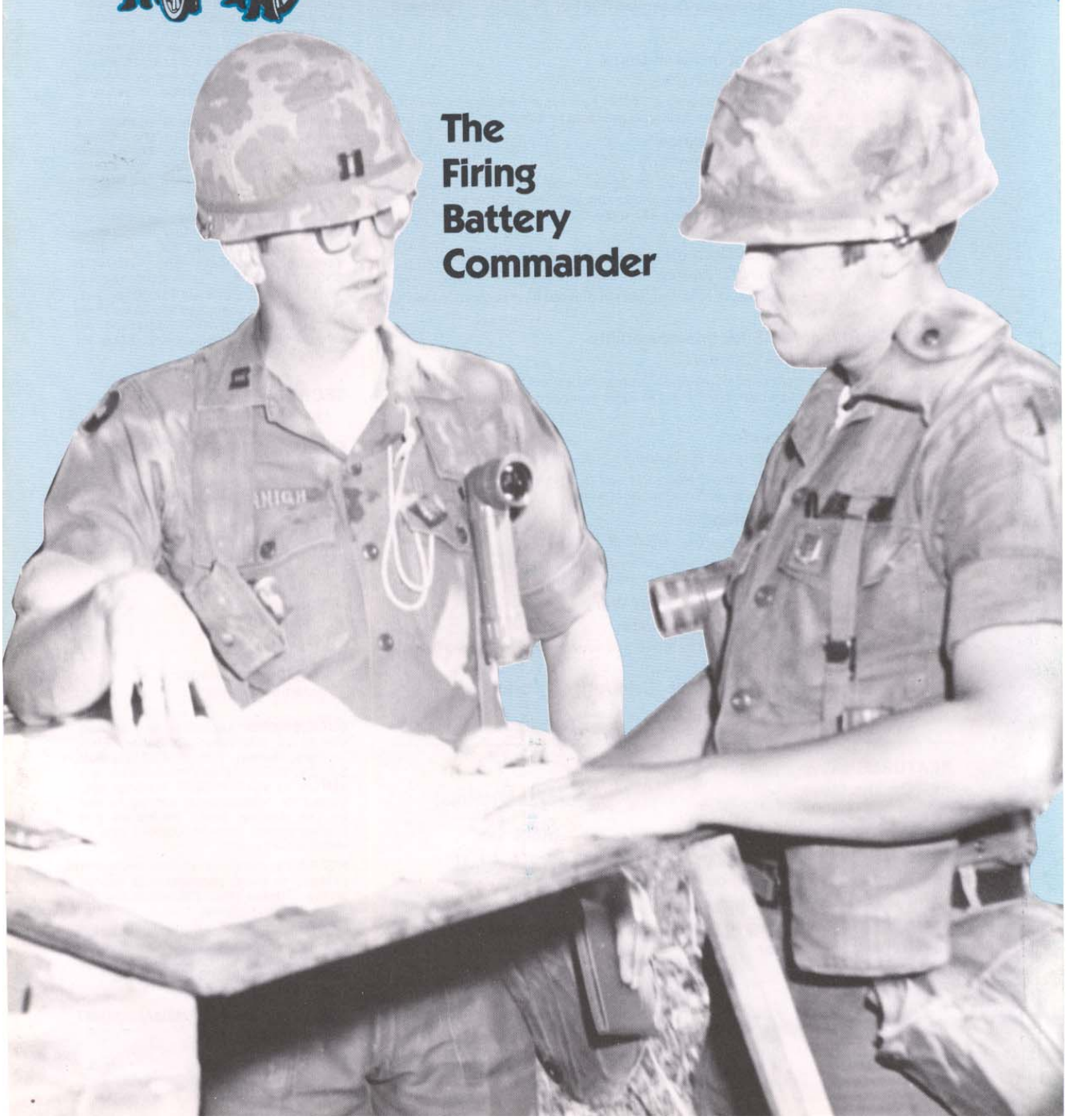
Field Artillery Journal

November-December 1981

Fire Support Conference
17-19 November 1981



The Firing Battery Commander

Volume 49 **November-December 1981** **Number 6**

ARTICLES

FEATURES

Seasons Greetings from the Journal Staff

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PURPOSE (as stated in the first *Field Artillery Journal in 1911): "To publish a journal for disseminating professional knowledge and furnishing information as to the field artillery's progress, development, and best use in campaign; to cultivate, with the other arms, a common understanding of the power and limitations of each; to foster a feeling of interdependence among the different arms and of hearty cooperation by all; and to promote understanding between the regular and militia forces by a closer bond; all of which objects are worthy and contribute to the good of our country."*

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On the Move

by MG Edward A. Dinges

As I meet with Field Artillerymen during my travels and your visits to Fort Sill, I continue to sense an increasing level of concern over the proliferation of ammunition components for our cannon systems. I share this concern. It is a mixed blessing. On the one hand, this proliferation provides increased capabilities needed for the extended battlefield; on the other hand, it requires each field artilleryman to know more about ammunition, how to manage this multitude of assets, and how to incorporate these added dimensions into fire support planning.

The ultimate solution lies in a revised basic load mix and the procedures for its management, but this development must await completion of current studies in field artillery targeting and fire distribution. In the meantime, we need to be as smart as we can in managing within existing resources and procedures.

On the increased capability side, a great deal of information has been presented in recent years highlighting the technological advances in ammunition. Terminally guided munitions allow us to assume a significant share of the responsibility for selective attack of high value point targets with a very high single shot hit probability. We can attack and kill armor targets before they can engage friendly troops. Additionally, new technology will allow us to delay, canalize, contain, or attrite formations with artillery delivered mines. Finally, through rocket assistance, we can attack at greater ranges without altering our cannons.

Not long ago *the* primary casualty producing projectile was high explosive, fired with charges 1 through 7, and a choice of point detonating (PD), time, or variable time (VT) fuzes. That basically was our range of options. Planning was simple, but capabilities were also limited.

Today, the 155-mm systems currently fielded have six propellants (figure 1), 18 projectiles (figure 2), and 13 fuzes (figure 3) which are not all compatible or interchangeable. As such, we cannot afford to assume that folks at the ammunition supply point are familiar with all the acceptable shell-fuze combinations (e.g., the substitution of the M564 mechanical time fuze for the M577 for use with dual purpose improved conventional munitions (DPICM) rounds can be disasterous; both are mechanical time, but only the M577 can cause the DPICM to eject its payload). A seemingly innocent mistake such as fuze substitution could render a significant portion of a unit's ammunition load unusable and thereby jeopardize the supported force's mission.

How should the components be distributed and what criteria should be used to drive the equation?

CHARGE	ZONES
M3, GREEN BAG	1-5 (w/o FLASH REDUCER)
M3A1, GREEN BAG	1-5 (w/o FLASH REDUCER)
M4 WHITE BAG	5-7 (w/o FLASH REDUCER)
M4A1 WHITE BAG	3-7 (w/o FLASH REDUCER)
M4A2 WHITE BAG	3-7 (w/FLASH REDUCER)
M119 WHITE BAG	8 (w/FLASH REDUCER)
M119A1 WHITE BAG	8 (w/FLASH REDUCER)
M119A2 RED BAG	7 (BUILT-IN FLASH REDUCER)
M203 RED BAG	8S (WITH FLASH REDUCER)
M197 NUCLEAR M206 NUCLEAR M207 NUCLEAR	

Figure 1. Propellants (155-mm).

PROJECTILE	FILLER
M107	HE
M549 M549A1	HE (RAP) HE (RAP)
M449 M449E1 M449A1	APICM APICM APICM
M485	ILLUMINATION
M483A1	DPICM
M692 (LONG DELAY) M731 (SHORT DELAY)	ADAM ADAM
M454	NUC
M116 M116B1 M116A2	HC & COLORED SMOKE HC & COLORED SMOKE HC
M110 M110A1 M110A2	WP WP WP
M110	AGENT H/HD
M687	BINARY
M121	CHEMICAL
XM795	HE
XM785	NUCLEAR
XM825	SMOKE
M718 (LONG DELAY) M741 (SHORT DELAY)	RAAM RAAM
M712	COPPERHEAD
M804	LITR

Figure 2. Projectiles (155-mm).

FUZE	FUNCTION
M78	CP
M78A1	CP
M557	PD
M572	PD
M739	PD
M565	MT
M577	MT
M564	MTSQ
M582	MTSQ
M514	VT
M728	VT
M732	VT
XM762	ET

Figure 3. Fuzes.

What is the optimum mix? The fire support coordinator's recommendation on ammunition mix must be based on an assessment of the expected target array facing the supported force. If the greatest threat is dismounted infantry in open terrain, then a preponderance of HE and antipersonnel improved conventional munitions (APICM) may be the desired mix while scatterable mines, DPICM, and Copperhead fill the bill against a predominately armored/mechanized threat. Whatever tactical mix is selected, it should be based on a majority of one or two types of projectiles with their compatible components. To do otherwise may result in situations wherein units have a little bit of everything but not enough of anything.

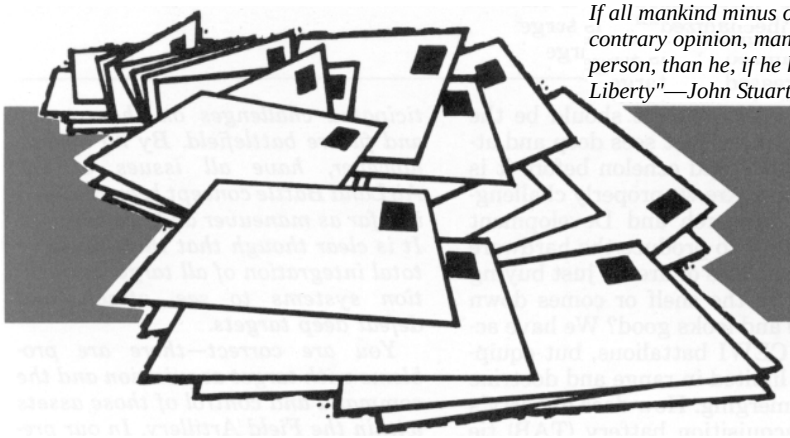
The fire support coordinator then must be prepared to impress on the maneuver commander the constraints we face in having these highly effective specialized munitions available. First is *time*. Clearly, ammunition distribution is a time-consuming process and without knowing the maneuver commander's needs and desires well in advance, we may not be ready with the correct mix of ammunition to insure that fire support makes its full contribution to the execution of the commander's scheme of maneuver.

A second issue is *transportability*. Generally, our ammunition vehicles gross out on weight before they cube out. Considering that a complete round of conventional 155-mm ammunition weighs approximately 168 pounds, an M109A2/A3 howitzer with the M548 cargo carrier and a 1½-ton ammunition trailer can transport about 124 complete rounds. Given a scenario which has a target array with a high proportion of mechanized infantry and minimum armor, the ammunition plan might specify a high percentage of DPICM. Since DPICM cannot be fired with charges 1 and 2 green bag, white bag M4A2 (charges 3 through 7) and M119A1 (charge 3) should be the propellant mix. Based on this mission, an M109 howitzer section ammunition load might be structured as follows:

DPICM	60% (74 rounds)
RAP	17% (21 rounds)
HE	15% (19 rounds)
COPPERHEAD	6% (7 rounds)
SMOKE	2% (3 rounds)
	100% (124 rounds)

But, building ammunition stocks of a particular mix for a specific operation is only the tip of the iceberg. Maintaining that load over time and then transitioning to a different mix to meet the changing needs of the maneuver commander is at least as demanding of our time and efforts when considering the limited load-carrying capacity within each field artillery battalion.

As technological advances increase our capabilities on the battlefield, shell/fuze/propellant/cannon combinations are, more than ever before, key elements in the equation for mission success. We at Fort Sill are hard at work in grappling with the revised basic load issue, but even with its resolution, it is clear that we can no longer afford to assume that "ammunition" is a problem for the ammunition platoon leader alone. It is a problem for all of us.



If all mankind minus one, were of one opinion, and only one person were of the contrary opinion, mankind would be no more justified in silencing that one person, than he, if he had the power, would be justified in silencing mankind. "On Liberty"—John Stuart Mill

Incoming

letters to the editor

Must we rob Peter to pay Paul?

Army literature continues to provide considerable information concerning "the extended battlefield, the integrated battlefield, and the air-land battle." Much of this literature indicates that these new concepts will offset the combat power ratios enjoyed by the enemy. Because each of these concepts leans heavily on fire support and especially field artillery support, I decided to look into the impacts the concepts will have on the field artillery.

Many field artillerymen serve as fire support coordinators (FSCOORDs). As such, they are deeply involved with a supported commander's "area of influence." How far can fire support weapons reach out? How many indirect fire weapons can be used in this area?

Within their "areas of influence," supported commanders must locate and attack enemy formations. The approximate distances beyond the "forward line of own troops" (FLOT) to which these areas extend are:

Force level	Distance (km)
Battalion	5
Brigade	15
Division	70
Corps	170

Current field artillery weapons in an armored or mechanized US division include 54 medium howitzers (155-mm) plus 12 heavy cannons (8-inch). These divisional weapons can range the "areas of influence" of both maneuver battalions and brigades but they cannot reach out to cover the division's area of influence. Augmenting cannons of the corps artillery can help out, but their calibers are identical to those of the division weapons and therefore have the same range limitations. This means that division and corps deep targets must be attacked using either air or corps missile systems.

Divisional cannons have the responsibility to provide:

•*Close support fires*. These fires are usually assigned to direct support (DS) and reinforcing (R) FA units. Normally each committed maneuver brigade is provided a DS battalion (18 weapons).

•*Counterfires*. When practical, these fires are assigned to general support/general support reinforcing (GS/GSR) field artillery.

•*Suppression of enemy air defense (SEAD) fires*. These fires are usually handled by general support field artillery, if practical.

•*Interdiction fires*. These deep fires are directed against enemy second echelon elements. When practical, they are fired by GS (GSR) field artillery.

•*Other fires.* Nuclear, toxic chemical, illumination, smoke, and scatterable mine fires may be called for, and, when the situation allows, GS (GSR) field artillery is used for this support.

With the 66 cannons now available to the armored and mechanized divisions and the many targets to be fired, supported commanders must decide where priority for FA fires should go. Who will get "the most favored treatment"? Can a commander afford to take field artillery support away from committed maneuver brigades in order to "lend a hand" with SEAD, counterfire, and interdiction efforts? Can corps artillery "beef up" the division artilleries at the expense of the corps' needs for field artillery fires?

It appears to me that with the new concepts we have increased the *workload* of the field artillery without commensurably increasing the *work force* (tubes and rails of the field artillery). The range capabilities of cannon weapons have not kept pace with the extended "areas of influence." As we continue to increase the categories of fires needed, we must, in effect, "rob Peter to pay Paul" with our weapons in order to get the new tasks done.

Charles W. Montgomery
LTC (RET)
Lawton, OK

Not all are privileged to be!

During my service, I have worn the cross cannons and red lapels with a special sense of pride and belonging. I have always known that we had something special going for us and we "Redlegs" in the field have looked to Fort Sill for leadership.

For a number of years, Fort Sill has been the TRADOC leader in innovation, imaginative thinking, and in making many of your new ideas into proven doctrine; recently, however, doubts have entered my thinking. Over the last two years as an assistant division commander in Europe, charged primarily to work with our maneuver elements, I have seen the emergence of a new defense doctrine. This doctrine puts a premium on speed and the ability to move laterally on the battlefield. This is not a return to the old mobile defense, but it is a departure from the active defense concept of a few years ago — the concept of maximum firepower forward, limited reserve, or perhaps no reserve, and early use of force multipliers. We in the Field Artillery supported this earlier doctrine by moving battalions from corps artillery to division control, by moving the target acquisition mission down to division, and by such innovations as the dedicated battery and the fire support team (FIST). We sacrificed tube depth to obtain more effective coverage out front early.

The no-reserve, "three-brigade-up" concept made our job of fire support coordination easier. I personally believed we had an optimal solution. I still believe that to fight outnumbered

and win we must fight three up, minimize our own exposure (especially for artillery) by moving less often, make maximum use of our multipliers by commitment as early as possible, and avoid a war of attrition which defense in depth seems to imply.

Maneuver doctrine today, however, is progressing in another direction, with emphasis on maximizing the speed of the mechanized team. Now we use the increased speed of the Abrams tank, find a flank and exploit it, get at the enemy's support elements, hit between the first and second echelons, keep the enemy off balance and upset his timetable, go on the offensive when the situation favors, and hold substantial reserves. This defense is best characterized by speed, violent execution, and timely counterattacks. Sounds good — they may be right??

But what does this mean for field artillerymen? It presents a problem of sizeable proportions for us — a challenge we must all meet. For example, how do we provide coverage for a fast-moving, tank-heavy force that is having success on the enemy's flank? My observations of recent field exercises in Europe indicate we lack the capability (both in method and in hardware) to provide adequate fire support coordination. We are dependent on FM radio with its attendant problem of line of sight, limited frequencies, and the poor maintenance track record of our secure equipment. It does not take a very sophisticated jammer to disrupt this fragile communications link. We had our best success when we went back to the old reliable liaison officer. Over the years, numerous TDA (table of distribution and allowance) scrubs have eliminated these positions and now we must take them out of our hide. Faced with our inability to effectively communicate and sell our wares, the tanker then forgets us and fights his battle without us. The bad habit thus developed may not be so obvious during a field exercise but the results on the battlefield could be disastrous. Remember the Israeli experience when they relied on air cover and left their artillery behind?

But, we have other problems. What about target acquisition? How often have I heard it said that target acquisition is our major problem in the Field Artillery? How can we do our job on General Starry's extended battlefield without it? It should be the Field Artillery that sees deep and attacks the second echelon before it is committed. Are we properly challenging the Research and Development Community to produce the hardware to let us do this or are we just buying what is on the shelf or comes down the pike and looks good? We have activated CEWI battalions, but equipment is limited in range and doctrine is still emerging. How does div arty's target acquisition battery (TAB) tie in with CEWI and who controls the TAB elements when they are committed? These questions need answering now.

Many analysts, especially those who have studied the last Mid-East War, predict the next war will be characterized by intense violence and heavy expenditure of munitions. Do we have the ability to resupply FA munitions on the battlefield? I think not.

Again, lessons from the Yom Kippur War indicate many tanks were killed. At what level and how do we control our tank killing systems so that we can maximize their use? What do we do with the Copperhead and the TOW Cobra? Forts Knox and Benning have not solved the fire distribution problem.

So, Fort Sill, your work is cut out for you and I have only raised more questions without providing answers. What we need is a new resurgence of field artillery innovation and forward thinking. No matter what our tankers and infantrymen do, we've got to support them. There are bright young gunners who will rise to the occasion; there always have been, for NOT ALL ARE PRIVILEGED TO BE FIELD ARTILLERYMEN.

Wendell H. Gilbert
BG, GS
Chief of Staff
HQ, First US Army
Fort George G. Meade, MD

Your letter, Sir, brings to the forefront many issues that deeply concern the entire Field Artillery Community. Although Fort Sill and the School have in the past worked in all areas you mention, there still remains much to do. As such, our efforts are far from finished.

Completion of the Fire Support Mission Area Analysis (MAA) established the Field Artillery as the leader in articulating necessary changes in materiel, doctrine, force structure, and training to meet anticipated challenges on the current and future battlefield. By no means, however, have all issues of the AirLand Battle concept been resolved insofar as maneuver and fire support. It is clear though that there **must** *be total integration of all target acquisition systems to see, attack, and defeat deep targets.*

You are correct—there are problems with target acquisition and the command and control of those assets within the Field Artillery. In our present system, both the sensors and the control and management of those sensors are inadequate to perform the mission of the AirLand Battle. Here the Field Artillery Community has been working for some time and has recently begun to show significant progress.

The development and approval of a division target acquisition battalion for Division 86, the effort of the Mission Area Analysis, and the resultant Fire Support Development Plan (FSDP) provide the foundation for resolving inadequacies associated with target acquisition. We currently have a series of requirement documents in the works that address the shortcomings and deficiencies outlined in the FSDP. Although these requirements do not reflect a panacea within themselves, they do represent our first real attempt to look at Field Artillery target acquisition as a system and tie it together through proper management of command and control.

As you are well aware, nothing comes easy; therefore, we are diligently working to break down any and all barriers to progress. The MAA and FSDP certainly challenge the Research and Development Community to give us the new systems required to accomplish the mission, not only in target acquisition but also in ammunition resupply and communications.

Indeed, with the doctrinal explosion currently underway, the Army is revising all of its doctrinal publications to reflect how to fight the AirLand Battle. The next step will involve revision of doctrine to reflect the emerging Army 86 organizations and capabilities.

As you alluded, the path ahead will not be easy. While your letter was addressed to Fort Sill, it is applicable to all Redlegs, wherever they may be. For this we sincerely appreciate your comments and sharing of concerns.—Ed.

Safety officer?

While stationed at Fort Sill, 1973-1976, I initiated and waged a long battle to eliminate safety officers. Your July-August 1981 issue on page 25 says ". . . and the safety officer checked each artillery piece in his battery to insure that the mission was safe to fire." Please tell me that this was a special TACFIRE training exercise and that the FA has not slipped back to the most undesirable practice of using safety officers! Also note on page 26 that Copperhead is **not** rocket assisted. I congratulate you on another informative, interesting issue.

David E. Ott
LTG (Ret), USA
Alexandria, VA

At the outset, Sir, be assured that we have not reverted back to using safety officers as a standard practice. As you may know, Change 1, AR 385-63, chapter 11, states that the chief of firing section is responsible for insuring that only safe practices take place at or near his weapon, to include verifying that the announced and proper data are applied to his weapon and that the proper charge, fuze, and projectiles are fired. He has the final responsibility for the safe firing of his weapon. Further stated is that a separate battery safety officer/noncommissioned officer is not required during the firing of field artillery, but commanders may appoint a battery safety officer. The battery safety officer is not required to verify all data placed on the on-carriage fire control equipment. He may rely on safety stakes, safety tape, or physical constraints on the weapon to insure that the safety limits are not exceeded. Since the field artillery commander is responsible for safety during all phases of a firing exercise under his control, he has the option to appoint a battery safety officer.

A call to the commanders of the division artillery and FA battalion mentioned in the article indicated a couple of reasons that the option to appoint a battery safety officer was exercised.

First, there is a severe shortage of experienced section chiefs; i.e., most are PFCs (appointed as acting corporals) rather than authorized E6s.

Second, the impact area used for training is relatively small, a restriction which places added emphasis on safety. The commander's decision then to use a safety officer was not based on special requirements of TACFIRE testing.

Insofar as the material on Copperhead, the divisional release from Korea contained erroneous information which we here should have caught and corrected. The Copperhead round is not rocket assisted.—Ed.

206th Anniversary of the Field Artillery

I would like to remind all my fellow Redlegs (both active as well as retired) in the National Capital Region and surrounding area that the 206th Anniversary of the Field Artillery will be celebrated on the 27th of November 1981 at the Bolling Air Force Base Officers' Open Mess. Although we anticipate that each active duty officer in the area will receive an invitation, our computer lists are not perfect and as such we may have inadvertently missed someone. If you have not received an invitation, please contact the invitation committee at (202)325-0116/0118 or AV 221-0116/0118.

Major General Dinges, Commandant of the US Army Field Artillery School and host for the gala celebration, indicates that this will be our "best" ball to date and will provide an excellent chance to make and renew acquaintances with fellow cannoneers. Additionally, the Senior Field Artilleryman in the Army, Vice Chief of Staff General Vessey, will be the Guest of Honor and featured speaker.

So, mark 27 November on your calendar and spread the word to the fellow sons of Saint Barbara with whom you work and socialize. I personally look forward to seeing each and every one of you at the 206th National Capital Region's anniversary celebration of the Birth of American Field Artillery. NOT ALL ARE PRIVILEGED TO BE!

Curtis L. Lamm
LTC, FA
Chief, Field Artillery Branch
USA MILPERCEN
Alexandria, VA

"Long Tom" discovered

The article entitled, "The 'Long Tom'" in the November-December 1980 *Journal* was of great interest to members of this battalion since we were fortunate enough to obtain one of these fine relics.

In 1980, CW2 Bill Morrow, Battalion Maintenance Technician, received word that an artillery piece covered with honeysuckle vines and foliage was located among the grass and weeds in a wooded area near the American Legion Building in Granite Falls, NC. Mr. Morrow went to Granite Falls and discovered that the piece was indeed a rare find — a *Grande Puissance Filloux* 155-mm gun M1917A1, No. 74.

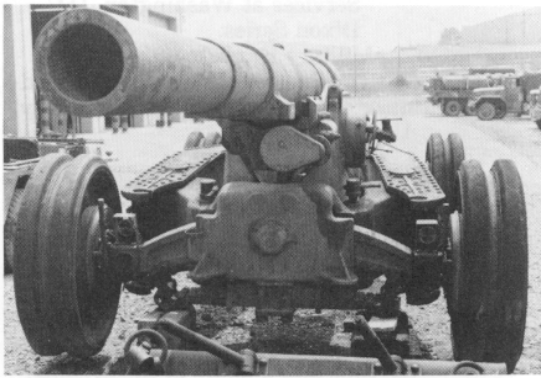
Considering its age and the length of time it had been disposed to the elements, the piece was in superb condition and was complete, to include the spades and limber. We transported the gun to Charlotte, NC, where a massive clean-up operation began. After gallons of oil, brake fluid (used to free the wheels by burning the shoes and linings from the drums), sand (more than 3,000 pounds to blast off the rust), paint and elbow grease, the *Grande Puissance Filloux* looks almost new. It now stands proud as it once did when it was hurling those 95-pound projos 17,000 yards.

Although National Guard units were armed with the *Grande Puissance Filloux* in the 1930s, no one seems to know how "old No. 74" arrived at its location in Granite Falls. From all indications, this is an authentic "Long Tom," but we would appreciate receiving any additional information available on the grand old cannon.

The gun will be permanently mounted in front of the maintenance shop where its grandness can be viewed by all!

Tom Cutchen
CW3, NCARNG
1st Bn, 113th FA
Charlotte, NC

Old No. 74.



Instructors needed

The Republic of Korea Army Administration School is reorganizing its English language program and establishing an Army English Language Institute in Seoul, Korea. The Commandant of the Administration School has solicited my assistance in obtaining suitable instructors for the English Language Institute. This is a unique employment and travel opportunity for native US qualified applicants. Retired military officers are desired; however, all qualified applicants will be considered, including spouses. Retired military personnel should consult the following applicable service regulations for waivers required prior to employment by a foreign government.

Army	AR 600-291
Air Force	AFP 211-31
Navy/Marine	NAUSOP 1778

Outlined below are the general aspects of the program:

PROGRAM OUTLINE

Eligibility:

•College graduate.
•Native US citizen.
•Prefer individual who has previous English teaching experience.
•Under 50 years of age (60 years for retired field-grade officers).

Subject areas:

•Practical English conversation.
•Texts: American Language Course (8-volumes) published by the Defense Language Institute at Lackland Air Force Base, Texas.
Intensive Course in English by English Language Services at Washington, D.C. Dixon Series.
•Military English:
•Texts published by Headquarters, Department of the Army, USA.
•Current English:
•Newspapers and magazines *(Time & Newsweek)*.

Working conditions:

•Instructors will work 30 hours a week (Monday through Friday), 6 hours a day, 4 hours being in the daytime and 2 hours in the evening.
•Instructors will be required to move into the apartment located in the institute at Seoul, Korea.
•Periodically, instructors will tutor students after working hours.

Compensation:

•Monthly salary of $1,500 (14.69 percent tax included) will be paid in Korean currency. This salary will be paid according to the official exchange rate of the contract day.
•Medium-sized modern furnished apartment for family living (two bedrooms, a living room, a kitchen, and a bathroom).
•Round-trip airplane ticket for the individual (one person).

Contract terms:

•Contract period is one year respectively beginning in January 1982. Renewal of the contract is flexible according to the employee's desires.
•Employed instructor should arrive at the School not later than *10 January 1982*.
•The employment will be effective from the day of the contract upon employee's arrival at the School.

Applications/inquiries should be addressed to:

ROKA Administration School
c/o Army Section
JUSMAG-K
APO San Francisco 96302

Jere W. Sharp
MG, USA
Chief, JUSMAG-K

Polaris II

On page 57 of the July-August 1981 *Field Artillery Journal*, the short article, entitled "New Method Takes the Work Out of Finding North," did not provide sufficient information.

Not knowing the source of material, the credit for and the name of the development is incorrect.

The new method of finding north is named Polaris II and was developed under the Field Artillery Officer Advanced Course Battlefield Research Program by Captains Don H. Zacherl, Rudy T. Veit, and Victor W. Roeske, three FAOAC 1-80 students. The three captains were awarded the Army Commendation Medal at the class graduation for their development. The Counterfire Department had several governmental agencies review the formulas and validate the astronomical calculations used by the captains in their development. Upon validation, the US Army Field Artillery School made a formal request to the US Army Engineer Topographic Laboratories (ETL) to validate and test the proposed aiming circle reticle. It was at this time that Mike McDonnel and Don Dere of ETL entered the process. These two gentlemen did validate the concept and re-engineered the reticle design and fabricated a prototype. Instructors and students of the Survey Division, Counterfire Department, US Army Field Artillery School tested the new reticle in spring 1981. The method proved successful to an accuracy of plus or minus one mil; however, the etchings on the reticle were too thick and occasionally blocked out the stars. US Army Engineer Topographical Laboratories has revised the reticle to reduce the thickness of the etchings. The new lens will be tested shortly. Upon successful testing, USAFAS will work the production, distribution, and installation procedures. Full fielding is anticipated to be completed within 12 months of final testing. It is true Mr. McDonnel and Mr. Dere had a hand in the final design and, without their efforts, a brilliant idea would have been lost. But the real credit for the idea and development remains with Captains Zacherl, Veit, and Roeske.

Kenneth A. Kleypas
COL, FA
Director, Counterfire Department
USAFAS

Telephonic coordination with ETL provided the following comments: "The Engineer Topographic Laboratories' (ETL) article did not intend to bypass the valuable role of Captains Zacherl, Veit, and Roeske in conceiving this means of determining north. The Polaris II procedure and methodology proposed by them led to the development of the ETL concept, referred to as the Circumpolar Method of Orientation. The original Polaris II concept would have required extensive modifications of the M2 aiming circle, amounting to design of a new instrument. The present concept requires only one change to the M2—the substitution of a new reticle for the present reticle. The new reticle is identical to the present reticle except for the addition of three concentric circles for aligning on polar stars and retains all the functions performed by the standard M2 instrument."—Ed.

Confusing

In the artillery, the word "adjust" has two different meanings. Given the fire command BATTERY ADJUST, NUMBER 3 ONE ROUND, each howitzer follows the mission because of the command BATTERY ADJUST (FM 6-40, paragraph 2-14(b)), but only number 3 will do the "adjusting" in the sense of firing adjusting rounds (FM 6-40, paragraph 2-9(a)(2)). This is needlessly confusing to inexperienced cannoneers.

