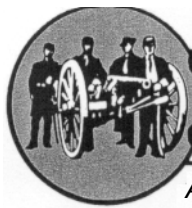# Field Artillery

A Professional Bulletin for Redlegs

On Time
On Target

Field Artillery

A Professional Bulletin for Redlegs

February 1992   **HQDA PB6-92-1**

Hotlines

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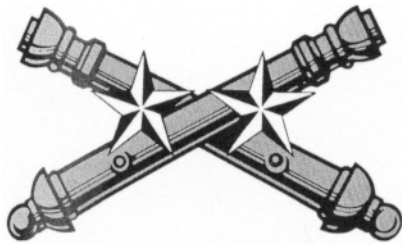
Targeting and the D^3 Methodology

Targeting is the process the maneuver commander uses to focus the fire support, intelligence and command and control (C^2) battlefield operating systems (BOSs) to achieve his intent. The process is tough, and we need to get much better in our understanding and execution of it.

D^3 Methodology

A critical means used to translate the commander's intent into a plan is the decide-detect-deliver (D^3) methodology. The elements (called functions) of D^3 cause the commander to determine what to attack with his fire support system, how to acquire those targets, and when those targets are found, how to attack them in a way that disrupts, delays or limits the enemy's ability to respond.

Decide. During this function, the commander's intent for fire support and maneuver is translated into targeting guidance and priorities. Based on staff analysis of which resources are critical to the enemy for a given course of action (called high-value targets, or HVTs), the commander decides which targets he must defeat for his plan to succeed. Analysis by the intelligence and fire support staffs determines whether a HVT can be acquired and successfully attacked. Those that can be are presented to the maneuver commander as potential high-payoff targets (HPTs). The commander selects and prioritizes the most critical of these targets. This is his HPT list.

The results of the decide function produce the commander's targeting guidance, priority intelligence requirements

(PIR) and information requirements (IR). These priorities form the basis for the intelligence collection plan and target acquisition taskings.

The decide process also translates the commander's intent into products used by the fire support system. These products include the HPT list, target selection standards (TSS) matrix and the attack guidance matrix (AGM). The end result of the decide function produces a clear articulation of the commander's intent for his sensors and shooters.

Detect. This function focuses acquisition and surveillance assets at the times and places necessary to acquire HPTs for attack to ensure friendly success. The flow of information from the target acquisition assets to the intelligence, targeting and attack cells must be planned, coordinated and rehearsed. Those assets that produce targetable data should be linked directly to the targeting cell. The cell evaluates the data, based on the HPT list and AGM, and forwards the information to the attack system(s). Information that is less than target quality—such as that produced by shell reports from units (ShellReps) and moving target locating radar (MTLR) reports—is sent to the intelligence cell to analyze and correlate with various sources and produce targets.

The priorities developed in the decide function guide and expedite the processing of targets acquired in the detect function.

Deliver. In this function, the fire support system attacks the targets the decide function identified as critical and the detect function has located. When the maneuver commander determines which targets are HPTs, he also specifies what effects (suppress, neutralize or destroy) are necessary to disrupt, limit or delay the enemy, as well as which HPTs require target damage assessment (TDA).

Targeting is *not* solely, or even primarily, fire supporters' responsibility, though we are key players in the process. D^3 is a tool used by the combined arms force commander to coordinate and synchronize the BOSs to achieve the outcome he envisions. The quality of the targeting effort often determines the force commander's success or failure. To succeed, he must be an active, informed player in the targeting effort.

D^3 and Operation Desert Storm

Desert Storm confirmed two things we already knew about targeting. First, D^3 is difficult, particularly at echelons division and above. Second, D^3 *works*.

As more decision makers and acquisition, surveillance and attack systems get involved, the process gets tougher. This is particularly true when joint assets are included. Competition for assets is intense. Many intelligence systems are capable of both target acquisition and TDA but cannot do them simultaneously. Establishing and adhering to priorities becomes increasingly critical.

The success of our targeting effort is evident in the incredible destruction wrought by the fire support system in Desert Storm and the consequent lack of American and allied casualties. This success was achieved because the D^3 methodology is sound and commanders and staffs throughout the force worked hard to master the process.

Before the war, the battle command training program (BCTP) increased the visibility and focus of the targeting process for division and corps staffs. In the desert, commanders filled the critical jobs with quality people and used the mobilization period to train the process and develop and refine techniques.

An enemy who outgunned and outranged us lost the war because he could not target our forces. We won because we could and did target the enemy successfully. D^3 made that happen.

Conclusion

The D^3 methodology is the key to success for the targeting process. To attain that success, we must work closely with the intelligence and maneuver communities to ensure we identify, acquire and attack those targets critical to the success of the mission.

As fire supporters, we must be leaders in the effort to focus all the battlefield operating systems to achieve the maneuver commander's intent.

