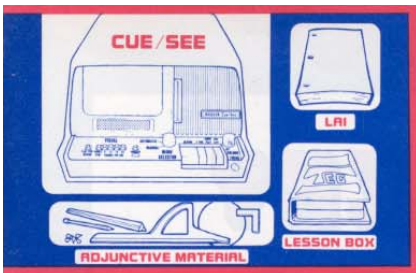
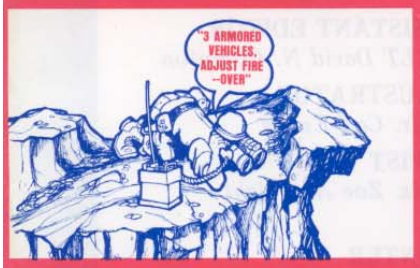


FIELD ARTILLERY JOURNAL

January - February 1975



TRAINING FOR THE MODERN BATTLEFIELD

FIELD ARTILLERY JOURNAL

Volume 43 **January-February 1975** **Number 1**

The **Field Artillery Journal** is published bimonthly at the US Army Field Artillery School for the same purpose stated in the first **Field Artillery Journal** in 1910:

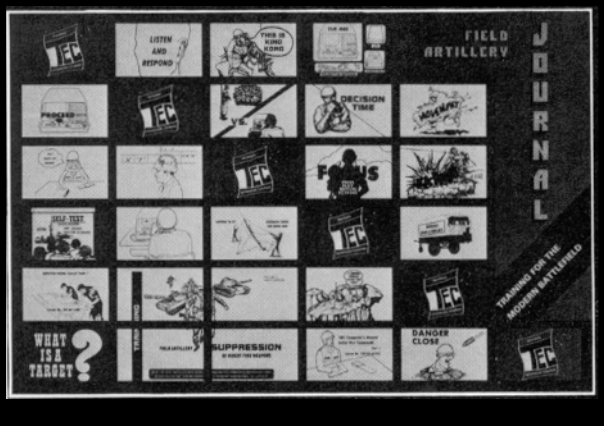
> *"To publish a Journal for disseminating professional knowledge and furnishing information as to the field artillery's progress, development, and best use in campaign; to cultivate, with the other arms, a common understanding of the powers and limitations of each; to foster a feeling of interdependence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

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

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

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

Subscriptions to the **Journal** may be obtained through the Field Artillery Historical Association, Fort Sill, OK 73503. The rate remains $6 per year.



Frames from individual Training Extension Course (TEC) lessons and the cover from the first draft Training Circular published by USAFAS highlight the cover of this issue.

PRINTER
Anchor Printing
Fort Worth, Texas

Articles

Features

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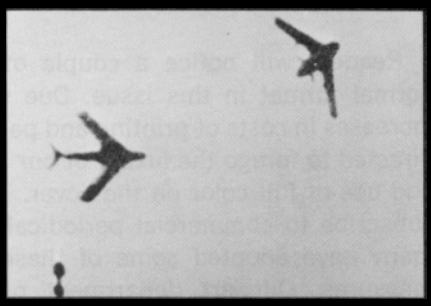

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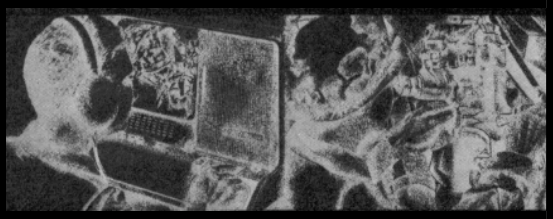

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a word from the editor

Readers will notice a couple of changes to our normal format in this issue. Due to the continuing increases in costs of printing and paper, we have been directed to forego the luxury of our heavy cover stock and use of full color on the cover. Those of you who subscribe to commercial periodicals will notice that many have adopted some of these same economic measures. Our art department people view these changes as a challenge, and I believe you will see that in future issues, as in this one, we will maintain our high standards of quality in art as well as in the layout.

I take this opportunity to welcome aboard our new printing firm, The Anchor Printing Company of Fort Worth, TX. They have done some work for us in the past and we are looking forward to working with them. Judging from this issue, we are fortunate to have the Anchor people with us.

This issue contains a new standard feature which should have high interest among our readers. It is entitled, "The **Journal** Interviews . . ." We have many important visitors who come through the Field Artillery Center and School for various meetings, briefings and conferences. Arrangements have been made for us to interview these individuals. We were very fortunate to have as our first interviewee MG Thomas M. Rienzi, the Director of Telecommunications and Command and Control for the Department of the Army. General Rienzi brings us up-to-speed from the communications standpoint and we will be interested in your reaction to this new feature.

As our cover indicates we have devoted a good deal of space to the business of training. Captains Orville Smidt, Winn McDougal and Ray Whitney from the Army-Wide Training Support Department of the School provided the article on Training Extension Courses or TEC as it is known around the School, a revolutionary approach to training. COL V. Ivanov of the Soviet Army has written a discussion on the methods of combating self-propelled artillery and training in the Soviet Union.

BG Vernon B. Lewis Jr., Assistant Commandant of USAFAS, has given us an enlightened look at future FA tactics and techniques as presented by him at Fort Sill's recent Field Artillery System Review.

The members of the newly-formed Modern Battlefield Techniques Committee, Majors Bob Michela, Carl Taylor and Dave Mooney and CPT Paul Luellig, have provided the information on the methodology being used to prepare the new series of training circulars in our "View from the Blockhouse" feature.

This issue also contains two articles on materiel development: CPT Francis J. Monaco has written on the new Analytical Photogrammetric Positioning System (APPS), a system he helped test; and 2LT Arnold M. Manaker of Watervliet Arsenal provided the article on engineer developments in artillery technology.

We are continuing our series on the Mideast (Near-east) War by COL Horst Toepfer of the German General Staff. It is interesting to note that several points made by Colonel Toepfer in the November-December issue seem to have been borne out by susequent actions in that area of the world.

We are also beginning a new series with this issue. We recently received permission to reprint extracts from the "Field Artillery in Vietnam" monograph written by MG David E. Ott, Commandant of USAFAS. The monograph is scheduled to be published as a volume of the Department of the Army "Vietnam Studies" series. The first extract deals with the early advisory effort.

Rounding out this issue is a follow-up article to Fairfax Downey's "Yale Batteries," which was published in our July-August 1974 issue. It seems that our late Secretary of State, Dean Acheson, was a mess sergeant in that unit and recounted his humorous views on that unit and its training. Our thanks to **American Heritage** for their permission to reprint the article.

Finally, we have included our annual list of senior field artillery commanders. Again, units are encouraged to keep us posted on changes as they occur.

Enjoy your **Journal!**

editor

User R&D

I join with so many others in congratulating you on the quality of the *Field Artillery Journal.* Continuing with the high standards you have set, your publication will do much to enhance the professionalism and pride of every artilleryman.

As a project manager who has enjoyed and profited by continuous user participation, I agree with most of the points made in Colonel Longmore's article, "A Proposal for User R&D" (September-October 1974). One of the frequent criticisms voiced in the development circles is the inability to identify the originator of a requirement. The lack of a "corporate memory" hinders adequate understanding of the basis for an aspect of a requirement often leading to incorrect decisions during a development program. The identification of a user PMO should go a long way to improving the development of systems responsive to the user needs.

William J. Harrison
COL, FA
Project Manager
Fort Monmouth, NJ

PET

I read the article "Pet You Bet" in the September-October 1974 *Journal* with great interest. The reporting of the PET program by COL Homer W. Kiefer Jr. and Chaplain (MAJ) James D. Bruns was superb. They perceived the possibilities of PET, established a program and then were able to write clearly and cogently about it.

Congratulations on including such a fine article in your *Journal*.

PET has been used widely in CONUS and has had tremendous success. It is a leadership tool designed to assist in the development of interpersonal skills up and down the chain of command.

Gerhardt W. Hyatt
Chaplain (Major General), USA
Chief of Chaplains

Combined Arms Team

The Commandant of the Field Artillery School recently wrote to senior commanders advising that he would forward them copies of the ***Journal*** *in order to increase communication within the combined arms team. Following is an extract of the reply received from MG Henry Emerson of the 2nd Infantry Division.—Ed.*

. . . I welcome the establishment of a regular dialogue between the home of the Field Artillery and this division.

In view of recent emphasis I have been placing on development of proper maneuver techniques, addressing the essential integration of new developments in fire support into our thinking is particularly appropriate at this time.

I am vitally interested in keeping my commanders informed of changes in your techniques and doctrine. I can assure you that future issues of the *Field Artillery Journal* will receive close attention . . . . I have asked my major subordinate commanders to advise me as to what articles would be helpful to them in future issues of your *Journal*, and this information will be forwarded to you at a future date.

It appears as though you have a good thing going and I appreciate the opportunity to assist you in your efforts.

Henry E. Emerson
Major General, USA
Commanding

MG Danford

You may be publishing an article on General Danford, last Chief of Field Artillery, who died . . . (September 1974). As a sergeant in the Yale Batteries I knew him well and admired him greatly.

You are welcome to use my tribute of which I inclose a work sheet to save time. This may be printed in the *Yale Alumni Magazine* but that will not interfere with your using it if desired.

Major General Robert M. Danford 1879-1974

They turned out the heavenly guard for him,
And trumpeters sounded two brave, brazen flourishes.
The tall, lean newcomer stood straight, square-shouldered.
There was tautness of discipline in his lips
But readiness for warming smiles as well,
A glint of steel in his eyes
Was tempered by friendly understanding.

Michael, the archangel, stepped forward to face him.
"I am not worthy of this honor, sir,"
The newcomer protested.
"I saw no combat. All my service"—
Michael held up his hand and spoke:
"Your service, your great service,
Was making many soldiers fit to serve their country best.
Well done, General."
And Michael, the warrior angel,
Flashed a salute with his flaming sword.

Fairfax Downey
Sergeant, Yale Batteries
West Springfield, NH

Tie Draws Fire

SHOCKED!! That was my reaction to the inside cover of your September-October issue where you announced a "Navy Blue" artillery tie.

Please help me explain to my infantry and navy friends why Redlegs are blue around the collar.

Leonard F. B. Reed Jr.
COL, GS
Deputy Information Officer
TRADOC

P.S. I'd buy a red tie in a minute and may buy a blue one if I have a good explanation.
P.P.S. Even for $8.50.

The "Navy Blue" artillery tie was

selected for fashion-conscious Redlegs to set off the red blazers which they so proudly wear. The blue tie gives the discerning artilleryman the flexibility to wear navy as well as black slacks and even a patterned shirt with his blazer. Don't worry about what to tell your infantry and navy friends . . . let your ensemble do the talking.
P.S. Although the FA School Book Department is closing, the ties may be obtained through the Fort Sill Post Exchange. P.P.S. Still for $8.50.—Ed.

2d Cannon Topped

As an avid reader of the *Journal*, I noted with interest your article concerning the eight Army aviators of the 2d Cannon Battalion, Field Artillery School Brigade, US Army Field Artillery School, having accumulated the staggering total of 15,614 hours of flight time in Army aircraft ("Right by Piece," Sep-Oct 1974 *Journal*). We of the Army National Guard share this great accomplishment with you, especially since we are one and the same Army, always have been and hope to always be.

In the 50th Armored Division Artillery, which I have the honor of commanding, we have 14 Army aviators assigned who spend some weekends and some evenings performing National Guard training. These fellows come from all walks of life and cover a great range in years of experience from World War II through present day training. The experience of these pilots in Army aircraft ranges from a Department of the Army test pilot with over 16,000 hours to a young second lieutenant currently attending flight school to earn his initial rating. In between this range, we find that three of these gentlemen are airline pilots, two are full-time National Guard instructor pilots and two are civilian instructor pilots. The total time for my 14 aviators exceeds 46,000 hours for an average of 3,285 hours per aviator, including the one still in training.

We share your excitement regarding Army aviation and I offer to you these statistics of our 50th Armored Division Artillery Aviation Section, of whom we are justly proud and we want to share their accomplishments with artillerymen everywhere.

Keep up the good work in this extremely fine publication.

George J. Betor
COL, FA, NJARNG
Commanding

A Problem of Priorities

I appreciated Major Norman's article in the September-October (1974) issue of the *Journal* concerning training problems of the 1st Battalion (Tgt Acq), 128th FA of the Missouri ARNG. Although Major Norman's points are well taken, there are many overriding considerations that have to be faced before all of his suggestions could be implemented. I cannot answer all of his questions, but I do offer a few comments regarding considerations of higher agencies and commands that must be taken into account.

Concerning civil disturbance missions, I can conceive of no more logical sequence of priorities for control than the local civil police authorities, the most immediately available local ARNG unit, ARNG units from other state locations and the active Army itself, all in the order mentioned. The State Adjutant General, in close cooperation with all local and state law enforcement agencies, is in a better position than anyone to ascertain the threat on one hand versus the resources available and required on the other.

An additional full-time technician for maintenance of equipment is certainly desirable. Funding, however, will probably not permit another technician without establishment of an overall criteria for additional maintenance technicians in other type units with peculiar maintenance problems.

New doctrine will dictate some changes in the very near future concerning targeting within field artillery. New equipment developments and observations of the recent Yom Kippur War will impact on target acquisition itself. It is becoming so much more a part of the total field artillery system that it is doubtful it would be considered for a separate career field, especially at this time.

Concerning the Mutual Support Program, Army Readiness Region (ARR) V, and the Target Acquisition Department of USAFAS, there was and still is a good working relationship. Mobile training teams are funded by the Army readiness regions, so these requests must be directed through ARR V, which is an aggressive and helpful command. With the advent of the ARR under STEADFAST (reorganization of the Army in late 1973), and the increased and real emphasis on the Total Force concept practiced by USAFAS, a few realignments are required in channels and methods of operation; but all toward the end of improving readiness of the supported Reserve Component units. Contact is encouraged with the FA School departments, but all requests for all things cannot go direct. Patience and a full understanding by all concerned will allow the system to operate with the single thought in mind of providing assistance to the supported Reserve Component unit.

Funding is always a problem. Custer even complained on the western frontier one time that Congress was not providing him with enough funds to buy hay for his horses, thus he would have to reduce the size of his stables, which in effect adversely impacted on his "combat power." He was caught up in the money pinch just as we are experiencing it today.

The considerations offered in this letter are in no way meant to demean Major Norman's efforts at stating some of his problems. They are to recognize his problems as being real and merely to explain some of the conditions of the time that have an impact on those problems at higher levels. He is to be commended for having the initiative to discuss these areas of concern.

Robert T. Fischer
LTC, FA
Chief, Reserve Component Branch
Director of Instruction
USAFAS

Cannon Collector

As an infantryman, I served with Headquarters Company of the 115th Infantry Regiment, 29th Infantry Division,

landing on D Day of the Normandy Invasion. My service ended with a great admiration and interest in artillery, however, and I have pursued this interest with special attention to US military history. In the meantime I have managed to collect a couple of artillery field pieces; a 1902 3-inch gun and a 3-inch ordnance rifle complete with limber from the Civil War. The latter, I had to completely restore from trail to muzzle sight. The other piece is in a state of limbo having been horribly destroyed by infidels working with welding torches in the process of scrapping this fine old gun to the junk yard where I discovered and sort of rescued it. Federal Regulations of 1968, however, may prevent my restoration which is somewhat of a shame since only 544 of these pieces were manufactured. I may have to confine my collecting endeavors to artillery ammunition and related memorabilia. The *Journal* now is a refreshing companion to these interests.

John Hooper
Collector, US Artillery Munitions
Ortonville, MI

From the 3d ACR

We field artillerymen at Fort Bliss are a very small minority even though a majority of troops here wear the red scarf (ADA). Your issues of the *Field Artillery Journal* are one of the few means we have to stay abreast of the latest field artillery developments and happenings.

The 3d Armored Cavalry Regiment possesses the only field artillery at Fort Bliss in the form of three separate 155-mm (SP) Howitzer batteries assigned, one to each of three squadrons. Our howitzer battery commanders, as you are probably aware, answer directly to an armor lieutenant colonel, squadron commander. The armored cavalry squadron commanders and the Regimental commander are the only non-FA, field grade officers in the Army that command field artillery units.

Recently, Fire Support Coordination Elements have been formed in the regiment and subsequent TOEs will reflect this. Each squadron headquarters and the regimental headquarters now have artillery staff officers to perform the very necessary task of advising the commander on the use of fire support assets and controlling the fires delivered on surface targets.

As the regimental fire support coordinator, I am requesting eight copies of the *Journal:* one of each issue for the squadron commander and his staff, his FSO, one for the regimental commander and his staff and one for the regimental FSE.

Keep up the good work, your past issues have been interesting and informative.

James L. Koster
MAJ, FA
FSCOORD
Hq, 3d AR Cav Reg
Fort Bliss, TX

Your distribution will be adjusted accordingly.—Ed.

FDC Aid

The Field Artillery Team within Redstone Readiness Group has worked with Reserve Component FA units in Mississippi, Alabama and Tennessee for over one year assisting them in programs to improve their readiness posture. We have determined that because most of these units train only one weekend per month, knowledge retention and proficiency of the more technical aspects of field artillery fire direction is one of their most difficult problems. Field Manual 6-40 is used reluctantly because of its size and the complex manner in which it has been compiled. Timeliness in fire missions in many cases has been less than desired because of the "sword drill" type manner necessary to search the 500-plus pages of this field manual.

With the above thoughts in mind, SFC L. Bradshaw, of this organization, has developed a pocket guide in field artillery precision fire. This guide is a condensation of techniques given in FM 6-40, and was designed in a typical flow sequence to facilitate use. It contains a condensed checklist on correct deflection, adjusted elevation, time registrations, multiple lot registrations, verifying five and one impact and time registrations, destruction missions, total corrections and high angle registration. The guide has proven very handy and useful in the FDCs of the reserve component units under our purview. Perhaps other FA units could use this guide in their training activities. While it would be impossible for us to print large volumes of this guide, one information copy could be provided upon request.

Ted A. McDonald
MAJ, FA
Redstone Readiness Group
PO Box 1500-A
Huntsville, AL 35807

We have forwarded a copy of the guide to the Gunnery Department for evaluation. Along this line, the School is in the process of preparing Training Circulars on all aspects of the Field Artillery System including the gunnery problem.—Ed.

Dramatic Photo

As an ROTC Cadet at the University of Dayton I was recently looking through some Army journals. In particular, the *Field Artillery Journal* caught my eye. Leafing through the *Journal.* (March-April 1974) one particular picture caught my attention. On page 14 I saw a very moving picture of two soldiers standing over the fallen body of a fellow comrade.

Being a photographer I realized this picture was more than just another picture in a magazine. I immediately cut this picture out and mounted it on mat board to hang on the wall. As the days went by I showed the picture to other fellow cadets and friends and they too thought it was a very dramatic and emotional picture. If possible, then, could you please send me two copies of the (March-April 1974) issue . . . .

After reading your *Journal* I was very impressed with the expertise and care that was put into preparing it, especially when considering the pictures and articles. I would consequently be very indebted if you obliged me in any way.

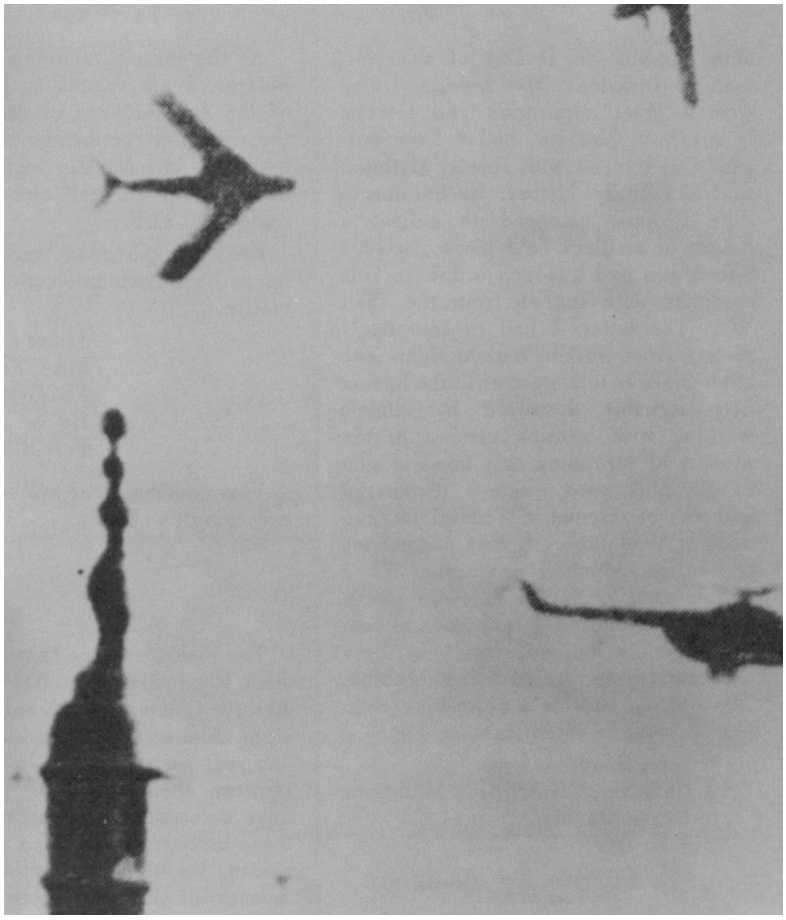
Thomas R. Askins
Miamisburg, OH

The photo was taken by PFC L. Paul Epley of the 173d Airborne Brigade in 1966 in Long Khanh Province, RVN. Your copies have been forwarded.—Ed.

Part II The Turning Point

The 1973 Neareast War

by COL Horst Toepfer
Army General Staff
Federal Republic of Germany



This is the second in a series of three articles on the Neareast (Mideast) War by Colonel Horst Toepfer of the German General Staff. The articles originally appeared in the FRG military publication *Truppenpraxis*. Part I was published in our November-December 1974 issue and Part III is scheduled for the March-April *Journal*.—Ed

In Part I the events leading to the war and the beginning phases of the war were examined. It was established that the Arabs had been successful in penetrating the border positions in a surprise attack and on the second, third [and] probably still on the fourth day of the war, (8, 9, 10 October 1973) breakthroughs on the Golan Heights and on the Suez Canal were imminent. What that would have meant for Israel was also presented. At the same time, however, it was recognized that as a result of the rapid completion of the Israeli mobilization—at the latest 72 hours after the war started (around noon on 9 October)—so many Israeli units, brought to full strength by reserve replacements or filled completely with reserves, were available that the tempo of the Arab attack could be slowed by counterattacks which were constantly becoming stronger. Nevertheless, within this time the Syrians and Egyptians had seized a large part of the Golan Heights and a strip on the western bank of the Suez Canal approaching 30-35 kilometers in width in the north and becoming narrower (10-15 km) in the south. The air force surface attacks to slow the enemy, primarily in the first two days of the war, cost the Israelis half the aircraft lost in the entire war because the attacks had to take place against the advancing spearheads which were protected by the SAM umbrella.

Consolidation of the Israeli Defense—Counterattack Phase

On the third day of the war there occurred, in addition to small local counter-thrusts, the first [serious] counterattacks. [These were] initially on the Golan front because here the Israeli reserves had shorter approach routes. However, the first reserve units were also already underway to the Sinai Peninsula where all the important passes remained in Israeli hands. On the Golan Heights the counterattacks forced the Syrians to slow their offensive. The Syrians had to go more and more over to the defense and had to accept the loss of the positions they had seized. Finally, the pressure applied by the Israelis on a wide front became so strong that they could bring forward their offensive reserves in an attempt to destroy the mass of the Syrian Army.

The first week of the war did not pass quite so successfully on the Suez front. Nevertheless, counterattacks also began here which stopped the Egyptian advance before it reached the first higher ground. The Israelis were able finally to push the attacking Arab forces back to a long but narrow bridgehead (10-20 km in depth). Here the Egyptians went over to the defense. They so reinforced this long bridgehead that at the end of the first week of the war allegedly 100,000 men with approximately 1,000 tanks were located on the east bank of the Suez Canal. Some of the SAM-6 rockets, which the Egyptians had pushed to the east across the Suez Canal, were pulled back to positions directly east of the canal or on the west bank so that a 10-km strip east of the bridgehead (altogether about 30 km) could be covered. In that way Israeli air attacks against the Egyptian bridgehead on the Suez Canal could occur only by accepting heavy losses.

Lessons:

a) The attacker's initial successes cannot with certainty be cleaned up immediately by committing the assembled reserves to counter-thrusts. The main thing is first to slow the attack, to fix the enemy, to push him back step by step through deliberate counterattacks and to force him to revert to the defense in order to win freedom of action for yourself.

b) For the attacker the main goal would have been to attempt, through building strong points, to breakthrough on the north front in spite of reinforced resistance and on the southern front, also by creating strong points, to continue to widen the bridgeheads and above all to seize the important passes for later operations.

c) A prerequisite for further operations for the defender as well as the attacker is to have reserves at one's disposal. It is not absolutely necessary that these reserves be immediately available, especially not for a defender who already has the attack under control; however, from the beginning, the time when the reserves will be available for commitment must be included in the planning (for example, duration of the mobilization, state of readiness of reserve units, etc.).

d) For an attacker, especially one superior to his enemy, it is necessary to attain his attack objectives by massing his forces even if this does entail considerable risk (for example, the temporary loss of the air defense umbrella or the calculated risk associated with the employment of air defense weapons, etc.).

Problems of the Third Front

For the Israelis the enemy was, in the truest sense, on all sides: in the North, Lebanon and Syria; behind them, Iraq; in the East, Jordan; in the Southeast, Saudi Arabia; and in the Southwest, Egypt with the other North African Arab states. Only the Mediterranean Sea in the west was easy to watch over. As the combined Egyptian-Syrian attack began, it was quite possible that Lebanon in the North and Jordan in the East could or would join the attack. That is why the Israeli forces deployed in those areas could not be withdrawn immediately and committed along the threatened borders. Furthermore, in the course of the mobilization, these forces had to be reinforced if only in limited fashion because it was not apparent whether Jordan would be forced to join the conflict. It could not be predicted that King Hussein would withdraw himself from the affair by sending an expeditionary corps to Syria. Even though the border defense units deployed toward the North and the East were kept as small as possible, they still were not available directly at the critical points on other fronts.

Lessons:

a) Even borders which do not lie along critical points must be guarded and secured because any attack from these areas could threaten the flank or the rear areas of the defenders.

b) A defense plan (war plan) must also include such borders and defense forces must be made available in these areas in accordance with the possible threat.

c) The politicians must attempt through negotiations to make such borders as secure as possible so that the military leaders can use the available forces in those areas as additional reserves in other areas if required.

Strategy of Defense—Israel's Transition to the Offensive

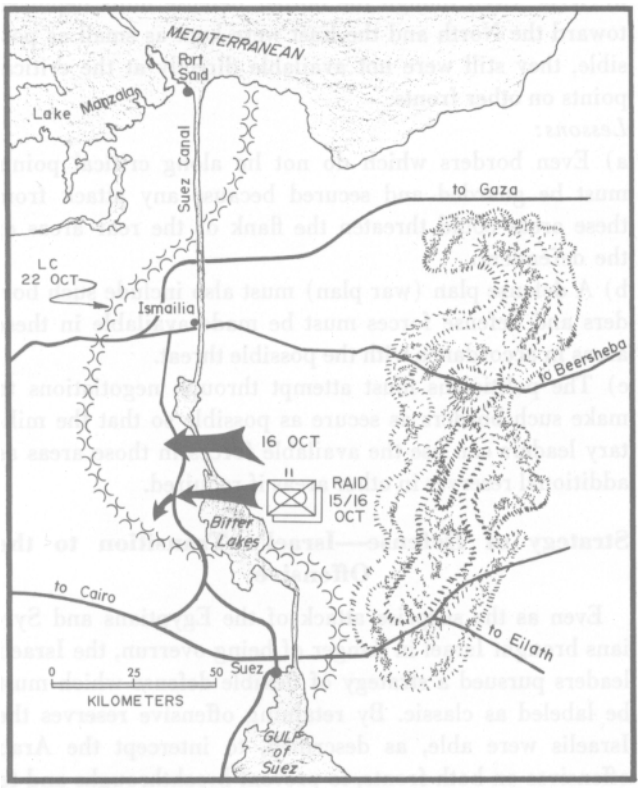
Even as the surprise attack of the Egyptians and Syrians brought Israel in danger of being overrun, the Israeli leaders pursued a strategy of flexible defense which must be labeled as classic. By retaining offensive reserves the Israelis were able, as described, to intercept the Arab offensives on both fronts, to prevent breakthroughs and to

force the enemy to revert to the defense. Because of the heavy Israeli losses in men and, above all, in materiel, the main point for further military defensive strategy was to seek victory through an adept approach. Next to the political possibilities should appear military superiority. How could this happen?

Restraint in the West—Offensive in the North

The strength [for the Israelis] to become offensively oriented on both fronts was certainly not absolutely lacking; however, the determining factors were time, past experiences with fighting strength and fighting spirit, as well as the danger which the enemy represented at that time for Israel. While the distances from the Sinai front to the Israeli heartland still amounted to approximately 250 km, the distance from the Golan front to Haifa was only about 70 km. The restraint of the Egyptians in the first days of the war was caused by the consolidation of the bridgeheads and pumping in stronger offensive forces; however, the bridgeheads were not consequently broadened after the first Israeli counterattacks, while the Syrians continually attempted to win terrain to the west and held strong reserves in readiness between the Golan Heights and Damascus.

The decision as to the location of the first Israeli offensive on the North front was due to the danger of further Syrian successes, the time factor involved with the short distance between the Golan Heights and Haifa and the



fact that further reinforcements from Iraq had to be anticipated. In addition to this, the problem of the third front still existed. From the counterattacks the Israeli military developed the offensive by making available at the same time strong reserves. In three places they achieved penetrations in the positions just seized by the Syrians and these penetrations broadened into a breakthrough with the main attack lying along the road to Damascus. During this action the Israelis restricted their activities on the Sinai Peninsula, although they fully expected the Egyptians to relieve the pressure on the Syrians by renewing the offensive. Since this did not happen, ground was quickly gained by the offensive on the North front. In tank and artillery battles the Syrian reserves held in readiness in front of Damascus were defeated and thrown back. The enemy losses in men and materiel were high and could not be replaced immediately.

This gain satisfied the Israelis for the time being because their own losses, measured against the successes achieved, were relatively low. Therefore, they were able to withdraw a part of the reserves from the north and reinforce their counter-measures on the Suez Canal. Their clever operational leadership had brought them their first large success after 10 days of the war.

