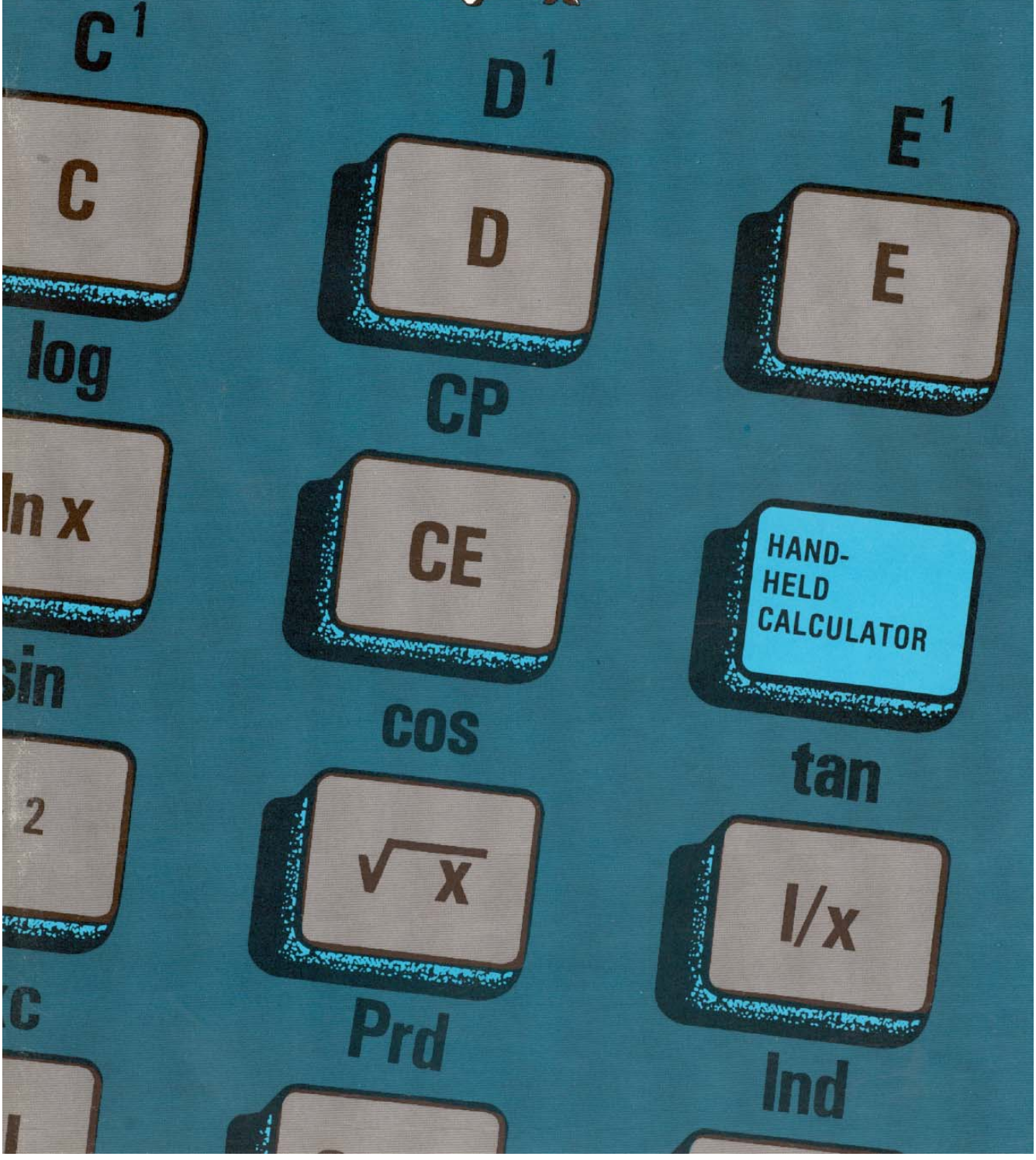
Field Artillery Journal

January-February 1980



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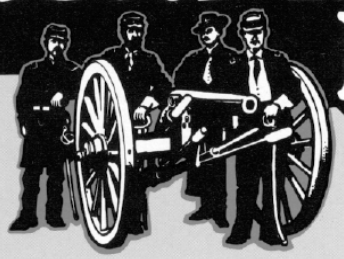


The Journal of Fire Support

Volume 48 **January-February 1980** **Number 1**

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

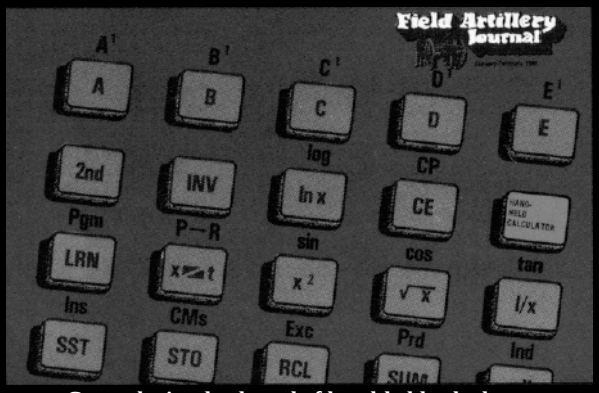
> "To publish a Journal for disseminating professional knowledge and furnishing information as to the field artillery's progress, development, and best use in campaign; to cultivate, with the other arms, a common understanding of the powers and limitations of each; to foster a feeling of interdependence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

Funds for the printing of the publication were approved by the Department of the Army, 23 February 1979.

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

All letters and articles should be addressed to Editor, *Field Artillery Journal,* P.O. Box 33131, Fort Sill, OK 73503. AUTOVON 639-5121/6806 or commercial (405) 351-5121/6806.

Subscriptions to the *Journal* may be obtained through the Field Artillery Association, Fort Sill, OK 73503. The rate is $9 per year to US and APO addresses. Canadian and Mexican addresses should add $2 for postage, and all other foreign addresses should add $3 for postage. There is a reduced rate for multi-year subscriptions. For further information write to the Field Artillery Association or call AUTOVON 639-5123/3703 or commercial (405) 355-4677.



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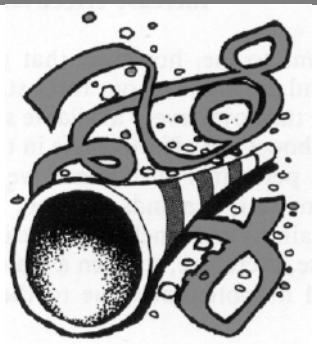
Articles

Features



Happy New Year

On the Move...

by MG Jack N. Merritt

As you all recognize, one of my charges at Fort Sill is to increase effectiveness of the field artillery to meet its potential challenges. Most of my recent columns have discussed ways we are going about this in materiel, doctrine, and training developments.

Aside from those three roads to improvement, though, there is still another way to extract higher levels of contribution from our field artillery system. It has to do with the interrelationship between our gear, our people, and the way we put both together to do our business whether in crew drill, in fire direction centers, or in fire support elements.

Standardization

I recently visited Israel with other commandants, and there had a first-hand look at the way the Israeli Defense Force operates. We learned many things, but what impressed me most were the apparent advantages they get from standardization, particularly in the field artillery.

The Israelis, in any conflict, have a clear and present reconstitution requirement, both at the outset, when large numbers of reserve personnel fill the ranks of their units, and also as the fighting continues, when they combine units who have suffered losses to form new, fully effective organizations. Obviously, in their situation, standardization not only can, but has, paid off handsomely.

I was impressed enough with their approach to ask myself what kind of similar gains we in the US artillery might make with the same, or similar, initiatives. I understand, of course, that "standardization" in our Army carries a certain amount of emotional baggage and that field commanders are not too excited about losing any prerogatives.

With this in mind you can be sure that I do not open the subject lightly.

Increase effectiveness

It seems to me, however, that given the size of the threat and the limits on our force structure and materiel, we must turn over every available stone in searching for ways to boost our effectiveness in the future. For example, the personnel turbulence we continuously experience, in itself, demands solution. Standardization simplifies training and ameliorates the impact of turbulence. I propose, therefore, to open a dialogue on standardization and its potential value to the field artillery. The Army Chief of Staff and Commanding General, Training and Doctrine Command (TRADOC), fully support and encourage these efforts.

Uniformity

Now, "standardization" can mean a variety of things. It can mean uniformity in vehicle loading, as in the positioning of ammunition on M548 ammunition carriers. It could mean similarity in operations as it would if all our division artillery tactical operations centers were to operate alike. It can mean uniformity built in a certain place in the cab, or it can concern similarity in training, where all M110A1 cannoneers are trained at Fort Sill the same way, and then exercised and evaluated in field units

according to the same plan. Finally, I expect it means a combination of the things I've mentioned.

Initiative and ingenuity

I hold that the key to standardization is first of all not to inhibit command initiative. Just as there is a great difference between freedom and license, I think there is a degree of standardization which frees commanders to concentrate on more important things. I happen to believe that captains and lieutenant colonels can find far more important outlets for their creativity than yet another—"Oh Lord" way of placing the maps and firing charts in the fire direction center or tactical operations center. It may be ego-satisfying to the officer—but it is confusing to the soldier. I think the point is that the gains to be made through standardization are not at the expense of initiative or command prerogative—I just want to get leaders expending that talent in worthwhile areas.

For example, one of the staple subjects in the *Field Artillery Journal* has concerned innovative articles by battery officers on the organization and layout of their fire direction centers. I attribute this to three factors:

• One, the interest and dedication of our young officers to doing the best possible job in the most efficient way.

• Two, the fact that M577 command post carriers are not, when issued, configured for fire direction operations.

• Three, no one in charge has ever said "quit fooling around with marginal things" and issued the Army solution.

Now, I am not going to encourage further articles on marginal changes to FDCs etc., in the *Journal*. I will inaugurate an open (but not very extended) dialogue with the field to arrive at a "School solution" for FDC and command post layouts and track and support vehicle stowage. All we need is a reasonable solution that the Army can support and we need it soon. Our time and imagination should be used to increase effectiveness through lively training and streamlined procedures.

Training

In the training arena our mission to "train as you fight" is perhaps standardization in its basic sense, and it is here that I think we have made some significant gains. Standardized crew drills, Army Training and Evaluation Programs (ARTEPs), Soldier's Manuals and "How to Train" tools published by the TRADOC should be viewed as the leading edge of our standardization efforts. Further, recent inclusion of realistic nuclear tasks in appropriate ARTEPs represents but another step forward in our effort to insure cannoneers trained in Germany, for example, can effectively function in like units throughout the world.

How we train our soldiers is equally important as what we train in offsetting today's personnel problems. Specific procedures (crew drills) outlined in our 6-series manuals are provided for one reason—to insure soldiers everywhere do it the same way, everytime. Now I understand an optimist would say we can and will solve our personnel turnover problems through astute management, and that may be true. However, I would argue that standardized crew training is now one best hedge against turbulence. It is therefore important that commanders use the tools at hand.

Conclusion

These are but a few of the many examples I could give where standardization could be used as a lever to increase effectiveness. Other areas we ought to examine might be the physical layout of battalion FDCs and the setup of fire support elements at brigade, division, and corps. Standard vehicle loading and product improvements to current equipment come to mind, as do other well-thought-out crew procedures. Another possibility might be simply to buttress the standardization that already exists.

The Field Artillery needs to move quickly forward toward standardization, and I need and want to hear from all of you in the field. What I ask are comments and suggestions on these subjects:

• Areas in the FA system which can be standardized to increase efficiency and effectiveness without eroding the exercise of initiative.

• Areas where effective standardized procedures are now in existence, but perhaps are now being practiced for whatever reason.

• Equipment standardization which, through product improvement programs, would add to the effectiveness of our operations.

• Comments about past efforts to improve performance through standardization, and insights on why those efforts succeeded or failed.

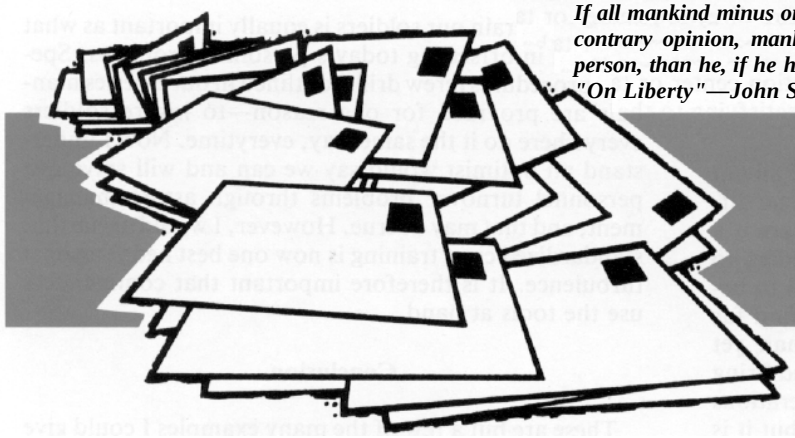
The Director or Evaluation at the School, COL Roland B. Rogers, will be my clearing house for your comments. His address is:

Commandant
USAFAS
ATSF-AE (Standardization)
Fort Sill, OK 73503
AUTOVON: 639-4190

Additionally, the *Journal* will publish valid ideas, as received, along with new approaches from the School to insure that the FA community is kept fully abreast of the proceedings.

I am pointing to bring this dialogue to fruition at the earliest opportunity when together we can set the best course.

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

Are we prepared?

Here we go again—fighting the last war!

The Soviet Union, in doctrine, training, and equipment, is ready for the next war—the nuclear war.

The US thinks of nuclear weapons as retaliatory or as a means to demonstrate political will. Our service schools teach conventional tactics, our field units train for conventional war, and we are so equipped.

This present state of affairs is clearly brought out in two excellent articles in the September-October 1979 *FA Journal*: "Theatre Nuclear Weapons" on page 20 and "The Soviet Theater Nuclear Offensive" on page 24.

History seems to be repeating itself. In World War I, our field artillery was so antiquated that the French found it necessary to retrain as well as reequip our units before certifying them for combat. Believe it or not, such simple procedures as indirect fire missions and meteorological data had not been part of our technique. World War II gave us time to be fairly well prepared. Even then, the incorporation of armored and airborne units resulted from the efforts of a progressive group against much opposition.

As late as the famous Louisiana Maneuvers when Nazi armor was racing across France, our (then) Chief of Infantry was heard to say: "Good French infantry would have stopped all that," and he represented a lot of our seniors' thinking.

"The strategic and tactical missile forces are the basis of the firepower of the land forces for defeating its enemy." This prophetic Russian quote should be our doctrine. These necessary forces can only be *field artillery* units. The present artillery concept of a conventional war fought at division level must be abandoned.

A reconstituted corps artillery headquarters commanded by a major general will be required. The div arty effort will require a brigadier general to command the expanded missile forces. Our conventional-minded senior commanders must be replaced. "We have the necessary talent within our ranks" writes CPT Scott R. McMichael.

Kudos to our new editor, MAJ John Dobbs, for this tremendous start to new thinking. It is hoped there'll be a flow of similar articles—all bearing on doctrine, training, and equipment for the nuclear war.

R. P. Shugg
BG (Ret), USA
Oakland, CA

Another Fort Knox

Although it has been 20 years since I was an artilleryman, I still read the *Journal* when I have a chance. The article on Henry Knox in the September-October 1979 issue was particularly interesting because I have always admired him and I see that we share the same birthday—mine 184 years later. I would like to add that there is another Fort Knox near Rockland, Maine. It is not well known because it is not on a very heavily traveled highway, but it is a beautiful, well kept solid granite masterpiece of military engineering. Of course, there are many beautiful sites to see in Maine, my home, but unfortunately there is not one big attraction for people to visit. Come to think of it, I kinda like it that way. Aiyuh.

John W. Kelley Jr.
LTC, GS(CM)
DCSOPS
Sixth US Army
Presidio of San Francisco, CA

Wrong capital

This note is to point out an error in the article concerning Samuel Ringgold by COL (Ret) R. M. Stegmaier.

Baltimore is not and never was the capital of Maryland; Annapolis is now and was in 1846.

Patrick J. Kelly Jr.
Bethesda, MD

You're right, and thank you for pointing out the mistake. Baltimore may not be the capital, but it did have a pretty fair baseball team. (Wonder what that has to do with Ringgold?)—Ed.

Help!

The 260th Field Artillery Detachment, a small unit providing artillery support to the Army Aviation School at Fort Rucker, is seeking information for its unit history. The unit was activated on 3 June 1968 at Fort Sill, was later deployed to Vietnam, and was inactivated on 1 March 1970. Our current unit history file covers only the period from reorganization at Fort Rucker in 1972 to the present.

We are seeking information regarding the first two years of the unit's existence. If anyone has knowledge of insignia, war stories, photographs, or any information about the unit, please contact 260th FA Detachment, 1st Battalion, 1st Aviation Brigade, Fort Rucker, AL 36362 (telephone: AV 558-2019/3581).

Frank G. Green
CPT, FA
260th FA Det
1st Bn, 1st Avn Bde
Fort Rucker, AL

Please let us (THE JOURNAL) know also.—Ed.

Mini-artillery direct fire/indirect fire range for the M110A1

Field Artillery sections must be able to shoot quickly and accurately which requires considerable practice. Currently most firing batteries must substitute dry firing for live firing exercises.

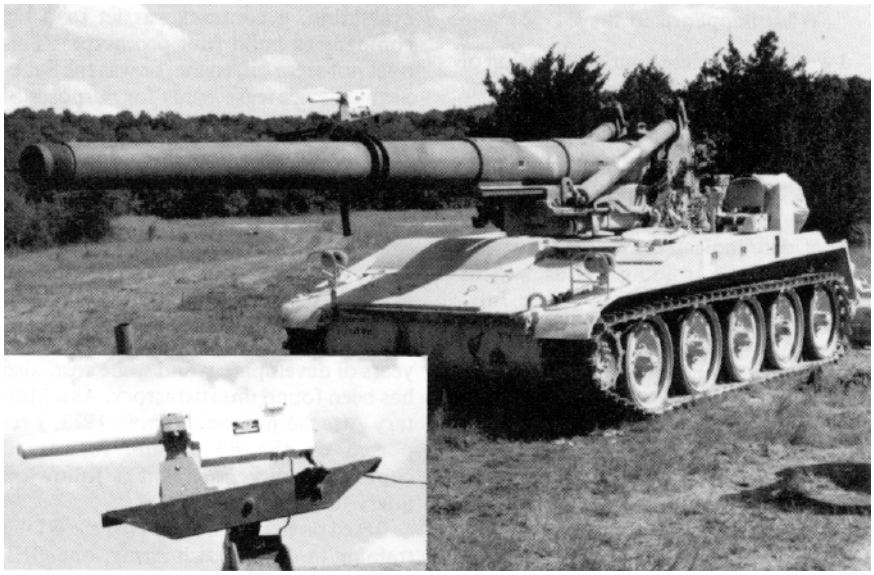
Armor units have overcome this problem by teaching tank crews on locally constructed mini-tank ranges, a capability which can now be afforded the field artillery. Such ranges provide close-in live direct fire capability and create effects which approach realistic battlefield conditions. For example while the weapon system is stationary, the crew has a complete view of various battlefield conditions; e.g., hilly terrain, built-up areas, wooded areas, etc. Also included are miniature buildings, vegetation, and vehicles on a scaled battlefield.

Since the mini-direct fire range is a close-in training facility, units need not move an appreciable distance nor is it necessary to schedule the range far in advance.

The range has stationary, moving, and pop-up targets and is equipped with adjustable floodlights which can be used to simulate both sunlight and illumination. This allows sections to be trained in both daylight and night direct fire procedures. The system utilizes .22 caliber long rifle shells; therefore, the problem of obtaining high explosive ammunition is eliminated. One of the greatest advantages is that an entire section can be trained, since hundreds of rounds can be fired daily.

The only special adaptation required for artillery howitzers is a ring-shaped mount (can be locally fabricated) that slips over and secures the subcaliber device to the tube. The rear of the howitzer must be elevated since 35 mils is the minimum quadrant for the M110A1 self-propelled 8-inch howitzer. The tracks of the howitzer can be backed over 2 1/2-ton truck tire rims until the rear howitzer road wheel is centered, allowing the howitzer tube to be sufficiently depressed. After the .22 caliber device is attached to the mount on the gunner's side of the howitzer, parallax shields should be installed in both the gunner's and assistant gunner's sights. Once this is accomplished the gunner must adjust his pantel slightly toward the end of the tube so the bullet may be observed. A mini-tank range boresighting target is placed at approximately 1,600 meters on the scaled range, and the pantel is adjusted until the reticle pattern of the sight and the strike of the bullet coincide.

Once the boresighting procedures have been completed targets are positioned on



the range at 400, 800, 1,000, 1,200, 1,400 and 1,600 meters. During firing, if the .22-caliber bullet does not strike both the 400 and 1,600 meter targets, check to insure that the targets are at the proper ranges; if not, perform the boresighting procedures again. When the bullets are properly striking the closest and farthest targets, the mini-range is ready for unit training.

Another excellent training device is the artillery indirect fire simulator which can be collocated with the artillery mini-direct fire range. The simulator area consists of two cement paths the width of the howitzer's track. At the forward end of these runners is a horizontal metal pipe against which the howitzer is positioned; 18 inches in front of the howitzer tube is a fixed target board which is 20 feet high and 10 feet wide. Affixed to this board are preprinted sheets with numbered targets of various sizes, depending on the simulated range of the target. For example, at a simulated range of 8,000 meters, the target is oblong in shape—four mils vertical radius; at a simulated range of 12,000 meters, the target is more circular in shape—four mils vertical radius by three mils horizontal radius.

The subcaliber device is a .22 caliber barrel which is mounted in the M31 field artillery trainer in-bore mount. A special aluminum sleeve must be fabricated which securely positions the subcaliber device in the mount. In addition to the .22 caliber in-bore device, an M55 laser can be mounted on the outside of the tube. Two special ring mounts must be constructed to attach the laser to the howitzer. Either the subcaliber device or the laser may be used for the training exercise or both systems simultaneously.

The howitzer is boresighted, utilizing both the .22 caliber device and the laser, which consists of aligning the .22 subcaliber device and the laser with the predetermined quadrant and deflection of the boresighting target. This procedure takes approximately 25 minutes and once completed the facility is ready to be used.

The principal advantage of this facility is that an entire section can be cross-trained, firing either the subcaliber device or the laser in positions as gunner, assistant gunner, or section chief. Hundreds of rounds may be fired at relatively little cost, thereby insuring a better trained section.

Greg R. Pepin
CPT, FA
IOAC 4-79
13th Co, 1st TSB
Fort Benning, GA

*Thank you for your comments and support of the **Journal.** Improved direct fire training for our cannoneers is currently being addressed at the School by the Dictorate of Training Developments. An Artillery Direct Fire Trainer (ADFT) has already been fielded for most field artillery cannon systems and is currently being adapted for use with the 8-inch howitzer. A .22 caliber weapon such as you suggest for direct fire training, though inexpensive, has a drawback in that it would require a considerable safety area and backstop since the .22 caliber round can carry more than a mile.*

The indirect fire trainer (M31) now in service can be used in the firing battery simultaneously with the ADFT (the M31 providing training on the miniature range and the ADFT used to the flank for direct fire).—Ed.

Incoming

What happened to the BT-33?

I would appreciate your explanation of the status of an observed fire training (OFT) device for US artillery forward observers. In the November-December 1976 *FA Journal*, a leased Swedish BT-33 device (Saab-Scania) was reported as undergoing satisfactory evaluation. Results to that date indicated that students who received BT-33 training did as well as those trained with live fire. In the July-August 1977 issue, it was reported that operational tests were being conducted by the Field Artillery Board to assess the effectiveness of a *US version* of an OFT as a supplement to, or replacement for, conventional training for forward observers. The major difference between the BT-33 and the US version was a requirement that the OFT be portable and setup time be 30 minutes or less.

The July-August 1978 issue noted that the Board was continuing its evaluation of four US prototype OFTs and that a development contract had been let in *April 1975* (prior to the first *FA Journal* article on the BT-33) for the US version of the BT-33. In the March-April 1979 *FA Journal*, however, it was reported that the US OFT was not recommended for production due to "poor reliability and maintainability." US Army Field Artillery School (USAFAS) representatives were now reported going to England to observe two British-developed indirect fire trainers—"Master Gunner" built by Marconi Space and Defense Systems and a trainer built by Invertron Simulated Systems. According to your latest article, USAFAS is planning to lease both devices and bring them to Fort Sill for a formal evaluation.

I find it more than a little suspicious that, four years after receipt of the BT-33, USAFAS is essentially where it was in 1975 with respect to an OFT device. Some questions:

• First, what were the results of the BT-33 evaluation and why were they not reported in the *FA Journal*? It should be pointed out here that the BT-33 was *in use* in 1975 for training artillery observers in every artillery and infantry regiment in the Swedish Army. In addition, they had been purchased for use by the military forces of Denmark, West Germany, Norway, Great Britain, and Yugoslavia. Surely, these countries found them satisfactory.

• Second, the BT-33 was leased from Saab-Scania prior to April 1976 when I visited Knox Hall and discussed it with a USAFAS project officer there. Yet, while USAFAS was just beginning its evaluation, a contract was let to a US company to build four prototypes. This does not seem fair to me, or was the Saab-Scania device leased only for purposes of taking it apart so a US duplicate could be made.

• Third, the requirement for portability and a 30-minute setup seems like a poor excuse to discount the inexpensive, already in-production model BT-33. None of the other countries listed above needed a portable version. And as it turned out, our US version, after four years of development and some cost, also has been found unsatisfactory. As a Military Attaché in Stockholm in 1973, I reported on the BT-33 and forwarded copies of my report and a follow-on query to Fort Sill.

Based on my observations of the BT-33 training in the Swedish Army, one OFT could be issued to each US div arty. In such a case, only one classroom per div arty would be dedicated to regular forward observer training on the OFT. This would be more efficient and cost effective and negate the need for frequent setup and takedown and portability. In addition, operator training could be centralized at div arty headquarters with each battalion scheduling use of the OFT classroom. Since the OFT can be used in any weather, day or night, year-round, it is ideal for basic OFT as well as inclement weather training. I can guarantee that possession of a BT-33 at Fort Sill as well as at the Grafenwoehr and St. Barbara ranges plus one per US div arty (both Active and Reserve Army and Marine units) would be one of the best investments we ever made in maintaining and improving forward observer proficiency. It is a shame that hundreds of Basic Course artillerymen and thousands of cannon-cockers around the world have been denied use of the BT-33 these past four years because of the lack of fortitude and funding to lease or purchase 15 or 20 BT-33 trainers from Saab.

I look forward to your explanation of this curious chain of events.

William E. Serchak
COL, FA
US Dept of Energy
Washington, DC

The US Army has been searching for an observed fire trainer (OFT) since a concept and need for one were developed in a study conducted at Ohio State University in 1956. In the 1960s the concept was explored in more detail, and a prototype was developed by a private contractor and evaluated by USAFAS. This project was later cancelled because of maintenance difficulties with the device. In 1972 the requirements document for an OFT was revised and funds were approved for concept development. In 1973 a contract was awarded with an expected delivery date for the first prototype in FY 75.

In 1976 a decision was made to lease a BT-33 for USAFAS evaluation. (It was later purchased for use at USAFAS.) The primary purpose of this evaluation was to obtain a training effectiveness data base to support the requirements for an OFT-type device. There could have been a "buy American" trend during this time frame, but this is not documented in the OFT files. The evaluation of the BT-33 revealed some significant maintenance problems; in fact the device used at Fort Sill has been unusable due to maintenance problems more often than it has been available for training.

The US OFT was tested in 1977 and 1978 at USAFAS, with OT II being completed in September 1978. The device failed the test because it couldn't meet maintainability requirements; thus, production of the US OFT was not recommended.

At this point, a decision had to be made: buy the BT-33, with 10-year old technology, or look at more advanced type OFTs now available? Two British devices, Marconi's Master Gunner and Invertron's Artillery Fire Control Training Simulator, were examined and found to have more potential than the first generation BT-33.

The British Royal School of Artillery tested both of the British devices and decided to buy the one manufactured by Invertron. USAFAS has arranged to lease both devices for further evaluation at Fort Sill. The Field Artillery Board will conduct this test during February and March 1980. If the results are favorable, procurement of one of the devices will be recommended. The basis of issue for the OFT is planned as two per division artillery.

The portability requirement for the device has been dropped because the current state of the art doesn't give us this option without exorbitant cost. USAREUR recently purchased four BT-33s and is using them for training at various locations throughout Europe.—Ed.

Reunion

The 189th and 202d Field Artillery Battalions will hold a reunion 18-20 April 1980 in Oklahoma City, OK. Contact Robert (Moose) Harrison, 1519 Kinkaid Drive, Oklahoma City, OK 73119; phone 405-632-4906.

Can you beat this?

The 2d Battalion, 42d Field Artillery (Lance), recently completed its Annual Service Practice (ASP) at the NATO Allied Missile Firing Installation (NAMFI), Crete. The evaluation team, consisting of European and American Lance members, conducted it's evaluation of the three battalion firing batteries during the period 6-22 August 1979. The battalion performed creditably and I believe the scoring results to be worthy of publication in the *Journal*. (A firing element consists of an assembly and transport (A&T) section and a firing platoon or launcher section.)

Battery A score:	
1st Firing Element score:	99.5
2d Firing Element score:	98.8
(2d Firing Platoon - 100%)	
Battery B score	
1st Firing Element score:	97.8
2d Firing Element score:	98.0
(1st Firing Platoon - 100%)	
Battery C score:	
1st Firing Element score:	99.1
2d Firing Element score:	95.7
(1st Firing Platoon - 100%)	
Battalion overall score:	98.1
Firing platoons:	99.3
A&T platoons:	95.9

The evaluation is conducted over a three-day period. The highest scoring firing element, consisting of one launcher platoon and one assembly and transport section, is awarded the honor of firing the battery's live missile. The competition is keen as is evidenced by the listed scores. The evaluation itself covers all aspects of operator's maintenance on the Lance system equipment, assembly and transport operations, system checkout of the missile round, and firing operations.

To the best of our knowledge, we were the first US Lance unit to achieve a score of 100 percent during an ASP evaluation. We are extremely proud to have had one firing platoon (launcher section) in *each battery* achieve this distinction.

As one of the signs placed in a local tavern in Crete states:

YOU MAY EQUAL OUR SCORE,
BUT
YOU CAN'T BEAT IT! "WE WERE FIRST!!!"