Field Artillery—On Time, On Target!

Inactivation is Not a Four-Letter Word: An Open Letter to Platoon Sergeants

Editor's Note: This letter is in response to two articles that appeared in the June 1991 edition: "Inactivation: the Reality of Building Down" by Lieutenant Colonel Randall C. Williams, Jr., and "Moving into History: The Inactivation of 1-84 FA" by Major William R. Ward and Colonel Douglas J. Middleton. Both articles outlined the "big picture" of battalion inactivations in the continental US with some checklists.

The following "Incoming" gives tips for platoon sergeants of inactivating battalions, several for those units inactivating in US Army Europe. The information is based on the experiences of Sergeant First Class Ronald W. Rosier, who was Platoon Sergeant and Chief of Firing Battery for A Battery, 1st Battalion, 18th Field Artillery (1-18 FA), 17th FA Brigade, Germany, from August 1986 until the battalion's inactivation in June 1991.

Looking back to the time in Augsburg, Germany, when the 1-18 FA went through the inactivation process, there were some areas of concern specifically for platoon leaders. Our processing went rather well, under the circumstances, and we finished ahead of our E-Date (end date). By "under the circumstances," I mean we were working toward 4inactivating the battalion when Operations Desert Shield and Storm were getting into high gear. We sent equipment and personnel to Southwest Asia and helped units leaving Augsburg get on trains—trucks, tracks and baggage. The battalion sent 70 troops to GTA [Grafenwhoer Training Area, Germany] to give some "train the trainer" instruction to the 5-17 FA (8-inch howitzers) on the M109A2 howitzer and its M992 FAASV (FA ammunition supply vehicle) before 5-17 FA trained IRR [individual ready reserve] Redlegs. And to top everything off, we "POMed" [prepared for overseas movement] for the Southwest Asia area though we didn't have to go.

From a platoon sergeant's point of view, inactivation was a large nut to crack. Before you reach for that cup of Java or Geritol, just remember, you have to get back to basics to make it all work.

On the morning of our official notification [commander of 1-18 FA] Lieutenant Colonel James Coomier (Raider 6) briefed us on the inactivation mission. During that briefing, he put to rest two weeks of rumors and second guessing. He outlined our tasks and set conditions and standards to efficiently accomplish our inactivation mission. At the end of that briefing, the battalion had a good idea of what was ahead. Let me address some areas, and then you take it from there.

Planning

The first thing that happened was the platoon leaders from both platoons and one FDO [fire direction officer] were reassigned to battalion headquarters. That left the battery commander, the FDO/supply officer, first Sergeant, Sergeant First Class Murray and me. Here are inactivation tips related to the planning process.

● You have to decide who works on what detail and who's in charge of what. As you plan for inactivation, you'll have a closer working relationship with your commander, and battalion will give you some guidance. But the commander gives the mission—you get it done.

● Get subordinate leaders involved. For example, Gunny Sergeant Casas helped a lot by checking my personnel assignments. This keeps your personnel on the same team. It'll give them a secure feeling, and their work product will reflect it. Hint: when everybody's thinking the *same* way, then nobody's thinking.

● Keep in mind you'll have personnel on guard, CQ [charge of quarters], ACQ [assistant CQ], and staff duty, so plan ahead.

● I timed my troops when they were working on vehicles; that way I could develop a reasonable time line for vehicle processing.

● Keep the command section informed on the status of your projects. The commander needs a daily progress report.

● Make sure you give the first sergeant a detail of personnel. He'll need to start on billets early. You can't let it wait till later because you might not have the personnel around. You have to develop a plan to inventory the billets and then stick to the schedule.

● Every day you have to "make money." Time is your biggest adversary. You don't have time to retrace your steps. Do it right the first time.

● Be flexible. If your crews come up with a way to decrease your vehicle processing time, check it out with the TM (technical manual). Sergeants Montieth and Guevara and Specialist Quick developed a plan to decrease vehicle processing by eight hours and cover all the bases. We changed the schedule to reflect the new time line—"Attaboys" were given.

Teamwork and Coordination

Believe me when I say "no grass will grow under your feet." You're going to be walking, calling, coordinating and checking training. More tips.

● Get dirty with the troops. When your troops see you there turning wrenches right along with them, they'll know what they're doing has command emphasis. This will also help you make on-the-spot decisions on items that crop up unexpectedly.

● The "what ifs" can get you every time. But if you think ahead and have the facts, you can prevent them from "biting you in the pants."

● You'll see a small tendency to be more concerned with your battery's tasks, but give a helping hand to your sister battery or brother platoon sergeant when a small crisis arises. Everybody's working toward the one goal: meeting the E-Date "TOT" [time-on-target].

● Whatever you do, do it safely. Always Think Safety.