Restraint in the North—Offensive in the West

The key positions (above all the passes) on the Sinai Peninsula were in Israeli hands. Moreover, the Israelis had succeeded in throwing back the advancing enemy and in sealing off the Egyptian bridgeheads. If the Egyptians made a sortie with strong armor support, it resulted in tank battles and artillery duels. If these thrusts occurred forward of the air defense umbrella, the Israeli Air Force launched massed attacks against the Egyptian tanks and destroyed them (for example, the large Egyptian attack on 13 October with the alleged loss of 500 Egyptian tanks). The Israeli offensive forces were brought swiftly, but under cover, into assembly areas on the Sinai Peninsula, but the expected strong offensive to win back the Suez Canal did not begin immediately.

On the contrary, under strict secrecy the Israelis first of all brought Soviet PT 76s and amphibious personnel carriers, which had been captured in the Six Day War, to the weakest points of the bridgeheads, the terrain directly east of the northern part of the Great Bitter Lake. The Bitter Lake itself was viewed by the Egyptians as an obstacle. This realization motivated the Israelis to conduct a surprise raid in the night from 15 to 16 October across the lake with the amphibious armor forces. [They crossed] approximately eight km of water . . . successfully and the next morning the raid detachment (one-two battalions) was already deep in the western hinterland and overran the first SAM positions.

[The raid units] were not only reinforced in their fighting strength by units and heavy weapons which were transported by helicopters but more important [they were also reinforced] morally by the personal, early morning visit of the Minister of Defense. Exploiting the raid's success, the Israeli military leaders committed the offensive reserves north of the Great Bitter Lake and assaulted the bridgehead positions frontally in those areas where the raid's success had broken open the air defense umbrella ... and after 24 hours of stiff tank battles the canal north of the Bitter Lake was reached and crossed. In the meantime, the raid detachment which was constantly being reinforced (almost brigade strength) had captured additional SAM-6 positions and had forced several SAM-2 and SAM-4 sections to change positions. Now the Israeli Air Force was able to enter the battle and attack airfields and depots deep inside Egypt as well as to assist the Israeli units advancing across the canal through close air support. These successes led, as is known, to the American-Soviet efforts to establish a cease-fire and an armistice. The cease-fire was supposed to be effective on 22 October but it was not observed by either side. It is not to be investigated in this essay which side was the guiltier in violating the cease-fire. The Israelis widened their 30-km and 40-km wide bridgehead by another 20 km to the south, reached the Gulf of Suez near Adabiya, surrounded the city of Suez and cut off the Egyptian Third Army on the West bank of the canal, until it came to a second cease-fire on 24 October.

Israeli troops now stood on the West front about 60 km from Cairo and on the North front about 35 km from Damascus. Only a well-armed, morally strong armed force with superior leadership can win successes such as these.

Lessons:

a) Every defense needs a clear concept which considers not only one contingency but depicts several logical possibilities and is very flexible.

b) The military defense strategy developed from that concept must likewise be so flexible that every possibility available to the enemy is considered with the goal of winning the initiative swiftly in order to force one's own will upon the enemy.

c) The military leaders in the chain of command down to at least division, if not to brigade level, must be aware of the intentions of higher leaders for foreseeable decisions and must make subsequent decisions as they are required in order to conform to the intentions of the higher leadership. This presupposes a mutuality in military thinking which is based on thorough training and mutual trust in the higher and middle leadership.

d) However, military leadership alone cannot achieve the established objective if the armored forces are generally too weak, not armed sufficiently or, in their spirit and readiness, are not willing to fight.

e) If the conditions in "c" and "d" exist, it depends on the supervision of the highest military leadership who, relying on the politician, interprets warfare as an art of fine creative activity based on scientific principles.

f) In case one's own forces are too weak for all the required deciding offensives, the old principle applies, "Don't trickle—mass!" The Israelis, holding on the West front with an active defense while conducting a massed attack on the North front and later vice versa, confirmed this principle.

g) The offensive on the West front was conducted other than expected. It surprised the enemy through the unexpected, extremely risky, but well planned and conducted amphibious raid coupled with the massive breakthrough in the middle of the bridgehead and the crossing of the canal in practically the same motion. By this [action] practically all of the above mentioned points are confirmed.

h) The modern armament available today makes possible and necessary the immediate widening of a bridgehead to reach the next operational objectives. This eliminates enemy air defense forces and is of value to one's own conduct of the air battle as well as close air support of the land forces.

i) Precisely these offensives in the North and West have shown that only a common combat leadership of the land and the air forces and, in coastal areas, of the navy, brings outstanding successes.

j) The operational objectives of the land forces have changed in as much as it has proven necessary to eliminate the enemy ground-to-air defense to support one's own air force. Similarly, the operational objectives of the air forces have also changed since only the air force is able to defeat enemy armor attacks if one's own land forces are not yet available.

k) This presupposes, however, that the available military forces are led in the current theater of operations by one common (central) commander who is completely responsible.

War Plans and Their Necessary Flexibility

If one understands all plans of a military and political nature for use in a possible war, then Israel's war plans present some examples which are worthy of note. Even if one cannot see into the safes of the Israeli government and the general staff, the 1973 defensive war has disclosed a great deal.

For one thing, there is the name itself. Often one shies away from speaking of a war plan although defense with

weapons normally occurs only in a war. It is clear that defense can only be successfully conducted by alternating from defense to attack.

For another thing, the war plan must be all encompassing; that is, it must consist of plans which include the political side, the military interests and the civilian problems as well as economic, administrative and any other questions which belong to the whole complex. At the same time, however, it is necessary, and should be considered an axiom, that all partial plans together form the war plan, aligned on the objective of a successful defense and a victorious termination of the war—whether the termination of the war be military or political.

That the Israeli war plan was almost perfect is shown by the different stages of the war (see Part I). Military and political intelligence had recognized the forthcoming attack in sufficient time. Attempts were made through diplomatic steps—and not only from the Israeli side—to avert the danger. The population had been and was constantly being informed by the government (Department: Interior). Even under the difficult circumstances the mobilization rolled swiftly and smoothly along. Civilian measures supplemented the military mobilization. The economy converted immediately to war production. Administrative simplifications allowed public life to continue smoothly in spite of the burden of the war. The foreign and domestic policy was balanced out and followed immediately the requirements of the war. This list should suffice as proof that the war plan was good.

This required flexibility can be ascertained similarly in the various measures taken by the Israelis in all areas. The mobilization began to run without delay even on the very highest holiday. Civilian installations and enterprises immediately and independently started with their war duties. Trade and business continued under new

Soviet BTR-50 reconnaissance vehicle similar to the type used in the 15-16 October raid across the Great Bitter Lake.

missions without interruption. Failures of a military nature were parried in the first days by improvised as well as planned measures. The conversion from a passive defense to an active defense with counterattacks and finally counteroffensives is an ideal example of the necessary flexibility of war plans.

Lessons:

a) War plans are a necessary prerequisite for every country.
b) Above all, they [war plans] must be available for defense of freedom.
c) War plans must be all inclusive and consider all possible interests of politics, economy and administration as well as of the military defense which must be directed toward the final objective.
d) Every war plan should guarantee through successful defense a victorious end to the war which can be achieved militarily as well as politically.
e) Through appropriate foreseen or predictable possibilities the war plan must possess flexibility of execution so that one's own reactions to enemy actions are always possible.
f) The preparation of the war plan requires logic, experience and mutual assistance.

Propaganda, Mass Media and Fighting Spirit

In the observations made up to now the talk has been primarily of military but also partially of political measures, actions and reactions. Since the Second World War, however, psychological warfare has been an important factor not to be underestimated. Also in this war psychology was employed as a weapon by both sides successfully.

Actually, this weapon has been applied since 1967, after the end of the Six Day War. The Israelis used it to maintain the myth of their invincibility. In doing so, however, they had to realize that they also deluded themselves and challenged the Arabs to undertake a psychological counterattack which, as experienced, was completely successful.

The Arab states, especially Egypt, "irrigated" their own populations and the world with the endless repetition, "Through further armed conflict we shall take back our stolen land." This psychological warfare, however, had just the opposite effect on the Israeli population; it increased their preparedness for defense and brought forth sympathies for Israel from a large part of the world. Finally, even the Soviet advisers were withdrawn. Of course, this was a political measure resulting from the displeasure which appeared among the advisers as an effect of this propaganda.

With the beginning of the war, as the penetrations in the Israeli positions succeeded and, above all, as the first

prisoners were brought in, the Arab governments attempted from these successes to make full psychological use of the myth of invincibility spread by the Israeli propaganda. They were able to place their own population in a victory frenzy and a part of the world in doubt because the Israeli blitzkrieg, which was expected to recur, did not materialize for over a week. Even then it marked itself only partially through the separated offensives and not immediately with lightning-like successes.

The Israelis countered this psychological warfare at first with silence because the concern especially of the western world was present. Along with increasing [Israeli] successes and, through their program of more open information for the press were the tables turned [in respect to psychological warfare].

The very extensive diplomatic activities of both sides during the war—with the resulting information passed through the mass media of the entire world—must be counted as part of this psychological warfare effort.

In the Korean and Vietnam wars, television had its importance along with the older mass media, newspapers and radio. Through pictures with sound as well as through the speed of the news reports but primarily through commentary with maps and films and discussions, the entire world could participate directly in the events and form judgments.

The measures just described had an unusually strong influence on the morale of the fighting troops as well as on the civil population involved. The Arab armed forces were successfully revitalized psychologically (the modern, highly technical Soviet weapons must also have played a role in this). For the Israelis the seriousness of the situation was a factor raising their fighting spirit. Even the first reversals and initial losses did not dampen their confidence of victory which grew as the first successes paved the way. Also, the constantly increasing deliveries of weapons by the Soviets and Americans strengthened the morale of the respective countries, their armed forces and their people.

Lessons:

a) Psychological warfare is becoming more influential not only in battle but also in political conflicts; it has become a tool of strategy.

b) The morale of the armed forces and the people, as well as opinions of the entire world, are influenced by psychological warfare and propaganda.

c) More than ever this warfare demands an intensive review of its application because the success for one's own side also supports the other side even if that result is unwanted.

d) Building myths can similarly achieve a double effect with one negative aspect.

e) Silence can be a tool in this warfare.

f) Television is a propaganda weapon not yet fully realized and, because psychological warfare is timeless and ever present, even well-meant critical observations of one's own situation can unconsciously do more damage than good.

g) Through sympathy of world opinion, weapons deliveries, diplomatic activities, moral support from others and even through neutrality, psychological rearmament of the armed forces and the civilian population as a part of this warfare can be strengthened.

h) It appears that one who does not understand psychological warfare, uses it incorrectly or under-estimates it can lose the "war" during "peace."

Two Victors—Two Losers—Cease-Fire and Armistice

Part II is titled "The Turning Point." It was a turning point from the attacker's offensive through a defense stretched to the breaking point to an active defense with succeeding counteroffensives which paved the way for the success, the victory. But this victory of the defender, as well as the earlier victory of the attacker, was dangerous for the entire world.

In a time of attempts at worldwide détente after a powder keg (Vietnam) had just been put out, this war had for all nations, particularly for the superpowers, the effect of a very hot shower with the danger of being scalded.

The war broke out unexpectedly and could not be stopped right away. The wheel of history could not be turned back. Only one method was available: There could be no victor and also no loser. Through weapons deliveries, very active diplomatic travels, constant consultations by the superpowers among themselves with a common objective (a war at this time cannot be useful) and with light pressure on those participating in the war, the cease-fire resulted, therefore, to two victors or, viewed politically, two losers. Both parties felt themselves to be the victor and labeled the other as the loser. It is also difficult to determine after-the-fact how the parties stood on 22 or 24 October. After initial successes the Arabs had, in addition to high losses in men and materiel, again lost territory. The Israelis had likewise suffered relatively high losses but at the end had not lost but, on the contrary, had gained territory. But in view of the entire world situation, would it in the end really have been a victory? Probably not, because even after four wars with the Arabs, according to their [the Arabs'] way of thinking, a fifth war would have to follow. Only through this desired inconclusive outcome will it be possible for the Arabs to enter into a lasting peace with Israel if the boundaries can be guaranteed by the world, especially by the superpowers.

Two models of the Soviet PT-76 Amphibious Tank.

Lessons:

a) In today's world situation even larger local wars are controlled by the superpowers.

b) Since it is that type of war, there will always be recorded both successes and failures. Balancing these out will have to be controlled accordingly.

c) Such a war can be localized only if this [balancing] is successful and the superpowers want it—that is, if it suits their plans.

d) Every war is political, therefore such controlling measures must also be political, even if they consist, as in this war, of weapon deliveries.

e) With that, however, détente and guarding against conflicts can only be insured if two superpowers in the world stand stalemated; each alteration of this power situation can lead to world crises or to world wars. A change in the balance does not occur if another major power joins the equation, but rather only if two other superpowers become involved which are not in a stalemate situation with the others.

Summary of Part II

As already noted in the summary of Part I, the lessons of Part II also contain various self-evident facts and truisms. However, the course of the war after the successful defense against the attacks points out some new perceptions:

- It is possible for a relatively weak and temporarily surprised defender to win freedom of action very quickly.
- In doing so, the defender must be prepared to accept calculated risks and larger losses.
- All boundaries must be secured militarily and through political measures.
- For attacker and defender in this time of ever increasing requirements for common, centralized leadership, the missions for the armed services have changed in selection of objectives and will continue to change according to the conduct of operations. (Examples: Army to open [gaps in] the air defense umbrella; air force alone to destroy attacking land forces, etc.)
- Counteroffensives, as well as offensives, must maintain the momentum of surprise with regard to the point in time as well as to the nature of the operation. (Example: Crossing the Suez Canal after undertaking a raid across the Bitter Lake.)
- All inclusive war plans must also anticipate in their military portion such detailed precautions to remain flexible.

• Psychological warfare becomes a two-edged sword if it is improperly applied; it is not only a military tool. It must cover all areas and above all must be effective abroad.

• Mid-intensity wars can be limited since equally strong major powers, even if they are rivals, must through control prevent a widening of the war for their own protection.

Chronology

Chronology of events in the 1973 Neareast War compiled from press, radio and television reports:

6 October

Beginning of the attack by Syrian and Egyptian armed forces.

7 October

Israel reports 400 Arab tanks surrounded east of the canal and combat bridges over the canal destroyed.

8 October

Israel sees 8 October as the turning point. Egypt reports complete control of the eastern bank of the canal.

10 October

Israel attacks the attacker on both fronts with strong air force units. Jordan mobilizes, Iraq sends airplanes and tanks to the Syrian front. Golan Heights still in Israeli hands.

11 October

Israel reports on the counterattacks toward Damascus. Egypt reports the thwarting of counterattacks in Sinai.

13 October

Jordan participates in the war. Israel reports the destruction of the majority of the Iraq units protecting the road to Damascus.

14 October

Egyptians attack in Sinai with strong forces. The Syrian resistance in front of Damascus strengthens.

15 October

Israel conducts counterattacks in Sinai and Israeli tanks advance further toward Damascus.

16 October

Israeli troops cross the Suez Canal toward the west.

17 October

Egyptian counterattacks do not penetrate. Israel begins the counteroffensive in Sinai.

19 October

Israeli troops widen the bridgehead west of the canal toward the north.

20 October

The bridgehead is further extended.

21 October

Israel reports the expansion of the bridgehead to 40 km wide and 30 km deep.

22 October

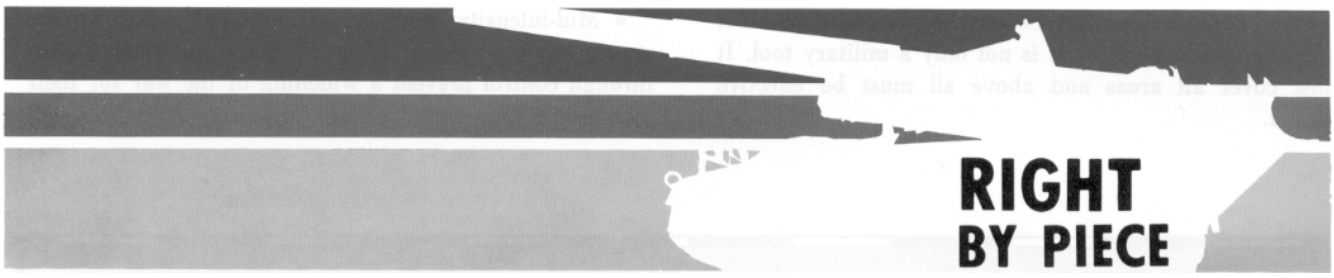
Cease-fire in the morning is partially observed; in the course of the day battles flare up again. Israel, defeating Egyptian counterattacks, pushes out the bridgehead toward the south and west.

23 October

Fighting on both sides of the canal continues. Both parties attempt to gain favorable positions for a renewed cease-fire.

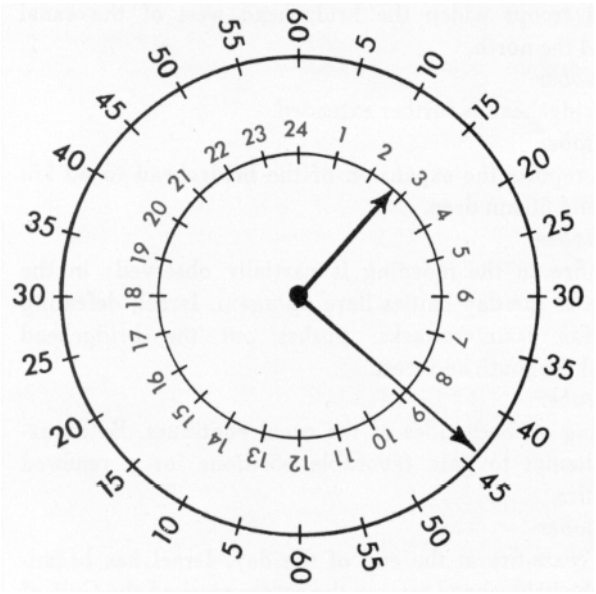
24 October

Final cease-fire at the end of the day. Israel has broadened the bridgehead toward the south, reached the Gulf of Suez, cut off Suez and [cut off] the mass of the Third Egyptian Army on the east bank of the canal.



CPX Clock Helps Time Problem During Exercise

CAMP RIPLEY—Accelerated time frames during Field Training Exercises (FTX) or Command Post Exercises (CPX) can be exasperating. When one hour of actual time equals two or perhaps three hours of exercise time, it can be confusing to interpolate from a wristwatch to a time chart during the heat of a paper "war." A much easier solution to the time conversion problem—the CPX clock—has been devised by the 47th Infantry Division Artillery, Minnesota Army National Guard.



TIME IS 0244

The clock was used successfully during CPX Viking Shield V recently conducted by the division at Camp Ripley. The CPX lasted 24 hours, however, exercise time was 48 hours. The Division TOC and the Division Artillery Operations Center used the CPX clock and personnel indicated it greatly facilitated the use of exercise time.

A standard electric wall clock was converted: one complete revolution of the hour hand covered a 24-hour period. An inner set of numbers was associated with the hour hand; an outer set of numbers indicated two periods of 60 minutes each for one revolution of the minute hand. Color coded adjustable circular scales for night and day periods, as well as removable scales to indicate three-hour exercise times, can also be used.

One problem that bears attention is the cyclic output of the field generator. If it is higher than the 60 cycles for which the clock is wired, the tempo of the message insertion into the exercise will certainly be accelerated.

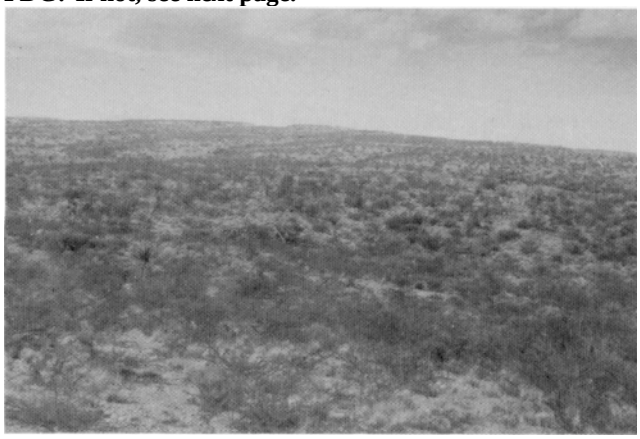
Discarded Camouflage Conceals Battery

FORT BLISS—Finding Battery C, 1st Battalion Airborne, 319th Field Artillery, may prove as difficult for our readers as it did for the 3d Armored Cavalry Regiment recently on exercise "Gobi Express V," held in the desert here.

Battery C's "magical" trick of the disappearing artillery battery had members of the ACR scratching their heads in confusion and amazement. Through exceptional efforts in disguising their position, the battery was never located during the FTX, even though the actual grid was finally given to the ACR.

How did battery members accomplish this feat? They made it appear they had displaced from the position and reconnaissance aircraft, after the first flyover, concentrated

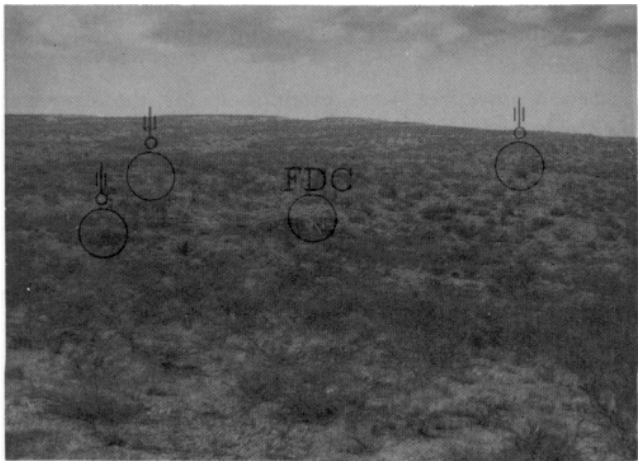
Battery C in position. Can you find three howitzers and an FDC? If not, see next page.



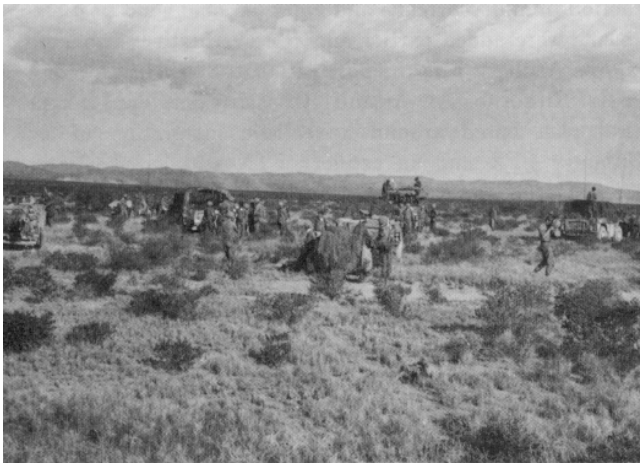
their search elsewhere. CPT Gregory L. Shawn, battery commander, explained it this way: "We hoped that by camouflaging our position as a displaced site, the pilots would look elsewhere." Captain Shawn said the battery disguised the four M102 howitzers and FDC as used, dried vegetation clumps. They also beat down the grass, dug gun pits and tossed the fresh dirt back in, drove vehicles in a manner to make it appear wheel tracks were leading away from the area and scattered a few C-ration boxes around. Then they emplaced next to the gun pits making it appear they had tossed old camouflage vegetation into a pile where it dried quickly in the desert climate.

The Redlegs hid their emplacement so well that they were not found even after the 3d ACR was given the exact grid location and reconnaissance aircraft flew over the position several times.

Equipment camouflaged included four howitzers, the FDC, six gamma goats and several trucks.



Shown within the circles are three of the four howitzers and the FDC of Battery C, 1-319 FA.



The exercise terminated, Battery C, 1-319 FA, moves from camouflaged positions.

THE WINNER! "General Issue," the Redleg lobster, poses with field artillery representatives: top row from the left, COL Louis C. Friedersdorff Jr., LTC William H. Schneider and MAJ Robert M. Dunning; bottom row from the left, LTC Tilford C. Creel and LTC Kenneth L. Burgoon.

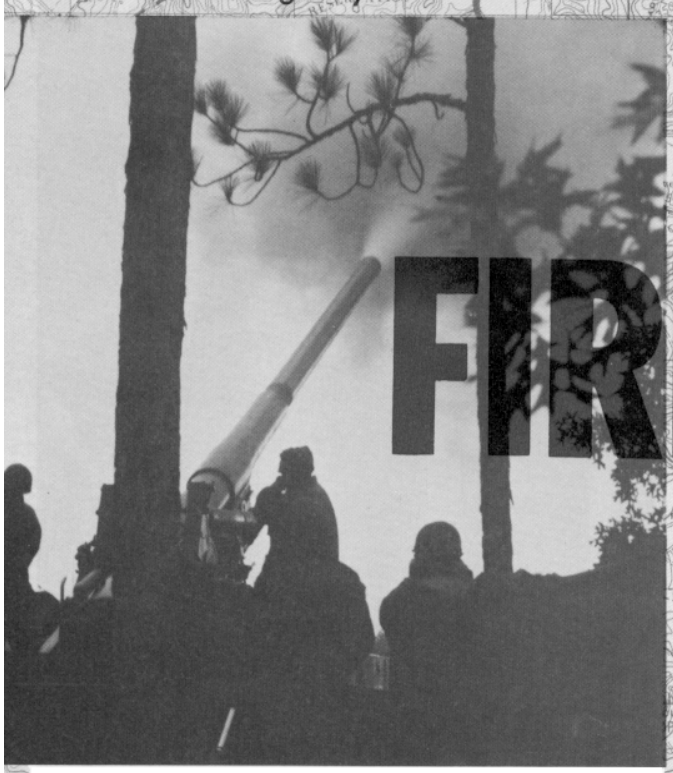
Redleg Lobster Sets Unbeatable Race Pace

"General Issue," a Redleg lobster resplendent in crossed cannons and stars, crawled away from Navy, Air Force and foreign entries in the Fifth Annual Lobster Land Race held recently at the Naval War College, Newport, RI. Trained by field artillerymen to represent the Army, General Issue and his jockey, COL Louis C. Friedersdorff Jr., and trainer, LTC William H. Schneider, were presented the traditional trophy and The Grand Lobster painting, to be held by the winners for one year.

At the end of the evening's festivities, General Issue was ceremoniously carried to the end of a pier outside the main entrance of the Club and tossed back into the briney deep, as his loyal supporters sang a chorus of "The Caisson Song." The poor losers had a less pleasant fate, much to the delight of the hungry audience.

FIREX 74

Right By Piece



FORT BRAGG—"FIRE MISSION: RED DRAGON: Grid PJ680859; armor battalion assembly area; target number XY1047, fire for effect, time on target: three zero minutes from now!"

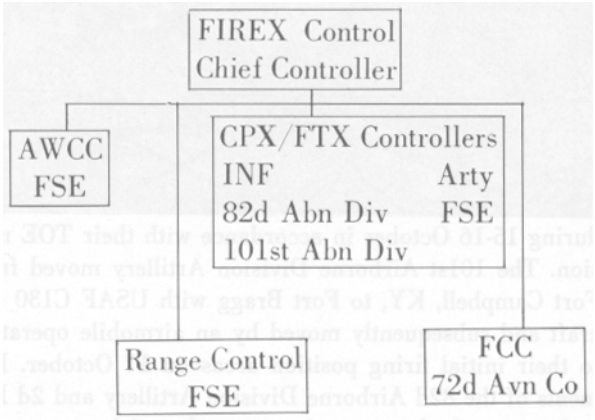
This corps artillery call for fire, preceded by the code words signifying all the artillery with the corps, was answered by a thunder of sound from exploding projectiles fired from 234 artillery pieces. The mission was the final massing of fires for FIREX 74, a field artillery live fire tactical exercise conducted from 17-20 October 1974. FIREX 74, the fifth in a series of field artillery exercises which began in 1969, again was a joint venture. Participating were elements of the Army, Army National Guard, Army Reserve, Air Force, Air National Guard and US Marines.

Preparation for the exercise began in April. XVIII Airborne Corps Artillery assumed responsibility for the planning and conduct of FIREX 74 and COL Leo S. Comish Jr., the Corps Artillery Commander, was designated as the exercise director. The XVIII Airborne Corps Artillery, 82d Airborne Division Artillery, 101st Airborne Division (Air Assault) Artillery and the 1st Corps Support Command were directed to participate while the artillery units of the Fleet Marine Forces at Camp LeJeune, NC, the 151st Field Artillery Group, South Carolina National Guard, 113th Field Artillery Group, North Carolina National Guard and the 4th Battalion, 17th Field Artillery, US Army Reserve, accepted invitations to participate. Altogether an equivalent of 17 field artillery battalions of all calibers were involved in the exercise.

Seven objectives were established for the exercise: improve readiness; conduct training at all levels in fire planning, fire support coordination, airmobile and resupply operations and live fire field artillery gunnery; provide joint command and staff training in corps artillery level field artillery operations and intelligence; exercise combat support and combat service support functions required for a corps size force; exercise tactical and administration communication system; evaluate techniques and concepts designed to enhance counterbattery responsiveness; and improve coordination between active Army, Air Force, Army Reserve Components and Marine forces.

To enhance training and realism in fire support coordination, infantry brigade and battalion command post elements were added participants. Representatives from the Corps Artillery Fire Support Element, 82d Airborne and 101st Airborne (Air Assault) Divisions developed a control plan based around a realistic integration of an infantry CPX and an artillery FTX with emphasis on "real world" times from the initiation of requests for fire to the actual impact of rounds in the target area. In addition to the normal CPX/FTX events the scenario was expanded to include extensive play and message traffic for nuclear weapons allocation, assignment, release and delivery; air defense warning for REDEYE elements with the infantry brigades and artillery units; live aggressors frequently employing CS gas in conjunction with their attacks of battery positions; and fire missions which at all levels included seldom used techniques such as group and series fires.

Hand-in-hand with the development of the scenario and control plan went the creation and organization of the physical means through which the exercise would be controlled and safety insured. The control headquarters was organized into four main subdivisions:



The control element was under the direction of the Chief of the Corps Fire Support Element who acted as Chief Controller for the exercise. FIREX control had a dual role: representing the corps and division headquarters for exercise play and responsibility for control of all ranges and airspace up to 29,000 feet.

