillery and air defenses. If MRLs can suppress enemy artillery and air defenses enough to help our efficient tank killers perform their mission, why shouldn't MRLs be considered a valuable part of the antiarmor team?


There is another consideration to the antitank question. All of our antiarmor weapons require some kind of direct line-of-sight to the target: Each tank gunner must see his target at the time of firing; the ATGM gunner must maintain his line-of-sight from weapon launch until impact; the FO designating targets for laser-guided weapons (and each weapon's seeker) must keep the target in sight during the weapon's terminal flight phase; and, most electrooptical guided weapons, such as Maverick, require direct line-of-sight during the entire flight to impact. Now, how can these weapons operate against an armor force which moves to its final assault position under cover of foliage or terrain or which becomes obscured by battlefield smoke or dust? The answer is: Not very well. On the other hand, if the enemy armor force can be pinpointed by sensors or observers, a single battalion of MRLs could quickly concentrate massive indirect fire (as many as 720 rounds in 20 seconds) on it. Certainly only a small percentage of the projectiles would actually hit an enemy vehicle, but that small percentage would result in a significant number of disabled or damaged vehicles. The remaining mass of projectiles would cause other damage, possibly creating enough confusion to weaken or even break the attack. Round for round, MRL fires may well be less effective against armor than cannon fires, which are generally regarded as ineffective. But, battalion for battalion, the MRL is incomparably better when facing enemy concentrations.

On the cost-effectiveness question, how can one compare two very different weapons? This can perhaps be done by comparing the theoretical costs of the respective ammunition required to kill one enemy soldier. Apples and oranges! If one weapon is more usable or useful in specific circumstances than another, and vice versa, a meaningful comparison between the two is not possible. It is true that rocket ammunition would cost more than equivalent cannon ammunition, but in combat the extra cost would be more than justified. Let's say that a rocket round would cost \$200. A battery salvo of 240 rounds would cost \$48,000, or approximately two or three times the cost of general-purpose aerial bombs weighing about the same as the rocket warheads (about 10,000 pounds). But now consider: Fighter-bomber aircraft are worth between three and 12 million dollars, which would be equivalent to the cost of 15,000 to 60,000 rocket rounds. If we assume that tactical air missions would suffer a loss per sortie rate of one percent (a low rate in very high-threat combat

situations) and that one sortie is roughly equal to a 240-round MRL salvo, then one aircraft would theoretically be lost out of each 100 sorties which would deliver ordnance equal to 24,000 rocket rounds. Assuming a typical aircraft value of six million and about \$12,000 per sortie for ordnance, tactical air would cost \$7.2 million to deliver ordnance equal to \$4.8 million worth of MRL ammunition. Obviously, this is not a complete analysis. Many factors could not be explored here, and, even if they had been, no precise dollar comparison would be possible. Nevertheless, this little exercise clearly illustrates that MRLs would be cost effective in support of, or as a supplement to, tactical air, particularly in air defense suppression and other missions that are unusually hazardous for aircraft.

Similar relationships exist between the MRL and other weapons. A single 155-mm self-propelled howitzer preserved as a result of reduced exposure to enemy counterfire would be worth more than 600 rockets. One M60A1 tank saved through suppression of enemy ATGMs would be worth more than 1,300 rockets on a direct dollar exchange basis.

But some things are simply priceless. What is it worth to the nation for a plane, howitzer or tank to survive for yet another battle — with a battlewise crew? What is the human value of those crews? How can we measure in money the value of damage inflicted on the enemy? How much is it worth to a commander to be able freely and quickly to employ massed fires whenever needed, without complex coordination or serious concern for enemy counterfire response?

Most of the arguments against MRLs contain at least a grain of truth, but once it is understood that the MRL is a unique weapon rather than a poor-man's cannon, the arguments lose their punch. MRLs have more growth potential than cannons. Reinforcing firepower can be built up more rapidly and at less cost with MRLs than with cannon. MRLs can deliver quantities of surprise fires that cannon cannot begin to match. *One* modern MRL can deliver a salvo roughly equal to a two-cannon battalion time-on-target to a range of 20 kilometers and march order before its rounds even begin to impact. And, the impacts could occur less than five minutes after the target is first discovered. An MRL system would be worthwhile even if it could perform no mission other than counterfire — and it can perform many other missions. The MRL is not a cannon, but it can very greatly enhance the combat effectiveness of cannon, tactical air and, in fact, our entire combined arms team. 

**LTC W. H. Rees, USAF, is Chief of the Aerospace Support Division, Headquarters, 23rd Air Division, Duluth International Airport, MN.**

# REDLEG Newsletter

*MG Robert Gard, Commander of the US Army Military Personnel Center (MILPERCEN), recently sponsored three open discussion sessions with Fort Sill officers and enlisted personnel. His candor was appreciated and the following are highlights of his remarks. —Ed.*

## **Where Are The NCOs?**

Visits to the field frequently start with the question, "Where are the NCOs I'm supposed to have on my TOE?" The answer is simple, "They aren't in the Army." There are several reasons for this. First, there are two principal sources of "authorizations" — the TOEs and TDAs say the Army is authorized, for example, approximately 14,000 E8s. The latter arbitrary ceilings (imposed by the Office of the Secretary of Defense, the White House Office of Management and Budget and Congress) say the Army can have only approximately 12,000 E8s. This is a shortfall of 2,000 or about 14 percent.

At the E7 level the figures are about 48,000 *authorized* and only about 44,000 *allowed*. This is a 4,000-man gap, but you must add to that the 2,000 E7s who are filling the vacant E8 slots. So, we are really missing 6,000 E7s. This continues all down the NCO ranks to E5 where we come up about 20,000 short. Overall, the Army is 12 percent under the number of E5 to E8 NCOs as shown in authorization documents.

On top of this 12 percent is another five percent we are missing because of our inability to promote into our budget-allowed E5 and E6 slots due to insufficient numbers in the right skills having matured to promotable status. Figuring into this is the fact that we have good promotable people, but they are in the wrong skills so the cut-off scores are unbelievably high. Thus, the E5 to E8 shortage is Army-wide. The combat arms are much worse — they are 25 percent short.

These two factors put MILPERCEN a total of 17 percent short of NCOs even before we start the allocation and

distribution process — which itself is less-than-perfect. This "leveling the bubbles" of getting the NCOs we do have into the proper skill fields and units where they are needed is MILPERCEN's biggest management problem. Important factors affecting this leveling process are tight PCS dollars and rigid stability criteria.

MILPERCEN is trying to reconfigure the career management fields to bring into line the disparity between the authorization documents and the budget restrictions. If the Army can convert the senior grade spaces (which we are authorized but not allowed to fill) into lower grade slots, we would generate about 60,000 additional privates and PFCs. *No* promotions will be lost. We are trading off paper NCO slots into those we have and can't promote.

## **MOS Imbalance**

Reenlistment policies are changing. We are trying to correct MOS imbalance. You are aware of the mandatory reclassification program. We may someday see the day when a career NCO will be told at re-up time, "Sorry, you cannot re-up in this MOS; however, we'd like to keep you and here is a list of five or six MOSs in which you *can* re-up." Of course, this would have to be accompanied by offering some sort of separation pay similar to that which we give officers who are victims of reductions in force (RIF).

## **Officer Problems**

We have gone from a peak officer strength (Vietnam) of about 172,000 to the current 98,000 and it's not over yet. Resignations and retirements are generously approved, but three RIFs of 12,000 officers were still required. The political decision not to call up Reserve Component units to any great extent helped create the problem. We're still overstrength in the Vietnam year groups. RIFs are extremely unfair, but it's an unfair world. Some really fine officers got separated but there was truly no other way to go. The Army used every option available, to include under-procuring second lieutenants by 5,200 over the last three years in order to stay under officer strength ceilings.

Junior and middle grade officers have been the most

vocal in complaining about low promotion selection rates caused by post-Vietnam overstrength. But senior officers have been hurt at least as much — the promotion selection rate for first-time-considered to O-6 is less than 40 percent.

We used to be able to categorize an officer up for promotion as "fully qualified, but not selected" and let him stay in the Army at that grade. This isn't possible now when the promotion system is being used to help us stay within strength ceilings. There is little chance of reverting to the old system in the foreseeable future because the ceiling is still being lowered further. The Army has been told to go down to an officer strength of 94,000 by FY 1980, and to explain why we can't do it by FY 1979.

## OPMS

The credibility of the Officer Personnel Management System (OPMS) will not be good until its logic is extended into the promotion system.

OPMS is *not* a scientific system designed to work perfectly with alternating assignments in the officer's two specialties with schools interspersed. It never will be and never can be. Take an officer whose specialties are field artillery and aviation. If you look at projected utilization rates at the O-6 level, there are not enough slots in either field to utilize the average officer with these two specialties much more than 50 percent of the time. For the time he is not in an artillery or aviation job, he will be required to perform in another specialty or in other assignments.

What *is* OPMS? It is simply developing two fields in which each officer is professionally qualified.

## Ticket-punching

It is going out! The tradition dies hard, but the leadership of the Army and promotion boards are coming around to accepting this. We're not there yet, but it's coming. It's not necessary to "command" or to "do time" in the Pentagon. This last brigadier general list had four men who had never served in the Pentagon and two *combat arms* officers who not only did not command at the O-6 level — they were not even selected by the board for command. This was *unthinkable* five years ago. They were selected because the Army needed them in their alternate specialty. MILPERCEN assigns people where they are needed, and it's easy to see that certain highly competent and capable officers may never be "needed" at the Pentagon when it comes time to issue them orders. Promotion boards are told not to penalize an officer for not having all the right "punches" in his ticket when he can't control the punching. [General Gard never attended the advance course — a "punch" most people consider essential. —Ed.]

## DOPMA

The Defense Officer Personnel Management Act (DOPMA) is currently stalled in Congressional committees. Basically, it eliminates the distinctions between Regular Army officers and Reserve officers at the eleventh year of service. Among other things, it would do away with temporary and permanent promotions — there would only be one — and the force-out of Reservists at 20 years would be ended. MILPERCEN is hoping to tie the Retirement Modernization Act (RMA) to the final version of DOPMA. The RMA would change the horribly unfair system of retirement that gives you nothing if you leave the service before 20 years. This happens despite the fact that Uncle Sam has been taking part of your "salary" to build up a retirement annuity. RMA contains provisions that after five years service, the officer will have certain options for recouping some of this "vested right."

## New OER

MILPERCEN is testing a new OER. It has been extensively field tested and we're revising it accordingly. There will still be some numbers but less emphasis on them and no total score. One very good aspect of the new form is that the rated officer will write his own job description. We will still have the "traits" portion with ratings from 1 to 5. The proposed form will let the reviewer do more than check a block and sign his name since there will be a section for the reviewer to add his comments. This is *not* going to eliminate inflation. The only way to do this is through a "forced distribution" system to which the Army is opposed because it could lead from healthy to cut-throat competition.

## Assignments

For officers who are graduating from branch career courses and have not had battery command, MILPERCEN assignment officers are doing everything possible to assign these graduates to posts where command opportunities are available. MILPERCEN cannot and does not desire to preempt the post/division commanders by directing their assignments, but we are doing the next best thing. For the current FA Officer Advance Course, we reached this goal of 100 percent assignment of graduates without command experience to locations where they can get this opportunity.

## Women In Combat Units

General Gard is personally in favor of re-examining the prohibition against allowing women to serve in certain

Category I units which would not be apt to come into direct combat. Women are authorized to serve in some Category II units with the mission of furnishing support well forward, but not authorized in the Category I units much farther back behind division and corps boundaries.

*General Gard commanded a field artillery battery in Korea, a battalion in Europe, a division artillery in Vietnam and was Commanding General of Fort Ord, CA. He has a doctoral degree from Harvard University. He has been Commander of MILPERCEN since 1975.*

### Artillery Enlistment Bonuses

MILPERCEN has announced changes in authorized enlistment bonuses in certain field artillery MOSs. Effective 31 August, non-prior service personnel can be enlisted with an enlistment bonus option for the following MOS/award levels: 13E—\$2,500; 13B—\$1,500; 15D—\$1,500; and, 82C—\$1,500.

Those personnel who enlisted under the delayed entry program with old enlistment bonus awards and enter active duty subsequent to 31 August, will receive the new figures. Tied to this bonus option is the requirement that enlistees have high school diplomas, be in mental categories I, II or III and sign up for four years.

### E8 Combat Arms MOSs

"Drastic action in some cases" — that is the way some E8s will feel. MILPERCEN announced that due to a shortage of field artillery master sergeants, non-combat E8s

will be assigned to first sergeant positions in FA headquarters and maintenance units. All this will be done on a test basis at Fort Hood, TX, Fort Riley, KS, and Fort Sill. Officials say that if the test results are positive, non-combat E8s will be assigned to positions in other combat arms MOSs, both in CONUS and overseas. All E8s selected for this move will be taken from career management fields which have too many E8s — fields in which the E8 has little chance of becoming a first sergeant.

### MILPERCEN Contacts for FA Officers

Duty	Office Symbol	AUTOVON
<i>Colonels Assignments</i> LTC T.P. McHugh	DAPC-OPC-A	221-7862
<i>LTCs Assignments</i> LTC R. D. Chelberg LTC D. W. Jones	DAPC-OPL-A	221-9789 -9793
<i>MAJs Assignments</i> MAJ T. P. Easum MAJ J. A. Siraco	DAPC-OPM-A	221-0686 -0687
<i>FA Branch Chief</i> LTC J. V. Slagle	DAPC-OPE-F	221-0116 -0118 -0187
<i>CPTs Assignments</i> MAJ J. Mullett MAJ P. Kitchings	<i>LTs Assignments</i> MAJ R. A. Coleman CPT G. D. Skirvin	-7817