John D. Spengler
MAJ, Field Artillery
Operations Officer

How about it missileers—is the sign correct?—Ed.

Doctrinal domain

In MAJ Bohdan Prehar's article, "Artillery Scatterable Mines" (September-October 1979 *Journal*), he alluded to the fact the artillery has crossed into the doctrinal domain of the engineers in the employment of such a weapon. Not only is this the case with scatterable mines, but the use of Copperhead (CLGP) and follow-on precision guided munitions provide the artillery with a capability to engage moving armor targets—a doctrinal domain under the auspices of the Armor. These, along with future developments, establish the fact that to improve force effectiveness, the crossing of "doctrinal domain" must be accomplished and that we in Army should not let parochial interest of winning a battle outweigh those of winning the war.

Charles R. Stephens
CPT, FA
Ch, Test Mgt Ofc

Nuclear warfare

Congratulations for publishing the two excellent articles by Jeffrey Record and CPT Scott McMichael in your September-October 1979 issue. More attention needs to be paid to both tactical nuclear warfare and surprise attack. These are indeed the backbone of Soviet theater doctrine. Mr. Record's description of our peacetime deployment as the greatest temptation to preemption since Pearl Harbor is no exaggeration. In my opinion, we are so vulunerable to a surprise attack that the Soviet Union will soon be able to launch one with purely conventional (that is nonnuclear) means initially, reserving the nuclear weapons for use at first sign that NATO might be able to get some of its nuclear weapons into action. The Soviet military commentators frequently note that surprise can provide such a great advantage as to allow an attacker to defeat a much larger defender, rather than himself have to achieve a three to one or greater force advantage in order to attack successfully. Yet our facile assumptions that a full-scale mobilization would be necessary on the part of the Warsaw Pact are based on the idea that the attacker must achieve such a large force superiority. In point of fact there is now in peacetime no FEBA to be breached by nuclear weapons unless one considers the troops in the barracks as the potential of a FEBA. And our nuclear storage sites can just as easily be attacked by diversionary units as struck by nuclear missiles.

On the other hand, the Israelis were able to use a minimum of prepared fortifications to such great effect that a very small defending force was able to stop an attack delivered with both considerable surprise and overwhelming force ratios.

The frantic reaction of the Soviet leadership to the possible deployment of cruise missiles and other potentially non-surpriseable weapons that can reach the Soviet homeland is a clear indication that Mr. Record is correct in his assessment of their importance. Mr. Brezhnev has even gone so far as to announce a withdrawal of Soviet tanks in an effort to preclude our deployment of cruise missiles.

Thus, I would recommend that NATO institute a double barreled improvement program; one barrel would be deployment of theater based nuclear weapons capable of hitting the USSR and the other barrel would be creation of a system of prepared fortifications to prevent a surprise attack from overrunning the defenders before they can deploy.

John Sloan
LTC (Ret)
Springfield, VA

Correction

I appreciate your publishing my letter in the November-December *FA Journal*. Congratulations on another superb issue.

I made one typographical error in the submission of my data concerning "most rounds fired in Europe in WWII." Total rounds fired by the 175th Field Artillery should have been 315,676; however, this does not affect the claim nor the total figure as computed.

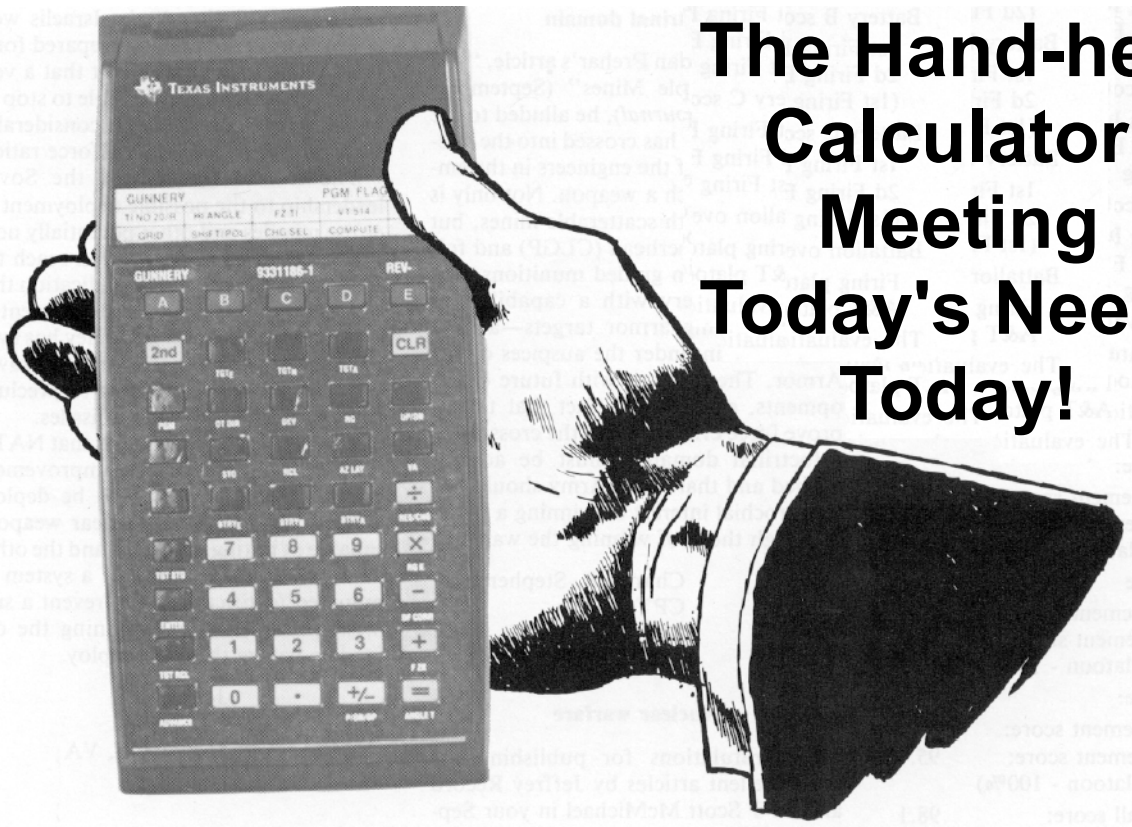
David W. Larson
MAJ, FA, MNARNG

Thank you for the correction and kind words concerning the ***Journal****.*—Ed.

Reunion

The 204th Field Artillery Battalion of World War II will have a reunion 18-20 April 1980 at the Bahia Motor Hotel, 998 W. Mission Bay Dr., San Diego, CA 92109. For more information write Robert H. Cronin, 28672 Sunset Rd., Valley Center, CA 92082.

The Hand-held Calculator: Meeting Today's Needs Today!



by CPT Henry W. Stratman, SFC Shelton Alsup, SFC Dave Dunsmore, Mr. Max Conerly, and Mr. Lonnie R. Minton

***T**imely* utilization of commercial technology has been the elusive goal of materiel developers since the advent of the catapult. At last, a precedent is set! OFF-THE-SHELF, HAND-HELD CALCULATOR (HHC) technology is now available which will enhance and expand Active, Reserve, and National Guard cannon and Lance fire direction capabilities, survey computations, and sound/flash computations.

Background

Extensive evaluations of the hand-held calculator's potential with magnetic card programs were conducted by US Army Field Artillery School (USAFAS) and the US Army Field Artillery Board in 1977. The results were encouraging, but the fragile nature of the magnetic cards and the unpredictable reliability of the card reader limited the HHC's field application. At the same time, however, the computer industry had introduced programmable modules with sufficient memory capacity for comprehensive applications without reliance on magnetic cards.

Thus, in 1978 USAFAS wrote a Letter Requirement incorporating the module concept while subsequent procurement actions were initiated through US Army Training and Doctrine Command (TRADOC). A prototype module containing several programs was produced by USAFAS for concept evaluation and accuracy testing by TRADOC Combined Arms Test Agency (TCATA). Additionally, the Human Engineering Laboratory (HEL) funded an Advanced Concept Proposal Evaluation conducted by the 8th Infantry Division in Europe, using the prototype module during their winter training period at Grafenwoehr. The final results supported the HHC's fire direction potential.

The HHC's developmental program received additional momentum when US Army Armament Materiel Readiness Command indicated that the capability to logistically support FADAC in the 1980s would be doubtful. Should our ability to support FADAC fail before the Battery Computer System (BCS) is available, the Field Artillery battery would be forced to rely strictly on a manual fire direction system. To preclude this undesirable possibility, USAFAS initiated an expedited development/procurement program with the Gunnery, Weapons, and Counterfire Departments and the Directorate of Combat Developments assuming responsibility for software programming.

General information

The HHC is a commercially available Texas Instruments Model 59 (TI-59) calculator incorporating a preprogrammed memory module. It is powered by an internal, rechargeable battery pack. Chargers and adapters for external power sources (AN/PRC-77 radio battery (BA 4386) and 12-volt vehicle battery) are provided to extend the battery pack's life and prolong operation time. The calculator's keyboard allows data entry, control of calculator functions, and provides numeric display to 10 digits.

The HHC will be fielded as a component of the following two computer sets (figure 1):

1) Computer Set, Field Artillery, Missile (LIN Z 17227) NSN 1220-01-082-1647.

2) Computer Set, Field Artillery, General (LIN Z 17226) NSN 1220-01-082-1646.

Note: *The only difference in the two sets is that the Computer Set, Field Artillery, Missile, comes with a printer.*

In addition to the computer sets, program kits have been developed for use with the HHC which consist of firmware modules preprogrammed to accomplish functions explained later in this article. The program kits contain instructions on the use of the computer sets with the modules. The basis of issue is shown in figure 2.

Item name	NSN	Part No.	Cost
Computer Set, FA, General	1220-01-082-1646	11784958	$273.89
Computer Set FA, Missile	1220-01-082-1647	11784959	410.00
Program Kit, Computer Set, FA M101A1/M102	1220-01-082-1624	9331239	45.60
Program Kit, Computer Set, FA M114A1	1220-01-082-1625	9331241	45.60
Program Kit, Computer Set, FA M114A2/M109	1220-01-082-1623	9331240	45.60
Program Kit, Computer Set, FA M109A1	1220-01-082-1617	9331237	45.60
Program Kit, Computer Set, FA M110A2	1220-01-082-1618	9331238	45.60
Program Kit, Computer Set, FA Special Situation	1220-01-082-1628	9331245	45.60
Program Kit, Computer Set, FA Lance	1220-01-082-1619	9331244	45.60
Program Kit, Computer Set, FA Sound/Flash	1220-01-082-1627	9331243	45.60
Program Kit, Computer Set, FA Survey	1220-01-082-1620	9331242	45.60

Figure 1. Supply nomenclature.

		Type of set
a.	**Cannon units:**	
	1) Two per battery fire direction center	General
	2) Three per battalion fire direction center	General
	3) Two per survey party	General
b.	**Lance units:**	
	1) Four per battery fire direction center	One Missile & three General
	2) Six per battalion fire direction center	One Missile & five General
	3) Two per survey party	General
	4) Two per survey information center	Missile
c.	**Target acquisition units:**	
	1) Two per sound/flash platoon	General
	2) Two per survey party	General
	3) Two per survey information center	Missile
d.	**Headquarters and headquarters battery (HHB), division artillery:**	
	1) Two per survey party	General
	2) Two per survey information center	Missile
e.	**Pershing:** Two per survey party	General
f.	**HHB, corps artillery:** Two per survey information center	Missile
g.	**HHB, Pershing:** Two per survey information center	Missile

Figure 2. Basis of issue.

The unit's Army Stock Fund budget must be used to procure the computer set and program kits. Requisition authority for the purchase of computer sets will be made available to the units. For those organizations that have already purchased TI-59 calculators, significant savings can be made by requisitioning the following:

- Required program kits.
- External power source connectors.
- Connector, plug, electrical (NSN 5935-01-082 - 1638, Part No. 9331190).
- Cable assembly, special purpose, electrical (NSN 1220-01-082-1637, Part No. 9331189).

The required technical manual, TM 9-1220-242-12P&HR, should also be requisitioned.

Funded requisitions should be forwarded to:

HQ, ARRCOM (B14)
ATTN: DRSAR-MMH-L
Rock Island, IL 61299

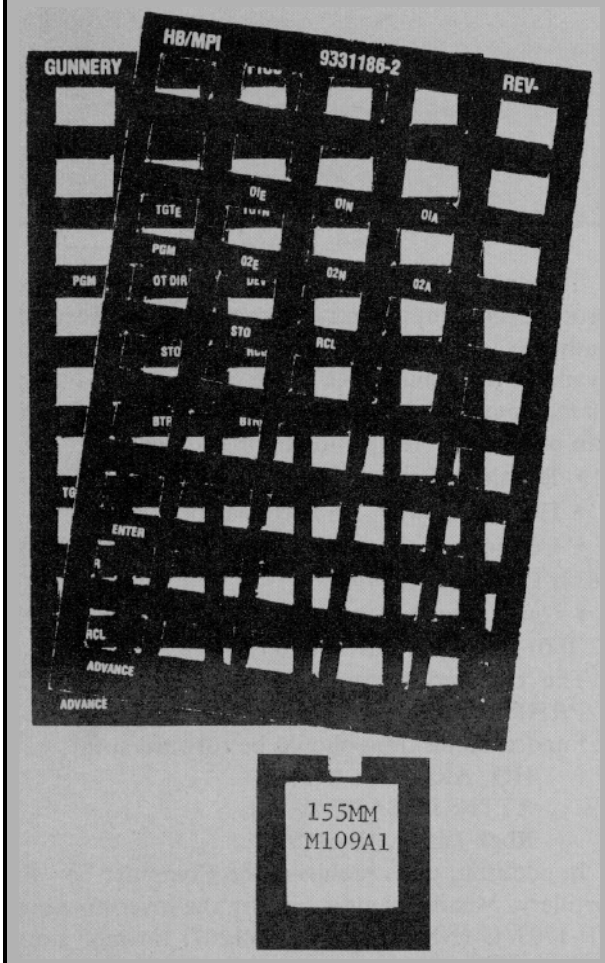
In addition, units requiring the Computer Set, Field Artillery, Missile, should procure the inverter/vibrator PP-1703/U (NSN 6130-00-889-1207) through normal procedures.

The remainder of this article will introduce the four major HHC applications:

- Cannon gunnery.
- Sound and flash.
- Survey.
- Lance gunnery.

9331183-2 REV-			GUNNERY MODULE	
HIGH BURST/MPI			PGM FLAG NO. 04	
				SET UP
ORIENT △	△ DATA	MBL		

9331183-1 REV-			GUNNERY MODULE	
GUNNERY			PGM FLAG NO. 02	
TI NO 20/R	HI ANGLE	FZ TI	VT 514	VT 732
GRID	SHIFT/POL	CHG SEL	COMPUTE	EOM



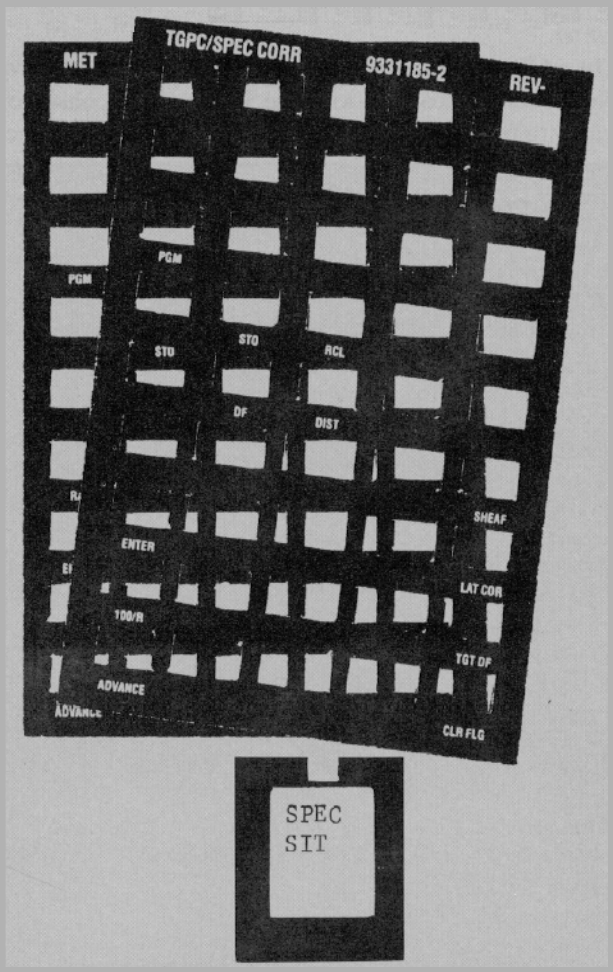
Program Kit,
Computer Set, FA, General
M109A1

9331184-1 REV-			SPECIAL SITUATION	
CONCURRENT MET			PGM FLAG NO. 08	
VE INPUT	PSN VE	TI INPUT	PSN TI	SET UP
REG DATA	BTRY DATA	MET DATA	DF DATA	PSN DF

9331184-2 REV-			SPECIAL SITUATION	
SUBSEQUENT MET			PGM FLAG NO. 09	
RG INPUT	TOTAL RG	FZ INPUT	TOTAL FZ	SET UP
PSN CONST	BTRY DATA	MET DATA	DF INPUT	TOTAL DF

9331275-1 REV-			SPECIAL SITUATION	
TGPC/SPECIAL CORR			PGM FLAG NO. 07	
WPNS	WPN 6		AC #2	SET UP
LOC. B. P.	WPN 1	WPN 2	WPN 3	WPN 4

9331275-2 REV-			SPECIAL SITUATION	
INTERPOLATION			PGM FLAG NO. 10	
VALUE ~ 1	COMPUTE 2	VALUE ~ 3		SET UP
BASE #1	BASE #2	BASE #3		



Program Kit,
Computer Set, FA, General
Special Situation

Figure 3. Program Kits.

Cannon artillery applications

The cannon artillery hand-held calculator set supplements the existing FADAC/manual fire direction system by providing programs which parallel, simplify, and expedite manual gunnery computations. During degraded modes of operation—FADAC inoperable/unavailable, lone gun operations, hip shoots, etc.—the calculator can provide timely firing data. The HHC is not a replacement for FADAC, but an integrated computer manual system which simplifies and speeds TODAY's fire direction computations.

The gunnery solution computed by the calculator is a tabular firing table (TFT) standard condition solution. The Ballistics Research Laboratory, Aberdeen Proving Grounds, MD, produced the curve-fit equations using second degree polynomials, fit to TFT data by the least squares method. The curve-fit solution is an approximation which normally agrees with the TFT solution but may vary as much as ± 3 mils in elevation, ± 1 mil drift, and ± 0.1 second fuze setting. Although the calculator's solution is not as technically correct as the ballistic solution provided by FADAC, TACFIRE, or BCS, it is more accurate than the manual solution. Unlike FADAC, the HHC cannot automatically compensate for nonstandard conditions. Registration corrections in the form of Range K, Fuze K, and deflection corrections are applied in a manner similar to the way a GFT setting is applied to a graphical firing table.

Both low and high angle firing data for high explosive (HE) self-registering mode dual-purpose improved conventional munitions (DPICM) and rocket assisted projectile (RAP) families can be provided by the HHC. Firing data solutions for antipersonnel improved conventional munitions (APICM) and field artillery scatterable mine (FASCAM) projectiles are provided by manually applying TFT addendum corrections or GFT scale conversions to the base projectile solution. The programmed charge capabilities vary with different weapon systems. In general, eight charges are available: four green bag and four white bag.

Computer Set, Field Artillery, General, is used for cannon gunnery computations. Two program kits in addition to the computer set are required to accomplish all Field Artillery gunnery applications. (The program kits and computer sets must be requisitioned as separate items.)

The weapon system program kit (module) provides the firing data solutions and the high burst (HB)/mean point of impact (MPI) registration application and are available for the M101A1/M102, M114A2/M109, M114A1, M109A1, and M110A2 weapon systems (figure 1). The M198 weapon system program kit will be produced when fire control information is available. In the interim, the M109A1 program kit can be used for the M198 system, provided that registration corrections are applied.

The special situation program kit is common to all weapon systems. It contains less frequently used, but important, applications. Its program features include:

- Concurrent and subsequent meteorological (met) mathematics.
- Terrain gun position corrections/special corrections.
- M549A1 rocket assisted projectile gunnery (M114A2/M109/M109A1 *only*).
- 14.5-mm M31 Trainer.
- Joint munitions effectiveness manual/surface to surface (JMEM/SS).
- Linear interpolation.

Reversible keyboard overlays and cue cards (figure 3) are provided as component parts of each program kit to facilitate man-machine interface, simplify training, and enhance retention of operator skills. Additionally, the software is designed to provide displays for several common operator errors.

Because of the HHC's limited capabilities, it cannot replace FADAC, but it can contribute substantially to the effectiveness and versatility of the battery fire direction center.

Any questions regarding the cannon gunnery application should be addressed to the Commandant, USAFAS, ATTN: ATSF-G-RA, Fort Sill, OK 73503 or call AUTOVON 639-5769/3901.

Sound/flash application

The Computer Set, Field Artillery, General, with Program Kit, Computer Set, Field Artillery, Sound/Flash (figure 1) is issued to each sound/flash ranging platoon as a supplement to the FADAC. This computer set may be used in situations where manual processing of data is normally required. It will not however currently replace the manual M53 Sound Plotting Set since, at times, plots must be made to assist the record reader. There are six available programs on the sound/flash module:

- Program 01—Enter/recall coordinates of sound ranging microphones and flash ranging observation posts (OPs).
- Program 02—Sound ranging location and adjustment.
- Program 03—Flash ranging location, adjustment, and looking azimuth.
- Program 04—Target location, adjustment, and looking azimuth (with laser rangefinder).
- Program 05—Location of OP by trilateration.
- Program 06—Visual met.

The sound/flash module is labeled externally with the words "sound/flash." This set can be further identified by its internal identification by pressing 2nd Pgm

01 E. The figure 1.000000017 will appear in the display. If a different number appears, the module should be exchanged for another sound/flash module.

The sound/flash module is a part of the sound/flash program kit. The program kit also contains instructions on the use of the sound/flash module in conjunction with the computer set.

Any questions regarding the sound/flash application should be addressed to the Commandant, USAFAS, ATTN: ATSF-CF-R, Fort Sill, OK 73503 or call AUTOVON 639-5979/4787.

Survey applications

Artillery survey sections will be able to replace the SR-56 HHC with the Computer Set, Field Artillery, General (figure 1) as early as January 1980. The set will consist of the TI-59 HHC, a preprogrammed module, a user's manual, two types of power adapters, magnetic cards, and a USAFAS prepared handout consisting of survey unique user data and one copy each of 13 new forms.

Program 01—AZIMUTH AND DISTANCE FROM COORDINATES.
02—TRAVERSE, SLOPE DISTANCE, SUBTENSE, TRIG TRAVERSE.
03—TRIANGULATION AND TRILATERATION.
04—THREE POINT RESECTION.
05—AZIMUTH BY ALTITUDE METHOD, SUN OR STAR.
06—AZIMUTH BY HOUR ANGLE METHOD, SUN OR STAR.
07—AZIMUTH BY POLARIS TABULAR METHOD.
08—CONVERGENCE ASTRONOMIC OR GYROSCOPIC AZIMUTH TO UTM GRID AZIMUTH.
09—CONVERSION GEOGRAPHIC COORDINATES TO UTM COORDINATES.
10—CONVERSION UTM COORDINATES TO GEOGRAPHIC COORDINATES.
11—ZONE TO ZONE TRANSFORMATION—UTM GRID COORDINATES AND AZIMUTH.
12—SPHEROID CONSTANTS.
13—COORDINATE AND AZIMUTH CLOSURE, TRAVERSE ADJUSTMENT.

Figure 4. Survey programs 01 through 13.

The preprogrammed module contains 13 programs as listed in figure 4 and was designed to greatly reduce the computational load of a survey section. The survey module can be identified by users when a key sequence (identified in the USAFAS handout) is pressed. If the proper module is in the calculator, the number 1.000000082 will appear in the display.

The 13 forms for use with the calculator are five by eight inches and presently correspond in number with the programs. Yor example, FS Form 611-1 (Test) is used with program 01. The two exceptions to this are: 1) Forms ending in -6 and -6a are used with program 06. 2) Program 12 has no form as it stores spheroid constants for programs 9, 10, and 11.

The forms are divided into two portions: Instructions and Data Record. The general entry format is: Enter known data, enter field data, and then extract required answers. It should be noted that until the new forms are approved and published by Department of the Army, they cannot be ordered but they can be locally reproduced.

Survey information centers and missile units will receive the Computer Set, Field Artillery, Missile (containing a printer). A print routine has been programmed into the survey module and will produce a hard copy of headings, survey data, and required data.

Any questions regarding the survey application should be addressed to the Commandant, USAFAS, ATTN: ATSF-CF-SV, Fort Sill, OK 73503 or call AUTOVON 639-1198.

Lance application

The Computer Set, Field Artillery, Missile or General, with the Lance firmware module and a companion computer's record, FS Form 1217 (Test), provides the capability of rapidly determining accurate firing data for the Lance missile. This computer set will be the secondary method of determining firing data while FADAC remains the primary system. Manual computations are used only in cases where both primary and secondary systems are out of action and there is no other fire direction center available to compute the mission.

The Lance firmware module contains a test which checks the computer's ability to access the programs within the module and causes a unique display (1.000000559) indicating the correct firmware module is in the computer. The module has the following capabilities:

- Stores 13 firing points. (Additional sets of 13 firing points can be stored on magnetic cards.)
- Computes nuclear (M234/M252) firing data in two to three minutes. (Two additional minutes are required if zone-to-zone coordinate transformation of the target grid is required.)
- Computes nonnuclear (M251) firing data in four to five minutes. (Two additional minutes are required if zone-to-zone coordinate transformation of the target grid is required.)
- Re-displays firing data when required by the operator.
- Uses prestored firing points to compute firing data. (Firing point data may also be entered from the keyboard.)

Figure 5. Printout of firing data.

• Corrects firing point location used to compute firing data when a floating firing point is used.

• Prints the firing point list.

• Prints firing data, including the firing point and target location data used in computing the mission (figure 5).

• Computes and prints unit march tables.

Note. *The last three capabilities are available only with Computer Set, Field Artillery, Missile, which includes a printer. A self-instructional guidance package, WL**TL GP, August 1979, issued with each program kit, provides detailed instructions for each above listed capability. This information will be included in Change 1 to FM 6-40-4. Additionally, USAFAS will provide an instructor to train field units receiving these computers.*

Any questions regarding the Lance application can be addressed to the Commandant, USAFAS, ATTN: ATSF-WD-GM-L, Fort Sill, OK 73503 or call AUTOVON 639-5424/5301.

Warranty maintenance

The warranty on all computer sets, regardless of when the unit receives the set will expire on 15 March 1981. Until that time, if maintenance above the organizational level becomes necessary on the calculator or printer, the using organization will forward the defective item to:

Commandant
US Army Field Artillery School
ATTN: ATSF-SE-LG
Fort Sill, OK 73503

Complete details on maintenance procedures will be published in TM 9-1220-242-12P which will be part of each computer set. The Fort Sill point of contact for the handling of items to be returned to the manufacturer under warranty is Mr. Rick Stone, AUTOVON 639-4822. Please note that only the calculator or printer is to be forwarded to Fort Sill. Other parts of the computer set are to be retained by the unit for use with the calculator or printer when it is returned or replaced. When returning an item for warranty service, the sending unit should provide specific details as to the nature of the problem.

If the calculator or printer is determined to be non-repairable under warranty, due to mishandling or abuse by the user, the sending unit will be notified and normal procedures will be observed. In this case, the unit will requisition a replacement via local procedures.

CPT Henry W. Stratman is assigned to the Gunnery Department; SFC Shelton Alsup, Weapons Department; SFC Dave Dunsmore and Mr. Max Conerly, Counterfire Department; and Mr. Lonnie R. Minton, Directorate of Combat Developments, US Army Field Artillery School.

Battlefield Interdiction: Old Term, New Problem

by BG Edward A. Dinges and
MAJ Richard H. Sinnreich

American field artillerymen will be hearing a familiar term more and more frequently in coming months. The term is "interdiction," a word apt to conjure memories as diverse as "locomotive-busting" in World War II and the "trail-junction H + Is" of Vietnam.

In part, because of these doubtful historical associations, the Army's revived interest in battlefield interdiction has already met skepticism—some of it justified. This article explores the contemporary interdiction problem and suggests some solutions. For, as we shall argue, in a practical interdiction doctrine may lie a very considerable part of the solution to more basic tactical problems.

Historically, interdiction has been viewed primarily as "interruption," a process designed to interfere with the flow of enemy combat power into the frontline battle. Whether in the form of deep interdiction at or near the source of combat resources (e.g., the strategic interdiction campaigns against Germany and Japan), or in the form of battlefield interdiction (e.g., the much-maligned harrassment and interdiction (H&I) fires), all previous efforts shared essentially the same objective: to weaken enemy forces in contact by constricting or interrupting altogether their sustaining resources. Consistent with this view, interdiction focused on lines of communication, targeting the flow of logistics and replacements and, more rarely, reserve formations en route to commitment.

Generally speaking, these efforts had a relatively low payoff for the resources expended, partly because of difficulty in finding deep targets and partly because of limitations in the capability to attack such targets in a timely and effective way. Both acquisition and attack were restricted largely to tactical aircraft, and the difficulties involved in coordinating this effort with the land battle contributed significantly to the ground force-air force disputes so well documented in the literature of World War II.

Perhaps the greatest impediment to successful interdiction-as-interruption, however, may have been the inherently troublesome relationship between distance and geography on the one hand, and interdiction on the other. For as we rediscovered in Korea and again in Southeast Asia, the farther an enemy element is from its destination, the more different ways it has of getting there—unless, as happens occasionally, but rarely, geography itself limits those alternatives.

Despite these problems, today interdiction is once again on the front burner for several reasons:

- First, technology has improved target acquisition, real-time communications, and long-range strike capabilities.
- Second, we see growing concern that, unless disrupted, Soviet echelonment tactics supported by numerical preponderance might well eventually overwhelm even a well-prepared defense.
- Finally, there is a developing consensus that a credible theater nuclear employment concept must, for both political and operational reasons, focus heavily on targets well behind the frontline battle.

