

FIELD ARTILLERY JOURNAL

September-October 1975

ACCB!



FIELD ARTILLERY JOURNAL

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Number 5

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

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

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Pictured on the cover are members of the 1st Battalion, 77th Field Artillery, in support of ACCB.

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Articles

A Case for Land Navigation Systems 7
by Dr. Thomas J. Welch

The Downrange Agent 14
by David J. Salonimer

Air Cavalry Combat Brigade 18
by COL William H. Schneider

The Laser Rangefinder 31
by MAJ Jean Reed

The Observation Post in Defense 36
by LTC A. Vasil'chenko

Artillery Support in the Yom Kuppur War 40
by Brigadier T. L. Morony, O.B.E.

Smoke! 44
by CPT L. Kirk Lewis

**The Field Artillery in Vietnam
Part IV (Continued)** 46
by MG David E. Ott

Fire Support Symposium 52
by MAJ Robert G. Tetu Jr.

Features

A word from the editor 2

Incoming 3

Forward Observations 6

The Journal Interviews . . . 11

View From The Blockhouse 25

Right By Piece 56



pg. 11



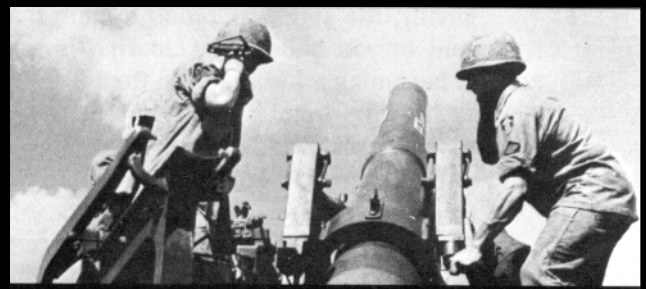
pg. 40



pg. 44



pg. 56



pg. 46

a word from the editor

Although we are still in the process of collecting and compiling the responses from our May-June readership survey, I thought you, as readers, might be interested in some of the information that has come to light at this point. Based on your returns, almost 60 percent of you are active duty, while over 36 percent are serving in reserve component units. Although 73 percent are officers, we were delighted to find that more than 23 percent of our surveys were returned by NCOs and enlisted personnel, 20 and 4 percent, respectively. Over 45 percent of you are in howitzer units, while another 45 percent responded from staff sections, service schools and other agencies. Only 8 percent responded from rocket/missile units. Judging from the returns, the **Journal** is pretty well read — 42 percent indicated reading all of each issue and 43 percent read most of the **Journal**. As a group, **Journal** readers tend to be well educated with 20 percent having high school degrees, 53 percent college degrees and a surprising 25 percent with graduate degrees. Of our standard features, you most enjoy reading about happenings in troop units as indicated by 75 percent of the returns in favor of "Right By Piece." Other features receiving over 50 percent of your votes include "Incoming," "Forward Observations" and "View From The Blockhouse."

A heavy 92 percent of the returns indicated a desire for more emphasis on FA tactics, techniques and organization; 58 percent expressed interest in FA innovations; and 30 percent desire more coverage of history, strategy and foreign armies and equipment. It was also noted that 36 percent of you pass your **Journal** on while 64 percent hang on to it. Finally, the staff was proud to note that over 93 percent of you believe the **Journal** is making progress in becoming a forum for all Redlegs.

Judging from a series of articles and features recently received, it is evident that most howitzer units are making excellent use of their M31, 14.5-mm trainers. One way to increase the effectiveness of this training device is to make the range as realistic as possible. CPT Cris Reineke of the USAFAS Gunnery Department was given a "mission-type" order to rebuild the Fort Sill range,

making it more realistic. The results are shown on page 25, along with some tips for your own range. We invite your attention to the feature and encourage other units to pass along to us their range innovations. We hasten to add that Captain Reineke was ably assisted by our fine TASO and Post Engineers.

We have one article in this issue in which the author takes somewhat differing views from those held at the FA School. British Brigadier T. L. Morony presents his analysis of the artillery employment in the last Arab-Israeli war.

Those interested in FA tactics and techniques will want to read COL Robert Schneider's excellent review of the fire support required for the Air Cavalry Combat Brigade, as well as CPT Kirk Lewis' article on the use of smoke. After leaving the Naval War College, COL Schneider assumed command of the 25th Division Artillery. Captain Lewis is assigned to the Gunnery Department.

David Salonimer of Redstone Arsenal, a pioneer in the development of laser guidance technology, has provided a futuristic look at the possible evolution of today's forward observer. Lasers are also the subject of MAJ (P) Jean Reed's article. Jean, author of the HELBAT article in our May-June 1974 issue, discusses adjustment procedures using the laser rangefinder.

Dr. Thomas J. Welch at Aberdeen Proving Ground brings us up-to-date on the latest developments in land navigation. MAJ Bob Tetu, also a former contributor, has sent us the information on a very well received fire support symposium recently held at Fort Carson. Company and field grade representatives from all combat and combat support units of the 4th Division participated.

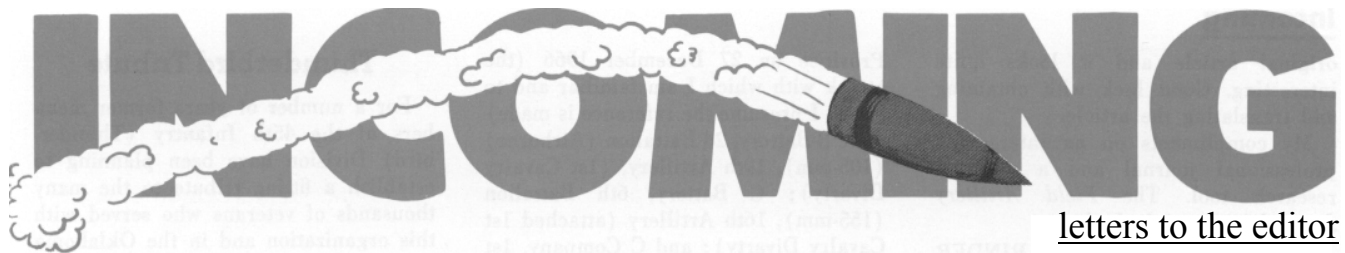
This month's interview is with BG Sidney Davis of the USAF Tactical Air Command staff and deals with fire support coordination and new AF equipment developments. Thanks also go to LTC George O'Grady of Headquarters, MASSTER, for his short piece on FAARP, the Forward Area Arming and Refueling Point. Lieutenant Colonel O'Grady also had another article of his, "The SHOTGUN Is Here," published in the April 1975 issue of **Aviation Digest**.

We have attempted to "touch all the bases" you mentioned in your readership surveys so, if we have missed something, let us know.

Enjoy your **Journal**!

editor

INCOMING



letters to the editor

Critique

. . . I have found your magazine to be excitingly informative, as well as comprehensive; quite unlike that preponderous publication *Air Force*.

Re: May-June 1974.

"The Greatest Gun," Edwards, MAJ Robert, was the kind of article that whets the appetite for more of the same; well done.

"Sultan Mehmet the Conqueror," VanderClute II, CPT Burt A., is one of those strikingly surprising moments in history that school history books seem to have forgotten about. Your author wrote this fascinating article in a style that is highly commendable and enjoyable; thank you.

Back page: It is quite delightful to find someone besides the British who doesn't mind gracing a cover with a well-done and executed painting of a soldier from our past.

Re: November-December 1974.

Your fronts-piece/jacket collage was quite well done, and it would be quite interesting to see your artist follow through with his illustration of the (what I've determined to be) XM-204. Very well done.

The rest of the journal was, to paraphrase the title on page 50, "Grande." Superb, and any other superlatives will equally fit.

"Basic Directions in the Training of Artillery and Missilemen" was a valuable insight into the working mind of a potential enemy, and a must for the serious student of modern day armies.

"The 1973 Neareast War" is a goldmine of information, for all persons concerned

"Captured," Reeder Jr., CPT William S., is an article that every member of every branch of the armed forces should be required to read. I would appreciate it very much if you could forward my vote of thanks to this brave man, for his article has inspired me to go on living; events surrounding certain aspects of my incarceration have done little to show me

anything positive, but this article lifted me out of my pit of self pity.

"Grande Cadence de Tir" was informative, but, it would be nice to see a small scale drawing accompanying such articles in the future.

"Beyond Deterrence," Ellis, MAJ Ronan I., was a bit confusing at times, as the author seemed to wander from the theoretical to the problematical to the humanistic to the "garden of roses" and back, though not necessarily in that order. War is hell and all of that, but either come right out and say, "We are going to blow you and everything you have into infinity, regardless of the cost, if you don't get the hell out of our territory," or just give the reader the statistical probabilities of such an action. I fear the article was just a bit too much; too much tedium, that is.

"Call Me Admiral," VanderClute, COL Burt A., would seem as if we are relearning the lessons that were supposedly learned in WWII, Korea and Vietnam. I must say though, it's about time that a comprehensive method of instruction/liaison has been effected

LAWRENCE O. ROBERTS
Minnesota State Prison
Stillwater, MN

Greatest Gun

A note has been on my desk for all too long to write to you in reference to the article, "The Greatest Gun" (May-June 1974 *Journal*).

I do not have the magazine at hand but I do recall that there was some question as to who took the pictures of the big gun at the Grafenwoehr proving grounds. I believe they were taken either by or for my brother, COL John Mesick (now deceased), a 1918 USMA graduate and a Field Artillery officer for over 30 years.

At the time that he visited Grafenwoehr, John was a member of the Liaison Mission with the USSR in Berlin under his classmate, GEN Lucius Clay. I visited him there in the fall of 1947 and

remember that he showed me these photographs because of my interest as an Ordnance officer in artillery design.

My brother served several times at Fort Sill — in the School of Fire and with the Observation Battalion — and may have sent in prints of his photographs to the School. I hope this will be of interest.

Benjamin S. Mesick
COL (Ret), ORD
Tucson, AZ

You may be right though the Morris Swett Technical Library, USAFAS, attributed the photos to a Major Busbe. —Ed.

I recently picked up several copies of the *Journal* at the Fort Sill Gift Shop. In these issues from 1974 and early 1975, I found your article and further articles and letters on the German 800-mm gun ("The Greatest Gun," May-June 1974 *Journal*). Although my main interest is in armor and US artillery, one cannot help but be fascinated by "Dora" and the legends surrounding it. I believe I may have found some material that may help clear up the weapon's fate.

While researching some specialized armored vehicles, I was thumbing through some old copies of the *Military Review* and found the enclosed paragraph on the gun. Since I had already noticed that the library had old copies of the *Illustrated London News*, I sought the original article and found the one that I have copied and enclosed. I apologize for the poor reproduction of photographs but I had to settle for photocopies. The key information provided here is that the gun was scrapped under the US Army supervision around 1949 — too late to be a war trophy and too early to survive into the period where history is assuming a more prominent role in shaping the future.

I was interested to note that one of the *Journal's* follow-up articles mentioned the possibility of reprinting the *Waffen Revue* [Weapons Review] article on "Dora." I hope that this becomes a reality as I have seen the

Incoming

original article and it looks quite interesting. Good luck with obtaining and translating the article.

My compliments on an interesting, professional journal and a valuable research tool. The *Field Artillery Journal* is certainly both.

GARY BINDER
Lincoln, NE

The material inclosed by Mr. Binder has been forwarded to LTC Robert Edwards, author of "The Greatest Gun."—Ed.

Downrange Agent

In your March-April 1975 issue, LTC C. L. Williams III presented a discussion on CLGP. The included discussion signified a growing awareness of the emerging downrange agent assisted terminally launch weapons. The enclosed candidate article whimsically extends such rationales.

It is my objective to stimulate interdisciplinary dialogs on prospective syntheses of such technology opportunities. The artillery forward observer will often have the needed vantage point to assist in close support activities, whether implemented with dedicated cannon, manned or unmanned aircraft, RPVs, ship-mounted guns or even robot ground mobility.

David J. Salonimer
US Army Missile Command
Redstone Arsenal, AL

See article, page 14.—Ed.

Layout Cited

The May-June issue of the *Journal* arrived a few days ago and once again I have enjoyed reading and studying it. I have one criticism, of an editing and layout nature, of the article "In Order to Win" on page 18.

The placement of the narrative discussion about the Beehive round (including the statement: "Perhaps its best known use being during the enemy attack on Landing Zone BIRD") with respect to the photograph and caption immediately above ("A and C Batteries, 2d Battalion, 77th FA, in LZ BIRD firing charge 1 at retreating Viet Cong") is misleading. Unfortunately, it sets the stage for creation of a historical myth in the minds of new field artillerymen — BIRD happened more than eight years ago — which does an injustice to the actual participants.

The units at LZ BIRD in Binh Dinh

Province on 27 December 1966 (the attack with which I am familiar and to which I presume the reference is made) were B Battery, 2d Battalion (Airborne) (105-mm), 19th Artillery, (1st Cavalry Divarty); C Battery, 6th Battalion (155-mm), 16th Artillery (attached 1st Cavalry Divarty); and C Company, 1st Battalion, 12th Cavalry. The latter unit protected the firebase and one of its members, SGT Delbert O. Jennings, won the Medal of Honor for his leadership and heroism in regrouping personnel to conduct an effective ground defense. B Battery won the Presidential Unit Citation and two field artillerymen (1LT John D. Piper, B Battery XO, and SFC Carroll V. Crain, B Battery CFB) won the Distinguished Service Cross for manning a howitzer in the face of heavy enemy fire and firing the two Beehive rounds which stopped the enemy's main attack. Numerous other decorations for valor were awarded to personnel of all three units.

Perhaps the photo caption is correct for another time and place. (The records may show another LZ BIRD elsewhere.) The point of this criticism, though, is that the *Journal* must be accurate as possible — if necessary, to the point of verifying "official" history. Further, the *Journal* should strive to be — indeed, in this opinion, must be — the faithful recorder of contemporary US Field Artillery history and the guardian and proponent of US Field Artillery traditions, in addition to its basic professional role. In this regard, perhaps the *Journal* could begin a regular series of one-page vignettes on FA units — battalion and separate battery — which served in Vietnam.

Keep up your good work.

Charles W. Raymond III
MAJ, FA
Fort Leavenworth, KS

Additional information concerning the action at LZ BIRD in December 1966, may be found in the excerpt contained in this issue. We did not mean to imply through the combination of the photo and the text of the article, that elements of the 2d Battalion, 77th FA, were engaged on the LZ during the night in question. If other readers drew that implication, it was unintentional and we regret it. We hasten to add that responses such as MAJ Raymond's greatly assist us in our role as the recorder of contemporary US Field Artillery history.—Ed.

Thunderbird Tribute

For a number of years former members of the 45th Infantry (Thunderbird) Division have been planning to establish a fitting tribute to the many thousands of veterans who served with this organization and in the Oklahoma National Guard, both in peace and war.

In recent months, we in Oklahoma have drawn much nearer to this goal through the retention of two state buildings and the formation of an active Museum Board under the guidance of this department.

We are looking for weapons, uniform items, military gear and correspondence, maps, captured papers and maps, weapons and enemy equipment, photographs, military newspapers and publications, etc. Individuals may send any appropriate item or a list of items to this Department, ATTN: 45th Infantry Division Museum. Donors will receive a form listing the items received along with our sincere and heartfelt appreciation for their assistance in this most worthwhile project.

I, therefore, solicit your cooperation in giving this endeavor wide publicity in your area.

John Coffey Jr.
Major General, OKARNG
The Adjutant General

Firepower

Congratulations to you and your small staff for the excellence of the new *FA Journal*! The following comments stem from a background of battery and battery commands in combat WWI, corps artillery command in WWII — all in Europe; divarty command in Korea; also tours of duty at FA School and FA Board. The mass of active duty FA officers of today have known only Korea and Vietnam. The massed usage of FA firepower as employed by modern European armies in WWI and WWII can only be history to them.

Yet this is the type of warfare that Russia and her Warsaw Pact allies are prepared to use in any eventuality.

Knowledge of and orientation to this type of warfare is a must for today's personnel.

In addition to articles on technique, the *FA Journal* has a duty to pound away at all that relates to necessary artillery power in our Army. You have made an excellent start in the articles



New AC

BG Albert B. Akers has been named the School's Assistant Commandant. With more than 24 years of distinguished military service since his graduation from West Point in 1951, General Akers assumes the post with an impressive record of field artillery experience. His assignments have included overseas duty in Italy, Thailand and Vietnam in jobs ranging from forward observer to commander of the 2d Armored Division Artillery. He also served as the Chief of Operations, G3, for I Field Force Vietnam and commander of the 6th Battalion, 29th Field Artillery. During his career the general has spent more than eight years in infantry and armored divisions, gaining a full appreciation and understanding of the combined arms team. General Akers was previously assigned as the School's Director of Instruction since August 1974. We wish him well in his new job.

— "Historical Precedent for Today's Modern Battlefield" and "Mass Fire in WWI."

I have been disturbed by lack of such thinking in many places [and] I am not alone in this view

R. P. Shugg
BG (Ret)
San Francisco, CA

No Number

The July-August 1974 issue of the *Journal* contains an excellent photograph on page seven of a battery firing at high angle. Adjacent to the photo is a letter from LTC William H. Schneider detailing the background of the picture tailing the background of the picture — namely, that it shows Battery C, 2d Battalion, 9th Field Artillery, in early June 1966.

I would like very much to have a

copy of this photograph for my office. Although I realize that you do not have the facilities to fulfill all requests such as this, I would be most appreciative if you could furnish me with the serial number of the picture. I could then request it from the Army Audio Visual Agency.

I await every issue of your very professional publication with great anticipation and enjoy it from cover to cover.

James R. Kerin
1LT, FA
2d Bn, 11th FA
25th Division Artillery

We regret that we are unable to provide the photo's serial number. As Colonel Schneider stated in his accompanying letter, ". . . no one knows its origin."—Ed.

Newport Artillery

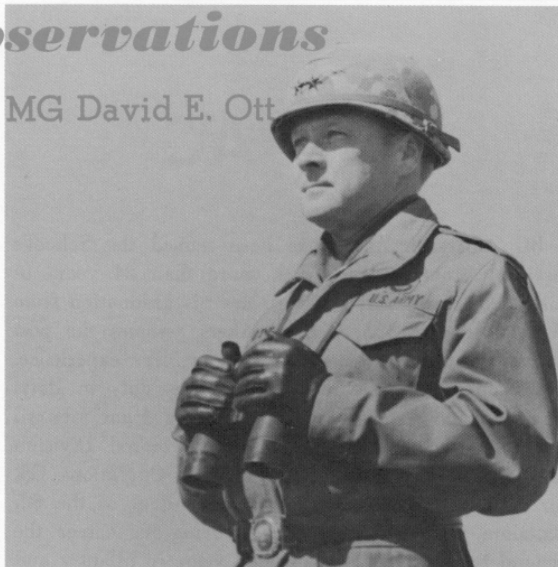
There follows a report of Army Bicentennial activities planned and executed by the "Redlegs" among the Army officers assigned as students, staff and faculty at the Naval War College which should be of interest this season to your readers.

The 50 Army officers assigned to the Naval War College conducted a retreat ceremony and pageant commemorating the Army's bicentennial anniversary, 14 June 1975, in historic Washington Square, Newport, RI. During the ceremony planned by COL William Schneider, FA, the Newport Artillery Company (a militia unit in continuous service since 1741) paraded uniforms of the Army dating from the colonial

(continued on page 55)

forward observations

MG David E. Ott



The recent series of draft training circulars published by the Field Artillery School urges field artillerymen to be more responsive in providing fire support. These circulars include changes in doctrine, tactics and techniques intended to assist us in this responsive requirement. However, in our effort to place fires as rapidly as possible, we must not overlook fundamental gunnery at the firing piece itself.

In the May-June issue of the *Journal* I addressed the problem of firing battery errors that surfaced during our HELBAT IV tests and during a later independent evaluation. In my opinion, this critical subject deserves further discussion.

Through the HELBAT IV series of tests in which the Field Artillery Center developed preliminary techniques for the use of cannon launched guided projectiles, hundreds of rounds were fired in an extremely responsive mode in order to come close to moving targets. We had accurate plots on all of these rounds and, in a later analysis, we were alarmed at the number of errors that had crept into our gunnery system. Most of these errors apparently came from careless work on the pieces where gun crews, in their attempt to be as fast as possible, were not taking up loose motion in the same direction and were not leveling bubbles carefully.

Revised Draft Training Circular 6-20-1 (pages 19 and 34) indicates that at times we need to emphasize speed over pinpoint accuracy. This emphasis on giving up pinpoint accuracy applies primarily to target location, *not* to the cannoner's duties at the weapon.

On page 42 of Draft Training Circular 6-40-1 we discuss the use of a higher charge to reduce time of flight to get steel on the target faster. In our instructions on survivability we also emphasize that the use of higher charges producing lower trajectories makes the locating of our weapons more difficult for the enemy. We must be careful that this technique does not degrade our accuracy to an unacceptable level.

As an example, let's look at firing charge 5 instead of charge 2 at a range of 4500 meters as indicated in the TC. (Figures are extracted from FT 155-AH-2. Values extracted from FT 155-AM-1 provide a similar comparison.) Charge 5 at that range shows an elevation of 206.6 mils and a range probable error of 10 meters. By comparison, charge 2 requires an elevation of 527.1 mils and has a range probable error of 20 meters.

The range probable errors show that charge 5 is more precise than charge 2 at 4500 meters. Precision, however, is not the key issue. Let's look at the change in range for a one mil change in elevation: for charge 5 it is 18 meters; for charge 2, 5 meters. Herein lies the significance of leveling the bubbles. Any carelessness in the lay for elevation with the higher charge has a much greater effect on accuracy at the point of impact.

I commend to your reading the article "Howitzer or Gun?" by James W. Porter, published in the January-February 1974 *Field Artillery Journal*. The following is a quotation of one paragraph of that article.

"Another factor that has probably led to the erroneous association of large probable errors in gun-type artillery weapons is the smaller angle of fall related to the flatter trajectory, particularly at shorter ranges. This results in a much larger change in range for a one mil change in elevation. As an example, when firing the M109 howitzer, charge 7, at a range of 12,000 meters, the change in range for a one mil change in elevation is 14 meters. At the same range when firing the 155-mm gun with supercharge, a one mil change in elevation results in moving the fall of shot 38 meters. This is not of particular significance unless small errors are made *in laying for elevation or in leveling bubbles on the weapon*. When such errors occur, as they often do, particularly under battlefield conditions, a two or three mil error in elevation of the gun is much more obvious on the ground than it is with a howitzer, e.g., 76 to 114 meters with the gun versus 28 to 42 meters for the howitzer at a range of 12,000 meters. As range increases for the gun, the angle of fall becomes greater and the difference between gun and howitzer lessens in this respect." (Emphasis added.)

When a howitzer is fired with a high charge it is functioning essentially like a gun fired at short to medium ranges and the projectile has the same characteristics in the impact area; low angle of fall, large change in range for one mil change in elevation, and *extreme sensitivity* to taking up loose motion the proper way at the piece or failure to level the bubbles!

Indeed, we must be more responsive in our request for fire. We must learn to shortcut fire commands; we must learn to use simplified gunnery procedures; we can trade some accuracy in target location and in the FDC for speed; but, we must never allow our concern for speed to override our fundamental procedures for insuring that we deliver the most accurate fire possible. We must pay constant and meticulous attention to keeping the bubbles level and to following good procedures at the gun or we will introduce unnecessary errors that cannot be tolerated.

Static OPs with observers on camp stools is a thing of the past. Students must be off the hilltops, moving around and forced to deal with a continually changing target area perspective and gun-target-observer relationship.

This emphasis shift in forward observer (FO) training undoubtedly was motivated in part by the conclusion that today's battlefield is often characterized by rapidly moving forces. The target acquisition (TA) ability of the moving FO and his ability to determine target coordinates provide our topic.

The Army's most effective TA system has been, is and well may continue to be the individual soldier. TA demands three things: detection, identification and location. The field artillery FO can detect and identify objects of military interest with good frequency and confidence; however, he is often unable to satisfactorily provide the essential element of location. The location problem is much more difficult for the moving FO.

Land Navigation Systems

There are two general approaches in attempting to solve this problem: more effective FO training and introduction of materiel. Certainly a mix of these solutions is going to be required. However, it is asserted here that the most cost-effective solution lies in emphasizing a materiel program.

Let us assume a simple and likely TA problem. An FO moves with a combined arms team during a movement-to-contact operation. Direct fire antitank weapons oppose the attack. The FO detects and identifies the weapon sites and wants to put indirect fire on these targets.

How does the FO come up with the target coordinates? How can materiel help out here? The answer is straightforward: materiel items "exist" which permit the FO to quickly and accurately determine observer-target distance and direction, and continually and accurately display to the FO his own map coordinates. The most hard-to-come by data for the gunnery problem, target coordinates, are thus determined. The two materiel items required to do this are the laser rangefinder with direction-elevation angle head and land navigation systems.

The application of the laser rangefinder to the field artillery TA problem has been appreciated since its appearance for testing at Fort Sill in the early 1960s. But what is a land navigation system? The equipment description for a particular vehicle navigation system as given in a recent MASSTER (Modern Army Selected Systems Test, Evaluation and Review) Test Report reads:

by Dr. Thomas J. Welch



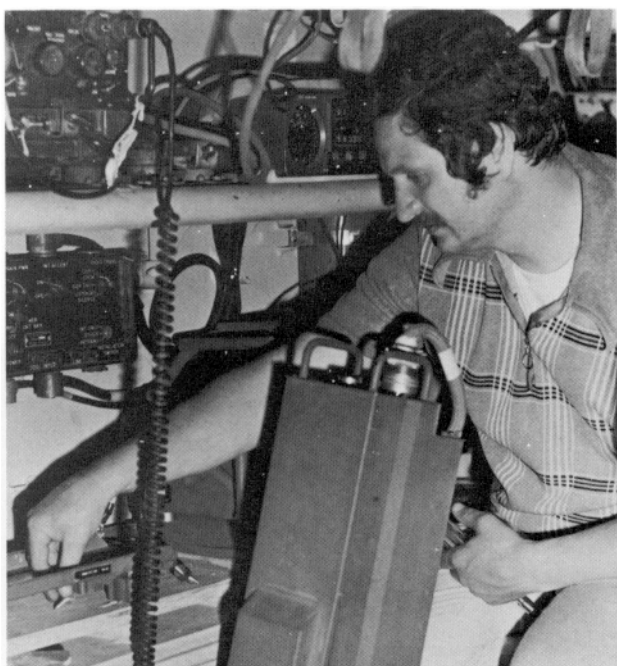
a case for land navigation systems



"The ANS/150K is designed to operate in all types of military tactical vehicles, wheeled or tracked. The readout device (navigator) contains a computer for calculation of the 8-digit coordinates displayed on the readout device. Input to the computer is provided in the form of distance traveled (measured from the vehicle transmission) and heading of vehicle (determined from a Singer-Kearfott gyro). When the vehicle is stopped, the gyro functions as a North-seeking gyro and performs the initial alignment of the system. When the vehicle begins to move, the gyro goes into a directional gyro mode of operation and provides a continual direction-of-travel input. This information is also displayed on the readout device (navigator) on a card-type dial giving the operator an immediate reference to the direction the vehicle is facing. Controls and adjustments required for use by the operator are located on the readout device for easy access." (September-October 1974 *Journal*)

Land navigation systems are capable of yielding direction as well as location information. This means that a land navigation system can be used to orient a laser rangefinder.

