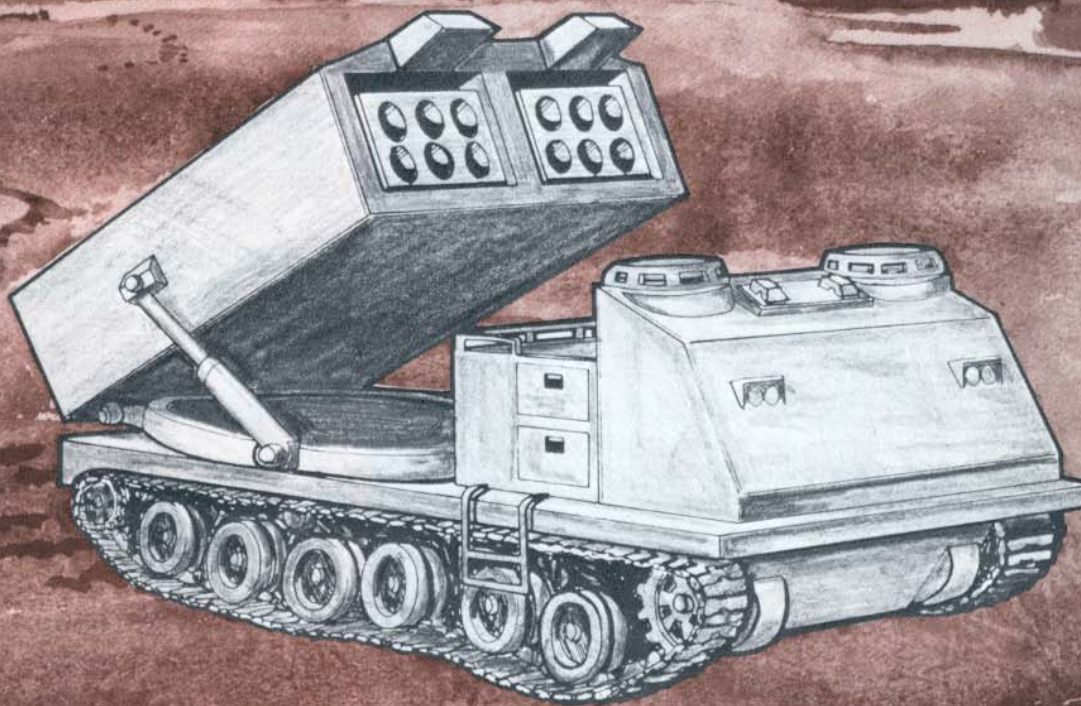


# FIELD ARTILLERY JOURNAL

March-April 1977



**GSRS Concept —  
Commandant's Column,  
page 3.**

# FIELD ARTILLERY JOURNAL

Volume 45

March-April 1977

Number 2

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

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

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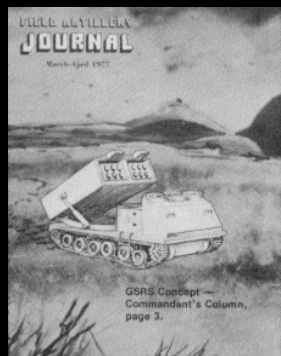
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The cover art depicts a possible design for our general support rocket system discussed in "Forward Observations." (Art by Mr. L. Mick, Fort Sill TASO.)

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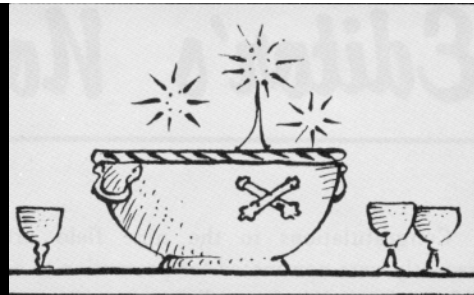
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## Articles

<b>Towed Armored Cannon</b> <i>by CPTs Joseph C. Antoniotti, Allan M. Resnick, and William J. Kronidak</i>	9
<b>MG Donald R. Keith's Address To DC Area Field Artillery Ball</b>	12
<b>Winning The West</b> <i>by COL (Ret) Robert M. Stegmaier</i>	19
<b>Extending Range Of Artillery</b> <i>by LTG (Ret) Arthur G. Trudeau</i>	22
<b>The Field Artillery In Vietnam Part VII</b> <i>by LTG David E. Ott</i>	29
<b>Which Weapon For Close Support — A New Look</b> <i>by MAJ G. J. Oehring</i>	34
<b>Limited Defense Option—Part II</b> <i>by LTC William M. Carrington, USAF, et al.</i>	37
<b>Request All Available! Why Not Minimum Required?</b> <i>by COL John P. Caruso</i>	45
<b>The GS Battalion ARTEP</b> <i>by MAJ Don Griffin</i>	52
<b>Firepower and Punch</b> <i>by MG (Ret) George Ruhlen</i>	54
<b>FIREX '76</b> <i>by MAJs Thomas D. Gaither and Bobby J. Getz</i>	57

## Features

<b>Editor's Notes</b>	2
<b>Forward Observations</b>	3
<b>Incoming</b>	4
<b>Right By Piece</b>	15
<b>View From The Blockhouse</b>	26
<b>Commander's Update</b>	42
<b>Redleg Newsletter</b>	43
<b>With Our Comrades In Arms</b>	50
<b>Redleg Review</b>	60



pg. 54



pg. 15



pg. 34



pg. 29



pg. 22

# Editor's Notes

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Congratulations to the nine field artillerymen who recently were nominated for promotion to one star rank. As a branch we did very well, getting 18 percent of the total. The Infantry had seven colonels selected and the Armor (the smallest combat arm in number of officers) produced 11 of the 50 names on the list. The branch proportions can possibly be explained as visual proof that OPMS alternate specialties are truly important in promotion selections for senior officers. ("Redleg Newsletter" has some pertinent information on the alternate specialty program.) The artillerymen selected for promotion to brigadier general are:

John S. Crosby	Edward C. O'Connor
Edward A. Dinges	Carl F. Vuono
Vincent F. Falter	Harvey D. Williams
Niles J. Fulwyler	Dwight L. Wilson
William W. Maurer	

We are quite proud that the School produced two of the nine: Colonels Crosby and Fulwyler. The School also gained a nomination for promotion to major general; our Assistant Commandant, BG Albert Akers, has been selected for a second star. In the past two years, Fort Sill has garnered 10 stars.

There seems to be considerable consternation over the use of the current primary diagnostic training tool known as the ARTEP. Those five letters stand for Army Training and Evaluation Program.

The problem stems from two basically different views of what it is and how it is to be used. One view, held by Training and Doctrine Command (TRADOC) and the Army service schools is that the ARTEP is *only, strictly, exclusively, solely* — an aide to a unit commander for determining the state of training of his unit. The ARTEPs are intentionally written as a series of specific combat-critical tasks so the commander can pin point specific weaknesses and conduct definite remedial training. Note that there has been no mention of anyone other than the commander and his unit.

The other view is that the ARTEP is an evaluation (the E in ARTEP). A thesaurus lists "rate" and "assess" as synonyms for Evaluation. This emphasis leads to using the ARTEP as a test. The holders of this view are in the operational side of the Army, i.e., senior command headquarters that must report training readiness to Department of the Army. The ARTEP serves their purposes

well. The problem introduced is that the chain of command enters the picture.

Sandwiched between the two views is the unit. The unit is told by its branch school to use the training tool to their (the unit's) best advantage. Use the ARTEP to train — any way *you* find best. *You* administer it. *You* evaluate the training level. If need be, *you* stop anywhere in the sequence of events to correct problems *you* find.

On the other hand, a unit, say a battalion, is told by division artillery or group that the unit *will be evaluated* on the ARTEP to determine the unit's readiness for reporting through command channels. Under this situation no one can blame the unit commander, certainly a career motivated officer, for "painting the rocks." The unit (and its commander) will be looked at very critically. No mistakes. The FOs must memorize the surveyed coordinates within the post impact area. FDOs must memorize the sequence of events and have their fire orders written down before leaving garrison. No short cuts allowed on the registration so we don't blow it.

The problem is bigger than the unit — bigger than the schools. Even bigger than TRADOC and FORSCOM. They both have understandable reasons for wanting to use such a functional tool as the ARTEP for their own requirements. DA will have to enter the net and solve the dilemma of the unit. The "operators" can use the ORTT or the EDRE to test training readiness if they must. It would certainly be a shame to lose the most valuable and most realistic training tool to come down the road in decades.

There are two staff changes this issue. Ms. Mary Corrales was promoted from Assistant Editor to Managing Editor. After 18 months with the *Journal*, she moves to the position as my chief assistant, responsible for all aspects of *Journal* operations. Filling the Assistant Editor's position vacated by Ms. Corrales will be Bill Finnegan, a true veteran in the magazine business and a retired USMC gunnery sergeant. He comes to Sill from the *Army Logistician* magazine.

There has been a change in the "official" nature of one of our most popular features, "Redleg Newsletter," which carries items of interest in the personnel field. Because branches, as such, above the rank of captain have pretty much been done away with under OPMS, there is a reluctance to produce news releases from MILPERCEN which are branch-related. Because of this, future "Redleg Newsletter" material will be data obtained from general

(Continued on page 49.)

# *forward observations*



**by MG Donald R. Keith**

I read Lieutenant Colonel Rees' article on multiple rocket launchers (MRLs) in the last two *Journals* with great interest. LTC Rees' thinking is in line with the TRADOC/DARCOM position which led to a requirement for an MRL which we call the General Support Rocket System (GSRS). We have studied this problem for years and we believe that we have found the right solution.

As correctly analyzed by LTC Rees, the problem is how to stop a major Warsaw Pact assault with its tank-heavy maneuver forces supported by massive numbers of field artillery and air defense weapons. The numerical superiority of Soviet firepower, creating a serious counterfire problem, has caused us to seek the most cost effective solution to correct this disparity. We are especially concerned that direct support artillery firepower for the maneuver units will be degraded if it has to assist the general support artillery in the counterbattery and air defense suppression roles. Degradation of fire support for the maneuver units is a serious situation. The direct support artillery units along with the air and ground antitank systems must be allowed to accomplish their intended mission with minimum interference. The envisioned primary missions for GSRS, then, are counterbattery and air defense suppression.

GSRS really got rolling when TRADOC established a Special Study Group (SSG) to further investigate the need

for an MRL and define the system's characteristics. The SSG was organized in November 1975 at Fort Sill with COL Pete Brooks as Chairman. Later, USAMICOM, at Redstone Arsenal, formed a provisional project manager's office with COL Ken Heitzke as the PM-designate and deputy chairman of the SSG. Altogether, the SSG was composed of some 40 personnel, representing 20 commands and agencies. In short, we got all interested parties involved.

Initially, the SSG analyzed 27 conceptual systems, US and foreign, which included free flight rockets and low cost guided missiles. Several ranges were also analyzed against the threat to ascertain the most cost effective system. The guided systems were eliminated because of their relatively high cost at the optimum range for a GSRS.

Finally, a separate technical and operational analysis was conducted to determine the better GSRS candidates for further study and play in a cost and operational effectiveness analysis (COEA). Four feasible US systems, (including the existing US Navy Zuni), and three foreign systems, (including the existing West German LARS and their conceptual MARS) were selected.

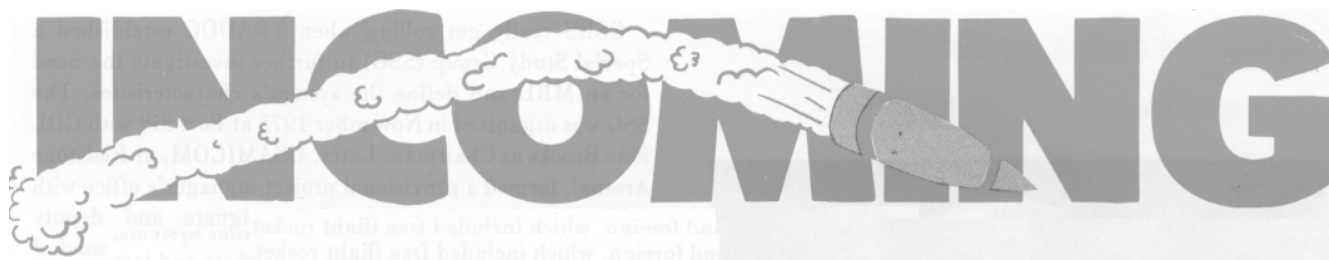
Because of recent advances in US free flight rocket technology, a conceptual, unguided candidate was the most cost effective candidate and it was selected by the SSG as the optimum solution, considering both money and manpower constraints, to the firepower disparity problem. There were no existing rocket systems that were competitive with cannons so there was no quick fix solution available that made sense.

The study effort culminated in January 1977, with a Defense Systems Acquisition Review Council (DSARC) decision for GSRS to enter development. We plan to field the system in the early 1980s.

The approved GSRS concept is a self-propelled, fast-reacting, multiple rocket launcher which will provide a high volume of fire in a very short time. Operationally, the concept is designed for the mobility, flexibility, and range requirements of the modern battlefield. Mounted on a derivative of the mechanized infantry combat vehicle (MICV), the 12-round launcher/loader will require a minimum-size crew of about three personnel to conduct launching procedures. The design range, in excess of 30 kilometers, will allow us to cover 90 percent of the targets we can acquire. That range will also give us positioning flexibility and improve lateral ranging of tomorrow's wider battle fronts.

The envisioned system will make maximum use of existing field artillery procedures for target acquisition, command and control, fire control, survey, meteorology, maintenance support, and ammunition resupply. To insure optimum responsiveness, the GSRS will be tied into TACFIRE, using the battery computer system.

*(Continued on page 14.)*



## letters to the editor

**"There are improvements to be made in nearly everything we do, if we will but exploit all the resources available to us, including soliciting the ideas of all soldiers, from private to senior general." —GEN Bernard W. Rogers, 17 Aug 76**

### Standard Ammo

In a recent ammo class at Fort Sill we were shown propellant charges for the 155-mm, 175-mm, and 8-inch weapons.

The thought occurred to me that we might be able to simplify charges for these three weapons if the weapons had powder chambers with the same diameter but different lengths. Lower increments could be used for the smaller caliber weapons up to the full charge for the 8-inch.

Wouldn't this simplify powder stockage?

Donald R. Bittner  
1LT, OKARNG  
Watonga, OK

*Here is an oversimplified answer to a complex question: Weapon design begins with a desired effect on the target (projectile) at a certain range (muzzle velocity). With these two "knowns," a ballistic equation is solved which dictates chamber pressure and its rate of buildup. A powder charge is then designed to achieve this pressure while holding tube weight and size to a minimum. If uniform powder were required to be a design criteria for all cannons, some powder chambers might have to be longer than current tubes or have walls a foot thick. The current procedure keeps the dog wagging his tail instead of the tail wagging the dog.—Ed.*

### 87th AFA Bn Reunion

The 87th AFA Battalion 32d anniversary reunion will be at the Sheraton Royal Hotel, Kansas City, MO, 15-17 July 1977.

Former members and their families are cordially invited. For details, write Ernie Wilson, 8247 Outlook, Prairie Village, KS 66208.

### FA OCS Graduates

I am interested in obtaining the current address of all Fort Sill Officer Candidate School graduates and all field artillery officers who graduated from the Fort Riley OCS during the period 1946 to 1951 when the Sill OCS was closed. Graduates are encouraged to send their current address, OCS graduation date and current assignment to me for possible nomination to the OCS Hall of Fame. Requirements for nomination are listed in the May-June 1976 *Journal*. Send nominations to:

Gillett Griswold  
Director, FA Museum  
ATTN: OCS Hall of Fame  
Fort Sill, OK 73503

### Murder Of Effective Training

Although we have not been totally successful, we have come pretty close to preventing effective military training.

After all, you flunk your training inspection if the status report figures do not agree, there is not a typewritten lesson plan in the visitor's book or some troop has a can of soda in the classroom. And God forbid if drowsiness hits anybody.

New TCs, innovative techniques, modern equipment and our heralded volunteer force have done little to really change our outdated and incomplete training management program.

After four years on line, where training inspectors, semiannual training plans and mandatory classes were cursed as obstacles, the chair of the infamous battalion training officer became mine. A real sympathy for the hardships of troop level leaders accompanied me.

Reflecting, there is no question that my troops learned more (and enjoyed it) from working on their howitzer, doing section drill on their own or in small

groups, with a cup of coffee or soda. There were no lesson plans, visitors books, status reports or inspectors. But there were two crucial elements — the target audience and the training objective. The administrative garbage was gone.

When there is a problem with equipment serviceability criteria (ESCs), your section chiefs and drivers get a 30-minute class TODAY. A one-hour block of instruction by the motor sergeant four weeks from now (training schedules must be in three weeks in advance) does not cut it.

It was a real disappointment when one of my recent NCO academy graduates could not show me how to verify whether his howitzer -10 manual was current. He was a strong leader, hard worker and excellent NCO, but the formal block of instruction had not given him the basics. A 15-minute class solved the problem.

My contention is that we are so bound to the training regulation and standard checklist that really effective training fails to materialize as often as it should. If the time we spent writing the monthly training evaluation, compiling the education level report and preparing the semiannual training plan were devoted to planning and executing interesting training, we would have fewer "motivational problems."

Take away the desk, telephone and coffee pot of the training czar, put him and all his people in line units as workers and let the unit's combat effectiveness on the annual training evaluation . . . be the indicator of the commander's ability to train his troops.

There are few things worse than sitting through another code of conduct or first aid class because "they said we had to." For those senior NCOs who have heard the class 15 times in 15 years of service, it is unrewarding. It is also an

insult to the junior enlisted who have heard it several times.

Our audience is often too large and made up of the wrong people. A class on mine detectors does not need to be taught to the 19 people left over after details and dental appointments. Teach it to the headquarters platoon personnel who have to use the thing. There is nothing wrong with six people learning about mine detectors while the rest of the battery works on maintenance, uses the CueSee machine or reads the latest TC from Fort Sill.

Let us stop kidding ourselves and insulting the intelligence of our subordinates. We do not need mountains of paperwork to prove we did training. And we certainly do not need "those guys up there" mandating training adventures that somebody thinks are good.

The money we could save would buy us a couple new vehicles or radios.

G. J. Enos  
CPT, FA  
HHB, 2-81st FA

### **Nuclear Training**

We are not training as we will fight with our nuclear capabilities.

It is our fault because we have been silent too long on the written standards and evaluations, with which we are forced to conduct nuclear training. The only written directive commonly used as a reference for nuclear training has been AR 50-5. Although there are some requirements in this regulation that could apply in the combat situation, chapters on physical security and transportation have been "loosely translated" by the major Army commands (MACOMs) to apply to tactical training. The physical security requirements for a fixed storage site do not conform to a field artillery position with a nuclear weapons storage area or an external weapons firing point. Although some MACOMs still require units to maintain the same paperwork required at a fixed storage site, my biggest heartburn is the MACOMs interpretation of the number of guards required to secure the storage area within the battery perimeter. The size of the battery reaction force must be at the discretion of the battery commander, based on the enemy threat and available personnel.

Presently, the MACOMs and DA are discussing the differences between a logistical movement and a tactical

movement. If the movement is logistical, chapter 4, AR 50-5, applies, i.e., vehicle inspection checklists (DD Form 626), a two-way radio in each vehicle, and vehicle loading restrictions. There are presently no published guidelines on the requirements for a tactical convoy. DD Form 626 is primarily intended for a commercial vehicle, but over the years several field artillery commanders have gone to painting and steam-cleaning trucks, using tire black and putting vehicles in administrative storage so that the vehicles can meet the "requirements" of DD Form 626. DA or the MACOMs must devise a more realistic method to insure that the military vehicles are free of critical defects prior to movement.

Chapter 4, AR 50-5, requires a two-way radio with each vehicle on a logistical movement without considering the number of radios authorized to a field artillery unit. A unit cannot fulfill the radio requirement without sacrificing other essential tactical functions.

Unit commanders really suffer with the decision of transporting their basic load of conventional ammunition as well as their prescribed nuclear load (PNL). Many field artillery units cannot even carry their basic load of conventional ammunition *much less* their PNL. Why don't logisticians compute the basic load on the number of ammo trucks in a unit instead of by available supply rate? The field artillery commander is faced with:

Should I move my PNL first or my conventional basic load? My conventional load has munitions for defense of the battery.

Do I have time to set up shuttle runs?

Can I carry the conventional and the PNL together? We cannot afford to give up the vehicle cargo space as presently depicted in our weapons systems manuals.

Also associated with the vehicle dilemma is the AR 50-5 requirement for alternate load carriers to accompany the convoy plus the associated paper work. The missile units are severely handicapped because of their system-peculiar transporters/launchers. Since most of our movements involve delivering nuclear weapons to people from the same unit, the AR 50-5 requirements for an entry control roster and other forms of identification seem superfluous.

The next step is to improve the system and standards for evaluating unit nuclear training. Inspections are conducted in

accordance with Technical Bulletin IG 5. Unfortunately, the biggest problem has been the lack of uniformity in the conduct of the inspection, interpretation of directives, and the overall rating for the unit. The teams below MACOM level should not be allowed to determine SATISFACTORY or UNSATISFACTORY ratings. These teams should be on an assistance basis only. There should be only one higher headquarters assistance team for a battalion commander to rely on. Layering of inspection teams is the major cause for excessive paperwork and man-hours spent by the inspected unit in preparation for the MACOM nuclear surety inspection (NSI).

Guidelines in TB IG 5 hamper realistic training. For example, the inspection team chief discusses conducting simultaneous operations, but he also says that his inspectors must observe all these operations, requiring unit personnel to stop their operation, get the inspector's attention, and then continue. We are not *really* conducting simultaneous operations. Another example is the escort requirement for the inspection team. Although the team chief carefully explains the escort requirements and his intention not to violate the two-man rule, the inspected unit personnel must insure there are no "slip-ups," thereby detracting from the conduct of the operation. Since the inspectors would not be present during an actual nuclear operation, why can't they be considered strictly as observers with no escort requirements? There are several other things that inspected units do which are "eyewash," but the units do them because they did the same thing last year and no one said anything. Some examples are laying out the entire special weapons tool kit on a field table for the inspectors and furnishing podiums for the "reader." Some senior commanders erroneously use the NSI evaluation to determine their unit's entire nuclear ability. First of all, the inspectors only observe two or three days of the unit's nuclear training. Second, the NSI is not conducted in conjunction with a test of the conventional capabilities. Therefore, they do not observe the unit performing all of its missions together. Third, most units conduct their NSI with just one nuclear round (simulated). They have not performed the equally complex problems of storing, securing, and transporting several rounds at the same

## Incoming

time. Fourth, the NSI team rarely observes a 24-hour operation. Fifth, many commanders use their surveyors and FDC personnel (high GT scores) for assemblers or security guards. These personnel would not be performing these functions in daily tactical operations. We are kidding ourselves that the NSI is a true test of any unit's nuclear capability.

Staff officers must be more responsive to our needs for doctrine, based on how we are going to fight and *not* on how we are going to get inspected. There appears to be help on the way. First, we are getting a written directive from Training and Doctrine Command which discusses nuclear unit operations in combat — FM 100-50. We now have a "source document" with which to send all our comments to higher headquarters; so get those pencils working and give higher headquarters some "troop input!" Second, the Field Artillery School is in the process of including all the nuclear surety related tasks into the ARTEPs. Unit commanders will now be able to evaluate their unit's conventional and nuclear capabilities at the same time for a true training readiness posture.

Once we have the guidance for conducting realistic nuclear training, the next step should be to look at the evaluation system. Although strong support is needed at the highest level, we must decentralize the current MACOM NSI system and put the evaluation responsibility at division artillery or group level.

Now is the time for all Redlegs to be instrumental in dictating our own nuclear training policies.

C. F. O'Donnell  
MAJ, FA  
Fort Sill, OK

### **Training Our Leaders**

Many old soldiers complain that the Army never changes. When they attend those 0800 formations, they seem to forget that the old Army tradition of 0600 reveilles disappeared only seven years ago. That change did not come about from union pressure. It came about when a division commander, then MG Bernard Rogers, employed his leadership ability and cancelled the traditional formations when the so called "EM's Council" successfully presented strong arguments against it. Today, as Army Chief of Staff, General Rogers was indeed sincere and consistent when he publicly stated that the Army does not need unions and that problems can be solved by good leaders who can communicate

with their men.

However, the question arises: Are we producing good military leaders today who will fulfill tomorrow's social needs, normally met by unions in a civilian environment?

I feel that although the Field Artillery School is deserving of great praise for its contribution to the recent rapid technical and doctrinal improvement of Field Artillery, leadership is an essential element that is not receiving even token attention.

I submit that a most important mission of the basic and advanced officer courses is to provide the students with a breadth of knowledge sufficient to give them judgment, perspective, and taste and teach them a sensitivity for the problems of others and strong ethical principles.

Unfortunately and incorrectly, the Field Artillery officer courses assume that the students were taught most everything they need to know about leadership in their pre-commissioning training. Leadership needs to be developed by formal classes at all military schools. A few courses (and not a few hours) in ethics, learning theories, human relations, and even psychology should be taught at the branch schools. Today, the FAOBC officer receives a total of only 8.6 hours of leadership training.

If USAFAS is to continue its role as an agent of change, it must think in terms of improving the most important asset of any unit — the small unit leader. All the changes which have been adopted by the School have been instituted to improve the small unit

commander's tactical and technical knowledge. I suggest that this effort continue, but that we immediately begin to improve the small unit commander's knowledge of his most important asset — the human being.

The human being, like technology, is undergoing constant change. He must be studied in an academic environment and not simply by means of a race or human relations seminar. There is a major difference in the way a second lieutenant with a college degree perceives right and wrong and the way an 18 year old private perceives it.

If we are going to develop good leaders, the branch schools must provide students with the knowledge to gain a perspective of their men, a sensitivity for their problems, and strong ethical principles. ROTC and other officer producing programs only lay a weak foundation at best.

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

*Your comments on the need for junior leaders to be sensitive to changing human needs are well taken, but can these aspects of human relations, which are really being developed and acquired from childhood, be "taught" in a very short educational experience whose charter is to produce technically qualified Field Artillerymen? Is not your plea better directed toward the officer producing college programs which have this mission, have four years to do it, and get these future officers at a much younger age?—Ed.*

### **Airmobility Works**

Following the procedures of the air assault artillery and the airmobile raid described in the May-June 1975 and the May-June 1976 *Field Artillery Journal*, the Red Dragons of the 3d Battalion, 13th Field Artillery, became the first unit in Hawaii to internally load M102 howitzers on CH-47 helicopters and make both day and night airmobile moves and raids. The unit was conducting routine field exercises and employed the new techniques to enhance the training. The internal loading proved to be both innovative and viable.

Michael T. Chychota  
LT, FA  
24th Inf Div Arty





### **Cadet Favors MRLs**

In today's Army with monetary constraints regulating the functions of our military forces, it is important to get our money's worth out of high-cost weapons systems. Modern target acquisition procedures and computers, sophisticated guidance equipment and gun tubes are commonplace in the Army today. Pinpoint accuracy is stressed. However, I believe that older, saturation-type weapons still have their place on today's battlefield, especially in the European environment.

Chief among these weapons is the multiple rocket launcher (MRL). Used extensively by US forces in WWII (principally in the Pacific Theatre), these weapons were primarily ship-launched, but there is no reason they cannot be launched from land. The Russians used tremendous numbers of MRLs during WWII. There are probably many Germans alive today who can attest to the damage and fear caused by the whooshing explosions of the *Katayusha* rockets. These weapons have a place on today's battlefield and are still used by the Soviets.

As a future infantryman, I will appreciate good fire support. However, I can easily see myself in a foxhole, facing a large-scale Soviet attack. With a smaller number of highly accurate weapons (rather than a mixture of expensive accurate and cheaper less accurate weapons), priorities may have to go to other targets and the infantryman would be left to his organic TOW and mortar support to stop the assault. This may not be enough. The addition of four rocket batteries (one battery DS to each brigade and one battery GS to the division) may help alleviate situations similar to the above. Russian offensive formations provide lucrative targets on which highly accurate artillery is not necessary. Rocket launchers put out tremendous volumes of fire at a cost-effective rate and they can make a large-scale attack costly to the enemy. The more accurate weapons can be saved for hardened targets or those which cannot be hit by the MRL. The MRLs also can be used to hit large targets such as supply depots and trains areas. As noted in an earlier edition of the *Field Artillery Journal* MRLs can be used to destroy AA weapons making life easier for the aviators and ground troops. The cheaper weapon and ammo enables us to saturate large areas with explosives. Why use costly ordnance to do this when

inexpensive ammo will do?

Aside from the MRLs there is another weapon which is not seeing the use it should. The 175-mm gun is being phased out because its accuracy is not up to expectations. The re-tubed models of the 8-inch howitzer have almost, but not quite, the same range as the 175. The 175-mm does not (and should not, due to inaccuracy) fire expensive rocket-assisted or laser-guided shells. Its use should be restricted to roles such as long-range interdiction or area bombardment where its inaccuracy would not affect the mission. Also, because it outranged all Soviet tube artillery, we should save it for counterbattery fire. Shooting shells which *might* be inaccurate is better than not shooting at all because you cannot reach the enemy.