## Commanders Update

MG Donald R. Keith  
Commanding General,  
USA Field Artillery Center

COL Wendell H. Gilbert  
101st Airborne Division Artillery

COL John E. Munnely  
USA Depot, Sacramento

COL William R. Owel  
528th Artillery Group

COL Billy J. Leathers  
558th Artillery Group

LTC Daniel Whiteside  
1st Battalion, 5th Field Artillery

LTC Marko Popovich  
1st Battalion, 15th Field Artillery

LTC G. Wilson  
1st Battalion, 17th Field Artillery

LTC Richard Rounseville  
2d Battalion, 21st Field Artillery

LTC Walter Bryde  
2d Battalion, 27th Field Artillery

LTC Charles G. Percy  
2d Battalion, 31st Field Artillery

LTC K. A. Ingram  
1st Battalion, 32d Field Artillery

LTC J. W. Carson  
2d Battalion, 34th Field Artillery

LTC John M. Daley  
1st Battalion, 36th Field Artillery

LTC Ted Medley  
1st Battalion, 37th Field Artillery

LTC Jackie R. Alsop  
3d Battalion, 37th Field Artillery

LTC Charles S. Nobles  
6th Battalion, 37th Field Artillery

LTC Fred R. Pope  
1st Battalion, 41st Field Artillery

LTC Howard C. Eggleston  
2d Battalion, 41st Field Artillery

LTC George R. Ax  
2d Battalion, 76th Field Artillery

LTC Aaron O. Crocker  
1st Battalion, 83d Field Artillery

LTC George L. Moses  
2d Battalion, 83d Field Artillery

LTC Herbert S. Simmons  
1st Battalion, 321st Field Artillery

LTC D. McKinney  
Officer Student Battalion  
Fort Sill

LTC J. Williams  
FAMSEG  
Fort Sill

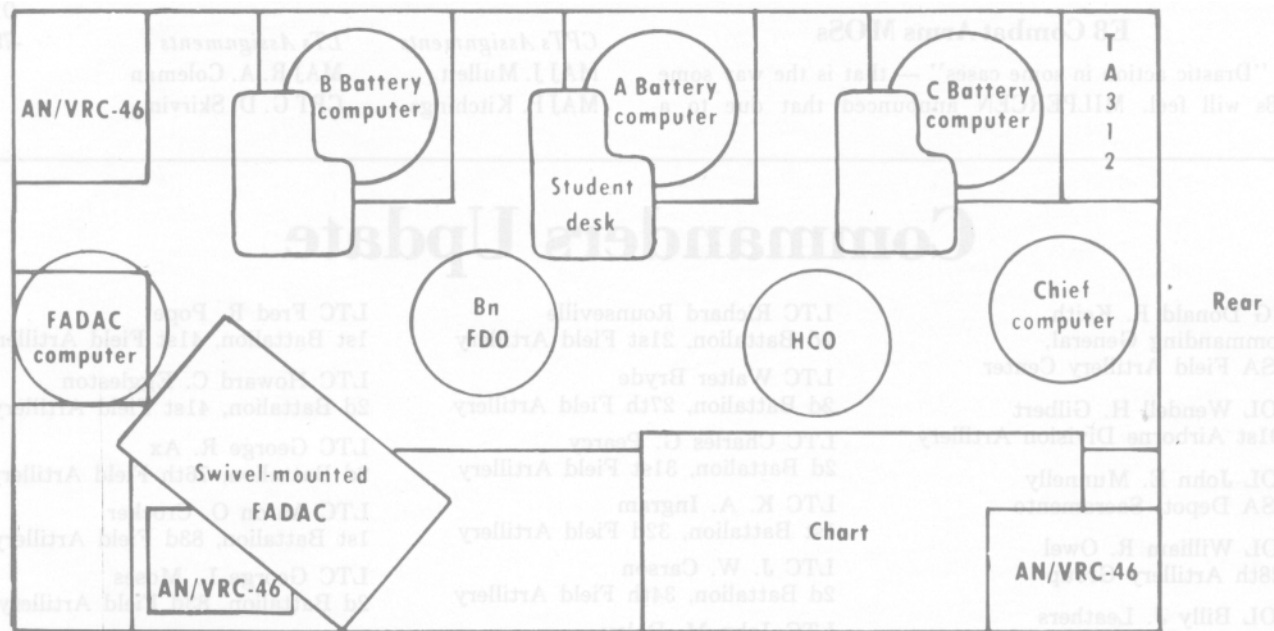
# BATTALION FDC-

A lot of talk has been going around about making headquarters smaller — more mobile, more survivable. The 1st Battalion, 77th Field Artillery, 1st Cavalry Division, made a decision to implement the idea, starting with their battalion fire direction center (FDC). The central idea was to place the entire FDC inside one M577 (modified) armored personnel carrier, thus giving the crew protection from small arms fire and shell fragments. Cramming seven men, a chart and a FADAC inside one M577 was no easy task. A lot of ideas were advanced, tried and discarded before the ultimate design was accepted. The basic floor plan is shown in the sketch.

The computers are seated in wooden student chairs mounted on one side of the vehicle as shown in photographs 1 and 2. Each computer has a permanently mounted TA-312 telephone to his left. The B Battery computer uses the AN/VRC-46 radio to his right as shown in photo 2. The A Battery computer uses the VRC-46 mounted underneath the FADAC (photo 3) and the C Battery computer uses the VRC-46 directly across from him (upper left, photo 5). The battalion fire direction officer (FDO), chief computer and

FADAC operator can monitor all radio traffic with the battery computers, concentrating on their respective fire direction (FD) nets. The seat belts from the troop benches were moved up and installed so that each computer has the use of one during movement.

The standard procedure during movement is for the center battery to assume technical fire direction for the battalion (if needed). The battalion commander or S3 generally will be present in that particular FDC to assist. The battalion FDO will take one of the seats and monitor the battalion command net. The center battery computer will monitor his respective FD net and the computer whose battery is not on the move will monitor his net. Each individual monitoring a net uses a headset. All information, including closing, situation and meteorological reports, are copied during movement. The battalion FDC never relinquishes tactical fire direction. The chief computer commands the track, the FADAC operator drives it and the horizontal control operator (HCO) assists the track commander (TC). If needed, the FDC track can pull over to the side of the road and assume technical fire direction within



# CAV STYLE

by CPT Eric C. Deets  
Photos by SP4 John Mead



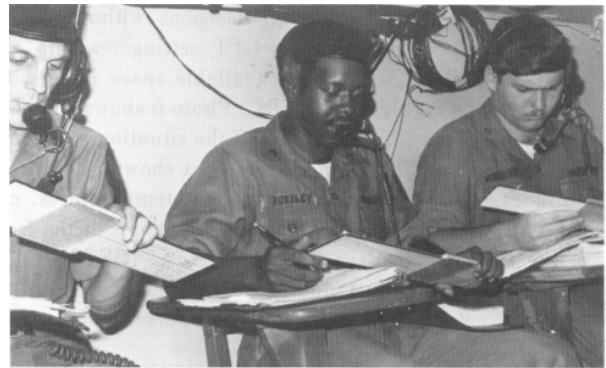
seconds, using the built-in chart (photos 5 and 7). Within one minute, the FADAC can be operational using the three-kilowatt generator permanently mounted topside.

Using FM 6-40-5, *Modern Battlefield Cannon Gunnery* (draft), as a guide, it was decided that each battery computer should be able to read the data from the FADAC directly to his battery (FDC can talk directly to the gun crews if needed). To accomplish this, a swivel mount for the FADAC was developed. The first attempt to use a swivel mount was unsuccessful because it was impossible to secure the mount during movement. The mount shown in photo 4 was developed by the author and uses a gear from a 1-1/2-ton trailer to swivel, raise and lower the FADAC. In the operating mode shown in photo 4, the FADAC swivels on the metal plate welded to the landing gear. To prepare for traveling, two-inch thick pads of styrofoam are inserted between the metal frame and the FADAC. Using the landing gear crank, the FADAC is lowered onto the pads; and, tiedown straps (5,000-pound) are used to secure the FADAC to the mount. The procedures are reversed upon reaching the new position. During the two months of training preceding the battalion Army Training and Evaluation Program (ARTEP), the FADAC was 100 percent operational. The shock-absorbing characteristics of the styrofoam and not moving the FADAC contributed to this readiness.

The FADAC operator sits on the TC's stand to operate the FADAC. Input data as displayed on the nixie tubes are checked by the battalion FDO or B Battery computer. As the FADAC is solving the gunnery problem, it is swiveled toward the computer whose data will be displayed. In photo 5, the FADAC is swiveled toward the C Battery computer. As soon as the data are displayed, the FADAC operator announces "C Battery data." The C Battery computer then reads the data to the C Battery chief computer over the landline or radio. At a nod from the C Battery computer, the operator swings the FADAC back and prepares for the next correction. Multiple missions are handled routinely in the same manner. If working more than one mission per battery, the operator announces "C1 data," "C2 data," etc.

Again using FM 6-40-5, the initial data for an adjust-fire mission are taken off the chart. The chart operator determines and announces data for all missions. If the FADAC operator announces his data, the HCO is quiet, letting the computer take the better data from the FADAC. The permanently mounted chart is shown in photos 5 and 7. The storage compartment underneath the chart is shown in photo 8.

Also shown in photo 5 is the ammo chart. The current ammunition status for the 1-77th FA and its reinforcing units is posted on the chart by the HCO. The current weather conditions affecting smoke missions are displayed also.



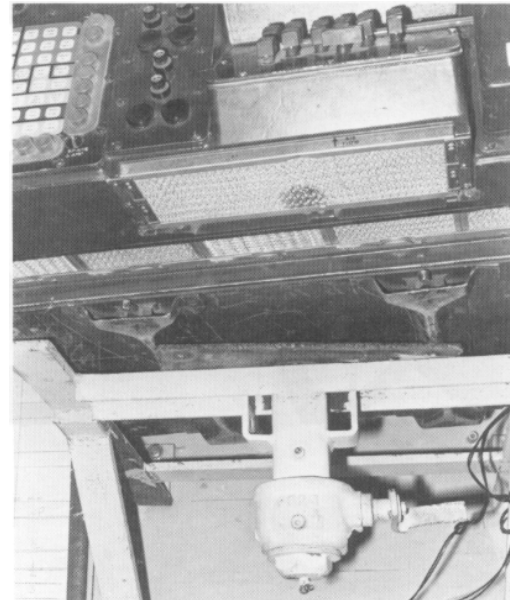
**Photo 1.**



**Photo 2.**



**Photo 3.**



**Photo 4.**

No FDO can make rational decisions without readily available information such as GFT settings, ammo and range capabilities, etc. Every available space is used for charts in this highly mobile FDC. Photo 6 shows the chief computer taking target altitude off the situation and range capabilities map. To the right is a chart showing locations, altitudes, muzzle velocities, propellant temperatures, call signs and frequencies. Photo 3 shows the chart at the front of the track. It displays FADAC "flags," GFT settings, standard fire orders, standard fire commands and on-call targets. Each chart is updated by the person closest to it.

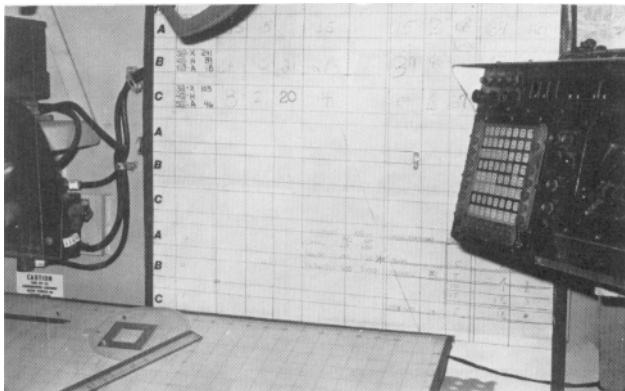
Some of the improvements and techniques not shown are:

1) The ground for FADAC is permanently bolted to the track and stowed inside the well over the track adjuster.

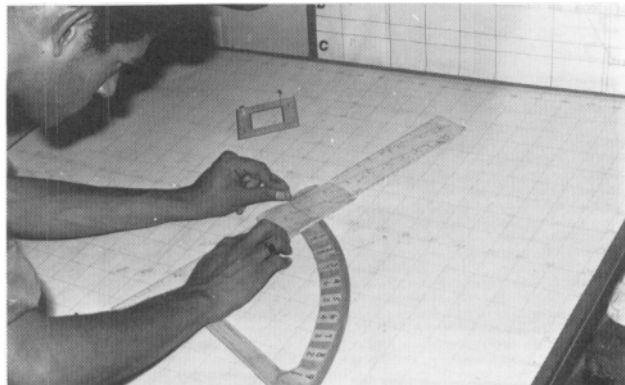
2) A three-kilowatt generator is mounted topside directly above the FADAC. The noise of the FADAC partially covers the noise of the generator. The generator is also mounted on styrofoam pads to absorb shock and vibrations. This generator is used only when the primary generator is nonoperational. The primary generator is mounted on a second M577 located 25 to 50 meters away. The 4.2-kilowatt generator on this other M577 is also used to charge the 24-volt system on the FDC track.

3) The FADAC cable is permanently mounted topside and fed down through an antenna mount hole to the FADAC. It remains connected to the FADAC.

4) A partially assembled RC-292 antenna is carried



**Photo 5.**



**Photo 7.**


topside with the cable running through the same antenna mount hole as the FADAC cable. The hole is sealed for chemical-biological-radiological purposes.

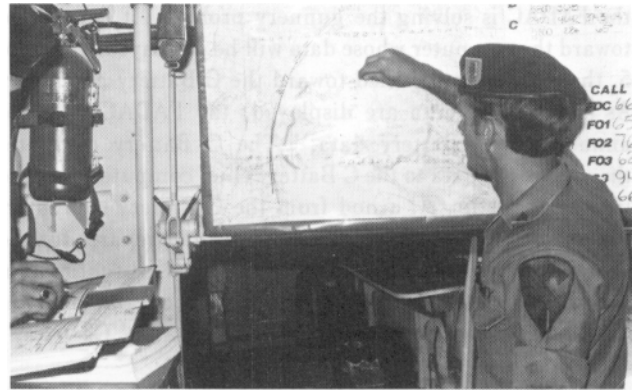
5) The TA-312s are connected to the telephone jacks on the rear of the track. The jacks are stenciled to identify the batteries, and the wire teams can hook up to them without question (B on left, C on right — no need to ask the FDO or use a light).

6) Another chart is set up outside the track and kept current in case the FADAC requires repair.

7) All equipment, to include the FADAC, FADAC mount, computers' desks and chart, can be transferred to another M577 within minutes. Enough equipment to run a separate FDC is carried in another M577 in case the main FDC is disabled.

8) All computers are at eye level with the FADAC display panel and can easily read the display, day or night.

Does it all work? Read the words of the battalion FDC evaluator on the formal ARTEP: "This is the most organized and most efficient FDC within div arty." Will it survive? Try exploding a 152-mm round, VT fuze, 10 meters from your FDC. The M577 was designed to stop shell fragments; the canvas tent extension wasn't. Is it mobile? Set-up for manual operation can be accomplished within seconds; FADAC, within minutes. The Field Artillery's mission is to support the ground-gaining arms; this battalion FDC stands a better chance of surviving and doing just that! 



**Photo 6.**



**Photo 8.**

**CPT Eric C. Deets, FA, is Assistant S3, 1st Battalion, 77th Field Artillery, 1st Cavalry Division, Fort Hood, TX.**

# 1976 Redleg Reference

The following is a list of **Journal** articles and "View From The Blockhouse" items for calendar year 1976, including descriptive notes as required and the issue in which the material was published. The letters "VB" indicate items from "View From The Blockhouse."

## Air Operations / Support

AAF's Flying Artillery (WWII attempt to mount 75-mm cannon in a B-25G), Jul-Aug.  
Operation Redleg (M102 unit conversion to M109), Mar-Apr.  
The Artillery Raid — Air Assault Style, May-Jun.

## Ammunition / Fuzes

Antipersonnel Shrapnel Rounds, Mar-Apr.  
Reference Note Ends "Confuzion" (time and proximity fuze setting procedures), Mar-Apr (VB).  
The Up-Load Exercise (ammunition), May-Jun.  
Universal Fuze Setter, Mar-Apr (VB).

## Communications / Electronics

The Warlock (a complete remote radio system), May-Jun.

## Counterfire

Counterfire — Part Two, Jan-Feb.  
FO Evolution (My Beautiful Balloon), Nov-Dec.  
Forward Observer Effectiveness, Jan-Feb.  
Get The Most Out of Your Q-4, Mar-Apr.  
The Polaris Method (obtaining directional control), Jul-Aug.

## Doctrine

Counterfire — Part Two, Jan-Feb.  
Doctrine — Where It's At, Jul-Aug (VB)  
Firepower (BG Albert B. Akers' speech), May-Jun.  
FIST! (fire support team concept), May-Jun.  
FIST! Responses, Jul-Aug.  
How To Defend Outnumbered And Win, Mar-Apr.  
The FA Cannon Battery (FM 6-50 highlights), May-Jun (VB).