MASSTER has also tested less expensive, developmental vehicle land navigation systems using a magnetic heading sensor in place of a gyro. One of these was the AN/PSN-7 Manpack Land Navigation System modified to test its potential as a vehicle navigation system. A feature of the AN/PSN-7 vehicle land navigator is that an FO can "take it with him" when he leaves the vehicle. Earlier MASSTER test reports have confirmed the performance and advantages of the man-carried AN/PSN-7,



including its use by the FO. The AN/PSN-7 is a good example of the "growth potential" of land navigation systems. For example, it may be desired in the future to replace the PSN-7's magnetic compass by a gyro in order to achieve better system accuracy. The entire system need not be replaced, only a component.

Both the ANS/150K and the jury-rigged AN/PSN-7 are passive, self-contained systems requiring no external radio signals, etc. The location/direction output is continuous and the devices are much more useful than systems designed to provide intermittent location readings only.

How accurate are these systems? MASSTER stated the following: "Based on all accuracy data collected on the ANS/150K for all vehicle configurations, courses and terrain, the maximum miss distance expected is 40 meters after 28 kilometers of travel." And for the developmental magnetic sensing system, MASSTER added: "The engineer test model's expected percent error after 28 kilometers is 1.75 percent error for distance traveled.

"There is no such thing as a perfect target acquisition system. The best we can do is bring together the most cost-effective detection and identification system we have (the FO) with the most cost-effective location systems available so that the resulting target acquisition system significantly increases our combat effectiveness."

Advantages

What advantages follow from the fact that an FO can continuously and accurately know his map coordinates throughout a combat movement? This location information, coupled with the observer target distance and direction, can yield target coordinates. Assuming good met data and low velocity error, the first rounds can be on the way rapidly and with a relatively high probability of being close to or on the target.

Consider the moving FO during night operations. If we want to achieve a capability to defeat the enemy at night, we must count on effective indirect fire. To do this, target coordinates must be known quickly and accurately; and this will usually require that the location of our best detection and identification system — the field artillery FO — be known. Consider also movement on featureless terrain, such as some deserts or some jungles,

Electronic hookup — A technical representative from a civilian manufacturing firm adjusts the electronic attachments on a location indicator that is now being tested by MASSTER at Fort Hood. The device, one of several being tested by MASSTER designed for use in various vehicles, is being installed in an armored personnel carrier. When installed, the device takes readings from gyroscopes, magnetic compasses and the vehicle's transmission to determine an eight-digit map coordinate.

or movement during conditions of reduced visibility or under conditions of battle fatigue. Under all these circumstances, a land navigation system can provide continuous and accurate location and direction information.

The Cannon-Launched Guided Projectile (CLGP) promises a new and important capability for the field artillery (July-August 1974 *Journal*). It should be noted that CLGP can be guided reliably to a point target only if the reported target location is within the sensor capture "basket" and maneuver area of CLGP. The recent Forward Observer Team Equipped with Ground Laser Locator Designator (FOTEGLLD) test at MASSTER emphasized this. The addition of a laser rangefinder to the FO's laser designator will enhance this capability for the FO with good visibility to known points and whose location can be determined by resection. However, for the semi-fixed or moving FO and for the times of poor visibility or absence of known points, the laser rangefinder generally can be used only to yield observer-target information. (See page 31 this issue.—Ed.) There has been some concern over the vulnerability of the FO using a laser to designate a target for the CLGP. A high percent of CLGP misses causes the FO to expose his position many times to an enemy capable of detecting his laser beam. Perhaps the best protection such an FO can have is a high probability of CLGP target hits — and that means good target location data.

The critical importance of FO location to the effectiveness of indirect fire has been pointed out and measured by the notable HELBAT (May-June 1974 *Journal*) series of field experiments. HELBAT experiments demonstrated that the FO and the guns can be located relative to each other by near simultaneous laser ranging by the FO and someone at the guns to a common target. The common target may be an illumination round visible to both laser rangefinder operators. This is a promising technique and is well-suited for the static or semi-static FO, but assumes conditions of good visibility, intervisibility and the commander's willingness to disclose his battery position and to illuminate part of the battlefield.

In addition to FO applications, note that knowing vehicle position as accurately as the MASSTER test indicated suggests other field artillery uses of land navigation systems. There is an important advantage in knowing the map coordinates of battery center as it is first occupied, of counterbattery radars and sound ranging sensors as they are emplaced, etc. Completely satisfactory? No, unless we are willing to sacrifice a little accuracy for speed and accept the possible later arrival of more accurate survey.

Placing a land navigation system within the firing battery deserves special mention. Recall that land navigation systems can provide not only location information, but also direction information. Consider, for example, the case of a land navigation system within a moving 155-mm SP vehicle. The map location and the direction of the tube are always known. The SP vehicle can stop anywhere, its tube already "laid in" and its location on a firing chart immediately known. Other 155-mm SP vehicles within the battery can stop within sight of the navigation-equipped SP gun and quickly lay their tubes in by sighting their panoramic telescopes onto the panoramic telescope (or extension thereof) of the navigation-equipped vehicle. The 155-mm SP battery can thus be ready for timely, accurate fire. This advantage should be seen to be more than a new, more effective "hip-shoot" capability. More important, it suggests the possibility of roving guns — SP artillery that moves, stopping to fire quickly whenever it needs to, and then moves again. Enemy counterbattery radar may determine a firing position of the SP battery; but, if the battery has moved on, counterbattery fire will be ineffective. A deceptive registration tactic is also suggested here.

Self-contained land navigation systems are not, by definition, vulnerable to countermeasures. An army so equipped will not lose its entire navigation/position location system upon the loss of a radio tower or satellite, or upon enemy electronic countermeasures. This is not the case for other active and, therefore, vulnerable position location systems.

Limitations

Land navigation systems need "start" coordinates. The coordinates are set into the system which then continually changes the coordinate readout as the vehicle moves. New start coordinates are needed after a certain amount of distance traveled, and the distance depends upon what is an acceptable error. If, for example, location to within 40 meters is required, the ANS/150K mentioned earlier should be corrected after about 30 kilometers of travel. New start coordinates can be determined from map inspection, occupying a point easily plotted on a map, laser resection, etc. Perhaps the best way to obtain accurate and precise coordinates is to make use of present and future field artillery survey materiel and techniques. Future systems, such as the Position and Azimuth Determining System (PADS), would be ideal for providing the occasional updating of the self-contained land navigation systems. A "high-low" mix of expensive, sophisticated systems such as PADS complementing relatively inexpensive, simple land navigation systems may be the most cost-effective solution.

Position Locator — SGT Chester Whitaker uses an experimental position and distance indicator to determine his exact location. The device is part of a test being conducted by MASSTER to study new equipment that can help a foot soldier navigate over rough terrain. It uses a combination of readings from magnetic compasses and antennas attached to each boot heel to measure distance traveled and determine an eight-digit map coordinate corresponding to the man's location.

Land navigation systems cost something. But the time it takes from the need for artillery fire to its delivery on target, the adjustment rounds (and CLGPs) that are wasted because of poorly known target location, the ammunition logistics burden, etc., are also costly.

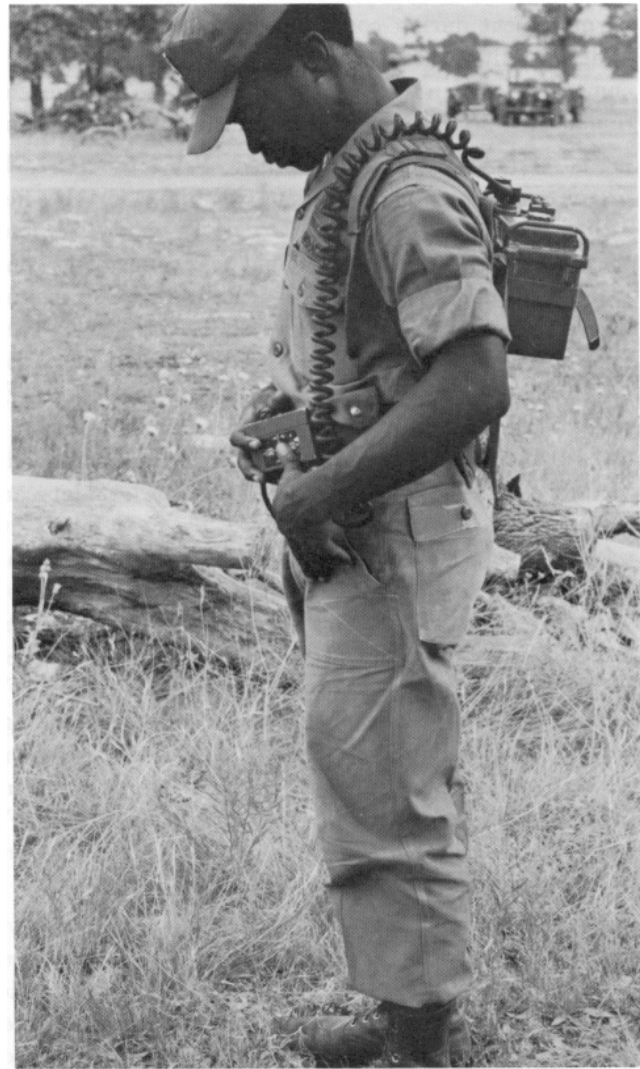
Land navigation systems are not as accurate as "survey" systems. True, but land navigation systems should not be seen in the narrow context of traditional field artillery survey requirements. Field artillery use of land navigation systems requires a new outlook for many. We must realize we need to substantially improve our responsiveness, even if it means giving up some accuracy.

The Other Side

A recent article gave a brief review of the Soviet Army's technological preparation for night combat. The first half of the article discussed the impressive Soviet night vision equipment. The second half addressed Soviet Army self-contained land navigation systems. Some excerpts: "Possibly of even greater interest (greater than the Soviet night vision capability) is the extensive Soviet use of some rather technically-advanced navigational equipment to facilitate movement during periods of darkness or reduced visibility. This equipment comes in three configurations: The most basic consists of a directional gyroscope; the second includes both coordinate and course indicators; and the most sophisticated, found in command vehicles, features a console which actually plots the vehicle's course on a topographic map. The equipment also is useful in forested areas, in cities which have suffered extensive destruction and in desert or steppe areas where prominent terrain features are lacking.

"The navigation equipment package without console (map plotter) is found predominantly in artillery units where it is used extensively to establish survey data — which seem to reflect the mechanism's accuracy. Average error is no more than 1.3 percent of the course covered.

"Soviet land navigation equipment endows Soviet reconnaissance, armor, artillery and command and control elements with a considerable advantage vis-a-vis any future opponent not so equipped. At present, this includes *all* Western armies." ("Soviet Technological Preparation for Night Combat," USA *Military Review*, March 1975).



Summary

There is no such thing as a perfect TA system. The best we can do is to bring together the most cost-effective detection and identification system we have (the FO) with the most cost-effective location systems available so that the resulting target acquisition system significantly increases our combat effectiveness. Passive, self-contained land navigation systems, together with the laser range-finder, permit the static or moving FO to rapidly and accurately determine target coordinates. The continuous and accurate coordinate readout of land navigation systems offers the field artillery other substantial advantages — especially in the area of roving guns. Land navigation systems should be part of a high-low mix of complementary field artillery navigation and position location materiel. It seems apparent that the Soviet Army has realized the combat potential of self-contained land navigation systems and has achieved an impressive operational navigation capability throughout its combat arms.



The Journal Interviews . . .

BG SIDNEY L. DAVIS

*Assistant DCS/Operations for Control and Support
Headquarters Tactical Air Command*

Brigadier General Davis, born 1926 in Prestonsburg, KY, entered the Navy at age 17 and participated in amphibious operations at Saipan, Tinian, Iwo Jima, Okinawa and the Philippines. Upon discharge, he attended Lincoln Memorial University, Harrogate, TN; entered the Air Force as an aviation cadet; and was commissioned in 1949. From 1950-51, the general served as a B-26 pilot in the 8th Bomb Squadron and flew 65 combat missions in the Korean War. Beginning in 1965, General Davis served as air liaison officer with the 82d Airborne Division and the XVIII Airborne Corps, Fort Bragg, NC. While there, he was TDY to the 8th Tactical Fighter Wing, Thailand, and flew 42 combat missions. He attended the Air War College in 1967 and 1968. After graduation, he commanded the 558th Tactical Fighter Squadron at Cam Ranh Bay, Vietnam, logging an additional 120 combat missions in the F-4. General Davis commanded the 1st Tactical Fighter Wing from April 1972 through February 1974 when he assumed his present position as Assistant Deputy Chief of Staff/Operations for Control and Support, Headquarters Tactical Air Command, Langley Air Force Base, VA. He is a command pilot with more than 6,000 flying hours and is a senior parachutist.

Journal: How would you relate your extensive past combat experience to the military situation of today?

Davis: Well, most of my past experience has been very closely associated with close support, and while we learned a lot of valuable lessons in combat, we're also learning a lot from the combat experience of other nations, as well as from the examination of the existing threat in a high intensity air environment, such as would

". . . we will be able to operate effectively from the very beginning in this environment rather than learn lessons in combat."

exist in Europe. We have to allow for the complexity of the environment in which close air support, artillery and other supporting fires are going to have to operate, and develop the ability to locate and attack targets in the most demanding atmosphere that we have ever encountered.

Journal: You mentioned the combat experience of other nations. What, in your opinion, are some of the lessons that we should learn from the recent Mideast War?

Davis: One of the big things is that we are going to need a complete understanding of each other's capabilities.



We've got to know how to train together for the mid-intensity environment, because when we get down to the real world, day-to-day operation at brigade level and below, the forward observers (FOs) and the fire support coordination troops will have to be able to work hand-in-glove with the tactical air control parties attached at their echelon.

If we do this, we'll be able to operate effectively from the very beginning rather than learn lessons in combat. It's important that we take the lessons that we've learned from whatever source and apply them now in our day-to-day training, in our professional schools and, most important, in our joint exercises.

Journal: How will the air defense belts that were used in the Mideast War affect TAC's capability to deliver ordnance?

Davis: It's going to take a dedicated effort to suppress the electronic warfare capability. We've got to have an in-being plan for jamming enemy acquisition and guidance signals in order to operate effectively and deliver our ordnance. There has been a quantum jump in the magnitude of the problem presented to us by the existing defensive environment. The SAMs and radar-directed anti-aircraft artillery all have to be dealt with both before and simultaneously with the delivery of the close air support. This is probably one of our biggest problems—to get an environment in which we can operate effectively, not only with regard to the number of aircraft losses we may experience, but in the effectiveness of the delivery.

Journal: What are some of the changes in our joint tactics that you envision as a result of this hostile air defense environment?

Davis: One area that may require additional emphasis is our mutual support of each other. For example, depending on what the situation is, we may find that it is to our joint advantages to use part of the artillery effort for the suppression of ground-based enemy air defenses. We need to develop coordinated procedures so that we can present an effective suppression system without wasting artillery. By thoroughly familiarizing our forward air controllers (FACs) and FOs with each other's missions and developing a coordinated approach, we can learn to employ the artillery for defense suppression at the same time that TAC aircraft are delivering ordnance.

Another development that's worth mentioning here is the Airborne Warning and Control System, or AWACS. This is an airborne radar system designed to extend the capabilities of the ground-based tactical air control system. It provides us with early warning of approaching enemy aircraft with an over-the-horizon

look, and assists us in getting our attack aircraft into position to work with the forward air controllers and the tactical air control parties that are colocated with the Army ground units.

As far as major changes go, I don't think we'll see that many, although the highly sophisticated battlefield of tomorrow certainly dictates that we make every improvement possible to our present systems.

Journal: With respect to air space control, would you address the "Big Sky Theory" as it relates to the field artillery?

Davis: First of all, we shouldn't be satisfied with any airspace coordination procedure which automatically denies either service from employing its forces to their maximum capability. In addition, in the future we are going to see more requests for simultaneous employment of artillery and TAC air, requiring the ability for simultaneous use of airspace. Now in the case where we do have a restriction from one service or the other, we have to make certain that it's not left in effect for an unreasonable length of time. We shouldn't impose the restriction unless it is absolutely necessary, and once it is put into effect, it should be removed as soon as possible.

Journal: Is the Air Force contemplating the use of remotely piloted vehicles (RPVs) or drones?

Davis: The Air Force already has a reconnaissance and electronic warfare capability with the RPV, and we are now looking toward a low-cost harassment type vehicle. In the future we do plan on using RPVs for harassment, for ECM and also as possible deliverers of weapons.

Journal: General Davis, would you tell us something about your new attack aircraft, the A-10?

Davis: The A-10 was designed specifically for close air support. Some of the main features of the aircraft include its ordnance carrying capability and its loiter or stay-time over the target, as well as the ability to maneuver and operate under conditions of limited visibility. One of the most significant factors concerning the A-10 is the survivability that was built into it. The aircraft is particularly suited to the close support role because of increased pilot protection and the two engines spaced apart and on the upper surface of the aircraft. Also, the A-10 is armed with the 30-mm cannon which is very effective against armored targets. We should remember that the A-7 is also an effective close air support and interdiction aircraft. It has a computed weapons delivery system that is extremely accurate and easy to use and,

as a result, it doesn't require a long run in or a great length of time in lining up to attack a target.

Journal: From a mid-intensity standpoint, what advantages do you expect to obtain from the "smart bomb?"

Davis: Guided munitions should prove particularly valuable at the beginning of the battle when we are trying to take out the command and control centers and the radar warning elements. Depending on the type of seeker we use with the bomb, such as infrared, laser or TV, we gain other advantages. The weapon can home in on the target and therefore allows us a greater stand-off distance accuracy and, in some cases, the element of surprise.

Journal: Sir, what are some of the improvements we can look for from the Air Force and TAC in the area of reconnaissance and target acquisition?

Davis: The Air Force is shifting more and more toward acquisition through airborne radar and infrared imagery transmitted by data link back to a decision point. The result of the relay is a significant reduction in the time it takes to obtain useable data. The airborne aircraft can relay targeting information almost instantaneously to the ground for use by the decision maker in determining target priorities and methods of attack.

Journal: Let's talk for a moment about the airborne forward air controller. In the light of the Mideast War,

". . . we are going to see more requests for simultaneous employment of artillery and TAC air, requiring the ability for simultaneous use of airspace."

will the airborne FAC be effective and survive the mid-intensity environment?

Davis: Let me answer the second part of your question first. We've already identified a requirement for a follow-on forward air control aircraft to replace the OV-10. It will have better survivability and be better able to designate targets from the air using a laser spot marker. This, of course, will enhance our employment of the more precise guided bomb with its stand-off capability. Now, regarding the FAC's effectiveness. First of all, we have always maintained the concept of the ground FAC, and we view the airborne FAC as an extension of his capabilities. While the high-threat environment may turn our orientation more toward the ground FAC, we don't want to eliminate the airborne FAC for two reasons. First of all, he can serve as an important airborne coordinator for the ground FAC. While orbiting behind the FEBA, he can relay ground information to the incoming fighters. As

the situation changes and the enemy air defenses lessen, it is very possible that the airborne FAC may move back in and control from the air. Basically though, he is an extension of the ground FAC.

Journal: As members of the combined arms team, what should be our main concern in order to make the tactical air support system a viable and effective one?

Davis: I think the main point is that we must address our problems jointly. That we, as providers of close air support by way of airplane delivered munitions, and the people on the artillery side of the house work together to acquire, detect and attack targets. We will have to cooperate very closely to coordinate and understand each other's systems. I think this is going to be very necessary in the future in all of our exercises and professional training, so that we can gain the required appreciation for each other's capability. Only with this type of understanding will we be able to produce the enhanced, integrated capability required in today's sophisticated combat environment.



Future Close Support Scenarios

All good things happen for the wrong reasons. In the early sixties I was dedicated to the proposition that what the Army needed most was a new indirect-fire antitank missile. The laser guidance emerged, which opened the technology door to a number of tactical possibilities and technology adventures: add-on guidance for dumb bombs and stupid rockets, cueing and IFF with disposable devices as well as ground control of drone-borne machine guns. What started out as an attempt at antitank missile improvement, and got a boost from some fortuitous technology, seems to have eventuated the basis for an option shock, availability of a large body of operational options, especially in close air support.—Author.

The Downrange Agent

It is hoped the reader will be patient with this whimsy, it is only a device to point-up what is seen as an inevitable portent in land-combat and to stimulate some innovation in technical areas where it will surely be needed, in the near and distant future periods.

In April 1976 George took Advanced Tactical Operations Training. He had been a tanker during the Vietnam conflict, but the Yom Kippur War of October 1973 saw a change in Army thinking about tanks, and emphasis on massive armor had faded. "The tank is a death trap, especially in cities," said Fred, his buddy. "There must be some other job we can do."

In the Advanced Tactical Operations School, George was trained as a Cuer for close air operations. His job was to put laser spots on target regions where he thought his US Air Force friends should drop bombs.

There were rumors that he would soon be issued a homing guidance designator so that he could guide missiles and bombs — "right on the button." He was concerned about the tactical role he would get with a designator. Many enemy soldiers would be stalking him, to eliminate his designator. They would quickly learn that he could take just about any target he could see well enough to want.

The Cuer job was relatively easy, and he could abandon the unit when he was done with it. It was more sophisticated than the familiar smoke grenades of the

Vietnam era and, of course, had a much greater range. He had to learn to properly alert the support aircraft people by radio, so they would know when to look for a marker flash. The Cuer would only have a couple dozen flashes available. It could also be used as a kind of flashlight to see at night or penetrate shadows, and to help with IFF (identification friend or foe), if his friends were wearing the issue retro-buttons (similar to highway markers that glow when struck by light).

During training, he was allowed to fly in a close support aircraft, to get the feel of what the cuee would see, and what the pilot would need to know to successfully help the pinned-down ground forces. The pilot's receiving equipment, for this operation, was a sort of window, called a heads-up sight, through which he could see pretty nearly as well as through the regular wind-screen. When one of his friends on the ground cued a target, he would see a point flash of light in the heads-up device apparently on it. His normal reaction was to zoom onto the flashed region and radio for another cue. He would repeat this operation until he was satisfied that he knew all he needed. Sometimes he only wanted confirmation that he was looking at the right clump of trees or at the right hill. Other times he needed help to spot a point in a cluster of objects.

He was told that eventually all close support would be from the air, and that the Cuer would be the most effective and feared man on the battlefield.

Most of the old dumb bombs were being converted

by David J. Salonimer

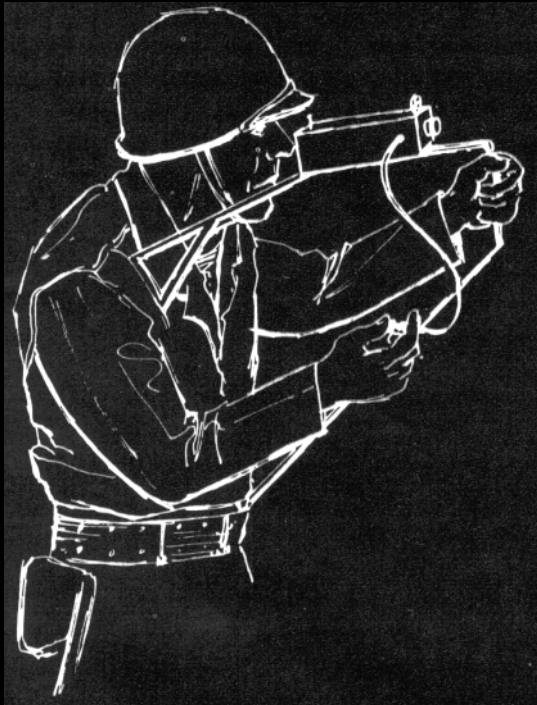
for ground direction, and the enemy air defenses had gotten so good that few pilots could be found heroic enough to fly directly over well defended regions, or very close to any spot that might contain AA weapons, even machine guns, and especially those little homing missiles.

George felt secure, there was a growing shortage of men to operate all the new gadgets that the technical nuts were producing. His new training would make him unique, and he would soon be elevated to the elite status of a downrange agent, able to direct ground and air operations somewhat, bombs, missiles, unmanned air-places, etc.

He would be so powerful that he would almost rule all he surveyed.

In December 1979, George started Downrange Agent Training. He had to prove himself in dexterity and resourcefulness as well as mental agility. He had to be fitted for a psychometric harness so he could be emotionally checked frequently, especially when he requested very powerful support ordnance.

"Show me a man with his plugs out and I'll show you a man you can't trust" was the rule.



Operator With A Laser Cuer (vizationalion) — The cuer projects single, Q-switched pulses onto selected target objects or adjacent regions in the theater, such as clumps of trees, to point out targets, confirm target areas, etc. A compatriot in a close support aircraft has a viewer that helps him see the end of the laser beam.

He was issued a hand weapon, but told never to use it except in emergencies, to save his own life. He was too valuable to reveal his location. Even firing his weapon might give his hard-won vantage point away.

"I rationalize my participation in weapon system developments with the idea that if the doctor must operate, he should use a sharp knife, not a dull hatchet."—DIS

During downrange agent training, George participated in some exploratory scenario experiments, where the tacticians were trying to discover what tasks the forward agent would have to do, especially what he would have to say to the launcher personnel to get a designator-guided missile to him, when and where he needed it. Close support timing would be critical, and some of the situations where it would be needed would create problems, especially where the forward agent was confused about exactly where he was, in relation to useable landmarks.

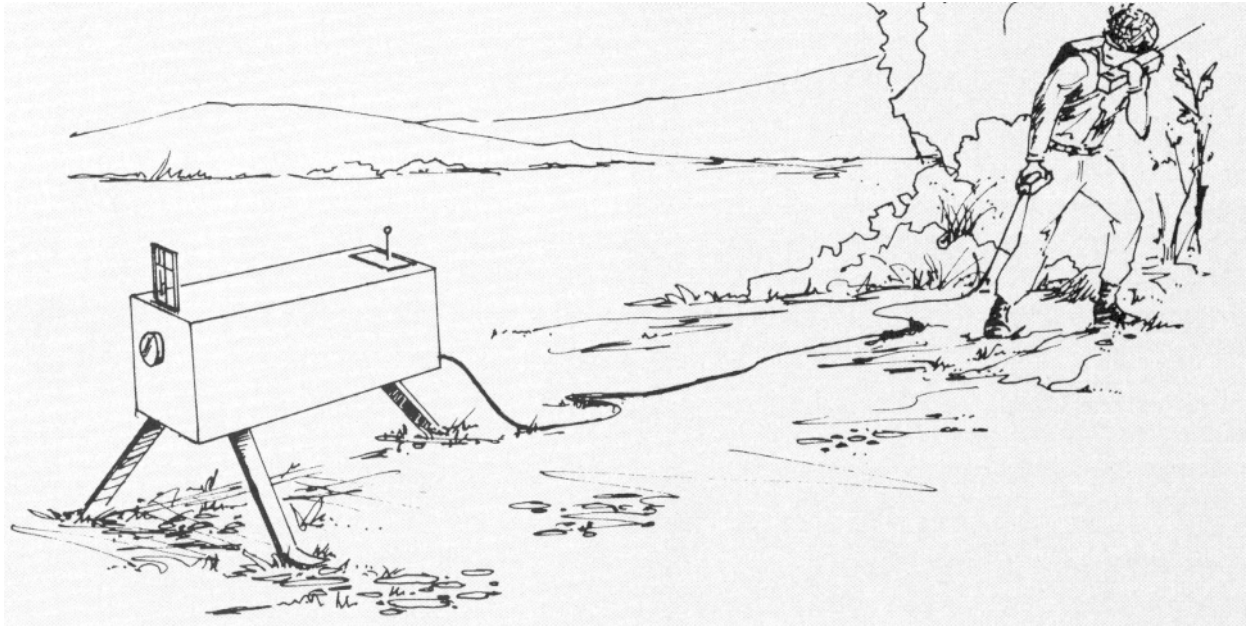
One of George's more playful buddies wired a designator so that the laser pump-lamp voltage jolted the operator, like a futuristic cattle prod. "I confessed to everything," said George, "even an unsolved Post Office robbery of 1893."