I believe in maintaining tradition, but tradition should not cause confusion or make training difficult. I suggest the command BATTERY ADJUST be changed to BATTERY FOLLOW. This would avoid confusion and make the fire command say what is meant.

John M. Rogers
CPT, FA (KYARNG)
C Btry, 2-138th FA
Bardstown, KY 40004

There should be little confusion for inexperienced cannoneers if the definitions of the initial fire commands in FM 6-50, paragraph 11-4, are read and understood. The first element of the fire command is PIECES TO FOLLOW/PIECES TO FIRE/METHOD OF FIRE. The command BATTERY ADJUST indicates that each howitzer will follow the mission and set all announced data on their fire control equipment. It also informs the battery that the mission is not a fire-for-effect mission, and that the entire battery will fire on the target when the METHOD OF FIRE (BATTERY (so many) ROUNDS) is announced in a subsequent fire command.

If the term "adjusting" is not clearly understood, the expression "fire in the adjustment phase of the mission," could be used to describe what number three is doing.—Ed.

Partnership

Many Army National Guard maneuver brigades and battalions are thousands of square miles apart; thus, providing fire support personnel to these units presents unique challenges and opportunities.

I was brigade fire support officer (FSO) with the 27th Brigade, 42d Inf Div. NYARNG, throughout 1970-80. The 42d Inf Div Arty is located in the New York metropolitan area, while the 27th Brigade is headquartered in Syracuse with its battalions, companies, and detachment-sized units located across western, central, and northern New York. (Syracuse is 250 miles from New York City.)

In 1978, the brigade and division artillery commanders recognized that, in order to support Inactive Duty Training (IDT) throughout the year and to foster cohesion between fire support specialists and maneuver soldiers, 13F troops and the small complement of field artillery officers in FIST and FSO jobs would have to reside in or near the infantry brigade, battalion, and company cities. It simply wouldn't do to designate certain (perhaps reluctant) soldiers from the FA region (southeastern New York) as 13F since they would only work face-to-face with the maneuver units during the annual training period and perhaps one CPX or FTX during the year.

We began by looking for Guardsmen who had served in FA units on active duty or earlier in their Guard career. Then we sought out 11C infantry mortar crewmen who had worked in the mortar platoon as forward observers (FOs) or in the platoon fire direction center (FDC).

At Annual Training 1979, Soldier's Manual FM 6-13F1/2 was issued and, during the 1979-80 IDT year, many took the initiative to use the TEC tapes, correspondence courses, and maneuver unit outdoor weekend training to increase proficiency. Reward for their efforts came at the conclusion of the 1980 Annual Training when our partnership soldiers from the 101st Air Assault Division occupied observation posts side-by-side and shared fire missions and their experience with us. As a result, both the Guard and Active Army soldiers feel more confident about going to war together.

A few brief pieces of advice for 13F soldiers, FIST chiefs, and FSOs are:

•Join fully in the social and non-duty hour activities of the infantrymen and tankers you support. Make them feel you're an essential part of the team — the guys who deliver the heavy blows.

•Get to the School at Fort Sill for resident training if you can, but if civilian jobs and family commitments preclude this, take full advantage of the USAFAS-produced exportable training products; e.g., 13F Transition Packet, Battle of Eiterfeld, and others.

•Enroll in the Army Correspondence Course Program through the US Army Institute for Professional Development, Newport News, VA.

FIST chief (left) transmits fire request while a team member prepares to sense initial rounds in adjustment.

•Keep a chapter or two from FM 6-20 handy in your briefcase, night-stand, or flight bags for reading during spare moments. (The entire manual is bulky, but it is in looseleaf format so that sections can be removed.)

•Become a member of the Field Artillery Association, share the magazine with others, encourage them to join the Association, and buy gift subscriptions/memberships for the infantrymen and tankers!

•At brigade and battalion level, be sure you're included on periodic staff visits to higher and lower headquarters, again to foster cohesion and recognition for your critical importance in the combined arms team.

MAJ Robert P. Fairchild
Fort Hood, TX

Apple computers

I currently own an Apple II Plus home computer and am interested in contacting other members of the military who also own Apple computers, for the purpose of establishing a Military Apple User's Group.

I would like to hear from anyone with problems relating to military themes (PLL, TAMMS, Training, Education, Household programs, etc.) which could be shared with members. I would also like to hear from anyone who is interested in forming such a user's group.

Joseph M. Teeples
CPT, FA
ATTN: ATSF-WD-CD-FB
US Army Field Artillery School
Fort Sill, OK 73503

Washington Artillery

I was happy to see the brief history of the Washington Artillery on page 40 of the July-August 1981 *Field Artillery Journal*. I have received several telephone calls from veterans of the Washington Artillery inquiring whether I had written the article (I did not) and inviting attention to some important statistics which were not included. Therefore, as a former commander and President Emeritus of the Washington Artillery Veterans Association, I would like to provide some additional information.

By a special Department of the Army directive dated 10 February 1971, the Washington Artillery was granted permission to use its traditional name in addition to its numerical designation, 141st Field Artillery Battalion.

As the 141st Field Artillery Regiment, the Washington Artillery entered Federal active duty on 13 January 1941. After training its "fillers" (drafted personnel), it participated in the Louisiana Maneuvers of 1941. Shortly after Pearl Harbor (7 December 1941), it changed stations from Camp Shelby, MS, to Camp Sutton, NC, thence to Camp Blanding, FL, and then to Fort Sill, OK. While at Fort Sill, the regiment was divided into two separate battalions — the 934th and 935th Field Artillery Battalions. Early in 1943, the 934th was redesignated the 141st Field Artillery Battalion. The two battalions participated in maneuvers in Tennessee and North Carolina and in August 1943 departed for North Africa, then to Italy, and then to southern France as part of the Sixth Army Group under command of GEN Jacob L. Devers. For the Central Italy Campaign, the 935th was awarded the Croix de Guerre; for the Colmar Pocket Campaign, the 141st was awarded a Presidential Citation. In the Italian and Southern France Campaigns, the two battalions fired a combined total of 171,871 rounds of ammunition. The two battalions returned from overseas in November of 1945 and were deactivated.

Upon reactivation of the 935th on 8 November 1946, it was my privilege to serve as commander of that unit for approximately nine years.

The Washington Artillery Veterans Association held a reunion in the Lawton-Fort Sill area in 1978 and presented its flag with 24 streamers to the Fort Sill Commanding general. The flag is proudly displayed in the Fort Sill Museum Hall of Flags.

The 141st Field Artillery Battalion (Washington Artillery) is now part of the 5th Division Artillery and, according to its Annual Training evaluation, the 141st will be combat-ready with little additional active training.

Numa P. Avendano
COL (Ret), FA
President Emeritus
Washington Artillery
Veterans Association
Lawton, OK

New type tow bar needed

In response to our brigade headquarter's directive and information provided in the May-June 1980 *FA Journal* ("Field Artillery Survivability"), our battalion has modified its tactics to utilize the split battery, 2-gun, 2-platoon concept.

During our latest training period at the Grafenwoehr MTA, we had the opportunity to exercise this concept. Each of the six 8-inch M110A2 howitzer platoons moved every two hours, after three fire missions, or after 21 minutes of continuous firing, whichever occurred first.

As the Service Battery Commander, I was hard pressed at times to provide towing for disabled howitzers. There is no substitute for an effective maintenance program, but unscheduled maintenance often raises its ugly head, particularly during frequent moves and peak equipment usage periods. (TM 9-2350-304-10, October 1979, describes towing procedures for the M110A2.)

We never leave a disabled piece anywhere; therefore, it is much more advantageous to tow a disabled howitzer to the next position, continue firing if at all possible, and repair it on the spot. If the repair cannot be effected, then the piece is evacuated with either the M578 or M88A1 recovery vehicles from the Battalion Maintenance Section.

The M578 or M88A1, however, are not always immediately available and we do not have a tow bar. Use of the tow cables is precluded by the cross-country terrain and the distance of 300 to 700 meters between positions.

The supply system has seven tow bars listed in the Federal Supply Group Identification Listings (FSG ILs), Supply Bulletin 700-20, and the Army Master Data File (AMDF) December 1980. Of these, Tow Bar, Vehicular, 2540-00-378-2012, is the most acceptable and is a Basic Issue Item (BII) for the M578 and the M88A1. But after testing this tow bar, we found that it did not allow the needed turning radius or freedom of movement.

It is obvious because of the length of the tube and the installed winterization kits that, unlike the old M110, an M110A2 cannot be towed from the front. When the howitzers were positioned rear-to-rear in our test and the tow bar connected, there was approximately two feet of clearance between the upraised spades which is not sufficient. Any up or down or turning movement caused the spades to collide.

What is desired is a heavy "V" design, long, telescoping, tow bar that would enable a howitzer platoon to tow a disabled gun when an M578 or M88A1 is not available.

We would appreciate any information or advice that your experienced staff or other units in the field could provide.

Thomas L. Esker
CPT, FA
Svc Btry, 1st Bn, 36th FA
APO, New York

The tow bar you describe could be fabricated; however, the telescopic design would require construction of such heavy material that handling by personnel would be very time consuming and difficult. The Recovery Section of the Automotive Department at Fort Knox indicated that two M578 or M88 tow bars could be modified and made into one that could possibly satisfy the requirement. However, there would still be problems with weight, stowage, and transportation. Your letter has been forwarded to the Ordnance School at Aberdeen Proving Ground, MD for further study. (The Ordnance School is proponent for recovery doctrine.)—Ed.

Eliminate inspectionitis

Throughout the Army there has been a great deal of emphasis placed on realism in training. The elimination of "inspectionitis" (a condition where units train with the objective of "looking good" for the inspector rather than training effectively to maximize combat readiness) can be achieved by creating a more realistic inspection environment.

Recent US Army, Europe (USAREUR) surety information letters and the USAREUR Inspector General (IG) have provided guidance directed at widening the focus in technical operations inspections to eliminate or decrease "inspectionitis." The 1st Battalion, 80th Field Artillery, under command of LTC Robert V. Murdoch, recently broke ranks and attempted a sincere and adventurous implementation of this guidance.

The battalion eliminated step-by-step reading from manuals while performing technical operations during a recent VII Corps Technical Validation Evaluation. Manuals were available as a ready reference, but locally prepared checklists were used as a supervisor's guide to insure completion of critical steps. The end result was a realistic inspection of nuclear proficiency, a "USAREUR FIRST," which the VII Corps Team commended by saying that the unit demonstrated a tremendous depth of knowledge and a high state of training in the area of special weapons.

In an inspection of this type, however, personnel must be thoroughly familiar with the operations involved since there is no reading from manuals — the key to success becomes training in all individual areas and team/section drills. This is a difficult and dramatic change from the old methods, but it can be done. We did it.

Ralph R. Steinke
1LT, FA
APO NY

Another "Schneider"

As the Training NCO for Service Battery, 2d Battalion, 147th Field Artillery, I am responsible for maintaining our unit's library which includes the *Field Artillery Journal*. I discovered the two articles about the American Schneider (November-December 1980 and May-June 1981).

Even though Aberdeen, SD might seem an unlikely place to find a Schneider, there is one in front of the National Guard Armory.

In the summer of 1980, our unit acquired the Schneider from a local junkyard dealer. At the time, we didn't realize what we had, but we restored the nostalgic piece as best we could, considering the facilities available.

Unlike MSG William Brown we were unable to locate some of the data concerning our Schneider. However, we did manage to find the following information:

•On the left side of the breech: Howitzer, 155-mm, SCHNEIDER, Model 1918. Beth Steel; J.S.F. Co. Steel.

•On the rear of the breech: A.B.S. & Fdy Co.; Erie, PA.

•On the cannon muzzle: (bottom) 2690 lbs., No. 1819, J.H.C. (top) A.B.S. & Fdy Co., 1919.

Because of the weapon's condition, we were unable to produce any more information. Hopefully, someday, we will be able to restore our Schneider to the proud condition it so justly deserves.

Many thanks to LTC Ronald Olson and MSG William Brown for their informative and interesting articles.

SSG Donn A. Grandpre
Svc Btry, 2-147th FA
Aberdeen, SD

Many thanks to you for your interest in and support of the Journal.—Ed.

Verifying boresight

The purpose of this letter is to request information concerning the validity of using the standard angle method of verifying boresight on the M110A2 howitzer.

There is concern that the muzzle brake on the M110A2 will cause the standard angle method to be invalid.

William E. Pape
1LT, FA
3d Bn, 37th FA

The muzzle brake on the M110A2 8-inch self-propelled howitzer makes it difficult to use the standard angle as a method of verifying boresight. Although difficult, the method is valid and some units have fabricated devices that allow this procedure to be used. However, beginning in January 1982, the M140 alignment device will be retrofitted to all M110A2 howitzers, and this will become the primary method of verifying boresight.—Ed.

Hot off the Hotline

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

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

Question: Are the Gunnery Department exams, as published in FM 6-50 with Change 1 still current?

Answer: *There are no Gunnery Department exams published in FM 6-50s. This FM is written by the Weapons Department and all exams in FM 6-50 with Change 1 are current.*

Question: In FM 6-50, Annex D, Task 12, the deflection change of 145 mils is extremely difficult for manual transversing weapons, such as the M102. Are there any concessions made for manual traversing versus hydraulic-operated weapons?

Answer: *There is no problem in attaining the time standards for traversing an M102 howitzer in accordance with FM 6-50, Annex D, Task 12.*

Question: Reference FM 6-50, Annex D, Task 13. At the conclusion of the task, the examinee is required to announce "ready." Shouldn't it be "set?"

Answer: *"Set" is the correct word to use. FM 6-50 will be corrected.*

Question: After a 155-mm howitzer M114A1 has been calibrated, what is the proper disposition of the M90 velocimeter worksheets?

Answer: *After calibration data has been provided to the batteries concerned, the form may be discarded unless local unit SOP requires that it be filed.*

Training Management in Small Units

by CPT Craig D. Wildrick

As battery commander, you are keenly aware of your most important mission — training your battery. Fortunately, the Battalion Training Management System (BTMS) is fully implemented in your battalion since the battalion commander has provided you with a long range plan, short range training objectives, and as many resources as you need. Your noncommissioned officers are highly competent, enthusiastic trainers who fully understand how to train soldiers. Your lieutenants and senior NCOs are skilled supervisors with an established program for sampling and evaluating training. As the battery training manager, your job is a piece of cake . . . or is it?

The Battalion Training Management System has been widely acclaimed for improving our training in two important ways:

•The battalion commander and his staff are provided a method to manage training that is relatively simple, but effective.

•The section chief is given full responsibility for the individual training of his men.

In both cases, management tools have been developed to make these tasks simpler, and the quality of our training *has* improved in many ways as a result of the system. However, units attempting to implement BRMS frequently encounter great difficulty despite intensive workshops. The reason for the difficulty is simply that the designers of the system appear to have overlooked a key training manager — the battery commander.

The battery commander attends the same training management workshop that the battalion commander and staff attend, during which he learns how they will manage training at the battalion level. Additionally, he receives an overview of the techniques his NCOs and officers are learning; however, little is presented that tells him how to make BTMS work in his battery. He knows he must develop a Short Range Plan; assess, sample, and evaluate training; hold training meetings; and perform other required duties. But he is not told how to fit all the pieces together; so he "implements BTMS" by meeting the requirements without making any real change in the way he manages training. He trains his battery in those areas he "thinks" his personnel need training, which may or may not be what is really needed. The following system for "Training Management in Small Units" (TMSU) is designed to provide the battery commander with the tools needed to manage training consistent with BTMS principles as outlined in TC 21-5-7, "Training Management in Battalions."

What does TMSU do for the commander?

The management problem facing the battery commander is not insurmountable. He merely needs a system which enables him to make informed decisions about how to best use resources available to train his unit. The system should:

•Assess unit proficiency on individual, section, and battery training tasks as outlined in appropriate Soldier's Manuals and ARTEPs. (It is difficult for the battery commander to decide what training to conduct without some idea of what his personnel can do.)

•Provide a logical, systematic way to decide what training his battery needs. (Given limited resources, generally not all of the training that needs to be done can be done. The battery commander must be able to prioritize training needs.)

•Set specific, quantitative training objectives. (Trainers and supervisors need to know what the battery commander expects in a given training period, and at the end of the period it will be evident to all concerned whether the objectives were met.)

(Cannoneer photo)

In addition, the system should facilitate the planning of training in detail and reduce the time needed to produce training schedules.

Training made simple

Training Management in Small Units is designed to meet the requirements outlined above and is applicable to company size units as well as staff sections. As an example, training for a 105-mm direct support artillery battalion will be demonstrated using ARTEP 6-105 and Soldier's Manual 6-13B1/2. Some familiarity with the terms and concepts outlined in TC 21-5-7 is assumed.

Figure 1 shows the steps in TMSU to get the system going. Once TMSU is in operation all steps occur concurrently.

As each step is discussed, specific management tools will be suggested to help the commander perform the step. At first reading, it may appear that

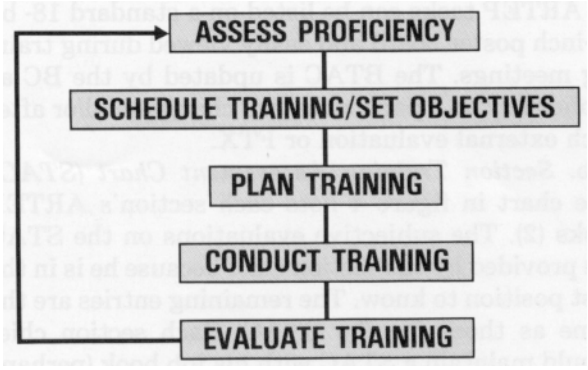


Figure 1. Management model.

an excessive number of "aids" are proposed, but the benefits of using them are much greater than the one-time administrative cost of preparing them. (To minimize administrative cost, make one set of charts on overlay paper using India ink and have them reproduced on a blueprinting machine at your training and audiovisual support center.)

Step 1: Assess proficiency

The battery commander must assess how well his unit can perform individual and collective tasks to decide what training is needed. The following aids are suggested:

a. *Battery Training Assessment Chart (BTAC).* The chart in figure 2 is used to assess battery level ARTEP tasks. Entries are made as follows:

•Column (1): Tasks from ARTEP 6-105.

•Column (2): PRIORITY — Tasks are prioritized using guidance from battalion quarterly training objectives. Tasks should be grouped by relative priority, although they can be rank-ordered if desired. In the example, five groups of tasks of relatively equal priority have been identified (priority A through E).

•Column (3): EX EVAL — Performance of the battery during the last external evaluation:

S: Meets standards.
N (in color): Does not meet standards.
—: Not evaluated.

•Column (4): FTX—Performance of battery during last FTX (S, N, —).

•Column (5): SUBJ EVAL—Commander's subjective evaluation of unit proficiency:

T: Unit is trained to perform task to standards.
P (in color): Need practice to meet standards.
H (in color): Require training.
?: Proficiency unknown.

•Column (6): NEXT TNG — Date the next training is scheduled on the Short (or Long) Range Plan.

Figure 3 shows the complete chart. As many as 51 ARTEP tasks can be listed on a standard 18- by 44-inch poster board and easily viewed during training meetings. The BTAC is updated by the BC as proficiency on a particular task changes and/or after each external evaluation or FTX.

b. *Section Training Assessment Chart (STAC).* The chart in figure 4 lists each section's ARTEP tasks (2). The subjective evaluations on the STAC are provided by the section chief because he is in the best position to know. The remaining entries are the same as those for the BTAC. Each section chief should maintain a STAC with his job book (perhaps on 3- by 5-inch cards). The cards are updated when section proficiency changes, and the chart is updated at weekly platoon training meetings.

c. *Multi-Section Training Assessment Chart (MTAC).* This chart in figure 5 is used for sections with the same ARTEP tasks; in this case howitzer sections. Entries are the same as those in figure 4.

d. *Individual Training Assessment Chart (ITAC).* The ITAC provides a measure of individual proficiency on Soldier's Manual tasks for each section. Figure 6 depicts skill levels 1 and 2 (SL 1/2) for MOS 13B. (For low density MOSs, the ITAC may be reproduced on 8½- by 11-inch paper and kept in a notebook or folder.) The first column shows the section or squad, and the second column shows the number of SL 1/2 personnel in each section or squad. Soldier's Manual task areas, skill levels, and the number of tasks in each area head the remaining columns. These headings correspond to the various sections in SM 6-13B1/2. To use the ITAC:

•Select the percentage of Soldier's Manual tasks that you want soldiers to be able to perform in each area. For example, you may want each soldier to be able to perform at least 70 percent of the tasks in each area. Initially the selection of the percentage is arbitrary so don't spend a lot of time on it. As will be shown in Step 2, this percentage will be adjusted periodically as individual proficiency changes.

•Have each section review his section job book and report the number of SL 1/2 personnel in his section

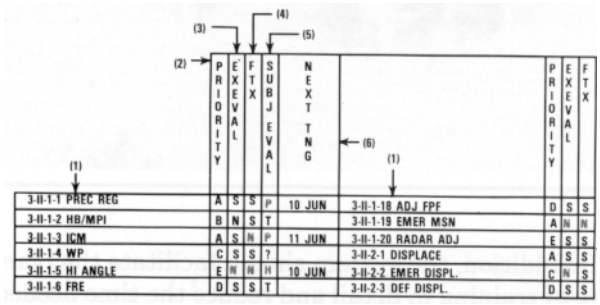


Figure 2. Battery level ARTEP tasks.

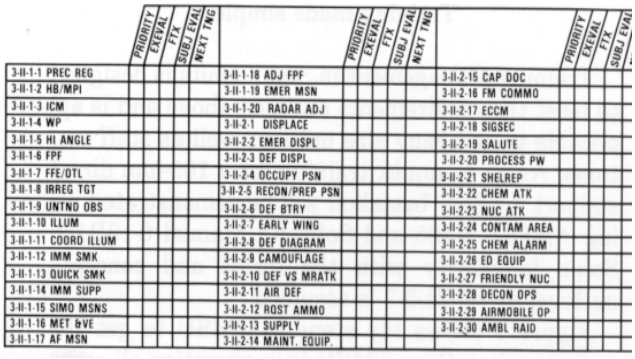


Figure 3. Battery training assessment chart.

that can perform at least the percentages of tasks selected above. Convert the figures to percentages and record in the appropriate blocks.

•Unless you have an unusual unit, not all of your soldiers will be able to perform the percentage of tasks you selected in each area, as is the case with the unit shown in the example. The next step is to choose the percentage of soldiers that you want, and could reasonably expect, to be able to perform the tasks by the end of the next training period. Record these percentages in color.

•Assume both percentages were 70 percent. Color entries on the chart show those sections in which less than 70 percent of the soldiers can perform 70 percent or more of the Soldier's manual tasks in a given area. The BC can use this information to identify relative training needs for each section as well as areas in which the battery is weak as a whole (Gunnery and First Aid in the example). More importantly, it can be used to set specific, quantitative training objectives, as will be shown in Step 2.

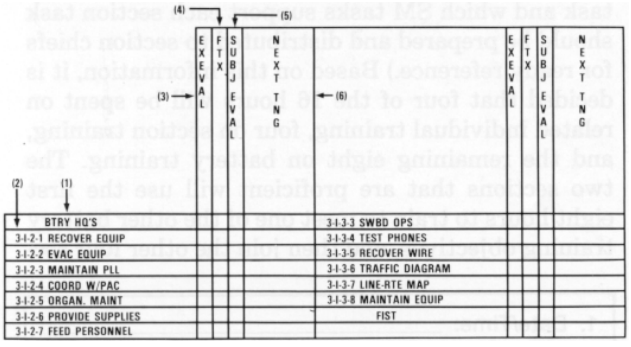


Figure 4. Section level ARTEP tasks.

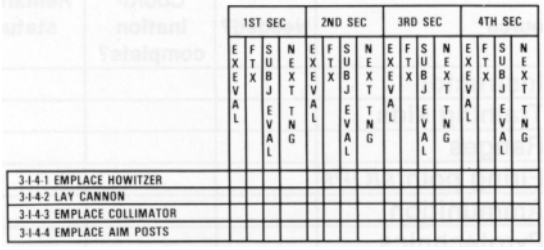


Figure 5. Multi-section tasks.

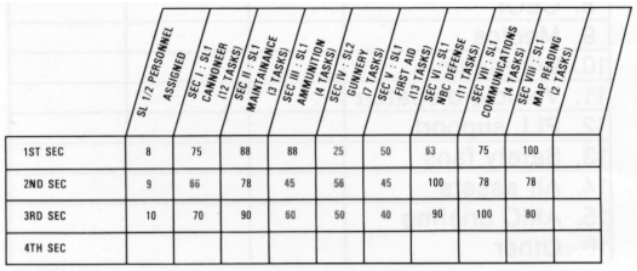


Figure 6. Skill levels 1 and 2 for MOS 13B.

Step 2: Schedule training/set objectives

Step 1 identified the battery training *needs*. Now, the BC must decide what training the battery *will* conduct based on the time and resources available; that is, he must prioritize his training needs for a given period.

Under BTMS, the battalion commander publishes a Short Range (three months) Training Program which delineates external and higher commitments, available resources, and his training objectives for the period. The BC uses this document as a starting point. He knows he must set training objectives which will enable the battery to achieve the battalion commander's objectives. The BC identifies tasks which support the commander's objectives *and* on which the battery needs to train using the various training assessment charts. For example, suppose the battalion task 3-III-2-1 (conduct displacements) was one of the commander's highest priorities for the period. Using the BTAC (figure 3), the BC identifies two supporting battery tasks:

3-II-2-1 (displace from position).

3-II-2-3 (provide defense during displacement).

Assume that the battery needs practice on the first task and is trained to perform the second (this is recorded on the BTAC). Therefore, to meet the battalion commander's objective, the battery should spend time and resources on the first task but not the second. During the weekly battery training meeting, the BC estimates the time and resources needed to raise battery proficiency to the desired level. (This estimate will be refined in Step 3, so it's not necessary to spend a great deal of time making it.) The BC then formulated his Short Range Training Program (figure 7).

The Short Range Plan (SRP) is designed to record 13 weeks of training time on a standard 28- by

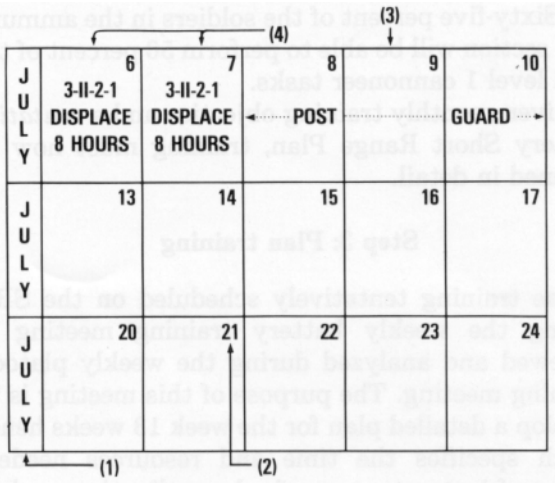


Figure 7. Short range plan.

44-inch poster board covered with acetate. The month (1) and date (2) are shown as indicated. External and higher commitments, such as post guard, are extracted from the Short Range Training Program and scheduled first (3). The BC must use the remaining time to conduct individual and collective training to insure that the battalion commander's objectives are met.

In the example, the BC estimates that it will take about 16 hours to raise the proficiency to ARTEP standards, so he indicates the task number, a short description, and the time estimate in the appropriate blocks (4).

After scheduling training on the highest priority task, the next highest priority task is scheduled, and then the next, and so forth, until available time and resources are expended. The highest priority training need not be a battery task, particularly if scheduling for an individual training cycle.

Scheduling training in this manner greatly facilitates setting battery training objectives. Training is first scheduled as outlined above to enable the BC to estimate the amount of progress he can reasonably expect to be made during a period, given the amount of time and resources allocated to it in that period. A list of monthly battery training objectives in order of priority should be published and distributed to trainers and supervisors in the third week of the month prior to training. This list is easily developed from the BC's estimates using the management tools already presented. Some examples:

•Each howitzer section will be able to achieve ARTEP standards on task 3-I-4-14 (displace to a supplementary position).

•Eighty percent of the soldiers in each section will be able to perform 60 percent of the NBC defense tasks listed in appropriate SMs.

•Sixty-five percent of the soldiers in the ammunition section will be able to perform 50 percent of the skill level 1 cannoneer tasks.

Given monthly training objecties and a *tentative* battery Short Range Plan, training must now be planned in detail.

Step 3: Plan training

The training tentatively scheduled on the SRP during the weekly battery training meeting is reviewed and analyzed during the weekly platoon training meeting. The purpose of this meeting is to develop a detailed plan for the week 13 weeks hence which specifies the time and resources needed, names of instructors, required coordination, and so forth. It may take the form of a detailed training and evaluation outline or merely allocate time to the section chiefs to conduct individual training.

The Planning and Coordination Reference (PCR) chart in figure 8 is suggested as a planning aid. The PCR should list all possible resource and coordination requirements for training. As training is planned, needs are identified by placing a check in the appropriate box. As coordination is conducted or completed, appropriate entries are made. Forms should be kept together in a notebook or folder to provide ready reference for training managers to check on the status of any event on the SRP.

Assume that the battery commander allocates 16 hours to conducting displacements. The section-level task which supports this task is 3-I-4-14 (displace to a supplemental position). Let's assume that four out of six sections need practice on this task. Of the four, two section chiefs say they need some additional time to conduct training on related individual tasks before they train collectively. (A listing of which section tasks support each battery task and which SM tasks support each section task should be prepared and distributed to section chiefs for ready reference.) Based on this information, it is decided that four of the 16 hours will be spent on related individual training, four on section training, and the remaining eight on battery training. The two sections that are proficient will use the first eight hours to train to meet one of the other battery training objectives, and then join the other four sections

1. Date/Time: _____
2. Training to be conducted:_____
3. Resources/coordination required: _____

Resource	Needed?	Coordination complete?	Remarks/status
1. Instructor			
2. Training aids			
3. Ranges			
4. Firing points/OPs			
5. Ammunition			
6. Pyrotechnics			
7. Rations			
8. CEOI			
9. Medics			
10. Wire team			
11. Vehicle dispatch			
12. PLL support			
13. Safety fans			
14. Air assets			
15. AMC briefing			
16. Other			

Figure 8. Planning and coordination reference.

for the last eight hours. The XO (or whoever runs the platoon training meeting) fills out the PCR (figure 8), briefs the BC on the plan, and updates the SRP by the end of the week. A monthly extract of the updated SRP should be distributed to trainers and supervisors in the third week of the month prior to training (with the batttery training objectives). (Note that the SRP is easily converted into weekly training schedules. By the time the schedule is to be published, all the planning will have been done.)