## Equipment

GMET (Graphical Munitions Effects Tables) Series Now Available, Jul-Aug (VB).  
Heavy Artillery — Who Needs It? Sep-Oct.  
The Warlock (a complete remote radio system), May-Jun.  
We Need An MRL (multiple rocket launcher), Nov-Dec.

## Foreign

Artillery Projects Of The Future, Jan-Feb.  
V-2 — The First FA Guided Missile System, Jul-Aug.

## Gunnery

Battery FDC — Cavalry Style, Nov-Dec.  
Forward Observer Effectiveness, Jan-Feb.  
GFT Determination Of Range Probable Error, Jan-Feb (VB)  
Modified Call For Fire, May-Jun (VB)  
Obtain Forms Through Pinpoint, Jul-Aug (VB)  
Support Fire With Smoke, Nov-Dec.  
The New Gunnery Sergeant, Sep-Oct.

## History

AAF's Flying Artillery (WWII attempt to mount 75-mm cannon on a B-25G), Jul-Aug.  
Antipersonnel Shrapnel Rounds, Mar-Apr.  
Technology And Civilization (how new weapons were born), Sep-Oct.  
The Battle Of Aachen (WWII city fighting tactics), Sep-Oct.  
The Field Artillery In Vietnam, Jan-Feb thru Nov-Dec.  
The Infantry-Artillery Team (WW I), Sep-Oct.  
The Theoretical Evaluation Of The Artillery After WWI, Jan-Feb.  
V-2 — The First FA Guided Missile System, Jul-Aug.  
Winning The West, Mar-Apr thru Nov-Dec.

## Maintenance

Mobility Versus Maintenance, Mar-Apr.

## Missile

In Search Of The Illusive Green Ball (proposed Lance sight), Jan-Feb.  
Lance ASP In Crete, Jul-Aug.  
Lance Testing In The European Environment, Jul-Aug.  
The Time Has Come . . . (Lance training and tactics), Jan-Feb.  
V-2 — The First FA Guided Missile System, Jul-Aug.

## Organization

FIST! May-Jun.  
Mobility Versus Maintenance, Mar-Apr.

Target Acquisition Now Counterfire Department, Mar-Apr (VB).  
The Infantry-Artillery Team, Sep-Oct.  
USAFAS Reorganization, Mar-Apr (VB).

## Personnel

Army Mine Planter Service "Warranted" Officers, Sep-Oct.  
Career Patterns For Company Grade Officers, Nov-Dec.  
FA Leadership Changes, Nov-Dec (VB)  
NCO Reclassification, Sep-Oct.  
The New Gunnery Sergeant, Sep-Oct.  
The Vanishing Yellow Helmet (elimination of safety officer), Mar-Apr.

## Research And Development

Aquila Ready For Testing (remotely piloted vehicle system), Jan-Feb (VB).  
Artillery Projects Of The Future, Jan-Feb.  
Cold Tube First Round Study (to improve first-round accuracy by applying correction factors), Sep-Oct (VB).  
In Search Of The Illusive Green Ball (proposed Lance sight), Jan-Feb.

## Tactics/Strategy

Decisive Lateral Positioning, Mar-Apr.  
Firepower (BG Albert B. Akers' speech), May-Jun.  
How To Defend Outnumbered And Win, Mar-Apr.  
Muzzle Brakes And LWSS (lightweight camouflage screening system), Jan-Feb (VB).  
Suppression of Enemy Air Defense (SEAD), Sep-Oct (VB).  
The Battle of Aachen (WWII city fighting tactics), Sep-Oct.  
The Infantry-Artillery Team, Sep-Oct.  
The Time Has Come . . . (Lance training and tactics), Jan-Feb.

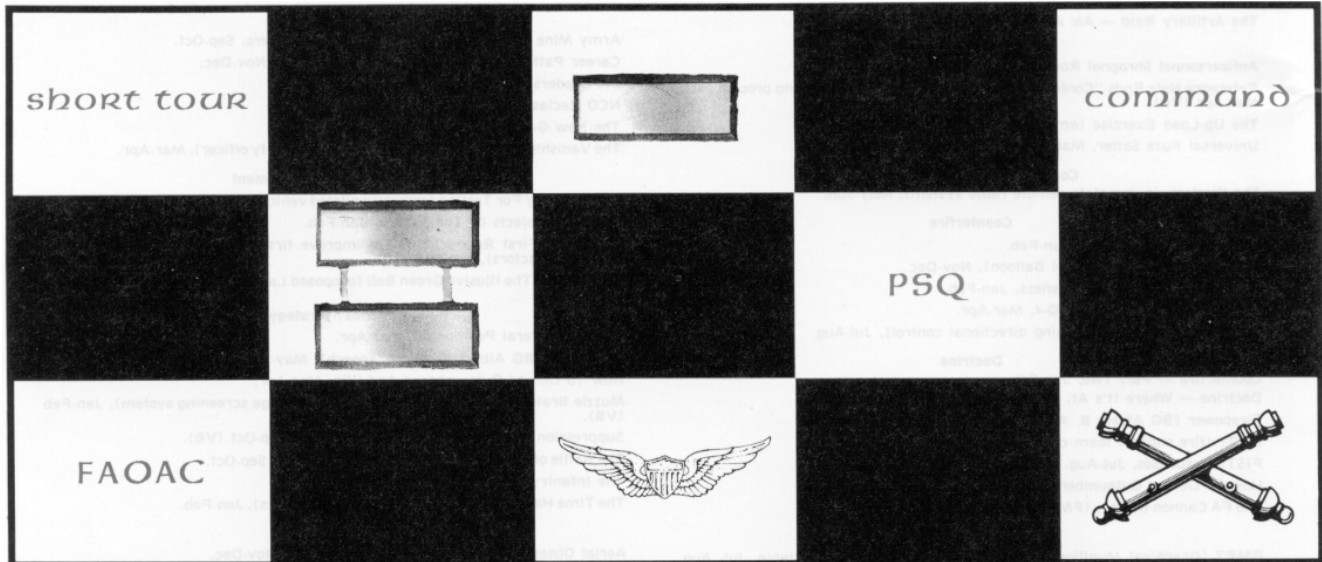
## Training

Aerial Observer Team TC (training circular), Nov-Dec.  
A Letter to Captain Baxter . . . (dealing with training environment), Jul-Aug.  
Army-Wide Training Literature (update of USAFAS training literature), Sep-Oct (VB).  
ARTEP Hotline, May-Jun (VB).  
Artillery Observer Trainer, Nov-Dec (VB).  
Counterbattery Confusion (artillery muzzle blast simulator), May-Jun (VB).  
Distribution of Soldier's Manual, Nov-Dec (VB).  
Eight-Inch OJT Packet Available From USAFAS, Nov-Dec (VB).  
FAOAC Contemporary Reading Program, Sep-Oct (VB).  
FAOAC Qualification Program (exam and study packet), Sep-Oct (VB).  
Firing Tables For M110A1, Nov-Dec (VB).  
Forging The Main Link (FAOBC FTX), May-Jun.  
Get The Most Out Of Your Q-4, Mar-Apr.  
ILC (Individual Learning Center) — A Success Story, Jul-Aug.  
Leadership Symposium — A New Approach, Sep-Oct (VB).  
Meteorological Observation Training Leaves Sill, Sep-Oct (VB).  
Missile Instruction Goes To Weapons Department, Nov-Dec (VB).  
Necessity — The Mother Of . . . (M31 trainer techniques), Mar-Apr.  
New CPX For FAOAC, Jul-Aug (VB).  
New Look For BNCOC (exported to NCO academies worldwide), Sep-Oct (VB).  
Operation Redleg (M102 unit conversion to M109), Mar-Apr.  
Red Team AO (aerial observer) Training, Nov-Dec.  
TACFIRE Graduates First Class, Jan-Feb (VB).  
TACFIRE Training Update, May-Jun (VB).  
The Time Has Come . . . (Lance training and tactics), Jan-Feb.  
The USAFAS Evaluator (the Systems Approach to Training), Sep-Oct (VB).  
The Vanishing Yellow Helmet (elimination of safety officer), Mar-Apr.  
Threat Class For Field Use, Mar-Apr (VB).  
Toward A More Congenial Training Environment, May-Jun.  
Trainers, Rise Up! (hostile training environment); Jan-Feb.  
USAFAS And ASA Publish TC, Jul-Aug (VB).  
USAFAS Scores, Mar-Apr (VB).

## Other

Clip and Save (Morris Swett Library bibliographies), Jul-Aug (VB).  
Obtain Forms Through Pinpoint, Jul-Aug (VB).  
Reflections On Being A Lieutenant In Germany, May-Jun.  
Secretary Hoffman Joins Hall Of Fame Roll, May-Jun (VB).  
The Field Artilleryman's Library, Mar-Apr.

# ***career patterns***



## ***for field artillery company grade officers***

by LTC Richard L. Reynard

*These are the personal views of an officer who recently completed serving as Chief of the Field Artillery Branch, MILPERCEN. —Ed.*

The career patterns for company grade field artillery officers are changing — for the good of the Army, the units in the field and the officer corps. But, each officer must be cognizant of the impact of these changes on his career, particularly with respect to timing, and must plan accordingly in light of his personal and professional goals. These changes result from new policies governing the officer advanced course (OAC), a change in CONUS stability rules and an old concept with a new name — Primary Specialty Qualification (PSQ).

As a result of a TRADOC study completed last year, OACs are now designed to prepare officers for battery level command and battalion staff duties. For this training to be of maximum benefit to each officer, he should attend the advanced course prior to assuming these duties. This would be soon after his promotion to captain or the fourth year of his commissioned service. The Field Artillery Branch at MILPERCEN is now programming officers for advanced course attendance when they are first available for reassignment after being promoted to captain.

"When first available" introduces the impact of the changing stability criteria. Department of Army policy now states that an officer will not be considered available for reassignment from a CONUS installation until after completion of 36 months on station. Even after 36 months an officer will be moved only when there is a need for him to go elsewhere (e.g., school or overseas). There are very few exceptions to this policy.

To understand the combined impact of these changes on an officer's career, consider a typical situation. After a lieutenant was commissioned in June 1973 he attended the Field Artillery Officers Basic Course (OBC) and the Airborne Course. He signed in to the 26th Armored Division Artillery in February 1974. He will have served 36 months in this assignment in February 1977. However, he will not be promoted to Captain until June 1977. The next Field Artillery OAC after these two dates starts in August 1977. Since the goal is attendance as soon as possible after four years active federal commissioned service (AFCS), Field Artillery Branch does not want to reassign the lieutenant to another station for a one- (overseas short tour) to three-year period. Therefore, he will stay at his first post until he goes to the advanced course.

This pattern applies equally to officers serving in overseas long-tour areas as well as those in CONUS. Army policy (AR 614-30) provides for an involuntary extension of foreign service tour up to six months to meet start dates for school. In other words, an officer's overseas tour can be extended to conform to OAC start dates.

The officer who serves an overseas short tour prior to OAC can normally expect to attend FAOAC between his fourth and fifth year of AFCS. Not long after the officer signs in for FAOAC, the FA representative at Fort Sill will request that he submit an officer assignment preference statement for FA Branch to use when considering his next assignment. At this point the officer should be concerned about being fully qualified as a field artilleryman.

PSQ is the new version of an old concept. For a company grade officer to be fully qualified in his basic specialty, FA Branch wants him to have:

- Served approximately three years in a variety of jobs at artillery battalion and battery/detachment level.
- Successfully completed the advanced course.
- Commanded a battery, company or field artillery

detachment for at least one year.

It is best for an officer to become fully qualified in his primary specialty early in his career. FA Branch will attempt to insure that every officer receives assignments which will provide this opportunity.

As the average "point of attendance" for OAC moves closer to four years (from approximately 6.8 years), fewer and fewer officers will have commanded prior to attendance. Those officers who have not commanded can expect to have an assignment after OAC where there are command opportunities.

Branch, of course, only assigns personnel for validated requirements, and each two-month assignment cycle is different. So there is no way to predict assignments specifically and there are no guarantees. However, the general pattern will be for those officers who have come to OAC from overseas to go to a CONUS post and those from CONUS will go overseas. For those going overseas, the determination of whether he goes to a short tour (unaccompanied) or long tour (accompanied) depends on three variables: (1) current requirements, (2) number of volunteers and (3) short tour equity. Short-tour equity is based on the date an individual returned from an unaccompanied) or long tour (accompanied) depends on three short tours and any extended TDY such as repetitive tours with Brigade 75 or 76.

Assume that there are 60 requirements for the assignment cycle into which a class graduates and 50 people who have not been overseas (or on two 6-month unaccompanied TDY tours within 24 months, or had a previous short tour) immediately before attending the advanced course; then all 50 will go to short tour assignments. If there are fewer requirements than short-tour vulnerable officers, then some may be assigned to overseas long tours. Each assignment is made on an individual basis considering all the factors discussed and other professional and personal circumstances. Every officer should expect to have at least one unaccompanied tour during his company grade years.

Regardless of location, the assignment after OAC is the period when most officers will complete their PSQ. If, for any reason, an officer has not successfully completed the requisites of PSQ during this period, he will normally be sent to troop assignments until he is thoroughly grounded in his primary specialty.

One point should now be clear. FA Branch expects a captain to complete PSQ before he is considered for a DA-directed assignment outside of his primary specialty. That does not mean an officer assigned to Fort Hood after FAOAC cannot or should not serve as an assistant G3 before he commands a battery. It does mean he should seek command during that 36 month (or longer) period at Fort Hood.

Although the field artillery aviator is in a different category, he should still be PSQ prior to his seventh year.

The fact that the aviator may not serve in a field artillery unit after specialty designation does not lessen FA Branch obligation to develop a technically qualified and proficient field artillery officer. Should the aviator not be designated into the aviation specialty, he will be prepared for any FA duty position. Those officers designated into the aviation specialty will have commanded prior to promotion to major and will be better prepared for aviation command.

### Command Types?

Another point of frequent concern is the difference between types of command duty. Command is command! Three years of FA troop duty and command for a year are separate categories. If an officer served 36 months in a field artillery battalion in Europe prior to the advanced course and then commands a training company at Fort Jackson after FAOAC, he is considered to be primary specialty qualified. Furthermore, the same would be true if he commanded a service battery, a firing battery or a headquarters battery. Each command has its unique responsibilities and satisfactions — but in each case it is command!