The principal communication means were sole user circuits and messenger drops for the artillery while the infantry utilized FM radio nets. All major units were required to enter and continuously monitor the FIREX Range Control Net (FM). A corps command and area multichannel communications network was established and maintained by the 25th Signal Battalion.

Of major importance was the attempt to effect an integration of target acquisition means. The 1st Battalion (Target Acquisition), 25th Field Artillery, was primarily employed as an enemy target acquisition unit. The TAB utilized radar, sound and flash ranging and the AN/MSS-3 searchlights operating in both the infrared and visible illumination modes to locate friendly artillery units.

An XVIII Airborne Corps Artillery gun crew loads a 155-mm shell.

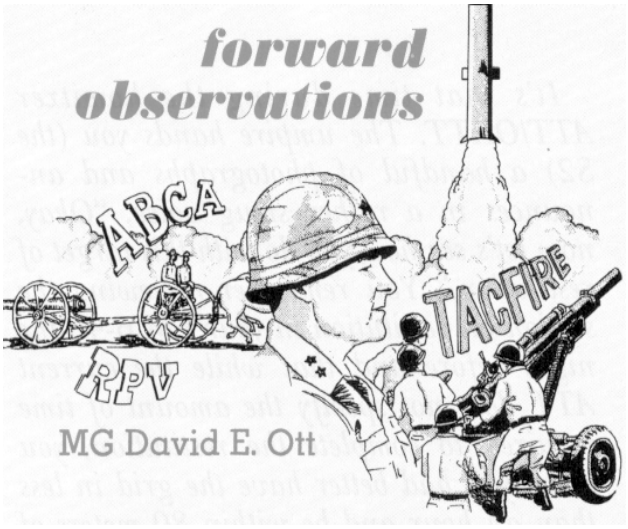
Other acquisition means employed were communications monitoring, aerial photography and airborne radar provided by the 358th ASA Company, 1st MIBARS, 218th MI Det and Air Force, Air National Guard and Army National Guard air reconnaissance units. Intelligence input from these agencies was channeled back into the play of the exercise through the control, acting as higher headquarters. Commanders of located units were notified as to the time and means of position detection. While serving primarily as the enemy, the TAB also performed in a friendly role by conducting numerous high burst and mean point of impact registrations, and providing meteorological support. The TAB was also given the mission of conducting the position area survey for the non-tenant units and of checking the entire position area survey for accuracy. In accomplishing this mission they conducted some 37,000 meters of traverse, monumented 49 new firing points and prepared a corps artillery survey bulletin.

Aviation support was provided by the 12th Combat Aviation Group, reinforced by four CH-54 helicopters from the 335th Aviation Company. Fort Eustis, VA. The corps Army airfield was established at an improved tactical air strip with a hot refueling capacity, (FALCON Airfield) and operated by the 269th Aviation Battalion. Logistical and aviation support was coordinated during FIREX 74 by liaison elements located at the corps artillery headquarters and who worked closely with the corps artillery S4 and aviation officers.

Actual deployment into the operational area began on 16 October with the arrival of the Marines in their initial position areas. The 101st Airborne Division (Air Assault) and 82d Airborne Division elements deployed during 15-16 October in accordance with their TOE mission. The 101st Airborne Division Artillery moved from Fort Campbell, KY, to Fort Bragg with USAF C130 aircraft and subsequently moved by an airmobile operation to their initial firing position areas on 17 October. Elements of the 82d Airborne Division Artillery and 2d Brigade entered the operation area by airborne assault during the afternoon and evening of 17 October. This was followed almost immediately by a nighttime airmobile move of the division's 2d Brigade supported by the 1st Battalion, 320th FA, and Battery B, 1st Battalion, 73d FA, to establish a blocking position. Corps artillery elements arrived in their initial positions during the afternoon of 17 October. Reserve Component units joined the exercise on 18 and 19 October.

At 0750, 18 October, a 10 minute conventional artillery preparation began to pave the way for the infantry attack. The preparation was followed by eight close air strikes delivered by the 192d Tactical Fighter Group. The targets were marked with yellow smoke rounds fired by the 1st Battalion, 39th FA, and 1st Battalion, 73d FA. The close air support was directed by ground and airborne FACs.

Although all exercise objectives were not achieved, from the standpoint of training, FIREX 74 was an unqualified success. Shortfalls on training objectives were expected and the discovery of errors in operational procedures and faults in organization were earnestly sought. FIREX also provided the vehicle for exercising the operational and logistical functions of a corps artillery controlling the same amount of artillery which can be expected in a combat environment.



The continuing top priority mission of the Army is to train for tomorrow's fight. We have seen the modern battlefield and this has caused us to refocus our attention toward a new approach to training management. This requires new ways in which we, and those of you in the field units, view and implement skill and professional development training. With unit support, the result will be training that is continuous, future oriented, flexible in the use of training delivery systems and dynamic in application.

In the first "Forward Observations," I discussed our goal of "first round fire for effect accuracy," and the "Field Artillery System" consciousness required to achieve that goal. While the equipment and doctrinal portions of the system have received our recent attention, it is upon trained personnel that the system primarily depends. *People are the most critically important element of the Field Artillery System*. To this end, the Field Artillery School is asking units to assist in making this change a viable one. The School should not and cannot be the "fount" of all artillery knowledge and the sole innovator of doctrinal and materiel change. Instead, the School should be, and is, a "catalyst" of training dynamics and a coordinator of innovation. This means the field unit will be involved more than ever before in devising, testing and implementing new techniques to support the Field Artillery System. And it will be required more than ever before to assist in the skill and professional development training of its Redlegs.

The major reason for this new approach is the threat posed by the modern battlefield. Fast moving, high attrition battles require the utmost in responsive fire support. Together, we need to develop and rehearse new ways to achieve this.

The implementation of OPMS and EPMS is another reason for a new approach to training management. For officers, more specialization and competence is required than in the past in both primary and secondary specialties. Training and education are being revised to reflect this. Details are still in the study stage, but the trend is toward greater emphasis on combining resident and nonresident instruction.

General William E. DePuy, Commander, Training and Doctrine Command (TRADOC), in the 1974 *Army Green Book* has said: "One thing is clear: Officers are going to have to take advantage of nonresident instruction to meet future education requirements." This is also true for noncommissioned officers. The Senior NCOES program is now being expanded. Eventually, it will include a nonresident only Operations/Intelligence correspondence course for our future E8s and E9s.

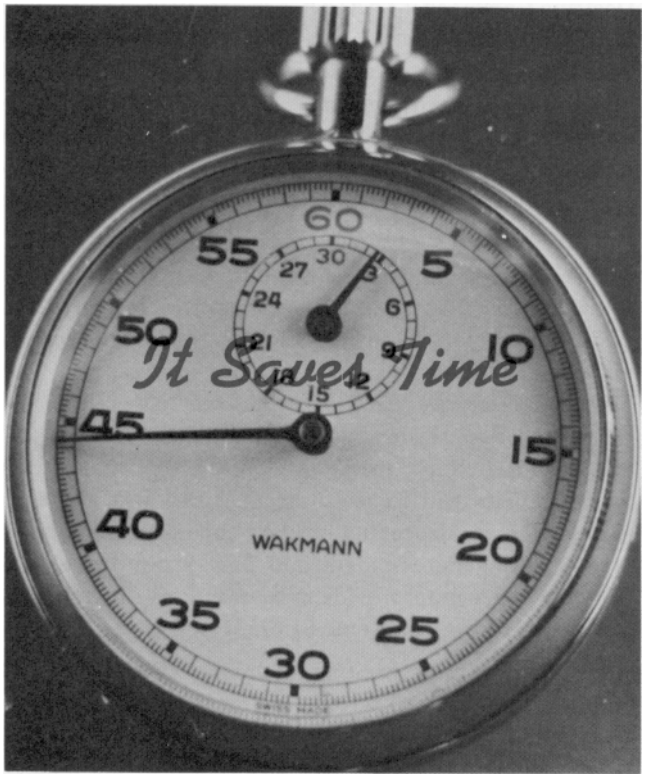
One of the methods we will use to promulgate changes in doctrine is a series of some 15 test training circulars. The first circular, TC 6-20-1 Field Artillery Suppression of Direct Fire Weapons (Test Edition) is already in your hands and we are hard at work on "The Dedicated Battery for Suppression," "Modern Gunnery Techniques" and "Firing Battery Operations." I would emphasize that these circulars will come to the field as "Test" editions and that we are depending on *your* comments to assist us before putting the circulars into final form. The results will help our arm to provide more responsive fire support to maneuver forces than ever before.

One of the most exciting and innovative aspects of individual and small group training is the Training Extension Course Program. TEC is an audio-visual, self-contained instructional device to be used in the maintenance and upgrading of MOS skill proficiency for enlisted men in grades E2 through E5 and will be a unit and individual task under EPMS. The TEC program is going to be a great help in this area. An article on this new program appears in this issue and I commend it to you.

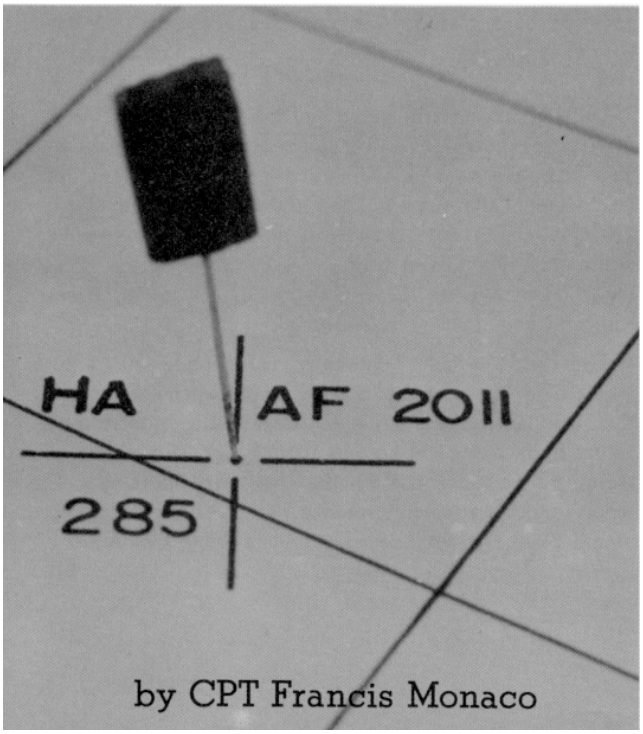
Unit involvement in individual training must increase. Monitoring correspondence course completions, validating TEC lessons and evaluating training circulars are just a few of the ways in which the unit will be involved. Of equal importance is the way in which units use the skills of individuals to train for accomplishing unit missions. This requires the application of continuous team, unit and combined arms training.

The Field Artillery School, in coordination with units in the field, is oriented to a training management concept that uses all our resources to prepare Redlegs for any future fight. Units will become involved in every aspect of training management. With the continued interaction of theory and "real world" practice we can and will develop viable Field Artillery doctrine and credible training for its use.

APPS-1



. . . And It's Accurate



It's that time during the howitzer ATT/ORTT. The umpire hands you (the S2) a handful of photographs and announces in a rather smug voice, "Okay, now let's see how you do with this target of restitution." You remember reviewing the section on restitution in your FM 6-40 the night before and that while the current ATT does not specify the amount of time required to complete the restitution, you know you had better have the grid in less than an hour and be within 80 meters of the target. If not, that umpire may start doing bad things with his red pencil! Whether you use the radial line method or the alternate, you know you are in for a tedious, time-consuming process, the accuracy of which will probably leave something to be desired.

Knowing all this, would you settle for a new system which could provide accurate (within 10 meters) target data in less than four minutes?

The US Army Field Artillery School has recently completed testing on such a system, the Analytical Photogrammetric Positioning System (APPS). The APPS-1 is a calculator-assisted photogrammetric device originally developed by the Engineer Topographic Laboratories at Fort Belvoir, VA, to provide US Army missile systems with long range positional data quickly and accurately. The APPS-1 passed Military Potential Tests in April 1973 and the Test and Evaluation Division of the Office of the Deputy Assistant Commandant for Combat and Training Development began testing a production model in January 1974 to determine its possible utility to the cannon field artillery.

The system consists essentially of civilian off-the-shelf hardware specifically interfaced

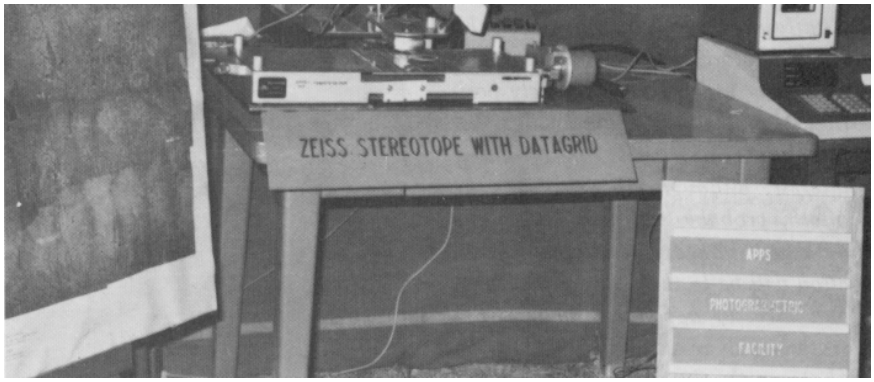
to perform stereo triangulation of small scale ultra-wide angle cartographic photography. Major components are the data base, the mensuration unit, the computational unit and the interface unit. It weighs about 240 pounds and is packed into three carrying cases that weigh an additional 240 pounds.

The data base, pre-flown by the Defense Mapping Agency Topographic Center, consists of three forms: a mosaic, the stereo pictures in the file and reference system folder and the magnetic cassette tape.

The mosaic is correlated with input reconnaissance photography. On the 1:106,000 scale data base tested, this amounted to an area of 8,750 square kilometers—125 by 70 kilometers—and on the 1:50,000 scale, an area of 1,127 square kilometers—49 by 23 kilometers.

The stereo pictures are numbered with the same system used to number individual photograph centers on the mosaic. Consecutive stereo photographs have a 60 percent overlap for stereo viewing. Each photo is indexed and has a superimposed point designator grid.

The cassette contains numerical survey data for each individual photograph, stereo triangulation parameters for three dimensional restitution solutions and critical data relating to the aerial camera's focal length, altitude, weather conditions at the time of exposure, etc.



Necessary apparatus for the APPS-1 includes a mosaic, file and reference system, Zeiss Stereotope with datagrid and the calculator system.

The mensuration unit has a modified Zeiss Stereotope with a Bendix datagrid. Two six-power monoculars are used with prisms, mirrors and a lighting system to focus on two viewing glass disks, each of which has a measuring dot in the center. The viewing disks provide the stereo effect with the photos.

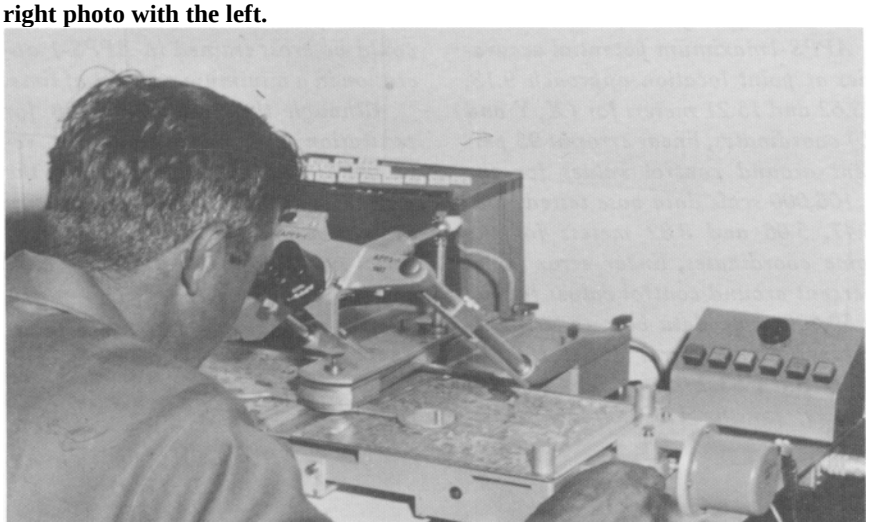
The computational unit consists of a Hewlett-Packard 9810A Programmable Calculator with a tape cassette memory. A magnetic card configures the calculator for APPS-1 operation. Input from the interface unit provides sufficient information to perform a stereo triangulation solution.

The interface unit was constructed by the Engineer Topographic Laboratory and basically connects the mensuration unit to the computational unit. Positional data is translated from the datagrid into numerical data that the computational unit applies to its stereo triangulation parameters for the particular photograph pair.

A typical APPS-1 solution comes from a seven-step procedure beginning with useable reconnaissance imagery from any source being provided to the operator.

- *The operator matches photograph numbers of the mosaic to the recon photo's point of interest.*
- *Next he pulls the adjacent stereo pair of photographs from the file using the numbers obtained by correlating the mosaic and recon photo.*
- *The stereo pair is securely positioned atop a photo-carriage.*
- *A two-minute operation of identifying to the calculator the photograph number of the stereo pair is performed so that numerical data can be accessed from the tape cassette memory. Indexing zeros the data-grid and performs a system self-check after the solution parameters are altered to compensate for photographic cant.*
- *The operator manipulates the photocarriage until the point of interest on the recon photo is under the measuring mark of the left eyepiece.*

APPS-1 operator manipulates the photocarriage until the point of interest on the recon photograph is under the measuring mark of the left eyepiece. Once the left measuring mark is in position over the point of interest the photo-carriage is locked into position and the x and y parallax knobs are manipulated to stereo the right photo with the left.



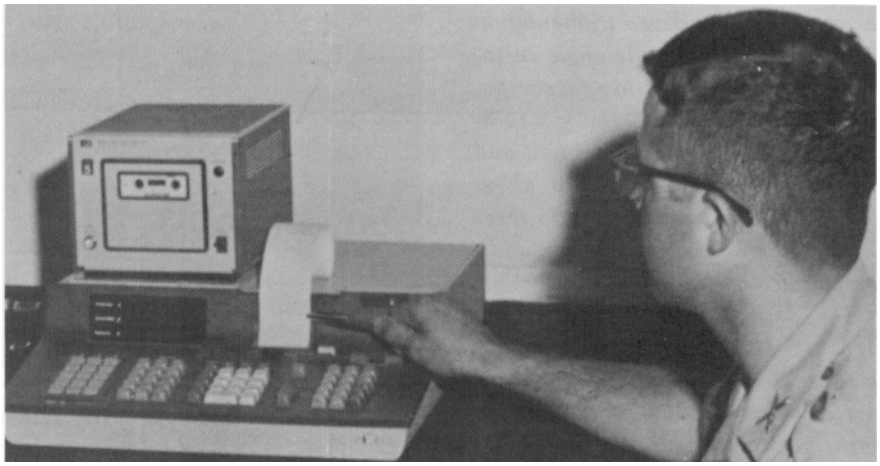
Available terrain features on the recon photo and the stereo data base should be utilized to accurately position the measuring mark. For FA targets of opportunity, the point of interest, although apparent on the photo, probably will not be on the data base imagery and visual correlation will be to the approximate area and directly dependent on the operator's skill in visualizing the recon photo on the data base. Once the left measuring mark is in position over the point of interest, the photocarriage is locked into position and the operator manipulates the x and y parallax knobs to stereo the right photograph with the left.

• The point of interest is assigned a control number by the operator who activates the calculator to compute the coordinates and elevation of the point.

• The computational unit will display the control point number assigned to the point of interest, the UTM grid zone, the Easting, Northing and height in meters. This output may be simultaneously displayed at a remote TTY terminal. APPS-1 computes this information in five to seven seconds. Any other point identifiable by the operator on the stereo pair (covering approximately 10 x 14 kilometers, 1:106,000 scale) can therefore be found five to seven seconds later; any point not on the pair mounted but on the data base can be found two to four minutes later (after repeating steps one through six).

Among the advantages of the APPS-1 determined from the testing by the Field Artillery School are:

• Operators require a minimum amount of formal training in the setup, operation and march order of the system. Experience in aerial imagery as well as normal stereoscopic visual acuity are prerequisites for APPS-1 operators. Two operators would insure 24 hour operation.



The computational unit displays the control point number assigned to the point of interest, the UTM Grid Zone, the Easting, Northing and height in meters in five to seven seconds.

• APPS-1 can be operated in field locations utilizing portable generator power and a stable desk top area. Shelter from wind, dust and temperature extremes are necessary for consistent system operation. Maintenance is minimal.

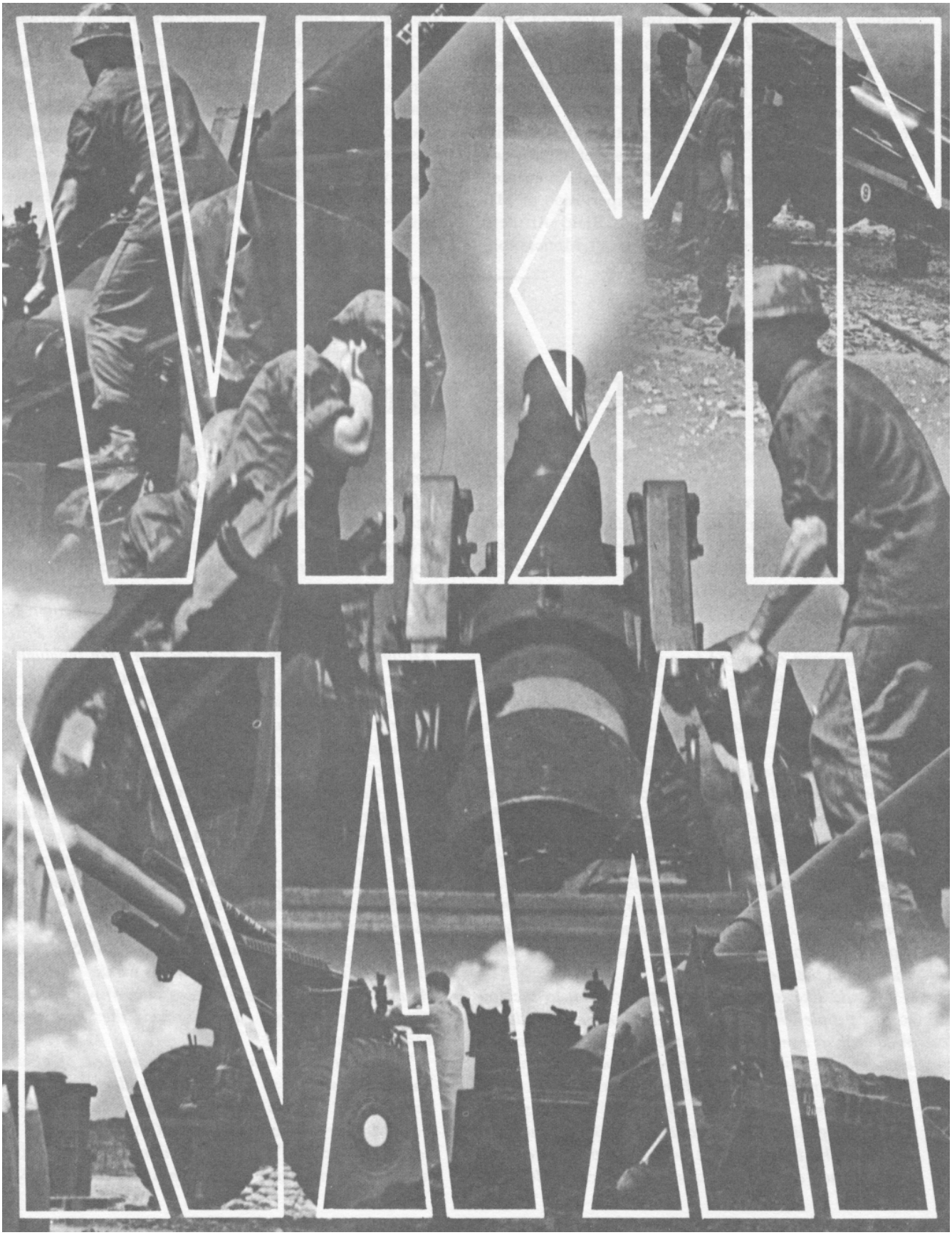
• Vertical imagery from an OV-1 Mohawk or similar reconnaissance aircraft taken so as to yield a scale of 1/300 to 1/700 produces the most easily correlated imagery for FA applications. Hand-held cameras (including polaroid types) when used to take high oblique photographs also produce correlatable reconnaissance imagery (although not as acceptable as aircraft mounted camera systems). The 1:50,000 scale data base was of significantly greater value to untrained imagery interpreters as far as correlation ability was concerned.

• APPS-1 maximum potential accuracies at point location approach 9.13, 13.62 and 15.21 meters for (X, Y and Z) coordinates, linear error at 95 percent around control values for the 1:106,000 scale data base tested; and 6.47, 5.06 and 8.82 meters for the same coordinates, linear error at 95 percent around control values for the 1:50,000 scale data base tested. Circular probable error for 1:106,000 scale data base approached seven meters; for the 1:50,000 data base, four meters. Firing points, observation posts, targets, survey control points, sound base positions and restitution points were all found using APPS-1. Using 15 minutes as the average time to completely set up APPS-1 in the field, it took untrained image interpreters approximately 2½ to 3½ minutes to correlate one point of interest. This time includes reindexing for different stereo pairs.

• Depending on the availability of input reconnaissance photography, APPS-1 could be deployed to existing S2/S3 facilities at FATAB, corps artillery or divsion artillery without any addition of personnel or equipment with the exception of space within a shelter with a desk top area for set-up. Existing field power supplies could be easily utilized, and personnel from FA S-2/S-3 sections could be cross trained in APPS-1 operation in a minimum amount of time.

Although the manual process for restitution will undoubtedly be retained as Field Artillery doctrine, the APPS-1 system will greatly enhance the derivation of accurate grids from aerial photographs.

CPT Francis J. Monaco, FA, served as Test Manager, APPS-1 Test Team, Test and Evaluation Division, DACCD, USAFAS. He is now attending the Field Artillery Officers Advanced Course.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In November 1972, the Commandant of the Field Artillery School was tasked by the late Chief of Staff, General Creighton W. Abrams, to write a monograph concerning the employment of field artillery in Vietnam. The document is to be one of a series of monographs written by a representative group of senior officers who served in important posts in that conflict and who still carry a heavy burden of day-to-day responsibilities within the Army. The series is entitled "Vietnam Studies" and, under the supervision of MG David E. Ott, Commandant of the Field Artillery School, the "Field Artillery in Vietnam Monograph" was completed and forwarded to the Department of the Army, Center for Military History, in February 1974 to be published as a part of the series.

The "Field Artillery Monograph" has since been approved by the Chief of Staff and cleared for publication. We propose, subject to comments from our readers, to publish extracts from the monograph in this and future issues of the *Journal*. As we go to press we do not have a firm publication date for the complete volume. We will advise you in a future issue.—Ed.

US Field Artillery in Vietnam

Preface

This monograph will illuminate some of the more important activities—with attendant problems, shortcomings and achievements—of the US Army Field Artillery in Vietnam. The wide variations in terrain, supported forces, density of cannon, friendly population and enemy activity which prevailed throughout South Vietnam tend to make every action and every locale singular.

Though based largely upon documents of an historical nature and organized in a generally chronological manner, this study does not purport to provide the precise detail of history. Its purpose is to present an objective review of the near past in order to assure current awareness, on the part of the Army, of the lessons we should have learned and to foster the positive consideration of those lessons in the formulation of appropriate operational concepts. My hope is that this monograph will give the reader an insight into the immense complexity of our operations in Vietnam. I believe it cannot help but reflect also the unsurpassed professionalism of the junior officers and noncommissioned officers of the field artillery and the outstanding morale and esprit de corps of the young citizen-soldiers with whom they served.

I would like to express my appreciation to the following people who assisted in this effort: MG Roderick Wetherill, as commandant of the Field Artillery School, authored the monograph from November 1972 until his retirement in May 1973, when authorship was transferred to me. To General Wetherill go my sincere thanks for getting this project off the ground. Under his direction the initial outline was developed, a research team formed and initial research conducted. MG Gordon Sumner Jr., formerly with the Office of the Assistant Secretary of Defense (International Security Affairs), must be credited with conceiving this project and finding support for its accomplishment. MG W. D. Crittenberger Jr., formerly Deputy Director, Plans and Policy Directorate, J5, Joint Chiefs of Staff, sponsored this project and helped to lay the initial groundwork. During the research and writing of the monograph his advice, based on his experiences as II Field Force Artillery commander in Vietnam, has been invaluable. BG Robert J. Koch, former Assistant Commandant of the Field Artillery School, was my principal assistant in this effort (as he was for General Wetherill before me). He helped me to steer the activities of all those who participated in producing the monograph. Beyond that, he provided valuable input to the monograph based on his experiences as the commander of the 23d Artillery Group and the XXIV Corps Artillery in Vietnam. COL (Ret) Vincent G. Oberg, former director of Army-Wide Training Support Department of the Field Artillery School, with the help of two of his division chiefs, Lieutenant Colonels Ray K. Casteel (now director AWTSD) and Carl W. Sullinger (now AWTSD deputy director), coordinated this effort within the Field Artillery School. He developed a plan of work, sought out source material and formed the monograph research team.