Completing the initial 13 weeks of detailed planning is the most arduous task required to implement the system. However, after the first 13 weeks are planned, only one week is planned each week and the process takes much less time. In the beginning of the week, training for the week 13 weeks hence is scheduled at the battery training meeting. Detailed planning is accomplished at the platoon training meeting in the middle of the week and by the end of the week the SRP is updated. Thus the planning process stays 12 weeks ahead, as required in TC 21-5-7.

Steps 4 and 5: Conduct and evaluate training.

These steps are executed by trainers and supervisors as discussed in applicable manuals and BTMS workshops. The SRP should include a listing of what tasks will be evaluated each week. As training is conducted, sampled, and evaluated, the BC must be kept informed on the progress being made. The SRP may have to be modified if the battery fails to achieve one or more monthly training objectives. The evaluation step forms the basis for making new assessments of proficiency and starting another iteration of the process.

TMSU in headquarters battery

If you are a headquarters battery commander, you're probably thinking that there is no way that you can manage training using the method just described because you have far too many MOSs to worry about and don't have the time to manage them all. You're right — training management should be decentralized to the staff section level for section and individual training.

The BC *should* manage battery-level training (conduct displacements) and common tasks from FM 21-2 and FM 21-3 using the BTAC and ITAC which list common tasks only. At battery training meetings, the BC schedules training in which he wants the entire battery to participate. Staff section chiefs must come to the meeting prepared to schedule necessary training for their sections. Each section must assess its training status, schedule training, set objectives, and plan training using TMSU.

To facilitate staff section planning, the BC, in coordination with the battalion XO, should designate times when he will regularly conduct battery training and when the staff sections will conduct training. For example, he may reserve Wednesday mornings for maintenance training and Friday afternoons for training in the PAC. The amount of training that can be scheduled each week will vary with the section.

	HSB	A	B	C	BN		HSB	A	B	C	BN
3-I-16-2 PERFORM SUPPLY ADMIN						•101-521-1203 ISSUE/REC WPNS (SL1)					
•121-004-1228 FILE DOC (SL1)						•101-521-2151 PROP BOOK (SL1)					
•121-004-1415 POST REGS (SL1)						•101-521-2152 MAINT PROP BK (SL1)					
•121-004-1227 ESTABLISH FILES (SL1)						•101-521-2153 INV PROP BK (SL1)					
•101-521-1163 DOC REGISTER (SL1)						•010-76Y-3101 ACCT BULK FUEL (SL3)					
•101-521-1164 SIG. CARDS (SL1)						•010-76Y-3102 EOM BULK FUEL (SL3)					
•101-521-2252 EQ. ADJ REPORTS (SL2)						•010-76Y-3151 PREP 2715,2715-1 (SL3)					
•101-521-2154 DET RELIEF FROM RESP.						•010-76Y-3152 PREP 2406 (SL3)					
•101-521-2155 CASH SALES (SL2)						•010-76Y-3201 AUTO. H. R. (SL3)					
•101-521-2156 STATE CHARGES (SL2)						3-I-16-3 TURN IN UNSVC ITEMS					
•101-521-2157 GPLD (SL2)						•101-521-1159 TURN IN EQUIP (SL1)					
•101-521-2158 CC VOUCHER (SL2)						3-I-16-4 PROCESS CL V REQTS					
•101-521-2159 RPT OF SV (SL2)						•101-521-2101 DIRECT WPN SEC (SL2)					
•101-521-2201 SHIPMENT CARDS (SL2)						•101-521-1201 CONTROL AMMO (SL2)					
•101-521-2202 STORAGE OF SUPP. (SL2)						•101-521-2161 RQST AMMO (SL2)					
•101-521-2301 EDITING OPNS (SL2)						•101-521-2162 TURN-IN AMMO (SL2)					
•101-521-1101 LAUNDRY (SL1)						3-I-16-5 MAINTAIN EQUIP					
•101-521-1102 CLOTHING REQ (SL1)						•551-721-1007 BEFORE OPS MNT (SL1)					
•101-521-1103 CLOTH/EQUIP REG. (SL1)						•551-721-1008 DURING OPS MNT (SL1)					
•101-521-1202 KEY CONTROL REG (SL1)						•551-721-1009 AFTER OPS MNT (SL1)					

Figure 9. Supply training assessment chart.

It may be necessary to modify some of the management tools to meet the needs of a particular section. For example, the battalion S4 section has only five ARTEP missions and a low personnel density. This section may be charged with managing training for all 76Y personnel in the battalion. Figure 9 shows how the STAC and ITAC can be combined and yet perform the same functions.

Summary

The battery commander is charged with the responsibility of making the best use of available resources to provide professional training which will make his unit "fit to fight." A comprehensive, systematic method of managing training is necessary to fulfill this responsibility.

This is a system that works!

CPT Craig D. Wildrick is the brigade fire support officer for the 1st Battalion, 321st Field Artillery.

It is an unquestioned fact that the role of a battery commander in peacetime is of the utmost importance since no other company grade artilleryman has more responsibility or contributes as much to the combat readiness of his battalion. However, in our efforts to modernize artillery systems, we might have forgotten to evaluate and redefine, if necessary, the combat role of the battery commander.

The Firing Battery Commander

by CPT Michael J. Hennelly

Does the battery commander have a role in combat that is commensurate with the duties and responsibilities assigned him in peacetime? Is the field artillery making best use of this key personnel resource? To answer these questions, it may be helpful to evaluate the present combat duties of a direct support firing battery commander and compare these duties with those of selected foreign armies.

German Army (1940s)

In 1940, the US was concerned with the doctrine and tactics of only two armies—our own and that of Germany. What then was the role of a battery commander when artillery was making the transition from horse-drawn to motorized and mechanized guns? Field Manual (FM) 6-20 (dated 1940) states that "The battery commander commands the battery and supervises all of its activities: reconnoiters and selects positions, determines objectives and the character of fire in accordance with instructions of the battalion commander, prepares and conducts fire, and provides for the replacement of personnel, ammunition, and equipment."

In an amplifying article for the *Field Artillery Journal* in January of 1940, MAJ Josiah A. Wallace writes:

> The battery commander habitually conducts fire from a command post in the immediate vicinity of the guns. . . . He is assisted by a gunnery sergeant, gunnery corporal, and two RTOs. . . . It should only be necessary for the battery commander to lay out and check their work and exercise other supervision from time to time so that he is never denied time for attention to other elements of his battery when this is required.

In the American Army of 1940, the commander was concerned with four principal combat duties:

- •Supervising battery operations.
- •Supervising fire direction.
- •Insuring battery supply.
- •Reconnaissance of new positions.

Because one of the major duties of the American battery commander was the preparation and conduct of fire, we may suppose that he spent a good deal of time in the battery area. The German army of that time took a different approach. In a Military Attache Report to the War Department in 1941, the role of a Wehrmacht battery commander was clearly stated:

> The battery commander specifies the location of the observation post . . . and also the firing position and the method of entering it. He orders the establishment of communication, the machinegun position, and the limber position. He specifies the base piece and method of laying and generally prepares for entry into positions and opening of fire by his battery. . . . Direct support battery commanders should go to their main observation posts as soon as they have completed the arrangements for the entry of their battery into action and remain there in general during the battle.

In comparison, the battery commanders of the two armies had fundamentally different roles. The American commander was present in the firing position most of the time because he had fire direction, supervisory, and logistical responsibilities. The German commander, however, fought the battle from an observation post and entrusted the command of the firing battery to his executive officer.

Other armies

In different countries, the role of a battery commander in combat is as varied today as it was in 1940 since they serve in different capacities, such as fire support officers, forward observers, and fire direction officers. There is by no means, however, a consensus on the best use of a battery commander. In the following description of the roles of foreign battery commanders, Great Britain and West Germany were selected because they are close allies in NATO; Israel was chosen because it provides many tactical combat lessons; and the Soviet Union was selected because it serves as the model for most Warsaw Pact armies.

Great Britain

In a British battery, the commander is a major and has three captains and three lieutenants to

assist him. The commander serves in combat as a battlegroup (battalion) fire support officer and his place of duty is with the battlegroup commander. He is the adviser on all fire support matters to include nuclear fires, counterbattery, long range antitank, and air defense. To help him accomplish this task, he has a command party of four to six soldiers and two radio-equipped Land Rovers who accompany him to battlegroup headquarters.

One might suppose that, if the commander were not responsible for supervising the firing battery, it would be the job of one of the assigned captains, but this is not the case! The senior of the three captains is responsible for logistical and administrative support and is not always in the battery area while the other two captains are forward observers. Here the British have expanded the role of forward observer as we know it since they have placed the most experienced personnel as far forward as possible for two reasons.

• First, it is felt that the person who can see the target is the best judge of how to engage it. They rely on a very experienced observer to issue the fire order instead of the fire direction officer.

• Second, the British realize that an observer is not continually firing missions. When lulls occur, he should be fire planning and sending back battlefield intelligence. For this, it is desirable to have someone more experienced than a new second lieutenant.

The officer in charge of the firing battery is the senior lieutenant whose title is that of Gun Position Officer. He has two lieutenants under him as gun section commanders and a lieutenant or sergeant-major in the fire direction center (FDC). The Gun Position Officer is also responsible for reconnaissance, selection, and occupation of position (RSOP) based on the guidance given him by his commander at battlegroup headquarters.

West Germany

The role of the battery commander in the Bundeswehr is similar to that of his British counterpart. In combat, the commander would serve as a battalion fire support officer and, as such, would perform all fire support functions and would position the forward observers assigned to the maneuver battalion. To accomplish these tasks, he has an M113 as his command vehicle. He would seldom, if ever, be in his battery position. The firing battery is commanded by the battery executive officer who has an assistant executive officer supervising the FDC. The battery also has two NCO platoon leaders — one accompanies the executive officer and functions as a chief of firing battery and the other performs RSOP in his assigned vehicle.

Israel

The role of the Israeli battery commander is in direct contrast to that of the British and German roles because he is always in the battery position. An Israeli commander does not usually begin his military career as an officer; rather, he enlists, goes through the ranks, and works up to the position of section chief or chief computer. Following this experience, he goes to officer school and begins again as an artillery second lieutenant. When an officer subsequently becomes a commander, he is the most experienced and knowledgeable artilleryman in the battery.

In the battery position, the commander's duties are mostly supervisory responsibilities. A fire direction officer (who is second in the battery chain of command) supervises the FDC and the executive officer performs RSOP.

Soviet Union

According to an article written by Colonel Marakhovskiy ("Operations of an SP Howitzer Battery *Military Herald,* May 1977), at the assault position for the attack, the commander is with the maneuver commander or close to him; during the battle, his command vehicle moves at a distance of 50 to 100 meters from the latter's command post.

The battery commander is not at the battery position, but his role is more than that of a battalion fire support officer. According to an article by Major General Sharyy ("In Order for the Artillery Support to be Constant," *Military Herald,* June 1977), with the appearance of a target, the battery commander receiving the mission from the company commander is forced to halt, deploy the command observation post, and prepare the target data for opening fire. As a minimum, he needs 8 minutes to do this: 2.5 minutes for setting up the range finder, 0.5 minutes for determining the polar coordinates, 2 minutes for transmitting the command to the fire position, and 2.5 minutes for packing up the range finder.

The Soviets think that the role they have assigned to the battery commander is one that takes advantage of his expertise in the fields of fire direction and forward observation.

America

The battery commander has served as fire direction officer (1940 American), forward observer (1940 German), battalion fire support officer (present day British and German), a combination of these roles (Soviet), or in some nonstandard role (Israeli).

The role designated for a present-day American battery commander, however, is different from all of

these. FM 6-50 lists the responsibilities of a firing battery commander which include (among others) the following:

•Insuring that the battery accomplishes its mission.

•Performing reconnaissance, selection, and occupation of the battery position.

•Maintaining ammunition supply.

•Supervising the activities of the FDC (when necessary).

•Insuring the battery's survivability.

There are several reasons for this change of emphasis. For example, since fire direction has become more decentralized and more complex, it is not feasible to designate the commander as the fire direction officer if he is to perform his other major duties. Another reason is the probability of moving several times daily to survive. This development has lent emphasis to the battery commander's traditional duty of reconnaissance, selection, and occupation of position which requires an enormous amount of time. Even if the unit moves only three times daily, the commander cannot spend most of his time in the firing battery area.

If the need to move frequently did not exist, what other essential combat roles does the commander fill? The executive officer commands the firing battery portion of the battery and insures the delivery of timely and accurate fire. The fire direction officer (normally the assistant executive officer) insures the accurate and timely production of firing data, issues the fire order, and coordinates with the battalion S3 to determine the type and amount of ammunition to be requisitioned. The first sergeant establishes the battery operations center and develops the battery defense plan.

New developments

If we examine the job description of a commander circa 1940 and exclude his fire direction responsibilities, we see a commander who has to supervise his battery's activities, conduct RSOP, and provide for the logistical needs of his unit. This is essentially what the battery commander is trained to do today. What then is the most effective use of a battery commander in combat? Has the nature of artillery warfare changed to such an extent that the role of the battery commander should be changed?

Even though the nature of field artillery changed very little the last decade, American field artillery has improved tremendously in a quantitative manner — artillery has gotten larger and faster and can fire a greater variety of ammunition. Recently, there have been two developments which, I think, fundamentally alter the nature of artillery warfare: The first development was the advent of nonstandard artillery ammunition such as precision guided munitions (PGMs) and field artillery scatterable mines (FASCAMs).

Precision guided munitions represent not only a quantum jump in the cost of ammunition but an even greater amount of combat power available to influence events on the battlefield. The whole pace of artillery warfare has been altered. On the one hand, there exists a much higher level of destructive power at a much lower level than ever before; but there also exists as a logical countermeasure an enemy who relies on many lightly armored vehicles rather than just a few heavily armored, easily killed vehicles. Precision guided munitions, however, are only as effective as the command structure that makes the decisions of how and when to employ them. They can help make interdiction a workable reality in future conflicts. Both PGMs and FASCAM add a dimension to the field of fire support that it has not had before.

Other elements that have changed artillery warfare are the awesome and highly complex systems of target acquisition sources planned or now available to the field artillery. We are also developing the systems needed to collate and process all of this information in a timely manner.

Although these developments have significantly altered the nature of artillery warfare, there are some elements which never change. If we are to win a war, we have to possess the ability to apply a decisive amount of combat power at the time and place we choose. The ability to do this depends on the integration and coordination of personnel and weapons systems. One of the most influential roles in this entire process is that of the fire support officer. The relentless pace of combat combined with the wealth of available information and the destructive capabilities of new munitions will tax those in the area of fire support as never before.

The American artillery is currently exploiting these new developments with some of our least experienced personnel. FIST officers, for example, are our newest and least experienced second lieutenants since this is the first step in any artillery officer's development.

But who do we use as fire support officers — the men who have to use this wealth of information to plan and control the employment of our artillery? In many cases we use those captains who have not yet been primary staff officers or commanders, or we use first lieutenants who are not yet eligible for command. Battalion commanders place much greater emphasis on command than on fire support. This is inevitably and rightly so in a peacetime environment,

but what about war? The whole key to effective use of new combat developments is the emphasis we place on fire support personnel.

In combat, the direct support firing battery commanders should be battalion fire support officers. Four areas which must be considered for the artillery to perform its mission in a timely and accurate manner are fire support, firing battery operations, fire direction, and forward observation. American battery commanders do none of these as their major duties. They should! I believe our commanders are under-utilized and that we are not putting enough command emphasis on fire support.

Examine the relative merits of this proposal. If a commander is a fire support officer, what do we lose? We lose an officer from the battery who does RSOP as his major function. What do we gain?

•We take advantage of the competence and professional qualities of a battery commander and apply that to an evermore complex and important job.

•We gain stability in the position of fire support officer.

•We gain in the increased level of trust and credibility that the maneuver commander would have in a battery commander as fire support officer.

•We gain in the satisfaction of knowing that a battery commander is no longer performing essentially a peacetime role in a wartime environment.

Recommendations

In order to implement this concept, there are several changes which would have to be considered.

The first change would be in the duty of reconnaissance, selection, and occupation of battery positions. Who would accomplish this task? There are two immediate solutions which seem feasible. One would be to have the battery first sergeant lead the advance party. The other would be to have the current battalion fire support officer occupy a slot in the firing battery as a reconnaissance officer. The job of RSOP could then be accomplished by either a first sergeant or a reconnaissance officer without any increase in battalion authorized strength.

The other problem area would be the assignment of FIST personnel. The question of whether they belong to the firing battery or to headquarters battery would have to be answered. Although this topic would merit an entire series of articles, I shall attempt to briefly address it. There are three possible alternatives to consider:

•The first is to maintain all present organizations and reduce the position of fire support officer to a first lieutenant's slot. Thus, at maneuver brigade level, the direct support artillery battalion commander would be the fire support coordinator and the FSO would be his principal assistant. Similarly at maneuver battalion level, a firing battery commander would be the fire support coordinator and the FSO would be his principal assistant. This alternative could be implemented with the least amount of turbulence.

•The second alternative is to return all FIST personnel to the three firing batteries. The battery commander would then be responsible for their training, vehicle maintenance, and supply. Although this would increase the administrative and training burden of the commander, he would also receive three additional officers to help with that burden.

•The final alternative is somewhat more sweeping. All FIST personnel could be formed into a fire support battery under the command of the brigade fire support officer. In order to retain the five-battery structure within a direct support battalion, the depleted headquarters battery would be combined with service battery to form a headquarters and service battery. The FIST battery would be strictly a peacetime organization and would be dissolved in wartime as each FIST went to its maneuver battalion. Although the brigade fire support officer would be responsible for training all FIST personnel, the battery commanders could work closely with him to insure that they could provide input to training. Here, FIST personnel would have higher morale than they do belonging to an unwieldy portion of headquarters battery. A final advantage would be that the S4 would not have to be the service battery commander which is a difficult job at best.

It is not within the scope of this article to explore all of the peacetime administrative and logistical ramifications which would flow from such a change.

If the field artillery of the US Army is to meet the demands of the battlefield of the future, we must consider the technological challenges we face. We cannot afford to under-utilize one of our most valuable officers — the battery commander — by basing his current duties solely on custom and tradition. The key to victory is to be better trained and to make the most efficient use of all of our resources. In the artillery, we would take a long step toward maximizing our personnel resources by using the firing battery commander as a battalion fire support officer.

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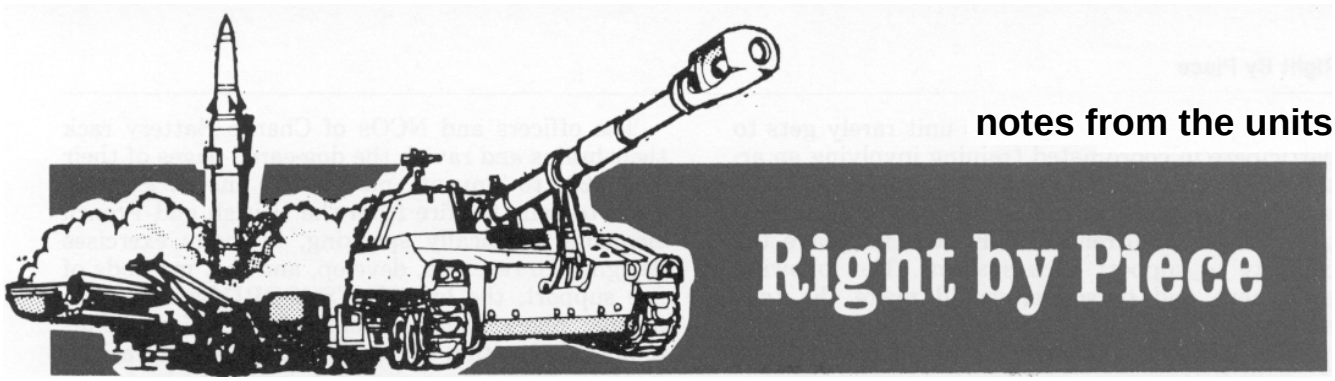


TACFIRE tested

FORT RILEY, KS—The "Big Red One's division artillery has spent the last several months preparing, training, and testing Redlegs to use the new TACFIRE system, which was fielded in January this year.

In May, the entire division artillery held a field training exercise to validate their ability to use TACFIRE. They also participated in the division command post exercise, "Red Fire," using TACFIRE for live fire missions.

During the exercise, each of the battalions provided fire support in the normal division support configuration: the 1st Bn, 5th FA, was in direct support of the 1st Bde, and the 1st Bn, 7th FA, was used in direct support of the 2d Bd. The 3d Bn, 6th FA, provided general support to the whole division sector.

The combined arms field training exercise put TACFIRE through several tough and demanding tests.

"Everyone did a typically outstanding job, which is the battalion and division standard," said CPT Bernard Ellis, C Battery Commander, 3d, Bn, 6th FA.

"The reason the battalion did so well is because the NCOs did such an outstanding job," claimed Ellis.

"There was a lot of good training going on out there," said SSG Henry Litt, section sergeant, Btry A, 3d Bn, 6th FA. "We sent 71 rounds down range."

As missions were created by forward observers and channeled through the TACFIRE computers to each battery, the atmosphere in each section was charged with electricity and excitement.

Fire mission instructions received at the battery were relayed to the guns by intercom and then repeated by each section gunner so that everyone could hear the type of round, fuze size of the propellant charge, and, most importantly, the command, "Fire!"

As tensions mounted, final adjustments were made and the safety officer checked each artillery piece in his battery to insure that the mission was safe to fire.

When the command was given, all the guns roared in unison. Each of the crews knew that, besides the loss of pride for being out of sync with everyone else, a case of beer is the fine for missing the beat.

"A lot of young guys needed this kind of field experience to get to know what's going on," said SSG Johnny Kennedy, motor sergeant, Btry B, 3d Bn, 6th FA.

The new TACFIRE system marks the first time an Army unit in the field has had a real-time, computer-generated battle map, showing tactical boundaries and friendly and enemy locations.

Berlin Brigade's six-gun div arty

BERLIN, WEST GERMANY—On 23 September 1963, the 2d Battalion, 6th Infantry, was the first to welcome Charlie Battery, 94th Field Artillery, to its ranks. The unit's mission was to provide fire support to the Berlin Brigade if renewed conflict should arise in the "divided city." Formerly designated as D Battery, 1st Battalion, 35th Artillery, C Battery, 94th FA, established its new home at McNair Barracks and began the mission of providing timely and accurate artillery fires for the US, British, and French Brigades.

One battery supporting a composite maneuver division? Much like a one-legged man in a kicking contest, C Battery eagerly accepts what appears to be an insurmountable task and more. Basically, the battery consists of six M109A1 howitzers, six M548s, a headquarters element composed of a small maintenance section, and communication, ammunition, supply, and administrative sections. In addition, the battery also contains a fire support element that is intended to support the US maneuver brigade.

Along with the mission of supporting the Berlin, British, and French Brigades, Charlie Battery also has the requirement to train and maintain a level of technical and tactical proficiency for the 13 MOS soldiers. This is accomplished through two annual major training exercises in West Germany. One of those visits is to participate in an annual ARTEP for those artillerymen in areas not confined by an eight-foot wall, complete with pyrotechnics. Any travel from Berlin is a time-consuming project. First, the tracked vehicles must be rail-loaded in a unique manner for travel through the East German corridor. Second, the wheeled vehicles must traverse the corridor via the autobahn according to various regulations that govern the composition, conduct, and rate of travel. By the very nature of its assignment

and assets available, this unit rarely gets to participate in coordinated training involving an artillery battalion. In addition, the TACFIRE, BCS, or GLLD systems are not projects for implementation since the current MTOE does not have the capacity to support such systems. The following equipment and personnel would make the task easier:

•Two additional howitzers in order to implement the split battery concept as an eight-gun battery.

•Additional personnel for the maintenance section to accomplish the ever-present operations for material readiness.

•A full complement of FIST personnel, vehicles, radios, and associated equipment to firmly establish the nine-man company FIST concept. This would include the assignment of a major as brigade FSO, captains as battalion FSOs, and lieutenants as FIST chiefs.

•Additional wheeled vehicles to support critical areas.

•Artificial training devices to augment the 14.5-mm Subcaliber Trainer and the SAAB BT33 Indirect Fire Trainer that are currently in use.

•Also, the battery commander's position should be upgraded to a major since he also serves as brigade fire support coordinator and staff officer to the brigade commander.

Charlie Battery supports the Berlin Brigade during local field training exercises, mobile operations in urban terrain (MOUT), ARTEPS, command post exercises, Camms exercises, mortar exercises, ceremonial events, and readiness exercises.

How is this done? Like most of today's Army, many of the tactical elements of the brigade are organized under an education/sports block, guard/detail block and a field/MTA/training block known respectfully as the yellow, red, and green blocks.

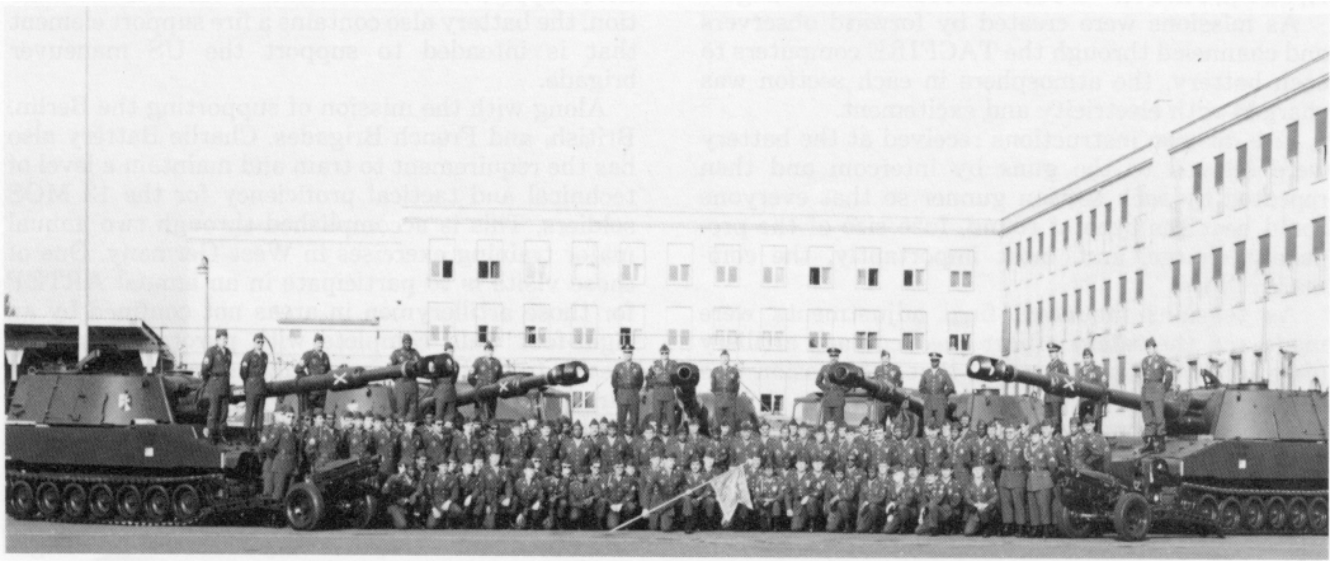
The officers and NCOs of Charlie Battery rack their brains and ravish the dog-eared pages of their FM 6-20s to "invent" methods to answer and respond to calls for fire from the British and French elements. Tactically speaking, in many exercises designed to research, develop, and test methods of fire support, the brigade FSCOORD/battery commander plays "selective hide and seek" as he attempts to position the battery throughout various locations in the inner city. But, here's the best part, there are no nice figures like 1-22 or 2-33, etc., supporting on the left, right, rear, or even downtown on Berlin's busiest street, the Kurfurstendamm.

Notwithstanding this challenge, C Battery often leaves a CPX/FTX or Camms Exercise with the general consensus "well we wore out two sets of tubes, but we gave 'em hell, didn't we?"

Charlie Battery's soldiers gladly accept the challenge to compete with the remainder of the brigade during the Allied Forces Day parade, Brigade Review, and Independence Day parades by bringing the solid OD green vehicles to a blistering brilliance. Howitzers appear throughout the crowd-filled streets with tracks and track pads painted black with silver exhausts, accented by red and yellow reflective tape. Quite naturally, each track is given its annual pre-parade paint job by the maintenance division. At the same time the "salute" battery, a five-gun 75-mm pack howitzer battery, is given a final touch of "Pledge" while "section chiefs" adjust the red scarves and gleaming black helmet liners affectionately known as "Spandau liners."

The soldiers, enlisted men, NCOs, and officers of Battery C, 94th FA, stand proud and flexible as did many other artillerymen since that day in 1963 when the Berlin Brigade welcomed their first Redlegs eager to accept the challenge to contribute to the defense of Berlin.

Battery C, 94th Field Artillery.



German officials hosted by 42d FA Brigade

GIESSEN, GERMANY—The 42d Field Artillery Brigade recently hosted the Lord-Mayor of Giessen and 20 Other German officials at the Grafenwoehr Training Area. The brigade initiated the visit so that German officials would be better informed on the training received by American soldiers, many of whom live on the economy within the jurisdiction of the various officials. The hope was that, by knowing what is required of American soldiers, the officials would be more objective when dealing with such sensitive issues as maneuver damage and perceived American misunderstanding of the German culture. The project was a success as indicated by the following article (translated) from the "Giessener Anzeiger."

For some of them, it was the first flight in a military helicopter, and the steel helmets which they were "issued" did not make the group in their "civilian" suits look military. But things got more military: During lunch, only a few meters from the field mess hidden under a camouflage net, several 203-mm howitzers "thundred off." An unusual, but interesting, scene presented itself to the guests from the county of Giessen, the mayors, and the representatives of institutions on the troop training area Grafenwoehr. They were present on the invitation of the US Forces from Giessen, who were in Bavaria on maneuvers.

The 42d US Field Artillery Brigade, which is stationed in Giessen, travels to Grafenwoehr twice each year. For one day, mayors and representatives from the Giessen county, Lord-Mayor Goernert, and Police President Sauer were invited on an information flight to the maneuver area.

"We train as realistically as possible," emphasized Colonel Cizmadia, deputy commander of the Giessen North Community shortly before take-off, "starting with the combat helicopter up to the steel helmets, which everyone has to wear." The lunch was certainly different from what had been expected by some. There were no tables set at some shady spot under trees. Everyone received an olive colored packet, crammed with tins and cans. In a tent, which was covered by a large camouflage net, everyone could try his own luck at the meal, supplied with a little can opener. Somehow it was fun to "crack" the can and try the ham and eggs or some sweets or chewing gum.

The Americans were very generous with information about the maneuver. Even before the always interesting questions about the costs for an exercise could be posed, the figures were already visible on a large board. The three-week stay costs $250,000 for the Giessen US units in Grafenwoehr. The majority of this amount is needed for ammunition. The rounds which are fired from the howitzers cost $180.00 each.

Much interest was shown by the guests from the Giessen area in reference to the howitzers and technical details. And the soldiers were always willing to explain and demonstrate how the rounds, which weigh 200 pounds, are loaded into the cannons and how it is possible to be ready to fire again after only two minutes. Also very impressive were the effects caused by the heavy guns. The explosions were visible from an observation post close to the impact area.