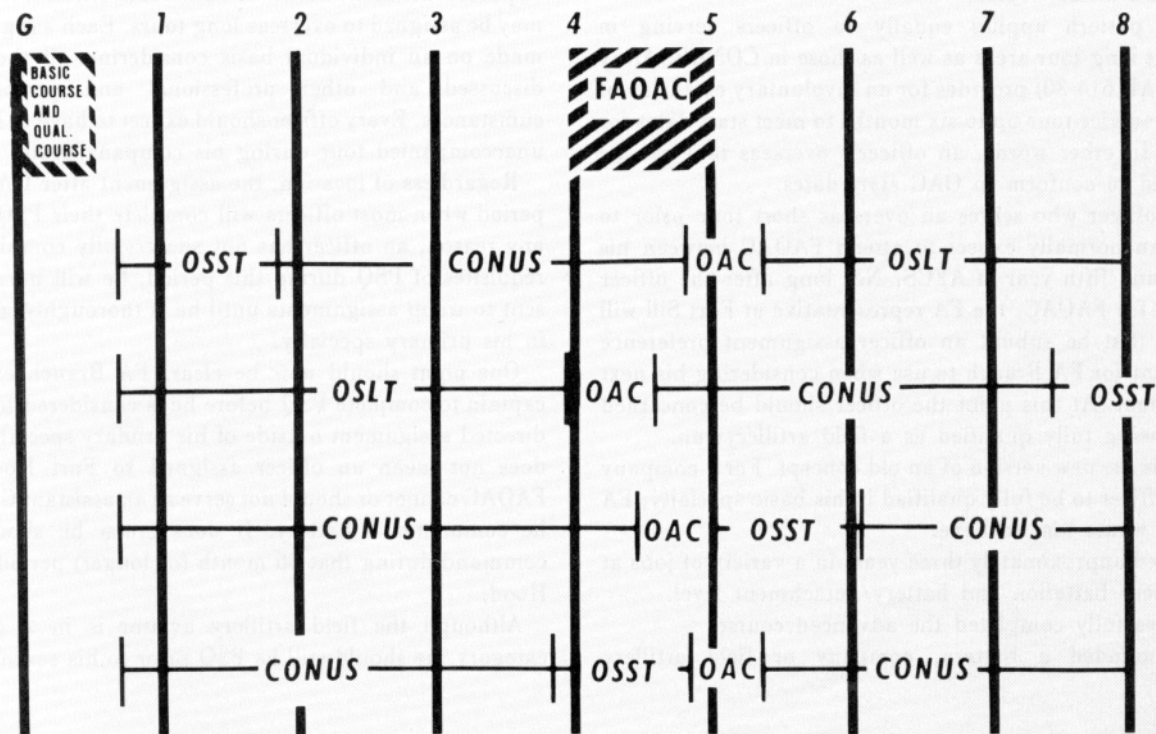
Some time between his sixth and ninth year of commissioned service a captain will have completed his PSQ and again be ready for reassignment by FA Branch. He will then be considered for a branch immaterial assignment.

The possibilities are numerous — alternate specialty job, service school instructor, advanced schooling, recruiting command, ROTC, etc. He has probably served as a staff officer with troops at battalion or higher level, and he is prepared to assume field grade duties in his primary specialty. He is qualified to be a battalion S3 or XO several years hence, or, in a national emergency, tomorrow!

The responsibility for an officer's development is shared by the officer, his commander and FA Branch. FA Branch will direct an assignment which can provide the opportunity for the type of duty an officer needs; the local commander assigns the specific job; and, the officer must perform to the best of his ability in *every* job and monitor his career with respect to his own immediate and longer term goals. All of these actions must occur within the constraints of Army requirements — which must be the paramount consideration. And, all must be geared to develop the officers who will lead and direct the Army and its many functions — the field grade officers of the future. ✕

**LTC Richard L. Reynard, FA, completed his service as Field Artillery Branch Chief and is now attending the National War College.**

## Long-Range Assignment Patterns



# Support Fire And Maneuver With

# SMOKE

Since 1973 and the Yom Kippur War there has been considerable discussion about the use of smoke on the modern battlefield. Proper use of smoke reduces the enemy's effectiveness both in daytime and at night and provides users the opportunity to maximize their own effectiveness.

In August 1975, USAFAS published Training Circular 6-40-5, *Field Artillery Smoke*, which discussed the new techniques of employment. This doctrine has now been incorporated into the new Field Manual (FM) 6-40-5.

A smoke test was conducted at Fort Sill during the first two weeks in December 1975 to verify the new doctrine and quantify the degradation of combat systems (i.e., DRAGON, TOW, night sights, etc.) while operating in a smoke environment. This test was conducted by representatives of the Field Artillery School, Army Materiel Systems Analysis Agency (AMSAA) and the Field Artillery Board. The test provided all participants the opportunity to observe the smoke capabilities of artillery (105-mm and 155-mm) and mortars (60-mm, 81-mm and 4.2-inch).

This test and some recently learned lessons on smoke employment in the Yom Kippur War not only point out the need to consider additional techniques, but also suggest the

direction artillery should take in the procurement of equipment and use of existing assets for increased survivability.

Heavy losses from antitank guided missile (ATGM) fire in the early days of the October war caused the Israelis to realize quickly that methods had to be found to reduce or degrade this threat.

Of the various ideas tested, smoke produced by far the greatest degradation of the ATGM threat. Artillery units immediately began using smoke to their advantage. In the Syrian sector the Israelis were opposed by forces possessing formidable numbers of tanks and antitank weapon systems. When the Israelis began their counterattack and advance to Damascus, the artillery planners used a technique which greatly reduced their losses to the multitude of ATGMs and Syrian tanks. Three hundred meters in front and to the flanks of their advancing tank formation, the Israelis delivered a rolling artillery barrage. This barrage consisted of high explosive (HE) and white phosphorous (WP) fires. The HE forced the infantrymen to seek overhead protection and the tankers to button up. The smoke obscured the Syrians' vision and prevented them from engaging the

by MAJ Kirk L. Lewis

advancing armored formations. The barrage was advanced in concert with the movement of the maneuver elements. Though this technique required considerable expenditure of ammunition, one Israeli artillery commander stated that these fires were a key factor in the Israeli capability to advance in this sector with minimal losses. WP was used since its rapid dissipation did not impede the movement of the friendly forces.

In addition, the Israelis succeeded in degrading the Syrian artillery by effectively "smoking" their observation posts (OPs). Due to the topography of the area, the Israelis were able to place smoke on the upwind side of the hills occupied by the Syrian OPs and effectively obscure them. HE fires were mixed with the smoke to immobilize the observers, preventing them from moving to other areas. On one occasion, this permitted the Israelis to take a battalion-size objective with minimal interference from Syrian artillery fires.

Defensively, smoke provides the user the capability to increase the effectiveness of his fires and to survive to fight another time. The maneuver forces shown in figure 1 have organized a system of mutually supporting positions that provide a framework for the defense by locating antiarmor kill zones and positioning antiarmor weapons to bring maximum fire into this zone. A possible scenario to support this defense by field artillery would go something like this: Forward of phase line Black, deliver smoke and HE/improved conventional munitions (ICM) fires. This will cause the enemy to button up and prevent forward observation. As the enemy forward elements cross phase line Black, terminate the smoke to give antitank gunners the visibility to engage the enemy with direct fire in the kill zones. Continue HE/ICM fires. As the enemy closes to within 1,000-1,500 meters (phase line Green) and direct fire from advancing armor makes the antitank weapon positions untenable, place FA smoke in front of the enemy again to

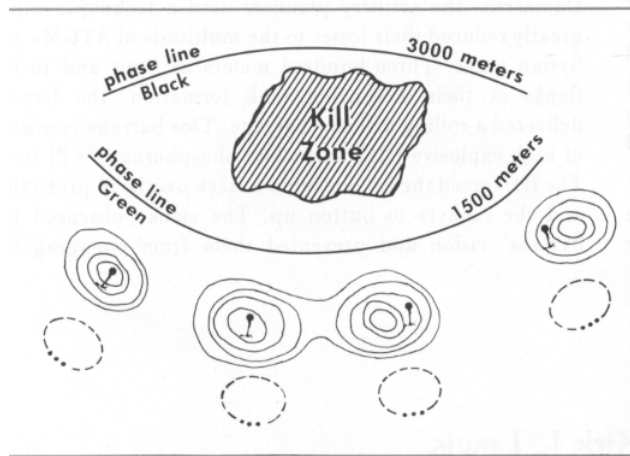


Figure 1.

obscure his vision. The antitank gunners can now move to supplemental positions where they can renew the fight.

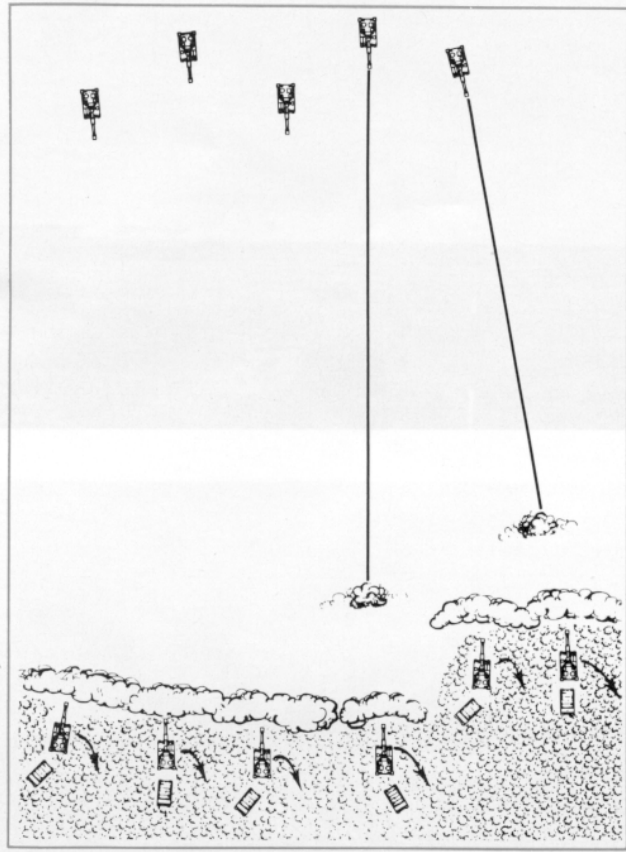
### Smoke At Night

During night operations artillery smoke can provide additional advantages to daytime employment. Smoke has the capability to counter enemy illumination as well as degrade night observation devices. At night, the weather conditions are usually ideal for smoke employment: fewer rounds are required to obscure a given area; and, the smoke remains considerably longer and drifts at a much slower rate, due to the normally lighter winds. During the Fort Sill smoke test it was found to be advantageous to fire WP randomly with hexachloroethane (HC) munitions. The HC provided the area obscuration while the WP caused a momentary blinding of thermal imagery and infrared detection devices. This is the same effect an individual experiences when a bright light is shone in eyes that have become accustomed to the darkness. This blinding effect is of sufficient duration to cause the operator to lose a target. Troop tests during the 1960s showed that smoke placed in front of tanks equipped with illuminating searchlights effectively degraded the capabilities of those searchlights. The smoke blinded the tank crew by producing glare in the tank sight and vision devices, causing considerable confusion.

### Position Area Survivability

Smoke can provide FA firing batteries an increased degree of survivability. During WWII, the Anzio Beachhead was surrounded by terrain that provided the Germans excellent observation of the entire area. This gave them the opportunity to adjust fires precisely on allied units, especially US artillery and ammunition supplies. The US 240-mm howitzers at Anzio provided superior fire support but were extremely vulnerable to these counterbattery fires. To provide concealment and protection, the artillery commander had six fog-oil smoke generators emplaced around his position. The smoke screen produced by these generators hid his location from observation. He received no further damage once the screen was in place. Additionally, the smoke defeated the enemy's flash ranging capability during the hours of darkness. The commander caused confusion to the German sound ranging acquisition by setting off dynamite charges to coincide with howitzer fire. The Soviet forces employ both sound and flash ranging acquisition means far forward, both in the attack and defense. This smoking technique could be used to degrade their counterfire program as well. The Syrians found that smoking their own battery positions after receiving heavy counterbattery fire caused the Israelis to shift their fires to other identifiable targets. There are no chemical generators in the active US inventory. However, today's artillery





**Figure 2.**

commander can smoke his position with smoke pots issued in the basic load or use various expedient means.

One of the major threats to our FA missile systems is small arms fire from civilian saboteurs, long-range patrols and attack by tactical strike aircraft. Once the position has been located by the enemy, screening of the area with smoke would greatly reduce the enemy's capability to damage the missiles and would allow the firing elements to complete their fire mission or displace, depending on the situation.

### **Concealment in "March Order"**

The threat of being overrun by armored forces is very real to cannon artillery units located near the forward edge of the battle area. Considerable thought is being given throughout the artillery community to find solutions to this problem. Artillery was not designed to fight against tanks, but it can cause major structural damage to armored vehicles through direct fire out to ranges of 1,500 meters. However, it is ill-equipped to fight it out with tanks. Tank fires become very accurate as the distance to the artillery closes. Though the firing battery may be well dug in and camouflaged, there will come a point in the battle when the decision to displace the battery to an alternate position

must be made. At this time the howitzers will be most vulnerable. However, if they were equipped with a system that provided an instant smoke screen capability, they could safely move from their positions under the protection of this screen. If equipped with an engine exhaust system (figure 2), the rear howitzer could reinforce the smoke screen as they depart the area.

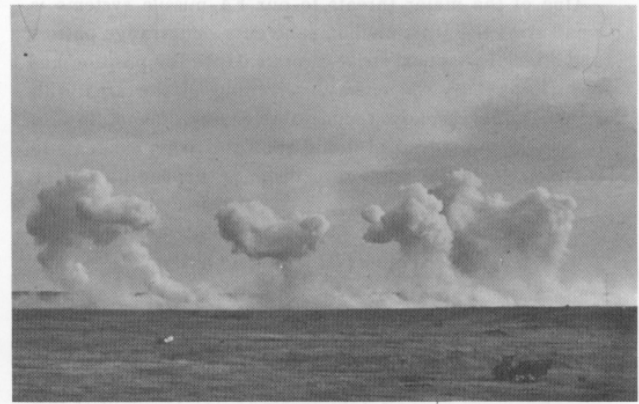
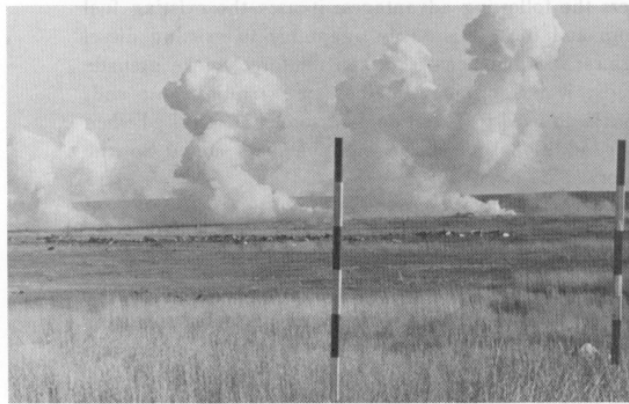
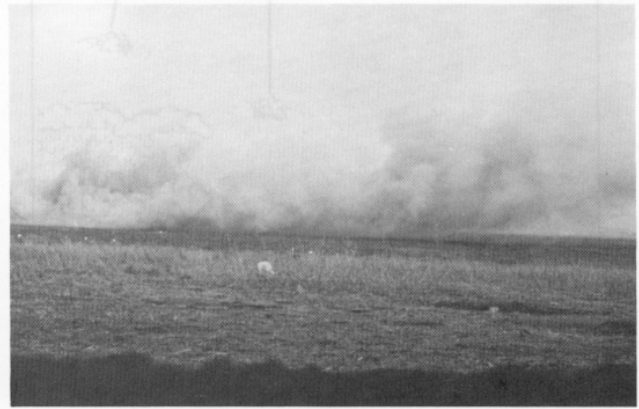
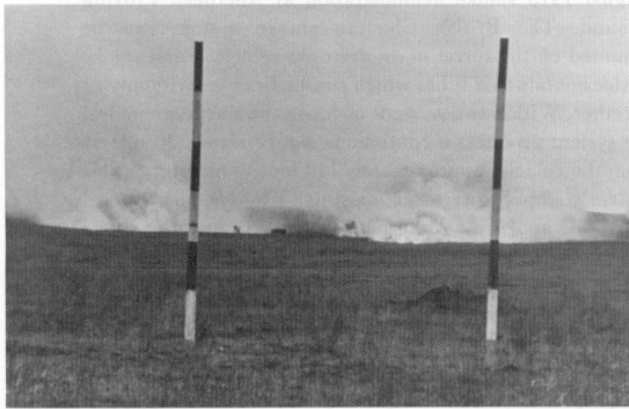
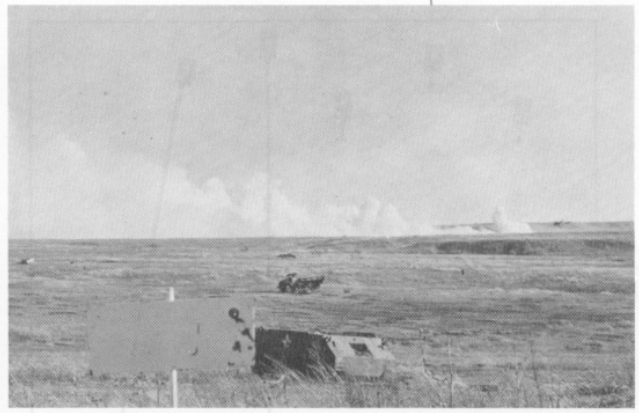
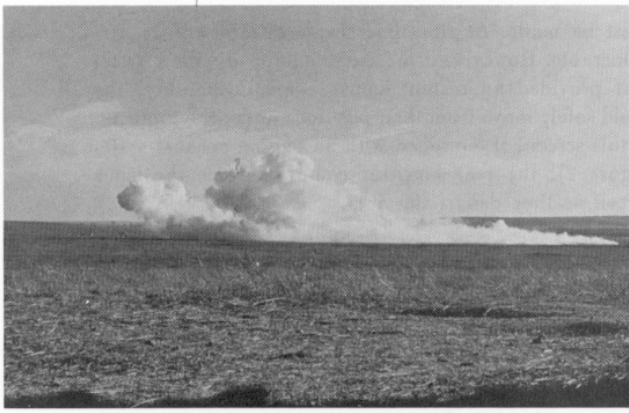
### **Smoke Systems**

