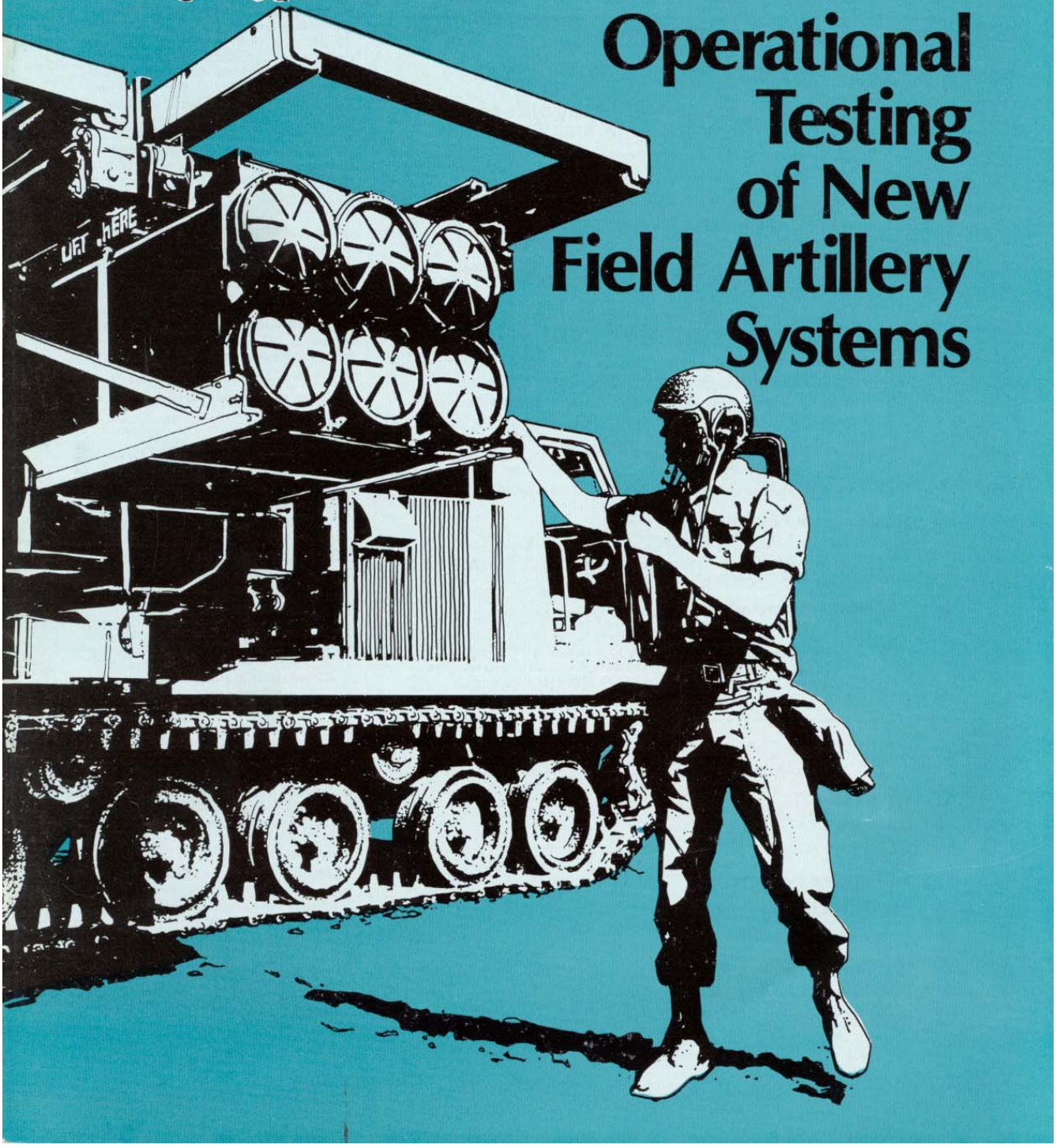
Field Artillery Journal

September-October 1982

Operational Testing of New Field Artillery Systems



Field Artillery Journal

THE JOURNAL OF FIRE SUPPORT

Volume 50 **September-October 1982** **Number 5**

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

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On the Move

MG EDWARD A. DINGES

A new and important function within the School which is gaining increased attention as it proceeds with its vital mission of insuring the good health of the field artillery personnel force worldwide is the Field Artillery Proponency Office (FAPO).

Last October, as the result of an action by the Army's Deputy Chief of Staff for Personnel (DCSPER), each school was formally acknowledged as the proponent for its particular branch. I mention "formally acknowledged," since, in reality, we have been heavily, but informally, involved in branch proponency for many years. With this transfer of proponency functions also came the authority to establish a central agency for coordination of key personnel issues. In so doing, we now have an even stronger voice in insuring that the interests of all field artillerymen are considered in the formulation of Army policies.

Proponency extends to all field artillery specialties, affecting more than 44,000 officers, warrant officers, and enlisted soldiers. To serve this sizeable force, the staff of the proponency office includes officer, warrant officer, and enlisted action-level workers.

Proponency responsibilities encompass a wide spectrum of personnel management areas, ranging from initial acquisition and training through career development to separation; in other words, sort of a "cradle to grave" approach. Here, it is important to keep in mind that, although the Proponency Office is involved in nearly all aspects of personnel management, it is essentially a coordinating agency. As such, the Proponency Office reviews and works virtually every issue impacting on field artillery personnel, to include determining the number of acquisitions required for a certain specialty and screening organizational structure documents to insure compatible standards of grade authorization within the military occupation specialty (MOS)/career management field (CMF). Through the work of the FAPO and the direct link which it provides into the Army personnel management system at MILPERCEN and DCSPER, the Commandant of the School now has a much greater voice in the formulation of personnel policies affecting field artillerymen.

For example, one of the most complex tasks facing the FAPO has been the development of plans to support fielding of our newest weapon system—the Multiple Launch Rocket System. The Proponency Office has been the key agency in bringing together all players necessary to resolve crucial problems and has developed a detailed plan to provide the personnel necessary for MLRS. This plan—of necessity very complex—provides for the needs of the field artillery and, at the same time, for the career progression of the individual soldier. Similar efforts are in progress involving other new equipment and systems such as TACFIRE, Pershing II, and the Remotely Piloted Vehicle (RPV).

The Proponency Office also reviews the files of ROTC cadets who have chosen the Field Artillery Branch to identify those who might experience problems and therefore would benefit from advance study materials; FAPO has also developed a coordinated field artillery assessment of the minimum education and qualification standards for new field artillery officers. Additionally, on the enlisted side of the house, FAPO has been active in the development of the Enlisted Force Management Plan, providing input for guidance to the FY82 E7 promotion board, reclassification training for noncommissioned officers who migrate to the Field Artillery, and reduction of shortages of middle-grade noncommissioned officers in CMF 13. And finally, recent attention has been focused on establishing FA warrant officer entry criteria, development of an improved warrant officer training strategy, and input to a field artillery warrant officer guide.

The FAPO is our key representative in an effort to develop a pilot program to test the concept of a competency-based enlisted force—one which recognizes technical skills as the potential for advancement as well as leadership ability. This is a particularly meaningful program to those in our more technically oriented specialties. The Proponency Office also participates in the Army Education Requirements Board seeking to expand educational opportunities for field artillery officers and warrant officers, and FAPO is an active player in the development of the Army Regimental Manning System.

In conclusion, with our role as the proponent for the Field Artillery now formally recognized, we have the wherewithall to see to the needs of our ranks. Although FAPO is not staffed to handle individual personnel matters, these issues do drive major policy changes. With this in mind, we welcome your comments, questions, and, most importantly, your ideas. You may contact the Proponency Office by calling AUTOVON 639-1266 (commercial 1-405-351-1266) or, preferably, by writing the Commandant, US Army Field Artillery School, ATTN: ATSF-AF, Fort Sill, OK 73503.

Shortly prior to press time, Department of the Army announced that Major General Edward A. Dinges, Commanding General, US Army Field Artillery Center and Fort Sill and School Commandant since June 1980, will be reporting to Brunssum, Netherlands, on 22 October 1982 for assignment as Deputy Chief of Staff for Operations and Intelligence, Allied Powers, Europe.

General Dinges' successor will be Major General John S. Crosby who at the time of this writing is serving as Deputy Chief of Staff for Personnel, US Army Forces Command, Fort McPherson, GA.

General Crosby, scheduled to arrive at Fort Sill on 28 September 1982, served as the School's Director of Course Development from May 1976 to May 1977.

Incoming

LETTERS TO THE EDITOR

Speak Out
The *Journal* welcomes and encourages letters from our readers. Of particular interest are opinions, ideas, and innovations pertinent to the betterment of the Field Artillery and the total force. Also welcomed are thoughts on how to improve the magazine.—*Ed.*

Heavy equipment transporter needed

The purpose of this letter is to propose that one heavy equipment transporter (HET) be added to the table of organization and equipment (TOE) of the nondivisional 8-inch howitzer battalion. The addition of the HET will increase the battalion's ability to haul ammunition, move supplies, recover and evacuate damaged and destroyed howitzers and other equipment, and perform required maintenance.

Under the current TOE, the 8-inch nondivisional battalion is provided 27 5-ton M813A1 cargo trucks to move its ammunition. Normally, four of these trucks are dedicated to carrying special weapons and related propelling charges, leaving only 23 to carry conventional ammunition. These vehicles can carry 1,175 projectiles in one sortie; however, with a basic load of 160 rounds per howitzer and a probable controlled supply rate of 160 rounds per tube per day, the battalion will be required to move 2,880 projectiles per day. This, in turn, will require at least three sorties per day using all available 5-ton trucks. One heavy equipment transporter, however, can haul 22.5 tons, allowing the entire basic or resupply load to be carried in one sortie.

Under the current TOE, the nondivisional 8-inch howitzer battalion is provided one M88 medium recovery vehicle, one M578 light recovery vehicle, and two M816 wheeled wreckers to recover its various wheeled and tracked vehicles; however, evacuating equipment to the maintenance company is sometimes a problem.

Corps support command provides nondivisional units with corps maintenance companies operating in sector which usually means that the battalion is anywhere within a 50-mile radius of its direct support maintenance company. Since the maintenance company has only one HET to backhaul damaged equipment from units in the sector to its location, damaged equipment must either "wait" on the HET or be abandoned when the battalion displaces. With an organic HET, however, the battalion would be able to evacuate damaged equipment directly to the supporting maintenance company and subsequently backhaul a replacement item from the operational readiness maintenance floats (ORF) or war reserve.

The nondivisional 8-inch battalion TOE presently provides seven 2 ½-ton M35A2 trucks to carry all of its supplies except fuel, ammunition, and major end items. These trucks are initially filled with essential basic load items such as a 15-day supply of expendables and all required sets, kits, and outfits — leaving little room for such nice-to-have items as barrier material. Once in the field, these vehicles are engaged in transporting supplies from the rear corps supply and service companies to the battalion trains and then forward to the batteries. The HET would allow hauling of barrier material or specific amounts of other supplies so that a stockpile could be made in the battalion trains. This would ease the constant operation of the general supply vehicles.

The present nondivisional 8-inch battalion TOE requires all of its ammunition and supply vehicles to be in continuous operation which provides little time for routine organizational maintenance. As distances between the battalion trains and the supporting supply activities increase, the running time of the vehicles will also increase. As such, when vehicle breakdowns or battle losses occur, the strain to pick up the slack and keep the supplies and ammunition flowing will place a further demand on the remaining vehicles. The addition of the HET would allow maintenance to be performed on the supply vehicles or ammunition carriers on a routine basis.

In summary, the HET would allow the nondivisional 8-inch battalion the following advantages:

•An ability to haul more ammunition with less sorties per vehicle.

•Direct evacuation of disabled or destroyed vehicles to the supporting maintenance company or salvage collection point.

•Backhauling of ORF or war reserve replacement end items.

•More time to perform maintenance.

These bonus effects can be realized without additional training requirements since battalion MOS 64C (transport motor vehicle driver) personnel are taught to operate the HET in advanced individual training.

Walter G. Dobinson Jr.
CPT, FA
FA Team
RG Snelling
Fort Snelling, MN 55111

Although your suggestion to incorporate the heavy equipment transporter (HET) into the FA unit is not considered feasible, there are several programs currently underway which address your concerns. For example, there are four actions which should directly improve ammunition resupply to corps artillery units:

•First, the heavy expanded mobility tactical truck (HEMTT), capable of carrying 10 short tons, is being adopted to replace the 5-ton truck in self-propelled 155-mm and 8-inch units. The HEMTT is currently under development with Initial Operating Capability expected in July 83 and fielding to the force (to include RC) to follow in Department of the Army Master Priority List sequence.

•Second, since not all FA units will convert completely to the HEMTT (e.g., towed M198 units will retain 5-ton trucks in the firing batteries), the Transportation Center and School is developing a Required Operational Capability (ROC) document (the first step in the procurement process) for an on-board crane for the 5-ton truck. This crane will provide FA units with a self-contained on-load/off-load capability at the ammunition transfer point (ATP)/ammunition supply point (ASP) and in the battalion/battery area.

•Third, the Combat Service Support Mission Area Analysis (CSSMAA) currently being completed by the US Army Logistics Center clearly identifies the need for one or more ammunition transfer points to support the FA brigade operating in a division area. These ATPs would provide quick turnaround time for the unit and thus better utilize the 5-ton trucks or 10-ton

HEMTTS. It should be noted that the ATP concept is intended to be organized with a variable number of (usually 12 to 15) 22.5-ton trailers which have as prime movers the M915 series tractor.

•Last, the Field Artillery School is currently involved in the detailed conceptual study of a support battalion for the FA brigade which should also result in improved Class V supply to the brigade.

Use of the HET by corps 8-inch battalions to haul ammunition, while efficient in terms of being able to haul large tonnages, would not appear effective in view of its limited cross-country mobility and the nature of terrain which it would have to traverse to reach the corps artillery positions since these will be located well forward in the division area of operations and intermixed with div arty weapons systems. (Incidentally, the haul capacity of the HET is 60 short tons as opposed to the 22.5 short tons referenced in your letter.) Another consideration is that the exchange ratio between HETs and HEMTTs would necessarily reduce the number of ammunition haul vehicles by over 80 percent (6:1), therefore increasing the vulnerability of the unit due to the critically few number of ammunition haulers. As an aside, the Ordnance Corps used an equivalent to the HET during WWII to haul high tonnage ammunition in a single lift over hard surface roads, but there is no indication that it was ever used forward of the ammunition supply point or in a cross-country mode.

Your concern about the paucity of HETs at the direct support maintenance battalion has been rectified (within the division) by the inclusion of 24 HETs in the Heavy Division '86 S&T Battalion TOE. It is anticipated that a similar upgrade for nondivisional units will result from the Corps '86 study efforts currently on-going. It should be noted that the unit responsibility for battlefield recovery (if the item cannot be "fixed forward") is only to the nearest maintenance collection point which is, by doctrine, well forward.

In summary, your suggested addition of the HET to the corps artillery unit TOE has meritorious aspects; however, due to its limited availability, relatively high vulnerability, and limited mobility in cross-country operations, as well as numerous other actions underway to improve ammunition resupply, it would not seem to be the most feasible alternative at this time.—Ed.

Where is the AN/PRC-68?

In the September-October 1981 *FA Journal* (page 5) SSG Harry Hernandez requested information on the new AN/PRC-68 radio. The *editor's note* stated that it would be fielded in European self-propelled battalions in 1981. It is now mid-1982 and we still haven't received any equipment.

Would you please give us an update on the fielding and advise us of how we can expedite the issue process of this much needed piece of equipment.

Ken Evans
MAJ, FA
Executive Officer
2d Bn, 75th FA
APO NY

A representative of the School's Communications and Electronics Department contacted Mr. Jorge Bigas, CECOM representative, DRSEL-ED-CR-A, at AUTOVON 992-5280. Mr. Bigas stated radio set AN/PRC-68 is available for issue under stock number 5820-01-079-9260 and LIN S83585. —Ed.

Ballistic cover new?

In the July-August 1981 *FA Journal*, "View From the Blockhouse," the CBS (Crew Ballistic Shelter) is touted as a new development. I thought that we'd experimented with a ballistic cover a few years ago for both the 8-inch howitzer and the M548 series vehicles. What happened to them? Also, on page 26 of the same issue, the picture at the bottom of the page shows a crewman in some sort of strange headgear. What is it? (Perhaps I've been too long from the guns!).

John D. Spengler
MAJ, FA
Military Science Department
Indiana State University
Terre Haute, IN

The crew Ballistic Shelter (CBS) is, in itself, a new product improvement proposal. In the past, other proposals, such as a fiberglass covering to be adapted as a winterization kit, were considered. Also, Kevlar and ballistic nylon blankets were considered for both the M110A2 howitzer and the M548. These proposals were evaluated and determined infeasible primarily because none of the proposed improvements could be decontaminated.

The photo on page 26 of the July-August 1981 ***Journal*** *is of the crew on an M198 howitzer. The DH178 helmet was required when firing the M203 charge because of possible blast and overpressure danger. Tests conducted during the past year by the Surgeon General's Office and the Medical Research and Development Command, however, have determined that the DH178 helmet is no longer required. Foam ear plugs are all that is needed when firing any charge, including the M203, provided no more than 12 M203 charges are fired in a 24-hour period. However, if more than 12 M203 charges are fired in a 24-hour period, the 25-foot lanyard should be used.—Ed.*

National Guard uses TACFIRE

I am the fire support officer for the 1st Battalion, 263d Armor, South Carolina Army National Guard, a roundout battalion for the TACFIRE-equipped 1st Calvary Division, Fort Hood, TX.

Having an obvious need to be proficient with the TACFIRE system, our battalion requested that the 1st Battalion, 82d Field Artillery, at Fort Hood provide Mobile Training Teams (MTT) to train our FIST personnel in the use of Digital Message Device (DMD) in preparation for our battalion Army Training and Evaluation Program (ARTEP) for Annual Training 1982. These Mobile Training Teams also attended several of our battalion Inactive Duty for Training periods in 1982.

When we reported to Fort Hood for our two weeks of annual training, the 1-82d FA furnished Digital Message Devices (DMD) and a Variable Format Message Entry Device (VFMED). During the first week, the 1-82d FA presented instruction on the VFMED to the Fire Support Headquarters Section; the second week we began our ARTEP which lasted approximately four days. The 1-82d FA furnished two operators to troubleshoot the system, but our personnel were able to operate the DMDs during the ARTEP without assistance.

The 1-263d AR received an excellent rating on the ARTEP and special notation was made by the chief evaluator on their effective use of TACFIRE, which would not have been possible without the outstanding and professional assistance by the 1-82d FA at Fort Hood. The teamwork displayed between our fire support sections and theirs is a clear example of the "Total Force" concept.

Wesley J. Fudger
CPT, FA (SCARNG)
1-263d AR
Sumter, SC

Who says FIST won't work?

Have you ever overheard a senior officer such as a tough and experienced brigade commander or a senior artilleryman say that "FIST isn't working?" Hearing this is enough to make a dyed-in-the-wool artilleryman want to crawl under a rug or even consider retiring his Saint Barbara's Medal.

Why would experienced and professional senior officers make such pronouncements or rather denouncements upon the role of fire support teams (FISTs)? Their comments obviously are not based on positive experiences with a proficient, sound, and functioning FIST system. Since success generates confidence, it is then apparent why senior officers lack confidence in the FIST system.

Perhaps we can explore some of the problems that have plagued the FIST concept since its inception in July 1977 when the Vice Chief of Staff approved its implementation.

•**Problem 1:** Some maneuver units were forced to give up both personnel (forward observers) and equipment to form the FIST in field artillery units. There are some maneuver personnel who remember this fact vividly and long for the day when their long-lost assets will return to their control where they feel they will be better utilized.

•**Problem 2:** Lack of enlightenment of certain maneuver commanders regarding the true mission, capabilities, and role of the FIST chief and his team. The role of the FIST chief is often fondly remembered by some maneuver battalion and brigade commanders as the role of their respective forward observers who performed miracles.

•**Problem 3:** Lack of enlightenment of some senior FA officers on the real mission and capabilities of the FIST. This is often compounded by their inherent mistrust of having MOS 13F enlisted soldiers call for and adjust live indirect fires. This mistrust and lack of confidence stems from their own personal experience of the traditional role of the forward observer (an officer) — a role they themselves perhaps fulfilled in Vietnam for that same company commander who is now a maneuver commander at the battalion or brigade level.

•**Problem 4:** Perhaps the root and possibly the most crucial problems exist with the assignment and experience levels of those junior officer's designated as FIST chiefs. In most cases, the position of FIST chief goes to a brand-new second lieutenant who has just completed his Officer's Basic Course at Fort Sill; therefore, the critical role of the fire support coordinator (FSCOORD) at the company level goes to our most inexperienced field artillery officers. It's no wonder that the tasks of fire planning, coordinating, and communicating the capabilities and limits of the field artillery, mortars, naval gunfire, and close air support are not effectively accomplished by our novice FA representative at the company level. It is no small wonder then why many say, "FIST isn't working." It is extremely difficult for this most novice FIST chief to gain the confidence of his company commander and "enlighten" or "sell" him on his role as the commander's FSCOORD.

•**Problem 5:** Lack of emphasis on the assignment of experienced and competent fire support officers (FSOs) at the battalion and brigade levels. Too often, an FSO assignment is a "dumping" or "holding" ground for FA officers who either experienced difficulty in other FA assignments or are simply waiting for a "slot" to open in a firing battery — as in the case of a successful FIST chief (now a first lieutenant) being placed in a battalion FSO slot. As a result, the very essence of fire support coordination often goes sour and reinforces the maneuver commanders lack of confidence in his FIST.

What are the solutions to these problems? Basically, the above problems fall into two general categories:

•Communication and education.

•Career progression and assignment policies of FIST officers.

In order to rectify the problem of enlightening the appropriate commanders on the true role and capability of FIST, an increased amount of FA command influence, support, and interest must be made in improving the entire FIST and fire support organizations and functions. This was demonstrated recently in the 5th Mechanized Infantry Division Artillery under the direction and influence of its commander, COL Ross W. Crossley. As a result of this commander's influence in the assignment of FIST personnel (officers and enlisted) and upgrading both their equipment and training, maneuver commanders began to see first-hand what the role, capabilities, and mission of the FIST organization really were. This resulted in an enlightenment and educational process of all concerned and contributed to an extremely successful combined arms team effort at the National Training Center, Fort Irwin, CA, in early 1982.

In addressing the second problem of career progression and assignment of FIST/FSO officers, its impact upon the enlightening process has a pronounced effect. As stated earlier, the Army habitually assigns its most junior and inexperienced FA officers to fire support assignments — unlike most of our allies and the adversaries who assign their most experienced and competent FA officers. Often, their own battery or regimental commanders serve as the FSCOORD to their respective maneuver units.

We should start assigning more experienced officers to FIST slots and reserve the current FA career progression of FIST chief, FDO, and XO for our lieutenants. An assignment consideration could be FDO, XO, and then FIST chief for starters. Assignments at the battalion and brigade fire support officer levels should also be given to experienced FA officers, preferably captains as battalion FSOs who have had successful battery commands. The brigade FSO should be carefully selected from among the quality majors available. Along with upgrading the experience level of the FIST/FSO officer, the prestige and assignment as a FIST/FSO must be enhanced; commanders should stress their importance and DA selection boards should also know of their importance. These assignment changes would help reinforce the "enlightening" process by providing more competent and experienced fire support coordinators at the maneuver levels.

Only when we can point to the success of the FIST concept and win the full confidence of the maneuver commanders can we become a functional part of the combined arms team and can say "FIST will and does work."

Karl R. Ingram
MAJ, FA
3d Bn, 19th FA
Fort Polk, LA

Missing: one stick

Problems have surfaced in this unit regarding graphical firing tables (GFT) for the M110A2 8-inch SP howitzer — specifically charge 5, green bag (GB) versus white bag (WB). During a live fire exercise, discrepancies were first noted when the executive officer (XO) and fire direction officer (FDO) compared computations for safety data. At the minimum range of 6,500 meters (for that position), the GFT produced an elevation of 267 mils while the tabular firing tables (TFT) gave an elevation of 245 mils. Further analysis revealed that the GFT used was for green bag powder only and that a GFT for charge 5 white bag did not exist. Although this subject was the basis of considerable discussion at the time, it did produce a viable, semiaccurate, hand-made charge 5 WB "stick."

The gunnery problem — the dilemma with which we are faced — is three-fold:

•Logistics.
•Location.
•Doctrine.

The first problem is due to the non-employment of green bag powder within this battalion. All of our fire missions are therefore accomplished using white bag powder, charges 5, 6, and 7. Considering the tactical deployment of the 8-inch system, this is a somewhat realistic scenario.

Because of the mountainous terrain and proximity of the firing batteries to the impact area, the minimum quadrant often results in a high XO's minimum quadrant elevation (QE) necessitating the selection of a charge lower than that which we desire. This allows for an increased elevation and, hence, the ability to clear site to crest while maintaining the capability to encompass the bulk of the impact area.

The M90 velocimeter has made it possible for us to abandon registrations and shoot only meteorological (met) plus valid velocity errors (VEs) as per current doctrine.

Having established the necessity of firing charge 5WB, we arrive at the problem of applying a valid GFT setting for charge 5WB on a charge 5GB graphical firing table. For example, at a range of 10,000 meters and a hypothetical total range correction of minus 500 meters, one extracts an elevation of 418 mils for charge 5WB, while the same setting for the green bag powder produces an elevation of 455 mils. By placing the white bag GFT setting on a green bag stick and firing at a target 10,000 meters away, we are short of this target by 585 meters, which could present a serious safety problem in addition to the obvious loss of accuracy for fire for effect and immediate suppression missions.

Two solutions appear, at first, to be viable. The first is to fire "met to target" for each and every mission, abandoning the charge 5GB GFT altogether in order to produce the desired effect on the target. The obvious fallacy of this method is the lack of responsiveness necessary for adequate fire support. The second possibility deals with the production and distribution of charge 5 white bag graphical firing tables, keeping in mind the inaccuracy of firing data obtained when applying white bag GFT settings to a green bag stick.

In conclusion, the serious safety problem already noted must be considered when utilizing charge 5WB to accomplish our mission. Local production of charge 5WB GFTs can and has been achieved, but this is a time-consuming and somewhat inaccurate solution. Hopefully, the production of a white bag stick will be examined in order to increase the responsiveness and accuracy of the 8-inch system.

Ted Almay
1LT, XO
and
Steve Peaslee
2LT, FDO
A Btry, 1-27th FA
Fort Carson, CO

The question of using the charge 5GB GFT for charge 5WB firings is not new. You have apparently incorrectly attempted to place the charge 5WB GFT setting on the GB GFT; if this process is correctly followed (see the following example based on your data) the charge 5 (GB) GFT can be used to generate charge 5WB firing data.

In your example, the GFT setting is constituted by establishing the relationship between "should hit" and "did hit" data. If the chart range is 10,000 meters, then an elevation of 454 mils, charge 5WB "should hit" the target. But, due to nonstandard conditions, a range correction of minus 500 meters exists. This means that an elevation of 418 mils "did hit" the target. For this hypothetical case then, the first part of the GFT setting is: GFT A, charge 5WB, Lot —, RG 10,000, EL 418. It is this GFT setting that is placed on the charge 5GB GFT and thereby establishes the relationship between the chart range and elevation to fire for this set of nonstandard conditions. Therefore, when placing the manufacturer's hairline over the chart range of 10,000 meters, the correct elevation to fire of 418 mils is determined on the charge 5GB GFT.

You are correct in that a met + VE solution is the best. This can be determined readily by using FADAC and deriving a GFT setting for firing prior to registration. After registration, the charge 5WB GFT setting correctly applied to the charge 5GB will enable the rapid determination of accurate firing data.

Local production of graphical fire direction equipment is absolutely forbidden. Only fire direction equipment developed by the Gunnery Department at USAFAS with approval from the Ballistic Research Laboratory is authorized for cannon firings.—Ed.

Mil or milliradian?

Contrary to what CPT James R. Koch states in his letter to the editor in the May-June 1982 *FA Journal*, the mil is by definition an angular unit of measure equal to 1/6400 of a circle and is only approximated by the mil relationship or WORM formula. The unit of angular measure to which he refers to as having 6283+ elements per circle is the milliradian. The WORM formula is only technically correct for angles in milliradians and widths which are subtended circular arcs, not subtended chords. The use of the WORM formula with angles in mils and widths as subtended tangents is only justified in situations where accuracy is not required *and* only for small angles where the subtended tangent is roughly equal to the subtended circular arc. His derivation of a correction factor to be applied to the WORM formula is appropriate for use in determining gun position displacements but should not be used in battery survey operations.

Lee N. Elmer
LTC (Ret)
Leavenworth, KS

Assistance Requested

Members of our readership who have back copies of the *Journal*, years 1940-1946, and who would be willing to donate them for research are encouraged to contact:

Doctor R. Livolla
Army Materiel Systems Analysis Agency
York Hall
Aberdeen Proving Ground
MD 21005

FDC layouts

Recently, the 4th Infantry (Mechanized) Division Artillery did quite a bit of work on battery and battalion fire direction center (FDC) layouts in an M577 command post carrier and received a write-up in the *Field Artillery Journal* (July-August 1980). This article prompts the following questions:

•Is it possible to obtain a reprint of the 4th Inf Div Arty solution to the battery and battalion FDC layouts?