The monograph research team consisted of officers and clerks assigned to various field artillery activities on post, and of officers who had recently completed the Field Artillery Officer Advanced Course and were on casual ("blackbird") status awaiting further assignment. The monograph team must be credited with

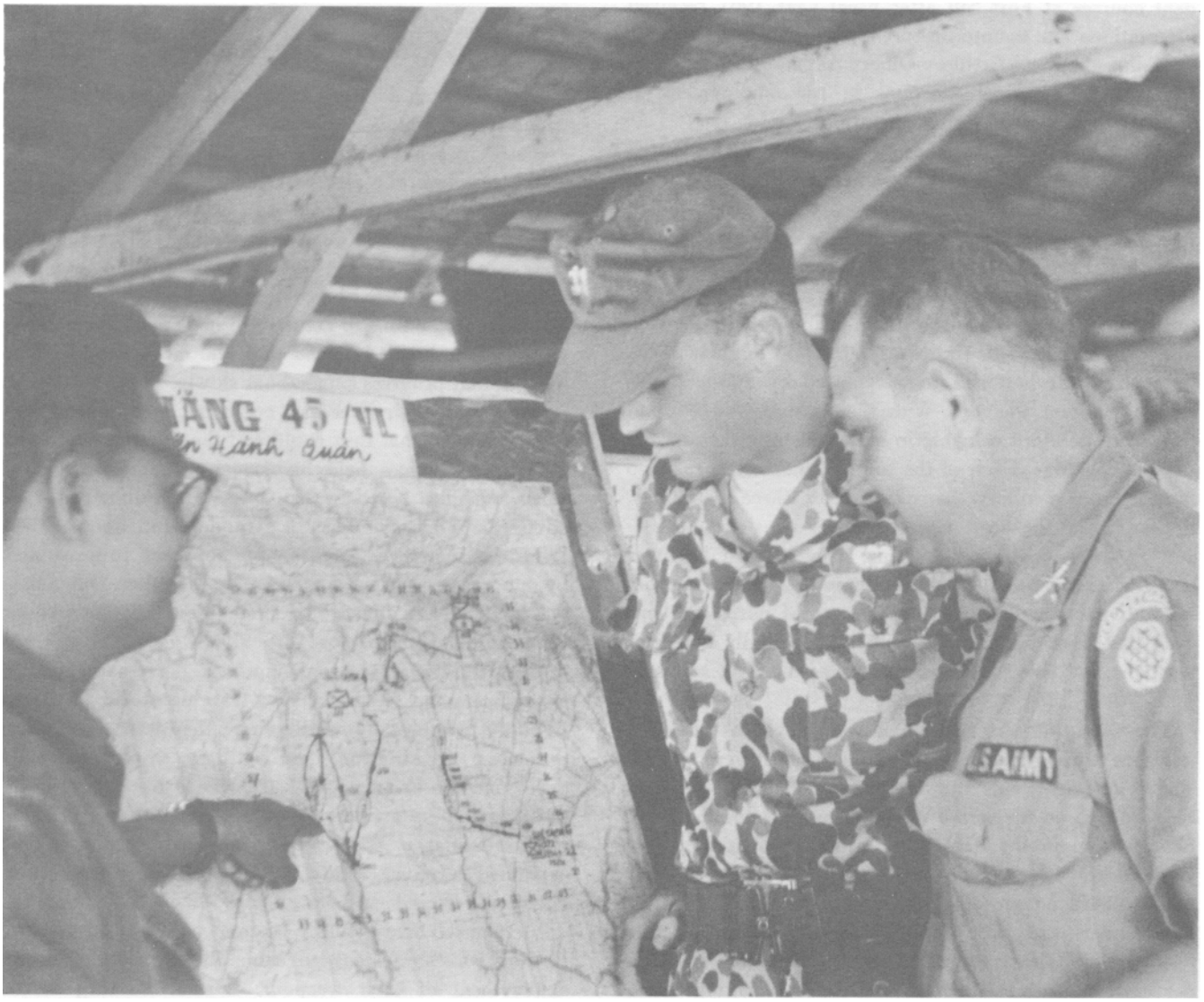
accomplishing the legwork—researching the topic and expanding into more detail the general guidance they received. Members of the team were LTC Calvin DeWitt III, MAJ Bob W. Garner, MAJ Ronald N. Funderburk, MAJ Craig H. Mandeville, CPT Richard L. Murphy, CPT Fred R. Franzoni, CPT Richard H. Reed, CPT Nicholas A Radvanczy, 1LT Melvin M. Yazawa, Mrs. Pamela K. Morales and PFC C. Foster Deen.

Last, I extend my sincere thanks to all field artillerymen who contributed much of the source material for the monograph either by relating to us their personal experiences and observations or by lending us their personal files.

Part I

by MG David E. Ott
Commandant, USAFAS

The Field Artillery Adviser



The US advisory buildup during the early 1960s included the assignment of the field artillery advisory team down to battalion level as quickly as teams could be trained and sent. Each team included an artillery officer, usually a captain, and a senior NCO. In most cases both had attended the six-week Military Assistance Training Agency (MATA) course taught at the US Army Special Warfare School at Fort Bragg, NC. The course prepared students for future duties as advisers in Vietnam by teaching them both what to expect and what was expected of them. The curriculum included, among other subjects, a profile of the country, its people, government, history and geography; the organization and employment of its military and paramilitary forces; and basic language instruction. The Redleg advisers were given additional instruction concerning Vietnamese artillery and methods of employing field artillery effectively in Vietnam. In addition to the MATA course, artillerymen attending resident courses at Fort Sill after fiscal year 1961 received orientations on counterinsurgency operations. Students attending the Field Artillery Officer Advanced Course participated in practical exercises in the employment of artillery in support of jungle operations.

Field artillery advisory teams were assigned to battalions of both divisional and corps artillery. Each Vietnamese division in 1961 had a division artillery consisting of one 4.2-inch mortar battalion and one 105-mm howitzer battalion. Each mortar battalion had nine weapons and the cannon batteries had four weapons each. In 1963 mortar batteries were reduced to six and cannon battery weapons were increased to six. From late 1964 to early 1965, 4.2-inch motar batteries were replaced by 105-mm batteries; 105-mm weapons, with their longer ranges, had proved to be more valuable in accomplishing the mission of area coverage. Each of the four Vietnamese corps also had its own artillery, usually two or three battalions, depending on the need. Corps artillery consisted of 105-and 155-mm howitzer battalions. The 155-mm howitzer was the heaviest artillery in Vietnam during this period. Like division artillery, the battalions of corps artillery each had three batteries. Each battery initially had four weapons, but this number was increased to six by early 1965.

The young officers and NCOs who served as battalion advisers were of the highest caliber. They were professional, knowledgeable and aggressive. Yet they were soon to learn that as advisers they could not "get things done" as they had in the American units in which they had served. Now they could only advise—not lead. Their advice could be accepted or rejected as the Vietnamese commander saw fit. Though often frustrating, this exclusively advisory status was necessary if the Vietnamese were to learn without having the US making South Vietnam a puppet state. Accordingly, advisers in the field were specifically directed to avoid any action that might be construed as leading a Vietnamese military organization in combat against the enemy.

To add to their frustrations, advisers were often fearful that their superiors would judge their advisers' effectiveness by the effectiveness of the unit they advised. Unhappily, in some cases their fears were justified. An outstanding officer might be assigned to advise a mediocre unit which he was powerless to improve if the unit commander were indifferent to his suggestions. Though expressed humorously in this first verse of a rather lengthy poem, the dilemma was a very real one:

"*I can't pull the throttle,*
I can't ring the bell,
But if this goddamn train should stop,
I'm the one that catches hell."
(An Adviser's Lament—Anonymous)

The Adviser's Challenge

Even when an adviser's suggestion was accepted by his counterpart, it often seemed that the suggestion was executed in a painstakingly slow and inefficient manner. There were several reasons for this.

First, advisers were faced with helping an army whose soldiers came from a culture with values different from their own. The Americans believed that anything could be accomplished with hard work, and that a year in Vietnam would be ample time to get the job done. The Vietnamese, on the other hand, believed that one must work hard to live but that progress came about slowly. They had fought an enemy all their lives and could not comprehend why Americans felt that they could end the fighting overnight. Many other values held by Americans and Vietnamese clashed. Suffice it to say that it was often difficult for an adviser and his counterpart to understand one another. What was viewed as a reasonable approach to a problem by one was often viewed as inane by the other. Other than making a sincere effort to understand one another's views, little could be done to close this cultural gap.

Many of the most promising young Vietnamese artillery officers and NCOs received training at the US Army Artillery School at Fort Sill where they were exposed to the latest thinking on field artillery employment and developments. From fiscal year 1953 to fiscal year 1973, 663 Vietnamese artillery officers were sent to Fort Sill. Peak attendance was during the early years of the expanded advisory effort, 1960 to 1964, when yearly attendance exceeded 60 officers.

Vietnamese field artillery leaders could not be effective if they were not knowledgeable in all aspects of the employment of their weapons. Formal training served

that purpose. An even more important factor in developing leaders was encouraging the Vietnamese to take command. American advisers could not command Vietnamese units, and although the Vietnamese might make mistakes and perform awkwardly initially, they would be challenged to perform and to develop into outstanding leaders. Thus, any frustrations that an adviser might feel in not being given a firmer hand to control the situation were well worth the end result of effective Vietnamese leadership.

A third reason for ineffectiveness was poor operational practices, some inherited from the French and others developed by the Vietnamese over a period of years. Perhaps the most noteworthy of these practices was use of the field artillery primarily as a defensive weapon. The French had unavoidably set a poor example for the Vietnamese. They had been forced to use their artillery defensively due to a lack of soldiers, poor communications, limited road networks and insufficient equipment. Since the road network was so vital to their operations and the Viet Minh tactics centered on cutting this network, the French developed a series of small outposts along the roads, each with one or two guns and mutually supporting wherever possible. For this purpose they used approximately 400 weapons of mixed calibers, including US 105-mm and 155-mm howitzers and UK 3.7-inch and 25-pound guns. These weapons were manned by crews of seven to eight men and usually were located in an outpost occupied by one or two infantry platoons. From these positions, artillery supported squad-size outposts positioned along roads and canals. As a result of this type of employment, the war was often known as the war of the "firing lieutenant." Each platoon of two guns was commanded by a French lieutenant who, because of his isolated location, actually conducted his own little war. Artillery employed in this static role was not organized into batteries or battalions. Thirty to forty guns were grouped under a small headquarters staff responsible for their administrative and logistical support.

By 1965 some changes were made toward a more offensive spirit on the part of the Vietnamese artillery. MG Charles J. Timmes, Chief MAAG, Vietnam, noted in June 1964 that there was less hoarding of weapons in motor pools and an increasing tendency toward employing all available weapons in the field. He gave much of the credit for the improvement to field artillery advisers. In addition, a US Army contact team noted in a report written in early 1965 that artillery weapons were being used frequently to support South Vietnamese Army operations and that there was little hesitation to move weapons in support of those operations. However, the same report noted that most often only two guns were used to support a battalion-size operation. The report was also critical of

the fact that once a platoon of two guns was moved and emplaced to support an operation, it was seldom moved again throughout the duration of the operation.

Another poor operational practice was over-control of the artillery commander by the supported maneuver commander. The Vietnamese followed the strictest interpretation of the French artillery commander's relationship to the ground commanders. At regimental level, the infantry commander actually commanded artillery assigned to his support. This alone was not necessarily a bad practice. US artillery doctrine permits it, particularly, as was often the case in Vietnam, when both maneuver and supporting forces are some distances from their parent units on semi-independent operations. Given the command of his supporting artillery, however, the Vietnamese ground commander had a tendency to over-involve himself in the details of its employment. He often selected weapon positions and required that the artillery obtain permission from him before firing. As a result, corps and division artillery commanders were powerless to influence the action through their subordinate artillery headquarters, which were controlled by the supported commanders.

But Vietnamese artillery was not completely ineffective. Prisoner interrogations revealed that the enemy grudgingly respected ARVN artillery and intentionally planned attacks in areas that were beyond its range. Then, too, there were hopeful, though isolated, examples of South Vietnamese artillery operating aggressively and achieving outstanding results. One such example was Operation DAN THANG 106 during the period 15-22 April 1963. Field artillery supporting the operation moved 110 times and fired 1,007 missions. One artillery concentration was credited with killing 60 Viet Cong.

Vietnamese artillery nonetheless had a long way to go, and to the advisers there were as many disquieting signs

as there were hopeful ones. The ARVN operation at Ap Bac, a small village in the Mekong Delta, was bitter evidence of the weakness of the artillery. Too long in static positions and dependent on slipshod firing procedures, the artillery in this case showed itself to be unequal to the task of providing responsive support to offensive ground operations.

The attack against Ap Bac in January 1963 was well conceived but poorly executed. It was to be a three-pronged attack, including mechanized infantry, and was designed not only to surprise the Viet Cong but also to trap and pin him down. Once the enemy was surrounded, government forces would tighten the circle and destroy him with all available fire support from small arms to tactical air power. Open rice land to the east of Ap Bac was left unguarded. The decision was that if the enemy attempted to escape in that direction, he would make an excellent target for aircraft and artillery. As the joint ground and air assault was launched, the Viet Cong 514th Battalion, reinforced by local guerrilla forces, made attempts to escape the closing trap but was checked in every case. With all avenues of escape closed, the Viet Cong withdrew into the village, dug in and prepared to fight even though they were outnumbered and outgunned.

Problems started when areas near helicopter landing zones were not cleared by preparatory artillery fire. Enemy gunners shot down five helicopters with intensive automatic small-arms fire, which could have been neutralized by an adequate artillery preparation. Poor leadership, lack of aggressiveness by the South Vietnamese, incorrect and uncoordinated use of the armored personnel carriers and the unwillingness of the Vietnamese commanders to listen to their advisers caused the assault to slow and halt. Reinforcements were parachuted in but were not employed correctly. Night set in, and the Viet Cong picked up their weapons and casualties and escaped through the leaky trap set by the ground forces. Artillery was not fired during the night to hold the enemy in position; instead, the next morning the Vietnamese cut loose with an unobserved artillery barrage into the village which killed government soldiers. When the battlefield was searched, only three enemy bodies were found. Reports from the field attempted to declare this controversial battle a victory for the South Vietnamese. It was not.

The Adviser Learns, Too

Although the Vietnamese displayed significant weaknesses in certain aspects of the employment of their artillery, at the same time they demonstrated a considerable degree of ingenuity. They had been fighting essentially the same enemy for several decades and had developed or copied from the French various employment concepts that

A 105-mm position within a hamlet, Kontum Province, September 1963.

were particularly well suited to the peculiarities of their situation. Their country and the enemy presented a situation which the US army had not faced since the Indian wars. Artillery advisers were in a position to learn from their counterparts as much as if not more than their counterparts could learn from them. What advisers learned and reported to their superiors was later invaluable in the employment of US artillery.

Advisers learned, for instance, as their counterparts knew all along, that artillery could not be responsive if it had to be moved into supporting distance after a hamlet was attacked. A majority of the enemy's attacks were of small scale and lasted for only a short time. They normally terminated before artillery could be positioned. Even worse, the enemy could easily plan an effective ambush of any artillery convoy that was rushing to the relief of a hamlet. The artillery had to be prepositioned throughout the countryside so that the maximum number of hamlets would be under the protective umbrella of one or more weapons. The amount of artillery available and the number of positions to be occupied dictated that only two or three weapons, rather than a full battery, could occupy a single position. This piecemeal application of artillery was contrary to everything US artillerymen had learned relative to the employment of field artillery; past wars had shown that artillery was most effective when the fires of entire battalions could be massed against the enemy. But in the past area coverage was not important.

Cannons in this environment could be called on to fire in any direction. Artillerymen were quick to term this a 6400-mil environment. Procedures to shift fires quickly from one direction to another had been developed by the French and passed on to the Vietnamese, who made further

refinements. The French routinely constructed in their outposts circular gun pits and protective parapets, which allowed the guns to be swung in all directions while providing protection for their crews. Sufficient markers of known azimuth were located around the gun emplacements to provide convenient reference points no matter the direction the guns were to fire. The Vietnamese adopted in their FDCs a circular firing chart that was several times the size of a normal chart and permitted the computation of fire missions in any direction.

The advisers also learned that the use of scattered outposts required a host of changes to what they had considered normal operating procedures. Wire communications could be cut or tapped easily and could be used only within outpost perimeters. Radio, previously considered a backup system, became predominant. Another change was that infantry was required to protect artillery positions and this placed restrictions on the artillery that American advisers had not experienced. Artillery commanders, at best, were required to consider the availability of infantry protection in planning each of their moves. At worst, artillery movements could be totally controlled by an unwise infantry commander, who could deny protection if artillery did not move when and where he desired. Still another change was that each outpost had to be able to direct its own fire. US Army doctrine said that fires would be directed from battalion FDCs, with backup provided by the firing battery. With batteries spread over wide areas, the battalion commander was too far removed from the action to have a full appreciation of each local situation. Commanders of batteries or their platoons were in the best position to establish priorities and decide what targets to engage.

Advisers were impressed with the innovative techniques devised by the Vietnamese that enabled a hamlet to call for artillery fire. In the initial years of the American advisory buildup, hamlets and villages were not equipped with radios but requested fires by prearranged signals such as colored flares. A hamlet was given four flares of different colors, each color representing a cardinal point. Red might represent north; green, south. If the hamlet were attacked, its defenders fired a flare of the color that indicated the direction of the enemy attack. From the outposts, data were computed and guns fired at various preplotted points on the appropriate side of the hamlet. Another signal was a large wooden arrow lit with kerosene at night and swung horizontally to point in the direction of an enemy attack. This procedure required the supporting artillery outpost to be at a higher elevation than the hamlet in order to see the arrow. As radios became available, they were issued to hamlet officials. An artillery target indicator was then devised. This was a simple circular board containing the outline of the hamlet and the relative locations of preplanned, numbered concentration points. The operator pointed a rotating arrow in the direction of the enemy attack to find the azimuth and identify the point nearest the activity. With a radio the operator could request fires by concentration numbers and make subsequent corrections.

American advisers regained a respect for lightweight towed artillery weapons in Vietnam. All but forgotten in scenarios pitting our forces against a sophisticated enemy in Europe, where the punch of heavier artillery was required, the 105-mm howitzer again came to the forefront as the principal Army combat artillery piece. Although the 105-mm projectile was much smaller and had less destructive power than the 155-mm projectile, the 105-mm howitzer was easy to manhandle, was helicopter transportable and had a high rate of fire. It therefore proved to be the most desirable US artillery weapon in counterguerrilla operations.

One of the most important lessons learned by field artillery advisers was that efficient clearance procedures were absolutely necessary if artillery was to be at all effective. The necessity for obtaining clearance was peculiar to a counterguerrilla operation in which the enemy operated in and around populated areas. Clearance was often agonizingly slow in coming. The reasons for delay could be completely valid. For instance, the ground commander might be unsure of the location of one of his patrols or the responsible government official might have reason to believe that civilians were in the target area. On the other hand, the delay could be totally inexcusable and caused by inefficient clearance procedures or indifference of the responsible official.

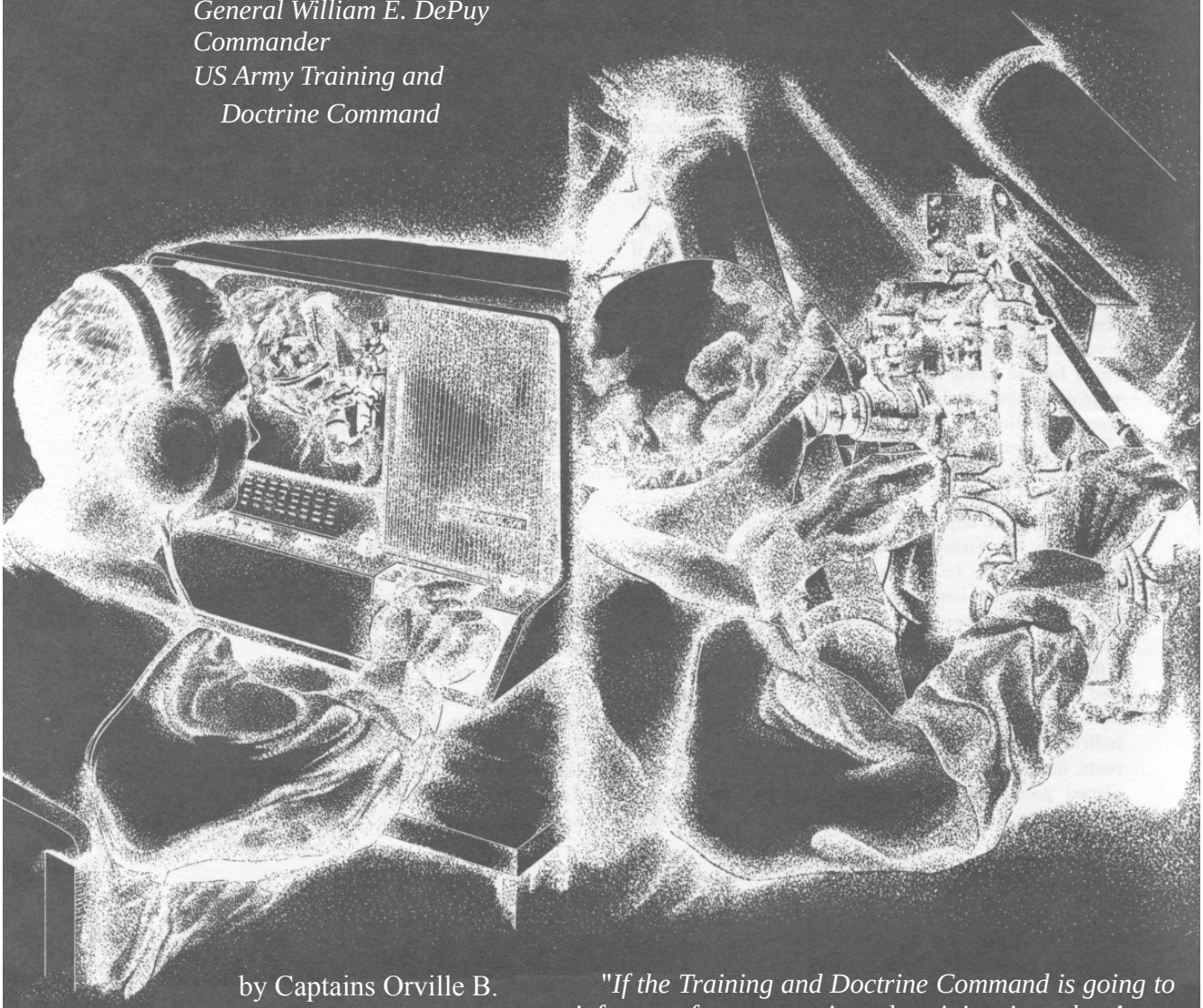
These are only a few of the more important of countless lessons learned from the Vietnamese by US artillery advisers. Those advisers who were career soldiers often found themselves returning to Vietnam before the conclusion of hostilities. Many were assigned to US artillery units and profitably used much that they had learned as advisers.

"The training extension course (TEC) for units in the field uses the latest techniques in teaching and training theory and is prepared in a validated multimedia format. Lessons have already been designed for several MOS and critical duty positions. Initial lessons were introduced this summer [1974] and 600 additional lessons are now under development. Combat arms units, both active and reserve, are now being issued audio-visual teaching machines for the TEC program." (Army Magazine)

General William E. DePuy
Commander
US Army Training and
Doctrine Command

TRAINING
TEC
EXTENSION COURSES

IS HERE



by Captains Orville B. Smidt, Winn B. McDougal and Raymond E. Whitney

"If the Training and Doctrine Command is going to infuse performance-oriented training into the Army, TEC is the best hope."

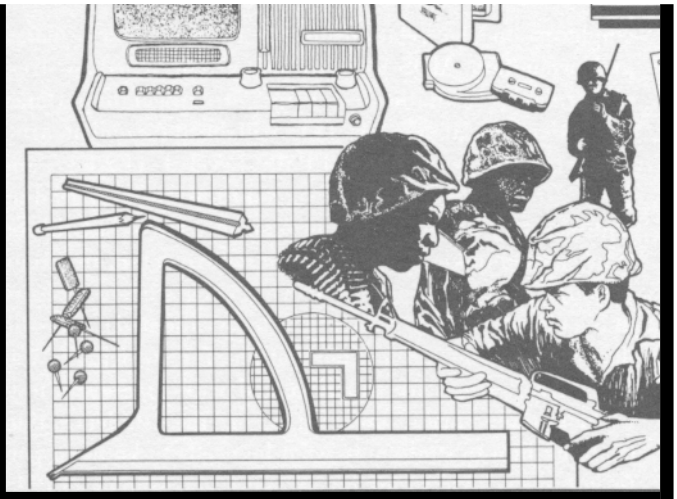
Brigadier General Paul F. Gorman
DCS Training/Schools
TRADOC

A cannon battalion has had a high turnover of fire direction (13E) personnel. The battalion commander wants to insure the replacement 13Es are able to perform the duties of the horizontal control operator (HCO) before going to the field. Time is running short to set up an effective unit training program. The battalion has just been issued Training Extension Course (TEC) materials on a test basis. These include seven audio-visual TEC lessons on Surveyed Firing Charts. Part seven of the series is a performance-oriented self-evaluation and is administered to the new 13Es to see what they know about performing the duties of the HCO. Though most pass the "diagnostic" test, several are weak in some skills necessary to perform critical tasks in this duty position. These men are directed to take the TEC lessons in their weak skill areas. While working the lessons, the men are observed helping each other to master the material. Within a few hours, all are ready to train confidently in a field environment.

• Four soldiers were selected from a field unit to receive TEC lessons and a field performance test on the RC/292 Antenna. Of the four, only one had seen a 292 before and none had been trained in its use though their MOS required proficiency in antenna erection. After taking five TEC lessons, the soldiers were brought to a field location; they were broken down into two-man teams; and each team was issued an RC/292 Antenna kit which had been "bugged" with missing items and broken parts. The first question posed by soldiers from each team was: "Where is Change 2 to the TM?" Since each TEC lesson in the series on the 292 followed a common sense procedure for objective design, the soldiers could inventory the antenna kit, identify defective components, assemble and disassemble the antenna and select a safe, practical antenna site for clear communications. Both teams successfully erected their antennas within the required time limits. This example shows that the ultimate test in performance-oriented training is actually doing the job-required task.

These actual experiences of test units using initially fielded TEC lessons last summer and fall reflect the success that will be repeated soon throughout active and reserve component combat arms units.

Early as 1971, the Board for Dynamic Training, since redesignated the Combat Arms Training Board (CATB), identified a critical need for a type of instruction which gears itself to the needs of the individual soldier after he has finished his formal military training. To satisfy this need, a new and dynamic training program titled TEC was initiated. The question might be asked, "Why is the TEC method of instruction so effective, as opposed to our current method of unit classes and MOS libraries?" The answer can be found in a four-phased analysis of TEC



conducted jointly by Human Resources Research Organization (HumRRO) and CATB last year. Three major factors have emerged from this analysis:

First, whatever training materials used must be designed to teach what the student needs to know to perform required tasks. "Nice-to-know" information is not included.

Second, the training media used must increase student motivation and reinforce teaching points. Since each student learns at a different rate, self pacing is important.

Third, the training material must be thoroughly tested on those it is designed to teach.

Materials of this type are coming into use in a variety of commercial and administrative fields. For example, they are being used in more than 60 police schools teaching everything from how to frisk a suspect to criminal law. The results at these schools provided a clear indication of the effectiveness of performance-oriented training materials:

• They reduced a 28-hour course to 12 hours.

• The per-class failure rate of five to ten percent was reduced to zero.

Deciding to try this approach in the Army, CATB initiated the TEC I Plan in 1972. By 1974, the initial CATB-developed lessons piloted a TEC II system for field use. Targeted toward the eight highest density combat arms MOSs. TEC II is providing more than 600 lessons which are being developed by service schools and civilian contractors in key MOS and common subjects for combat arms units. A TEC III plan is now providing for the development of lessons for combat unit critical skills in technical and administrative MOSs. TEC IV is expanding lesson development to support unit skill training.

The new approved Enlisted Personnel Management System (EPMS) is placing great emphasis on mastery of enlisted skills. For the first time, every aspect of enlisted personnel management will be interrelated with particular

emphasis on the relationship of training, performance and promotion. MOS tests are being redesigned to stress performance, with the test being of critical importance for promotion above E4. TEC will be the combat arms MOS training system for EPMS Level 1 (E2-E4) and Level 2 (E5). Lessons are designed to assist in upgrading and maintaining MOS skill proficiency. Each TEC lesson teaches need-to-know skills in progressive detail, in a reinforcing, self-paced format allowing each student to learn at his own rate. Each lesson is tested (validated) with students from the target population for which it was designed. Lessons are supplemented with diagnostic tests to determine prior knowledge of the student, thus enabling him to study only what he needs to know to perform tasks critical to his job. When a new soldier (EPMS level 1) reports to his unit, TEC will assist the commander in determining any areas in which the individual is weak and quickly upgrade these to an acceptable level. Then when the soldier is ready to compete for promotion to E5 the combination of TEC and job experience will ensure that he has mastered the MOS skills required to perform EPMS Level 2 duties.

Units That Have TEC
2d Infantry Division Artillery
3d Infantry Division Artillery
4th Infantry Division Artillery
9th Infantry Division Artillery
101st Division Artillery
TRADOC Schools

Units To Receive TEC	DATE
82d Airborne Division Artillery	Feb 75
XVIII Corps Artillery	Feb 75
1st Cavalry Division Artillery	Mar 75
2d Armor Division Artillery	Mar 75
III Corps Artillery	Mar 75
1st Infantry Division Artillery (—)	Mar 75
3d Armored Cavalry Regiment Units	Mar 75
25th Infantry Division Artillery	Apr 75
193d Brigade Units	Apr 75

TEC Lessons Completed
FDC:
- surveyed firing charts
- vertical control operator
- FDC computers records
- high burst registration
- MET + VE

Common:
RC-292
- tactical fm radios
- expedient early warning devices
- cover, camouflage and concealment
- calls for fire

The Media

With TEC, the emphasis is on the entire instructional system and media selection is only one part. Too often the emphasis in military instruction has been media-centered. This is particularly true in units where individual training is often presented by lecture. TEC II is using an audio-visual media to achieve these ends. The equipment includes: an audio-visual device, the Beseler Cue/See teaching machine; the TEC lesson with audio cassette, 8-mm film strip cartridge and student instructions; adjunctive materials (GFT, GST, etc.) to support active student participation; and headsets for multiple student environments. TEC increases learning reinforcement with multi-media techniques and self-paced instruction. Lessons can also be prepared in "audio only" format to simplify student hands-on learning with large items of equipment such as howitzers or vehicles. TEC lessons can be prepared in a printed format for use with correspondence courses and programmed texts or in other ways to highlight programmed instructional techniques in skill training.