The smoke systems to accomplish this are available today. They are the British Chieftan Protective Smoke System and the Teledyne Engine Exhaust Smoke Subsystem. Both systems were demonstrated to TRADOC and the research and development community during the August 1975 smoke demonstration at Aberdeen Proving Ground. The British Chieftan smoke system can be mounted on the turret of an armored vehicle. Each smoke device contains six tubes which can be fired individually or together. Within two seconds of firing the smoke grenades, the system produces a continuous smoke screen 30 meters from the vehicle, approximately 110 meters in length. This system's superiority over existing US systems caused TRADOC and Army Materiel Development and Readiness Command to seek its procurement for our tanks. This procurement should be expanded to include sufficient numbers to equip all M109 howitzers. The cost of two smoke launchers is approximately \$1,000. To provide the battery with a longer duration smoking capability, each self-propelled (SP) artillery weapon should be equipped with an engine exhaust smoke subsystem. This system offers the following advantages: it uses the existing fuel pump and fuel; it is easily adaptable to existing diesel engines; it is inexpensive; it can reinforce smoke grenade clouds; it has minimal maintenance requirement; and, there is no need for additional personnel as required when other additional defensive equipment is added to the battery.

Smoke systems, of course, would not be issued to towed artillery. A technique that could be used to provide a screen in front of both towed and SP battery positions is to fire HC smoke at the minimum time fuze setting. This technique was demonstrated during the Fort Sill test. The canisters functioned properly but were widely dispersed. To provide an effective screen, each weapon must fire a minimum of three rounds. The issued smoke pots could also be properly placed and detonated at the appropriate time to enable the weapons to displace under protection of smoke.

### **Radiation Protection**

Another benefit that can be derived from smoke placed over the battery area is protection from the thermal radiation of a nuclear explosion. Field tests during the early



Photographs show some of the results of the smoke test firings conducted at Fort Sill. Though taken on different days from different distances and directions, these pictures show comparisons of 155-mm and 4.2-inch mortar firing WP and HC. The WP explodes and obscuration created dissipates at a rate determined by atmospheric conditions. The HC rounds continue to burn after impact, usually giving greater duration of cloud. Top, left and right, is the 4.2-inch firing WP' center, left and right, is the 155-mm firing HC; and, bottom, left and right, is 155-mm firing WP. Photographs on left are initial or early effects and photos on right indicate dispersion. [Photos provided by USAMSAA, W. T. Hirnyck; photo reproductions by Alvis Kennedy.]

1950s showed that thermal radiation exposure beneath a smoke screen was reduced from 65 to 90 percent at various ranges from the point of impact. This screen, of course, provides no protection from the blast effects, but the screen can reduce the thermal radiation to a level that will minimize fuel and ammunition fires.

Remember, when planning the defense of the battery position, include provision for smoke — it could very well be a key to your survival.

### **Smoke For Target Identification**

Artillery smoke can be used for marking purposes. Drawing again on the Israeli experience, many forward observers and tactical fighter pilots had considerable difficulty identifying specific targets or individual rounds on the battlefield due to the dust and smoke. Here the available colored smoke provided significant help, especially when marking targets for tactical air support. When pilots are operating in an area with a high density of air defense systems targeted against them, their attention is primarily directed toward surviving this air defense artillery threat. When WP was used for marking they could not, in most cases, differentiate between the many impacting smoke rounds and a specific target. The use of colored smoke, for the most part, overcame this problem. Excessive amounts of smoke in various sections of the battle area caused the forward observers to use colored smoke frequently in adjustment to insure they were observing and adjusting the correct rounds.

We must learn from others, combining this with our own experiments in using smoke. Our forward observers must be knowledgeable in the proper use of FA delivered smoke. This knowledge can be gained only through *field experience and training*. Commanders and S3s should make plans to carry smoke to the field each time they fire. This will be the only way to insure that forward observers have the opportunity to observe the smoke under varying wind and weather conditions. Though smoke is carried on each problem, there will be times it cannot be fired due to adverse conditions. When this occurs, it will add to the forward observer's knowledge of weather and its limiting effect on employment of smoke.

### **Train To Use Smoke**

The present ammunition available for training is very scarce. Under the current authorizations (CTA 23-100-6), only eight rounds per 105-mm and 12 rounds per 155-mm are authorized for an entire year of training. Department of the Army is aware of this situation and is taking corrective steps. Directives have been sent to the field authorizing major commanders to issue ammunition to support the new Army Training and Evaluation Programs.

The entire CTA-based training ammunition management system is now under revision, and approval of the new program should be forthcoming.

Both in training and combat, smoke is requested more often than it is available. The artillery planners and forward observers must, within their capabilities, maximize the effectiveness of available smoke rounds.

### **Think Before You Smoke**

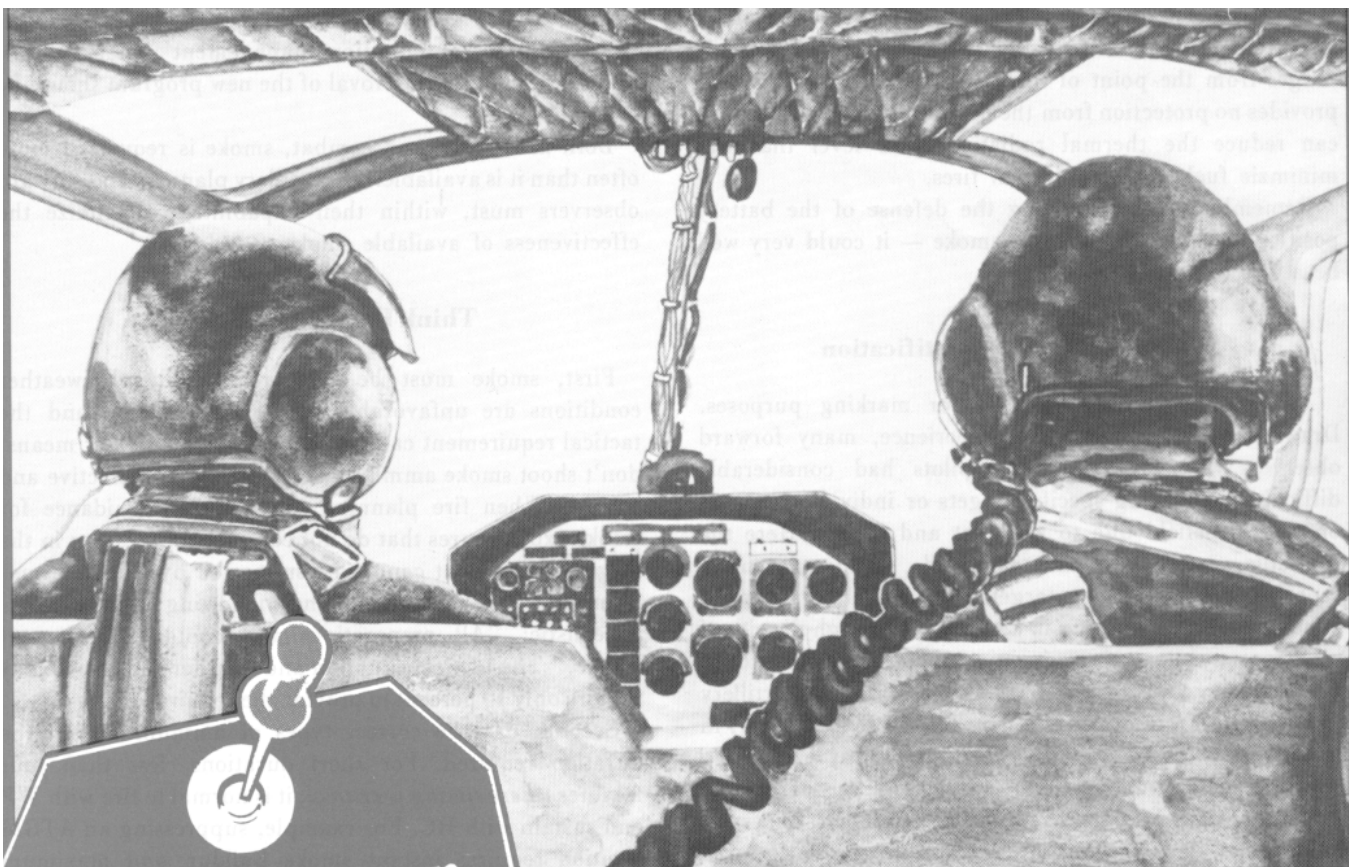
First, smoke must be used realistically. If weather conditions are unfavorable for its employment and the tactical requirement can be fulfilled by some other means, don't shoot smoke ammunition — it will be ineffective and wasted. When fire planning, do not state guidance for smoke expenditures that do not consider the weather in the target area or that cannot be supported by available ammunition. For example, the following guidance is unrealistic: "All preparations will contain 50 percent smoke." The tactical situation and weather conditions may require only 10 percent to provide the required effects.

Second, use the correct types of ammunition for the duration required. For short durations, less than four minutes *where timing is critical*, it is normal to fire with WP and sustain with HC. For example, suppressing an ATGM position requires instant smoke buildup and maximum psychological shock effect to distract the ATGM gunner and obscure his vision. Using only WP to provide four minutes of obscuration requires a replenishing round every 30 seconds; thus, eight rounds per gun must be fired to meet this requirement. Establishing with WP and sustaining with HC (as stated in FM 6-40-5 for immediate smoke) reduces the number of rounds to two per gun, a savings of six rounds per gun — rounds which then are available to be used for a later mission.

Third, plan ahead. If time is available, prestock ammunition to support anticipated requirements.

Using smoke requires considerable knowledge of weather, types of ammunition and the tactical situation — with imagination as an added ingredient. When employing smoke, the user must always be able to adjust to changes in the operational environment. Smoke generally is not equated to combat power; but, the effective use and delivery of smoke by the field artillery at the critical time and place on the battlefield will greatly contribute to the success of the combined arms team. ☒

**MAJ Kirk L. Lewis, FA, is serving with the 1st Battalion, 81st Field Artillery.**



## Consumer Notice:

Please read  
FAAO TEAM  
article  
thoroughly prior  
to entering  
combat.

Editor

A new training circular, TC 6-40-6, *Field Artillery Aerial Observer Team Operations*, has been written for the field artillery and maneuver commanders who control observation aircraft and for the aviators and observers who operate in them. It is designed to supplement existing doctrine for the employment of aviator-observer teams on the battlefield and provides the doctrinal basis for training field artillery aerial observer (FAAO) teams. The TC provides the commander insight into employing FAAO teams in the high threat environment. It should assist in the development of a detailed training program and serve as a handbook for the FAAO team.

For success in battle, an understanding must be gained of the characteristics, capabilities and limitations of combat organizations and their equipment. Each must be used to its full potential and integrated into the combined arms team. When properly trained and employed, the FAAO team is an element which can help tip the balance of combat power in our favor. By capitalizing on the helicopter's speed, range and ability to bypass obstacles, the FAAO can increase the supported unit's combat effectiveness by providing:

- Greater observation and collection of intelligence than is possible with ground observers or reconnaissance personnel.

- Improved reaction time to threats within the commander's area of influence and interest.
- Observation at extended distances from ground units for the engagement of targets with indirect fires.

Commanders and staffs must know the FAAO team capabilities and use them to supplement and strengthen the observation plan.

### The Operational Environment

Unlike the early days of Vietnam when Army aircraft were free to roam the skies virtually unimpeded, aircraft crews now must face a more sophisticated and powerful threat. The battlefield includes advanced air defense weapons, electronic warfare and intense use of artillery, tactical air strikes and attack helicopters against maintenance facilities and rearm/refuel points. Army aviators in this hostile environment must survive to perform assigned missions. To assist in degrading the enemy's capability to acquire, track and engage our aircraft, maximum advantage must be made of periods of reduced visibility. All FAAO teams must operate both at night and under adverse weather conditions of low ceiling and poor visibility. However, instrument flying techniques will only be possible in rear areas due to the air defense threat.

### Terrain Flying

Where the terrain permits, the aviator will fly at the altitude and airspeed that best enhances both survivability and mission accomplishment. Enemy detection and engagement capabilities may dictate combinations of low level, contour and nap-of-the-earth (NOE) flight, as well as hovering, popping up, sideslipping, dashing, quickstopping and landing maneuvers. Recognizing the high threat, the aviator must remember that "what can be seen, can be hit." He must use the terrain to protect himself to insure that he, not his enemy, has the tactical advantage. To keep the aviator's exposure to the bare minimum, NOE flight will often be the only option. On other occasions, it may be possible to use low level or contour flight, gaining an equal degree of protection from detection.

The aviator must use the terrain to his advantage — mastering the concept of terrain flying. This is the environment in which the aerial observer must learn to operate.

Indirect fire adjustment becomes difficult when terrain flying: The aircraft is not able to operate at high altitude (1,500 to 2,500 feet above ground level) and the FAAO's perspective is almost that of a ground observer. The observer cannot use binoculars the way he would on the ground since helicopter motion can induce nausea. Aircraft repositioning during adjustment will give the observer a changing view of the target. Additionally, radio communications are degraded. The communication associated with transmissions from aircraft at high altitudes is a thing of the past. A radio relay may be required.