•What does the Fort Sill "School solution" battery and battalion FDC layouts look like?

•What is the Gunnery Department's opinion of placing firing charts at a slant in excess of 800 mils along the side of the M577 in an effort to conserve space as opposed to placing them flat?

Your assistance in providing answers to these questions will be greatly appreciated.

David C. Cutler
CPT, FA
Btry B, 1st Bn, 22d FA
APO New York

*We are most happy to provide a copy of the **Journal** containing the FDC layout.*

The United States Army Training and Doctrine Command (TRADOC) recently approved the standardized battery FDC layout for the M577 command post tracked vehicle developed by the School's Gunnery Department. Blueprints and photographs may be obtained by writing:

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

No standardized layout, however, was developed for a battalion FDC.

There are no objections to the placing of firing charts at a slant as opposed to placing them flat, as long as the chart operator is able to obtain accurate chart data without undue difficulty. (The firing chart is placed at a slant of 10 degrees (178 mils) in standard battery FDC layout). In deciding which angle to slant a firing chart, the following items must be considered:

•The pressure placed on the plotting pins. (Excessive pressure may bend the pins and affect the accuracy of the chart data.)

•Stability of plotting equipment on the firing chart.

•Potential difficulty in operating the firing chart.—Ed.

Reunions

6th Field Artillery Association — 16-18 September 1982 at Lancaster, PA. All former members of the 6th FA are welcome. Contact L. Longenberger, Secretary, 6105 Lake Pointe Dr., Orlando, FL 32807.

7th Field Artillery Association — 17-18 September at the Ramada Inn, 1117 Williston Road, South Burlington, VT. Contact Carl Bessette, President, 78 Sherman St., Burlington, VT 05401, or Ernest Oakes, Secretary/Treasurer, 1 Pearl Lane, Wilbraham, MA 01095.

56th Field Artillery Battalion (8th Infantry Division) — 8-10 October in Albany, NY. For more information, contact P. Day, 2607 Flemming Road, Middletown, OH 45042.

The exceptional tactician: "How do we find him?"

"Evaluate Field Artillery officers to identify truly exceptional tacticians."

A recently held high level conference has once again resulted in a "message" being sent to "the field" in which an abstractly conceived idea is to be implemented on a practical level. As is true for most such brainstorms, the idea itself is full of merit and deserves an honest effort to bring about its realization in the practical world. Nevertheless, it presents a major difficulty of practical application in at least one area — that of evaluation.

Briefly stated, the message postulates the eternal truism that overall US combat readiness is contingent (among other things) upon the proficiency of tacticians on the battlefield. Precisely, what constitutes a proficient tactician is not only left undefined by implication, but indeed appears to be a part of the definitive problem. Talented tacticians are to be identified, but the difficulty of measuring either talent or proficiency in the realm of tactics must first be addressed in practical terms; i.e., "establish a program . . . ."

Tactics, being itself a most nebulous term (much like "leadership," etc.), is difficult to define or measure in other than subjective terms. The primary difficulty of evaluation of tacticians occurs in transition from the abstract — tactics — to the practical and measurable *proficiency*. Normally, a test or an evaluation can examine only the student's ability to remember/regurgitate tactical principles as factors to be considered for certain tactical situations; to wit: "you always locate the latrine downhill (downstream, downwind) from the mess; command and control are always collocated; field artillery is placed well forward in the attack, etc." There is seldom available a precise and unambiguous solution, except perhaps the infamous "School solution" which, as we all well know, has been the object of merciless criticism — and properly so. "It all depends on the situation" is not just a trite and worn phrase; each and every situation on the battlefield is indeed an accumulation of circumstances that make it completely unique — circumstances that conspire to render laughable any attempt at applying a "School solution." The old "if-then" proposition is no more *universally* valid in tactics than it is in philosophy. Certainly, conditions on the battlefield require judgmental application of known and tested principles, but the tactician utilizes a technique that is a direct reflection of his temperament, personality, and previous experience in similar situations. Academically learned tactical wisdom is not irrelevant, nor can it alone produce much more than an automation — a robot, lacking that all important ingredient to success: initiative.

It follows then, that in battle the test of proficiency in tactics can (and is) measured by success or failure to accomplish the mission and achieve victory. However, evaluation of tactical competence and proficiency in an academic environment is not nearly as simple, nor is it quite as final and, where failure is concerned, not quite as devastating.

Academically, an examination is administered that is graded objectively (true-false, multiple choice, etc.) or subjectively (essay). The grade awarded is a percentage of questions answered correctly, which in turn reflects the student's ability to commit to memory a set of core principles. Subjectively graded tests are not really much more complex. Only if the student clearly violates a tactical principle can the instructor/evaluator award an "unsatisfactory" observation or evaluation report. If, on the other hand, the instructor merely disagrees with the particular course of action chosen by

the student, because it "might" have been done "better" this way or that, then a subjective discourse becomes unavoidable. Moreover, if the student/tactician intuitively did things differently from what he "should" have done (in the opinion of his evaluator), but without having violated a core tactical principle, then it cannot rationally or logically be argued that the student was necessarily wrong.

Thus, the idea and the requirement to identify and train first-class tacticians is, at once, a most noble and worthwhile endeavor *and* one frought with difficulties of application in reality; nevertheless, we must drive forward with deliberation and implementation. Indeed, the Tactics, Combined Arms and Doctrine Department (TCADD) of USAFAS is even now giving substance to this idea by implementing phases of such an evaluation program, together with a set of reporting provisions and proposals for recognition awards for our most brilliant field artillery tacticians. But the real test will come on the battlefield; the final evaluator will be combat; and the ultimate award will be successful accomplishment of the mission that leads to victory.

Charles E. Mehring
MAJ, FA (Ret)
Lawton, OK

Hotline

QUESTIONS AND ANSWERS

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

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

Question: Where can we get a towed howitzer or any piece of field artillery equipment, preferably 155-mm, to display at our armory? Who are the points of contact?

Answer: *Possible sources of information on how to obtain display materiel are:*

Dr. Norman Carey
Office of the Center of Military History
20 Massachusetts Ave., NW
Pulaski Bldg., Room 4136
Washington D.C. 20314
or
Mr. Joseph P. Casadei
Headquarters
US Army Armament Materiel
Readiness Command
Sales and Donations Office
Rock Island, IL 61299

Additionally, the Center of Military History is compiling a list of organizations for eventual distribution of M1 155-mm guns, known as Long Toms. The Armament Materiel Readiness Command maintains a waiting list, and weapons are issued as they become available.

Question: Should the spades on the M109 be up or down during the conduct of "hip shoots" if only one mission is to be fired?

Answer: *There are no spade requirements for the conduct of hip shoots.*

Question: How many Lance and Honest John units are on active duty and how many of those are deployed in USAREUR?

Answer: *The breakdown is as follows:*

- ***US Lance Battalions:***
  - *II Corps Artillery, CONUS ..... 2 battalions*
  - *V Corps, USAREUR ..... 3 battalions*
  - *VII Corps, USAREUR ..... 3 battalions*
- ***NATO Lance Battalions:***
  - *Federal Republic of Germany ..... 3 battalions*
  - *Great Britain ..... 1 battalion*
  - *Italy ..... 1 battalion*
  - *Netherlands ..... 1 battalion*
  - *Belgium ..... 1 battalion*
- ***Other Allies:***
  - *Israel ..... 1 battalion*
- ***US Honest John Detachments:***
  - *Turkey ..... 4 detachments*
  - *Greece ..... 6 detachments*
- ***Republic of Korea Honest John Battalions:***
  - *Korea ..... 3 battalions*

Question: What is the correct method for transferring muzzle velocity variations (MVV) across charges? Also, is there a reference note on it?

Answer: *Recent studies conducted by the School's Gunnery Department indicated that MVVs for a charge of a given powder lot are transferrable to other charges within the same powder lot. An information note, currently being written to more fully explain the theory and procedures, should be ready for distribution this month (September 1982).*

Question: What field manuals for artillery doctrine specify the use of operations codes when a unit does not have speech security equipment? AR 530-2 and AR 380-51 require protection of classified information by manual code when speech security equipment is not available. Also, DA Pam 380-150 covers how to identify and request proper codes through COMSEC account channels, but what about the use of operations codes, particularly in the case of a nuclear-capable unit that does not have speech equipment?

Answer: *You are correct in that various field manuals for artillery doctrine do not specifically state to use operations codes in lieu of speech secure equipment. The G3/S3 has the responsibility for determining what type of traffic is considered sensitive and how this traffic is to be protected from unauthorized disclosure as referenced in FM 6-20-2, page 8-4. FM 6-20-2, FM 32-6, and AR 380-51 may be helpful in determining what information should be considered sensitive and requires encryption by whatever means available.*

Question: In my battalion (155-mm, SP), our FADACs are programmed with the Revision 5 tape. Is there a revision that covers the dual-purpose improved conventional munitions (ICM)?

Answer: *The dual-purpose ICM projectile is on the Revision 5A FADAC tape (NSN 1290-01-06-0396) for the M109A1 howitzer. It is also on the soon to be released Revision 6/6A FADAC tape (NSN 1290-01-068-0367) which is a free issue. To insure that your unit is on the mailing list for Revision 6, call ARCOM headquarters at Rock Island, IL (AV 793-6776/5631).*

Operational Testing of New Field Artillery Systems

by LTC(P) B. H. Ellis and LTC R. F. Bell

From January 1982 to April 1983, four new field artillery systems—The Battery Computer System (BCS), the fire support team vehicle (FISTV), the Multiple Launch Rocket System (MLRS), and Pershing II (PII)—have or will be undergoing operational testing (OT). Operational testing provides data to estimate the operational effectiveness and suitability of new weapons systems to support the Materiel Acquisition Process (MAP). The agency responsible for all Army operational testing is the US Army Operational Test and Evaluation Agency (OTEA). With this unusually large amount of operational testing of FA Systems in a relatively short period, it is important that field artillerymen be informed about operational testing in general, OTEA, and the operational test for BCS, FISTV, MLRS and PII.

Operational testing

The Army, of course, does not want to field weapons systems that may be technically functional, but not capable of operation by soldiers in peacetime or combat environments. The best way to preclude such a situation is to test new weapons systems operated by typical user operators, crews, or units in as realistic an operational environment as possible. This is operational testing.

Operational testing supports the Army's materiel acquisition process by providing information to assist decision makers at the major decision milestones during the acquisition process. Issues to be resolved by operational testing are provided to the testers by the combat developer, US Army Training and Doctrine Command (TRADOC). Based on OT issues and a weapons system's required operational capability, an independent evaluation plan is developed. From the evaluation plan, a test is designed to obtain data on system performance in a realistic operational environment. Operational tests are normally conducted in at least three phases:

•A phase to evaluate training.

•A phase to ascertain that correct data collection procedures and organization have been established.

•A field exercise phase—the heart of any operational test—in which the majority of the data is collected.

After the test is completed, a test report is written by the field testers that states the factual results of the test but draws no conclusions. Using data from the test report and from many other sources available on the tested system, the evaluator writes an Independent Evaluation Report (IER) that presents his conclusions to the acquisition decision-making body on the system's performance during the test. If all of the operational test issues are not resolved during a test due to limitations of tested item, the test support package, or the test conduct, then further testing on the new system may be recommended.

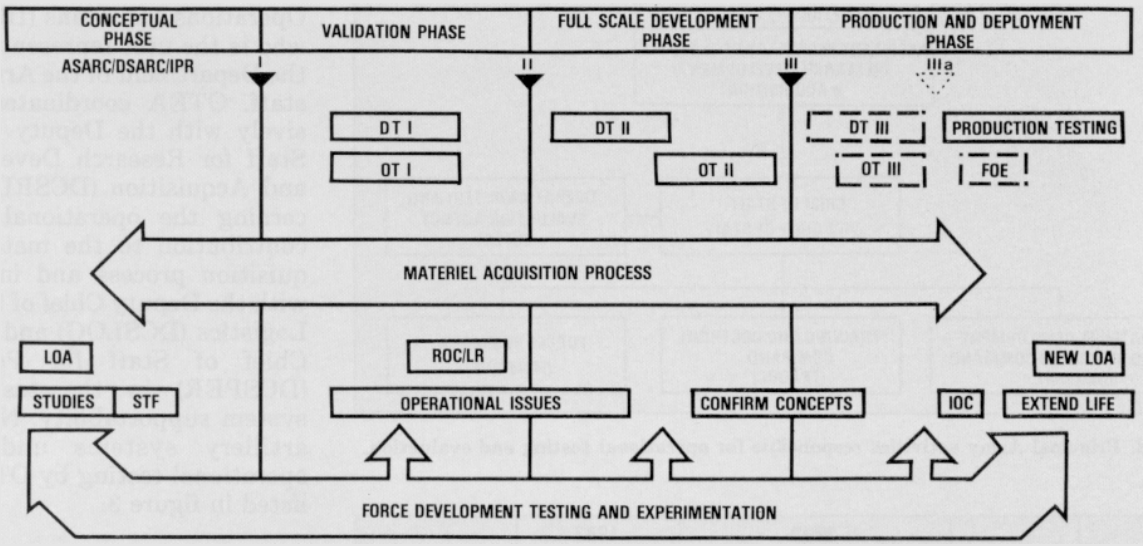
Operational tests are designated OT I, OT II, OT III or Follow-on Evaluation (FOE) according to how they support specific decision milestones, as shown in figure 1.

OT I is conducted during the demonstration and validation phase of early prototype systems to provide an indication of system potential, identify early operational problems, assist in planning later OTs, and gain insights.

OT II is usually the most intensive and important operational test, with the results directly influencing what is perhaps the single most important checkpoint in the acquisition process—Milestone III. This decision review must decide whether or not to enter the system into production and deployment. If significant deficiencies exist in either the hardware or the system support package, the decision may be made to correct the deficiencies and conduct a re-test at OT IIA. However, if the decision at Milestone III is to move ahead to a production and deployment decision, several options are available, such as:

•To go into full production with no further testing.

•To conduct follow-on testing on the production items. This would then require that follow-on evaluation be conducted.



ASARC .....ARMY SYSTEMS ACQUISITION REVIEW COUNCIL
DSARC .....DEFENSE SYSTEMS ACQUISITION REVIEW COUNCIL
DT .....DEVELOPMENT TESTING
FOE.....FOLLOW ON EVALUATION (AS REQUIRED)
IPR.....IN-PROCESS REVIEW
IOC.....INITIAL OPERATIONAL CAPABILITY FDTE
LOA ..... LETTER OF AGREEMENT
LR..... LETTER REQUIREMENT
OT..... OPERATIONAL TESTING
ROC..... REQUIRED OPERATIONAL CAPABILITY
STF..... SPECIAL TASK FORCE

Figure 1. Materiel Acquisition Process (MAP).

In unusual circumstances, the decision may be for limited production items and conduct of an OT III. If operational issues remain unanswered after a production decision, the decision review may direct that the operational tester conduct an OT III or FOE, as appropriate. An OT III or FOE, which is conducted on production line items, addresses any unresolved issues and provides information not gained in an earlier OT.

New materiel systems requiring operational testing are designated either as major or non-major. Major systems, such as the Pershing II and MLRS, are intensively managed at DA or DOD level and hence require action by an Army Systems Acquisition Review Council (ASARC)/Defense Systems Acquisition Review Council (DSARC). Major systems, as a minimum, include those systems which involve over $200 million in research, development, test, and evaluation (RDT&E) funds or over $1 billion in procurement funds. The US Army Test and Evaluation Agency (OTEA) is responsible for operational testing of all major systems.

Systems which do not meet the requirements for designation as major are designated non-major systems and divided into four categories for operational test management. Category 1 non-major systems, such as FISTV, are systems which have high level interest and, therefore, are intensively managed by OTEA. These systems normally have RDT&E costs of less than $150 million or procurement costs of less than $600 million. OTEA also conducts operational testing for Category 1 non-major systems.

Operational testing for Categories 2, 3, and 4 non-major systems is conducted by other designated operational testers, such as the US Army Training and Doctrine Command's (TRADOC) Field Artillery Board. An example of these systems would be the M110A2 Crew Ballistic Shield and Field Artillery Ammunition Support Vehicle (FAASV). Although OTEA does not conduct the OT for Categories 2, 3, and 4 non-major systems, OTEA actively monitors these systems. Force development testing and experimentation (FDTE) is conducted primarily by the combat developer to evaluate new concepts of tactics, doctrine, organization, and materiel. Major FDTEs are tests which have the potential to impact significantly on doctrine, organization, or tactics of the Army and therefore become subject to intensive management by OTEA.

OTEA

The US Army Operational Test and Evaluation Agency was organized in September 1972 when the Secretary of Defense directed that all services form independent operational test and evaluation organizations.

The mission of OTEA is to support the Army's materiel acquisition and force development processes by exercising responsibility for all operational testing, FDTE, and joint user testing for the Army.

The US Army Test and Evaluation Agency, located in Falls Church, VA, is the Army's primary field operational testing and evaluation agency (figure 2). The commander reports to the Army Chief of Staff through the Vice Chief of Staff. OTEA has a close working relationship with

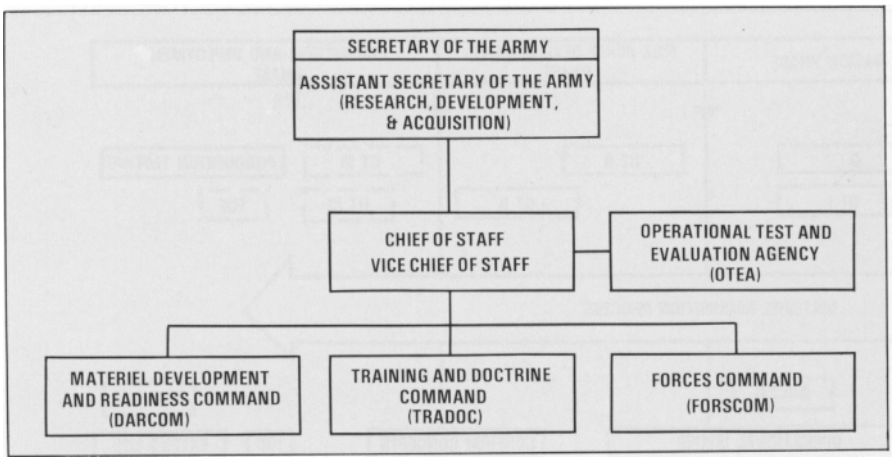


Figure 2. Principal Army activities responsible for operational testing and evaluation.

System	Category	1982 J F M A M J J A S O N D	1983 J F M A M J	Location
BCS	C1	FOE		Fort Hood, TX
Pershing II	Major	OA		Orlando, FL
FISTV	C1	OT II		Fort Sill, OK
MLRS	Major	OT III		Fort Bliss, TX
Pershing II	Major		OT III	Fort Sill, OK

Figure 3. The 1982-83 operational test schedule for new field artillery systems.

the Deputy Chief of Staff for Operations and Plans (DCSOPS), who is the user representative on the Department of the Army (DA) staff. OTEA coordinates extensively with the Deputy Chief of Staff for Research Development and Acquisition (DCSRDA) concerning the operational testers contribution to the materiel acquisition process and interfaces with the Deputy Chief of Staff for Logistics (DCSLOG) and Deputy Chief of Staff for Personnel (DCSPER) in the testing of system supportability. New field artillery systems undergoing operational testing by OTEA are listed in figure 3.

Battery Computer System

The Battery Computer System (BCS) (figure 4) is required by the Field Artillery for two applications. First, it is intended to replace the M18 Field Artillery Digital Computer (FADAC) both at cannon battery level and in

Figure 4. Battery Computer System.

units not planned to be equipped with TACFIRE. Second, the BCS is also intended to replace the Battery Display Units (BDU) in TACFIRE to satisfy artillery requirements for independent battery operations, individual gun corrections, and direct battery to fire support team (FIST) and forward observer (FO) data links.

The BCS is planned to be used with the Battery Computer Unit mounted in the current M561 Gamma Goat or the M577 command post vehicle. The BCS is expected to interoperate with TACFIRE, the Meteorological Data System (MDS), FIST Digital Message Device (DMD), and Firefinder.

The BCS Follow-on Evaluation (FOE) was conducted at Fort Hood, TX, during January to March 1982, by elements of the 1st Cavalry (1-21st FA and 1-82d FA) and 101st Airborne (B/2-230th FA) Division Artilleries. The purpose of the FOE was to provide data and associated analysis on the operational effectiveness and suitability of the system. The BCS met all test objectives and was recommended for further production. The production decision was made in May 1982 to furnish enough BCSs to outfit the entire Army.

Pershing II

The Pershing II (figure 5) is a two-stage, solid-propellant, surface-to-surface weapon capable of engaging targets with an air burst/surface burst nuclear warhead. The Pershing II missiles consist of a reentry vehicle and two new propulsion sections. The additional propulsion section (second stage) provides additional range. A Pershing Ib will consist of the new reentry vehicle and only the first stage propulsion section. The PII forward area ground support equipment, which provides command and control to the firing platoons and the equipment required to launch a missile, consists of the following: a modified Pershing Ia erector-launcher, a M.A.N. 10-ton tractor/crane, a platoon control central, and a reference scene generation facility.

A Pershing II Operational Assessment (PII OA) was conducted at Orlando, FL, during July and August 1982. Troop support for this test was provided by the 3d Battalion (Pershing) 9th Field Artillery, from Fort Sill, OK. The purpose of the Operational Assessment was to provide information early in the development cycle on the operational effectiveness and suitability of the Pershing II system to support an October 1982 ASARC II. Reports for this test are presently being prepared for presentation to the Army Systems Acquisition Review Council. An operational assessment normally is not used as a method for the field testing of a system; however, the decision was made to examine selected operational criteria in order to have an earlier look at the system. An Operational Test III is scheduled for the March to April 1983 time frame. Testing during OT III will be conducted at Fort Sill, OK, and troop support will once again be provided by the 3-9th FA. OTEA will also monitor missile findings conducted during development tests.

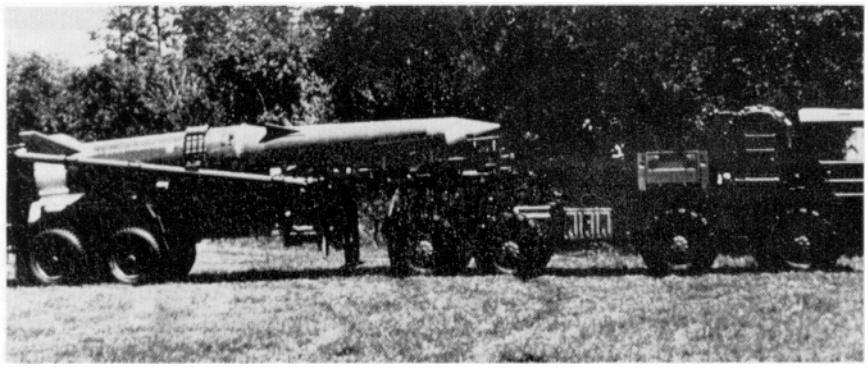


Figure 5. Pershing II.

Fire support team vehicle

The XM981 fire support team vehicle (FISTV) is a standard M113A2 armored personnel carrier which utilizes external fuel tanks and a modified M901 improved TOW vehicle (ITV) weapon station. The ITV weapon station has been modified to place the Ground/Vehicular Laser Locator Designator (G/VLLD), TOW night sight (AN/TAS-4) and a North Seeking Gyrocompass (NSG) under armor (figure 6).

The FISTV is intended to fulfill a need for a system that will allow the fire support team (FIST) to be compatible in mobility and protection with the mechanized infantry, armor, and armored cavalry units being supported.

Operational Test II for the FISTV will be conducted in three phases at Fort Sill, OK, during the period 15 September to 10 December 1982.

Phase I will be concerned with individual and collective training. Phase II will be a pilot test, designed to test and refine plans for data collection and scenario control. Phase III will be a series of field exercises to evaluate the operational effectiveness and suitability of the FISTV system.

Major troop support elements for this test will be provided by FORSCOM and TRADOC (Fort Sill). A production decision will be made for this system in March 1983.

Multiple Launch Rocket System

The Multiple Launch Rocket System (MLRS) is designed to supplement cannon artillery weapons available to US division and corps commanders for the delivery of large quantities of firepower in a very short time against critical, time sensitive targets. The MLRS (figure 7) includes four major elements:

- Self-propelled launcher/loader.
- Launch pod/container.
- Resupply vehicle and resupply trailer.
- Command, control, and communications system. The command, control, and communication system associated with the

MLRS consists of the on-board fire control system, a digital message device, and the fire direction system in MLRS battery and battalion fire direction centers.

Operational Test III (OT III) for the MLRS is being conducted in four phases:

•Phase I addresses individual and collective training. The individual training portion of Phase I was accomplished at Fort Sill, OK, during April and May 1982. The collective training portion of Phase I will be accomplished in early October 1982.

•Phase II will be a pilot test to evaluate and refine the plans for data collection and scenario control.

•Phase III will be two 12-day field exercises in which the MLRS unit will conduct tactical operations in a free maneuver environment, to include live and non-live fire missions and resupply operations. This phase is designed to provide data and associated analysis of the operational effectiveness and suitability of the MLRS.

•Phase IV will be a combined Development Test/Operational Test firing of a select number of MLRS rockets.

MLRS accuracy and target effects data will be collected during phases III and IV by the Test and Evaluation Command (TECOM) and OTEA for evaluation.

During OT III, the Army's Initial Operational Capability (IOC) unit, designated as D battery, 3d Battalion, 6th Field Artillery, will be used. This unit was formed and trained at Fort Riley, KS. Additional operational, logistical, and administrative support will be provided by elements of the 2d Battalion, 18th Field Artillery, and the Field Artillery Training Center at Fort Sill, OK. The MLRS OT III will also take on an international flavor in that the US battery will be augmented with a West German and a United Kingdom crew. The MLRS ASARC is scheduled for February 1983.

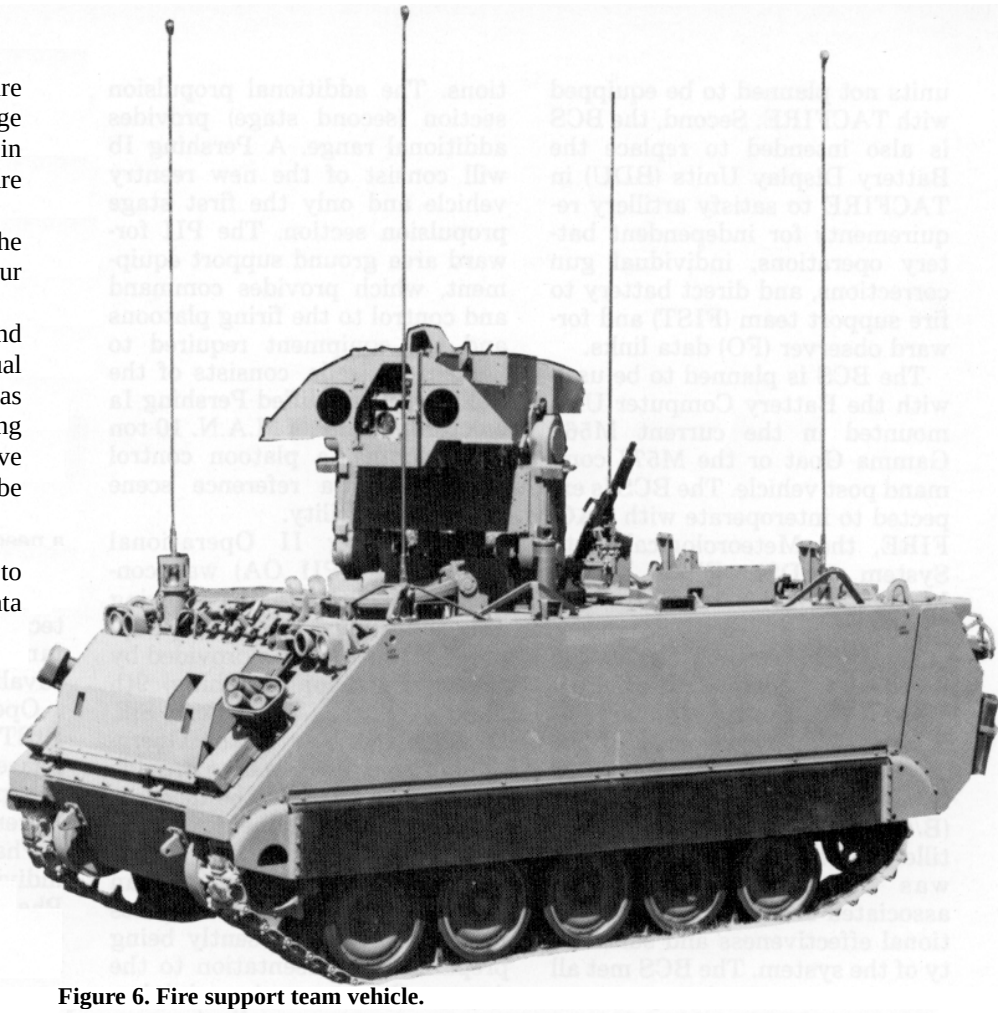


Figure 6. Fire support team vehicle.