George's main job was to occupy vantage points from which he could see the conflict zones, designate objects of interest, direct homing ordnance and provide effects feedback to the weapon controller. His state-of-mind was to be assessed, unbeknown to him, whenever his commander felt George had requested an excessively large weapon.

He had to control unpiloted-aircraft-borne machine guns by aiming and wagging his designator beam. The drone-borne guns would spray fire at the tip of his laser-wand. Occasionally, he was to use his designator to activate release of drone-borne, laser semi-active bombs.

The downrange agent's job was very difficult. He had to know how to employ a large variety of units, not only target directors, but also line-of-sight retro-communicators, language bridge devices, homing beacons of all types, locale assessors, graphical situation displays, target spectral analyzers and encoders, IFF interrogators, responders, et al.

In the earliest phases, the downrange agent was concerned only with service to a few specific guns or support aircraft. This was called a "dedicated" mission. Later,



A downrange agent has set-up a disposable guidance designator for an unpiloted aircraft carrying a laser guided bomb or logistic package. It will overfly the laser marked target region and automatically release its payload. Guidance subsystems on the drone are modified units from a bomb add-on kit. Bomb release occurs when the sensor depression angle is right. The downrange agent likely will abandon this designator when he has completed his mission. After bomb release, the aircraft will take aerial photos before returning "home."

he trained as an "undedicated" downrange agent, to help any compatriot who asked.

Some DRAs had stumbled into the eye of authority storms, where ranking officers in a particular region would try to take over control of a man who happened to have a critical zone in his field-of-view. Combat DRAs might sometimes go days/hours without relief, and enemy units would always be scouring the combat theaters to find them. There were rumors that the enemy had sensors that would locate him quickly and had designator-homing missiles. Such scares made him use his periscope accessories and work out of cover most of the time.

There were stories that the distant-future downrange agents would have sensors implanted inside their bodies and perhaps some sort of tickler or exciter in their brains. The pay and fringe benefits would have to be wonderful to get him to volunteer for that kind of job.

Distant future DRA training started in about 1987. One of the young men in George's unit, Bill, took that training. He had psychometric pickups installed in his body and learned many new tricks. Bill operated as part of a four-man team. The men learned to help each other

in climbing to vantage points, deceiving or distracting the enemy, with spoofing and other defense tricks.

Bill had to learn to cocoon himself for rest and to emplace electronic barriers to alert against infiltrator guerillas. He trained primarily in night situations, using low light level vision equipment of all types, both active and passive. Many of the "targets" Bill considered were underground and he designated the critical points for close air support with terminal homing missiles or drones.

Bill felt he was being made into a kind of robot, an android. He felt his superiors were expecting too much of him and often wondered how the first downrange agents kept their sanity.

Urban Conflicts

George and Bill were pioneers in combatant-starved, open field military scenarios. Battles in city surrounds in the early 70s had engendered a different set of technological problems. The conflict theaters were often buildings, with and without basements, tunnels, sewers, cellars, etc. In many instances commanders wisely bypassed potential citadels or just demolished them. But the enemy would take hostages, foray out of any possible sanctuary, block roads by toppling buildings and impede stairwells with booby traps and concertina barbed wire. In many cases, the built-up areas were crucially located and had to be taken. A considerable body of urban conflict materiel and tactics evolved.

The assault rule was bypass, encapsulate, siege, harass and secure. More substance was devoted to locating humans inside buildings, and using acoustic harassers,

wall punchers, etc., than was devoted to improved versions of conventional weapons, characteristic of the 60s and 70s. In built-up areas, the tank proved truly a death trap; people could toss jars of jellied, flaming gasoline on them from building windows, and pick-off the personnel who tried to escape.

George's friend, Albert, took Urban Conflict Training. Albert learned that the most serious problems were involved with unified action, identification friend or foe, compatriot and enemy location and vector communications around corners.

Albert was first trained in unprepared built-up areas (buildings as they might be found where such conflicts were unknown). He was subsequently exercised in bolstered buildings where some rooms were toughened for urban conflict possibilities.

He worked with wall probes, wall punchers and harrassers. He learned to expect the assaulted to have caches of supplies and munitions as well as defense plans and some escape doors.

Training for distant future conflict in built-up areas involved a special theater, including extremely well prepared buildings, almost impregnable citadels with sealed-off refuges and caches, communication conducts, some with wires buried, and escape hatches.


"George had no gripe about privacy," said Albert. "I had to carry a recorder with an open microphone all the time for the training analysts. My blood pressure, the

sweat of my palms and pulse were continually recorded when I was in that psychometric harness.

"After I first saw the lie-detector function results I couldn't look my commanding officer in the eye for several months. I hope my wife never gets hold of those tapes.

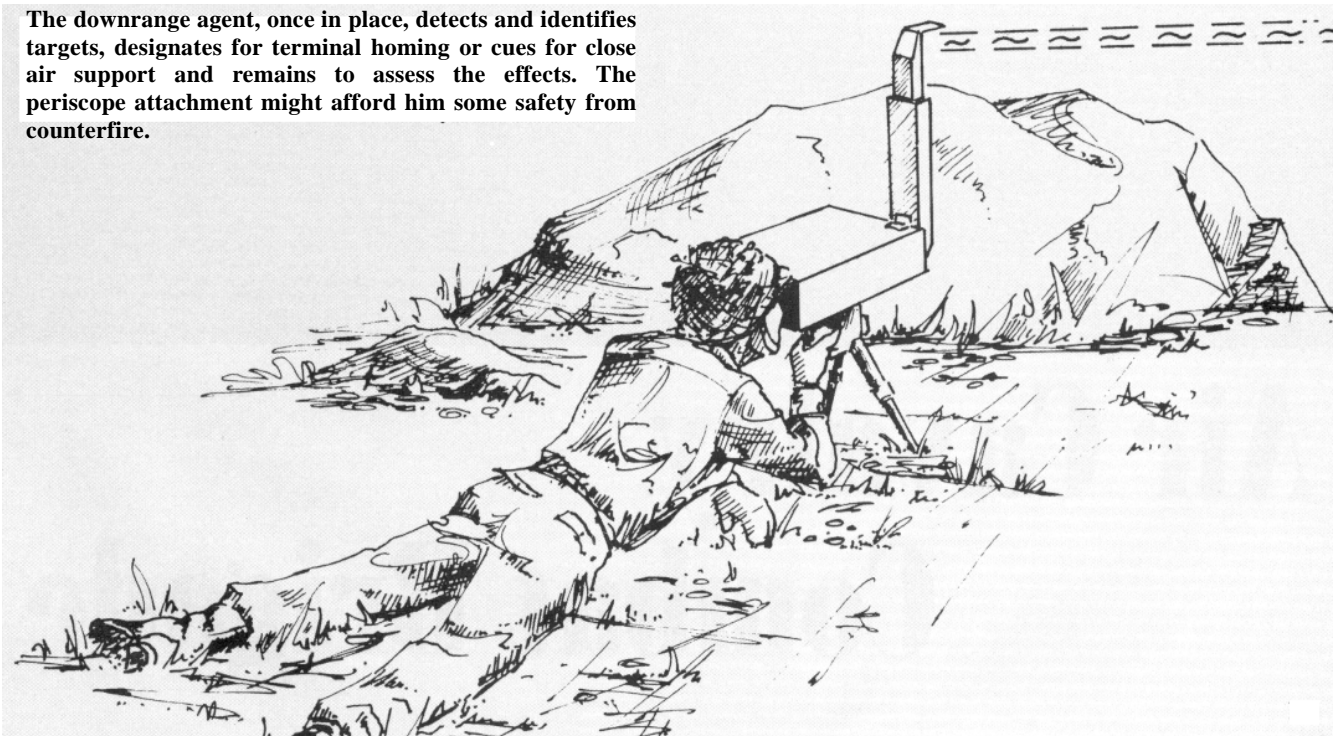
"In the Urban Training Theater they took movies of every activity.

"They even used infrared cameras in order to make a full assessment of all aspects of the Urban Conflict Training."

What should be done? Research, exploratory development of components and especially tactical scenarios. What's holding us back? Well, as my friend put it, "Rat holes we got, what we need is a hell of a lot more sand." 

The 1974-75 edition of *Who's Who in America* lists among Mr. David J. Salonimer's many accomplishments his pioneer research in laser guidance technology used with the laser "smart bombs." He earned a BS degree in electrical engineering from Wayne State University in 1950 with post graduate work at the University of Alabama in 1963. He presently works as an applications technologist for the Army Missile Command, Redstone Arsenal, Huntsville, AL.

The downrange agent, once in place, detects and identifies targets, designates for terminal homing or cues for close air support and remains to assess the effects. The periscope attachment might afford him some safety from counterfire.



Fire Support For The



Air Cavalry Combat Brigade

by COL William H. Schneider

In February of this year, at Fort Hood, TX, a new and unique maneuver brigade, the 6th Cavalry Brigade (Air Combat), was officially activated. It joins the force structure as one-of-a-kind after having been a test brigade in the First Cavalry Division for over three years.

The ACCB (Air Cavalry Combat Brigade), as it is commonly called, is unique because it is an all helicopter maneuver force capable of rapid reaction, able to perform a variety of missions anywhere in the corps area. It can cross the corps area in a matter of minutes at speeds of 80 to 100 knots at tree-top level without regard for barriers. Its principal weapons system is the attack helicopter which, armed with the TOW missile, is expected to be particularly effective against enemy armor units. ACCB advocates frequently refer to these attack helicopters as "flying tanks."

But, to the field artillery community, this brigade is unique in that it does not have any organic field artillery support. Should it and, if so, what type . . . how effective will the fire support be to such a fast moving organization? If not, what are the alternatives. What should we, as artillerymen at any level, know about ACCB?

In the current organization (Figure 1) note that the brigade is currently being manned at a level below its full TOE. Even at this reduced level it contains 200 helicopters: 30 percent of these are observation helicopters used by the scouts (potential forward observers) and 40 percent are attack helicopters, each capable of carrying various combinations of ordnance including TOW missiles, 2.75-inch rockets; 20-mm cannon, 7.62-mm miniguns and the 40-mm grenade launcher. There are only two platoons of ground troops and no mortars in the brigade. The mission of the riflemen is similar to the mission the cavalry had in Vietnam.

The fundamental differences between troop organization of the air cavalry squadron and the attack squadron are:

- Each air cavalry troop has an aero rifle platoon (Blues). There are no such ground units in the attack squadron.

- There are nine attack helicopters in each air cavalry troop, compared to 21 in an attack troop.

- The ordnance load of the flying tanks in the troop of the attack squadron will likely include more of the TOW missiles than the 2.75 rockets. The opposite is true of the air cavalry troop.

However, to fully appreciate the ACCB you should understand the attitude of the troops. To them ACCB is not just an organization; it is a frame of mind. Since mid-1971, the provisional brigade in various configurations has been undergoing extensive testing by

Headquarters MASSTER (Modern Army Selected Systems Test, Evaluation and Review). Members of the brigade, past and present, believe in this exciting concept and are convinced the ACCB can perform any mission assigned better than a conventional maneuver brigade. This positive attitude and *esprit de corps* have been evident during their many tests and have contributed materially to the outstanding results.

Mission

The mission of the ACCB is to locate, disrupt and destroy enemy forces (predominately armored and mechanized units) by aerial and combat power. The brigade does possess a limited capacity for independent operations, but as pointed out by MG Robert Shoemaker, 1st Cavalry Division Commander [presently LTG Shoemaker, Commander, III Armored Corps], any extended operation would require augmentation for combat support and combat service support functions. These support elements were purposely minimized to keep the brigade lean.

There are two basic roles for the ACCB: to conduct independent operations or to detach its subordinate elements and place them in support of committed combined arms forces. It is envisioned that the ACCB is ideally suited for use in situations where time is of the essence, available conventional forces are inadequate and supporting air is unavailable due to adverse weather conditions. On the other hand, if the elements of the brigade are detached and integrated into the ground commander's combined arms force at the lowest level they will add additional combat power. Additionally, the brigade headquarters is capable of exercising command and control of ground maneuver and support units that may be temporarily assigned for a particular operation.

The basic fighting element is a combination of aerial scouts and attack helicopters, flying the nap-of-the-earth, often below tree-top level. While one scout can control from one to three attack helicopters, conclusions of the MASSTER testing indicated that three scouts and five attack helicopters form the optimum mix. The key to the success of their employment is the leader (warrant officer, lieutenant or captain) of the scout helicopters. He is sometimes called the "battle captain" or "super scout" in his particular area. In this role he "manages" the battle. He calls for and adjusts artillery, directs air strikes, selects attack positions, coordinates with ground maneuver elements . . . he does it all! Typically, when the scouts discover a target they will call for the attack helicopters. These flying tanks, having laagered nearby, will then make maximum use of the stand-off range of the TOW and 2.75 rockets to attack the target.

COL William H. Schneider, FA, recent graduate of the Naval War College, is commander of the 25th Division Artillery.

Field artillery support was virtually nonexistent during the testing by MASSTER. Although forward observers (FOs) and fire support officers (FSOs) were present in the units, the nature of the tests evolved around the effectiveness of the scouts and attack helicopters against tanks. As a result, there was no evaluation of field artillery "play." Unfortunately and all too frequently, the only function given to the FO and FSO was that of air space coordinator.

For approximately a year (1973-1974) a 105-mm howitzer battalion (airmobile) had the mission of direct support (DS) of the ACCB. Based on participation in various exercises, the fire support of this battalion proved to be inadequate: the batteries of this light battalion could not effectively cover the large area assigned to the ACCB; and because it was limited to the air mobile capability of the batteries for the required frequent and often short moves, the flexibility and responsiveness of the fire support was inadequate.

Before the decision was made in early 1974 to retain the ACCB as a separate brigade, consideration was given to including organic field artillery support. Representatives from the Field Artillery School at Fort Sill argued that if the ACCB was going to operate as a maneuver force, then the time-tested principles for close, continuous and all-weather fire support would apply. Discussions took place with the Combined Arms Combat Developments Activity (CACDA) concerning the inclusion of a DS artillery battalion or an aerial field artillery battery. The eventual decision made was not to include any field artillery support. However, as a compromise, the approved TOE did include an FSO and section at brigade and squadron level. These were deemed necessary to effectively plan and coordinate the fire support which would be provided by units of the division artilleries or corps artillery. Currently, the FSO and section in the brigade headquarters are being filled, but at the squadron level the FSO sections will remain vacant.

Fire Support Problems

Keep in mind the two major differences between the ACCB and any other maneuver brigade. These are the speed with which it moves about the battlefield and its lack of the ground elements necessary to seize and hold terrain. This latter difference may cause some to argue that it cannot be classified as a maneuver force when operating independently, but is in fact a fire support unit that can concentrate and provide a devastating amount of fire power. With artillery support not having been evaluated by MASSTER, the Field Artillery School is presently investigating how best to support the ACCB. A discussion of problem areas associated with this support



Pop-up battery FDC in position during airmobile artillery ACCB support.

is based on experience gained by members of the DS battalion who worked with the brigade for approximately one year.

The standard doctrinal responsibilities associated with the DS mission apply. It is the effective compliance with these responsibilities that present these problems.

It will not be unusual for the ACCB to have a zone of operations 40 to 80 kilometers wide when operating as an independent force. Obviously this is rather difficult for one DS battalion to cover adequately. Therefore, additional artillery units providing reinforcing and general support fires will be necessary for full coverage of the area. Firing batteries will be making frequent moves to support the fast-moving brigade. One might believe that an airmobile battalion would be the best suited for this challenge. However, once the brigade is committed within its area, the battery moves will generally be short ones of eight to 15 kilometers. Moves by the CH47 helicopters for this distance, when close to the line of contact, are not only dangerous but more time consuming than ground moves. This is due to the expected air defense environment, the signature of the CH47 (size, noise, dust cloud and infrared emission) and the fact that the heavy lift helicopters, not being organic to the artillery unit, are less responsive. Prime movers organic to airmobile battalions would definitely add to their flexibility and capability.

By the current concept, an artillery battalion will be given the DS mission when the ACCB is assigned a specific tactical mission. One way of accomplishing this is for the same artillery battalion to remain with the

brigade for all of its operations in the corps area. In this case the advantage of association may be outweighed by the problems of keeping up with the brigade and outrunning its own artillery logistical support. Although there are CH47 helicopters organic to the ACCB and other corps aviation units, their use is primarily intended to move large amounts of petroleum, oils, lubricants, ammunition and other logistical support to the forces. For this reason and because the artillery is not organic to the ACCB, the use of CH47s for artillery logistical support is not likely to receive the necessary priority.

Another method is for a different DS battalion to be assigned as the ACCB moves from one area of operation to another. While this may alleviate the logistical problems, it also presents numerous fire planning and coordination problems. Before discussing these, there is one other problem for the firing batteries that needs to be mentioned.

Since the ACCB has virtually no ground troops, there are usually no clearly defined front lines. Although the scouts and attack ships are continuously moving throughout the area, their coverage of such a wide zone is not complete. This means that the batteries have little or no security, particularly at night or during extreme weather conditions. Also, the helicopters can be totally withdrawn from the area in three to five minutes, leaving the firing batteries completely exposed. It is quite possible that an enemy armor column could reach an airmobile battery before an airmobile move could be coordinated. This extremely serious problem is likely to be overlooked since the security of the firing batteries in support of conventional maneuver units is taken for granted.

Even though there are FSOs assigned to the ACCB and its squadrons, the timely establishment of the initial liaison by a DS battalion representative will continue to be a requirement. Coordination of such things as frequencies, call signs, locations, capabilities, special fire planning techniques and methods of operation will often have to be conducted "on the fly." Artillerymen who appreciate the value of continuous association with maneuver units readily will understand the problems of providing instant and effective fire support to this new unit with little prior warning and probably very little understanding of how it operates.

Furnishing FOs to each company-size maneuver element can be accomplished easily enough. (If the battalion is not authorized sufficient FOs, then the FSOs who establish initial liaison with the organic FSOs in the brigade can be used as FOs at the troop level.) The real challenge comes when the young lieutenant reports to the troop operations tent that is likely to be located 30 to

50 kilometers behind the line of contact. Troops are commanded by majors; captains are troop operations officers; and the unit functions as a mini-squadron. How can this FO perform his traditional role when the troop commander is controlling his unit's operation from a tent or from a UH1 helicopter and his scouts and attack helicopters are covering a 10 to 20 kilometer area? The answer is that he cannot. He must become a mini-FSO. To be employed on the front line would mean flying with just one of the scouts. In this situation the scout has priority on the FM radios for unit nets. He also has a specific mission to accomplish and he is not going to be interested in staying around an area for the FO to fire a mission. Additionally, the FO will only be seeing one part of his area of responsibility. Therefore, the best place for him to be is with the troop commander at the troop command post or in the command and control ship. His duties will then include relaying fire missions received from the scouts on troop radio nets to the appropriate firing battery. To do this rapidly he must have good communications and be kept abreast of all battery and other friendly locations by the squadron FSO. The FO will also assist the troop commander in his fire planning and fire support coordination. This is more easily said than done. Imagine, if you will, a young lieutenant with his reconnaissance sergeant, probably with nothing more than a PRC-77 radio, accomplishing the listed tasks. Experienced or not, he is going to have a tough time convincing a major, the operations officer and all of the scouts (whom he probably will not even meet) that he can help them kill targets when they have such a large amount of fire support available. Using his portable radio he most likely is not going to be able to talk to the appropriate firing battery, which will be a considerable distance in front of him. By the time he relays the mission through another station and the mission is finally fired, the scout who originated the mission will have either killed the target with his attack ships or left the area, being convinced that field artillery cannot help. This dilemma, coupled with the FO probably not being an aviator, makes it that much more difficult for him to become credible when advising and recommending how the troop commander should be using artillery in support of his mission. While this example may seem extreme and possibly exaggerated, it is typical of the problems experienced by several outstanding FOs during a variety of realistic training exercises when a 105-mm battalion (airmobile) was assigned the DS mission. As will be discussed, the field artillery has numerous ways in which to provide essential support to the ACCB, but the FO, the initial and vital link between the supported and supporting units, must be able to operate effectively.

FA Missions for the ACCB

So far this discussion may sound rather negative; however, it is not intended to imply that the field artillery cannot support the ACCB. There are valuable missions that can be performed if the ACCB is expected to accomplish its mission with minimum loss of men and helicopters.

COL Charles E. Canedy, who has commanded the ACCB since December 1973, stated that he believes the field artillery still will be able to perform its traditional fire support role and that its most important mission will be that of "stripping away the threat force ADA (air defense artillery) screen (and) next in priority would be counter battery."

Preplanned fires along flight routes of the helicopters and preparations on the objective are standard support missions that will be particularly important to the ACCB since helicopters are not only vulnerable to ADA weapons but also to small arms and crew served weapons. In a nuclear environment a particularly good combination would be the rapid exploitation capability of the ACCB following an artillery nuclear strike. Smoke missions to screen the attack helicopters, illumination missions to assist the attack of enemy armor at night by the flying tanks and the firing of VT over the enemy armor/mechanized columns to keep the tanks buttoned up and the infantry in their carriers while the ACCB attacks from its stand-off range on the flank are some examples of special missions that will provide realistic artillery support. The development of the Cannon Launched Guided Projectile ("CLGP," March-April 1975 *Journal*) will certainly enhance the artillery's tank killing and counterbattery capabilities.

Although the pilots are reluctant to admit it, there are periods of extremely limited visibility when the helicopters are unable to fly. The all-weather capability of



the artillery becomes most essential since it can be the only element capable of providing valuable counterbattery fires which will result in security for the key ACCB installations. While the operations center for their various units may be far enough to the rear, the forward area refueling and rearm points (FARRP), the lifeline of the helicopters, are positioned forward enough to be just outside of enemy artillery range. Considering the time element to move a FARRP, the number of helicopters likely to laager in that area and the vulnerability of such an area to attack, the protection afforded by artillery becomes vital.

Experience gained in field training exercises has shown that the artillery air observer from corps artillery or division artillery assets can play an important role. Although all pilots in the ACCB are potential artillery air observers, they are primarily concerned with their own missions. When they are enroute to a specific objective and spot a target, they are frequently unable to divert and attack it. With an available air observer in the area, working under the control of the FSO, such a target that has been reported by the scout to the troop operations center will be given to the air observer by the FO or FSO. The fire mission is then initiated while the air observer moves into position to observe. The air observer is also trained to find targets and can be counted as an additional target acquisition asset. Additionally, he will serve as a valuable communications link between the FSO or FO and battalion or battery fire direction centers (FDCs) when communication problems exist.

As was mentioned earlier, the value of continuous association between a maneuver unit and its supporting artillery is a nonquantifiable, but nonetheless significant, factor. After a period of time this association factor becomes quite evident in the attitudes and training of those units which have such a relationship. Without a DS battalion organic to the brigade, there is not too much influence one field artillery major, the FSO, can have on the entire brigade.

Various ideas and attitudes have been expressed informally by staff officers in the ACCB. The FSO, while listed in the TOE as a separate staff officer, will work with the S3 air, under the direction of the S3. The ACCB does not require organic artillery and will rarely require attached DS artillery. During most tactical employment, if artillery support is provided, the ACCB should have priority of fires. The ACCB will use artillery to fire preparations and then will rely more on its own helicopters for suppression and attacks of targets of opportunity. The ACCB does not visualize using FOs and will rely on their own scouts for identification of targets and initiation of fire missions.

As unsound as these comments may sound to staunch artillerymen, it is understandable that such ideas exist and why the ACCB staff officers' ideas differ from those of established field artillery employment concepts. It has been my observation that, while the senior air cav officers do appreciate the value of supporting artillery, the younger officers generally believe that they have sufficient organic firepower to accomplish any mission without outside help. Also, current field artillery and armor publications do not include any doctrine or guidance, so almost any view seems acceptable until proved wrong. Thus, without the continuous presence of DS artillerymen to sell their product and demonstrate their value, incorrect ideas will lead to unacceptable methods of operation and it will become extremely difficult to get operations back on track after these ideas are firmly entrenched.

One obvious solution is to activate a new battalion, assign it to the ACCB, begin fostering this close relationship and solve the problems. This, in all probability, will not occur because of force level constraints and because the solution has not been acceptable to CACDA and the armor community. This is unfortunate because an organic DS battalion in a peacetime training environment is very important in order to learn and evaluate the artillery techniques to be used in combat. This also permits rapport and confidence to be established between the two elements and helps to establish a pool of experienced officers and NCOs.

Once in combat, it is essential for the ACCB to keep its own FSOs and FOs (mini-FSOs) for obvious reasons. It is not as important for the same artillery battalion to remain in DS because the ACCB will need different types of artillery units for different missions. If the mission is one in which there is no other available artillery in the zone and the brigade must move a considerable distance to get to its operational area, a light airmobile battalion would be appropriate with its lift being provided by organic ACCB CH47s. If there is a mission in the corps zone where artillery units are already available in the ACCB area, a self-propelled artillery unit could provide the necessary fire support and would have the mobility for frequent, short moves. This type of battalion can also provide better security for its own elements than can an airmobile unit. The key is flexibility. The combat support units were left out of the ACCB so that it could remain extremely flexible. Therefore, the artillerymen called upon to serve with and support them must be just as flexible.

Conclusions and Recommendations

It concerns me that a new concept has evolved into an active brigade with very little having been done to investigate how artillerymen can best work with it in the

mutual accomplishment of assigned missions. This is not to imply that artillerymen cannot rise to the challenge.

In concluding, I suggest some steps be taken now and some specific recommendations considered.

Unless we do something about it, the old adage "out of sight, out of mind" will be applicable to the relationship of the field artillery and the ACCB. A separate brigade without supporting artillery truly will be separated from the artillery without some first class "salesmen" on hand. Therefore, the FSO position at the brigade level should be continuously filled by a sharp, bright and most innovative artillery major. The FSO position in the TOE of the squadrons, which are authorized but currently unfilled, should be filled immediately with similarly qualified and outstanding young officers. These three officers, who should be aviation qualified, could provide valuable training in artillery procedures, maintain the artillery presence in the brigade and provide important ideas for the formulation of doctrine on fire support for the ACCB. I foresee the problem as being one of monitoring who fills the positions. With the demise of the Field Artillery Branch and no senior artillery headquarters immediately responsible for filling these positions, the importance of the job soon could be perceived disadvantageous since it is out of the mainstream of field artillery unit assignments.

I recommend that action be taken by the Field Artillery School to have FO sections authorized in the TOE at the troop level. The authorization for these sections should be sufficient to permit operation as a mini-FSO and the capability to communicate over long distances. Once authorized in the TOE, I do not believe, recognizing the manpower constraints, that these sections need to be filled in peacetime. However, in combat, having the same FOs rather than switching each time the DS battalion is changed would insure more consistent fire planning and coordination within the ACCB as it moves throughout the corps zone.