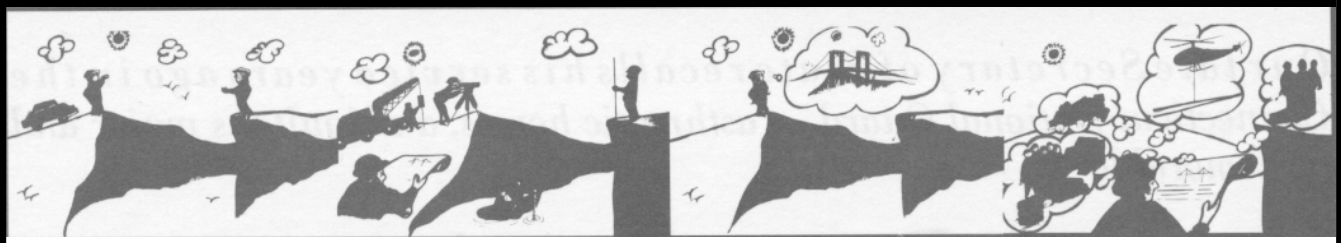
Instruction Procedures

Each TEC lesson contains Lesson Administrative Instructions (LAI) which provide training guidance for unit leaders. The LAI explains what will be taught, for whom it is designed, the materials and prior skills required to work the lesson and may contain a pretest for diagnostic use. For some lesson series the pretest and final test are contained in the final lesson itself. Student instructions are also included in the lesson package. These parallel the LAI in content for information the student requires to work the lesson. The lesson itself includes an introduction, objectives, learning activities and evaluation steps. Student activity is emphasized and learning motivation is increased by immediate reinforcement of answers. Finally, the student is placed in a close relationship with the lesson itself and is not placed in competition with others. TEC deemphasizes failure. If the student does not get the right answer the first time, he is encouraged to repeat the process.

Lesson Development

At the Field Artillery School, the skills and knowledges to be taught and mastered are defined by proponent resident instructional departments and task analysis personnel from the Doctrine Department. These are given priority by the USAFAS TEC Coordination Committee for lesson development. Subject areas are defined and performance training objectives are established by military and civilian TEC writers in coordination with CATB. Draft lessons are validated with soldiers from the target

The nine-step TEC development process.



population and the final lessons are distributed to units. Lesson effectiveness is measured by unit trainers through such performance indicators as improved skill proficiency, higher MOS test scores and mission accomplishment.

TEC is focused on a goal—trained soldiers. The TEC lesson itself forms the nucleus and only those teaching points required for mastery are addressed. The lesson development procedures encompass a philosophy which uses a systems approach to instructional design. This approach serves as the foundation for each lesson and also guides each service school in determining what subjects should be taught and how they should be presented in the TEC lesson. Unit feedback on the reaction to TEC, ideas for improvement, training effectiveness data and other information help make the system work. Lesson development can be illustrated by a nine step process which includes procedures for keeping the training program current.

TEC IS HERE

Many active and reserve component units, USAR schools and service schools already have TEC lessons, adjunctive material and audio-visual teaching machines on a test basis. TEC hardware has been prepositioned for issue to many more units, both in the US and overseas. The actual date TEC reaches each unit is based on the proposed TRADOC distribution schedule. The important point to note is that TEC is coming. Over 600 lessons are being prepared for the combat arms alone, of which 85 are 13B and 13E MOS lessons and 150 are common subjects lessons to be used by all combat arms branches. Upon initial issue of TEC to the unit, a CATB-user orientation will be presented to key unit personnel. This will explain the TEC System, its component elements and unit command actions required to help make TEC work. In addition, the 1975-76 editions of the Field Artillery Training Support Catalog (a new "one-stop" reference for all nonresident instructional material) will contain unit implementing guidance for TEC and listings of TEC lessons. By June 1975 the USAFAS Bi-Monthly List of Instructional Material will contain listings of new TEC lessons as they are produced.

Many methods of implementing TEC in units may be used with the eight sets of hardware issued to each battalion. Among the most widely used is the battalion learning center concept. This involves the allocation of a comfortable building or room with sufficient space to accommodate the eight audio-visual teaching machines, student working space and storage space for adjunctive materials. If desired, additional references for MOS training and test study may be provided. The facility should be managed under close unit supervision. In some units, which have widely dispersed batteries, battery learning centers with two teaching machines may be more useful. TEC can be used in section areas during training hours and in the orderly room at night or on weekends. Several units also have experimented with mobile learning centers in trailers or vans to insure full use of TEC in each battery training schedule. This also facilitates TEC use while in the field. The method used is largely dependent on the commander, his unit's environment and situation and the resources available. Innovation

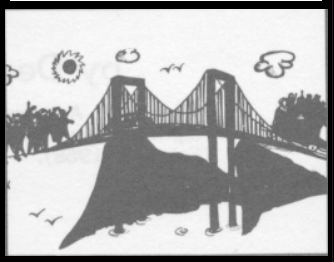
(Continued on page 38)

ORGANIZE MANAGEMENT

CONSTRUCT PROTOTYPES

TEST PROTOTYPES

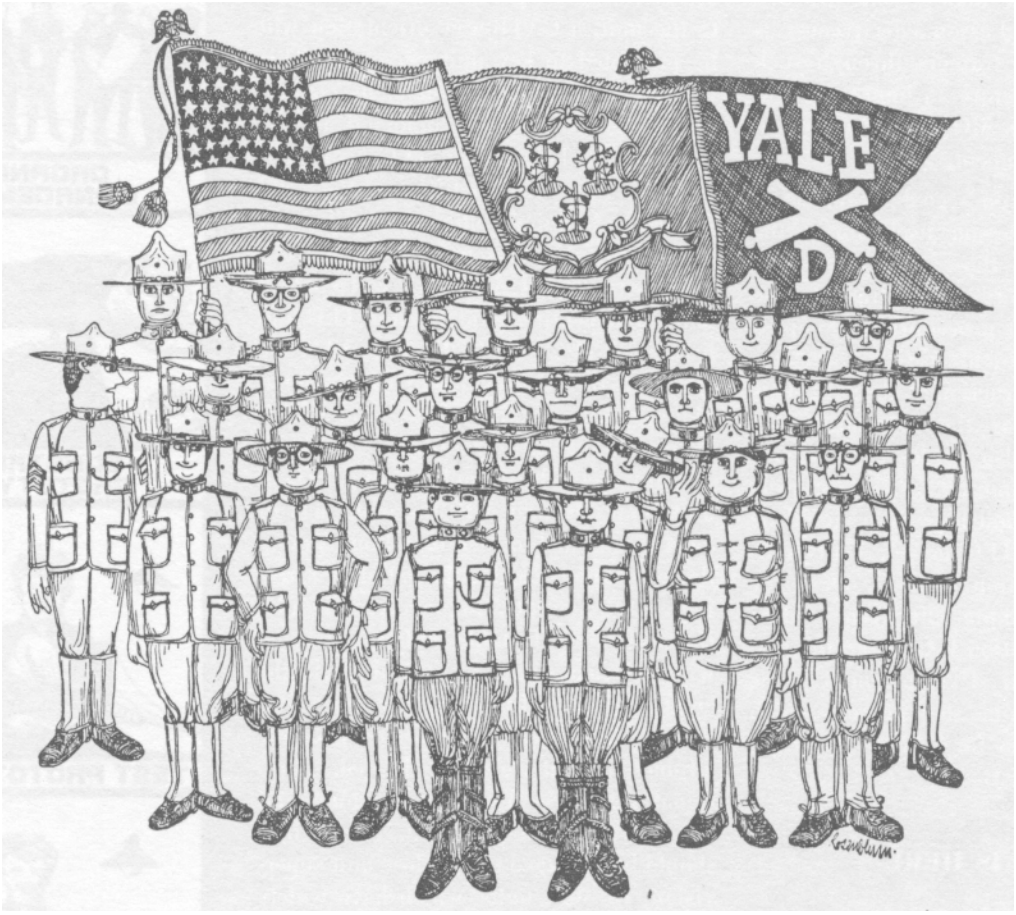
ANALYZE RESULTS



IMPLEMENT/RECYCLE

Our late Secretary of State recalls his service years ago in the Connecticut National Guard — asthmatic horses, a ubiquitous major and a memorable

Range Practice



by Dean Acheson

The calender has it that these events occurred nearly 50 years ago last summer [1966]. It is hardly more credible than that a thousand ages can be like an evening gone. But as President Lincoln said, "We cannot escape history." Nineteen sixteen was the year of the Wilhelm-strasse's amazingly successful plot to distract President Wilson's attention from the war in Europe by involving him with Mexico, of General "Black Jack" Pershing's invasion of Mexico in "hot pursuit" of Pancho Villa, after that worthy had staged a raid across the Rio Grande on Columbus, NM. Poor General Pershing never caught up with Villa.

But President Wilson caught up with the realization that the United States had no army. Improvising, he

called out the National Guard and mustered it into the federal service. This is where I came in. Having finished the first year of law school and being without plans for the summer, I was easy prey for the press gang in the form of friends in the so-called Yale Battery, Battery D of the Connecticut National Guard's Regiment of Field Artillery. In no time I found myself that lowly form of military life, a private and "driver" in the old horse-drawn field artillery. Garbed in a hilariously ill-fitting uniform and Stetson hat with its red cord, I made my small contribution to the gloriously unorganized confusion of our journey from New Haven to training camp at Tobyhanna in the Pocono hills of Pennsylvania.

None of our batteries had ever owned any horses. Those used in the evening drills in New Haven had been moonlighting, supplementing a more mundane daytime existence as brewery and dray horses. We would get our horses, so we were told, at Tobyhanna. They would come to us from the West—an interesting thought, this. Would we be, we wondered, the first bipeds they had ever seen? Our imagination was far inferior to the reality.

The first disillusion came on arrival. It was with mankind. We had been preceded by a New Jersey regiment which had, quite naturally, appropriated the best sites and everything movable. Our relations with them soon resembled those between colonial contingents in the Continental Army, meaning that had Hessians been handy, we should have preferred them.

Then came the horses. Those assigned to the New Jersey regiment arrived first. Words sink into pallid inadequacy. Our first impressions were gay: a vast panoramic cartoon of our enemy campmates in side-splitting trouble. Blithe horse-spirits from the Great Plains seemed to be enjoying a gymnastic festival, with inanimate human forms scattered around them. But the comedy was not to last.

Our horses emerged from their boxcars strangely docile. Only occasionally would an eye roll and heels fly or teeth bare in attempted mayhem or murder. No more was the landscape gay with mad scenes of separating centaurs. Over the whole camp a pall settled, broken only by asthmatic wheezes and horse coughs. Stable sergeants and veterinary officers hurried about with worried faces. The wretched horses had caught cold in the chill night mountain air, so different from that of their warm, free prairies. The colds had become pneumonia and contagious.

Then they began to die. One has no idea how large an animal a horse is until faced with the disposal of a dead one, and in the Poconos, where solid rock lies barely two feet under the surface! It was no illusion, to those whose picks drew only sparks, that the bodies of the deceased grew faster than their graves. Soon we were pleading with the sufferers to be of good heart, not to give up the battle for life; we put slings under them to keep them on their feet; tenderly gave them the veterinarians' doses; manned round-the-clock watches at the stables.

At just this time, far off in the higher echelons of the Army, some keen leader of men decided to raise the morale of the troops by inspecting them. The choice fell on Major General Leonard Wood, late a physician and Teddy Roosevelt's CO in the Rough Riders, then commanding the Eastern Department of the Army and soon to be Governor General of the Philippines and a presidential aspirant. At that time not even Alexander the Great would have impressed us, much less imbued us with martial spirit. We were sunk too deep in the horse-undertaking business.

A friend was doing midnight-to-four sentry duty at our stables. Lanterns bobbed and boots slid on stone as a party approached. Tearing himself away from the nuances of horse breathing, he shouted "Halt! Who goes there?" Back came the ominous answer, "The Commanding General of the Eastern Department." Rapidly exhausting his knowledge of military repartee, my friend ordered, "Advance to be recognized." General Wood stepped into the lamplight. The sentry did not know him from the mayor of Philadelphia, but the stars on his shoulders were enough, and, anyway, he had run out of small talk. He managed a snappy salute and the word "Sir!" which seemed safe enough.

General Wood took over. His examination brought out that the sentry was guarding the battery's stable, or part of it, and that the stable was, not surprisingly, inhabited by horses. He then sought to probe the vaunted initiative of the American soldier. "What would you do," he asked, "if, while you were on duty, one of these horses was taken sick?" For a moment the enormity of this question flooded my friend's mind, submerging all consciousness of military protocol. When he could speak, the outrage of it burst through. "Jesus, General, they're *all* sick!" (See "Yale Batteries" July-August 1974 *Journal.)* Like Bert Harte's Ah Sin, when the ace fell out of his sleeve in the poker game, "subsequent proceedings interested him no more."

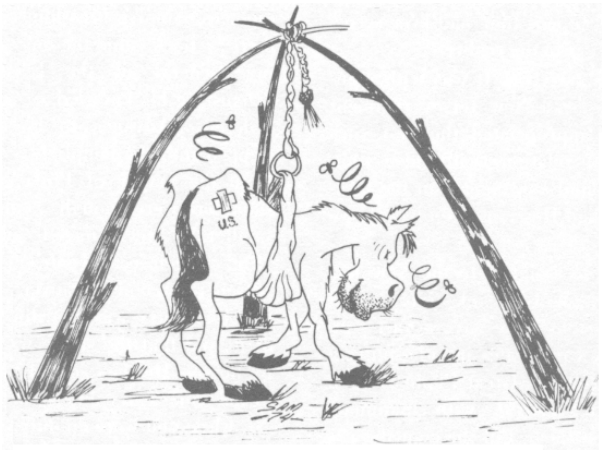
At the height of the horse crisis I was ordered to report to the captain's tent. General consensus recognized Captain Carroll Hincks as a good guy. A few years ahead of us at Yale, he had just begun to practice law in New Haven. He did his best to be a good soldier and a good battery commander. To say that his natural gifts lay in his own profession is no disparagement, since he was destined to become a highly respected federal judge, first on the district bench and later on the court of appeals.

The captain began—truth forces me to admit—with a

gross understatement, followed by an even grosser untruth. "You may be aware," he said, "of the dissatisfaction of the men with the food being served to them." Remembering the troubles of my friend at the stables, a simple "Yes, sir" seemed an adequate reply. To coin a phrase, the food was God-awful.

"Very well," he went on, "I'm going to give you a great opportunity." A clear lie, obviously. Captains did not give privates opportunities; they only gave them headaches. "You will be promoted to the rank of sergeant and put in charge of the mess."

A nice calculation of the evils before me would have required an advanced type of computer. In the descending circles of hell, horse-burial details were clearly lower than mess sergeants—closer to the central fire and suffering. Mess sergeants suffered only social obloquy. But redemption worked the other way. The horses might get well or all die. But those who became mess sergeants all hope abandoned. Corporals, even little corporals, might become emperors, but no mess sergeant ever got to be a shavetail. However, the captain had not offered me a choice; he had pronounced a judgment. "Yes, sir," I said again, and was dismissed.



As things turned out, life proved tolerable. One help was that the food could not get worse; another, that one of the cooks was not without gifts which, when sober, he could be inspired to use. It only remained to convince the regimental sergeant major that after the cook's Bacchic lapses the true function of the guardhouse was to sober him up, not to reform him. All in all, things began to look up. Although the very nature of the soldier requires that he beef about his food, the beefing in Battery D began to take on almost benevolent profanity. That is, until the major entered our lives.

In real life—if I may put it that way—the major was a professor, a renowned archeologist and explorer of lost civilizations, obvious qualifications for supervising regimental nutrition and hygiene. He turned his attention first to food. The rice we boiled, he correctly pointed out, seemed to flow together, in an unappetizing starchy mass. In the Andes, he said, they prevented this by boiling the rice in paper bags. Aside from the inherent implausibility of this procedure, it seemed to have no relation to the end sought. But the professor-turned-major showed no inclination to debate the point; and an order is an order according to the Articles of War. After all, it seemed to make little difference, since the bags, and even the hemp that tied them, simply disappeared into the gelatinous mass. But our customers found otherwise. They reported an indissoluble residue, impervious to chewing, soon identified as wood pulp. The major was the killing frost that nipped the tender buds of the battery's good will toward me.

Then came the matter of the disposal of the dishwater in which the men washed their mess kits. Neither regulations nor regimental headquarters had considered, much less solved, this problem. However, we in the cookhouse had. We simply tipped the barrel over a small cliff behind the company street. No one criticized this eminently practical solution of a practical problem until the major came along. He regarded it as unhygienic and again found the solution in Andean practice. There they had built fires within horseshoe-shaped, low stone walls and poured dishwater over the hot stones by the dipperful, turning it into a presumably sanitary steam. A ukase [order] was issued to the kitchen police. Sullenly they built the stone horseshoe and, after diligent scrounging for wood, the fire. Appalachian stone proved to be more heat resistant than the Andean variety. An hour's dipping hardly reduced the level of the dish-water and produced no steam. At this point the kitchen police, delivering a succinct statement of their view of the situation in general and of me specifically, poured the whole barrel of water over the fire, and signed off for the night. It was mutiny; but it was magnificent. Next morning, a new detail dumped the gruesome residue over the cliff. We resumed our former practice, leaving the stone horseshoe and a few charred logs as an outward and visible sign of the major's diligent attention to hygiene.

Realizing that the reader, like a court, must not be wearied with cumulative proof, I mention only the deplorable incident of the colonel's inspection and pass on. Lower officers did more than enough inspecting to maintain desirable standards. The colonel's perusal was rare and was of purely ritualistic significance. No one, least of all himself, looked for or would call attention to defects, not because they weren't there, but because it would have been embarrassing. It would defeat the purpose of the ritual, just as it would for a visiting chief of state, reviewing

a guard of honor, to point out a dusty shoe or a missing tunic button, or for the Pope, being carried into St. Peter's, to tell a cardinal that he had his hat on backward.

The major, however, lacked a sense of occasion. He seemed unaware that in ritual, form, not substance, is of the essence, that the officers attending the colonel were there as acolytes, not fingerprint experts. As the least of the acolytes, I joined the party at the mess hall and tagged along to the cookhouse. Everything shone. The cooks, sober and in clean aprons and hats, saluted. The colonel returned their salute and murmured, "At ease," as he turned to go. The major chose this moment to hook his riding crop under a large and shining tub hanging against the wall and pull it out a few inches. He might have been Moses striking the rock. A stream of unwashed dishes and pans poured out and bounced about. The group froze as the colonel looked hard at the major and then asked our captain and first lieutenant to see him at his quarters after the inspection. He walked on.

The first necessity was profanity. Little could be added to the already exhaustive analysis of the major's failings. The shortcomings of the cooks and kitchen police hardly exceeded primitive stupidity. My own problems were not serious. Some sacrifice must be offered on the altar of discipline—passes curtailed, pay docked and so on. But underlying opinion was clear. The real *faux pas* was the major's, and the colonel would see it that way—as he did.

Meanwhile the summer was passing. The horses' particular brand of pneumococcus seemed to lose its zest. As they recovered, they became more amenable to military discipline. Soon the drivers had the caissons rolling along; and the gunners grew proficient at mental arithmetic as they listened to the shouted numbers, twirled the wheels that moved their gun barrels and learned to push home dummy shells, lock the breeches and jump aside to avoid a theoretical recoil as lanyards were pulled.

South of the border the political temperature cooled as the days shortened. General Pershing came home empty-handed, rumors flew that the National Guard would be demobilized; but not before we had had a day of range practice, not before the effort and sweat of summer had been put to the test of firing live ammunition. Labor Day came and went. The mountain foliage began to turn, the blueberries to ripen on the hillsides. A few trenches were dug on a hill across a valley, enemy battery emplacements were simulated with plywood, notices were posted to warn berry pickers off the range on the chosen day. The major was posted as range officer to ride over the target area before firing began to ensure that it was clear.

On a glorious autumn morning the regiment set out for the firing position, a plateau some miles beyond our camp at the far end of the military reservation. On the parade ground the sight of the full regiment in formation was a moving one; but when Battery D brought up the end of the column of march and our rolling kitchen took its place at the end of that, martial spirit suffocated under a pall of dust. Not a breath of air moved it. Only a wet handkerchief over the nose and mouth kept lungs from filling solid.

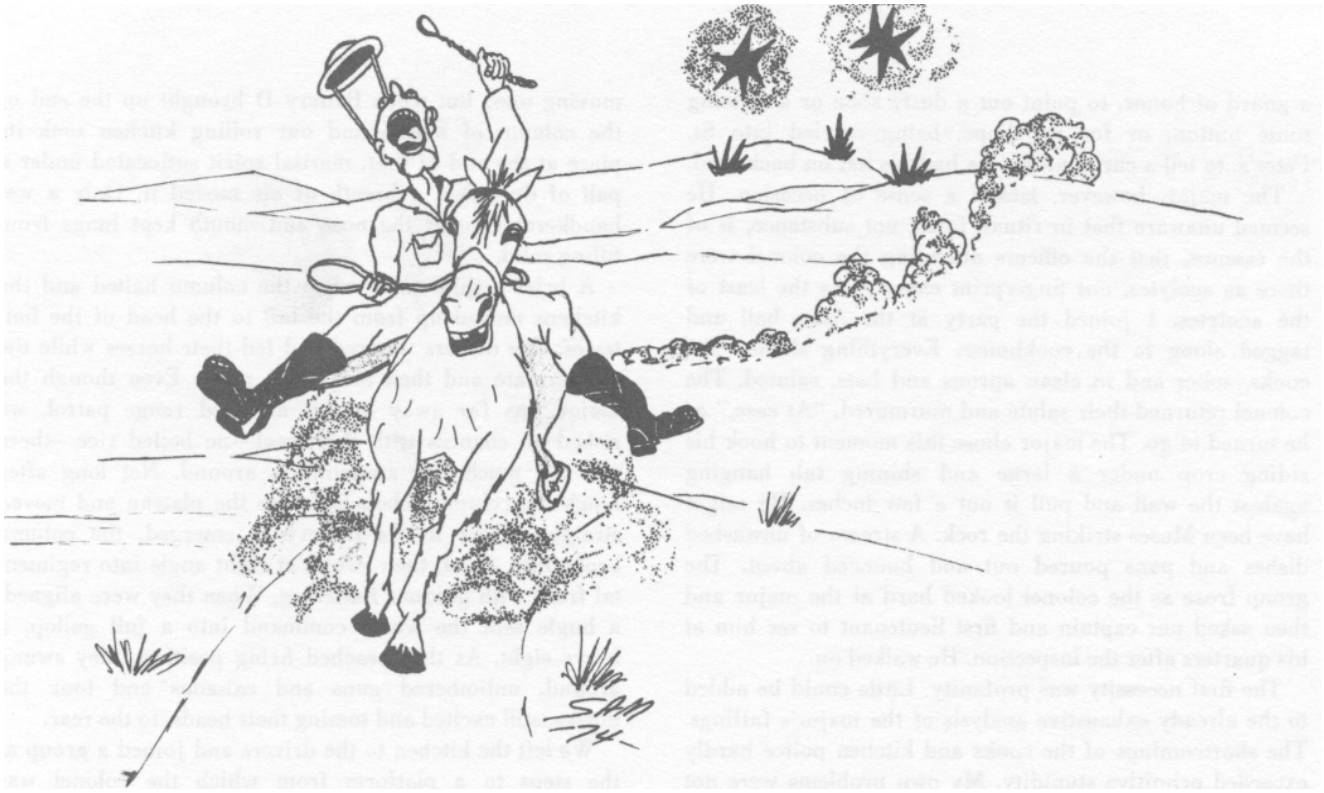
A brief respite came when the column halted and the kitchens moved up from the tail to the head of the batteries. The drivers watered and fed their horses while the gunners ate and then took their place. Even though the major was far away on his assigned range patrol, we risked no chances with that meal—no boiled rice—there was too much live ammunition around. Not long after lunch the column debouched onto the plateau and moved straight across it. As Battery D emerged, the column broke into a trot, then swung at right angle into regimental front with guidons fluttering. When they were aligned, a bugle sent the whole command into a full gallop, a brave sight. As they reached firing position, they swung around, unlimbered guns and caissons and took the horses, still excited and tossing their heads, to the rear.

We left the kitchen to the drivers and joined a group at the steps to a platform from which the colonel was observing the terrain through field glasses. The last preparations for firing had been completed, gun crews and officers shouted numbers as they computed distances, angles and elevations; wheels on the guns turned. The regulation procedure from here on was pretty conventional. One or two guns would fire a long and then a short—that is, on the first they would add to the estimated range, on the second, subtract. Having thus, hopefully, bracketed the target, they would split the difference, or make other corrections, and everyone would be ready for business.

The colonel turned to his second-in-command. "Range clear?" he asked with rising inflection. The words were repeated across the platform and down the steps. The words were picked up and rolled back as a receding breaker is by an incoming one. This time the inflection was reversed, assertive; not a question but an answer, "Range clear!" Then from the platform came the electrifying command: "Regimental salvo!"

The usual procedure might be conventional, but the colonel was not. He would start this exercise with a bang that few present would forget. In 16 guns shells were shoved home, breeches slammed shut; gunners jumped clear while lanyard sergeants watched for the signal. "Fire!" said the colonel. The resultant roar was eminently satisfactory. Some of the horses snorted and gave a plunge or two. The whole hilltop across the valley burst into smoke and dust.

About a mile our side of it appeared a separate source of dust bursts, moving toward us at great speed, touching, so it seemed, only the higher mounds. An order to cease



fire stopped the reloading, and field glasses centered on the speeding horseman. Word spread that it was the forgotten major. As he came nearer, he seemed to be urging the horse to greater effort. Panic or rage or both had clearly taken over. He would certainly gallop up flushed and breathing hard, fling himself from the saddle and run toward the steps shouting, "What damned fool . . . ?" One could see him, stopped by the colonel's cold stare, salute and stammer out, "Range clear, sir!" I didn't wait for the confrontation. The platform would soon be the scene of high words, possibly controversy, in any event, unpleasantness. It was clearly no place for a mess sergeant who belonged with his field kitchen.

For a few days much talk and questioning revolved about who said what to whom. Unfortunately I could not help with this since I had rejoined the kitchen group before the dialogue began and was quite as puzzled as the others about what had happened. Anyway, it was all forgotten in a few days when we broke camp for the move home and mustering out.

Years later I met the major again. We had both exchanged military titles for somewhat higher civilian ones. But although we were to see a good deal of one another, not always under the pleasantest circumstances, it never seemed to me that our relationship would be improved by probing the events of that memorable range practice.

(Continued from page 33)

close command attention and full integration of TEC into the unit training plan or SOP are the prerequisites for successful use of TEC by the troops. With this in mind, today's commanders need to become TEC oriented. Each unit commander should begin planning a unit environment that will enhance the TEC training program.

The payoff of TEC in improved job knowledge and MOS skill proficiency among junior enlisted personnel can be of invaluable benefit to the Army as well as to the Field Artillery System. The program will enhance the ability to deal effectively with the threat expected in tomorrow's combat on the modern battlefield.

CPT Orville B. Smidt, SC is an educational technologist in the TEC Division, and CPT Raymond E. Whitney, FA, is a TEC project officer, AWTSD. CPT Winn B. McDougal, FA, is Course Development Division Chief, AWTSD.

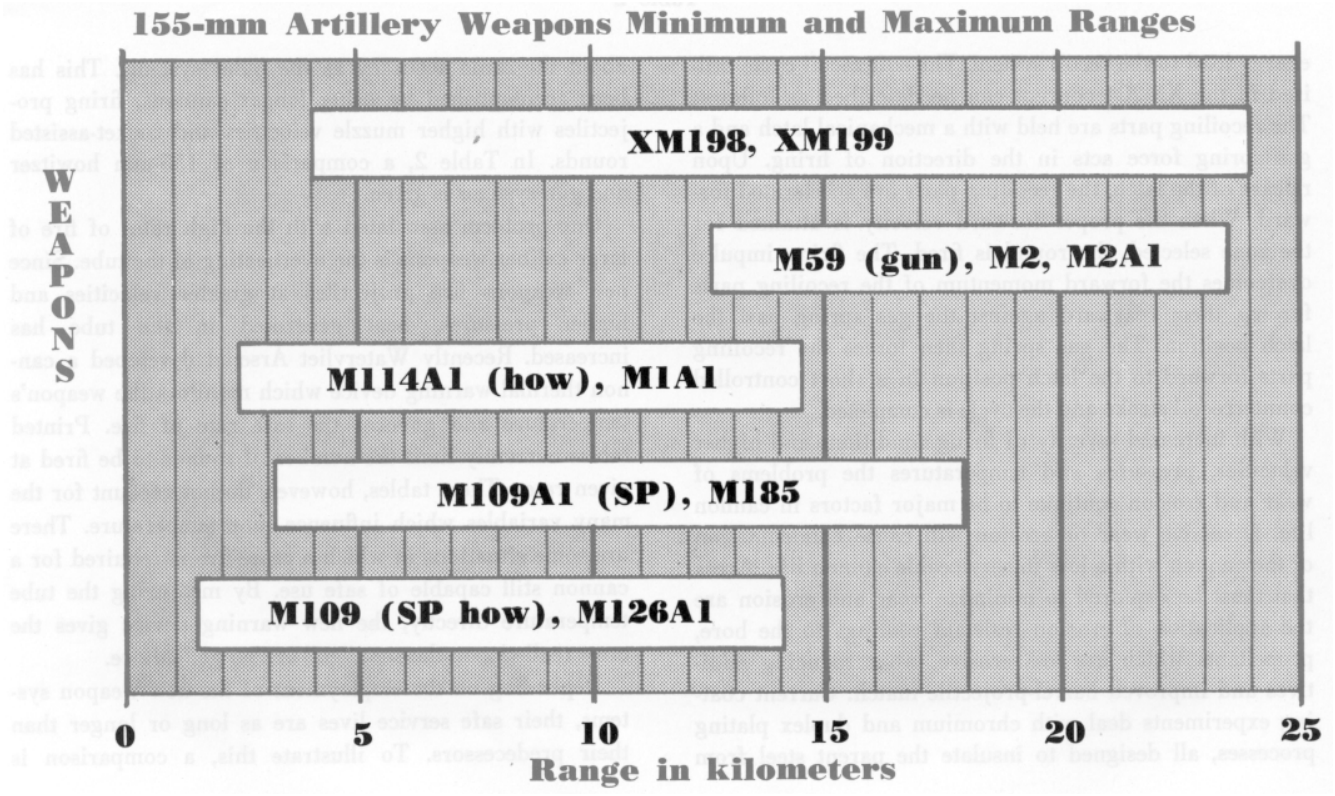
Engineering Developments in Artillery Technology

by 2LT Arnold M. Manaker

Significant engineering advances have been taking place in artillery weapon systems (carriage, propellant and cannon) for several years. Today, the US Army has howitzers and guns that out perform their predecessors in range, accuracy, rate of fire, service life, maintainability and reliability. The personnel of Watervliet Arsenal, NY, are responsible for some of these major cannon technology achievements that have been made and some of the problems that still are being solved (See "Arsenals," March-April 1974 *Journal*).