The information given to the responsible parties from towns and communities should be of even greater importance, since they deal with the upcoming maneuver in September (Reforger 81). That is when the Americans will train, not in Grafenwoehr, but in Giessen and the surrounding area, naturally without live ammunition, but with tracked vehicles. This way, the local politicians would be able to offer practical advice and tips in connection with maneuver damages, etc.

With their helmets on the table, the guests unpack their NATO rations and have lunch in Grafenwoehr.

Cadets train with Field Artillery

WEST POINT, NY—With its engine roaring, a Gama Goat bounds over the hilltop. Even before it stops, soldiers in camouflage fatigues leap from the vehicle and begin securing the field and checking for enemy positions and mines. As the dust settles, the battery commander quickly selects the gun emplacements. Moments later, six Gama Goats trailing six M102 105-mm howitzers speed onto the field—their six-man crews ready to roll the guns into place.

This is not an unusual day for members of Battery C, 2d Battalion (Airborne), 321st Field Artillery, 82d Airborne Division—except that the observers and location are new. Instead of being watched by fellow soldiers at Fort Bragg, NC, the paratroopers are observed by second-year cadets at the United States Military Academy's Camp Buckner near West Point.

Battery C troops are among the more than 1,000 soldiers who arrived at the Military Academy in June to provide support for West Point's summer Cadet Basic Training and Cadet Field Training. Other troops included infantrymen from Fort Bragg, NC, Special Forces and engineer units from Fort Devens, MA, transportation units from Fort McClellan, AL, and those assigned to augment the regular West Point teaching staff.

All 1,100 sophomores at West Point train with summer support troops as part of seven weeks of instruction in each of the Army's combat and combat support branches. Each company of cadets rotates through a wide variety of classes, ranging from an hour's instruction on encoding and decoding messages to two days of offensive infantry training.

"The field artillery batteries spend two and a half days teaching the cadets," said MAJ John J. Rysenka, West Point tactical officer at the field artillery committee site. The cadets learn forward observation, fire direction, and firing at one site with Battery A, while Batttery C covers the reconnaissance, selection, and occupation of position (RSOP) portion of the field artillery training.

In approximately eight hours, members of the artillery units instruct some 60 cadets in the techniques of moving and firing a battery of howitzers. Cadets are paired with each member of Battery C including the leadership positions of battery commander, executive officer, fire direction officer, first sergeant, and chief of the firing battery.

"The training has to be done in a certain sequence," said CPT James F. DeBroux, commander of Battery C. He met in April with the West Point Artillery Committee to determine West Point's requirements. At that time DeBroux watched a videotape of last year's demonstration performed by the 101st Airmobile Division, Fort Campbell, KY. (The 82d and the 101st train the cadets every other year.)

SSG Milton C. Wimberley (right) instructs Cadet Paul A. Lozano in the use of the panoramic telescope. (Photo by R. F. Abercrombie)

"We go by the book as much as possible," said SGT Kenneth L. Harvison, a 23-year-old gunner from Jackson, IN. "We're not as tactical here as at Fort Bragg, and there's not as much pressure to camouflage and conceal our position."

"The cadets are impressed with West Point training," noted Senior Cadet Mark C. Grieb, cadet supervisor of a platoon of sophomores. "They're actually involved in something new. This training helps them narrow down their choice of which branch of the Army they want to serve in." Except for Cadet Troop Leadership Training during the junior year, Cadet Field Training is the best opportunity many cadets have to participate in field training with regular Army units.

"The cadets respect experience," Grieb said, "and listen to the soldiers because they know what they are doing."

"They get a chance to see a little of what we do," said SP4 Curtis F. Pearce, 22, Brooklyn, NY.

Bayonet Thunder I

FORD ORD, CA—Blistering heat, dust, and artillery rounds whistling overhead was the scene at Camp Roberts recently as units of the 7th Infantry Division battled over the central California countryside participating in the division artillery field training exercise "Bayonet Thunder I."

Nearly 1,200 soldiers from more than 10 units were under the direct control of COL Thomas D. Reese, the division artillery (div arty) commander. Along with divisional units were elements of the California and Oregon Army National Guard and the Air Force.

The purpose of the exercise was to mass the fires of the div arty, fire a division preparation, counterfire, and coordinate the live fires of all fire support assets such as mortars, attack helicopters, and artillery simultaneously.

"Using all the fire support at the same time was the key objective during the exercise," said LTC David L. Runnells, the div arty operations officer.

The div arty Redlegs fired day and night while under continued threat of aggressor attack from the 3d Battalion, 17th Infantry; 1st Battalion, 51st Air Defense Artillery; and the opposing forces (OPFOR) element of the 107th CEWI Battalion. The 107th attacked the artillery forces using a Soviet PT-76 tank, while the 1-51st ADA used aeriel MERCATS to deliver chemical attacks.

"CS gas and smoke were used in the attacks," according to div arty chemical officer CPT Norrell Lantzer. After the chemical attacks, the 590th Supply and Services Battalion set up a decontamination point to rid unit personnel and equipment of chemical agents.

Throughout the exercise, the Air Force element of the 7th Division coordinated strafing missions against the div arty units and conducted aerial reconnaissance. According to one Air Force officer, attempts to locate the div arty tactical operations center proved impossible.

The div arty forces were "protected" from the air attacks by the composite Alfa Battery, 1st Battalion, 51st ADA.

One of the highlights of the two-week exercise was an airmobile movement of an artillery battery. Alfa Battery, 2d Battalion, 8th Field Artillery was ordered to conduct an artillery raid. (An artillery raid is when a unit is airlifted to a remote firing point, fires a specific mission, and is lifted back out again.) A CH-47 Chinook helicopter from the 49th Helicopter Company "Delta Scooners" California Army National Guard transported A Battery's personnel and equipment to and from the site.

A 105-mm howitzer from the 2d Battalion, 8th Field Artillery, is hooked up to a CH-47 Chinook helicopter. This mission was just part of the training that took place during the 7th Division Artillery field training exercise "Bayonet Thunder I" held recently at Camp Roberts, CA. (US Army photo by SGT Jim Wishart)

The artillery units also conducted river-crossing operations during the field problem, and the 52d Chemical Detachment provided smoke coverage for these operations.

For training in survivability operations, the 13th Engineer Battalion constructed fortified firing positions for the cannoneers.

The div arty was joined in the exercise by the command element of their roundout direct support battalion, the 2d Battalion, 218th Field Artillery, from the Oregon Army National Guard.

Although the units that participated in the div arty war were from different commands, components, and services, they all performed well together as a team, which made "Bayonet Thunder I" a huge success.

Terrain Gun Position Corrections:

An Alternative Method

by 1LT Michael D. Walp

If the Field Artillery is to survive to perform its fire support mission on the modern battlefield, firing batteries must take maximum advantage of existing terrain. As such, we must disperse our men and equipment in order to provide timely and accurate artillery fire in support of maneuver elements in a potential environment of extensive counterfire. An article in the *Field Artillery Journal*, "Field Artillery Survivability" (May-June 1980) indicated the emphasis NATO artillery has placed on dispersion of firing batteries since threat doctrine dictates that a primary mission of Warsaw Pact artillery is counterfire. Therefore, NATO artillery batteries can expect massive counterbattery attacks involving tons of ordnance delivered by both cannon and multiple rocket launcher systems. This type of counterfire could be devastating, but proper utilization of natural terrain features can greatly enhance the artillery battery's ability to survive and continue the fire support mission.

Certain problems are inherent with extended battery fronts, one of which is obtaining an effective sheaf in the target area. When our weapons are dispersed, terrain gun position corrections (TGPC) must be computed immediately while individual piece corrections must be determined and applied as soon after occupation as possible. If this is not accomplished prior to firing, the result will be a sheaf corresponding to the same depth and width as the weapons positioned on the ground, with little or no effect on the target. The computation of terrain gun position corrections are preferably completed by the advance party as recommended in FM 6-40, "Field Artillery Cannon Gunnery," so that individual piece corrections can be applied immediately upon occupation of the battery. As soon as the battery is laid, corrections can be applied and the battery is ready to fire. In actuality, however, these corrections are usually computed by the fire direction center (advance party personnel often find the computations time-consuming and confusing and consequently the task falls back to the FDC).

Graphical Terrain Gun Position Correction Tables

The 2d Battalion, 41st Field Artillery, 3d Infantry Division Artillery, has developed, field-tested, and is currently utilizing a Graphical Terrain Gun Position Correction Table (GTGPCT) to obtain terrain gun position corrections. The graphical tables are derived from precomputed data and consist of corrections for open, standard, closed, and converged sheafs (figure 1). The precomputed tables have been found to be accurate within established gunnery standards. The result is a simplified method

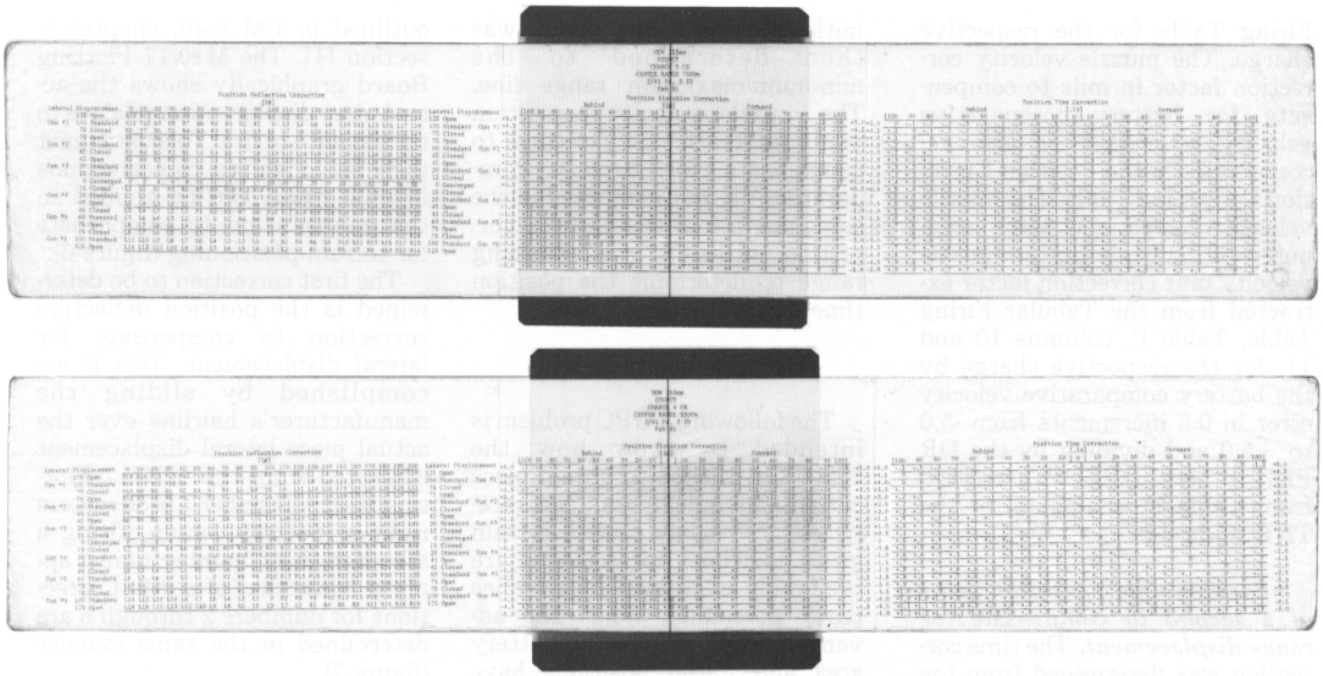


Figure 1. Graphical Terrain Gun Position Correction Tables.

of obtaining corrections quickly without a loss in accuracy.

The Graphical Terrain Gun Position Correction Tables were prepared for charges 2, 4, and 5 Green Bag and 6, 7, and 8 White Bag. These charges were selected because they correspond to the Graphical Firing Tables and represent the most common charges used in the field artillery. Data was computed utilizing an optimum range which represents an assumed center range for each respective charge. In that TGPC data is transferable 2,000 meters (m) over and short of center range, all ranges for a given charge are covered (figure 2). The following corrections are available from the GTGPCT and were computed as follows:

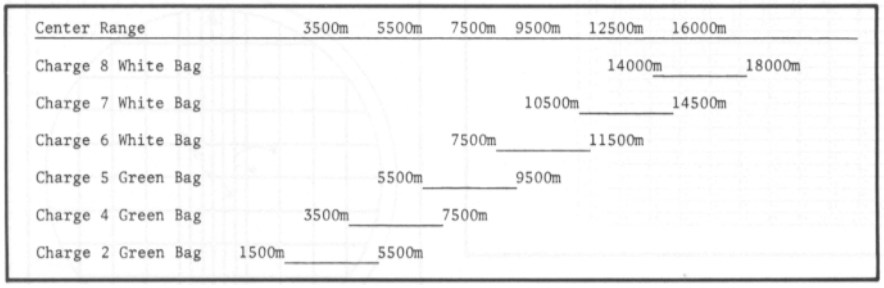


Figure 2. Range coverage utilizing the GTGPCT.

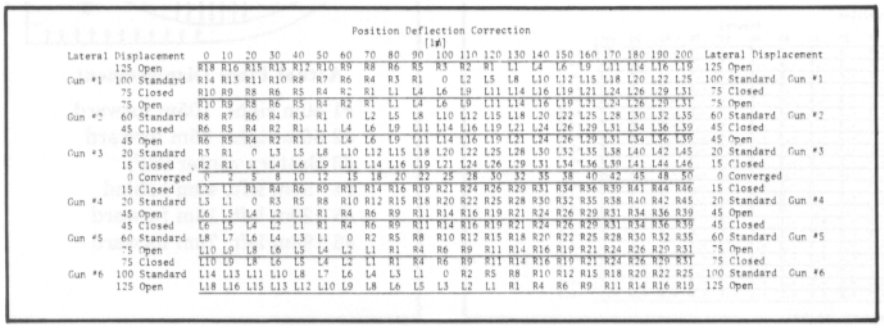


Figure 3. Position Deflection Correction Table.

•***Position deflection correction in mils to compensate for lateral displacement.*** Correction data is available for open, standard, closed, and converged sheafs. The correction values were determined to the nearest mil by multiplying 100/R at the minimum range line (correction toward battery center) and the maximum range line (correction away from battery center). The largest 100/R value used was 25 at the minimum range line. Lateral displacement was computed in 10-meter increments to a maximum of 200 meters right/left of battery center (figure 3).

•***Position elevation correction in mils to compensate for range displacement.*** The range correction values were determined to the nearest mil for each 10 meters of displacement forward and behind of battery center. The correction values were determined by dividing the displacement by the DR PER 1 MIL DELEV, Table F, Column 5, of the Tabular

Firing Table for the respective charge. The muzzle velocity correction factor in mils to compensate for battery comparative velocity error (VE) is also accounted for in the Position Elevation Correction Table. The muzzle velocity corrections were computed by multiplying the muzzle velocity unit correction factor extracted from the Tabular Firing Table, Table F, columns 10 and 11, for the respective charge by the battery comparative velocity error in 0.5 increments from -5.0 to +5.0 and dividing by the DR PER 1 MIL DELEV extracted from Table F, column 5, of the TFT. (figure 4).

•***Position time correction in 0.1 of a second to compensate for range displacement.*** The time correction was determined from the Graphical Firing Tables for each respective charge by placing the manufacturer's hairline over the center range and determining the corresponding time for fuze M564. The difference between the initial and the adjusted time was then determined to the minimum/maximum range line. The muzzle velocity correction factor in tenths of a second to compensate for battery comparative VE was computed in the same manner as the position correction utilizing corresponding range to determine the position time correction (figure 5).

Sample problem

The following TGPC problem is intended to show how the GTGPCT is used to obtain piece corrections quickly and accurately. As previously stated, terrain gun position corrections are preferably computed by advance party personnel. When the advance party occupies the battery area and initial positions have been determined, initial deflections are given to the ground guides and subtense readings are made. Subtense readings are converted to meters and the M10/17 Plotting Board is prepared as outlined in FM 6-40, chapter 8, section III. The M10/17 Plotting Board graphically shows the actual piece displacement relative to the azimuth of fire. This data must then be converted to corrections in mils which can be applied to the gunner's aid to compensate for terrain positioning (figure 6).

The first correction to be determined is the position deflection correction to compensate for lateral displacement. This is accomplished by sliding the manufacturer's hairline over the actual piece lateral displacement extracted from the M10/17 Plotting Board. Number 1 is 80 meters right of battery center. Firing a standard sheaf, number 1 must apply a correction of a R3. Corrections for numbers 2 through 6 are determined in the same manner (figure 7).

The second correction to be determined is the position elevation correction to compensate for range displacement. This is accomplished by sliding the manufacturer's hairline over the actual piece range displacement forward/behind battery center extracted from the M10/17 Plotting Board in relation to the battery comparative VE for the piece to be

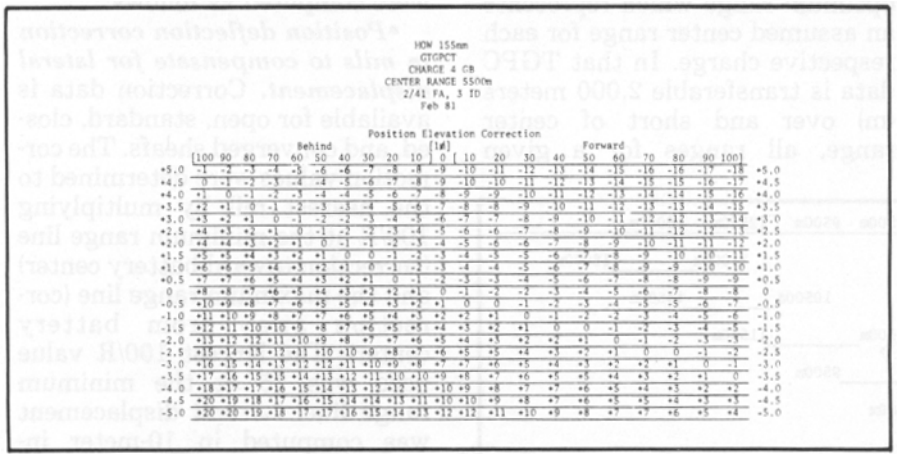


Figure 4. Position Elevation Correction Table.

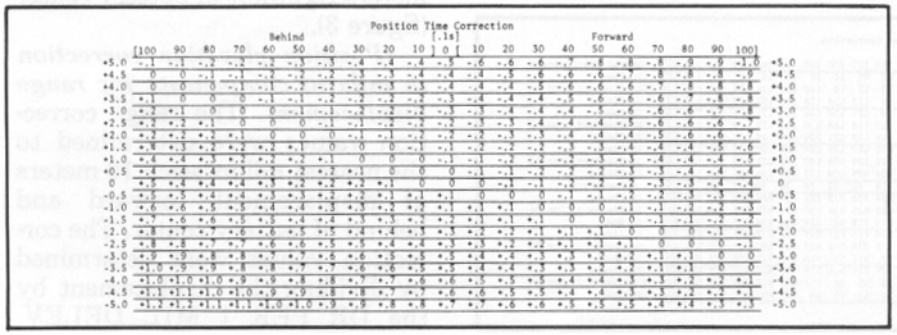
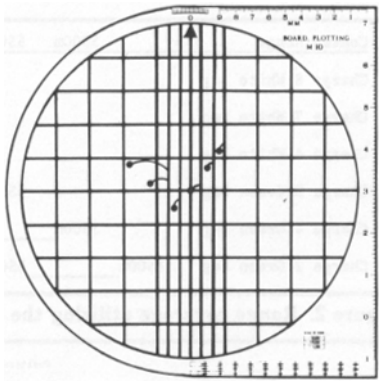


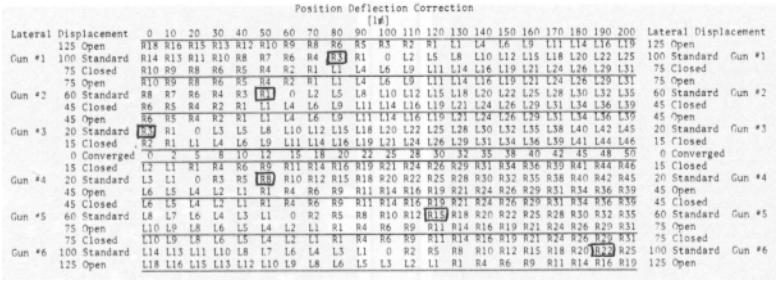
Figure 5. Position Time Correction Table.



Actual Piece Displacement

#1 80m right, 105m forward
#2 50m right, 75m forward
#3 Battery center (BP)
#4 50m left, 40m behind
#5 120m left, 15m forward
#6 195m left, 75m forward

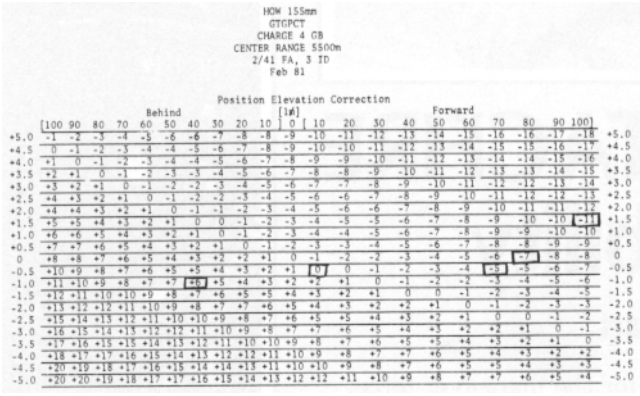
Figure 6. Example problem.



#1 80 right = right 3
#2 50 right = right 1
#3 0 base piece = right
#4 50 left = right 8
#5 120 left = right 15
#6 195 left = right 24*

*Number 6 is 195 meters left of battery center. Lateral displacement is in 10-meter increments, requiring interpolation using artillery expression.

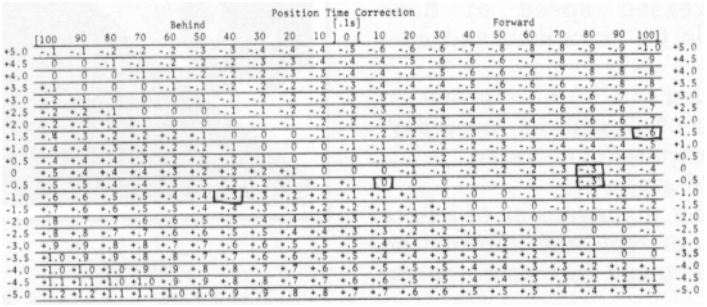
Figure 7. Deflection corrections.



#1 105 forward/+1.3 = -11
#2 75 forward/-0.3 = -5
#3 Base piece = 0
#4 40 behind/-1.0 = +6
#5 15 forward/-0.4 = 0
#6 75 forward/+0.2 = -7

Note: Interpolation and artillery expression must be applied as necessary.

Figure 8. Elevation corrections.



#1 105 forward/+1.3 = -0.6
#2 75 forward/-0.3 = -0.3
#3 Base piece = 0
#4 Behind/-1.0 = +0.3
#5 forward/-0.4 = 0
#6 75 forward/+0.2 = -0.3

Note: Interpolation and artillery expression must be applied as necessary.

Figure 9. Time corrections.

corrected. Number 1 is 100 meters forward of battery center and has a comparative VE of +1.3. To correct number 1 back on line with the battery, a position elevation correction of -11 must be applied. Corrections for numbers 2 through 6 are determined in the same manner (figure 8).

The last correction to be determined is the position time correction for fuze M564 which is similar to the method used to determine position elevation corrections. On the Position Time Correction Table, the manufacturer's hairline is placed over the actual piece displacement forward/behind battery center. Number 1 is 100 meters forward of battery center and has a comparative VE of +1.3. To correct the M564 fuze setting, a time correction of -0.6 must be applied. Corrections for numbers 2 through 6 are determined in the same manner (figure 9).

The corrections determined in the above example will check zero mils in deflection, elevation, and time with manual computations. ARTEP 6-365 (Army Training And Evaluation Program Field Artillery, 155MM SP Direct Support Cannon Units) allows 25 minutes to determine TGPC data. Utilizing the GTGPCT, corrections can be determined by advance party personnel in minutes, day or night, rain or shine, and applied as soon as the battery is laid. It is worthy to note that the GTGPCT eliminates the need for GFTs, TFTs, TGPC worksheets, etc., required to determine corrections manually. The advantage of the Graphical Terrain Gun Position Correction Table is obvious — corrections can be determined in a fraction of the time, for any sheaf desired, with no loss in accuracy.

1LT Michael D. Walp is assigned to Service Battery, 2d Battalion, 41st Field Artillery.

TACFIRE/nonTACFIRE Interoperability

by K. Patrick Cathcart

Based on our current program for fielding TACFIRE, all Active Army field artillery units are required to train and be prepared to fight with or without TACFIRE (not all units will receive TACFIRE simultaneously). After the Battery Computer System (BCS) is fielded to both Active and Reserve Component units, operations will be somewhat easier; presently, however, Reserve Component units are not scheduled to receive TACFIRE. As such, this article presents options that field artillery commanders may selectively employ based on available equipment in the best configuration to suit the situation.

One or more of the options presented here may raise serious objections which may be valid in terms of a single unit's desired mode of operation; however, one must remember that the bottom line for all options is to achieve the fastest, most effective fire support for the maneuver force.

Before discussing commanders' options in the following situations, it is important to note that there are some common advantages and disadvantages associated with each option:

1) Advantages:

•Increased speed of data available for command and control.

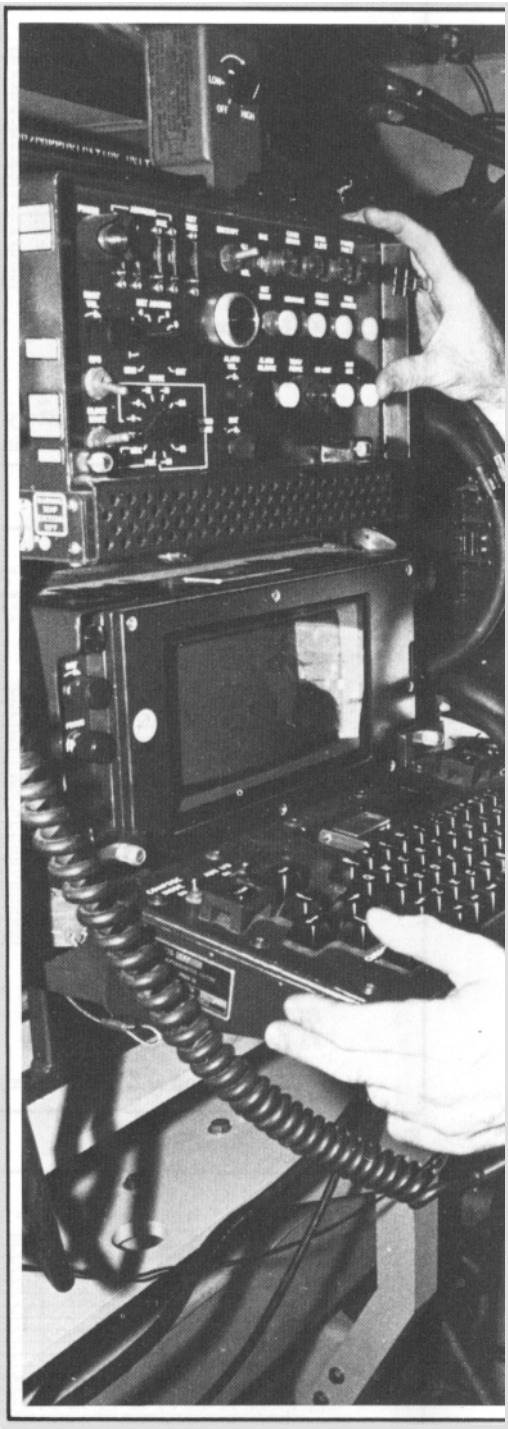
•Higher quality of information because of timeliness, accuracy, and computer generated printouts and graphics.

•Easier management of assets because of real-time information on current and forecasted operations.

2) Disadvantages:

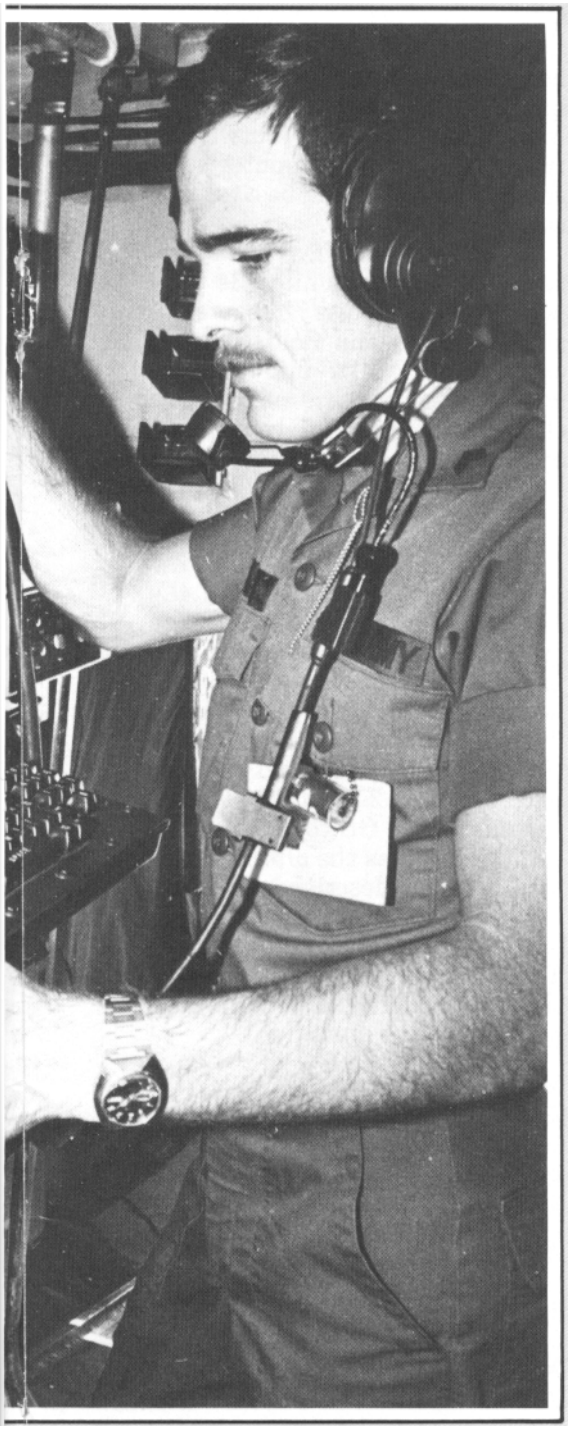
•Unique digital signature.

•Collocation of command and control elements may offer an unacceptable risk if the elements are targeted and subsequently lost.