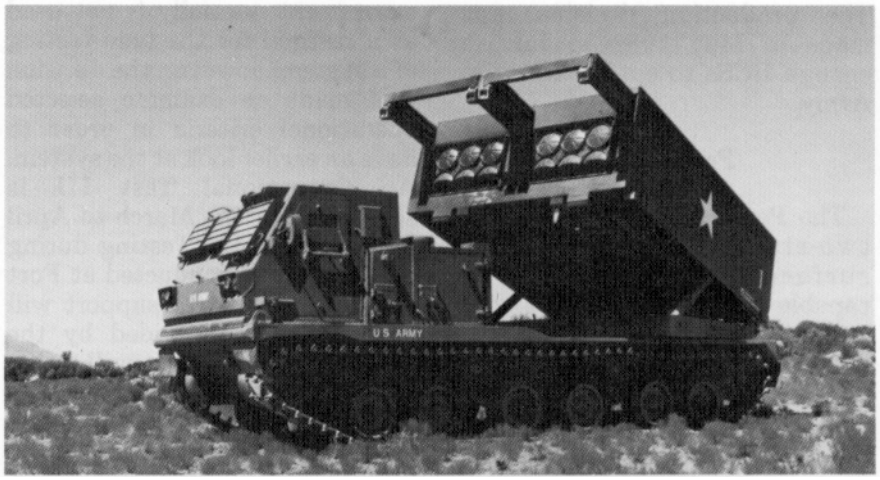


Figure 7. Multiple Launch Rocket System.

Summary

The four new field artillery systems undergoing operational testing in 1982 and 1983 will add significant firepower capability to the US Army. OTEA is proud to support this effort to get the best equipment possible in the hands of our fine soldiers.

LTC(P) B. H. Ellis, is the Test Manager, Field Artillery Systems, US Army Operational Test and Evaluation Agency (OTEA) and LTC R. F. Bell is the Assistant Test Manager, Field Artillery Systems, OTEA.

The Field Artillery Board

by CPT Donald R. Klinger

The history of the United States Army Field Artillery Board, by necessity, closely parallels that of the United States Army.

During the Revolutionary War and early history of the United States Army, the Artillery together with the Engineers and Ordnance were combined into one arm. This arm functioned under the Commander of Artillery, who was BG Henry Knox, the first Chief of Artillery under GEN George Washington. In 1776, General Knox recommended to Congress "That all matters respecting artillery and artillery stores be under the direction of a Board of Ordnance whose business shall be the regulation and management of the affairs of this Department and to whom returns shall be made." Although this was, in effect, the first Artillery Board of the United States Army, it ceased to be active, and no permanent board existed after the close of the Revolutionary War.

During the Civil War, the importance of artillery was again demonstrated on the battlefield and, to give permanent representation to this arm of service at the War Department, the Artillery Board of 1866 was formed. This Board was directed to prepare and submit a study for an artillery school and a study on artillery instruction at Army posts. The result of the recommendation of the Board was the organization of the present Artillery School. In the fall of 1866, however, the Board itself adjourned and was never reassembled; consequently, there are no records of proceedings from that date until the year 1900.

On 28 April 1900, Headquarters of the Army directed that the Commandant of the Artillery School, together with the heads of several departments, constitute a board of artillery to which the Commanding General of the Army might refer for opinions and recommendations on matters pertaining to the artillery.

Board established

In 1902 the Field Artillery Board was established to deal solely with field artillery matters. Headquarters of the Army, Washington, DC, 25 June 1902, specified that, "The Commanding Officer of the Battalion of Field Artillery and the Captains of the Batteries of Field Artillery stationed at that post (Fort Riley, KS) shall constitute a board to be known as 'The Field Artillery Board' to which may be referred from time to time all subjects concerning the operations of artillery in the field upon which the Commanding General of the Army may desire its opinion and recommendations."

The present United States Army Field Artillery Board is the lineal descendant of the Field Artillery Board organized at Fort Riley, KS, in 1902. As time went on, the work of the Field Artillery Board, the oldest test agency of its kind, proved to be so useful that the other branches of the Army established similar organizations.

Mission

The mission initially assigned to the Board in 1902 was to consider questions concerning artillery in the field referred to it by the Commanding General of the Army and make recommendations. Examination of old Board records reveals that much of the early work of the Board was similar to that performed today; i.e., the testing and evaluation of new equipment. In addition, the Board had the sole responsibility, until 1911, for field artillery doctrine, tactics, and techniques. Thus, the problem considered by the Board at its first meeting, 4 August 1902, under the President, COL George B. Rodney, dealt with "Examination of Gunner," a test to examine and classify gunners of field artillery.

The early Board also considered problems of organization and equipment. On 11 February 1904, the Board recommended that the strength of the horse battery be

designated as 157 officers and men, 202 horses, and two musicians. The Board also recommended that enlisted men discard sabres during field exercises. In the summer of 1904, the Board tested the Forbes rangefinder, the Luger automatic pistol, submitted a recommendation for an artillery gunnery badge, compiled a list of textbooks to be used for field artillery instruction, and prescribed standard equipment to be maintained by the battery.

The Field Artillery Board, which had operated at Fort Riley from 1902 was moved in 1913 to Fort Sill, where the Artillery School of Fire had been founded two years earlier. The Board continued to function at Fort Sill until 1916 when its members, together with all other field artillery officers then stationed at Fort Sill, were dispatched to the Mexican Border to pursue Pancho Villa. A Lieutenant of Infantry maintained the records of the Board from 1916 until it was reconstituted at Fort Sill in 1918.

A list of membership of the Field Artillery Board during its early years reads similar to "A Who's Who of the Field Artillery." Some of its early illustrious members were Peyton C. March, Dan T. Moore, William Lassiter, William J. Snow, W. S. McNair, Ernest Hinds, Fox Conner, Harry Bishop, and Augustine McIntyre.

In July 1922, the Field Artillery Board was moved to Camp Bragg, NC by the Chief of Field Artillery, MG W. J. Snow. General Snow desired that the Board be near his office in Washington as well as the manufacturing centers which were concentrated in the East. Also, Camp Bragg appeared to offer more suitable terrain to test equipment and more adequate facilities for firing long-range weapons.

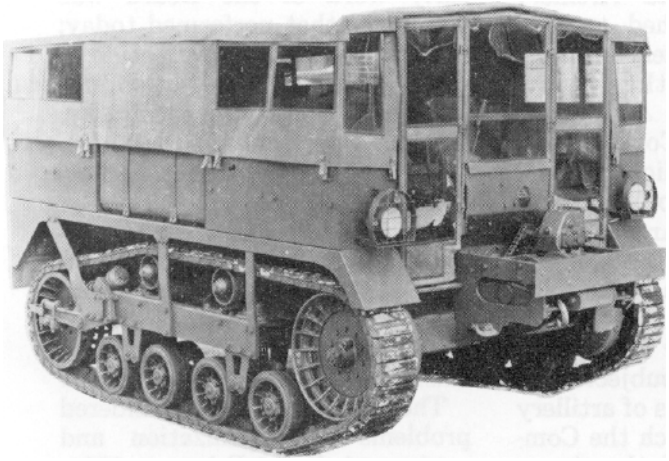
At Camp Bragg, the operations of the Board continued along lines similar to those of its predecessors. Its functions were to test and improve existing equipment and techniques and to develop and design new materiel as the occasion demanded. Reflecting the transition of military equipment during these years, in 1925, the Board tested pack saddles, removable horseshoes, a 2½-ton tractor, and a cross-country Ford.

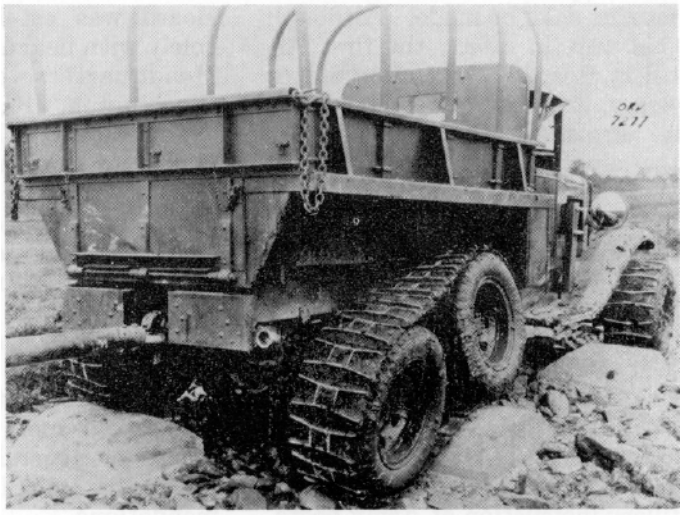
Permanent quarters were built for the Field Artillery Board at Fort Bragg in 1933 while under the presidency of Colonel McIntyre. There was no formal division of the Board into sections at this time; however, activities were carried on by subdivisions—gunnery, guns and carriages, motors, instruments, survey, communications peculiar to field artillery, and administration. Among its projects during 1938, the Board tested several models of the 105-mm howitzer, a new 75-mm gun carriage, five models of trucks, five models of tractors, and one passenger car. During this period, a much publicized test of syrup pitchers, aluminum and glass, was carried to a triumphant conclusion—aluminum winning.

During World War II, the Board kept abreast of actual battlefield performance of materiel by maintaining observers on all fronts. It was also in close contact with the other branches of the service and with civilian agencies. The Board performed its mission without major changes in its makeup or duties until 1945.

Projects completed during World War II included a 3-inch antitank gun and ammunition, plastic canteens, a command post truck, modifications on the 105-mm howitzer, a 155-mm gun, a 4.2-inch mortar, graphical firing tables, a gunner's quadrant, a fuze wrench, and improved smoke and chemical shells.

On 1 October 1945, the Field Artillery Board was integrated into a system of Army Ground Forces Boards. Each of four Boards was charged with the testing of related items of equipment rather than the equipment peculiar to one arm. The Army Ground Forces Board No. 1, the largest of the established Boards, was headed by BG Guy O. Kurtz. In addition to a Field Artillery Service Test Section, this board included test sections concerned with seacoast artillery, communications and electronics, Army aviation, and airborne





The high speed Cleveland tractor (above) and the light prime mover T-9 (right) underwent rigorous testing by the Field Artillery Board.

Evaluation of protective clothing for rocket fuel personnel.

testing. (It is noteworthy that, because of the seniority of the Field Artillery Board, any Board into which it is integrated has been known as Board No. 1.

Primary emphasis was placed on the evaluation of problems that occurred during World War II. Among the Board's early projects was the development of more complete and accurate meteorological data to use for artillery firing. In the fall of 1946, the Board began its first intensive testing of equipment during winter in operation "FRIGID" in Alaska. This was followed by operation "FURNACE" in the spring of 1947 to observe equipment under desert conditions.

On 1 March 1946, Headquarters, Army Ground Forces Board No. 1, was informed that the Field Artillery Service Test Section had been awarded the Meritorious Service Unit Plaque for outstanding accomplishments. The citation read ". . . Personnel of the Field Artillery Service Test Section, Army Ground Forces Board No. 1, studied, tested, and developed

An 8-inch howitzer on a GMC chassis being test fired (top). Corporal missile on erector launcher (middle). Current testing of the M110A2 crew ballistic shield (bottom).

many novel types of artillery materiel including rockets and towed and self-propelled weapons. The high standard of discipline maintained and the devotion to duty evidenced by the personnel of this test section reflect most creditably upon command."

The next major event occurring in the history of the Field Artillery Board took place in 1954. In June of that year, the Board, then known as the Field Artillery Service Test Division, was moved to Fort Sill as Board No. 1, Office, Chief of Army Field Forces. The purpose of this move was to facilitate coordination and interchange of ideas and information between the Board and the Artillery School.

On 1 February 1955, the Army Field Forces was redesignated US Continental Army Command (USCONARC) while the Board retained the title, Board No. 1. The Board assumed the name, "US Army Artillery Board," on 1 January 1956.

The Field Artillery Missile Division, stationed at Fort Bliss, TX, was added to Board No. 1 in the fall of 1956. The mission of this division was to test and evaluate field artillery guided missiles (surface-to-surface) and rockets. The Materiel and Gunnery Divisions remained at Fort Sill. The Materiel Division, which was concerned with field artillery howitzers, guns, vehicles, and ammunition, sought greater mobility for artillery weapons, greater range, increased reliability, and reduced complexity. The Gunnery Division handled all artillery supporting equipment including such areas as meteorology, radar, sound and flash ranging, survey, fire direction, and artillery communication.

By virtue of the Army's reorganization on 1 August 1962, the Board was transferred from USCONARC to Headquarters, US Army Test and Evaluation Command (TECOM), and the Missile Division was moved from Fort Bliss to Fort Sill. On 5 February 1968, the Board was reorganized to better accomplish its mission of testing and reduce the span of control. All of the former test divisions were placed in a Test Directorate and the support functions, to include the shops of the former test divisions and the Property Division, were combined into a Test Support Directorate. This organization enabled the Board to accomplish its assigned test and evaluation mission in a more orderly, efficient, and effective manner under a system of centralized control and decentralized operations.

On 1 March 1969, the Board was redesignated "US Army Field Artillery Board," and a separate TACFIRE Test Branch was formed from the Fire Direction Control Section for the purpose of conducting service tests of the TACFIRE system. In March 1973, while still under the command of the US Army Test and Evaluation Command, the mission of the Board changed from service testing (ST) to development testing (DT) and operational testing (OT). Development testing included engineering testing and that part of service testing which assesses operability and maintainability of the system by the prospective user. Operational testing was conducted by user troops or individuals, preferably in units, to determine if the system is operationally suitable from a doctrinal, organizational, and tactical point of view and to collect performance and reliability, availability, and maintainability (RAM) data for the equipment when in the hands of troops. The TACFIRE Support Detachment (Provisional) was organized and assigned to the US Army Field Artillery Center and Fort Sill, effective 20 September 1973, and was attached to the US Army Field Artillery Board. Its mission was to provide tactical operations and logistical support to the US Army Field Artillery Board in the conduct of the tests of the TACFIRE system. The TACFIRE Support Detachment (Provisional) was discontinued effective 30 May 1974.

In November 1974, early testing of the TACFIRE system was completed, so the TACFIRE Test Branch was dissolved, and the personnel were transferred to the US Army Field Artillery School Brigade or White Sands Missile Range, NM.

The most significant testing underway in 1974 was that of the M110E2 howitzer system. Other items tested were:

•A cargo carrier which was driven 4,000 miles and taken for an hour-long swim.

•A computer for fire direction control.

•New protective circuits for the Lance nuclear warhead fuze.

•A new meteorological system to replace the one in use since the 1950s.

•A flash detector which, through electroptics, enables the observer to detect enemy weapons by locating the flash when fired.

•A mobile radar set to locate enemy weapons.

US Army Training and Doctrine Command, General Order No. 359, dated 27 June 1975, reorganized and reassigned the US Army Field Artillery Board to the US Army Field Artillery Center and Fort sill, effective 1 July 1975, as a major subordinate command. The formal tasking and test priority scheduling for the US Army Field Artillery Board became the responsibility of Headquarters, US Army Training and Doctrine Command. The mission of the Board changed from development testing to primarily operational testing and force development testing and experimentation. The change helped to assure independent user testing and evaluation of equipment before the final decision to buy was made.

Current mission

Today, the Board has an assigned mission to plan, conduct, and report on Operational Tests (OT), Force Development Test and Experimentation (FDTE), Concept Evaluation Plans (CEP), Follow-On Evaluations (FOE), and other directed tests of field artillery systems and associated equipment; to do this, it is authorized 152 military and 37 civilian personnel organized into command,

operations, test, and test support divisions (figure 1). The Office of the President provides overall management of all board activities in addition to normal command and administrative actions. The Plans and Policy Office functions as the Board's Operations Center, coordinating with outside agencies, screening test documentation, and performing long range planning. Headquarters Battery provides billeting, mess, personnel, and training support for assigned and attached personnel.

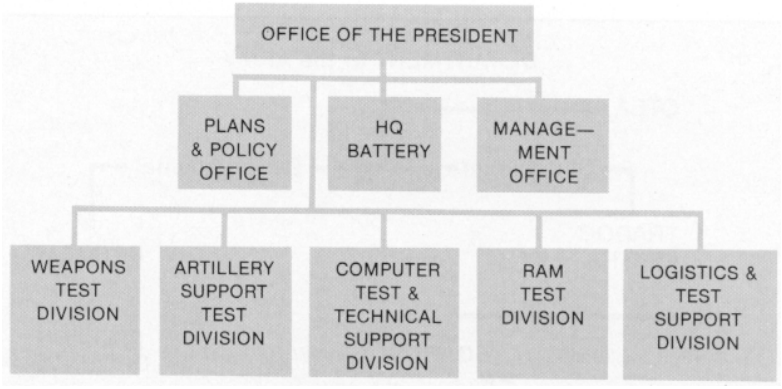


Figure 1. Organization of the USAFABD.

Testing is conducted by one or more of four test divisions which are responsible for the planning, conduct, and reporting of testing for each system assigned to the Board for test. Artillery weapons, vehicles, projectiles, and associated training devices are tested by the Weapons Test Division. Artillery-related systems such as tactical computers, radar, survey, flash, and meteorological equipment are tested by the Artillery Support Test Division. The Computer Test and Technical Support Division tests field artillery tactical data systems software and provides computer and analytical support to the Board. In addition, this division provides computer and methodology support to the rest of the Board. The fourth test division, the Reliability, Availability, and Maintainability Test Division, is the most hardware-oriented division. Their personnel are normally attached to another test division for each project and key on system reliability, maintainability, and logistics supportability.

The Management Division and the Logistics and Test Support Division provide support for testing and all required housekeeping functions. The Management Division is responsible for budgetary support and fiscal monitoring of test projects. They also provide TDY arrangements and other management functions in support of overall Board activities. The Logistics and Test Support Division manages the Board logistics and organic test support, to include meteorological, flash, survey, calibration graphics, and photographic sections; in other words, this section is the Board's point of contact for the coordination of outside support such as equipment and personnel required in support of testing.

The Board performs its mission during a relatively short but critical period in the material acquisition process. The US Army research and development cycle requires that all systems under development be tested before critical decisions are made i.e., continue development, redesign, or terminate concept. Currently, a series of developmental tests and operational tests are required prior to acceptance or purchase of any developmental system. In order to meet these testing requirements, the Army has tasked certain commands and agencies to conduct specific types of testing. Developmental testing—the testing of material systems to determine if technical specifications have been met—is the responsibility of the Material Development and Readiness Command (DARCOM) and is normally conducted in the factory or at one of the many US Army Proving Grounds. The Operational Test and Evaluation Agency (OTEA) has responsibility for operational testing for the Army. Operational testing as defined in Army Regulation 71-3 and TRADOC Regulation 71-9 is ". . . testing and evaluation of materiel systems . . . accomplished with typical user operators, crews, or units in as realistic an operational environment as possible . . . ." Operational tests provide data to evaluate the operational effectiveness and suitability of the new system, to include the adequacy of doctrine, tactics, and logistical supportability of the system. Operational tests of most non-major systems (low cost, low risk and/or non-controversial) are delegated to the Training and Doctrine Command (TRADOC). To help accomplish its testing mission, TRADOC has established eight test boards (figure 2). The Deputy Chief of Staff, Test and Evaluation, TRADOC, assigns missions to the appropriate test organization (e.g., field artillery systems to the FA Board).

Field Artillery Board participation in the operational testing process begins when the Board receives a Letter of Execution from TRADOC, assigning a system for test. Based on equipment or system type, the project is assigned to a test division and to a project officer. Receipt of initial source documents such as the Independent Evaluation Plan (IEP), Required Operational Capabilities (ROC), and Letters of Agreement (LOA), are reviewed and commented upon by the Board as soon as they become available. Test Integration Working Groups (TIWG), including the materiel developer, combat developer, developmental tester, and others, integrate the overall test process and attempt to avoid duplication of testing.

With the basic test management groundwork laid, detailed test planning begins months before the start of the test. Some of the support packages (e.g., how will the equipment be employed,

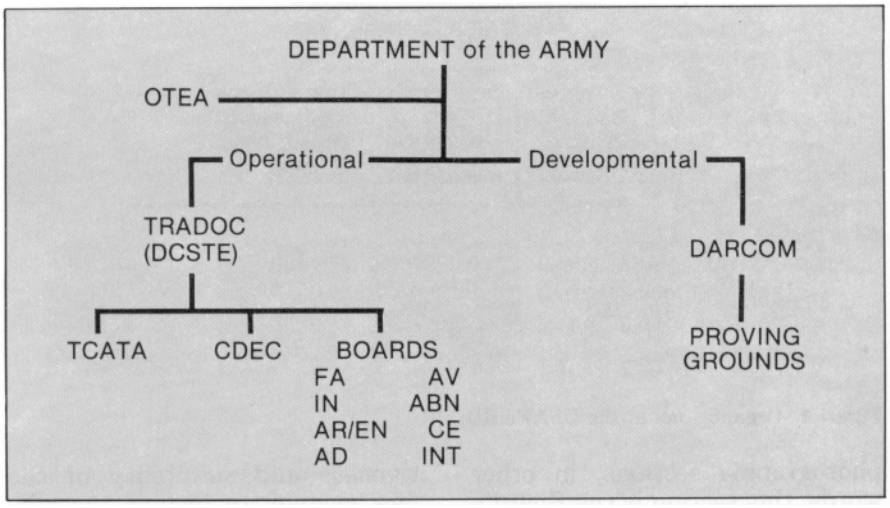


Figure 2. Army test community.

PROJECT	TYPE TEST	TEST DATES
IFPILS (Instrumentation)	Accept	Sep 82
MLRS	FDTE	Aug-Sep 82
155 Screening Smoke XM825	OT II	Jul 82-Aug 82
TACFIRE Tape Val Ver 4	OT II	Jul 82-Aug 82
M110A2 Crew Ballistic Shield	OT II	Jul 82-Sep 82
FIST DMD	FDTE	Aug 82-Sep 82
M578 PIP	FDTE	Aug 82-Nov 82
M110A2 Midlife PIP	Cust	Oct 82-Nov 82
MDS Evaluation	OT II	Nov 82-Feb 83
TACFIRE Tape Version 5	OT II	Dec 83-Feb 84
FIST DMD	OT II	Aug 83-Oct 83
TAB (9th ID/HTTB)	FDTE	Oct 83-Jan 84

Figure 3. Scheduled USAFABD tests.

PROJECT	TYPE TEST	ANTICIPATED TEST START
XM782 ET FUZE	OT I	4th Qtr 82
XM836 SADARM, 8-inch	OT I	1st Qtr 84
FIST FDTE II	FDTE	1st Qtr 84
FAASV FOE	FOE	1st Qtr 84
MLRS MAIT Personnel Eval	FDTE	1st Qtr 84
XM723 155-mm	OT I	4th Qtr 84
8-inch Binary Proj I/V Agt	OT II	1st Qtr 85
155-mm Binary Proj I/V Agt	OT II	1st Qtr 85
TACFIRE/ADLER	FDTE	2d Qtr 85
Sm785 155-mm	OT II	4th Qtr 85

Figure 4. Future USAFABD tests.

maintained, and by whom) may be required at least one year prior to initiation of the test.

The IEP, provided by the combat developer, provides the issues (questions to be answered) and criteria (required system performance level) which must be evaluated. Using the issues, criteria, and applicable regulations as a framework, the test officer determines the required number of systems to test, test duration, and other resource requirements. These requirements are coordinated within the Board and then forwarded to TRADOC as the Outline Test Plan (OTP) for approval and inclusion in the Five Year Test Plan (FYTP). Once approved and published in the FYTP, the OTP becomes a tasking document. Utilizing the resources identified in the approved OTP, the test officer develops a Test Design Plan (TDP) geared to provide the information and data required by the IEP. The test officer must consider appropriate regulations, resources available, sample size, location, and time available when formulating the TDP. The TDP is coordinated with all interested agencies to insure completeness and is approved by DCSTE, TRADOC, or OTEA, as appropriate. At the specified time, test operational support units are identified and given new equipment training, the Test Directorate is formed and trained, and the best is conducted in consonance with the TDP. During and immediately after the test, all facts are compiled, and an analysis of the system's performance in light of the required issues and criteria is conducted. The results are then printed in a Test Report (normally within 60 days of test termination). The report is approved by the Board President for release to the appropriate evaluation agencies.

As a result of the strong efforts made toward Force Modernization during the 1970s, many of the systems developed are now entering operational testing. Already completed during FY82 are the FIST FDTE, M.A.N. Truck User Evaluation, TACFIRE Tape Version 3 Validation, FA Fortifications, and OT II of the Field Artillery Ammunition Support Vehicle (FAASV). Figure 3 shows the tests currently scheduled through October 1983. A small sample of future tests are shown in figure 4. The Field Artillery Board is dedicated to continuing its 80-year tradition of thorough and professional testing of the field artillery systems of the future.

CPT Donald R. Klinger is Chief of the Plans and Policy Office, US Army Field Artillery Board, at Fort Sill.

HELBAT/ACE
Fire Support Control Research Facility

by Barry L. Reichard

This facility will not eliminate the need for live HELBAT field exercises. It can, however, be used to perform time and motion studies of the total artillery fire support system.

During the past decade, the HELBAT (Human Engineering Laboratory Battalion Artillery Test) series of field exercises has provided a fundamental understanding of field artillery fire support system operations, as well as cursory evaluations of promising new materiel and operations concepts. New concepts that were born as a result of HELBAT exercises include:

•Closed-loop fire control technique, wherein unguided area-effects projectiles can be effectively delivered on moving target complexes.

•Battery Computer System (BCS).

•M109-based ammunition resupply vehicle.

•Fire support team (FIST) Digital Message Device (DMD).

•On-board gyro-based fire control.

More importantly, however, HELBAT serves in general as a learning tool in the area of artillery system research and development. The experienced success of HELBAT can largely be accredited to:

•The joint TRADOC-DARCOM management scheme by which HELBAT exercises are planned and executed, wherein an executive committee (EXCOM) provides general direction and a working group does the planning and manages the execution.

•The fact that both baseline and new concepts are studied in a live-fire, total system operations context.

In HELBAT 8 (September-November 1981), the baseline system, against which new concepts are

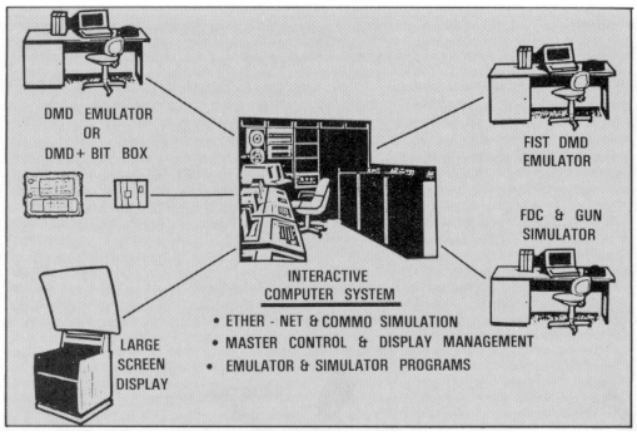


Figure 1. ACE fire support control simulator technology.

compared, was changed from the voice-manual-FADAC system to the newly fielded tactical automatic data processing (ADP) TACFIRE system. Here the major thrust was the demonstration and evaluation of new flexible artillery command and control concepts, designed to permit fuller exploitation of ADP technology. Such concepts were successfully demonstrated but, in the process, so was the true complexity of the artillery fire support control problem area. Total artillery system operations now must include far more than the old-fashioned forward observer/fire direction center/gun components. Even with the smallest integral artillery unit (the battalion), many "Players," radio nets, fire missions, and data messages must be dealt with in real time. Additionally, with the full exploitation of ADP, even the traditional functions of many artillery components may be changed drastically. In other words, HELBAT 8 pointed out a need for intensive, controlled experimentation in artillery fire support control.

While HELBAT 8 was being planned, Ballistic Research Laboratory (BRL) members of the HELBAT Working Group initiated a major work effort that would permit the live play of artillery fire support control functions in a computer-controlled laboratory environment. Through the exploitation of newly developed interactive operating systems (software), a real-time, multiplayer simulator technology (called ACE for Artillery Control Experiment) was conceived. With the ACE concept, components of the fire support control ADP system can be played a number of ways:

•Devices can be emulated on low-cost commercial video computer terminals.

•Devices or functions can be simulated in interactive computer programs.

•Actual tactical equipment, fielded or experimental, can be accommodated through the use of the ACE Bit Box device, which interfaces any equipment employing the TACFIRE message protocol and format to a wide variety of commercial computers on which ACE can run.

A particular ACE setup can be configured with any combination or number of these components as is needed for the desired application or the organization and operation to be played. Those fire support control components that are not actively played and inputs external to the organization structure being studied can be represented by scenario-based, time-ordered TACFIRE messages read into ACE from a centrally controlled magnetic tape or disc memory unit or by a DMD operator with cue cards. ACE components are interconnected by a program called ETHER, which simulates radio nets and characterizes communications from perfect to a selected, degraded probability level of successful data communications for each net. A Master Control and Display Management Program provides for computer control of a particular experiment and permits experimenters to monitor real-time message flow on a large-screen TV or other suitable monitor or printer to instantly extract data, such as decision time for a particular player. A sample ACE setup is depicted in figure 1.