Range is one of the more important characteristics of an artillery system. In achieving extended range engineering problems must be solved: withstanding induced thermal and mechanical stresses, absorbing higher recoil energies, increasing muzzle velocities and improving erosion and wear characteristics which lead to longer cannon life. (The cannon being defined as the "shooting" part of the weapon, including tube [or barrel], breech opening and closing mechanism, firing parts and muzzle attachments.)

Consider what has been accomplished during the past several years in solving these problems. Just after the Korean War the development of lighter weight cannons for increased air mobility was emphasized. Requirements for higher muzzle velocity and longer ranges were also specified. To attain these specifications it became necessary to use very high strength materiels in the design of lightweight cannons. The constraints of availability and reasonable cost vied with physical characteristics in the materiel selection process. The materiel finally chosen is known as modified SAE 4330 nickel chrome-molybdenum alloy steel, commonly called "gun" steel. Its chemical composition reflects numerous studies and tests seeking the best combination of strength, toughness and ductility. To enhance the properties of the steel further, a process of vacuum degassing was applied to eliminate as many impurities as possible. With the use of SAE 4330 steel and vacuum degassing, modern cannon materiel can withstand greater thermal and mechanical stresses than ever before.



More recently, a fabrication process known as "autofrettage" has been applied. This operation consists of intentionally overstressing the bore of a tube to a predetermined value exceeding the yield strength of the tube, thus giving the tube greater plasticity. When the overstress is removed the bore retains some compressive stress, a desirable condition which resists the pressure generated during firing. Through prestressing the tube, the elastic working range is increased while the yield strength and hardness remain about the same. This means that more rounds can be fired before a tube reaches the condemnation limits. Tubes recently designed will wear out before reaching the fatigue life design limit.

At the present time, a new firing principle is being utilized for the 105-mm howitzer XM204. This new recoil system is called "fire-out-of-battery" and will reduce the energy load to the recoil system. The soft recoil cycle utilized in the XM204 concept can be described as follows: The recoiling parts are held with a mechanical latch and a gas spring force acts in the direction of firing. Upon release of the latch, the recoiling parts are accelerated forward. When the proper forward velocity is attained for the zone selected, the round is fired. The firing impulse overcomes the forward momentum of the recoiling parts forcing them rearward against the gas spring past the latch position. The gas spring then forces the recoiling parts forward to the latch position in a short controlled counterrecoil stroke and the cycle is completed.

With increased severity of firing conditions and higher velocities, pressures and temperatures the problems of wear and erosion continue to be major factors in cannon life. Excessive wear or erosion will cause condemnation of the cannon with a loss in serviceable cannon life. Areas that must be explored to minimize wear and erosion are the application of erosion resistant coatings to the bore, propellants which are less erosive, wear reducing additives and improved barrel-projectile match. Current coating experiments deal with chromium and duplex plating processes, all designed to insulate the parent steel from heat and abrasive attack. Composite barrels of exotic materials may appear in the future but they are now only in early developmental stages.

Engineering achievement at Watervliet and other arsenals have resulted in substantial improvements of artillery weapon ranges. The range of the XM198 covers that of the standard M114A1 howitzer as well as that of the M59 gun (Table 1). This newly achieved wide range capability has obvious advantages to both artillerymen and logisticians.

Concern for accuracy must come with the increased ranges of the new systems. Factors affecting accuracy of the system include stiffness of the tube, stability of the round in the tube and the interface between tube and projectile. The new weapon systems have the capability to deliver more lethal rounds over greater distances with about the same accuracy as the older systems. This has been accomplished by using longer cannons, firing projectiles with higher muzzle velocities and rocket-assisted rounds. In Table 2, a comparison of 155-mm howitzer and gun systems is given.

Comparison of PE/r as a Percentage of Range

Weapon	Cannon	Range (meters)	PE_r (meters)	Percentage
155-mm, Towed				
XM198	XM199	24,000	60	.25 – Predicted
M59	M2,M2A1	23,500	61	.26
M114A1	M1A1	14,600	55	.38
155-mm, SP				
M109A1	M185	18,000	45	.25
M109	M126A1	14,000	36	.26

Table 2

One problem associated with the high rates of fire of large caliber weapons is the overheating of the tube. Since new weapons fire projectiles at greater velocities and higher pressures, heat generated in the tube has increased. Recently Watervliet Arsenal developed a cannon thermal warning device which monitors the weapon's temperature and governs the safe rate of fire. Printed tables currently limit the number of rounds to be fired at given rates. These tables, however, do not account for the many variables which influence tube temperature. There are some situations in which a cease-fire is required for a cannon still capable of safe use. By measuring the tube temperature directly, the new warning device gives the crew realistic, on-the-spot "go" or "no go" advice.

Depending on the employment of the new weapon systems, their safe service lives are as long or longer than their predecessors. To illustrate this, a comparison is

Comparison of Cannon Lives of 155-mm Towed Weapons at Maximum Range

Weapon	Cannon	Range (meters)	Life (rds)
XM198			
1. Howitzer range	XM199	18,000	7500
2. Gun range	XM199	30,000	2500
M59	M2, M2A1	23,500	700
M114A1	M1A1	14,600	7500

Table 3

made of the 155-mm towed weapons in Table 3. When acting as a gun, the XM198 lasts three and one half times as long as the M59. When used as a howitzer, it equals the life of the M114A1. The XM198 achieves its ranges at lower pressures than any of its predecessors, thus experiencing less wear and greater life.

The breech and firing mechanisms of newer weapons have been designed with emphasis on maintainability. On the XM198 these parts have been reduced to 15 and 12 components, respectively. They are designed so that one screwdriver and two wrenches are the only tools required for maintenance in the field.

At Watervliet Arsenal the paramount concern in the manufacture of fine cannons is cost. There is as much effort devoted to design for produceability as is devoted for range or accuracy. Reduced fabrication times equate to reduced costs and more cannon in the field. Great strides have been made in reducing machining times as is shown in Table 4.

Although there have been significant improvements in artillery cannon technology, there is more work to be done. Engineers and scientists at Watervliet Arsenal are pushing the frontiers of technology to insure that cannon weapons will perform effectively and safely with increased mobility and improved longer range performance. The arsenal is proud of its contribution to the artillery community.

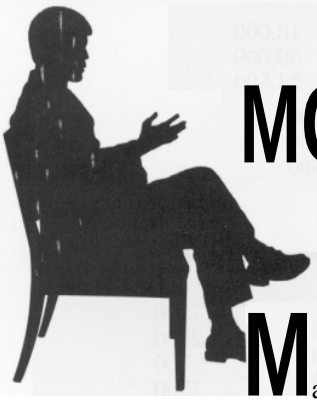
Production Fabrication

Caliber, Cannon	Machining Hours		Percent Reduction
	1962	1974	
105-mm M137	92	53	42
105-mm M68	124	82	34
105-mm M103	175	79	55
155-mm M126A1	124	108	13
155-mm M185	132(1971)*	114	14
175-mm M113A1	471	127	73

*The M185 was not manufactured until 1971

Table 4

2LT Arnold M. Manaker, FA, is a project officer at Watervliet Arsenal Research Laboratories Composite Material Group. He has a PhD in mechanical engineering from the University of Massachusetts.

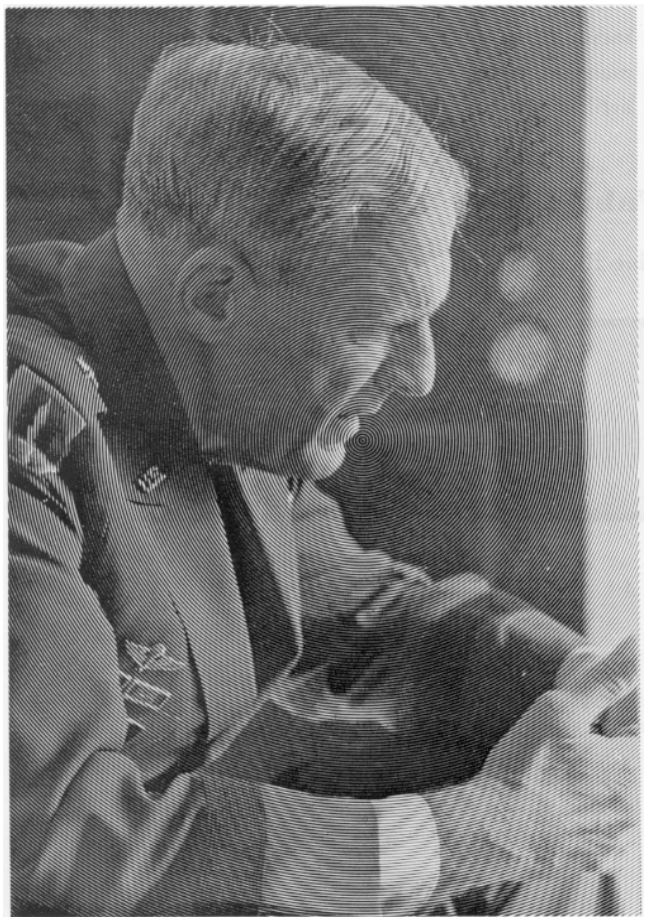


The Journal Interviews . . .

MG THOMAS M. RIENZI

Director, Telecommunications and Command and Control

Major General Rienzi, a native of Philadelphia, PA, was born in 1919 and attended Lehigh University prior to his appointment to West Point where he was graduated in 1942 as a lieutenant in the Signal Corps. He served with the 96th Signal Battalion during World War II and in May 1945 entered the Command and General Staff College. The General's commands include the 51st Signal Battalion in Korea in 1958, the 1st Signal Brigade in Vietnam in 1969 and the Strategic Communications Command, Pacific, in 1970. He has also served as the Commandant of the US Army Signal Center and School at Fort Monmouth, NJ. General Rienzi holds masters degrees in electrical engineering from the University of Illinois and international relations from George Washington University. He left Hawaii in 1972 for his present assignment as the Director of Telecommunications and Command and Control, Department of the Army, Washington, DC.



Journal: *General Rienzi, you have just completed two days of briefings here at Fort Sill, including discussions with both Major General Ott and Brigadier General Lewis. What are your impressions of the School's effort to update FA doctrine and materiel development in the light of the modern battlefield?*

Rienzi: What I have seen is really tremendous. The attitude that Generals Ott and Lewis have inculcated in the colonels, the sergeants and the junior officers here is just great. It is an attitude we need to make our modern Army go forward. I believe very strongly that General Ott has given the department directors their heads to push their piece of the doctrine to make the Field Artillery System better in every way.

I would suggest very strongly that in looking to the future and what we are going to do in that future, that we look at the lessons of the past. If we are going to look now at some new system we must first consider what happened in Vietnam and Korea. We must insure that we do not make the same mistakes in our fervor to move ahead. For example, in the communications arena I am really convinced that more effort and time should go into thinking about what the communication requirement of the future will be, rather than assume it will be something like we have today. For "way out" thinking, I can see the laser being used for point-to-point communications and I have not heard any ideas like that posed by the aggressive folks

who are here at the Artillery School. I am convinced there should be a close tie-in to the proponent of communications, the Signal School at Fort Gordon. There should be plenty of interface between the doctrine writers there and the doctrine writers here. I am also convinced that the Communications and Electronics Department of General Ott's school, who is the user's representative for how communications should work, should play a dynamic part in the communications requirements of the future artillery system.

Journal: *How does the new series of tactical radios fit into future communication developments?*

Rienzi: The new series is really important when you remember that the present series was made of transistor technology of the '50s and built in the '60s. By the 1980s all of these radios will be somewhere between 12 and 15 years old. They can be compared to a car that is 12 to 15 years old. With soldiers aggressively using them, they tend to wear out. You know, in Korea we went to a subminiature tube, from a tube that was two and one-half inches high to a tube that was only a half inch high. In Vietnam we used a transistor about the size of the top of a cigarette. Today, with large scale integrated circuits, we can put enough electronic components for a complete radio receiver on the top of a pinhead. With the dynamic systems I see the artillery producing, making the new series of tactical radios smaller is a must. As a consequence, just today [15 November], and I believe it has been signed by the Chief of Staff, we have approved a required operational capability for the new radio—instead of weighing 50 pounds, it weighs 15 pounds; instead of having a thousand channels, it has two thousand channels; and instead of being 10 percent secure, it is capable of being totally secure. We can expect to see this radio on the battlefield initially in the 1980s. Instead of that big box on the back of a soldier that attracts the sniper, it will be something the size of your protective mask or an ammunition pouch so anybody could be a radio operator. This is a must and I believe that it is my biggest job to see that this project comes to fruition.

I would hope in the next 30 days to have a task force assembled to begin the Army System Acquisition Review or Defense System Acquisition Review to produce this FM radio. I think it is the guts of the communications and command and control of our Army. That way you majors and lieutenant colonels will have the right radio on the battlefield if we have to fight.

Additionally, in the multi-channel arena where we are going to tie the higher levels of, for example, a corps artillery together, you just cannot do it on a single channel radio. Although the transmission systems we have today are good, the switching systems are manual and if we are going to interface with TACFIRE or if we want to switch something quickly on the battlefield, it will have to be done automatically or semiautomatically. This is a big push, with automatic voice, data and message switching we will not need as many soldiers. As a consequence, we will be reasonably able to offset the high cost of the equipment with a reduction in the number of soldiers. I could make an analogy with our long haul or multi-channel systems. To transmit from point A to point B, a distance of 100 miles, requires a relay every 25 miles with one system. With another system, every 100 miles you need a relay. I proved to myself that if you just get rid of one of those relays, you could buy a satellite terminal. So we must automate the long haul systems behind the divisions and get cheaper ways to get long haul communications, and it seems to be the satellite terminal.

Journal: *What impact will satellite communications have on artillery commanders?*

Rienzi: The tactical satellites are going to assist the div arty commander to communicate from his FSE or from one FDC to another division on the flank or to corps artillery in the echelons above division. The expanded battlefield of the Yom Kippur War stretched from the Golan Heights to the Sinai, a distance of 200 to 300 miles. To communicate over such distances with accuracy and reliability, you will have a ground terminal that fits in a jeep or that two or three men can carry. It will transmit 22,000 miles up to a synchronous satellite down to a place 300 miles away. This should give the artilleryman much more command control than he has today. Tying this system in with TACFIRE will allow this data to move automatically over greater distances with fewer soldiers on the battlefield. To move the commands from the White House for tactical nuclear weapons on the battlefield in Europe, satellites today need reliability in the European terrain or on any terrain where we might fight. The satellite terminal is the basis for giving us significantly better communications. I know it because we have tested it. This is the way to go for a communications system that will fit a fire direction system that can be worldwide, if it is needed, with missiles. For the tactical battlefield, with the corps and divisions of the numbers we have today, it is really the only way to go.

Journal: *How much concern should today's Redleg have in the area of electronic warfare?*

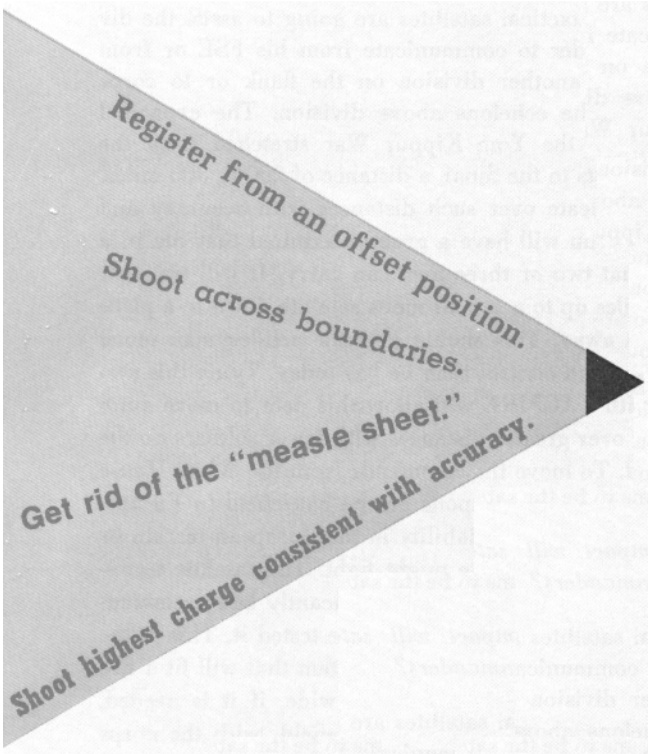
Rienzi: EW is on the battlefield today and anyone who does not practice countermeasures and counter-countermeasures and secure his transmissions and work around

(Continued on page 48)

on the Modern Battlefield

Evolving Field Artillery Tactics and Techniques

by BG Vernon B. Lewis Jr.
Assistant Commandant, USAFAS



New field artillery tactics and techniques being developed at Fort Sill may sound like utterances made by a field artilleryman who has just been drummed out of Snow Hall on charges of heresy. In reality, they are ideas being explored, developed and tested at the Artillery School—as well as Benning and Knox. The new maneuver tactics of overwatch and the proven threat of the Antitank Guided Missile (ATGM) have caused us to take a closer look at some of our doctrine which has been held sacred too long.

The new tactics and the new threat have dramatically changed today's perception of the modern battlefield. The maneuver elements are no longer satisfied with "two up and one back" and the field artillery can no longer be content with "move, shoot and communicate." The challenges resulting from our closer look demand major changes in field artillery tactics and techniques as they relate to this modern battlefield. These changes include improved fire planning, closer integration of fire support and maneuver element training, survivability and preservation of combat power, reduction of registrations and new thoughts on counterfire and target acquisition. The total approach has been to make field artillery a more effective and responsive part of the combined arms team.

Some believe the artillery's mission is to move, shoot and communicate. THEY ARE WRONG! Our mission is to provide close, continuous and timely fire support to the maneuver elements and to interdict and add depth to the battlefield.

To do this we must be able to move, shoot, communicate and acquire targets. In comparison with other fire support systems, field artillery (especially that in direct support) is always present—it comes early and stays late.

In Vietnam, field artillery was often accused of being

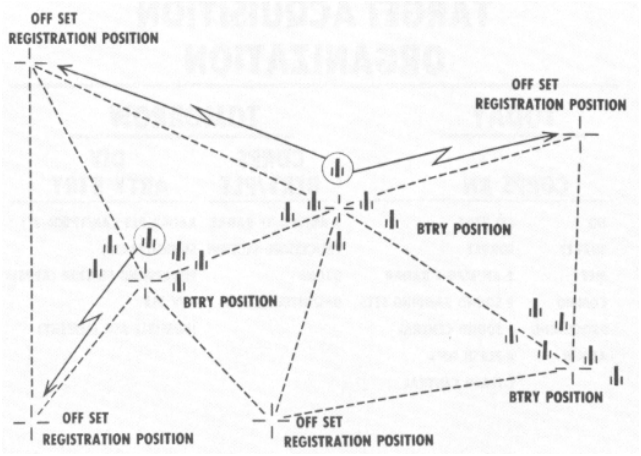
too slow and unresponsive. Some of these accusations were justified. In our zeal to achieve accuracy, we have often done so at the expense of precious time. Many people fail to understand that the more double- and triple-checks we crank into our process, the longer it takes to get a round off. Because our guns and fire control equipment are manned by humans, we must design our procedures to minimize human errors through safety checks at each link of the gunnery chain. Now we want to obtain the best of both worlds—faster response, but without a degradation in our concern for safety and accuracy. Our training will be directed to this end.

We believe that the fight will be won or lost at the brigade level or lower. Our most responsive fire support, therefore, has got to be focused through the direct support field artillery battalion and its reinforcing units. As a first step, we must beef up this direct support capability. Cannon battalions that normally work for corps artillery must become immediately responsive to the needs of the committed brigades. This can be done by attaching these units to division artillery for further assignment, as appropriate, in reinforcing a direct support battalion. This will in no way detract from the corps firepower, but rather will enhance its responsiveness. We can still shoot corps targets with procedures we have always used. We're simply loosening the strings to speed up the shooting.

One thing hasn't changed—the field artillery still offers the maneuver commander massive combat power through its ability to rapidly mass and shift fires about the battlefield. In order to mass and transfer, we have long advocated centralized control. We now believe that more of this control should be placed with the direct support battalion commander because he is with the brigade commander at the decision point of the battle. He needs to have his hand on the artillery throttle without having to go through a lengthy process of requests and clearances.

Our mission is accomplished through the field artillery system and, like any system, it can only function properly if each link in the chain does its job right, from target location to firing data computation to laying, loading and shooting the guns. This system must be linked with its greatest user—the maneuver commander.

The main link in the chain that connects the field artillery system to the maneuver unit company commander is the forward observer (FO). This young lieutenant must have a thorough understanding of the company commander's scheme of maneuver and tactics. He must be taught to appreciate terrain and he must have a thorough knowledge of the enemy's weapons capabilities and employment practices. Officer Basic Course instruction at the Field Artillery School (USAFAS) has been modified recently to produce a student more knowledgeable in offensive and defensive maneuver tactics, terrain appreciation and enemy weapons and tactics.



We have the smallest FO party of any army in the free world—a lieutenant FO, an E5 recon sergeant and an E3 RTO/Driver. Their future equipment will include the Fixed Format Message Entry Device for TACFIRE and a Laser Rangefinder. We have been testing size, procedures and missions of this FO team as part of the field artillery system at MASSTER.

In mechanized and armor units, we may find that we want to put the FO team in a Mechanized Infantry Combat Vehicle instead of just the FO in a tank as we do today. An FO in a tank is separated from the rest of his team and equipment. He is also using a very expensive combat vehicle with limited observation for transportation. If he acts as the tank commander to use the tank's weapons in the fight, then he neglects his FO duties. If not, then he takes the tank out of the fight. Neither is desirable.

The next most important link in the fire support chain is the fire support officer (FSO) who does most of the fire planning for the maneuver element. We recognize that our entire fire planning procedure needs a major overhaul. The system currently written in manuals and recently taught at USAFAS is just not responsive to the need for real time fires on the battlefield. This is one of our priority projects.

Fire planning beginning with the FO and passing through the FSO must be based on priority, not quantity. Gone are the days of the "measle sheet." We will plan sufficient fires to provide adequate coverage for the maneuver element, while still allowing for rapid dissemination of the fire plan and computation of firing data through the field artillery system. We want to discourage covering the map with targets. More targets do not make better fire plans.

The fire plan of the future will spell out in greater detail the parameters under which fire direction officers (FDO) in selected units can engage certain targets. It will take into account the enemy's target acquisition capability; it will give guidance on selectivity in shooting; it will specify

TARGET ACQUISITION ORGANIZATION

TODAY		TOMORROW	
CORPS BN		CORPS BTRY/PLT	DIV ARTY BTRY
HQ	(3) BTRY	2 AN/TPQ-37 RADAR	RADAR PLT (AN/TPQ36-37)
SURVEY	SURVEY	PROCESSING SECTION	SOUND (FAALS)
MET	2 AN/MPQ-4 RADAR	DRONE	PROCESSING SECTION (APPS)
COMMO	2 SOUND RANGING SETS	OPS/INTEL SECTION	RPV PLT
PROCESSING	1 SOUND CENTRAL		(POSSIBLE ASA ELEMENT)
ADMIN	4 FLASH OP's		
	1 FLASH CENTRAL		

dedicated batteries for advancing maneuver elements; and it will address moving and the hardening of positions. Planning and employment considerations for all fire support subsystems of the Field Artillery System will be outlined; more consideration will be given to the threat; and guidance will be provided on registration restrictions, air defense suppression, deception measures to confuse the enemy about field artillery positions, counterfire priority and suppression instructions, to mention a few.

The fire plan will outline the judicious use of our radars—when to turn them on, where to look and how to go about getting them looking at the right spot at the right time. We know that a radar, if left on too long, is going to be located. It only needs to look when somebody is shooting. In other words, our fire plans in the future will not be stereotyped as in the past. They will take more factors into account and give better guidance, and will do so in real time—with less paper.

We are working with the Infantry and Armor Schools to better train their young officers and NCOs in the essentials of fire support. We think infantry and armor officers need the same degree of training in the use of fire support because they may be the maneuver commander of a combined arms force on a given day.

We are all integrating the training of the combined arms team much better than in the past. In this regard, the requirement is long overdue for establishing training and testing procedures that force the interface of the maneuver and field artillery systems. This is a two-way street. For the field artillery, we must practice what we preach. We say our mission is to provide fire support to the ground gaining arms, yet in the past we have been trained and tested on our ability to move, shoot and communicate—in an environment void of maneuver elements.

Too many artillerymen have been concerned that the war might interfere with the gunnery problem. We've got to tie our training to the maneuver elements in a live fire environment. FOs and FSOs must be required to operate with their infantry and armor counterparts. The field artillery battalions must be able to respond to the needs of the maneuver commander; they must be able to shoot the fire plans prepared by the FSOs. At the same time, the ground gainers must learn how to better plan and handle their fire support. All of us must be trained and tested as we will fight—as a combined arms team.

ARTEP

TRADOC is publishing a new series of Army Training and Evaluation Programs (ARTEP) which hopefully will accomplish this training goal. The advanced levels of these ARTEP will force the combined arms team to train together, because to achieve a level one of readiness, each unit will be required to demonstrate its capability to function as a team member in a live fire combined arms environment.

Survivability

We are also working on several new concepts to enhance the survivability of our field artillery on the modern battlefield. In consideration of the Soviet target acquisition capability, we must assure the preservation of some of our combat power for that critical time when it will be needed to influence the outcome of the battle.

We believe that some batteries should be in hardened, dug-in, well-camouflaged positions to shoot targets of opportunity. The number and type of batteries hardened and firing only at selective targets, as compared with the number and type that move frequently to shoot at targets of opportunity, will be the option of the force commander. We hope to reopen the issue of earthmoving equipment in the field artillery TOE to enhance the rapid hardening of gun positions, particularly when batteries are forced to move frequently.

Deception is another area where we can reduce our vulnerability. Dummy positions can be prepared to deceive the enemy's aerial and visual reconnaissance. The Arabs used these very effectively in the Mideast War. We may occasionally fire one or two weapons from dummy positions, then rapidly move them out. Dummy fire missions over radios and the remoting of our actual radios will aid in misleading enemy monitors and electronic direction-finding equipment. The Israelis were successful in this area. Deception will have to be well thought out and coordinated between the artillery, maneuver forces and the Army Security Agency (ASA). Within the deception effort we must learn to deviate from our normal patterns. The only limitation in this regard is our imagination.

To confuse the enemy's ability to analyze our fires in his zone and to reduce his ability to determine the locations of our maneuver boundaries and artillery units, some artillery fires should come across boundaries from units located on the flanks. The extended range M109A1 and M110E2 howitzers, when combined with the efficiency of TACFIRE,

provide this capability. Firing the highest charge consistent with accuracy will reduce the possibility of detection by the enemy's counterbattery radar since lower trajectory projectiles with shorter times of flight are more difficult to pick up.

Registration

Registration of our weapons is another area in which major changes are taking place. The field artillery has traditionally registered from each new position area and the option of how often to register has been left up to FDOs. This practice will have to change. Furthermore, we have developed an offset registration system which pulls the registering gun out of the normal battery position and moves it to an offset registration position up to 1,000 meters away. A typical artillery battalion area will have three primary battery positions and several offset registration positions. The complete complex will be tied together with a closed survey of 1:1,000 accuracy. When our Position and Azimuth Determining System (PADS) becomes available, this entire survey can be accomplished in less than an hour. Through the use of the Analytic Photogrammetric Positioning System (APPS), a new calculating device for accurately locating points on a photo, we can locate registration points without survey. We'll no longer have to use road junctions and other readily identifiable prominent features that make it easy for the enemy to recognize what we are doing and to get shell reports on us. This procedure presents only a small gunnery problem and offers several advantages from the standpoint of survivability and deception.

We came a long way toward reducing our vulnerability due to registration requirements in July of this year when we adopted the ABCA (America, Britain, Canada, Australia) registration procedure to replace (effective 1 March 1975) the old fork-bracket method of registration. The ABCA technique is faster, uses less ammunition and is substantially as accurate as the old system. Since the need to reduce unnecessary firing is so obvious, we are working toward the eventual elimination of registrations. Our goal, now within the state of the art, is first round fire for effect accuracy.

The four things we must know accurately in order to hit a target are gun location, target location, muzzle velocity and weather. Currently our gun location is done by time-consuming manual survey. The new PADS will all but eliminate the need for position area survey and will give us an instant readout of location and direction as it traverses the terrain. Target location will be more accurate with the introduction of several new target acquisition devices—new radars, remotely piloted vehicles (RPV) and the APPS. Presently our muzzle velocity (MV) problems are partially solved by our slow and inaccurate calibration procedures. The introduction of a velocimeter to each firing battery should resolve this difficulty. This will give us real time MV each time we fire. To complete the met plus VE picture, the new AN/UMQ-7 MET Data Sounding System should provide more accurate weather data every hour by means of a computerized data link.

By introducing real accuracy into the four areas of unknowns and nonstandard conditions, we will be able to achieve that goal of first round fire for effect without registration and our accuracy will be diminished only by the statistical probabilities associated with dispersion. As a bonus, our vulnerability to enemy counterfires will be lessened by reducing the number of rounds we shoot.

Counterfire

We've also been looking at some new counterbattery/countermortar techniques. USAFAS is firmly convinced that both the countermortar and counterbattery functions, which we refer to as counterfire, belong down in the division. Experience and war gaming tell us that corps artillery is too far removed from the problem, by both time and distance, to effectively run a counterfire program.