Area fire weapons (as compared to pinpoint artillery) still have a viable mission on today's battlefield. We can get "more bang for the buck" with MRLs and 175s. The tremendous firepower provided by these weapons may be all the maneuver battalions need to turn the tide to victory. We all hope we never have to use them, but it will make a lot of people breathe easier knowing we have them.

Michael J. Sienicki  
Cadet, USMA  
Class of '78

### **Before We Buy An MRL . . .**

LTC W. H. Rees' article *We Need An MRL* is excellent; however, I would like to offer a couple of thoughts on these systems that I feel need to be considered.

First, while MRLs are probably the finest weapons available for a no-adjustment FFE mission, especially in preparation fires, I feel that this is too specialized a mission to justify separate units, given the current small size of the Artillery. As the article pointed out, NATO forces are outnumbered 9 to 2 in artillery, but this Soviet lead is qualitative as well as quantitative since our own guns are usually inferior to the Soviet's in both range and rate of fire. This means we cannot fire as many missions in a given time, or range as great a battle front as can our potential enemy. Likewise, greater range and rate of fire give the Soviet artillery a greater survivability since it gives them more depth in which to hide, increases the chance of error in our counterbattery location process, and means they are less likely to be spotted by firing for shorter lengths of time. Thus,

before we go spending funds on new rocket systems, we should first develop modern, long-range, quick-firing cannon and avoid, at all cost, replacing general purpose cannon units with special purpose MRL units.

Second, if we still want MRLs (and I feel we should), then they should be manned, at least in the first stages of a conventional European war, by elements that will not be critical in their normal jobs and can be diverted to man the rocket units (i.e., elements of headquarters batteries and service batteries). Admittedly, this will cause a lot of problems, but we are going to have to make a few sacrifices to increase our combat firepower in these lean times.

John R. deTreville  
CPT, FA  
Fort Bragg, NC

*I think many US field artillerymen will strongly disagree with you on the Soviet qualitative advantage in cannon artillery and our comparative range shortfall.—Ed.*

### **MARS Not Ready**

The article by LTC W. H. Rees on the need for a multiple rocket launcher was outstanding. It is especially heartening to see a sister service recognize the Army's need for such a system.

Advocates of a multiple rocket launcher system should be encouraged by the DOD decision of 11 January 1977 to enter development for the general support rocket system — a multiple launch rocket system.

Although not related to the article, the caption under the picture on page 12 in the January-February *FA Journal* is in error. The MARS (or RS-80) is not "currently available." Although a prototype launcher has been built and used for launcher dynamic tests, the rocket motor and warhead have not been developed. It is my understanding that work on this program has stopped.

Kenneth S. Heitzke  
COL, FA  
Project Manager, GSRS  
Redstone Arsenal, AL

*Our use of the term "currently available" was premature. A German official reports that a rocket motor has been developed, but the entire system is not ready for fielding.—Ed.*

## Incoming

It appears that my father, MG (Ret) Carlos Brewer, USA, was planning to submit an article to you about the time he died — or so I judge from a rough draft I found among his effects. I am sending the draft to you in case he had not submitted it and it would still be of interest to you.

Can you believe that anyone could be so dedicated to the Army that he would be researching and writing articles to improve artillery techniques at age 85?

I also served in the Field Artillery during my 26 years of active military service, but I could in no way match my father's devotion. Would that I could!

R. M. Brewer  
COL (Ret), FA  
Arlington, VA

## Separate Loading Ammo

I am convinced that our field manuals do not adequately stress the importance of carefully loading the powder charge in separate loading ammunition. Power and uniform seating of the projectile are stressed, whereas the correct loading of the powder charge is implied only by a caution not to insert the base of the reduced charge beyond a certain point. No reason is given for this precaution; therefore it is likely to be ignored by the responsible cannoneer. Actually it is even more important that the powder charge be loaded correctly than that the projectile be seated uniformly. The important thing is to be sure that the breechblock makes firm contact with the ignition charge. The reason for this is that the black powder in the ignition charge explodes when in a confined space but only burns rapidly when not confined. I had three incidents before and during WWII that convinced me of the importance of correctly loading the base charge.

When I became Director of the Department of Gunnery at the FA School in 1929, the Department was teaching that the 155-mm howitzer was unreliable in firing the lower zones, using number 3 charge or less. To emphasize this fact, a mission was always fired at the end of the 155-mm howitzer instruction at a short range, using charge 2. The result was definitely erratic, as far as range was concerned, and sometimes the projectile tumbled and failed to explode. An increase in the elevation frequently resulted in a decrease in range and several shots were required to get the burst close enough to make a definite deflection sensing. One day, however, the demonstration of the erratic range was a failure, for the range was quite accurate even with small elevation changes. This was so unusual that I went by the battery position to see what the personnel were doing. The battery commander explained that he had learned from the French during WWI that it was important to get close contact between the base of the breechblock and the ignition charge. He said that the French even put grease on the face of the breechblock and made sure that there was close contact by using the breechblock to push the powder charge into the chamber the last few inches. That made sense to me, and the Gunnery Department discontinued teaching that the lower charges gave inaccurate range distribution. Instead, we stressed the importance of correctly loading the powder, especially with the reduced charges.

My second experience with incorrect loading was in the late 1930s when I was assigned to the 25th Field Artillery at

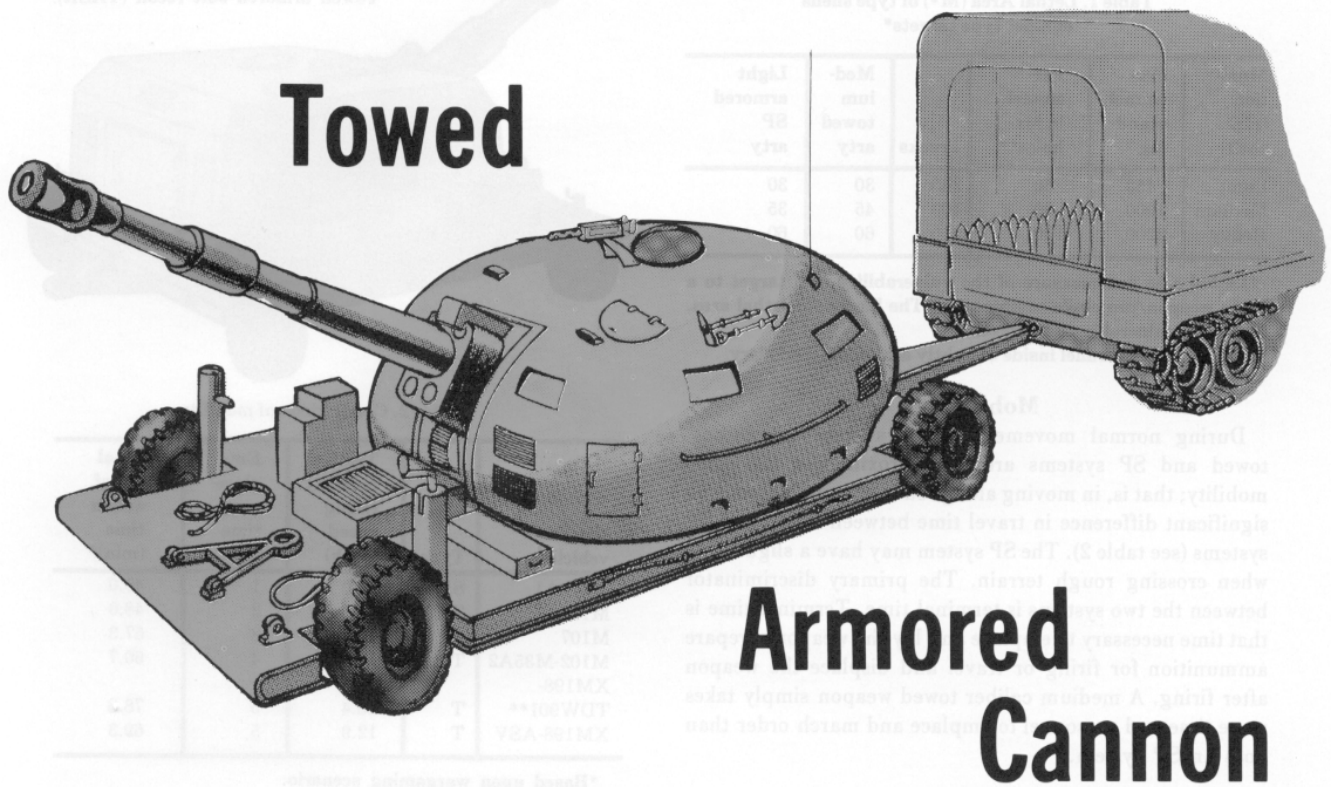
Madison Barracks, NY. The unit had been getting erratic range results and thought the powder they were receiving was defective or that the range tables were wrong in the probable error assigned to the 155-mm howitzer at different ranges. Remembering my experience at the School, I suggested a check to determine whether personnel had been trained in loading the powder charge. It was found that battery personnel were disregarding the necessity of a close contact between the breechblock and the ignition charge. This was corrected and increased accuracy showed up immediately.

My third experience with excessive range errors due to improper loading occurred during WWII. A battalion of 8-inch guns was assigned to my group to counter a German battery that had a bad habit of dropping rounds in the vicinity of any division or corps CPs reported to them. We took the German battery under fire as soon as the sound ranging battalion got a fix on it. The battalion commander of this 8-inch battalion informed me that these guns had a range dispersion greater than the firing tables indicated. I found that personnel were disregarding the proper handling of the powder. After the battalion learned proper loading procedures, the German battery was silenced.

I have searched the present field manual for instructions for loading the 8-inch and found that more than a page is devoted to instructions on the importance of carefully loading the projectile with the caution: "Power and uniformity in ramming are essential to the accuracy of fire." On the other hand, only one brief paragraph is devoted to the proper loading of the powder, with nothing about the importance of close contact between the powder charge and the face of the breechblock. There is a statement that the powder charge should not be inserted beyond a certain point — which is intended to insure this close contact — but the reason for this is not stated. It is easy to see that this caution could be ignored or only carelessly observed, as was the case in the three situations I have cited. I am convinced by my observations that it is even more important that the powder charge be loaded correctly than that the projectile be uniformly rammed.

The reason for this close contact should be stated in field manuals *in italics*. A further statement that this will result in the explosion of the ignition charge — rather than simply a burning of the black powder — might also emphasize the importance of this caution.

*The Journal regrets the death of Major General Brewer and reiterates the comment of his son: ". . . that anyone could be so dedicated to the Army that he would be researching and writing articles to improve artillery techniques at age 85? . . . Would that I [we] could!"—Ed.*



*The concept described in the following article is not currently under development. It is proposed to stimulate thought about weapon design within the Artillery Community.—Ed.*

**TAC . . .**  
**TASR . . .**  
**What is it?**

Simple, it's the Field Artillery School Combat Development Doctrine Team's answer to the old argument — towed versus self-propelled (SP) — and the answer is neither, but rather a weapon system which combines some of the best characteristics of each — the towed armored cannon.

For some time, questions have been raised concerning which cannon system is preferred for the field artillery because of trade-offs involved with a towed or SP weapon system. Discussion and research reveal three characteristics which generate this dilemma: survivability, mobility, and RAM (reliability, availability, and maintainability).

**Survivability**

Should a battery be subjected to counterfire, the incoming rounds have a distinct lethal area associated with each element within the targeted unit (see table 1). The gun crew is the "softest" element of the field artillery system. Although there is not a great difference in the vulnerability of the towed and SP weapons themselves, it is obvious that a weapon which provides greater crew protection from counterfire can make the entire system more survivable. Current towed artillery as well as the 8-inch M110A1 and 175-mm M107 SP weapons provide little crew protection. The 155-mm M109A1 provides some shelter for four crewmen. With the development of the armored support vehicle (ASV) (be it metallic, ceramic, or fabric armor), most of the crew will be afforded a higher degree of protection, but steps must still be taken to protect the cannonneers on towed weapons. Protection from counterbattery fire must be afforded to *all* artillery crewmen; skilled artillerymen must be conserved.

**by CPTs Joseph C. Antoniotti, Allan M. Resnick, and William J. Krondak**

**Table 1. Lethal Area (M<sup>2</sup>) of type shells against type targets\***

Munitio n (HE shell)	Perso nnel standi ng	Person nel in foxhol es**	Trucks	Medi um towed arty	Light armor ed SP arty
Light	450	50	230	30	30
Medium	1000	90	400	45	35
Heavy	2200	160	950	60	60

\* Lethal area is a measure of the vulnerability of a target to a given weapon/projectile combination. The larger the lethal area, the more vulnerable the target.

\*\* Equates to personnel inside of lightly armored SP artillery.

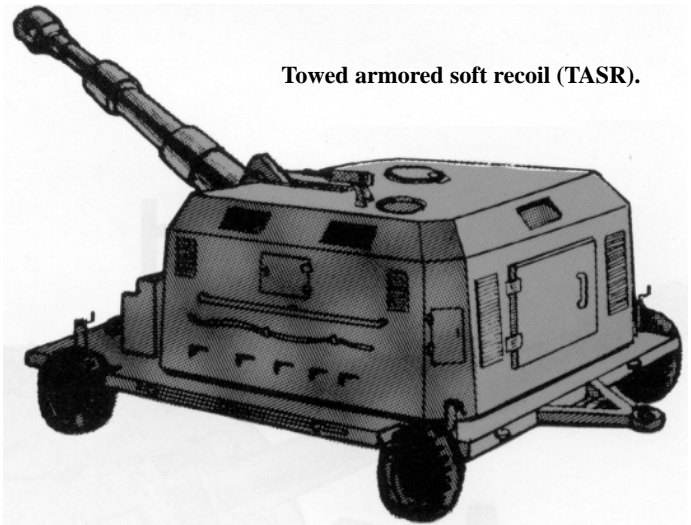
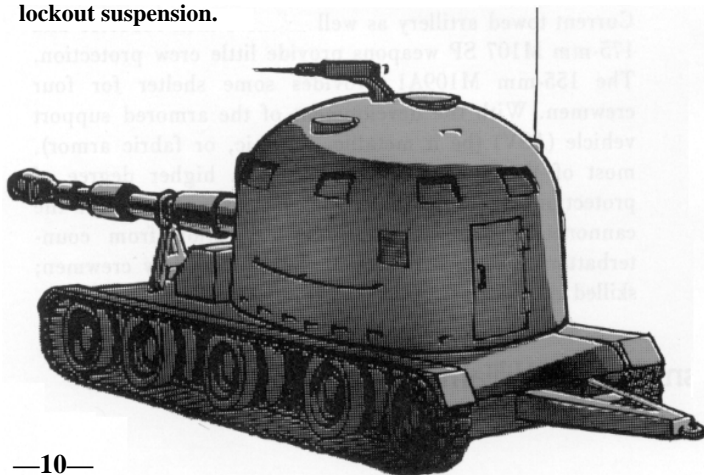
### Mobility

During normal movement under average conditions, towed and SP systems are of approximately the same mobility; that is, in moving along roads or trails, there is no significant difference in travel time between towed and SP systems (see table 2). The SP system may have a slight edge when crossing rough terrain. The primary discriminator between the two systems is terminal time. Terminal time is that time necessary to emplace and lay the weapon, prepare ammunition for firing or travel and displace the weapon after firing. A medium caliber towed weapon simply takes more time and personnel to emplace and march order than does an SP system.

### RAM

Reliability, availability, and maintainability favor the towed system. Difficulty is encountered when attempts are made to precisely measure the RAM characteristics of weapons systems, but field experience and engineering estimates indicate that towed weapons have fewer RAM problems than more complex SP systems. Primarily this is because an SP weapon combines armament and automotive components on one chassis. The complex combination of subsystems is conducive to failure simply because there are more things to go wrong. If the automotive component fails, the weapon is immobilized and firing may be difficult

**Towed armored cannon (TAC) using free wheeling track with lockout suspension.**



**Towed armored soft recoil (TASR).**

**Table 2. Comparison of mobility**

Weapon-vehicle	Type	Tactical mobility rating speed (mph)	Emplac ement time (min)	Total out of action time (min)*
M109A1	SP	13.0	1	45.0
M110A1	SP	14.1	2	48.0
M107	SP	12.9	3	57.3
M102-M35A2	T	13.8	4	60.7
XM198-TDW9 01**	T	10.4	5	78.8
XM198-ASV	T	12.9	5	69.3

\*Based upon wargaming scenario.

\*\*TDW901-Twister dragon wagon is a conceptual wheeled vehicle for the XM198.

or impossible. When the automotive and armament subsystems are separated, RAM improves. The towed system is therefore more desirable from this viewpoint.

### The Concepts

It is apparent that a system capable of using the best attributes of current towed and SP systems would be optimal; that is, a system that provides protection for the crew, minimizes terminal times, and significantly improves the RAM characteristics.

Two concepts are proposed. The first, the towed armored soft recoil (TASR) uses an armored turret, a unique suspension system, and a soft recoil cannon. The second concept, the towed armored cannon (TAC) would be appropriate if soft recoil technology cannot be satisfactorily applied to medium and large caliber weapons. The TAC uses a high efficiency muzzle brake and free wheeling track with lockout suspension.

The TASR uses soft recoil to achieve several goals. Soft recoil reduces emplacement/displacement time by eliminating the need to dig-in trails. It also shortens the recoil cycle, increasing the possible rate of fire. Finally, by reducing the shock transmitted to the entire weapon system, it improves RAM.

To reduce terminal times, the system will be emplaced by using a mechanical or hydraulic suspension device which raises and lowers the firing platform. Mobility is enhanced by large puncture-proof foam filled tires.

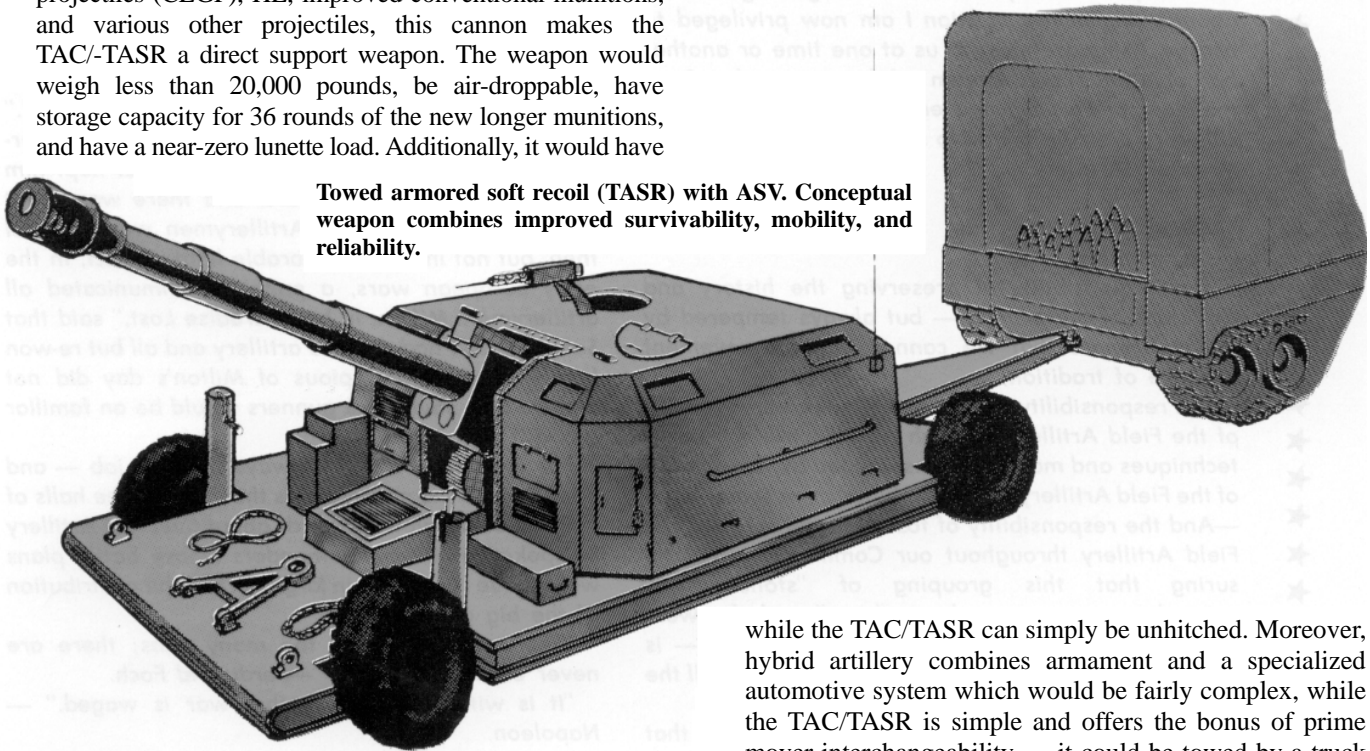
If the TAC is developed, its high efficiency muzzle brake will greatly reduce the shock of recoil. The effects of overpressure created by such a muzzle brake can be decreased by the armor shield and other crew protection measures. Free-wheeling track with lockout suspension provides a stable firing platform, improves mobility, and minimizes emplacement/displacement time.

The cannon tube envisioned for both concepts is the 155-mm cannon developed for the XM198 towed howitzer. With its capability for firing cannon launched guided projectiles (CLGP), HE, improved conventional munitions, and various other projectiles, this cannon makes the TAC/TASR a direct support weapon. The weapon would weigh less than 20,000 pounds, be air-droppable, have storage capacity for 36 rounds of the new longer munitions, and have a near-zero lunette load. Additionally, it would have

ultimate objective is a hardened and protected battery position that requires minimal set-up time.

Preliminary investigation of artillery systems that combine some of the best features of towed and SP weapons has been done at Rock Island Arsenal. (See article in May-June 1976 *Field Artillery Journal*.) The TAC/TASR described here incorporates more crew protection than the hybrid artillery concepts evaluated by Rock Island in their preliminary analysis. The slight loss of cross-country mobility in the TAC/TASR compared to the various hybrid concepts may be offset by decreased emplacement/displacement times since most of the hybrid systems require "off-loading" the weapon before firing,

**Towed armored soft recoil (TASR) with ASV. Conceptual weapon combines improved survivability, mobility, and reliability.**



6400-mil traverse, a chemical filtration system for the crew, a portal for ammo resupply directly from the artillery support vehicle (ASV), and a detachable armored shelter. It is envisioned that the howitzer would be manned by a crew of five to seven.

A firing battery that uses this weapon would be a hardened position. All "soft" vehicles could be consolidated at battalion level; the command post version of the mechanized infantry combat vehicle (MICV) would be used for FDC and command vehicles. Another MICV-derivative, the ASV, would carry the basic load and act as prime mover for the weapon system. Two ASVs per weapon would probably be necessary to maintain adequate ammunition resupply and transport flexibility. The ASV would have an armored cab and a protected cargo area. Again, the

while the TAC/TASR can simply be unhitched. Moreover, hybrid artillery combines armament and a specialized automotive system which would be fairly complex, while the TAC/TASR is simple and offers the bonus of prime mover interchangeability — it could be towed by a truck as well as by the ASV.

In summary, the TAC or TASR would achieve the survivability and RAM characteristics of a towed weapon with greatly increased crew protection and the mobility and speed of emplacement of an SP system. High risk technology and complicated power systems are not required for its operation. The inherent simplicity, ruggedness, and lethality of the system would allow it to make a significant contribution to field artillery mission accomplishment.

With current technology, this weapon could be the weapon of the future — **TODAY!** ☒

**CPTs Joseph C. Antoniotti, Allan M. Resnick, and William J. Krondak are assigned to the Doctrine Team, Directorate of Combat Developments, USAFAS.**

## General Kerwin, other honored

### **MG Donald R. Keith's address to the Washington, DC Field Artillery Ball.**

*Last year as I sat out there where you are sitting now, it did not occur to me that this year I would be in a position which would occasion my having the honor of speaking to you tonight.*

*Frankly, over the years I have thought a good deal about being in the position I am now privileged to occupy. I suppose most of us of one time or another harbor that secret dream of becoming the Commandant at Fort Sill and enjoying the title which is still very difficult for me to say in the first person — Mr. Field Artillery.*

*Along with the title, of course, goes much responsibility:*

*—The responsibility of preserving the history and traditions of our branch — but always tempered by the awareness that we cannot shun improvement because of tradition;*

*—The responsibility to continue to seek improvement of the Field Artillery through new doctrine, training techniques and materiel items, guided by the mission of the Field Artillery in the combined arms team;*

*—And the responsibility of fostering the spirit of the Field Artillery throughout our Community — of insuring that this grouping of "stone-hurlers, catapulters, gunners and missileers" and the wonderful ladies who so admirably support them — is permeated by that very special bond which we call the spirit of the artillery.*

*I am privileged to accept these responsibilities that I have to the Army and to you, who are the Field Artillery. I pledge my utmost efforts to fulfill them.*

*One of the more difficult things to do in the Army is to take over a good outfit. I've been very impressed by the work that Sill, in conjunction with the rest of the Community, has been doing for the past few years under the capable and dynamic leadership of Dave Off. I kept up with it from my desk here in Washington. The momentum is there — and my big job is to keep it going.*

*Since arriving at Sill only a short time ago, I have had the chance to take stock of the Field Artillery, for I have been briefed — and briefed — and briefed — and I've asked many questions. In fact, it feels very*

*good to stand here as a speaker rather than sitting as a listener!*

*It occurs to me that as we stand on the threshold of the third century of service to our nation, we should consider the state of the Field Artillery from the point of view of where we've been, where we are, and where we are going.*

*The Field Artillery has always been something special. We have been — and are still— known as "the last argument of kings" and "the king of battle," and these names go back into dark history when, in speaking of artillerymen, they said that "those who dabble in infernal substances partake of the devil." They said there was a "veil of mystery that the artillerymen had cloaked his trade with that kept him separate from all the others, and there was great profanity in the ranks." Artillerymen were special then, but not in a very favorable light. In fact, in the early European wars, a pope excommunicated all artillerymen. Milton, in his "Paradise Lost," said that Satan himself had devised artillery and all but re-won heaven with it. The pious of Milton's day did not dispute him, saying his gunners would be on familiar ground!*

*The Field Artillery has always done its job — and done it well. The many quotes that hang in the halls of our School are glowing words about the Field Artillery — spoken by force commanders whose battle plans were made successful in large part by the contribution of the big guns:*

*"There can never be too many guns; there are never enough of them." —Ferdinand Foch.*

*"It is with the artillery that war is waged." — Napoleon.*

*"You know who won the war; the artillery did." — GEN George Patton.*

*And the Field Artillery has always had a bond. When we say "Not all are privileged to be Field Artillerymen," we mean it — because we feel it.*

*Today the state of the Field Artillery is good, but more than that — it is exhilarating! And that exhilaration stems not only from the internal direction of our units and schools, but also — and perhaps more so — from the redirection of the Army toward full-fledged combined arms operations.*

*We have always prided ourselves in the fact that the Army is a team — and yet today that feeling is*

## guests, ladies, fellow Redlegs:

more alive than it has been for a long time. And successes we enjoy are due to that teamwork — from the highest levels of the Army to the lowest numbered cannoner.

We've redirected much of our doctrine toward the modern battlefield and developed new tactics, techniques, and organizations to improve our chances for success.

Training — which must become the number one priority in the Army — is undergoing dramatic changes in methods, publications, and most of all, the actual conduct of training in our units.

I recently attended TRAINCON — the US Army Europe sponsored training conference at Grafenwoehr — where General Blanchard demonstrated to his senior NATO commanders the new TRADOC "how-to-fight" doctrine in live fire action. It was impressive! Equally impressive, however, was the display of new training devices that will allow commanders to get realistic training to their troops — even in a hostile training environment. There are a number of devices and simulators that will greatly enhance FA training **and** it will make learning fun for the soldier.

When we talk about today's Army and today's Field Artillery, there is sometimes a tendency among those who labor in our nation's capitol to say "Gee, I really must get out of this place and get back into the Field Artillery — get out and smell some smoke — and get my boots muddy." I must admit that I was one of that group during the last four years I've spent here. But now when I put the Washington time in perspective, I don't see it totally that way. You who work here — without cordite and mud — are as important to the Field Artillery as those who shoot the rounds. Most of you here in Washington are resource guys, involved in many programs — all involved in getting, and defending, things for those in the field. And you don't have to be involved in Field Artillery peculiar matters, because that team I spoke of involves everyone. All are vital to the success of the combined arms team in battle, and that's really what we all signed up for.

You are doing your time here — with long hours and long rides to work from houses that cost too much — and it's appreciated. You constitute some of the best and the brightest the Army has, and when you begin to think about leaving here — and getting back to the cordite and mud — we want you to strongly consider coming to Fort Sill — back to your

School. Our successes at Sill are due to the fine people we have there — many of whom have come from DC — and from the war colleges and from command positions. We need fine people — and we continue to get them. At our Senior Commanders Conference in October, several of our current division artillery and group commanders expressed their desires to come to Sill when they finish their command tours.

So today the state of the Field Artillery is good. We're in good shape and moving toward where we want to be for today's Army.

But what of tomorrow? We are looking at our third century. What does the future hold for our branch in the Army of the 1980s — and 1990s and into the 21st century?

It is perhaps a coincidence that we find ourselves asking these questions at a time when we have just celebrated a 200th anniversary. For, as we look to the future, we find that we are standing right in the middle of our future. We all have a part in shaping it — and this is the greatest challenge of all.