At the March 1982 HELBAT Executive Committee meeting, it was agreed that the ACE and HELBAT activities should be joined to create a research or test bed facility with which a combination of laboratory and field exercises could be run under the joint TRADOC-DARCOM HELBAT management scheme. Further, an Artillery Control Experiment/Command Post Exercise (ACE/CPX) Facility Subcommittee was appointed to provide for near-term, joint guidance in the development of the facility. It will be located in a newly built HEL building and will use ACE software provided by BRL as well as computer hardware and mock-up artillery facilities provided by HEL. Through radio links, laboratory-based exercises can include field elements such as the mobile command post vehicle, howitzer, and ammunition-handling test beds as shown in figure 2.

This facility will not eliminate the need for live HELBAT field exercises. It can, however, be used to perform time and motion studies of the total artillery fire support system and, alternatively, to study selected individual components thereof in a total operations context to identify field data needs and aid in the planning and preparation of efficient HELBAT field exercises. The extreme flexibility of this type of evolving test bed facility is obvious, with a range of applications too broad to cover here. With the development of interactive scenario data bases, for example, active single-thread players, such as a FIST headquarters with only one active forward observer, can be tactically loaded to simulate the actions and reactions of subordinates and higher echelon players, thus eliminating the need for large numbers of personnel. Flexibility is also enhanced by the ability to mix simulated and real (live) players, which can even include a remote player in another part of the country interconnected to the facility via commercial telephone lines. Using an appropriate mix of generic, developmental, and standard artillery equipment, general research areas (such as decision and control theory and operator interface technology) can be studied; also, new hardware,

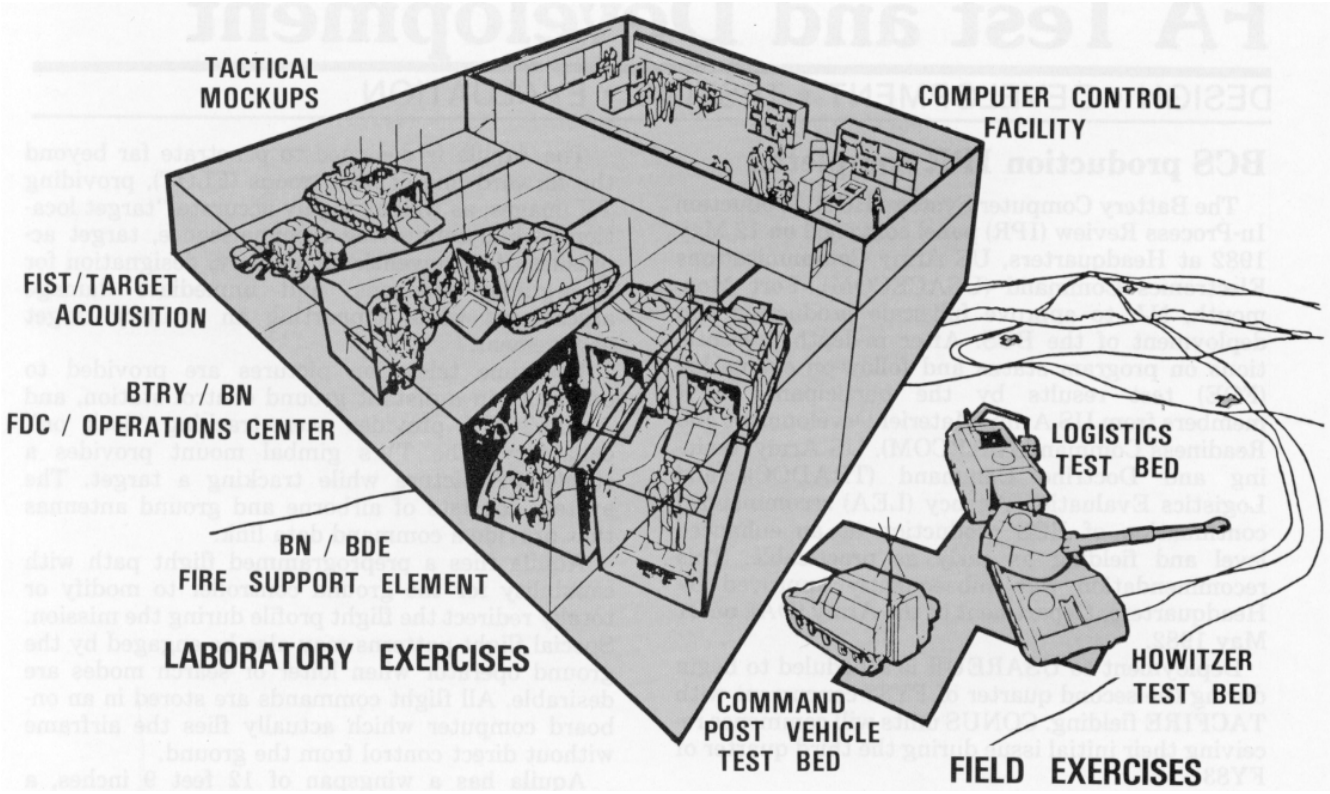


Figure 2. HELBAT/ACE fire support control research facility.

software, and "skinware" technology application concepts from such research can be explored. As a technology in itself, the HELBAT/ACE Research Facility concept could also be utilized and further developed as an automated CPX facility at Fort Sill for field artillery training in the new tactical ADP world. In addition, this CPX facility could be used by the combat developer and trainer to investigate alternative operations and organization concepts. The Field Artillery School is now considering this application.

Specific study exercises to be run in the HELBAT/ACE Research Facility will be planned and executed by the HELBAT Working Group under the general direction of the HELBAT Executive Committee. In the near term, validation experiments are being planned to determine whether operations in the laboratory facility can duplicate selected fire missions accomplished in the field during HELBAT 8. Some of the first actual study exercises will probably include:

•Loading players such as the FIST headquarters and the fire support element (FSE) with a scenario of tactically-derived, time-ordered TACFIRE messages while performing HELBAT 8 fire missions.

•Rerunning HELBAT 8 fire missions with degraded communications.

These exercises will initially be limited, of course, by hardware and software capabilities of the facility. As additional facility components (such as TACFIRE and generic terminals for battalion fire support elements) are developed or acquired, all HELBAT 8 type fire missions can be run in the facility; then a program to add other fire support functions (such as fire support planning) should perhaps be considered. Use of the HELBAT/ACE Research Facility will also be planned in joint laboratory-field exercises to explore field artillery concept work areas identified at the last HELBAT Executive Committee Meeting; these are:

•Improved data communications performance of FM push-to-talk radios.

•Use of the air observer and elevated platforms as high technology target acquisition devices.

•Artillery use of an NBC-protected command post vehicle.

•Further advancement of on-board weapon computers; e.g., on-howitzer test beds.

Barry L. Reichard is a senior weapon system analyst at the Ballistic Research Laboratory, Armament Research and Development Command. He is a specialist in field artillery systems and has actively participated in the planning and carrying out of the HELBAT tests.

FA Test and Development

DESIGN • DEVELOPMENT • TESTING • EVALUATION

BCS production IPR completed

The Battery Computer System (BCS), Production In-Process Review (IPR) panel convened on 12 May 1982 at Headquarters, US Army Communications Electronics Command (USACECOM), Fort Monmouth, NJ, to approve full-scale production and deployment of the BCS. After in-depth presentations on program status and follow-on evaluation (FOE) test results by the participants, IPR members from US Army Materiel Development and Readiness Command (DARCOM), US Army Training and Doctrine Command (TRADOC), and Logistics Evaluation Agency (LEA) recommended continuation of BCS production at an enhanced level and fielding as early as practicable. This recommendation was subsequently approved by Headquarters, Department of the Army (DA), on 21 May 1982.

Deployment to USAREUR is scheduled to begin during the second quarter of FY83 concurrent with TACFIRE fielding. CONUS units will commence receiving their initial issue during the third quarter of FY83.

Aquila flight successful

Aquila, the Lockheed-built US Army tactical unmanned air vehicle system, has successfully completed the first of a series of test flights over the Arizona desert test range.

Launched from a rail catapult mounted on an Army wheeled vehicle, the system flew 48 minutes over its prescribed course into a truck mounted vertical net barrier where it was recovered undamaged.

The flight represents a high point in full-scale engineering development of 28 air vehicles and 5 ground support systems scheduled for delivery to the Army through 1986.

The Aquila is designed to penetrate far beyond the forward line of own troops (FLOT), providing TV images, as well as highly accurate "target location" while conducting reconnaissance, target acquisition for conventional artillery, designation for laser-guided weapons, and immediate damage assessment while supporting an artillery target engagement.

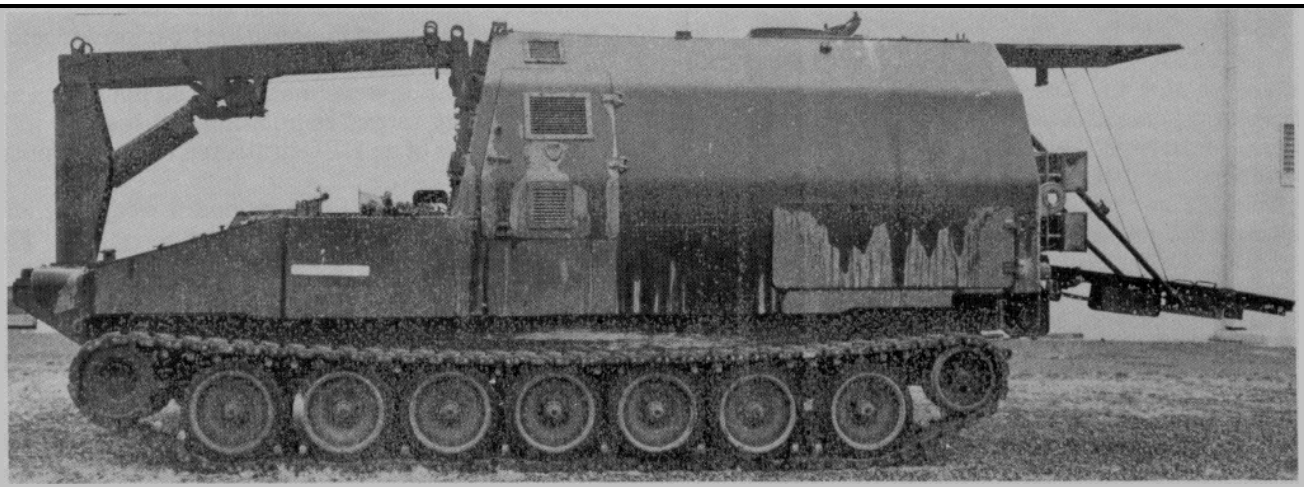
Real-time television pictures are provided to operators in a distant ground control station, and Aquila's TV provides scene-tracking "lock on" capability. The TV's gimbal mount provides a stable TV picture while tracking a target. The system consists of airborne and ground antennas that provide a command data link.

Aquila flies a preprogrammed flight path with capability for the ground controller to modify or totally redirect the flight profile during the mission. Special flight patterns may also be engaged by the ground operator when loiter or search modes are desirable. All flight commands are stored in an onboard computer which actually flies the airframe without direct control from the ground.

Aquila has a wingspan of 12 feet 9 inches, a length of 6 feet 10 inches, and a designed gross weight of 250 pounds. Its body and removable wings consist primarily of tough Kevlar composite.

A two-cylinder, air-cooled piston engine develops 26 horsepower at 8,000 revolutions per minute, driving a two-bladed wooden pusher propeller. The Aquila remotely piloted vehicle and its support equipment can be carried in existing Army trucks.

The current Aquila carries the Army designation YMQM-105. It is derived from the earlier Army-Lockheed program under which 23 Aquilas (designated XMQM-105) were built and tested in 218 flights.



The field artillery ammunition support vehicle (FAASV) awaits testing in the Blacktail Facility anechoic chamber at the US Army Electronic Proving Ground, Fort Huachuca, AZ. The anechoic chamber is used to determine whether radio and other emissions are escaping from the test item and also whether the test item can be penetrated by outside emissions.

BCS contract

Following months of testing and evaluation, the Army awarded the third year of a five-year contract to Norden Systems Inc. in May this year for the production of 217 Battery Computer Systems (BCSs). The value of the agreement for the third year was $26 million.

The BCS underwent electrical performance and severe environmental testing during a First Article Test Program conducted by the Army Communications-Electronics Command (CECOM), the Army's Test and Evaluation Command, and Norden Systems.

The Test and Evaluation Agency conducted a three-month follow-on evaluation in January through March of this year. The 1st Cavalry Division Artillery, as the player unit, put the BCS through its paces in three intensive five-day field exercises to test its effectiveness in an operational environment.

The results of these tests, plus those conducted in an independent evaluation by the Army Materiel Systems Analysis Activity, were examined in an in-process review held May 12. The review board decided to approve continued production and deployment of the BCS.

MLRS FDTE

The US Army Field Artillery Board is conducting the Multiple Launch Rocket System Force Development Test and Experimentation (MLRS FDTE) at Fort Sill. The multiple purposes of the MLRS FDTE are to assess the adequacy of MLRS command, control, and communications (C^3) systems and organizational structures at platoon and battery levels over extended periods of time. Additionally, employment doctrine, adequacy of maintenance, and system operation training are being evaluated with raw failure data being collected on the MLRS system during the entire period.

During MLRS FDTE, section and platoon training is conducted, followed by battery training on organization, doctrine, and logistical concepts developed by the MLRS TRADOC System Manager (TSM) in coordination with the US Army Field Artillery School. Field evaluation of data collection and reduction procedures for battery-level testing also serves as a shakedown of the battery-level organization and collective battery training. The final phase is two 96-hour field evaluation exercises (FEXs) separated by a period to reduce the collected data and "fine tune" the MLRS operations and organizational structures.

Limited testing of the compatibility and interoperability between the MLRS battalion's fire direction system (FDS) and TACFIRE at both battalion and division artillery levels is also being conducted. During these field exercises the MLRS units provide fire support by simulated firings in both offensive and defensive scenarios typical of those expected in combat situations.

Pershing II contract awarded

The US Army Missile Command (MICOM) recently signed the first production contract for the Pershing II long-range missile system.

MICOM awarded $104,971,000 to Martin Marietta Aerospace at Orlando, FL, for both missiles and ground support equipment. This is in addition to the $87,000,000 awarded to them in December 1981.

Martin Marietta is the system prime contractor, but subcontractors (e.g., Goodyear Aerospace, Bendix, Singer Kearfott, and Hercules, Inc.) share in the funding.

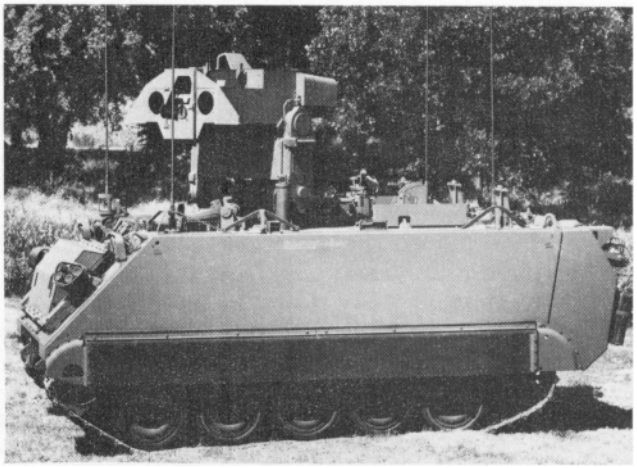
FISTV exceeds goals

The fire support team vehicle (FISTV) exceeded mission reliability specifications by a wide margin in recent Engineering Development Tests at the Yuma, AZ, US Army Proving Ground. In the tests, a mission reliability rating of 0.92 was demonstrated.

The system, which locates and designates targets within 40 meters circular error probable (CEP) at a range of 3,000 meters, was developed by the Emerson Electric Company under a contract awarded by the US Army Tank-Automotive Research and Development Command.

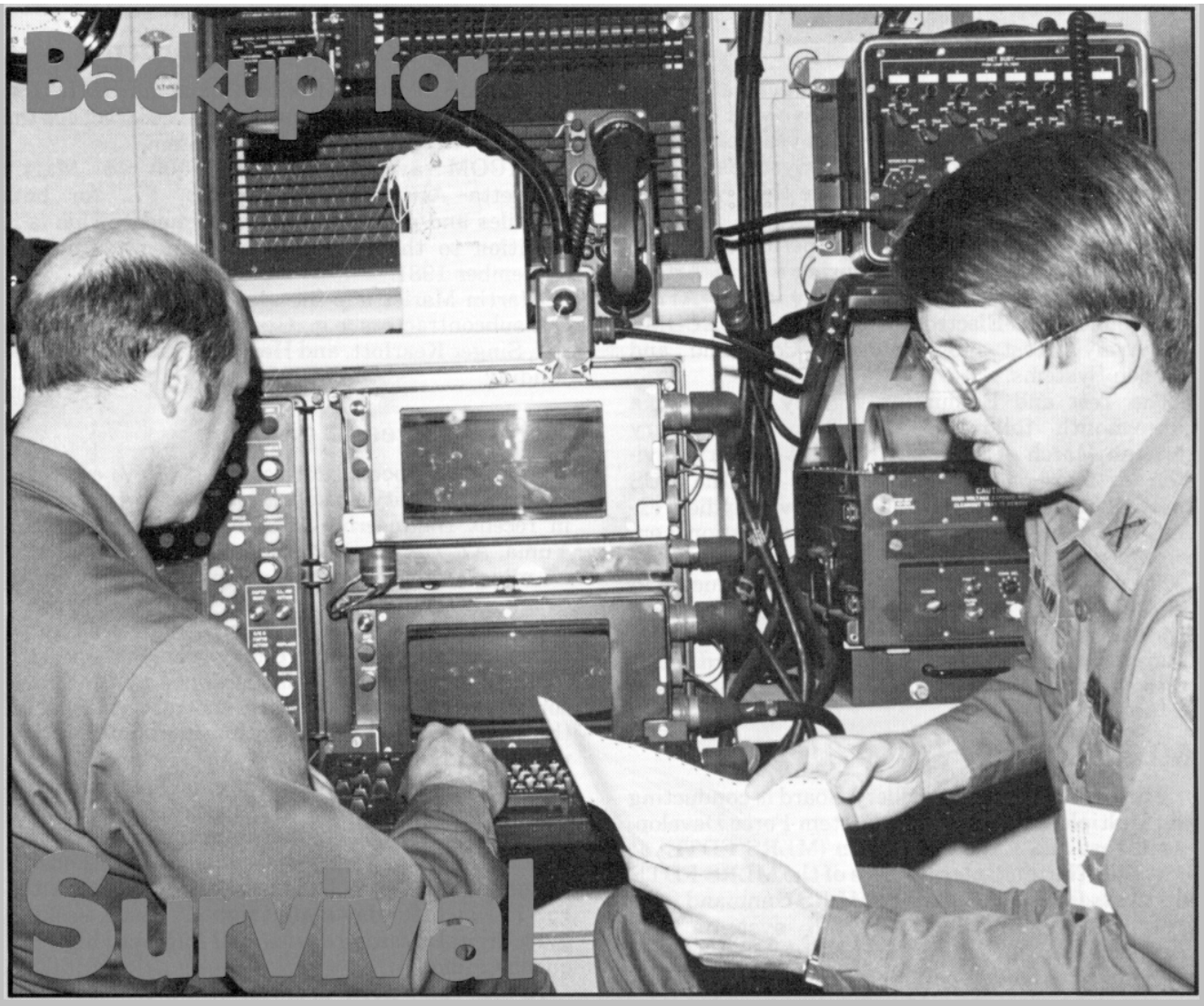
Based on the design of the proven M113 armored personnel carrier, the FISTV locates targets and provides target designation information for all indirect fire using the Ground Laser Locator Designator (GLLD). Other subsystems within the FISTV include day/night sights, north seeking gyro, digital message device, and four very high frequency radios.

In use, the FISTV operator acquires and lases a target. The target's position, in earth coordinates, is automatically computed and sent to a digital message device within the FISTV for communication to an indirect fire unit. FISTV is compatible with all laser-guided munitions.



The test program for the fire support team vehicle (FISTV) included automotive, durability, environmental, and mission performance testing (Emerson Electric Company photo).

Backup for Survival



by COL Paul A. Slater and COL John A. Seitz

Saturation coverage of the fourth flight of the space shuttle Columbia revealed that our media remains enamored with the multiple backup systems installed in each space craft and the hours of intensive training required to enable astronauts to handle them. The flexibility and survivability of this man-machine system seems awesome to the uninitiated; but, to the advocate of systematic mission analysis such measures are routine. Similarly, the concerned field artilleryman, immersed in an evaluation of the findings of the Field Artillery's own Fire Support Mission Area Analysis, must ultimately confront the issues of flexibility and survivability in his own profession's man-machine systems which are proliferating at a rate guaranteed to challenge his doctrinal framework.

One critical area within the Mission Area Analysis is command and control; and, as one contemplates the coexistence of tactical and technical fire direction hardware such as TACFIRE, the Battery Computer System, FADAC, and the programmable hand-held calculator, the need for a doctrinal statement outlining the backup scheme and the resulting training program becomes apparent. Tasked by the Commandant of the Field Artillery School to formulate and articulate such doctrine, the Directors of the Tactics, Combined Arms and Doctrine Department and the Gunnery Department linked arms in a thorough investigation of the issues using viewpoints of the current field commanders, previously published doctrine from TRADOC and Army and Defense Systems Acquisition Review Councils, and the knowledge bank at the Field Artillery School. Culminating in a formal presentation to the March 1982 Field Artillery Executive Committee at Fort Sill, the investigation provided a conceptual framework suitable for that portion of the future that lies just beyond the technological threshold of the present.

Unexpectedly, a measure of fuzziness concerning the distinction between tactical and technical fire direction surfaced during the examination of this question.

Gunnery Department research proved that the definitions have remained virtually unchanged since 1919. But, since the question surfaced, it is useful to examine both terms as defined in FM 6-40 in order to insure a common frame of reference:

•*Tactical Fire Direction* is the command of one or more units with the selection of targets to attack, the choice of the unit or units to fire, and the allocation of the most suitable munition for each mission (chapter 2, para 2-1A(1), FM 6-40, 1 Dec 78).

•*Technical Fire Direction* is the conversion of calls for fire from the observer into fire commands to the cannon section. The term observer includes individuals, target acquisition equipment, intelligence sources, and fire plans (chapter 2, para 2-1A(2), FM 6-40, 1 Dec 78).

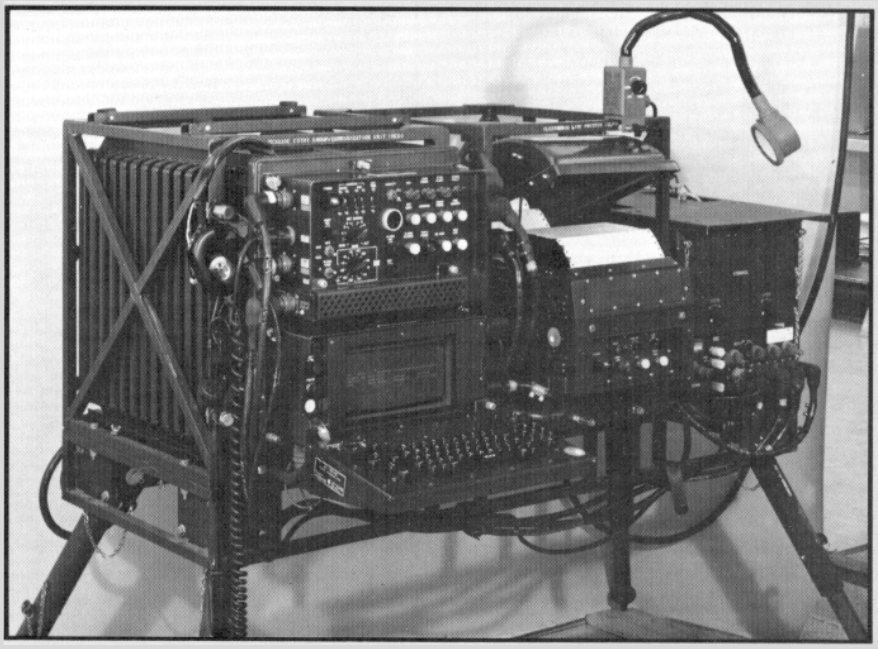
TACFIRE

There is certainly no doubt that TACFIRE, the hub of the fire support system for the 1980s and into the 1990s, is the primary hardware for performing tactical fire direction (such as the selection of unit(s) to fire, the choice of suitable ammunition, number of volleys, etc.). The on-going fielding of TACFIRE currently involves the 9th Infantry Division at Fort Lewis and will soon include the 3d Armored Division in Europe and the 75th Field Artillery Brigade at Fort Sill. These units will rapidly learn what previously equipped units already know and praise; namely, that, in addition to its tactical fire direction and gunnery prowess, TACFIRE gives new and added dimensions to the ancillary functions of intelligence, fire planning, and target analysis.

Nevertheless, amidst the general enthusiasm surrounding the equipment's capabilities, ignorance sometimes dulls its reception. What, asks the occasional critic, does one do when TACFIRE goes down? The first response to that question may surprise a few field artillerymen. Without a true understanding of the internal makeup of TACFIRE, one might be prone to turn to other hardware when TACFIRE stumbles. Yet, TACFIRE is in fact its own best backup; for thanks to the endowment of its farsighted planners, TACFIRE possesses a systemic redundancy that allows the user to selectively discriminate among the various functions and to operate in degraded modes when the situation so demands. If, for example, one of TACFIRE's three memory banks fails, the user can continue to operate with the remaining two, providing that he limits the operative functions to those most essential to the mission. Or, should the 15-kilowatt generator fail or be damaged, system redundancy provides a second 15-kilowatt generator—and, should *that* fail, the vehicle itself has a 100-ampere generator which, as REFORGER proved last year, works as an additional alternative. There simply is no better or faster way to perform tactical fire direction than with TACFIRE—even in the degraded mode.

A catastrophic failure of TACFIRE can, however, degrade the equipment to the extent that it is operationally ineffective. But this challenge is the same one presented to the field artillery commander who must move his unit and consequently be off the air for a period of time. Fortunately, system design allows the TACFIRE of a mutually supporting unit to assume control from the inoperative TACFIRE. Some well-trained units have disproved the original estimate of a 20- to 30-minute transfer of control, accomplishing it efficiently in two or three minutes. A simple manipulation of addresses at the supporting unit TACFIRE, accomplished without the firing batteries and FISTs even being aware of it, can allow a commander to move speedily to this second alternative backup system for tactical fire direction.

Should the field artillery mutually supporting unit's (MSU) TACFIRE also suffer some degradation of its capabilities while it is in control, the resilience of the total system emerges even more clearly. The judicious elimination of certain TACFIRE functions will permit the successful management of both units' tactical fire direction with only one TACFIRE and with it operating in the degraded mode. Furthermore, the interchangeability of components will certainly encourage cross-levelling of equipment between units which would sustain or enhance combat operations. TACFIRE, with its genesis in the 1950s and its on-going modifications



Battery Computer System.

to suit the 1980s and 1990s, is a backup to itself in three different ways:

•The resiliency in the "wounded" TACFIRE.

•Its mutually supporting unit's TACFIRE.

•The resiliency of the mutually supporting unit's TACFIRE should its effectiveness be degraded.

In the unlikely event that all TACFIRE elements were degraded or destroyed, the unit would be required to convert to manual with voice techniques for tactical fire direction (our standard method of operations until the advent of TACFIRE automated our techniques and procedures). The manual-voice method will continue to be taught at the Field Artillery School because, even when we have automated procedures, it is necessary that the field artilleryman understand these techniques to know what is happening.

Tactical fire direction in the digital world will be performed at FA battalion level while technical fire direction will be performed at battery level (and sometimes at platoon level when 3x8 battalions become a reality).

Battery Computer System

Designed to be the primary hardware for performing technical fire direction, the Battery Computer System (BCS) will soon reach units equipped with TACFIRE. BCS can provide gunpointing data to individual guns faster and more accurately than any other system in the inventory, to include manual gunnery computations; but the beauty of equipping an organization with both BCS and TACFIRE is that the battalion TACFIRE performs technical fire direction and computes the battery-center to center-of-target data. Only individual piece corrections for terrain positioning remain to be calculated manually and BCS performs that function phenomenally; and, if intelligence information is sufficient, BCS will even tailor the impact pattern to best fit the shape of the target.

Hand-held Calculator

While TACFIRE is the primary backup for BCS in accomplishing technical fire direction, some units may not enjoy the luxury of possessing both systems. If the fielding schedule or if combat losses deprive a unit of both BCS and TACFIRE, that unit must exercise the manual/programmable hand-held calculator (TI-59) option (performed at battery level). The TI-59 neatly augments the tabular and graphical techniques. The BCS can, of course, operate independently of TACFIRE; but the battalion fire direction responsibilities become purely tactical, and the BCS will either receive direct digital communications from observers or respond to a manual-voice fire order as does FADAC using current procedures.