Although the decision not to have a DS battalion is currently being challenged by the Field Artillery School, it is not realistic to expect that decision to be changed in the near future. In the meantime, I think the practical way to approach the problem is to anticipate that the ACCB will be given a DS battalion from the zone within which it is operating. Therefore, I recommend that the way to train now is to use elements of existing corps artillery units to participate in field training exercises with the ACCB for the experience and evaluation that could be achieved. Ideally, it would be most beneficial if entire battalions could participate but, with limited training funds, the headquarters elements to include FDCs, FSOs and FOs participating in all exercises with

the ACCB could make valuable contributions. By rotating this opportunity among the available battalions, various types of artillery weapons can be evaluated in this role and the number of artillerymen gaining experience in working with the ACCB will increase. Since the ACCB is a corps unit, the recommended training under the guidance of corps artillery will also permit experience with and evaluation of fire support planning and coordination procedures at that level. In this manner such procedures as quick fire channels, priorities of fires and clearances for the ACCB to fly through the corps zone or laterally across the corps front can be addressed.

Because the ACCB is currently assigned to III Corps, it is appropriate for III Corps Artillery to become directly involved with the brigade. It can monitor the quality of FSOs, have the battalion staffs work with the ACCB on a rotating basis and experiment at corps artillery level with the various fire planning and coordination methods. I believe that this training challenge, if met in the right atmosphere with the whole-hearted and enthusiastic support of the chain of command, will produce the same positive attitude and innovative results that have been demonstrated by the ACCB in its endeavors to date.


The contribution from the Field Artillery School must be one of evaluating the doctrine and then getting the word out to the troops. Although the field artillery tactical missions and the seven inherent responsibilities for each still apply when providing support to the ACCB, microscopic examination of these missions might suggest slight modifications necessary to accomplish timely fires

for the ACCB. The evaluation can take place with the training just discussed and in conjunction with efforts by MASSTER. The word can get out to the field in one of the new and innovative training circulars that are being published by the School. Additionally, the artilleryman's bible, FM 6-20, would need to have his doctrinal guidance included.

In the "Field Artillery Materiel Development Plan (U), FAMDP 77," the Field Artillery System on the battlefield of the future is discussed. In part the plan states:

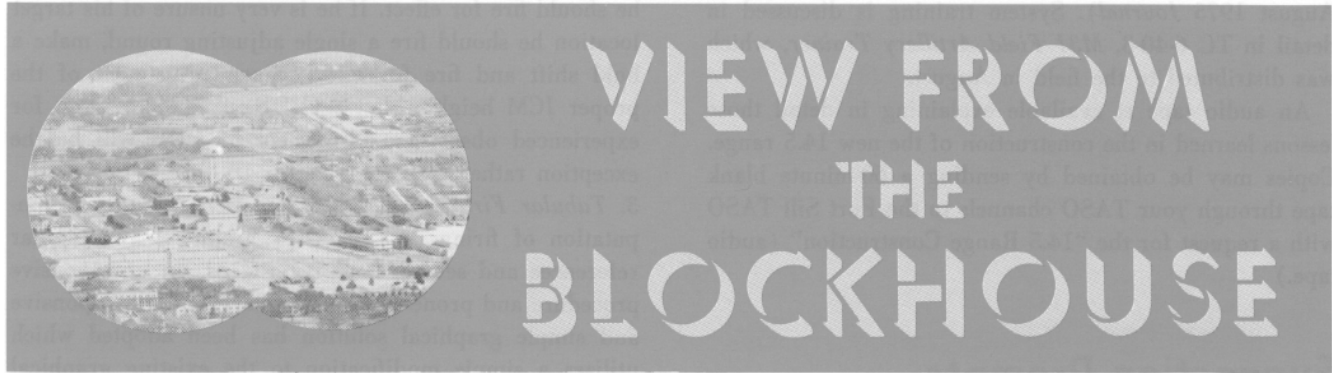
"The field artillery must be optimized as a total system to effectively provide the requisite fire support on the fluid battlefield envisioned in the future. This optimization must be oriented toward efficient utilization and expenditure of resources, and improved target acquisition capabilities, if moving and stationary hard point targets are to be effectively engaged on a porous battlefield."

It is reasonable to assume that the 6th Cavalry Brigade (Air Combat) will be a vital part of that future and fluid battlefield. I also expect that in various deployment contingencies this lean and mean brigade will be one of the early arrivals in the combat zone to be used as an economy of force unit. Whenever and wherever the ACCB may appear, artillerymen in the area must be ready to provide outstanding support. To quote from a new artillery training circular, "... field artillery must respond INSTANTANEOUSLY."

The question is, will *you* be ready for this challenging mission? 



Notes from the School



School Builds 14.5 Range

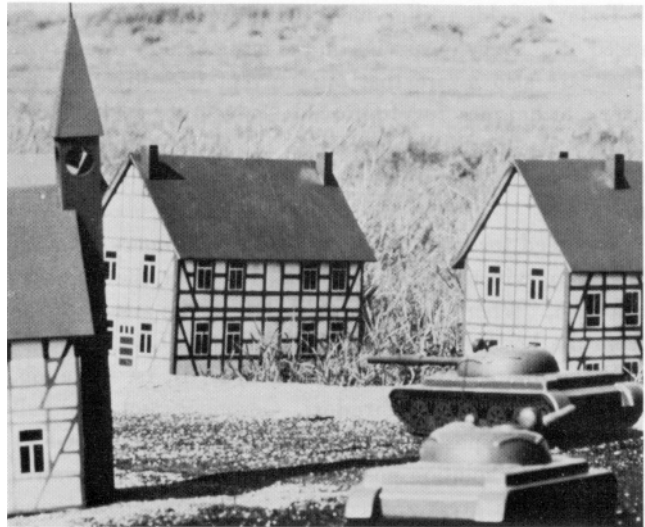
Fort Sill's newest artillery range contains several small European-style villages, heavily infested with enemy armored and infantry forces — thanks to the Gunnery Department, the local TASO and the Post Engineers. The target area seems to stretch for miles but it is actually situated on less than 25 acres. Located east of Dodge Hill on the east range, the new facility is the result of three years experience on the older "Caruthersburg" 14.5 range. The features which favor this newer range over the older one are:

- A low amphitheater setting permitting observation from sloping terrain on all sides of the range.
- An accurate 1:50,000 scale map permitting observers to practice map-terrain association, the critical element in target location.
- Observer movement all over the area effectively simulating actual battlefield conditions.
- Actual terrain variation as the observer moves, due to a large amount of vertical relief and plenty of natural and man-made terrain features.
- Realistic scaled material allowing target identification to be concurrent with other observer training. One-tenth scale houses, T-62 tanks and BMPs are currently being built by TASO. BRDMs, trucks and other equipment are being developed and will be available soon. Contact your TASO for information on how to obtain these 1/10th scale Warsaw Pact style targets along with plans for constructing the 1/10th scale buildings.

The new range was constructed to make maximum use of "system" training of the FO, FDC and gun sections. System training permits the commander to train the FO sections concurrently with the FDC and howitzer sections by occupying the M31 range in a tactical configuration. The FDC training is essentially identical to "live" fire

One-tenth scale miniaturized European village adds realism to FO training.

T-62 tanks roll through Fort Sill's newest 14.5 range.



missions. A large variety of missions (i.e., area adjustment, high angle, suppression, TOT, precision registrations and high burst/MPI registrations) can be fired. The FADAC program for the M31, which is included as a part of the M31 trainer package, is procedurally identical to full-caliber revision five programs. With the M31 mounted in-bore, the gunners and assistant gunners receive training on setting values on real weapons. The system permits the commander to identify student strength and weakness under controllable conditions. This facilitates more responsive corrective action and maximizes training time utilization. Successful use of system training by the 4th Infantry Division Artillery significantly reduced mission times on the unit's ARTEP (see July-August



View From The Blockhouse

1975 *Journal*). System training is discussed in detail in TC 6-40-3, *M31 Field Artillery Trainer*, which was distributed to the field in August.

An audio tape is available explaining in detail those lessons learned in the construction of the new 14.5 range. Copies may be obtained by sending a 60-minute blank tape through your TASO channels to the Fort Sill TASO with a request for the "14.5 Range Construction" (audio tape.)

Suggestion Prompts ICM GFT

Today's field artillerymen recognize the necessity of speed of delivery to survive on the battlefield of tomorrow. They are also aware that our current fire direction delivery techniques for Improved Conventional Munitions (ICM) are totally unresponsive and provide the enemy with warning that artillery fire is being adjusted upon them.

The need for a more responsive ICM gunnery solution has been evident for quite some time, but the question has been, "Where do we start?" Part of the answer came from the best of all sources . . . THE FIELD. SP4 Curt J. Hribernik, an FDC Computer with HHB, 1st Battalion, 22d Field Artillery, Zirndorf, Germany, got the ball rolling by proposing a Graphical Firing Table (GFT) solution. The solution posed by Curt was most innovative and showed a great appreciation for the problem. Using the suggestion of Specialist Hribernik as a point of departure, the Gunnery Department focused its attention on determining a more complete solution to the ICM gunnery problem.

To formulate more responsive ICM computational procedures, three basic problems were addressed:

1. *Low Level Winds*. In computing ICM firing data, a correction for the effect of low level winds was necessary. This computation required knowing both the wind speed and direction in the target area and was obtained either from a MET message or by estimation from the observers. As neither method is truly valid, it was determined that time consuming corrections for low level winds could be eliminated from ICM computations.

2. *Adjustment by the Observer*. The ICM round is most effective against exposed personnel. Therefore, time consuming HE adjustment should be avoided. The effects of an ICM battery volley cover a larger area than most munitions, so in most situations surprise will produce better results than pinpoint accuracy. If the observer's initial target location is within 200 meters of the target he should fire for effect. If he is very unsure of his target location he should fire a single adjusting round, make a bold shift and fire for effect. Since adjustment of the proper ICM height-of-burst (HOB) is difficult even for

experienced observers, adjustment of HOB will be the exception rather than the rule.

3. *Tabular Firing Table ICM Gunnery Solution*. Computation of firing data required graphical and tabular references and several arithmetic steps, an unresponsive procedure and prone to human error. A more responsive and simple graphical solution has been adopted which utilizes a simple modification to the existing graphical firing table. Once the modification has been completed, entry into the tabular firing tables is no longer required. The procedures to modify the graphical equipment are as follows: (All data is based on a 155-mm M109A1 weapon system firing the M449 ICM projectile.)

a. Using the appropriate ICM addendum (FT 155 ADD-I-1 for the M109A1), CHG 4GB) and type projectile, compute ICM Quadrant Elevations (QEs) for all HE QEs listed in the addendum. Use the following equation: HE QE + Ballistic Correction = ICM QE. (Table A).

HE QE	+	CORR	=	ICM QE
155	+	97	=	252
160	+	93	=	253
165	+	90	=	255
170	+	86	=	256
175	+	83	=	258
180	+	80	=	260

b. On the appropriate graphical firing table (CHG4) construct a line parallel to the existing scales. This line is to become the basis for the ICM Quadrant and fuze setting scales. To prepare the ICM QE portion of the scale, construct a graduation on the ICM scale corresponding to each HE quadrant used in step a. The first graduation is constructed corresponding to an HE quadrant of 155 mils. This graduation is labeled 252 which indicates that an HE quadrant of 155 mils yields an ICM quadrant of 252 mils. Successive graduations are also determined, plotted and labeled in this manner.

TABLE A							
CHARGE 4G	QUADRANT ELEVATION						FT 155 ADD-I-1 PROJ, HE, M449 MODS FUZE, MT, M565
1	2	3	4	5	6	7	8
QUADRANT ELEVATION FOR PROJ, M107	CORRECTIONS TO QUADRANT ELEVATION FOR PROJECTILE, M449A1 M449 M449E1			CORRECTIONS TO QUAD ELEV FOR AN INC OF 50 M 100 M IN HGT IN RG		CORR FOR LOW LEVEL WIND OF 1 KNOT	RANGE TO IMPACT
MILS	MILS	MILS	MILS	MILS	MILS	METERS	METERS
155	98	97	98		1.4	5.2	4378
160	94	93	94		1.7	5.1	4394
165	91	90	91	19.4	2.0	5.1	4414
170	87	86	87	18.9	2.3	5.0	4438

CHARGE 4G
4G

TABLE B
FUZE SETTING

FT 155 ADD-I-1
PROJ, HE, M449 MODS
FUZE, MT, M565

1	2			3		5	6
	M449A1	M449	M449E1	50 METERS IN HEIGHT	100 METERS IN RANGE		
M564 FUZE SETTING FOR PROJ, M107	CORRECTIONS TO FUZE SETTING FOR PROJECTILE,			CORRECTIONS TO FS FOR AN INCREASE OF			
9.6-10.6	-1.3	-1.2	-1.3			0.4	
10.7-14.2	-1.2	-1.1	-1.2	0.0		0.4	
14.3-17.8	-1.1	-1.1	-1.2	0.1		0.4	
17.9-20.8	-1.0	-1.1	-1.1	0.1		0.5	

c. Having completed the ICM quadrant scale, an ICM fuze setting scale is also required. The construction of the ICM fuze setting scale is very similar to that of the ICM quadrant scale. To compute an ICM fuze setting enter the appropriate correction table (Table B FT 155 ADD-I-1) with the M564(HE) fuze setting and apply the correction listed. Use the following equation: HE(M564)FS + Ballistic Correction = ICM (M565)FS. In this example the lowest listed M564 FS in Table B FT 155 ADD-I-1 is 9.6 and has an M449 correction of (-1.2). The ICM (M565) FS corresponding to the HE FS of 9.6 is 8.4. By examining the table, similar computations can be made for each whole fuze setting on the ICM fuze scale.

M564	+	CORRECTION	=	M565/ICM
10.2	+	(-1.2)	=	9.0
11.1	+	(-1.1)	=	10.0
12.1	+	(-1.1)	=	11.0
•	•	•	•	•
•	•	•	•	•
•	•	•	•	•

Each computed ICM FS is then plotted opposite its corresponding M564 fuze setting and labeled. The 0.1 FS increments are plotted by interpolation.

Having successfully constructed the scale, let's shoot!

The following Shell HE — Fuze TI (M564) firing data has been determined to a target that warrants engagement with shell ICM:

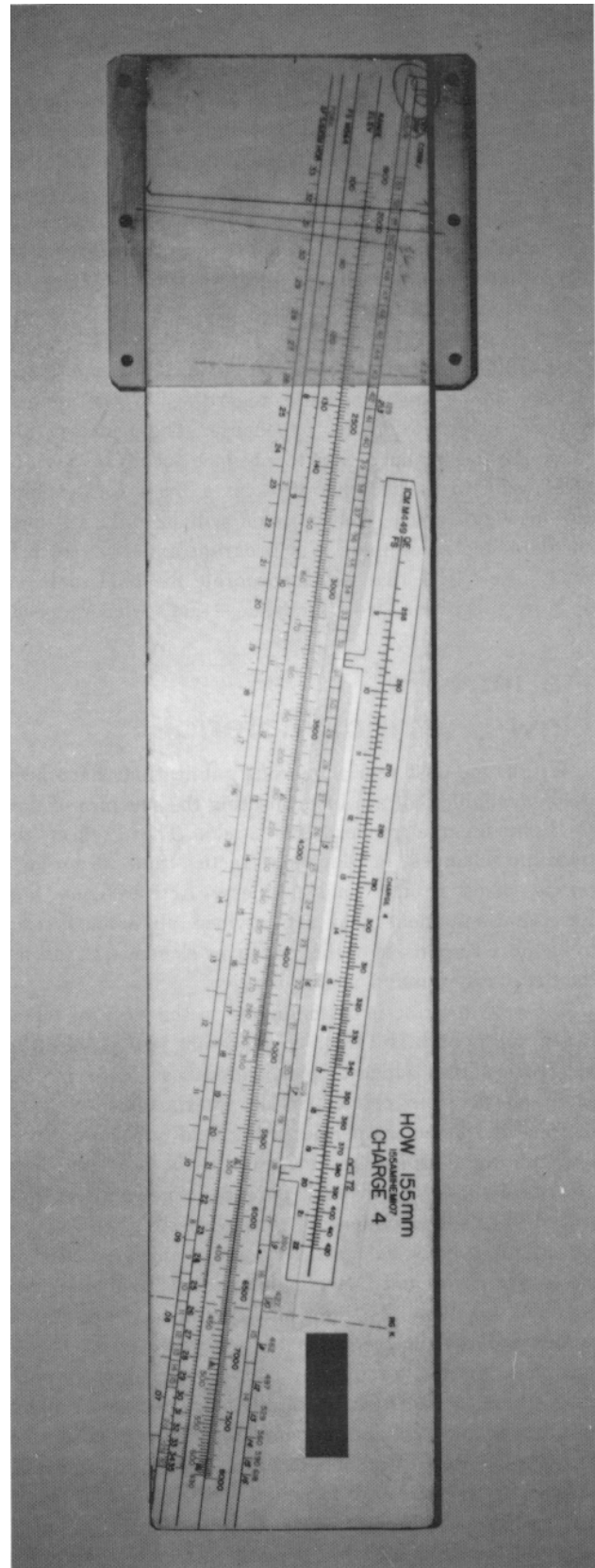
HE QE 274 TI 15.9 DF 3158

To determine ICM firing data with the new GFT Scale:

1. Place the manufacturer's hairline of the GFT over the HE QE of 274 and on the ICM scale read ICM QE 321.
2. Place the manufacturer's hairline over the M564 FS of 15.9 and read (ICM) M565 FS 14.8.
3. Deflection for HE and ICM are the same.

Work this same problem using the TFT — you will be pleasantly surprised.

A responsive solution to the ICM gunnery problem was the established goal and, thanks to Specialist Hribernik, it has been achieved. To provide an appreciation of the time saved, two missions were processed: one using the old technique and the other using the modified GFT solution. Both missions include times for the forward



Correctly modified GFT.

View From The Blockhouse

observer, fire direction center, firing battery and time of flight.

The TFT solution mission included compensation for low level winds, assumed a two round shell HE impact adjustment, one round shell HE fuze time adjustment and fire for effect with shell ICM. Total mission time was 12 minutes and 30 seconds.

The modified GFT solution mission was fired using the modified procedures which ignore low level wind corrections, assume a target location within 200 meters and immediate fire for effect. Total mission time was two minutes.

By following the steps in this article, one can immediately adopt this procedure regardless of the weapon system, projectile model or charge. The Gunnery Department has taken action to produce locally a paste-on ICM scale in limited quantities as a basis for teaching this new procedure. The paste-on will be only an intermediate step since there is a program underway to produce a new GFT that will incorporate the ICM scale.

More suggestions from the field — that's what we need!

An Index of New Doctrinal Material

Within the past year numerous publications have been made available that are incorporating the specifics of how to fight on the modern battlefield. They reflect the dynamic changes in doctrine, tactics and techniques taking place in the field artillery. Active Army and Reserve Component field artillerymen alike must train to be more responsive to the maneuver elements, to master the art of suppression and to survive.

The new doctrine is disseminated in the form of training circulars and ARTEPs. They are not just a collection of theories from which to pick and choose. They in fact represent doctrine printed in an interim form until a reasonable refinement period in the field and administrative milestones will allow inclusion in the next revisions of FMs 6-20, 6-40 and 6-50. New doctrine in these TCs and ARTEPs has undergone limited testing and is intended for use by field artillery and maneuver units of the Active Army and Reserve Components in their training, and for "final testing" and comments from which refinements will be made.

A very limited number of training circulars is published here at USAFAS initially for use in resident instruction and for an "impact" distribution to Active Army and Reserve Component units. This is for immediate use in training and to solicit early comments from the "users." About 60-90 days after our initial

publication, DA reprints each for general distribution through the pinpoint system. All field artillery units should insure they have current pinpoint accounts and have checked Block 39 (RA Tactics) on DA Form 12-11A.

Training circulars in print:

TC 6-20-1, *Field Artillery Suppression of Direct Fire Weapons*. USAFAS printing dated May 75; DA printing dated 12 May 17 (available through pinpoint).

TC 6-20-2, *Immediate Suppression With a Dedicated Battery*. USAFAS printing dated March 75; DA printing dated 12 April 75 (available through pinpoint).

TC 6-20-5, *Field Artillery Smoke*. USAFAS printing dated August 75; DA printing about December 75.

TC 6-40-1, *Modern Battlefield Gunnery Techniques*. USAFAS printing dated April 75; DA printing dated 30 June 75; (available through pinpoint).

TC 6-40-4, *Fire for Effect—How to be Your Own Forward Observer*. USAFAS printing dated June 75; DA printing about November 75.

TC 6-50-1, *Firing Battery Operations*. USAFAS printing dated April 75; DA printing dated 30 June 75 (available through pinpoint).

Training circulars to be published:

TC 6-2-1, *Survey Operations*. Early February 76.

TC 6-4-1, *The Threat*. November 75.

T 6-10-1, *Field Artillery Communications*. February 76.

TC 6-15-1, *Field Artillery MET Message*. Early December 75.

TC 6-20-4, *Counterfire*. Late September 75.

TC 6-20-6, *Fire Support Planning and Coordination*. October 75.

TC 6-20-8, *Field Artillery Suppression of Enemy Air Defense Weapons*. January 76.

TC 6-50-3, *Field Artillery Ammunition*. October 75.

TC 6-121-1, *How to Train in Target Acquisition*. February 76.

TC 6-121-2, *Field Artillery and Army Security Agency Units—A Targeting Team*. December 75.

Combined arms and performance standards are the keys to the new Army Training and Evaluation Program (ARTEP) replacements for the ATP and ATT. ARTEP is a different approach to training and the standards are tough. For Active Army as well as Reserve Component units, the inability in a given situation to have 100 percent of supporting and supported units, all personnel, ideal range facilities, complete ammunition requirements, etc., must not preclude training and evaluation under ARTEP to the maximum extent possible. Following is our ARTEP status:

ARTEP 6-365/6-37 (155SP Bn, Armd or Mech Inf Div). USAFAS printing dated June 75; DA printing about October 75.

ARTEP 6-155 (105T Bn, Inf, Ambl and Abn Div and Sep Bde). USAFAS printing dated July 75; DA printing 1st Qtr FY 77.

ARTEP 6-395 (155SP, 175SP, 203Bns [GS type]). USAFAS printing scheduled for 1976.

ARTEP 6-595 (Lance Bn). USAFAS printing scheduled for 1976.

Many of the TCs and ARTEPs have the words "test," "draft" or "revised draft" on them. This is normally found on the USAFAS productions pending the subsequent reprint by DA. As long as the dates listed here coincide with the publication, it is current.

In addition to the TCs and ARTEPs, the *Journal* has carried several related articles on the new doctrine, tactics and techniques. The November-December 74 issue initiated a series of articles that are directly or indirectly concerned with the new material. There have been from four to seven articles and items of interest in each of the last five issues of the *Journal* that outline doctrinal changes and complement current resident instruction here at the School, as well as material being published in the TCAs and ARTEPs.

OAC Gunnery Subcourse Revised

As part of the revised and more challenging Officer Advanced Course (See May-June 1975 *Journal*), the Gunnery Department has adopted a new approach toward the gunnery subcourse. Designed around the Field Artillery Digital Automatic Computer (FADAC), the program is aimed at producing highly competent battalion fire direction officers (FDOs) capable of optimizing overall system effectiveness on the modern battlefield. Although FM 6-40 is still the basic reference source, instruction also includes the more liberal approach found in the current series of training circulars, specifically TC 6-40-1 *Modern Battlefield Gunnery Techniques*.

Before discussing the revised two-phased subcourse, a word about the gunnery portion of the qualification examination mentioned in the cited article: The gunnery portion of the examination will address manual procedures only and will be limited to chart construction and use of the graphical equipment necessary to solve the gunnery problem. Successful completion of the examination enables the instruction to proceed rapidly into the more essential elements of the two-phased subcourse.

Phase I gunnery instruction is designed to provide the student with the basic fundamentals necessary to operate within the overall Field Artillery System. Each major fire direction block of instruction (basic review, registrations, MET, etc.) begins with a brief review of

manual procedures. This technique allows the student to become knowledgeable in the step-by-step procedures to determine manual firing data. Manual procedures are taught primarily to insure a positive backup capability and classroom periods allotted for this purpose have been significantly decreased, allowing the majority of the instructional time to be devoted to the integrated manual and computerized procedures.

To operate as a systems manager the student must be thoroughly knowledgeable with the primary means of gunnery computations — FADAC. He must become not only a FADAC expert but must also become an advocate of the computerized gunnery solution and be prepared to accept future generations of more sophisticated field artillery computers. To this end, hands-on FADAC instruction has been increased five-fold over that presented just one year ago. Currently, 60 percent of all gunnery instruction affords the student hands-on opportunity with FADAC. Instruction does not isolate on the computer but explains the interaction between the manual and computer solutions. Through this integrated process the student becomes aware of the increased accuracy and responsiveness to be gained by use of the computerized solution. The double-check system, perhaps one of the more "sacred cows" of fire direction, has undergone major modifications. The system being emphasized is the verification of input and output data by an independent source, normally the FDO or Chief Computer. As an added benefit to FADAC instruction, the FADAC is taken on each field problem throughout the subcourse and students are required to operate as a functional fire direction team throughout the exercise.

No area of gunnery has undergone more significant changes in procedures and techniques than observed fire. The student will find the days of large sections and static observation posts (OPs) have vanished from the hilltops of Fort Sill. All observed fire shoots have been restructured using small tactical disposed observer teams relearning (or learning) the duties of the observer while operating on a highly mobile and ever-changing battlefield. To get away from the regimented, structured academic environment on the OP, all observed fire shoots are ungraded. The student is encouraged to do whatever is necessary to "put steel on the target" rapidly and to actively participate in evolving or improving procedures.

Having mastered the basic fundamentals of Phase I, the student moves on to Phase II where he will be challenged to tie together all facets of the Field Artillery System through a series of week-long exercises. The gunnery exercise is a direct support 155-mm howitzer battalion live-fire "system shoot" consisting of both day and night operations. Students will be rotated among various

View From The Blockhouse

activities such as cannoner, forward observer and battery or battalion FDO. Each position is designed to give the student a better understanding of the relationship of the various elements operating within the system. Selected students will also be designated to evaluate firing battery, observation post and battalion and battery FDC procedures, concentrating on responsiveness. Each mission is conducted in the context of the Army Training and Evaluation Program (ARTEP) (January-February 1975 *Journal*) with the students pitting their abilities against the speed and accuracy requirements of the test. Total mission and accuracy results are compared to the established ARTEP standards and an appropriate rating for each mission is then awarded. Upon completion of the gunnery exercise all students will have a better appreciation for unit evaluation concepts and for the gunnery procedures which will provide for more responsive fire support.

The statement, "That's okay for the school environment, but in the field . . ." will become a thing of the past and the FAOAC graduate will emerge a competent manager of all aspects of gunnery.

More Effect For TEC

The American Analysis Corporation is contracted by USAFAS to design, develop and produce the now-familiar TEC training kit. The following report was brought to our attention by American Analysis which suggests to the instructor the "Optimum Use of TEC Lessons."—Ed.

The following list presents ways of using TEC lessons, in order of decreasing effectiveness of instruction:

1. *Individualized Resident Instruction*

Individual study in a classroom with an instructor present. Students allowed to help or be helped by fellow students. The instructor's role is to:

- Introduce the course.
- Provide advice and remediation for those soldiers without interrupting other students studying on their own.
- Conduct post-tests and field practice exercises.
- Provide subsequent remedial instruction for those needing it.

2. *TEC Individual Mode*

Individual study without an instructor, but with an initial orientation from and subsequent access to an instructor or supervisor to answer questions. Soldiers should be encouraged to consult each other when they are confused.