At the same time, however, there is little evidence that the relative effectiveness of interdiction-as-interruption has increased or that it will. While interdiction capabilities have improved, so also have the mobility and survivability of potential targets—particularly armored formations. At the same time, the ratio of interdiction assets to potential targets has if anything worsened; allied forces in Europe are significantly outgunned in artillery and barely hold their own in tactical aircraft. Finally—and perhaps most important—the inherent diminution of interdiction effectiveness with increased frontage and distance persists. Indeed, given the growing urbanization of modern Europe and the consequent proliferation of lines of communication, the problem has probably intensified.

All this argues for treating cautiously indeed any suggestion that nonnuclear interdiction can significantly disrupt the introduction of enemy forces or their sustaining support into the central battle. Still less, can we be confident

that even a significant disruption of enemy force generation efforts will by itself solve our tactical problem? Regulating the pace of the central battle may delay our eventual defeat; by itself, however, it will not guarantee victory. If the Warsaw Pact is willing to pay the price in casualties, it can ultimately win a battle of attrition.

Finally, from a purely operational perspective, the relegation of interdiction solely to an interruption function is not very helpful. Such an approach establishes no clear priorities for the allocation of scarce indirect fire assets; e.g., when is an interdiction target more important than a counterfire target? Or, given two interdiction targets, which is the more critical? Also, this approach offers no guidance for planning and conducting interdiction operations; e.g., when should an interdiction target be struck for maximum benefit? Or, given two equally lucrative interdiction targets, which should be struck first? Finally, interdiction-as-interruption provides no clear breakout of interdiction responsibilities either within or between major command echelons; e.g., when does responsibility for interdicting a given target shift from corps to division? Does the interdiction objective change and, if so, how?

What we require, in short, is an interdiction concept which must—

- Be capable of execution within our capabilities.
- Make an impact on the battle that would be worth the resources invested.
- Provide clear planning, allocation, and execution guidance.

The key to satisfying these requirements is recognizing that to defeat an attacking force superior in numbers, echeloned in time and space and geared doctrinally to continuous combat, we must somehow set the terms of battle. And to do that, we must seize the tactical initiative. It simply will not suffice for us to be in the right place when the enemy arrives there, even if he arrives late with depleted numbers. Given the Warsaw Pact's numerical superiority, we cannot be confident that attrition alone will break the momentum of an attack. Instead, we must find a way to use that very momentum to defeat the attack—to disrupt the enemy's plan of operation and force him to fight in a time, place, and manner which negates his numerical advantage.

In short, we must *shape* the central battle, producing a configuration of enemy forces in time, space, and strength adapted to their defeat. And to do that, we must manage the battle throughout its depth. We must stop thinking about the central battle and force generation as if they were independent problems. There is only one battle, and everything done to injure the enemy before he joins the fight will influence—*and must be influenced by*—the way that battle is conducted.

One part of that effort, to be sure, will be to disrupt within our capabilities the flow of enemy combat power into the battle area. Indeed, at corps level, that may be the only contribution interdiction *can* make.

But a greater potential for interdiction to contribute to the battle is at division level, at distances of 30 kilometers or less from the line of contact. Here real-time target acquisition is most likely; here the ratio of potential interdiction assets to potential targets is greatest; and here, most of all, the movement alternatives open to an attacking force are fewest and their selective denial promises to be most effective. Interdiction here can do much more than simply regulate the pace of enemy operations. Carefully planned in conjunction with the defensive battle plan, interdiction can help to influence when, where, how, and with whom the central battle takes place. By canalizing enemy forces as they move into the division's area of influence, by opening or widening the gaps between successive attacking formations, and by fixing or delaying the reaction of enemy reserves, interdiction can help turn the attacker's momentum into a vulnerability. At the same time, by protecting the movement of our counterattack forces and supporting economy-of-force dispositions in less critical sectors, interdiction can help us gain the freedom of maneuver to exploit this vulnerability. In sum, by shaping the battle, interdiction can help us wrest the initiative from the attacker, and so fight the critical central battle on our terms instead of his (figure 1).

INTERDICTION PROCEDURES

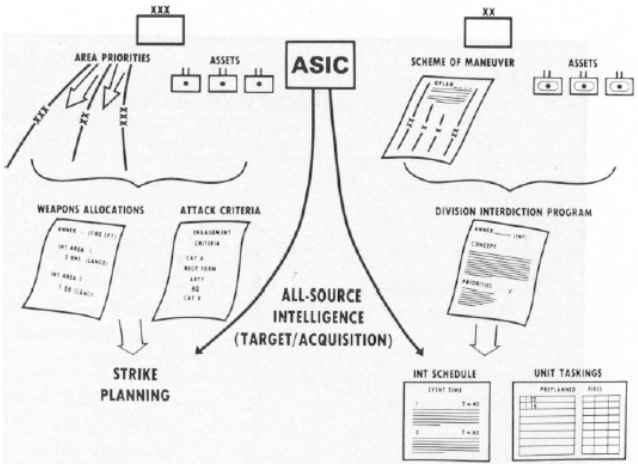


Figure 1.

Both in purpose and in process, this latter approach to interdiction has much in common with tactical deception (with which, in passing, it should be closely integrated). Like deception planning, interdiction planning must be backward planning, beginning with a condition to be produced and ending with a sequence of actions designed to produce it. Like deception, interdiction is designed to influence the enemy's behavior as much as his capabilities.

And, like deception, interdiction will be most successful when the purpose of the interdiction operation becomes apparent only after it is too late for the enemy to do anything about it.

Viewed in these terms, interdiction at division level differs in several important respects from interdiction operations conducted by corps to disrupt enemy force generation:

• Interdiction at corps is attrition-oriented; its stimulus is the acquisition of a lucrative target, and its success criterion is largely a function of target degradation or substantial delay. Interdiction at division is maneuver-oriented; its stimulus is a preplanned sequence based on our tactical scheme, and its success criterion is an enemy disposition in time, space, and strength which meets the requirements of that scheme.

• Interdiction at corps is target-oriented; the key question in prioritizing targets is: "Which target can hurt us most, earliest." Interdiction at division is plan-oriented; the key prioritizing question is: "Which strike if not executed will most endanger the friendly tactical plan?"

• Interdiction at corps in time-sensitive; the critical requirement is rapid strike planning, since a target not struck quickly decays rapidly and may not be reacquired. Interdiction at division is event-sensitive; the critical requirement is rapid post-strike assessment, since failure to achieve the interdiction objective may require alteration of the plan of defense.

• Finally, although interdiction at corps is target-oriented, it may be conducted as a closed-loop targeting problem, whereas interdiction at division must be planned in direct conjunction with the scheme of maneuver and therefore—like deception—will require the active and continuous involvement of the G3.

Some of the more important of these contrasts are summarized in figure 2.

While differing in many respects, corps and division will share certain interdiction requirements. Of these, perhaps the most critical will be the requirement for continuous targeting based on real-time intelligence/target acquisition. At corps, continuous targeting will be necessary both to assure accurate weapon delivery and to permit nuclear package update; at division, it will be essential to permit correct time-sequencing of preplanned interdiction events. For much the same reason, it may in some circumstances become necessary at either level to fence or otherwise protect delivery assets for a time in order to insure timely execution of a critical strike. Finally, at both corps and division, while execution of interdiction may for convenience be controlled by a fire support element, it will have to be monitored carefully by the maneuver commander whose battle will be influenced by the success (or failure) of interdiction operations (figure 3).

What are some of the procedural implications of this approach to interdiction?

INTERDICTION **OBJECTIVE: MANAGE THE BATTLE THROUGHOUT ITS DEPTH**		
	CENTRAL BATTLE	**FORCE GENERATION**
Objective:	Shape the battle.	Delay and degrade the forward flow of enemy combat power.
Locus:	Division.	Corps.
Success criterion:	Desired configuration of enemy forces at the point of collision.	Significant disruption of the tempo of enemy forward movement.
Attack stimulus:	Preplanned interdiction schedule integrated with the scheme of maneuver.	Acquisition of a lucrative target meeting the attack criteria set by the commander.
Staff responsibility:	G3/FSE.	FSE.
Key intelligence requirements:	Identification of mobility corridors. Event template.	Target identification. Anticipated location/time of entry into division sector.
Principal systems:	155-mm and 8-inch howitzers; GSRS.	GSRS, Lance (CSWS), TACAIR.

Figure 2.

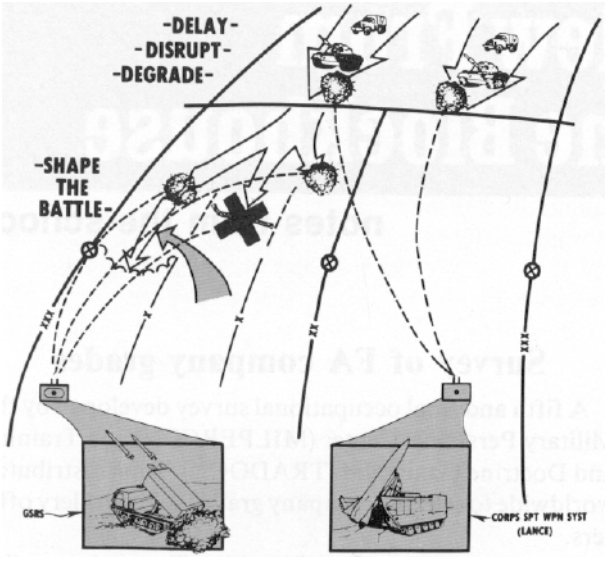


Figure 3.

At corps, perhaps the key procedural decision will be the initial allocation of corps strike assets—artillery and air—to interdiction operations across the corps zone of influence. In turn, this area allocation should drive interdiction target engagement criteria, with more restrictive criteria applied to those sectors of the corps zone of influence receiving a lesser allocation of interdiction assets.

A second important procedural problem will be the handoff of an interdiction target (or potential target) to the division in whose zone the target appears likely to be committed. Since the division interdiction plan will be closely tied to the scheme of defense, corps should at a minimum provide advance notice of the introduction of an enemy formation into the division zone and, if possible, some indication of the expected time and probable area of entry. Once in the division interdiction zone, however, corps attack of the formation should be cleared in advance with division, whose plans for the target unit may require that its movement not be further obstructed. Alternatively, division may ask corps to attempt to provide additional delay, if such delay would contribute to execution of the division's defensive scheme.

These considerations apart, targeting and engagement by corps interdiction assets should not pose any novel procedural problems. In contrast, interdiction at division will require some fairly rigorous planning and execution procedures.

Regarding planning at division, the key will be integration of the Interdiction Plan directly into the Operations Plan. Both in the Concept of Operation and in the fire support subparagraph, the linkage between interdiction operations and the scheme of maneuver should be direct and unambiguous.

The Interdiction Plan itself should comprise two elements:

- A description of the enemy configuration of forces to be produced.
- An event-based interdiction schedule which sequences the interdiction strikes to be delivered to produce the desired configuration and assigns specific delivery and coordination responsibilities.

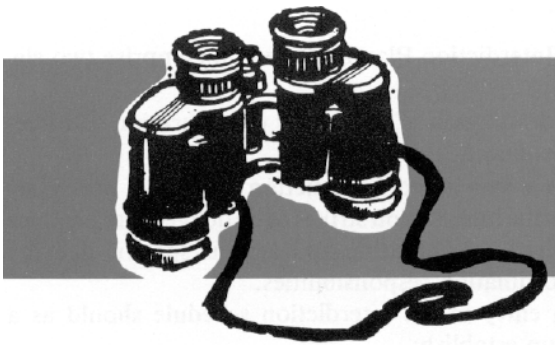
Each entry in the interdiction schedule should as a minimum establish:

- Purpose of the strike (block an avenue, cover a flank, etc.).
- Trigger time or event on which the strike will be executed (arrival of the second echelon of a formation at a designated point along its march route, commencement of a brigade counterattack, etc.).
- Duration of the effort (15 minutes, until a friendly evolution is completed, etc.).
- Delivery unit.
- Munition to be delivered.
- Cancel conditions (anticipated problem does not develop, scheme of maneuver altered, etc.). The cancel condition provides some assurance that execution of a critical interdiction strike will not fail as a result of temporary communications failure.

As the last requirement suggests, the interdiction schedule is necessarily a contingent schedule (hence, the requirement noted earlier for close monitoring of execution by the maneuver commander). Perhaps more important, is the sensitivity of the scheme of maneuver to the conduct of interdiction, since the success of an interdiction strike cannot be guaranteed. Immediate post-strike assessment will therefore be essential. Even so, where the success of the interdiction strike is critical to the plan of defense, the schedule should make explicit provision for possible follow-on attacks.

As this brief overview indicates, effective employment of interdiction to manage the battle in depth will require careful planning and even more careful execution. It is a process far different from—and more complex than— the nearly random interdiction targeting with which the field artillery has been burdened in the past. In return, it offers an operationally coherent approach to solving an important problem—to get the most tactical leverage from our scarce field artillery assets.

BG Edward A. Dinges is Assistant Commandant of the US Army Field Artillery School and MAJ Richard H. Sinnreich is assigned to Planning Coordination Office/Modern Battlefield Techniques Committee, USAFAS.



View From The Blockhouse

notes from the school

Update on FMs 6-30 and 6-40

Change 1, FM 6-30, has been completed and is expected to reach the field in the first quarter of 1980.

As a result of suggestions and recommendations received from units worldwide, some changes included are:

- Target numbering has been revised.
- Section on mortar has been revised to reflect some of the differences between mortars and artillery.
- A glossary has been added to provide a ready reference.
- The index has been expanded to facilitate locating needed information.

FM 6-40, Field Artillery Cannon Gunnery, has been in the field approximately one year and is currently under review. Input from the field for changes to FM 6-40 is highly encouraged. Comments should be forwarded to Commandant, US Army Field Artillery School, Gunnery Department, ATSF-G-RA, Fort Sill, OK 73503.

Field Artillery Reference Data Update

Special Text 6-1-1, Field Artillery Reference Data, dated December 1976, is currently being revised to reflect all field artillery TOEs as of 1 November 1979. When published, the new document will show all sections (personnel and equipment) organic to battery size elements of the Field Artillery. In addition, the handbook will provide the characteristics of field artillery equipment.

The expected publication date for ST 6-1-1 is March 1980.

LOs and TMs for the M110A2

Units that have not as yet received TM 9-2350-304-10 or LO 9-12 for the M110A2 8-inch howitzer through normal pinpoint distribution can obtain copies by sending a request with a self-addressed envelope to:

CDR, ARRCOM
ATTN: DRSAR-HA-L (Mr. Koester)
Rock Island, IL 61299

Due to a limited supply of these materials requests will be handled on a "first come, first serve" basis.

Survey of FA company grades

A fifth and final occupational survey developed by the Military Personnel Center (MILPERCEN) and Training and Doctrine Command (TRADOC) is being distributed worldwide to selected company grade Field Artillery officers.

According to MILPERCEN, this will complete a pilot program which was designed to develop an occupational data system for supplying information to officer management and training communities.

As in the previous surveys of "other" branch officers, Specialty 13 officers are being asked detailed questions about their jobs, and in particular the skills, knowledge, and equipment needed to meet specific assignment requirements.

Survey participants are also being given an opportunity to comment about satisfying or dissatisfying aspects of the work.

BG Edward A. Dinges, Assistant Commandant of the US Army Field Artillery School, has expressed personal interest in the results of the questionnaire: "Because of the importance of the survey insofar as future training and utilization of our company grade officers, I would hope all participants give careful consideration to each question. Additionally, each officer should insure timely return of materials—say within one month following receipt."

Redleg Sutler opens

The Redleg Sutler, a unique gift shop specializing in US Army Field Artillery memorabilia and collector's items, opened last October in Snow Hall.

In name, the gift shop follows the traditions of the original post trader or sutler dating back to 1869 when Fort Sill was established. John S. Evans, who had been a sutler at Forts Gibson and Arbuckle, obtained the first license to operate a post trader's store at Fort Sill. The building housing the store was a barn-like structure made from lumber hauled 300 miles from the railhead at Fort Harker, KS.

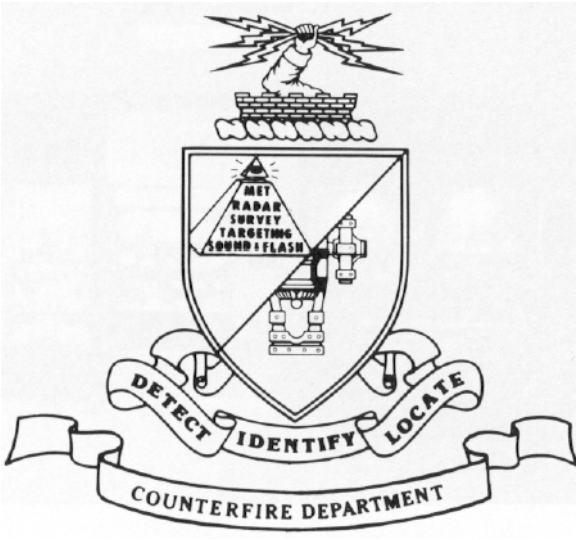
In contrast to the merchandise sold in earlier stores, the Redleg Sutler offers such items as glassware, stationery, pen sets, director's chairs, brass cannons, and medallions—all portraying the Field Artillery School crest or the Field Artillery cross cannons. A forthcoming mail order catalog will be made available to units outside the Fort Sill area.

The merchandise in the new store may be different from that in the old, but the function of the new store is the same—to serve those persons interested in field artillery.

The Redleg Sutler in Snow Hall is operated by the Field Artillery Association and managed by Ms. Linda Butler. All profits go toward the support of the Fort Sill Museum. Inquiries regarding merchandise offered can be made by writing to the Field Artillery Association, US Army Field Artillery Center and Fort Sill Museum, Fort Sill, OK 73503, or by calling 405-355-4677.

THE NEW—Field Artillery mementos can be purchased at the Redleg Sutler in Snow Hall.

THE OLD—Indians gather to draw supplies at the old post trader's store. (US Army Field Artillery Museum photo)



COUNTERFIRE SYSTEMS REVIEW

Met computers being shipped

Meteorological Data Processing Group OL-192/GMD-1 is being shipped to Active Army units. Units in Europe should now have this equipment on hand while those located in CONUS, West Pacific, and Alaska should receive theirs within 90 days. Reserve and National Guard units will receive the system by December 1980.

The purpose of the Meteorological Data Processing Group is to quickly and accurately convert the raw met data and raw wind data received by the Rawinsonde System into real time accurate meteorological messages. Even though most of the computations are automatic, the computer operator still retains full control of the OL-192. The operator enters the raw met data from the Radiosonde Recorder AN/TMQ-5, and the raw wind data from the control-recorder when prompted by the LED display of the OL-192. The end product is a punched and printed tape of the computer and Air Weather Service met messages. The solid state computer speeds computations significantly.

USAFAS has recently mailed an instructional package to each command authorized the OL-192/GMD-1 to help met sections put the computer into immediate use. Any unit desiring an additional package should forward a request to the Commandant, US Army Field Artillery School, ATTN: ATSF-CF-MET, Fort Sill, OK 73503.

Field Artillery Target Acquisition Conference

The Field Artillery Target Acquisition Conference held at Fort Sill 23-25 October 1979 was well attended with 15 of 17 Active Army and 7 National Guard target acquisition batteries (TAB) represented. The conference was designed to provide a forum for interchange of ideas among TAB commanders and the Field Artillery School. This theme was highlighted in the opening remarks of COL Jere L. Hickman when he stated, "This conference is for passage of information—share your problems and solutions with all of us." Following were three fast-paced days of briefings and group discussions on training, equipment, personnel, and near-term future developments.

Of particular interest were informative presentations by two TAB commanders, CPT Tommy J. Lenzini of the 25th Infantry Division Artillery and CPT James T. Glowacki of the 4th Mechanized Division Artillery.

At the conclusion of the conference, attendees stated that it had given them an excellent opportunity to discuss common problems and learn a number of alternate solutions. They also expressed a desire that the conference be held on an annual basis.

Firefinder Operator Trainer

During the period 12 November 1979 through 11 January 1980, the US Army Field Artillery Board conducted an On Site User Test (OSUT) of the first A17E11 Firefinder Operator Trainer recently delivered to the Counterfire Department. The OSUT began the validation of a portion of the newly developed Firefinder Operator (13R10) Program of Instruction for formal resident training scheduled later this year. The OSUT had three major objectives:

1) To obtain data which would allow assessment of the reliability/maintainability characteristics of the device.

2) To determine the extent to which the training device satisfied requirements specified in the Training Device Requirement.

3) To determine whether the device permitted effective transfer of training from the simulator to actual radar operational hardware.

The Counterfire Department is scheduled to receive one A17E12 (AN/TPQ-36 Mortar Locating Radar) Organizational Maintenance Trainer this month and two additional A17E11 Trainers in February/March. This equipment is expected to effect a training cost savings in excess of $100 million dollars over the twenty year Firefinder system life cycle.

Branch is NEVER Immaterial!

by LTC Dave Mooney

The Artillery Officer Corps is at 70 percent strength — not by any current bean-counting method, but because at any one time approximately 30 percent of the Army's Field Artillery officers are working in jobs that have nothing to do with the Field Artillery. Some examples are comptrollers, generals' aides, ROTC instructors, high level staff officers, or students. And to a similar degree, the same applies to the enlisted cannon-cockers, many of whom are on recruiting duty or working elsewhere in their secondary MOS. Most of these positions are classified by a term which I have always considered offensive — "branch immaterial."

I submit that branch is never immaterial. It may not consume all our working hours — it may not consume any of them — but it is too important to us and to the Army to be relegated to a total backseat position whilst we pursue other endeavors. Branch sired us and raised us and, by and large, has been responsible for the best assignments we've had. Branch also, more than occasionally, acts in the role of great uncle or Godfather when it comes to changes in grade or assignment. The wonders of OPMS/EPMS notwithstanding, branch is still the most important of our affiliations.

We all began with the title of Field Artilleryman, and, unless you are among the misguided few who, in a moment of irrationality, transferred out, you are a Field Artilleryman forever, according to the Order of Saint Barbara. And I need not remind readers of this journal that "not all are privileged to be . . . ."

Being a proficient Field Artilleryman is not a part-time occupation. It is simply not something you can pop in and out of like typing or swimming. However, upon leaving a field artillery assignment for a "branch immaterial" job, it is very easy to slip away from that reality. We find ourselves wrapped up in the details of a new job, meeting new people, learning new facts and procedures, and facing new problems that cannot be solved by TACFIRE. We tend to forget from whence we came. The tyranny of the moment subdues the past . . . and the future.

All this dilution of one's former self is aided and abetted in some places by the "Great Mystifier" — the General Staff (GS) insignia, a small piece of metal which has the power to remove all branch identity from the wearer. On my last GS assignment, I found myself reaching for a set of cannons in the morning until I remembered that I had become a member of the great unwashed sector known affectionately throughout Armydom as the "general staff weenie," further identified by the "green weenie sweater" endemic to all such types. Branch, at the higher levels, seems to be of little consequence.

Even worse is the latest great leap backward for those who have any pride in their branch — the new green weenie shirt. Aside from being often mistaken for an Air Force type who has had a run-in with a berserk laundromat, the wearer of the latest in Army finery is prohibited

from wearing branch insignia. The Natick explanation is that the fabric is not strong enough to hold insignia without tearing. I find it odd, however, that the fabric is strong enough to hold a chaplain's insignia, and there are those of us who feel our insignia of branch is as important as the chaplains'.

At any rate, if you are in the general staff ranks, or if you have made the decision to be in style, or if you simply are in a "branch immaterial" job where no one pays any attention to branch, you can quickly fade into sheltered anonymity.

Please don't.

There are many reasons for not doing so, and they go far beyond any sentimental attachments we may have to Signal Mountain. The reason to maintain the personal affiliation with our branch through the "trappings" of the Artillery is because the professional affiliation simply cannot be allowed to run out.

Several articles in the *FA Journal* over the last few years have discussed the coming of a "Revolution on the Battlefield" which will come about through great technological advances in fire support. The articles spoke of it as the future, but as one of our leaders used to say in the "Halls of Snow," the future is now.

The number of field artilleryman is finite, set by DA, and it all fits in with the grand scheme of having enough of us to man the guns when we have to go to battle. It's that simple. The guys who sit up in MILPERCEN planning assignments also have to prepare for the revolution. They obviously can't keep everyone in an FA position where it is easy to retain a high degree of branch proficiency. And yet they must proceed on the assumption that we are all branch qualified and capable of moving into a field artillery slot on short notice, like being told the balloon is going up.

And in these times of rapidly changing technology, graduation from the advanced course, class of ought-6, is not sufficient in itself to maintain even branch qualification, much less branch proficiency. The last few issues of the *FA Journal* have discussed the deployment of TACFIRE to the field, the status of GSRS, the production of GLLD, etc. We are told that of the 30 plus major items of equipment in the Field Artillery, only three will survive into the 1990s. The rest will be replaced by new items in various stages of development, and many of them are just one tour away. Additionally, the force structure is changing. Tactics are changing. The revolution on the battlefield is real.

Where do we fit into the scheme? Individually, I don't know and I doubt if anyone does at this point. But I do know that all these plans for the Field Artillery of the 1980s weren't made with "branch immaterial" officers and NCOs in mind. They were made with the assumption that there would be an ample supply of professional, up-to-speed field artillerymen to make it happen and happen right, when the time comes.

We are those field artillerymen, no matter where we are and what we're doing right now.

So how can we expect to "come on board" for that next FA assignment in the early 1980s if we have considered our branch "immaterial" for the last three years or more? We can't.

Or can we? We can begin preparing now — and the first action is to resolve never to speak the words "branch immaterial" again! Then make another resolution to be conscious of our FA status, our need for proficiency, and then . . .

• Let all the other weenies around you know you're a field artilleryman. From the moment they first see you. Wear cannons on your necktie. Place a stack of *FA Journals* in a prominent place in your office (don't leave them home; your wife doesn't need to be impressed). Hang a set of cannons on your office wall, even if you are surrounded by comrades in other arms. It might spur them on to more branch pride.

• Stay in touch with the FA School. If you need information on something, call someone at Sill and ask them. Unless things have changed drastically since I was last there — and I know they haven't — I can speak for the guys there and say they continue to be the source of FA answers to the folks in the field — to all of us; not just to those in battalions and division artilleries.

• Write an article for the *FA Journal*. You'll have fun writing it and you'll learn a lot just doing the research.

• Find the rest of the cannon cockers on your post or on the staff. Shame them into coming out of their branch immaterial hole and into the red sunlight. And even if there are only a few of you, celebrate Saint Barbara's Day together, noticeably. If nothing has been scheduled at your post, start something. All you need is a punch bowl and a sword.

• And finally, and most importantly, THINK. Find out what's been going on, what people are saying about it, and then sit down with a glass of Artillery punch and think about what it all means to you. Where do you fit in?

Could you come out of that recruiting station right now and go into a chief of smoke job? Could you come out of your closet-like office in the Pentagon and be a brigade fire support officer?

Are you still a field artilleryman?

The answer is yes. The question is proficiency.

Think about it.

LTC Dave Mooney is the Public Affairs Officer at Fort McPherson, GA.

As Chief of the Field Artillery Branch, Company Grade Combat Arms Division, US Army Military Personnel Center (MILPERCEN), I feel it is important to share up-to-date information with you on a regular basis. In the course of counseling company grade officers, several issues of a general nature have surfaced. As such it is important for you to understand the policies and procedures used by FA Branch in the assignment process under the Officer Personnel Management System (OPMS).

Currently, FA Branch manages about 3,200 lieutenants and 1,700 captains. Because of a decline in our budgeted officer strength following the Vietnam conflict, we do not have enough company grade officers (in all branches) to meet Army requirements. This shortage, which is most critical in the grade of captain, Specialty 13 (FA), will have significant impact on assignments throughout your career. In short, each of you must be prepared to assume positions of greater responsibility earlier than normal in your career, and those positions will be mostly in your Field Artillery specialty.

Specialty 13 qualification

As a Field Artilleryman, Specialty 13, your company grade years will be spent developing basic officer skills. You are a combat arms leader — and to successfully lead entails a vast background and varied experience in Specialty 13 assignments. This is called "Specialty 13 Qualification." During counseling, you will hear assignment officers mention "specialty qualified." This means you must have the following minimum objectives accomplished early in your career:

1) Serve approximately three years of Specialty 13 troop duty assignments and a variety of jobs at battalion and battery/detachment levels, such as TOE artillery units, training centers, and Special Ammunition Support Command (SASCOM) units.

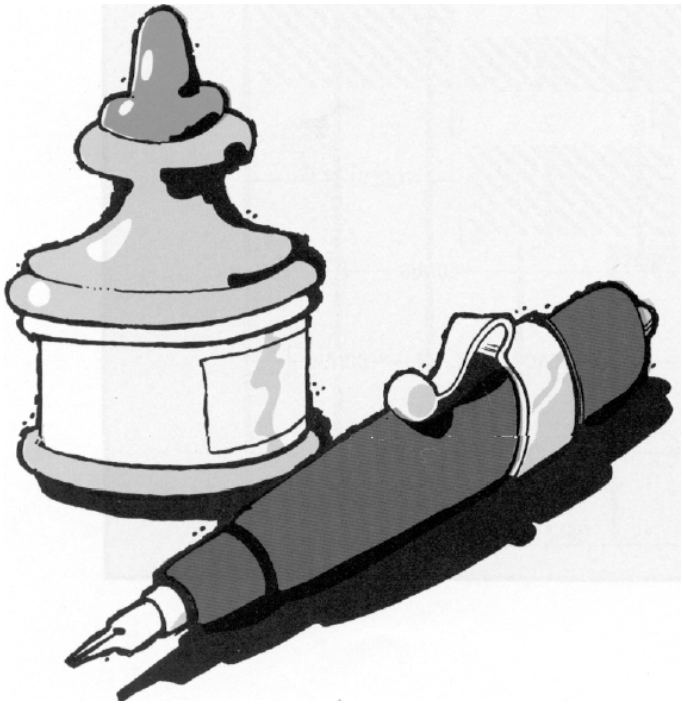
2) Attend the advanced course by your eighth year of commissioned service. (Generally, officers attend the resident course at Fort Sill between their fourth and eighth year, depending on School quotas and completion of normal tours.)

3) Successfully command a company/battery sized unit for at least one year (most officers will average over 24 months). Commands such as cannon/missile batteries, training center companies/batteries, and SASCOM detachments are considered equivalent.