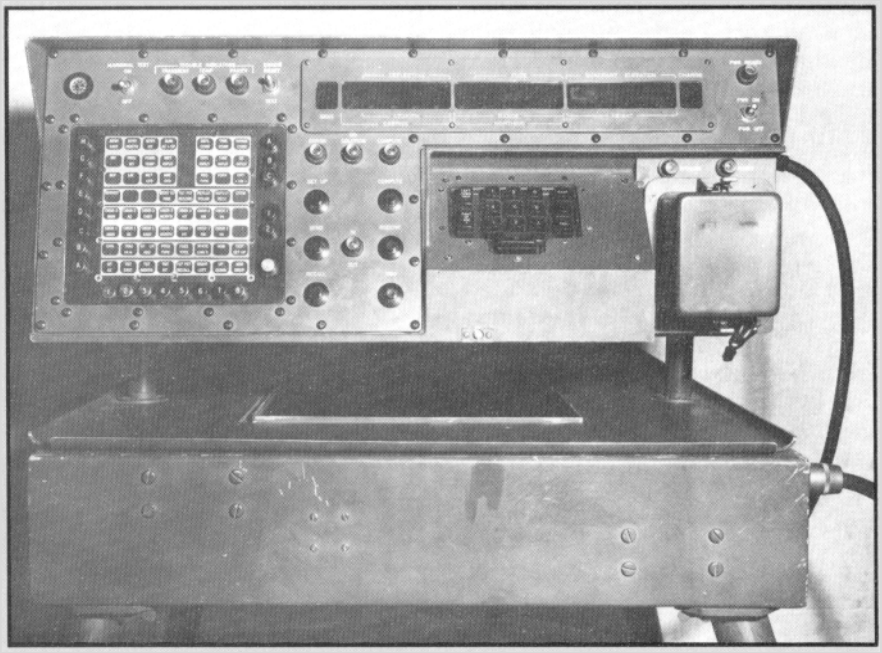
FADAC

Units retain their FADACs pending the completion of BCS fielding. FADAC, the predecessor of BCS as the primary technical fire direction hardware, may appear by itself or with TACFIRE. For units equipped only with FADAC, commanders must decide whether to base the technical fire direction at battalion or at battery level. Their backup system is the manual/programmable hand-held calculator option. For units equipped with both FADAC and TACFIRE, the battalion TACFIRE is the best system for technical, as well as tactical, fire direction; but, should TACFIRE become inoperative, the battery FADAC is the backup, followed by the manual/programmable hand-held calculator option at battery level. In any case, the age-old principle "always use the best available data" applies.

Training

Standardization of this backup scheme will facilitate the training of the Active, Reserve, and National Guard Components of the Field Artillery Community during the transition years ahead. Resident instruction at the Field Artillery School continues to stress the use of recommendations and data received from the best available fire direction hardware. But inherent in that policy is the obligation to design a training strategy that exposes officers and enlisted soldiers to the proper doses of qualification training.

The 1981 Review of Education and Training for Officers (RETO)



FADAC.

Captains' Training Strategy followed on the heels of a similar training strategy for lieutenants in 1980 and the 1979 publication of the Commandant's Enlisted Training Strategy. These three source documents represented the culmination of a detailed job-task analysis by the Directorate of Training Developments and the culling and consolidation of recommendations from fire direction personnel and their commanders in the field. The enlisted training strategy focused on the three principal fire direction MOSs of career management field 13.

A 13C TACFIRE operations specialist at Skill Level 1 receives his initial exposure to TACFIRE in a one-station unit training (OSUT) course at the Field Artillery School and Field Artillery Training Center. While the training includes a brief orientation on manual fire direction, qualification in these procedures is not a course requirement. The cannon fire direction specialist 13E receives similar Skill Level 1 OSUT training on basic manual technical fire direction skills, to include the use of the programmable hand-held calculator and a brief introduction to the Battery Computer System. The Field Artillery School and Field Artillery Training Center close the loop of Skill Level 1 training by offering the 13F fire support specialist lessons on calls for and adjustment of fire, plus Copperhead and Ground/Vehicle Laser Locator Designator and Digital Message Device operations.

At Skill Level 2, the 13Cs and 13Fs receive on-the-job training in their units. A 13E at that skill level currently receives only leadership-oriented instruction in the Primary Noncommissioned Officer Course; but, in order to qualify that soldier to be a better battery computer or primary operator of BCS, USAFAS plans to establish a primary technical course to provide BCS operator training.

The 13Es and 13Fs at the Skill Level 3 plateau must attend a basic noncommissioned officer course where they will learn, in addition to progressive leadership skills, fire direction skills commensurate with their increased responsibilities. Noncommissioned officer academies throughout the Army organize to offer this training. A 13C must go to either the Field Artillery School at Fort Sill or the 7th Army Training Center at Grafenwoehr, Germany, to receive Skill Level 3 instruction at a TACFIRE basic technical course.

Rounding out the enlisted training strategy is the Skill Level 4 instruction offered to three MOSs (13C, 13E, and 13F) at Fort Sill; 13Es and 13Fs attend the Advanced Noncommissioned Officer Course, whereas 13Cs attend an equivalent Advanced TACFIRE Noncommissioned Officer Course. Ultimately all active duty 13Es will attend the 13C course since there is no 13E Skill Level 4 position. Reflecting the current duty descriptions and the analysis of actual job-task requirements, the training at this level and at the previous three levels fits the needs of the enlisted student.

The same neat fit appears in the training strategy for company grade officers. A lieutenant can expect resident course and on-the-job training in technical fire direction. The Officer Basic Course features the gradual withdrawal of FADAC instruction and the simultaneous addition of BCS training. Plans already exist to integrate into the curriculum introductions to Copperhead, the Ground/Vehicle Laser Locator Designator, and the Digital Message Device.

Captains attending the Officer Advanced Course in the near term will see the elimination of FADAC instruction and the expansion of existing TACFIRE training. While the Tactics, Combined Arms and Doctrine Department continues to teach tactical fire direction (both the classroom techniques with which we are all familiar and the TACFIRE equipment used in that same role), the Gunnery Department augments that training with manual and BCS technical fire direction skills. With TACFIRE's interface with Copperhead, the Ground/Vehicle Laser Locator Designator, the Digital Message Device, BCS, Firefinder, Multiple Launch Rocket System, Pershing II, remotely piloted vehicles, and seven other systems appearing in the mid-1980s, such will be the milieu within which the future battalion fire direction officers, battalion and brigade fire support officers, and division artillery or field artillery brigade targeting officers learn their trade. And, for those field artillery captains assigned as ROTC instructors or Reserve Component advisors, this instruction will prepare them to reveal to their charges the dynamic force represented by the fire support system which backs the AirLand Battle concept. In sum, all company grade officers are taught to appreciate and employ each type of tactical and technical fire direction option.

Conclusion

When Columbis's final test flight ended successfully on the Fourth of July, the nation was justifiably proud of the intrepidity of the crew and the sophistication of the technology that made it all possible. For that event, man and machine were prepared; but what of the Field Artillery? To realize the Fire Support Mission Area Analysis claim that "If challenged, we *can* win," each member of the Field Artillery Community must master not only the mechanics of our tactical and technical fire direction equipment, but also the parameters for their use. Preparation to win means providing workable backup systems that keep the field artillery flexible, guarantee the best chance for its survival, and promote our close, continuous support of the maneuver arms.

COL Paul A. Slater is Director of the Tactics, Combined Arms and Doctrine Department, USAFAS. COL John A. Seitz, former Director of the Gunnery Department, USAFAS, is now Chief of Readiness Group Fort Riley.

View from the Blockhouse

FROM THE SCHOOL

WARNING

Safety of troops operating self-propelled 8-inch M110A2 howitzers

An interim change to TM 9-2350-304-10, page 5-25, will add the following warning between steps 4 and 5:

WARNING

When firing M650 projectile, in the rocket-on mode, a danger zone is required from target to 6,000 meters short of target because of the possibility of rocket motor non-ignition.

This warning is necessary because it concerns possible loss of life, personal injury, or destruction of property, and it should be recorded in your technical manuals pending the change to the TM.

The Reserve Component training challenge

During the past 10 years, military journals have been filled with articles on the Battalion Training Management System, to include common-sense training, how-to-train/how-to-fight, and "hostile environment" training. In addition, training innovations such as performance-oriented training, Soldier's Manuals, job books, Skill Qualification Tests (SQTs), and all sorts of guides, aids, and training literature have been discussed.

The field artillery has its share of training problems since, in some FA MOSs, soldiers progress from one weapon system to another (others may stay with the same system throughout their career). One might say our challenges are as diverse as the number of units and even the number of soldiers.

A particular training challenge facing the Field Artillery School is the integration of Active Component-Reserve Component (AC-RC) training. Here, since the total artillery force is currently 42 percent Active and 58 percent Reserves, the training challenges facing the Reserve commander are the same as those facing the Active commander with one exception—the Reserve commander must accomplish his training for combat contingency deployment with only 36 annual training days. In many instances, live-fire training in National Guard and Army Reserve units is restricted by the lack of firing areas, travel time to firing areas, and ammunition allowances. All of these restrictions can degrade training time.

Reserve commanders can now multiply valuable training efforts through several training programs such as AC-RC partnership units, affiliation, annual training integration with active partners, and special schools. Additionally, the Field Artillery School currently offers refresher courses, mobile training teams, and exportable materials to add to the list of multipliers.

•***Refresher courses:*** The School conducts 17 one-week refresher courses from October through May each fiscal year. These courses, designed primarily for battalion and brigade staffs, provide an opportunity for Reserve commanders to receive updates in gunnery, weapons, tactics, communications, and counterfire. Reserve attendees are afforded the opportunity to meet with their Active counterparts to discuss training programs and look at different approaches to training. Subsequently, valuable points of contact are established who can answer training questions, assist in solving training problems and, in many cases, speed up the scheduling of valuable training support to Reserve units.

•***Mobile training teams:*** Currently, USAFAS provides approximately 40 mobile training teams (MTTs) per year in support of US Army Reserve and National Guard units. Last year these MTTs involved 60 resident instructors and supported more than 1,000 Reservists and Guardsmen. The tasks of these MTTs ranged from instructor support for radar sections to nuclear-chemical training and battalion/battery fire direction training. The MTT duration varied from a weekend to two weeks, and the training of units on site with organic equipment proved to be viable and cost-effective.

•***Exportable materials:*** The School currently publishes a list of instructional materials to include individual training programs, crew training packets, and battalion/brigade command post exercises which can be used to supplement unit training. Also, an available service that many commanders may not be familiar with is the "search and ship" program. If a commander or his training personnel cannot locate desired training materials in USAFAS publications or if they have specific training problems they cannot solve, assistance is available from the School. Upon request, a training specialist will research the problem, search USAFAS stocks, and ship available materials to the unit.

Further information regarding USAFAS support for Reserve units can be obtained by calling the Extension Training Management Division, Directorate of Course Development and Training, USAFAS, at AUTOVON 639-2520/4587 or Commercial 405-351-2520/4587.

Standardization update

The 11th meeting of the Quadripartite Working Group on surface-to-surface artillery was held during the period 17-21 May 1982 at Headquarters, Royal Artillery, in the London suburb of Woolwich. Delegations representing Field Artilleries of America, Britain, Canada, and Australia (ABCA) (with New Zealand observing) continued their efforts toward the goal of Standardization, Rationalization, and Interoperability.

The long term objectives of this ABCA Working Group are to:

•Standardize field artillery procedures.

•Standardize field artillery ammunition.

•Develop surface-to-surface artillery concepts up to the year 2000.

•Develop future field artillery meteorological requirements.

•Resolve automation systems interface problems.

•Achieve standardization of field artillery weapons post 1990.

•Standardize procedures for the tactical use of scatterable mines on the battlefield.

In future issues of the **Field Artillery Journal**, certain STANAGs/QSTAGs that have been ratified by the United States will be discussed to point out the significant points that US field artillerymen should and must be aware of when interoperating with other NATO/ABCA forces.

The 12th meeting of the NATO Artillery Working Party will convene at NATO Headquarters next month (October). (Mr. B. M. Berkowick, USAFAS International Standardization Coordinator, NATO/ABCA)

Change 1 to FM 6-2

Change 1 (1 March 1982) to FM 6-2 (Field Artillery Survey, dated 29 September 1978) is now available for distribution. This change can be requisitioned from:

US Army Adjutant General Publication Center
2800 Eastern Boulevard
Baltimore, MD 21220

The DA Forms (for use with the TI-59 calculator) in Appendix R of Change 1 should be reproduced locally for use by survey units since they cannot be requisitioned. Reproduction instructions for these forms are included in Change 1.

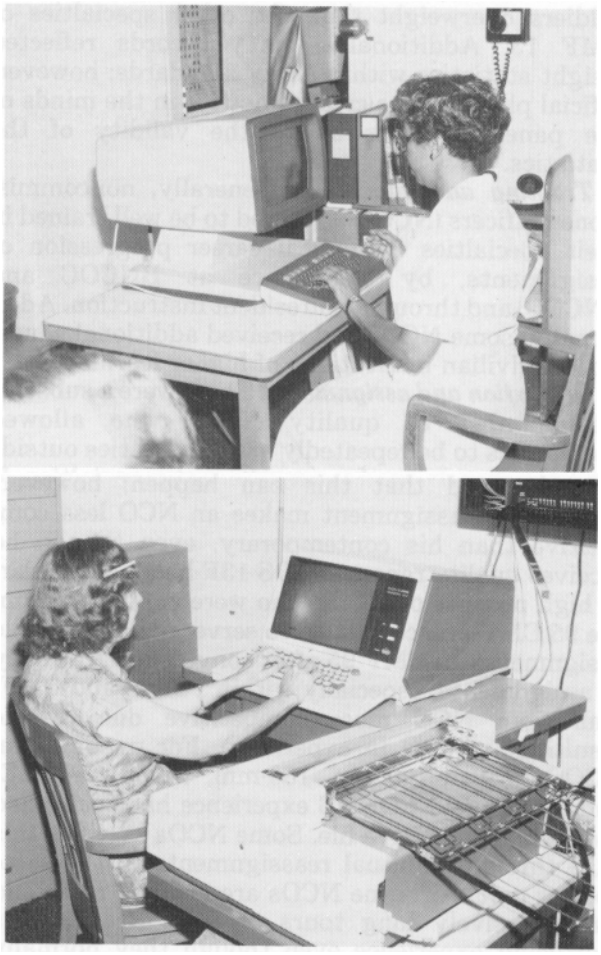
Reschedule of MQS II Evaluation

The *Field Artillery Journal* (May-June 1982) contained a short article entitled "MQS II Program for Lieutenants Ready for On-Site Evaluation." The evaluation, which was to begin in August 1982, has been tentatively rescheduled by US Army Training and Doctrine Command to start in January 1983 and end in November 1983. The evaluation will include selected units in US Army Europe and both Active and Reserve units in CONUS.

Thanks for the help

The School recently completed a rewrite of FM 6-50, The Field Artillery Cannon Battery, and the new version should be ready for distribution by the second quarter of FY83.

We at Fort Sill express our sincere thanks to all Active, Reserve, and National Guard units that provided input. In all, more than 266 responses were received, most of which provided information that was incorporated into the manual. As a result of these collective efforts, a much improved field manual will soon be available to the entire Field Artillery Community.



The School's Morris Swett Library has two computer terminals which provide information of interest to field artillerymen. Mrs. Consuella Brown (top) operates the unit that controls the Bibliographic Retrieval Service, DIALOG, Information Bank II, and the Online Computer Library Center's Interlibrary Loan subsystem. Mrs. Martha Relph (bottom) operates the Defense Technical Information Center unit. Personnel interested in using these, or more traditional reference services, are encouraged to contact Mr. Les Miller, Supervisory Librarian at AUTOVON 639-4525 or Commercial 1-405-351-4525. (Photo by SP4 Jim Williams)

CMF 13 Review and Analysis

The following information was provided the Commandant, US Army Field Artillery School, by Brigadier General C. N. Neely, President of the FY83 Advanced Noncommissioned Officers Course (ANCOC) Selection Board. Material presented was based on an analysis of official records of 356 Career Management Field (CMF) 13 soldiers eligible for attendance at ANCOC during FY83.—Ed.

E6 competence (strengths and weaknesses)

Physical fitness: A tabulated 11 percent of the soldiers whose records were considered did not meet the standards of AR 600-9. Of the records considered, MOS 13E had a higher percentage of soldiers overweight than the other specialties of CMF 13. Additionally, many records reflected weight statistics within Army standards; however, official photographs created doubts in the minds of the panel members as to the validity of the statistics.

Training and education: Generally, noncommissioned officers (NCOs) appeared to be well trained in their specialties by logical career progression of assignments, by attendance at BNCOC and PNCOC, and through nonresident instruction. Additionally, some NCOs had received additional education at civilian institutions of higher learning.

Utilization and assignments: There were a substantial number of quality NCOs who allowed themselves to be repeatedly assigned duties outside their primary, secondary, or alternate specialties. It is understood that this can happen; however, repeated malassignment makes an NCO less competitive than his contemporary, even though he receives quality reports. MOS 13F had a particularly high number of NCOs who were converted from the 95 CMF and continued to serve, or had multiple assignments, in CMF 95 after conversion. A variety of assignments, especially within PMOS and CMF, makes an NCO more competitive due to the resulting increase in experience. For example, an NCO who had 105-mm, 155-mm, 8-inch, LANCE, and foreign and CONUS experience habitually had the more competitive file. Some NCOs sacrifice this edge through habitual reassignments to the same post or unit. Airborne NCOs are inclined to extend for excessively long tours at Fort Bragg, thus sacrificing experience even though they normally did excedingly well when assigned to non-airborne units.

Potential: The majority of files considered showed that the NCO had potential for advancement.

Administration

The administration of NCO field artillery careers and the administrative support of the NCO are lacking! Senior noncommissioned, warrant, and commissioned officers must take a more active part to insure correct and professional administration. For example:

•Some commanders awarded the Good Conduct Medal for periods of time when the servicemember had one or more Articles 15.

•Many records did not reflect earned achievements, particularly academic achievements.

•Also, six percent of the files considered did not contain an official photograph. Many of the photographs that were present were of such poor quality that they were useless.

•Enlisted Evaluation Reports (EER) did not receive the required attention to detail. Job descriptions were not complete and many of the acronyms used were not commonly familiar; i.e., "Performed duties of ARU." Administrative data in the heading was often incomplete. Narratives should track with the job description; all too often they did not. Some reports were for a period longer than one year. Many raters and indorsers did not provide any information as to job performance, but spoke only in generalities. Too many reports were poorly written, and some showed little or no effort on the part of the rater or indorser. Most raters and indorsers did not mention overweight progress for overweight NCOs.

Overall, the general status of CMF 13 appears to be strong with many quality NCOs.

Recommendations

Physical fitness and the weight control program should continue to receive emphasis by all commanders. The program should be enhanced by making commanders aware of the possibility of invalid statistics being entered in official records.

Commanders, staffs, and instructors should strive to eliminate malassignments and educate NCOs to the detrimental effect of malassignments.

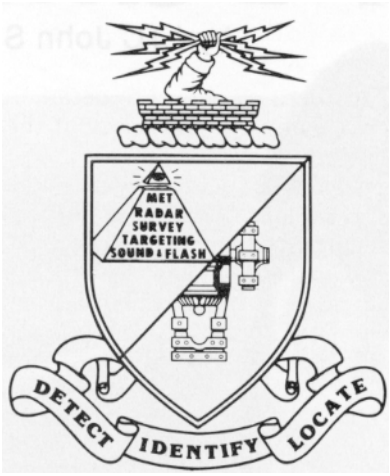
NCOs should be educated as to the importance of establishing intermediate career objectives and long-range goals. It is believed that in doing this the NCO will become more aware of the detrimental effects of malassignment which will eventually lead to a more professional and trained force.

Senior NCOs and officers should place more emphasis on the administration of enlisted careers, insuring that only the most professional attention is provided. It is specifically recommended that command sergeants major and all commanders be charged with the supervision of the EER developed in their units. It is hoped that this direct involvement will insure that the servicemember will be given the professional rating that has been earned.

Correction

The national stock number (NSN) for the magnetron for the AN/MPQ-4A radar set as printed on page 34 (right column) of the May-June 1982 Field Artillery Journal is incorrect. The proper NSN is 5960-01-032-4284. The cost remains the same.

TARGET ACQUISITION



SYSTEMS REVIEW

Redesignation of Counterfire Department

It started out as the "Observation Department," then became the "Target Acquisition Department," and, in 1976, was redesignated as the "Counterfire Department."

The name "Counterfire Department" has served us well, fulfilling its original intent; i.e., to emphasize the new counterfire doctrine and tactics. Although those close to the Department recognized that its responsibilities were much broader, to many, the term "Counterfire" gave the implication that the sole function of the department revolved around the Field Artillery's counterfire role. In actuality, however, the Department is responsible for target location, meteorology, and survey functions—all of which apply not only to counterfire, but to all types of field artillery support.

To eliminate any misunderstanding and to better describe the actual functions of the Department, the Commandant of the Field Artillery School has recently directed that it once again assume its former title of "Target Acquisition Department." Hopefully, this redesignation will assist in furthering field/School relationships for the future.

New course scheduled

Good news is in the mill for soldiers in the grade of E5 and E6 who hold MOSs 17B, 17C, 82C, and 93F (Combat Surveillance Target Acquisition). These personnel will soon be selected for attendance at a basic technical course (BTC) designed to provide a working knowledge of those duties required of noncommissioned officers in their respective grades.

The course, which should begin in April 1983, will be "tracked," with approximately 50 percent devoted to common subjects and the remaining half devoted to MOS-peculiar instruction.

Improved target acquisition sensor

The Field Artillery School, with the cooperation of the Intelligence School, is working on a new battlefield surveillance and target acquisition device. The system, called the Elevated Target Acquisition System (ETAS), would replace the AN/TPS-25 and AN/TPS-58 radars. It would also replace the AN/PPS-5 ground surveillance radars in the CEWI battalion and the AN/PPS-15 radars in the heavy divisions.

The Elevated Target Acquisition System consists of a multiple sensor package mounted on a hydraulically-operated pole. The pole would raise and lower the sensor package, enabling the ETAS to utilize more survivable locations on the battlefield than current radars and provide improved line-of-sight. The sensor's package consists of:

- •High resolution television (TV).
- •Forward Looking Infrared (FLIR) thermal sight.
- •Laser rangefinder.
- •Nettable ground surveillance radar.
- •Radio frequency interferometer.

The system will be mounted on an M113/M2 series vehicle for the heavy divisions and a high mobility multipurpose wheeled vehicle/light armored vehicle for the light divisions. Each vehicle will have an on-board land navigation device, thus reducing the current survey requirements.

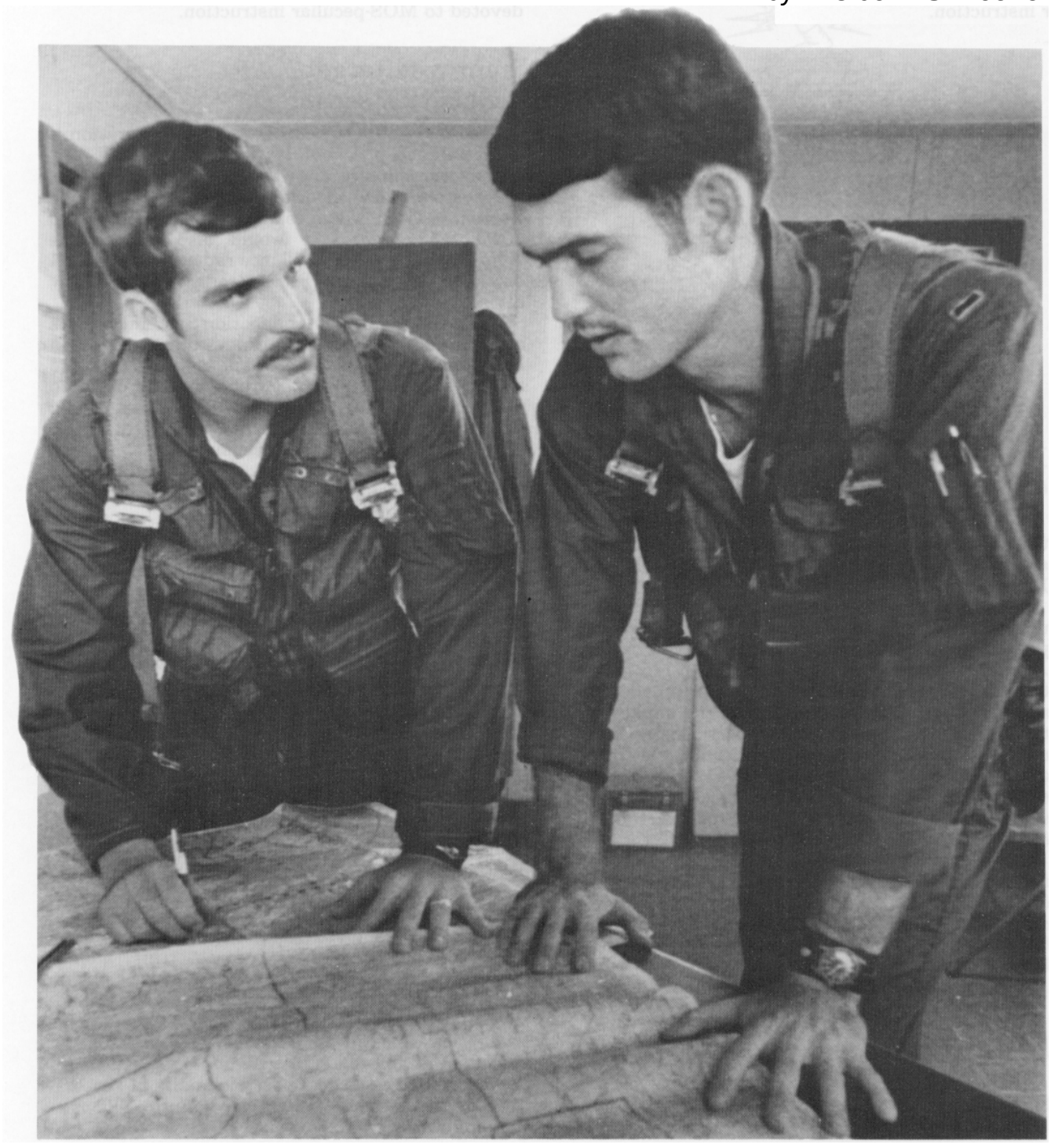
The ETAS will be able to acquire targets utilizing the TV, FLIR, and interferometer out to 10 kilometers and yet remain totally passive. For longer range surveillance or when weather prohibits using the optics systems, a low-power netted radar is utilized.

The netted radars permit radar returns from multiple ETAS vehicles to be displayed at a central location as one comprehensive display. Operator interface is minimal as the system will automatically detect, classify, and track multiple targets.

Night Vision and Electro-Optics Laboratory (NVEOL) will award a contract this month (September 1982) for a prototype system that will include all the sensors except the ground surveillance radar. The prototype will provide the foundation for the ETAS and will be used to evaluate and improve the system's performance in order to provide the best possible family of sensors to meet the needs of the artillery and intelligence communities.

Operational Art of the AirLand Battle

by LTC John S. Doerfel



THROUGHOUT history, most successful armies have profitably understood and practiced the principles of operational art. Recently, the US Army has begun putting increased emphasis on studying and appreciating the operational realm of war. The doctrine of the AirLand Battle envisions employing the insights of operational art against our adversaries.

Operational art is the intermediate level of war between military strategy and tactics. The operational level of war makes use of available military resources to attain strategic goals within a theater of war. Most simply, it is the theory and practice of large unit (army and corps) operations, the use of battles and their results to attain a major military goal. (Final Draft Field Manual 100-5, *Operations,* Department of the Army, Washington, D.C., 15 January 1982, p 2-7.)

The operational goal of the Soviet type of offensive is achieved through:

•Echelonment of units and formations.

•Employing first-echelon forces whose primary purpose is to create ruptures or breakthroughs.

•Emphasis on using succeeding echelons to exploit the successes of the first echelon.

•Succeeding echelon success defined as executing high-speed, multiroute, deep advance to destroy or fix NATO forces and thus lead to the collapse of NATO's defenses.