3. *TEC Group Mode*

Group mode presentation, but with each student

responding to every practice exercise. Instructor advances the lesson when everyone is ready. He should answer those questions having any general relevance. Purely individual questions should be deferred until the group lesson ends.

4. *Lock-Step Resident Instruction*

Group mode presentation either live or mediated. The difference between this and Number 3 is that the instructor calls on individual soldiers to answer each practice question. This mode is enhanced if students can ask questions during the presentation. Even in this mode, a TEC lesson should outperform most live lectures.

Correspondence School Mode

Individual study without access to an instructor, supervisor or other knowledgeable person gives variable results. Depending on the personality and prior training, this mode may rank anywhere from two to five in this list.

Based on this ranking, the following is suggested:

- a. Instructors and supervisors should allow students to work at their own pace and to confer with each other.
- b. Instructors and supervisors should augment TEC lessons by being available to answer questions. Their role is to "help" as opposed to "presenting information" (which is usually called "teaching").

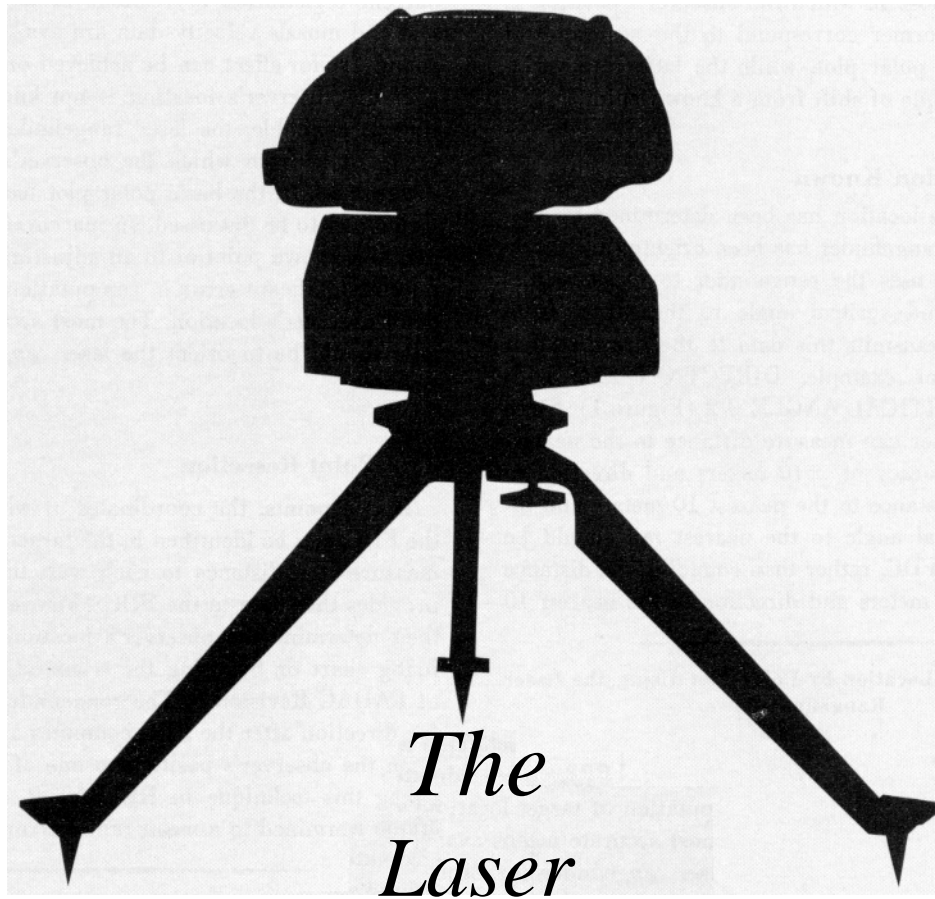
Terrain Gun Position Corrections

Survivability on the modern battlefield dictates maximum possible use of cover and concealment in positioning field artillery weapons; that is, terrain gun positioning.

These larger, more irregularly shaped terrain gun positions may necessitate the application of individual piece corrections to achieve the desired sheaf. The Gunnery Department, USAFAS, has developed and is currently testing terrain gun position corrections, a more responsive solution to the special corrections problem which retains acceptable accuracy.

Procedures include a hasty traverse technique with the M10 or M17 plotting board to determine accurate piece displacement in large position areas and a position correction procedure in which individual piece corrections for each of three sectors of fire are computed and sent to each gun. Terrain gun position corrections can be computed on a new Record of Fire which is currently being tested at Fort Sill. The Record of Fire is designed to replace the FDC computer's record (DA Form 3622). More detailed information on these new procedures and the Record of Fire will be sent by letter to all field artillery battalions in the near future.

Adjustment of Artillery Fire



Rangefinder

The AN/GVS-5 laser rangefinder is in engineering development. Twenty rangefinders are being manufactured for DT/OT II now scheduled to begin in September 1976. Following completion of testing, a decision will be made on final fielding of the rangefinder now planned for the period FY 1977 through FY 1979.—Ed.

by MAJ Jean Reed

The capability of the laser rangefinder to provide an accurate measurement of range to a target (± 10 meters) provides a significant increase in the capability of the artillery observer to achieve accurate and responsive first round fire-for-effect or surprise fire.

HELBAT 2 (May-June, 1974 *Journal*), a field experiment conducted in 1971 at Fort Hood by the

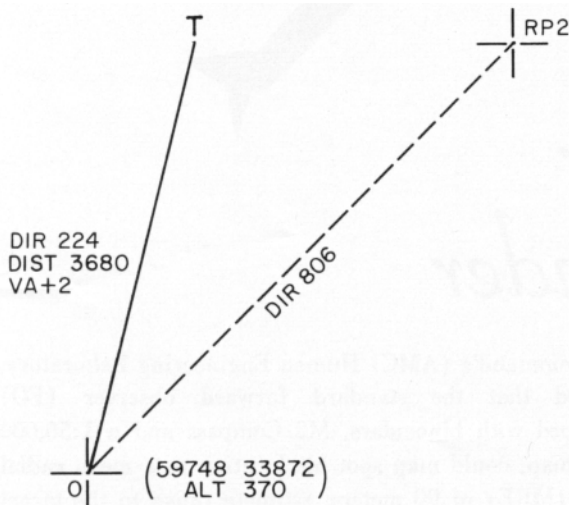
Army Materiel Command's (AMC) Human Engineering Laboratory, showed that the standard forward observer (FO) equipped with binoculars, M2 Compass and a 1:50,000 scale map, could map spot his location to a mean radial error (MRE) of 90 meters, estimate range to the target with an average error of 17 percent and measure direction to the target with an average error of 78 mils. These errors produced an MRE in target location using polar plot of 490 meters. Using the laser rangefinder and some new techniques for establishing the observer's position, target location errors were reduced to an MRE of 21 meters. These and other techniques for using the laser rangefinder are under investigation at the Field Artillery School and were used by artillery observers during HELBAT 5 in the spring of 1975.

Techniques for using the laser rangefinder fall into two general categories: those in which the observer's position is either known or can be determined by using the laser rangefinder and those in which the observer's position is not known. The former correspond to the technique of target location by polar plot, while the latter are variations of the technique of shift from a known point.

Observer's Position Known

If the observer's location has been determined by survey and his laser rangefinder has been oriented for direction, the observer uses the rangefinder to measure distance, direction and vertical angle to the target from his position and transmits this data to the fire direction center (FDC); for example, DIRECTION 224, DISTANCE 3680, VERTICAL ANGLE +2 (Figure 1). Since the laser rangefinder can measure distance to the nearest meter with an accuracy of ± 10 meters and direction to the nearest mil, distance to the nearest 10 meters and direction and vertical angle to the nearest mil should be transmitted to the FDC, rather than rounding the distance to the nearest 100 meters and direction to the nearest 10

Figure 1.—Target Location by Polar Plot Using the Laser Rangefinder.



The observer's position has been determined by survey and a reference direction has been provided to RP2: 806 mils. Registration corrections are available. The observer ranges on his target and obtains this data: Direction 224, Distance 3682, Vertical Angle +2. He transmits his call for fire: FIRE MISSION, DIRECTION 224, DISTANCE 3680, VERTICAL ANGLE +2, PLATOON OF INFANTRY IN THE OPEN, VT, FIRE-FOR-EFFECT. FDC computes firing data. The replotted location of the fire-for-effect rounds is 60550 37467 Alt 377. By comparison, the surveyed location of the target is 60553 37465 Alt 377, for a radial error of 3.6 meters.

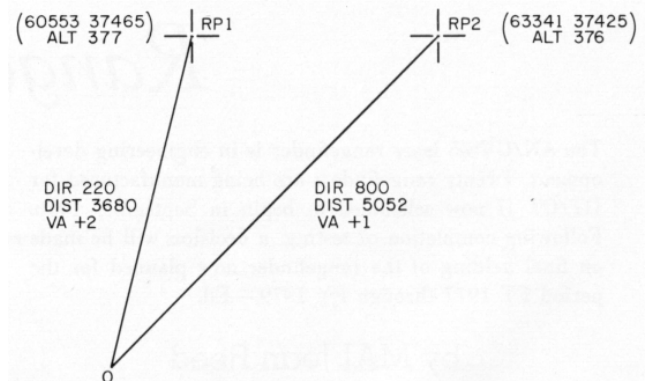
mils, as has been the usual practice. The FDC can then determine an accurate target location by polar plot using FADAC or a firing chart, and compute firing data. If current registration corrections or accurate meteorological and muzzle velocity data are available, accurate first round fire-for-effect can be achieved on the target.

If the observer's location is not known, but sufficient time is available, the laser rangefinder may be used to obtain data from which the observer's location may be determined. In the basic polar plot technique and in the techniques to be discussed, an inaccurate azimuth to a target, to a known point or to an adjusting round will introduce a significant error in computation of target location or of observer's location. The most accurate means available should be to orient the laser rangefinder for direction.

Two Point Resection

If two points, the coordinates of which are known to the FDC, can be identified in the target area, the observer measures the distance to each with the rangefinder and provides that data to the FDC (Figure 2). The FDC can then determine the observer's location graphically on a firing chart or by using the trilateration survey routine of FADAC Revision 5. The rangefinder may be oriented for direction after the FDC computes a reference azimuth from the observer's position to one of the known points. Using this technique in HELBAT 2, observer locations were determined to a mean radial error of four meters.

Figure 2.—Two Point Resection.



The observer's position is not known, but the laser rangefinder can be oriented for direction using the M2 Compass. Locations of RP1 and RP2 are known by the FDC, and RP1 and RP2 can be identified by the observer. Observer ranges on RP2 and obtains readings: Direction 800, Distance 5052, Vertical Angle +1. Data transmitted to the FDC is: REGISTRATION POINT 2, DIRECTION 800, DISTANCE 5050, VERTICAL ANGLE +1.

Observer ranges on RP1 and obtains readings: Direction 220, Distance 3682, Vertical Angle +2. This data is transmitted to the FDC: REGISTRATION POINT 1, DIRECTION 220, DISTANCE 3680, VERTICAL ANGLE +2.

FDC computes the observer's location using the trilateration routine of FADAC Revision 5 Matrix 2. The value obtained is: 59742 33867 Alt 369. FDC then computes the direction from the observer's location to RP1 and provides the reference direction to the observer who sets the value on the azimuth scale of the rangefinder. The reference direction determined by the FDC is 226. By comparison, the surveyed location of the observer's position is 59748 33872 Alt 370 and the direction from the observer to RP1 is 224 mils, for a radial error of 7.8 meters.

Two Point Resection by Firing

If only one known point is available, the second point may be established by firing. The round should be fired sufficiently far from the known point to produce an apex angle at the observer's position of at least 300 mils. The observer orients the rangefinder on the known point, using the M2 Compass to provide an approximate direction, then sends the desired location of the round by shift from the known point. The observer ranges on the burst and on the known point and provides the distance, direction and vertical angle of each to the FDC, which determines the observer's location and a reference direction to the known point (Figure 3). If no known points are available, a second round may be fired by shifting from the first; the distance, direction and vertical angle to each burst from the observer's position are determined with the rangefinder; and the data are provided to the FDC which determines the observer's location and a reference direction to the last round fired. If the locating rounds are fired with current registration data or with accurate meteorological and muzzle velocity data, the observer's position and a reference direction should be determined with sufficient accuracy (mean radial error less than two range probable errors) to permit relatively accurate first round fire-for-effect on targets located by polar plot from the laser rangefinder position.

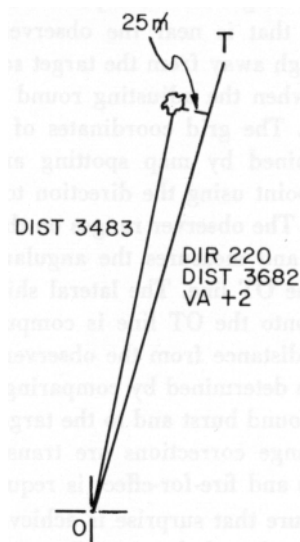
Figure 3.—Two Point Resection by Firing One Round.

The observer's position is not known, but the laser rangefinder can be oriented for direction using the M2 Compass.

The location of RP1 is known by the FDC and RP1 can be identified by the observer. Registration corrections are available.

The observer ranges on RP1 and obtains: Direction 220, Distance 3680, Vertical Angle +2. Data transmitted to the FDC is: REGISTRATION POINT 1, DIRECTION 220,

DISTANCE 3680, VERTICAL ANGLE +2. A second point is selected such that the apex angle of the observer's position is at least 300 mils and this call for fire is transmitted: FIRE MISSION, RESECTION, FROM REGISTRATION POINT 1, DIRECTION 220, RIGHT 1500, ONE ROUND, FIRE-FOR-EFFECT.



The FDC computes firing data to the second point and then determines the grid coordinates of the second point by replot.

The observer ranges on the burst of the second point round and obtains this data: Direction 620, Distance 3962, Vertical Angle +4. The data is transmitted to the FDC: SECOND POINT DIRECTION 620, DISTANCE 3960, VERTICAL ANGLE +4.

FDC computes the observer's location using the trilateration routine of FADAC Revision 5 Matrix 2, the grid coordinates of the registration point and of the second point, and the distances and vertical angles from the observer to the two points. This value is obtained: 59768 33903 Alt 369.

FDC then computes the direction from the observer to RP1 and provides the reference directions to the observer. The reference direction determined by the FDC is 221.

By comparison, the surveyed location of the observer's location is 59748 33872 Alt 370 and the direction from the observer to RP1 is 224 mils, for a radial error of 36.9 meters.

Observer's Position Not Known

If the observer's position is not known and there is not enough time to use one of the previously discussed techniques, accurate and effective surprise fire may still be obtained on the target. The technique is basically that of a shift from a known point, with the known point being determined by firing. The chief utility of the following

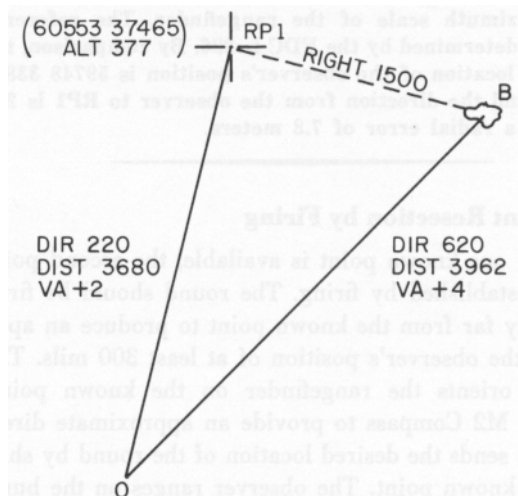
techniques is that they permit accurate and responsive fire-for-effect in a mobile operation without registration.

The observer orients the laser rangefinder using the M2 compass and determines the direction, distance and vertical angle to the target from his position. An adjusting point is selected that is near the observer-target (OT) line and far enough away from the target so that surprise will not be lost when the adjusting round bursts (1,000 meters or more). The grid coordinates of the adjusting point are determined by map spotting and fire is requested on that point using the direction to the target as the OT direction. The observer ranges on the burst of the adjusting round and measures the angular deviation of the burst from the OT line. The lateral shift required to bring the burst onto the OT line is computed using the mil relation and distance from the observer to the burst. The range shift is determined by comparing the distances to the adjusting round burst and to the target (Figure 4). Deviation and range corrections are transmitted to the nearest 10 meters and fire-for-effect is requested.

In order to insure that surprise is achieved, an adjusting point may be selected that is well removed from the vicinity of the target. The rangefinder is oriented on the target using the M2 Compass and distance and vertical angle are determined. An adjusting point is selected and fire on that point is requested, using the OT direction. When the adjusting round bursts, the observer determines direction, distance and vertical angle to the burst with the laser rangefinder. The deviation and range corrections required to place the subsequent volley on the target may be determined by the observer using the M17 plotting board to eliminate the errors which would be introduced if the mil relation or rough sine factor were used when there are large differences between the OT direction and observer-burst (OB) direction. While the FDC is computing firing data to the adjusting point, the observer orients the M17 plotting board on the OT direction and plots the target at the distance measured with the laser rangefinder. After measuring the direction, distance and vertical angle to the burst of the adjusting round, the plotting board is oriented on the OB direction and the burst is plotted at the distance measured with the rangefinder. The plotting board is then reoriented on the OT direction and the lateral and range shifts required to move the burst of the adjusting round to the target are determined. Corrections are then transmitted to the FDC and fire-for-effect is requested (Figure 5). The utility of this technique is that the required corrections may be determined quickly and minimal radio transmissions are required. The accuracy is sufficient to permit fire-for-effect on the target following a large shift from the adjusting point. More accurate corrections may be computed with FADAC, but more radio transmissions are required: the observer's position is polar plotted from the

adjusting point using the back azimuth of the OB direction; the OT direction and an ADD corresponding to the measured OT distance are entered; and firing data to the target are computed.

Figure 4.—Use of Laser Rangefinder for Determination of Subsequent Corrections.



For the purposes of illustration the observer's location is known and the laser rangefinder has been oriented by M2 Compass. Registration corrections are not available. The observer ranges on his target with the laser rangefinder and obtains this data: Direction 220, Distance 3682, Vertical Angle +2. The adjusting round bursts 25 mils left of the OT line and the observer obtains a range to the burst of 3483 meters from his position. The deviation correction required to move the round onto the OT line is determined using the mil relation $25 \times 3.7 = R90$. The range correction is determined by comparing the OT distance and the OB distance: $3682 - 3483 = +199$ or $+200$. Subsequent corrections are transmitted to the FDC: RIGHT 90, ADD 200, FIRE-FOR-EFFECT, and firing data is computed. The replotted location of the fire-for-effect rounds is 60553 37465 Alt 377 and corresponds exactly to the surveyed coordinates of the target, for a radial error of 0.

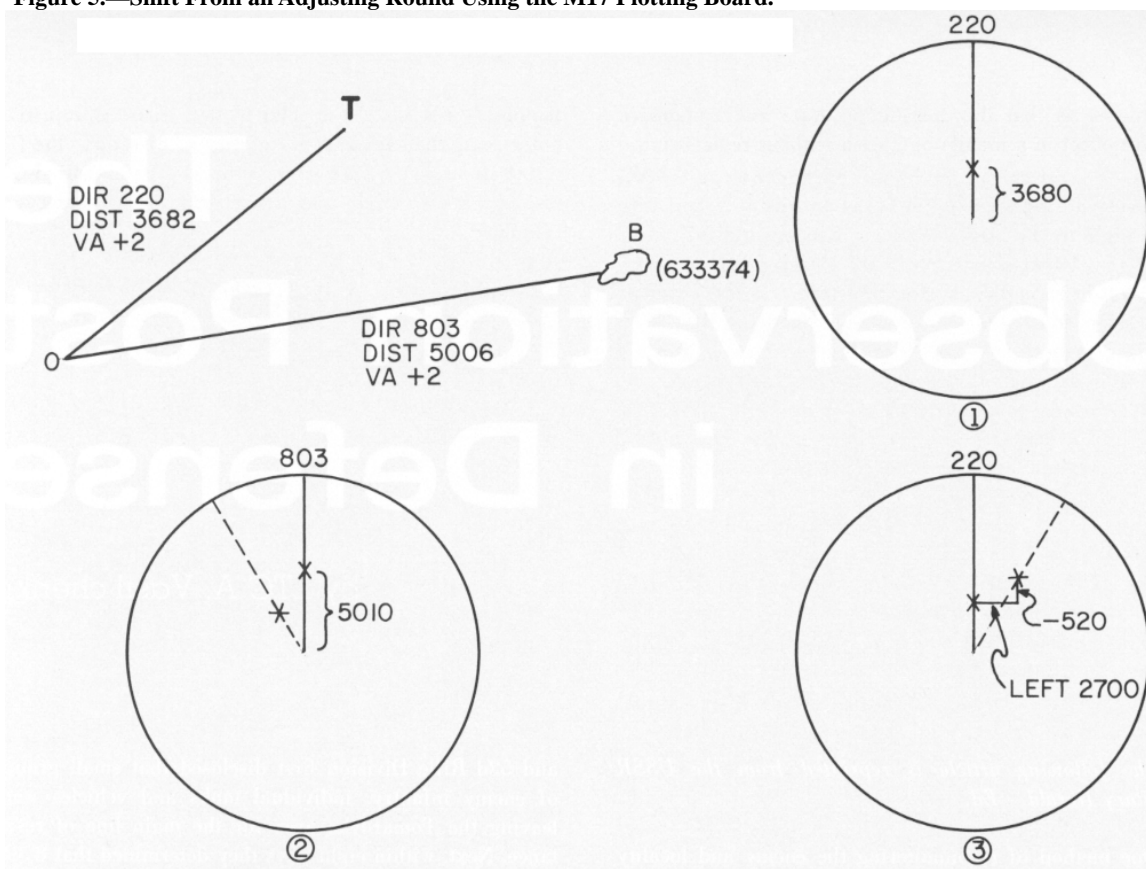
Adjustment of Subsequent Volleys

If required, subsequent volleys may be adjusted with the laser rangefinder. Deviation spottings are made with respect to the OT line and corrections are computed using the mil relation and the distance to the target measured with the rangefinder. Range corrections are computed by comparing the distance to the target with the measured distance to the burst of the adjusting round or the fire-for-effect center of impact.

Mean Point of Impact Registration

The laser rangefinder may also determine data for computation of a mean point of impact registration. Orienting

Figure 5.—Shift From an Adjusting Round Using the M17 Plotting Board.




The observer's position is not known, but the laser rangefinder can be oriented for direction using the M2 Compass. Registration corrections are not available. The observer ranges on his target and obtains readings: Direction 220, Distance 3682, Vertical Angle +2. The observer selects an adjusting point at grid coordinates 633374, well removed from the vicinity of the target, and sends a call for fire to that point: FIRE MISSION, GRID 633374, DIRECTION 220, PLATOON OF INFANTRY IN THE OPEN, VT, ADJUST FIRE.

While the FDC is computing firing data to the adjusting point, the observer orients the M17 plotting board on the OT direction and plots the target at the distance measured with the laser rangefinder: Direction 220, Distance 3680.

When the adjusting round bursts near the adjusting point, the observer ranges on the burst and obtains the data: Direction 803, Distance 5006, Vertical Angle +1. He orients the plotting board on the OB direction and plots the burst at the measured range: Direction 803, Distance 5010; then reorients the plotting board on the OT azimuth and determines the shift required to move the adjusting round to the target: Left 2700, drop 520. The vertical shift is determined using the mil relation: $(+2 \times 3.7 - (+1 \times 5.0)) = +2$. Subsequent corrections are transmitted to the FDC: LEFT 2700, drop 520, UP +2, FIRE-FOR-EFFECT.

The replotted location of the fire-for-effect rounds is 60551 37473 Alt 377. By comparison the surveyed coordinates of the target are 60553 37465, Alt 377, for a radial error of 8.2 meters.

data is provided by the FDC and the rangefinder determines the location of each burst fired during the registration. The observer ranges on each burst, determines the direction, distance and vertical angle and provides the data to the FDC.

In the problems demonstrating each of the techniques in Figures 1-5 it has been assumed that the observer ranges accurately on all targets, adjusting rounds and known points. While this represents an ideal condition for using the laser rangefinder, it does provide a basis for comparing the techniques. Further, the results of HELBAT 2 demonstrated that the observer can locate targets to an MRE of 21 meters. These results were further confirmed in HELBAT 4, conducted at Fort Sill during September-October 1973. Even if this error is incorporated, the radial errors for all of the techniques discussed will be such that effective first round fire-for-effect or surprise fire can be achieved. Although the range probable error or adjusting and marking rounds may also introduce an additional error, particularly if the round impacts greater than four range probable errors from the intended impact point, subsequent corrections can be quickly and accurately determined with the laser rangefinder and accurate fire-for-effect can be delivered. 

MAJ Jean Reed, FA, is assigned to the Test and Experimentation Division, Office of the Deputy Assistant Commandant for Combat Development, USAFAS, Fort Sill, OK.

The Observation Post in Defense

by LTC A. Vasil'chenko

The following article is reprinted from the USSR Military Herald.—Ed.

One method of reconnoitering the enemy and locality under any combat conditions is, as is well known, the reconnaissance. In battalions and companies reconnaissance is organized for all forms of combat operation and is conducted personally by commanders specially assigned for this purpose by observation posts and by persons engaged in observation. At night and when visibility is limited (in snowy weather, haze, etc.) observation is supplemented by listening.

It is difficult to overrate a well organized observation system. This is convincingly confirmed by the experience of the Great Patriotic War [World War II].

In the area of Belgorod, in the summer of 1943, when our troops were being prepared for defense, personal observation of unit commanders and of observers of observation points and posts located in zones of the 51st

and 52d Rifle Division first disclosed that small groups of enemy infantry, individual tanks and vehicles were leaving the Tomarovka area for the main line of resistance. Next, within eight days they determined that 8,300 infantrymen, 45 tanks, 17 armored personnel carriers and 19 weapons were coming to this area. At the same time the preparation of the initial position of Hitlerite attack was disclosed.

All this permitted our command to determine the grouping of enemy forces and equipment and the nature of his forthcoming operations with great certainty and accuracy. Therefore the attack that soon began in this area was not unexpected by our troops and was successfully repelled.

By contrast, an underrating of reconnaissance frequently resulted in serious consequences. For instance, on the eve of 4 January 1945, the enemy suddenly started an attack in the zone of the 331st Rifle Division of the 31st Army, captured the first trench and then extended

The Russians are watching!

The Russians are watching!

the breakthrough to three kilometers (km) along the front and to six km in depth.

And here is what was said about it in the proclamation of the troop commander of the 3d Byelorussian Front: ". . . The reconnaissance and observation in the 331st Rifle Division was conducted on a low level; the commander's observation and the reconnaissance from observation points and posts were poorly organized; the reconnaissance personnel did not know their sectors of observation and their duties, and did not report their observations on time. The observation results for the day were not summarized and no conclusions were drawn. They did not keep observation books or kept them with extreme carelessness. As a result of it, the arrival of new enemy forces from the interior and their deployment was not determined. The strike was entirely unexpected."

A reconnaissance system in modern defensive battles is organized in a battalion (or company) so as to ensure the best view of the enemy and of the locality to the biggest depth possible from the front, from the flanks and from the intermediate spaces, as well as from the rear of one's own troops. Therefore, observation posts and individual observers are distributed in echelons over the entire interior of the defense as well as at flanks and junctions. Their number depends on the conditions of the situation and the combat assignment of the unit.

For instance, in a motorized rifle battalion (MRB) on defense usually one or two observation posts are set up, and in a company, one or two observers. Each platoon and squad is also assigned an observer.