There is a revolution happening in our Army — and that revolution is brought about by the great acceleration of change that is the theme of Toffler's "Future Shock" — things are happening at a breakneck pace — not so much because of things we've done, but because of a series of explosive technological advances which have made nearly everything we envision possible. Technological advances in command, control and communications, automatic data processing, giant steps in increasing the lethality of munitions, laser technology — it's really mind boggling.

Within the Field Artillery, this revolution on the battlefield will be one such as has not been seen since the end of the last century. In the Spanish-American War, artillery was essentially as it had been — a direct fire weapon that physically accompanied the infantry, firing cannons that recoiled to the rear with each firing, giving off tremendous clouds of smoke from exploding black powder, only to be laboriously hauled back into firing position, and reloaded, to repeat the cycle.

In the Russo-Japanese War, just seven years later, a 75-mm cannon had been developed, which could aim at a target not visible to the gunner — indirect fire. This was coupled with an on-carriage recoil mechanism for stability and smokeless powder, which

also increased the range of the cannon from hundreds of yards to thousands, and a breech mechanism which allowed rapid reloading. It was no longer necessary for artillery to physically accompany the infantry, for their increased range and indirect fire procedures became their mobility — and modern artillery was born.

Now, another revolution in Field Artillery is upon us, brought about again by great technological advances. This one, however, involves not just the cannon, but the entire Field Artillery system. Between now and 1985 we will see advanced radars and other target acquisition capabilities, laser-guided munitions, extended range howitzers, and devastating advances in rocket and missile capabilities, all tied together by a completely automated command, control and fire direction system.

That revolution is going to happen — and so as we work day to day on these improvements, we find that we are right **now** well into the future of the Field Artillery. Our task is to be sure that the revolution takes place in an orderly manner and that we — and the entire Army — are trained and ready to employ it. And it will take all of us to make it happen correctly and on time.

The Field Artillery, "that fascinating weapon that so prodigiously lengthened the warrior's arm," has been a vital part of our nation's defense for over 200 years. It is alive and well and moving toward an even more vital role in the third century of service. We will face our greatest challenges yet in the years to come, but we will have the resources to accomplish that mission.

- Well-conceived employment doctrine.
- Advanced equipment.



**Forward Observations** (Continued from page 3.)

While the design is for existing dual-purpose sub-munitions for the warhead, the system is also designed for adaptation to other warheads, such as smoke, scatterable mines, and terminally guided munitions when that technology becomes available.

There are currently two feasible organizational concepts under consideration:

- 1) a GSRS battalion structured along the lines of a conventional general support battalion with three firing batteries of 4 to 6 launchers each, and
- 2) a rocket/howitzer battalion with at least one GSRS firing battery.

Force structure and manpower constraints will ultimately influence the determination of the GSRS organization.

Finally, and most important, we are taking a *total* system approach in this program. All training

- But, most importantly, we will continue to have field artillerymen like you and those all around the world who meld technical competence with that special bond which makes the Field Artillery special — and the field artillerymen a special breed of soldier.

Kipling referred to "the never ending mystery of the gunner's art." And while we think it is not all that mysterious, there can be no question that there is art mixed with the science of cannons.

- A person who works with his hands is a laborer.
- A person who works with his hands and his head is a craftsman.
- A person who works with his hands and his head and his heart is an artist.

A Field Artilleryman certainly works with his hands and head — but he also works with his heart — for the bonds that hold the gunners together are strong ones:

—They are the reason S.L.A. Marshall was moved to write: "That the guns will never be deserted simply because danger threatens is a point of honor around which the artillery has largely built the solid discipline of its corps."

—They are the reason that Molly Pitcher and Margaret Corbin watched their husbands train, followed them to war, manned the cannons when the going got rough, and kept firing the cannons after their husbands fell.

—And they are the reason we are all gathered here tonight — to renew that bond which will continue to be felt by all of us as we forge ahead into the third century of our nation, our Army, and our Artillery. ☒

developments and logistic considerations are included in the initial contract. That means that we will have "software" as well as hardware deliverables during the development cycle so that when the system is ready to be fielded *everything* should be ready to go — the training support package, a checked out logistic support system, computer software for gunnery and, of course, the launcher and rockets themselves.

We at Fort Sill will be participating in the development program to insure that the total package meets our requirements.

The GSRS is on the front burner! With Congressional support for the required funding, the Army's GSRS batteries will be commanded by FA officers currently in the basic course. ☒



## RIGHT BY PIECE

### Molly Pitcher Day At 3-34th FA

FORT LEWIS, WA — The thunder of 105-mm howitzers vainly protested the invasion of women on artillery ground as perfume and brightly colored feminine attire mixed with the acrid cordite fumes and subdued camouflage netting.

It was Molly Pitcher Day for the wives, girlfriends, and mothers of the men of the 3d Battalion, 34th Field Artillery. Molly Pitcher is the legendary heroine of the Revolutionary War who took over her husband's duties in the artillery battle at Monmouth.

The battalion commander, LTC Frank Partlow, wanted the women to know what their men do as artillerymen. "I don't really know what my husband does in the field," said Brenda Whitney. Her husband, SP4 Eugene Whitney, is a surveyor with the 3-34th. Debbie Wilson was equally hazy about the duties of her husband, PFC Jerry Wilson, who is with communications. "I think he fixes radios," she said.

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**Sharon Stout receives a quick lesson about her husband's 105-mm howitzer. (Photo by L. Christodoulides.)**



The chaplain's section provided the funds for babysitters at the Child Care Center as some 60 ladies assembled in the dining hall of the 3-34th.

The women were bused to the field where the men had already deployed for a battalion ARTEP.

Most of the men and their visitors were obviously pleased with the situation. "This is great. I love it," said Sharon Stout as she squinted through the sights of the gun. Sharon's husband is the gunner of an M102 105-mm howitzer.

The women inspected the guns, the fire direction center, and the communications and command sections and then settled down to a lunch of C rations.

Meanwhile the guns kept firing at their distant targets which the women were soon to visit in the artillery impact area. In amazement they silently watched as shells screeched overhead, exploding in the impact area about a mile away. There were ground bursts, air bursts, and delayed action bursts that exploded underground, shaking the earth and sending clouds of dust in the air. Then came a colorful display of white phosphorus rounds followed by green and red smoke rounds that spread out like a multicolored curtain.

### CLGP Fired Successfully

WHITE SANDS, NM — The first production version of the Army's cannon-launched laser-guided artillery projectile (CLGP) has successfully passed its maiden test in firings at White Sands Missile Range. This first-try success was considered a major achievement by program officials since it provided an acid test for the many new materials and techniques involved in the low-cost production design.

The production model incorporates a number of improvements including a new gyroscope and other parts made with molded glass-filled polycarbonate. It also includes techniques that eliminate all electrical connectors.

The 37-second flight successfully demonstrated all aspects of a full trajectory with the exception of terminal guidance. The 155-mm projectile deployed fins and wings, established roll control with the helium-jet roll-rate sensor, and executed pre-programmed maneuvers.

## Right By Piece

### FA Training For The 6th Cav Bde

FORT HOOD, TX — Pilots from the 6th Cavalry Brigade (Air Combat) had a chance to dabble in the art of field artillery recently, in the first fire support training class held for the Blackhorse Brigade.

The Brigade has no organic field artillery units, but the pilots need to know all aspects of various fire support systems which will be deployed in their area of operations.

MAJ Donald Taylor, fire support officer for the Brigade, taught 70 pilots the basics of indirect fire observation and adjustment in a 16-hour block of instruction. Included in the instruction were calling for and adjusting indirect fire and close air support strikes, artillery terminology, and radiotelephone procedures, plus a look at the threat to field artillery.

Field artillery units from the 1st Cavalry and 2d Armored Division Artilleries supported the instruction.

**FORT STEWART, GA — SSG Louis Hartley, instructor in the 24th Infantry Division Artillery NCO Retraining Academy, supervises SGT Gilbert Pritchett in setting a time fuze during a live fire exercise. The NCO Retraining Academy at nearby Hunter Army Airfield recently graduated its first class of 13B and 13E personnel. The 10-week course is designed to equip NCOs from excess MOSs with the technical knowledge required in field artillery specialties. This course is one of several division-level schools established with the assistance of the Field Artillery School to carry out the necessary training without using TDY funds.**



**FORT STEWART, GA — SGT Theodore Spencer (left) is a man who enjoys his work. This direct fire action took place during training for C Battery, 1st Battalion, 35th Field Artillery, under the Quick Draw Exercise (QDE) program of the 24th Infantry Division Artillery. QDEs are short notice, limited-duration exercises, designed to evaluate independent performance of howitzer sections and batteries. The evaluation incorporates 14 ARTEP tasks, a maintenance inspection, and a written test. There are plans to expand the section level exercise to survey, FDC, etc. (Photo by Jim Jeffcoat.)**

### EM Win For Charity

FORT CARSON, CO — The enlisted men of the 4th Div Arty had a double treat recently — they beat the Div Arty officers team in basketball and collected \$180 for charity.

For the past three years, the artillerymen of the Ivy Division have played a basketball game with admission receipts going to worthy causes. So far, a total of \$1,700 has been donated to Fort Carson families.

The score? 50-47.

## Hip Shoot Help

FORT SILL — The 75th Field Artillery Group has devised a quick fire rule for use by firing battery officers and noncommissioned officers in emergency or "hip shoot" missions. The rule was designed by CPT Michael H. Vernon while serving as the operations officer and was manufactured by Fort Sill Training Aids Service Office. The rule is made of plastic, is pocket size (8½" x 3"), and can be written on with a grease pencil. On the back are simple instructions for use. In addition to the quick fire rule, all that is needed to determine firing data is a 1:50,000 scale map, a protractor for determining azimuth of fire, and an OF fan for angle "T" conversions.

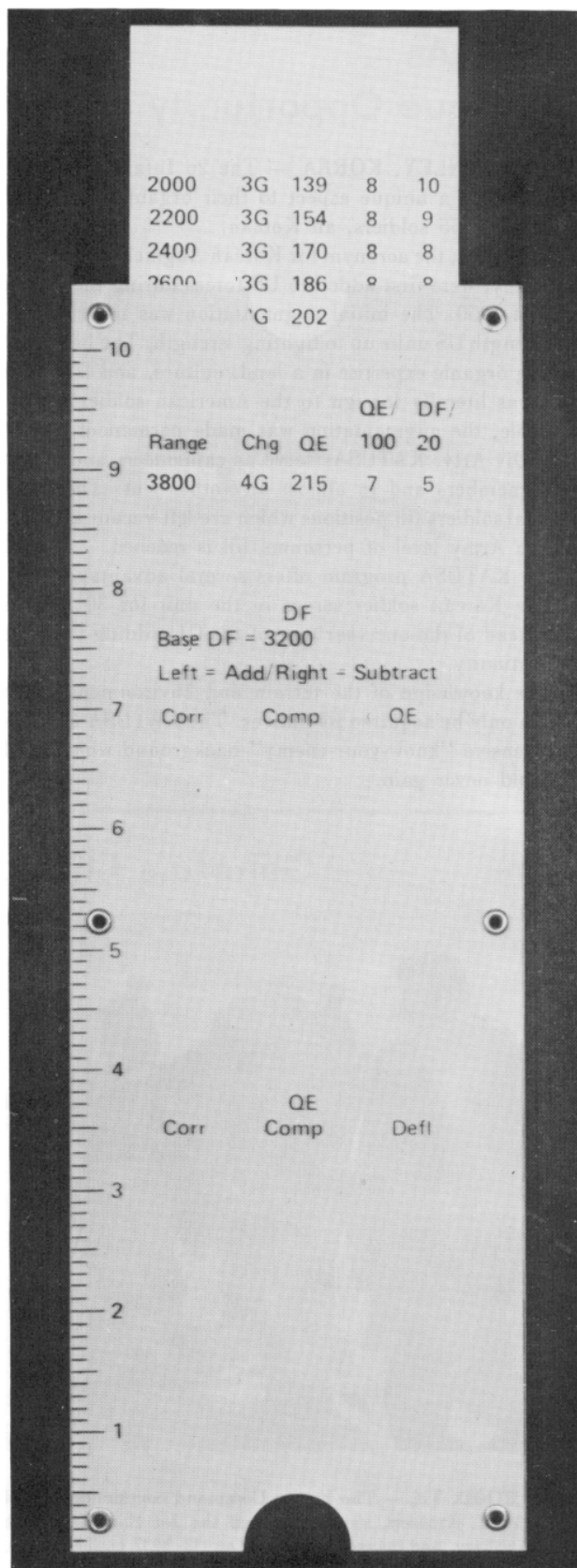
Along the left edge are graduations which can be used to determine range on a 1:50,000 scale map. The center slide is graduated in 200-meter increments, and the charge, quadrant, "C" factor, and 100/R value corresponding to that range are listed as extracted from the appropriate firing table. Once the range to the target is determined, that range is placed in the range window, and the optimum charge and quadrant are displayed. Deflection 3200 is fired if the piece is laid on the azimuth to the target; however, if not laid on the azimuth to the target, the necessary computations can be made and subsequent data can be determined using the "C" factor and 100/R listed. Based on adjustments by the observer, subsequent firing data are determined using the "C" factor to adjust the quadrant and 100/R to adjust the deflection. Observer corrections, firing data computations, and fire commands can all be written on the rule with a grease pencil.

The rule is so easy to use that firing data can be determined without the aid of an FDC. The rule can be adapted to any weapon system by simply changing the values on the center slide.

## Guard Notes

WASHINGTON, DC — The National Guard Bureau has announced that the conversion of Guard M109 howitzers is progressing satisfactorily with 170 weapons having been converted to the M109A1 configuration and six battalions having been equipped with the improved 155-mm weapon (see *FA Journal*, September-October 1976). Priority of fill is to the ARNG battalions that are affiliated with active divisions.

Also, the ARNG has been allocated 175 81-mm mortars which will provide 100 percent fill of ARNG requirements for this weapon.



Quick fire rule.

## Right By Piece

### KATUSAs — A Unique Opportunity

CAMP STANLEY, KOREA — The 2d Infantry Division Artillery has a unique aspect to their organization — an additional 355 soldiers, all Korean.

KATUSAs, the acronym for Korean Augmentation to the US Army, were first added to US forces during the war in August 1950. The initial augmentation was to bring understrength US units up to fighting strength. The benefit of having organic expertise in a land, culture, and language that was literally foreign to the American soldier was so valuable, the augmentation was made permanent.

In Div Arty, KATUSAs serve as cannoneers and rocket crew members and in almost any other slot. These additional soldiers fill positions which are left vacant after the Eighth Army level of personnel fill is reached.

The KATUSA program offers several advantages:

- The Korean soldier serves in the unit for 30 months instead of the one-year tour of the GI, adding valuable continuity.
- The knowledge of the terrain and environment which can only be acquired by natives. The KATUSA also has extensive "know-your-enemy" background which a GI could never gain.
- GIs are exposed to Korean culture on a first-hand basis

even if they elect not to participate in off-post activities.

- The psychological benefit which prevents the Democratic Peoples Republic of Korea from saying that the Republic of Korea is "occupied."
- The Koreans benefit from the association with their US allies and learn the latest US materiel and techniques. This is an invaluable aid to coordinated operations as well as advanced training with equipment which that nation may procure at a later date.

A KATUSA arrives at his US unit after completing basic training in the ROK Army and a three-week US Army orientation course. He is issued US uniforms and equipment at the orientation course where he begins learning US culture and habits. Div Arty conducts weekly English language training for its KATUSAs *and* there is mandatory Korean language training for all US officers.

The biggest problem besides language is the large pay differential. A Korean basic soldier receives only \$3 to \$5 per month compared to the \$300 to \$400 for a junior US soldier. At the completion of his service with the 2d Division, the KATUSA returns to his national force structure or civilian life.

These troops, who comprise one-eighth of the division, exemplify the friendship and understanding that underlies the Korean-American alliance.

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## Generals Check Their Fire Support

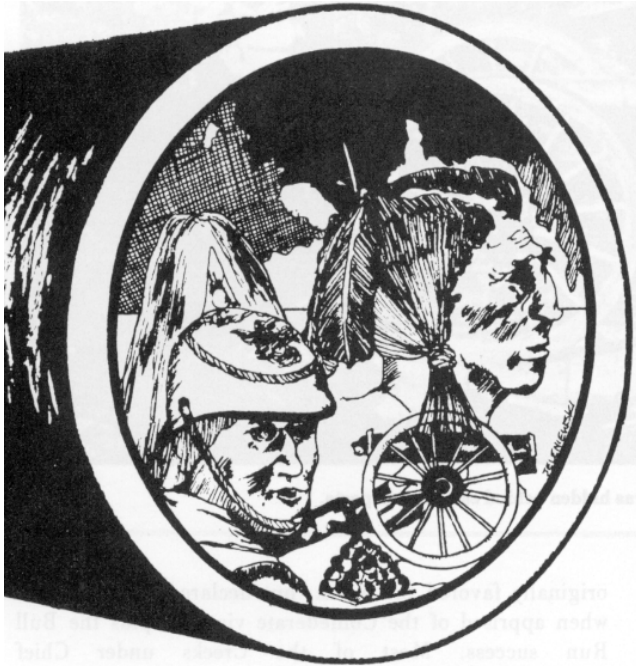


FORT HOOD, TX — The Forces Command commander, GEN Frederick J. Kroesen, recently visited the 1st Battalion, 78th Field Artillery, and inspected training on the M31 trainer range. (Photo by J. W. Pierce.)



ANSBACH, WEST GERMANY — Chief of Staff, GEN Bernard W. Rogers, discusses field artillery procedures with PVT Charles Freeman of HHB, 1st Battalion, 94th Field Artillery. (Photo by SGT Rick Badal.)

## Chapter Seven



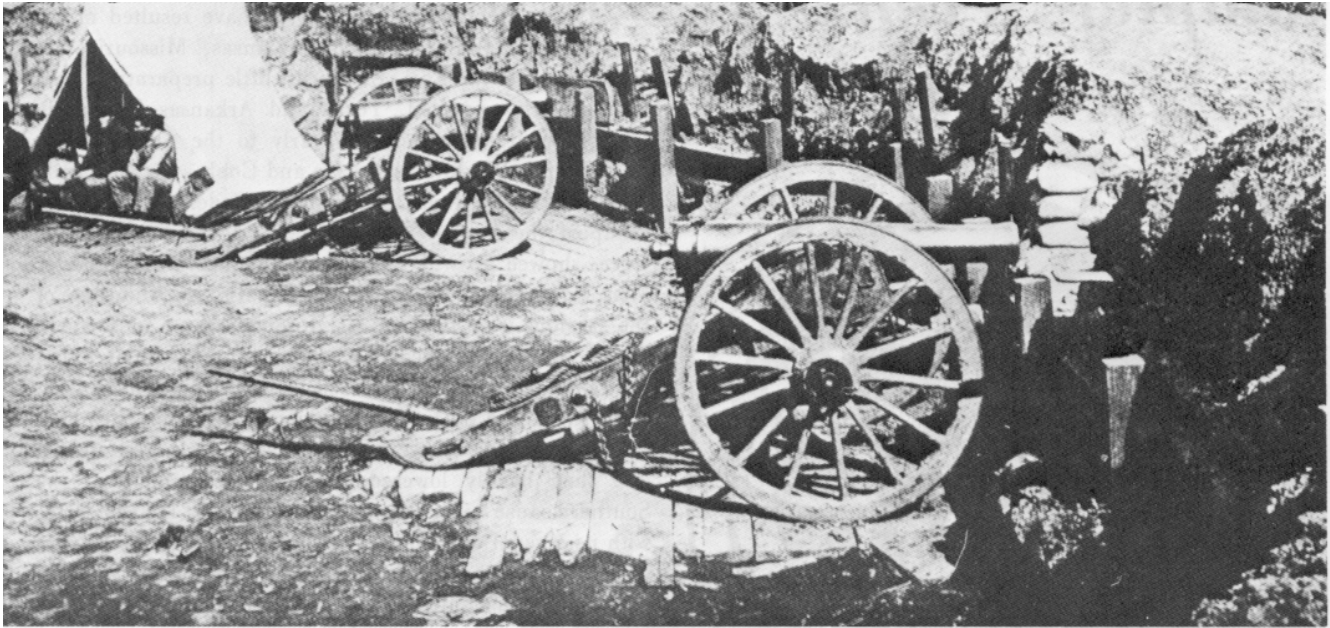
# Winning The West

by COL (Ret) Robert M. Stegmaier

Effective planning could easily have resulted in the separation of Indian Territory, Kansas, Missouri, and Colorado from the East. Even with little preparation, that result nearly occurred. Texas and Arkansas Depots in Indian Territory surrendered early to the Confederates. Forts Smith, Washita, Arbuckle and Cobb were all hastily evacuated by the Union forces, and Confederate forces soon occupied these sites. At Fort Smith, the Arkansas State forces showed up with 10 pieces of artillery. The Liberty, Missouri arsenal fell to Southern sympathizers, and some of the cannons were taken to St. Joseph, near Fort Leavenworth. At Fort Leavenworth, an anchored steamer flying the Confederate flag was forced to lower the flag by local citizens, backed by a rusty cannon. At Junction City near Fort Riley and at Denver, Confederate flags were unfurled and then hastily lowered. Mormon acceptance of the Southern cause was a continuing threat. Fort Leavenworth, with its arsenal of weaponry, was guarded only by several understrength companies. Reinforcements of two artillery companies from Fort Randall and two infantry companies from Fort Kearny were rushed in.

The Missourians requested artillery from Jefferson Davis to capture the St. Louis arsenal; on 8 May 1861, boxes marked "Marble" arrived, but they were seized by Union sympathizers. The boxes contained mortars and guns destined for Southern use. Had the Missourians received the weapons, Fort Leavenworth and the St. Louis arsenal may have fallen to Confederate control. With the hope of obtaining rifles, 2,000 unarmed rebels entered battle at Wilson's Creek.

Union troops from Indian Territory came to Fort Leavenworth and routed the Southern sympathizers from the St. Joseph area. In St. Louis, Captain Lyon captured 1,000 Missourians training as militia to support the Confederacy. St. Louis units manned by men of German birth proved strong Union defenders. At Boonville, Lyon's troops attacked the Confederate forces, and artillery commanded by CPT James Totten scattered the Missouri Southerners. Farther south, General Sigel with 1,100 troops marched north toward Carthage to stop the retreating rebel forces. The forces met at Coon Creek. Sigel opened fire with grape and canister shot while the Confederate's three 6-pounders poured forth solid shot. Sigel won the artillery duel but was threatened by flanking maneuvers. To aid his withdrawal, he echeloned his three batteries at 1,000-yard intervals. Thus, he always had two batteries in firing position as the batteries were withdrawn. Against this masterful maneuvering, the Missourians were unable to attack successfully. Later in the afternoon, finding enemy cavalry to his rear, Sigel moved two infantry columns in strength to the right and left of the road. The enemy cavalry, hoping to strike the center strongly, concentrated its forces on the road. Artillery tore their ranks apart. Sigel



**Artillery used to protect the camp was hidden behind earthen ramparts.**

marched freely thereafter to Sarcoxie. By intelligent use of artillery, he had retreated before overwhelming odds, limiting his losses to 13 killed and 31 wounded.

Arriving at Springfield, General Lyon and 7,000 men faced the prospect of meeting General Price's army of 20,000. Reinforcements from St. Louis were denied by General Fremont. Lyon, despite the odds, again chose the unexpected and attacked. At Wilson's Creek his tactic accomplished complete surprise. Totten's artillery reduced a gathering of Southern supply wagons to shambles and stopped a counterattack by Hebert's Louisianians and a Confederate cavalry unit. On the left, Sigel's forces were overwhelmed, but the other Union units held fast. The casualties in this battle amounted to 23 percent of all engaged, one of them being General Lyon. The Union forces evacuated the battleground, but the Confederate troops were too exhausted to pursue aggressively.

At Lexington on 12 September, Confederate General Price with 10,000 men and 18 guns faced 1,800 Union soldiers under command of Colonel Mulligan. Wetted cotton bales had been moved forward by the Southerners for protection against Union artillery. In the midst of battle, white flags suddenly appeared from Lexington windows. Price sent envoys forward to investigate. Mulligan had not authorized surrender but, knowing that continued resistance meant many casualties and eventual defeat, decided to abide by his soldiers' decision.

In Indian Territory, the Choctaws and Chickasaws declared for the Confederacy. John Ross, a Cherokee

chief, originally favored the North, but declared for the South when apprised of the Confederate victories plus the Bull Run success. Most of the Creeks under Chief Opothleyohola, augmented by many Seminole families, were defeated in their desperate attempt to escape to Kansas.

In March 1862, the Confederates assembled 60 pieces of artillery and 20,000 troops, including Indian units, for advance into Missouri to face 10,500 Union troops. A distant salute of 40 cannons informed Union General Curtis of the arrival of a new commander — Major General Van Dorn — in the Southern camp. On 6 March at Pea Ridge, the advancing force faced Union batteries hidden behind log and dirt barricades. On the following day, the regiment of Colonel Osterhaus was overrun by Texan cavalry; the units of German-born soldiers ran, leaving behind their artillery. The Indians of General Pike, following the Texans, placed horse collars around their necks and excitedly danced around the guns shouting: "Me big In'gen, big as horse." When Union batteries registered on the captured guns, the Indians broke and ran. George Bent, half Cheyenne, who was there, said: ". . . the warriors did not understand the white man's way of fighting and they had no liking for the big guns. Many of them deserted during the fighting . . ." On the second day, Sigel blasted the Confederate artillery positions with 40 guns. The Confederates, having lost Generals McCulloch, McIntosh and Slack and hearing a rumor that Generals Van Dorn and Pike were captured, departed the field with General Stand



**CPT George Washington, chief of the Caddoes, was a Confederate Indian. (Courtesy of the Smithsonian Institution, Bureau of American Ethnology.)**

Watie and his Cherokee regiment covering the retrograde movement.

After this battle, President Lincoln authorized enlistment of two Union Indian regiments — one Creek and one Cherokee. Colonel Weer led these units (reinforced with two regiments of infantry, one regiment of cavalry and two batteries of artillery) into Indian Territory. One company marched to the Cherokee capital, Tahlequah, and captured John Ross, the chief, forcing the Cherokee nation into the Union ranks. A third Indian regiment composed of Cherokees was formed. The troops, with 160 miles of unguarded supply line, evacuated Indian Territory leaving southwest Missouri open to Stand Watie's Cherokees and bushwhackers.

On 28 November, General Blunt, knowing the Confederate forces were planning to winter in the Cane Hill area, moved with 5,000 men and 30 cannon in that direction. His force was too strong to contend with, so the Confederates, under General Shelby, retreated into Arkansas, using Sigel's skillful plan of in-depth artillery. In a desperate Union cavalry charge of 250 men, Colonel Jewell was killed and the threat was repulsed. In a counterattack, the Confederates' advance was stopped by Union artillery. General Shelby asked for a truce to bury the dead, and, during the break, his forces disappeared. Blunt returned his command to Cane Hill to winter.

In December, General Hindman assembled his Confederate Army to move against Blunt. General Herron moved with 6,000 men to reinforce Blunt at the Cane Hill position. On 6 December, with Herron still a few miles away, Hindman decided to strike Herron by surprise. Leaving one brigade to deceive Blunt, Hindman moved north of Cane Hill to Prairie Grove. His instructions to his men were to shoot low and aim for officers and artillery horses. His 8,000 troops were fresh compared to Herron's 6,000 exhausted men. Artillery fire was the first warning to the Union troops of the Confederates' presence. Twenty guns in answer alerted Blunt, who was eight miles away, to come galloping to assist. Despite heavy odds, Herron attacked, crossing the stream in force. To trap them, Shelby abandoned four guns with Collins' battery located in position to cover them. When the Illinois contingent gathered around the prizes, all paid dearly for their supposedly easy triumph. Shelby had victory at hand but found his conscripted Arkansas troops unwilling to fight. Blunt's men appeared. Now 42 guns hit the Confederate lines. Hindman reported: "There was no place of shelter upon the field." Hindman asked for a 12-hour truce to bury the dead. Hindman's forces disappeared. The Union troops followed as far as Van Buren, Arkansas, where they captured four steamboats. Union troops now occupied Fayetteville as a strongpoint. Colonel Phillips with the three Indian regiments reoccupied Fort Gibson.

In April 1863, the most effective troops of both sides were called to the aid of Vicksburg. The Second Colorado Regiment was brought to Missouri to stop guerrilla warfare in Missouri. The loyal Indian regiments, assisted by Negro units at Fort Gibson, counteracted the moves of the Choctaws, Chickasaws, and other rebel Indians.

General Blunt, hearing that the rebel Indian units were at Elk Creek south of Fort Gibson, decided to attack this position in July before the arrival of Cabell and his 2,000 Arkansans and four guns. In the battle of Elk Creek, Blunt had three regiments, three battalions, eight field pieces, and four howitzers to Cooper's eight regiments, two squadrons of cavalry, and four guns — about 4,500 attacking 9,000. Cooper's troops, however, were largely demoralized by failure of a Confederate promise to keep

*(Continued on page 56.)*

# EXTENDING

Somber reports in certain media indicate that NATO forces are outgunned by a factor of 6:1 by the Warsaw Pact forces. The widely deployed Soviet 130-mm M46 field gun is reported to have a maximum range of 31,000 meters matched among current US artillery only by the soon to be withdrawn 175-mm M107. This means that NATO artillery not only suffers from a numerical inferiority but also is outranged.