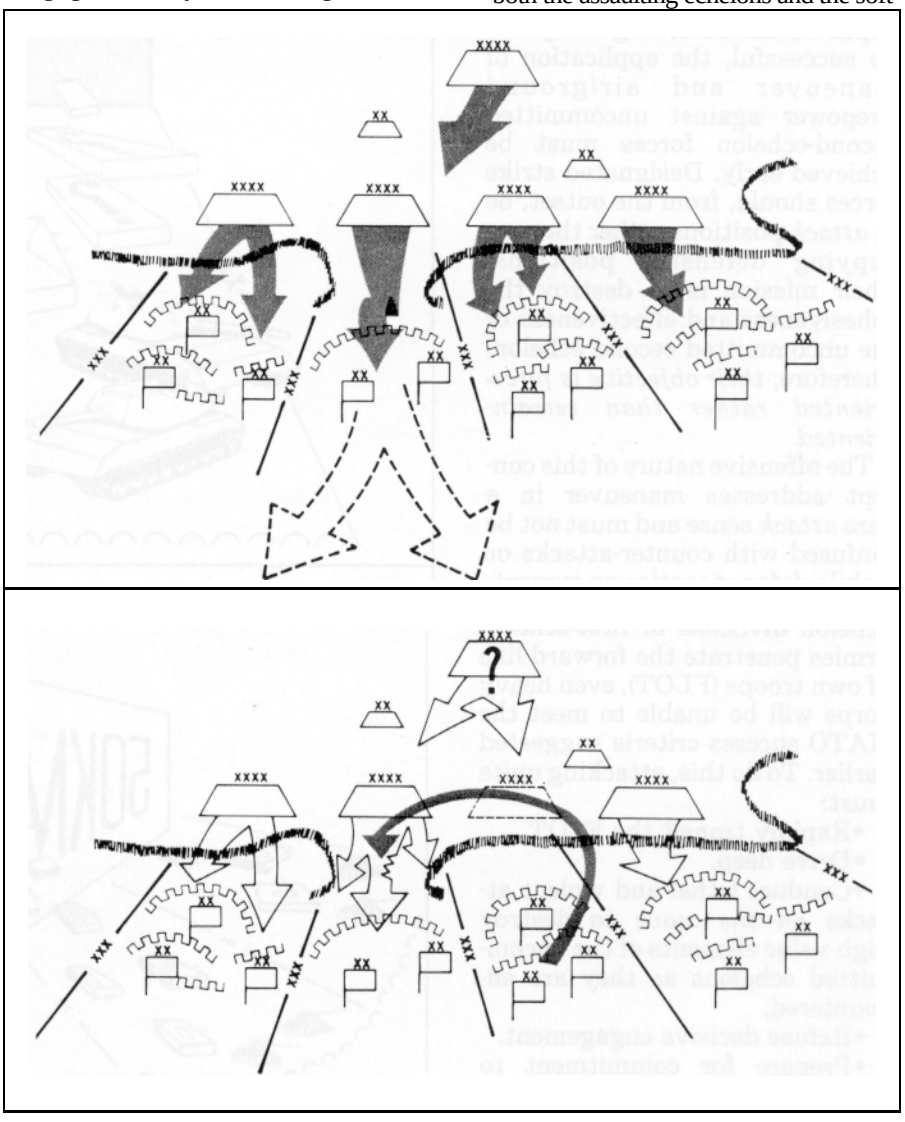
•Penetration and exploitation by second-echelon forces which cannot be countered by deployed NATO forces.

Given the operational goal of the enemy, we must redefine the concept of a successful defense. Success must be measured in the context of the Soviet *TVD* (theater of operations) commander's perspective and how he views the battle, its current status and its goals. For example, it is of little matter if heavily defended NATO corps conduct cohesive defense if lightly defended corps can be penetrated and the theater exploited.

Therefore, success requires more than the conduct of a cohesive defense by individual corps. A corps that is fixed may translate as success to the Soviet *TVD* commander. As such, a candidate definition is: NATO success requires the defeat of enemy armies through combined air and ground actions and a resultant ability to maneuver in support of the theater mission. Therefore, to succeed, NATO corps and their supporting air must defeat opposing armies rapidly and then remaneuver, either in part or in total, to the most vulnerable sectors of the theater.

To do this, NATO corps cannot permit the second-echelon divisions of the first-echelon army to be committed. These divisions must be engaged as they are moving to, occupying, or departing final regimental assembly areas. This is the time when they are most vulnerable. This is the area where the deliberate use of friendly attacks represents a reasonable risk to NATO commanders.

Most importantly, this is the only point in time and space where the future combat potential of the second-echelon divisions can be defeated without decisive engagement. While avoiding decisive *individual engagements* (battles of attrition) below the corps level, the cumulative results to be achieved through these engagements are a *decisive defeat by the corps* through employment of offensive air support and combined arms maneuver against both the assaulting echelons and the soft



interior of *first-echelon armies.*

To appreciate the catastrophic degradation of combat power, one needs only to imagine the consequences of the presence of a large attack force conducting high-speed air and ground operations in the NATO corps rear, destroying midrange air defense sites, engaging corps and division resupply columns, and overrunning maneuver assembly areas, major tactical operations centers, and command and control centers—all the while refusing decisive engagement.

It is precisely because of the structure, size, and weight of the Soviet attacker that interdiction limited only to fire support cannot be expected to accumulate to decisive defeat; it must include maneuver to the operational depth of the attacking army. To be successful, the application of maneuver and air/ground firepower against uncommitted second-echelon forces must be achieved early. Designated strike forces should, from the outset, be in *attack* positions rather than occupying defensive positions. Their mission is to destroy the cohesiveness and effectiveness of the uncommitted second echelon. Therefore, *their objective is force-oriented rather than terrain-oriented.*

The offensive nature of this concept addresses maneuver in a pure *attack* sense and must not be confused with counter-attacks or mobile defense tactics as currently understood. It has at its base the assumption that, if second-echelon divisions of first-echelon armies penetrate the forward line of own troops (FLOT), even heavy corps will be unable to meet the NATO success criteria suggested earlier. To do this, attacking units must:

•Rapidly transit the FLOT.

•Drive deep.

•Conduct lethal and violent attacks *on the move* to destroy high-value elements of the uncommitted echelons as they are encountered.

•Refuse decisive engagement.

•Prepare for commitment to continue the attack either on the rear of the first-echelon divisions or to the depth of the enemy's formations.

The forces required to meet the NATO success criteria are:

•Air Force offensive air support (OAS).

•Air Force offensive counter air (OCA).

•Armor.

•Mechanized infantry.

•Field artillery.

•Combat engineers.

•Cavalry.

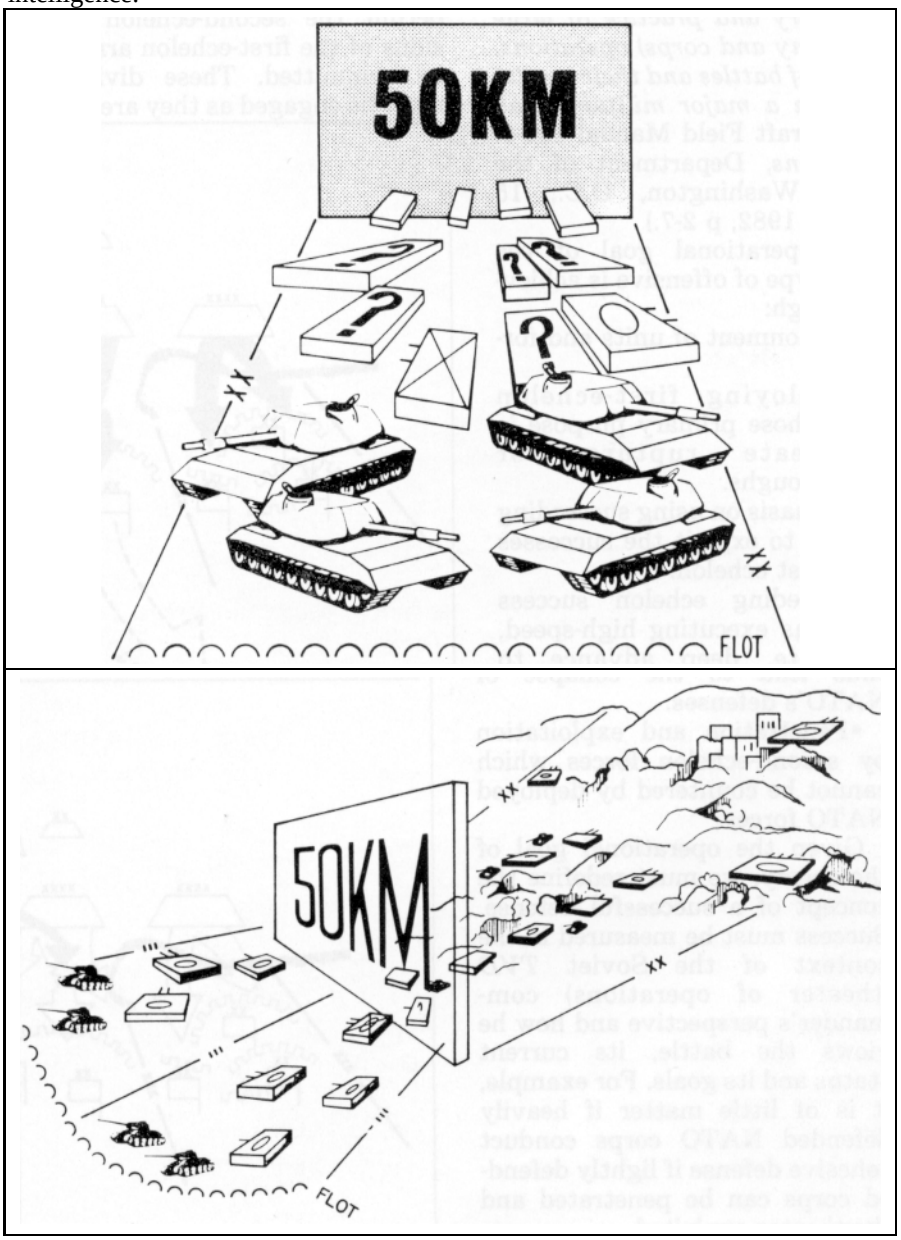
•Special operating forces.

•Helicopters.

•Command and control plus communications and tactical signal intelligence.

The key to the success of this operation is the quality of intelligence available for planning prior to, during, and after the attack is launched. Simply put, intelligence must tell us what is to our front and where it is located in time and space. The enemy's intentions should be surmised, and his capabilities should be identified. A detailed picture is desirable but not necessary. Current intelligence collections can provide the locations of major elements of enemy forces.

Many would suggest that the absence of real-time or near-real-time intelligence would render



such an attack beyond the limits of acceptable risk since current and near-term systems cannot see beyond 50 kilometers at best. While it is true that high resolution even at 50 kilometers is probably not available, commanders who *know* their enemy (and the various options available to him), and *know* the terrain upon which they will fight, can, in fact, *see* far beyond the 50-kilometer barrier of electronic surveillance devices. Moreover, further substantiation of the enemy can be gained if commanders *force the system* and draw upon the intelligence available from adjacent and higher headquarters.

This information, coupled with our understanding of how the Soviets are structured and plan to fight, will provide our commanders with sufficient knowledge to make decisions with reasonable confidence. Our continuing intelligence preparation of the battlefield will focus on identifying the enemy forces in contact and locating the second-echelon divisions and armies, uncommitted reserves and potential high-value targets.

Once the attack is underway, intelligence emphasis will shift to tracking potential Soviet counterattack forces. Our attack should electronically "light up" the enemy's command, control, communications, radar, and surveillance systems perhaps to the depth of the *front,* thereby easing and improving our collection and targeting capabilities. With this information, we can use maneuver, air and ground firepower, and movement, or a combination, to counter threats to our striking forces. A quick and accurate intelligence assessment detailing the effect of our offensive on the enemy is critical if commanders are to correctly choose whether to continue the offensive, shift to the defensive, or maneuver to other sectors.

The operational depth to which the attack is pressed is a key component in its success. The depth of the attack will permit maneuver forces to participate with OCA and indirect fire in the suppression and destruction of the enemy air defense. This is the first step in achieving the requirement of local air superiority during the conduct of the attack. Air defense-free combat corridors will be created to realize the full potential of close air support and attack helicopter support.

At the same time, battlefield air interdiction sorties will use the gaps created for deep interdiction of mobile reserves and elements of second-echelon armies. Air Force broadband jammers closely coordinated with the attacking force can "shut down" the enemy's capability either to assess the nature of the attack or to react in a coherent, timely manner. As such, the total participation of OAS and OCA in the coherent execution of the operation is an absolute requirement. Therefore, mutual development of the integrated concept of the operation and continuous coordination during execution are essential to achieving the requisite operational depth required for success.

In sum, the Air Force can make a significant contribution to the ground commander's intelligence needs forward and to the flanks of the attack. This is accomplished by the high-speed reconnaissance surveillance aircraft supporting the mission. Critical resupply can be effected by using Air Force airdrop or low-altitude parachute extraction system techniques. Local air superiority and interdiction of mobile reserves and elements of second-echelon armies can be accomplished through Air Force OCA and OAS operations. In essence, it is the balance of combat power brought to bear—both tactical air and combined arms maneuver—that changes an assessment of an operation of this nature from a gamble to a deliberate risk, deliberately taken.

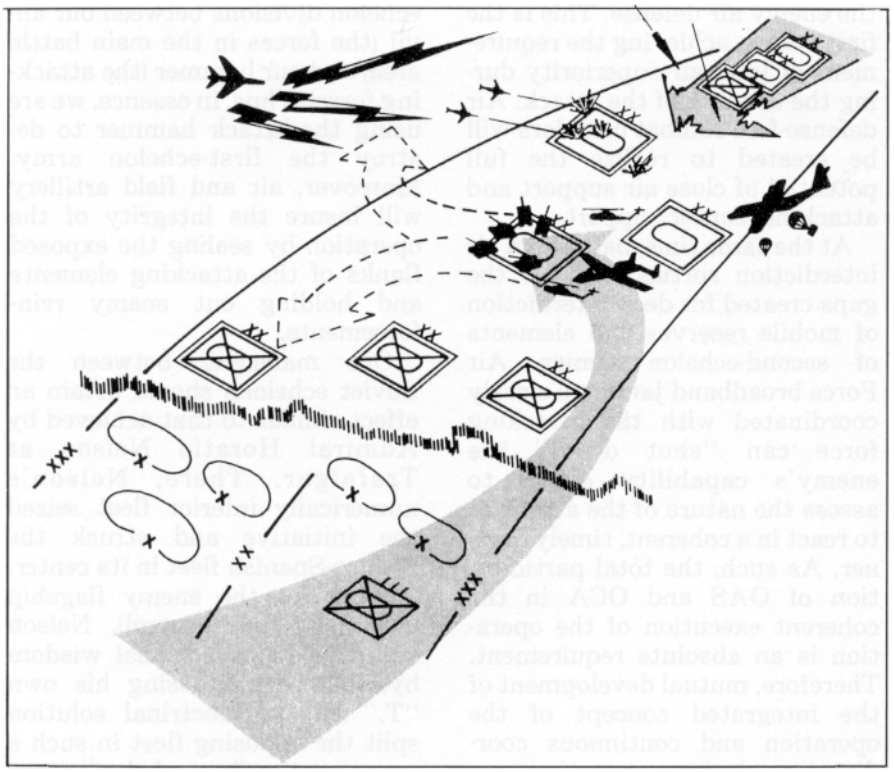
Some will argue, however, that an operation of this nature risks being caught between the hammer of the second-echelon army and the anvil of the first-echelon divisions of the committed first-echelon army. In fact, we are reversing the roles. We are placing those committed, first-echelon divisions between our anvil (the forces in the main battle area) and our hammer (the attacking force). Thus, in essence, we are using the attack hammer to destroy the first-echelon army. Moreover, air and field artillery will insure the integrity of the operation by sealing the exposed flanks of the attacking elements and holding out enemy reinforcements.

Our maneuver between the Soviet echelons should attain an effect similar to that achieved by Admiral Horatio Nelson at Trafalgar. There, Nelson's numerically inferior fleet seized the initiative and struck the Franco-Spanish fleet in its center. Aiming for the enemy flagship (command and control), Nelson abandoned conventional wisdom by, in effect, crossing his own "T." His antidoctrinal solution split the opposing fleet in such a way that the first echelon's (van) momentum (wind caused) prevented it from turning back to intervene in the battle. The momentum of the following echelons (center, rear) prevented their maneuvering to advantage, thereby allowing the British to defeat each echelon in detail.

Our maneuver should have a similar effect. The ponderous weight and operational methods of the Soviet first-echelon divisions will prevent their interference with the second-echelon battle. We are using the enemy's strength against him.

We expect that our operations would have two possible outcomes. Soviet doctrine emphasizes reinforcement of success but does not address catastrophic failure—such as the defeat of an army. Therefore, it is most probable that the Soviet commander would be content to achieve stability in the affected sector and would devote his remaining maneuver resources to supporting more successful sectors. This frees NATO forces to maneuver in support of threatened areas, thus expanding offensive operations throughout the depth of the battle.

Alternately, the threat posed by our attack could alarm the



Soviet command to the point of changing the Soviet concept of the operation by altering the mission of second-echelon forces from reinforcement to counterattack. In this eventuality, successful forces would attract the weight of the Soviet attack, thereby relieving pressure in critical sectors and gaining for them the opportunity to seize the offensive. By forcing changes to the Soviet concept of the operation, we gain the initiative for NATO by attracting the weight of the Soviet attack upon our most capable forces. Finally, the intermingling of NATO and Warsaw Pact forces and the reducing of the probability of early defeat might raise NATO's nuclear threshold.

We must also understand that even the destruction of an entire army may not materially affect the theater battle. It may be that offensive operations below the corps level will be too shallow and too small to affect the *TVD* or frontal commander's concept of operation in time. The Soviet commander may simply choose to sacrifice the attacked army, seal the attacking corps, and continue his major thrust in the expectation of defeating other corps and ultimately achieving isolation of the attacking force. If this is a reasonable alternative for the Soviets, and if we are serious about doing more than making our more capable corps look good to historians, it may be time to begin to consider major corps or multicorps offensives designed to defeat entire *fronts.*

(Reprinted with permission from ***Military Review,*** *May 1982)*

LTC John S. Doerfel is Chief of the Concepts Division, Directorate of Combat Developments, US Army Field Artillery School.

Commanders Update

COL James L. Merchant
2d Armored Division Artillery

COL Fred F. Marty
41st Field Artillery Brigade

COL Marvin L. Covault
212th Field Artillery Brigade

COL Robert T. Smith
558th Artillery Support Group

COL Henry M. Hagwood
US Army Field Artillery Training Center

LTC Juergen Nolte
3d Battalion, 3d Field Artillery

LTC Myrt W. Webb
1st Battalion, 8th Field Artillery

LTC John C. Truesdell
2d Battalion, 8th Field Artillery

LTC Calvin R. Fore
2d Battalion, 10th Field Artillery

LTC Lawrence D. Richardson
1st Battalion, 15th Field Artillery

LTC Edward G. Anderson III
1st Battalion, 18th Field Artillery

LTC Robert S. Ballagh Jr.
3d Battalion, 19th Field Artillery

LTC Thomas W. Chapman
6th Battalion, 33d Field Artillery

LTC Robert B. Cato
1st Battalion, 36th Field Artillery

LTC Clarence R. Shaw Jr.
2d Battalion, 36th Field Artillery

LTC Gerald R. Wilson Jr.
1st Battalion, 37th Field Artillery

LTC William H. Ott
3d Battalion, 37th Field Artillery

LTC Morris J. Boyd
1st Battalion, 39th Field Artillery

LTC George H. Hegg
3d Battalion, 79th Field Artillery

LTC Edward G. Alexander
2d Battalion, 377th Field Artillery

LTC Thomas R. White
2d Cannon Training Battalion

LTC James A. Pongonis
4th Basic Training Battalion

Loan repayment claims

Reservists, eligible for the Defense Department's FY81 student loan repayment program, can soon submit individual claims.

Forms required are DD (Test) Form 2057-5 (Federal Student Loan Confirmation) and the Loan Repayment Program Agreement which is attached to enlistment or reenlistment contracts. (DD Form 2057-4, Loan Repayment Statement of Understanding, which has already been completed by most loan repayment applicants, was used to identify those eligible for the program and is not part of the claims process.)

Department of the Army will distribute the new forms to USAR units in September this year.

DD Form 2057-5 contains three parts which must be completed by the Reservist as well as the unit personnel records section and the institution holding the loan. A certified copy of the loan must also be attached to DD Form 2057-5.

In filling out the Loan Repayment Program Agreement, the Reservist acknowledges that he or she understands the terms and obligations involved.

Who qualifies?

USAR unit members who enlisted or reenlisted in 201 Military Occupational Specialties between 1 October 1980 and 30 September 1981 may qualify for loan repayment. They must be high school graduates and must have scored 50 or better on the Verbal/Math Section of the Armed Forces Qualification Test.

Loans eligible for repayment include Guaranteed Student Loans insured or guaranteed under Part B of the Higher Education Act of 1965 and National Direct Student Loans, made under Part E of the 1965 Act. The loans must have been made after 1 October 1975.

How much is repaid?

For each satisfactory year an individual remains in the Selected Reserve, the Department of Defense will repay either 15 percent of the balance of the loan or $500, whichever is greater. The government will also pay the lender the amount of interest due on the loan each year. However, no loan repayments will be made until at least one year of satisfactory Selected Reserve service has been completed from the date of enlistment or reenlistment.

Once repayment has been approved, subsequent Guaranteed Student Loans and National Direct Student Loans incurred while an individual serves in the Selected Reserve also will be eligible for repayment. In such cases, the loan balance against which the 15 percent is applied will be the cumulative loan amount outstanding when an individual enlists or reenlists plus any additional loans incurred while in the Reserve.

Submitting loan repayment claims

Reservists should use the new forms to submit claims for loan repayment on or about the anniversary of their enlistment or reenlistment dates. This will usually be the drill weekend immediately preceding or following the anniversary. To obtain repayment each year, a new claim must be submitted on DD Form 2057-5. All payments will be made directly to the lender.

At least one year must have elapsed from the date on which a loan is incurred before a repayment claim can be made for that loan. For example, a Reservist who reenlisted in September 1981 and acquired a loan in March 1982 must wait until September 1983 to file for repayment since that individual will have completed only six months of service from the date of the loan until his reenlistment anniversary.

Reservists whose loans are more than a year old but whose enlistment/reenlistment anniversaries have already passed this year will not, however, be required to wait until next year to file for repayment. Rather, when their units have the forms, they can submit claims for the service year preceding their anniversaries. Claim for succeeding years must be made on or about the anniversary dates.

Multiple loans

A unit member claiming repayment on more than one qualifying loan must file a separate DD Form 2057-5 for each loan. Each lender will receive a percentage of the repayment equal to his share of the total principal owed by the Reservist on all the loans. The interest acrued on each loan between enlistment/reenlistment anniversary dates will be paid in full to the respective lending institutions.

If a Reservist holds two or three loans and one of the loans is less than a year old on the enlistment/reenlistment anniversary, a claim on that loan must be withheld until the next anniversary.

Arranging for forbearance

Army officials recognize that some unit members may experience hardships if their loans become due before the anniversary dates on which they can claim repayment. As such, these Reservists should ask their lending institutions for deferment or forbearance (in accordance with the US Department of Education Federal Student Financial Aid Handbook 1981-82).

The Department of the Army has prepared a sample letter requesting forbearance on loans falling due for servicemembers enrolled in the repayment program. Commanders should be able to obtain copies of the letter through command channels.

Reservists are cautioned that the Army is forbidden by law to refund any portion of payments they've already made to lenders. Federal law also forbids the Army to repay defaulted student loans.

Where to go for answers

Some aspects of the loan repayment program are complex; therefore, commanders needing additional information may contact the following individuals:

•*First Army*—Major Potocki, AUTOVON 923-2658; COMMERCIAL (301) 677-2658.

•*Fifth Army*—Major Smith, AUTOVON 471-4675; COMMERCIAL (512) 221-4675.

•*Sixth Army*—Major Merwin, AUTOVON 586-2945; COMMERCIAL (415) 561-2945.

Exceptional Family Member Program

The Exceptional Family Member Program (EFMP) is a voluntary Army program to help soldiers with family members who require special education or medical services. It was formerly called the Handicapped Dependent Program.

An exceptional family member is defined as "A family member with any physical or emotional problem, intellectual disorder, gift, or talent that limits or enhances the individual's capability to engage in pursuits with peers or beyond the normal scope of their peers and which requires special treatment, therapy, education, training, and counseling."

Soldiers with exceptional family members face unique problems, particularly when being reassigned. In addition to the normal problems of moving a family, soldiers with exceptional family members must determine whether their dependents can get the special care or training needed at the new duty station. The Exceptional Family Member Program was established to help soldiers solve these problems.

All soldiers on active duty with exceptional family members are eligible to participate in the program. AR 614-203 outlines the program, and DA Pamphlet 600-8, Procedure 4-11, gives application procedures.

By next month (October 1982) the Department of Defense Dependents Schools (DODDS) systems will have 180 more teachers and other personnel who are specially trained to work with and educate handicapped children.

While EFMP is designed to help soldiers with exceptional family members, it is not a solution to all assignment problems. Participation in the program does not exempt the soldier from reassignment when eligible. All soldiers are considered for worldwide assignment in accordance with current assignment policies and the needs of the service.

Also, enrollment in the EFMP does not guarantee that assignments will always be compatible with the family member's special needs. Soldiers must understand that they face the possibility of a restricted short tour from time to time during their military careers. However, every possible attempt will be made to assign soldiers to areas where special facilities are available to meet the exceptional family member's needs.

If you have family members who require special care or training, you owe it to yourself and to them to let MILPERCEN know about these needs before you receive reassignment instructions. It is regrettable when a soldier could have taken steps to avoid a potential problem or hardship and chooses not to.

For more information about the EFMP, contact your local MILPO or MILPERCEN (DAPC-EPH-P), AUTOVON 221-8090.

Personnel Assistance Points

For soldiers en route overseas, Personnel Assistance Points (PAPS) are available at each departure location to assist them in solving last-minute problems.

For example, if a soldier is involved in a car accident and must be delayed, he or she can call the PAP at their departure location for instructions on what steps to take.

The eight Personnel Assistance Points within CONUS and their telephone numbers are:

PAP	Serves	Phone Number
JFK	Kennedy International and Washington National Airports	(212)917-1698/1699 AV: 232-4304
McGuire	McGuire Air Force Base and Philadelphia International and Dulles International Airports	(609)724-3106/3107 AV: 440-3106
Charleston	Charleston Air Force Base, SC	(803)554-3210/3141 AV: 583-3210/3141
St. Louis	St. Louis International Airport	(800)325-1680 AV: 693-6253/6254
Los Angeles	Los Angeles International Airport	(213)643-1997 AV: 833-1997
Oakland	Oakland International Airport	(415)635-8452 AV: 864-2231/2580
San Francisco	San Francisco International Airport	(415)877-0751 No AUTOVON #
Seattle	Seattle-Tacoma International Airport	(206)243-5521/5522 AV: 357-4502

***Note:** PAPs will accept collect calls.*

Simultaneous Membership Program

Enrollment has more than tripled in three years in an Army Officer Training Program for Selected Reserve members who are also advanced ROTC cadets. More than 6,500 cadets, including nearly 3,000 USAR unit members, are now taking part in the Simultaneous Membership Program (SMP). There is, however, some confusion about the rules of the program.

The Army established the SMP in 1979 to increase the number of officers entering the USAR and Army National Guard and to increase ROTC enrollment. High school students may enlist as potential SMP participants in Guard or Reserve units and attend basic training during the summer. Enlisted soldiers already assigned to Selected Reserve units may qualify for simultaneous membership if they have four or more years of enlistment remaining. The SMP is open to college students with or without prior military service.

Simultaneous Membership Program enlistees may be eligible for the ROTC Advanced Course as early as their freshman year in college. After enrolling in advanced ROTC, the cadets receive drill pay from their Reserve units in the grade of E5 (unless they have reached a higher grade), in addition to the $100 monthly subsistence allowance they are entitled to as Advanced Course cadets.

Upon successful completion of advanced ROTC, cadets can receive early commissions and serve as second lieutenants in their Guard or Reserve units while completing their degrees. After graduation, they are slated for either Active or Reserve Component duty, depending on the needs of the Army. Participants sometimes mistakenly believe they are guaranteed duty with Selected Reserve units for the entire term of their military obligations. However, cadets are considered Total Army assets and are assigned accordingly, unless they have Guaranteed Reserve Forces Duty (GRFD) contracts. (GRFD contracts are written agreements between the Army and individuals specifying that service obligations will be completed exclusively in the Reserve Components.) SMP participants and other non-scholarship Advanced Course cadets may apply for GRFD contracts.

A relatively common but incorrect assumption about GRFD contracts is that they may be broken. Cadets who have these contracts are never involuntarily ordered to active duty, but they may volunteer for Active Component service and thus void their contracts.

Besides mixups about their Component assignments, SMP members also reflect concern on how to credit their enlisted duty toward overall length of service. Once they are commissioned, SMP participants cannot count as creditable service their enlisted duty in Reserve or Guard units which was performed while they were Advanced Course cadets. However, if they remain in enlisted status (are not commissioned) after completing advanced ROTC, the time spent would be creditable. Of course, those who are commissioned can count the time spent in their commissioned status for pay purposes. Whether or not SMP members are commissioned, enlisted duty prior to entry into the Advanced Course can be counted when computing longevity of service.

Some Army Reserve unit commanders also have questions on how to manage SMP cadets and about how the program's rules apply to their commands. SMP participants should be treated as officer trainees and given duties normally required of second lieutenants. Individual training plans should be developed for each cadet and, even though they will be exposed to the full range of duties performed by lower-ranking enlisted soldiers, emphasis is placed on their development as officers. Counseling and instruction in officers' leadership roles is considered to be a major part of their training.

SMP members may attend their unit's Annual Training and ROTC Advanced Camp in the same summer. However, if Annual Training dates conflict with the Advanced Camp schedule, the cadet must go to Advanced Camp.

The total number of SMP cadets assigned to a Major US Army Reserve Command (MUSARC) may not exceed four percent of its combined (officer and enlisted) authorized strength. Furthermore, MUSARCs must have an actual or projected commissioned officer vacancy within the command to accept an SMP member for assignment. However, there is considerable flexibility in determining officer vacancies to be filled by cadets; for example, the vacancy could be lieutenant, captain, or field grade and MUSARCs may place cadets in individual units based on command-wide vacancies.