Besides these, observation points and engineering and chemical posts, organized by senior officers, could be

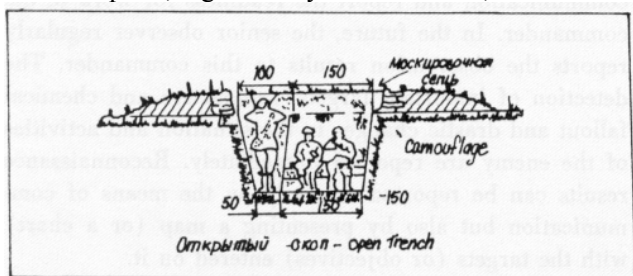
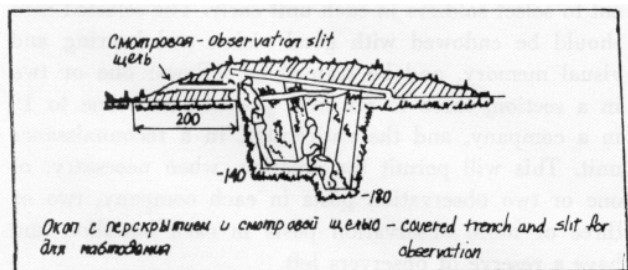


Figure 1 — Creating a place for an observation post.



located in a defense zone of a battalion for successfully carrying out the following missions: detect or specify the grouping of the enemy, his combat personnel and character of activities, the location of tactical weapons for nuclear attack, of tanks, artillery and antitank guided missiles, of command and observation posts and of radio and technical equipment; determine the character of the locality at the enemy's disposal, its engineering structures and the presence and location of various obstacles; detect early any changes in the routine location and activities of the enemy and disclose signs of his preparing for a nuclear or chemical attack; and determine the actions of enemy sappers, the advance of enemy troops from the interior, their deployment and transition to attack.

Besides these, observation posts and reconnaissance personnel of defensive elements also observe throughout the course of battle the location and operations of their own troops and of their neighbors, the fire results of our artillery, of the mortars and of other firing equipment.

According to the experience of the tactical training carried out in recent years, it is possible to vary the staff of observation posts.

In MRBs and in reconnaissance units the staff usually includes two or three persons, one of whom is the senior officer. In tank battalions, the observation posts are, as a rule, in vehicles and reconnaissance is conducted directly from the tank.

The place chosen for an observation post is usually among the battle formations of the units or flanks of the battalion's defense zone. It is equipped by the staff of the post. The best time to carry out this work (when in direct contact with the enemy) is at night or under conditions of limited visibility (mist, snowy weather, etc.). The required engineering work depends on the assignment, the battle situation, the nature of the locality and the distance of the enemy. All accommodations for the work of the observers and for the location of the instruments, as well as for the protection of the staff from enemy fire, must be ensured first. Usually, trenches of the open type or covered trenches with an observation slit are dug (Figure 1). Various natural shelters such as ravines, groves, craters, embankments, etc., could also be used for these purposes.

When selecting a place for an observation post it is necessary to take into consideration the fact that the observers must see and hear everything, and be unnoticeable to the enemy. Therefore, they must not be located near distinctive local objects, on tops of hills, hillocks and burial mounds.

If, due to the local conditions, it is impossible to find a place that will ensure good observation of adjacent areas

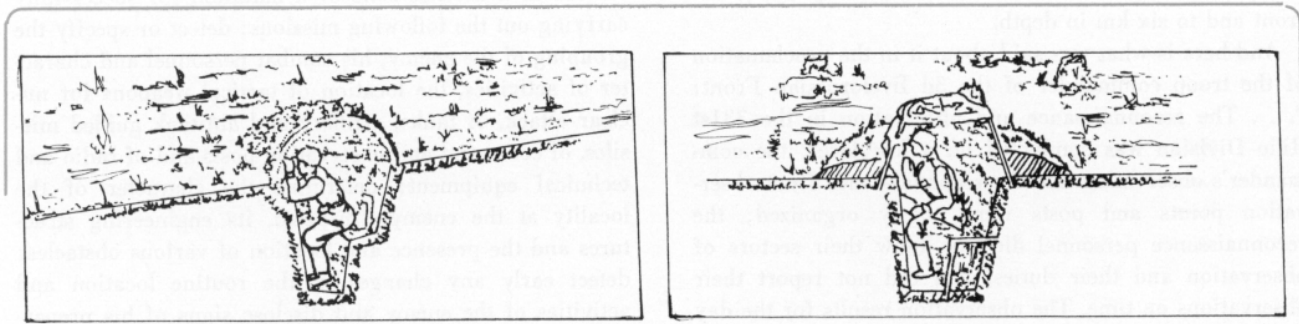


Figure 2.—Observation cells

from all sides, then one member of the post could be moved out in the necessary direction. He can build himself a foxhole in the form of a dummy local object (Figure 2). In forests and bushes, the observer settles within a short distance from the border of the forest, and in destroyed populated points, he most frequently stays among the ruins or in the attics.

It is expedient to communicate with observation posts by wire. In individual cases they can be assigned radio stations or use the regular communication means of tanks (or combat vehicles).

The task is assigned the observation post by a commander or staff officer of a battalion usually at the location from which the observation will be conducted, but in exceptional cases on a map. The senior observer issues the assignments to the individual observers.

When the assignment is made the observation post is given reference points, data on the enemy, the location of advance elements of our forces, the location of the observation post (or observer) and of the observation zone (or sector) the items requiring particular attention (what to determine and what to observe), sequence of reporting the observation results and a time to be ready for observation activities. The assignment issued to the post is entered in a journal.

The observation post must have observation instruments (binoculars, a periscope for the observer), a table with a night light on which the map or chart of the location is placed, an observation notebook, report blanks, directions for the observation post concerning the duties of the senior observer and of the other observer, various tables (audibility of sound, visibility of individual objects from various distances, linear dimensions of some objects, targets and local objects), instructions about the order of determining distances by various methods, about the indicators of basic armament types and of military technology of the

enemy and about his preparation for attack, particularly for the use of mass extermination weapons. Besides these, the observers urgently need a compass, a watch and means of communication.

The observation continues without interruption. Depending on the conditions of the situation, it is carried out simultaneously by the entire staff of the post or in shifts.

When the work has been organized the senior observer must study the location of the enemy in the given zone (or sector), appoint the first observer to perform the duties, assign tasks to the other observers and determine the sequence of their shifts, explain the equipment at the post, draw a plan of the locality, check the means of communication and report the readiness for work to the commander. In the future, the senior observer regularly reports the observation results to this commander. The detection of important targets, radioactive and chemical fallout and drastic changes in the situation and activities of the enemy are reported immediately. Reconnaissance results can be reported not only by the means of communication but also by presenting a map (or a chart) with the targets (or objectives) entered on it.

The post engages in reconnaissance work for the period of time which is determined by the commander until it is replaced by another post.

To conduct reconnaissance during combat it is expedient to select soldiers in each unit early. The selected men should be endowed with good vision and hearing and visual memory, and be trained as follows: one or two in a section, three to six in a platoon, and nine to 12 in a company, and the entire staff in a reconnaissance unit. This will permit the creation, when necessary, of one or two observation posts in each company, two or three or more observation posts in each battalion and have a reserve of observers left.

They can be trained at tactical and combat drills and at tactical exercises, as well as at special assemblies during each of the training terms. For the final training stage they can be assigned to exercises and drills, carried out with reconnaissance units before they leave for camp, and have them take exams.

It is quite clear that the programs and hours for the training of the observers will depend first of all on the regular structure of the unit and could vary extremely. In Table 1, one of the possible variants is proposed.

For the training of observers by this variant it is necessary to take into consideration that the evaluation of the assignment received by a senior observer and his distributing the assignments to his staff at the post are done, in this case, during the hours of self-preparation, and that orientation on the map and determination of one's location in the locality is practiced in the course of each exercise in the field. Subject numbers 3, 4, 6 and 8 in the table are studied in the locality against the background of the created tactical situation.

The "enemy" at these exercises is represented by models or targets, which could be stationary, emerging or mobile, and his shots are effected by blank fire, explosive packets and smoke grenades.

Also, the company's tactical series, which permits creation of an instructive tactical situation in a short time, can be used for the training of reconnaissance personnel.

Particular attention must be paid to developing in reconnaissance personnel good visual memories and enhancing this quality at all combat training exercises and particularly at tactical drills. Even when the men are on their way to field training any unit could be stopped and individual fighters could be questioned as to what elements in the locality and reference points along the route they had memorized.

In conclusion, one desires once more to emphasize that observation, as one of the main methods of reconnoitering the enemy and locality, has not lost its importance in modern battles. Furthermore, the experience of tactical drills convincingly testifies to the fact that when commanders pay the necessary attention to training the staff in reconnaissance, and skillfully organize the studies during the combat training period, they will receive in good time the most varied reconnaissance data without which it is impossible to make well-grounded decisions.



Table 1

List of Subjects	No. of Hours	
	Recon. unit	Line unit
1. Study of reconnaissance symbols for engineering construction in the locality, for barriers, armaments, technical combat equipment and for nuclear means of attack by a possible enemy.	12	6
2. Study of observation instruments and sequence of their employment.	6	4
3. Equipping the location for the observation posts and observers.	14	7
4. Sequence of studying the locality and reference points and measuring the distances to them.	6	4
5. Official records of observation post.	6	4
6. Duties of senior observers and of other observers.	10	7
7. Operations of observation posts during the preparation of an attack and during the attack (day and night).	26	26
8. Operations of observation posts in a defense situation (day and night).	26	16
	<u>106</u>	<u>74</u>

This article is about artillery support in the Yom Kippur War. There are, however, two preliminary points to be made about it.

First, I spent 10 days in Israel in October. I went to all the right places, I saw all the right people and I had all my questions answered but I was entirely on my own. My questions really were only my questions. The interpretations I set on the answers were my interpretations and the conclusions I have drawn are my own. They are perhaps peculiarly mine because the Israelis have not, I think, entirely reached their own conclusions yet.

The second point is this. This article is about the Arab-Israeli battle of 1973 which happens also to be the last war. But in talking about this last war I cannot present for you any magic window opening necessarily onto the next war. Indeed I am simply going to try to give you some thoughts arising from a battle in a desert country (the Golan is a desert, too) in a Mediterranean climate. I cannot offer revelation in the context of Western defence.

The Israeli artillery started the war fairly low down in the military pecking order. The Israeli aim in all their battles in 1948, 1956, 1967 and 1973 had been to win those battles decisively, and the Israelis still believe that armour is the only arm which can win a battle decisively. It follows that armour was their primary arm. The rest of the Israeli forces were bent on assisting the armour to win the battle decisively: the infantry was in support, the artillery was in support, the engineers were in support and the air force was in support—all of them were in support of the armour.

The advantages of an air force operating freely (as the Israelis did in 1967) in a Mediterranean climate are obvious. You can really rely on air support when neither the weather nor the enemy can interfere with it; you can be sure of the effect of air support (for, of course, a Phantom or a Skyhawk does carry a formidable punch even in artillery terms); and finally air support presents a simple logistic problem. There is no difficulty about getting ammunition to the aircraft because the aircraft come back to rearm.

All of these advantages of airpower had become very plain in 1967 and as a result the air arm had become the premier arm in support of the tanks. People felt that between them, tanks and aircraft could win any war, and, because between

artillery support in the yom kippur war

by Brigadier T. L. Morony, O.B.E.

them they could win any war, the obvious need for artillery was correspondingly reduced.

But the big discovery that emerged as a result of this war of 1973 was that not even the Israeli Air Force could operate freely any more. The effect of SAM and ZSU 23:4 and the Triple A as a whole was, in fact, to make operations by the Israeli Air Force not free but very expensive. Of course the Air Force would get through when it had to (and it did, too, in Golan and Syria particularly), but it had to count the cost and that cost was high.

I am reasonably convinced that any air force facing an air defense of this kind and this density will reach the same position. Essential operations

by air forces will, of course, go on but they will be expensive and it will therefore be necessary to evaluate the target against the risk. Even if the target is such that the risk has to be taken, the evaluation will still delay the response. Be that as it may, it was for these very reasons that the Israelis found that close air support as they had come to know it was dead. It just didn't happen: the Israelis found themselves without the close air support on which they had relied.

There are two big points that come out of this. First—the Egyptians, who were not previously regarded as being among the first division of fighting men, more or less halted the Israeli Air Force in the immediate battlefield area and that Air Force was one of the best in the world. Effective air defence is therefore entirely possible. There is no need to worry any more about the enemy ground attack sortie rate, or about manoeuvring as little as possible by day or about the damnable business of resupply only at night. The Egyptians have proved that effective air defence is possible if it is really wanted. But the question then becomes "How badly is it needed?" because an effective air defence is very expensive indeed. The density of SAM deployed along the Canal in October 1973 was about 20 times the density of SAM deployed in Central Europe today. There was SAM 2 and SAM 3 and SAM 6. On top of that there was ZSU 23:4—2,000 rounds a minute of 23-mm and the Israelis say it is deadly. Then there was SAM 7—a tail chaser, a heat seeker and effective against aircraft up to 520 knots. And so on, but of course the bill in terms of manpower and in terms of cash is very high, and it will be necessary to sacrifice something else if the decision is taken to adopt this defence. Nevertheless, for the first time in history, an effective air defence is a realistic option.

That is the first point and it is obvious. The second point is also obvious: it is that without close air support, ground forces have to rely on their own indirect fire weapons.

Now that the Israelis are reappraising the value of artillery, they have been asking what is artillery for in this armoured battle, in which close air support is denied them and the enemy confronts them with a ferocious gun line?

They say that they have found the 105-mm gun relatively ineffective—except for helicopter operations. They do not think it earns its place in the division artillery.

They have, however, found that what we used to

call medium guns—that is the 130-mm and upwards—are effective and moreover that they are effective against tanks. Three regiments of 155-mm guns (that is 36 guns in their parlance) not only can stop tanks but did stop a battalion of tanks, on several occasions. A concentration by 36 guns of about 10 rounds fire-for-effect fired as fast as possible is effective.

It gets its effect because a tank which is hit, wherever it is hit, will be killed; and moreover in a thick concentration the tanks which are not hit and killed will still lose aials, tracks and so forth. Some T62s had their fuel tanks punctured by splinters and the Israelis think that a mixture of HE and white phosphorus may be useful against the T62.

It follows from all this that they think the divisional artillery should be 155-mm and that it should be used as a rule in the mass and controlled from a divisional fire support control centre. The Israelis argue further that, because of the effectiveness of guns firing in concentration, you cannot afford to dissipate artillery effort by providing a guaranteed response to calls for fire from individual units and subunits. To get your effect you need all 36 guns from all three regiments. You cannot afford to lose any of them providing first aid for infantry subalterns who have got into difficulty.

The Israelis therefore regard their guns as a weapon which should be used in the mass to have a real effect on the armoured battle. Because this effect is a real one, they use their guns "in the mass" and will not readily dissipate their effort on intimate close support. Priority one is therefore general support. Direct support in the sense of guaranteed fire is incompatible with such a philosophy and close support (the response to unit calls for fire) is losing even the second place of priority.

That second priority must be counter-bombardment. The Russian gun line is formidable. Israeli batteries were moving to alternative positions four or five times in a day. They were not unduly worried about it because their artillery is largely SP and the moves were easy; the area had been surveyed in detail long ago, so that orientation presented no difficulty. Finally the Israelis keep most of their ammunition on wheels in requisitioned vehicles which eliminates any dumping problem. But, even so, as they motored from one



position to another, the point was still driven home that counter-bombardment should be Priority Two. The armour, the infantry and the engineers (perhaps particularly the engineers on the Canal bridges after the counter-crossing) were also in no doubt about the priority of counter-bombardment. Against the Russian gun line which is at the moment mostly towed, neutralizing counter-bombardment is economic and effective. A couple of rounds a minute in the right position could keep a battery quiet—this was plainly very worthwhile.

Target acquisition and location were not sophisticated. Both the Egyptians and the Israelis went rather for the primitive approach. Counter-bombardment by both sides was conducted by small parties—an officer, a signaller and an "ack" [EM] penetrating (usually overnight) and then bringing down observed counter-bombardment fire.

Now in view of the size of the general support task and the extent of the counter-bombardment problem you will appreciate that Priority Three, the

response to unit calls for fire, is going to be a little unreliable. This is quite reasonable because the need to fire a divisional concentration, or a counter-bombardment programme, may be out of all proportion to the results of responding to the pleas of a squadron or a company out on a limb.

But it does make it very confusing because, whatever other lessons come out of the war, one is certainly that there is still a need for an immediate response to calls from units for indirect fire support. Just as SAM and the consequent reduction of close air support have enhanced the importance of artillery as a divisional weapon, so Sagger and the rest of the antitank weaponry have emphasised the need for immediate indirect fire support in the unit and brigade battle. Put another way, great as may be the need for artillery to join in the attack on enemy tanks, there is a comparable need for indirect fire to assist in the operations and manoeuvre of our own tanks.

There is in fact no need for this indirect fire

to kill antitank gunners or to destroy antitank guns; it will be sufficient to spoil the missile operator's aim possibly by frightening him or by obscuring his target with smoke—one is speaking therefore simply about neutralization. It will often be difficult to identify precisely where the Sagers are coming from, so that one is speaking also about area shoots rather than point targets. It will always be essential to have an immediate response and, because that immediate response is essential, it will almost certainly have to be guaranteed: and that of course is the direct opposite to what I said earlier when I was describing the importance of general support in the divisional battle.

The Israeli hope is therefore (I think it is still a hope rather than a clear intention) that the artillery should shed their mortars and that both the infantry and the armour should have some of their own 81 or 120-mm SP mortars to provide for their own organic indirect fire support. This would free the gunners, armed with 130-mm guns or better, to concentrate on their proper task, which is as a rule (so the Israeli gunners seem to think) to help in the defeat of the enemy tanks and to engage and destroy the enemy guns.

This is, perhaps, a different philosophy to that to which we, in our Army, are accustomed and it is important therefore to remember that I have been talking about the Israeli experience. It is for consideration how that experience should be applied by us or, indeed, whether it is applicable at all. The big points are:

An effective air defence is possible. It is very expensive but for the first time the option exists.

Medium guns used in the mass (thirty-six 155-mm at 10 rounds fire-for-effect) are effective against tanks. It is therefore in this role that artillery must be used. General support is therefore Priority One.

Because of the need not to dissipate artillery effort, any guaranteed response from artillery to unit calls for fire is impossible. Any response to unit calls for fire at all will often be difficult. What we tend to call close support is therefore of lower priority, and not even second priority because the Russian gun line presents a threat which has to be met. Counter-bombardment is Priority Two.

However an immediate response to unit calls does still remain essential and must therefore be provided. This may be achieved by mortars integral to infantry and tank battalions.

It is perhaps worth thinking about. 

This article, reprinted from the British publication *Journal of the Royal Artillery*, March 1975, proposes that fixed priorities be established for field artillery support, with General Support (GS) assigned priority one; Counterfire, priority two; and Direct Support (DS), priority three.

Although a good case is made for these priorities, the proposal limits the flexibility which must be inherent in FA employment.

On the modern battlefield, the battle will be won or lost at the brigade level—a fact which dictates that a maneuver brigade *must always* have immediately responsive field artillery support, in the form of the DS mission. DS must therefore always be *the* priority mission of the artillery supporting a maneuver force.

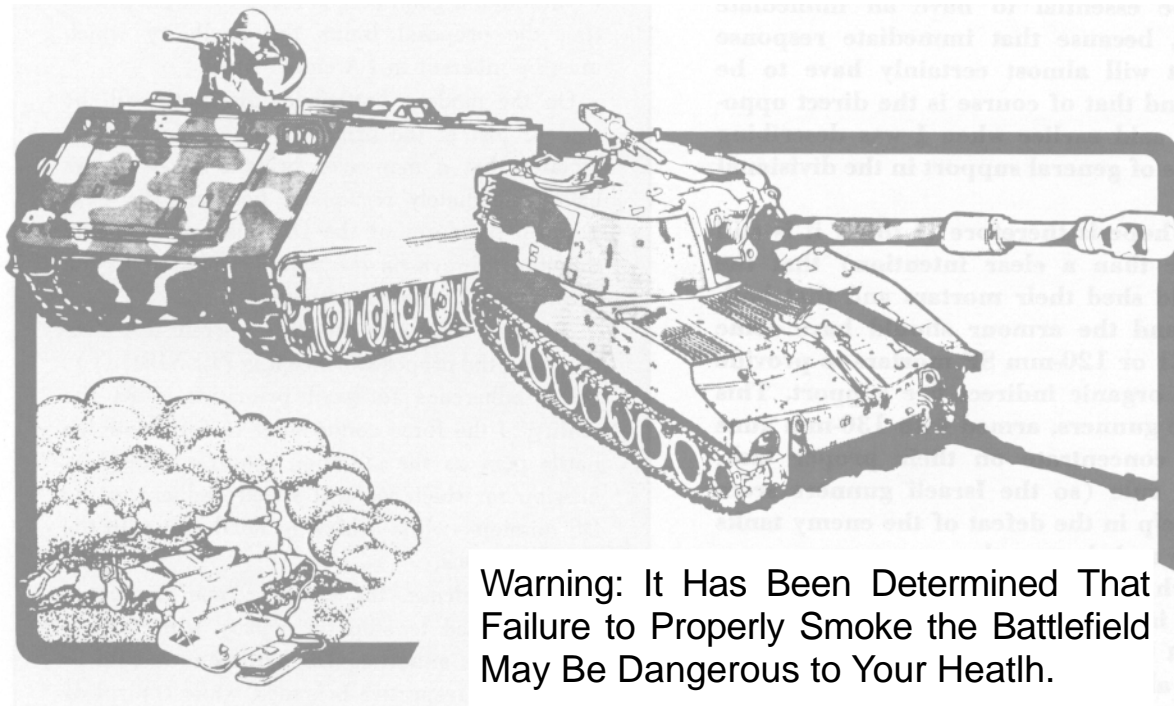
The key difference between current FA doctrine and the proposed concept is FLEXIBILITY. Strict adherence to fixed priorities limits the ability of the force commander to formulate his battle plan as the situation requires. The only mission to which *we* will strictly adhere is the DS mission—while achieving flexibility with the other missions.

In the defense, for example, one can agree with the need to stop the enemy with massed fires. In this situation, DS battalions remain in DS of their respective brigades, while control of all other field artillery available to the commander may be centralized by assignment of a mission of general support or general support reinforcing. This allows the DS battalion commander and the Divarty commander to mass fires, as required, to fight the defensive battle.

In the offense, however, tanks will be the major weapon, and supporting artillery must be immediately available in large amounts for the brigades' attack and exploitation. Here, the DS again is paramount, and in fact must be "beefed up" with other field artillery available by the assignment of a reinforcing mission. We still retain the capability to mass fires, but make more artillery immediately responsive to the committed brigades.

The ability to mass artillery for the attack of targets such as tank formations is not in contravention with assigning DS as the first priority mission—but rather is included through flexible organization and mission assignment.—USAFAS

SMOKE!



Warning: It Has Been Determined That Failure to Properly Smoke the Battlefield May Be Dangerous to Your Health.

The use of smoke in warfare is not new. In 1701 Charles XII of Sweden produced smoke by burning damp straw to cover the movements of his troops making river crossings. For the most part, smoke in the 18th and 19th centuries was considered more of a handicap than an aid to tactical maneuver. World War I saw the use of smoke by all belligerents, both in offensive and defensive operations. World War II brought about the refinement and development of smoke-producing agents and projectiles for indirect weapons systems. With the increased capability of these munitions, smoke could be used beyond the forward edge of the battle area to deny the enemy observation and information on the movements of friendly front line troops.

The Germans were successful in breaching the Maginot Line between St. Avold and Saarlben by using artillery and mortars to obscure the fortifications and observation posts. The US Third Army's crossing of the Saar River relied heavily on mortars and artillery to

supplement smoke generators during the operation. Lessons learned from WWII clearly demonstrated that smoke was very effective in denying enemy observation and thereby degrading the enemy's direct and indirect firepower. Dummy and deceptive smoke screens caused the enemy to expend large amounts of ammunition against unprofitable targets.

Over the years since WWII, the use of smoke as a screening agent has received minimal emphasis. In Korea and Vietnam smoke was used primarily as a signaling and marking agent. Until recently (Yom Kippur War), little or no instruction on its use was given to students in service schools, to include the Field Artillery School. The majority of our leaders today have never employed smoke in field exercises or in actual combat operations.

This minimal use and lack of knowledge has degraded our present capability to employ smoke ammunition. Recent field use also indicates that HC (Hexachloroethane) ammunition is unreliable and has a fairly high

by CPT L. Kirk Lewis

malfunction rate. Additionally, since WWII, the amount of smoke ammunition in the basic load has been limited and is predominantly WP (white phosphorus). Although WP is excellent for marking, it is unsuitable in its present form for long duration screening.

One may ask, "Why this new emphasis on the use of smoke?" The Israeli/Egyptian conflict of 1973 clearly demonstrated that an antitank guided missile (ATGM) gunner could neutralize or destroy modern tanks. The number of Israeli tanks destroyed by these weapons emphasizes that methods must be sought to counter this threat. Techniques were derived both at the Armor and Infantry Schools to increase maneuver force survivability when operating in this environment. The Field Artillery School also developed techniques which enable immediate suppressive fires to be brought to bear against ATGM positions and allow the maneuver elements to accomplish their mission. In this search for more effective ways to degrade ATGM fires it was realized that smoke is an excellent agent for severing the optical link required by an antitank gunner to effectively engage and defeat a target.

To realize the full potential of field artillery delivered smoke techniques, new doctrine is required to assist the combined arms team in smoke operations on the modern battlefield. How then can the field artillery best use existing smoke assets?

The first task was to consolidate available smoke information and simplify the technical data into simple, useable form. It quickly became obvious that the forward observer (FO) holds the key to successful employment of smoke and existing gunnery procedures were streamlined to achieve greater responsiveness. His ability to determine the weather conditions, predict their effect on smoke and integrate this information with the scheme of maneuver will insure that the smoke provides an advantage to the user. He must always remember, as should all users, that smoke may degrade friendly operations to some extent.

Because of the considerations involved in the employment of FA smoke, smoke might be referred to as "the thinking man's ammunition." The FO must be knowledgeable of the amount of ammunition required and delivery system availability. Some requested smoke missions will require ammunition expenditures in excess of the basic load or in excess of available artillery. If the FO is inadequately trained or fails to consider all the necessary employment factors, the maneuver commander may be misled or the smoke mission may become a liability rather than an asset to the supported force.

Based on the need for responsiveness, simple procedures and control of smoke on the battlefield, three delivery techniques to provide smoke to maneuver

forces have been developed.

The first of these techniques, Immediate Smoke, is used primarily to suppress ATGM positions or small area targets where HE fires would be ineffective. Because time is critical in accomplishing this, a mixture of ammunition is fired to provide a rapid buildup of smoke lasting approximately five minutes. This is accomplished using one firing platoon with one gun firing WP and one firing HC. Because of the limited amount of smoke being employed (two rounds), minimal command and control will be required, thus insuring maximum responsiveness to the maneuver elements.

When larger targets or areas up to 600 meters require responsive smoke and time is available for HE adjustment, the Quick Smoke delivery technique is used. Here platoon fire, using one to three platoons, will be employed with either WP or HC ammunition. Responsiveness is achieved by the FO's determination of the number of platoons to fire the smoke, using a normal sheaf.