High cost precludes deploying weapons in numbers equivalent to those of the Warsaw Pact forces. However, if NATO's artillery can be provided with a range advantage, this can, to some extent, offset the numerical disadvantage.

The reasons for extending the range of current artillery are:

- A range advantage permits suppressive, neutralization, and counterbattery fire to be delivered with minimum exposure to return fire.

## RANGE OF ARTILLERY

- An increased range capability allows fewer guns to cover a wider front. Each battery is then capable of responding to more fire missions, thus operating more efficiently.
- In the modern concept of fluid forward edges of the battle area (FEBAs), an improved range allows weapons to be sited farther rearward, giving an added measure of safety against fast-breaking enemy advances.
- Massing of fire is enhanced.

With ranges of 25 to 40 kilometers becoming achievable, improvements are necessary in the areas of target identification, location, and damage assessment, particularly for missions against targets deep in well-defended territory. In the case of flank and supportive fire, the normal means of fire control are still adequate.

It is sometimes suggested that artillery is not useful beyond 30,000 meters because the radius of effect of the delivered munition is small in relation to the uncertainties of delivery precision and target location. This may indeed be true for isolated point targets and naturally fragmenting munitions; however, many other targets of opportunity exist which are intrinsically area in nature. Natural or artificial choke points (bridgeheads, intersections, etc.) provide predictably target-rich environments where

delivery precision is not all important and target location is precise. Other potential targets in this category are logistic and resupply centers and dispersal areas. These latter targets are often well defended against air attack and positioned far enough back from the FEBA so that they are inaccessible to existing artillery.

The question of what constitutes acceptable delivery precision depends on the nature of the target and the munition itself. Demonstrated precisions of less than 0.3 percent of range and 0.7 mil deflection have been achieved at ranges beyond 40,000 meters using sub-caliber, spin-stabilized ammunition in the 175-mm M107 weapon. This means that 50 percent of rounds fired from a single gun may be expected to fall in an area 240 meters long by 56 meters wide. If such a projectile is carrying antipersonnel grenade submunitions, the lethal area is a 150-meter diameter circle. When this is superimposed on the 240- by

56-meter dispersion pattern, only a relatively small number of rounds is required to obtain high kill probabilities.

The firepower of a currently standard weapon system can be improved significantly only by improving the ammunition. From the outset, we require a definition of improved firepower. In the most elementary sense, improved firepower means the ability of the weapon to take out a target effectively at a longer range or more effectively at the present conventional range. Thus, accuracy, range, and shell lethality are inherently interrelated. Relative cost, of course, is another important consideration.

Figure 1 shows various means of extending the range of an existing weapon without reference to the effect on lethality. The left-hand section of the figure essentially implies modifications to the weapon, since higher muzzle velocities for a fixed-mass shell usually require changes in the recoil system. Since certain usable margins exist in almost all major service weapons, some modest increase in muzzle momentum can often be tolerated within the existing recoil systems. Further, muzzle brakes can be added or improved to permit further small gains.

The center block of figure 1 indicates a method of range extension using rocket boosted shells. The conventional

by LTG (Ret) Arthur G. Trudeau



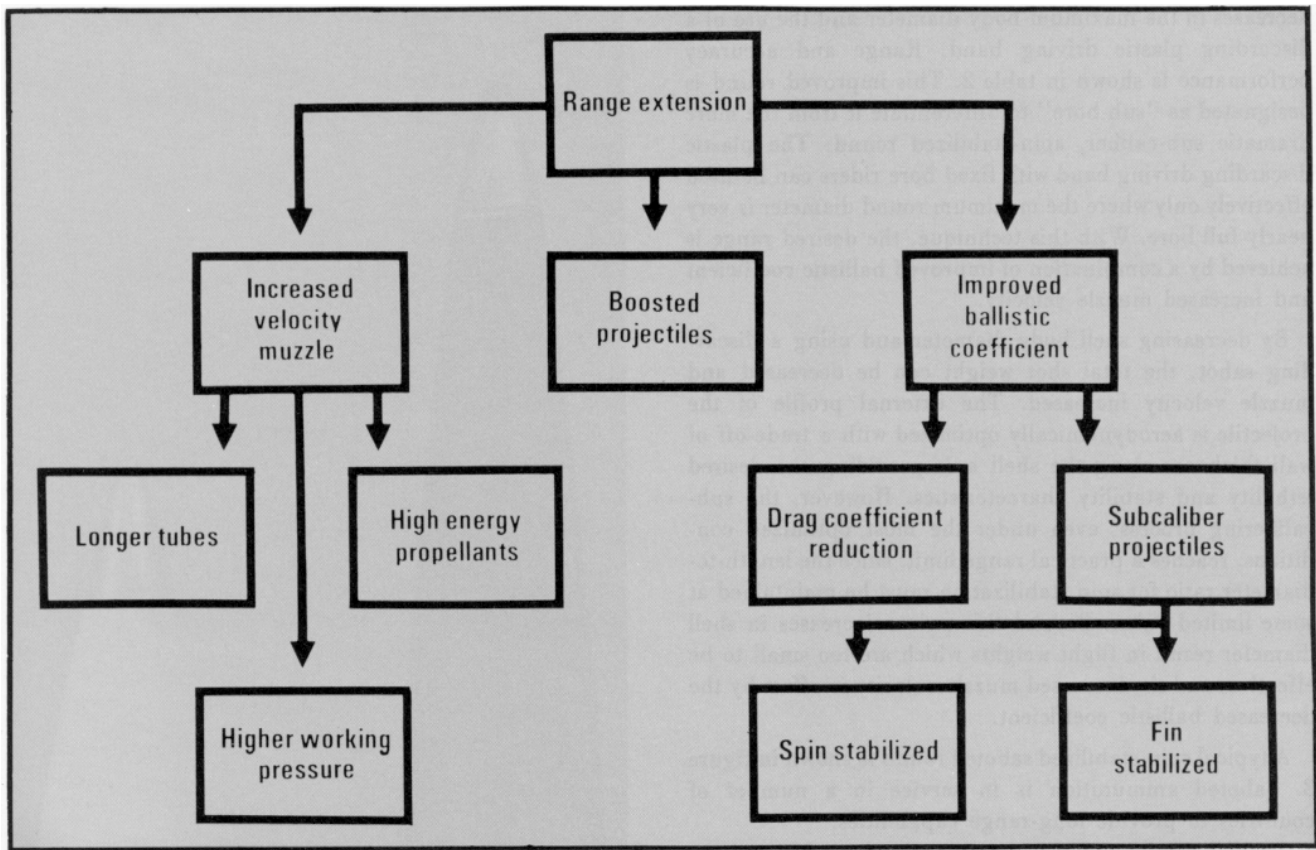


Figure 1. Methods for extending the range of standard artillery.

rocket assisted projectile (RAP) has a very low mass fraction motor incorporated into the rear of the shell. The rocket burn adds a small increment to the gun muzzle velocity (on the order of 15 percent), and range extensions of up to 25 percent can be obtained at some sacrifice of weight or payload and perhaps accuracy. Generally, RAP rounds tend to suffer from the complexity of adding a rocket burn to a gun-launched shell, including range variations due to humidity and temperature, while the cost per round is increased substantially compared to purely ballistic projectiles.

The blocks on the right side of figure 1 outline the ways in which increased ranges can be achieved by basic redesign of the projectile. The first improvement can be the utilization of optimum aerodynamic shapes.

Figure 2 shows a conventional 155-mm M107 projectile standing beside an extended range full bore (ERFB), low drag profile projectile. Both rounds weigh a nominal 96 pounds, have maximum diameters equal to the gun bore diameter, and are spin-stabilized with no discarding parts.

At 825 meters per second, the low drag projectile provides an 18 percent increase in range (26 kilometers versus 22 kilometers).

The M107 has a long cylindrical section providing the in-bore "wheelbase." The low drag round has angled, aerodynamically designed nubs fixed to the forebody to provide the front portion of the wheelbase support. The nubs are shaped and positioned to provide minimum drag, small Magnus effects<sup>1</sup> and adequate in-bore stability.

A comparison of the performance of the two shells when fired from several weapons is shown in table 1. It is to be noted that, in general, the low drag projectile increases the range between 10 and 18 percent, becoming more efficient as the muzzle velocity increases. Also, by using improved fragmentation steel and high energy explosive fill, the terminal effect of the low drag projectile against personnel and light materiel more than doubles that of the M107 projectile. In large quantity production, the low drag projectile costs about 15 percent more than the M107.

Further increases in range can be obtained by small

<sup>1</sup>Magnus effects arise from the interaction between the surface of a spinning projectile and the air. This is the effect that causes a golf ball to "hook" or "slice." The effect is small in relation to overall wind resistance.

decreases in the maximum body diameter and the use of a discarding plastic driving band. Range and accuracy performance is shown in table 2. This improved round is designated as "sub-bore" to differentiate it from the more dramatic sub-caliber, spin-stabilized round. The plastic discarding driving band with fixed bore riders can be used effectively only where the maximum round diameter is very nearly full bore. With this technique, the desired range is achieved by a combination of improved ballistic coefficient and increased muzzle velocity.

By decreasing shell body diameter and using a discarding sabot, the total shot weight can be decreased and muzzle velocity increased. The external profile of the projectile is aerodynamically optimized with a trade-off of wall thickness along the shell axis providing the desired lethality and stability characteristics. However, the sub-calibering process, even under the most optimized conditions, reaches a practical range limit, since the length-to-diameter ratio for spin stabilization must be maintained at some limited value. Beyond this point, decreases in shell diameter result in flight weights which are too small to be effective, and the increased muzzle velocity is offset by the decreased ballistic coefficient.


A typical spin-stabilized sabot round is shown in figure 3. Saboted ammunition is in service in a number of countries to provide long-range capabilities.

By changing from spin stabilization to fin stabilization, projectiles can be made smaller in diameter, leading to very high ballistic coefficient designs with high muzzle velocities. Such designs permit extreme ranges to be obtained. Of course, the projectile diameters are small, and the effective payloads are similarly small. However, special uses of these devices have led to the development of a wide range of projectiles. A variety of different payloads can be carried within the low drag profile projectile shapes of both spin- and fin-stabilized designs.

The spin-stabilized rounds — full-bore, sub-bore, and sub-caliber — have shown good dispersion characteristics in lot production when compared with conventional standard artillery ammunition.

Plastic driving bands, both retained and discarded, have resulted in substantial reductions in barrel wear. Studies have shown excellent round effectiveness against a variety of targets out to the maximum range of the spin-stabilized designs.

The new family of weapons currently under development should be expected to exploit all current advantages even more effectively.

It well may be that the data generated in the development of these long-range artillery rounds may result in future production of superior projectiles for both scientific and military purposes. 

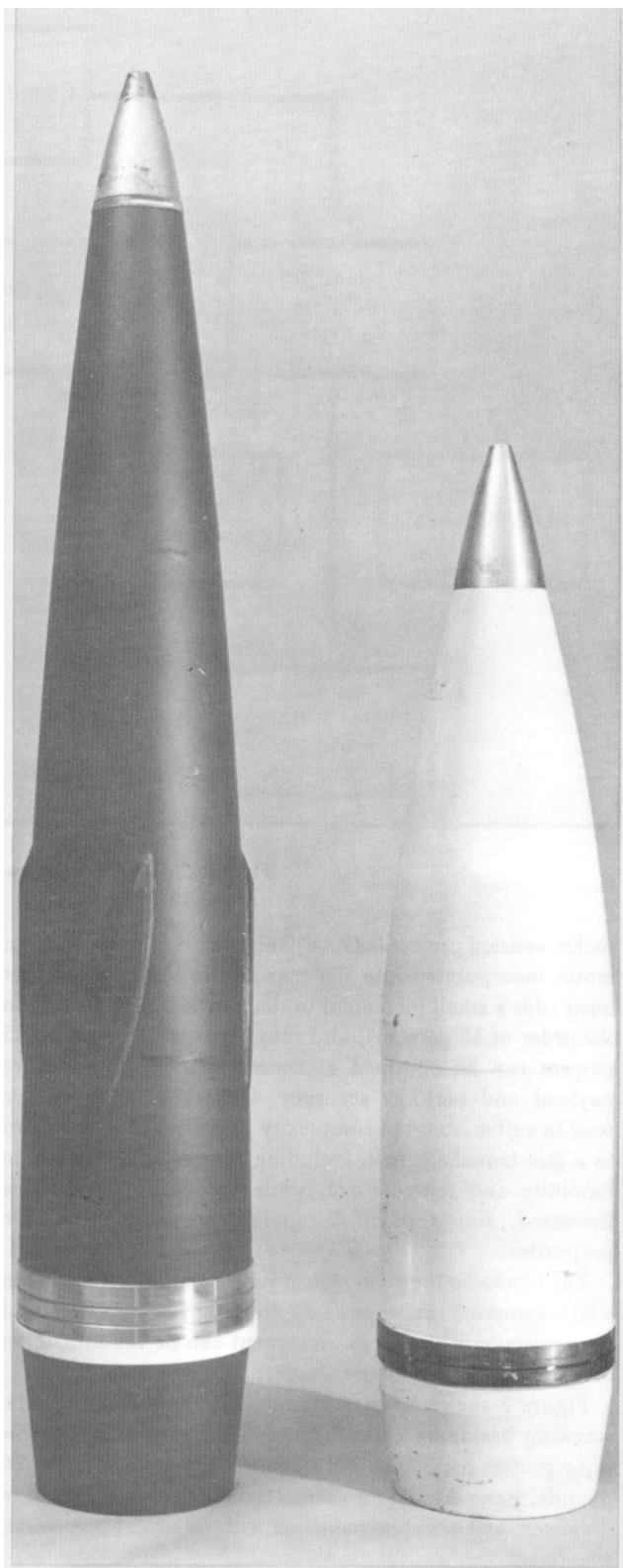


Figure 2. Comparison of ERFB and M107 projectiles.

**Table 1. Comparison of performance of M107 and ERFB projectiles.**

Weapon	Zone, propelling charge	M107		Extended range full bore (ERFB)	
		Range	Velocity	Range	Velocity
M109 SP	7, M4A1	14.6	562.7	15.9	552.0
M109 SP	7 Star, special	17.5	668.2	19.7	665.0
M109G SP	8	17.9	680.7	20.2	670.0
M109A1 SP	8,M119	18.0	684.3	20.4	673.6
FH-77	7	21.3	801.0	25.0	791.0
FH-70, XM198 and GCT	Maximum	22.1	826.0	26.0	816.0

**Legend:**

Range is in kilometers; velocity, in meters per second.

M109G is an M109 modified to German specifications.

FH-77 is a Swedish 155-mm howitzer.

FH-70 is a 155-mm towed weapon, jointly designed by the UK, Italian, and West German armies.

XM198 is an experimental US 155-mm towed weapon.

GCT is a French 155-mm SP weapon.

**Table 2. Range and accuracy performance of sub-bore 155-mm shell.**

Weapon	Zone, propelling charge	Velocity (meters per second)	Maximum range (meters)	PE <sub>R</sub> (percent)	PE <sub>D</sub> (mils)
M109	7,M4A1	563	16,720	0.21	0.5
	7 Star special (7.45 kg M30 .052)	662	20,200	0.25	0.5
M109A1	8	684	21,250	—	—
L-23 (15.5 cm Haub "F")	8	661	20,180	0.25	0.5
FH-77	—	825	28,350*	—	—
FH-70 XM198	—	825	28,350*	—	—
GCT	—	830	27,200**	0.3	0.6

**Legend:**

\*Modified nubs, 1.7 caliber boat-tail.

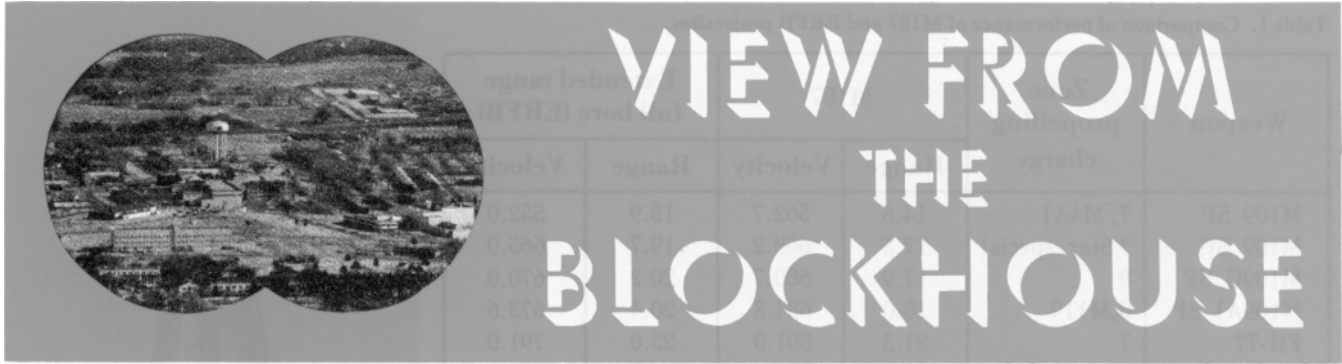
\*\*1.1 caliber boat-tail.

L-23 is a French designed towed 155-mm howitzer.



**Figure 3. 155-mm ERSC.**

**LTG (Ret) Arthur G. Trudeau, USA, is former Chief of Army Research and Development.**



## Charge Selection Criteria Refined

In an effort to improve field artillery responsiveness and survivability, many new ideas and firing procedures were introduced in TC 6-40-1, *Modern Battlefield Gunnery Techniques*, and later refined in FM 6-40-5, *Modern Battlefield Cannon Gunnery*. Among these was a technique of firing the highest practical charge.

Reports from the field indicate that there has been misinterpretation of this doctrine in that some units have interpreted the "highest practical charge" technique to mean that they should fire the *maximum* charge — or highest *possible* charge. Such was certainly not the intent. Additionally, subsequent study has reevaluated the doctrine in view of Soviet counterfire target acquisition capability.

Firing a higher charge decreases time-of-flight, improves delivery accuracy, and reduces the probability of detection by counterbattery radars by lowering the ballistic trajectory. On the other hand, a lower charge affords better munitions effects, less erosive action on tubes, and decreased stress on recoil systems and reduces the possibility of enemy flash and sound ranging and infrared detection.

Recent detailed technical assessment of Soviet/Warsaw Pact counterbattery radars indicate that this is an area of significant weakness. The Soviet ability to accurately locate fire units with such radars is not as great as previously thought. The higher charge technique, therefore, becomes less imperative from a survivability aspect, and other considerations become overriding. On balance, these considerations indicate that a lower charge is more desirable and should be used as a normal firing procedure.

There are instances when a higher charge is dictated. Planned on-call suppressive fire is an example where the responsiveness gained in reduced time-of-flight can have high payoff. The charge selection "decision maker" remains the fire direction officer. He must take a commonsense approach, considering the criticality of rapid response, the enemy target acquisition capability, the terrain, howitzer wear and tear, and any other pertinent

factors. The FDO must judge the most practical charge to fire under the tactical circumstances.

An interim change to FM 6-40-5 incorporating the above has been sent to the field. Comments or questions from units are most welcome and should be addressed to Gunnery Department, Fort Sill, OK 73503.

## Commanders' Refresher Course

Approval for a new course for senior commanders is expected momentarily. The proposed course is designed for command designees of battalions, FA groups, and div arties. The plan calls for a three-week orientation with one week at Fort Sill, one week at Fort Leavenworth, and one week at Fort Knox. Other combat arms have similar programs with orientation at their branch schools taking the place of the Fort Sill phase.

The service schools are responsible for peacetime training and will insure that the commander:

- Understands the importance and management of Soldiers Manuals and the ARTEP.
- Knows what the service school teaches the sergeants, lieutenants, and captains he will find in his unit.
- Fully understands the range of problems facing his unit.
- Has an appreciation for the management systems (personnel, training, maintenance, etc.) available to him and some working knowledge of how to make the systems work.
- Is provided the training support materials related to the commander's "critical task" list.

Fort Leavenworth will orient the future commanders on the job of fighting in wartime. The commanders will participate in two battle simulation games in three of the five days at Leavenworth.

The final week of the program will be conducted at Fort Knox where the officers will attend the Senior Officers Preventive Maintenance Course.

If Department of the Army approval is obtained, the course will begin in April or May 1977.

## SQT Clarification

Training and Doctrine Command finds that many soldiers may have the misconception they will not have to take their new skill qualification test (SQT) until 1979. This is not the case, as all but two field artillery MOSs will be tested in April 1978.

Minor deviations in test dates may occur where commanders feel soldiers did not have adequate time to study the Soldier's Manuals. Such cases will be minimal because development of Soldier's Manuals and SQTs is pretty much on schedule.

The SQT is a three-component testing vehicle that uses written questions that are totally relevant to the job, hands-on demonstration of some of the critical skills, and the commander's certification of certain tasks. Soldiers who took SQTs during the validation process said the tests are just what MOS testing should be.

The following is the schedule for distribution of Soldier's Manuals for career management field 13. SQTs will be given about six months later.

<b>MOS</b>	<b>Soldier's Manual Distribution Schedule</b>	<b>SQT Active Army</b>
13B	Oct 77	Apr 78
13E	Oct 77	Apr 78
13F	Oct 77	Apr 78
13W	Oct 78	Apr 79
13Y	Oct 78	Apr 79
13Z	Aug 77	Apr 78
15B	Oct 77	Apr 78
15D	Oct 77	Apr 78
15E	Oct 77	Apr 78
15F	Sep 77	Apr 78
15J	Oct 77	Apr 78
17B	Oct 77	Apr 78
17C	Oct 77	Apr 78
82C	Oct 77	Apr 78
93F	Oct 77	Apr 78

## SQT For Reserve Components

Soldier's Manuals (SMs) and Skill Qualification Tests (SQTs) are going to be just as important for Guard and Reserve enlisted personnel as for Active Army soldiers.

Although Guard and Reserve members will not be required to "record qualify" with SQTs until about a year after Active Army members do, they should start preparing for the test immediately upon receipt of SMs.

It is estimated that a Guardsman or Reservist will need about 10 to 12 months or five times the calendar time Active personnel need to prepare for the SQT because they

meet only two days a month.

About two months prior to the Active Army SQT testing, an "SQT Notice" will be given to all soldiers scheduled for the tests. This indicates which parts of the SM will be used for their SQT. Since the same two-month notice will also be given to Guardsmen and Reservists, they will have about 14 months to prepare.

In order to determine what modifications Reserve Components would make to Active Army SQTs, readiness regions have been assigned various specialties to test in their own regions.

If the current timetable holds true, the first field artillery SQTs for the Guard and Reserve will be administered for record in the spring of 1979. SQTs for both Active and Reserve forces are being geared first to soldiers qualifying for skill levels 2 and 3.

In order to be promoted in the Active Army, a soldier must first qualify on the SQT for the next higher skill level. Skill level 1 includes E-1 through E-4; level 2, E-5; level 3, E-6; level 4, E-7; and level 5, E-8 and E-9.

SQTs will also play an important role in the promotion policy of the Guard and Reserve, and recommendations for the use of SQTs are currently being studied by the Army's Reserve forces.

Although a soldier — whether Active, Guard or Reserve — will have to obtain a certain score on the SQT at the next higher skill level to be promoted, that will not be the only criteria for promotion, as was the case for the SQT's predecessor — the Military Occupational Specialty (MOS) test.

The big difference is that when troops pass their SQTs, they can adequately perform their combat mission. The MOS test did not determine that very important — and basic — capability.

## Major PIP For M109

There is an extensive list of changes to be made to the M109 155-mm self-propelled howitzer under a product improvement program (PIP) to be initiated in early 1977. Two M109s with the PIP applied will be tested in the spring. If testing is satisfactory, the PIP will be applied to all US M109s beginning in June 1979.

The PIP affects almost all aspects of the weapon from the main gun to power train. The items currently in the PIP package include:

- A "bustle" designed to carry 22 rounds. Provision is made for a bottom center port to allow direct loading from the ammo carrier to the hydraulic loader/rammer.
- The counter recoil buffer has been redesigned to provide a smoother return to in-battery position, virtually eliminating return shock. Purging will still be required.
- The rammer will be redesigned and totally hydraulic. Ram and retraction will be manually actuated by a crewman.

## View From The Blockhouse

- Crew handholds will be welded to each side and the top of the turret.
- Aeration/low coolant warning will be provided by a red light added to the portable instrument panel.
- A fuel system air purge will operate through a pump system.
- A shutdown alerting device will indicate normal, caution and danger operating temperature and pressure ranges.
- A sight guage will be used as an air cleaner restriction indicator and will work on differential pressure.
- An alternate position for the portable instrument panel will be in the turret on the gunner's side beneath the turret ring. The panel will contain the master switch in addition to the low coolant warning light.
- The driver's hatch opening device will be similar to the one installed by the Israeli Army. Provisions will be made to lock all hatches with padlock sets and common keys.
- A "T" bleed device will be added to the upper recoil system for purging purposes.
- The rotor shield weather cover will be a "window shade" type device which will provide protection against precipitation. It will function through the full range of tube elevation.
- Turret overhead hydraulic lines will be converted to flexible lines.
- The traversing mechanism step cover will be a simple aluminum plate.
- The pantel ballistic cover will be welded aluminum rather than cast steel.
- The tube travel lock will be a combination locking pin to prevent falling forward and a spring device to prevent uncontrolled falling rearward. Additionally, the spring will assist in raising the lock to the travel position.
- The current latch on the cab side door will be improved and strengthened. No positive action, such as inserting a pin, will be required by the crew.
- A "D" handle will be added to the equilibrator hand pump to act as a knuckle guard.

## Correspondence Courses Move

Sixteen of 18 TRADOC service school correspondence course programs are being combined under one program manager at the US Army Training Support Center at Fort Eustis. Student records and course training materials are being transferred from the various service schools to the consolidated location. Field artillery correspondence courses will move from Sill to Eustis in June of this year.

Students should not be alarmed by this move as a smooth transition is expected with a minimum impact on the student. All correspondence course students will receive a letter confirming the transfer date of their course records.

The consolidation will provide a single focal point for

correspondence course training and cut duplication of stockage. Under the old "school system" organization, there were about 3,655 subcourses in the Army inventory. Combining the correspondence programs will cut the number of basic core curriculum courses to about 2,202.

The service schools will remain the subject matter experts and the center of branch knowledge. The Training Support Center will become the single point of contact for students.

The new address for the correspondence program is: Army Correspondence Course Program (ACCP), US Army Training Support Center, Newport News, VA 23628. However, students should continue to write to Fort Sill until word is received on transfer completion.

## FAOAC Qualification Program

With the entrance of OAC 1-77 in early January, the Qualification Program (*FA Journal*, September-October, 1976) has been through its third cycle. Results are encouraging. The average scores for each of the five academic disciplines show a steady improvement over the past two classes.

	1-76	2-76	1-77
Gunnery	80	80	93
Tactics	74	79	84
Weapons	67	74	85
Communications/electronics	81	82	84
Counterfire	86	88	87

This improvement is the result of hard work and conscientious preparation on the part of prospective students. By starting the course with the requisite skills demanded of them, students are able to cover a vast amount of territory. The end result is a more competent graduate and ultimately a more professional corps of artillerymen.

Student comments from previous examinees generally support the Qualification Program. The self-study packet provided is apparently on target and well used. For those who have been away from the sound of guns, it quickly puts them into the artillery business and gets them on a common base to start the course.

### Correction

In the January-February issue we carried the requisitioning instructions for the components of the lightweight screening system (LWSS). The NSN listed for "Aluminum nestable pole" was incorrect.

The correct NSN is 1080-00-563-6342.

## Part VII—An Overview Work To Be Done



# American Artillery in Counterinsurgency

by LTG David E Off

A great deal must be done to prepare the US Army for the eventuality of another counterinsurgency action. As long as underdeveloped countries continue to be vulnerable targets of subversion, the likelihood is strong that the governments of these countries will seek and receive US help. Developments and refinements in Army doctrine, organization, and materiel, based on experience in Vietnam, will achieve the maximum effectiveness of American and allied forces.

The major US efforts must be devoted to fighting a conventional war. The greatest threat to American national survival is still from the Soviet bloc countries. Priority must go to training, organizing, and equipping US forces to fight on the terrain of fully developed countries against a sophisticated, armor-heavy enemy. But, placing emphasis on preparing for one type of war does not necessarily preclude preparing for others. In fact, the important needs of the Army in the areas of field artillery materiel and doctrinal development are equally applicable to conventional and counterinsurgency warfare.

Assault helicopters offer an excellent example. As expected, aerial artillery proved to be an effective weapon system in the low-intensity combat environment and, surprisingly, invulnerable in those instances where combat rose to near mid-intensity level against semi-sophisticated forces. Field artillerymen would like to see assault helicopter assets centralized at corps level so they can be dispatched *en masse* to augment cannon artillery quickly anywhere in the corps area. Attack helicopters will always be costly, low-density items, but centralized control would enable maximum use of those attack helicopters available. Further, by using the existing field artillery fire control system, helicopter fires could be requested when cannon artillery alone could not do the job. American experiences in Vietnam provided valuable insight into the employment of assault helicopters in Europe, and the doctrine promulgated for their employment in Europe will be useful in counterinsurgency.