### Teamwork

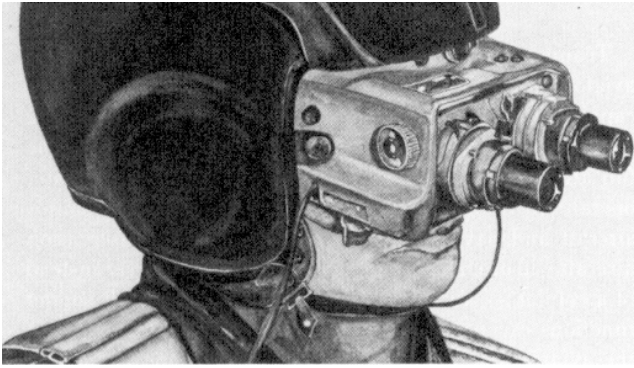
Teamwork is essential for fighting and surviving. The aviator and observer must complement each other's capabilities. The aviator must position the observer so he can conduct fire missions. Since terrain flying requires the full attention of the aviator, the observer must navigate, operate all radios (tactical and navigational) and monitor aircraft and navigation instruments. Current observation aircraft will often have a nonaviation-rated observer instead of a copilot — and this observer must perform all copilot functions except aircraft control. It becomes obvious that the aviator and FAAO must not only become experts in their own jobs but also must crosstrain so they can instantly anticipate the other's actions in any situation.

Both the pilot and observer must be thoroughly familiar with the terrain and the friendly and enemy situation. Mission briefings must be *accurate* and *detailed* if the team is to extend effectively the eyes and muscle of the combined arms force. The team must know:

- The location of friendly indirect fire units and how to contact them by radio to request rapid and responsive fires when required. (This knowledge allows the team to determine the gun-target (GT) line for use in fire adjustment and also to preclude flying into friendly fires.)
- The location, organization for combat and intended maneuver area of supported ground forces and how to reach them by radio so close support can be provided without endangering friendly forces with indirect fires.
- The procedures, frequencies and call signs necessary to communicate with the airspace management element.
- The location of enemy units and likely antiaircraft weapons. Team members must be able instantly to recognize enemy equipment, knowing its capabilities, limitations and vulnerabilities.

The FAAO must be:

- Totally familiar with the inner workings of the field artillery and its relationships with supporting and supported units.
- Proficient in locating and identifying targets and calling for and adjusting all indirect fires from surface weapons and direct fires from aircraft.
- Capable of performing battle damage assessments.
- Able to use all aircraft radios to contact maneuver area units and authenticate calls.
- Able to navigate the aircraft during terrain flying, always able to determine location within 100 meters.
- Able to map spot targets to Army Training and Evaluation Program (ARTEP) standards.
- Able to use fire support coordinating measures.
- Able to operate aircraft navigational equipment as required.
- Able to locate his position in relation to friendly and enemy units on a three-dimensional battlefield.



### **Equipped for night flying.**

The aviator must be able:

- To teach a nonrated observer all copilot duties except aircraft control.
- To call for and adjust indirect fires using "at my command," "shot," "splash" and projectile time-of-flight data.
- To use the survival flight techniques of masking, unmasking and moving from one position to another during the conduct of a fire mission.

Additionally, the aviator must make certain considerations while planning primary and alternate routes. He wants to keep terrain mass and vegetation between the enemy and the aircraft; avoid silhouetting the aircraft when crossing ridgelines; and, avoid open areas when terrain permits.

### **Employment, Location And Control**

Our battalion-sized units in the defense will often be required to occupy sectors five to 10 kilometers wide so commanders must carefully consider the optimal deployment of the observation assets. Ground-based observers can be positioned on key terrain while FAAOs can cover large sectors between ground observation posts. Effective employment will depend on both how well the commander organizes his observation assets and on the initiative of the observers.

FAAOs are organic to the headquarters battery of each FA group and division artillery, except the airmobile division. The div arty/FA group aviation officer, supervised by the S3, is responsible for the training and employment of FAAO teams. Requests for div arty FAAO teams are consolidated by the FA battalion S3 and forwarded to the div arty aviation officer who directs the employment of the teams — either on a mission basis or attached to or placed under the operational control of the supported unit. Mission briefings will be provided by the battalion fire support officer (FSO) in whose sector the team is expected to operate.

### **FAAO Team Mission**

An ideal mission for aerial observer elements is the support of fast-moving, widespread covering/screening forces, especially those forces containing air cavalry

elements. An example would include these actions: An air cav scout sees a target, passes it to the aerial observer and continues his scout mission. The aerial observer, flying approximately 500 meters behind the scout, receives the target and sends a fire mission to the appropriate FDC. The aerial observer adjusts fires and then regains contact with the air cav element. The FA battery executes a fire mission based on the aerial observer's request and adjustment.

### **Mission Briefings And Execution**

When given a mission to support an FA battalion, the observer team should, if time permits, fly to the supported brigade's command post (CP) for orientation by the brigade FSO. If told to fly directly to the maneuver battalion CP, the battalion FSO will provide the team with the following information:

- The supported commander's fire support needs.
- The sector of responsibility.
- The friendly and enemy tactical situation to include the location of all friendly observation posts (as well as known and suspected enemy air defense positions).
- Frequencies and call signs for intelligence purposes and for requesting fires.
- Positions/coverage of artillery and mortars.
- Availability of naval gunfire and tactical air.
- Current fire support coordinating measures.
- Fire plans.
- Targets already designated in sector.
- Target numbers the team may use.
- Reference lines in effect.
- Frequencies and call signs of air cav and attack helicopter teams in the area.

The team uses this information to complete preflight fire support planning. This planning must be as thorough as time permits and should include the team becoming familiar with the terrain in its sector by map or actual reconnaissance. Lack of adequate preflight planning can be fatal!

The FAAO team can make significant contributions to the collection of information (intelligence) about the enemy since it can observe the entire battlefield and obtain a more accurate and detailed picture of the enemy than either a ground observer or sensor system. The team should receive the essential elements of information and other information requirements of the division, div arty and brigade. The team should be debriefed concerning the observed enemy activity at the completion of the mission.

The team will then fly to the assigned sector and establish communications with the supported fire direction center (FDC). Fire support planning is continued with the FDC by establishing the targets, target/reference points and lines from which to identify or shift fires (e.g., gun-target, observer-target or reference lines). Initially, the team will

share the command/fire net and, later, a fire direction net with ground-based FOs under the control of the maneuver battalion's FSO.

### **Survivability**

To accomplish the mission, the team must survive. Application of the following basic principles will enhance survival: Minimize exposure time; present a minimal signature when exposed; and, use sound tactics.

With the acquisition capabilities of the Soviet ZSU 23-4/SA8 and other anti-aircraft systems such as the SA7, the aviator will rarely be able to expose the aircraft more than 30 seconds while determining target locations. To enhance survivability, teams should train to be exposed no more than 10 seconds. The team must pop up from its masked position, acquire the target, determine its location, immediately return to a concealed position and then send the call-for-fire. When exposed, if possible, provide a head-on silhouette. In addition to presenting a minimal signature, the team can easily establish the observer-target direction by reading the aircraft heading indicator. A side or a rear silhouette gives the enemy a much better target, especially with infrared-seeking missiles.

The two flight tactics that will enhance survivability and mission accomplishment are the stationary hover and pop up. When using the hover, the aircraft is positioned behind trees or other vegetation which provide camouflage for the aircraft and still permit observation of the target. Take care to insure that rotor wash doesn't stir up dust and debris that will provide a signature of the aircraft's position. Remember, however, that heat-seeking/radar-guided air defense artillery weapons can acquire targets through limited foliage. Hence, avoid exposure in the vicinity of positions where you have used the stationary hover technique for a prolonged period. The pop up technique is used to provide minimal exposure during target acquisition and adjustment of fires. The aviator must know when to pop up to permit both observation and adjustment. After exposure, the team should return to the masked position and, in most cases, move to another location prior to popping up again. Aircraft movement must be of sufficient distance to make location difficult for the enemy. Random movement will greatly enhance FAAO team survivability, so avoid set patterns. An alternative tactic (available when the enemy situation and terrain will not permit terrain flying techniques) is for the observer to perform his mission dismounted! He becomes a ground observer with the added flexibility of being able to call his helicopter forward and reposition rapidly. This method requires that the observer have a portable radio set AN/PRC-77. The aviator can relay the calls if necessary.

Since the FAAO team will be required to operate extensively at night using terrain flight techniques and will not necessarily be able to perform to the same degree of proficiency as during the day, the peculiarities of night

vision and its increased physical demands make night operations extremely difficult and demand extensive night training. A plus is that night vision devices such as the AN/PVS-5 goggles are available. Observation is greatly enhanced by using the goggles since they allow target acquisition at ranges out to 400 meters for personnel, 2,000 meters for vehicles and 3,000 meters for prominent terrain features.

### **Call-For-Fire**

The aviator or the observer member of the FAAO team will have to request fire support and should use the proper call-for-fire both in training and in combat.

Key to aerial observation, the FDC must know the direction of the imaginary line along which the FAAO has determined the target location and from which he will make shifts and corrections. This may be stated in degrees, mils or a cardinal direction. Some of the more common lines which can be used include the gun-target line (the FDC will assume this as the standard if nothing is sent), the observer-target line and a reference line. The latter may be a cardinal direction or a line on the ground provided by an identifiable terrain feature; e.g., railroad bed, river, etc. There are four ways to determine direction: Using the aircraft heading indicator or magnetic compass; using a map; estimating; or, computing from a known direction. When you shift from a known point, send direction as part of the call-for-fire. On other missions send direction *after* the call-for-fire because it is not needed until just before an adjustment is made.

The method of fire and control element is used to specify the degree of control desired over the firing unit to attack the target effectively. To minimize exposure and insure the aircraft is in position to observe, the requester may use "At My Command" and have the FDC announce "(Unit) Is Ready" when the pieces are ready to fire. The FAAO will then announce "Fire" when he is ready to observe. "At My Command" remains in effect throughout the mission until "Cancel At My Command" or "End Of Mission" is given. Target numbers will not be assigned to targets of opportunity unless requested (and the fire direction officer (FDO) agrees) or the FDO directs that it be recorded as a target. The FDC normally transmits special firing sequence data to the aerial observer: "Shot" is sent by the FDC the instant the round is fired to alert the observer the round is approximately "time-of-flight" away from impacting. "Splash" is sent by the FDC to alert the team the rounds will impact in five seconds — this will help the FAAO team position the aircraft so it can see rounds impact without exposure.

### **Training**

Two points made earlier require reemphasis: The observer and the aviator are highly trained specialists, and the

observer and the aviator form a *team*. Training an effective FAAO team to master the special skills and achieve the coordination and teamwork required for success and survival is a challenge. The first phase of training for an artillery observer takes place in the Field Artillery Officer Basic Course. This is the entry training for FA officers and the primary emphasis is on producing a qualified ground forward observer. Aviators graduating from flight school since September 1974 have received terrain flight training. Those aviators qualified prior to that date are now required to attend courses of instruction established at post/division level. This training concentrates on the navigation and aircraft manipulation required to operate in an NOE mode, as well as a mix of low level and contour flight.

When an officer is selected as an aerial observer, there are steps that both he and the unit training manager can take to fulfill the advanced training requirements. By contacting the Extension Training Division at Fort Rucker, AL, the potential AO can enroll in nonresident courses to prepare for an AO school. Fort Rucker Subcourse AV 75, *Tactical Map Reading*, is the course used in the NOE training to teach aviators terrain flying navigation. This course would give the potential AO a beneficial foundation in navigation. Each post/division should establish an AO school using Army Subject Schedule 1-8 as a guide. AR 600-106 requires that individuals undergo a "scheduled course of instruction" prior to performing AO duties. The course outlined in Army Subject Schedule 1-8 offers 69 hours of ground and 20 hours of flight training and meets the AR requirements.

Upon completion of initial aviation training and assignment to a tactical unit, an aviator should undergo an advanced terrain flying qualification training program. This is the aviation unit commander's responsibility, and a sample training program of 34 hours of ground and 22 hours of flight training is offered in FM 1-1. When assigned to the div arty or artillery group aviation battery/section, the aviator could enroll in nonresident FA courses of instruction to prepare for duties as a member of the FAAO team. He can do so by writing USAFAS, ATTN: ATSF-SE-R, Fort Sill, OK 73503. Fort Sill Subcourse FA 302, *Observed Fire Procedures*, will give him a good foundation and prepare him to work with the AO.

With the individual training completed, the FAAO team can be formed for training and operations. This training must be monitored closely by the commander so that the true effectiveness of the team can be determined. Although there is no established program of instruction for the team phase, units that have experimented with it have emphasized standardization of cockpit duties and constant cross-training of aviator and observer duties. The cockpit standardization should stress instrument checks and announcements the observer must make. Likewise, this standardization should delineate the flight techniques the aviator must perform in support of the observer. The product of this phase should be a harmonious, efficient and

mutually dependent team that can perform the mission and survive to perform again. The commander can exercise his FAAO teams by including them in command post and field training exercises.


### **Simulation**

Helicopter flight time and FA live fire are costly. With the current emphasis on reducing training costs, the program manager must be imaginative in using resources during the training cycle. The examples listed here are means by which this manager can cut training costs. Helicopter simulation can be accomplished by use of flight simulation devices (TV tape of terrain) for navigation training; a "cherry picker" to simulate pop-up during FA adjustment on a miniature range for firing of the 14.5-mm M31 FA trainer; and, a series of low towers that the observer/aviator would have to climb to see impact of the 14.5-mm projectile on a miniature range. FA live fire simulation can be achieved by using the puff board for basic FO skills in adjusting fires and the M31 range with or without helicopters for intermediate skills and adjusting fires.

### **Training Evaluation**

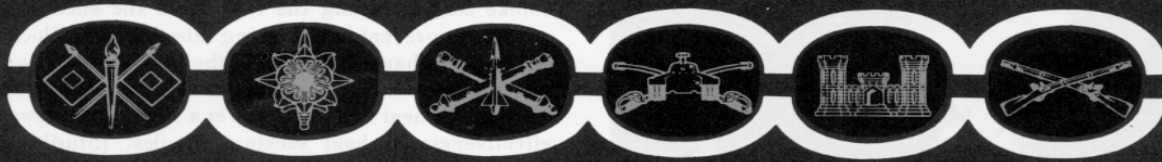
To develop a training program the commander should refer to some additional publications. TCs 21-5-1 and 21-5-2, along with FM 21-6, will provide the method and means for the development of a training program. Training requires evaluation (not testing). The most cost-effective evaluation is informal. Throughout the conduct of the training program, the commander and the training manager will be evaluating both the level of team performance and the training quality and appropriateness. The program must not be fixed; rather, it must be flexible enough to accommodate changing priorities, new doctrine and new ideas. The training and evaluation outline to be published in TC 6-40-6 will be of considerable value when establishing the training program.

### **Summary**

Individuals selected as members of FAAO teams should come to the commander with a set of basic skills. The programs outlined here serve to qualify the individuals and to meld the teams into effective extensions of the fighting force. The trainer has a responsibility to manage these programs through imaginative use of all available resources, establishing a training program and then evaluating that program and the teams it produces through use of the ARTEP. This is no small task, but the product is an effective FAAO team that can be integrated into the combined arms team and truly become that element capable of tipping the balance of combat power in our favor. When units receive the TC, it will contain all the necessary references for effective FAAO team training. Comments for improving the TC are requested and should be submitted to: Commandant, USAFAS, ATTN: ATSF-TD-TM, Fort Sill, OK 73503 (AUTOVON 639-4902). 