The last technique is Special Smoke. In this method, individual rounds are placed using special corrections to maximize the effectiveness of each smoke round fired. This technique is the least responsive method since considerable time is required to determine the firing data for each piece. Additionally, since this will produce the large deliberate screens for a longer period of time, exact ammunition requirements will be calculated to maximize useage and to insure ammunition requirements are available or that efforts are made to prestock the required ammunition.

A complete discussion of all these techniques is contained in the new draft training circular 6-20-5, *Field Artillery Smoke*. In addition to the methods outlined, the TC contains basic smoke employment fundamentals and planning guidelines necessary to effectively employ smoke. The TC also discusses the increased emphasis and use of smoke in the future which will require some adjustments to present basic loads and the development of new ammunition to provide increased effectiveness over current capabilities.

Work has already begun on new 155-mm and 105-mm ammunition. This ammunition will provide rapid buildup capability and a longer burning duration. The two concepts receiving major attention at this time are WP impregnated cotton wicks and WP filled plastic wedges. Static test firings have been accomplished with both concepts. It is planned that the 155-mm round should be fielded by 1980.

To test future concepts and build a better data base, USAFAS and Army Materiel Systems Analysis Agency

(continued on page 51)

During 1966 three divisions — the 4th, 9th and 25th — came to Vietnam. Two separate brigades — the 196th and the 199th Light Infantry Brigades — and the 11th Armored Cavalry Regiment also arrived. The organization of supporting artillery varied somewhat. The divisional artillery of the three infantry divisions consisted of three 105-mm howitzer battalions and one composite battalion of 8-inch and 155-mm weapons. The separate, nondivisional brigades were organized for independent operations. For that reason, they each had an organic 105-mm howitzer battalion. The armored cavalry regiment, roughly equivalent to a brigade, had no artillery battalion. Instead, each of its three subordinate squadrons had an organic 155-mm self-propelled howitzer battery, which together equalled an artillery battalion. The absence of an artillery battalion headquarters, however, precluded the coordination of all fires.

As 1966 began, artillery in the Republic of Vietnam consisted of one 105-mm battalion in direct support of each maneuver brigade, two additional 105-mm battalions, a 155-mm battalion, one 155-mm and 8-inch battalion, an aerial rocket artillery battalion, four 8-inch and 175-mm battalions and two artillery group headquarters. Before the end of 1966, the amount of artillery in Vietnam was to increase over 100 percent. There would be four group headquarters, six 8-inch and 175-mm battalions, six 155-mm or 155-mm and 8-inch battalions, twenty-four 105-mm battalions and the one aerial rocket artillery battalion. There would also be two artillery 40-mm "Duster" battalions that had been reactivated from Reserve and National Guard assets.

The very number of the operations during 1966 was particularly important for those concerned with artillery employment. Operation MASHER/WHITE WING, conducted by the 1st Air Cavalry Division in early 1966, was the first large-scale operation to cross corps boundaries, and it involved a tie-in with Marine Corps forces as well as allies of the Army of the Republic of Vietnam and the Republic of Korea. The effect of the operation on the enemy was devastating; it was the largest of the 19 major operations conducted during 1966 and resulted in 2,389 enemy casualties.

The operation took place mainly in Binh Dinh Province, largely controlled by the enemy and considered a very "hot" area. Binh Dinh is bounded by the South China Sea on the east, by foothills on its northern boundary with Quang Nga Province and by large hill masses on the west and south. In the eastern part of the province, the terrain is mostly flat coastal plains; to the west, the terrain becomes rugged but is interspersed with flat plateaus. Reliable intelligence gathered over a period of months pointed to the presence of a large enemy force

Part IV The Field Artillery Buildup



1966 Combat Operations

by MG David E. Ott
Commandant, USAFAS

in the north of the province. Believed to be operating there were the 18th and 210th North Vietnam Army Regiments, the 2d Viet Cong Main Force Regiment and an unidentified regiment.

The division plan for the operation covered four phases: Operations MASHER, WHITE WING, WHITE WING (EAGLES CLAW) and WHITE WING (BLACK HORSE). Phase I, Operation MASHER, began with a deception operation south of Bong Son to increase the security of Highway 1 and to lead the enemy to believe efforts would be directed southward. The 3d Brigade (Gary Owen) conducted the initial assault. The artillery for this diversionary assault was task organized to allow for adequate fire support in the event heavy contact was made.

The organic 105-mm battalions were assigned their normal missions of direct support and the aerial rocket artillery battalion was assigned its normal mission of general support. In addition, the division had field artillery support available from higher headquarters. One 8-inch/175-mm battery was given the mission of general support to the division; one 105-mm battalion, that of reinforcing the South Vietnamese Airborne Brigade Artillery; and one searchlight battery, that of general support.

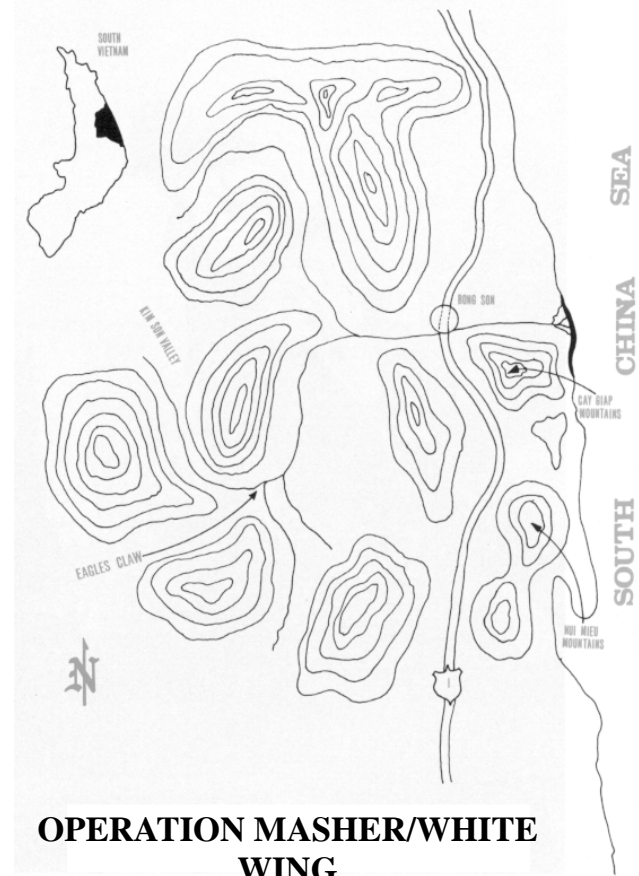
To further weight the attack, elements of direct support units that were not heavily committed in the opening phase of the operation were attached to more heavily committed units. Some units were also given on-order missions, which would facilitate planning for projected future operations. Additional firepower outside the division organic and attached resources was also made available for the operation. Tactical air support, both preplanned and immediate, was available for the entire operation. Naval gunfire support was available on call except for the period 10 February through 1 March. The fires of a 105-mm battalion of the 22d South Vietnamese Division Artillery and a 155-mm battery of II Corps were also available.

The initial assault into the area south of Bong Son met little opposition. On 28 January, in conjunction with the Vietnamese Airborne Brigade, air assault and overland attacks were launched north of Bong Son. Two enemy battalions were found, fixed and destroyed during the move north. Prisoner interrogation revealed that the enemy had moved out of the coastal plains and into the adjoining highlands to the north and west.

In response to this intelligence, the division launched Phase II of the operation, WHITE WING. Originally scheduled for 4 February, the initial assault was delayed for 48 hours because of bad weather. On 6 February,

with a battalion of Marines holding blocking positions to the north, the 2d Brigade, 1st Air Cavalry Division, launched a coordinated five-battalion attack from both sides of the An Lao Valley and swept south toward the 22d Division.

As the 2d Brigade moved south, the 3d Brigade launched Phase III, a series of attacks into the area southwest of Bong Son. Highlighted by valleys, this area was appropriately nicknamed the "Eagle's Claw." A number of light to moderate contacts were made as enemy units within the valleys were caught between converging forces. Meanwhile, the 2d Brigade received some valuable intelligence information. Among the prisoners captured by the division was a battalion commander of the 22d North Vietnamese Army Regiment. He revealed that his unit held defensive positions in an area south of Bong Son. The brigade responded to this intelligence with an assault into the area and, in three days of continuous fighting, destroyed the 22d Regiment. While the 2d Brigade was engaged, the 1st Brigade relieved the 3d Brigade in the Kim Son Valley and in a matter of days rendered the 18th North Vietnamese Army Regiment ineffective, capturing



all of the enemy antiaircraft weapons and recoilless rifles.

The final phase of the operation, WHITE WING (BLACK HORSE), was a sweep into the Cay Giap Mountains southeast of Bong Son. The sweep, conducted with the South Vietnamese 22d Division, met only sporadic enemy resistance. By 6 March, 1st Cavalry sky-troopers had made a complete sweep of Bong Son and the area could no longer be considered an enemy stronghold. The division had maintained contact with a determined enemy for 41 consecutive days and had again proved the effectiveness of airmobile operations.

For the supporting field artillery involved in Operation MASHER/WHITE WING, the success of the operation

Field Force Artillery — 8-inch howitzer ready to fire. Note gunner's quadrant in hand of man on left.

is of particular significance. The artillery showed that it could follow the fast pace of the airmobile troopers. Displacements were made quickly and efficiently without loss of the fire support capability.

At the outset of Operation MASHER on 25 January, the division artillery forward command post displaced to the Bong Son Special Forces Camp where it was collocated with the division tactical operations center and the Vietnamese division command post. The move greatly facilitated clearance procedures and created a quick fire channel which permitted immediate US response to Vietnamese calls for fire and Vietnamese response to US calls for fire.

Although every attempt was made throughout the operation to position artillery so that displacements were held to a minimum, the speed with which ground troops moved and the size of the area of operations nonetheless



dictated an unusually high number of artillery displacements. Shown are battery displacements for the 41-day period:

Operation	Displacements by	
	Air*	Road
MASHER	2	30
WHITE WING	28	27
WHITE WING (EAGLE'S CLAW) (11-28 February)	27	35
WHITE WING (BLACK HORSE) (1-6 March)	0	17
Total	57	109

*Average of 12 CH-47 sorties per battery displacement.

When a field artillery unit is moving, it cannot support the maneuver forces; the displacement that becomes necessary requires a considerable amount of planning and coordination to avoid depriving the ground troops of the support they need. Nevertheless, 1st Cavalry artillerymen at all levels of the command met this challenge. Although most of the personnel assigned to the division were not strangers to airmobility, many of the supporting units were; yet they too completed air moves without major difficulty.

In early February during Operation WHITE WING, a CH-54 Crane moved a 14,000-pound 155-mm towed howitzer for the first time in combat. The weapon belonged to Battery A, 1st Battalion, 30th Artillery. This feat showed that medium towed artillery could go virtually anywhere the lighter (105-mm) artillery could go; thus, greater flexibility of the artillery and its supported forces was achieved. Much of the credit for the move must go to the men of the 1st Cavalry Division Support Command who fabricated and tested the special slings required to lift the 155-mm howitzer.

The large number of displacements by air put a tremendous strain on the air resources of the division. When the artillery was displaced by helicopters, ammunition was transported separately. During MASHER/WHITE WING, artillerymen attempted to determine a means of economizing on "blade time" in the displacement of artillery. The product of this experimentation was a double-sling system that allowed the CH-47 to lift the 105-mm howitzer as well as a load of ammunition. The ammunition was suspended underneath the howitzer by means of a long (18- to 20-foot) sling. With crew riding inside the CH-47, this new method proved invaluable in subsequent operations since it permitted the displacement of a complete firing section in one aircraft sortie. The initial attempt to test this concept during combat was not made until Operation JIM BOWIE which took place a few days

later, though the development is attributed to the experiences of MASHER/WHITE WING.

The development of procedures to displace artillery during MASHER/WHITE WING is of secondary importance to the actual shooting done by the field artillery. Operation MASHER/WHITE WING testifies to the ability of the field artillery to maintain a devastating volume of fire and still move and communicate with the supported forces. During the operation, 141,712 artillery rounds of all types were fired during 16,102 missions.

In addition to the artillery expended, the US Navy supported the operation with 3,212 5-inch rounds and the US Air Force flew 515 tactical air sorties during which over 1,000 tons of ordnance were dropped.

Both tube and aerial artillery received a fair share of credit for enemy killed. Of particular value in this respect was information gleaned from prisoner interrogations. For example, a prisoner from the 8th Battalion, 18th North Vietnamese Army Regiment, revealed that on 3 February 1966, at the end of Operation MASHER, his unit had discovered and buried 200-400 bodies killed by artillery. All told, Operation MASHER/WHITE WING yielded 2,389 enemy casualties, of which 358 confirmed dead were credited to the field artillery.

On the whole, Operation MASHER/WHITE WING was a tremendous success in defeating the enemy and freeing the civilian populace of the Bong Son area from enemy control. The complete fire support system functioned effectively throughout this operation. Target acquisition resources, artillery survey, artillery aviation, firing batteries and support elements all acted as a team. The cooperative effort and enthusiastic response of South Vietnamese artillery contributed significantly to the overall fire support coordination effort. On the US side, the 2d Battalion (Airmobile), 19th Artillery, and the 1st Battalion (Airmobile), 77th Artillery, exchanged liaison personnel during the operation to facilitate the direct support of the other's brigade. Artillery communications functioned smoothly throughout the operation and despite the vast area covered by the operation, artillery survey personnel from the division artillery and the support battalions traversed in excess of 190,000 meters and established 18 survey control points during the operation. If there had been doubts as to how an entire division artillery would fare in its first large-scale operation, MASHER/WHITE WING erased them.

Another significant 1966 field artillery action occurred during Operation BIRMINGHAM. This operation is noteworthy because it involved a major movement of supporting field artillery that required detailed planning and coordination.

The operation was initiated when Military Assistance Command directed a search and destroy operation into northwest Tay Ninh Province. Controlled by the US 1st Infantry Division, Operation BIRMINGHAM was directed at locating and destroying Viet Cong forces and base camps in the area. The 1st Division was operating in the Phu Loi area, 50 kilometers southeast of Tay Ninh, when the division commander received word to displace to Tay Ninh Province within a week. The 1st Division Artillery had to plan and coordinate the displacement of elements from seven field artillery battalions. The result was the smooth movement of 72 pieces of field artillery into Tay Ninh Province using all available means of transportation. The 1st Division Artillery Headquarters, functioning as the convoy control element, moved by road with the 1st Battalion, 7th Artillery, and the 8th Battalion, 6th Artillery, in the formation. Security for the convoy was provided by the 1st Squadron, 4th Cavalry ("Quarter Horse"). One battery of the 2d Battalion, 33d Artillery, moved by C-130 aircraft from Lai Khe to the city of Tay Ninh. Air Force C-123 aircraft were used to displace a second battery of the 2d Battalion, 33d Artillery, from Binh Gia, southeast of Saigon, to Tay Ninh. An attached battery of the 2d Battalion, 13th Artillery, was airlifted by CH-47 helicopter from Phu Loi. The 3d Battalion (Airmobile), 319th Artillery, under operational control of the 1st Division and in support of the South Vietnamese Airborne Brigade, moved separately by road; and a battery of 175-mm guns, in general support of Operation BIRMINGHAM, moved by road to Soui Da. To insure continuous and sufficient fire support for the road moves, the 1st Division Artillery Headquarters utilized its headquarters battery executive officer to coordinate fire support along the route of march.

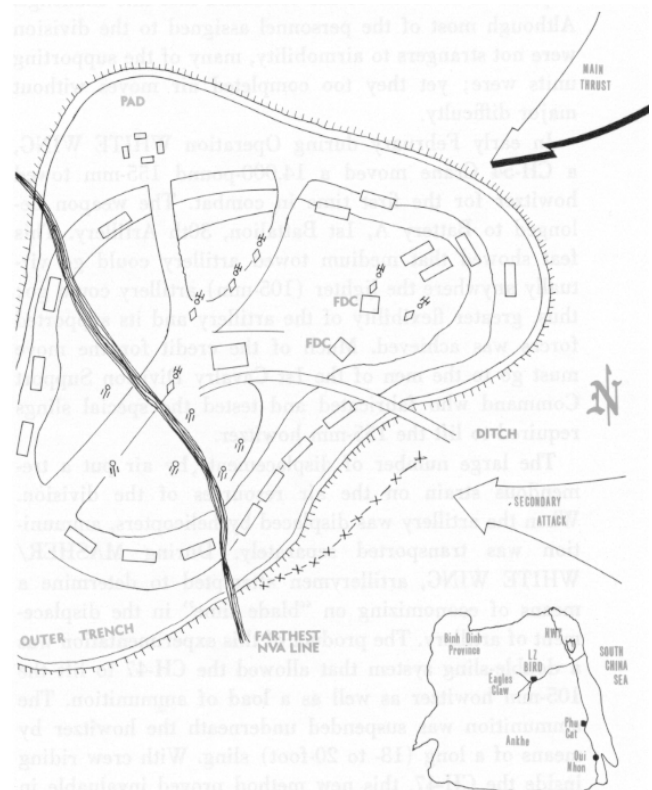
COL Marlin W. Camp, now Brigadier General (Ret), 1st Division Artillery commander, was justifiably proud of the manner in which the move was conducted. The success of the move is especially significant because these were the first friendly units to venture deep into northwest Tay Ninh Province.

For field force artillery to provide maximum area coverage, certain of its firing units were required to occupy extremely remote positions. In such cases, movement to the positions and position preparation required detailed planning. Those weapons that provided the best area coverage by virtue of their long ranges were self-propelled weapons—8-inch howitzers and 175-mm guns — too heavy to move by helicopter. For the most part, the "heavies" were restricted to movement by road.

Some of the roads over which self-propelled weapons moved were in remote areas which had been in

enemy hands. These roads could be expected to be heavily mined with the bridges destroyed. Extensive engineer support was required to open those roads and the engineers, like the artillery that followed, were subject to ambush at any time. Infantry and armor support was required to help open the roads, provide protection and keep the roads open until the artillery movement was completed and support withdrawn.

In a war characterized by the frequent movement of field artillery, the displacement of Battery B, 7th Battalion, 8th Field Artillery, in September 1967 is particularly impressive. The movement of Battery B was unusual because it was accomplished by Air Force tactical airlift. The battery, under the command of CPT Edward G. Walker, was moved from Bien Hoa Air Base to a landing strip at Song Be in heavily contested Phuc Long Province. To make the move, the weight of the weapons had to be reduced to the lift capacity of the aircraft. This was done by removing the weapons' spades and tubes and transporting them by C-130 aircraft. The carriages could then be lifted by C-124s. Battery B was positioned at the end of the Song Be airstrip from where its weapons



LANDING ZONE BIRD

could easily reach to the Cambodian border. The men of B Battery worked on their new position for a month and then turned it over to B Battery, 6th Battalion, 27th Field Artillery. Both batteries swapped their weapons to avoid the problem of again having to move weapons to and from a remote area. The artillery position at Song Be was occupied until June 1971. The weapons could not be withdrawn in the same manner in which they had been moved to Song Be since the landing strip was insufficient to allow them to take-off with these same loads. The weapons were, therefore, withdrawn over a road that had been opened and improved during the four years that the Song Be position was occupied.


As noted earlier [May-June 1975 *Journal*], the first combat firing of the Beehive round occurred in November 1966. But it was the battle at Landing Zone BIRD in December that really woke up field artillerymen and infantrymen to the effectiveness of this new round.

LZ BIRD was a fire base located in the Kim Son Valley 50 kilometers north of Qui Nhon. No strangers to the valley, the 1st Cavalry Division had operated throughout the area since Operation MASHER/WHITE WING early in 1966. The landing zone had only a half-strength infantry company (Company C, 2d Battalion, 12th Cavalry) for security in addition to 12 howitzers (six 105-mm and six 155-mm). The surrounding terrain afforded good cover for an enemy force that might decide to attack the base. On the night of 26 December 1966, two companies of the 22d North Vietnamese Army Regiment decided to test the light defenses and silently moved to within feet of the outer perimeter of BIRD.

Shortly after midnight the enemy launched a

coordinated mortar and ground attack against the position. The attack penetrated the base from both the northeast and southeast. Driven slowly back, the defenders found themselves cornered in the south end of the base in the vicinity of the number two gun of the 105-mm battery position. Almost in desperation, CPT Leonard L. Schlenker, the battery commander, ordered the firing of Beehive, and 1LT John T. Piper, the battery executive officer, loaded the round, yelled a warning and fired the round to the northeast in the direction of the enemy main attack. One hundred enemy soldiers were at the northeast corner of the fire base in and around the number one gun position of the 155-mm battery. Piper fired one additional round and the attack was halted as suddenly as it had begun.

The United States lost 30 men killed in action at BIRD while claiming 266 known enemy dead. For doggedly beating back a determined and numerically superior enemy, the three units at BIRD (Battery B, 2d Battalion, 19th Field Artillery; Battery C, 6th Battalion, 16th Field Artillery; and Company C, 2d Battalion, 12th Cavalry) were all presented the Presidential Unit Citation. SGT Delbert O. Jennings, weapons platoon sergeant, was awarded the Medal of Honor for his bravery, and Lieutenant Piper and SSG Carrol V. Crain, Battery B chief of firing battery, both received the Distinguished Service Cross for their actions.


The most important benefit derived from the action at BIRD was recognition that the Beehive round was a tremendously valuable asset to the over-all fire base defense program. It had gained the confidence and respect of both artillerymen and infantrymen and would continue to play a vital role in position defense throughout the remainder of the war. 

SMOKE!

(continued from page 45)

(AMSAA) will conduct a smoke test at Fort Sill in December of this year. Both mortars (60-mm, 81-mm, and 4.2-inch) and artillery (105-mm and 155-mm) will be fired using current smoke ammunition. New night observation devices and sighting devices of antitank missile systems will be tested to determine their effectiveness while operating in a smoke environment. It is hoped that this test will provide considerable base line smoke data for refinement of current techniques and equipment as well as future developments.

As with all new concepts and doctrine, the ultimate test rests with the artillery users and feedback that will

insure the new procedures are workable and attain the desired results. TC 6-20-5 closes by urging field units to "train to use field artillery smoke." When conducting field exercises or ARTEPs, the use of field artillery smoke should be played to the maximum extent possible. This is the best method to insure that all users can adequately use "the thinking man's ammunition." 

CPT L. Kirk Lewis is currently serving in the Operations Branch, Gunnery Department, USAFAS.



by MAJ Robert G. Tetu Jr.

The mission of the Field Artillery to provide continuous and timely fire support to the force commander is still as applicable today as it was during the historical development of the first indirect fire weapons. In line with that mission, the Field Artillery must be able to establish with its supported combat arms a close relationship marked by mutual trust and respect. Our military schools have been successful in teaching the technical aspects of fire support, but the means of establishing and maintaining good professional relationships have been left generally to individual expertise and experience. It is normally accepted by most field artillerymen that a good officer (however young and inexperienced) can and will maintain the required relationship. Some say that in combat, when the shell fragments are flying and people are dying, close cooperation between, say, the tank company and the forward observer (FO) will be there automatically. After all, it's necessary for survival. But will we really have the time during the next war to afford the luxury of waiting for that fragile relationship to develop? Are we "making it" right now as far as our tank and infantry counterparts are concerned? Are the commitments so heavy and the day-to-day training requirements so severe that we take care of our parochial field artillery problems at the expense of maintaining strong lines of

communication with our supported arms? The 4th Infantry Division (Mech), Fort Carson, CO, had an opportunity to explore this and other related subjects in depth during February 1975 and the results may be of interest to the Field Artillery community.

In the fall of 1974, the 4th Mech Fire Support Coordinator generated the idea of having an FO symposium to examine existing fire support coordination problems which, in the opinion of the FOs, had been evident at the maneuver company level. What began as a field artillery project, however, became a division-wide program as soon as the word reached the maneuver companies, battalions and brigades. As the interest level climbed, to include eventually the Infantry School, the Field Artillery School and the Combat Arms Training Board, the symposium took on a different flavor. First, the participants would include not only field artillerymen but also representatives of tank and infantry companies and battalions. Second, with the number of participants and observers expected, a structured agenda covering specific subjects was required. Third, junior officers would present topics for discussion to as many senior officers as possible, with the latter invited to add their comments.

Input from FOs, fire support officers (FSOs) and company commanders provided a basis for the agenda.

To stimulate conversation and audience participation, lieutenants and captains from field artillery, tank and infantry companies were selected to give brief opinion presentations which would then be followed by open group discussions. Invitations were extended to the interested agencies, unfortunately, TDY travel was restricted at the time and only a representative group from Fort Sill attended. In order to keep the program as informal as possible, and in keeping with the original Greek meaning of symposium (syn, together; posis, drinking), we had beer available for everybody during the breaks.

The guest list grew to 120 to include Fort Carson's Commanding General, Assistant Division Commander (Maneuver) and each of the brigade commanders. In spite of the command interest and audience size, the original plan of open, frank discussion was retained and the event was video taped and recorded.

The conference was a success. In fact, so much discussion was generated during the first four-hour session that only 50 percent of the agenda was completed. As a result, another symposium was held and the remaining agenda was completed with the same degree of enthusiasm.

Many of the issues and problems that surfaced did not lend themselves to easy solutions, but the ensuing discussions definitely strengthened the lines of communication between the supporting and supported combat arms. These brief summaries highlight the discussion.

Fire Support Coordination and Planning

The fast-moving, mobile battlefield forecast for modern war focuses on the need for commander-FSO/FO concurrent planning. The FO/FSO cannot afford to wait for the issuance of completed orders to formulate a plan of fire support. He must be involved in the very early concept planning phases of operations so he can keep pace with supported units. The accepted doctrine and sequence of command and staff action is fine as long as the fire support representatives are not left behind the power curve fleetingly traced by the tank and mechanized units. The FO/FSO must force himself, if necessary, to be included in the entire planning process and maneuver commanders must realize this necessity.

Numerous complaints surfaced concerning the continuous lack of guidance regarding the economic, effective use of indirect fire ammunition. Most of the young officers felt that ammunition expenditures experienced in training were unrealistic and excessive. They felt that a strong need existed for specific instructions listing priorities of targets by type so ammunition expenditures and target planning could

compliment today's available supply rates. Rather than compiling a laundry list of targets, FOs should be able to be selective and realistic with their fire planning.

The fact that decentralized battalion operations may be the order of the day on today's battlefield dictates the feasibility that FOs may not always be available to every unit requiring FA support. Therefore, more than ever before, small unit commanders down to squad and fire team level must be able to call for and adjust artillery fire. This fact was acknowledged by virtually every maneuver commander present, but they noted that methods to achieve this goal of instruction must be simple, concise and clear. The gridded template method, offered by the Field Artillery School for suppressive fire techniques, was considered by some to be too complicated to be taught across the board to junior NCOs and enlisted men.

Previous fire planning doctrine and procedures came under heavy attack by many FSOs. Viewing the modern battlefield as discussed by General William E. DePuy, Commanding General, USA Training and Doctrine Command, in his tape "Readiness for Modern Battle," they felt that measle sheets and detailed plans and fire support annexes were things of the past and luxuries we can no longer afford. It was agreed by many that quick fire plans and verbal orders would be the order of the day for the FA on today's battlefield.