Generally, these objectives are met by an officer's eighth year of commissioned service, but each case is different, depending on sequence of assignments and tour length policies. The best preparation for a successful career is to become fully qualified in your FA specialty.

Other specialty development

Company grade officers under OPMS are designated another specialty in their eighth year of commissioned service. The selection of your other specialty is based on Army requirements and your military/civilian schooling, job experience, and personal preferences. DA Pam 600-3 outlines the Officer Personnel Management System and serves as the



An open letter to company grade artillerymen

This information is intended to supplement the material presented in the article entitled "The Company Grade Years — A Decade of Development" by LTC(P) Leslie E. Beavers and MAJ Glen D. Skirvin in the July-August 1979 ***Field Artillery Journal.*** — Ed.

"bible" for your professional development. Our charter in the Combat Arms Division is only to *identify* that other specialty, since most officers will not serve in another specialty assignment until their field grade years. Because of the FA specialty demands and the shortage of captains, most of your tours will be at division and lower levels.

Assignments

During the company grade years, FA Branch will probably assign you five or six times based on Army requirements. Records of those officers available and qualified for a position are examined, and the appropriate Request for Orders is issued to the losing organization. Sounds simple, doesn't it? Behind this simple-sounding process is a complex, dynamic officer requisitioning system designed to put the right officer in the right place at the right time. CONUS and overseas requisitions are received every two months, and the FA Branch's mission is to fill those Army requirements. Based on the requisitions, assignment officers consider those officers most available (i.e., most time on station), compare specialty combinations to those required in the assignment, balance off professional development needs for the officer's specialty, weigh the officer's personal preferences, and then determine who gets the job. The final decision, however, is also influenced by the following considerations:

1) Assignments will be balanced between CONUS and overseas. Generally, if an officer is in CONUS, his or her next assignment will be overseas and vice versa.

2) Tour equity of at least one short unaccompanied and one long accompanied overseas tour during company grade years.

3) Other specialty or branch immaterial assignments are possible only after the officer has completed Specialty 13 qualification.

4) Advanced course attendance, when possible, at senior first lieutenant or junior captain time frame (four to eight years).

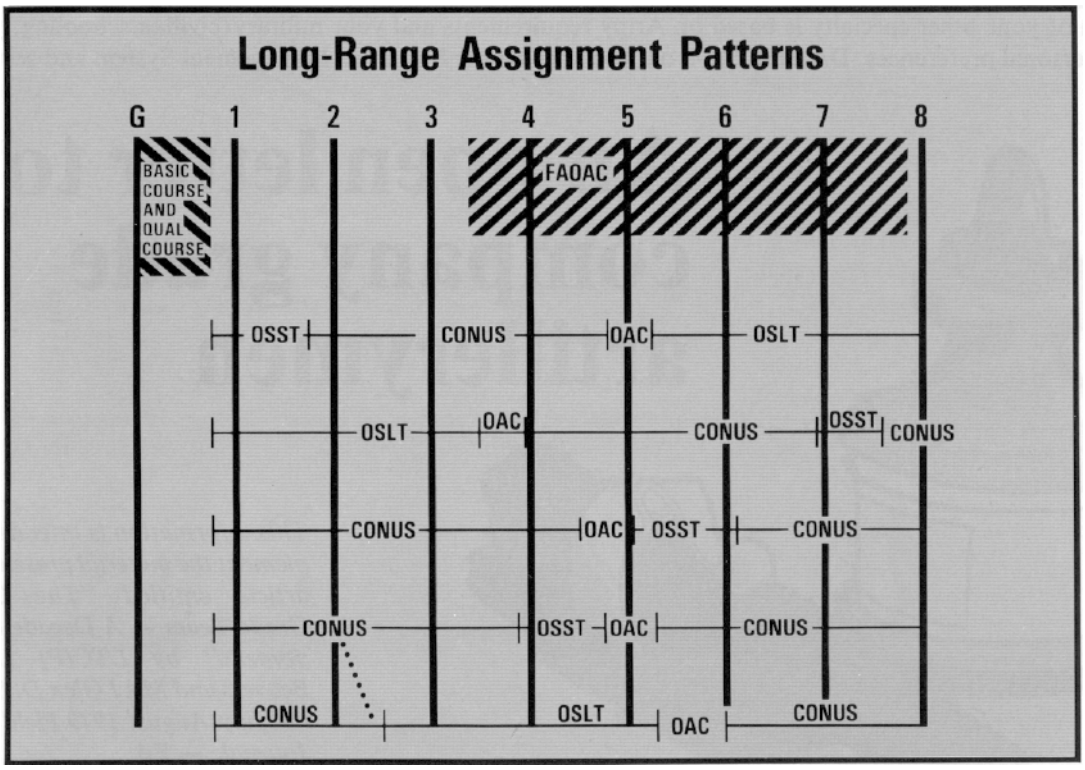
Army requirements are of utmost importance, and the Army Vice Chief of Staff has established certain priorities which affect your potential assignments and professional development. The current priorities are:

1) Priority 1 — Army readiness regions, Reserve Officer's Training Corps, US Military Academy, and US Army Recruiting Command.

2) Priority 2 — Department of the Army, Department of Defense, and joint activities.

3) Priority 3 — Rest of the Army based on Department of the Army Master Priority List.

Figure 1 shows the typical assignment patterns that can be expected by FA officers.



Overseas Tours

About one-third of our Field Artillery captains and lieutenants are currently serving in overseas areas. Based on our unique mission of nuclear and conventional fire support, a higher proportion of our company grade officers serve with forward deployed forces than do other combat arms branches. Necessarily, we enforce the tour equity aspects for overseas short tours to be fair to all. Although requirements are diminishing somewhat for Korea, we still foresee a continuing need to send officers on unaccompanied assignments. Long tours (accompanied) take the larger slice of our overses requisitions, so it may not be unusual for a company grade officer to serve two long tours. Some criteria used in determining who goes overseas are:

1) Most available officer (that officer on-station in CONUS the longest since his last overseas tour).
2) Tour equity (when possible, one long and one short tour).
3) Volunteers are given first consideration for available assignments.
4) Foreign service tour extensions are encouraged when in the best interest of the Army and the officer's professional development.

Important to note is that the Field Artillery Branch assigns only to the overseas major command; i.e., the 21st Replacement Battalion in Germany or the Requisition and Replacement Detachment-Korea. The major command then assigns you to a specific unit; therefore, you should write the gaining commander and express your desires and career needs for that assignment.

Stability

How long will I be here? This question is frequently asked by officers in CONUS. The answer is never clear-cut because officers are moved only on valid Army requirements and predictions about time-on-station must be generalized. Because our force structure requires 30 to 40 percent of our officers to be overseas, you are vulnerable for overseas movement after two years in CONUS, although the average time-on-station has been 24 to 30 months. It is therefore vitally important that an officer's preference statement be periodically updated to reflect current information. Since overseas requisitions are received 10 months in advance of the required report date, the FA Branch assignment officer will review files of CONUS officers serving their 15th month on-station for possible movement in their 24th month. Vulnerability for overseas duty increases thereafter with each requisition cycle. (It has been FA Branch policy to give officers selected for battery command one year stabilization. Although each post or overseas command has its own tour length policy, FA Branch grants stability for only one year in CONUS.) Command extensions are possible and are judged on a case-by-case basis. Each officer should insure that his command stabilization is known to FA Branch.

Manner of performance

It is no secret that today's Officer Corps is very competitive; our mission is too important to accept mediocre performance. Accordingly, the ultimate indicator of an officer's manner of performance is the Officer Efficiency Report (OER). These documents, over a period of years, will indicate to selection boards your potential for further promotion or military schooling. Since the OER is a subjective evaluation by our superiors for a particular job in a specified time frame, the total accumulation of such reports is an accurate predictor of future worth regardless of such factors as inflation, writing ability, assignments, and location. Many officers become fearful as OER time draws near. Knowing the importance of OERs, they cross their fingers and hope they will receive a good rating. Good communication is the key to a successful performance evaluation. Each rater and rated officer should discuss performance objectives and provide feedback during the rating period. If properly counseled, an officer will never be surprised by any efficiency rating.

The selection board's decision is based on the total file. In addition to the OERs, Officer Record Briefs, awards and decorations, letters of appreciation/commendation, records of military/civilian schooling, and official photographs are analyzed. *It is your responsibility to insure that your official file is complete!* You can obtain copies of your official records by writing USAMILPERCEN, ATTN: DAPC-PSR-SR, 200 Stoval Street, Alexandria, VA 22332.

Military/civilian schooling

The FA Branch's goal for an officer's education is that he be an advanced course graduate and possess a baccalaureate degree by the time he is eligible for major. Beyond this, further military/civilian education will be granted only to meet specific Army requirements because current fiscal constraints preclude training or TDY schooling in excess of that required for the next assignment. For example, in most cases, we cannot send officers to airborne school unless they are on orders to an airborne unit. Any MOS producing school must also be in line with the officer's specialty. For example, we would not send an officer to the Automatic Data Processing Officer Course unless he were a 13/53 en route to a 53

assignment. To do otherwise would violate the OPMS guidelines on specialty development and waste tax dollars.

Possible military schooling is considered as each officer is assigned. For example, if the assignment calls for a target analyst, we would consider you for the Nuclear and Chemical Target Analysis Course at Fort Sill. It is therefore appropriate to list your schooling desires on the Officer Preference Statement so that career managers can integrate personal needs into the assignment process.

All FA officers are automatically considered for attendance at the FA Officer Basic Course upon entry on active duty. Additionally, each new officer will receive follow-on training in one of four Additional Skill Identifier (ASI) producing courses. These are:

1) 13A — Cannon Battery Officer Course (eight weeks) for officers going to Army training centers, cannon units, or cannon warhead detachments.

2) 13B — Lance Officer Course (four weeks) for duty with Lance missile and warhead detachment units.

3) 13C — Pershing Officer Course (seven weeks) for duty with Pershing missile and warhead detachment units.

4) 13D)— Target Acquisition/Survey Officer Course (nine weeks) for those officers destined to go to target acquisition batteries or platoons.

Senior lieutenants and captains are also considered for the 13B, 13C, or 13D courses if that training is needed for their next assignment.

As I mentioned earlier somewhere between the fourth and eighth year of commissioned service, first lieutenants and captains are considered for the FA Officer Advanced Course (FAOAC), depending on normal CONUS or overseas tour completion. Approximately six months before the class starting date, eligible officers will receive their FAOAC orders and will be required to send a completed DA Form 483 (Officer Preference Statement) back to FA Branch. Three months before starting, FAOAC officers will receive a letter specifying their follow-on assignment. During the advanced course, FA Branch will individually counsel each officer on professional development needs and long range assignment possibilities. Future military schooling will be considered in conjunction with your specialty combination and your professional development needs. A review of DA Pam 600-3 for your particular specialty will help you plan your professional development. Desires for additional military schooling should be included on preference statements.

Advanced degree

Many officers ask if it is necessary to have a master's degree to get ahead in the Army. The answer is *NO!* Promotions are based on an officer's demonstrated performance and potential as reflected in his OERs. Civilian education is considered in the whole man concept but is not by any means the sole reason for selection/non-selection. Most of our officers who have a master's degree completed the requirements off-duty; however, some of our technical specialties may require an advanced civil degree. For these types of positions, the Fully Funded Advanced Degree Program has been designed to select and send qualified officers to obtain a master's degree. These programs are:

1) Advanced Degree Program for ROTC Instructor Duty. Selected officers receive advanced schooling in a shortage discipline and then serve a three-year tour as an ROTC instructor.

2) USMA Instructor for those officers selected to teach in an academic department at West Point, NY.

3) Advance degree for an Army Educational Requirement Board position for those staff positions requiring a particular skill.

4) Other programs such as the Cooperative Degree Program, Degree Completion Program, etc.

To qualify for any of the Army fully funded programs, an officer must be Specialty 13 qualified, be available and recommended by Branch, possess an above average efficiency file, and be academically acceptable to the civilian institution. At any given time, only about 100 of our 4,900 company grade Field Artillery officers are enrolled in such programs, which demonstrates the scarcity of that schooling. Once an officer completes the program, he will be required to serve an immediate utilization tour.

A personal philosophy

During my tenure as Chief, Field Artillery Branch, I have enjoyed the privilege of talking to many of our fine officers in the field, and the common question was: "What should be my main professional development objective?" My answer is simple: "Your target should be battalion command." In the combat arms, we are ultimately charged with leading men in combat.

Of all the boards, the 0-5 command selection board is the toughest — and purposely so. Our country deserves the best troop leaders to command our 125 battalion level FA units worldwide. Currently, 30 to 40 percent of the eligible FA lieutenant colonels are selected to command. If your goal is to be one of those officers, you should be aware of the professional development objectives which command selection boards look for. Obviously, a battalion commander should be a proven troop leader, tempered with battery level command and battalion/div arty level staff experience. In

Specialty 13, a review of the recent FY79 and FY80 command board results revealed selected officers had the following credentials:

1) Company grade years: About 33 to 35 months of troop duty excluding command time and about 20 to 22 months of battery level command.

2) Field grade years: About 24 to 26 months of troop duty as a major with no more than 37 months since last troop duty assignment as of selection. (Troop duty is generally defined as brigade level and below.)

Bear in mind that our current 0-5 command selection boards are considering the Vietnam era year groups that experienced the reductions in force. Their assignments, professional development objectives, and officer management systems were different from our current shortage year groups. Because of the current shortage and the fact that our Specialty 13 utilization rate has increased, FA Branch believes that year group 71-79 company grade officers will have experienced the following by the time they are eligible for command selection:

1) Company grade years: About 60 months of troop duty (excluding command time) and 24 to 30 months battery level command time.

2) Field grade years: About 24 to 28 months of troop duty as a major. (While these average months are a prediction for the late 1980s and early 1990s, assignments now being made will reflect these figures.) As mentioned earlier, FA Branch must plan each officer's Specialty 13 development. Each assignment we make must contribute to that long range development objective — battalion command. Our goal is to insure that each officer has the opportunity to achieve the developmental steps within his specialty combination necessary for the grade of lieutenant colonel. Our assignment actions during the later captain years are coordinated with the Major's Division because they significantly affect the timing and availability for 0-4 level assignments, particularly troop duty. The 16 years of service target for promotion to lieutenant colonel must be viewed as a continuum of opportunities for an officer to shape and nurture his professional development. Field Artillery assignments, while necessary to meet Army requirements, are generally flexible enough to permit any officer an opportunity to experience overseas duty, a variety of FA weapon systems (both cannon and missile), and the unique duties of Army training centers and special weapons detachments — all contributing to a true professional leader.

The Field Artillery Branch can equitably distribute overseas tours, vary the type of assignments, and advise and counsel individual officers on their progress, but the critical day-to-day professional development responsibility falls on the individual officer and his commander. With each assignment, the officer must do his best, seek guidance, and ask his commander for feedback on his performance.

We think it is very important for officers to check with Branch periodically on assignments, professional development, etc. A two-way communication channel is vital in career management so we welcome you to visit whenever possible or write or call.

Our address is: USAMILPERCEN
ATTN: DAPC-OPE-F
200 Stovall Street
Alexandria, VA 22332

Our telephone numbers are: AUTOVON: 221-0116/0118/7817/0187
Commercial: (202) 325-0116/0118/7817/0187

All three legs of the professional development triangle — the officer, the commander, and FA Branch — working in concert can achieve our ultimate objective of a professional Officer Corps. The key is operating from a common grid established for professional development — DA Pam 600-3, Officer Professional Development and Utilization. All must realize that Field Artillery officers will be afforded equal assignment opportunities and that advancement ultimately will be based on demonstrated manner of performance and potential.

LESLIE E. BEAVERS
LTC(P), FA
Chief, Field Artillery Branch

REDLEG NEWSLETTER

Reserve promotions for FY80

US Army Reserve officers, unit and nonunit, are identified for mandatory promotion the year prior to their promotion eligibility date (e.g., captains eligible for major in 1981 will be considered in April 1980). Those eligible should notify their Personnel Management Officer at least 30 days before the board convenes if they have not received a copy of the promotion consideration folder (PCF). Individuals should insure that the PCF contains most recent OERs, current letters of commendation, and an official photograph.

FY80 Army promotion list schedule

Grade	Date	Education Requirement
1LT-CPT	11 Mar- 18 Apr	OBC
CPT-MAJ	6 May- 6 Jun	OAC
MAJ-LTC	16 Sep- 17 Oct	50% CGSC
LTC-COL	4 Nov- 5 Dec	CGSC*
Unit vacancies	3-7 Dec 79	
(all grades)	7-11 Apr 80	
Held at Army level	4-8 Aug 80	

*CGSC must be completed within three years after promotion to LTC.
Board results are released 60 to 90 days after adjournment.

Reminder for reservists

Army reservists are reminded to inform their individual unit commanders of any changes in status such as address, number of dependents, civilian employment, physical or mental condition, or marital standing.

According to the US Army Reserve Components Personnel and Administration Center (RCPAC) non-unit reservists should inform RCPAC in writing of any changes, addressing their letters to:

USARCPAC
*ATTN: AGUZ-RMR-D
9700 Page Blvd
St. Louis, MO 63132

*Changes in physical status should be addressed to the attention of "AGUZ-RCH."

Reserve officers: Talk to your PMO!

US Army Reserve officers, unit or nonunit, are encouraged to frequently contact their Personnel Management Officer (PMO) since he is the vital link for training opportunities and career management recommendations. This link is more important now than ever because in these austere times it will be impossible for most officers (nonunit) to achieve a good retirement year through active duty for training alone. Your PMO will be glad to explain the other options for earning retirement points when you call or write Field Artillery Branch:

Telephone: toll free 1-800-325-1884;
AUTOVON 693-7871; or
in Missouri, call collect
314-263-7871.

Mailing
Address: Commander
USARCPAC
ATTN: AGUZ-OEC-FA (add CMC* number)
9700 Page Blvd
St. Louis, MO 63132

CMC*	SSAN**
141 MAJ McShea	LTCs
142 CPT Unwin	00-32
144 MAJ Stacy	33-65
145 CPT Hanrahan	66-99

*Career Management Code (CMC)
**Officers are assigned to a PMO based on the last two digits of their SSANs.

W-2s on the way

According to US Army finance officials, W-2 Forms (Wage and Tax Statement) for 1979 will be forwarded to soldiers at the end of this month (January 1980) to allow for late changes in tax and earning figures. Last year the forms were mailed in December which resulted in approximately 84,000 containing incorrect information.

Individual soldiers are reminded that taxes can be figured using cumulative figures on the December Leave and Earnings Statement (LES); however, filing of income tax statements should not be accomplished until receipt of the W-2s.

Battalion S1 job being analyzed

A test program conducted by the Army Institute of Personnel and the Training and Doctrine Command could result in significant changes to the normal duties performed by battalion S1s.

In mid-1979, former Chief of Staff GEN Bernard W. Rogers called for development of a program that would train the S1 to become the "commander's resource for analyzing the people component of the organization . . . for providing the human estimate of the situation." To accomplish this goal, it will be necessary to stabilize the tours of officers performing S1 duties, offer them special training, and relieve them of many administrative burdens they now face.

Under the test program, 40 commissioned officers, most of them captains, recently completed a six-week training program at the Army Administration School, Fort Benjamin Harrison, IN. The course centered on traditional staff responsibilities of the battalion S1. In addition, a special four-week course is now underway for battalion administrative officers (BAOs). Student enrollment includes 10 lieutenants, 10 warrant officers, and 10 sergeants major.

After the BAO graduation in March, the Army will begin a one-year field test to evaluate the effectiveness of the battalion S1/administrative officer concept. Ten of the 40 specially trained S1s will be assigned to selected units without BAOs, 10 to units with lieutenants as BAOs, 10 to units with warrant officers as BAOs, and ten to units with sergeants major as BAOs.

Training and Doctrine Command will be responsible for monitoring the program and collecting information from the tested units.

April set for ANCOES selection

According to the Military Personnel Center (MILPERCEN) a Department of the Army Board will meet in early April to select eligible E6s to attend Advanced Noncommissioned Officer Education System (ANCOES) courses during FY81.

The board to be held at Fort Benjamin Harrison, IN, will consider E6s with a date of rank of 1 April 1975 through 31 March 1978 and a basic active service date (BASD) on or after 1 October 1963. The board however will not consider individuals previously selected that have an imposed or initiated bar to reenlistment or that have been denied reenlistment through the qualitative management screening process.

All eligible E6s should insure that individual qualification records, enlisted efficiency reports, enlisted evaluation data reports, and photographs are up to date. Additionally, those being considered may write a letter to the board president explaining matters important to the consideration of their record. These letters must include name, social security number, and grade and be addressed to: President, ANCOES Selection Board, c/o Commander, USAEREC, ATTN: PCRE-RB, Fort Benjamin Harrison, IN 46249.

Letters of recommendation from the soldier's current chain of command will not be accepted.

Field Artillery First Sergeant Program

The Field Artillery First Sergeant Program has expanded to include Fort Knox, KY, according to MILPERCEN officials.

The program gives non-combat arms E8s serving in overage MOSs the opportunity to be assigned as first sergeants of either a headquarters or service battery of a field artillery battalion.

Soldiers selected are stabilized for 24 months and at the end of that time are returned to their primary MOS career branch for control and management.

With the addition of Fort Knox, there are now 10 CONUS installations in the program: Forts Sill, Riley, Hood, Polk, Stewart, Ord, Lewis, Carson and Campbell.

As of late last fall there were 41 combat support and combat service support E8s serving in the field artillery as first sergeants under this program.

To be eligible, soldiers must:

- Be in grade E8. (E7(P) may apply but acceptance and assignment will not be made before the projected promotion month.)
- Not have a profile that would prevent duty with combat arms.
- Be branch releasable.
- Submit a letter of recommendation from the soldier's command sergeant major or E9 rater.

In most cases volunteers are given their first choice of posts if vacancies exist at that installation.

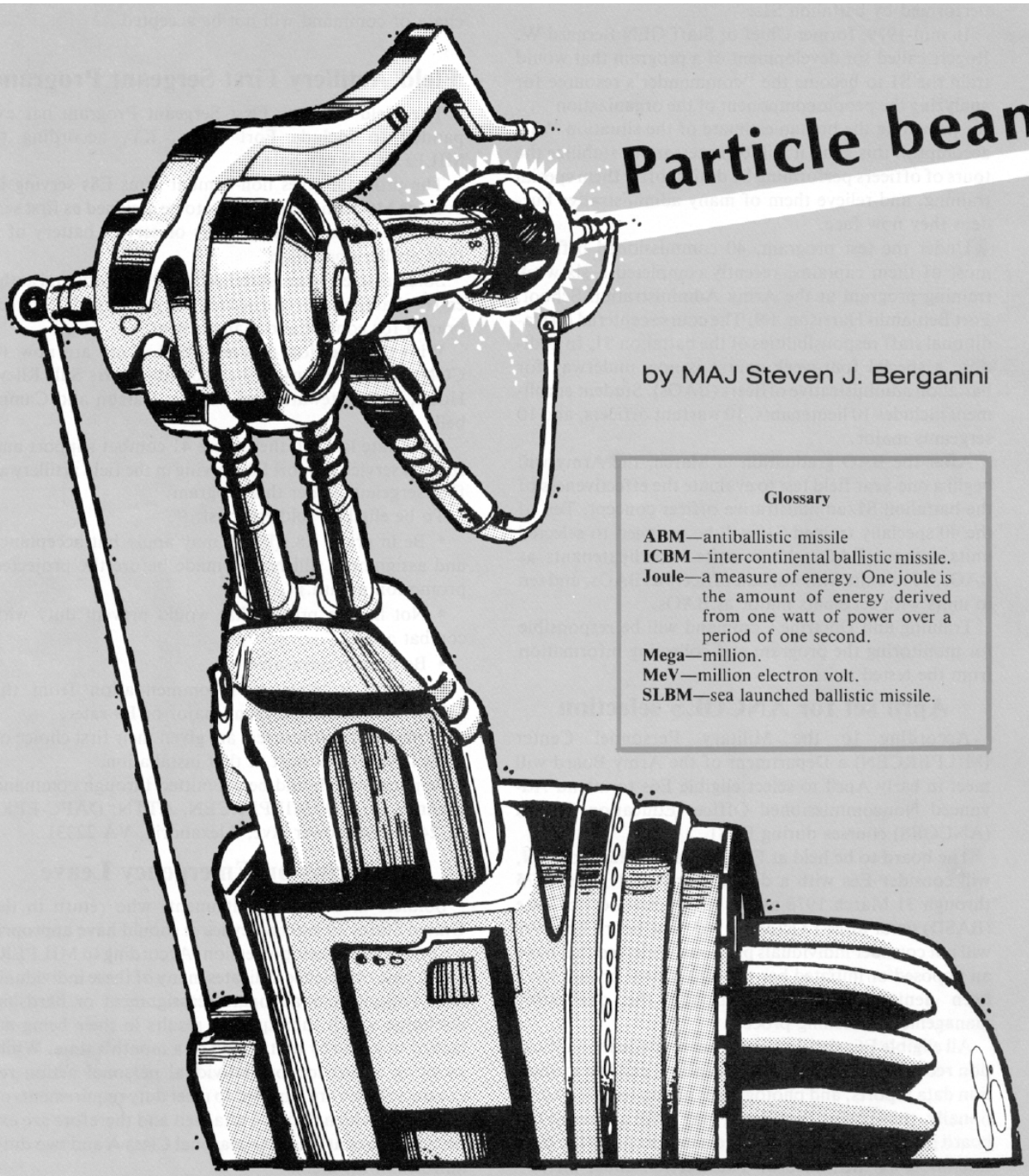
Applications should be submitted through command channels to: HQ, MILPERCEN, ATTN: DAPC-EPK-A, 2461 Eisenhower Ave, Alexandria, VA 22331.

Uniforms on Emergency Leave

Soldiers in overseas assignments who return to the United States on emergency leave should have appropriate uniforms in their possession. According to MILPERCEN, past experience indicates many of these individuals later request compassionate reassignment or hardship discharge which subsequently results in their being attached to a nearby unit for up to a month's time. While awaiting a decision on individual personal action requests, soldiers are required to meet duty requirements of the unit to which they are attached and therefore are expected to have at least one seasonal Class A and two duty uniforms with them.

Particle beam

by MAJ Steven J. Berganini



Glossary

ABM—antiballistic missile
ICBM—intercontinental ballistic missile.
Joule—a measure of energy. One joule is the amount of energy derived from one watt of power over a period of one second.
Mega—million.
MeV—million electron volt.
SLBM—sea launched ballistic missile.

weapon development

Particle beam weapons have been a familiar component of science fiction adventures during the last 50 years, but "death rays" are no longer mere figments of writers' imaginations. Despite claims to the contrary, the technology is evolving to develop an operational beam weapon, as best evidenced by a recent presidential report to Congress indicating that a breakthrough in particle beam technology could occur in the very near future.[1]

The United States and the Soviet Union are each developing charged particle beam weapon systems. These weapon systems may be operational as early as 1980 and could have the capability to destroy satellites and neutralize strategic nuclear forces.

This article outlines the fundamentals of particle beam weapons and provides a relatively nontechnical overview of beam weapon development in the United States and the Soviet Union.

Beam weapon fundamentals

A particle beam transmits a stream of high-energy atomic particles which can destroy or neutralize a target. The particles may have a positive or negative charge or may be neutral. In each case the particles are injected into some type of medium, normally an electron beam, and accelerated to near-light (relativistic) velocities. The medium, called a plasma when combined with the particles, can then be aimed at the desired target. For example, a negatively charged electron beam similar to those in a television picture tube can be fired through a gas or other source of positive atomic particles such as protons. These particles are swept along by the oppositely charged electron beam. Since the electron beam is relativistic, the positive particles are accelerated to relativistic velocities. The almost massless electrons can then be removed from the beam, leaving a stream of relatively heavy atomic particles.[2]

This stream of particles traveling at a relativistic velocity is a tremendous energy emission. Einstein's famous formula, $E = mc^2$, shows the relationship between energy, mass, and the velocity of light. For example, it demonstrates why a very small object, such as an atomic particle, moving at a relativistic velocity will have a very high energy potential and why it will impart an enormous amount of energy to whatever it strikes.

Particle beams are not a steady stream of energy but rather are a series of pulses. Like a bolt of lightning, each pulse is only a few millionths of a second long and discharges great quantities of energy which can have a variety of effects on a target, depending on the level of energy.[3] For example, a beam of five seconds' duration with an energy of 25 megajoules would have the explosive equivalent of 50 pounds of TNT.[4] Such an explosive force could have devastating effects on an intercontinental ballistic missile's (ICBM) reentry vehicle or its booster during the powered portion of flight. Additionally a selected target could be totally disintegrated, by making its molecular structure unstable through the enormous energy transfer. Similarly, a target could become super heated and vaporize. A beam with a lower energy level could pass through a target, such as an ICBM reentry vehicle, causing electrical and magnetic disruptions in its electronic components.[5] The lethality and relativistic nature of beam weapons make them especially suitable for antiballistic missile (ABM) applications.

Soviet developments

The technology of beam weapons spans many areas of scientific research, to include:

- Pulsed electric power generation.
- High-speed electrical switching.
- Plasma physics, particle acceleration.
- Electrical energy storage.
- Beam steering.
- Optics.
- Nuclear fusion.

[1]"Particle Beam Weapons Breakthrough Near?" *Flight International,* 22 July 1978, p. 262.
[2]Smith, H. P. "Charged Particle Beam Weapons." *Canadian Defence Quarterly,* Spring 1978, p. 17.
[3]"Key Beam Weapons Test Slated." *Aviation Week & Space Technology,* 9 Oct 1978, pp. 42-53.
[4]"Army Pushing New Weapons Effort." *Aviation Week & Space Technology,* 16 Oct 1978, pp. 42-49.
[5]Fawcette, James. "Is the ICBM Obsolete?" *Electronic Warfare,* July/August 1977, pp. 31-34.

A variety of projects are underway in the Soviet industrial and scientific communities which focus on the various aspects of beam weapon technology. Each project could have peaceful applications; however, when all the many developments are considered collectively, it seems likely that they are parts of an organized effort through which the Soviets have made significant advances in developing a particle beam ABM system.[6]

Sarova, near Gorki, is believed to be the headquarters for beam weapon development within the Soviet Union. A powerful particle accelerator being developed there has the capability to develop a pulse only one ten-millionth of a second long with an energy of 10 megajoules. This accelerator could be used as the cornerstone of a proton beam weapon for ABM or antisatellite use. Some particle beam propagation experiments have been conducted at Sarova, apparently to determine target effects.[7]

While in the Earth's orbit, several Soviet space vehicles have conducted experiments on electron beam propagation and creation of artificial plasma clouds. Other Soviet space vehicles have also employed plasma thrusters for attitude stabilization. Both of these developments show a technology which could be used in beam weapon applications.