*with our comrades in arms*



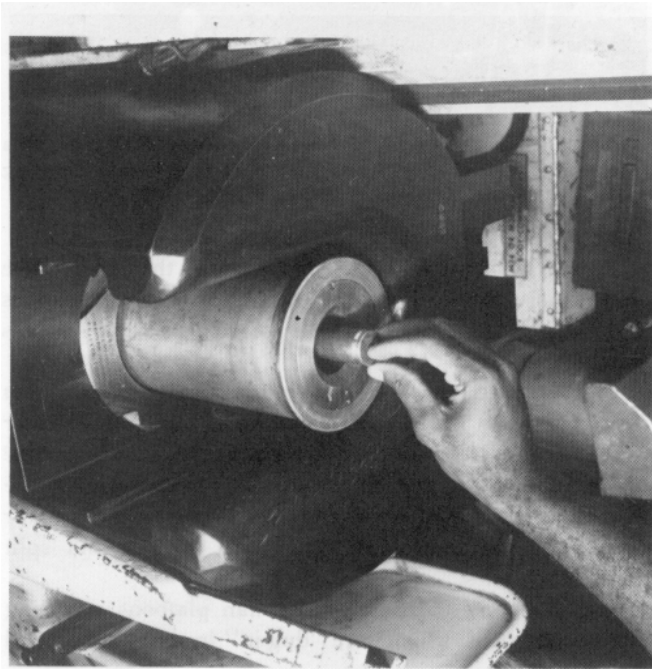
## New 20-mm Training Device

A subcaliber 20-mm training device for the 105-mm tank gun has greatly reduced ammunition costs and increased training realism for tankers. The new round is inserted directly into the breech of the main tank gun and simulates target engagements at only a fraction of the cost of 105-mm ammunition.

Similar to the M31 training device used by artillery units, a 20-mm round costs only 35 cents while the 105-mm round costs about \$50.

The new training round requires only small impact areas, so tank crews can engage targets on tank platoon assault courses with their main battle gun. This would be impossible with 105-mm ammunition.

Initial reactions of tankers have been mixed. A tank commander pointed out that while substitution of the 20-mm



**The 20-mm training round is inserted into the modified breech of a 105-mm main tank gun. The subcaliber device simulates target engagement by the tank crew at only a fraction of the cost and does not require extensive range facilities. (US Army photo by Frank Frasure)**

trainer for the actual main gun round did not affect him or the driver, it did not offer realistic training to the loader. "The loader is the guy who really suffers because the loading and firing characteristics are very different. There is no recoil with the 20-mm and this presents a safety hazard when the loader . . . fires a 105-mm round which has a great deal of recoil."

Another tank commander said that the training device was a complete waste of time. "Tank crews don't get the 'real feel' of the main gun when firing a subcaliber round," he said. "With the 20-mm round, the tank doesn't jump around and there's no recoil."

One loader questioned said that he did not receive realistic training with the 20-mm device. "One problem with the 20-mm is that the rounds fall short . . . Most of the time you can't tell where the rounds are going. Plus, the firing pin and empty casings have a tendency to stick, which means I have to free them and pry the casings out of the breech. This process takes too long."

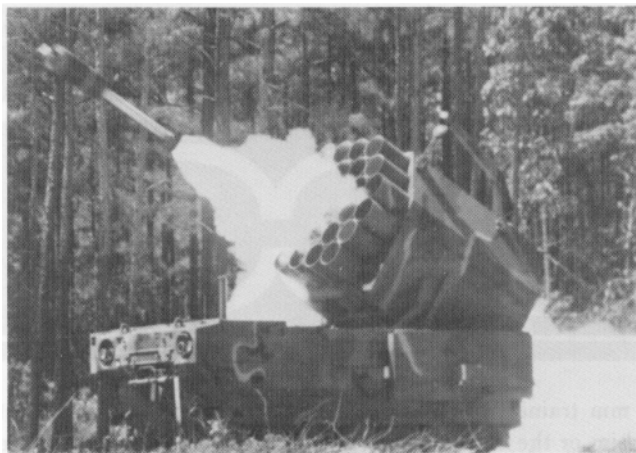
## Enemy Minefields Under Attack

A surface launched fuel air explosive (SLUFAE) mine neutralizer is under development by the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA, for use by combat engineers to breach defended enemy minefields.

Now in the engineering design test phase, the system is showing great potential in initial tests against live 300-meter deep minefields. The system consists of rocket-propelled fuel air explosive rounds fired into a minefield from a 30-tube armored launcher mounted on a tracked cargo carrier. The rounds impact in a linear pattern and form highly volatile liquid chemical aerosol clouds. Automatic explosion of the clouds by delay detonators produces blast effects that detonate land mines to clear paths through minefields. The rounds can be fired from the launcher singly or in ripples.

The SLUFAE is expected to provide a mine neutralizer

## With Our Comrades In Arms



operational at distances up to 1,000 meters from the minefields. Completion of the development is scheduled for 1980.

## New Camouflage For M60A1 Tank

Improved camouflage for the M60A1 tank is being developed and tested to compensate for the increased capabilities of Soviet detection equipment and the improved accuracy of weapons. The project is being undertaken by the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA.

The M60A1 has been selected for an expedited pilot program which will provide camouflage for the tank against selected threats. Permanently mounted six-foot fiberglass rods which fold out above the tracks in seconds support a special camouflage net. A camouflage disruptor, used to disguise the gun barrel, is a portion of a net mounted on a collapsible aluminum frame. Twenty foliage brackets have



been added to secure branches and supplement other techniques. Prototype smoke launchers located on the turret are being evaluated at Edgewood Arsenal, MD. The smoke rockets are projected and explode to form a rapid smoke screen, hiding the tank from the enemy.

Also, to prevent heat seeking missiles from "locking on" to the hot exhaust fumes from the tank's engine, an air foil was developed. The foil forces the exhaust up and out, causing the heat to dissipate over a wider area, lowering the effectiveness of heat seeking missiles. [Studies are underway to develop a similar system for self-propelled artillery weapons—Ed.]

## CDEC Tests Foxhole Designs

Everybody knows a foxhole, in its simplest form, is a hole in the ground where a soldier can take cover to avoid hostile gunfire. But, like the proverbial mousetrap, the Army may have devised a better foxhole. The US Army Combat Developments Experimentation Command (CDEC) has completed a comprehensive series of field trials to determine



**Sighting along the barrel of his instrumented M16 rifle, this soldier prepares to defend his position in a parapet foxhole during a simulated battle at Fort Hunter Liggett.**

the effectiveness of that new foxhole.

Recent developments have shown that the old foxhole may expose the soldier unnecessarily to enemy weapons fire. With the increasing lethality of modern weapons, this is unacceptable.

The basic design of the newer holes features a parapet (mound of dirt) in front of the foxhole, with the defender firing to the side rather than straight ahead. An alternative has a split cut in the center of the parapet giving the defender a choice of observing and firing to the side or front. The new holes are called the parapet and split parapet foxholes.

For field trials, CDEC used 23-man platoons attacking eight-man squads which were "dug in" in the experimental

foxholes. The rifles and machine guns used were equipped with live fire simulators and low intensity laser systems for assessing the number of "hits and misses." Each player wore a lightweight, highly instrumented backpack which relayed his every move and action to a master (central) computer for recording, analysis and casualty assessment.

The central computer made a mathematical assessment of the probability of a miss or a kill each time a round was fired. After the three seconds required to make such an assessment, one of the two distinctive audio alarms was sent to the player notifying him that he had either been killed or had been engaged by a hostile player. The additional integration of simulated mortar fire and hand grenades into this system contributed to the creation of a realistic battle which could be recorded and evaluated by computer. More than 100 attacks were conducted to provide an extensive base for evaluation.

The data which were developed during the experiment are now being compiled and edited for detailed analysis and evaluation. The results should provide sufficient empirical scientific data to enable the Army to build a better foxhole that will be more effective in future conflicts.

## Dog Days At Belvoir

Man's best friend may prove to be a valuable companion on the battlefield. The use of dogs for mine and booby trap detection is being explored by the US Army Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA.

At distances as great as 25 feet, a dog can detect a trip wire invisible to humans. The dogs' ability to detect metallic mines equals that of conventional metal mine detectors and exceeds it in the detection on non-metallic mines.

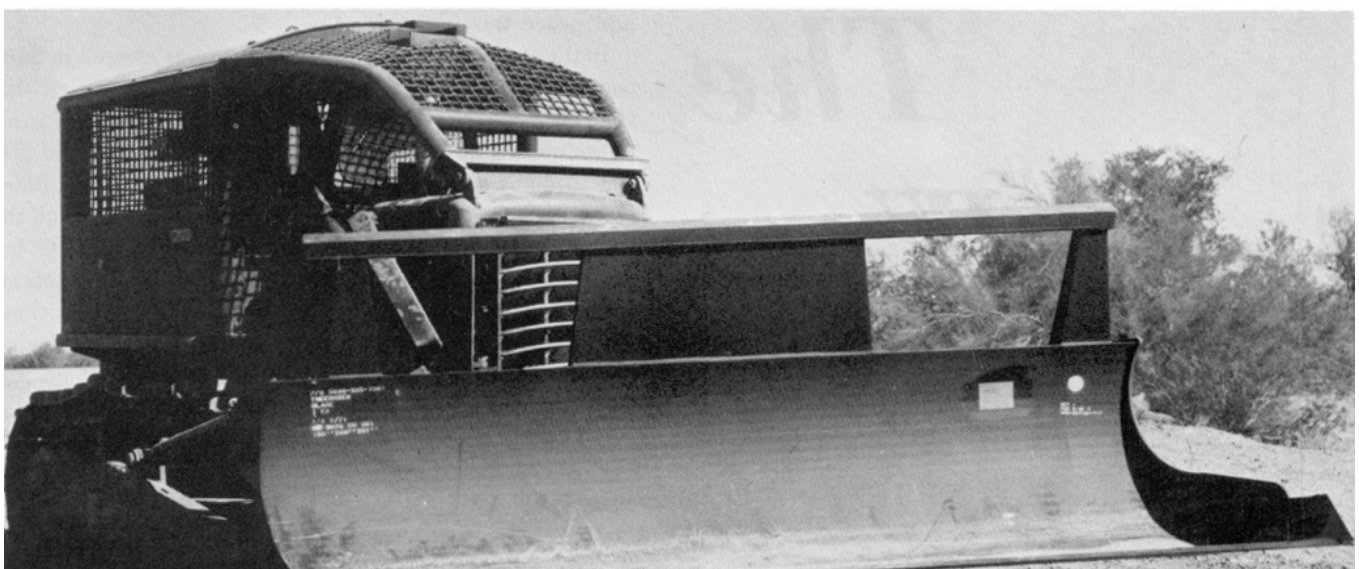
A research physicist in charge of the project at MERADCOM said, "Dogs are remarkably proficient in the detection of booby trap wires, far excelling any other practical or even experimental devices now available."



**Baron, a German shepherd, locates antipersonnel mines by detecting the odor emitted from the explosive. Dogs have located explosive devices before but only by sniffing out the human scent associated with their emplacement.**

The exact "mechanism" a dog uses to detect mines and booby traps is not completely understood. It is known that a dog's extraordinary sense of smell is a major factor. The dog's keen hearing may also be important — it is believed that they may actually hear the vibrations of the booby trap and trip wires. German shepherds and Labrador retrievers undergo eight months of booby trap and land mine detection training.

**YUMA PROVING GROUND, AZ — Viewed from the side, the D-7F low speed, full track Caterpillar Tractor awaits further rigorous testing here. The tractor features a combination heater-air conditioner and a tree-dozing capability. (US Army photo by SP5 Theodore Rogers)**



## Chapter Five



# Winning The West

by COL (Ret) Robert M. Stegmaier

In 1804, Meriwether Lewis and William Clark discovered that Missouri River Indians, even though quite aware of cannon, did not lack courage. A journal of the group's travel gives this account of the Sioux trying to capture Captain Lewis: "To their astonishment the so greatly outnumbered Americans manifested an instant readiness to fight. Clark drew his sword, companions paddled furiously to his rescue and the cannon on the keelboat were brought to bear . . ." The Sioux lost their martial urge. On the following day, as the boat was about to cast off, Indians seized the mooring rope. Lewis drew a sword to cut the rope. Clark aimed a swivel gun, and the chiefs backed off. The swivel gun could hold 16 musket balls and cut down almost any frontal attack. It was a fearsome weapon.

In 1807, when the Arikara challenged Manuel Lisa's expedition up the Missouri River, Lisa stopped their warlike gestures by loading and aiming the little swivel gun on the keelboat. In a subsequent parley, Lisa gave them some of his trading goods; he informed the Arikara that many more presents and Shehaka, an enemy Mandan chief, were in the boats that followed. He was allowed to pass.

The second boat was Choteau's, a rival trader. On board was an Army detachment under Sergeant Pryor returning Chief Shehaka to the Mandans after his visit to Washington. The Arikara attacked and swivel guns were turned on them. The boat drifted onto a sand bar and, in the face of heavy fire, the crew had to jump overboard to free the vessel. With 10 wounded aboard and scant medical supplies, the boat was forced to return to St. Louis.

In 1808, when Fort Osage, the first *factory* (trading post), was being constructed by the United States Government, William Clark (of Lewis and Clark fame) notified the Indians of the contemplated project. Before the fort was half finished, 2,500 Kansa and Osage warriors threw up lodges in the vicinity. Fearful that the Indians might try to steal the trading goods, Clark positioned artillery and infantry in strong defensive positions. To illustrate the power of the big guns, the soldiers prepared a feast at which the guns boomed while the Indians danced, and peace was maintained.

In the same year, when Fort Madison was erected in Sauk country, Black Hawk and a party of warriors visited the site. The soldiers came out with arms; a cannon was hauled to the main gate and a soldier was ready to apply the fire. The Indians moved away from the scene. Later, Black Hawk declared: ". . . had our party got into the fort, all the whites would have been killed."

That the Indians along the Missouri had dread of artillery was recounted in 1809 by Thomas James. This time, it was the James' party that was charged with returning Chief Shehaka to his tribe. "On approaching their [the Arikaras'] village, we took precautions against an attack. A

well-armed guard marched along the shore, opposite the boats. My crew composed part of this force. When within half a mile of the village, we drew up the cannon and prepared to encamp. The whole village came out in a body, as it seemed, to meet us. They had not come far toward us when an old chief rode out at full speed and, with violent gestures and exclamations, warned and motioned back his countrymen from before our cannon . . . . He supposed we were about to inflict a proper and deserved punishment for the attack on Captain Pryor's troops and the murder of eight or ten of them the year before . . . . They agreed to come to us and hold a council if the company's forces would lay aside their arms and turn the cannon in the opposite direction."

Between 1813 and 1821, 108 cannon were sent from the US depot in Pittsburg to western forts. By 1823, cannon may not have been an effective *field* weapon, but its use in holding forts had been established. All but two of the western forts had at least one cannon. Fort Atkinson boasted the greatest number — 14. Fort Mackinac had 10, and the others had one to five pieces. Most of the forts had at least one 6-pounder — the most versatile weapon.

In June 1823, the Arikara had killed 15 mountain men and wounded seven. The American Army, under the command of Colonel Leavenworth, was dispatched to revenge the loss. The Arikara, seeing the artillery, retired to strong defensive positions within their village. The artillery balls bounced off the native palisade houses. To the dismay of the mountain men, Leavenworth agreed to a parley, during which the Arikara pulled out. The Army — the punitive branch of the American nation — had lost face; the mountain men figured Indians thereafter would scoff when mention of army retaliation was threatened.