Situation I

A TACFIRE equipped division artillery with an attached non-TACFIRE equipped FA brigade: The typical TACFIRE equipped div arty will have three direct support (DS) and one general support (GS) battalions. The attached FA braigade has three battalions general support reinforcing



(GSR) or reinforcing (R) the TACFIRE equipped DS battalions. The remaining fourth battalion's mission is general support to the division.

The nonTACFIRE equipped FA brigade tactical operations center (TOC) is collocated with the TACFIRE equipped 1-13th FA GS battalion.

Mech div arty (TACFIRE):
1-10 FA (155-mm SP)
1-11 FA (155-mm SP)
1-12 FA (155-mm SP)
1-13 FA (8-inch SP)

Attached FA brigade:
HHB, alternate div arty TOC
1-100 FA (155-mm SP)
1-101 FA (155-mm SP)
1-102 FA (155-mm SP)
1-103 FA (8-inch SP)

Organization for combat:
1-10 FA: DS 1 Bde
1-11 FA: DS 2 Bde
1-12 FA: DS 3 Bde
1-13 FA: GS
1-100 FA: GSR 1-10 FA
1-101 FA: R 1-11 FA
1-102 FA: GSR 1-12 FA
1-103 FA: GS
HHB FA Bde: Alternate div arty TOC

Equipment available:
1 Div arty computer.
1 Variable Format Message Entry Device (VFMED) with div arty TOC (counterfire and operations)
1 VFMED (FSE main)
1 VFMED (FSE TAC)
1 VFMED (liaison officer)
2 AN/TPQ-37 artillery locating radars
3 DS battalion computer centers Each with:
- 1 VFMED operations/intelligence element
- 1 VFMED per maneuver battalion (usually 3) fire support section (FSS)
- 1 VFMED per maneuver brigade FSS

1 AN/TPQ-36 mortar locating radar per DS battalion
1 GS battalion computer center with:
- 1 VFMED operations/intelligence element
- 2 VFMEDs for fire support sections

Option 1. The 1-13th FA battalion computer remains loaded as a battalion computer center. However, the FA brigade can receive some computer center support for map overlays, target lists, fire unit status, and messages of interest from the staff of the battalion computer center. The two AN/TPQ-37 radars may send fire requests or target locations to either the div arty computer or directly to 1-13th FA. Also collocated with the divisional GS battalion are elements of the 1-103d FA battalion TOC. Several of the S3 and S2 personnel may set up their stations directly outside the computer center and receive tactical and technical fire control solutions for the batteries of 1-103d. The 1-103d S3 or fire direction officer (FDO) can communicate the fire commands by voice to the batteries in much the same way as with centralized battalion fire control with manual/FADAC methods. The same considerations used prior to TACFIRE for remoting radios to reduce electronic signature and dispersion of key elements, wherever possible, apply to TACFIRE. When the alternate div arty TOC assumes control of the battle, the 1-13th FA may be reloaded as a div arty computer and the data base restored. The 1-103d FA will receive fire orders by voice from the alternate div arty TOC and will compute technical fire control solutions manually. The GSR and R fire unit's technical fire control solutions are computed by the DS battalions and announced by voice by the R and GSR FDO/S3 collocated with the DS battalion TOCs. Mutual support for the DS battalions is not available when the battalion TOC moves. The requests for additional fires from a DS battalion will be computed by manual/FADAC procedures in the reinforcing batteries.

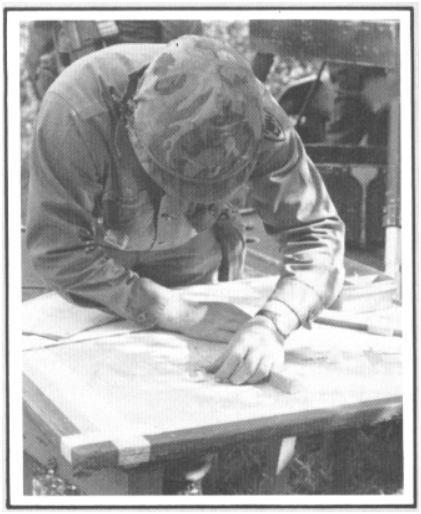
Option 2: The FA brigade TOC is collocated with the TACFIRE equipped 1-13th battalion. The 1-13th's TACFIRE is loaded as a division artillery computer and performs permanently as the alternate div arty computer center. The batteries of the 1-13th FA receive their technical fire control solutions from the centers of the TACFIRE equipped DS battalions. If the division artillery

has a fire order for the GS batteries, it is transmitted to the DS battalion that has the specific GS battery on file for execution. The 1-103d FA GS battalion TOC is set up near the div arty TOC. If required, the 1-103d FA battalion will compute technical fire control solutions manually when responding to fire orders from the division artillery TOC or the FA brigade.

Option 3: Option 3 is similar to Option 2 in that the FA brigade TOC is collocated with the TACFIRE equipped GS battalion loaded as a division artillery computer. All batteries of the GS 1-13th FA and 1-103d FA have their technical fire control solutions computed by the closest DS battalion computer center. The fire commands are announced by voice to the batteries which do not have battery display units. With the Battery Computer System, this option will not be as difficult to execute.

Option 4: The FA brigade has its nonTACFIRE GSR or R battalions manually compute individual technical data. Basically the div arty works in the digital TACFIRE mode, and the nonTACFIRE brigade battalions continue their mission in FM voice. The brigade R and GSR units have a liaison officer (LNO) at the DS battalion. The nonTACFIRE liaison officer could be the battalion fire direction officer if necessary. The nonTACFIRE liaison officer sends fire orders at the request of the DS battalion to his units over the R or GSR F1 net. All batteries monitor and compute firing data simultaneously for the mission. The nonTACFIRE GS and GSR battalion FDOs receive FM voice fire orders on the div arty FM net from the div arty TOC or FA brigade, as appropriate, for their general support role.

Current situation. It is vital that the FA brigade keep up with the current situation; therefore, collocation of the brigade TOC with the div arty GS battalion is necessary. Whether the 1-13th FA computer is loaded as a battalion computer and then programed to a div arty set (or maintained as a div arty set at all times) becomes a tactical decision. The GS, GSR, and R battalions will not keep up with the real-time battle situation since their liaison officers cannot provide real-time information. This situation is not critical, however, since the mission of these battalions is to provide additional fire support when and where directed; therefore, the R and GSR are not required to know the precise tactical situation to perform their mission. Additionally, this option will not complicate the normal mutual support role in the TACFIRE units.



Operational considerations. The TACFIRE GS battalion computer center does not have all of the equipment normally available to a division artillery computer set. Specifically, one mass core memory unit, one digital data terminal, one electronic tactical display, one S-280 shelter, one printer, one MJQ 15 power plant, and the truck-mounted five-ton expandable van for the operations/intelligence element are not in the battalion. If another mass core memory can be obtained from resources within the TACFIRE equipped division artillery, the GS battalion's computer cables can be used. Some degradation of operational capacity will be experienced; however, the quality of operations available with the computer outweighs those without the computer so it should be used to the best advantage.

Training. Regardless of the option selected, training is imperative for success. Rehearsals, skill practice, and field training exercises must be implemented with the same sense of urgency characteristic of all field artillery operations.

Situation II

A TACFIRE equipped FA brigade attached to a nonTACFIRE division artillery: The typical TACFIRE equipped FA brigade may consist of a brigade headquarters and four battalions. The division artillery will have three DS battalions and one GS battalion. The 2-203d FA is given the mission of GS to the division and performs as the alternate div arty TOC as described in Situation I. The FA brigade TOC collocates with the TOC of the nonTACFIRE division artillery, and the staffs become mutually supporting for the operation.

Mech div arty:
2-20 FA (155-mm SP)
2-21 FA (155-mm SP)
2-22 FA (155-mm SP)
2-23 FA (8-inch SP)

Attached FA brigade (TACFIRE):
HHB, div arty TOC
2-200 FA (155-mm SP)
2-201 FA (155-mm SP)
2-202 FA (155-mm SP)
2-203 FA (8-inch SP)

Organization for combat:
2-20 FA: DS 1 Bde
2-21 FA: DS 2 Bde
2-22 FA: DS 3 Bde
2-23 FA: GS
HHB: Div arty TOC
2-200 FA: R 2-20 FA
2-201 FA: R 2-21 FA
2-202 FA: R 2-22 FA
2-203 FA: GS and alternate div arty TOC

Digital equipment available:

FA Bde:
1 Div arty TACFIRE
3 Variable Format Message Entry Devices:
Each with:
2 Liaison officers (LNO)
1 Operations and intelligence element

FA Battalions with TACFIRE:
1 Battalion computer
1 Variable Format Message Entry Device (LNO)
3 Digital Message Devices (for training)
2 AN/TPQ-37 radars
3 AN/TPQ-36 radars (from div arty TAB)

Option 1: The 2-203d FA's TACFIRE battalion computer remains loaded as a battalion computer and also contains the fire units of the 2-23d FA. The computer will provide tactical and technical fire control solutions for both battalions, with the nonTACFIRE battalion FDC personnel sending fire commands by voice to their fire units. As the alternate div arty TOC, FDC personnel are prepared to configure to a division artillery if required. The three remaining TACFIRE battalions (2-200th, 2-201st, and 2-202d FA) collocate with the tactical operations centers of the nonTACFIRE DS battalions (2-20th, 2-21st, and 2-22d FA) and perform as reinforcing artillery. Primary calls for fire will come by voice to the direct support battalions that will compute tactical and technical fire control with manual/FADAC techniques for their batteries. Requests for additional fire will be given to the reinforcing battalion. The computer operator and fire direction officer of the reinforcing battalion will input the missions at the console and send the fire commands digitally to their batteries. Operations for fire planning, map overlays from the Digital Plotter Map, artillery target intelligence, meteorological (met) data, and operational information will come to the DS battalion via the TACFIRE computer center. Input of all of the voice missions from the nine fire support team (FIST) elements of the maneuver companies is not an option for the reinforcing battalion computer operator, since the FIST elements do not have digital equipment. If Digital Message Devices and trained operators are available for FIST elements, then the reinforcing battalion can compute tactical and technical fire control solutions for all of the direct support and reinforcing fire units.

Option 2: The 2-203d FA's TACFIRE battalion computer is loaded as a division artillery computer only when the division artillery computer is not available for an extended period of time (i.e., three hours or more). The batteries of the 2-203d FA and 2-23d FA are entered in the reinforcing battalions' fire unit files and the technical and tactical fire control solutions are sent either digitally or by voice to the firing batteries. If the employment of special munitions appears to be a consideration, some type of computer center support is required for the division fire support elements (tactical and main). This support may come from the FA brigade TACFIRE at the div arty TOC or from the GS TACFIRE battalion loaded as a division artillery computer.

Option 3: The two liaison Variable Format Message Entry Devices (VFMEDs) that appear in the tables of organization and equipment (TOE) of the TACFIRE equipped FA brigade may be sent to the tactical (TAC) and main fire support elements of the division. Remote computer terminal equipment at these locations will allow for automated target analysis and fire support coordination via digital communications. Option 3 may be exercised with Option 1 or 2 as presented in this situation.

Operational considerations. After attaching a field artillery brigade to a nonTACFIRE division, commanders should consider the issue of how far to "weave" one unit into the other. Since, on order, the brigade may be required to move to another area in the battle, an attempt must be made to get the most from the data processing support available and still be able to identify the unit's assets. Collocation will yield some sharing of assets that will hopefully increase combat power substantially.

Training. Again, training is an important consideration; therefore, FA brigades with TACFIRE should work with nonTACFIRE equipped division artillery units in command post and field exercises. Division artillery units have FIST elements; maneuver battalion, brigade, and division fire support elements; and other assets that are not routinely available to the FA brigade. Only by working together can the two units determine how assets can be used to provide the best results.

Situation III

Division artillery with TACFIRE operating adjacent to a division artillery without TACFIRE: This situation may occur with or without the Battery Computer System (BCS). The TACFIRE equipped division artillery has a liaison team on the TOE that is equipped with a Variable Format Message Entry Device. The liaison team goes to the TOC of the adjacent division artillery and performs its liaison function. The liaison team of 49th (Mech) Division Artillery goes to the 42d (Armored) Division Artillery as was done prior to TACFIRE.

42d Armored Division Artillery equipment:
1 Division artillery computer
2 VFMEDs for FSEs (TAC/main)
1 VFMED for counterfire/operations
1 Liaison VFMED
3 DS battalion computer centers each with:
1 VFMED per maneuver battalion
1 VFMED per brigade FSS

1 DMD per FIST HQ and platoon observer
1 VFMED for operations/intelligence elements

1 GS battalion computer center with:
2 VFMEDs for fire support sections
1 VFMED for operations/intelligence elements

2 AN/TPQ-37 radars
3 AN/TPQ-36 radars

Note: *The adjacent 49th (Mech) Division Artillery does not have TACFIRE.*

The 42d div arty liaison team can give the adjacent 49th div arty TOC a fairly accurate real-time report of the activities in the adjacent TACFIRE zone and also report back to the TACFIRE division artillery any special information of potential tactical value. The liaison team of the nonTACFIRE equipped division artillery at the TACFIRE equipped TOC can insure that the correct items of interest are getting to their parent unit.

The 42d and 49th Division Artillery headquarters and headquarters batteries are only staffed and equipped for one liaison team per division artillery. A determination of where a specific liaison team should go must be based on the artillery available in the organization for combat. If three divisions are on line, some type of corps artillery is probably available; therefore, the TACFIRE equipped liaison team may need to go to the corps field artillery section since the FA brigades will be collocated with a division GS battalion TACFIRE. If two divisions are on the line and no corps assets are available, each unit exchanges a liaison team with one another.

As in the previously stated situations, training in the required operations will be necessary. The liaison team needs to know where to set up and where to move in the convoy of the visited unit, as well as communications protocol, antenna siting considerations, information considered of interest to the parent unit, etc. Command post exercises probably would be effective tools to give the liaison teams the necessary training to perform to the expectations of the division artillery commander.

Situation IV

Reforger 19XX, a nonTACFIRE DS battalion with a maneuver brigade attached to a TACFIRE equipped division: In the absence of digital equipment with a maneuver brigade sector, the nonTACFIRE equipped DS battalion computes voice missions by manual/FADAC methods. The division artillery liaison team with the Variable Format Message Entry Device sets up in the nonTACFIRE DS battalion operations center and assists in division artillery command control operations with the nonTACFIRE DS battalion.

Situation V

Operations in the covering force area: Currently the howitzer battery of the cavalry squadron is not TACFIRE equipped. The key issues for the covering force area are mobility and decentralized operations. For survivability, TACFIRE should remain in the main battle area if possible. The howitzer batteries equipped with BCS can work digitally, but other units must use manual/FADAC technical fire control by voice.

Situation VI

Operations with a nonTACFIRE equipped roundout brigade from the Reserve Component: This situation is being addressed by the office of the Deputy Chief of Staff for Operations at the Department of the Army. If the equipment or the training is not available for the roundout units, then the gaining div arty commander must decide whether or not to distribute scarce assets among all units.

Situation VII

Operations with the Battery Computer System available in the nonTACFIRE equipped division artillery or FA brigade: When the Battery Computer System becomes available, the same considerations apply to the operations of TACFIRE units working with nonTACFIRE units; for example:

•Collocation of TACFIRE equipped units with nonTACFIRE units at battalion headquarters and higher.

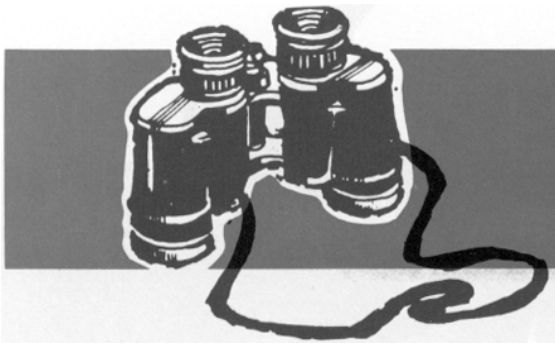
•Battalion TACFIRE computer centers compute tactical and technical fire control for the TACFIRE and the nonTACFIRE batteries.

•The TACFIRE equipped GS battalion is the alternate division artillery TOC.

AFATDS

Initial testing of the Advanced Field Artillery Tactical Data System (AFATDS), currently being planned for design, is set for 1986, with fielding to be in the 1990s. AFATDS is to replace TACFIRE in Active Component units and will also be issued to Reserve Component units. From the Electronic Numericator and Intergrator (ENIAC) in 1946, the M1 Computer in 1953, the M18 Field Artillery Digital Automatic Computer in 1963, the Tactical Fire Direction System (TACFIRE) in 1978, to the Battery Computer System in 1982, the list of fire support computer systems continues with the advent of AFATDS, or whatever name it will untimately be called.

K. Patrick Cathcart is a Field Artillery Operations Specialist – Automatic Data Processing – in the TACFIRE Division of Tactics, Combined Arms and Doctrine Department, US Army Field Artillery School.



View From The Blockhouse

notes from the school

Fire Support Conference 1981

The Field Artillery School will host the annual Fire Support Conference during the period 17-19 November 1981. The purpose of the conference is to provide the latest combined arms team doctrine, to identify changes taking place in FA weapons, tactics, and techniques, and to provide a forum for the exchange of ideas and experience. Anticipated participants will include TRADOC service school instructors and representatives of corps and division artillery, FA groups and brigades, readiness regions, and the Reserve Components. A Target Acquisition Battery Commanders Conference will be conducted simultaneously.

Revision of FM 6-20-1

A preliminary draft of FM 6-20-1, "The Field Artillery Cannon Battalion," is currently being prepared by the Field Artillery School's Tactics, Combined Arms and Doctrine Department (TCADD). Suggestions for improvement of the field manual are encouraged and should be forwarded to:

Commandant
USAFAS
ATTN: ATSF-CA-AD
Fort Sill, OK 73503

Please use DA Form 2028 (or facsimile) to record comments and reasons for suggested changes. (LTC Bailey, TCADD)

The Field Artillery System of the future

You may recall an article in the March-April 1981 issue of the *Field Artillery Journal* which described a recently completed Field Artillery School project called the Fire Support Mission Area Analysis (FSMAA). In case you missed it, the article explained that the FSMAA's objectives were:

•To identify deficiencies affecting the fire support system's ability to accomplish assigned fire support tasks.

•To highlight potential materiel, doctrine, force structure, and training opportunities which could remedy the identified deficiencies within the fire support system.

Now, although that article recognized that the FSMAA report had been published, it also highlighted the fact that a Mission Area Analysis is not a one-time study. More accurately, it is a process—a continuous, coherent, dynamic effort—which will help the Field Artillery continually refine its needs and priorities consistent with future changes in the threat, doctrine, technology, and resources. In short, the Fire Support Mission Area Analysis serves as a springboard for subsequent activities which help chart the future direction of the Field Artillery.

Two recent significant events which have sprung directly from the publication of the FSMAA report were the Field Artillery System Program Review (FASPR) and the publication of the Fire Support Development Plan (FSDP).

The Field Artillery System Program Review, held at Fort Sill during June 1981, was a senior officer (70 general officers) review and assessment of where the Field Artillery currently is, and where it is heading in the future. It was no coincidence that the FASPR was conducted three months earlier than had been originally planned. Since the Field Artillery School was first to complete an MAA Report, the Army's leaders recognized the opportunity to exploit, in a timely manner, Fort Sill's efforts. Thus, for two days in June, the Field Artillery School benefited from lively discussions, reasoned conclusions, and sound recommendations of many of the military community's policymakers and commanders.

Although the FSMAA was the core around which the System Program Review was built, a draft version of the Fire Support Development Plan became the point of departure for discussion during the conference. The Fire Support Development Plan is a spinoff from the FSMAA. It culminates the Mission Area Analysis process in the fire support mission area by matching programs and opportunities to deficiencies and by detailing specific actions for implementation. The FSDP formulates a coherent action plan to accomplish the development of fire support doctrine, materiel, organization, and training to better cope with the present threat and to provide a greater fire support contribution to combined arms efforts for a winning force on the future battlefield. The next step is to turn the actions into budgeted programs. (Further details of this total process are explained in another article, "Putting It All Together," in this issue of the *Journal.*

The two days of briefings and discussions during the System Program Review highlighted a significant number of priority actions and programs on which the Field Artillery must concentrate to enhance its capabilities and effectiveness in the future. The majority of the programs and actions discussed are already underway and addressed in the Fire Support Development Plan. In those instances, the FASPR helped validate what Fort Sill already recognized as being essential requirements for the Field Artillery System. In a few instances, the FASPR helped identify several issues which are receiving less attention and priority than is warranted. Consequently, in its list of priority action programs, the Field Artillery School has included those needs identified by the FASPR attendees. The result of all of this has been the publication of the final version of the Fire Support Development Plan which incorporates, into one package, a coherent articulation of prioritized action programs for the Field Artillery.

Specifically, the Field Artillery School has recognized its major priority interests and actions as:

•Fielding the Multiple Launch Rocket System.

•Designing a corps support weapon system.

•Establishing the division support weapon system requirements.

•Developing fire and forget munitions.

•Continuing the M109 Howitzer Extended Life Program.

•Developing a targeting cell.

•Fielding the Remotely Piloted Vehicle and Standoff Target Acquisition System.

•Beginning the 3 x 8 conversion.

•Examining alternative approaches for integrating Reserve FA units into routine active duty FA unit training and operations.

•Developing a method for determining and implementing an optimum allocation/distribution of artillery fires among close support, counterfire, and interdiction requirements.

•Establishing the desirable mix of self-propelled versus towed artillery in Reserve Components.

•Developing system requirements for supporting light forces.

•Resolving the roles, missions, and organization of mortars in the fire support system.

•Developing a by-unit survey of equipment/manpower/training shortfalls associated with full implementation of fire support teams in active units.

•Continuing to improve standardization of FA procedures and organizations.

Just from the extent of the preceding list, which is not all-inclusive, it becomes apparent that the Field Artillery has plenty to keep it busy. But, just as significant as the tasks ahead, is the recognition of the Field Artillery's accomplishments which produced that extensive list of action programs. From the January 1981 publication of the Fire Support Mission Area Analysis report, through the June 1981 Field Artillery System Program Review, to the September 1981 publication of the Fire Support Development Plan, the Field Artillery School has achieved an unprecedented and highly successful series of milestones which lay out a validated and reasoned course for designing a Field Artillery System which will enhance the capabilities of the combined arms team on the AirLand battlefield.

Conference attendees check out the M198.

Sustainment training for TACFIRE units

As normal personnel vacancies occur in units currently equipped with TACFIRE, the availability of sustainment training is of special interest. A review of forecast deployment for TACFIRE with the US Army Military Personnel Center indicates a six-month lead time is required for formal allocations to attend TACFIRE courses. Requests for course attendance should be forwarded from battalion through division artillery (FA brigade), to corps (or center), and subsequently to US Army Forces Command (FORSCOM) or US Army Training and Doctrine Command (TRADOC). The US Army Military Personnel Center will then allocate available student spaces to TRADOC or FORSCOM. Sustainment training is competing with deployment training for course allocations; therefore, if your unit is equipped with TACFIRE, and you know of a six-month loss in a TACFIRE position, you should request a course allocation *TODAY.* Course titles, dates, and correct duty positions are available and can be obtained by callilng AUTOVON 639-3465/6498 or by writing:

Commandant
US Army Field Artillery School
ATTN: ATSF-CA-TT
Fort Sill, OK 73503

Fire Observations Training Set

Training Set, Fire Observation (TSFO) (previously known as the observed Fire Trainer (OFT), is an electro-mechanical device employing computer driven optics to simulate the delivery of artillery fire. This is accomplished through interchangeable terrain scenes which are projected upon a screen.

The device consists of an instructor station with a computer, a projection system, a speaker system for appropriate audio sounds, and 30 student observer stations positioned to view the terrain scene. The TSFO has the capability to engage fixed and moving targets with a varied number of bursts from one of four 155-mm battery locations. The bursts will simulate air, graze, and mixed bursts to scale with respect to observer target range. Additionally, both illumination and smoke missions can be fired with simulated wind drift.

A contract was awarded for TSFO to Invertron on 28 August 1981. The first set will arrive at Fort Sill in June 1982. Other sets will be issued to the Infantry, Armor, Aviation, and Air Defense Artillery Service Schools, major division posts in CONUS, Hawaii, Korea, and Europe as well as Fort Dix, Indiantown Gap, Fort Devens, and Fort McCoy. (CPT Heath, DTD)

TACFIRE training program

The School's Directorate of Course Development and Training (DCRDT) continues to receive requests for training materials on TACFIRE, most of which are from units scheduled to receive the system in the near future and are interested in getting a jump on training. Training Development Division, DCRDT, is preparing a self-paced training package, the TACFIRE Training Program (TTP), which should be ready for issue late this year or early 1982. The lessons require extensive use of the TACFIRE Technical Manuals (TM 11-7440 series) while many are designated for "hands-on" training. For these reasons, when the TTP package is completed, it will be issued automatically only to those units which have already been equipped with TACFIRE.

New 155-mm training round

A new low cost indirect fire training round (LITR) M804 has been developed to provide a reduced cost projectile capable of providing real value training. New firing tables are not required for the LITR round since it has the same ballistic characteristics as the M107 HE round and the same TFTs/GFTs/GSTs and FADAC tapes are used for computations. The LITR round is scheduled for fielding during FY82-83. As such, several 155-mm units have been notified that their 1982-83 training ammunition allocations will include the DODIC D-513 projectile.

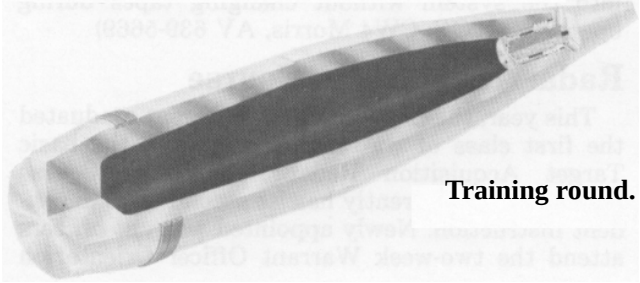
In lieu of a high explosive filler, the M804 round has a small smoke spotter charge that is vented through holes located forward of the rotating band in the bourrelet area. The 9th Inf Division Artillery has test fired the LITR and initial impressions are good; however, observer spottings may be difficult if fired into wooded areas, snow, or soft terrain.

Mr. Charles Pells (National Inventory Control Point, Rock Island, IL, AUTOVON 793-3133/3366) stated that the M804 LITR will go into production with 5,000 rounds during February 1982 and 20,000 rounds each month thereafter. Rounds will cost approximately $105, compared to $156 for the M107 HE projectile. The current contract is for approximately 134,000 rounds. The projected fielding plan for the LITR projectile is as follows:

USAREUR—12,00	EIGHTH ARMY—1,800
TRADOC—32,800	WESCOM—500
FORSCOM and USAR—46,300	National Guard—19,300

Rock Island will maintain about one month's production stock on hand for stockage and testing use at all times; this represents 21,100 rounds of the initial production buy.

The LITR can be fired in all 155-mm weapon systems using charges 1-5 green bag or 3-5 white bag. The only authorized fuze at this time is the PD M557 SQ/D. Additional testing is scheduled in early FY82 to expand the firing capabilities to charges 6, 7, and 8 and to include the M557/M739 PD fuzes, the M564/M582 MTSQ fuzes, and possibly the M732 proximity time fuze. (Mr. Turpin, WD)



Training round.

Field Artillery Officer Basic Course

The Field Artillery's training strategy for lieutenants, which was approved in January 1981, was the result of an extensive front-end analysis undertaken when decisions were made to implement parts of the Harrison Study (Review of Education and Training for Officers: (RETO); see the January-February 1981 issue of the *Field Artillery Journal* for a recap of RETO).

As a result of this extensive job analysis effort, senior officer review, and subsequent training strategy development, significant changes were made to the Field Artillery Officer Basic Course (FAOBC).

The following changes became effective with FAOBC 1-82 in October 1981.

•An intensive cannon-oriented course of 17 weeks and 3 days replaced the general 10-week OBC and 7-week Cannon Battery Officer Course.

•All new FA lieutenants will attend the new 17-week, 3-day OBC course.

•Total school time for missile and target acquisition designated lieutenants will be increased by approximately seven weeks.

•All graduates of the course will be awarded a skill identification of 13E.

The new course will concentrate on jobs which new lieutenants will be expected to perform immediately upon arrival at their first duty stations. Specifically, the purpose of the new course is to provide the newly commissioned lieutenants with a general knowledge of the Field Artillery System, to include skills and in-depth knowledge in the areas of observed fire, fire direction, and management of individual training, all of which prepares them to become FIST chiefs or cannon battery executive officers and to manage maintenance and training at battery level.

Information on the new basic course can be obtained by writing to the Commandant, USAFAS, ATTN: ATSF-CT-TM-PD, Fort Sill, OK 73503.

COUNTERFIRE SYSTEMS REVIEW

Programmed Operator Proficiency Trainer

With the inclusion of the AN/TPQ-36 and AN/TPQ-37 radar systems into the Army target acquisition inventory, a new system for training operators has been introduced. Called the Programmed Operator Proficiency Trainer (POPT), it is an off-line computer program that functions with the existing operational program of each radar system. The POPT is a 10-minute exercise that can be used by radar operators to practice operational procedures and techniques necessary to accurately locate hostile weapons, conduct friendly registrations, adjust fires, transmit target and location information to TACFIRE, reset system faults, and perform electronic counter-countermeasures. Supervisors can evaluate a radar operator's skill by selecting pre-programmed targets and grading the operator on the time taken to process target locations and the accuracy of the operator's height corrections. POPT programs are on a magnetic tape that is delivered with each system and can be loaded into the system without changing tapes during operation. (POC: CW4 Morris, AV 639-5669)

Radar Technicians Course

This year, the Counterfire Department graduated the first class of warrant officers from the basic Target Acquisition Radar Technicians Course (4C-211A) and currently has its second class in resident instruction. Newly appointed warrant officers attend the two-week Warrant Officer Orientation Course at Fort Rucker, AL, prior to reporting to Fort Sill for in-depth training in their specialty as 211A Target Acquisition Radar Technicians.

The Target Acquisition Radar Technician Course is a 17-week warrant officer basic entry level course which provides instruction in the operation and organizational maintenance of the AN/MPQ-4A, AN/TPS-25A, and AN/TPS-58B radar systems. The course also includes instruction on operations for the new AN/TPQ-36 and AN/TPQ-37 Firefinder radar systems soon to be deployed worldwide.