A facility near Semipalatinsk in Soviet Central Asia has been the site of advanced nuclear fusion experiments. During the past three years, nuclear debris has been released into the atmosphere at this facility at least eight times. US officials believe the Soviets are conducting experiments with explosive nuclear generators which achieve fusion by bombarding small fuel pellets with lasers. It would be a misapplication of technology to use such nuclear generators for generating commercial electricity, but they would be ideal for providing the enormous pulses of power required for beam weapons.

Soviet efforts in these technical areas support the theory that the USSR regards beam weapon development as a high-priority mission. Some US officials have indicated that the Soviets have progressed so far that they may be able to field an ABM proton beam weapon as early as 1980.[8] Such a weapons system would probably be ground based, but a space-based neutral particle beam system could be deployed in the late 1980s. Since many of the components of a beam weapon are extremely large and extensive power supply systems are required, additional development would be necessary to reduce weight and size for space deployment.

Some US officials believe that the Soviets are beginning to look beyond the coming generation of beam weapons to the late 1990s. By then it might be possible to deploy a much more powerful space-based weapon which could beam lethal rays of particles over large areas of the Earth's surface. The effects would be similar to those of a neutron bomb. Assuming that the technology was sufficiently advanced, a true "death ray" might be envisioned which could kill silently while leaving structures unharmed.

Development of this type of beam weapon would require considerable refinement and advancement of current technology. Tremendous power levels would be required, and the size of such devices would require a massive construction project in space. Such devices would probably be the major subject of disarmament discussions; in fact, use of beam weapons on biological targets has already been addressed at the United States/Soviet disarmament conference in Geneva.

United States developments

The United States has also conducted beam weapon research for several years, but until recently it was a low priority effort. Now, with the risk of a Soviet technological breakthrough, the US program has picked up momentum and direction.

Early US efforts included a project called *Seesaw*, funded by the Advanced Research Projects Agency of the Department of Defense, to develop a Navy beam weapon. The project was discontinued because of insurmountable problems in physics. Some research continued, but the emphasis was on lasers rather than particle beam weapons. During the past few years, beam weapon research has been resumed by the Armed Services and is now being coordinated by the Department of Defense as a nationally directed program.

The Navy's *Chair Heritage* program was initiated to develop a charged particle beam weapon for aircraft carriers and cruisers to defend against antiship cruise missiles. Because its particle accelerator is the best mechanism for testing beam propagation, the *Chair Heritage* program was given a higher priority than other beam weapon programs. The weapons would be located below deck, and the beams would be magnetically routed to small firing turrets located at strategic points on the hull and deck. The system would be capable of firing six shots per second and engaging targets at ranges out to 4.5 kilometers. Deployment of this system depends on beam propagation.

Lethality tests, scheduled for 1981, will use two particle accelerators developed at the Lawrence Livermore Laboratories in California.

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[6]"Soviets Test Beam Technologies in Space." *Aviation Week & Space Technology,* 13 Nov 1978, p. 14.
[7]"Soviets Push for Beam Weapon." *Aviation Week & Space Technology,* 2 May 1977, p. 16.
[8]"US Pushes Development of Beam Weapons." *Aviation Week & Space Technology,* 2 Oct 1978, pp. 13-28.

• The first, a 5-million electron volt (MeV) accelerator, which uses a 10,000-ampere electron beam gun, will fire a beam of electrons through 10 accelerating modules which cumulatively accelerate the beam to relativistic velocities. The purpose of the 5-MeV accelerator is to test beam and energy transport and dispersion of the beam in high-density gases.

• After the initial testing with the 5-MeV accelerator, a 50-MeV accelerator with a 10,000-ampere electron beam gun will be used to continue the propagation tests.

The two accelerators will be connected for later testing. The 5-MeV accelerator will test the currents in the electron beam injector, and the 50-MeV machine will test for higher particle energies in the beam. Continued experimentation will answer key questions about beam stability and expansion, target motion effects, and beam aiming.

Probably the most critical aspect of *Chair Heritage* or any other particle beam weapon is power. Based on the technology demonstrated by the 50-MeV accelerator, the power for a particle beam weapon would have to be increased to 500 MeV. To achieve this increase, some key power problems must be solved, such as power transfer, high-repetition rate switching, intermediate power storage, pulse forming networks, and component size and weight reductions. Funds have been allowed for some work in these areas, but the majority of the funds are earmarked for accelerator development (of the $56 million projected for the next four years, only $16 million is power related).

The Army is involved in research on two separate ABM beam weapons.

• The first, called *Sipapu*, is a neutral beam, space-based weapon, which is ranked second in priority to *Chair Heritage* and is receiving in excess of $10 million this year. This program, being conducted at the Los Alamos Scientific Laboratory in New Mexico, is based on advanced Soviet technology demonstrated in a Russian-designed plasma generating device. The US version is being tested to determine compatibility with a Meson Physics Accelerator, located at Los Alamos. The two devices will be coupled to form a test apparatus for follow-on experiments on beam propagation and lethality. The *Sipapu* program has reached a stage where weapons packaging designs could be initiated. If *Sipapu* were developed in a less sophisticated, antisatellite configuration, it could be launched in three to five years with adequate funding.

• The other Army beam weapon is a ground-based, charged particle beam system which is currently being funded at less than $10 million. It is based on an autoresonant particle accelerator being developed under contract from the Army Ballistic Missile Defense Command. The accelerator is a proof-of-principle device and is not intended for direct weapon application. The design has the potential of generating single pulses with 1 to 10 megajoules of beam energy.

Both the *Sipapu* and the ground-based system will be quite large, although considerable work is being accomplished to develop new, smaller power generating devices and compact components for beam weapon systems. Still, the *Sipapu* system will be so large that many space shuttle missions will be required to transport its components into the Earth's orbit. It will probably be employed as a system of weapon platforms, surveillance and tracking satellites, and command and control satellites.

The US Air Force is interested in beam weapons, but its primary emphasis is currently in the area of high-energy lasers for space defense. A beam weapon program, currently in progress at the Air Force Weapons Laboratory, Kirtland Air Force Base, NM, has a lower priority than *Chair Heritage* or *Sipapu*, as its funding level is only about $2 million per year.[9]

The experimental work at Kirtland is centered on a "collective effect" accelerator which transforms a low-energy, high-current electron beam into a high-energy, moderate-current ion beam. The electron beam creates an electromagnetic field which accelerates positive ions in an associated plasma to particle energies many times greater than those of the electrons in the electron beam. This is a significantly greater acceleration field than is produced by other accelerators, but the distance over which this acceleration has been achieved is less than one meter. Air Force physicists are investigating this area as a potential alternative to other acceleration methods.

Initially, the American projects were developed as separate entities, with a relatively loose interservice coordination. In 1978, however, the Department of Defense organized an Office of Directed Energy Technology to coordinate the development of beam weapons, and the Pentagon established the Particle Beam Technology Study Group, composed of 53 Defense Department and US scientific community personnel.

The study group established five basic ares of technology and their funding levels: power systems, accelerator technology, beam propagation, pointing and tracking, and target effects. The group also defined four weapon system missions and estimated the funding and time required for prototype development. An operational system could be fielded before 1986.

The four weapon systems recommended were short, medium, and long-range endoatmospheric charged particle

[9]"Air Force Emphasizes Laser Weapons." *Aviation Week & Space Technology*, 30 Oct 1978, pp. 51-53.

beam weapons and a space-based, long-range, neutral particle ABM weapon. Prototype development would cost an additional $760 million and probably would require six or seven years.

• The short-range system will require a high energy beam, a high rate of fire, and a compact power source and will have a range of about one kilometer.

• The medium-range system, to be used against hardened reentry vehicles, will have an engagement range of about five kilometers. It will have a tightly focused, high pulsed, high rate of fire particle beam requiring precise pointing and tracking.

• The long-range system will have an extremely high current, high pulsed, tightly focused particle beam requiring advanced pointing and tracking. It will have a range of about 10 kilometers.

• The space-based system will require a very compact power source with large fuel capacity. This system will probably have a lethal range of hundreds of kilometers and be primarily targeted against ICBMs and sea-launched ballistic missiles (SLBMs) during the first few moments of their flight.[10]

The five-year program and the centralized, coordinated control of the previously fragmented projects represent a realistic US approach to beam weapon development. This concept seems to agree with Congressional perceptions of how we should proceed in developing these weapon systems. The program, with its all-important funding levels, is still just a concept, however, the funding will have to be approved by Congress.

Future implications

Successful development of particle beam weapons by the Soviet Union or the United States would have broad implications. The peace which we enjoy today is linked to the concept of deterrence based on assured mutual destruction. The effective neutralization of one country's strategic nuclear capability by the other, with the resultant loss of mutual destruction capability, would upset the balance of power drastically. The country with the upper hand would be in a position to impose its political will on the other with no fear of strategic nuclear reprisal and it would no longer have to exercise caution in its global quests for natural resources and influence expansion. An overwhelming strategic superiority would be enjoyed unless, or until, the other country also developed the capability.

In the event that both countries develop the weapon system, the future could be very uncertain. Antibeam weapon strategy might include the prospect of a future war in space to destroy "each other's" beam weapons. The concept of a global war without strategic nuclear weapons could give a clear advantage to the better conventional force, prompting more aggressive action. Chemical weapons might become acceptable to fill the nuclear void. Conversely, the prospect of a global war with its drain on dwindling world fuel resources might be a deterrent to future war.

In any event, if particle beam weapon systems are deployed by the Soviet Union and the United States, the prospect of a global nuclear holocaust might finally be nullified. This milestone in weapon development might also be a milestone in our search for global survival.

MAJ Steven J. Berganini is an operations research systems analysis officer, assigned to the Project Missile Project Office, Huntsville, AL.

Planned laser tests mark new era

A new generation of weapons — high powered lasers and particle beams — will be demonstrated soon by the Air Force in a "proof of concept" that will be as significant as Billy Mitchell's battleship bombing demonstration of the 1920s predicted Air Force Secretary Hans Mark.

Speaking at a banquet celebrating the 60th anniversary of the Air Force Institute of Technology, Mark said the high energy lasers will be fired from an experimental C-135 flying laser laboratory airplane, based at Kirtland Air Force Base, Albuquerque, NM, home of the US Air Force Weapons Laboratory. The Air Force Weapons Laboratory experimentally used a laser beam against a flying target as early as 1973.

Mark said the laser weapons demonstrations will change the way of thinking about the use of warplanes in much the same way that Mitchell's bombing demonstrations changed attitudes about airpower.

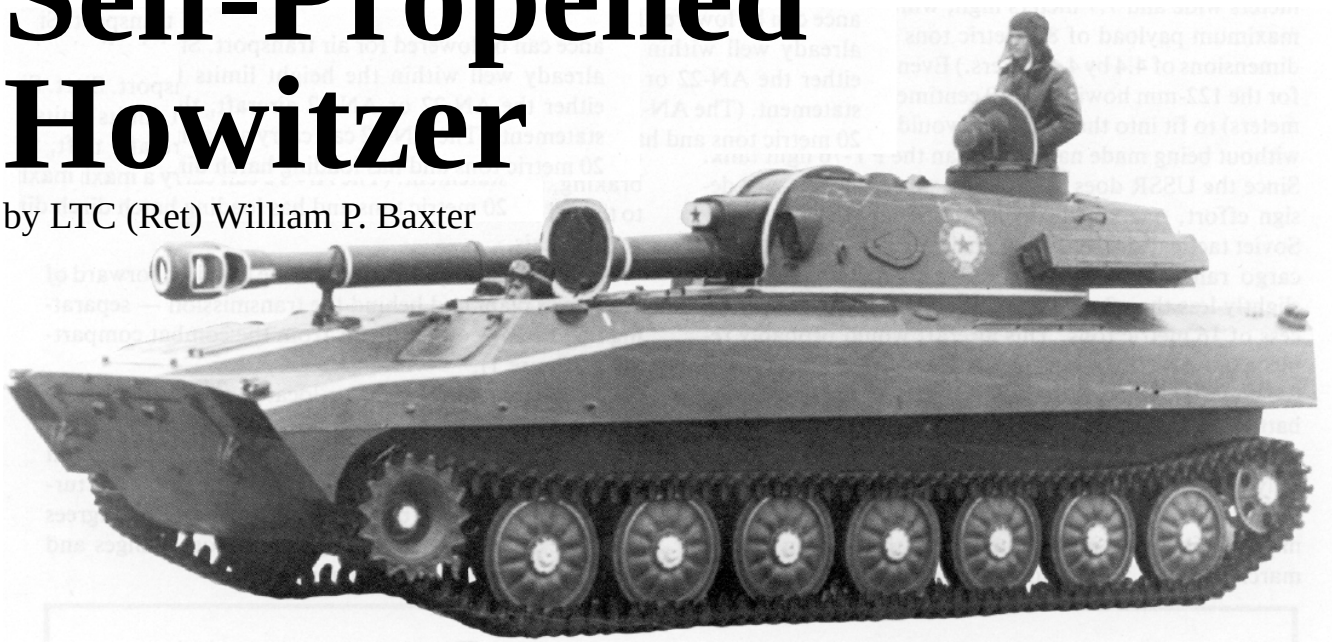
Some American intelligence sources have claimed the Soviet Union has developed the capability of land-based "death rays," as they are known in popular terms, that could disintegrate in-coming missiles long before they entered that country's atmosphere.

Mark also predicted that the Air Force will be able to go into space and develop enormous monitoring and verification capabilities "that will allow us and the rest of the world to understand when and where someone is trying to do something to endanger the security of the world." (Mr. Jack Jones, *Dayton Daily News,* Dayton, OH)

[10]"Beam Weapons Effort to Grow." *Aviation Week & Space Technology,* 2 April 1979, p. 12.

Soviet 122-mm Self-Propelled Howitzer

by LTC (Ret) William P. Baxter



In the Soviet view, a future ground war will be characterized by a fluid tactical situation in which highly mobile forces will fight a series of meeting engagements on a battlefield of great depth and without a defined frontline trace. With typical devotion to detailed planning, the USSR is equipping and training its army to fight and win that war.

One product of this preparation was the introduction of the M1974 self-propelled howitzer in 1974, catching the West largely by surprise. Indeed, an article in the November-December 1975 edition of *Field Artillery Journal* asserts that . . . "Soviet artillery is mainly towed, with an almost total lack of self-propelled pieces." This article appeared at the very time that the M1974 122-mm and the M1973 152-mm self-propelled howitzers were being issued to Soviet tactical units. Since 1974, there have been several articles in the US military press speculating on the characteristics of Soviet self-propelled artillery. Only in the past few months, however, has an authoritative Soviet description of the characteristics and employment of the 122-mm SP howitzer appeared in the open press. An article in *Znamenocets*, an official journal of the Ministry of Defense intended for junior officers and NCOs of the Soviet Army, describes the 122-mm SP weapons system as a full-tracked, high-speed chassis mounting a fully enclosed, revolving turret that carries a 122-mm howitzer. It is equipped with radio communications, day and night vision devices, and a CBR (chemical, biological, and radiological) protection system for the crew. The total weight of the weapon is 16 metric tons.

Steel tracks with combination rubber-metal links provide a low ground pressure of 0.5 kilogram per square centimeter and good cross-country mobility. Drive sprockets are at the front of the vehicle. Soviet designers opted for the Christie-type suspension (figure 1) which is standard for most Soviet tracked vehicles.

The chassis design appears to be based on the Soviet PT-76 light tank, although the differences are sufficient to justify calling it a new design. Grates over the front of the tracks and extendable grates on the rear of the chassis in amphibious operations, but actual water propulsion is accomplished by the tracks. The power plant is located in the middle of the chassis between the driver and combat compartments. According to *Jane's Weapons System 1979-1980* (edited by R. T. Pretty) the equipment is longer (7.3 meters vs 6.91 meters) and higher (2.42 meters vs 2.2 meters) than the PT-76, but is 9 centimeters narrower (3.05 meters vs 3.14 meters). A unique feature, according to the Soviet article, is that equipment clearance

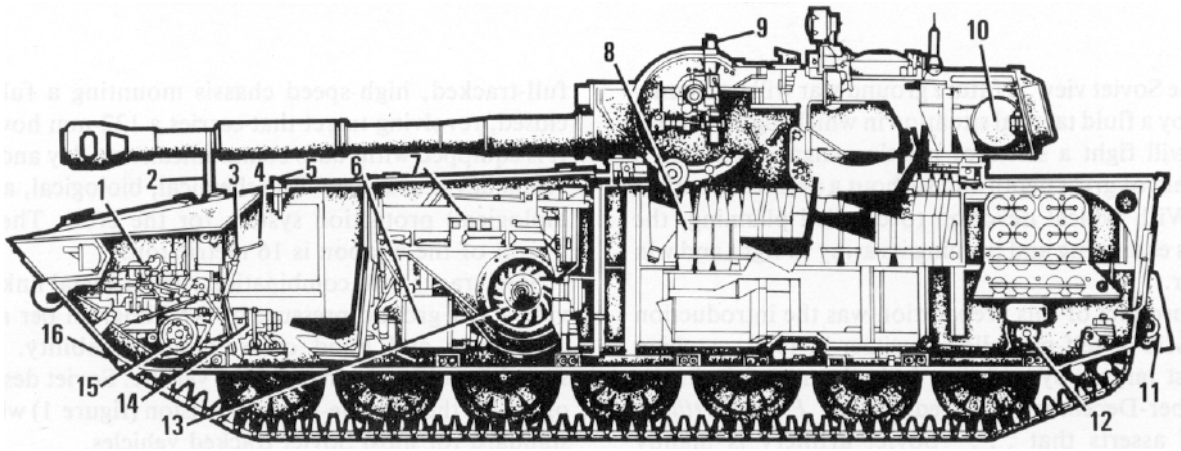
can be lowered for air transport. Since the vehicle is already well within the height limits for transport in either the AN-22 or AN-12 aircraft, this is an unusual statement. (The AN-12 can carry a maximum payload of 20 metric tons and has loading hatch dimensions of 2.95 meters wide and 7.7 meters high, while the AN-22 has a maximum payload of 80 metric tons and loading hatch dimensions of 4.4 by 4.4 meters.) Even though the chassis for the 122-mm howitzer is 10 centimeters too wide (3.05 meters) to fit into the AN-12, it would fit into the AN-22 without being made narrower than the PT-76 light tank. Since the USSR does not usually waste unnecessary design effort, one is led to speculate that perhaps a new Soviet tactical air transport is being developed that has a cargo ramp between 3.05 and 3.14 meters wide and slightly less than 2.42 meters high with a payload in excess of 16 metric tons. This aircraft would probably replace the AN-12. Lowering the clearance of the 122-mm SP could serve other purposes, such as decreasing the battlefield silhouette or locking the suspension out of recoil; however, the Soviet source relates this capability only to air transportability.

Znamenocets states that the fuel capacity for the 122-mm SP howitzer is 550 liters and that it can "road march" up to 500 kilometers without refueling. Sustained highway speed is stated at over 60 kilometers per hour, and speed on unimproved roads is in excess of 30 kilometers per hour. It can negotiate a 35-degree slope and can "swim" at 4.5 kilometers per hour. While there is no specific data given on the power plant, the 122-mm howitzer is stated to have a preheater which indicates a diesel power plant, based on its resemblance to the PT-76 and traditional Soviet practice of using diesel engines in tracked combat vehicles.

The 122-mm SP howitzer apparently has a manual transmission and is controlled by laterals for steering, braking, and clutching operations. This system, similar to that of the PT-76, enables the vehicle to spin on its own vertical axis.

The driving compartment is on the left side, forward of the power plant and behind the transmission — separating the driving compartment from the combat compartment (figure 1).

The combat compartment, located at the rear of the chassis, includes an all-welded turret with a rigidly mounted basket that holds the combat crew, combat stowage, howitzer, and fire control instruments. The turret, mounted in a ball bearing race, traverses 360 degrees using electrical power for large deflection changes and manual traverse for small changes.



Legend:

1—Pneumatic system.
2—Travel lock system.
3—Control mechanism for turning, clutch, and brakes.
4—Main drive transmission control.
5—Viewing devices.
6—Engine preheating system.
7—Engine oil system and main transmission.
8—Stowage kit.
9—Measuring instrument mount.
10—Air filtering system.
11—Hydraulic equipment.
12—Hydraulic shock absorber.
13—Cooling system jacket.
14—Space reduction gear.
15—Final drive.
16—Drive sprocket.

Figure 1. Cutaway view of the 122-mm SP howitzer.

The 122-mm SP howitzer is operated by a crew of four: a commander, a gunner, a loader, and a driver-mechanic. All of the crew stations except the driver-mechanic's are in the combat compartment. The commander's station, equipped with a cupola for vision, is at the left rear of the turret. The gunner's station is on the left of the howitzer in front of and below the commander's station. The gunner uses an optical sight extending through the roof of the turret for indirect fire and a telescopic sight parallel with the tube for direct fire. The loader's station is on the right side of the howitzer to the rear of the breech, where there is a hatch for access to the vehicle and probably for disposing of empty shell cases. The driver-mechanic enters the driver's compartment through a hatch and has a periscope and a small port for vision.

The howitzer is mounted in a cradle on trunions and can be depressed to minus 3 degrees or elevated to plus 70 degrees. The tube is equipped with a muzzle brake to reduce recoil and a bore evacuator to keep powder gases from entering the combat compartment. It has a semiautomatic vertical sliding wedge-type breechblock that automatically extracts the expended cartridge case. The firing pin may be recocked in event of misfire. The crew is protected during recoil by a folding and a fixed guard rail along the recoil path of the breech. A power rammer and extractor are fixed to the folding guard rail to simplify the task of the loader and to permit loading at any quadrant elevation.

The sustained rate of fire is five rounds per minute, and the piece can be ready to fire from the march in less than two minutes. The principal projectiles are HE fragmentation and shaped charge rounds, although there are special projectiles, such as smoke, illuminating, and leaflet rounds for special missions. The effective range is stated as being up to 15 kilometers. The caliber, physical appearance, breechblock, and effective range support the conclusion that the 122-mm SP howitzer is an updated adaptation of the older Soviet D-30 towed howitzer.

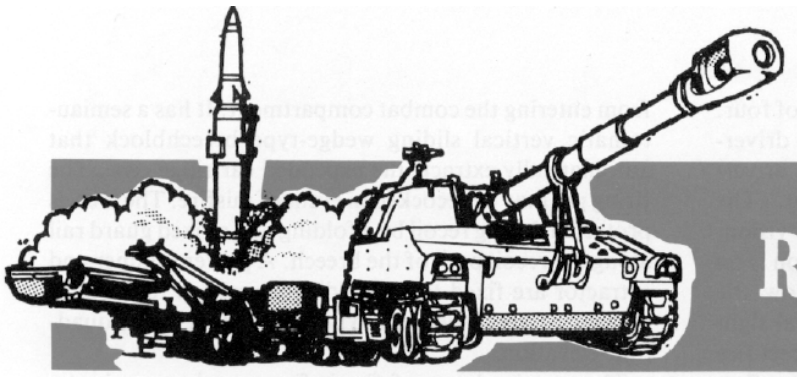
According to *Znamenocets*, the 122-mm SP howitzer is intended for employment in the indirect fire role as a counterbattery and antipersonnel weapon. It can also assume the uniquely Soviet mission of breeching minefields and barbed wire. In the direct fire role, it can use the shaped charge round to engage enemy armor.

The entire hull is hermetically sealed to prevent leaks while fording and has a two-stage vortex pump to empty the bilge. The crew is protected from CBR contamination by a collective protector unit which is mounted in the bustle of the turret and probably operates on the overpressure principle. A searchlight is mounted on the roof of the turret forward of the commander's cupola. Size suggests that the searchlight's function is limited largely to providing illumination for night movement. A travel lock to the right of the driver's hatch supports the tube during movement and most likely is releasable from inside the vehicle by the driver-mechanic. All vehicles apparently have radios for external communications.

In summary, the 122-mm SP howitzer can be described as possessing the following characteristics:

- Capability for both direct and indirect fire missions.
- A good rate of fire.
- High mobility and long range without refueling to keep pace with rapidly advancing mechanized forces.

LTC (Ret) William P. Baxter is a consultant in Soviet military affairs for General Research Corporation of McLean, VA. Before retiring from the US Army, he served in the Soviet/Warsaw Pact Division, Directorate of Research, Defense Intelligence Agency, and was a liaison officer to the Group of Soviet Forces, Germany for three years.



Right by Piece

Chemical specialists demonstrate equipment

FORT SILL, OK — The strangely dressed soldiers are not auditioning for episodes of the "Flies." They are chemical specialists demonstrating the need to know nuclear, biological, and chemical (NCB) warfare techniques.

LT Carroll Lucas, III Corps Artillery, came up with the idea of a run in the protective clothing, gas masks, and helmets. Due to the heat, the run was changed to a walk. Sixteen people from units within III Corps Artillery participated in the eight-mile walk. They wore the new M1 Charcoal Impregnated Protective Suit in MOPP (Mission Oriented Protective Posture) 4 which includes rubber gloves and footwear.

A pamphlet explaining the reasons for the march was handed to soldiers along the way. It described the great losses suffered by the Russians during World War II because of chemical warfare and urged soldiers to start NBC training.

Three 20-minute breaks were scheduled and at each stop participants pulled off their masks looking as if they had been in a sauna.

MAJ Harvey Snowden, S2 for III Corps Artillery, took part, and was very interested in the physical effects of exercise with the equipment on. The mask caused a change in breathing patterns and the wearer tired easily. It also created difficulty in vision, speech, and identification. The clothing worn over the regular fatigue uniform caused body temperature to remain high.

Two ambulances from the 47th Field Hospital and a jeep followed the marchers along for anyone who needed a ride. No one dropped out of the walk, but they were very grateful for the cold drinks waiting for them at the end of the hike. (SP4 Virginia Mildfeldt)

Getting it together . . .

FORT DIX, NJ—On Thursday, SP4 Roy Gordon was busily performing his S3 duties at Fort Knox, KY. Alton Rodeheaver was also busy, but he was working as a surface coal miner near Kingswood, WV. At the same time, Hank Winkler was installing electrical lines in Philadelphia.

Twenty-four hours and several hundred miles later, these men joined together in the hills of West Virginia's Camp Dawson to participate in a unique command post exercise (CPX) involving Active Army and Reserve Component forces. The CPX brought together the 3-3d FA from Fort Knox, KY (SP4 Gordon's unit), the 1-201st FA from the West Virginia National Guard (SFC Rodeheaver's unit), and the 78th Division (Tng) Maneuver Training Command (MTC) from Fort Dix, NJ (SFC Winkler's Army Reserve unit).

The 78th Division (Tng) MTC developed the controlled map CPX under the leadership of Field Artillery Team Chief LTC Joseph Verrone and Project Officer MAJ Charles Dancer. The exercise, which was conducted over an uninterrupted 24-hour period, involved an attack on West Germany by opposing forces and a counterattack by US troops. The 3-3d Field Artillery's mission was direct support of US maneuver forces, and the 1-201st FA reinforced the fires of the 3-3d FA.

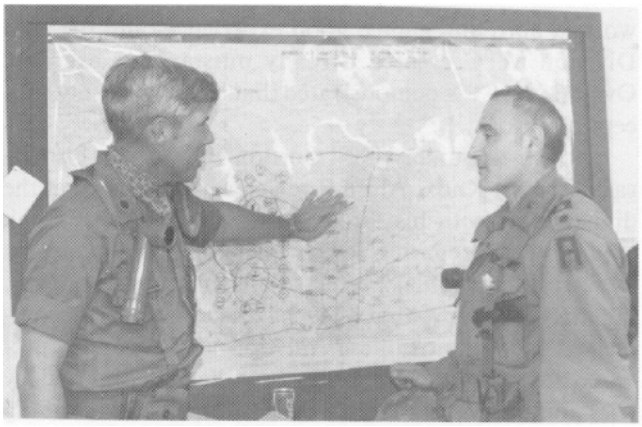
The exercise not only symbolized the Total Army concept at work, but it also represented the important and lesser known Affiliation Program. This program promotes an ongoing working relationship between the Active Army and Reserve Components. Such a partnership is designed both to strengthen and optimize Army combat capability and efficiency.

The Camp Dawson CPX marked the fourth year the 3-3d FA and the 1-201st Guard unit have affiliated for training purposes. On several occasions, the 1-201st traveled to Fort Knox for weekend drills with the 3-3d's equipment and key personnel, but this was the first time that the two groups worked together in a CPX administered by another unit, the 78th Division (Tng) MTC.

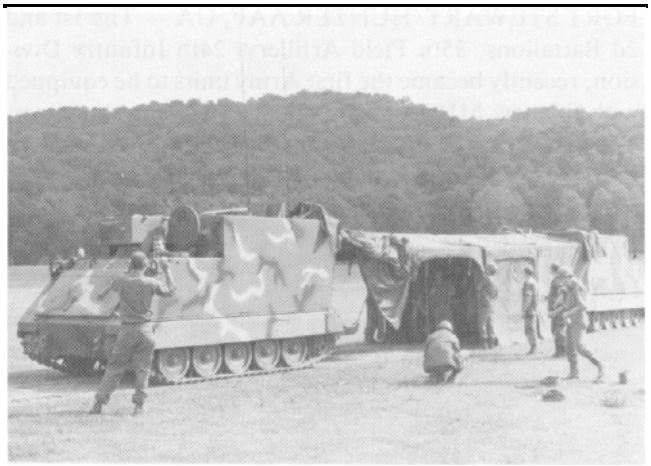
At the conclusion of the exercise, participating troops enthusiastically commented about their weekend experience. "This CPX was great—it was really realistic. It has given me confidence that I could do the job if I am called to active duty," declared the 1-201st Supply NCO, SFC Rodeheaver. "The CPX helped me to use my supply manuals and SOPs to solve problems."

SP4 Gordon, S3 Section, 3-3d, also felt that the exercise was beneficial. "I got to know members of our affiliated unit. I was also able to see beyond my own particular job to the big picture."

Both the Army and National Guard unit commanders strongly endorsed the CPX and Affiliation Program.