### Target Acquisition

Target acquisition is another area in which counterinsurgency and conventional warfare are similar. Experience in Vietnam proved that developments in target acquisition have not kept pace with developments in weapons and mobility systems. American survey equipment was not adequate for the task. To conduct a detailed survey with the means available, survey teams were required to bring control unusually long distances from questionable survey control points over insecure terrain. Even when these obstacles could be overcome, the means used were unresponsive to the needs of many firing batteries that moved continuously. As a result, survey personnel took shortcuts which lessened accuracy.

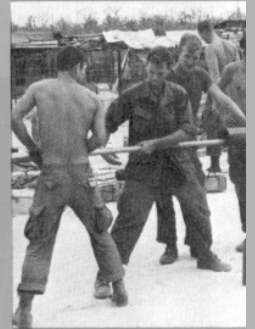
# *In Vietnam, The*



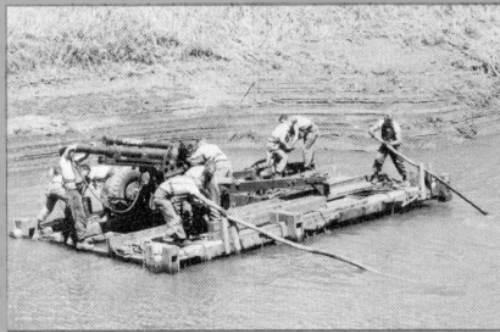
*built firebases,*



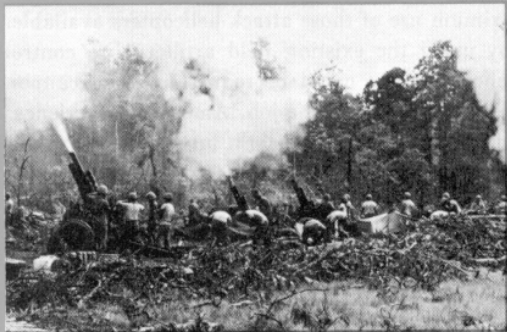
*made friends,*



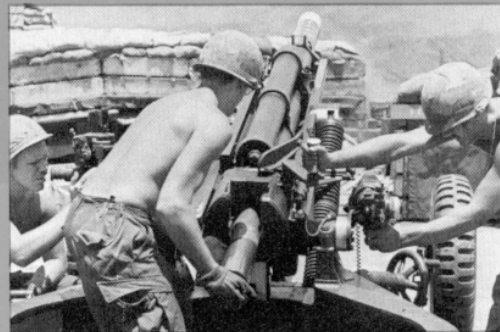
*maintained,*



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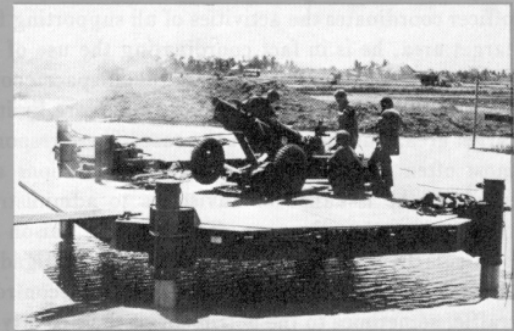
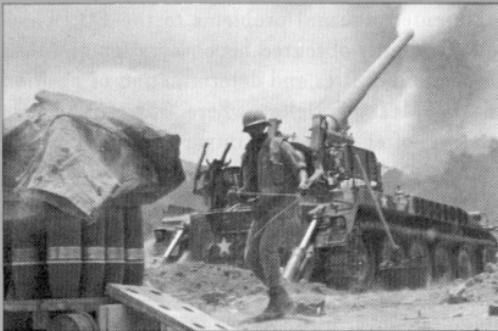
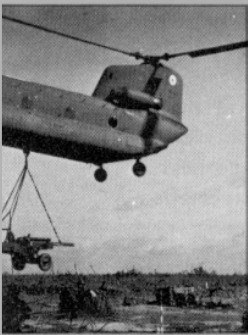
# Field Artillery. . .



*wrote home,*



*directed fire,*



*came home.*

The field artillery was also deficient in locating enemy mortars, rockets, and artillery. The AN/MPQ-4 radar scan was unacceptably small; we had no radar to track low-trajectory projectiles; and sound ranging equipment was obsolete.

Much has been done to correct target acquisition deficiencies. New survey equipment and position determining systems indicate that the requirement for fast, accurate survey is all but solved. New counter mortar and counterbattery radars are being deployed. Sound ranging equipment, remote sensors, and ground surveillance radars are being improved.

### **Fire Support Coordination**

Vietnam showed that the importance of the fire support coordinator has expanded significantly over the past decade. Our mobility has advanced to a point that, in any future conflict, the situation on the battlefield most likely will be fluid and operations continuous. No longer can we depend on the neat phasing of operations that permitted detailed planning for employing maneuver forces and their supporting fires. Fire support coordinators will have to be chosen from the very best artillery officers available.

The high density of aircraft on the modern battlefield requires that use of airspace be carefully coordinated whether in a counterinsurgency or a conventional war. In Vietnam, the field artillery was given the mission of controlling airspace because it seemed a logical extension of the duty of coordinating fires. If the field artillery fire support officer coordinates the activities of all supporting fire in the target area, he is in fact coordinating the use of airspace. The argument is valid so long as the airspace coordination responsibilities of the fire support officer are limited to the target area. But this was not the case. These responsibilities most often included a large area of operations and even involved the issuance of advisories to administrative air traffic traversing the area. The artillery liaison sections, particularly at maneuver battalion and brigade levels, devoted a large portion of their efforts to controlling air traffic, sometimes to the detriment of the primary duty for which they were organized and equipped — the coordination of fires.

### **Weapons**

The requirements for artillery weapons in a conventional war conveniently overlap the requirements for artillery weapons in a counter guerrilla war. Weapons with longer ranges are needed to mass fires from greater distances in conventional operations and to provide increased area coverage in counter guerrilla operations. Lightweight artillery contributes to the strategic and tactical mobility of airborne and airmobile forces in either a conventional or counter guerrilla war. The artillery will be

well served by the new towed 105-mm and 155-mm howitzers, which are in development.

A new attack helicopter is needed for the modern battlefield. Procurement of an advanced attack helicopter is under way and, once fielded, it will be faster and have more accurate fires, increased firepower, and improved avionics. The field artillery can use the new aircraft to extend and augment the range of its cannons and missiles in both conventional and unconventional operations. The aircraft is of great interest to the field artillery because its fires should be integrated and coordinated with other supporting fires.

### **The Field Artilleryman's Performance**

Vietnam underscored certain doctrinal, organizational, and materiel problems that must be corrected during the postwar period. These problems proved annoying but did not prevent field artillerymen from carrying out their mission. The American soldier has always had a reputation for being able to adapt to, and be innovative in, any situation he faces. Vietnam reinforced his reputation.

In every modern war, the performance of the field artillery forward observer party has surpassed expectations. Vietnam was no exception. There, an observer party generally consisted of only two men — the forward observer and a radio operator. Numerically, FO parties represented a small part of the total field artillery force, but their number belied their importance. They were the key to the proper functioning of the entire field artillery system.

Vietnam presented unusual problems to the FO. Thick jungle foliage frequently obscured his observation and thus made the adjustment of fires and determination of position difficult. In the Mekong Delta, where *observation* was good, the land was often so flat and unvarying that position determination was difficult. The FO used a number of techniques to support the infantry: He requested spotting rounds when his location was in doubt; he adjusted with smoke before firing high-explosive ammunition; when in dense foliage, he adjusted by sound; and he continuously sought vantage points in hills, rocks, or trees that would allow him to do his job.

There can be little doubt that the FO succeeded in supporting his company. The maneuver unit valued artillery support so highly that it would seldom go anywhere without an FO or beyond the range of its supporting cannons. If all the FO had done was provide supporting fires, that would have been enough; often, however, he navigated for the company, directed the fires of organic mortars, and assisted the company commander in numerous other ways. On occasion, the FO was left in command.

Field artillery fire support coordinators at all maneuver levels deserve particular recognition for a job well done.

The complexities of coordinating supporting fires on the modern battlefield are immense. In Vietnam, fire support officers (FSOs) were short on doctrine applicable to their situation and they were hampered by extensive clearance procedures. They met the challenge superbly. They quickly learned how to orchestrate all fire support systems.

During offensive operations, the FSO traveled with the maneuver commander. Often they orbited the battlefield in a command and control helicopter. The commander supervised and controlled the maneuver of his forces while the FSO brought firepower to the battle area. He bore heavy responsibility for an officer of his rank. He was required to think and act calmly and precisely, yet quickly, under intense pressure.

Artillerymen with batteries did a superlative job in providing continuous, responsive support to ground forces. Their use of existing mobility systems and the fire base concept allowed firing units to follow and support forces with the same high quality support provided by the field artillery in past wars. More impressive than their ability to move by road convoy was the field artilleryman's ability to move by helicopter and boat. The ability to move and support by boat is particularly noteworthy because riverine artillery involved a series of equipment and operational innovations.

Once the firing unit was moved and positioned, the establishment of a carefully planned fire base allowed the unit to stay in the position. The fire base was not a defensive outpost, but an integral part of an offensive effort.

The men of the firing units were quick to adopt new schemes to bring responsive fire support to the infantry from their established fire bases. New FDC and gun procedures permitted the rapid shifting of fires with no loss of accuracy and little loss of time.

Field artillery commanders at all levels demonstrated flexibility and imagination in the performance of their mission. Much of the field artillery had been organized to fight conventionally. As a result, changes in organization and procedures had to be made at all levels to accommodate the situation. At the battery, FDCs were augmented to provide decentralized operations. At battalion level, it was often necessary to organize additional firing batteries to provide the required coverage. At all battalions, many of the maintenance, supply, and administrative activities of the batteries were centralized so that battery commanders were relieved of many of those responsibilities. At higher levels, commanders were given new responsibilities such as base camp defense. Changes to operating procedures often required a corresponding organizational change, which could only be accomplished by use of on-hand TOE assets. Thus, when battery FDCs were increased in size, personnel and equipment were taken from other sections within the battery or from the existing assets of the parent battalion. Or, when an additional firing battery was added to a battalion, it was organized from personnel and equipment taken from other

batteries.

The field artillery advisers must also be recognized. They worked long and hard to teach the Vietnamese how to employ American weapons. They were often frustrated by the inefficiency of the Vietnamese artillerymen and the reluctance with which their advice was accepted. Still, their efforts slowly achieved results and, though the South Vietnamese artillery at the time of the US withdrawal still had vast room for improvement, its officers and men were left with the requisite knowledge and equipment to do the job.

Effective performance from individual field artillerymen is certainly required if the entire system is to be effective. However, any assessment of field artillery performance cannot be made in isolation from the rest of the system. The field artillery was an integral part of total US combat power, all working toward the successful completion of a single mission.

The most professional army that the United States has ever fielded was sent to Vietnam to help a faltering nation repel an insurgency. Time after time American soldiers met the enemy on the battlefield and defeated him soundly. They pushed him from hamlets and villages, pursued him across the countryside, and followed him into his sanctuaries. They bought time for the South Vietnamese to build their armed forces and bring government programs to the people, giving advice and material assistance. American forces did not destroy the enemy. He could not be destroyed — only repulsed — because of the restrictions that were imposed. But they left Vietnam a militarily stronger nation with the requisite know-how and tools to do the job. The South Vietnamese were in a position to help themselves, and that was the Army's goal.

Field artillery contributed significantly to the successful completion of the Army's mission. It helped ground forces repel the enemy and followed the ground forces in pursuit. It aided in the protection of hamlets, government installations, and lines of communication and thereby held the enemy at bay while the government worked with the people to better their lives and to win their support. It also helped build and strengthen the South Vietnamese field artillery to a point that it was capable of providing the support needed by the army, government, and people of South Vietnam. That is what the field artillery set out to do.



*This is the final installment of this series on the role of field artillery in the Vietnam conflict. The series began with the January-February 1975 issue which contained data on the monograph's conception and birth.*

*Complete copies of the monograph may be obtained for \$3.10 from the Superintendent of Documents, Washington, DC 20402. The title is "Vietnam Studies, Field Artillery, 1954-1973" and the stock number is 008-020-00556-8. Units may request copies using DA Form 17.*

*It has been our pleasure to bring this series to you. —Ed.*

# which weapon



## for close support — a new look

—A Canadian artilleryman prefers the 105-mm howitzer, based on terminal effect and rate-of-fire.

—Ed.

Most NATO forces in Northwest Europe, Canada's included, equip their artillery with the M109 155-mm self-propelled howitzer. This same equipment was used extensively in Vietnam by the USA and her allies, and the Israeli Defence Forces make exclusive use of it for close and general support. The model organizations taught at our staff colleges show the equipment as being the only close support artillery piece. For these reasons the 155-mm calibre, particularly in the M109 version and in new developments as well, has become extremely popular — popular to the extent that many regard it as the standard and, therefore, the best size for close support artillery.

On the other hand, Canadian formations in Canada, as well as some British formations in NATO Europe, depend largely on the 105-mm howitzer for close support. Many, however, regard these examples of a cheaper and lighter gun being more attractive than the heavier and more

expensive one. I've even heard some infanteers [infantrymen] express the opinion that the gunners aren't providing the best support available when all we can deliver are 105-mm weapons. At the risk of debating motherhood, I'd like to briefly compare one version of each gun in light of their effectiveness as close support artillery.

The 105-mm and 155-mm calibres are the most widely used in the Western world for artillery pieces. There are many designs incorporating these calibres: the 105-mm C1 [M101], L5 Pack Howitzer, British Abbot and American M102; and, of the 155-mm, the self-propelled M109 with German and other variants, the towed M1A2, Swedish Bofers plus new developments such as FH70, to name some. The lists are longer and a comparison of every aspect of each would only prove tedious. For this reason this paper will deal only with the 105-mm C1 and the 155-mm M109. These are the most popular versions in Canada and besides, all equipments of the same calibre have generally the same essential characteristics provided the design is sound.

The characteristics of both guns are known to us and a

by MAJ G. J. Oehring

discussion of them here is needless. What is essential is an examination of the weapons and their actions at the target. Gun-end features are a matter of design and not essential in a discourse on effectiveness. For example, range is not of great significance to the infantry so long as support is provided at the right place and time. The fact that a gun is self-propelled, towed by a truck or carried by mules does not figure in the target area. This is what we mean when we say "the weapon of the artillery is the projectile." That aside, let's examine the effects of an artillery attack against a target in terms of weight-of-fire, effects-of-fire and proximity of own troops.

Weight-of-fire on a target in any period of time is the product of projectile weight and rate-of-fire. A 155-mm regiment of M109s firing at the maximum sustained rate of one 95-pound round-per-gun per minute will deliver 24 projectiles weighing 2,280 pounds in every minute of an artillery attack. On the other hand, a 105-mm regiment can deliver 2,376 pounds firing its 33-pound projectiles at the maximum sustained rate. I've used a sustained rate-of-fire here, but it can be similarly illustrated that the 105-mm will always produce a greater weight-of-fire than the 155-mm, given unrestricted ammunition availability. Of course arguments will ensue on the validity of my figures of one round and three rounds per minute and a further discussion may be required. New developments will permit faster rates, but the sustained rate will always be limited to the muscle power available to transport and lift the rounds. Maybe medical opinion differs, but I'd rather carry and lift a ton of ammunition in 33 pound lots than in 95 pound ones.

Weight-of-fire is important from the standpoint of target neutralization and morale effect on our own troops. Obviously,

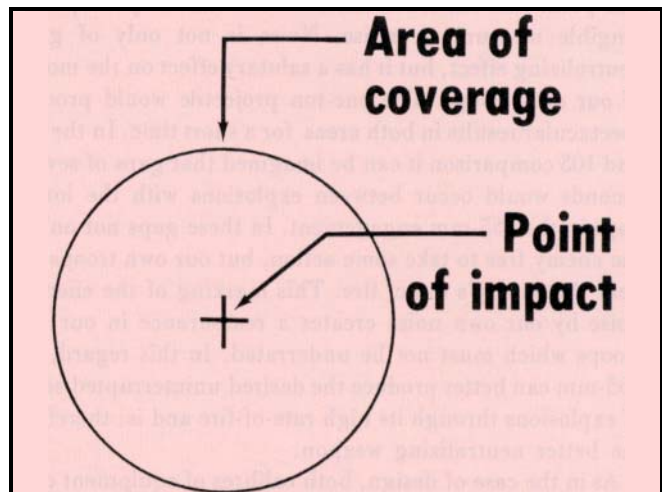
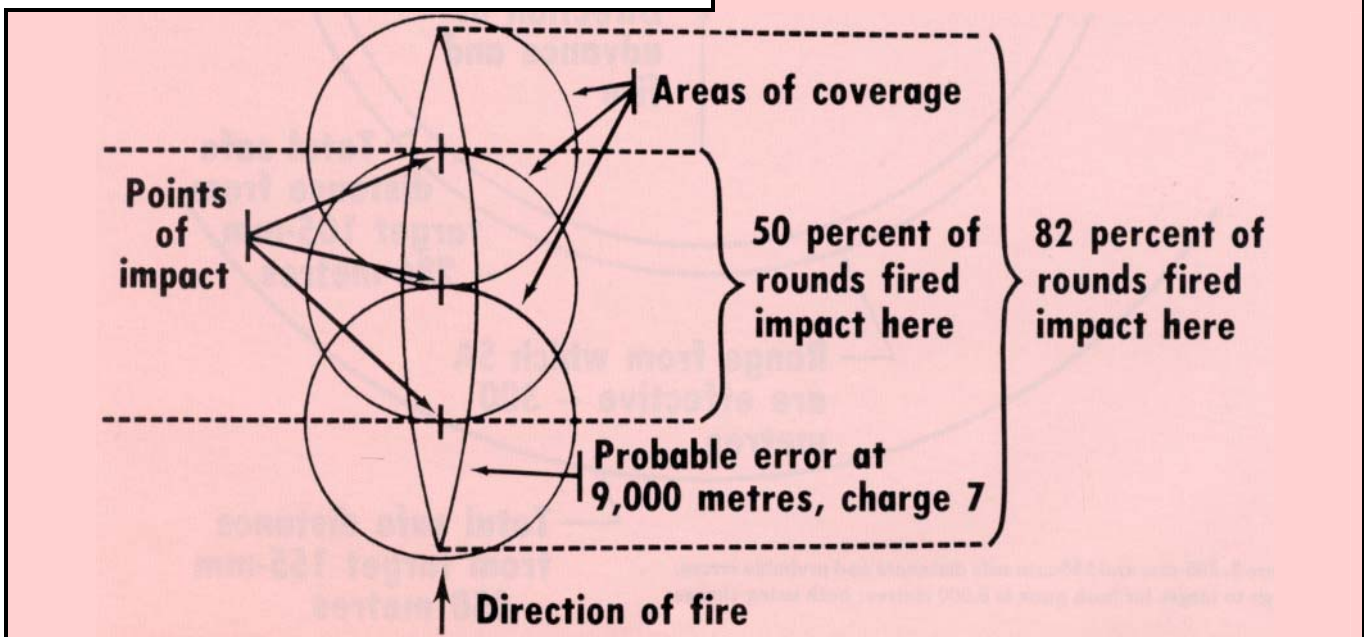


Figure 1. Diagrammatic area of coverage of one 155-mm HEPD round; probable error not considered.

the more explosive and steel whizzing about a target area the better, but there are other factors aside from sheer weight. A projectile weighing a ton exploding in a target area would produce some exciting effects, but would not two one-thousand pounders be better? How about four five-hundred pounders, and so on? Why not 72 thirty-three pounders instead of 24 ninety-five pounders? I suppose the extreme of 32,000 one-ounce rounds (say .50 calibre) would neutralize certain types of targets, but that approach limits weapons employment to an unacceptable level. The 155-mm advocates will now say that the 105-mm has surpassed these unacceptable limits. That argument I'll get into later.

Figure 2. Diagrammatic area of coverage of three 105-mm HEPD rounds; probable error not considered.



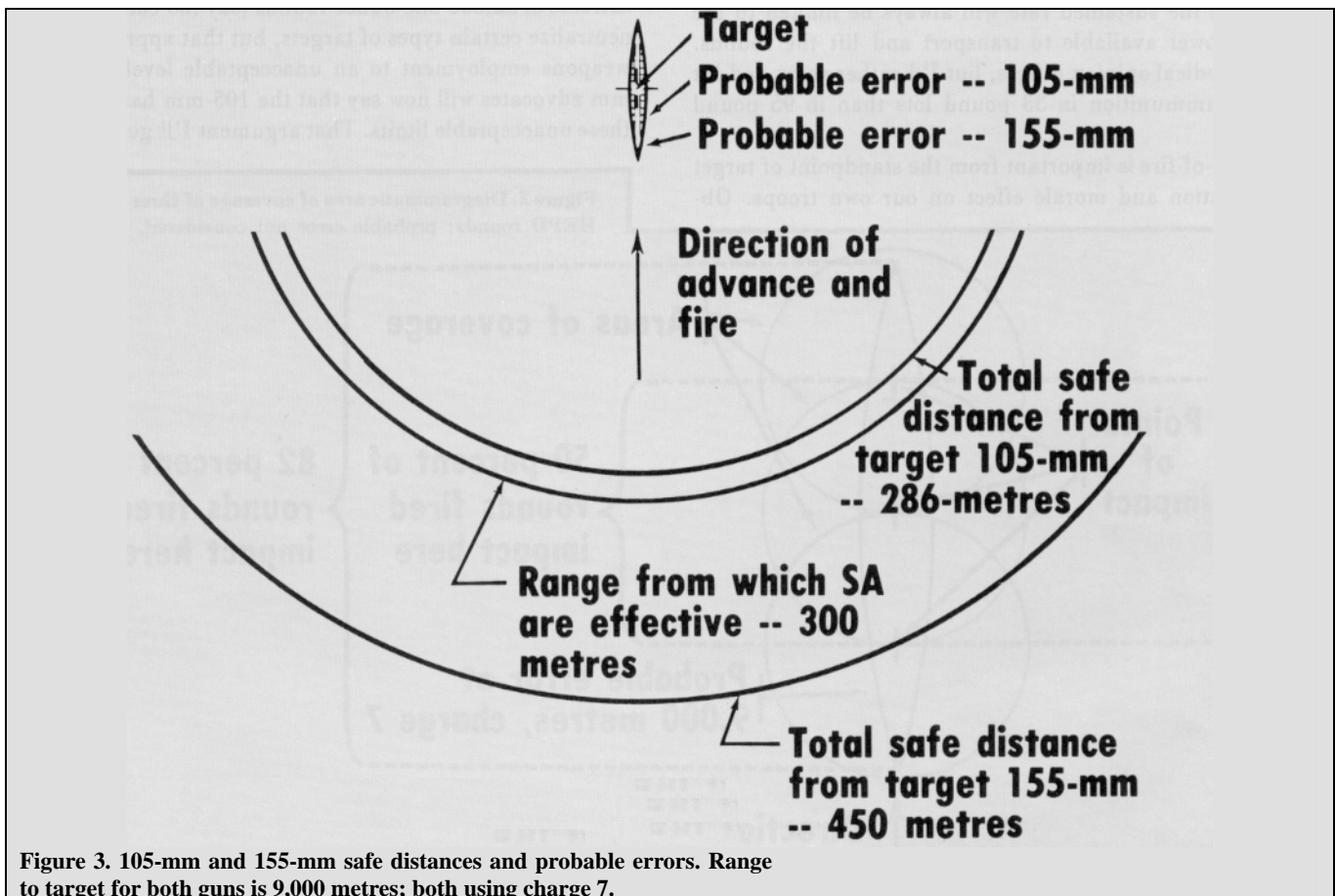
The point that should be made here is one of perhaps less tangible measure — noise. Noise is not only of great neutralizing effect, but it has a salutary effect on the morale of our own troops. The one-ton projectile would produce spectacular results in both areas for a short time. In the 155 and 105 comparison it can be imagined that gaps of several seconds would occur between explosions with the longer gaps in the 155-mm engagement. In these gaps not only is the enemy free to take some action, but our own troops can hear the enemy's direct fire. This masking of the enemy's noise by our own noise creates a reassurance in our own troops which must not be underrated. In this regard, the 105-mm can better produce the desired uninterrupted series of explosions through its high rate-of-fire and is, therefore, the better neutralizing weapon.

As in the case of design, both calibres of equipment offer choices of projectiles and projectile action. But for the purposes of this comparison, let's limit ourselves to the high explosive (HE) shell with point detonating (PD) fuze. With this weapon, a 155-mm shell covers a frontage of 55 metres and the 105-mm, one of 40 metres. (These are popular, unclassified figures. Classified studies show similar proportions, but do give the 155-mm a better edge.) Obviously, the 155-mm is more effective in such a one-round comparison. However, when the three-rounds-to-one ratio in weight-of-fire is reexamined, a

different picture emerges. Where the one 155-mm round covers 55 metres, the three 105-mm rounds cover 40 metres plus the distance between individual rounds caused by probable error. This comparison is shown diagrammatically in figures 1 and 2 and shows the 105-mm to have a greater area coverage than the 155-mm.

The argument than arises that, although the 155-mm weapon covers less area, it has greater destructive power against hard targets such as tanks, APCs and fortifications. Admittedly, this is a definite advantage of the bigger cannon. If, however, we concede to the premise that the job of the artillery is neutralization and not destruction, then let's forget about the latter. Tank guns and excellent antitank weapons exist for this purpose and, generally, they are effective out to the range of artillery, i.e., the distance to which the FO can see. Anyway, the chances of achieving a direct hit with any type of indirect fire on a moving target are very slim. Studies indicate that in World War II only two to three percent of German tank casualties were caused by indirect fire. I'm not advocating the abandonment of developments toward increasing the antitank effectiveness of artillery, for anything we can do in that area will be a significant breakthrough. What I am saying is that destruction is one thing while neutralization is

*(Continued on page 49.)*



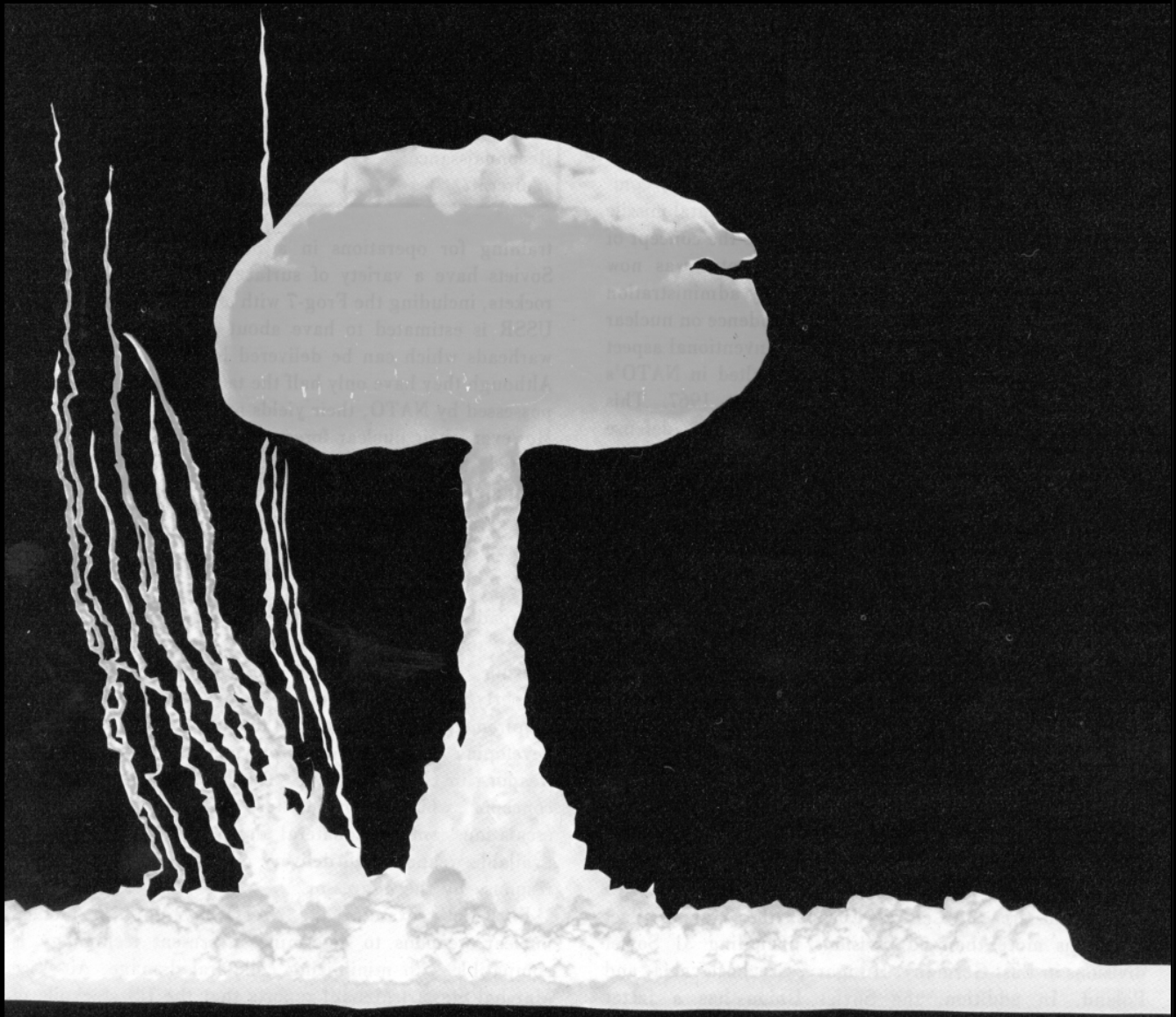
PART II

by LTC William M. Carrington, USAF, et al.