The combination of these two warrant officer courses serves to enhance the effectiveness of the individual warrant officer when he arrives at his first unit assignment. (POC: CW3 Barrett, AV 639-5014)

Field Artillery Radar Crewmember Course external evaluation

Student Evaluation, MOS 17B Questionnaires were forwarded to the field in April this year to each 17B graduate who completed the Field Artillery Radar Crewmember Course within the last year and to his or her immediate supervisor. These questionnaires aid the Field Artillery School in recognizing shortcomings in training and identifying those subjects that were overtrained. The questionnaires were returned from the field during July/August and the data is now being compiled. The findings will be reviewed by the School and necessary changes will be implemented in the MOS 17B Program of Instruction by January 1982. (POC: CW3 Reed, AV 639-3294)

Generator set D423A

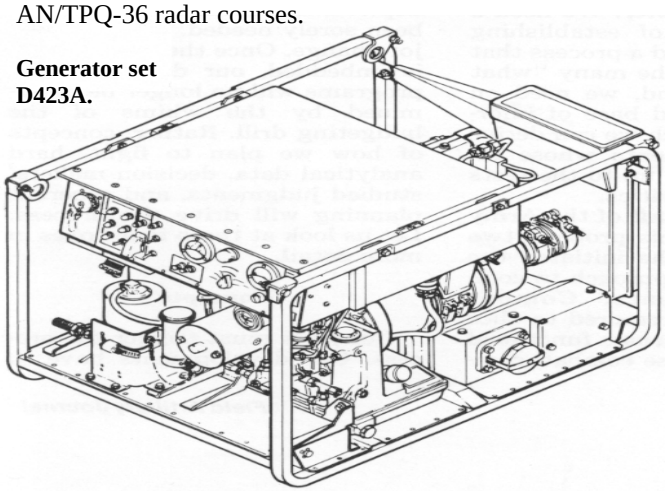
Much attention has recently been given to the Army's newly acquired Firefinder radars, the AN/TPQ-36 mortar locating radar and the AN/TPQ-37 artillery locating radar. This interest is due to their outstanding test performance in reliability, maintainability, and sophistication in comparison to the other weapons locating or moving target locating radars. This is particularly true for the AN/TPQ-36 with its specially made, self-contained power unit generator set D423A.

Skid-mounted on the back of a modified M116A1 ¾-ton, 2-wheel trailer containing the radar system's transceiver group, the generator enhances the radar's mobility. It was designed to have superior characteristics in terms of durability (6,000 to 10,000 hours between overhauls), reliability (500 hours mean time between failures), maintainability, excellent all-weather starting characteristics (60 seconds to full load at –50° F to +125° F), and extremely low vibration. Its inherent multifuel operation capability (turbine engine aviation fuel: grades JP-4, JP-5, JP-8; diesel gasoline, aviation gasoline: grades 80/87, 100/130, 115/145) makes it an ideal set for field use. The generator is also portable (weight of 365 pounds, height 22 inches, length 33 inches, width 24 inches). All components that can cause hazardous conditions are insulated and enclosed. A significant maintenance feature is that all components requiring routine service are easily accessible.

This turbine-engine-driven, multifuel generator provides all of the Q-36 radar system's power requirement. This is accomplished through the built-in power conditioner unit (PCU) which converts the 6-phase, 1,600-Hertz output of the turbine-driven alternator into a precision 3-phase, 400-Hertz, 120/208-volt, 10-kilowatt output.

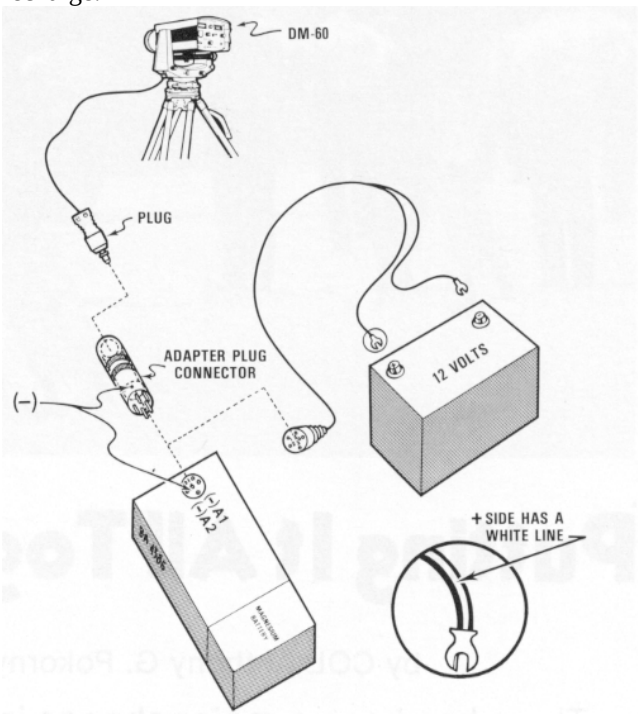
The operation and organizational maintenance on the D423A turbine generator is taught at the US Army Field Artillery School as part of the curriculum of the Firefinder AN/TPQ-36 radar courses.

Generator set D423A.



Alternate power for the DM-60

The present cubitape battery pack provided for the DM-60 is capable of 200 measurements when new; however, a noticeable reserve power loss results after each recharge.



Alternate power supply.

The power cable furnished with the Computer Set, General (TI-59) (1220-01-082-16460) and either a 12-volt or a BA-4386 (AN/PRC-77) battery provide an excellent alternate means of power for the DM-60. The BA-4386 battery provides more than 50 consecutive measurements and is ideal for use in areas where vehicle power cannot be used. The TI-59 power cable can be semipermanently installed in the survey vehicle. (A bracket or other means of securing the cable when not in use must be provided to prevent damage to the cable.)

To power the DM-60 from a BA-4386 battery, remove the adapter plug connector from the TI-59 cable and insert the adapter plug into the BA-4386. With the DM-60 cable connected to the DM-60, insert the DM-60 plug into the adapter connector and you are ready to measure distance. To use the 12-volt battery with the TI-59 cable, leave the adapter connector in place on the TI-59 cable and insert the DM-60 plug.

The cost of one BA-4386 battery is $8.44, and the cost for one cubitape battery pack is $92.05. Using the 12-volt or BA-4386 battery will facilitate the survey mission and eliminate the need for purchasing additional cubitape batteries.

Note: The original DM-60 manual has been rewritten and is now TM 5-6675-304-12.

Putting It All Together

by COL Anthony G. Pokorny

There has been a major change in the way the Army does its combat developments business and the Field Artillery has been the "point man" in this revolution for several years. The purpose of this article is to explain what the Field Artillery School is doing to effect this change and summarize what is being accomplished.

Year in and year out, the annual budget process starts out rather orderly and logically; but, toward the end of each cycle, it normally turns into a rather hectic series of events. For example, decisions are required in very short order with little time for thorough analyses, while Department of the Army action officers are forced to go into overdrive and produce statements of combat requirements based on nothing but limited subjective analysis. They give it their best shot and have done admirably well; however, the action officers, our decision makers, and the Army deserve better. We need a systematic way of establishing priorities. We need a process that is responsive to the many "what if" questions. And, we need an analytically sound base of information from which we can derive combat requirements whose rationale will stand up to the tests of our toughest critics.

The Chief of Staff of the Army began to solve this problem two years ago when he initiated the "mission area" approach to combat developments. Combat developers were required to slice the Army into various functional areas such as close combat, communications, intelligence, etc. The Chief then asked that we analyze these mission areas in great detail to determine deficiencies and fixes. Fort Sill was given the responsibility for the "fire support" mission area.

The improved developments process, which resulted from the Chief's initiative, has taken the form of the diagram shown.

Some of the old timers will probably say that this is just about the same process we have always had. Wrong!! While the latter steps of the process are generally the same, the first four boxes depict a new front end which has been sorely needed. This is a major change. Once the new process is imbedded, our developmental programs will no longer be determined by the whims of the budgeting drill. Rather, concepts of how we plan to fight, hard analytical data, decision makers' studied judgments, and coherent planning will drive the process. Let us look at these four boxes in more detail.

Concepts

Concepts must trigger the process. Our developments have to

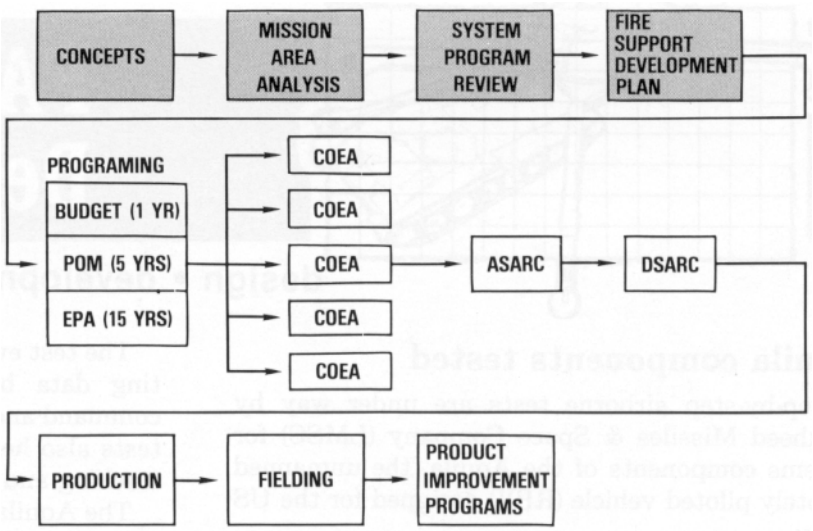
be keyed to the way we are going to combine technology and people to fight and win in battle. FM 100-5, published in the mid-seventies, started us thinking about modern combat. Spilling out of that capstone manual have been other concepts such as the Integrated Battlefield, the Deep Attack, the Extended Battlefield, and now the AirLand Battlefield. This series of concepts is an evolutionary refinement of how to win, which will be articulated in the new version of FM 100-5 that is soon to be published.

Mission Area Analysis

How we plan to fight determines the thrust of the second box. Mission area analyses surface the deficiencies in our capability to execute the concepts. The Field Artillery School's Fire Support Mission Area Analysis (FSMAA) is the first analysis of this type to be completed in the Army. It was a test case to see if it could be done and, if so, how it should be done. Although the effort was considerable, it has been well worth the investment of time, manpower, and money. Our job is much easier now that we have established the analytical foundation to validate concepts and derive our priorities. Other TRADOC schools are now conducting their own mission area analysis in the functional areas assigned to them.

System Program Review

System Program Reviews (SPRs) are important since they get key decision makers involved in the developments process early. The Army's top managers review the results of mission area analyses and judge upon the directions that the numbers are suggesting. Impractical or low payoff directions can now be changed long before Army or Defense Systems Acquisition Review Council decision times. We have had SPRs in the past, but without prior mission area analyses. Most of these SPRs have proved to be difficult to focus and have not been particularly productive because of inadequate preparation. Mission area analyses' results give the decision makers something significant to chew on during the short period of time they are assembled to pass judgement on a particular battlefield function. The Field Artillery SPR held in June this year was extremely helpful for polishing the rough edges off our course for the future.



US Army Developments Process.

Fire Support Development Plan

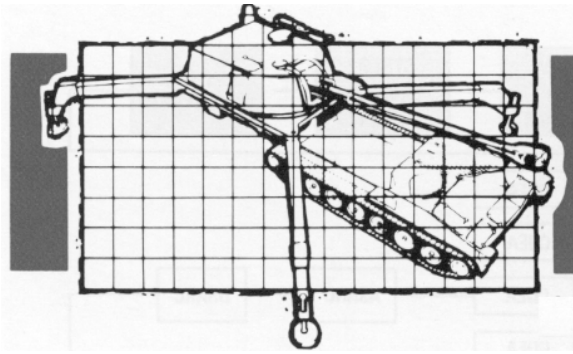
The functional area development plans take the recommendations of the mission area analyses and SPRs and convert them into action programs. Development plans then provide the link between the front-end analyses and the budget. Super ideas will go nowhere unless resourced adequately. Of special interest from our Fire Support Development Plan was the use of a relatively new and complex analytical tool called "Goal Programming."

Goal programming is designed to obtain a compromise between competing requirements, resources, and goals to define a range of feasible solutions to difficult management problems. Decision makers provided with a goal programming solution can perform sensitivity analysis to insure that the solution is acceptable for those objectives which are non-quantifiable and subsequently can make decisions with more accuracy than ever before.

The beauty of goal programming is that it can juggle a host of different variables at one time. Variables of importance to the developments process include: combat effectiveness, cost, time, risk, quantity, etc. Multidimensional goal programming is proving to be much more powerful than the traditional two-dimensional cost/benefit analysis technique. We have used goal programming successfully to establish our combat developments priorities and believe it has application throughout the entire Army.

So the Army really does have a new developments process on the drawing board and Fort Sill has helped prove that it can work. It is now up to the rest of the Army to do the homework necessary to fully implement the new process across the board. If this happens, the Army will take a great stride forward in managing the process of force modernization.

COL Anthony G. Pokorny, formerly the Director of Directorate of Combat Developments, USAFAS, has been reassigned to Korea.



FA Test and Development

design • development • testing • evaluation

Aquila components tested

Step-by-step airborne tests are under way by Lockheed Missiles & Space Company (LMSC) for systems components of the Aquila, the unmanned remotely piloted vehicle (RPV) designed for the US Army.

Although the RPV will be unmanned, each major subsystem of the air vehicle will initially be tested in manned aircraft. Lockheed has been highly successful in using this low-risk, step-by-step approach in other programs. All RPV subsystems are to be tested in this manner before committing the RPV to unmanned flight tests.

The initial tests used interim data link (IDL) subsystems. The airborne portion of the IDL was installed aboard a modified twin-engined Piper Seneca 2 aircraft and successfully flown over a test range, while ground instruments recorded IDL measurements.

RPV FOR ARMY—An Aquila remotely piloted vehicle receives adjustments on a test stand at Lockheed Missiles & Space Company, Sunnyvale, CA.

The test evaluated IDL performance in transmitting data between the manned aircraft and a command-and-control station on the ground. The tests also helped determine data link margins and tracking and ranging capabilities.

The Aquila is designed as a highly survivable unmanned drone for reconnaissance, target acquisition, and laser designation of targets. The system will spot for conventional artillery and laser-designate targets for precision guided weapons. The system will then provide damage assessment after the weapon's impact.

Real-time television pictures can be sent via jam-resistant data link to a command-and-control van several miles behind the battle front.

The Aquila system consists of the air vehicle (the RPV) plus launch, recovery, maintenance, and command-and-control units, all carried on standard Army trucks.

Warhead for MLRS?

The United States, Great Britain, West Germany, and France are soliciting ideas from industry on the cooperative development of a terminal guidance warhead for the Multiple Launch Rocket Systems (MLRS).

Requests for proposals were released in the four countries on 31 July this year asking for technical approaches on the new warhead and ideas on how the program would be managed quadrilaterally.

Plans are for the four countries to share in both the military and economic benefits of co-development and production of the terminal guidance warhead, according to COL Monte Hatchett, MLRS Project Manager at the US Army Missile Command, Redstone Arsenal, AL.

Proposals from all four countries will be evaluated by an international committee at Redstone Arsenal; present plans call for the awarding of several competitive contracts for Concept/International Program Definition by the end of this year.

In addition to the terminal guidance warhead and the baseline dual-purpose improved conventional

munitions (ICM) warhead, a scatterable antitank mine warhead is being developed by Germany.

Field of the basic MLRS system is expected to begin in FY83.

Wind tunnels

A projectile, one foot long and one inch in diameter, was placed sideways and level in a chamber with a protective window. On each side, huge pipes designed to direct air into and out of the chamber stood ready. Ear protectors were donned, a button pushed, and air rushed through the subsonic wind tunnel at 800 feet per second. Directly facing into the onrushing air, the projectile at first moved slightly to the side, giving evidence of its likelihood for straying off center if it had been a real projectile in flight.

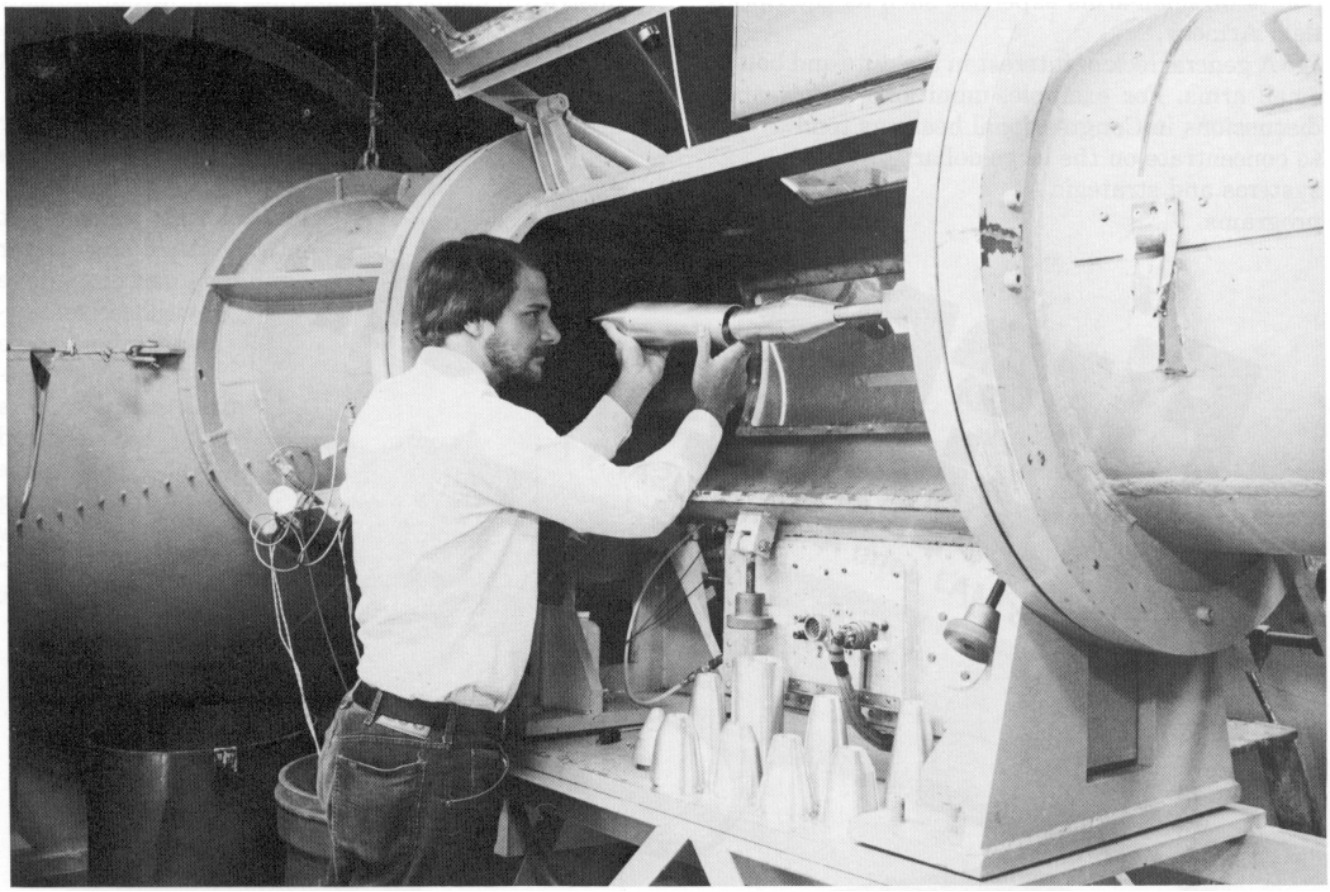
The subsonic wind tunnel is the slowest of three used to simulate the flight of projectiles or missiles at the US Army Armament Research and Development Command (ARRADCOM) Headquarters. The other two wind tunnels—transonic and supersonic—can generate winds up to 1,400 and 2,100 feet per second, respectively.

Scale models of projectiles are used in most cases because the wind tunnels are relatively small. The subsonic tunnel is 24 inches in diameter, the transonic is 16 inches square, and the supersonic is nine inches square. Based on previous experience, subjecting scale models of projectiles to such great wind velocities has been applicable for most free-flight configurations. The models tested are usually no smaller than one inch in diameter which might represent a full-scale 8-inch projectile.

Full-scale versions can be tested in the subsonic tunnel which is used mainly for testing mortar projectiles and various submunition designs such as STAFF, SADARM, and minefield dispersion units.

Antitank projectiles are tested in the transonic wind tunnel. In long-range flight, they would be killing targets at speeds within 800 to 1,400 feet per second.

The supersonic wind tunnel, which achieves velocities between 1,800 and 2,100 feet per second, is used to test faster antitank and artillery rounds and other types of projectiles or missiles that move at a comparable speed. (Mike Biddle)



Placing an 81-mm mortar projectile inside the subsonic wind tunnel is Walt Koenig, a mechanical engineer in the Fluid Mechanics Branch of ARRADCOM's Large Caliber Weapon Systems Laboratory. (Army photo by Gil Barns)

Firepower Maximization

by MAJ John A. Hurley, USAFR

The present US search for a suitable military sidearm successor to the venerable .45-caliber semiautomatic M1911A1 pistol has led to foreign shores as well as to domestic sources. Indications are that the desired features include double-action (as compared to the M1911A1's single-action) capability, increased magazine or "clip" capacity (the 1911A1 magazine holds seven rounds) and 9-mm vice the .45-caliber.

Inasmuch as most NATO nations (and even many non-NATO allies) utilize the 9-mm round for their pistols and submachineguns, possible weapons for adoption as the new standard US military sidearm include: Browning (Belgium); Beretta (Italy); Walther; Heckler and Koch (West Germany), as well as entries provided by two well-known US handgun manufacturers: Colt and Smith and Wesson.

This search, which will be consummated soon, has highlighted the following factors of major concern:

•Decline of the US small arms research and development capability.

•Limited opportunity for quickly increased or "surge" US small-arms production.

•Shutdown of traditional US government focal-points of small-arms expertise such as the Springfield Armory.

•A general lack of interest in the nuts and bolts of small arms. For example, munitions and weapons discussions in Congressional hearings tend to concentrate on the large-dollar systems and strategic programs.

The above negative observations apply particularly to the US handgun/sidearm picture but also relate to the US long-arm (i.e., rifle, submachinegun, shotgun, and machinegun) research, development and production environment. This dire situation has been exacerbated by the increasing role of the conglomerates who bid on contracts to manufacture US weapons. Here many factors have arisen which disenchant these conglomerates from the military weapons market to include:

•Strident public (and thus stockholder) debate and concern over "gun control."

•Low profit potential on government contracts, on-again/off-again US government interest in conventional ordnance.

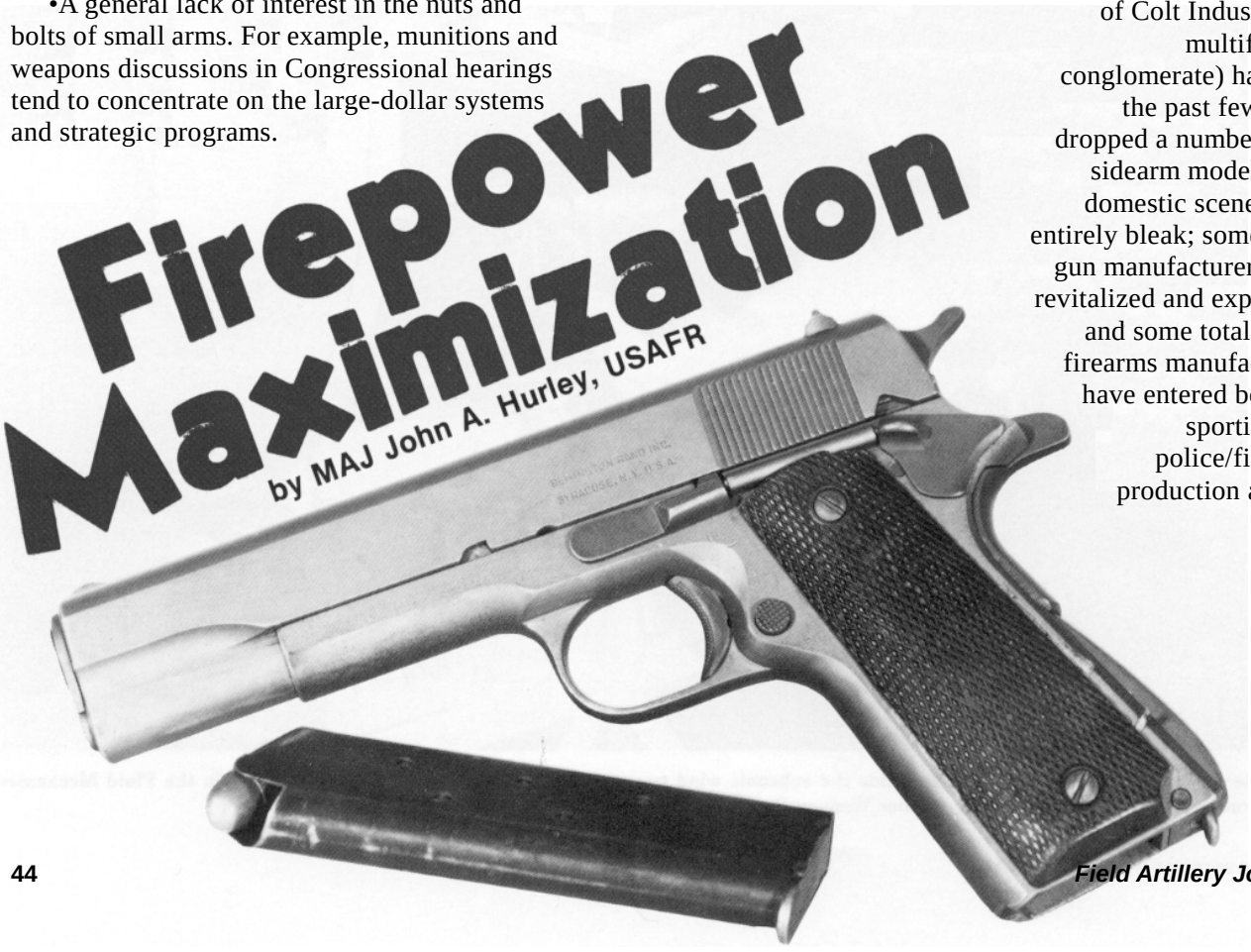
•Heavy sporting firearms importation from Europe and Japan.

•Outdated and very labor-intensive US arms production facilities.

•Heavy conglomerate interest on the profit/loss "bottom line."

•Minimal infusion of new ideas and concepts.

Evidence that these factors have taken their toll can be seen in the recent announcement by Olin Industries, a major conglomerate, that its subordinate division, the long-fabled Winchester Arms Company will be soon "divested." Similarly, Colt Firearms (now a component of Colt Industries, a multifaceted conglomerate) has over the past few years dropped a number of its sidearm models. The domestic scene is not entirely bleak; some other gun manufacturers have revitalized and expanded, and some totally new firearms manufacturers have entered both the sporting and police/firearms production arenas.



Numerous fascinating arms anecdotes with relevance to US martial arms adoption abound, such as:

•How the .45 was chosen over the .38 as the standard US sidearm caliber.

•The pre-World War I German ancestry of the fabled "Springfield 03."

•The US World War I adaptation of the British Enfield .303 rifle into the US .30 Enfield.

•The almost total lack of US-made machineguns at the early stages of World War I.

•The somewhat short-lived roles of novel US weapons such as the full-automatic Pedersen Device, Johnson semiautomatic rifle and light machinegun, and Reising submachinegun.

•General MacArthur's role in retaining the .30 caliber rifle over the .276 caliber.

•The development by "Carbine Williams" of the .30 M1 carbine and its many variants.

•John Garand's invention of the famous World War II and Korean War standby — the .30-06 M1 Garand Rifle.

•The long presence of the .45 semiautomatic M1911A1 pistol and the M1918 Browning Automatic Rifle (BAR) in the US forces.

•The development of the M3 caliber .45 submachinegun ("grease gun") and antitank man-portable rocket launchers ("bazooka").

•The US back-pedalling in the 1950s and 1960s over NATO small-arms caliber and weapon standardization.

•Domestic US political and economic concern over foreign production of equipment, particularly weapons for US forces.

•The demise of the Army's Ordnance Corps.

•The controversy over the introduction of the M16 rifle into US usage in Vietnam, allegations as to its shortcomings, the intensive review of the problem, and subsequent product improvements which led to the now standard M16A1.

•The closing of the Springfield Arsenal, etc.

These and other episodes are part of the rich history of US martial arms development in the 20th century and form part of the backdrop for the current need to upgrade our firepower.

The purpose of this article is not to recount the long key and sometimes legendary (as with the various "Springfield" rifles) role of the development and production of martial firearms in US history nor to indulge in the interesting debates on such topics as:

•Revolver versus semiautomatic pistol.

•Single-action versus double-action semiautomatic pistol.

•Pros and cons of specialty weapons such as carbines, submachineguns/machine pistols, and grenade launchers.

•Semiautomatic versus full-automatic rifle firing capability.

•Adequacy of magazine capacity for rifles.

•"Best" caliber for rifles (NATO 7.62-mm/.308-caliber; former US standard caliber .30-06; present US M16A1 5.56-mm/.223-caliber; USSR 7.62-mm "short round," etc.)

Rather, the purpose of this article is to highlight the immediate and imperative need for the US to maximize the firepower available to the individual soldier, sailor, airman, or Marine.

The present and foreseeable threat is clear; foreign forces have readily available large stocks of smallarms which encompass several "generations" of improvements since the World War II era of revolvers/pistols, bolt-action and semiautomatic rifles, submachineguns and machineguns. Since World War II, for example, all of the Warsaw Pact nations and most of the NATO nations, as well as many other nations, have fielded at least two generations of progressively improved and more lethal individual firepower. These weapons have been tested in numerous conflicts at various levels of magnitude and intensity. Huge stocks of World War II, Korean War, and Vietnam era weapons from various countries have been redistributed after capture or abandonment. Additionally, military/security assistance and foreign arms sales activities by various nations have accelerated the level of arms sophistication and quantity of firepower throughout the world.

Some of the targets which US/Allied armed forces individuals (not only infantryman) may encounter are:

•The traditional human individual and group targets.

•Guerrilla and special operations forces striking behind the conventional "frontline."

•Armed helicopters and low-flying "fast movers."

•Armored fighting vehicles (AFVs).

•"Soft-skinned" vehicles such as trucks, etc.

Thus it is essential that the US embark on an immediate program to evaluate potential threats and to develop and field the individual and crew-served weapons necessary for the most lethal and effective firepower. In the future, the US will most probably not have the advantage of quantity and numerical superiority which it and its Allies enjoyed in the latter years of World War II. For example, in certain (not all) categories of tanks, the Germans had

qualitative advantages in a "one on one" basis but these advantages were weakened by US airpower, Allied numerical superiority, and the post-D-Day difficulties for the Germans of a two-front war and a badly shattered homefront. In the North Korean Conflict, the US and its Allies were sorely tested by the North Koreans and the Communist Chinese even though the latter regime had just one year earlier consolidated its hold on the Chinese mainland. In the Vietnam War, the US had virtually unlimited logistics, sealift/airlift, medical, and intelligence support and (over South Vietnamese skies) uncontested air superiority. Yet, again individual units were put to the ultimate test as the enemy typically had the advantage of deciding when and where to initiate an attack. In future hostilities and contingency scenarios which may be encountered in various climbs and areas ranging from desert oil fields to combat in built-up areas, one of the deciding factors may well be the instant availability of superior individual and small-unit firepower. Fruitful areas for exploration include:

•Increasing the lethality and destructive range of the various types of hand grenades.