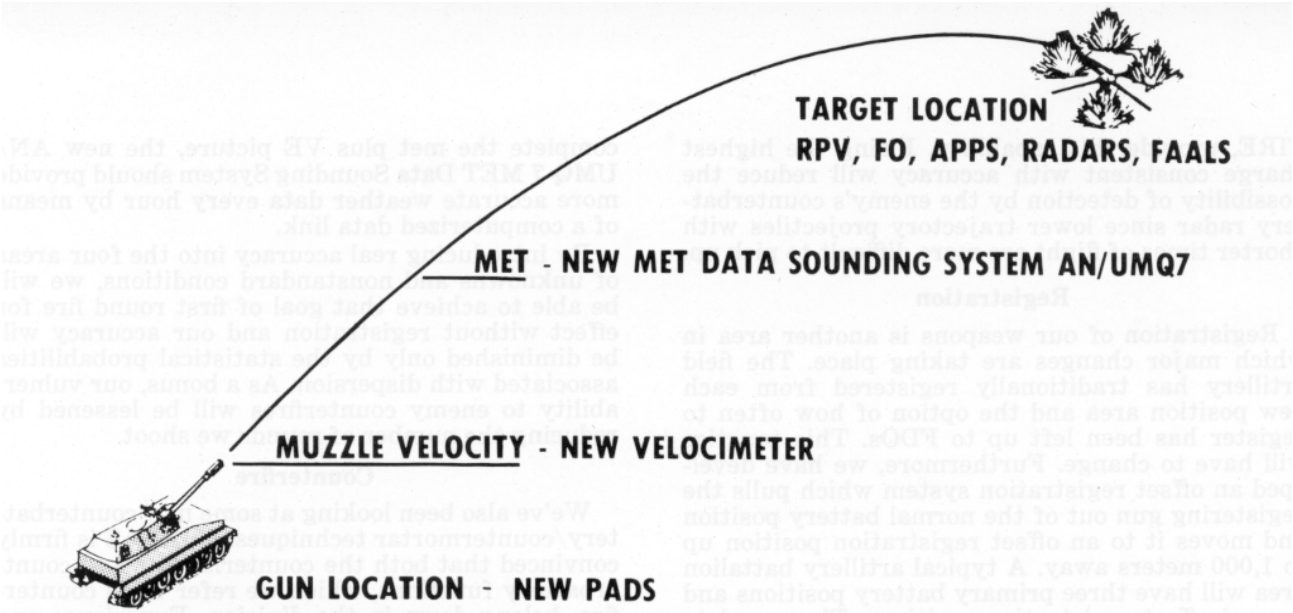
We want to apply the same careful judgment to counterfire techniques as we do to registrations and the other missions already discussed. If the enemy fire is not hurting us, we may opt to locate him and not attack—like us, he'll move if he knows he's located. When we do activate a counterfire program, we will have to do so in coordination with ASA efforts to jam the enemy locating radars.

In the new counterfire concept, all our target acquisition resources, as well as our artillery and mortar weapons, will be triggered by the direct support battalion or by the brigade or maneuver battalion FSO—those who can most accurately and rapidly assess the location and severity of the enemy fire. Additionally, division artillery will be able to quickly turn on all assets in the division sector.

Target Acquisition

Just as the counterfire responsibility needs to be in the division, so do target acquisition assets. We are proposing a target acquisition battery in each division artillery and the elimination of the target acquisition battalion in corps artillery. This division artillery target acquisition battery will be just that—an outfit that can acquire targets. It will be organized so that the radar platoon will have all the target locating radar, the sound ranging platoon will have the interim sound ranging systems and ultimately the Field Artillery Acoustic Locating System and the processing platoon will have the APPS. The battery will eventually have an RPV platoon and an ASA element can be added to give us a real time radio intercept and jamming capability for counterfire purposes.

The equipment in these platoons will be centralized or decentralized according to the needs and situation. Centralization by TOE will enhance training, teamwork and maintenance. On the battlefield the target acquisition elements will go



where they can best serve the needs of the direct support battalion.

Survey, meteorological and FO functions will leave target acquisition to become the responsibility of the S3. These functions are oriented more toward operations than target acquisition. This will leave pure target acquisition assets involved with a counterfire processing center at division artillery which will be more responsive and flexible.

To provide for more sophisticated systems at corps artillery we are proposing a target acquisition battery or platoon to replace the target acquisition battalion. This outfit would concentrate on identifying deeper targets, such as the enemy's rocket launchers, which must be found before they shoot. It would be meshed closely with the intelligence community, other services' targeting agencies and the joint or unified command targeting system.

The field artillery community recognizes more than ever that the battle is fought within the division. We are reorienting toward supporting the brigade level maneuver elements. Techniques for suppression, improved fire planning, integration of fire support and maneuver training, along with survivability of combat power, reduction and eventual elimination of registrations and new counterfire and target acquisition techniques—all contribute to a field artillery system designed to give more responsive fire support on the modern battlefield. We recognize and are proud of our role in the combined arms team and will continue to develop new and better methods and procedures to insure that we can accomplish our mission in support of the ground gaining members of that team.

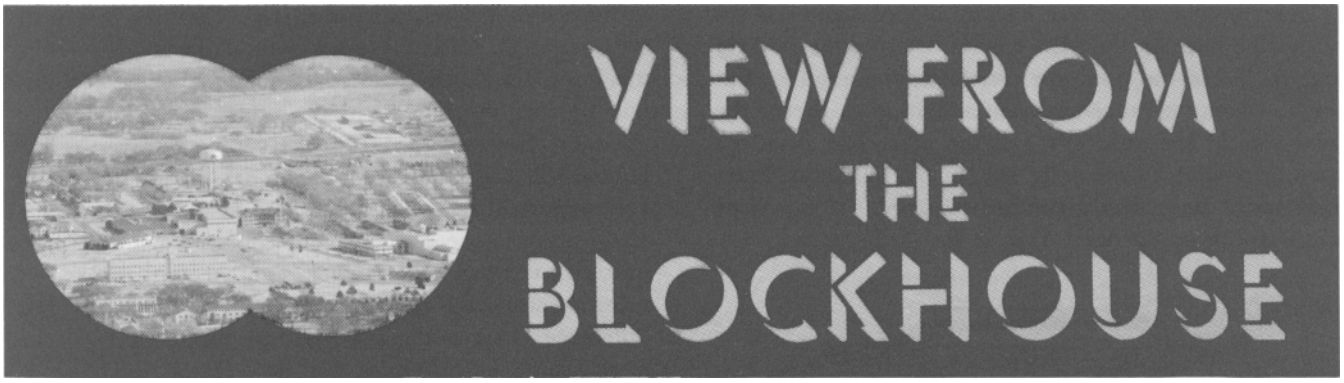
RIENZI

(Continued from page 43)

jamming is going to be a dead fellow. There is no doubt that in the early stages of the Yom Kippur War, when transmissions were made by a pretty hardened army, the Israeli Army, in the clear, that the Egyptians homed in on them. Within a short time there were artillery rounds on that commanding officer. EW is keyed to the future of our artillery and you must remember that you will not have full freedom to transmit in the clear whenever you desire. You must pay attention to all the facets of countermeasures, counter-countermeasures and support measures. I am talking about such things as deception, and they better be in your plan as well as the communicator's plan.

Journal: *Do you have a final message for our readers?*

Rienzi: I am very attracted to the Field Artillery School and to what General Ott and General Lewis are doing in the way of command, control and communications. The aggressive attitude and free thinking I see is very helpful. The training attitude of producing signal officers who will serve in artillery units is very heartwarming to me. So I say, keep it up and push like heck and we communicators will push with you to make a significantly better fire control system that can support the combined arms team of which the Signal Corps is a part. If we must fight in the future, we will have a system that can go anyplace and deliver firepower on the battlefield accurately—when we want it, where we want it. That is my message and I hope that I can be invited back a year or so from now to see the progress and bring to you here what progress I see in Washington as to where our great volunteer Army is going in the future.



On the Level–Forget the Plumb Line

"Level the trunnions but forget about the plumb line!"

What's this? Any gun crew knows the trunnions must be level to conduct accurate fire control alinement tests. And the one sure way to level the trunnions has been to track a plumb line. But plumb lines, places to attach them and calm weather are not always easy to find—especially in the field. Now, however, there is another method available to M109/M109A1 howitzer crew members. They can use the plumb line once to accurately scribe the M15 quadrant, then they can level the trunnions any time, anywhere. The procedure has been developed by the Review and Analysis Division of the Weapons Department, USAFAS, in conjunction with Frankford Arsenal, Philadelphia, PA.

The items necessary to scribe the quadrant are three 10-ton jacks, a cord line at least 22 feet long with a half pound weight, a three to five gallon can of water or waste oil, some paint, a brush, a sharp knife, a straight edge and an M1A1 calibrated gunner's quadrant.

To prepare the plumb line, drive the M109/M109A1 howitzer on a firm, dry base, as level as possible, with sufficient space in front of and above the tube for the line. Attached to a fixed object, the line must drop at least 22 feet so it can be seen while elevating the howitzer tube through a 600-mil range. Put the weight, tied to the end of the line, in the bucket of oil (water will work but oil is best since its thickness holds the weight steady). Hang the line where there is little or no wind so it will be taut during the test. The end of the tube should be within 12 inches of the plumb line.

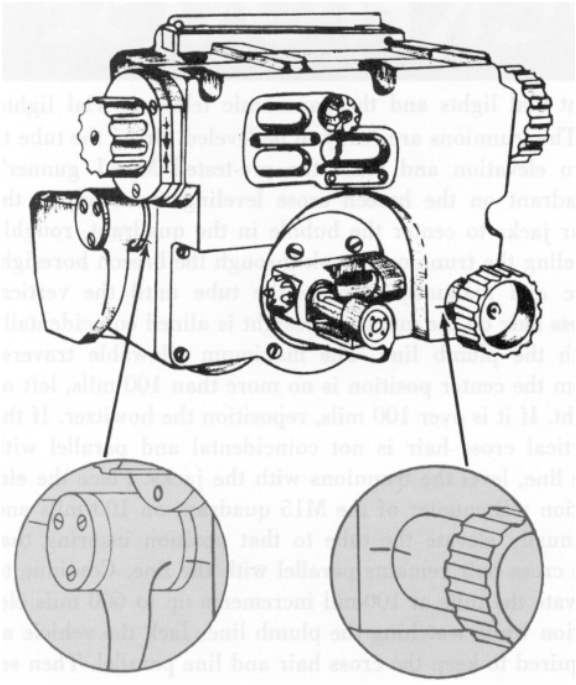
Place one jack under the howitzer's front chassis so the carriage will tilt evenly when raised with either of the rear jacks. Fasten the cross hairs to the muzzle boresight. Release the howitzer travel lock, open the breech and install the breech boresight disc in the tube chamber. Release the cab traverse lock and turn on the M15 quadrant vial lights and the panoramic telescope vial lights.

The trunnions are ready to be leveled. Bring the tube to zero elevation and place the pre-tested M1A1 gunner's quadrant on the breech cross leveling seats, adjust the rear jacks to center the bubble in the quadrant, roughly leveling the trunnions. Look through the breech boresight disc and manually traverse the tube until the vertical cross hair on the muzzle boresight is alined coincidentally with the plumb line. The maximum allowable traverse from the center position is no more than 100 mils, left or right. If it is over 100 mils, reposition the howitzer. If the vertical cross hair is not coincidental and parallel with the line, level the trunnions with the jacks. Place the elevation mil counter of the M15 quadrant on 100 mils and manually elevate the tube to that position insuring that the cross hair remains parallel with the line. Continue to elevate the tube at 100-mil increments up to 600 mils elevation while watching the plumb line. Jack the vehicle as required to keep the cross hair and line parallel. Then set the elevation mil counter of the M15 quadrant on zero mils. Depress the tube to zero mils and watch the plumb line. Continue to elevate and depress the tube until the vertical cross hair remains parallel and coincidental with the plumb line from zero mils to 600 mils elevation. When it does, the trunnions are level!

To check the M15 quadrant, place the elevation mil counter on zero; place the correction counters on zero; and center the cross level vial bubble. Manually elevate or depress the tube until the bubble in the elevation vial centers and the tube is at zero elevation. The elevation counter and the correction counter should still read zero. Set the elevation mil counter to 600 mils and elevate the tube to 600 mils. Closely observe the cross level vial bubble. The bubble must not move over two graduation marks from the center of the vial. (If it does, the quadrant may be defective, so discontinue the test and notify your maintenance unit.) Set the elevation mil counter to zero mils and depress the tube to zero mils. Again observe the cross level vial bubble. If it has not moved over two graduation marks during elevation and depression of the

tube, you are ready to scribe the mount.

To scribe the mount take a sharp bladed knife and cut two scribe lines on the M15 quadrant, using the straight edge to insure the lines are even with one another. Cut one line from the range quadrant mounting bracket to the front side of the quadrant. Cut the other line from the cross level knob to the other side of the quadrant. Paint these scribe lines with a contrasting paint. (Note: Wipe off the excess so the paint dries in the scribe lines.)



The M117 panoramic telescope (pantel) and the M145 pantel mount are used to verify the accuracy of the scribe marks on the M15 quadrant. With the howitzer still on jacks, place the tube at zero elevation and center the cross level and pitch level vial bubbles. Look through the eyepiece on the pantel and rotate the telescope. Choose a well-defined aiming point moving from left to right. Record the reading that is on the 6400-mil azimuth counter. Set the quadrant elevation counter on 900 mils and elevate the tube to 900 mils. Center the bubbles in the cross level vial and the pitch level vial. Look through the eyepiece on the pantel and find the aiming point again moving the telescope head from left to right. Record the reading that is on the 6400-mil azimuth counter. The difference in the readings on the 6400-mil azimuth counter at zero mils and 900 mils elevation is the amount of error in the pantel sight mount. Record this reading as you will need it later.

To verify the accuracy of the scribe marks move the howitzer off the jacks. If you are in the field, be sure to emplace the spade. Place the elevation mil counter on zero and manually elevate or depress the tube until the bubble in the elevation level vial is centered. The tube is now at zero elevation. Carefully aline both scribe marks on the quadrant and slowly traverse the tube manually as someone watches the bubble in the cross level vial on the quadrant. Somewhere during the 6400-mil traverse, this bubble will center and the trunnions will be level. It is very important that the bubble be centered exactly. Once again perform the pantel mount check. When you have finished, compare the pantel sight mount error you recorded while the howitzer was still on the jacks. The difference between the two error readings must not be more than plus or minus one mil. If the difference is greater, repeat the procedure again to be sure there were no mistakes, and if it is still greater, contact your maintenance unit. If the readings are within the tolerance, the trunnions can be leveled in the field any time by using the scribe lines.

Now that you know how to scribe the M15 quadrant and how to use these scribe lines to level the M109/M109A1 trunnions, you can say goodbye to the plumb line. Fire control alinement tests can be performed accurately, in much less time, under any field conditions. In the near future, the technical manual and the field manual for the M109/M109A1 howitzers will contain the scribe procedure.

Dial-A-Scholar

An innovative technique of instruction has been introduced into the Field Artillery Officer Advanced Course (FAOAC) electives program at USAFAS. It was a conference telephone call to a professor at the University of Illinois: a telephone amplifier and two roving microphones had been installed in a Snow Hall classroom allowing the students to talk directly to the professor.

According to the instructor who coordinated the call, CPT Earl Guy of the Tactics and Combined Arms Department, the technique provided the students several benefits: It allowed them to talk directly to a member of the academic community whose writings the students had read; it added credibility to the instruction; and it contributed toward mutual understanding between the professor and members of the military.

The students, from FAOAC 3-74 and 1-75, were enrolled in the elective "The Military and United States Society" and they spent an hour talking to Professor Roger Little, a sociologist and former Army officer, about a wide range of current military/social issues.

Since the call was such a success, plans are to make at least one such call to a prominent civilian or military figure in a related field each time the elective is offered. Possible uses in other areas are also being explored by USAFAS.

Boresighting Device To Retire Test Target

US Redlegs worldwide will be happy to hear that the cumbersome and time-consuming plywood test target used in boresighting will soon go the way of catapults and horse-drawn artillery.

Development and testing of new boresight devices are underway for all cannon systems with the M102 howitzer alinement device, M140, and mounting bracket scheduled to be fielded by April 1975. The Weapons Department (formerly Materiel and Maintenance Department), USAFAS, in conjunction with Frankford Arsenal, perfected the device and bracket.

The operating procedure itself is simple: In a matter of seconds, one member of the crew can attach the T-shaped device to a bracket mount, insuring that the dovetail of the alinement device locks into the dovetail of the mounting bracket. Place the cannon at zero elevation and level the panoramic telescope mount by centering the bubbles in the cross level and the pitch level vials. Aline the cross hairs of the telescope with the M140 alinement device using the azimuth counter knob and the mount's cross level knob. Final cross hair alinement is obtained by operating the telescope's azimuth knob for direction and elevation. With the cross hairs of the telescope and M140 alined, the telescope mount pitch level bubble centered and the tube at zero mils elevation, the azimuth (upper scale) reading should be 4800 which boresights the weapon. If a reading other than 4800 is obtained, adjust the boresight adjustment shaft in the same manner as would be done with the test target method.

Not only does the device eliminate the need for the cumbersome test target apparatus but it incorporates a radioactive luminous source for night sighting requirements.

Testing is underway for the M109A1 device and is scheduled in mid-January for the 175-mm and 8-inch howitzers. Upon successful testing, these boresight devices and mounting brackets will be fielded.

A Redleg boresights his M102 howitzer with the new M140 alinement device. (Photo By Harvey Kennedy)

NCOES View from the Blockhouse

The most recent honor graduates from the last basic and advanced Noncommissioned Officer Education System (NCOES) courses at the Field Artillery School are: SGT Robert L. Grunert, FA Cannon Basic Course 2-75; SP4 Archie L. Huie, FA Missile Basic Course 1-75; SSG J. D. Satterfield, Tactical Electronic Equipment Maintenance Course 1-75; SP5 Lawrence B. Wigton, Combat Surveillance Target Acquisition Basic Course 1-75; SSG Dennis G. Chiodini, Combat Surveillance Target Acquisition Advanced Course 1-75; SFC Mike Salazar, FA Missile Advanced Course 1-75; SFC James W. Mitchell Jr., FA Cannon Advanced Course; and SFC Gary C. Cook, Tactical Electronic Equipment Maintenance Advanced Course 1-75.

Input from the students and faculty indicates that there is still a good deal of misinformation concerning the NCOES program. Students are arriving at Fort Sill with the impression that the courses are MOS producing. This is wrong! The purpose of the courses is to prepare the individual to assume the duties inherent in the higher enlisted grades. The emphasis in NCOES is on overall professional development as opposed to teaching the basic techniques and fundamentals of the respective MOSs. Only a brief review of the fundamentals is provided. Records of the registrar indicate that students who have not been working in their MOSs have a much greater rate of failure. Instruction is presented in three general areas: Career Management Studies, General Army subjects and MOS subjects. The MOS instruction presented consists, for the most part, of advanced techniques and skills required by the supervisor within the various MOSs. The nomination of an unqualified individual is unfair to him and other members of his class.

Commanders are enjoined to ensure that individuals who are nominated to attend NCOES have the background as well as the MOS experience required by each specific NCOES course.

Marine Instruction

"We consider Fort Sill the 'Home of the Marine artilleryman,'" says COL Karl N. Mueller, US Marine Corps Representative to the Field Artillery School.

"The Marine Corps and the Field Artillery School have had a long and productive relationship," Mueller emphasized.

Recent Department of Defense consolidation moves have led to the centralization of all formal Marine artillery training at Fort Sill.

More than 900 Marine officers and enlisted men will be trained at Fort Sill this fiscal year in a variety of artillery

subjects. The instructor staff at the School has been reinforced with 24 Marine officers and nine enlisted men who are assigned to the various academic departments to instruct both Marine and Army personnel.

In addition to normal instruction, four special Marine courses have been established at the School. The four-week Special Career-Level Artillery Advanced Gunnery Course provides technical fire direction training to Marine officers who have not attended the FA Officer Advanced Course. The four-week Marine Scout Observer Course prepares enlisted men to function as part of the forward observer team. The Marine Fire Controlman Course trains corporals and below in the principles of technical fire direction. The Marine Artillery Operations Chief Course trains an NCO to assume duties as direct support battalion operations chief.

"It's really a pleasure for us to be here at the heart of the field artillery community," Colonel Mueller concluded.

"ARTEP"

Throughout the Army, the service schools are preparing a new series of training documents called ARTEP—Army Training and Evaluation Program.

The purpose of the ARTEP is to outline a program of training and evaluation for a unit and establish easily identifiable and meaningful training/evaluation standards. The tasks outlined in this series of documents are to be performance-oriented with specific conditions and standards for each task.

The concepts behind ARTEP are: combined arms execution; different levels of proficiency which correlate with readiness condition; train and evaluate the total unit capability; increase the emphasis on fire planning, survivability, tactics and techniques required on the modern battlefield.

The combined arms execution is extremely important. The field artillery must train and then be evaluated just as it will fight—in the combined arms environment. Maneuver participation in the FA ARTEP can range from CPX play to the entire maneuver unit in the field, but more participation by the maneuver units will better the training and evaluation environment for the field artillery unit.

The ARTEP concepts must be considered in light of today's training environment. It is a "real world" fact that training dollars are under close scrutiny along with the rest of the budget. The current version of AR 350-1 provides guidance concerning decentralized training management to the level of battalion and separate company/battery. The ultimate in performance-oriented training will prevail when the field artillery is totally integrated and compatible with the maneuver elements of the combined arms team in accomplishment of the primary maneuver missions of "Movement to Contact, Attack, Delay and Defend."

The guidance under which the ARTEP was formulated stressed a modular concept which would allow flexibility in training as well as in evaluation. The document must be usable by both active and reserve component units to permit a common training and evaluation standard. The levels of performance identified in the ARTEP are directly related to your unit readiness condition REDCON 1, 2 and 3.

The ARTEP will be more of a challenge than the present ATT/ORTT. The unit will be placed into a realistic situation through an innovative and demanding scenario which will test fully its abilities to support the maneuver arms. The scenario must reflect local maneuver and support requirements.

The ARTEP provides the commander with the flexibility to demonstrate his initiative and react to a tactical situation. For example: Registrations are not required but should be accomplished as necessary to maintain firing accuracy. The units will have to do more than "put rounds in the box." More emphasis is given to survivability, fire planning and tactics. Time standards are more demanding. Rapid response to the fire support requirements of the maneuver units is a predominant requirement.

The first ARTEP was written for the 155-mm SP Direct Support Battalion of the Mechanized/Armored Division. This document is now going through a series of validation steps which are intended to purify and polish it before it is fielded.

One battalion at Fort Carson was evaluated in November 1974 using the initial Test Version of the ARTEP, and a battalion at Fort Hood was evaluated the first week in December. The results of these evaluations will be the basis for adjustment and refinement of the document. Additional active duty unit training and evaluation will be accomplished at Fort Carson this spring using a revised version of the document. Two reserve component battalions will undergo training and evaluation during summer training this year.

The approved version of this first ARTEP will serve as the format for the rest of the family of ARTEP. A fully validated and useful document for the DS 155-mm battalion will be ready for the field by fall.

The combat environment of the future dictates that field artillery doctrinal employment be dynamic and forceful. The performance orientation of the future family of field artillery ARTEP will encompass this thinking

and inject it into the training environment by stressing more comprehensive and demanding standards of performance, agility of maneuver and ability to survive. This article is designed to make you aware of the programs. A future issue will give you a complete and comprehensive look at what an ARTEP is and how it differs from our current series ATPs and ATTs.

USAFAS Training Circulars

The analysis of the Arab-Israeli War has caused the US Army to take a close look at its doctrine for fighting on the modern battlefield. The FA community is in the process of changing its concepts to support new offensive maneuver doctrine as well as participating in the development of defensive doctrine.

The need for this new doctrine is so urgent that we cannot afford to conceptualize, define, test, redefine, retest and finally publish FMs. We are trying to paint a fast moving train and our paint brush is the test edition training circular (TC). The TCs published in the next year will eventually be incorporated into a new FM 6-20 and FM 6-40.

These TCs will have a combined arms flavor and will be developed in concert with the Infantry and Armor Schools to insure that the ideas advanced will accomplish the mission—responsive fire support for the ground gaining arms.

In November 1974, USAFAS distributed its first training circular, TC 6-20-1 (Draft Edition)—FA Suppression of Direct Fire Weapons. Additionally, 15 circulars are being produced on a priority basis with the first three TCs to be published by the end of March 1975: The Dedicated Battery for Suppression, 6-20-2; Modern Gunnery Techniques, 6-40-1; Firing Battery Operations, 6-50-1; Field Artillery Tactics for the Modern Battlefield, 6-20-3; The Threat and How To Counter It, 6-4-1; Counterfire-Suppression of Indirect Fire Weapons, 6-20-4; Smoke, 6-20-5; Fire Planning, 6-20-6; Fire Support Coordination, 6-20-7; The Forward Observer, 6-40-2; Survey Operations, 6-2-1; Air Defense Suppression, 6-20-8; How To Train in Target Acquisition, 6-121-1; How To Train a Communication Section, 6-10-1; and How To Train a Firing Battery, 6-50-2.

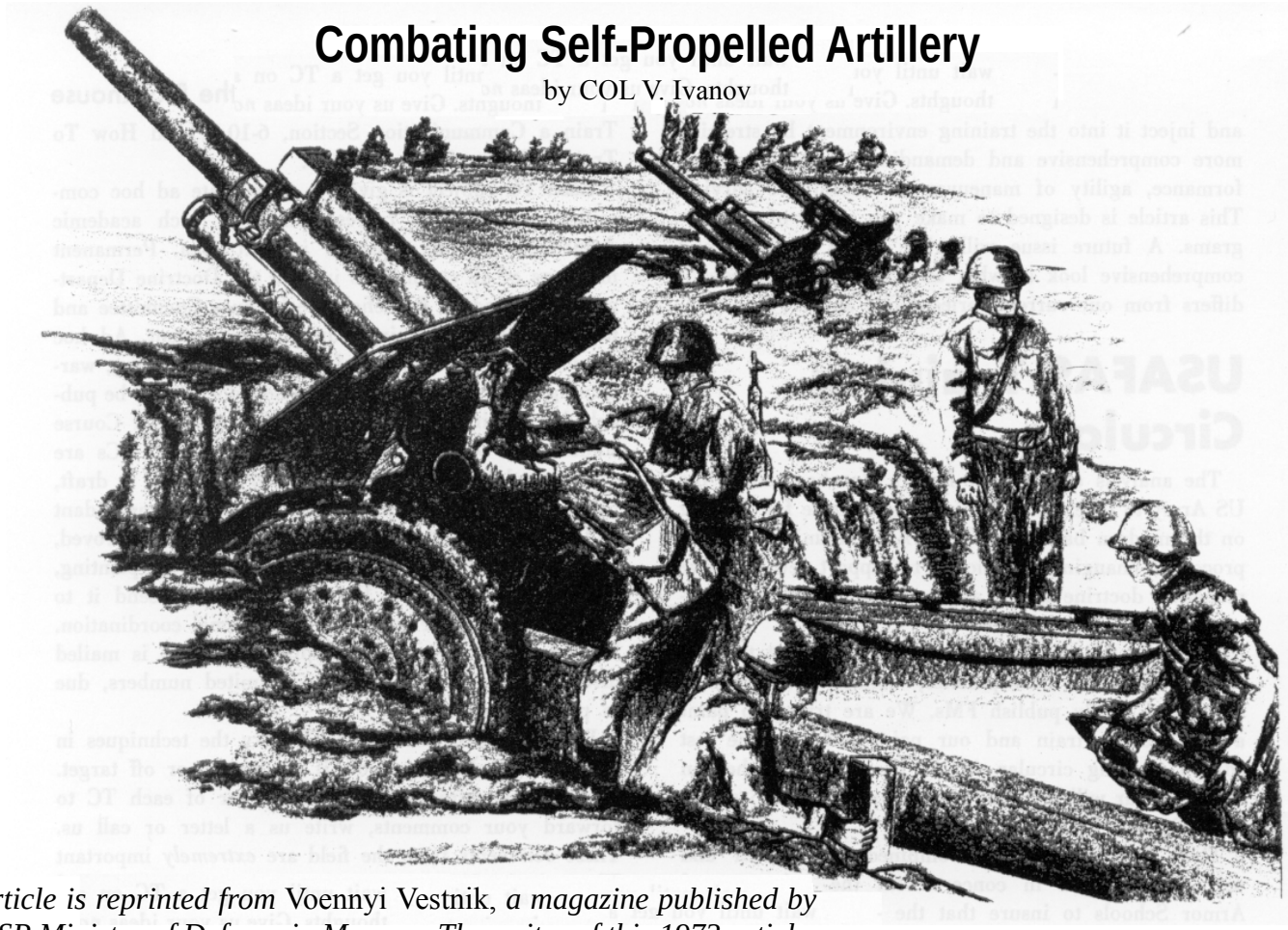
Each TC subject is given to a separate ad hoc committee composed of representatives of each academic department having expertise in that area. Permanent members of all committees include the Doctrine Department, the Modern Battlefield Techniques Committee and the Army-Wide Training Support Department. Ad hoc committee members devote full-time to researching, war-gaming, evolving and writing the new doctrine to be published in their TC. Some of the FA Advanced Course students are working on these subjects. Draft TCs are coordinated with all departments and approved, in draft, by the Executive Committee (the Assistant Commandant and all department directors). As a draft is approved, simultaneous actions are taken to prepare it for printing, incorporate it into the FA curriculum and send it to Fort Benning and Fort Knox for informal coordination. Forty-five days from draft approval, the TC is mailed directly to units in the field—in limited numbers, due to printing constraints.

We ask you to take these TCs, try the techniques in your units and let us know if we are on or off target. Use the pre-addressed card in the rear of each TC to forward your comments, write us a letter or call us. These comments from the field are *extremely* important We can't develop new concepts in a vacuum. We need the best thoughts of all field artillerymen to develop valid procedures for support of the maneuver forces on the modern battlefield. The climate for change is right. Don't wait until you get a TC on a subject to express your thoughts. Give us your ideas *now!* You may also perceive the need for training circulars in other areas. Let us know the subject and provide a brief scope for contents as well as any detailed concepts you may have developed. TCs are published by the Department of Doctrine, USAFAS. Comments concerning them should be addressed to: Commandant, US Army Field Artillery School, ATTN: ATSF-DOC-DL, Fort Sill, OK 73503; or phone AUTOVON 639-4902/6304. Your ideas concerning new concepts are also solicited and may be mailed ATTN: ATSF-AC-MBT, or phone AUTOVON 639-5103/5562.

USAFAS is very involved in modernizing our doctrine—and we need you to get involved, too.