In 1825, in a "show of force," General Atkinson led eight keelboats and 476 soldiers up the Missouri River. The Indians were astonished by the thunder of artillery salutes, exhibitions of fireworks, the roll of martial music

and the glitter of troop parades. Sioux, Oglalas, Cheyennes and Crows signed treaties.

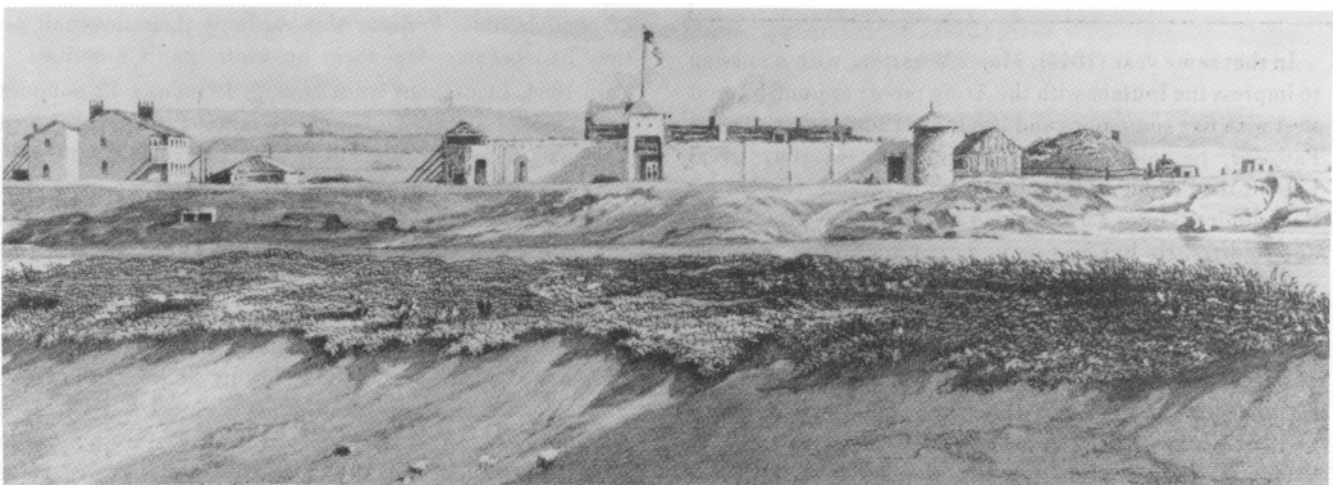
In 1826, the first land journey of a cannon across the Plains was undertaken by Ashley, a mountain man. Ashley made it as far as Bear Lake. Only one firing was recorded, but what a momentous occasion that was! The shot celebrated the return of Jedediah Smith and his two companions after an absence of a year of traversing the Great Salt Desert — a dry expanse of 75 miles considered deadly to man and beast. Later, the gun was abandoned.

Plains Indians by this time were definitely aware of the powers of the American soldier and his artillery. In 1829, CPT Bennet Riley on the Santa Fe Trail had killed eight Iowa and Comanche Indians at long range with grape and round shot from a 6-pounder.

During the Black Hawk War (1832), the steamboat *Warrior*, with a 6-pounder aboard, created havoc in the Indian ranks. Off-shore, the gun fired into the defensive positions from the rear; the boat cut off escape by water. Approximately 150 to 300 Indians were killed against 30 soldiers. The 4th Artillery traveled 1,800 miles in 18 days to reach the sphere of operations; however, while en route, cholera struck the artillerymen. More than 30 percent died and the unit did not get into the war.

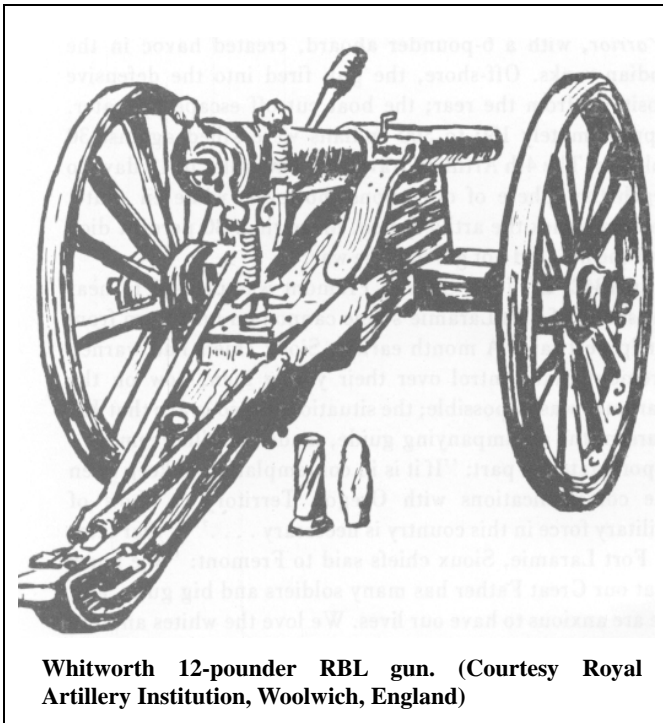
In 1842, LT John Charles Fremont was pleased to hear the sound of Fort Laramie's lone cannon on his return from a trip westward. A month earlier, Sioux chiefs had warned Fremont that control over their young men, now on the warpath, was impossible; the situation was so grave that Kit Carson, the accompanying guide, made his will. Fremont's report stated in part: "If it is in contemplation to keep open the communications with Oregon Territory, a show of military force in this country is necessary . . . ." A year later at Fort Laramie, Sioux chiefs said to Fremont: "We know that our Great Father has many soldiers and big guns, and we are anxious to have our lives. We love the whites and are

#### **Fort Laramie.**



desirous of peace."

In 1844, Fremont dragged a 12-pounder along on his second western visit. Of the cannon, he reported: ". . . it staved off one major Indian attack . . . . We pulled that cannon from Kaw's Landing 1,500 miles to the Dalles on the Columbia and another 400 miles through the snow and icy passes going south from Oregon to the east side of the Rockies. We even got it halfway through the Sierras; there we lost it in snowdrifts 12 feet high . . . ." Unknowingly, Fremont had been denied authority to transport this cannon on a supposedly peaceful mission. His wife had opened the order from Washington and sent him word to move out. In so doing, he failed to receive the rescinding order until his return.



**Whitworth 12-pounder RBL gun. (Courtesy Royal Artillery Institution, Woolwich, England)**

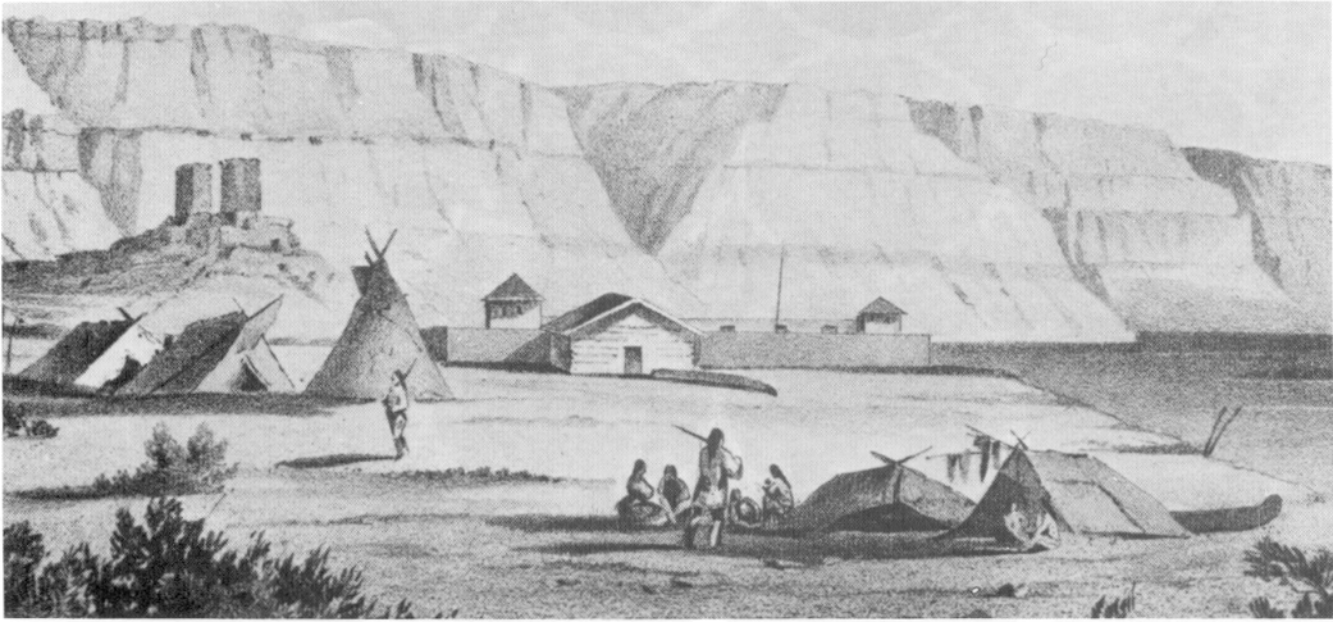
In that same year (1844), Major Wharton, with a mission to impress the Indians with the Army power to punish, went west with five companies and two brass 12-pounders. To the Pawnees, he said: "Under the authority of your Great Father, the President, I am on a visit to several tribes of his Red children. I am accompanied by a very few of his chiefs and soldiers. He has sent us into your country fully armed and prepared for war, but, notwithstanding, he has sent us here on an errand of peace, and we therefore come to you to speak the words of truth and kindness. Your Great Father is at peace with all the world, and he desires that peace may exist between all the tribes of his Red children. War is one of the scourges of the human . . . ." That evening, to demonstrate power, Wharton sent up a few rockets. To the

Otoes, Wharton, in part, said ". . . if there be grounds for further complaints, he (the President) will punish you. A few shots from yonder big guns would prostrate your towns and scatter your people like straws before the wind. He does not wish, however, to treat you thus, but he insists on your conducting yourselves better." For the Otoes he also demonstrated rockets. The Sauks, exposed to a demonstration of howitzer fire and rockets, did not like the idea of fighting an enemy that used such fearful weapons as *fire hawks* (rockets).

At Fort Laramie in 1845, COL Stephen Watts Kearny, with five dragoon companies and two mountain howitzers, showed a group of Indians the burst of shells as they hit the ground. For evening inspiration he promised: "At night I will send stars to the heavens, which will tell the Great Spirit that you have listened to my words (of peace) . . . ." Francis Parkman, who was present, stated: ". . . among the rest, the Arapahoes came in considerable numbers to the fort. They had lately committed numerous murders, and Colonel Kearny threatened that if they killed any more white men he would turn loose his dragoons upon them and annihilate their nation." In the evening, to add effect to his speech, he ordered that a howitzer be fired and a rocket thrown up. Many of the Arapahoes fell flat on the ground, while others ran away screaming with amazement and terror. On the following day, they withdrew to their mountains, confounded at the appearance of the dragoons, at their big guns which went off twice at one shot and the fiery messenger which they had sent up to the Great Spirit. For many months they remained quiet and did no further mischief. Brules, Sioux, Oglalas and southern Cheyennes received similar awesome demonstrations.

In 1849, Fort Laramie finally was made a military installation and was equipped with eight 12-pound howitzers. Two years later, these howitzers announced the beginning of a council between Colonel Mitchell and the Plains Indians. Crow, Snakes and Sioux — generally hostile — signed treaties. The Indians patiently waited for the arrival of commodities. Perhaps this explains their downfall — they had become dependent on white man's annuities.

In 1854, Lieutenant Grattan, with 19 men, a 12-pounder and a mountain howitzer, went to a Sioux camp from Fort Laramie, demanding the killers of a cow from an emigrant train. When the Indians refused, the petulant lieutenant ordered his men to level their rifles. At this moment, an Indian fired and killed the lieutenant. The howitzers let off a blast but the aim was high. The Indians reacted instantly and the detachment was overwhelmed before the howitzers could be reloaded. The 10 remaining members of the Fort Laramie garrison set out the following day to retrieve the guns. To avenge the Grattan affair, Colonel Harney came out with infantry, cavalry and artillery. Little Thunder, a Brule, sent to him this ultimatum: "If you wish peace, we



are willing; if you wish to fight, we are also willing." It was a brave but foolish declaration. Harney had come out for war. At Ash Hollow, the infantry attacked frontally, the cavalry blocked retreat and the artillery tore up the defensive positions. The Sioux loss was 86 to four for the Army. Harney demanded the surrender of the killers of various emigrant groups. To his surprise, five Sioux (one of whom was Spotted Tail) surrendered and two others joined them; all were sent to Fort Leavenworth to be tried and were sentenced to death. The President reduced the sentence to imprisonment and after a few years the Indians were released.

On the Washington State coast, Yakimas killed Agent A. J. Bolen. MAJ Granville Haller, with 84 men and a howitzer, marched to avenge the killing. Several hundred warriors under Kamiakin killed five of Haller's men, wounded 17 and captured his mules. In an escape effort, Haller abandoned the howitzer. In the fall of 1856, COL George Wright left Walla Walla with 570 regulars, some friendly Indians, 100 employees, two 6-pounders and two howitzers. This time the Army was triumphant.

The Washington Indians were riding high. On 25 January 1857, Seattle was visited by Governor Stevens who ridiculed the idea of Indian troubles. Luckily, a US Navy vessel, the *Decatur*, had hit a reef and was beached at Seattle for repairs. Shortly after Stevens' departure, the Indians attacked. Captain Gansevoort of the *Decatur* placed his 90 men in defensive positions within the city. Brass howitzers, together with the *Decatur's* guns, guarded the south portion of town; in the north blockhouse were two 9-pound guns manned by marines. These Indians had never been under artillery fire. They called them "the shells that max poohed," which meant that they landed and then

#### **Fort Walla Walla.**

exploded. In one instance, the Indians formed a circle and danced around an unexploded shell; its explosion broke up the formation.

In 1857, Colonel Sumner made the mistake of permitting his 200 cavalry to ride away from his infantry and artillery. Suddenly there appeared 500 mounted Cheyennes painted for war. Their medicine man had promised them immunity against the white man's bullets. The cavalry expected a call to retreat; instead, Sumner ordered carbines to be holstered and sabers drawn. At the glint of steel, the Cheyennes were afraid their "medicine" would be of no value — they broke and scattered. Sumner, breaking the military standard of close-up support of cavalry by infantry and artillery, had been saved by a fluke.

In Washington State in 1858, Colonel Steptoe and 158 men and two howitzers were routed by approximately 1,200 Palouse, Spokane and Coeur d'Alene Indians. Artillery alone kept the battle from being a massacre. COL George Wright assembled two companies of the 9th Infantry, five of the First Dragoons and five of the 3d Artillery. The dragoons and artillery were to fight as infantry except for one section with two howitzers. Wright had the new Model 1855 rifle musket. At Four Lakes, 13 miles from present-day Spokane, artillery drove the entrenched Indians out into the open where infantry and dragoons could finish up. Four days later, at Spokane Flats, howitzer fire again routed the Indians from the woods. Only one soldier was injured in these two engagements.

In the battle for the northwestern area of the United States, artillery was used in peace to display its effectiveness and in war when its power was necessary. 