•Providing most "long-armed" personnel with a sidearm (as a contingency stopgap, the numerous .45-caliber M1911A1s could be issued until the new 9-mm pistol is selected and produced in adequate numbers). This would be a departure from recent usual US practice.

•Ameliorating the present critical shortages of ammunition.

•Increasing the number of M79 single-shot grenade launchers and M203s (M16A1 rifle with attached under-barrel 40-mm grenade launcher) deployed to squad level so that the range of grenade effectiveness can be extended out to well beyond the much more limited hand-thrown range.

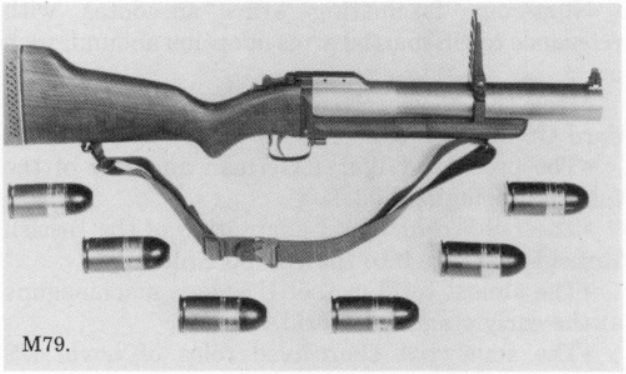
•"Rediscovering" the research of recent years regarding the development of various types of small-arms projectiles with greater probability of hit per round.

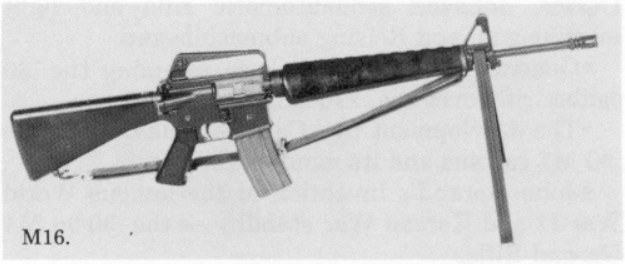
•Researching the small arms and associated weapons and foreign weapons which should be purchased outright for US usage.

•Developing a solution for the M16A1 jamming problem.

•Increasing the availability of night vision (active infrared and passive low-light level) devices for both general observation and weapons-aiming purposes.

•Providing mass individual issues of metascopes so that forces in combat areas can be aware of hostile infrared use.


M79.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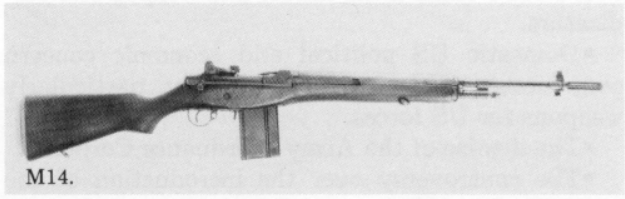

M14.

•Supplying field units with simple, ruggedized laser and other target designator devices to use with air support, naval gunfire, and artillery.

•Deploying to the squad level increased numbers of "throw-away" one-shot rocket launchers for use against enemy armor, soft-skinned vehicles, and bunkers/buildings, etc.

•Accelerating development and deployment of lighter weight squad and platoon support weapons (mortars and light and heavy machineguns).

•Developing better non-lethal munitions ("stun" grenades/temporary vision-denial grenades/"rubber" projectiles, etc.) for civil disturbance/riot control/special operations purposes.

•Developing easily sowed state-of-the-art mines and explosive devices for area denial in areas of high armor threat.

Marksmanship training with the M16.

•Equipping US "soft-skinned" administrative vehicles such as trucks with ring and pintle mounts for machineguns, recoilless rifles, rocket launchers, and antiarmor weapons such as TOW.

•Developing and deploying simple bolt-on armor packages to apply to soft-skinned US vehicles.

•Developing simple enhancements such as the Warsaw Pact bayonet scabbard wire cutter to maximize the individual's combat effectiveness without adding weight.

•Re-emphasizing marksmanship training and annual requalification (not just "weapons familiarization" token firing) under realistic situations including night firing and firing while wearing masks and NBC protecive clothing.

•Considering a modest monthly incentive pay ($5 or $10) for individuals who maintain firearms qualification at Sharpshooter or above.

•Reducing the present mania about possible weapons theft so that units and invividuals can have reasonable and timely access to weapons and ammunition when appropriate.

•Rebuild the US Government's in-house small arms research and development capability and provide incentives to the US private sector to enhance its complementary capability.

•Providing incentives for industry to maintain an in-being quick reaction "surge" production capacity.

•Developing aggressive antitank procedures for infantry training.

•Providing silencers and flash-hiders for more individual weapons.

•Determining whether US troops stationed in NATO countries and armed with M16A1 5.56-mm/.223-caliber rifles should be equipped with presently available M14 7.62-mm/.308-caliber rifles (the NATO standard rifle caliber). It can well be argued that the M14 with its longer range, reliability, greater penetrating power, and ammunition interchangeability with other NATO rifles and the US M60-series of machineguns should be the principal US rifle in NATO areas. Some enhancements such as folding or collapsing steel stocks could be provided.

Some of the other areas which should be explored for portability, durability, and/or reliability include:

•NBC protective equipment.

•Improved helmets.

•Lighter weight body armor capable of protecting against not only shell fragments but also direct small-arms fire.

•Eye goggles for use in desert and snow.

•Camouflage uniforms with low infrared signature.

•Improved lighter weight personal equipment (packs, compasses, sleeping bags, food packets, canteens, etc.).

•Greater allocation of individual radios (aiming toward the now nearly standard US police practice of a portable radio for each individual in addition to car-mounted mobile radios.

•Pyrotechnics and other audio-visual signalling and communications equipment such as loud hailers.

Additionally, very specific intelligence as to enemy capabilities and vulnerabilities must be disseminated whenever possible on an *unclassified* basis to small units and individual troops. As an example, soldiers must know the specific "reach" and impact of foreign weapons they may encounter (e.g., the difference in ranges between 12.5-mm and 14.5-mm Warsaw Pact heavy machineguns) and must know specifically the vulnerable areas of foreign armor, soft-skinned vehicles, aircraft, and helicopters. They need to know "where to shoot."

These measures to *maximize firepower* are critically essential and apply not only to Active and Reserve/Guard elements of the combat arms but also to rear area and support elements which may become "frontline" targets for guerrilla and special operations attacks.

The time to effect these necessary improvements is now!

MAJ John A. Hurley is a United States Air Force Reservist with a Mobilization Augmentee assignment to the International Programs Directorate of DCS/Programs and Evaluation (DCS/PA), Headquarters, US Air Force.

With Our Comrades In Arms

notes from other branches and services

Smoke! Smoke! Smoke!

The ancient strategy of using smoke as a protective obscurant is still effective on the modern battlefield.

One of the particular research and development (R&D) efforts at US Army Armament Research and Development Command's Chemical Systems Laboratory (CSL) for the Project Manager for Smoke/Obscurants (PM/SMOKE) was the development and fielding of the Vehicle Engine Exhaust Smoke System (VEESS). It was adopted by the Army to provide a low-cost, repeatable-use, onboard vehicle smoke-generating capability to complement the smoke grenade launching system on armored vehicles.

The VEESS uses the existing vehicle engine fuel pump to provide diesel fuel from the vehicle fuel tanks, through solenoid valves and nozzles, to the engine exhaust manifolds where it vaporizes and then recondenses behind the vehicle to form a dense smoke screen. The system is driver-activated and can be operated continuously or at intervals upon command. It provides a screen capable of blocking visual through near-infrared detection, acquisition, and tracking devices to include laser rangefinders.

Development of this system for M60A1/3 tanks was initiated in 1976 with initial fielding on those vehicles in Europe in 1980. The system was applied to the US Army Europe M728 combat engineer vehicles in 1980, and applications are planned for the M88A1 medium recovery vehicles this year. Application programs are also underway for other US tanks as well as the armored vehicle launched bridge and several air defense vehicles.

In another R&D area for the PM/SMOKE, CSL is completing engineering development of the XM825 155-mm smoke screening projectile designed to provide a significant improvement in visual ground screening effectiveness over the Army's current standard projectiles.

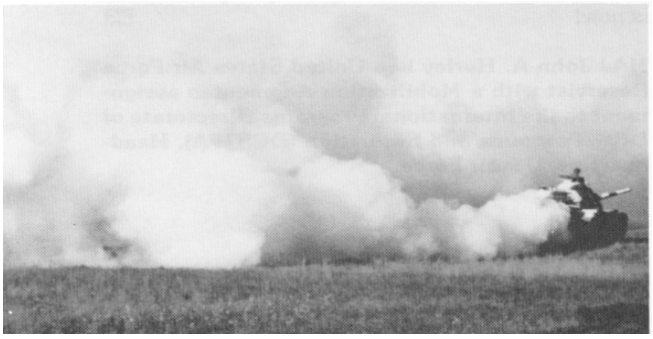
The XM825 ejects white-phosphorus saturated felt wedges above the target area. The wedges fall to the ground, producing a dense obscuring cloud up to 250 meters long.

The projectile, which is designed for use with the Army's M109A1 and the M198 howitzer weapon systems, is expected to be adopted for Army use within two years.

Looking ahead, one of the most important facets in smoke munitions development is to provide the Army with an effective means of countering enemy sensors operating in mid- through far-infrared regions. An improved smoke generator is under development at CSL to provide the Army with a capability to generate large area smoke screens. The generator, designated the XM49, is expected to be capable of providing screens which effectively block visual through far-infrared detection and acquisition.

Another CSL development for PM/SMOKE is the XM76 infrared screening grenade. This munition is designed to complement or replace visual screening grenades for armored vehicles and provide an efficient screen from the more sophisticated battlefield weapons and sensors that are expected to be developed in the future.

The Vehicle Engine Exhaust Smoke System (VEESS), adopted by the Army to provide a low-cost on-board vehicle smoke generating capability, complements the existing smoke generating launching system on armored vehicles. (US Army photo)



First Guard unit activated in Guam

Secretary of Defense Caspar Weinberger recently announced the establishment of a Territorial Command Headquarters at Agana, Guam, the first Guard unit in that territory.

Plans for additional Air and Army Guard units are now being made and will go into effect as the territory becomes able to support them. Future Army units under consideration include a Signal, Military Police, and Medical Company, two Engineer Detachments, and a Service and Supply Headquarters. An Air Force Civil Engineering Unit is also planned for the Air National Guard.

Guam became a territory of the United States in 1950. It is self-governing with a civilian governor and popularly elected legislature. The island, which is located near Hawaii, was a major air and naval base during World War II.

Solar power study for Air Force

Lockheed Missiles and Space Company has begun the second phase of a study that will provide the formula for developing a 10- to 50-kilowatt space solar power system for advanced military operations.

Under contract to the Air Force Aeropropulsion Laboratory at Wright/Patterson AFB, OH, Lockheed last year began preparing preliminary designs for a high-voltage high-power (HVHP) automatic solar power system.

Lockheed developed performance models of the critical components that would form an HVHP system to define their weight, efficiency, thermal capabilities, and other characteristics important to study conclusions.

Lockheed will analyze the data obtained from these models and then formulate a conceptual design of an HVHP system and pinpoint technology that requires more advanced development before the HVHP can become a reality.

"Developing such a high power system will require the most advanced power components and technology available in the late 1980s," said Bob Corbett, project leader for the HVHP study. He said the power-to-weight goals of the system are three to five times those of near-term space power systems.

The major problem in developing a high power system is reducing weight. However, data from the HVHP study shows significant weight can be saved using thin, efficient solar cells, high-temperature alkali-metal batteries and high-voltage power control and distribution systems.

"We are confident that 6 to 12 watts per pound power systems can be developed if the appropriate component combinations are applied," said Corbett.

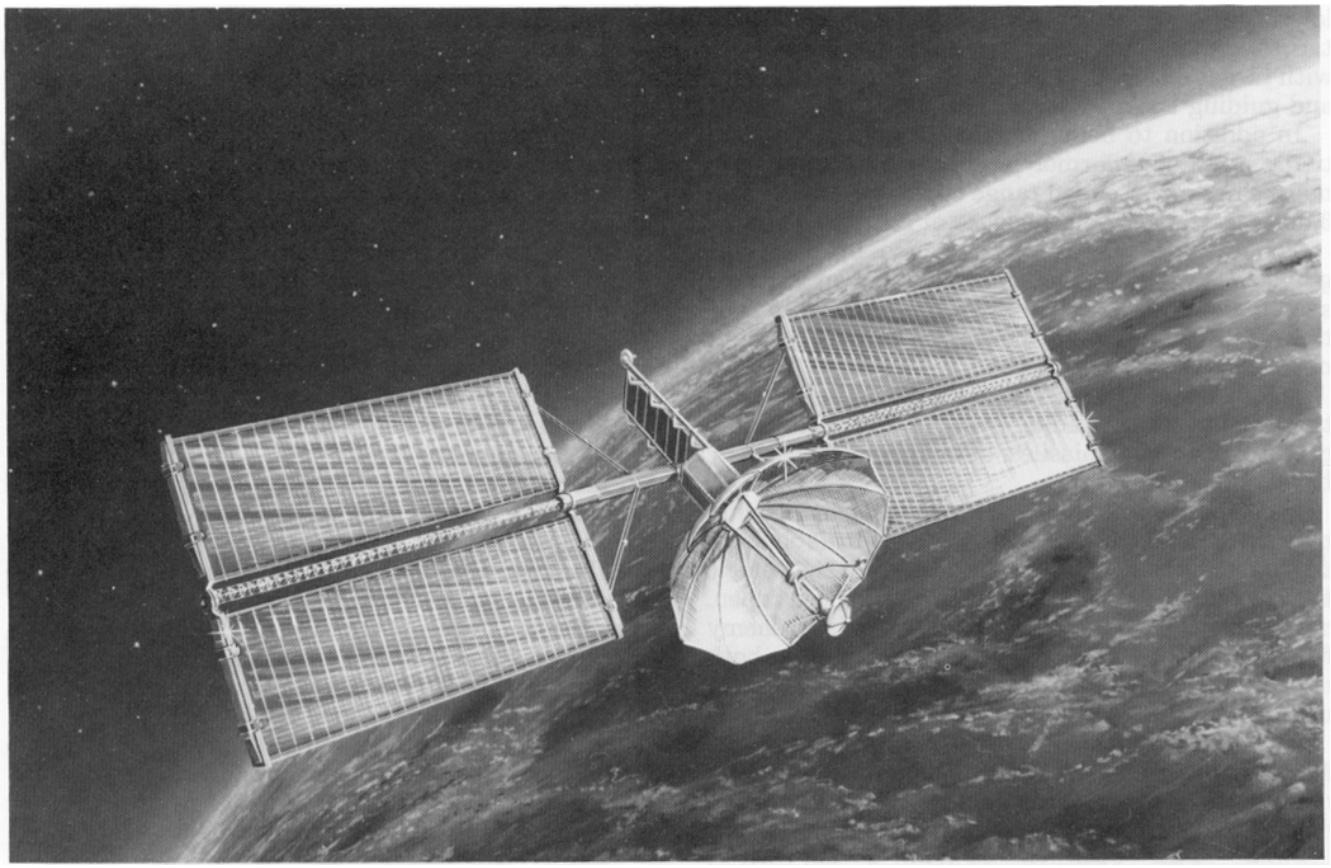
In conducting the HVHP study, consideration must be given to a variety of mission profiles ranging from low earth orbit to geosynchronous earth orbit and possibly higher.

Lockheed has recommended that emphasis be placed on power systems for mid-altitude and inclined orbits since they are receiving wide attention in various Department of Defense studies.

Corbett said gallium arsenide cells are likely candidates for HVHP solar array designs since they are more resistant to space radiation than the conventional silicon cell.

For low and mid-altitude orbits, nickel-hydrogen cells — now close to operational applications — appear to be the only battery system capable of the high cycle life required.

To meet higher system power density required for geosynchronous missions at multi-tens of kilowatts, a high-temperature alkali-metal battery with an energy-to-weight ratio of 50 to 60 watts per pound will be required.



An artist's concept of a high-voltage high-power solar system.

M901 Improved TOW Vehicle

The M113 armored personnel carrier (APC) has been a rugged, reliable vehicle; however, it has one major weakness: it isn't designed to be a fighting vehicle.

A new version of the venerable APC is now in comparison production tests at Aberdeen Proving Ground, MD. Not only can it fight, but it packs a punch strong enough to knock out heavy battle tanks.

The test item, known as the M901 Improved TOW Vehicle, is a modified APC which carries a turret-type, tube-launched, optically-tracked, wire-guided missile launcher and at least 10 missiles.

According to Ted Wheeler, Materiel Testing Directorate (MTD) M901 test director, the new vehicle is a second generation TOW carrier.

"The predecessor to this vehicle was pretty awkward, and the gunner was exposed because there was no turret. The first vehicle had a tripod set up inside an M113 which could traverse, but the system wasn't very effective," he said.

In the M901, the gunner sits in the fully-enclosed turret and has two sights—a standard day sight and a night sight. The optical sighting system provides the gunner, through a periscope-like device, with either a 3-power or 13-power telescopic sight. The lower power sight is used for general vision and target acquisition, while the higher power sight, with target reticle, is used when aiming at the target and guiding the missile to impact.

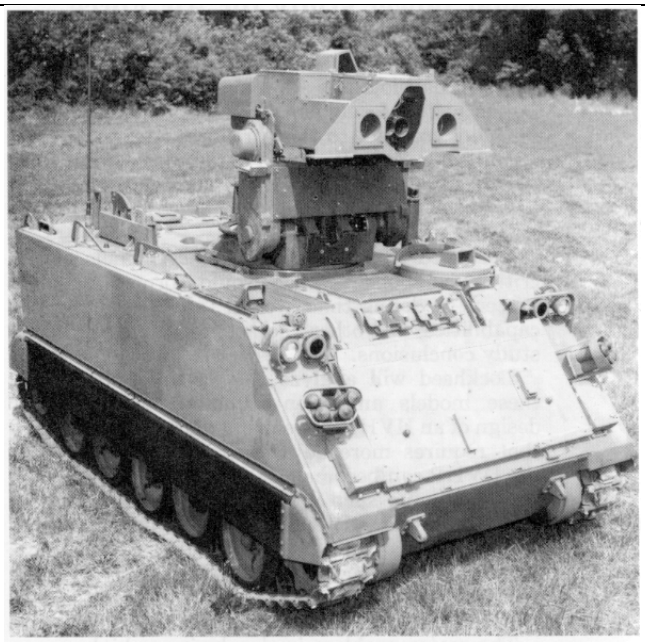
In addition to being capable of penetrating virtually any known armor plate, the 54-pound TOW missile has an extended range capability (more than 3,000 meters) and relative ease of control.

That ease of control is managed by a missile guidance system which homes in on an infrared source and correlates the missile's position in relation to the aiming point held by the gunner's sight mechanism.

An aditional protection for crewmen is provided through the quick loading system. The turret launcher can carry two missiles, but only one target may be attacked at a time.

When the two rounds are expended, the launcher may be moved to its loading position (about 45 degrees elevation with a loading hatch in the vehicle top opened). With the launcher back and hatch open, only a small opening is left through which enemy fire may be aimed at the loader. Side armor on both sides of the vehicle further reduce the exposed area, making loading a quick and relatively safe job.

In both of its earlier production forms, the M113A1 and M113A2, the old APC proved to be a nimble and maneuverable vehicle, and the addition of the TOW system has not degraded vehicle performance. The vehicle system's technical characteristics are impressive:



M901 Improved TOW Vehicle.

•At least ten 223-mm TOW missiles can be carried.

•Two smoke grenade launchers provide instant cover.

•A 7.62-mm M60 machinegun provides fire suppression.

•The vehicle can attain a top speed of 42 miles per hour.

•It has a tight turning radius (less than 25 feet).

•It has a cruise range of 300 miles.

•It is fully amphibious.

•The combat-loaded weight is 26,000 pounds (a four-man crew is used for mechanized infantry and a five-man crew for armored cavalry).

•It has an excellent fuel economy (more than 3 miles per gallon).

More than 1,100 M901s have been produced since its 1978 acceptance into the inventory. The majority were assigned to Europe-based units.

Though the TOW's armor penetration capabilities are still safeguarded, it is known to be a potent penetrator. Its uncanny accuracy and ease of control make it a feared antitank weapon.

Wheeler said that the high resolution optical system in the M901, plus its rapid turret turn rate, make target acquisition fast and simple. The relatively slow travel time of missile to maximum range allows the gunner to correct his aim or dodge bullets and still recover in time to hit a target.

The TOW launcher system has seven built-in self-tests, which facilitate troubleshooting and repair.

Ranger vacancies

The Army is currently looking for noncommissioned officers to serve with the 1st and 2d Battalions (Ranger), 75th Infantry, located at Fort Stewart, GA, and Fort Lewis, WA respectively. Requirements exist for 13F NCOs in the ranks of SGT/SP5, SSG, and SFC.

A soldier who is serving overseas must complete his tour before returning for training and reassignment. An application should be submitted no later than eight months before the date on which the individual is eligible to return from overseas.

Volunteers will receive airborne and Ranger training at Fort Benning, GA, before joining their units. (DA Pamphlet 351-4 and Chapter 6, AR 614-200 apply.)

The point of contact at Infantry/Armor Branch is SFC Kinsley or Mrs. Dansby, AUTOVON 221-8340.

Maverick test firing successful

Hughes Aircraft Company's imaging infrared (IR) AGM-65D Maverick air-to-surface missile recently completed the first phase of its development and evaluation testing for the US Air Force. With seven of eight test firings resulting in direct hits, the Maverick was used against tanks, a simulated radar van, trucks, and other ground targets from A-10 and F-4 aircraft at Dugway Proving Grounds, UT, Fort Riley, KS, and Eglin Air Force Base, FL. The one miss was due to a loading procedure error and was not attributed to either the IR guidance or operation of the missile.

The IR Maverick will provide Air Force tactical air crews with the ability to destroy tanks, bunkers, ships, parked aircraft, and radar or missile sites around the clock, in low visibility or battlefield smoke.

The test shots, designed to explore representative points in the missile's flight envelope, were made during day and night, at high and low altitudes, and at various ranges and aircraft speeds.

The IR Maverick seeker senses the thermal image of a target area and projects a TV-like picture on a cockpit display. The air crew locks the seeker on the selected target and fires the missile.

Its digital centroid seeker guides the missile to the center of the target. After launch, the flight crew is immediately free to take evasive action or to fire successive missiles at other targets.

Because of the Maverick system's maturity, the Air Force did not follow the normal sequence of an easy-to-hard series of test shots normally held for engineering development missiles.

"Instead, difficult shots were made from the start," said J. B. Roberts, Hughes' IR Maverick program manager. "For example, the second shot at Eglin AFB was the most difficult of the eight. The missile made a direct hit at night against an idling tank. The tank was parked head-on to the attacking aircraft, thus providing the smallest target signature."

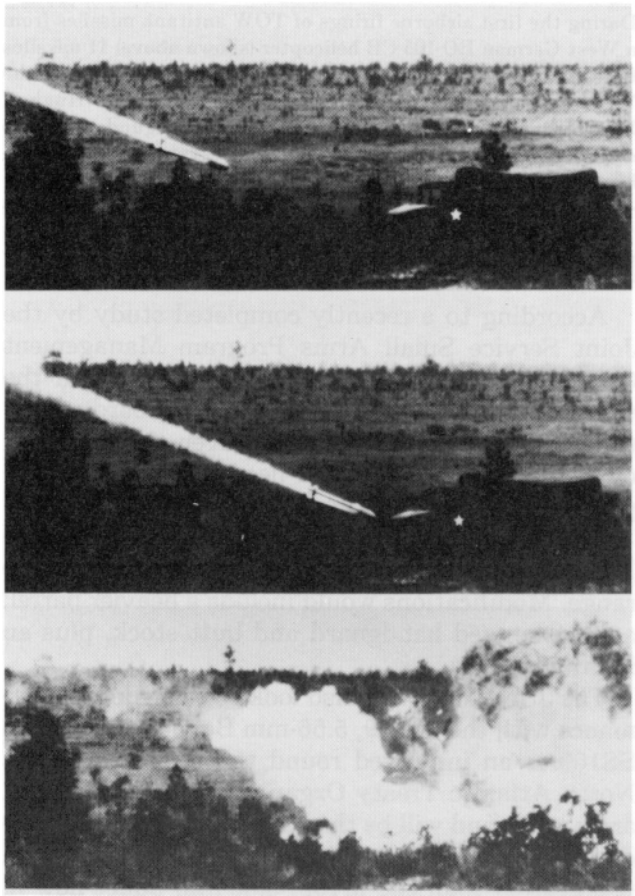
More than 900 TV Mavericks have been launched from distances ranging from a few thousand feet to many miles, and from high altitude down to "treetop" level. In those launches it has demonstrated exceptionally high accuracy, scoring an overall 85 percent rate of direct hits.

The IR seeker has high commonality with the Navy Walleye and the Air Force GBU-15 glide weapons. It is now being integrated with a blast fragmentation warhead for use by the Navy.

Since completion of the initial test firings, the Air Force has started a series of approximately 20 more launches of the IR Maverick to validate the missile's tactical utility in more combat-like conditions.

The Air Force will be testing the IR Maverick in launches from F-16, F-111 and F-4G aircraft.

After completion of the final round of tests, production of the IR Maverick is expected to begin in 1982.



DIRECT HIT—In this sequence of photographs, a Hughes Aircraft Company AGM-65D imaging infrared (IR) Maverick missile strikes a truck target on a test range at Eglin Air Force Base, FL.

During the first airborne firings of TOW antitank missiles from a West German BO-105 CB helicopter (shown above) 11 missiles fired scored 100 percent hits. The firings were conducted at the West German armed forces' firing range at Meppen. Hughes' Electro-Optical and Data Systems Group, El Segundo, CA, has delivered more than 1,000 airborne TOW systems, which have been installed on a variety of foreign and US-built helicopters.

M16A1 rifle

According to a recently completed study by the Joint Service Small Arms Program Management Committee (JSSAPMC) there are no rifles in the world that offer significant, across-the-board advantages over the M16A1 rifle. However, the study did determine that there was a need to develop an improved combat rifle.

The Army is addressing ways to improve the M16A1 rifle's ruggedness and maximum effective range. Modifications would include a heavier barrel, a more rugged handguard and butt stock, plus an improved sight.

The JSSAPMC will also look at the rifle's performance with the SS109, 5.56-mm Belgian bullet. The SS109 is an improved round that won the recent North Atlantic Treaty Organization (NATO) small arms trials and will be the basis for the NATO standard 5.56-mm bullet. It offers greater range and penetration than the M193, 5.56-mm bullet now in use.

In the NATO trials, the M16A1 ranked ahead of all other NATO candidates in the individual weapons test.

Pave Mover

A Hughes Aircraft Company engineer uses a full-color display to test a stand off airborne system for detecting and tracking massed armor and other forces. The system, called Pave Mover, displays targets and their movements in full color on a cartographic base showing roads, railroads, airfields, and rivers. As many as 4,096 hues can be displayed. Pave Mover uses airborne radar to relay target information via data link to a mobile ground-based data processing control station (DPCS). Computers in the DPCS process the information and display target data. Pave Mover's radar, a long-range, all-weather, sidelooking electronic scanned array radar, can guide missiles or tactical aircraft to designated targets. Guidance commands and targeting information are supplied by the DPCS. The Pave Mover system is part of a broader Assault Breaker program for neutralizing enemy armor before it reaches the forward edge of the battle area.

Pave Mover display.

Moving? Subscribers should send their new address four weeks in advance to:

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American Sound Ranging In Four Wars

by MAJ (Ret) William R. Bursell

"Sound ranging is not only the largest single source of counterbattery intelligence, but is also as important in this respect as all other such intelligence sources combined."

When GEN John J. Pershing arrived in France in June 1917, the Allies had numerous sound ranging sections at the front. General Pershing was so impressed by their ability to locate the enemy's artillery, that he cabled the War Department (30 June 1917) that the Allied Expeditionary Force (AEF) would need physicists for the technical work of locating enemy guns by sound ranging. Five sound units were organized and trained under the Corps of Engineers, and the first sound section was committed to action in the 1st Infantry Division sector at Madres France 10 March 1918.

The first sound sections were equipped with British sound ranging sets, French wire, and batteries from a downed German Zeppelin. The book, *American Munitions* (US Government Printing Office 1919) by Benedict Crowell, states that one American sound ranging section set a record of 117 locations in a single day and that, during the final months of the war, more enemy guns were located by sound ranging than by any other means. The primary problems encountered by the sound ranging sections during the war were:

•Maintaining heavy (8 tons per base) long wire lines.

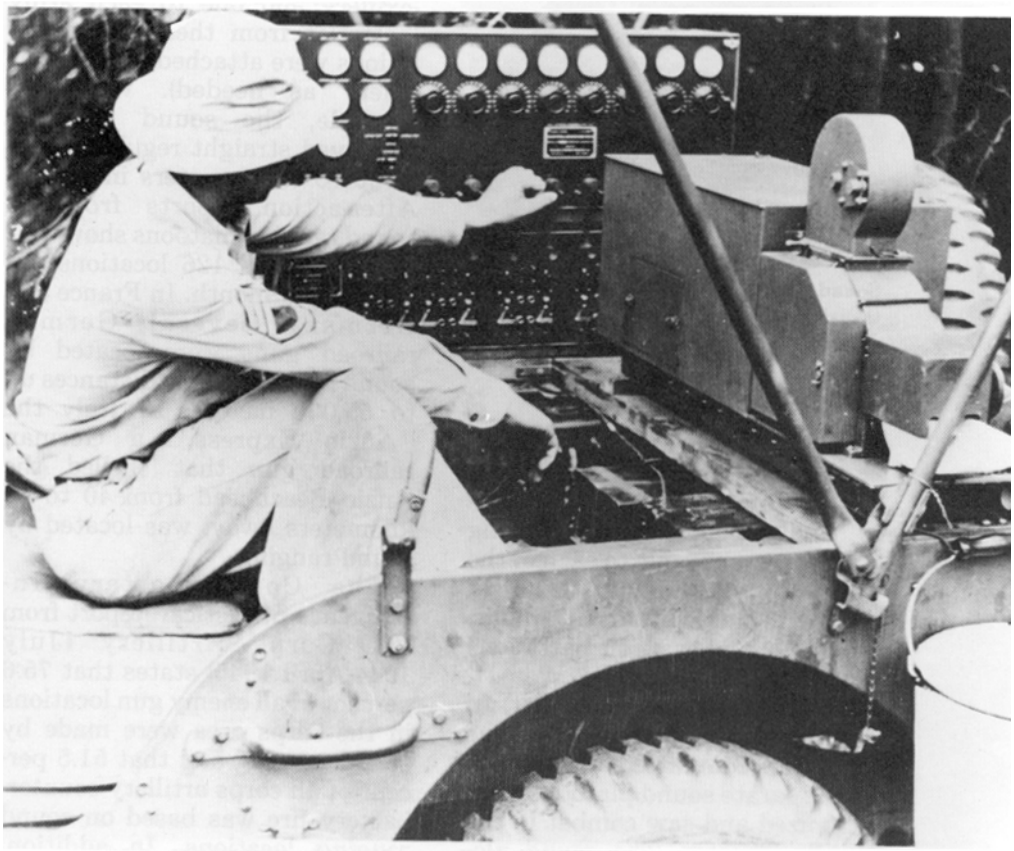
•High gusty winds.