Once a cadet is assigned against a vacancy, the vacancy cannot be used to bring another SMP participant into the program. A commissioned officer may be assigned to the position later without affecting the SMP cadet's status.

Because SMP cadets are intended to be commissioned under the early commissioning program and to serve as officers in Reserve Component units while finishing their degrees, it is particularly important for their units to train them properly to prepare them for commissioning.

Civilian personnel management

Because of substantial differences between military and civilian personnel systems, many military managers and supervisors of civilian employees frequently have questions about civilian personnel management. Military personnel are encouraged to contact their civilian personnel offices (CPOs) for orientation and training programs. CPOs are responsible for helping military as well as civilian personnel learn about civilian personnel management policies, procedures, and practices. In addition, DA Pamphlet 690-11, Guide to Civilian Personnel Management, outlines major features of this program.

Reserve promotion boards announced

The US Army Reserve mandatory promotion boards for 1983 have been established by the Department of the Army and will convene at the Reserve Components Personnel and Administration Center (RCPAC) in St. Louis on the dates listed below:

Army Promotion List	Convenes
1LT to CPT	11 Jan 1983
CPT to MAJ	8 Mar 1983
MAJ to LTC	7 Sep 1983
Warrant officer	14 Jun 1983

Army Medical Department	Convenes
1LT to CPT; CPT to MAJ	16 Feb 1983
MAJ to LTC; LTC to COL	14 Jul 1983

Officers will be considered if they are eligible for promotion on or before the following dates:

Warrant officer	31 Aug 1984
1LT to CPT; CPT to MAJ	15 May 1984
MAJ to LTC; LTC to COL	31 Dec 1984

Officers are advised to closely review promotion material received from RCPAC and to remain in contact with their Personnel Management Officers.

Meaning of new DOPMA terms

One of the primary goals of the Defense Officer Personnel Management Act (DOPMA) was to standardize several procedures for personnel management among the services. Toward that aim, the Act and its implementing regulations have introduced new terms and modified others.

The following list also includes some old definitions which were not changed but are often misused:

•***Active Duty List (ADL)***—An order of seniority list of commissioned officers serving on active duty which does not include those described in 10 U.S.C. 641 (e.g., USAR officers on active duty for training are not on the ADL).

•***Active Guard/Reserve (AGR)***—A new term that replaces "statutory" and "long" tour in relation to training and full-time duty. Applies to USAR and ARNGUS members on full-time duty (over 179 days) who provide full-time support to the Reserve Components and are paid from Guard and Reserve Personnel Appropriations. AGR commissioned officers are not reflected on the ADL; therefore, they are not eligible for automatic integration into the RA when they reach the appropriate field grade rank.

•***Army National Guard of the United Statues (ARNGUS)***—A Reserve component composed of all members of the Reserves of the Army who are members of the Army National Guard. Some may be serving on active duty. Of these, some are on the Active Duty List (ADL).

•***Army of the United States Without Component (AUS)***—Composed of persons appointed into the Army without regard to component. Prior to DOPMA, the AUS component provided a means for temporary appointments of officers to fill Active Army requirements by grade. Currently, only warrant officers, lieutenant generals, and generals will be appointed or promoted in this component.

•***Competitive Category***—A group of commissioned officers who compete among themselves for promotion.

•***Permanent Appointment***—Appointment or promotion in the RA, USAR, or ARNGUS. With implementation of DOPMA, all commissioned officers received permanent promotions in the component (RA, USAR, or ARNGUS) in which they were serving.

•***Regular Army (RA)***—Those persons whose continuous service on active duty in both peace and war is contemplated by law. The Army's statutory (10 U.S.C. 522) authorized strength is 63,000 RA commissioned officers.

•***Temporary Appointment***—Appointment or promotion in the AUS (no longer applies to commissioned officers below the rank of lieutenant general).

•***United States Army Reserve (USAR)***—All Reserves of the Army who are not members of the Army National Guard. Some may be serving on active duty. Of these, some are on the Active Duty List (ADL).

•***Zone of Consideration***—Commissioned officers on the Active Duty List (ADL) of the same grade and competitive category or warrant officers of the same grade whose dates of rank fall within a promotion eligibility category. The promotion eligibility categories are:

1) *The Promotion Zone*—(Formerly, officers being considered for the first time from the primary zone.) An eligibility category defined by an announced range of dates of rank of ADL commissioned officers and active duty warrant officers in the zone; for example:

•Lieutenant colonels and below who are eligible for promotion consideration for the first time (excluding below-the-zone consideration).

•Colonels and brigadier generals who are eligible for promotion and have neither been previously recommended for nor removed from a promotion list to the next higher grade.

2) *Above the Zone*—Those commissioned or warrant officers in the zone of eligibility for promotion consideration whose date of rank is senior to any officer in the promotion zone.

3) *Below the Zone (Secondary Zone)*—A promotion eligibility category which consists of officers or warrant officers eligible for promotion consideration whose date of rank is junior to any officer in the promotion zone.

Reservists Physical Readiness Test

Army Reserve unit soldiers will take the same Army Physical Readiness Test (APRT) as the Active Army beginning 1 October 1982. The test (2-mile run, push-ups, sit-ups) will be given during Annual Training.

The new policy and a new regulation are the result of the "Year of Physical Fitness" declared by the Secretary of the Army.

The regulation states that unit Reservists to the age of 40 will take the APRT at least once a year. Soldiers must attain a minimum score of 60 points on each test event and an overall score of at least 180 points.

Army Reservists attending full-time resident training or instruction for 56 days or more are also subject to the APRT. Students who fail to achieve minimum standards on the APRT may be issued a completion certificate in lieu of a graduation certificate.

Reserve soldiers without medical profiles who repeatedly fail to pass the APRT and display no progress toward passing it may be separated from their units.

For the time being, Reservists 40 years and older will continue to take the four-mile march; however, they will eventually run the two-mile event of the APRT after a complete medical screening.

The table below specifies the scores necessary to pass the test. The score to the left of each slash indicates the minimum score and the number to the right of the slash is a perfect score.

Age	Push-ups	Sit-ups	Two-mile run
	Men under 40		
17-25	40/68	40/69	17:55/13:05
26-30	38/66	38/67	18:30/13:40
31-35	33/61	36/65	19:10/14:20
36-39	32/60	34/63	19:35/15:05
	Women under 40		
17-25	16/40	27/61	22:14/17:10
26-30	15/38	25/51	22:29/17:25
31-35	14/34	23/41	24:04/19:00
36-39	13/30	21/31	25:34/20:30

The new regulation is expected to be distributed shortly; however, USAR unit members must depend on individual programs of exercise in preparing for the APRT.

Disability

An individual entering the Army is examined and declared physically fit before acceptance. He is presumed to be fit from that point throughout his military career unless he is subsequently classified unfit by injury or disease. This "presumption of fitness" is a factor which has a significant impact on physical disability retirement. If a soldier has satisfactorily performed his duties until he is scheduled for nondisability separation or retirement, his continued satisfactory performance sustains the presumption that he is fit for duty. Thus, such a soldier is not eligible for physical disability retirement. Only in rare cases is there an exception to this presumption.

The application of the "presumption of fitness" was mandated by Department of Defense as a result of Congressional complaints. These complaints concerned the practice of retaining officers and noncommissioned officers on active duty with physical impairments who were ably performing their jobs and subsequently retiring with disability ratings because of the same physical effects.

In the Army today, there are soldiers with physical problems which prevent them from fully carrying out the duties required of their rank or job. To remedy this situation, a medical evaluation should be ordered by the individual's commander. If after this evaluation the soldier doesn't meet standards for retention, a medical board should be held and the soldier referred to a physical evaluation board for possible disability retirement or separation. If these actions are not taken and commanders continue to keep and not identify physically disabled soldiers, "presumption of fitness" will affect the soldier at separation or retirement time, and he will lose disability pay and the resulting tax advantages, as well as possible Social Security disability insurance benefits.

Complete information on the Disability Retirement System is outlined in AR 635-40.

ETM Catalogs

One year ago (September 1981) Army Extension Training (AET) distributed a series of new publications, the Extension Training Materials (ETM) Catalogs (identified as DA Pamphlets in the 350 series) listing extension training materials. There were 77 different books for specific ARTEPs and TOEs. A consolidated listing of MOSs (DA Pam 350-100) was distributed to TDA units.

All ETM Catalogs have been updated and revised for distribution in September/October 1982. Some additional catalogs in support of new ARTEPs will also be added this year.

Units that did not receive the initial distribution of the ETM Catalog should advise the Army Training Support Center (ATSC), ATTN: ATIC-AET-IO, Fort Eustis, VA 23604. Requests for additional copies of the ETM Catalog should be addressed to US Army AG publications, 2800 Eastern Boulevard, Baltimore, MD 21220.

In order to properly identify all units, the following information must be included:

- Unit name and address.
- Unit Identification Code (UIC).
- Unit ARTEP, TOE, and TDA.
- Point of contact (person/telephone number to contact).

Retirement

Effective 1 June 1982, the following changes are in effect for personnel requesting retirement instead of complying with permanent change of station (PCS) assignment instructions:

•The 13-month application period will be reduced to six months from date of PCS alert notification.

•The 30-day decision period will be part of the six-month application period.

The above changes will be incorporated into AR 635-100 and AR 635-200. Applications for retirement which are not the result of PCS assignment may continue to be submitted up to 12 months before the requested retirement date.

New MOS

As of 1 September this year, the recruiter MOS and reenlistment NCO (79D) MOS have been merged into a new Recruiting and Retention MOS (OOR). This merger affects about 8,300 soldiers.

Soldiers assigned to MOS 79D and OOE will be reclassified in accordance with DAPC-POS-M, MILPERCEN letter, subject: Merger of MOS OOE (Recruiter) and MOS 79D (Reenlistment NCO), Active Army Only—Reclassification Guidance, dated 3 May 1982.

Each soldier must be interviewed by the first officer, grade 0-5 or above, in his or her chain of command, and will be offered a chance to volunteer for the new MOS OOR. The soldier must meet minimum standards outlined in the MILPERCEN letter and must be recommended by the interviewing officer.

A soldier performing either recruiting or retention duties in this new field, who is later assigned to the other type of duty, will attend a transition course at Fort Benjamin Harrison, IN. This training will be conducted each time the soldier makes a similar move. The purpose of the training is to keep the NCO abreast of any program or procedural changes which may have occurred.

A Skill Qualification Test (SQT) will be developed to include a specific "track" for both the reenlistment and the recruiter functions. Personnel reassigned between functional areas will not take the test for the new functional area until they have served at least three months in the appropriate position.

A proposal to equalize the Special Duty Assignment Proficiency Pay (SDAPP) for recruiters and retention NCOs working at equivalent levels has been submitted to the Office of the Secretary of Defense for approval. Under the old system, recruiters could earn up to $150 a month SDAPP, while reenlistment NCOs received $50 a month SDAPP.

The new OOR (Recruiting/Retention) MOS affects active duty personnel only. National Guard and Army Reserve soldiers will continue using MOS OOE to identify recruiters and MOS 79D to identify reenlistment NCOs.

For more information concerning the merger, contact MILPERCEN (DAPC-EPH-A), AUTOVON 221-0239.

Competitive Voluntary Indefinite Program

A recent change to AR 135-215 will affect many officers currently on active duty who desire to enter the Competitive Voluntary Indefinite (CVI) Program and compete for career status. The new policy requires a two-year minimum period of active federal commissioned service before an officer is eligible to apply for voluntary indefinite extension of active duty.

On the surface, this change appears relatively minor; however, the impact on officers on overseas orders can be significant. Since most personnel desire to take their dependents with them overseas, they must either apply for voluntary indefinite (if eligible) or request a tour extension long enough to complete a full tour. The same problem could apply to officers desiring to apply for special schools such as aviator training. Those officers might have to apply for tour extensions in order to complete the obligation incurred.

The intent of the new change is to allow personnel sufficient time on active duty to build a strong Official Military Personnel File (OMPF) before the selection board renders a decision that could prevent an officer from pursuing a career. In effect, the new change now allows two types of tour extensions.

•The first, called the short-term extension, still remains for those cases requiring from 1 to 90 days for extreme hardship reasons.

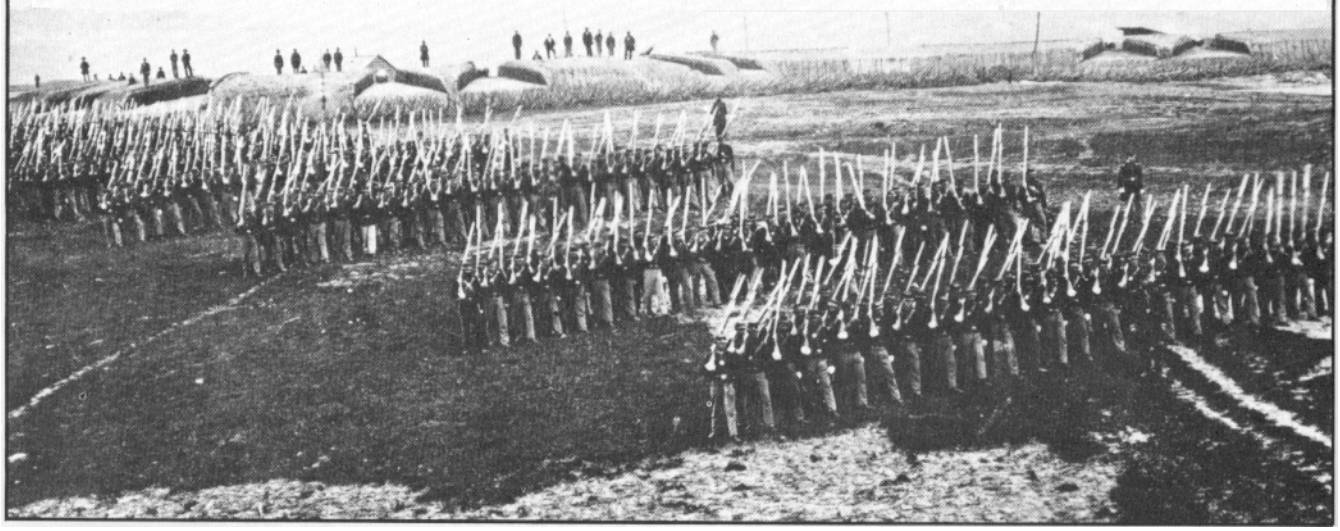
•The second, called short-term extensions from 90 days to 36 months, is applied for in order to meet obligations that would be incurred through training or overseas moves.

The formats for the extensions are listed in figures 2-4 and 2-5, AR 135-215.

Even though the change does allow a tour extension in lieu of voluntary indefinite, the intent of the change was to encourage persons with over two years active federal commissioned service to apply for CVI. Therefore, Combat Arms Division will not accept tour extensions in lieu of CVI when the officer has over two years service at the time the extension would take effect. Questions regarding the new regulation or OPMD policy should be addressed in writing to DAPC-OPE-P or you can call your personnel actions officer at AUTOVON 221-0146/0147.

Historical MILPERCEN Site

by CPT Peter C. Eisen



The 26th New York Regiment at Fort Lyon circa November 1861 to May 1862. Note the abatis in front of the parapet and the telegraph line in the right background. If the modern-day MILPERCEN had been standing it would have been visible in the right background. (Photo: courtesy National Archives.)

The home of the US Army Military Personnel Center (MILPERCEN) is in Alexandria, VA, in the high-rise Hoffman Building, which stands in a low valley amid a scattering of light industrial and commercial buildings.

During the Civil War, Alexandria was the southernmost point of the heavily fortified perimeter surrounding Washington DC. The occupation of the nation's Capitol by the Confederate Army could have brought about the capitulation of the United States government; therefore, great efforts were made to protect this area from attack. By the end of 1865, this fortified perimeter was 37 miles long and consisted of 68 inclosed forts and batteries, which by themselves had an aggregate perimeter of 13 miles. The fortifications had emplacements for 1,120 weapons upon which were mounted 807 guns and 98 mortars. Connecting the major forts were 20 miles of rifle trenches. Today, MILPERCEN stands on the southern edge of this defensive system, between two adjacent forts within the zone where artillery fires overlapped.

The fortification of Alexandria began little more than a month after hostilities began at Fort Sumter. A northern force occupied the town on 23 May 1861. Alexandria was a southern town decidedly pro-Confederate in its sympathies; in fact, one hotel owner welcomed the arriving northern troops by flying a Confederate flag over the roof of his establishment. Outraged, COL Elmer E. Ellsworth, commander of the New York Fire Zouaves, proceeded to remove the flag and was killed in the process by a shotgun blast from an equally irate hotel owner. To a northern population, hungry for heroes and dramatic war news, the dead Ellsworth became something of a *cause celebre*. The next morning work began on a fort just west of the town on Schuter's Hill, a site approximately one-half mile north of today's MILPERCEN. In honor of the fallen colonel, it was named Fort Ellsworth. In its completed state, it had a perimeter of 618 yards and mounted 16 smoothbore and four rifled guns. Among these weapons was a 100-pound Parrot rifle which, with a 10-pound powder charge, could throw its projectiles to a maximum range of 8,428 yards.

During the early days of the war, Fort Ellsworth was considered to be one of the forward outposts of the northern army. One writer, at the time a corporal in the 3d Maine Volunteers, recalled bivouacing near Alexandria in July 1861:

> *Above us, on the hill, was Fort Ellsworth. Beyond us, the farm fields that scattered away into patches and forests of pine and scrub oak were in the country of the rebels. We were at the front, if the raw troops and raw scars of new earthworks on the sacred soil of Virginia might be said to constitute a front. We began to feel more important.*

Fort Ellsworth and the other fortifications thrown up around Washington during the first weeks of the war were soon recognized to be inadequate for a serious defense of the Capitol; they were incapable of supporting each other and as such, hardly constituted a "front."

These deficiencies led Congress in early July 1861 to resolve that the Secretary of War should make

plans for a comprehensive defensive perimeter around the city. Later that month the northern defeat at Bull Run emphasized the vulnerability of the Capitol. Thus, in August 1861, MAJ (later major general) John G. Barnard, a milddleaged engineer officer, was given the task of overseeing the construction of the defenses of Washington.

Barnard recognized the weakness of Fort Ellsworth. "It might exert an influence over the inimical population of Alexandria," he later wrote, ". . . but, in its relation to the operations of armies, it could neither offer much aid to the defense nor materially deter the attack." One of the first decisions made by Barnard was to supplement Fort Ellsworth with another fort on the ridge a mile to the south. Work began there in August 1861. This strongpoint, named Fort Lyon after a general who fell at Wilson Creek, MO, was a half mile south of the modern MILPERCEN. With a perimeter of 937 yards, Fort Lyon was the second largest fort in the defenses of Washington. Its armament at the end of the war included 27 smoothbore and five rifled pieces.

Extending west from Forts Ellsworth and Lyon, scores of other earthwork forts were hacked out of Virginia pines and clay; as time progressed the perimeter extended into Maryland on the other side of the Potomac River. On the waterfront in Alexandria, Battery Rodgers was built to cover the channel of the river.

The addition of Fort Lyon to the defenses of the Capitol blocked the southern approaches to Alexandria. Its guns were sited to fire on Telegraph Road, the major land avenue of approach from the south. (The 20th century MILPERCEN stands on the ground between Forts Ellsworth and Lyon where their fires overlapped).

The forts around Washington were mostly earthworks, shaped in irregular Vauban-type stars depending on the terrain and fields of fire which they were to cover. The perimeters were sodded earthen parapets, 12 to 18 feet thick on exposed fronts; revetted embrasures were cut through the parapets for the artillery. In front of the parapets and surrounding the forts were dry moats about 20 feet wide and deep. Beyond the moats were abatis of fallen trees, with sharpened branches facing away from the forts.

Most regiments with the Army of the Potomac served at one time or another in the forts around Washington. The high turnover of units in the forts was a problem for those responsible for the defense of Washington. This Civil War version of personnel "turbulence" posed a special problem in regard to artillerymen. Wrote Barnard, "The artillerymen, whose training requires much time, having learned the disposition of the armament and computed the distances of the ground over which the attacks may be looked for, and the ranges and service of their guns, should not be changed."

The infantry units garrisoning the forts were considered to be relatively interchangeable; but, due to the technical nature of their art, the artillerymen were not.

In testimony before the odious Joint Congressional Committee on the conduct of the war, MAJ Abner Doubleday (later a major general, but better known as the founder of American baseball) told Congress on 3 January 1862 that the forts, although otherwise secure, were "inadequately garrisoned with artillerists." His testimony also revealed that the magazine at Fort Lyon had caved in and the men were repairing it, which left hardly any time for their artillery duties.

GEN William F. Barry, Chief of Artillery for the Army of the Potomac, told the Joint Committee that heavy artillery regiments should be formed to be the permanent garrison for the forts. "I have been trying constantly," he told the legislators, "to have some more regiments mustered into service as heavy artillery for that express purpose."

Training the artillerymen was also a problem. Some forts, in particular among them Fort Ellsworth, had been firing blanks during service practice. General Barry noted,

> *It has been a difficult matter to exercise these long range guns, for the range has not always been unobstructed. The pickets and guards were in the way, and when we did fire them we had first to send out and remove the pickets. As a compromise blanks were used, but this used up a great deal of powder, so much that we had to stop it*."

Distributed under the signature of GEN George B. McClellan, (then commander of the Army of the Potomac) Barry wrote detailed regulations:

•At least 100 rounds were to be maintained for each piece.

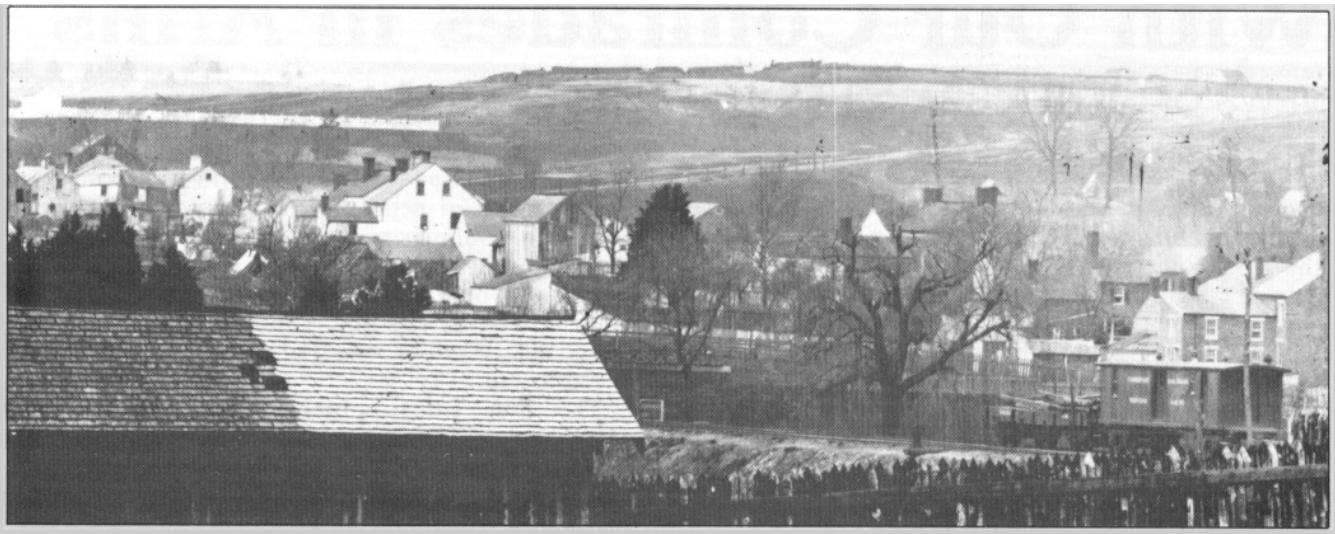
•Range cards were to be prepared showing elevations and directions to key terrain features and likely avenues of approach.

•Two (preferably three) reliefs were to be trained on each gun.

•Gun sections should habitually serve the guns; each man being assigned a special number at the gun, and thoroughly instructed in all its duties, and, as occasion offers, in the duties of all the numbers. Every night, at retreat or tattoo, the men who are to man the guns in case of a night attack should be paraded at their pieces and inspected . . . The men so stationed should "call off" their numbers before being dismissed and, in case of alarm, repair at once to their posts, equip themselves, and *await orders*.

The dangers of storing and handling ammunition in underground magazines in the days before electric lighting posed special problems. General Barry's regulations prohibited smoking in the magazines and the carrying of swords, pistols, and canes in the magazines to prevent sparks.

In spite of these precautions, there was an explosion of the powder magazine at Fort Lyon (where the magazine had so recently been rebuilt after the cave-in) on 9 June 1863. According to one source, 20 men were killed and 14 wounded from the Third New York Heavy Artillery. As quoted in the *Washington Post*, a witness recalled seeing 45 or 50 bodies and suggested that the Confederate guerrilla



View from the hilltop, looking northwest from Alexandria toward Fort Ellsworth. The white fences-in structure in the left background is a reservoir still in use today. (Photo: courtesy National Archives.)

LTC John S. Mosby, the "Gray Ghost," may have been responsible.

Other records attribute the high non-battle casualties of the 15th New York Heavy Artillery, a unit predominantly made up of German immigrants, to the explosion at Fort Lyon.

Forts Ellsworth and Lyon were never attacked; the only fortification around Washington where actual fighting took place was Fort Stevens on the northern perimeter of the defensive belt. There, in July 1864, a small Confederate Army under GEN Jubal Early, hoping to draw Union forces away from their seige before Petersburg, staged a demonstration and then retired. It was there that President Lincoln was under fire, and LTC Oliver Wendell Holmes, later Associate Justice of the Supreme Court, is alleged to have told the President, "Get down, you fool!"

Although the forts in the MILPERCEN vicinity were never in action, for one brief moment in 1862 it seemed a distinct possibility. In August that year the Army of the Potomac under McClellan was sailing back from the abortive Peninsular Campaign near Richmond when forces under GEN John Pope in Northern Virginia made contact with Confederates in the Manassas vicinity; the northern defeat at the Second Bull Run followed. In the days before and after the battle, until Lee began marching his army north towards Maryland, it seemed that a Confederate attack on Washington was imminent.

In an almost panic-stricken atmosphere, a flurry of telegraph messages were exchanged between Lincoln, McClellan, Barnard, and GEN Henry W. Halleck; the Military Commander-in-Chief, concerning the safety of Washington. Both Forts Ellsworth and Lyon and the strengths of their defenders were mentioned in these dispatches; on the morning of 28 August, Barnard told McClellan that the defenses south of the Potomac, including Ellsworth and Lyon, required 2,000 additional experienced artillerymen.

The debacle at Second Bull Run only heightened fears that a battle for Washington would soon erupt. On 2 September COL Charles S. Wainwright, Commander of the 1st New York Artillery, just back in Alexandria from the Peninsular Campaign, wrote in his diary, "It seems as if the whole of Pope's army were poured in on us today as stragglers." But the anticipated battle never materialized; instead, Lee marched north and participated in the battle at Antietam.

As the war progressed and the Army of the Potomac ventured farther from Washington, the importance of its defenses faded—with the notable exception of Early's foray in 1864.

Some of the heavy artillery units which had been formed especially for duty in the Washington forts were reorganized as infantry and fought during the latter stages of the war. One such unit, the 1st Maine Heavy Artillery, which had served in the forts around the Capitol, suffered 632 killed and wounded out of 950 personnel during an attack at Petersburg—the highest losses suffered by any one unit in a single combat during the Civil War.

When the war ended in 1865, the fortifications around Washington, although never intended to be an impregnable "Maginot Line," achieved their mission.

Nothing remains of the original Forts Lyon and Ellsworth. Standing where Fort Ellsworth once was is the George Washington Masonic National Memorial. Next to it, perhaps in deference to the past, stands the Battery Hill Condominiums. Farther south, on the other side of Interstate 95, the former site of Fort Lyon is now occupied by homes and apartments. And in the middle, right off the Telegraph Road exit from the interstate, is the Hoffman Building and our MILPERCEN.

CPT Peter C. Eisen is assigned to Headquarters and Headquarters Battery, 1st Battalion, 97th Field Artillery, Fort Ord, CA.

With Our Comrades in Arms

NEWS OF OTHER BRANCHES AND SERVICES

America's last Polaris

America's Polaris era ended as a US Navy Polaris A-3 missile was carefully lifted from a launch tube of the *USS Robert E. Lee* (SSBN 601) after the submarine's 15 other A-3 missiles had been removed in similar fashion.

The offloading took place inside a covered explosive handling wharf at the US Submarine Base in Bangor, WA, in February this year.

The *USS Robert E. Lee*, launched 18 December 1959, will be converted as others have been of its class from a Fleet Ballistic Missile (FBM) submarine to a nuclear fast attack boat.

Although the Polaris is now history in the US Navy, it still serves as a Western deterrent to nuclear attack; Great Britain has four operational FBM submarines, each equipped with 16 Polaris A-3s.

The Polaris story began in late 1955 when the US Navy chose Lockheed Aircraft Corporation (now Lockheed Corporation) to build the world's first seaborne strategic missile. Tight timetables were set for development of a strategic missile for a surface ship by 1962 and for a submerged submarine by 1965. However, the government accelerated the program and, in 1960, two years early, the missile was ready. Furthermore, the Navy bypassed the surface-ship missile, and the new missile was ready five years ahead of schedule for the undetectable, invulnerable submarine.