Limited

Defense

Option



Collateral damage and escalation control  
of nuclear weapons use in Europe.

This defensive concept was proposed with the NATO strategy of flexible response in mind. The question is: How realistic is this concept? The limited defense option concept incorporates these key features:

- The employment is defensive in nature.
- The weapons involved are limited in yield.
- The aggressor must have a clear understanding of NATO's intent before the first weapon is detonated.

### Background and Threat

The Atlantic Alliance was initially created after World War II to prevent continued Soviet expansion in Western Europe. For many years defense of NATO territory depended on the concept of massive retaliation which sought to deter Soviet aggression by the relative certainty that NATO would resort to a strategic nuclear response early in war. This concept was based on American nuclear superiority. Soviet progress in nuclear technology, combined with their development of an inter-continental missile in 1957, began to undermine the validity of the concept of massive retaliation because the United States was now vulnerable to nuclear attack. The Kennedy administration efforts in 1961 — to reduce NATO's dependence on nuclear weapons and to emphasize instead the conventional aspect of the defense of Western Europe — resulted in NATO's adopting the flexible response strategy in 1967. This strategy placed responsibility for European defense primarily on conventional forces and called for a distinct "firebreak" between the conventional and nonconventional phases of combat. Since the 1960s, the emphasis on the conventional options for defense has shifted somewhat. NATO documents now call for a balanced mixture of conventional, tactical nuclear, and strategic nuclear weapons and stress the need to keep the aggressor convinced of NATO's readiness to use nuclear weapons, if necessary. The present NATO strategy of flexible response is essentially defensive in nature and emphasizes deterrence. Essential to its success is the ability of the US and her allies to communicate, to the opponent, possession of a military capability and the willingness to use it, should deterrence fail.

To support its national objectives, the Soviet Union commands an impressive array of capabilities — strategic and tactical nuclear, chemical, and conventional forces. In the crucial area of Central Europe, the Warsaw Pact maintains more than 56 divisions, including 31 Soviet divisions in East Germany, Hungary, Czechoslovakia, and Poland. In addition, the Soviet Union has a faster mobilization capability than NATO and could rapidly increase its forces in the central region to some 70 divisions.

As for tactical nuclear weapons, the Soviets have considerably strengthened their forces and have emphasized

### Estimated Peacetime Forces Available To NATO And The Warsaw Pact

Force	North and Central Europe	
	NATO	Warsaw Pact
Armored divisions	12	33
Mechanized and airborne divisions	13	37
Main battle tanks	7,000	20,000
Light bombers	165	250
Fighter/ground attack aircraft	1,250	1,500
Interceptor aircraft	350	2,150
Reconnaissance aircraft	275	500

training for operations in a nuclear environment. The Soviets have a variety of surface-to-surface missiles and rockets, including the Frog-7 with a range of 70 miles. The USSR is estimated to have about 3,500 tactical nuclear warheads which can be delivered by missiles or aircraft. Although they have only half the tactical nuclear warheads possessed by NATO, their yields are believed to be larger. However, their nuclear forces are ill-suited for fighting a limited tactical conflict using selective nuclear fire techniques.

### Collateral Damage Limitation

Broadly defined, collateral damage limitation is the ability to eliminate an important enemy target without causing extensive damage to militarily unimportant property or inflicting massive civilian casualties. The requirement to limit collateral damage is a key element in developing a concept for employment of tactical nuclear weapons in Central Europe. The NATO goal is to adopt concepts which provide for political acceptability, escalation control, collateral damage limitation, use of available weapons and delivery means, and a predictable response by the aggressor.

First, let's examine the NATO inventory of tactical nuclear weapons to determine if present technology is compatible with minimizing collateral damage. Air Vice Marshal Stewart Menaul reports that the US stockpile of 7,000 tactical nuclear weapons in Europe contains 26 different versions or modifications and yields. Included in this inventory are surface-to-surface missiles, tube artillery, and atomic demolition munitions, with warheads ranging



in yield from sub-kiloton to megaton. Recent developments have produced nuclear warheads with yields below 0.1 kiloton, capable of being incorporated into precision guided munitions, some of which have a delivery accuracy of near zero circular probable error. Current surface-to-surface delivery systems are being modified or replaced to provide increased range, improved accuracy, and optional small yields. Developments relative to nuclear artillery shells have resulted in improved range, optional yields, increased flexibility, and greater firepower. The combination of very low yield weapons, coupled with terminal homing guidance, offers prospects for accuracy and collateral damage limitation which could eventually blur the distinction between conventional and nuclear effects. Continued progress in this area will create a more viable defense posture within the NATO Alliance.

### **Political Ramifications**

The Kennedy and Johnson administrations deliberately played down the role of tactical nuclear weapons, convinced that the use of even the smallest nuclear weapon would inevitably lead to a worldwide nuclear holocaust. Former President Nixon stated:

". . . No president should ever be in the position where his only option in meeting aggression is an all-out nuclear response . . . . If the United States has the ability to use its forces in a controlled way, the likelihood of nuclear response would be more credible, thereby making deterrence more effective . . ."

Use of tactical nuclear weapons in Central Europe is politically acceptable by the US, but what about our European allies? Do they share this same philosophy about tactical nuclear weapons employment? Wynfred Joshua and John Scharfen, in their study on tactical nuclear weapons policy, state that our allies have sought to maintain a low threshold for the introduction of tactical nuclear weapons in order to:

- Avoid a protracted conventional war.
- Indicate resolve to defend.
- Threaten escalation to a strategic nuclear strike. They further noted the pressures by European allies to move away from the position of a conventional defense of Europe toward a credible deterrent defense in which tactical nuclear weapons play an indispensable role.

In West Germany, attitudes on the role of tactical nuclear weapons have not been uniform because of a fundamental defense dilemma. On the one hand, the Germans continue to have the greatest initial stake in the maintenance of NATO's overall deterrent, in which tactical nuclear weapons retain a crucial role. On the other hand, they were forced to face the prospect that a failure of

deterrence would victimize German territory very early in any conflict. German military planners have urged that any major invasion be met with tactical nuclear weapons as a complement to conventional firepower. This position is not fully shared by West German political officials because it is felt to be incongruous with Bonn's *Ostpolitik*.

Our European allies are aware of the need for a defensive nuclear capability to strengthen deterrence. Clearly, the requirement to limit collateral damage is an all important factor in evaluating the political acceptability of tactical nuclear weapon employment.

Now let's examine the impact of collateral damage limitation on the criteria of escalation control and a predictable response by the aggressor. US allies and potential enemies must be convinced that NATO forces have a sound military strategy for using tactical nuclear weapons. It should be made clear to friend and foe alike that the objective of using these nuclear weapons (short of general war) is to terminate hostilities quickly under conditions which do not sacrifice critical interests of NATO. They should further understand that, if the decision is made, tactical nuclear weapons would be used to reinforce political initiatives aimed at ending the conflict and to support the strategy of flexible response.

If the US were to use tactical nuclear weapons to repel a conventional invasion, the Soviets would be faced with the choice of escalation or negotiation. They could not merely respond with tactical nuclear weapons of their own because lack of weapon flexibility would compel them to respond at a higher level. Soviet doctrine calls for a strategic nuclear response, but they are aware that this would destroy their homeland as well as NATO. Thus, the Soviets would probably negotiate if they were convinced that our use of tactical nuclear weapons was a defensive act which threatened them no more than their incursion threatened NATO. To convince them of this, the US must clearly proclaim a limited objective policy and confirm it at every juncture by discriminately using very low yield weapons and informing the Soviets of the tactics and constraints to be employed. So the argument for smaller, more accurate tactical nuclear weapons is premised on making the use of such weapons more credible and acceptable, thereby increasing deterrence. Once again we see the influence that the requirement for collateral damage limitation has on other criteria when evaluating a concept for nuclear weapons employment.

### **Escalation Control — The Nature Of The Problem**

The decision to use tactical nuclear weapons is one with the gravest consequences imaginable. Among the more serious of these consequences is the problematical one that

the use of *any* nuclear weapon will lead to their unacceptable use by either side. Is the limited defense option concept necessarily escalatory?

### **Military Control In NATO**

In 1954, the North Atlantic Council authorized its military commanders to plan for the use of nuclear weapons in a defensive war, without regard to which side used them first. This was in response to the growing realization that the NATO nations were not willing to maintain a conventional force large enough to assure deterrence of aggression. Subsequently, both Great Britain and France elected to become independent nuclear powers. At that time, all the warheads in Europe belonged to the US. Individual countries developed or purchased the capability to deliver tactical nuclear weapons, but the warheads remained in US hands under the absolute control of the president.

In 1962, NATO adopted the strategy that nuclear response should be appropriate to the provocation. This led analysts to conclude that NATO had a sliding-scale response philosophy.

In 1968, procedures were set up for consultation within NATO regarding the "when, where, and how many" of nuclear response, with special consideration being given to the country in whose territory nuclear detonations might occur. NATO continues to refine its own thinking with regard to the use of nuclear weapons, but the basic philosophy remains unchanged: Nuclear weapons *are* a substitute for conventional forces and are considered an appropriate response to certain, undisclosed provocations by the Warsaw Pact.

The nuclear warheads in Europe are of two categories: national weapons and NATO weapons. Both the US and Great Britain have warheads which are maintained unilaterally and which could possibly be used with or without NATO authorization. The NATO weapons are all US weapons in US hands, but are assigned to be delivered by NATO forces; for example, by Turkish missiles or German artillery tubes.

In time of emergency, the Supreme Allied Commander, Europe (SACEUR) would request, from NATO, the release of whatever weapons he thought appropriate. The NATO Secretary General would then initiate the consultation process. Not all members need to be consulted, nor does the consultation have to be done in advance. If the members concur in the use of nuclear weapons, the secretary general would request that the US president release certain warheads to NATO for employment. If the president concurs, he would order the US custodians to release the warheads and inform the secretary general.

Since SACEUR is also the US Commander in Chief, Europe (USCINCEUR), there is no coordination problem. SACEUR would designate which units — US, German or others — would receive the warheads from USCINCEUR.

The North Atlantic Council has made it clear that the decision to use nuclear weapons would be made by civilians. Thus, control of the military community of NATO is not a problem from the escalation control point of view. This procedure is a divisive issue because the US will not relinquish its ultimate control and many fear this may be too constraining a process. Furthermore, the French, British, or Americans may *unilaterally* use nuclear weapons and thereby put the Alliance in a disadvantageous negotiating position with the Warsaw Pact. This proliferation of nuclear weapons in the West poses two potential problems for NATO:

- Disagreement among the three over use.
- The increased chance of unilateral first use.

### **Political Control In NATO**

Wars are fought to achieve political goals; therefore, the use of tactical nuclear weapons must be in the hands of civilian leaders.

Most military action is the result of a political decision after weighing the benefits of victory against the price of the victory and the risk of defeat. Thus, it can be seen that whether this particular nuclear defense option can be kept under control or whether it will lead to an unacceptable nuclear exchange depends on the results of a political estimate of the situation by NATO's civilian leaders. But what are the criteria by which these civilian leaders will judge the merits of the use or non-use? The best that can be done is to establish some general guidelines against which to test the concept. Rigid rules do not exist. We can only form guidelines that tend to limit or escalate war once nuclear weapons have been introduced. We can never say with absolute certainty that the use of nuclear weapons will or will not lead to escalation.

Wars that have been limited in some way in the past have been so because one of two tests was met: Either both sides wanted it that way, or one side did not have the capability to increase the level of violence. It is clear that the latter condition has not been satisfied in that neither side lacks the capability to escalate either incrementally or instantaneously to strategic nuclear war. The first condition holds some possibility of keeping the initial use of nuclear weapons under control. There are several criteria which must be set if we are to conclude that this use of nuclear weapons is non-escalatory because both sides desire strict control. The various test criteria may be grouped under two headings: physical and psychological.

### **Physical Restraints**

Offsetting the tendency to spread the initial use of nuclear weapons are those factors which the other side's leadership can readily perceive, measure, and evaluate as conveying the intent to keep the use of nuclear weapons

carefully restricted. If the side first using a nuclear weapon has some message to convey or some diplomatic or moral commitment to meet, then the physical parameters of such first use tell an important story. The physical factors which influence escalatory pressures are geography, yield control, and target selection.

Restricting the use of nuclear weapons to a certain geographic area is one of the limiting factors most widely mentioned. In recent history we have seen several examples of extremely violent wars that were, despite their seriousness, confined to fixed boundaries. Korea, Cuba, Vietnam, and the Arab-Israeli wars of 1967 and 1973 illustrate wars that did not spread outside certain borders. True, none of these conflicts involved the use of nuclear weapons, but they do illustrate that neither the intensity nor the potential loss of a war necessarily forces the scope of the conflict to a wider area.

The most significant difference between limited conventional war and limited nuclear war is the resultant damage to one's own territory if the nuclear war is fought in one's homeland. The US, Great Britain, and France might be willing to take on the Warsaw Pact in a limited nuclear war fought only in East and West Germany, but is it also reasonable to assume that France would allow that same war to take place in France and still refrain from retaliating (escalating) against the enemy's homeland? One may conclude that a geographic boundary is a limiting influence on the use of nuclear weapons only so long as the owners of the territory wherein the war is being fought either agree to absorb the nuclear devastation or have no choice in the matter.

The second plausible physical constraint is weapon yield control. The ability to build warheads of almost any size leads to the conclusion that if weapon yield were very small, nuclear weapons would only be serving the classic military purpose of concentrating all available fires where needed. In this sense, the limit is clear to both sides and might be acceptable. However, two factors mitigate this argument. To the untrained observer, one "mushroom cloud" looks much like another. Second, the side losing would find the urge to use slightly larger or "more efficient" weapons to redress the situation almost irresistible. Thus, while not being inflationary, yield control offers absolutely no constraint on the escalation of the use of nuclear weapons.

The last physical constraint is careful target selection. Many experts feel that the single factor most likely to drive a limited nuclear war out of control is an attack on a nuclear power's homeland or strategic forces. There is ample evidence to indicate that even purely tactical target selection is also critical in the escalation process. In both Korea and Vietnam, the targets available to the air forces were closely controlled by the civilian leadership. Political and diplomatic maneuvering was linked closely to target selection. This process is limiting only in the sense that it may not lead to a strategic exchange, but it does not discourage the widespread use of tactical nuclear weapons.

Also, the side that is on the receiving end of a nuclear weapon, even if the target were carefully selected to demonstrate only that which the user wished to express, would most likely suffer some troop casualties and would be under severe internal pressure to protect its troops by responding in kind.

Target selectivity may keep the initial use of tactical nuclear weapons from spiraling up to a strategic exchange, but it actually encourages the use of more tactical weapons by removing the onus of first use.

### Psychological Restraints

Psychological factors influencing escalation control are not as easily defined as the physical factors; however, they may well be more critical in some instances. Psychological factors are those which affect the escalation process because of some perception or fear by the leadership of one of the sides. These factors are usually grouped into three categories: clarity of intent, conceivability of limited nuclear war, and linkage to strategic nuclear war.

Clarity of intent implies that when the other side has ample warning of what is about to take place, he will not draw the wrong conclusion or act irrationally. It is mandatory, therefore, that NATO be unified and resolute in its attitude and action and firmly communicate this resolve to the other side. Unshakeable unity is difficult to demonstrate convincingly considering the diversity of the Alliance.

A NATO war game called "Carte Blanche" simulated the use of tactical nuclear weapons in a limited war scenario. The results suggested that 1,500,000 German civilians would be killed and 3,500,000 German civilians wounded in two days. Statistics like these have to give pause to certain members of the Alliance who might find their sovereign territory a nuclear battlefield. It is generally agreed that if there is to be any chance of keeping the first use of nuclear weapons limited, the intentions of the user must be made apparent from the very beginning and these intentions must be taken seriously by the other side. Further, if the use of tactical nuclear weapons were reserved for *later*, rather than *sooner*, the impression conveyed could conceivably be that of desperation rather than firm resolve. Therefore, in order for clarity of intent to be a limiting factor, it must signal resolve, unity, and a clear commitment to use violent force.

Another potentially limiting factor is the belief, by the side first using nuclear weapons, in the conceivability of waging a limited tactical nuclear war. The theory of flexible response is that there must be some choice other than surrender or suicide. NATO has made it known that it is willing to wage a tactical nuclear war. Moreover, it is NATO policy to substitute nuclear forces for conventional forces. Since all implemented decisions of the North Atlantic Council are unanimous, the size and capabilities of the NATO nuclear forces on European soil should be a clear indication of NATO's nuclear policy. Most estimates give

NATO a clear advantage in tactical nuclear weapons. NATO also has an advantage in tactics, since massive formations of troops as traditionally employed by the USSR and the Warsaw Pact are not viable in a nuclear environment.

Some aspects of tactical nuclear warfare argue that the policy outlined by NATO is all bluff and rationalization. Both sides realize that the destruction of parts of Europe in World War II was much less severe than the destruction would be in a tactical nuclear war.

The major difference between using the threat of war as a deterrent today than before WWII is that mankind fears the deterrent today as he did not prior to the nuclear era.

All these drawbacks notwithstanding, NATO appears to believe that the alternatives to a willingness to consider tactical nuclear warfare as a possible option are unacceptable. This difficult choice is somewhat ameliorated by the dubious, but popular, philosophy that the defender has the right to certain measures that the aggressor does not.

The firm link between limited nuclear warfare, using only tactical nuclear weapons and gradual or sudden escalation to strategic nuclear war, could be a psychological limiting factor. Deterrence does not stop once war has started. There is much deterrent value left in unused weapons and available options. What needs to be done is to reestablish the credibility of the threat.

#### Conclusion

The first use of a nuclear weapon is a significant and dangerous step. However, it is NATO policy to substitute

nuclear capability for conventional troop strength, and it fully intends to use that nuclear capability, under carefully controlled circumstances, to defend its territory. Since no conflict involving nuclear weapons is a purely military action, the ultimate control of the use of nuclear weapons is and should be in the hands of civilians. The civilian leadership of NATO will make a decision based on an analysis of the situation, weighing, in general, these six factors to determine the relative safety of the alternatives: geographic limitations, yield control, target selectivity, clarity of intent, conceivability of tactical nuclear war, and linkage to strategic nuclear war. These factors may or may not tend to limit the escalation of a first use of tactical nuclear weapons. Furthermore, no amount of testing will ever allow one to say absolutely that a proposed course of action will keep the use of nuclear weapons under acceptable control.

It is concluded that weapon yield control and linkage to strategic nuclear war have no effect on the escalation process one way or the other. Geographic limitations and clarity of intent do tend to keep the nuclear weapon usage under control, but target selectivity is escalatory, and conceivability of tactical nuclear war is very likely to cause a limited tactical nuclear war to expand. Of course, it is the weight one attaches to each of the six limiting factors that determines the result, but use of tactical nuclear weapons would not lead to a general nuclear war. It would probably lead to a limited nuclear war in Western Europe. ☒

*Part III will examine possible Warsaw Pact responses to a NATO policy of limited defense. —Ed.*

**Members of Study Group 4, Class 58, Armed Forces Staff College, are: LTC William M. Carrington, USAF; LCDR Harold W. Gehman Jr., USN; MAJ Ralph W. Holm, USAF; MAJ Patrick L. O'Donovan, CF; LCDR Robert D. Stiger Jr., USN; MAJ Patrick E. Walker, USA; MAJ Dale O. Wiener, USAF; and, MAJ Thomas W. Young, USAF.**

## Commanders Update

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COL Frank J. Wasko Jr.  
7th Infantry Division Artillery

COL David B. Lucke  
9th Infantry Division Artillery

LTC William A. Spin  
1st Battalion, 3d Field Artillery

LTC Charles R. Hansell  
2d Battalion, 8th Field Artillery

LTC Bartley W. Furey  
2d Battalion, 10th Field Artillery

LTC Joseph W. Bagnerise  
2d Battalion, 21st Field Artillery

LTC James E. Dewire  
1st Battalion, 22d Field Artillery

LTC James J. York  
2d Battalion, 35th Field Artillery

LTC Dennis I. Runey  
1st Battalion, 40th Field Artillery

LTC Richard O. Cullum  
1st Battalion, 79th Field Artillery

LTC Thomas F. Plummer  
4th Training Battalion  
Fort Sill

LTC Gunnar C. Carlson  
Training Command Battalion  
Fort Sill

LTC Rockwell C. Cramer  
Joint Security Group  
Korea

LTC Merle L. Mulvaney  
4th Battalion, 77th Aerial Rocket  
Artillery

LTC John N. Tragesser II  
284th Air Traffic Control Battalion

# REDLEG News letter

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## Aviation Training Programs for 1977

Fort Rucker has some new training programs for Army aviators in 1977.

The initial entry rotary wing (IERW) training program will be revised in May and will stress night and combat skill-related training. It will include a dual-tracking feature in which about 25 percent of the students will be qualified as OH-58 aeroscout pilots. The self-paced mode of instruction will be used in all phases of the course, and greater reliance will be placed on simulator use. The course is designed to improve battlefield survivability and effectiveness.

In addition to the IERW program, there will be an aviator refresher course beginning in April for officers returning to flying duty after serving three or more years in a non-operational flying assignment.

Also, an aviation commander's readiness course has been designed for aviation unit commanders and key staff officers. They will receive instruction on management and use of aviation resources.

### Alternate Specialty Designation Procedures Changed

Some officers now may be designated with an alternate specialty before completion of eight years' active Federal commissioned service (AFCS) under two new procedural categories. The new categories are event-oriented designation and permissive designation:

- *Event-oriented designation* is keyed to officers selected for graduate school or flight training. Officers who already have a primary specialty designation and are selected to attend graduate school in a field that supports an alternate specialty, will be designated in that specialty when selected for graduate school. If the academic discipline pursued at graduate school supports the officer's primary specialty, an alternate specialty will not be designated until completion of eight years' AFCS. No such designation will be made if the graduate study does not clearly align with one of the OPMS specialties.

Officers selected for flight training will be designated Aviation Specialty Code (SC) 15, as their alternate specialty upon graduation from flight school. Officers with Aviation Materiel Management, SC 71, as a primary specialty are excluded from this designation procedure. Aviators in Year Group 1971 or later will have SC 15 automatically recorded on their Officer Record Brief (ORB) to reflect this specialty as their alternate. This designation should be reviewed by affected officers during their next ORB audit.

A significant feature of SC 15 designation is that officers designated under these procedures will be evaluated during their eighth year of AFCS to determine their appropriate specialty combination. For example, a Field Artillery officer (SC 13) who graduates from flight school in his third year of service will be designated with SC 15 as an alternate specialty and will maintain the 13/15 combination through his seventh year of service. At the eight-year point, a review of Army requirements and the officer's past assignments and experience may confirm the 13/15 combination or may prompt MILPERCEN to designate the officer with primary SC 15 and another non-combat arms OPMS specialty as his alternate. Likewise, MILPERCEN may leave SC 13 as his primary and designate a different non-aviation OPMS specialty as his alternate.

- *Permissive designation* provides for an officer's alternate specialty designation before the eight-year point when the officer clearly is qualified in an alternate specialty. This will be allowed when an officer's education and assignment experience clearly justify the designation of an alternate specialty prior to the normal designation period. For example, permissive designation of an officer's alternate specialty may be allowed for an officer who received a graduate degree supporting an OPMS specialty through off-duty efforts and who has had assignment experience in the specialty.

Officers having questions regarding these policies are encouraged to contact MILPERCEN by writing or calling the professional development officer in their respective OPMD career divisions.

### College Scholarships Available

Active duty enlisted personnel now have the opportunity to finish college and earn a commission — all at Army expense.

On January 15, Army ROTC began accepting applications for two-year college scholarships for the 1977-78 school year. Applications must be received by April 15.

These scholarships pay full tuition, books, educational fees and \$100 per month subsistence allowance for up to 20 months. In addition, students are paid while attending the Advanced Camp, normally between the junior and senior years of college. Along with the scholarship benefits, students may also be eligible to receive GI educational benefits.

Applicants must have at least one year of active duty, be under 25 when eligible for commissioning, have at least two years of college credit, have a GT score of at least 115, have

## **Redleg Newsletter**

been accepted by a college for next fall's enrollment, and be a US citizen.

After graduation, the former enlisted members will be commissioned as second lieutenants and must serve a four-year service obligation.

Army regulation 145-1 has complete details. Scholarship applications may be obtained by writing: Army ROTC Scholarships, Fort Monroe, VA 23651.

### **Officer Career Specialties**

The latest word on OPMS is that many officers were designated in overstrength career specialties. DA has singled out OPMS specialty 54 — Operations and Force Development — as being overstrength in grades O-4 and O-5.

DA is encouraging officers in that specialty to consider asking for a redesignation into an understrength career specialty. Other overstrength career specialties in addition to number 54 are:

- *O-4/O-5 level:* Aviation (15), Counterintelligence/HUMINT (36), Aviation Materiel Management (71), Armament Materiel Management (76), and Traffic Management (86). For majors, overstrength specialties are Aviation (15), Research and Development (51), and Tank/Ground Mobility Materiel Management (77).
- *O-3 level:* Operations and Force Development (54) and General Troop Support Materiel Management (83).

Officers desiring redesignation are encouraged to contact their career manager at MILPERCEN, Alexandria, VA.

### **Promotion To Major, AUS**

With a tentative convening date set for 17 May 1977, attention is now being drawn to the 1977 major, AUS, selection board. For those captains in or near the probable primary zone, the next few months will mark a period of increasing anticipation.

The 1974 major, AUS, selection board signaled the beginning of an era of extremely keen competition and relatively low selection rates. In 1974 the Army promotion list (APL) selection rate for officers considered in the primary zone for the first time was only 58.8 percent, down from a high of 79.0 percent in 1969 (no board was held between 1969 and 1974). Since 1974, however, there has been a slight, continuing improvement in APL selection rates. Although the 1976 selection rate was up to 64.1 percent, there is no indication that the competition for promotion is lessening. On the contrary, the general quality of the officers entering the primary zone is exceptionally high. Most of these officers were commissioned during the Vietnam buildup and most have been through three reductions in force. Unfortunately, continuing manpower constraints will result in many of these quality officers not being selected for promotion. Secondary zone selections are not following the

upward trend of the primary zone. In fact, the 1976 APL secondary zone selection rate was 8.9 percent, down from 15.0 percent in both 1974 and 1975. Indications are that this reflects the recent change to the variable zone which allowed the 1976 board to select between five and 15 percent from the secondary zone, depending on the quality of the officers in the zone. Under the 1976 board guidance, the secondary zone selectee had to be competitive with the upper one-half of those selected from the primary zone. In short, the competition will be even stiffer for the next board.

Guidance to recent selection boards has continued to reflect the Army's commitment to OPMS. This is best exemplified by the instructions to the 1976 major, AUS, selection board which stated that "promotion in the Army is based on the board's determination of the *potential* of an officer to perform in the higher grade," and that "*potential* will be based, for the most part, on the record of performance and aptitude in both his/her *primary and alternate specialties*." We can expect the focus to continue on specialty development and away from the "generalist" approach of years past.

DA has not yet announced the zone of consideration for the board scheduled to convene on 17 May 1977. However, if the pattern established by the last three boards holds, we can expect a primary zone between seven and eight months in length. The last board's primary zone cutoff was 31 January 1969.

If you are in or near the expected primary zone, you should be taking steps now to insure that you are ready to be evaluated by a selection board. Remember, your Official Military Personnel File (OMPF) at MILPERCEN represents you to the board; therefore, every effort should be made to insure that it is complete and accurate. As a minimum, check for a current photograph and review your officer record brief (ORB) for accuracy. The ORB is particularly critical in that it reflects the information contained in the officer master file. If there is an error in your date of rank, for example, you may not be considered at all, or you may be improperly sequenced on the recommended list. Another precaution is to visit MILPERCEN or designate a representative who will be in the Washington, DC area to review your OMPF. You are the best auditor of your own file and in the best position to know if something is missing or misfiled. Check it out!

### **ENTNAC Speeded Up**

Security checks on all non-prior service personnel now enlisting in the Army are being processed and returned quicker. DA officials say that the speedy return of the Entrance National Agency Check (ENTNAC) will prevent unqualified applicants from entering active duty and reduce the fraudulent enlistment problem. In addition, officials say that the quicker checks will reduce holdover problems at training centers and nonproductive time on arrival at units.

The Field Artillery rightly prides itself on its ability to mass fires of battalions separated laterally and in depth. We are all aware of the testimonials of famous military figures attesting the crushing lethality of massed fires and the preeminent position of field artillery on the battlefield. Now just suppose we could do the job better — that is to say faster, more effectively, and at less cost in tubes and ammunition. Sounds too good to be true? Let's take a look.