•Intensive fire.

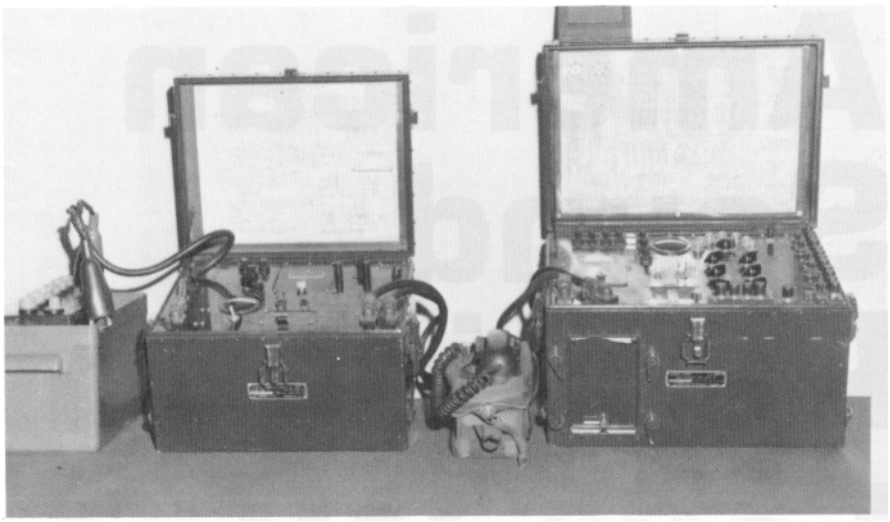
•Two and one-half days installation time.

•Convincing the artillery to shoot on sound locations.

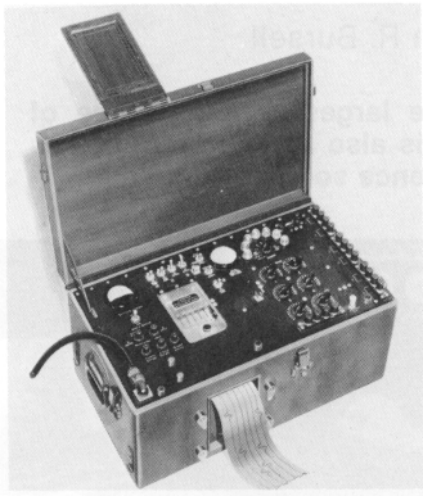
LT Charles B. Bazzoni, an American physicist who commanded Sound Ranging Section No. 1, complained that battery officers received insufficient instruction about the potential of his service. In his opinion sound ranging deserved more than a 20-minute dissertation to 90 or 100 officers who had forgotten whether a hyperbola was animal, vegetable, or mineral. In 1922, the Field Artillery took over the sound ranging mission.



In World War II, the GR3C sound set was the standard item for sound ranging.



Until June 1977, sound rangers conducted operations with World War II vintage equipment — the GR-8 sound ranging set produced in 1945.



Sound ranging set AN/TNS-10 is an all-transistorized recorder which is easier to maintain and offers greater sensitivity control.

World War II

In World War II, sound ranging was employed in all theaters of combat. One sound ranging platoon was organic to each of the two letter batteries in the Field Artillery observation battalions. Of the 26 observation battalions activated during World War II, 23 were committed to combat. In addition to the 46 sound platoons in these committed battalions, five separate sound platoons were organized and saw combat in the Pacific Theater. The sound platoons were committed as follows:

34 sound platoons were employed in the European Theater, one in Burma, 10 in the Pacific Theater, and 14 in the Mediterranean Theater (some platoons served in more than one theater). One battalion was assigned to each corps artillery and one to each army (batteries from these army battalions were attached to corps artillery as needed). Whenever possible, the sound platoons employed straight regular bases, 6,750 to 8,440 meters in length. After-action reports from 32 sound ranging platoons show that they averaged 126 locations per platoon per month. In France and Germany several German railroad guns were located by sound ranging out to distances up to 55,000 meters. In Italy the "Anzio Express," a German railroad gun that shelled the Anzio Beachhead from 40 to 50 kilometers away, was located by sound ranging.

The Counterbattery Intelligence Statistical Report from VII Corps Artillery (July 1944-April 1945) states that 75.6 percent of all enemy gun locations in the corps area were made by sound ranging and that 51.5 percent of all corps artillery counterbattery fire was based on sound ranging locations. In addition, Operations Research Office (ORO) of John Hopkins University, Technical Memorandum T-62, dated 15 January 1950, stated (based on World War II studies): "Sound ranging is not only the largest single source of counterbattery intelligence, but is also as important in this respect as all other such intelligence sources combined." The sound rangers of World War II had about the same problems as those of their predecessors of World War I; however, because of lighter wire and faster survey procedures, installation was cut to approximately eight hours for a deliberate base and to one hour for a hasty base.

Korea

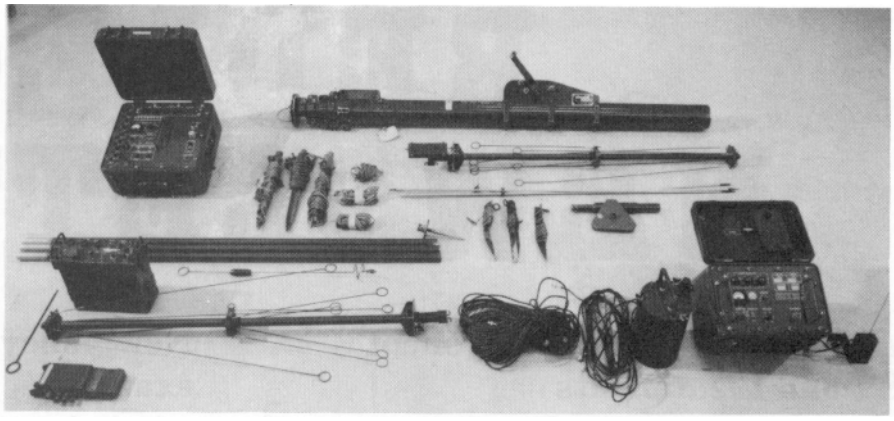
Sound ranging was not as effective during the Korean War as it was in World War II because of the mountainous terrain, too few sound platoons, insufficient training, and rapid turnover of personnel. There were two observation battalions in Korea, the 1st (committed 4 September 1950 at 60 percent strength) and 235th (committed in December 1952 at full strength). The 1st and the 235th each had three sound platoons, one in each letter battery (the third letter battery had been added to observation battalions after World War II). In World War II the normal frontage for a sound platoon was 10,000 meters. On occasion a platoon might have to operate two sound bases for short periods of time (10 to 20 days) to cover increased frontage; in Korea, however, this frontage was more than doubled for the sound platoon which meant each platoon had to operate two bases continuously without a proportionate increase in trained personnel. The sound platoons were augmented with personnel from other platoons in the battalion, on a catch-as-catch-can basis. Because of the mountainous terrain, irregular sound bases were employed in most cases, thus materially increasing the difficulty of record reading. Despite

these problems, sound ranging again accounted for the majority of hostile artillery locations. An Oklahoma University ORO study credits sound ranging with 60 percent of all enemy artillery locations made (includes locations made by a US Marine sound platoon). The 1st Observation Battalion made a total of 1,449 sound locations during an eight-month period (October 1951 through May 1952). Bravo Battery's sound platoon made 172 locations in June 1952 and adjusted the 16-inch guns of the battleship Iowa on one of these locations. In 1961, observation battalions were renamed target acquisition battalions.

Vietnam

On 15 October 1967, C Battery (Reinforced) 26th Target Acquisition Battalion, was committed to action in Vietnam and assigned to the 108th FA Group. In May 1968, C Battery was redesignated F Battery and employed two sound platoons near the DMZ—one near Gia Linh and one near Con Thien. Each platoon put in a four-microphone irregular base, approximately 2,000 meters in length, oriented to range on enemy guns located north of the DMZ. During one six-month period, these platoons made 340 artillery locations and 151 mortar and rocket locations.

An attempt was made to put in a sound base at Khe Sanh but due to intense enemy fire wire lines to the microphones never became operational. Maintaining wire lines proved to be the biggest problem for sound rangers in Vietnam. Since the microphones were outside of the base camp confines, the wire crews had to obtain infantry support for protection each time they had to maintain the wire lines, change batteries in the microphones, or replace microphones (American patrols blew up several microphones, believing them to be enemy mines). Because of the short bases (four microphones) initially



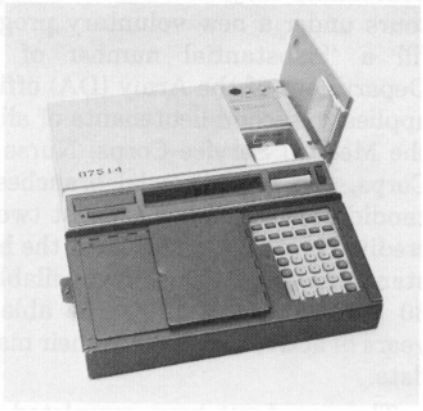
The AN/ERA-114 eliminates longwire lines.

employed, accurate locations were not reliable past 4,000 meters and, if one microphone went out, the entire base would be out of operation. The longest base they were able to install was a six-microphone, two-second base, 3,375 meters in length, which gave them a front coverage of only 5,000 meters. In Vietnam, obtaining spare parts and expendables (especially styluses and recording paper) was exceedingly difficult. The rotation of trained personnel and the lack of qualified replacements prevented the sound platoons from reaching their full potential.

Epilogue

Target Acquisition Battery TOE 6-307H (31 August 1976) combined the sound platoon and the flash platoon into a single sound/flash platoon. Change 10 to TOE 6-307H (15 May 1981), however, deleted eight observer spaces from the platoon thus eliminating the flash ranging capability and the platoon once again became a sound ranging platoon.

With new equipment coming into the inventory, the future of sound ranging never looked better. The Position Azimuth Determining System (PADS) will



The OL-274 is a fast and accurate computer.

survey a sound ranging base in one hour or less, compared to the present six to eight hours. This survey system along with the radio data link AN/GRA-114, which eliminates the laying, maintaining, and recovery of 10 to 20 miles of wire for each sound base, will enable the platoon to be operational within one hour. The FADAC is being replaced by the OL-274 computer to speed up accurate data determination. Finally, the two remaining outposts will be equipped with the AN/GVS-5 laser range finder and the AN/TAS-6 night observation device, giving them the capability of obtaining polar plot fire-for-effect data, day or night.

MAJ (Ret) William R. (Bob) Bursell retired from the Army in 1961 and then served 15 years as a civilian with the Counterfire Department, US Army Field Artillery School, where he retired recently as Chief of the Target Acquisition Specialist Branch.

REDLEG NEWSLETTER

Attention Reserve Component Second Lieutenants

Some Reserve and National Guard second lieutenants may now serve three-year active duty tours under a new voluntary program designed to fill a "substantial number of vacancies," say Department of the Army (DA) officials. The option applies to second lieutenants of all branches except the Medical Service Corps, Nurse Corps, Chaplain Corps, and other special branches. To be eligible, candidates must have at least two years of college credit. They should also meet the height and weight standards of AR 600-9, be available for duty before 30 September 1981, and be able to complete 20 years of active duty before their mandatory removal date.

They need not have completed an officer's basic course, but any officer who attended a basic course and did not complete it is ineligible for the program. Officers enrolled in college under the early commissioning program or the delayed officer program are eligible for active duty only when completing their degree requirements.

Interested officers serving in Reserve or National Guard units should send applications through command channels to the US Army Reserve Components Personnel and Administration Center, ATTN: AGUZ-RCA-AD, St. Louis, MO 63132. Applications from non-unit personnel should be mailed directly to the Center. A complete application must include DA Form 160 prepared in duplicate, documentary proof of appointment, college transcripts, performance reports, and a recent full-length photograph.

Persons brought on active duty under the program will later be able to compete for voluntary indefinite status or Regular Army selection since a three-year active duty tour is not guaranteed all applicants. Officials emphasize, however, that a large number of positions are available.

For more information, call toll-free 1-800-325-1874, AUTOVON 693-7496, or commercial 1-314-263-7496.

New policy on retirement medical exams

Medical examinations for the purpose of retirement are no longer voluntary, according to interim Change No. 102 to AR 40-501. Army policy now requires all active-duty soldiers, National Guardsmen, and Army Reservists retiring after more than 20 years' service to undergo a medical examination. Examinations must be scheduled not earlier than four months nor later than one month before the date of retirement.

Shortage of area intelligence specialists

There is a continuing need for area intelligence specialists (MOS 97C). This MOS offers language training and duties involving daily contact with the local community in a foreign country.

Individuals who choose to apply for 97C MOS must meet the criteria outlined in AR 611-201. In addition to requirements in AR 611-201, the soldier must have a Defense Language Aptitude Battery (DLAB) score of 89 or higher or have successfully completed the Defense Language Institute foreign language course or have scored at least 2/2 on an Army language test as prescribed in AR 611-6. The soldier must also undergo an in-depth interview prior to acceptance.

Qualified soldiers desiring MOS 97C training must either request the training through the US Army Military Personnel Center in conjunction with a PCS move or be nominated by a unit commander familiar with 97C qualifications and prerequisites. Once nominated, the individual can expect a two- to six-month waiting period before final approval is received, the longer period applying mainly to overseas applicants. The nominated soldiers will be contacted by the US Army Administrative Survey Detachment (USAASD), INSCOM, who will arrange for screening and interview. Consideration for MOS 97C training will be given to *all* enlisted personnel *holding any MOS* who have been recommended by MILPERCEN or a military intelligence unit commander with 97C MOS positions.

Officer candidates needed

At the end of fiscal year 1980, 20 percent of the classroom slots at the Officer Candidate School (OCS) remained vacant. This dropoff in enrollment means a loss of more than 30 junior officers with the benefit of previous unit experience. The school regularly reserves 160 spaces for active duty soldiers, with the remaining 50 going to college graduates enlisted by Army recruiters.

More than 13,000 active duty soldiers meet the age and education requirements for OCS attendance. To qualify for OCS a soldier must:

•Be an enlisted person or warrant officer on active duty.

•Be at least 19½ years old but no more than 29 at the time of enrollment.

•Have completed at least two years of a four-year college degree program.

•Have a minimum GT score of 110 (males), 115 or higher on the Officer Candidate Test (OCT), and a minimum composite score of 200 on the OCT and Officer Qualification Inventory (OQI). OCT and OQI are not required for females; however, they must have a minimum GT score of 115.

•Meet medical fitness standards prescribed in AR 40-501 and weight standards prescribed in AR 600-9. Applicants must also meet the new PT standards — score at least 60 points on each of the three events in the Physical Fitness Test — a minimum of 180 points.

•Accept a three-year service obligation upon graduation.

Enlisted personnel can apply for OCS as soon as they have completed advanced individual training, while warrant officers can apply at any time. Anyone who would have 10 or more years of service by the date of commissioning is not eligible.

Students in OCS receive, at the minimum, the pay of an E5. Those in grade levels above E5 continue to receive the pay of that higher grade.

The initial step soldiers should take in applying for OCS is to contact their unit commander — the first person in the chain of command who is involved in the selection process. At this point, an evaluation is made of leadership potential and overall desire to become an officer.

After the application has been processed, a notice is sent instructing the applicant to appear before a board of officers for an interview. During the interview, current events and topics of general interest are discussed. The applicant's reactions and behavior are evaluated, as well as the quality of the responses to the questions. Shortly after the interview the applicant is told whether he or she has been accepted.

Join the Guard and go to college

The Army National Guard is offering a new scholarship program that provides ROTC scholarships to selected students who will then serve in the Army National Guard (ARNG) after graduation. The program is called the Army National Guard Reserve Forces Duty Reserve Officers Training Corps (ARNG-RFD-ROTC) Scholarship Program. Although the program will be ongoing, its success in the first year will be a major factor in determining the number of scholarships allocated to the ARNG in the future.

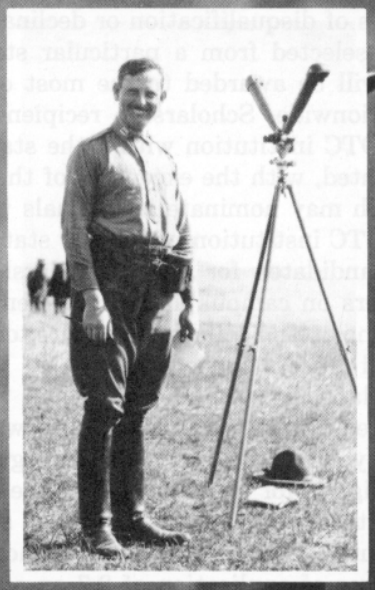
Under this program, the ARNG will award one two-year ROTC scholarship to each state, territory, and the District of Columbia. Each state may nominate a primary candidate and three alternates. If, for reasons of disqualification or declination, no candidate is selected from a particular state, the scholarship will be awarded to the most qualified alternate nationwide. Scholarship recipients must attend an ROTC institution within the state from which nominated, with the exception of the Virgin Islands, which may nominate individuals who will attend an ROTC institution in another state.

Possible candidates for these scholarships are student leaders on campus as well as members of the ARNG who attend college and desire to become commissioned officers in the Guard.

The scholarship provides tuition, related academic expenses, and a subsistence allowance for the final two years of the recipient's college career. To become eligible for the scholarship, the student must satisfactorily complete two years of a college academic course (with a minimum grade point average at time of application of 2.7 on a scale of 4.0), become qualified for entry into advanced ROTC, and successfully pass the Physical Aptitude Exam administered by the ROTC detachment.

Other factors determining eligibility are that the student be at least 17 years of age at the time of enrollment as a scholarship cadet and under 25 years of age on June 30 of the year in which eligible for appointment. Another requirement is that the scholarship recipient enlist in the ARNG for six years or have, at minimum, a remainder of four years on his or her enlistment obligation, or the individual may extend enlistment in order to qualify. Upon graduation, the cadet will serve with the ARNG in lieu of active duty.

Individuals interested in receiving an ARNG-RFD-ROTC scholarship should contact the Professor of Military Science at the ROTC institution they are attending or the State personnel officer. Winners of the 1981 scholarships were announcd in June this year.



DAN T. MOORE: Founder of the Field Artillery School

by CPT David T. Zabecki

Seventy years ago the Commandant of the School of Fire for Field Artillery welcomed the School's first class with these words:

> *This is a school of practical work; while an officer must know the theory upon which execution is based, proficiency is judged by results. In conduct of fire three points are regarded as essential: (1) proper commands given in proper sequence; (2) rapidity in determination and transmission of data; (3) rapidity in correcting data after observation. Error in commands or failure to come within a very brief time limit in handling data results in an officer being placed 'hors de combat' and relieved by another.*

In 1907 the Field and Coast Artillery split into separate branches, with the Artillery School at Fort Monroe promptly dropping all non-Coastal Artillery subjects from its curriculum. Thus, technical proficiency of artillery units in the field rapidly deteriorated.

If the United States had to fight a war with a poorly trained field artillery, the infantry would pay the price. As such, the establishment of a central school was widely supported, and its chief proponent was COL Edwin St. John Greble, assigned to the Office of the Chief of Staff, headed by MG Leonard Wood.

Fort Sill was tentatively selected as the site for the new school because of the size of the reservation and the concentration of artillery units stationed there. In November 1910, Greble had CPT Dan T. Moore sent to Fort Sill to make preliminary arrangements for establishing the school. (Moore had actually been targeted to head the school several years before and had been given a number of special assignments to prepare him for the task.) Shortly after Moore's arrival, a board of officers was appointed to develop detailed plans for the school. Moore worked as a member and recorder of the board and corresponded with Greble almost daily.

After a few minor setbacks, the group completed its work and, on 5 June 1911, War Department General Order No. 73 authorized the establishment of the School of Fire for Field Artillery at Fort Sill. A second order on 19 July designated CPT Dan T. Moore the School's Commandant.

Moore's real work then began. He set up shop in a little frame building in the southeast corner of the old post parade ground. His original staff consisted of two sergeants, to which LT Ralph McT. Pennell was soon added. (Pennell served as commandant of the School in 1944 and 1945.) Moore developed the courses of instruction, wrote and mimeographed the text material, laid out the firing ranges, and constructed a telephone system for range control. Additionally, he built a machine shop to make targets and installed a printing press to print training schedules, texts, and translations from foreign artillery journals. He also arranged student housing and messing and established the beginnings of a technical library.

His single biggest problem was trained manpower; therefore, he recruited and organized a school detachment and trained the individual specialists in their assignments. He also supervised the training of the two batteries of the 5th Field Artillery, which were to be the school troops, and held night class sessions to train the two battery commanders to serve as assistant instructors.

The original program of instruction called for four courses: a three-month course for battery officers; a one-month course for field grade officers; a three-month course for noncommissioned officers; and a one-month course for militia officers (primarily in the summer months). By the end of summer, Moore had accomplished the seemingly impossible. Everything was ready on 15 September 1911 when the school opened its doors and 14 captains and 22 noncommissioned officers reported for the first two courses. Among the captains was Henry W. Butner, who would command the School in 1936. On 15 November, three lieutenant colonels and two majors reported for the first field grade class.

Moore was born in Montgomery, AL, on 9 February 1877 to a fily with a strong military tradition. His great-great-grandfather was General Putman's adjutant during the Battle of Bunker Hill, and his great-great-uncle was Aaron Burr. His father, Irish-born Alexander Moore, was Garibaldi's cavalry commander during the wars of Italian Unification while his grandfather, Daniel Tyler, was a major general in the Civil War and a significant contributor to the early development of American Artillery.

Dan T. Moore grew up and was educated in Switzerland and Hanover, Germany. In 1898 he graduated with a Bachelor of Science degree from the prestigious Federal Polytechnical School in Zurich, two classes in front of Albert Einstein. He then returned to the United States for the Spanish-American War and was commissioned a second lieutenant in the 3d Connecticut Volunteer Infantry. He was later commissioned in the Regular Army in the 15th Infantry and saw service in Cuba from 1899 to 1901. In 1901 he transferred to the Artillery and from 1902 to 1903 was stationed in the Phillipines. In 1904 Moore attended the Artillery School at Fort Monroe and graduated with honors.

From 1904 to 1906, Moore was assigned as an Assistant to the Chief of Artillery in Washington, DC. Here he was placed on duty at the White House as a military aide to President Theodore Roosevelt, who was married to Moore's cousin, Edith Crow. (Roosevelt's other military aide at the time was CPT Douglas MacArthur.)

Roosevelt was an enthusiastic amateur athlete and boxed with Moore daily while insisting that

Moore not "pull his punches." During one of these sparring sessions, Moore hit the President so hard that he lost the sight of his right eye, but Moore did not know about this until years later.

In 1905, indirect fire was still in its infancy. Germany, in fact, was the only country with a really workable system. The War Department decided that the best way to close the gap was to get an American officer inside the German Artillery School at Juterborg. Moore's training in math and physics and his command of the German language made him the natural choice. Roosevelt was on friendly terms with the Kaiser so he wrote to him: "I have a young cousin in the American Army who wants to study in your Artillery School. Will you let him come?" No non-German had ever attended the highly classified school, but the Kaiser reluctantly agreed.

From June 1908 to October 1909 Moore was attached to a German field artillery regiment at Hanover, Germany, his childhood home. He served with several battalions of the Regiment von Scharnhorst, No. 10, an old line regiment that had seen action at Waterloo and, from October 1909 to February 1910, attended the school at Juterborg. He gave the impression of being an amiable but unenergetic American while taking in every bit of technical knowledge he could grasp. During his stay at the school, his roommate was Franz von Papen who became Chancellor Germany under the Weimar Republic and later Vice Chancellor under Hitler.

Upon Moore's return to the United States, he was assigned to the office of the Chief of Staff for nearly six months and then was dispatched to Fort Sill by Colonel Greble. Moore ran the School with an iron hand. It was performance-oriented and was among the first to set time standards for specific tasks: "Each shot short or over, each error in burst or deflection, should suggest instantly the proper correction. Fifteen seconds is regarded as enough time to get corrected data to the guns . . . ." Today's ARTEP standard for subsequent corrections is 15 seconds.

The first three classes of each of the Active Army courses graduated on 15 December 1911. More classes followed and the School staff slowly began to grow. By the end of the fall cycle in 1913 Moore felt that the school was in good shape and its continuation was a certainty so he requested reassignment. In October 1914, he was sent to New York City as an inspector-instructor of militia. After only six months in New York, he was reassigned to the General Staff of the Army War College, then located in Washington, DC.

Moore's old friend, Franz von Papen was the German Military Attaché?? in Washington, DC, in 1915 and lived with Moore and his family for a short period. An ironic twist of fate was that von Papen turned the tables on his old roommate by running a portion of the Washington-based German intelligence operation from Moore's house. Moore was furious when he found out about von Papen's activities, and von Papen was forced out of the country long before America got into the war.

Dan T. Moore and members of the Regiment von Scharnhorst No. 10.

In 1917 Moore assumed command of the 310th Field Artillery at Fort Dix. He commanded the 349th Field Artillery in France during the war and later assumed command of the 2d Field Artillery Brigade as part of the Army of Occupation in Germany.

When Moore returned from overseas in 1919, then a colonel, he resigned from the Active Army and accepted a commission as a colonel, Field Artillery, in the Officer's Reserve Corps. Up through 1935 he was active as a reservist and participated in numerous two-week active duty training periods. He was a colonel in the inactive Reserve when he died in April 1941.

Moore's son, LTC Dan T. Moore Jr., continued the dual family tradition of Artillery and Military Intelligence. A Field Artillery officer, he ran the counterintelligence operation for the Office of Strategic Services in the Middle East during World War II.

In December 1958, the US Army Artillery and Missile School honored Moore by dedicating a bronze plaque at his grave site in the National Cemetery at Fort Sam Houston, TX. In writing about the event, Moore's son-in-law, Washington columnist Drew Pearson, said of Colonel Moore, "He . . . was a little lonesome when he got out of the Army. Like many an Army officer, he didn't know what to do with himself. The Army was his life. He loved it and he didn't know how to do anything else. I write about him not merely because a plaque is being laid upon his grave, but because he was symbolic of the men and officers who make up the backbone of our fighting force—courageous, restless, sometimes hot-headed, underpaid, but dedicated to their country."

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FRAGMENTS

As editor of a professional branch journal, I have always believed that an editor's column should be used sparingly; not because there is often little to say but to allow more space for article and feature material.

At times, however, certain issues arise which, by their nature, have direct impact on our readership and subscribers and therefore must be discussed. Such is the case now as we look to 1982 and what this new year may bring.

This past August the *Journal* received correspondence from the Office of the Adjutant General, Department of the Army, directing a reduction in our estimated FY82 operating budget by nearly $16,000. A second requirement was that the magazine be shortened from 64 to 56 pages.

To comply with these directives, an extensive analysis was conducted to determine ways to reduce the *Journal's* operating costs. Areas examined included reducing the number of copies printed, limiting the use of color, and selecting a cheaper grade of paper.

The analysis concluded that, to meet DA requirements in the best interests of the *Journal*, the Field Artillery Branch, and the Field Artillery Association, our primary action would be to reduce the number of copies printed for worldwide distribution by 5,000. Reduction in number of pages, however, will be negotiated in the 1982 printing contract.

Our entire readership then will soon begin to notice the effect of these specific actions; however, the bottom line of all this may best be exemplified by the following paragraph quoted from the DA letter:

"Also, in the future, the committee (DA Periodicals Review Committee) will more closely study publications that are primarily professional journals. If the Army is directed to make additional cost reductions, we may have to discontinue such journals."

Clearly, this warning cannot be taken lightly and it is my view that all branch journals, to survive, must receive increased support from those who believe in and know the importance of our mission. Without this backing, the continued future of the *Journal, Armor, Infantry,* et al, may certainly be the subject of near term deliberations.

Subscription rates

Aside from cuts in *Journal* operating costs, another issue to be dealt with in 1982 is a need to increase the magazine's subscription rates.

Early this year, as a result of rising printing and distribution costs, the price per *Journal* copy to the US Field Artillery Association was increased by approximately 18 percent. As such, the Association began to loose money on current subscription rates.

Since no organization can continue to operate in the "red," a study was initiated to determine the best option and to allow for an anticipated across the board inflation rate of 12 percent. Subsequently, it was recommended to the President of the Association's Executive Committee that:

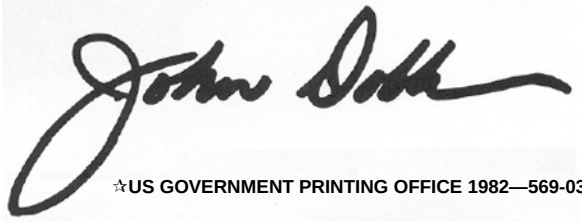
•Annual subscription rates be increased from $10 to $14.

•The Association offer an Associate membership ($5 annually) to soldiers in the grade of E5 and below. (An associate member will not receive a personal copy of the *Journal.*)

To accomplish this change, a vote of the Association's Executive Council was required and, at the time of this writing, the required number of ballots had been received to initiate the recommendations. Therefore, beginning with this issue, the above changes are in effect.

Conclusion

Looking to the near future then, with this issue begins a certain amount of "belt tightening" which will be accomplished as first order of business. As alluded to earlier, with your understanding, patience, and support, the *Journal* can continue as a top quality product serving the best interests of its entire readership. Although I'm not sure the old cliché "there is safety in numbers" applies here, perhaps our best bet for survivability is through a stronger, more active Field Artillery Association.



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THE BALLAD OF SAINT BARBARA

"They are burst asunder in the midst that eat of their own flatteries, Whose lip is curled to order as its barbered hair is curled . . . Blast of the beauty of sudden death, St. Barbara of the Batteries! That blow the new white window in the wall of all the world. ". . . While that the east held hard and hot like pincers in a forge, Came like the west wind roaring up the cannon of Saint George, Were the hunt is up and racing over steam and swamp and tarn And their batteries, black with battle, hold the bridgeheads of the Marne And cross the carnage of the Guard, by Paris in the plain, The Normans to the Bretons cried, and the Bretons cheered again . . . But he that told the tale went home to his house beside the sea And burned before Saint Barbara, the light of the windows three, Three candles for an unknown thing, never to come again, That opened like the eye of God on Paris in the plain."

(Author unknown)