LTC Easum, Commander of 3-3d FA (left) discusses the exercise with LTC Carline, Commander of 1-201st FA. (Photo by SSG W. Czaja)



Movement of the 1-201st FA during the command post exercise at Camp Dawson. (Photo by SSG W. Czaja)

"This exercise effectively provided for the interchange of knowledge and skills," commented LTC Tom Easum, Commander of the 3-3d FA, 194th Armor Bde. "Such training allows the Affiliation Program to achieve its objectives. And, by the way, I feel the MTC did an outstanding job—they were professional citizen-soldiers."

"The CPX enabled my troops to apply their classroom skills in a field environment. The exercise employed a realistic time frame under simulated combat conditions," added LTC Carline, Commander of the 1-201st FA. "This is an excellent learning vehicle which identifies the areas of training that should be emphasized. And, it is very beneficial to work with the affiliated Active Army unit in a simulated combat situation," he stressed.

COL William R. Kelley, a representative of Army Readiness Region II (ARR II) encompassing Pennsylvania, New Jersey, and West Virginia, also commended the CPX. He remarked that it met the combat readiness objectives of ARR II. "The exercise illustrated the value of the Affiliation Program. Both the 3-3d and 1-201st

worked hard and gained good experience, and the 78th Division MTC created a really outstanding exercise. Overall, the CPX demonstrated that the Total Army concept can work."

By dusk on Sunday, SP4 Gordon was back in his barracks at Fort Knox, Alton Rodeheaver was sitting at the dinner table with his family in Kingswood, and Hank Winkler was preparing for another week with his work crew in Philadelphia. Perhaps they will not meet again, but they all know that they have successfully accomplished their joint military mission and are more prepared for combat should they be called. (Submitted by CPT Judith Arnold, 78th Division Maneuver Training Command)

Units receive new M109A2 howitzer

FORT STEWART/HUNTER AAF, GA — The 1st and 2d Battalions, 35th Field Artillery, 24th Infantry Division, recently became the first Army units to be equipped with the new M109A2 self-propelled 155-mm howitzer. The M109A2 is being fielded by the US Army Armament Materiel Readiness Command, which has production, maintenance support, and management responsibility for the system.

Issue of this newly manufactured howitzer to the Fort Stewart units marked the first new self-propelled 155-mm weapon in the US Army inventory since 1969, when the last of the short tube M109s were delivered.

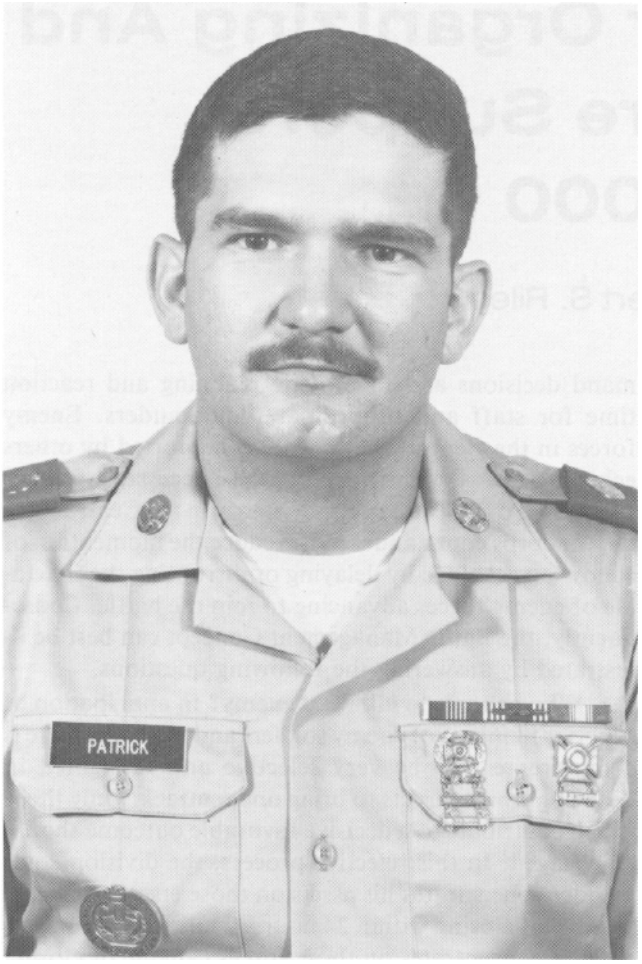
More than 500 of these artillery weapons are planned for production during the next three years, with the majority earmarked to re-equip Field Artillery battalions in the US Army, Europe.

The new M109A2 model has numerous significant improvements over the M109A1, especially in the areas of effectiveness, efficiency, reliability, and human engineering.

- The gun mount design has been improved.
- Hydraulic components have been simplified.
- On-board ammunition stowage has been increased to 36 rounds, which includes 22 of the newly developed longer rounds.
- Engine monitoring instruments have been added.
- Several new safety features have been incorporated, e.g. a ballistic cover has been placed over the panoramic telescope sight.

The M109A2 weighs 55,000 pounds, combat loaded. It can reach a maximum speed of 35 miles per hour and has a normal cruising range of 215 miles.

New M109A2 SP 155-mm howitzer.



SSG Gary M. Patrick.

Patrick named Sill Soldier of the Year

FORT SILL, OK — SSG Gary M. Patrick, 1st Training Battalion, US Army Field Artillery Training Center, has been named Fort Sill's Soldier of the Year.

Patrick got out of the service as a sergeant and reenlisted about a year later as a private first class. He bypassed basic and advanced individual training, going straight to Fort Stewart, GA, where he became a squad leader, training new arrivals in air defense artillery.

He put in for drill sergeant's school and was assigned to C Battery, 6th Training Battalion, at Fort Sill. Patrick graduated from the Drill Sergeant Course in just four weeks and then was assigned to D Battery, 1st Training Battalion.

Redleg cited for heroism

NEW YORK, NY — PFC Alexander Small, assigned to A Battery, 1st Battalion, 2d Field Artillery, has been honored for heroism by the New York City Fire Department for his life-saving efforts during a Brooklyn apartment house fire last August.

According to fire department officials, Small was credited for saving the lives of 12 persons for which he received a New York Fire Department Certificate of Appreciation.

Prior to his enlistment, PFC Small was a restaurant manager in New York. After his military obligation has been completed, he hopes to go into police work.

Commanders Update

BG Vincent E. Falter
VII Corps Artillery

COL Uri S. French
3d Armored Division Artillery

COL August M. Cianciolo
41st Field Artillery Group

COL James W. Wurman
212th Field Artillery Group

COL Rudolph N. Pataro
3d Basic Combat Training
Fort Dix, NJ

COL Ralph A. Udick
HQ Command, USA Garrison
Fort Campbell, KY

LTC George W. Aux
3d Battalion, 3d Field Artillery

LTC Isaac F. Bonifay
2d Battalion, 18th Field Artillery

LTC Richard M. Biondi
2d Battalion, 21st Field Artillery

LTC Stephen C. Husted
6th Battalion, 33d Field Artillery

LTC Daryl E. Garner
2d Battalion, 35th Field Artillery

LTC Kenneth W. Simpson
1st Battalion, 37th Field Artillery

LTC Jack T. Garven
1st Battalion, 75th Field Artillery

LTC Donald H. McClellan
1st Battalion, 92d Field Artillery

LTC Thomas Cunningham
4th Basic Training Battalion

New Concepts For Organizing And Managing Fire Support, 1986-2000

by COL (Ret) Robert S. Riley

As field artillery organizations increase in size, as tasks become more numerous, and as available resources (weapons and munitions) become more complex, battle commanders will become inundated with a myriad of details and everchanging requirements. Consequently, new concepts must be devised to keep pace with the tempo of expected combat and to facilitate effective decision making for maximizing combat power. This article addresses a new concept of how a commander could manage and organize for combat during the next two decades—the Battle Management Concept.

Battle management

Under the Battle Management Concept, the division commander's job will be to win the immediate battle (Central Battle) at the forward edge of the battle area (FEBA), while the corps commander will be expected to win the battle of interdiction. Critical to attaining the division objective is assignment of responsibility for attacking the enemy in depth beyond the direct fire battle. In fulfilling this responsibility, the division commander can follow the framework of a decision process model, which is the heart of the Battle Management Concept. Essentially, it is a comparison of the projected future combat situation to the desired, planned outcome with recognition of shortfalls. Implicit in the concept are four requirements:

- The requirement for a projection of the future combat situation.
- The need for current, accurate information on our own force capabilities.
- An ability to disseminate decisions and subsequent orders to shoot, maneuver, or allocate resources as needed to influence success in the Central Battle and the more distant Second Echelon Battle.
- And, most importantly, the requirement to have a battle plan with which to base a comparison between the projected future combat situation and the desired, planned outcome.

At division level, the battle plan should be well defined at least 24 hours in advance to serve as the basis for command decisions and to provide planning and reaction time for staff and subordinate commanders. Enemy forces in the Central Battle will be supported by others echeloned in depth to exploit the successes of those engaged. To achieve a decisive victory in the Central Battle, the corps commander must reduce the momentum of follow-on echelons by delaying or disrupting the timetable of enemy forces advancing to join the battle. Consequently, the Battle Management Concept can best be illustrated by answering the following questions.

- **Who chooses to kill what enemy?** In anticipation of superior numbers of enemy soldiers and materiel, there is a requirement to be very selective and farsighted in choosing which targets to bring under attack. Only those which contribute to a decisive favorable outcome should be engaged. In this selective process, the division commander concentrates his assets on those enemy elements capable of closing within 24 hours, while the corps commander concentrates on those forces capable of closing after 24 hours.
- **Who controls the multi-functional areas of the division?** Under the Battle Management Concept, these areas will be controlled by the tactical (TAC), main, and rear command posts (CPs). The TAC CP will control the brigades and all forces engaged in the Central Battle. The main CP will be force generation oriented. It will add the enemy second echelon to the Central Battle and will consider the "Whole Battle" from the present to 24 hours in the future. The rear CP will support the resource allocation decisions of the division commander.
- **Who conducts the analysis of the threat, develops the concept of battle, and coordinates the commander's plan to win the "Whole Battle"?** A Battle Coordination Team (BCT) is formed to act in anticipation of, not in reaction to, these functions. It retains an objective view of the whole 24-hour battle and continuously maintains this projection in concert with corps and adjacent divisions. Its functions will be to:

1) Maintain current and projected views of the "Whole Battle."

2) Maintain accurate and projected views of friendly capabilities.

3) Develop the best 24-hour battle plan for the division to follow.

4) Communicate the approved battle plan to the implementing elements of the division.

5) Monitor execution of the battle plan.

6) Maintain a continuous update of the battle plan.

This concerted effort will be facilitated by an automated battlefield capability for all tactical echelons to share a graphic real-time and projected view of the "Whole Battle." To conceptually come to grips with the automated components of the Command, Control, Communications, and Intelligence (C^3I) Systems and their role in supporting the Battle Management Concept, The Executive Control and Subordinate Systems (ECS^2) Concept has been developed. The executive system is the Tactical Operations System (TOS) which will provide the commander's priorities and guidance to the control systems for each functional area; e.g., systems such as the Tactical Data Systems (FATDS—the improved TACFIRE) for the field artillery and the All Source Analysis System (ASAS) for intelligence. The proposed ECS^2 structure will extend with variation from corps to battalion level.

Functional specialization

To support the Battle Management Concept and to simplify the management of fire support, artillery commanders must consider functional areas of fire support, allocate assets, and adjust priorities as the battle progresses. Since enemy forces outnumber NATO forces in men and materiel, the artillery commander is faced with the dilemma of how to quickly attain a more favorable force ratio in the course of battle. Under current concepts, suppression and neutralization fires against enemy tanks, armored personnel carriers, and self-propelled field artillery require large volumes of fire but ultimately result in few damaged tanks or weapons. Thus, to reduce the ratio of enemy forces to manageable levels, artillery cannon and missile firing units can be assigned functional specialization tasks and remain responsive to the tactical missions of direct support, reinforcing general support, and general support-reinforcing.

Through the proper allocation of resources to meet the requirements presented by the threat, the artillery commander then can use functional specialization to address the major areas of target servicing by indirect fire (TSIF), counterfire, suppression of enemy air defense (SEAD), and battlefield interdiction. In each of these areas the target attack method can be applied to the workload to determine the number of weapons which should be allocated to each task. The resulting distribution of weapons and munitions tailored to support these tasks then becomes a prime factor in implementing functional specialization.

Organizing the artillery for combat

The solution for implementing functional specialization lies in the organization of artillery for combat. The focus will be on four "centers" established to coordinate and direct combat tasks. Specific identification of each insures that none of the important functional areas are given less attention than desired by the commander. Each center is given necessary assets to accomplish its job to include target acquisition, fire control, and weapons systems needed for mission accomplishment. The proposed organization is shown in figure 1.

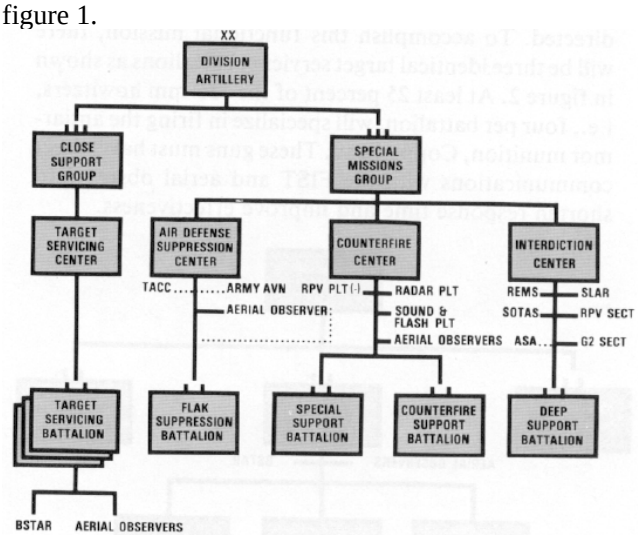


Figure 1. Artillery organization for combat, 1986-2000.

Corps FA brigades will be allocated on the basis of one each per committed division and will be attached to the division artilleries to perform special missions and to operate the three centers—Counterfire, Air Defense Suppression, and Interdiction. Brigade staffs may require augmentation to establish and operate these centers. The corps commander would retain the flexibility of allocating the appropriate number of battalions or fire units to augment fires, to weight the main attack, or to strengthen vulnerable areas in the defense.

Div arty will be responsible for establishing and operating the TSIF Center—the direct support center—and for establishing a TOC, coordinating fire missions, planning fires, establishing priorities, assigning position areas, allocating ammunition, and assigning targets to the appropriate center. Functionally, this organization for combat is designed to provide adequate close support to the forward combat battalions; kill the preponderance of the armor threat in the first five kilometers beyond the FEBA; silence, fix in place, and destroy the enemy air defense sites and artillery batteries; and delay, disrupt, and cause casualties among enemy second echelon and logistical forces by an intelligence guided interdiction program.

Target Servicing Center

Target Servicing Center activities will focus primarily on the area extending five kilometers beyond the FEBA. Each target servicing battalion would work directly with the combat brigades and would have the same responsibilities associated with the tactical mission of direct support. In addition to providing close support for the combat brigades, these battalions will concentrate on killing enemy armor in this zone. When only two of the three brigades are committed, the third target servicing battalion will augment fires of the other two battalions as directed. To accomplish this functional mission, there will be three identical target servicing battalions as shown in figure 2. At least 25 percent of the 155-mm howitzers, i.e., four per battalion, will specialize in firing the antiarmor munition, Copperhead. These guns must have direct communications with the FIST and aerial observer to shorten response time and improve effectiveness.

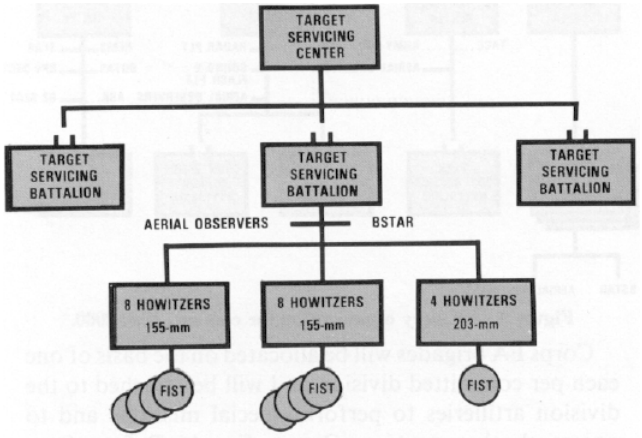


Figure 2. Target Servicing Center.

Employed in this role, the target servicing battalion should be located about 10 kilometers behind the FEBA. Although the range for communications would be extended by this deep positioning, there are off-setting advantages. First, enemy counterfire becomes more difficult and less effective because there is more real estate available in which to disperse and displace artillery. Displacements should be less frequent as a result of changes in the FEBA. Further, logistical support for the battalions should be somewhat eased in that the distances will be shorter and the operating environment safer. Through this functional specialization in missions, there would be limited use, if any, of illumination munitions. Also, rocket-assisted projectiles (RAP) and field artillery scatterable mines (FASCAM) could be eliminated from the basic loads of these battalions, thereby simplifying ammunition resupply for the direct support (DS) battalions.

Air Defense Suppression Center

All air defense suppression planning for the ground commander will be placed in this center which will be supported by a "Flak" Suppression Battalion of 203-mm and general support rocket system (GSRS) batteries as shown in figure 3. Enemy air defense fire units must immediately

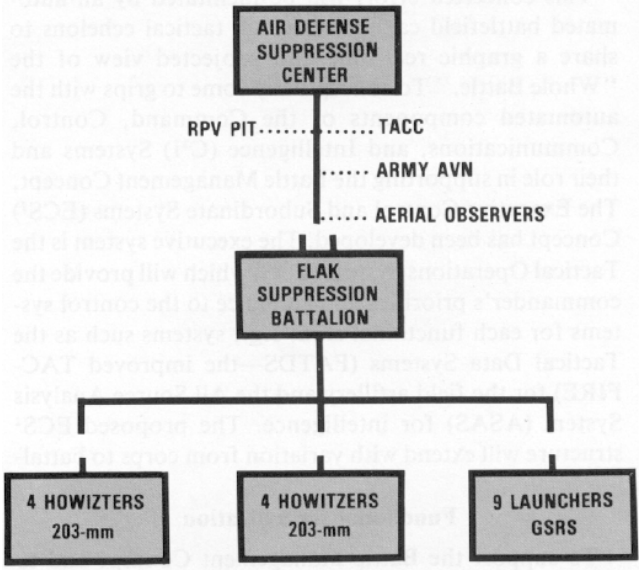


Figure 3. Air Defense Suppression Center.

be attacked when detected, and, since their locations are normally not revealed until firing, target acquisition means must be linked directly to the Air Defense Suppression Center and the Flak Suppression Battalion. (Normally, tactical fighter, close air support, and Army aircraft will be the targets of enemy air defense units.) Since the reaction time is very short, quick fire channels must be established to suppress and destroy targets.

Information on all air activity, planned or on-going, must be known in the Air Defense Suppression Center. There must be dedicated resources to permit immediate response to destroy the enemy air defense threat. The Air Defense Suppression Center will respond with an immediate GSRS volley of dual-purpose improved conventional munitions (DPICM) which should cause damage and halt firing. Immediately following this munition, two battery volleys of FASCAM containing both antipersonnel and antimateriel mines will be fired, and, after the enemy air defense unit has been fixed in place, it can then be destroyed by Copperhead. For this latter task, the destruction mission will be passed to the Counterfire Center.

Ammunition required for the "Flak" Suppression Battalion will be primarily DPICM and FASCAM; however, both the GSRS and 203-mm units should be capable of firing either munition. "Flak" targets may possibly

extend to an area 30 kilometers beyond the FEBA to reach deep enemy fire units. Possibly, RAP ammunition may be required for the 203-mm howitzers. Even with these specialized fire missions, the Flak Suppression Battalion will require only three basic types of ammunition.

Counterfire Center

The field artillery brigade staff will be augmented by staff personnel from the special and counterfire battalions and will operate the Counterfire Center. It will plan, coordinate, and execute all surface-delivered counter-fires in an area from five to 20 kilometers beyond the FEBA. Additionally, it will control the target acquisition means required to locate and destroy enemy artillery and air defense fire units. Two battalions will be under the operational control of this center as shown in figure 4. The special support battalion will have three batteries of 155-mm howitzers dedicated to firing Copperhead projectiles for destruction of artillery and air defense weapons. The Counterfire Support Battalion will neutralize enemy artillery batteries with DPICM and fix them in place with FASCAM.

Concurrent with the firing of DPICM and FASCAM, the Remotely Piloted Vehicle (RPV) Platoon will send an RPV to the target area for laser designation. The RPVs will communicate directly with the 155-mm batteries and will assist with destruction missions. Although the RPVs will be given specific locations of enemy batteries under attack, there may be occasions when they encounter or detect air defense weapons or clusters of armored vehicles on the move or in assembly areas. Such targets of opportunity should be reported to the appropriate center in order to be brought under attack. Also, during the hours of darkness, RPVs can be used to laser designate targets with the assistance of 155-mm illumination of enemy positions.

The primary ammunition requirements for the counterfire battalions will be DPICM, FASCAM, Copperhead, and illumination. The 155-mm howitzers of the Special Support Battalion will be devoted mostly to Copperhead but could fire FASCAM and illumination. The Counterfire Support Battalion will carry GSRS, DPICM, and FASCAM but the 203-mm howitzers carry all four type munitions. Again, through functional specialization, the resupply of the firing batteries will be simplified by reducing ammunition types to only those required.

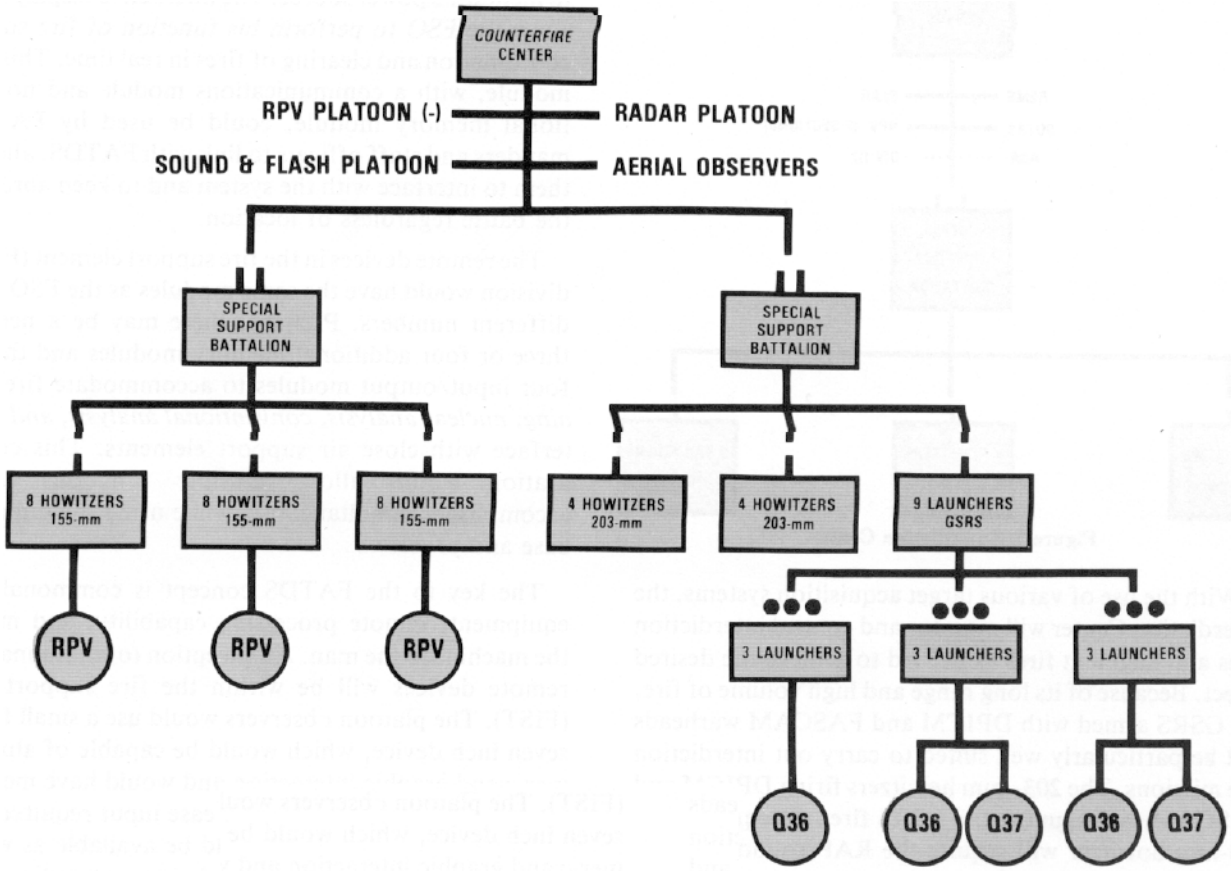


Figure 4. Counterfire Center.

Interdiction Center

The mission of the Interdiction Center will be to delay and disrupt enemy second echelon elements, command and control, and logistical support approximately 10 to 30 kilometers beyond the FEBA. To accomplish this function, the Interdiction Center will have a Deep Support Battalion under its operational control as shown in figure 5. Using assets provided, the center will determine the optimum location and time for interdiction fires. Barriers can be created by the use of FASCAM at critical points such as road junctions, bridges, stream crossing sites, defiles, or mountain passes. Enemy units halted along roads or fixed in place by FASCAM can be brought under attack by DPICM volleys fired by 203-mm howitzers. GSRS launchers can be used to attack large formations of enemy forces in the open or in assembly areas, while armored vehicles, self-propelled artillery, and air defense weapons can be attacked by 155-mm howitzers firing Copperhead when within range. At interdiction ranges, RPVs, stand-off target acquisition systems (SOTAS), and other aerial observation means will be essential to observe and to laser designate targets. Additionally, interdiction targeting must be closely coordinated with the Air Force.

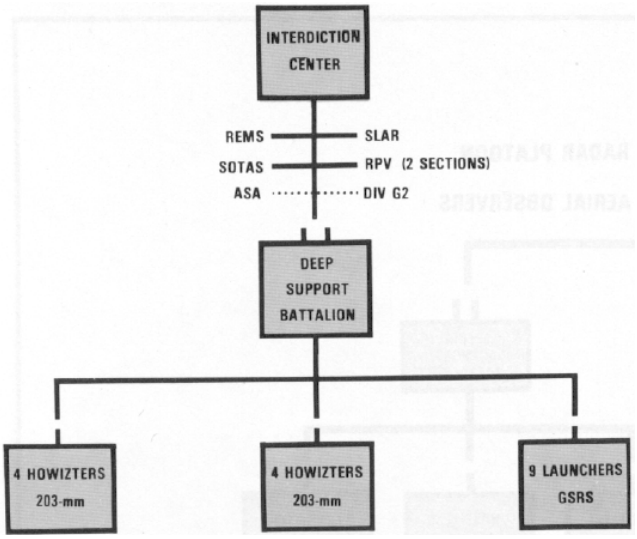


Figure 5. Interdiction Center.

With the use of various target acquisition systems, the Interdiction Center will monitor and control interdiction fires and augment fires as needed to achieve the desired effect. Because of its long range and high volume of fire, the GSRS armed with DPICM and FASCAM warheads will be particularly well suited to carry out interdiction fire missions. The 203--mm howitzers firing DPICM and FASCAM can augment the GSRS fires as required (the 203-mm howitzer will require the RAP round to reach deep targets).

Fire control

What will the fire control system look like and how will it evolve? The proposed Field Artillery Tactical Data System (FATDS)—the successor to TACFIRE—will comprise a system of processors distributed on the battlefield and tailored to support fire missions controlled by the functional centers. Specifically, there will be remote devices consisting of common processors, input and output man-machine interface modules, memory modules, and communication modules. These devices will be configured to provide the capability required at certain echelons.

For example, the battalion fire support officer (FSO) may be equipped with a processor with one memory module and a communication module accommodating two radios mounted in his vehicle. Also, he could have two input/output modules capable of operating in the vehicle, remoted from the vehicle via fiber optic cable, or interfacing with his processor via radio. This configuration would allow the FSO to work with the maneuver battalion staff or accompany the commander while maintaining the link with his processor. The input/output module would have the capability for keyboard entry, menu select entry, and interactive alphanumeric and graphical displays in a package the size of a briefcase to include its power source. The interactive display would allow the FSO to perform his function of fire support coordination and clearing of fires in real time. This same module, with a communications module and no additional memory module, could be used by FA commanders and staff officers to link with FATDS, allowing them to interface with the system and to keep abreast of the battle regardless of location.

The remote devices in the fire support element (FSE) at division would have the same modules as the FSO but in different numbers. Perhaps, there may be a need for three or four additional memory modules and three or four input/output modules to accommodate fire planning, nuclear analysis, conventional analysis, and an interface with close air support elements. This configuration would allow multiple functions to be accomplished simultaneously while using the same data base and processor.

The key to the FATDS concept is commonality of equipment, remote processing capability, and moving the machine to the man. An exception to commonality in remote devices will be within the fire support team (FIST). The platoon observers would use a small five by seven inch device, which would be capable of alphanumeric and graphic interaction and would have menu selective and prompt features to ease input requirements. Limited internal memory would be available as well as internal processing, such as moving target predictor routines

and translating shift-from-known-point and polar-plot data into grid data for transmission.

At the FIST chief level, there would be a device capable of performing all the functions of the platoon observer device. It would have increased storage and be capable of interfacing with two to four radios. Further, it would provide for relaying of data to and from the platoon observer as well as switching and routing of messages, both manually and automatically. The FIST chief would use this device to coordinate the use of mortars, field artillery, and other fire support means. The device would be about the same size as the present Digital Message Device (DMD).

In the area of communications and data distribution, the existing constriction is the Digital Data Terminals and the Communications Control Unit. These two devices would be replaced by a communications processor that would provide efficient utilization of the communication media and would be a fraction of the size of the devices it replaced. The communication processor would be compatible with the existing transmission type and rates (1,200 bit-per-second) as well as the 16-kilo bit-per-second digital capability of emerging communications systems.