### Templates

The idea for improving massing effectiveness began simply enough with a requirement for a technique to provide accurate assessment of the effects of massed artillery fires in CPXs and wargames. CPX/Wargame Caper Crown I, conducted by I Corps (Republic of Korea (ROK)/US) Group at Camp Howze, Korea in April 1976, demonstrated the need convincingly. The artillery section, I Corps (ROK/US) Group, explored several avenues and finally settled on the idea of normalizing effects patterns to a common denominator which could then be displayed on a template. Initial examination of improved conventional munitions (ICM) and high explosive (HE) effects data disclosed that a standardized effects pattern size could be used for all calibers when using ICM. In the case of HE, one pattern size was available for most calibers and the FDC procedures to handle the exception were very simple. Fortunately, the effects pattern size for ICM was the same width as the HE pattern and double the depth. This coincidence was useful in refining the technique.

Using the standardized pattern sizes, two templates were constructed — one for ICM (figure 1) and one for HE (figure 2). [*The templates are not to scale for security reasons. —Ed.*] The distances between aiming points on the templates were based on the width and depth of the common effects patterns using normal sheafs. The template is always oriented on grid north by the target acquisition source and its reference point is in the center at intersection E5.

### The CPX/Wargame Problem Solved

The templates were supplied to all field artillery echelons participating in Caper Crown II in October 1976 and were to be used as follows:

- The target originator would use the appropriate template to describe the target size and shape to the FDC. Point E5 can be placed anywhere, but normally it is oriented on the most convenient grid intersection. The target is then described, using a combination of letters and numbers reading right and up to delineate the points falling just within or on the target trace (figure 3, black outline).
- The FDC controlling the mission then determines the number of batteries/battalions to fire by tasking one

**REQUEST**

**ALL  
AVAILABLE!**

**Why not**

**MINIMUM  
REQUIRED?**

by COL John P. Caruso

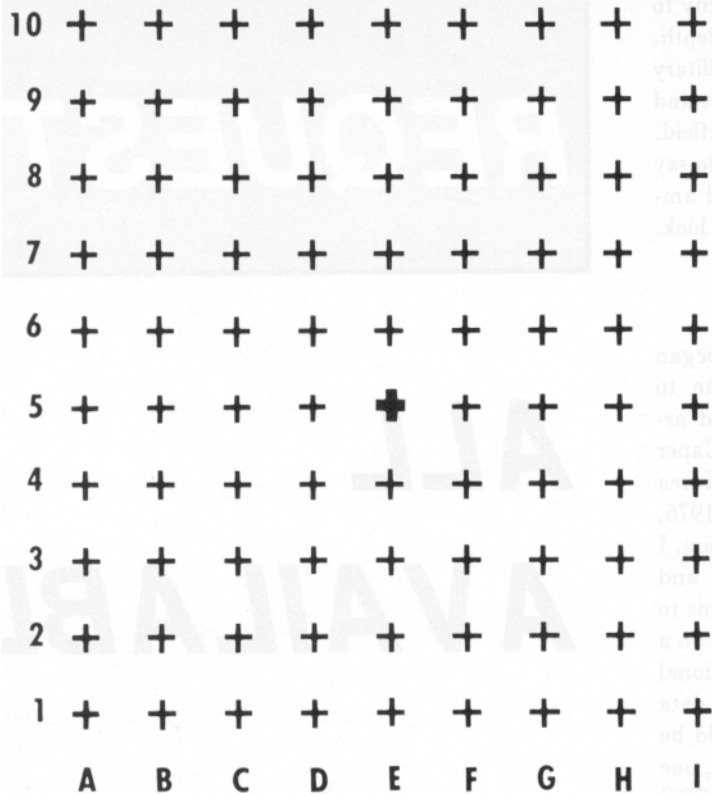


Figure 1. ICM distribution template.

battery per aiming point within and on the periphery of the trace. The FDC has the option of reorienting the template to insure optimum distribution of aiming points (figure 3, colored outline). The FDC determines the shell/fuze combination and number of volleys to be used in fire-for-effect.

- The mission data, including target trace, is then furnished to an assessment team which determines the fraction of casualties to be expected, based on the target posture and the shell/fuze combination employed.
- The target trace is placed on the gameboard to observe which enemy units, if any, are covered and to what degree. Casualties are then assessed.

### Transition To The Real World

As the procedure was being developed, it became apparent that the template had application far beyond the confines of a simulation situation. It offered a simple approach to the responsive, effective and economical delivery of massed fires on the modern battlefield. In fact, as we dug further,

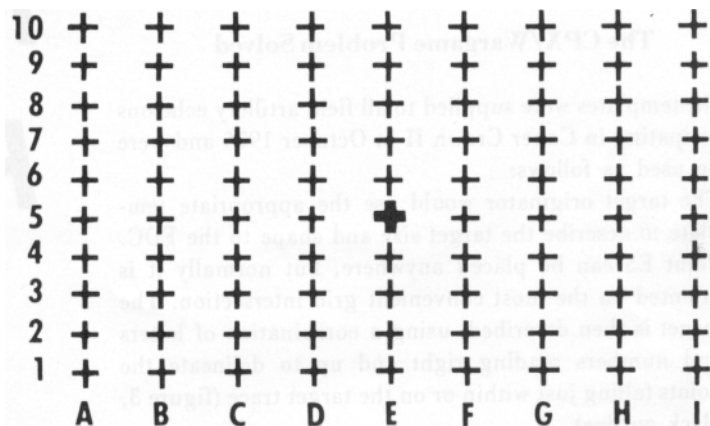
we became more astounded that the massed fire distribution technique (MFDT) had not been discovered and put into practice long ago.

### MFDT Features

The features of the MFDT should be obvious enough to convert even the most skeptical.

- *Responsiveness.* The MFDT provides responsiveness in several different ways. Regardless of the source, the MFDT allows area fire missions to be transmitted rapidly. If nonsecure communication is used, the only coding that might be required is the reference point grid. The FDC receiving the mission makes a rapid plot to determine the number of firing points to be taken under attack. If the target is FO-acquired and the number of points to be fired exceeds three, the direct support (DS) battalion calls on div arty and provides the reference point, direction (if other than grid north), and the points to be fired that exceed its capability. Div arty then assigns those points to other fire units within range. Large massed fire targets will normally be acquired at div arty or higher level, generating the process from the top down. In any event, we see the great responsiveness of the MFDT as the fire mission is transmitted rapidly, units to fire are determined rapidly, and an absolute minimum of encoding/decoding is required. Overall communications security is improved since the number of transmissions are reduced significantly.

Figure 2. HE distribution template.





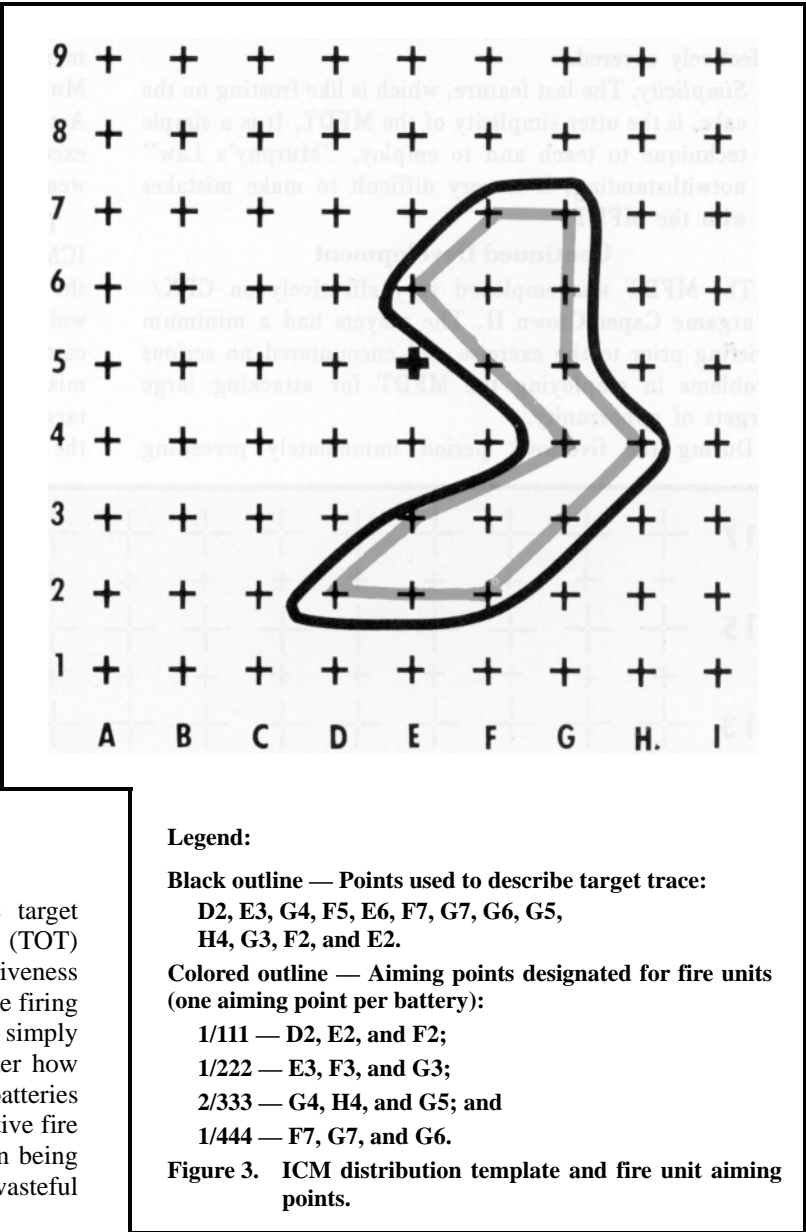
- *Flexibility.* The MFDT has the flexibility to handle targets of any size and shape. Current procedures cannot cope effectively with irregularly shaped targets. The MFDT does not "see" an irregular shape — it simply sees a series of aiming points that need to be attacked. It is obvious that the flexibility to apply effective fire to any target shape does not degrade the responsiveness of the technique.
- *Target Coverage.* Effective distribution of massed fires is another great plus of the MFDT. If the target is relatively small in area — that is, small enough to be attacked effectively with one battalion — then the question of distribution becomes somewhat academic. While the MFDT quickly and effectively distributes the battalion's fires without requiring conscious effort on the part of the fire direction officer (FDO), battalions have, or should have, SOPs to accomplish essentially the same thing. (The other features of the MFDT provide a strong argument for its adoption at battalion level, regardless of the current procedures for fire distribution being employed.)

The beauty of the MFDT surfaces as the target becomes larger. Current time-on-target (TOT) procedures are highly dependent for their effectiveness on the experience of the FDO and the SOPs of the firing units — not so with the MFDT. A larger target simply means more aiming points to be fired. No matter how large the target, as long as there are sufficient batteries to fire each point, the initial TOT will have effective fire distributed throughout the target area, rather than being clustered or scattered. The MFDT avoids wasteful overkill and useless underkill.

- *Cost Effectiveness.* What's this now? A way to apply effectiveness and efficiency yardsticks to the artillery problem? Absolutely — and, considering the number of tubes and amounts of ammunition available in various theaters of the world, it is just about time.

When using the MFDT on a large area target, we don't shoot "all available"; rather, we shoot the "minimum required" — a reasonably precise allocation of fire units-to-target to get the fire distributed most effectively. The difference in the number of firing batteries between *all available* and *minimum required* — assuming the sign is plus, and granting that it won't always be — represents firepower that can be employed elsewhere while the TOT is being executed.

**All available — minimum required = savings.**



Similarly, for ammunition requirements, no seat-of-the-pants flying is required. Effects data are continually being improved, and tables are available that can be entered with weapon caliber, troop posture, and percent of casualties desired to determine the number of volleys required.

There can be no argument that firing a given number of volleys, based on weapons effects data, from the number of fire units determined to be necessary surpasses firing a gang of volleys, based on intuition, from every tube that will reach the target.

The statement can be made with a high degree of assurance that the application of the MFDT to preplanned fires will result in better distribution of fires using fewer tubes and less ammunition. Also, if the tubes and ammunition

are to be used anyway, larger target areas can be effectively covered.

- *Simplicity.* The last feature, which is like frosting on the cake, is the utter simplicity of the MFDT. It is a simple technique to teach and to employ. "Murphy's Law" notwithstanding, it is very difficult to make mistakes with the MFDT.

### Continued Development

The MFDT was employed very effectively on CPX/Wargame Caper Crown II. The players had a minimum briefing prior to the exercise and encountered no serious problems in employing the MFDT for attacking large targets of opportunity.

During the five-week period immediately preceding

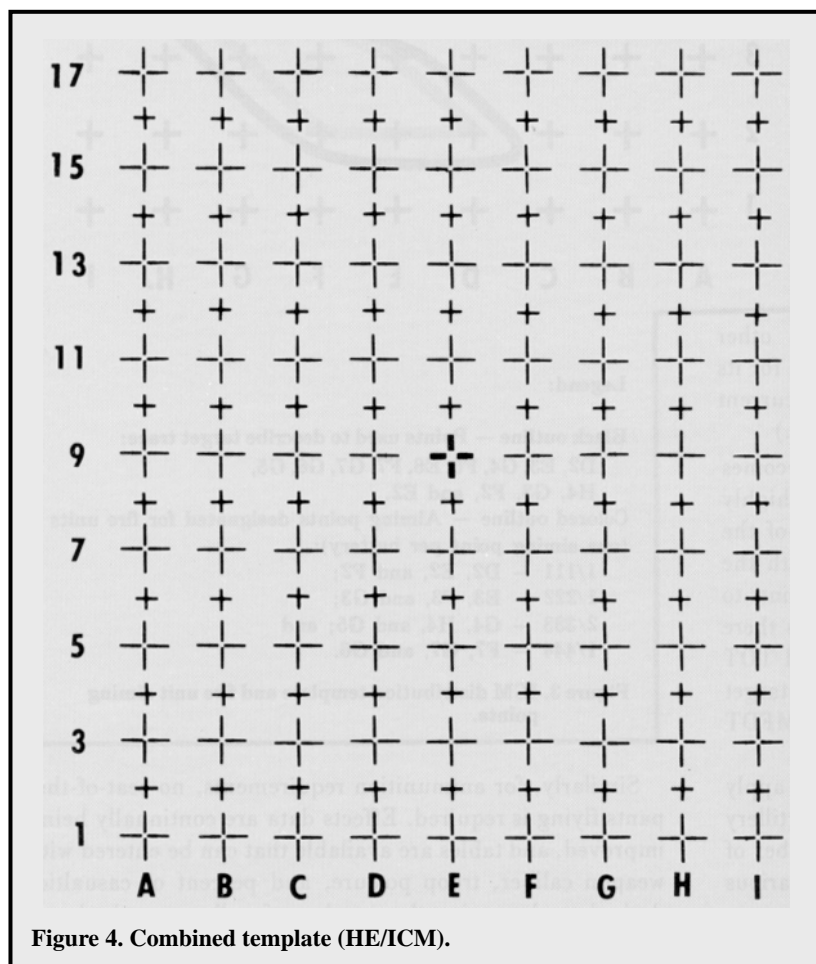


Figure 4. Combined template (HE/ICM).

The effects tables mentioned in this article are the Graphical Munitions Effects Tables (GMETs) discussed in the July-August 1976 *Journal*, which are now available. The authority for requisitioning GMETs is CTA 50-970. Pending publication of the next change to the CTA, users should use paragraph 26, Materiel Management Letter, HQ, US Army Armament Command, Rock Island, IL 61201, dated 30 September 1976, as the authority for submitting requisitions. The authorized

Caper Crown II, the MFDT was thoroughly reviewed by a member of the Joint Technical Coordinating Group for Munitions Effectiveness, Army Materiel Systems Analysis Activity. This review revealed the necessity to make an exception to the ICM common effects pattern size for one weapon caliber, just as had been determined for HE.

The idea also surfaced of using one template for both ICM and HE (figure 4). (Note that the reference point for the combined template is E9.) The relationship between the widths and depths of the two effects patterns makes a combined template feasible. A combined template is a mixed blessing: It allows more precise delineation of the target area by the target acquisition source and facilitates the attack of a target by a combination of ICM and HE; on the other hand, if only one type of ammunition is being used, the possibility of inadvertently assigning ICM firing points for HE, and vice versa, exists ("Murphy's Law").

When the MFDT was being analyzed, the question of the effect of actual sheaf orientation on the ground due to locations of position areas surfaced. The consensus was that the overlap of effects patterns would probably nullify any problems in this area. It is important to note that the MFDT did not introduce this problem — it has always been with us, although not as noticeable when so much ammunition has been wasted under current TOT procedures.

### Summary

It must be recognized that the MFDT is not a panacea. It does not supplant experience and judgment. We still need to appreciate the terrain, enemy formations and tactics, etc.

The MFDT is another tool in the FA kit bag — one that can be used very effectively when the situation calls for it — a responsive tool that will require itself well in the test of combat and is a solid step forward in bringing economy and efficiency to the massing of fires. ☒

**COL John P. Caruso is the Deputy Artillery Officer, I Corps (ROK/US) Corps in Korea.**

allowance for each item is: Two per firing battery, 8-inch battalion FDC, and HHB corps arty section; four per div arty and FA group; six per 105-mm and 155-mm battery FDC. Many thanks to all those ROK and US officers and civilian technicians who developed the MFDT technique. I Corps (ROK/US) conducted a live fire test of the MFDT in November 1976. When results are provided the *Journal*, we will pass them to our readers. —Ed.

### Which Weapon (Continued from page 36.)

another (close support). The best we can hope for now with HEPD is the neutralization of hard targets. As a friend of mine in the Armoured Corps puts it, "Artillery is the finely practiced art of shooting close to things." And three 105-mm rounds exploding near a tank produces better neutralization than one 155-mm round.

The distance from our own infantry that a round can be safely exploded is probably the most important criterion in considering a close support cannon. For the sake of argument, let's use 250 and 500 metres for the 105-mm and 155-mm, respectively, for troops on foot; and, the troops being on foot must be considered since, in the final analysis, infantry must leave their APCs for the final and ultimate acts in the attack and the defence. These "safe" distances, however, are for weapon splinters only and do not state the whole case. Probable error of a multi-round attack must again be considered. Figure 3 shows a target at a range of 9,000 metres being engaged with both guns using charge 7. Although the approaching infantry in an attack can near the 105-mm fire to a safe distance of 250 metres, they can only get within 286 metres of the target before fire must lift. For the M109 they can get within 450 metres of the enemy. This is of critical importance. The ideal weapon should allow the troops to reach a point where, once fire is lifted, the enemy has no time to react before the infantry is upon him. If we accept that the effective range of the infanteer's rifle is 300 metres, it can be seen that the 105-mm more closely approaches this ideal, for as soon as the cannon balls stop, the enemy is engaged with small arms fire. The longer range probable error of the

M109, therefore, adds greater distance to an already unacceptably large safe distance requirement. Similar deductions can also be drawn from a defensive scenario.

The above comparison has shown that the 105-mm produces a greater weight-of-fire, more effectively neutralizes an area and allows our own troops to get closer to an enemy (or the enemy closer to our own troops when we are defending) than does the M109. The 105-mm is, therefore, better than the M109 as a close support cannon. I have assumed, of course, that logistic capability will equal gun capacity; that is, for every available 155-mm round, three 105-mm rounds can and will be supplied. Also, I've not considered any number of guns above that held in a regiment. It may be that one round fire-for-effect from several M109 regiments will affect a target to the desired degree, whereas three rounds fire-for-effect from the same number of 105-mm guns will over-kill and, therefore, waste ammunition: a point of diminishing returns must lie somewhere. I've not discussed new and special ammunition for the 155-mm, such as cannon launched guided projectiles, but, remember, they're for destruction not neutralization and their expense will limit their use for that primary purpose. The whole logistics problem is another story. But one thing is clear: the 155-mm is too big a weapon for the close, intimate support of infantry. Its job is general support, which includes destruction. ✉

*Reprint from Canadian Combat Arms School Gunner Newsletter, Spring 1976.*

**MAJ G. J. Oehring is a Canadian battery commander.**

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### Editor's Notes (Continued from page 2.)

releases and, when possible, edited by the *Journal* staff to make the information pertinent to our branch. The content of "Redleg Newsletter" will still be factual, but, if you find errors or something you don't like, don't blame MILPERCEN artillery officers.

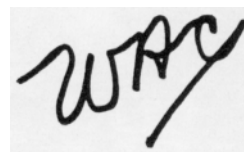
For the benefit of artillery units everywhere, a firing incident has come to light and maybe you can profit from the mistake of others. During a fire mission, a gunner was unable to see his collimator due to the sun's reflection. He was directed to refer to his aiming posts, but the gunner failed to counter-reset at the laid deflection. The result was a 350-mil error. It pays to be doubly wary in supervision whenever any non-routine laying procedure is used.

A few words on distribution of the *Journal*: We distribute 30 free copies to each Active and Reserve Component FA battalion. The intent is to have those 30 copies further distributed to the batteries on an equitable basis. For the Active units it is no major problem as the batteries are "next door." The Reserves and National Guard, however, may have to remail copies to the batteries. We frequently

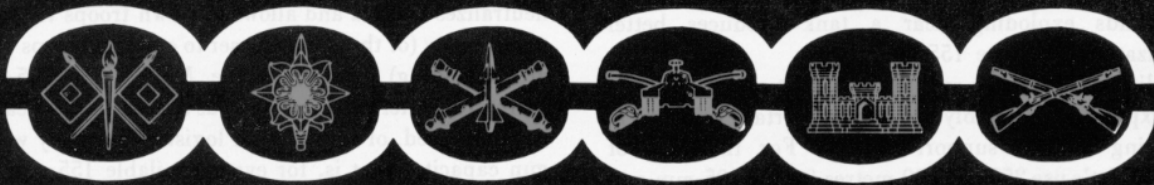
get calls, letters, and visits from Reserve Component battery personnel asking us to add them to the mailing list. This would nearly double our mailing list, which now contains approximately 2,300 addresses. We request the help of the battalions in insuring that *Journals* get down to battery level.

The last issue, January-February, had two errors that need to be corrected for the record. The inside front cover listed the wrong commandant — it should read MG Donald R. Keith. In "Commanders Update" (page 15) we listed Homer J. Gibbs as commander of the 1st Battalion, 77th Field Artillery. LTC Robert S. Fairweather remains in command of that unit. The procedure for getting the information for this feature requires a certain amount of lead time, during which assignments are altered.

Enjoy your *Journal*!



*with our comrades in arms*



## Super Mine Detector

The standoff detection of surface mines can now be achieved with the use of a new radar system being developed at Fort Belvoir, VA.

Called METRRA, for metal re-radiation radar, the experimental system can detect surface mines from any aerial platform ahead of advancing troops.

METRRA also locates booby traps, munitions, armed troops, and vehicles. It can locate targets that do not emit heat, and it does not require target movement for detection. METRRA operates through rain and fog and can penetrate dense foliage.

The present airborne system uses a transmitting and receiving antenna. Monitoring equipment displays and stores terrain and target information. In addition to the airborne METRRA, a portable backpack unit is being developed for use by ground troops.

During operation, transmitted VHF radio waves reflect off the surface and return at the same frequency, giving a picture of the terrain. Small amounts of VHF energy change to a harmonic frequency as the energy reflects off metal parts or semi-conductors of possible targets.



## ALOC Being Tested

DA officials are going to ease the strain for repair parts in Europe by testing an "air line of communication" (ALOC) for repair parts.

The test, combining the efforts of the US Army Materiel Development and Readiness Command, Military Airlift Command, USAREUR and 7th Army, began in January.

The plan calls for the shipment of 13,500 short tons of repair parts to Europe by air during FY 77. The parts will be placed on pallets and shipped from the New Cumberland Army Depot through the Military Airlift Command to Rhein Main and Ramstein airbases in Germany.

From the two airbases, the parts will be offloaded and shipped directly to direct support maintenance units. Delivery will be made on a seven-day-a-week basis by Army transportation units. The objective of the test is to reduce the time to provide repair parts to Europe and should include three C-141 deliveries a day.

This test will not change the present supply operations in Europe. Class II and IV supplies will be handled through normal channels and only Class IX will be shipped through ALOC.

**Stinger To Replace Redeye** — The Stinger missile system is being developed as a replacement for the Redeye system currently providing low-level air defense protection to forward battalions. Stinger, like Redeye, is a man-portable, shoulder-fired, infrared homing, air defense missile system. The advanced system is faster, more maneuverable and possesses improved countermeasures. In addition, Stinger is to have an organic subsystem which will permit the Stinger gunner to identify friendly aircraft electronically. Stinger is 10 inches longer and about 5 pounds heavier than the Redeye weapon round. The deployment concept for Stinger is comparable to that for Redeye. Stinger is well along in the development cycle, having successfully completed Operational Test II in October 1976 with the firing of 11 Stinger missiles at White Sands Missile Range, NM.

## TACFIRE Interfaced With Electronic Time Fuze Setter

A user-developer Army program has successfully interfaced a battlefield fire control computer with an artillery weapon.

### With Our Comrades In Arms

The HELBAT VI test, conducted jointly by the US Army Field Artillery School and US Army Human Engineering Laboratory, Aberdeen Proving Ground, used a fire control computer and the XM587 electronic time fuze to replace the "man link" between the computer and the weapon with a more accurate and faster means of setting, checking, and correcting the fuze setting for proper detonation.

Engineers at the US Army's Harry Diamond Laboratories (HDL), who are developing the XM587, recognized that the efficiency and advantages of the TACFIRE system could be improved by including an interface with an electronic time fuze setter.

Consequently, HDL modified the XM36 electronic time fuze setter to be an automatic interface between the computer and the fuzed weapon.

During HELBAT VI, each of the XM587 fuzed projectiles was more accurate and performed better than the control projectile with an M564 mechanical time fuze.

Based on this test, it is felt that the savings of precious seconds as well as near perfect fuze settings are applicable to other Army fire control computer systems.



**A soldier sets an electronic time fuze, the XM587, with an electronic fuze setter, XM36. The instantaneous contact of the setter upon the nose of the fuze sets, checks, and verifies the fuze electronics prior to firing. For the HELBAT VI test, the desired setting was calculated and introduced into the setter directly from a battlefield computer, thus eliminating the need of the man to determine and enter the required information into the setter.**

# The GS Battalion ARTEP

by MAJ Don Griffin

**H**aving just passed an Army Training and Evaluation Program (ARTEP) evaluation under the new ARTEP 6-165 for general support (GS) battalions, the 1st Battalion, 27th Field Artillery (8-inch), is full of experience, from which one might extrapolate that we exercised a good deal of bad judgment. We did reasonably well, but, as in most endeavors, there were mistakes and some frustrating problems that were foreseen but beyond our ability to solve. Hopefully our experience will provide a headstart for other units by suggesting some basic concepts and a program, which with more wisdom, time, and resources can achieve superb results.

The value of an ARTEP lies in the skill with which it is written and administered. We are fortunate that the 4th Division Artillery has plenty of experience — eight battalion ARTEPs administered in the last two years. Typically, an artillery scenario at Fort Carson covers 48 to 72 hours and involves firing all weapons on a variety of indirect fire targets, direct fire missions, and a division or higher level tactical operation requiring two or three artillery tactical missions, day and night deliberate and hasty moves, split operations (10 to 15 kilometers between batteries), roving batteries, and an array of complex survey problems. A highlight of our test was three batteries spread over a 20-kilometer front, performing roving battery operations (two counter-battery programs and a harassing and interdiction program, moving after each mission), all at night. The nature of the ARTEP will have a great deal to do with how you prepare. Hopefully, those who administer your ARTEP will be sufficiently skilled and experienced to make your efforts relevant to war.

## Cornerstones

Having observed a number of other ARTEPs, we had some idea of what was essential to success. The major pitfalls observed were:

**Good judgment is built on experience,  
which is the product of bad judgment . . . .**

- Lack of strong battalion control over batteries (particularly in technical fire direction).
- A failure to appreciate the importance of survey (particularly critical to a GS unit).

The keys to success are universal and generally consist of the artillery fundamentals that have not essentially changed since World War I. What you must select are those few fundamentals that you have time to emphasize and that have the greatest potential for improving your unit.

## Tight Control Over FDCs: Flexible Or Inflexible?

If you do not have a strong, technically competent S3, there is no decision to make here. We were fortunate and opted for tightly controlled FDCs. Some initial concern that the battalion might become a bottleneck and stifle battery initiative was quickly replaced with the conviction that we had made a smart move. Tight control by an experienced S3 produces uniform, high-quality, relatively complex training. The resulting good habits of always doing things the same way within the battalion made it very easy for any battery to assume technical fire control over the battalion. A move, which we initially feared might make us inflexible, turned out to be a cornerstone of flexibility.

To illustrate this type of control, a fire mission is answered by the battalion FDC. A battery designated in a battalion FDC fire order handles all further traffic with the FO and conducts the adjustment. Without delaying fire, the adjusting battery announces charge, deflection, and quadrant over the fire net to enable an independent check by battalion. At the battalion FDC's discretion, corrected data might be announced by battalion to prevent a firing error. When this becomes necessary, the battalion FDC controls the remainder of the mission. Upon entering fire-for-effect, the adjusting battery announces chart data to allow the other batteries to obtain an accurate target location. Other batteries, in turn, announce their firing data over the fire net as a double check.