Many were surprised by the numerous problems surfaced by the 81-mm and 4.2-inch mortar platoon leaders with regard to the integration of their assets into the tank and mech company's fire support. Not only do they have difficulty maintaining training proficiency among their own personnel, but also their expertise is often ignored by their supported units and other fire support agencies. The young platoon leaders made a strong point for the need to educate virtually everybody in mortar employment and tactics. Too often they are "written off" on mechanized non-firing field exercises. And there is a definite, urgent need for field artillerymen to become experts in the use of mortars. To allow the mortars to be spread across the unit zone operating independently is to sacrifice a vital part of the combined arms team, and this has happened more often than not. The field artilleryman cannot afford simply to be satisfied to know the location and range of the mortar tubes. To coordinate successfully all of the supporting fires of the force, he must have an intimate knowledge of the real capability and actual employment constraints of both mortars.

The Company Commander and the FO

The field artillery officers and the armor and infantry officers agreed that a close garrison relationship was essential so that the company commander and FO could

work well as a team in the field. How to go about achieving that garrison relationship, however, was the problem. Suggestions ranged from assigning FOs to maneuver units from a few days to a few months, to moving direct support battalions' current garrison locations across the post to their supported brigade areas. It was interesting to note during this discussion that the FOs were concerned that their infantry and armor counterparts realize FOs do more than simply support the maneuver companies — that they did indeed have field artillery battery responsibilities in garrison. It was apparent that most of the armor and infantry officers were uneducated as to what those responsibilities entailed, though they felt strongly that regardless of these duties the FO's first responsibility was to them.

The FSO and the Maneuver Battalion

The major discussion centered around the Fire Support Coordination Center and the physical location of the FSO, the 4.2 platoon leader and the air liaison officer (ALO). Not many present could envision a TOC as outlined in the field manuals with representatives of different fire support agencies working over detailed plans. The platoon leader felt that he had to be with his platoon, the ALO with the commander and the FSO wherever he was needed to best coordinate the fire support for the battalion. The final consensus was that the TOC or the command post would be that point from which the battle was being directed — whether the director was the commander, the XO or the S3 was unimportant. The requirement for the FSO, the ALO or anyone for that matter, to be in any particular place at any particular time would depend upon the battlefield situation.

The FSO and the FO

What seemed at first to be a parochial field artillery subject quickly took on added dimensions when maneuver commanders realized that there is supposed to be a fairly strong relationship between the FSO and his FOs. The artillery chain of communication was explained and FOs and FSOs cited numerous instances where the FSO can be a big help to the maneuver battalion commander. The fact that a more experienced senior field artillery representative — the FSO — is available to oversee and evaluate the support provided to the companies was a selling point toward strengthening the FSO/FO line of communication. The subject of equipment available to the FSO to work for and with the FOs was mentioned at this point but discussed in more detail later in the agenda.

Vehicular and Communications Equipment

The FOs agreed that the quarter-ton vehicle and GRC-160 radio currently authorized are inadequate to

support their mission. The jeep cannot maintain cross-country trafficability with the tanks and APCs and affords virtually no protection for the crew. The argument that the FO should be riding in his assigned tank provided by the tank company fell on deaf ears because that particular tank may be the one that is down for maintenance at any given time. Although it was recognized that the FO vehicle study underway at Fort Sill may someday solve this problem, the need for an interim solution was voiced. The vehicle generally supported was the M113 mounted with adequate radios.

With regard to radios, the group felt the GRC-160 has provided only a limited capability for the FO, especially when he was required to be physically separated from the company commander. A strong case was made for the FO to have the capability to operate simultaneously on two independent FM nets — his own fire direction net and the company tactical net. The FO still must retain the capability to backpack or remote one of these radios. The two radios also would afford the FO team the capability to split up and still support the force effectively on the fire direction net.

The FSOs made a strong plea for another vehicle to allow them to move independently around the battlefield. Since they lost their quarter-ton, they have been tied to the M577 track which, more often than not, forms a corner of the supported TOC. They consequently have to hitch rides with the maneuver commander to visit the companies, field artillery units, etc. They recognized that a significant portion of their time should be spent with the commander, but not so much that it limits their flexibility to fulfill their other fire support coordination responsibilities. And with no "wheels" they felt that their flexibility and capability was limited and too dependent on other people. Vehicles discussed ranged from the jeep to a motorcycle.


Training

Both individual and unit training were discussed at length with the emphasis placed on the latter. Some observers were critical of what they considered to be stereotyped or unrealistic training at Fort Sill in the Basic Course, but none had been through the new curriculum which had been in effect but a short time when the symposium began. At any rate, the changes taking place at the Field Artillery School appeared to be in line with the problem areas cited.

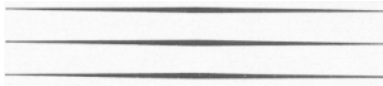
ORTTs came under heavy criticism from not only the junior officers but also some of the battalion commanders as well. The lack of realism, damage assessment and realistic scenarios were cited as problems throughout the Army. The new ARTEP concept appears to be oriented

toward solving these problems, but there was no doubt that they have caused a great deal of concern in the past. How to integrate and adequately assess battle damage from indirect fire means was recognized to be a difficult problem not easily solved. Current fire marking procedures were attacked by the FOs as extremely costly manpower-wise and unrealistic. FOs claimed that they are motivated on tests only when they can see the

results of field artillery fires, not so much the effect, but in realistic battle damage assessment.

The tapes of the symposium, to include a 20-minute summary, are being assembled and will be forwarded to the interested agencies. 

MAJ Robert G. Tetu Jr., FA, is assigned to the 4th Infantry Division (M) Artillery, Fort Carson, CO.



(continued from page 5)

through the Vietnam eras. A capsule summary of the Army's history was narrated by the Master of Ceremonies, MAJ Robert M. Dunning, FA. The Navy's Northeast Region Band played music appropriate to the periods.

The event was highlighted by the passing of the colors from the Colonial Color Guard to the Modern Army Color Guard of the 10th Special Forces Group, symbolizing the beginning of another 200 years of Army service to the nation.

MG Leonard Holland, State Adjutant General, read a proclamation by Rhode Island Governor Philip Noel officially designating June 1975 as Army Month in the "Ocean State." Representing the Army's Chief of Staff, BG Gerd Grombacher addressed the assembled 800 guests on the Army's

past, present and planned future contributions to American society.

Prior to rendering retreat honors to the colors, the Army's heroic dead were remembered in solemn tribute. A 21-gun salute to the Army was fired by the antique cannon of the Newport Artillery Company.

The ceremony was hosted by COL Charles I. McLain, SC, Senior Army Advisor at the War College. COL James Ashurst, FA, served as Commander of Troops.

Robert M. Dunning
MAJ, FA
Newport, RI

It is good to hear about the Newport Artillery Company again. Readers who have been with us from the beginning will recall that an article concerning that fine unit graced the pages of our first issue in July 1973. More information on the bicentennial activities at Newport can be found in the "Right by Piece" section of this issue.—Ed.



Gunners of the Newport Artillery Company fire a 21-gun salute in honor of the Army in historic Washington Square, Newport, RI.

The FARRP . . . A Friendly Place

FARRP — I can remember a few years ago when I used to fly cross-country in a helicopter. The fuel attendants at civilian fields looked forward to filling up the aircraft. At one airfield between Savannah, GA, and Fort Rucker, AL, the competition between two fuel outlets was keen. As the helicopter approached the fueling area two attendants would be signaling frantically for the pilot to land at their pumps. One fueler finally got most of the business when he hired a pretty girl, dressed her in short shorts and had her out guiding the hovering helicopter to the pump. At any rate, the service at most of these civilian fuel outlets was great. They voluntarily cleaned the windshield, provided transportation to the snack bar, etc.

Imagine if you will, an attack helicopter arriving at a Forward Area Rearm Refuel Point (FARRP) where the same kind of service exists. As the pilot lands, the senior attendant is right there. "Good morning, sir! We'll have you fueled up in no time. I have a crew ready to load the turret and — excuse me — Harry, get that windshield, will you? Now, sir, what kind of rockets do you want?" The pilot answers: "What kind do you have?" The attendant answers: "We have high explosive, fleshettes, dual purpose, submunitions, white phosphorus, smoke, chemical illuminesence, flare and chaff."

The pilot says, "Whoa! You're confusing me. Why so many types? What's their purpose? Which ones do you suggest?"

"Well, sir, I don't know why so many types either, but they are in the inventory. Let me try to explain. High explosive has been around for years so you are probably familiar with that one. The dual purpose warhead is just what it says. It is a high explosive antitank head with a fragmenting effect similar to the high explosive round."

"Wait," says the pilot, "If the dual purpose warhead does what the high explosive warhead does and more besides, then why have both?"

"Good question, sir, maybe it will be resolved in the

future so there is only one. It will sure make my job easier and reduce the inventory around here, but I'm not finished. In addition to those two we also have submunitions. Now, that's a new one so maybe I should explain. With this warhead you, in your cockpit, can select the fuze function time so you can cause the fuze to function right over the top of the target. When the fuze functions, five or more smaller warheads come out of the carrier warhead and plummet straight down on top of the target area. Each submunition is dual purpose and each can defeat the armor on top of a tank. If you use these warheads against a larger area target you are pretty well guaranteed of good target coverage. Each single rocket is worth several of the older ones, however, there is one caution, sir. If I were you I would not mix this warhead with others because this one is designed to be fired over the target, not at it. Your sight picture will be different, so stay with one kind or the other."

"Now that sounds mighty exciting. What else have you got?"

"Sir, these fleshette rockets are good against personnel and soft targets. As you probably know, they have a drawback in that to have optimum effect, they have to be fired at a specific range — however, we are doing some testing using the same fuze that is used with the submunitions and we hope to clear up this problem."

"That's good. What else do we have?"

"Well, sir, the rest of what we've got is sort of specialty munitions. We have white phosphorus — you are familiar with that. We have a new smoke round, chemical illuminesence, flare and chaff. Chemical illuminesence is sort of like those light sticks people have been playing with for years. Two chemicals mix and make a light. This round is like that. It has some long strands, like cigarette filters, soaked in these chemicals and when the warhead functions you have these glowing strips laying on the ground. It's a night target marker or a target reference marker so you can talk to your wing man and say, 'From that mark the target is 600 meters north or wherever.' It's a pretty good round but you would not need many

Right By Piece

of them. They're just for marking at night. The flare round is the same thing. The flare enables you, the pilot, to light up the target area for your own or somebody else's attack. They're real good but you probably don't need many. Then there is the chaff round which we are still developing. You're supposed to be able to use it to hide your helicopters from the bad guy's radar. As soon as I know more, sir, I'll let you know."

The pilot is now somewhat confused and says, "I'm still not sure how you should load me."

Now the senior attendant grins and says, "Sir, I been working on that and here's my plan. You know we have all these fancy do-dads here and about to make my FARRP run. We're planning on prepackaging all of our ordnance, rockets, too, so when you land, by golly as fast as we can, we'll have you airborne again. Here's the way I see it. We're going to load submunitions, 19 rounds to a pod. When you land we just hang this new pod — no sweat, we got the equipment to do it. We will also have the dual purpose round loaded 19 to a pod. I estimate you will use five times as many submunitions as you do dual purpose and that's the way we will hold the inventory. Smoke, white phosphorus and chaff will be preloaded in seven-round pods because you will probably use less of them. Some smoke, white phosphorus and chemical illuminance and flares will not be preloaded. If you need them either call ahead or, while you are here,

we will remove a couple of preloaded warheads and substitute the specialty warhead you need. OK?"

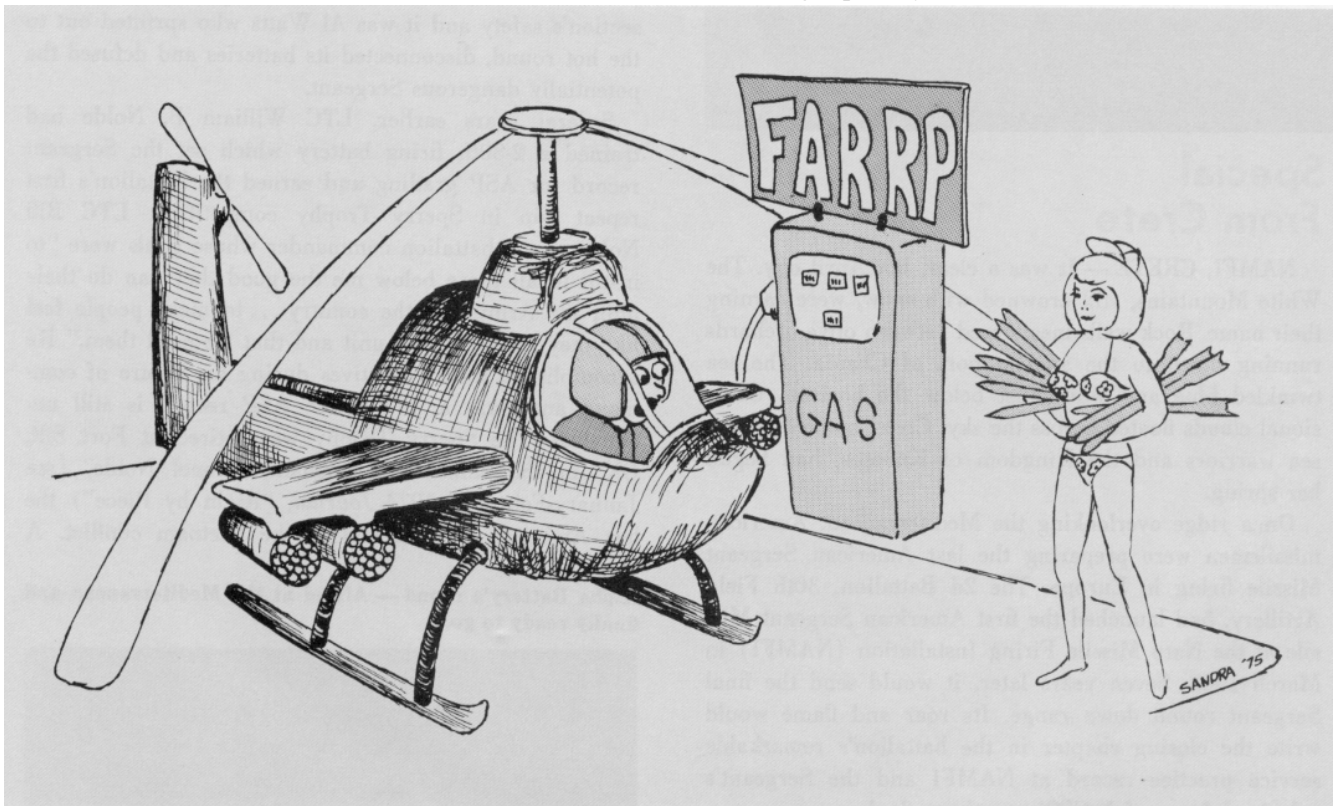
Now the pilot shows relief. He looks around and is ready for take off. He says, "I'll make it a point to be back next week and see how you have worked things out."

The week goes by and our pilot returns to the FARRP. As he lands, things go like clockwork and within minutes he is ready to go again. He leans out to say thanks to his friend the senior attendant, who says, "Don't leave yet. Harry . . . Harry! Where are you? Get up here and clean that windshield!" (LTC George O'Grady)

New Soviet 122-mm Howitzer

WARSAW — The Soviet Army has introduced a self-propelled howitzer in response and equivalent to current NATO types. The Warsaw Pact has long possessed an artillery capability, though it has been limited to towed or drawn pieces. The new 122-mm self-propelled howitzer is probably built on the Warsaw Pact's light armoured vehicle chassis.

The engine lies forward and to the right while the driver sits forward and to the left. The area in front of the driver is flat and a steep bow in front implies a swimming capability. The cab sits on the vehicle's stern.



Right By Piece

Two hatches are provided for the vehicle commander and his assistant. The cannon is mounted in a barrel-like arrangement and the bore evacuator and muzzle brake are located in the center of the tube. The gun is probably equipped with an automatic loading system. A number of these vehicles first appeared on 22 July 1974 at the Soviet display in the Polish Peoples' Army parade in Warsaw. To date, however, the new vehicle has not been distributed outside the Soviet Army to other Warsaw Pact members. (Extracted from *Soldat und Technik*, January 1975)



Special From Crete

NAMFI, CRETE — It was a clear, hot April day. The White Mountains, still crowned with snow, were earning their name. Rock walls meandered between olive orchards running down to the ancient port of Chania. The sea twinkled blue and white just below the horizon. Occasional clouds floated across the sky. Crete, home of brave sea warriors and the Kingdom of Knossos, had begun her spring.

On a ridge overlooking the Mediterranean, American missilemen were preparing the last American Sergeant Missile firing in Europe. The 2d Battalion, 30th Field Artillery, had launched the first American Sergeant Missile at the Nato Missile Firing Installation (NAMFI) in March 1968. Seven years later, it would send the final Sergeant round down range. Its roar and flame would write the closing chapter in the battalion's remarkable service practice record at NAMFI and the Sergeant's role in defense of NATO's southern flank.

The Sperry Trophy was presented to the best American Sergeant Missile unit world-wide. It represented an exceptional technical expertise and

professional manner in designating the Sergeant unit which best achieved that unique bond of men and machines so fundamental to today's complex technology. During the seven years it was awarded, the 2-30th won the Sperry Trophy three times—more than any other unit. In addition, the battalion set range records for the most accurate round ever fired and the highest graded evaluation score. The Annual Service Practice was the 2-30th's opportunity to reaffirm its motto—Striving to the Highest—and the missilemen from the Southern European Task Force made sure they took advantage of it.

The shoot was also the setting for some of the battalion's most memorable incidents. During ASP 1974, CW4 Al Watts, a soldier with the Sergeant system since it left the drawing board and known throughout the Army as Mr. Sergeant, earned a Soldier's Medal on the firing pad at NAMFI. A malfunction in A Battery's round at X-20 seconds caused missile shutdown after battery activation; the fuming missile squatted on the ridge overlooking the Mediterranean and mocked the firing section caged in a bunker less than 50 yards away. Minutes passed . . . the missile continued to smoke and make those desperate noises indicative of space-age problems. There was only one way to insure the trapped section's safety and it was Al Watts who sprinted out to the hot round, disconnected its batteries and defused the potentially dangerous Sergeant.

Several years earlier, LTC William B. Nolde had trained a 2-30th firing battery which set the Sergeant record for ASP grading and earned the battalion's first repeat win in Sperry Trophy competition. LTC Bill Nolde was a battalion commander whose goals were "to instill in all those below me the good they can do their unit, the Army and the country . . . to make people feel like they belong to the unit and that we need them." He accomplished these objectives during his tenure of command and built a unit whose ASP record is still unequalled. The Sperry Trophy was retired at Fort Sill, OK, in the name of Lieutenant Colonel Nolde, (see January-February 1974 *Journal*, "Right by Piece") the last American combat loss in the Vietnam conflict. A

Alpha Battery's round — Aimed at the Mediterranean and finally ready to go.



Right By Piece



The roar, the bang and the arching smoke trail — The Sergeant bids farewell to the men of the 2d Battalion, 30th Field Artillery.

half a world away, the 2-30th dedicated its home to his memory: Nolde Barracks remembers a fine man, a fine leader and a professional soldier.

The shoot always generated a lot of enthusiasm and excitement in the battalion. The privates in the firing sections, the truck drivers, surveyors, even the cooks responded to the opportunity of a live firing. Like reliving the early days of Cape Canaveral, these missilemen generated a special pride in the 2-30th's ASP record. It was an opportunity to enter, however briefly, that select space-age world seen so often on television, and to do it better than anyone else.

This year, the battalion would cap that record. Alpha Battery, firing first, worried and troubleshoot through a parade of range holds for aircraft and shipping in the safety fan, an uncommonly uncooperative piece of equipment. After a very long day on the pad and a hectic night, Alpha roared through an early morning countdown and sent a fine round down range the next day. MG Wilbur H. Vinson Jr., the commander of the United States Army Southern European Task Force, observed the firing and congratulated the weary but happy missile-men on the pad. SP4 Marion DeMarco perpetuated an Alpha Battery tradition. By vote of the firing platoon, he was awarded the honor of tossing a platoon wrench off the cliff and into the Mediterranean. It symbolized the frustration of a difficult time on the pad and the euphoria of the bang, the roar and the arching smoke trail.

A week later, it was Bravo Battery's turn. They were

firing the last round. The early morning sun was warm as the firing section emplaced their launching station, lowered the blast shield and started the gas turbine generator. Preparations continued to go smoothly as the azimuth orientation system was emplaced and the missile assembled. The familiar checks, the actions practiced so many times came and passed quickly. Finally, it was ready.

At X-15 minutes, the firing problem was inserted and at X-9 the control surface assemblies wiggled satisfactorily. The firing section gathered in the bunker at X-3 minutes and waited quietly. The Sergeant entered its erect and slew cycle and was shortly pointing into the sun. It cut a dark, sharp shadow against the Cretean rocks.

"Three . . . two . . . one . . . lift off" and the Sergeant made its thick, deep roar as it headed down range for the last time in Europe. It carried the memories of a battalion and its men who had earned their motto with the smoke and fire of the Sergeant Missile. The 2d Battalion, 30th Field Artillery, said goodbye to the Sergeant Missile that day in Crete and rededicated itself to Striving to the Highest.



FORT BENNING, GA — FADAC may be a familiar sight throughout the artillery, but few of us would expect to find one sitting in the main lobby of Infantry Hall. The computer and an extensive display of FA literature and equipment were recently displayed in the famed building to improve relations between the King of Battle and its sister arms. The crossed cannons on a large banner of blue may have irritated some, but it well-illustrated the growing spirit of cooperation and understanding prevalent in today's combined arms team.

Right By Piece

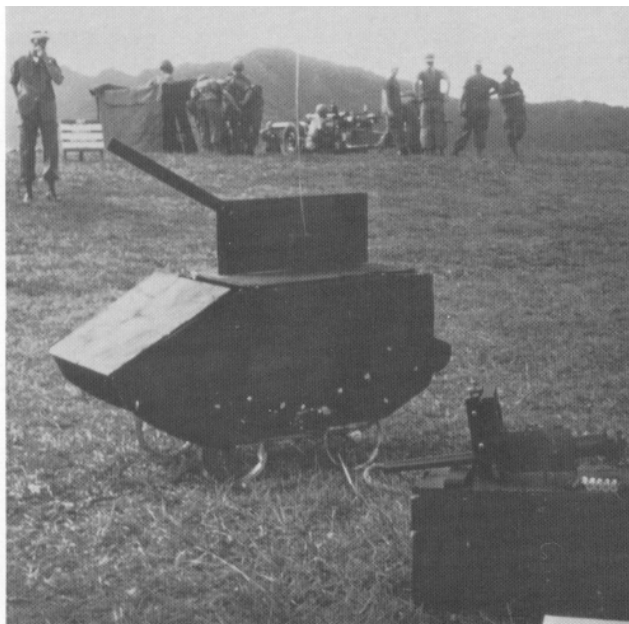
BMP "Buggy"

SCHOFIELD BARRACKS, HI — Few field artillerymen would engage a moving enemy APC with the 14.5 artillery trainer. Section after section did so and eagerly, however, during the 2d Battalion, 11th Field Artillery's recent "Best Howitzer Section Competition."

In the absence of a direct fire HE range, the 14.5 trainer was mounted in-bore for firing at moving targets throughout the exercise. Schofield TASO furnished a stationary APC constructed to the specifications outlined in TC 6-1. A thrift shop baby carriage was dismantled and mounted under the APC. On the range the APC patrolled a long, narrow strip of corrugated tin with its wheels placed in the grooves. Two engineer stakes with washers welded a foot from the top were driven at each end of the metal road. A parachute cord was strung through both ends of the target, through the washers on the stakes and back to the firing line. The APC moved in the direction which the cord was pulled.

After several rounds struck the target, the APC exhibited the symptoms of battle fatigue. Telephone poles were laid parallel to the metal track to prevent further damage to the undercarriage, thus protecting the modest investment.

The 2d Battalion's moving APC presents an inexpensive and effective solution to the problem of devising realistic and challenging targets on the 14.5 range. It may also be an answer to the Warsaw Pact's perpetual search for a lightweight and economically-powered armored vehicle.



BMP mounted on baby carriage chassis.

War At Grafenwoehr

GRAFENWOEHR, GERMANY — The 3d Armored Division's new training program, the "Five Day War," is being held at Grafenwoehr in conjunction with the division's annual ATT. For five days a hypothetical international situation develops as enemy forces quietly mass on the intrazonal border. US Army and West German soldiers awaken to the imaginary rumble of East European armored divisions and are ordered to defend the area extending from Grafenwoehr to Amberg and Hohenfels.



Hidden from aerial observation, the crew of an M109A1 prepares for operations.

On initial warning of attack all units are put on alert and one firing battery is dispatched from Grafenwoehr to Wieden in direct support of the 11th Armored Cavalry. Simultaneously, one of three participating 3d Armored brigades moves close to Amberg in reinforcement of the 12th Panzer Brigade. The German unit stands on the banks of the Naab River while the citizens of Amberg are evacuated.

Heavy fighting breaks out on the second day. The battalion at Amberg rolls to Hohenfels to join the 1st Brigade in a blocking position. The exercise continues until hostilities cease. The men are withdrawn to Grafenwoehr for refitting.

The men move into another blocking position at the Hohenfels training area for a live fire defense display on the third night. Howitzer units lay fires on enemy

ground forces while Vulcan units attack unfriendly aircraft (pre-positioned target balloons). When the sun finally rises over the smoldering range, the men prepare for the fourth consecutive day of operations.

The sword is exchanged for the dipstick as the men go "admin" on the fifth day. Soldiers inspect their vehicles and equipment for the consequences of four hard days over rugged German terrain. Preventive maintenance is performed and wear and damage is noted and reported.

By the end of the summer all 3d Armored Division units will have participated in the Five Day War.

200 Years Of Service

FORT ADAMS, NY — The Newport Artillery Company sponsored a bicentennial celebration in honor of Fort Adams during May 1975. The roar of a Model 1905 field piece accompanied a procession of men and women clothed in the various Army uniforms worn in service at Fort Adams during the past 200 years. The old stone walls stood proud against the sea as the fort was credited with more than 200 years of continual service to the nation.

Located on a peninsula overlooking the waters of Newport Harbor and adjacent to the US Naval Housing Area for students of the Naval War College, the site of the fort was originally occupied by mercenary cannons in 1699. Fortifications were built and strengthened by American, British, French and American forces, in that order, during the Revolutionary War.

The War of 1812 saw the Newport Artillery Company grow to regimental status, stationed and placed on alert at Fort Adams. In the following period of tranquility, forces in garrison at Fort Adams were ordered in 1825 to demolish the existing structure in preparation for the building of new fortifications. The demolition of the old fort lasted two years and construction of the present structure took 28 years.

Garrison strength rose and diminished relative to the proximities and intensities of conflicts from the Mexican War in 1846 to World War I. Then, in 1916, the old fort bulged at the seams as new units were sent in to bolster the small peacetime force. But after 18 months of war the nation returned to peace, leaving once again the hard-core "lifer" of the old service to tend to the tedious chores of garrison life.



The Fort Adams Quadrangle, constructed between 1824 and 1850.

In World War II, Fort Adams billeted the men of the 13th Infantry, 10th Coast Artillery and the 243d Coast Artillery (AA). Troopships came at night, embarked passengers for war theatres and slipped out on the morning tide. With the end of the war in 1945 and the sudden obsolescence of harbor defense, Fort Adams was declared surplus, given to the Navy and abandoned.

The historic old post came alive only sporadically from 1951 to 1970. In 1971, however, the Navy granted the property to a commission created to supervise its rebuilding. The Natural Resources Department became involved, granting Fort Adams a reprieve from obscurity and decay.



Model 1905 field piece is prepared to fire a salute during Fort Adams' bicentennial celebration.