Combating Self-Propelled Artillery

by COL V. Ivanov



This article is reprinted from Voennyi Vestnik, *a magazine published by the USSR Ministry of Defense in Moscow. The writer of this 1973 article, Colonel Ivanov, is a regular contributor to* Voennyi Vestnik. — *Ed.*

The methods of counterbattery bombardment have become complex with the change in artillery tactics involving the introduction of self-propelled guns, mobile control points, hydroscope navigation, equipment and means of topographical survey, radar and computers. Self-propelled guns and mortars are notable for their mobility and maneuverability, and their vulnerability is not great. It was not without reason, for example, that the Americans tried in the poorly accessible regions of Vietnam to replace the insufficient maneuverability of towed guns by using the fire positions of helicopters.

Local wars have proven that the tactics of self-propelled artillery are notable for great flexibility because it is possible to approach the position quickly and secretly and to decrease sharply the time for staying at it. Sound masking is provided by battery fire of battalions from various directions and by fire of roving guns (platoons, batteries).

Each officer-artilleryman must master the art of combating enemy self-propelled artillery. Unfortunately, in the practice of training exercises this task is not always resolved competently and the pecularities of use of self-propelled batteries of a probable enemy are not completely taken into consideration.

A very important and necessary condition for the successful destruction of self-propelled artillery is precision and quickness of opening fire. Here is a very simple calculation: Up to five minutes are needed to deploy it (at a prepared position, even less). For the destruction of one target, the battery can expend 100-150 shells (average expenditure against a target in mobile combat) in four to six minutes. A total of two to three minutes is required to detect the target, determine its precise coordinates, prepare effective fire and reliably destroy it. The task, as we see, is highly complex.

Of course, we have cited the most "optimum" calculation of operations of a self-propelled battery. In the end these guns were created not to "jump" from one position to another. Their advantages consist in their capability to support infantry and tanks with "fire and wheels" in mobile battle. Therefore, they, of course, will not begin to change position to the detriment of support of the infantry and tanks. A self-propelled battery can effectively

be located at one fire position for 30 to 40 minutes and more. In our opinion, we must proceed from this in organizing counterbattery bombardment.

It requires the coordinated work of reconnaissance and fire subunits, faultless coordination and physical fitness of the gun crews, steady communications, precise accuracy of computers and scrupulous calculation of all firing conditions.

During the Great Fatherland War [World War II], the Soviet artillerymen accumulated rich experience of combating mobile targets. Here is one of the examples about which MG (Arty) P. Nikitin spoke.

In the spring of 1942, the Hitlerites delivered a 210-mm gun on a flat car from Bryansk to the region southwest of Sukhinicha and, maneuvering along the tracks of the railway junction, fired on our troops at maximum ranges. The sound ranging was unable to locate the target (due to the great distance), aircraft also did not give its coordinates and the poor weather and intensive fire of antiaircraft facilities interfered.

The fire of the long-range gun caused many troubles. The troops suffered losses. During one of the shellings at the army command post, K. K. Rokossovskiy, then commander of the 16th Army of the Western front, was wounded. In order to cover the ill-fated target, LTG I. Kamera, chief of artillery of the front, allocated 300 large-caliber shells (this was a period of the most severe limitation on ammunition). The aiming circles were carefully adjusted at all the artillery observation posts. They began to send to the headquarters of army artillery the reading and time of location of the firing batteries of the enemy. In their processing it was disclosed that the directions to the especially bright flashes intersected in the region of the railway cutting convenient for the disposition of a mobile battery and its camouflage from the air. To destroy the target they prepared the fire of a corps regiment and, when it again revealed itself, they laid down a powerful artillery bombardment. No more 210-mm shells burst in the dispositions of our units.

This is how important it is to evaluate correctly the new developments in operations of enemy artillery and oppose them in time with one's own methods.

The three elements of counterbattery bombardment are reconnaissance, fire control and coordination.

Reconnaissance

In organizing reconnaissance, it is necessary to consider that the firing positions of the self-propelled artillery be brought near to the forward edge of their troops. Usually they are located at ranges of four to eight kilometers for a battery of 203.2-mm howitzers; three to five kilometers for 155-mm howitzers; and six to eight kilometers for 175-mm guns. Depending on the conditions and the nature of their terrain, they, of course, can be greater or less. The distance of the mortar positions from the forward edge is usually not great and does not exceed one to three kilometers. A self-propelled battery, as a rule, occupied a static region where a firing position, a fire control command post, an ammunition depot, transport, etc., are located.

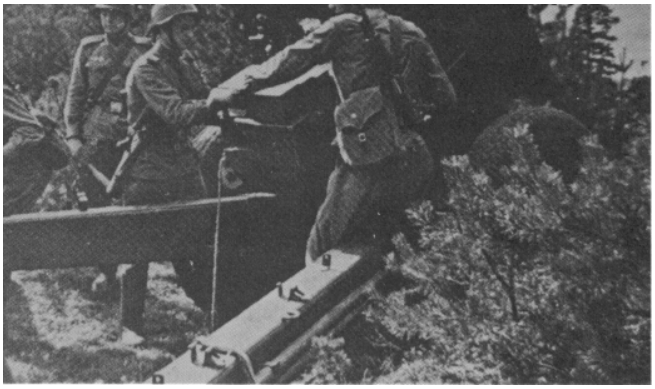
Assigned besides the main region are several alternate regions, one of which can fulfill the role of an assembly area. The battery is located here before receiving its firing task, and from here it advances to the region of the main position or, when necessary, conducts fire. Thus, depending on the nature of the terrain, the disposition of the targets and the conditions for observation, the self-propelled batteries can be maneuvered in a quite large range of distances from the forward edge and along the front. Therefore, it is important to direct reconnaissance means toward the disclosure of several positions of one battery. This is not an easy task. Quite recently the main reconnaissance indicators of firing positions involved the presence of materiel. Characteristic of self-propelled batteries, as has already been noted, is movement toward the firing position immediately before carrying out the firing task. Therefore, besides the well-known revealing signs (glare, glow and sound of shots, sand and smoke above the firing positions during the day, and reflections), attention should be paid to detail in the conduct and operations of the enemy, in the nature of engineering work, etc.

"Therefore, it is important to direct reconnaissance means toward the disclosure of several positions of one battery."

Thus, in the system of static areas of self-propelled batteries, groups of topographers can be observed, as well as the commander's personal reconnaissance and various operations of engineer equipment.

Further, individual firing positions or their regions can be designated in the course of training or maneuver of self-propelled batteries and by characteristics of preparing the routes and of supplying the ammunition. (They can accumulate early at the firing position. We cannot count on the enemy expending shots just from the battle stowage of the guns.) For this purpose it is necessary to observe carefully the movement of a column and of individual vehicles, especially at night.

The static regions of self-propelled artillery are also disclosed on the basis of tactical analysis. It is necessary here to consider that in broken terrain self-propelled



D-20 152-mm gun howitzer.

artillery is tied more to the roads, and in the open steppe and desert all of its unevenness will be used for shelter of elements of the combat formation.

The transfer of self-propelled batteries on dry ground is revealed by a train of dust as are the landing areas of helicopters which can be used for reconnaissance of firing positions, supply, evacuation and checking on combat service.

We will note one more instance. The subunits of self-propelled artillery have a large number of radio and radar sets. The latter are located in the immediate vicinity of the firing position of one of the forward batteries (a distance of three to five kilometers from the forward edge). In comparison with other data, the data of radio and radar reconnaissance permit disclosure of the regions of operation of the self-propelled artillery. Indeed its maneuver must be preceded by operation on radio networks and enemy artillery radar can reveal itself. All this permits the correct aiming of its reconnaissance and duty batteries (battalions). This is why the battalions conducting the counterbattery bombardment must maintain communications with the subunits of radar reconnaissance.

It is also necessary to consider the characteristics of disposition of the combat formation of a self-propelled battery. Its guns, depending on the nature of the terrain, can be located "on line," but more frequently in "diamond formation," in "wave," in V formation, in the form of a circle, etc., with intervals of 30-50 meters and more.

". . . subunits of self-propelled artillery have a large number of radio and radar sets."

Passability and mobility give them advantages in the use of natural cover. The self-propelled batteries will often be located behind ridges and in ravines (in space which cannot be struck by flat fire of our artillery). The engineer equipment of the positions can also be highly varied. On defense, for example, some of them can have concrete shelters. If the return fire of the enemy side becomes dangerous, the guns are concealed in them or are taken to an alternative position.

It is more convenient to conduct reconnaissance of such positions from mobile (roving) observation posts, searching scanned areas, and to select firing positions when possible in such a way as to provide flank fire. In this case, battery dispersion will be distributed along the entire front of the target. Self-propelled batteries can also be located for common fire especially if the enemy side has supremacy in artillery and aircraft, one platoon 300-400 meters from one another. In order to hamper the work of sound ranging, they conduct salvo fire. For this purpose fire can be conducted at maximum ranges, as well as fire from the flanks, by several batteries from various directions ("star battery"), etc. In certain cases the batteries

"In order to create confusion regarding their true disposition, dummy firing positions can be equipped."

(especially "roving"—on defense) can operate by troops and be located at intervals of 500-600 meters. When one platoon conducts fire for 5 to 10 minutes, the second is located in readiness. When the second one opens fire, the first one is shifted to the next firing position. Often used for ranging and control is the fire of the "operating guns" at a distance of 500-800 meters from the main position.

The mortars occupy firing positions by sections, "on line," and the roving guns are usually deployed directly on the routes of movement.

In order to create confusion regarding their true disposition, dummy firing positions can be equipped. Inflated models of "self-propelled vehicles," disguised as genuine, are set up at them. They are simulation of fire of the real batteries. This, of course, makes the conduct of reconnaissance even more difficult. This is why it is important to find indirect indicators which confirm that the target is authentic.

The large arsenal of deceptive methods which hinder reconnaissance, detection and the receipt of precise target coordinates requires careful selection of the lines of deployment of subunits for artillery reconnaissance, as well as planning of reconnaissance from helicopters of the regions not observed from ground observation posts.

Sound Ranging

Sound ranging still is the most effective means of detection. Besides determining the coordinates, it also provides the creation of registration points and the control of fire

for effect. The modern equipment of sound ranging stations has permitted a considerable decrease in the time for deploying them and an increase in accuracy of operation. However, this is insufficient to combat self-propelled artillery. Therefore, it is necessary to introduce broadly a short base and rational methods of processing the results of the ranging, and, mainly, to organize carefully the coordination of sound ranging and firing subunits, in which case there must be direct communication between them. Also effective is the joint disposition of posts for processing flash spotting and sound ranging, warning posts of batteries and battalions. Unfortunately this is not always possible, in particular, in mobile battle. Positive results on open and not severely broken terrain are produced by the use of stop watches for ranging the firing batteries and correcting fire against them.

Thus, receipt of the necessary data on self-propelled batteries provides only active, constant, timely and reliable reconnaissance. Not one means here is universal and replaces the others. Each one is used successfully only in specific conditions and must be supplemented with others, because from the moment of detection until the use of the self-propelled battery quite a small portion of time can expire. Meanwhile, data on the target must arrive successfully, be subjected to analysis and lie at the basis of the decision. Hence, reliability of the results of reconnaissance is insured only by the painstaking collection, processing and tactical and technical analysis of all data.

The time of fire activity of the target, the coordinates and the nature of fire are compared. The nature of the terrain, the regions, the methods and types of fire and the number of repeated ranges are compared.

The characteristics of the self-propelled guns and the increase in their firing range require a careful qualitative analysis of the artillery grouping. We cannot limit ourselves merely to determining the amount of "barrels." This can lead to serious miscalculations. Disclosure of up to 70 percent of its batteries is required for successful suppression of enemy artillery. A decisive role here belongs to aerial reconnaissance.

Preparation and Control

The preparation of accurate fire and the control of it are complicated by the fact that self-propelled batteries, as a rule, are not visible from observation posts and firing for their destruction is conducted as if against an unobserved target. Considering their maneuvering capabilities, the duty fire subunits must be kept in constant readiness and data on the registration points and the planned targets must be constantly renewed. In regions controlled by observers or radar stations, in probable routes of advance of self-propelled batteries and in places of their possible positions, sectors of planned fire are assigned which are called on to fulfill the role of "fire ambushes" and readiness of battalions and batteries for them must be extremely high.

Before conducting destruction of the planned target—the self-propelled battery—"final" reconnaissance of it and fire control must be conducted.

In supporting a self-propelled battery (especially observed), it can be expected that the enemy will simulate destruction of its materiel with smoke charges, demolition rounds, etc. Under their cover the target might leave the shelling zone. Therefore, it is necessary to observe carefully the results of fire in order to halt the strike in time.

An artillery strike against a self-propelled battery is conducted in a very short time because the target is capable of maneuvering quickly. In this period the reconnaissance men carefully observe the target or the adjoining terrain, trying to establish the moment of evacuation of the position. Repeated strikes are conducted only when there is confirmation that the target is on the spot.

BM-24 rockets on a truck.

As is known, the firing range of self-propelled guns increases incessantly (for a 155-mm howitzer from 18.2 to 24 kilometers). Therefore, the struggle against them must often be conducted at firing ranges close to the maximum, which increases the expenditure of ammunition. Difficulties also arise in fire correction by sound ranging subunits because the intersection by them of their bursts (in comparison with the possibility of intersections of a sound target) will be limited. In determining the installations for firing on the basis of ranging of registration points it is sometimes necessary to go beyond the limits of transfer established by the Firing Regulations. This is not desirable, but possible. Therefore, in our opinion, it is necessary to develop methods for calculating and introducing corrections in the ballistic wind during such transfers. Indeed the ballistics of guns and a missile and the ground temperature are calculated in ranging of registration points. Remaining are equivalent constant wind corrections, the influence of which on transfer, depending

on speed and direction, can be calculated beforehand.

It is very important to determine correctly the number and nature of registration points. Experience shows that each battery must have two registration points: one at the forward edge and the second in depth. The selection of them depends on the condition of the region of the targets, the character of the terrain and the conditions for observation. Actual and imaginary registration points can simultaneously be used, as ranging, and a systematic mistake can be determined according to them.

Fire Control

A necessary condition for effective suppression or destruction of a target is control of firing for effect. The absence of it or mistakes made in recomputations can bring to naught painstaking preparatory work. We remind you that if there is no difference in weather conditions on the days of ranging and control, sound coordinates of a registration point (target) determined by one sound subunit differ little and ensure sufficient accuracy.

If the disposition of the enemy in depth is not examined and also there are no conditions for operation of sound ranging, a ranging gun can be allocated. Its position is located in such a way that the range in determining the "fire correction of the moment" is approximately equal to the range from the center of the position region to the targets.

Coordination

And last are organizational questions. It is necessary to limit strictly the task of destroying the mortars and batteries of self-propelled artillery. In our opinion, we must combat the former with artillery subunits of motorized infantry units and the latter with artillery groups of senior commanders (in especially important zones the organization of combat can also be turned over to the higher staff). Otherwise, it is difficult to have coordination, assignment of tasks among artillery subunits (groups) and centralization and decentralization of fire control. Perhaps we should think about the creation of control posts for counterbattery bombardment, which unite the efforts of aircraft and artillery. Indeed a portion of the targets, due to difficulties of obtaining accurate coordinates, are more favorably destroyed by aircraft immediately after detection. Subunits of rocket artillery should also be used to suppress unarmored batteries.

BRDM-2 reconnaissance vehicle.

The complexity of counterbattery bombardment makes it necessary to introduce it more broadly in the practice of combat training and work on it more often at training exercises. Reconnaissance, preparatory fire and control of it, and the organization of counterbattery bombardment by staffs and commanders must become their main questions. Indeed nowhere is it so important to "compensate" the operations of the firing, reconnaissance and special subunits. It is necessary to use helicopters and aircraft at training exercises and to learn coordination with them. Without this, success of counterbattery bombardment is doubtful.

"Disclosure of up to 70 percent of its batteries is required for successful suppression. . . ."

The training exercises must provide good simulation. Thus, real self-propelled guns were used at one exercise for marking targets—self-propelled batteries on the side of the "enemy." They conducted fire with combat rounds in the direction of the line of deployment of the reconnaissance subunits of a counterbattery group (turned aside, of course). After several rounds, the simulation group departed and opened fire on the intersected target. In organizing reconnaissance at several lines (with the use of all technical means) and its meeting with fire subunits, many weak areas in training and specialists were revealed.

Such training exercises expand the range of perception of the officers, develop methods of coordination of fire and reconnaissance subunits and disclose all the complexity of counterbattery bombardment. Sound ranging surveyors at them explain the necessity of decreasing the time for processing the results of intersection, and reconnaissance men convince them that one range finder alone is not enough—that cross observation is necessary for reconnaissance of the self-propelled batteries in depth. The commanders of the batteries and battalions will understand how important it is to determine correctly the regions of special attention and to send to them various means; and how necessary it is to have constant officers' reconnaissance and special training of the reconnaissance men for detection of self-propelled batteries. It seems to us that the conduct of such training exercises should be provided in the plans for combat training.

The traditions of our artillery and the experience of the Great Fatherland War must also be disseminated for preparation to combat self-propelled artillery, considering at the same time its improvement.

REDLEG Newsletter

It's a whole new ball game! DA message 041956Z June 74 provides the details, but a few amplifying comments are in order:

• Selection boards will convene annually to select commanders for designated combat arms, combat support arms and logistic troop commands for the coming year.

• An officer retains his eligibility for annual command consideration as long as he remains in the grade of LTC or MAJ(P) and has not commanded a designated or equivalent command as an LTC or MAJ(P).

• Eligible FA LTCs or MAJ(P)s are automatically considered each year unless they decline command consideration. This may be done telephonically to Branch but must be confirmed in writing. Officers otherwise eligible may subsequently withdraw their declination and be considered the following year.

• Availability is not a factor in the selection process. Eligible FA LTCs or MAJ(P)s are considered regardless of location or time on station. Availability, however, may be a factor in determining which unit the selectee is slated to command.

• Due to the large number of officers eligible for consideration, a "prescreen" process will be used prior to the DA Command Selection Board. Thus, each eligibile FA officer will be considered by two independent agencies: a "Phase I" board (an element of the DA Selection Board) and FA Branch. Each of these agencies will provide to the Selection Board an alphabetical roster of nominees. This roster may contain nominations for up to three times the number of projected command vacancies for the selection period. The two rosters will be merged to eliminate duplication and the resulting roster submitted for Selection Board consideration.

Now, to answer the question "What are my chances for battalion command?" Eligible FA LTCs and MAJ(P)s will be considered for field artillery and combat arms material (training) command; upon request, they may also be considered for command in their alternate specialty provided that specialty contains designated command positions. All eligible FA LTC and MAJ(P) aviators will also be considered for aviation command (without regard to proponency). Eligible FA LTCs and MAJ(P)s who have been awarded a prefix 3 will be considered for Special Forces command and those with FAO alternate specialty will be considered for FAO command (Civil Affairs and Psyops). Based on the number of projected vacancies, it is estimated that 10 percent of the FA eligibles will be selected to assume command during the period 1 July 75 through 30 September 76. (Subsequent selections are expected to cover a one year period from 1 October through 30 September.) In the long run, chances for battalion command are estimated at 1 in 3 for FA LTCs. Each individual's probability of command is ultimately based on demonstrated performance and potential. In short—it's up to you!

In line with budgetary cuts throughout the Army, numerous steps have been taken to reduce the operating costs of OPD. This includes a drastic cut in funds available for commercial telephone calls. Accordingly, all career branches have been directed to limit acceptance of collect calls to only emergency inquiries or time sensitive calls from isolated locales where AUTOVON is not available. Your cooperation is

essential! Use AUTOVON or mail if your inquiry does not meet the emergency or time sensitive criteria. The Field Artillery Branch address is: HQDA MILPERCEN, ATTN: DAPC-OPD-FA, 200 Stovall Street, Alexandria, VA 22332. The AUTOVON number is 221-0752/0421.

The Officer Personnel Directorate (OPD) of MILPERCEN is establishing a revised Project Manager Development Program (PMDP) to identify, select and train officers as future project managers. A special office to monitor and manage the PMDP has been organized within OPD's Deputy for Professional Development and Plans. Application procedures for officers interested in pursuing project management are outlined in Para 30-4(a) and (b) of DA Pamphlet 600-3.

Fundamental to the development of project managers is attendance at the Defense Systems Management School (DSMS), Fort Belvoir, VA. Current OPD policy requires that students at the 20-week Program Management Course be prospective members of the PMDP.

Jointly staffed, DSMS is a tri-Service institution established by SECDEF to: a) Conduct courses of study to prepare selected personnel for assignments in the project/program management; b) Conduct related research; c) Assemble and disseminate information concerning project/program management.

DSMS offers resident courses in addition to the Program Management Course: an Executive Refresher Course, Cost/Schedule Control Systems Criteria Course for Functional and for Program Managers and an Orientation in Systems Acquisition. Quotas for attendance at each course are assigned to DA (MILPERCEN). Attendance is normally associated with duty requiring this advanced instruction.

Ever wonder why your unit never seems to get its "fill" of officers? Many think that TOEs and TDAs govern the number of officers assigned. Not so! The real answer is PRA—projected requisitioning authority. Numerous articles have been written on PRA; an excellent one is in the Spring '74 issue of TIPS—THE ARMY PERSONNEL Magazine. It's recommended reading for all commanders!

Senior Field Artillery Commanders

Brigadier General James W. Cannon
III Corps Artillery
Brigadier General Alfred J. Cade
V Corps Artillery
Brigadier General Charles C. Rogers
VII Corps Artillery
Brigadier General Milton E. Key
56th Artillery Brigade
Colonel Leo S. Comish
XVIII Airborne Corps Artillery
Colonel William W. Maurer
1st Infantry Division Artillery
Colonel John S. Crosby
1st Cav Division Artillery
Colonel Elton J. Delaune
1st Armored Division Artillery
Colonel Robert L. Schroeder
2d Armored Division Artillery
Colonel Michael N. Bakarich
2d Infantry Division Artillery
Colonel Edward A. Dinges
3d Armored Division Artillery

Colonel William L. Hauser
3d Infantry Division Artillery
Colonel Robert W. Sennewald
4th Infantry Division Artillery
Colonel Robert L. Schweizer
8th Infantry Division Artillery
Colonel Jack L. Zorn
9th Division Artillery
Colonel Peter J. Hino
25th Division Artillery
Colonel Maxwell Thurman
82d Airborne Division Artillery
Colonel David R. Hampton
101st Airborne Division Artillery
Colonel Talbott Barnard
9th Field Artillery Missile Group
Colonel Homer Kiefer
41st Field Artillery Group
Colonel Richard D. Boyle
42d Field Artillery Group
Colonel John E. Baker
72d Field Artillery Group

Colonel Vincent E. Falter
75th Field Artillery Group
Colonel John G. Kloke
210th Field Artillery Group
Colonel James N. Hale
212th Field Artillery Group
Colonel Robert H. Forman
214th Field Artillery Group
Colonel Lynwood B. Lennon
4th Missile Command
Colonel Edward A. Kelley, Jr.
FA School Brigade
Fort Sill, OK
Colonel John C. Bowden
558th Artillery Group
Colonel Charles C. Sperow
559th Artillery Group
Colonel Leo J. Fitzgerald
TUSLOG Detachment 67
Colonel Robert Harrington
3d Armored Division Spt Cmd

LTC Francis J. Burke
2d Battalion, 1st Artillery
LTC Merton Townsend
1st Battalion, 2d Artillery
LTC Robert W. Cook
2d Battalion, 2d Artillery
LTC Thomas A. Kelly
1st Battalion, 3d Artillery
LTC Rhoss Lomax
2d Battalion, 3d Artillery
LTC Keith Painter
2d Battalion, 4th Artillery
LTC Harold D. Farmer
4th Battalion, 4th Artillery
LTC Bruce A. Martin
1st Battalion, 5th Artillery
LTC Laurence R. Peate
2d Battalion, 5th Artillery
LTC Lewis Delrosso
1st Battalion, 6th Artillery
LTC Joe J. Breedlove
2d Battalion, 6th Artillery
LTC Guy J. Palmieri
3d Battalion, 6th Artillery
LTC James W. Doukas
1st Battalion, 7th Artillery
LTC Robert D. Banning
1st Battalion, 8th Artillery
LTC Theodore F. Smith
3d Battalion, 9th Artillery
LTC James E. Thomas
6th Battalion, 9th Artillery
LTC Henry S. Larsen
1st Battalion, 10th Artillery
LTC Robert H. Allison
2d Battalion, 10th Artillery
LTC David D. Dantzcher
6th Battalion, 10th Artillery
LTC David J. Lynch
1st Battalion, 11th Artillery
LTC Leslie E. Beavers
2d Battalion, 11th Artillery
LTC Edward Hackney
1st Battalion, 12th Artillery
LTC Robert D. Banning
3d Battalion, 13th Artillery
LTC Robert D. Chelberg
1st Battalion, 14th Artillery
LTC Neal A. White
6th Battalion, 14th Artillery
LTC John W. Symons
1st Battalion, 15th Artillery
LTC Townsend VanFleet
3d Battalion, 16th Artillery
LTC George M. Krausz
1st Battalion, 17th Artillery
LTC Harry E. Soyster
2d Battalion, 17th Artillery
LTC Clifford Jones, Jr.
3d Battalion, 17th Artillery
LTC Gilbert W. Crowl
1st Battalion, 18th Artillery
LTC Michael Stevenson
2d Battalion, 18th Artillery
LTC David L. Dunham
3d Battalion, 18th Artillery
LTC Donald W. Jones
1st Battalion, 19th Artillery
LTC Edward J. Stein
2d Battalion, 20th Artillery
LTC Virgil Detrich
1st Battalion, 80th Artillery
LTC Andrew J. McVeigh
1st Battalion, 21st Artillery
LTC Donald A. Ladner
1st Battalion, 22d Artillery
LTC Paul T. Wickliffe
1/25th Target Acquisition Battalion
LTC Paul A. McGowan
1st Battalion, 27th Artillery
LTC Gerald Stadler
2d Battalion, 27th Artillery
LTC Rodney C. Byers
2d Battalion, 28th Artillery
LTC Charles N. Fields
1st Battalion, 29th Artillery
LTC Paul E. Meyer
1st Battalion, 30th Artillery
LTC John E. Blanck
2d Battalion, 30th Artillery
LTC Thomas D. Reese
1st Battalion, 31st Artillery
LTC Woolf Gross
1st Battalion, 32d Artillery
LTC Thomas A. Austin
2d Battalion, 32d Artillery
LTC Henry L. Cotner
2d Battalion, 33d Artillery
LTC Ronald Savard
2d Battalion, 34th Artillery
LTC Donald B. Leary
3d Battalion, 34th Artillery
LTC Paul G. Polk
3d Battalion, 35th Artillery
LTC Edward J. Burke, Jr.
1st Battalion, 36th Artillery
LTC James N. Tilley
1st Battalion, 37th Artillery
LTC Beverly L. Barge
2d Battalion, 37th Artillery
LTC Gordon Pollard
3d Battalion, 37th Artillery
LTC Joseph Ecoppi
6th Battalion, 37th Artillery
LTC Walter Urbach, Jr.
1st Battalion, 38th Artillery
LTC Kelvin H. Hunter
1st Battalion, 39th Artillery
LTC James V. Slagle
2d Battalion, 39th Artillery
LTC William J. Emacio
1st Battalion, 40th Artillery
LTC Raymond Haddock
1st Battalion, 41st Artillery
LTC Ronald B. Stevens
2d Battalion, 41st Artillery
LTC Steven Friend
1st Battalion, 42d Artillery
LTC Richard L. Reynard
2d Battalion, 42d Artillery
LTC Malcolm L. Marks
1st Battalion, 73d Artillery
LTC Edward J. Bunn
1st Battalion, 75th Artillery
LTC William L. Hughes
2d Battalion, 75th Artillery
LTC William R. Farquharson, Jr.
1st Battalion, 76th Artillery
LTC Bernard Herring
1st Battalion, 77th Artillery
LTC Ronald Perry
4/77 Aerial Field Artillery Battalion
LTC August M. Cianciolo
1st Battalion, 78th Artillery
LTC Richard W. Brown
2d Battalion, 78th Artillery
LTC Charles Thompson
3d Battalion, 79th Artillery
LTC Jesse Hornsby
1st Battalion, 81st Artillery
LTC Gordon E. Saul
2d Battalion, 81st Artillery
LTC Leo Hergenroeder
3d Battalion, 81st Artillery
LTC Frederick R. Daly
1st Battalion, 82d Artillery
LTC James Shufelt
1st Battalion, 83d Artillery
LTC William Seago
2d Battalion, 83d Artillery
LTC Thomas H. Miller
1st Battalion, 84th Artillery
LTC Stephen E. Rash
3d Battalion, 84th Artillery
LTC Gustav Lydahl
1st Battalion, 92d Artillery
LTC Orren R. Whiddon
2d Battalion, 92d Artillery
LTC Ralph A. Udick
1st Battalion, 94th Artillery
LTC Robert T. Basha
1st Battalion, 319th Artillery
LTC George H. Thompson
3d Battalion, 319th Artillery
LTC John J. Madigan
1st Battalion, 320th Artillery
LTC Albert E. Wolfgang
2d Battalion, 320th Artillery
LTC Elmer W. Naber, Jr.
1st Battalion, 321st Artillery
LTC Raphael J. Hallada
2d Battalion, 321st Artillery
LTC John A. Raymond
1st Battalion, 333d Artillery
LTC Gerald D. Curbow
2d Battalion, 377th Artillery
LTC Alexander Cipriano
512th Group
LTC Howard J. Gill
557th Group
LTC Jose A. Riovo
1st Cannon Battalion
Fort Sill, OK
LTC William D. Gess, Jr.
2d Cannon Battalion
Fort Sill, OK
LTC Harland B. Bynell
5th Cannon Battalion
Fort Sill, OK
LTC John Stice
Specialist Training Battalion
Fort Sill, OK
LTC Lyman A. Lackey, Jr.
Staff & Faculty Battalion
Fort Sill, OK
LTC Jon E. Porter
Officer Student Battalion
Fort Sill, OK
LTC Richard Griffiths
1st Battalion, 2d Brigade
Fort Polk, LA
LTC Richard K. Pfabe
4th Battalion, 2d Brigade
Fort Leonard Wood, MO
LTC Frederick B. White
5th Battalion, 2d Brigade
Fort Leonard Wood, MO
LTC Donald P. Bennett
5th Battalion, 4th Brigade
Fort Leonard Wood, MO
LTC John J. Berner
11th Aviation Battalion
LTC Bobby H. Freeman
13th Aviation Battalion
LTC Billy W. Fugitt
14th Aviation Battalion
LTC William L. Longarzo
223d Aviation Battalion