## FADAC

FADAC is great and is particularly important to the GS unit for planned fires. It is not so great for those missions requiring adjustment, so we did these manually. A *must* is the FADAC computation of fire-for-effect missions because FADAC eliminates transfer limits, saving a 13-minute manual computation. FADAC can also be used to derive multiplot GFT settings to be used if the FADAC breaks down. FADAC is also a tremendous asset in computing hasty survey.

### If It Works By Radio, It Will Work By Wire

We elected to shoot by radio because of the widely separated operations. In a GS role, FD1 was the fire net and FD3 was a utility net (to pick up that met message you missed, conduct registrations, or exchange GFT settings). In a general support-reinforcing or reinforcing situation, FD1 was replaced by the designated fire net for the supported unit. Naturally there is concern over jamming and detection. The habitual use of two FD nets between all FDCs reduces this danger somewhat.

There is a trap here and you will discover it when you find your FDCs doing business by radio instead of wire when they are only a few kilometers apart. Using the radio is easy — it takes effort to force the use of wire when distances are short. Wire is a *must* to protect those FD nets.

### Hasty Survey Works . . .

. . . and it is definitely a cornerstone for success. You can pass a *battery* test without survey — a quick three-round mean-point-of-impact or a radar-requested fire mission will cure the survey ills. Without survey, however, you will never mass a battalion (barring registering all batteries). Like most artillery officers, we felt a little uneasy about survey, having some vague recollection about doing something with a theodolite once or twice at Fort Sill.

Before tackling a training program for survey, we laid the following ground rules:

- Accuracies of  $\pm 2$  mils and 20 meters would be acceptable.
- In anticipation of the 8-inch battalion MTOE change, we pulled all survey assets from the batteries and formed two battalion parties (we would have made three but there wasn't that much to "pool").
- We went without distance-measuring equipment, believing incorrectly that the MTOE would delete those in order to constitute target acquisition batteries.
- We decided that battery officers must be capable of conducting hasty surveys through the subtense method, simultaneous observations, and techniques using helicopters.

What we learned about hasty survey could constitute a separate article and we'll save the details for that. The points to make here are:

- Use hasty techniques!
- Don't leave survey planning to the survey officer. The battalion commander, XO, and S3 must get personally involved.
- Get the firing battery officers involved in conducting hasty surveys of up to two kilometers.
- *Correct* grid and direction are not essential. What is important is a *common* grid and direction for the firing batteries.
- During training, get away from established firing points as much as possible.

### Who Should Be The FDO?

We think the battery executive officer should be the FDO. He has been around a little longer and is more experienced than that new lieutenant from Fort Sill. What the XO lacks in fresh-out-of-the-school gunnery techniques, he more than makes up for in good judgment. If the mission starts out bad in the FDC, there isn't much the gun crews can do to turn it around. The XO has experience on the gun line and has more knowledge about the tactical operations of the battalion. Put the XO in the FDC and it becomes more of an operations center, not just a place where technical data are generated. Put the junior lieutenant on the gun line and let him work for the XO. This organization also elevates technical fire direction to a more important role, becoming something to which the junior lieutenant aspires, not something that will pass with promotion. We are really sold on this idea.

### Putting Your Cornerstones Together . . .

. . . is where it's really at. We made a costly error by overestimating the level of section training. By the time we had all of the parts working together, we discovered that some of the parts were not as strong as we would like — particularly howitzer sections. Now it's Monday morning and we can see that we missed a cornerstone — conducting section ARTEPs.

Some training techniques that were helpful to us were:

- *Survey exercises*: Competitive hasty survey exercises among battery officers can be fun and profitable.
- *FDC CPXs*: Save ammunition and get the bugs out in advance. If you opt for tight battalion control over FDCs, this type exercise is essential.
- *Base piece survey FTXs*: You can exercise your fire direction and survey techniques without wasting ammunition and troop time.
- *Battery RSOPS*: You can make a lot of progress by working with one battery per day. "Marry-up" the battalion commander with the battery commander, the S3 with the FDO, and the battalion XO with the firing battery officer and there will be a lot of learning on both sides.
- *Full-scale FTXs*: You really need at least one full-scale FTX with outside help to conduct the scenario and provide safety officers.

### That Hostile Training Environment . . .

. . . will brush aside many of your plans, and the limits on ammunition, people, and time will never let you become as good as you would like. We certainly did not do as well on our ARTEP as we wished, but we are convinced that we have the right pieces. Here's hoping some of you can put them together more skillfully.

**Good shooting!**



# Firepower

and

# Punch



art by Griffith Gates

*With all the improvements in the Field Artillery system taking place throughout the world, I feel it is a cause for celebration. We celebrated, as we do annually, at Fort Sill on St. Barbara's day by imbibing our traditional parochial drink — artillery punch. We used the Fort Sill recipe, but there are many variations. There are as many variations of artillery punch as there are imaginative artillerymen who pull corks as proficiently as they pull lanyards. The camaraderie of field artillerymen is exhibited not just on St. Barbara's day, but the whole year through. So here are a few more variations on tradition — to be enjoyed wherever and whenever artillerymen mass their fires around a punch bowl.*

*Donald R. Keith  
Major General, USA  
Commandant*

by MG (Ret) George Ruhlen



A published recipe for "artillery punch," allegedly served at the Fort Sill Officers Open Mess, prompted a spirited reply from veteran gunner COL John R. Elting, Fellow of the Company of Military Historians, in which he used this recipe as a case study of the decline and degradation of artillery tradition.

Lest the honored reputations of gunners as dilettantes in the concoction and imbibing of delectable punches be lost in this computer age, it seems proper that information on preparing some of the historical libations which warmed and gladdened the hearts of Redlegs of old be forthcoming . . .

From the latter part of the 18th century, punches have been popular for all social affairs, particularly among military units. Unique recipes often became associated with certain regiments either by virtue of invention or frequency of serving at their social functions and in time became identified by the regiment's name.

The name itself — punch — is supposed to have been derived from the Hindustani or Urdu word "panj," meaning "five," thus being descriptive of the five major ingredients of a true punch. English regiments allegedly brought home from India this tradition of punch making and drinking, from whence it spread to the American colonies and subsequently to state militia organizations, then to the Continental Army, and eventually to its Regular Army successors. Hence punch and punches are old Army traditions — to be treated with proper respect by all present-day warriors. Herewith follow a few distinguished artillery representatives.

About 1910 the widow of GEN Alanson Randol, an officer of the First Artillery during and after the Civil War, gave this recipe to my father, then stationed at Presidio of San Francisco. Mrs. Randol said it had been used by the First Artillery for many years going back to Civil War times, when peach brandy was sometimes substituted for champagne.

### **First Artillery Punch**

Prepare a pint of triple strength black tea and a pint of triple strength green tea; then blend the two together.

Place in a suitable large container, either glass or crockery, 1/4 pound of loaf sugar. Grate upon it the rinds of three lemons; then add their juice and the juice of two oranges. Pour over this the boiling tea mixture. Stir well, cover, and set aside to cool.

When cool, add in this order, stirring slowly, 1 quart of Jamaica (NOT Puerto Rican) rum, 1 quart of good bodied sherry, and 1 quart of brandy. Mix well, cover, and let stand for several days, preferably a week, in a cool place (such as a refrigerator).

When ready for use, pour the mixture over a block of ice in a large punch bowl and then add 3 or 4 quarts of champagne which greatly improves the taste of the punch and gives it life.

The quantities given above are suitable for small groups

such as were found on one or two company posts — about 15 to 20 people. It is alleged that when other branches of the service were entertained it was sometimes necessary to dilute the punch with an equal amount of mineral water, but this was a degradation of a good punch. If you must have a red punch, use cherry brandy and half as much sugar.

Colonel Elting tells me that the following recipe has been a great favorite of the Chatham Artillery of Savannah, Georgia for over a century and is still served at local functions. The Chatham Artillery was founded 1 May 1786 by Revolutionary veterans living near Savannah. Its modern descendants are Headquarters Battery, 48th Armored Division Artillery, and Battery B, 118th Field Artillery Georgia National Guard. With his permission, here is Colonel Elting's historic Chatham Artillery Punch.

### **Chatham Artillery Punch**

Add 1/4 pound of green tea to 2 quarts of cold water; then add the juice of 9 lemons. Mix and let stand overnight; then strain.

To this mixture add 1 pound of brown sugar, 1 pint of cherries, 3 quarts of pink Catawba wine, 1 quart of rum, 1 quart of brandy, 1 quart of rye whiskey, and 1 quart of good dry gin to smooth out the mixture. Let this stock sit for a week or two, covered, preferably in glass bottles. This aging period is quite important. (Some versions of this recipe call for the juice of nine oranges in addition to the nine lemons and aging in a stone crock or cedar tub.)

When ready to serve, stir well, pour over a block of ice in a large punch bowl, and then add 3 quarts of champagne.

These quantities will make about 3 gallons of punch, usually sufficient for about 20 people.

When time and availability of ingredients (by local acquisition) permitted, the 3d Armored Field Artillery Battalion, while on occupation duty after WWII occasionally passed a few uncommonly pleasant hours consuming their traditional combat beverage of equal parts of Cointreau, cognac, and champagne (C3) which soon became known as Gunner's Punch. The 3d FA veterans heartily recommend it for serious consideration and consumption by today's gunners.

### **Gunner's Punch**

To 1 quart of triple strength black (or green) tea add the juice of 12 lemons and then sweeten to taste with sugar. Add 1/2 pint of curacao, 1/2 pint of brandy, and 1 quart of Jamaica rum; then let stand for several hours, preferably overnight, in a cool place — refrigerator, potato cellar, snowbank, etc.

Over a block of ice in a punch bowl, pour approximately equal parts of the above base, burgundy wine, and carbonated water.

The above should quench the thirst of about 12 to 15 people.



# FIREX '76

by MAJs Thomas D. Gaither and Bobby J. Getz



**Adjusting rounds being fired from SLAMMER. Rockets can be fired singularly or in groups.**

FIREX '76, the largest field artillery exercise in the free world, was a coordinated exercise to train artillerymen in sections, batteries, battalions, groups, and division and corps artilleries in the techniques of delivering timely and effective fire. The exercise included units from the Active Army, Army National Guard, Army Reserve, US Marine Corps, US Air Force, and Air National Guard. Held at Fort Bragg, NC, 11 through 14 November 1976, the exercise included the weekend to permit Reserve and National Guard participation.

More than 6,000 personnel from 12 field artillery battalions and four separate batteries participated in the exercise with weapons ranging from 105-mm howitzer to 175-mm guns.

The exercise was conducted under the control of XVIII Airborne Corps Artillery with field artillery units participating from the 82d Airborne Division Artillery, 101st Airborne Division (Air Assault) Artillery, 2d Field Artillery Group (USMC), 113th Field Artillery Group (Kentucky National Guard), and 4th battalion, 17th Field Artillery (USAR). Also, the 1st Battalion, 84th Field Artillery (9th Infantry Division Artillery), participated using the equipment of the XVIII Airborne Corps Artillery's 1st Battalion, 39th Field Artillery, which was training at Fort Lewis, WA, during the exercise.

Support personnel were provided by the 1st Corps Support Command, the 12th Aviation Group (CBT), the 16th Military Police Group, the 20th Engineer Brigade, the 35th Signal Group, the 4th Psychological Operations Group, and the Military Intelligence Battalion, Air Reconnaissance Support. The US Air Force transported elements of the 101st Airborne Division to Fort Bragg from Fort Campbell, KY, and provided aircraft for reconnaissance and live-fire close air support (CAS) missions. Marine Corps aircraft also supported the exercise with CAS missions in support of planned operations.

The scenario for the exercise embodied the philosophy of the "quick-win" concept. The exercise was divided into three phases:

- Phase I consisted of inserting airborne and air assault forces on the enemy's main lines of communication to entice and canalize the enemy forces into preplanned "armor annihilation zones" (AAZ).
- Phase II consisted of enticing enemy forces into the AAZs.
- During Phase III, enemy forces were encircled and sealed in the AAZs. Units deployed to several different locations by land, air, and parachute and fired in support of corps operations under simulated combat conditions. The corps then conducted operations incorporating

**"... the largest field artillery exercise in the free world."**

massive indirect fires and airstrikes to annihilate the enemy forces trapped in the AAZs. Although range constraints at Fort Bragg inhibited the conduct of a free-play exercise with simultaneous airborne and airmobile insertions, enticement and encirclement operations were conducted around the major impact areas.

All FIREX objectives were achieved:

- Artillery fire support and coordination procedures were improved.
- New doctrine and techniques to increase responsiveness were evaluated.
- Corps level fire planning, fire support coordination, and artillery live-fire were accomplished.
- Joint command and staff training was achieved.
- Nuclear fire and nuclear release procedures were incorporated into fire planning.
- The corps combat support and combat service support elements and the corps tactical communication system were effectively employed.
- A four-battery battalion with eight guns per battery was organized and tested under field conditions.
- Training of affiliated Reserve Component units was carried out.

Emphasis during the exercise was on physical and firepower mobility. Physical mobility was achieved through frequent day and night moves with improved survivability and, through careful planning, provided the bulk of the corps artillery well forward to influence the action. A total of 97 battery-sized moves (of which 21 were airmobile moves) were executed in support of operations under simulated combat conditions. To preclude checkfires and to reduce aircraft vulnerability, aircrews employed terrain and nap-of-the-earth flying techniques.

Firepower mobility was achieved through detailed joint fire planning. Extensive and continuous fire support coordination insured the responsive massing of fires, uninterrupted by round-the-clock repositioning of firing elements.

Army artillery units applied new doctrine contained in recent US Army Field Artillery School training circulars. The new doctrine had broad implications for both the direct support and general support artillery roles, all geared toward improving the combined arms team's ability to mass decisive firepower rapidly at the crucial point in the battle. New doctrine in support of the airborne/air assault, enticement/encirclement antiarmor concept was employed in a tactically realistic, live-fire exercise.

Target intelligence was developed to support a fast-moving, firepower-oriented scenario. Communications circuits leading to the div arty operations centers were deliberately saturated with intelligence data, because it was there that the decisions had to be made regarding how, when, and where fires would be directed. The exercise



**SLAMMER—M200 rocket launcher pods mounted on a modified M91 chemical launcher.**

provided the opportunity to "debug" the systems and to train those key staff and command elements who play vital roles in intelligence, target acquisition, and fire support.

CAS targets were marked with Marine artillery, firing white phosphorus rounds. Although not a new technique, this procedure kept the airborne forward air controller out of the immediate target area and allowed artillery firing concurrent with delivery of CAS munitions. Aircraft employed high threat tactics. Beacons were used by Marine liaison teams to direct CAS strikes. This procedure proved effective, again improving the proficiency of the combined arms team.

FIREX '76 was an ideal training vehicle for the Reserve Component artillery battalions, providing their only opportunity during the year to train with Active Army units in a live-fire exercise. They were able to evaluate the training readiness of their units for planning future training. Another major area of emphasis was communication security. FM secure voice communication was used extensively with frequencies and call signs being changed at least twice daily. Although electronic countermeasures were employed, the frequent changes in call signs and frequencies insured continuity of operations.

Throughout the exercise camouflage training was evaluated. USAF and Army aviation reconnaissance missions were targeted against exercise participants. Units who violated survivability considerations, or were located by target acquisition means, were required to displace to new positions or were provided on-the-spot instruction to correct deficiencies.

FIREX '76 was logistically supported from tactical field sites. The 1st Corps Support Command provided services which included maintenance support and the establishment of a field ammunition supply point (ASP). Support requirements to sustain an operation of this magnitude provided an ideal opportunity for realistic training for service support elements. A logistical support activity provided Class I, II, and IV supplies plus equipment

maintenance support. Water and shower points were established and maintained. The 8th Ordnance Company, deploying in conjunction with an annual readiness evaluation, maintained a tactical ASP which stored and distributed approximately 6,000 rounds of artillery ammunition.

During FIREX '76, a new concept to improve firing responsiveness and flexibility was tested by units of XVIII Airborne Corps Artillery. In a special organization for combat, the 1st Battalion, 73d Field Artillery, was augmented with weapons from the 1st Battalion, 6th Field Artillery, to form a four-battery battalion with eight guns in each battery. The reorganization increased firing elements from three to eight, allowing the battalion and batteries to react rapidly to requirements for firepower. Through extensive airmobile operations, tremendous firepower was available simultaneously to conduct routine fire missions and raids. A study is being completed that critically analyzes the concept as it was employed in FIREX '76.

One of the major efforts during FIREX '76 was directed toward the field evaluation of the new counterfire doctrine. During the assignment of missions specifically designed to support counterfire, it became apparent that none of the four traditional field artillery missions was, in and of itself, adequate to produce the desired results. A proposed new mission which encompasses appropriate inherent responsibilities that accomplish counterfire doctrine is currently being staffed at XVIII Airborne Corps Artillery and with FIREX '76 participants. *Direct support* and *reinforcing* missions provide the majority of ingredients for counterfire but fail to provide artillery assets with which the corps commander can influence the situation. *General support* and *general support-reinforcing* missions provide fires responsive to the corps commander but do not provide for the quick fire channels and required liaison which constitute the counterfire foundation.

Concurrent with the inadequacies which were determined to exist in the traditional field artillery missions, it was discovered that emergency action channels/procedures to

accommodate transmission of nuclear weapons-related information are not provided for in the nonnuclear-capable 82d and 101st division artilleries. Proper procedures and mission changes necessary to support the new doctrine are inevitable. The realistic environment provided by FIREX '76 and the field testing of counterfire should result in a significant contribution to the Field Artillery Community.

A new weapon system, a 2.75-inch multiple rocket launcher, being studied at Redstone Arsenal, was test-fired and evaluated during FIREX '76. SLAMMER, as the system is called, consists of six M200 rocket pods of 19 rockets each, mounted on a modified M91 chemical launcher. SLAMMER has the capability of firing its 114 rockets either singly or in groups. All rockets can be fired in less than 30 seconds. Firing of the SLAMMER was incorporated into mass fire missions during FIREX '76. SLAMMER performed adequately as an area fire weapon, placing a high volume of fire on the target with acceptable accuracy.

The Night Vision Laboratory at Fort Belvoir made available a long-range night observation device to acquire targets and adjust artillery without illumination. It greatly enhanced the element of surprise and increased the probability of first-round target hits. By eliminating illumination of the battlefield, the individual's night vision was preserved and the location of friendly frontline elements and artillery firing positions were protected.

A high state of readiness is the most important goal of every unit in the Army. FIREX '76, by providing training in the field under realistic simulated combat conditions, significantly aided units in the pursuit of that goal. Firing procedures, communications systems, camouflage, artillery position defense, and all phases of support from field locations were tested and improved.

FIREX '76 was much more than an artillery live-fire exercise. It was an exercise in joint training, with Army, Marine Corps, and Air Force units working in close cooperation. The Reserve Component's military proficiency was improved by working with Active Army units.

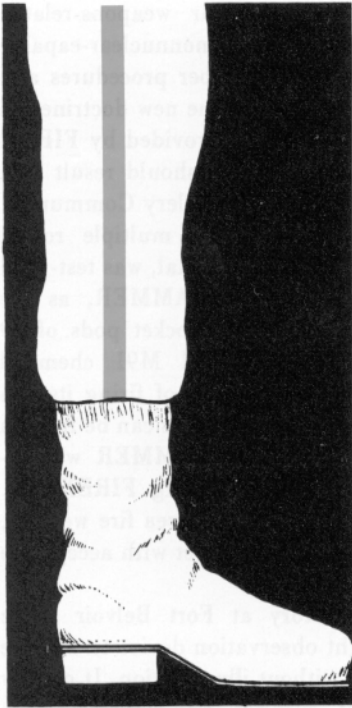
Once the firing ceased and the smoke cleared from the battlefield, it was readily apparent that FIREX objectives had been met and, in most cases, exceeded. Participants unanimously declared FIREX "the most valuable training we have all year." FIREX was tactically realistic; it allowed artillerymen to develop and execute joint fire support at the corps level; and it involved the entire spectrum of deployment considerations. It was the "one Army" in action. Most important, FIREX '76 was XVIII Airborne Corps Artillery's most effective training vehicle for insuring that all firepower assets available to the Corps are prepared to assure the success of the quick-win concept.



**MAJ Thomas D. Gaither is the S3 and MAJ Bobby J. Getz is the assistant S3 of XVIII Airborne Corps Artillery.**

**1st Battalion, 84th Field Artillery, firing in support of FIREX '76 operations.**





# Redleg Review

selected were in good physical condition and were given special concessions, such as warm bedding, good food on linen tablecloths, and liquor. After four months the volunteers would be gassed and replaced by another special work group (*Sonderkommando*) of 800 to 900 men.

From the time this system started in 1940, 13 *Sonderkommandos* were formed. Number Twelve revolted and succeeded in killing 70 German SS personnel. The coup took place in October 1944 when the gassing of a large group of Hungarian Jews was almost complete and liquidation of the *Sonderkommando* itself was imminent. Leaders met to plan a night action, but were surprised by an informer during their meeting. They killed the informer and attacked the guards. Using the few weapons they had been able to collect, they disarmed the SS men and threw three men into the furnace. They cut the wire fences of their own camp and a women's camp nearby and fled. Some prisoners managed to ford the nearby Vistula River, but the German SS men and their dogs rounded up the fugitives and shot them all. Not one of the 853 men of *Sonderkommando Twelve* survived the uprising, but none would have survived another fortnight in any event.

Professor Bruno Bettelheim of the University of Chicago has written in his thoughtful foreword to Dr. Nyiszli's book:

The one *Sonderkommando* that revolted and took such heavy toll of the enemy did not die much differently than all other *Sonderkommandos*. Why, then — and this is the question that haunts all who study the extermination camps — did millions walk quietly, without resistance to their death when right before them were examples such as this commando that managed to destroy and damage its own death chambers and kill 10 percent of their own numbers in SS? Why did so few of the millions of prisoners die like men, as did the men of only one of these commandos?

Bettelheim answers that it was inertia, a futile clinging to business-as-usual, when actually hope for self was vain and struggle could have helped others. His point is challenging, although of course the unresisting millions of prisoners did not have the example of *Sonderkommando Twelve* before them. Most had already perished by February 1944 and the remainder could not have heard the stirring story. Possibly, fear of provoking reprisals against other prisoners was another factor.

Among the non-Jewish groups were a number of underground organizations, but the guards treated the Jews with the greatest brutality and reserved the greatest indignities for them. Most of the Auschwitz inmates spoke Polish; many were ethnic Poles, arrested for suspected partisan activity. There were German-speaking Austrians, Czechs, Hungarians, Yugoslavs, and French accused of anti-Nazi activity. Of the inmates engaged in underground work, a high percentage were communist who had been trained in conspiratorial activity and discipline. Some were Russians, most of whom had tried to escape from prisoner-of-war or slave-labor camps in Germany or Poland. Out of some 600 attempts to escape from Auschwitz, a few survived to provide the outside world with documented evidence of the horrors of Auschwitz.

Jozef Garlinski opens his book with the voluntary surrender to the Nazis of Withold Piletski, former Polish cavalry officer and captain in the Home Army. He surrendered in order to organize Polish underground in Auschwitz. There were few communists among the Poles, so the communists made use of left-leaning socialist Joseph Cyrankiewicz to establish a Polish pro-communist underground in the Camp. Later he became a communist and premier of postwar Poland.

The Soviet underground leader at Auschwitz was Colonel Kuzma Kartsev, who specialized in armed uprising. The Soviets make every soldier take the soldiers' oath, the *Prisyaga*, to swear to fight to the death. Like the Imperial

*The following is a combined review of the two books listed. —Ed*

FIGHTING AUSCHWITZ, by Jozef Garlinski, Fawcett Publications, Inc., Greenwich, CT; 1975 (in paperback). AUSCHWITZ: A DOCTOR'S EYEWITNESS ACCOUNT, by Dr. Miklos Nyiszli, Fawcett Publications Inc., Greenwich, CT; 1960 (paperback edition 1976).

Of Adolph Hitler's extermination camps, the Auschwitz-Birkenau complex in Poland was the worst. Of six million European Jews (1.3 million of them helpless children) annihilated by the Nazis, three million died in the gas chambers of Auschwitz.

The two books under review are of professional interest to soldiers for their moving insights into the minds of humans in the grip of protracted fear. They are also of considerable historical interest, since so few of the thousands of books and articles published in many languages on the death camps reflect any resistance by the condemned. Further, most of the literature conveys the impression that all of the political prisoners in Auschwitz were Jews, which is not true.

It was Nazi practice to recruit volunteers among the Jewish inmates of the extermination camps to operate the gas chambers and crematoria. Volunteers

Japanese, they believe that to become a POW is a disgrace, even if he surrenders under direct orders from his military superior. It is standing Soviet procedure to initiate armed uprisings in POW camps. These are designed to force an enemy to strengthen camp defenses and reinforce his guards, thereby diverting resources from combat. Colonel Kartsev was unable to achieve an uprising at Auschwitz, but Soviet military prisoners on Oster Island in the Netherlands did revolt in 1944 and suffered heavy loss of life.

Of the books reviewed here, Garlinski's holds the greater interest. Besides having been a Polish officer and member of the Polish Home Army underground in Auschwitz, he has earned a doctorate at the London School of Economics and Political Science and has written several books on World War II. He writes very factually, but with enough characterization to hold the reader's interest. Dr. Nyiszli cooperated with Nazi doctors in their brutal human medical experimentation at Auschwitz. His book is shocking, but highly introspective and concerned with matters of detail.

The meaning of Auschwitz is a lesson familiar to nearly every veteran of hard, protracted combat. When the odds against survival soar, ultimate courage is derived from fear.

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**THE BATTLES FOR CASSINO** by Brigadier E. D. Smith, Charles Scribner's Sons, New York, 1975, 184 pages, \$8.95.

Guarding the Gustav Line and the road to Rome was the monastery above the little Italian town of Cassino. This seemingly impregnable fortress delayed the Allied advance five months during the winter and spring of 1944 — five months which saw four bitter battles.

The US Fifth Army of General Mark Clark, which included troops from Nepal, New Zealand, Poland and France, joined soldiers from America and Great Britain in facing one of Hitler's finest — Field Marshal Kesselring. Even with massive air and artillery support, the Allies paid dearly for the victory which finally came with the fourth battle. The elite German Parachute Division fought valiantly against superior forces as the principal defending force.

This book is based largely on the diary Brigadier Smith kept while serving as an officer in the Gurhas. This is an excellent tribute to the gallant stand made by both armies. This volume contains several maps which contribute greatly to the reader's ability to follow troop dispositions.

Lessons abound in this book for the student of military tactics. The paramount lesson is that the individual soldier is the ultimate weapon.

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**BISMARCK**, by Alan Palmer, Charles Scribner's Sons, New York, 1976, 326 pages, \$12.50.

Alan Palmer, British author of biographies of those men who most affected European history during the Napoleonic era and its aftermath, has now expanded his series with an excellent biography of Otto Von Bismark.

The author indicates in his preface that he has set out to rely more on the "social and economic background of Bismark's Germany" than on the man himself. Those who seek intimate details of Bismark's personal life or a deep analysis of his psychological motivation will not find it in this book. It is, rather, a straightforward rendering of the history of the era as it revolved around one man.

Palmer leads us quickly through Bismark's early life; then he discusses Bismark's failure to be accepted in the Prussian diplomatic service, a brief stint in the civil service and "retirement" at age 24 to the life of a gentleman farmer.

The revolutions of 1848 brought Bismark out of the countryside into politics — first as a reactionary supporting Junker privileges to the extent of even dabbling with the idea of participation in a *coup* to replace the too liberal Prussian King with a more conservative relative. In 1849, however, Bismark entered the Prussian Parliament which he was to dominate and mold, along with the rest of Europe until 1890.

The author offers a novel, but logical, view of Bismark's conduct in the formulation of the harsh peace terms imposed on the French after their defeat. Most historians see Bismark's opposition to these terms as a desire to prevent future conflict between France and Germany.

Palmer, however, argues convincingly that, although Bismark did work to ease the terms somewhat, he was not that adamant because he felt that a future war between Germany and France was inevitable.

The implication is that Bismark's greatest strength lay not only in his brilliance but also in hard work and extensive planning. By the same token, he was not afraid to beat a temporary retreat if necessary, and, above all, he remained detached from the emotions he seemed to create at will among kings, emperors, generals and whole populations. This, Palmer feels, was a trait that undid much of Bismark's work after his death since those who followed him were not able to retain this detachment and were, in fact, frequently carried away by their own rhetoric and propaganda.

In summation, Alan Palmer has given us a highly readable and worthwhile biography which should be read by anyone wanting to further his understanding of the background of modern Europe.

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**GERMAN ARMoured CARS OF WORLD WAR II**, by John Milsom and Peter Chamberlain, Charles Scribner's Sons, New York, 1975, 128 pages, \$10.

This book is a must for the armored vehicle, German history, or World War II buff.

The authors have produced a thorough research work on the development of German armor from the late 1920s through the end of World War II. Early development of these vehicles was carried out in contravention of the Versailles Treaty which forbade the Germans to have any tactical vehicles.

Contained in this work are more than 200 illustrations of the four-, six- and eight-wheeled vehicles, many of which are shown in more than one view. The photographic reproduction is exceptional considering the age of the photographs and the state of the photographic art a half century ago. Accompanying the pictures is a complete technical description of each vehicle to include its armor, armament, engines, suspension, performance, and dimensions. —Ed.