The central processors in the fire direction centers (FDC) would still maintain the data base for remote processors located elsewhere. Multiple input and output modules would distribute the capability for access to the central processor via fiber optic cable to all functional elements within the FDC and at remote locations. The central processor would have a greater capacity than the remote processors through additional memory modules and links to the communications processor. Interactive graphic displays (electronic battlemaps) would be used for planning and coordinating fire support and would be linked to the central processor data base. However, they would not be remoteable. In its final configuration, the entire central processor would be capable of being mounted in any combat vehicle, wheeled or track, larger than a ¼-ton truck. It would be independent of the carrier, enabling it to be easily transferred from one vehicle to another as the tactical situation dictates.

Conclusion

The key to success on the battlefield during the period 1986-2000 will depend on a qualitative concept of battle management, the organization for combat, and a network of automated tactical data systems to facilitate real-time battle situations and command decisions. Currently, no drastic changes are envisaged for the channels of command and control as they exist today. However, to effectively manage events on the battlefield and to influence the desired outcome, efforts must be made to maximize valuable resources through functional specialization.

For the field artillery, the apparent solution lies in its organization for combat. Organizing along functional lines will divide the battle workload among all FA head-quarters and functional centers. The shifting of assets necessary to accomplish such specialization may be strange to the traditional views of the artilleryman. However, superior numbers of enemy forces and the advanced technology of FATDS demand a rearrangement by functional tasks. The emphasis on the future employment of artillery should be on destruction—not suppression—of enemy armored vehicles, self-propelled artillery, and air defense systems. Only by meeting this challenge can the artillery be successful on the future battlefield.

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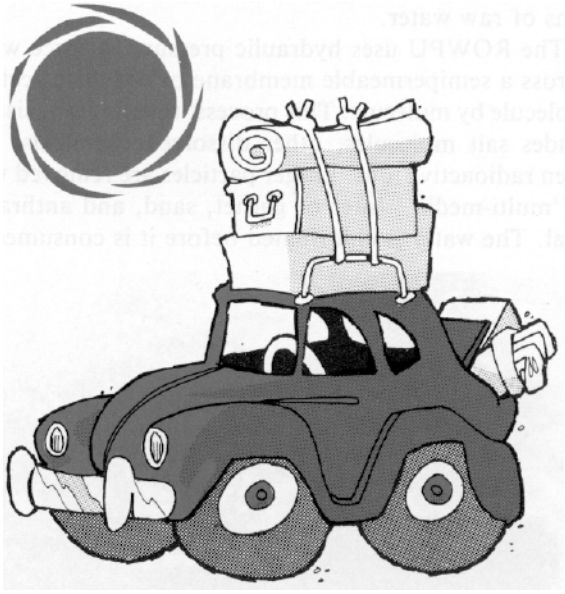
The thoughts and items presented in this article do not necessarily represent official US Army policy or endorsement by the US Army Field Artillery School.--Ed.



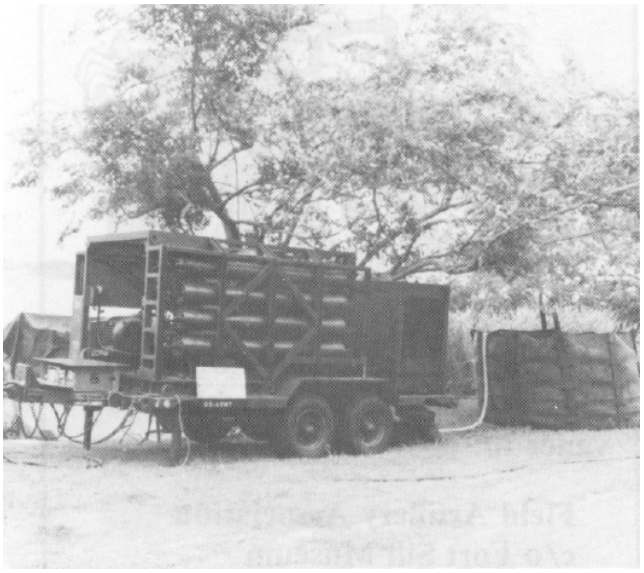
With Our Comrades In Arms

New water purification unit

The Army's newest water purification system, called the Reverse Osmosis Water Purification Unit (ROWPU), can process drinking water from almost any source. So far, the Army has used the brackish waters of the upper Chesapeake Bay, sea water from the mouth of the Panama Canal, and fresh water from Fort Knox and Fort Bragg areas.

Powered by a 30-kilowatt generator, the ROWPU can produce 600 gallons of drinking water per hour. (Eventually, the Army plans to test a unit that will produce 3,000 gallons per hour.) The model presently undergoing tests can make one gallon of potable water from two gallons of raw water.

The ROWPU uses hydraulic pressure to force water across a semipermeable membrane of cellulose acetate, molecule by molecule. This process, reverse osmosis, excludes salt molecules, other dissolved chemicals, and even radioactive ions. Larger particles are removed with a "multi-media" filter of garnet, sand, and anthracite coal. The water is chlorinated before it is consumed.



CPT Richard Skaaden, test officer, monitors instruments as the ROWPU draws water from the Panama Canal.

Presently-fielded Army equipment purifies water by coagulation. Chemicals introduced into a container of raw water attract suspended particles, such as grit and large grains of salt, and the coagulated matter is then separated from the water. However, dissolved chemicals and radioactive ions cannot be removed by this technique, and each type of raw water (saline, fresh, and brackish) requires a different purification unit.

Mobility sets the ROWPU apart from other reverse osmosis units, most of which are the size of small buildings. The Army unit weighs five tons and can be transported on a flatbed trailer about 12 feet long. In tests at Fort Bragg, the ROWPU survived an airdrop undamaged.

The Mobility Equipment Research and Development Command developed the ROWPU and tested the unit from August 1978 until January 1979. In June, the US Army Tropic Center in Panama began tests which lasted through December 1979.

XM1 tank tested

The 2d Battalion, 5th Cavalry, 1st Cavalry Division, has been selected to test the Army's XM1 main battle tank.

According to current planning, the battalion will receive and test 54 tanks, with delivery beginning in June 1980 and continuing through December. The test is scheduled to be concluded by April 1981.

Operational details for the test are being developed by the Combined Arms Test Activity (TCATA) at Fort Hood. TCATA test officers and specialists will be working with unit soldiers throughout the program.

The XM1 tank, produced by the Chrysler Corporation, will be the Army's first turbine-powered tank and is designed to incorporate significant advances in crew protection, mobility, and fire control.

The 2d Bn, 5th Cav, will be organized into four tank companies with three platoons to each company and four tanks per platoon. Current organizations will be modified to provide the unit increased petroleum and ammunition-carrying capabilities.

During the first quarter 1980, battalion personnel will undergo extensive operational and maintenance training to prepare them for testing the new vehicle.

A Hughes Aircraft Company technician is shown with three common imaging infrared guidance seekers now in engineering development at Hughes Aircraft Company for Air Force and Navy guided weapons. At the right is the advanced development model of a guidance unit for the Navy's Walleye glide bomb. In the center is an advanced development seeker for the Air Force's GBU-15 glibe bomb, and on the left is an early model of an infrared seeker for the Air Force Maverick missile. Note that the Walleye and Maverick units are nearly identical, while the unit for the GBU-15 is packaged differently.

1978 outstanding ROTC grad honored

The outstanding Army Reserve Officer Training Corps (ROTC) graduate award for 1978 has been presented to 2LT Janet Sue Hudson by Secretary of the Army.

As outstanding Army ROTC graduate, Lieutenant Hudson received the Hughes Trophy award, created and sponsored by the Hughes Aircraft Company. The award is presented annually to the previous year's outstanding graduate. This is the 15th year the award has been given.

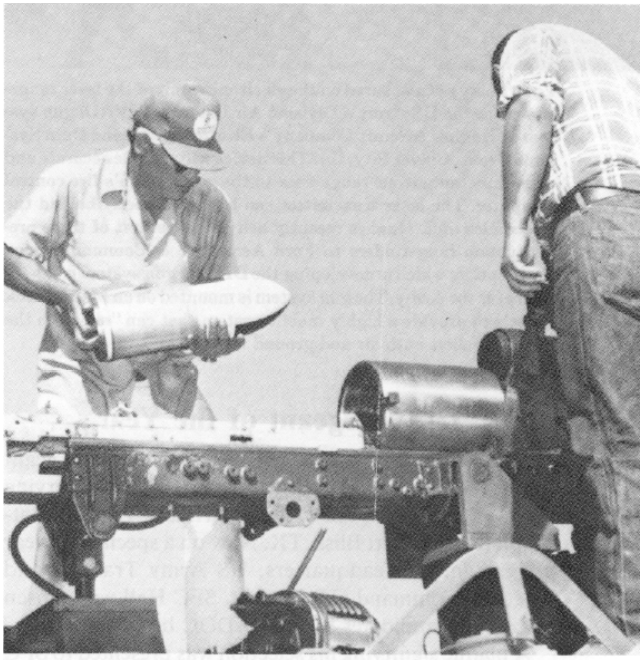
Hudson was selected for the award by a Department of the Army selection board from among nominees of 279 colleges and universities hosting the Army ROTC program.

STAFF antitank system tested

Aerojet Electro Systems, under contract to US Army Armament Research and Development Command (ARRADCOM), successfully delivered a millimeter wave radar sensor at Army Yuma Proving Ground to demonstrate a new concept in antitank weapon systems.

The STAFF (Smart Target Activated Fire and Forget) sensor was tested using a special 155-mm projectile designed by ARRADCOM, along with a new kind of warhead known as a self-forging fragment. The round was fired 1,000 meters downrange to pass over a partially buried tank (to simulate a tactical hull defilade position). The sensor successfully triggered the warhead over the target within the correct cycle of the projectile's spin which resulted in the highly concentrated fragment bundle penetrating at the top of the tank.

The STAFF is primarily designed for use by infantry units for close support and direct fire defense against heavy tanks. The system is to be made available for delivery by 105-mm to 155-mm weapons.



Personnel at Army Yuma Proving Ground, AZ, are preparing to launch the STAFF millimeter wave radar sensor mounted in a test 155-mm round.

Laser energy is measured on the electronics unit of the laser rangefinder for the US Army's Division Air Defense (DIVAD) gun system at Hughes Aircraft Company's Electro-Optical and Data Systems Group, Culver City, CA. This device will provide accurate and almost instantaneous range data to the gun system's fire control computer. The laser transmitter can be seen directly behind the electronics unit. Hughes recently delivered the first of three preproduction rangefinders to Ford Aerospace & Communications Corporation, which is developing the DIVAD gun system competitively for the Army. The gun system is mounted on an M48A5 tank chassis to provide a highly mobile system that can "shoot on the move" against both air and ground targets.

Drill Sergeant of the Year

SFC Robert E. Hall has been awarded Drill Sergeant of the Year honors for his accomplishments while serving with C Battery, 4th Air Defense Artillery Training Battalion (FAW), Fort Bliss, TX. Now on a special one year assignment at Headquarters, US Army Training and Doctrine Command (TRADOC), SFC Hall was chosen from nine candidates by a TRADOC board.

A plaque signifying his selection was presented to SFC Hall by former Secretary of the Army Stephen Ailes who established the Drill Sergeant Program in 1964.

Roland contract awarded

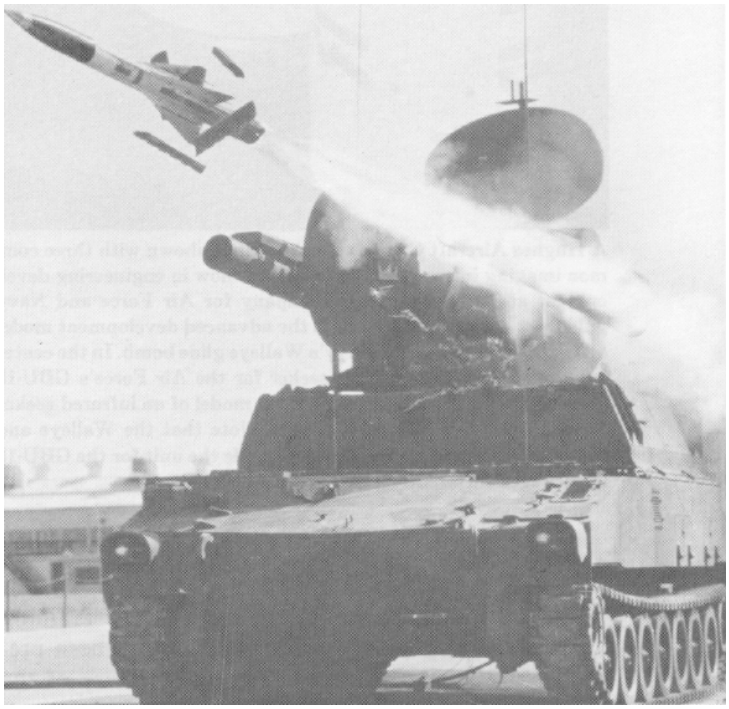
On 30 October last year the Army awarded Hughes Aircraft and Boeing Aerospace Companies the first contract for production of the US Roland, a foreign-developed air defense guided missile system, which is to be produced in the United States.

Following a successful technology transfer program, the US Army Missile Command contracted for 75 missiles and 3 fire units.

The first contract is for approximately $60 million, with an option to buy 410 additional missiles, 18 fire units, and related equipment at an additional cost of approximately $180 million. First hardware deliveries are expected in mid-1981.

US Roland is a short range all-weather air defense system that can operate as a self-contained unit from a track vehicle on the move or from fixed ground emplacements. It's primary tactical role will be to protect troops, airfields, supply depots, and other targets against low level air attacks, day or night, under all weather conditions. The weapon system is being built in this country under license granted by Euromissile, the European team that developed and produces Roland for the Armed Forces of France and West Germany.

The American built missile and 90 percent of the weapon's fire unit parts are interchangeable with the European-built Roland.



Supersonic US Roland missile roars from its launch tube during a test of the short-range, all-weather air defense system at White Sands Missile Range, NM. In its first test against a target, the system intercepted a drone aircraft.

Patriot missile tested

Patriot missile, the Army's most advanced air defense weapon, is undergoing operational tests at White Sands Missile Range, NM, following a recent tactical battalion demonstration and destruction of a pilotless F-86 jet.

For the tactical test, the Army and Raytheon emplaced three complete Patriot fire units, a command and coordination station, and a launcher in tactical positions on the New Mexico range. From those positions, fire units acquired and "located" the target, and fed information to the command and coordination station which then assigned the firing unit in the best location to engage the aircraft. Seconds later, the Patriot missile, armed with a live warhead, struck and destroyed the high-speed aircraft.

Patriot is being developed to replace both the Hawk and Nike Hercules missiles. The highly-mobile, all-weather system is expected to go into production early this year. Raytheon Company is prime contractor for the Patriot missile and Martin Marietta is principal subcontractor for the missile canister and launcher. Thiokol Company is subcontractor for the single stage, propulsion unit.

2d Division Aviation unit receives award

The "Brigadier General Carl I. Hutton Award for Flight Safety" has recently been awarded to B Company, 2d Aviation Battalion, 2d Infantry Division. This award, one of military aviation's highest forms of recognition, was presented to B Company for flying 24,800 accident-free hours.

The unit was cited specifically for flying in an area of South Korea which parallels the Demilitarized Zone and is characterized by rugged mountains, wire-strewn valleys, and year-round adverse flying conditions.

MAJ Eugene J. Davis, B Company Commander, accepted the trophy from LTC David H. Price, 2d Aviation Battalion Commander.

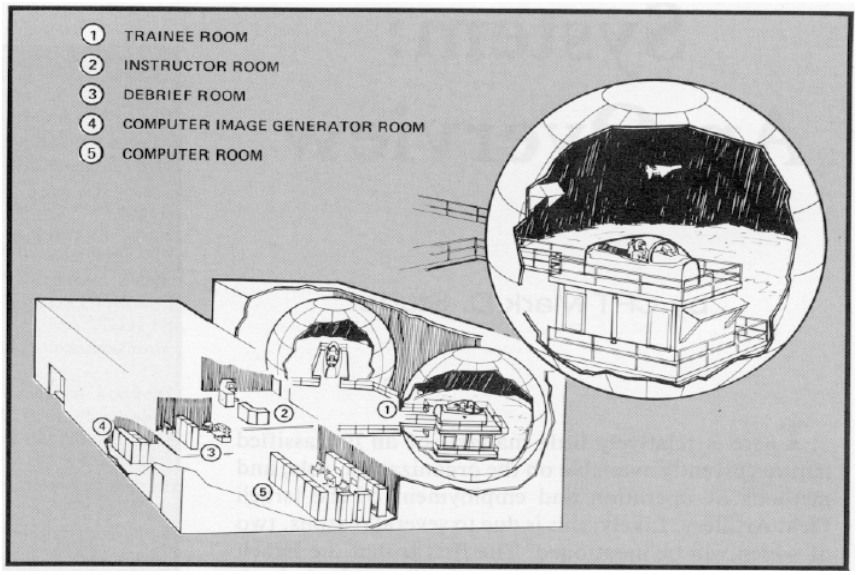
The Hutton Award is presented yearly to the best flying unit in the US Armed Forces. Company B will retain the trophy for one year and then pass it on to the next military aviation unit cited for outstanding flight safety.

New firing range safety course offered

The US Army Safety Center at Fort Rucker, AL, now offers a two-week range safety course covering all aspects of firing range safety, construction, renovation, inspection, and operations. Instruction on weapons characteristics and actual hands-on experience are also provided.

All types of ranges are studied including indoor, helicopter, demolition, laser, and direct fire. Course graduates will be able to advise and assist their commanders in training personnel realistically and safely while using live fire.

Information concerning specific dates, times, and places for classes may be obtained by writing Commander, US Army Safety Center, ATTN: PESC-EE, Fort Rucker, AL 36362 or by calling AUTOVON 558-6410/2091.



This artist's conception illustrates a new air combat trainer that will use computer-generated images to create a wrap-around view of sky and earth as well as flying aircraft and rocketing missiles. The combat simulator will be produced by Hughes Aircraft Company to train pilots of the US Navy and Marine Corps' F/A-18 Hornet strike fighter. Computer-generated images will be projected on two 40-foot domes, each surrounding a simulated Hornet cockpit. These images will move in response to the trainees' actions as they "fly" the simulator, giving them the sensations of being airborne in a dynamic combat situation. Under an $18.7 million contract with the Naval Training Equipment Center in Orlando, FL, Hughes' Support Systems Organization will produce and deliver the first of these systems, called a Weapons Tactics Trainer which should be ready for crew training by October 1982.

The Israeli Field Artillery System: An Overview

by CPT Mark D. Studer

There is relatively little material of an unclassified nature currently available on the organization, role, and methods of operation and employment of the Israeli Field Artillery. Likely, this is due to several reasons, two of which will be mentioned. The first is that the Israeli Armor and Air Force have played leading roles in both the 1967 and 1973 wars. As a result, literature on these wars and the Israeli Defense Forces in general has focused primarily on these two branches. The second is that, unlike the United States, Israel does not publicize facts about her defense organizations.

Armor and the Air Force will undoubtedly continue to figure heavily in Israeli plans and organizations, but the 1973 war revealed the vulnerabilities of tanks and aircraft in a Sagger and Sam rich environment. Thus the Israeli Field Artillery will probably play a much greater role in any future conflict.

This article provides an overview of the Israeli Field Artillery System by describing its organization, roles, and methods of operation and employment and some of the differences between the Israeli and US Field Artillery Systems.

Artillery organization and composition

Figure 1 depicts the levels of Field Artillery in the Israeli artillery. At army level, the Chief of the Field Artillery Branch, a brigadier general, controls the Field Artillery School, a number of separate FA battalions, and the artillery assets of the three territorial regions. In time of war, the Chief of the FA Branch may elect to attach his separate battalions to particular territorial regions or maintain control of them for missions at national level. The country of Israel is broken down into three regions—Northern, Central, and Southern. In charge of all field artillery within a particular region is the Field Artillery Territorial Commander, a colonel. His field artillery assets include separate battalions and the artillery of his divisions. He may elect to maintain control of his separate battalions in combat or can attach

Firing (FA) unit	Maneuver unit**
Battery: Battery commander (CPT) Executive officer (1LT) Fire direction officer (2LT) **Battalion:** Battalion commander (LTC) Fire direction officer (CPT) Survey officer (CPT) Communication officer (CPT)* S1 (1LT)* Maintenance officer (CPT)* **Division artillery:** Deputy div arty CO (LTC) Div arty fire direction officer (CPT) Assistant communication officer (CPT) Survey officer (MAJ) (deputy assistant to div arty CO) S1 (MAJ)* S4 (MAJ)* Maintenance officer (MAJ)*	**Platoon:** No artillery representative at this level. **Company:** Forward observer (1LT) (no FIST) **Battalion:** Fire support officer (CPT) (plus three NCOs) **Brigade:** Fire support officer (LTC) Operations officer (CPT) S2 (CPT) **Division:** Div arty CO (COL) (TAC CP) Chief of staff (LTC) (main CP) S3 (MAJ) (main CP) S2 (MAJ) (main CP) Counterfire officer (LTC) (main CP) (counterfire battalion CO—works for G2) Assistant S4 (1LT) (main CP)* Communication officer (MAJ)*
**Not field artillerymen.* ***All field artillerymen at maneuver units are assigned to the division artillery headquarters battery.*	

Figure 1. General organization of field artillery personnel and positions.

them to the divisions to augment their fires. Each division possesses a div arty composed of a varying number of battalions. Previously, these artillery units were separate from the division until time of war, but currently they are assigned directly to the division. Battalions are not, as with US artillery in divisions, assigned standard missions of direct support (DS) to particular maneuver brigades. Instead, they are controlled as a group by division artillery and are assigned direct support roles as the tactical situation requires. Organization of Israeli field artillery battalions closely tracks that of US artillery battalions. Each is composed of a headquarters/service battery and three firing batteries. Batteries have four to six sections depending on the type weapon of the unit. As in the US Field Artillery, lieutenant colonels command battalions and captains command batteries.

Figure 2 lists the general organization of the Israeli Field Artillery at levels to division in both the firing (FA) units and supported maneuver units. Of particular interest is the absence of an executive officer and S2 at the FA battalion level, no artillery representative at maneuver platoon level, and the presence of a lieutenant colonel fire support officer (FSO) with an operations officer (S3) and intelligence officer (S2) at maneuver brigade level. Field artillery battalions have no forward observers (FO) assigned or organic to them. All field artillerymen (FOs, FSOs) working in maneuver units are assigned to headquarters battery of division artillery. The reasons for these particular differences will become apparent as we examine the roles, missions, and methods of operation and employment of Israeli artillery.

The Israeli Field Artillery has a wide variety of artillery pieces currently in use. The 105-mm self-propelled (SP) howitzer M52, once the standard divisional howitzer, has been phased out and replaced with the 155-mm SP M109A2. The 155-mm packs more punch and has a greater variety of shell-fuze combinations available, so the Israelis prefer it to the 105-mm which they feel is

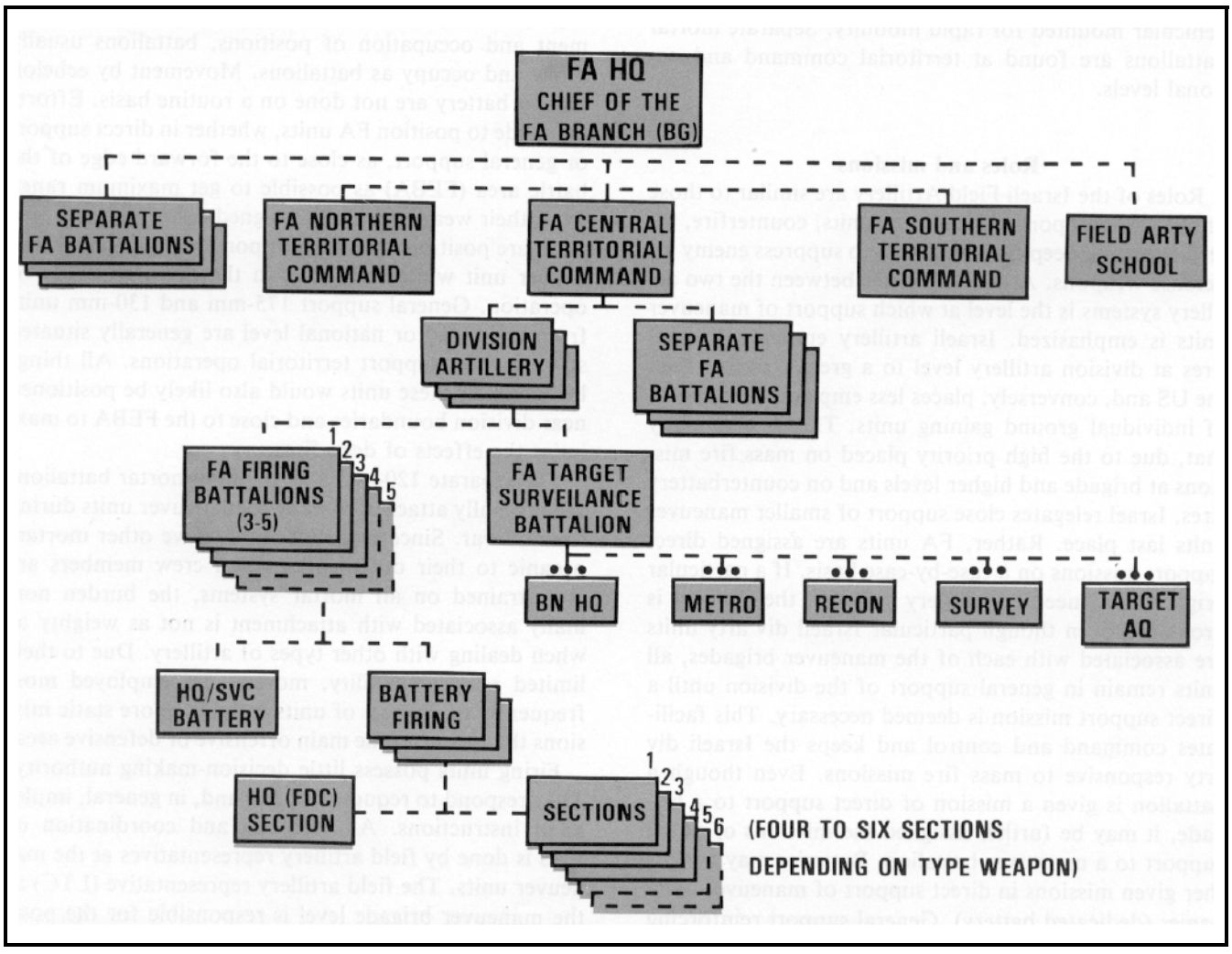


Figure 2. Israeli field artillery (minus missiles).

useful only in airmobile operations. Other 155-mm gun/howitzers of French and Israeli design are also utilized in the Israeli artillery, the newest being the Israeli produced M72, a self-propelled variety, sporting the L39 gun, and capable of ranges of 23.5 kilometers. The turret is mounted on a British Centurion tank chassis. It has a 6400-mil traverse capability and a 60-round carrying capacity. The 8-inch SP howitzer M110, while present in the Israeli inventory, is not used extensively due to its shorter range, limited traverse, and relatively slow rate of fire. The 175-mm SP howitzer M107 is used by the Israelis in separate battalions at territorial command or national level as a general support (GS) weapon for divisions or in support of other special missions. Above all, it is valued for its range capability. Also found in separate battalions is the Russian made 130-mm field gun M46, with a maximum range of 27,490 meters. Unlike the US Field Artillery, the Israeli Artillery has mortars as an integral part of their artillery. The two models most extensively used are the Israeli produced 120-mm and 160-mm mortars which are vehicular mounted for rapid mobility. Separate mortar battalions are found at territorial command and national levels.

Roles and missions

Roles of the Israeli Field Artillery are similar to those of the US—support of maneuver units, counterfire, interdiction and deep fires, and fires to suppress enemy air defense weapons. A key difference between the two artillery systems is the level at which support of maneuver units is emphasized. Israeli artillery emphasizes mass fires at division artillery level to a greater degree than the US and, conversely, places less emphasis on support of individual ground gaining units. This is not to say that, due to the high priority placed on mass fire missions at brigade and higher levels and on counterbattery fires, Israel relegates close support of smaller maneuver units last place. Rather, FA units are assigned direct support missions on a case-by-case basis. If a particular brigade is in need of artillery support, the support is provided. Even though particular Israeli div arty units are associated with each of the maneuver brigades, all units remain in general support of the division until a direct support mission is deemed necessary. This facilitates command and control and keeps the Israeli div arty responsive to mass fire missions. Even though a battalion is given a mission of direct support to a brigade, it may be further assigned the missions of direct support to a maneuver battalion. Batteries may be further given missions in direct support of maneuver companies (dedicated battery). General support reinforcing (GSR) and reinforcing (R) are not used by the Israeli Artillery. As in US field artillery, because of the administrative and logistical burden placed on maneuver units, FA units are attached only when necessary to support a particular operation. Attachment may be further designated as the situation dictates.

Methods of operation and employment

The greatest differences between US and Israeli field artillery exist in the area of operations and employment. Israeli artillery is deployed at division level. A division operations plan usually suffices to determine where div arty assets will be placed. Normally a four to eight kilometer area is selected in the division zone which will allow the artillery to support the division as a whole. Unlike US artillery employment, if an Israeli FA battalion is in direct support of a maneuver brigade, it will not necessarily be positioned in the supported brigade's zone of operation. Its position will depend on where div arty is located. All Israeli field artillery battalion positions are approved by div arty or higher headquarters, and the FA battalion is considered the smallest unit for deployment purposes. In operations involving movement and occupation of positions, battalions usually move and occupy as battalions. Movement by echelon and by battery are not done on a routine basis. Efforts are made to position FA units, whether in direct support or general support, as close to the forward edge of the battle area (FEBA) as possible to get maximum range from their weapons. Units assigned direct support missions are positioned to best support their particular maneuver unit while remaining in the div arty's area of operation. General support 175-mm and 130-mm units from territorial or national level are generally situated so as to best support territorial operations. All things being equal, these units would also likely be positioned near division boundaries and close to the FEBA to maximize the effects of deep fires.

The separate 120-mm and 160-mm mortar battalions are normally attached directly to maneuver units during time of war. Since maneuver units have other mortars organic to their organizations and crew members are cross-trained on all mortar systems, the burden normally associated with attachment is not as weighty as when dealing with other types of artillery. Due to their limited range capability, mortars are employed most frequently in support of units assigned more static missions than those in the main offensive or defensive area.