HISTORICAL MOMENT—The US Marine Corps guard at right, muffled against the chilly wind, watches as a crane prepares to lift the missile container, the last Polaris A-3 inside, from the *USS Robert E. Lee* (SSBN 601) in the explosive handling wharf at the US Submarine Base, Bangor, WA. With the removal of the Lee's 16 Polaris A-3s, (the last US Polaris missiles on patrol) the US Fleet Ballistic Missiles deterrent rests with the Poseidon C-3 and Trident I C-4 missiles.

The missile was called Polaris A-1—Polaris for the constant North Star which guides sailors and A-1 for the first of the line. Unlike liquid-fueled land-based US missiles, the Polaris A-1 had solid-fuel motors.

The first FBM submarine, the *USS George Washington* (SSBN 598), was built by the Electric Boat Company, which bisected a partially completed attack submarine and inserted a midsection containing 16 launch tubes.

The *USS George Washington* made history on 20 June 1960, when, cruising submerged off the Florida coast, it fired two Polaris A-1s on a target more than 1,000 miles down-range. The *Washington* made history again on 15 November 1960, when it departed on the world's first FBM patrol.

The bottle-nosed Polaris A-1 had a range of 1,200 nautical miles, a length of 28.5 feet, a diameter of 54 inches, and a weight of 28,800 pounds. It was deployed from 15 November 1960 to 14 October 1965; 169 operational A-1s were delivered to the fleet.

The Polaris A-2 had a range of 1,500 miles. It retained the A-1's shape and diameter but was 31 feet long and weighed 32,500 pounds. Polaris A-2 missiles were deployed from 26 June 1962 to 3 June 1974; 350 were delivered for deployment.

The bullet-shaped Polaris A-3 had a much-improved range of 2,500 nautical miles. It retained the 54-inch diameter but was 32.3 feet long and weighed 35,700 pounds. Altogether, 745 operational A-3s were delivered.

Follow-on Lockheed FBMs still in US Navy service are the Poseidon (C-3), which has the Polaris A-3's 2,500-mile range but has much greater capabilities, and the Trident I (C-4) whose range is 4,000 nautical miles.

New sight for helicopters

A helicopter crew accurately fired TOW antitank missiles while "peeking" over a barrier in recent tests of a new mast-mounted sight developed by Hughes Aircraft Company.

The sight, designed for use with the airborne TOW missile system, has been mounted above the rotors of a Hughes Helicopter, 500 MD Defender. The sight, which will significantly improve the helicopter's ability to avoid radar and visual detection, has been used to accurately guide TOW missiles during firing tests in the United States and Sweden, the latter marking the first international demonstration of the system.

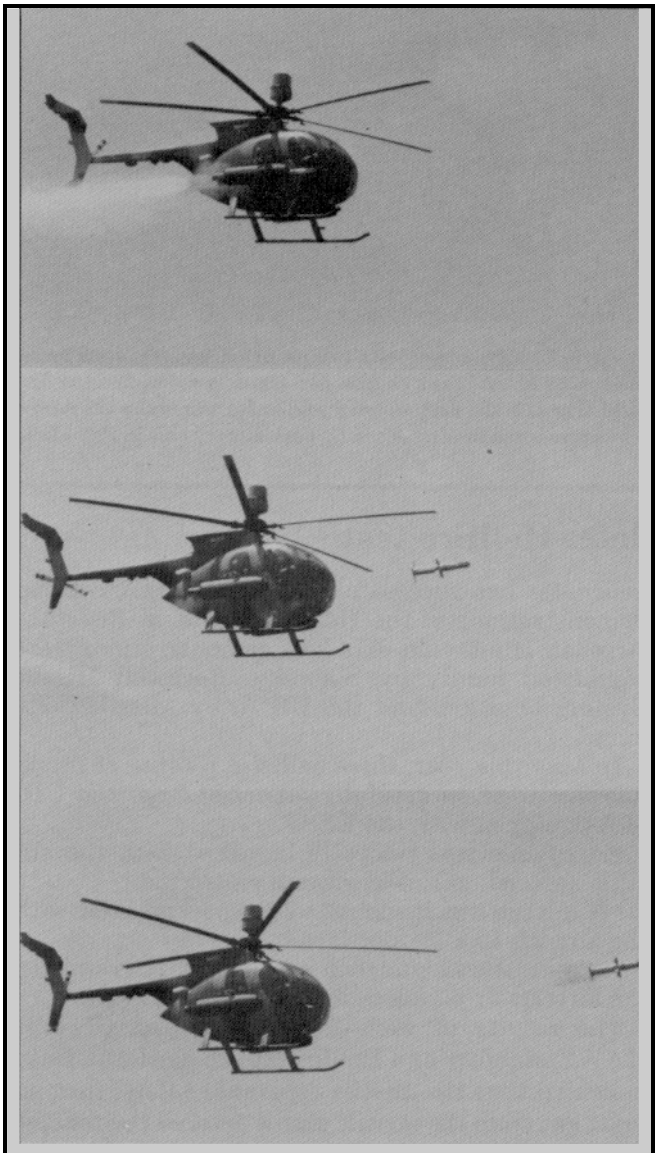
Equipped with the mast-mounted sight version of the airborne TOW system, the helicopter can hide

behind hills and trees to scout for targets. When a target is spotted, the gunner can fire a TOW missile, exposing only the sight to enemy detection during the entire operation. The missile climbs into the sight's line of vision following launch, while the helicopter remains hidden.

By flying behind cover while scouting and firing on targets, the helicopter is masked from radar detection by terrain clutter and can better avoid enemy fire.

The sight is stabilized to compensate for aircraft movement and vibration of the rotor blades. The design allows for future installation of a laser rangefinder, an automatic target tracker, and a forward-looking infrared (FLIR) night vision system.

The airborne TOW is the antitank system for the AH-1 Cobra series helicopters used by the US Army and Marine Corps. The system has also been installed on a variety of foreign helicopters.



A helicopter, equipped with the new mast-mounted sight, fires TOW antitank missiles while peeking over a barrier.

The M901 Improved TOW Vehicle releases a missile. (Emerson Electric Company photo)

NG unit receives ITVs

In late July of this year, the Georgia Army National Guard 48th Infantry Brigade received 51 antitank M901 Improved TOW Vehicles (ITV)—one of the first national Guard units to obtain new, major tactical equipment. Eventually, Guard units will be issued new state-of-the-art equipment under the "Total Force Policy" in which Guard resources are included with US regular forces in the event of war.

The 48th Brigade was selected to receive the ITVs since, during mobilization, it will become the Third Maneuver Brigade of the 24th Infantry Division (Mechanized), a vital member of the Rapid Deployment Force.

Based on the M113 armored personnel carrier, the ITV has two launch tubes from which TOW (Tube-launched, Optically-tracked, Wire-guided) missiles are launched. Each ITV carries 12 TOW missiles which, with a range exceeding 3,000 meters, can penetrate and stop the most heavily armored main battle tanks.

New ADA weapon systems

The US Army Training and Doctrine Command (TRADOC) and the US Army Materiel Development and Readiness Command (DARCOM) are currently staffing a letter of agreement to develop a lightweight air defense system (LADS) to deploy with light infantry, airborne, and air assault divisions. LADS is conceived to be a modular, self-propelled, single-barreled 40-mm gun derivative of the Sergeant York Air Defense Gun, mounted on a high-mobility, multiwheeled vehicle. This system will provide short-range air defense (SHORAD) for organic or assigned divisional assets in accordance with the priorities set by the division commander. LADS will complement the other SHORAD systems by providing a mix of technologies and weapons. Its mobility, transportability, and lethality will allow it to perform its part of the SHORAD mission along with future combined arms forces (CPT Rothwell, AUTOVON 978-4141, ATSA-CDM)

SERGEANT YORK AIR DEFENSE GUN SYSTEM—Named after SGT Alvin C. York (upper left), this air defense gun system roars through recent tests. The Sergeant York has twin 40-mm cannons mounted on an M48A5 tank chassis and features radar-directed fire control. Alvin York, noted for his bravery and sharpshooting during World War I, is the first enlisted soldier for whom the US Army has named a major weapon system. A scale model of the weapon system was presented to Mrs. Alvin C. York at her home in Pall Mall, TN.

BLACK HAWK completes Hellfire test

The US Army's External Stores Support System (ESSS) prototype for the UH-60A BLACK HAWK helicopter has successfully completed initial firing demonstrations of the Hellfire missile at Redstone Arsenal, Huntsville, AL. The demonstrations were conducted jointly by Sikorsky, Rockwell Missile System Division, and the US Army Missile Command.

Technicians at Redstone Arsenal load a Hellfire antitank missile onto an ESSS rack during BLACK HAWK/Hellfire missile test.

In May this year, three ballistic Hellfire antitank missiles were successfully launched from the UH-60A equipped with the ESSS:

•A missile was remotely launched with the aircraft secured on raised ground platforms.

•A missile was launched by the cockpit crew with the aircraft in a 50-foot hover.

•A missile was launched by the cockpit crew with the aircraft at 90 knots in forward level flight.

The results of each firing confirmed BLACK HAWK stability as a Hellfire launch platform. Data indicated that the missile separated safely, that no toxic gas from the missile plume entered the cockpit or cabin, that noise levels during launch were acceptable, and that the missile's plume does not heat up any of the airframe structure.

The ESSS consists of horizontal support structures mounted on each side of the aircraft. The structures are equipped with four stores stations which can accommodate auxiliary fuel tanks and a wide range of other stores to increase the BLACK HAWK's mission flexibility.

The external fuel tank system accommodates two 230-gallon tanks in the outboard positions and two 450-gallon tanks inboard. The use of all four tanks permits significant extension of endurance and range, making the BLACK HAWK self-deployable over long distances. Using the two 230-gallon tanks, a three-man crew and 11 troops can fly extended assault missions.

The ESSS is designed for rapid field conversion so that tactical deployment can be responsive to the battlefield scenario. The ESSS structures can be installed or removed by four maintenance personnel in approximately 40 minutes. The US Army plans airframe modifications on all BLACK HAWK aircraft for installation of the ESSS which will be supplied in kit form for use as needed.

US Army operational tests are scheduled for early 1983, with first production deliveries scheduled late in 1983 (Sikorsky News).

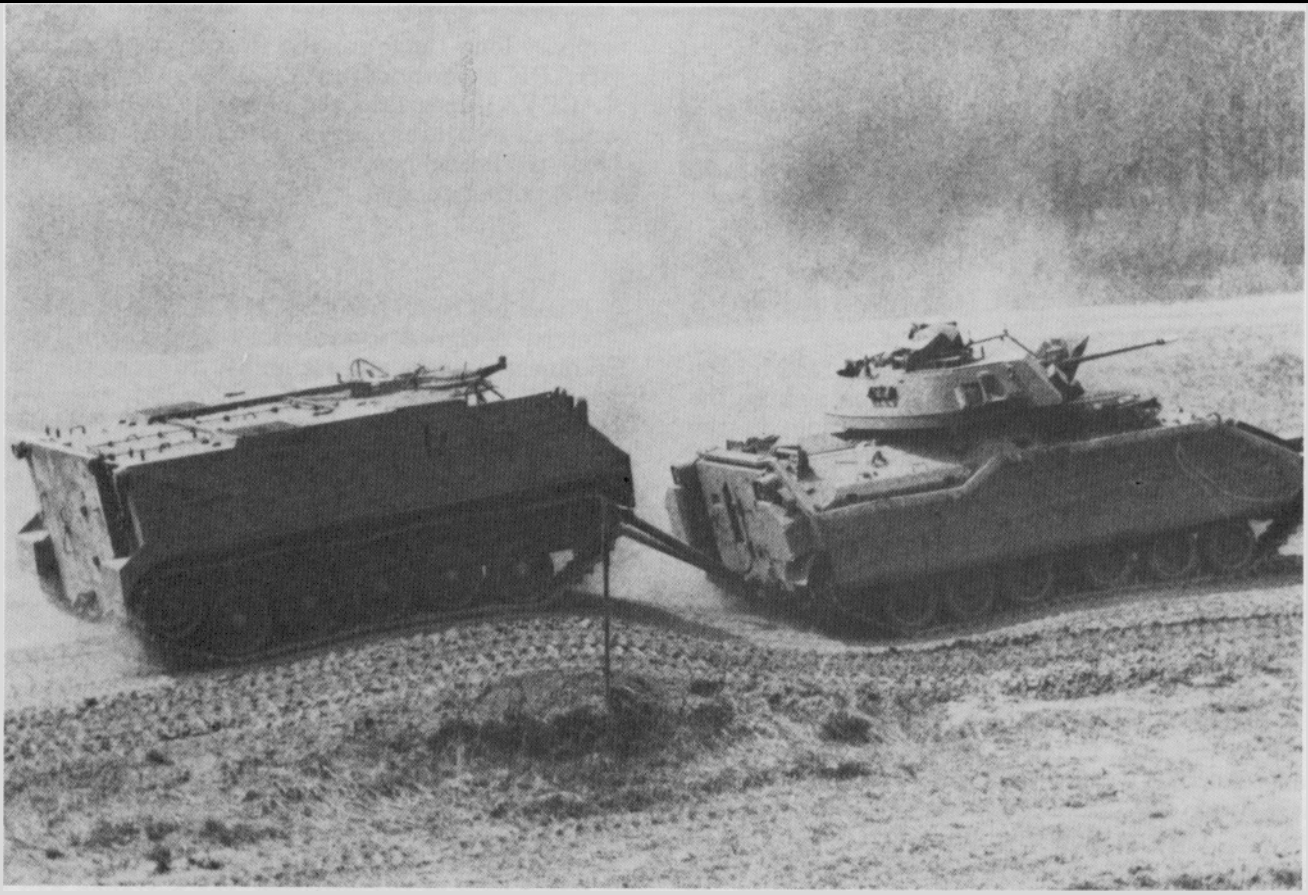
Patriot unit activated

The US Army's first Patriot battalion, the 1st Battalion, 43d ADA, was recently activated at Fort Bliss, TX. Assigned to the School Brigade, the battalion will be equipped in the near future with the Army's newest sophisticated air defense weapon system—the Patriot missile. The unit is expecting to take delivery of its full complement of equipment in early February 1983. The Patriot missile is currently being procured by the US Army from the Raytheon Corporation and will replace the aging Nike Hercules air defense missile system.

Organized under a Department of Army approved table of organization and equipment, the 1st Battalion, 43d ADA, will eventually include 483 assigned personnel distributed among three firing units and a headquarters battery.

The unit traces its lineage to the original 107th Company, which was assembled on 14 August 1901 as a coast artillery unit. After several reorganizations, the unit eventually became the 1st Battalion, 43d ADA. It was activated on 31 July 1979 at Fort Richardson, AK.

The new Patriot battalion will function as a training unit at Fort Bliss after receipt of its equipment. (Dennis Prevost)



A Bradley Fighting Vehicle tows an M113 armored personnel carrier over a rough terrain course at Aberdeen Proving Ground as part of its advanced testing program. The new fighting vehicle, now type-classified, has undergone more than three years of extensive testing. Once fielded, the new vehicle will augment some of the troop carrying functions of the M113 family of vehicles.

TACEVAL. . .
Pershing's ARTEP

by LTC Myron F. Curtis

The early morning darkness is pierced by the ring of a telephone at 0215 hours. You pick up the receiver and hear the crackle of a radio in the background. A crisp, professional voice says "Sir, we have a readiness test." You know by the sound of his voice that the NATO evaluation team is present in the battalion operations center (BOC).

This is how a Pershing Ia missile battalion's annual NATO Tactical Evaluation (TACEVAL) begins, which is similar to the way an evaluation might start for any artillery battalion stationed in Europe, but the similarity ends there.

Pershing Ia battalions in Europe have dual high-priority nuclear missions. On a 24-hour-per-day basis, a firing battery is deployed to a remote tactical firing site (called Combat Alert Status (CAS) site) on a Quick Reaction Alert (QRA) mission in support of the Supreme Headquarters Allied Powers Europe (SHAPE) planned defense of Europe. This mission is never dropped, even for a full-scale battalion tactical evaluation. The second, but equally important mission, is to provide general support long range missile fires in support of the SHAPE's subordinate units. The NATO TACEVAL measures the battalion's ability to execute all measures necessary to transition to a wartime readiness posture and support nuclear fire plans during combat.

Phase I

Phase I of the NATO TACEVAL is a "no-notice" exercise designed to evaluate the battalion's daily readiness posture and its ability to transition to a wartime readiness posture.

In 1981 the Phase I alert caught the 1st Battalion, 41st Field Artillery, in an awkward deployment (don't they always?). The battalion was changing battery responsibility on the CAS site while two batteries were split over a distance of 90 miles.

•Delta Battery's command and control and one firing platoon were in garrison. Two firing platoons were at the CAS site, one platoon was march ordered and prepared to return to garrison, and the other firing platoon was still on "hot" status.

•Charlie Battery's command and control and two platoons were at the CAS site. One platoon was on "hot" status with the other positioning its missiles over the tactical firing point. The third firing platoon was still in garrison, prepared to convoy to the CAS site.

Regardless of the situation, the battalion had to demonstrate its capability to deploy to the field in support of war plans. The simplest and quickest way was to task organize. The Delta Battery commander

assumed operational control of the Charlie Battery platoon (which was prepared to move) and ordered it to convoy immediately to garrison. Finally, the Charlie Battery commander assumed operational control of the Delta Battery firing platoon which was still on "hot" status. Decisions were made and the necessary "frag orders" issued.

One hour after the alert, six batteries were busy loading mission-essential and personal equipment, and battery special weapons convoys were forming. Soon they would be on the road to the storage area, under control of the service battery executive officer. Since the battalion command and control radio net had been fully operational for more than 30 minutes, status reports flowed into the BOC and the assistant S3 quickly updated the battalion field status board.

The NATO evaluators, present in every battery (to include the unit at the CAS site), observed the load-out, tested operations personnel on knowledge of war plans and alert procedures, determined the status of equipment, and selectively checked individual TA50 equipment. Within two hours, battery convoys began forming on the kaserne and at the nearby missile storage area. As each battery commander was satisfied that his unit convoy was fully prepared to move to its simulated wartime field position, he notified the chief evaluator and the NATO team began a very detailed inspection of loading plans, equipment, vehicles, and personnel.

When the NATO evaluators completed their evaluation, all batteries were released to begin the task of unloading equipment. Approximately eight hours had elapsed since the alert was initiated and a great deal of work still faced every soldier before things would be back to normal.

The Phase I TACEVAL lasted 12 hours and then battalion personnel were briefed on the strengths and shortcomings noted by the NATO evaluation team. They were also reminded that in about 45 days the Phase II evaluation would test the battalion's ability to move to the field, survive in a hostile environment, and support wartime plans.

A Pershing Ia battalion is composed of a headquarters and headquarters battery, a service battery, and four lettered firing batteries. The battalion has a combined strength of more than 1,400 soldiers—the largest combat battalion in the Army. Third echelon maintenance support is provided by organic ordnance, engineer, and signal maintenance personnel. Each firing battery has three organic firing platoons and the necessary food service, maintenance, communications, survey, and administrative personnel to sustain itself in independent operations for extended periods.

When a Pershing Ia battalion is deployed in the field, it can launch 36 nuclear-capable missiles, without reloading.

It is this mammoth organization of 36 missile launchers, 392 vehicles, 186 trailers, 159 generators, and 194 radios that is tested during Phases I and II of the NATO TACEVAL.

Phase II

The Phase II tactical evaluation begins with a simulated increased state of alert throughout Europe that causes the battalion to deploy to wartime field positions. One battery immediately emplaces its missiles and "generates" (assumes target coverage) on the CAS battery targets. As quickly as possible, the CAS battery deploys to the field (during the TACEVAL, the CAS battery simulates the move and remains on status; as stated earlier the QRA mission from CAS is never dropped, even for a full scale TACEVAL).

As the simulated wartime scenario continues, all NATO forces join in the defense of Western Europe against a surprise enemy attack. The aggressor advances across the theater front, and the readiness of the NATO units increases to full wartime posture. As each level of alert is declared by NATO, additional high priority targets are covered by Pershing missiles and an ever-increasing demand is placed on the battalion missile assets.

Aggressor activity increases and firing platoons and battery positions are attacked by ground and air forces using conventional and chemical munitions. Battalion personnel go into full chemical protective suits and continue their mission.

As positions are compromised by enemy action or if the tactical situation dictates, the battalion S3 cross-tasks target coverage and moves units to increase their probability of survival. (Each time a firing platoon receives a fire mission and simulates a missile launch, it is moved.)

The enemy continues to attack and NATO is pressed across the entire front. Additional target taskings are received until all firing platoons are in a fully ready status prepared to support the general war plans. Target coverage is paramount and units continue to work through NBC (nuclear, biological, and chemical) attacks, nuclear fallout, or enemy ground attacks without moving. Finally, the release orders are received and the simulated launching of missiles occurs throughout the battalion. Units march order and prepare to deploy to their next field position. Service battery begins to resupply the follow-on missiles, and the process continues. After four days in the field under conditions that test the battalion's ability to sustain itself in combat, the Phase II TACEVAL is complete.

A Pershing Ia battalion is specifically organized and equipped to provide a quick, reliable, accurate, and mobile nuclear strike force in defense of the free world. It is primarily employed in the Quick Reaction Alert role. At the same time, however, because of its flexibility, Pershing Ia retains the mission capability of general support of the field army. This is what the TACEVAL tests.

LTC Myron F. Curtis is the Commander of the 1st Battalion, 41st Field Artillery.

Right by Piece

NOTES FROM UNITS

Aerial observers extend eyes of artillery

FORT LEWIS, WA—If war comes, the first female aerial forward artillery observer may not be in the frontlines—just close to them. She is 1LT Mary Fullam of the 9th Division Artillery who, along with SP4 James Smith, was the first at Fort Lewis to earn aerial observer wings.

The observers learn vehicle identification, map reading, and other intelligence techniques.

FORT LEWIS, WA—Following the detonation of five pounds of TNT and 385 gallons of contaminated fuel, a mushroom cloud rises over Fort Lewis. The explosion, initiated by the 3d Battalion, 34th Field Artillery, 9th Infantry Division, as part of their Army Training and Evaluation Program, added realism to the nuclear portion of the testing at mortar point 10. Soldiers from the 9th Division Artillery's Chemical Section, the Division's 164th Chemical Company, and the Division's 15th Engineer Battalion, set up the blast which left a crater 25 feet wide and 8 feet deep. (Photo by SP4 Karen Ruckman)

Fullam may well be the first woman in the Army to complete training in this highly-skilled specialty.

COL Raymond Haddock, 9th Division Artillery Commander, said he will eventually have five forward observers assigned. The aerial observers form a vital link between the artillery batteries and cavalry brigade air attack helicopter pilots radioing back reports on where the enemy is and how to engage him with artillery.

Armed with binoculars, a radio, and a map, the observer and a helicopter pilot hover over treelines and spot any enemy movements. Then the chopper drops out of sight of the enemy radar and ground-to-air missilemen. When the observer gets the "shot" signal from the gun battery, the pilot pops the aircraft up to catch a look at the "splash" of artillery rounds on the targets. Timing of this sequence is crucial (they may have only about 10 seconds).

Haddock noted that the artillery has the ability to engage targets at extended ranges because of technical improvements and that "about the only thing we've got left to extend is our eyes."

COL Thomas H. Harvey, 9th Cavalry Brigade Air Attack (CBAA) Commander, said that aerial observers were used in Vietnam, but the number has been much reduced since then. However, they fit very well into the high technology, light division concept of forces support by fast-attack helicopter, he said.

He said the CBAA force includes 147 helicopters, among them 50 Cobra attack ships and 28 Black Hawks.

FORT RILEY, KS—SFC James Turnbow, an instructor from the Field Artilery School's Counterfire Department, gives instruction to cadets at the Fort Riley, KS, ROTC Advanced Camp on the PADS artillery survey system. (Photo: by CPT Jim Reese).

MLRS battery

FORT RILEY, KS—The Army's first Multiple Launch Rocket System (MLRS) Battery will be arriving at Fort Riley in February 1983.

Activated at Fort Sill on 8 April 1982, the battery is the first MLRS unit to be assigned to a field unit. It will come to Fort Riley as Battery D, 3d Battalion, 6th Field Artillery.

The members of the battery have been together since basic training and advanced individual training (AIT) at Fort Sill.

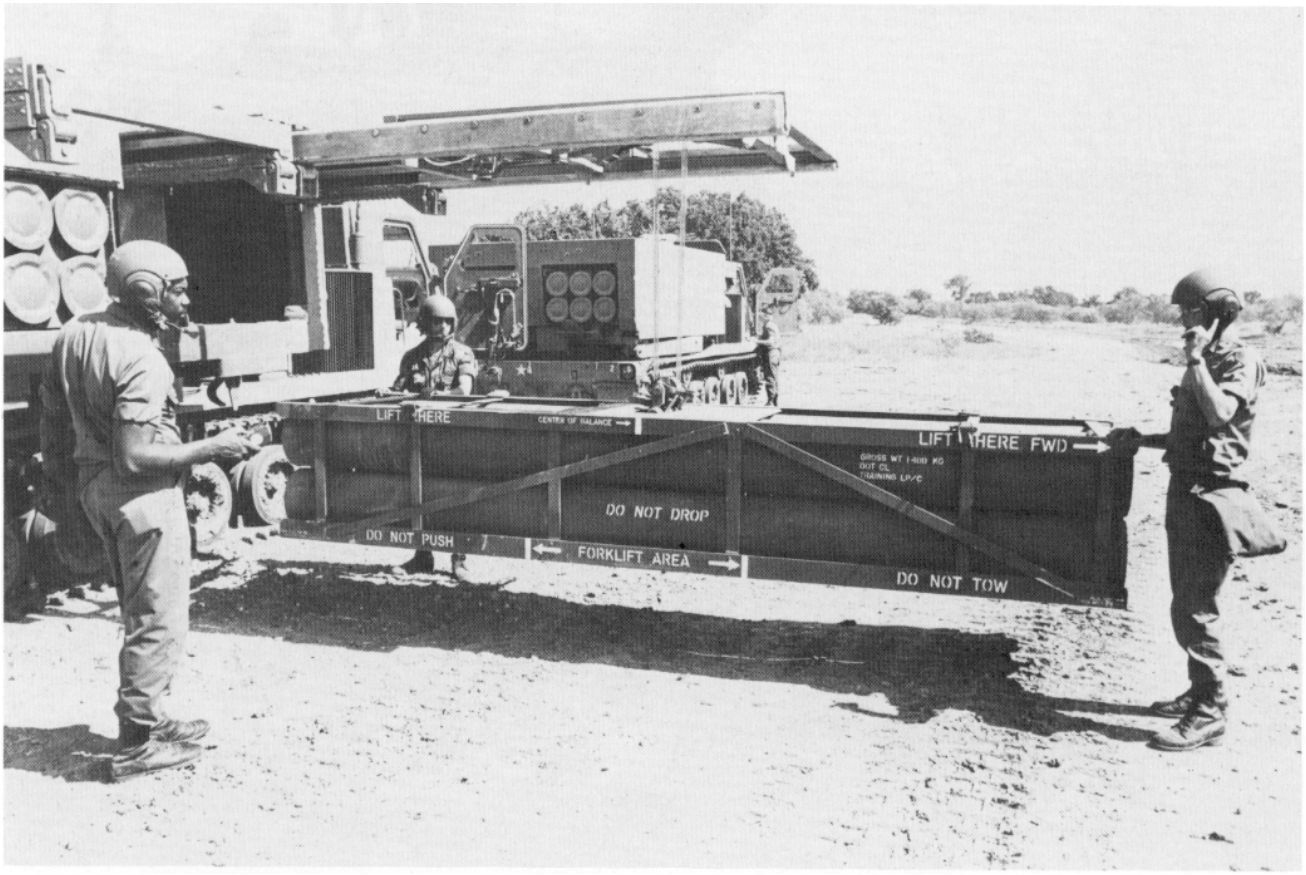
After AIT graduation, the soldiers began collective training on the new weapons system at the US Army Field Artillery Training Center. This training included intensive instruction at the section, platoon, and battery levels. After collective training, the soldiers will be evaluated by the US Army Field Artillery Board.

This month (September) the unit will take part in the Operation Test III of the MLRS and will get a chance to live fire the weapon at Fort Bliss, TX.

SGM Eugene Thompson, 3d Bn, 6th FA, visited Oklahoma to check on the progress of Battery D. "The men are fantastic," he said. "They are all really enthusiastic about their jobs and consider MLRS a real challenge. The training is coming along as scheduled. The only trouble that unit is having at all is that equipment is still arriving."

"The mission of Battery D when they arrive at Fort Riley next year will be reinforcing the fire of the 1st Infantry Division (Mech)," the sergeant major concluded.

SGT Phillip Battle punches the numbers into the fire direction control panel as SGT Clyde Long watches. The panel is inside one of the platoon's five self-propelled loader/launchers and can communicate to the computer device in the platoon headquarters tracked vehicles.



SP4 Wayne Poole (left) pushes the button to remove the launch pad container from the self-propelled loader/launcher (SPLL) while PVT Brendon Patnode (center) and SSG Donnelly Caldwell (right) look on.

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The Field Artillery Board

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