Firing units possess little decision-making authority. They respond to requests for fire and, in general, implement instructions. All planning and coordination of fires is done by field artillery representatives at the maneuver units. The field artillery representative (LTC) at the maneuver brigade level is responsible for the positioning of FA battalions in direct support of the brigade. He recommends the position(s), which is (are)

approved by div arty and relays them to the FA battalion commander(s). Controlled supply rates (CSR), monitored by the brigade FSO, are assigned to maneuver brigades based on the number of supporting FA units. FA battalion commanders further break the CSR down to the batteries. The brigade FSO as the planner and coordinator of fires directs when, where, what type and how much to fire, and battalion commanders determine which unit will fire. Fire direction officers at batteries and battalions do not have the freedom to fire a particular type or quantity of ammunition. They simply fire the requests from the maneuver representatives. Should the need arise to give a battery a mission of direct support to a maneuver battalion, the brigade FSO makes the decision to do so and the battalion commander implements the order. The battalion FSO, to best support the maneuver commander, can further assign the battery the mission of direct support to a particular company. Calls for fires originate from FA representatives at maneuver units and are monitored by those representatives at the next higher maneuver levels; e.g., forward observer requests monitored by battalion FSOs. Requests state the type, quantity, and time fires are needed. Schedules of fires are not done at FA battalion level, but at the maneuver brigade fire support element (FSE).

All Israeli brigade FSOs have previously had command of a battalion.

Centralization

Israel feels that in order to provide the most beneficial support to her maneuver forces, she must be able to mass fires rapidly at division level; therefore her organization must correspondingly be tailored to provide maximum support of this philosophy while not neglecting counterfire and close support requirements. The US artillery also places emphasis on mass fires, but generally at the battalion level. For this reason, the US places greater emphasis on close support than Israel. The degree of centralization must be looked at in light of the environment and size of the area one will fight in, the size and composition of both the expected enemy and friendly forces, and past experiences.

Deployment

Deployment of field artillery is another apparent difference which ties in closely with degree of centralization. Israeli artillery is deployed at division artillery level, not only for more effective mass fires but also to facilitate rapid communications and to ease logistical problems. Emphasis is placed on ammunition resupply which posed a problem to the Israelis during the 1973 war. US field artillery is generally deployed in wider areas to lend closer support to its maneuver units. While this is a valid method and would likely bring about more responsive fires to maneuver units initially in a target rich and an electronic warfare rich environment one must not only wonder, but also seriously reflect on, whether we will actually have the ability to communicate and resupply at the distances we expect in the next war. Israel has experienced these problems and has organized herself based on lessons learned.

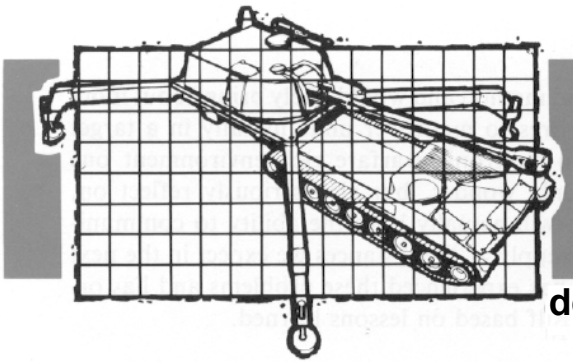
Responsibility and authority

Another very obvious and key difference lies in the location of responsibility and authority. The Israelis have placed a majority of the decision-making responsibility with the field artillery representatives at the maneuver units, to include positioning, fire planning (to include scheduling), intelligence processing and dissemination, and fire orders. Firing units concern themselves with deploying and occupying in a timely fashion and delivering quick and accurate fires. This setup allows FA commanders at battery and battalion level to concern themselves entirely with those tasks listed above rather than spreading themselves to cover more areas of responsibility. With fewer responsibilities, a firing unit commander can become more proficient in his delegated tasks. The US has left a majority of those responsibilities, which are delegated to FA representatives at maneuver battalions in the Israeli FA, with the firing batteries and battalions. As a result, units will probably be able to function better independently. The drawback would seem to lie in the relative complexity and number of responsibilities tasked to the FA unit. Could a US field artillery unit fulfill its responsibilities to the fire support system some time into the battle as well as an Israeli artillery unit?

Missions

To conclude this overview of the Israeli Field Artillery, a final difference to be pointed out is that they do not assign GSR or reinforcing missions. Since the fire support coordinator at brigade level is not the DS battalion commander but is an individual divorced from the battalion organization, there is no reason why a maneuver unit cannot have more than one direct support artillery unit, thus effectively eliminating the requirement for the reinforcing role. The Israelis consider the GS mission as flexible as a GSR mission and thus see no need for the GSR.

CPT Mark D. Studer is assigned to HHC, Defense Language Institute, Foreign Language Center, Presidio of Monterey, CA.

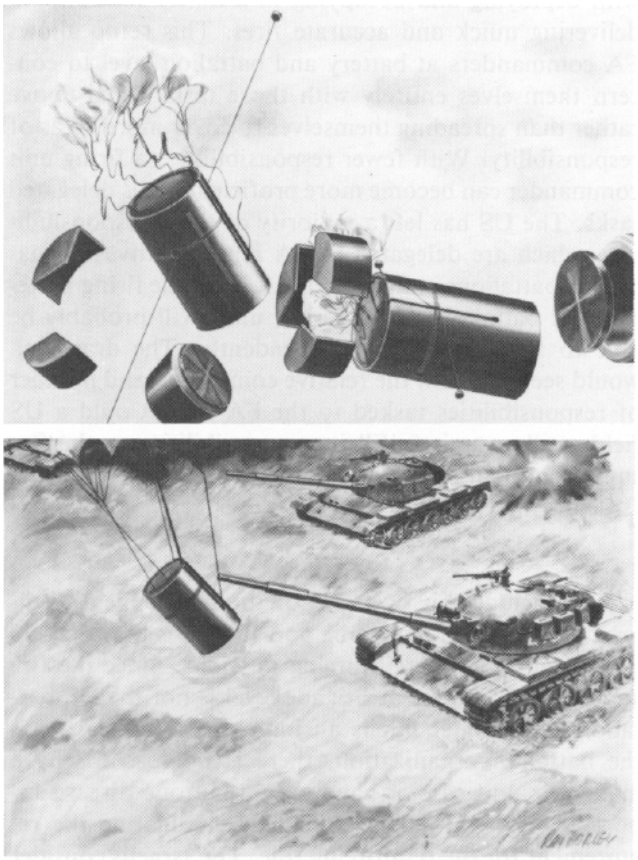


FA Test and Development

design • development • testing • evaluation

New anti-armor weapon system

Aerojet Electro Systems Company, in conjunction with US Army Armament Research Development Command, has developed a new anti-armor weapon system called SADARM (Sense and Destroy Armor).



Artist's drawings show SADARM (Sense and Destroy Armor) submunition system as it would be employed against enemy tanks far behind a battle area. At top, three submunition canisters from a round fired by a conventional 8-inch artillery weapon are ejected as the projectile enters the area above the target. A vortex ring parachute deploys from each canister, positioned to allow a sensor to scan the target area from an angle of 30 degrees from the vertical. The canisters descend at 30 feet per second while continuing to spin and allow their sensors to scan the target area (bottom). When the sensor detects a target, it fires its armor-piercing warhead, which sends a lethal slug into the vulnerable top side of the target.

The SADARM integrates a microwave sensor with a self-forging warhead and parachute to provide the Army with a fire-and-forget, all-weather artillery weapon. The system requires no target illumination, no in-flight guidance or command control assistance, and is independent of air superiority. SADARM locates the armor target, determines its center, and calculates the optimum time to fire—all this while in flight. As SADARM is deployed and falls, a parachute opens to provide a rotating search pattern, while the sensor determines the optimum burst point for the warhead. The self-forging warhead projects a slug to the target with sufficient energy to perforate its top to effect a kill.

Allies achieve progress in ammunition compatibility

Significant progress toward achieving full compatibility of 155-mm ammunition and commonality of 155-mm test procedures among military forces of four Western allied nations was reported following meetings held recently at Shoeburyness, England.

Attending the week-long Third Quadrilateral Safety Working Group Meeting were representatives of the United States, United Kingdom, Federal Republic of Germany, and Italy.

The meeting was combined with a series of demonstration test firings of a 155-mm projectile and a 155-mm propelling charge, both developed by the US Army, and a 155-mm howitzer developed by the three European members of the working group.

The M549A1 rocket-assisted projectile and the M203 propelling charge, developed at the US Army Armament Research and Development Command (ARRADCOM) under management of the Office of the Project Manager for Cannon Artillery Weapon Systems (PM-CAWS), were fired from the trilaterally-developed FH70 towed howitzer.

Developed jointly by the British, West German, and Italian armed forces in a cooperative effort, the FH70 is now being produced in Europe. It is a counterpart of the US Army's M198 towed howitzer, which was placed in

production last year at Rock Island, IL, by the US Army Armament Materiel Readiness Command (ARRCOM).

Uniform test procedures for 155-mm ammunition were developed and adopted at the Shoeburyness meeting. As a result, separate demonstration tests and trials by the four nations, as well as all other members of the NATO planning to deploy 155-mm weapons, will no longer be necessary. Results of tests conducted by one NATO member will be accepted by the other members. Therefore, while some NATO members are planning to field the FH70 and others the M198, the ammunition and testing procedures will be interchangeable.

The working group was formed as the result of a Quadrilateral Memorandum of Understanding. Following the Shoeburyness meeting, its accomplishments were seen as highly significant not only to the 155-mm interoperability program, which was its immediate concern, but also to the broader program of NATO Rationalization, Standardization, and Interoperability.

Nine representatives of five different Army agencies made up the US delegation at the working group's third meeting. Heading the American contingent was LTC William J. Schumacher of PM-CAWS, product manager for 155-mm ammunition. (*Army RD&A magazine*)

TACFIRE Follow-On Evaluation

The US Army Field Artillery Board conducted a Follow-On Evaluation (FOE) of the Tactical Fire Direction System (TACFIRE) at Fort Sill, OK, during the period May through August 1979. Battalions from III Corps Artillery (Fort Sill) and the 1st Cavalry Division Artillery (Fort Hood, TX) participated in the test.

The purpose of the FOE was to evaluate the effect of software (computer program) changes made to improve TACFIRE's responsiveness to forward observer fire requests. Fire direction centers from two battalions and one div arty equipped with TACFIRE conducted operations under a variety of combat scenarios designed to simulate a potential European battlefield situation.

New software capabilities were tested to include the forward observer's ability to designate a fire request as "urgent" together with computer sorting of incoming fire requests according to the commander's priorities.

In October 1979, the test report was distributed to the US Army Operational Test and Evaluation Agency and USAFAS for further evaluation of the TACFIRE system.

The capabilities which were tested will be included in a new version of TACFIRE software which incorporates nuclear target analysis/package fire planning according to current FM 101-31 series manuals.

New missile guidance system tested

At White Sands Missile Range, NM, the Army Missile Command (MICOM), Vought Corporation, and Honeywell fired a nontactical T-22 missile approximately 60 kilometers, landing it "on target," in the first ballistic missile firing utilizing the ring laser, strapdown inertial guidance.

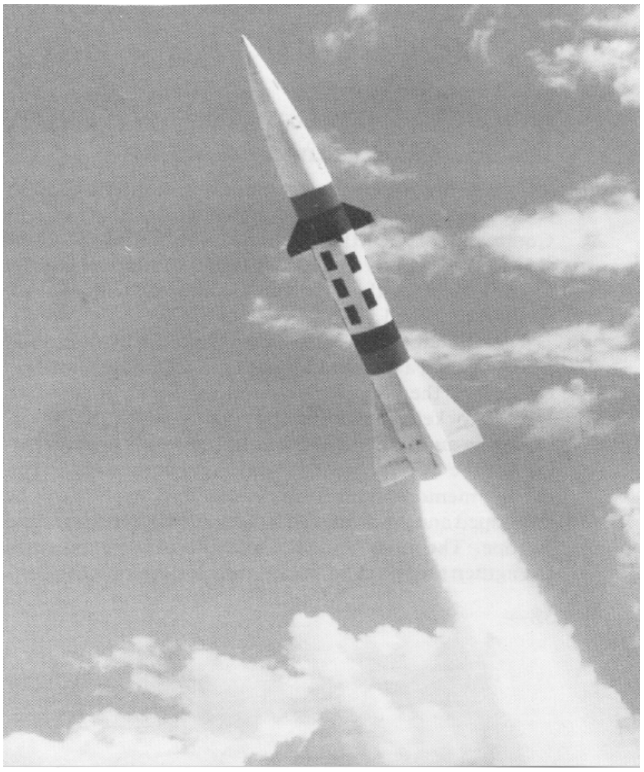
"Accuracy exceeded our expectations," said Jack Clayton, technical program manager for MICOM's Simplified Inertial Guidance-Demonstrator (SIG-D) program.

Two additional flights are planned at White Sands to demonstrate and evaluate the new technology.

Ring laser gyros are solid state devices which have fewer moving parts than conventional gyros, are more rugged and reliable, and are less expensive. The new guidance technique, offering long range accuracy and lower costs, has potential for across-the-board Army missile applications, possibly as a replacement for Lance or as a contender in the Army's new armor-defeating Assault Breaker program.

For the demonstration program, MICOM is using the Lance-size T-22 missile and Lance-size solid propellant motors and ground support equipment. Vought is supplying flight tests vehicles and related hardware and Honeywell the laser inertial measuring equipment. (DARCOM News)

A Lance look-alike, the nontactical T-22 missile, soars aloft at White Sands Missile Range, NM. The test demonstrated a new guidance technique.



XM785 155-mm nuclear projectile tested

The US Army Field Artillery Board (USAFABD) completed a customer test in October 1979 to determine the degree of ballistic similarity between the M549A1, M483A1, and M107 projectiles and to aid in supporting key development program decisions for the new improved 155-mm nuclear projectile XM785.

The overall test was conducted in two phases, with Phase I occurring 9-20 April and Phase II from 10 August through 4 October 1979.

The purpose of Phase I was to gather muzzle velocity and exterior ballistics data for verification of firing table addendum corrections proposed by the US Army Ballistics Research Laboratory (BRL). The test was designed to demonstrate the potential feasibility of registering with the M483A1 and then transferring fire to ranges both short and long of the registration range with M549A1 and the M107. The firings were conducted using zones 3G(M3A1), 5W(M4A2), 7W(M4A2), and 8(M118A1) utilizing a provisional graphical firing table (GFT) addendum solution. Firings utilizing the M203 propelling charge (8S) were conducted at Yuma Proving Ground during approximately the same time frame.

The reason for Phase II was to quantify the accuracy degradation incurred by delivering the XM785 nuclear projectile based on either the M107 or M483A1 registration corrections.

The 155-mm XM785 Nuclear Projectile Ballistic Working Group is now in the process of reviewing the collected raw data. A complete analysis is forthcoming.

GSRS renamed MLRS

The Army has renamed its new free flight artillery rocket currently under development at the Army Missile Command (MICOM) to Multiple Launch Rocket System (MLRS). Formerly called the General Support Rocket System (GSRS), the new name conforms with that already established by NATO allies.

The United States, Germany, United Kingdom, and France signed a memorandum of understanding last July calling for the cooperative development of a standard NATO rocket, known internationally as the MLRS.

Boeing and Vought Corporation currently are competing for the US Army MLRS development contract. Under the memorandum of understanding, MLRS will be developed and co-produced in both the United States and Europe. The joint program and the new weapon will strengthen the NATO alliance, reduce development costs through the cooperative effort, and enable the four countries to share production benefits.

The MLRS will feature a 12-round launcher mounted on a highly mobile, fully-tracked vehicle that can be emplaced quickly and deliver massive firepower. Hardware will be standard except for communications and perhaps the ammunition resupply vehicle.

Artillery electronic fuzes

Eastman Kodak of Rochester, New York has been awarded a $68 million contract to produce the M587 and M724 electronic fuzes.

The firm will manufacture 421,000 of these artillery time fuzes, the first in the inventory.

According to the Electronics Research and Development Command, Adelphi, Maryland, the M587 and M724 are immune to electronic countermeasures.

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Wanted: Battalion FDO!

by CPT Gary B. Griffin

Current artillery tables of organization and equipment (TOEs) do not authorize a duty position for a battalion fire direction officer (FDO); therefore, the critical selection of the officer best qualified to serve in this capacity is a problem faced by many field artillery battalion commanders. Unfortunately, the decision as to which officer will perform this "additional duty" is sometimes made only a short time before the battalion level Army Training and Evaluation Program (ARTEP).

Today's doctrine calls for the battalion S3 to carry out the duties of FDO, but the job is usually delegated to either the assistant operations officer or an available liaison officer. This practice of having the battalion S3 act as the FDO was adopted during World War II when tactical situations were less fluid and supported unit frontages were smaller. Battery FDOs were virtually nonexistent; however, unit executive officers maintained a limited capability to compute firing data either from inside a halftrack or foxhole. Then, as in many cases today, younger battery officers lacked the necessary experience in or knowledge of tactical fire direction and technical gunnery procedures.

In the Korean conflict and the war in Southeast Asia, the trend was toward decentralized fire direction. With increased independent firing battery operations, sweeping changes were required to improve battery fire direction capabilities. Modern field artillery organizations reflect these modifications in TOEs that authorize FADACs, command post carriers, additional radios, and officers solely dedicated to the fire direction effort. However, as a result of this growing decentralization, effective fire direction at battalion has in some cases been neglected. Although equipment at battalion level has been modernized and personnel changes have been made to improve FDC capabilities, the lack of a full-time officer responsible for fire direction reflects a great oversight

on behalf of our planners and organizers. Battalion fire direction is an increasingly critical aspect of current artillery tactics and techniques. With the emphasis on responsive and effective massing of artillery fires, the fire direction officer must be a well-trained, experienced field artilleryman. The era of the "additional duty FDO" is over.

Unfortunately, most S3s have lost touch with technical fire direction procedures, and the majority lack both the experience and necessary tactical fire direction skills to effectively control a battalion fire direction center. This, coupled with the current shortage of qualified soldiers and noncommissioned officers in the fire direction field, compounds the problem. The battalion FDC may be marginally effective except during those times when the unit is required to organize and train for an Operational Readiness Training Test (ORTT) or an ARTEP. For example, to pass a test, some battalions draw heavily from battery FDC assets, where soldiers are usually thrown together under the supervision of a part-time FDO and put through a crash training program.

The reclassification and retraining of selected senior NCOs should improve the situation. Although these NCOs have the technical skill and a sincere desire to do their best, they lack the necessary experience and self-confidence required to effectively supervise an FDC.

A step in the right direction is the Field Artillery School's emphasis on developing a highly qualified battalion FDO through the Field Artillery Officer Advanced Course. However, the glaring absence of the FDO duty position in current TOEs reflects the irony of this objective.

Latest battlefield techniques stress decentralization of the FDC effort down to battery level, but how efficiently can the battalion perform its fire direction operations without a full-time FDO? I feel the lack of this duty position will seriously decrease the battalion's tactical performance in combat just as adversely as it does in the training environment. The overwhelming complexities of modern warfare will create such tremendous demands on both the operations officer and his assistant that neither will be able to properly supervise the FDC. As mentioned previously, the operational tasks and coordination efforts inherent with large unit frontages, rapidly changing situations, and a sophisticated enemy will demand the total concentration of both the operations officer and his assistant.

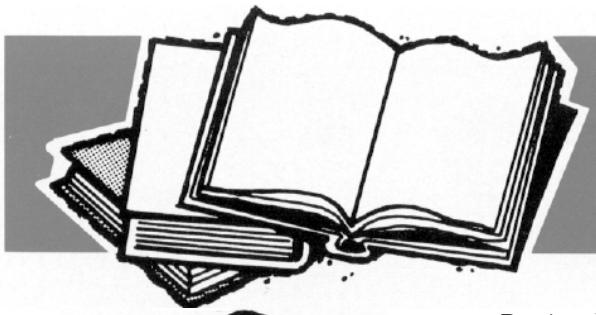
Even though the battery will be performing most of the fire direction computations, the battalion FDC will be responsible for proper massing, refinement, and updating of both registration corrections and data as well as continuously monitoring all fire direction frequencies. These tasks could be increased, depending on the tactical mission (i.e., computation of fire plans and programs by direct support FA units).

The authorization of a battalion FDO by TOE is sorely needed. The FDC could be made responsible to the commander, through the S3, for fire direction training throughout the entire battalion. This individual could act as an evaluator of battery fire direction training programs, supervise battery FDC section training, and be responsible for supervising a program within the battalion to identify, select, and train cannoneers to fill shortages in 13E duty positions. Thus, the battalion S3 and assistant S3 would be free to perform their primary duties since the FDO would bear sole responsibility for the operation and supervision of the fire direction center.

An example of how well a system works with a full-time FDO can be seen in the results of the Army's Operational Test Evaluation Agency TACFIRE Operational Test II (OTEA TACFIRE II) conducted at Fort Sill in 1974 with the 1st Battalion, 18th Field Artillery. During this comprehensive two-phase test, the unit underwent numerous iterations, based on a 1980 battlefield scenario with both TACFIRE and FADAC primary fire direction centers. Phase I centered on the present FADAC primary system, with a full-time fire direction officer, while Phase II utilized the same officer as the FDO in the TACFIRE shelter itself. Initial iterations of a similar scenario during the training phase of the evaluation reflected the inadequacy of the present system and the need for a single officer to be responsible for the supervision and operations of the FDC. During OTEA TACFIRE II, technical data for most fire missions was computed at battery level in accordance with current doctrine, and the system worked well. However, the importance of overall control, coordination, and management of the battalion's fires was keenly amplified during periods of peak activity when both battery and battalion FDCs were totally saturated with calls for fire from both supported units and force artillery headquarters. The successful completion of the test demanded the dedicated efforts of the battalion FDO.

The authorization of the FDO by TOE should receive serious consideration as soon as possible. Studies could be initiated to identify officer duty positions (i.e., ammunition officer, Redeye or S2) within field artillery cannon battalions that could be deleted in favor of the formal establishment of a Fire Direction Officer duty position. Consideration should be made for this TOE change before our new concepts begin to outweigh our organizational capabilities.

CPT Gary B. Griffin is an Army Recruiting Area Commander in USAREC.



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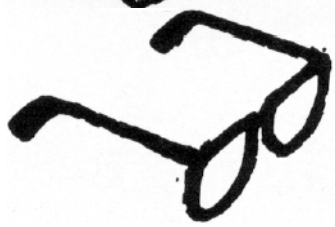

ATTACKS, by Field Marshall Erwin Rommel, Athena Press, Inc, Vienna, VA, 1979, 325 pages, $14.95.

Attacks is Erwin Rommel's personal account of his experiences in the first world war while serving as an infantry officer in France, Rumania, Austria, and Italy. Rommel traces his professional development from 1914 to 1917, allowing the reader to follow his transition from an inexperienced, young lieutenant to a veteran combat commander. First published in Germany in 1937, *Attacks* is largely based on Rommel's wartime journals and contains his evaluation and critique of significant events in several combat operations.

The significance of this book is twofold. First, it gives the reader an unusual perspective of a man who would emerge as one of the best known combat leaders of the second world war. If a man is, in fact, a product of his background, then this work offers a unique view from that perspective, as it was published before fame distorted reality. A second important aspect of this book is that it provides an excellent primer on small unit combat leadership, prepared by a man who made that leadership his trademark. The initiative, judgment, and valor expected of a commander are clearly shown through a review of several tactical situations.

Attacks, however, lacks a bit from its very nature. It is basically the description of company and battalion sized actions set in theaters of the war not commonly familiar to the general public. The sketches provided by the author complement the text, but fail to provide an overall setting for the reader. The book could offer greater value to a larger audience if the publisher had incorporated periodic footnotes to better explain historical background.

Despite this deficiency, this is an excellent book and well worth the time for reading. In an era of ever-increasing technology and sophistication, it is refreshing, and no doubt useful, to get back to basics every so often. Men fight battles, and leaders like Erwin Rommel will win victories whether in Rumania in 1916, North Africa in 1942, or Europe in 1985. It is a factor of the military equation that can neither be ignored nor taken for granted.

CAPT M. J. Swords, USMC, is an instructor in the Tactics and Combined Arms Department, USAFAS.

ROMMEL IN NORMANDY, Reminiscences by Friedrich Ruge, Presidio Press, Novato, CA, and London, England, 1979, 253 pages, $12.95.

First, I would like to mention that any officer who aspires to be a good leader should read the last chapter of this book.

The first half covers Rommel's assignments in the west, first as an inspector and later as field commander (with severe limitations in command) prior to the invasion. These first few chapters cover Rommel's tours of defensive positions in detail, interspersed with comments on Rommel's character and many anecdotes about his daily life. This mixture is distracting but, if one perseveres, there is a wealth of information worth reading. To follow Rommel's travels, one should have a good map of France on hand. The maps in the book relating to his travels are very general, but those for the situation at the time of the invasion until D + 90 are rather good. There are several photographs of defenses before the invasion and Rommel on inspection tours.

The second half of the book contains a general discussion of the German movements and the German leaders' reactions to the course of events, as well as Rommel's hopes for Germany and details of his death.

Friedrich Ruge, the author, was Rommel's naval advisor and obviously a close confidant and friend. He may be a bit biased toward Rommel, but he pointed out that fortunately for us Rommel was severely restricted in his actions by split commands, the German staff, and Hitler.

For World War II students or buffs, this book is worth reading.

LT (Ret) Ralph R. Balestrieri was an artillery FO during World War II and has made several contributions to the ***Journal****.*

B-29 SUPERFORTRESS AT WAR, by David A. Anderton, Charles Scribner's Sons, New York, 1978, 176 pages, $14.95.

In 1940 the Army Air Corps requested design proposals for a new bomber that could fly faster and carry more bombs than a B-17 flying fortress and have a range of at least 5,333 miles. Boeing Aircraft Company proposed a four-engine, pressurized airplane with remote-controlled gun turrets and a computerized fire control system—the B-29 Superfortress.

The aircraft first flew in September 1942. It was rushed into production and attained operational status in 1944, too late for the war in Europe but in time to play a key role in the defeat of Japan.

The book, *B-29 Superfortress At War,* consists of first person accounts by aircrews, maintenance people, and military leaders who were associated with the airplane in WW II and Korea. The author has skillfully connected these accounts and arranged them so that the book reads as a chronological history. *B-29 Superfortress At War* is an excellent book, well-written and informative. Reading it gives a better appreciation for the men and the airplane chiefly responsible for forcing the Japanese, with two million uniformed soldiers, to surrender without a costly invasion of their homeland. The book contains more than 200 photographs to support the text and add to the reader's understanding and enjoyment.

COL Warren E. Norman is the Senior US Air Force Representative at Fort Sill.

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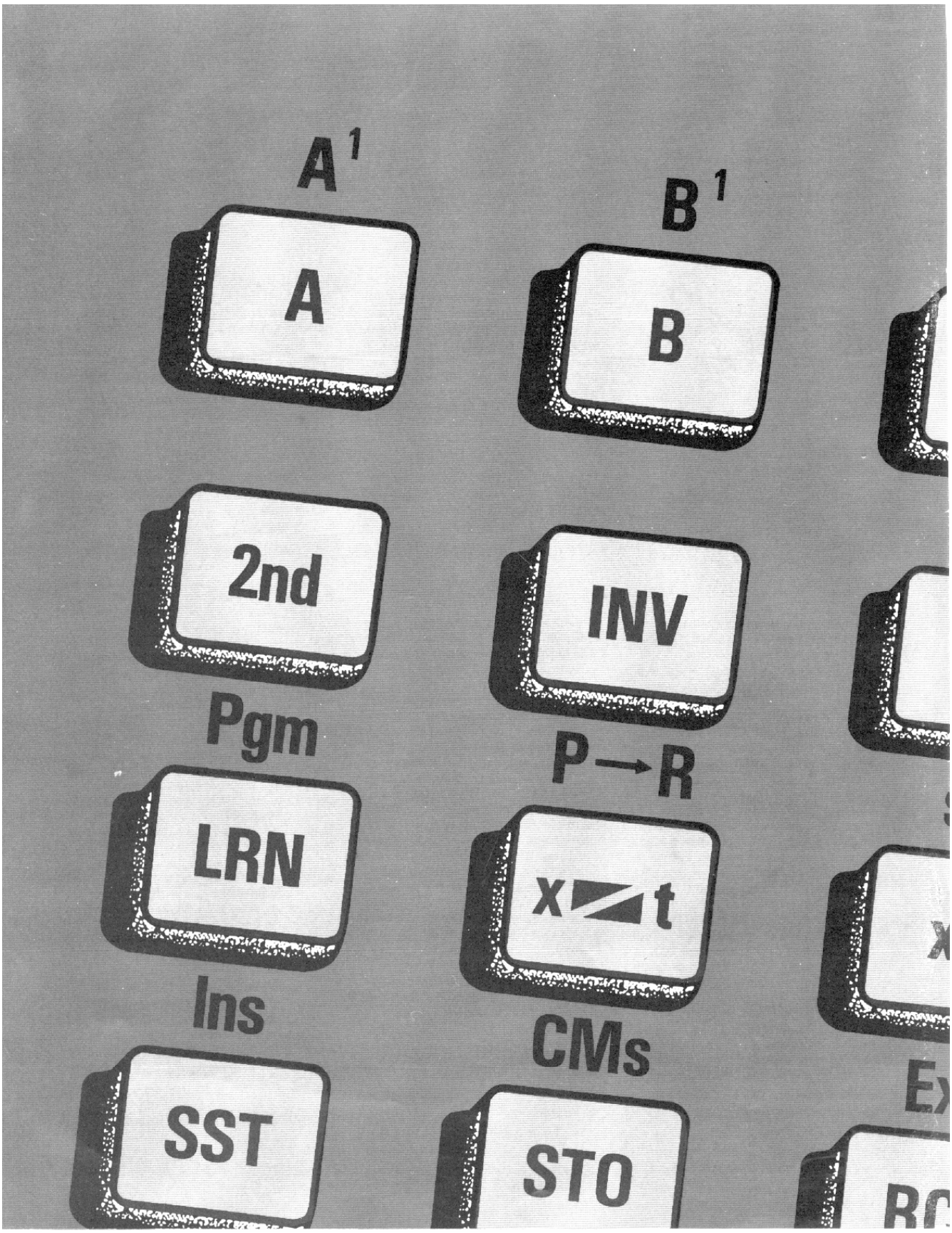
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