Training

● Your unit will have some reaction time to prepare, so you'll have time to check the training files and conduct common skills training and testing and APFTs

[Army physical fitness tests] before the troopers leave. You want to send a quality trooper to the next unit. Besides, physical fitness training is good for the morale and puts the troops in a good frame of mind to grab those wrenches and "Get Hot." Our battalion was able to get in some ranges and grenade qualification.

● We had "Sergeant's Time." Whatever it's called on your post—put it to work. Our five-hour weekly block of time really paid off.

Families

● Keep families informed—including your own. Sometimes the battalion newsletters don't make it home. So call and check the training section to make sure they do. Sometimes a soldier's spouse will have some questions not thought of in staff call.

● Get a handle on the number of pets, the number and types of privately owned weapons and privately owned vehicles your troopers have—especially non-US spec vehicles. This will help in the transportation scheduling that the battalion does for each battery.

● Learn about the entitlements soldiers can receive on "PCSing" [permanent changing of station]. Being in Germany, I had to learn about the legal aspects of financial loans from hostnation financing facilities.

● Housing, transportation and customs can answer a lot of your questions—call them.

● One good program we had was "Raider Green Tab Duty." This entailed having a leader accompany personnel to the airport and making sure they got off okay. For most families, this was their first or second time PCSing from Germany. This duty really paid off—all made their flights. There were some small problems but nothing a platoon sergeant couldn't handle. It gave the families the calming assurance that their battalion really cared for them.

Troops

● Battalion gave us a TOT on awards submissions; start early in writing them up. Your goal is to have the award in the trooper's hand before he leaves.

● Do the same thing for processing NCOERs [NCO efficiency reports]. Finishing all counseling and getting the forms to battalion will help. If you do it right, the soldier won't have heartburn when it comes to signing the report. If something comes up between the time you submitted it and the time the trooper sees it, you can always correct the report and then have the trooper sign it.

● Fill out a hometown news release and submit it with the award recommendation. You'll be surprised to find out how many hometown papers use those releases—that they really work.

● Put a big, screeching halt to any rumors. They distract soldiers and detract from their performance.

● Set up a specific time each day for you to answer troopers' questions. Sound off the wall? It isn't. The troops know you're active and moving around. They'll ask you questions all day—"nibble you to death like ducks"—and you have to get answers. But if they know you have time set aside for them, they'll use it. After the 1630 recall formation, I stayed for at least an hour. Nobody was turned away. If I didn't know the answer to a troop's question, I wrote it down and made some calls in the morning.

● Be prepared to map out a soldier's move for him. It might be his first (married or single).

● If you're not a math whiz, get a calculator.

Meeting TOTs

● Don't get hyper—get organized.

● Keep track of your time line. You might have to make one or two charts to track your progress. I had one for vehicles, troop processing and billets maintenance requests. Captain Dreisback (battery commander) had one to brief Raider 6. I used mine to brief him. They also helped First Sergeant Everette when the command sergeant major asked hard questions.

● Cover all the bases. You can't overlook or forget anything. Remember, making sure troops make appointments and process out completely is taking care of people. But don't micro-manage either.

After all the equipment is gone, the barracks are turned over and the personnel have, for the most part, departed, you can walk through the battalion area and feel proud you took care of soldiers. You had your "Raider Day." You accomplished your mission. Sounds complete—end of mission. "*Raider, Sir*."

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Reality Therapy: A Response to "Will the Build-Down Allow Risk-Taking?"

I want to commend Major Charles W. Pope, Jr., for his letter to the editor "Will the Build-Down Allow Risk-Taking?" in the August edition of this journal. Recently transferred from the FA [Field Artillery], I am an Army Acquisition Corps (AAC) officer with 10 years of FA troop experience. Your advice to commanders (in fact, all raters) is quite correct concerning their requirement to evaluate their subordinates' actions based on their objectives not necessarily on the path (or the risk) they took to accomplish the objectives.

Nonetheless, it will be very difficult to prevent an environment of self-preservation because communication between commander and subordinate is too often the exception, not the rule. It takes a lot of effort and time from both. From the subordinates, point of view, he doesn't want to be misinterpreted as seeking guidance. From the commander's viewpoint, he doesn't want to appear he is leading his subordinates by the hand.

The problem we face is that the "risk" is enormous. Even something as simple as a 2 Block on the front page of an OER [officer efficiency report] in today's Army is devastating—you simply can't recover. As you say in your article, "A soldier or civilian who receives anything less than full credit for improved performance and potential at report time will be left by the wayside by a promotion and selection system focused somewhat myopically on the reduction."

For many of us, your advice is refreshing but comes a bit late. When I got promoted to major in 1986, I set my sights on what I thought a promotion board would require to determine my

"potential" for advancement and future service to the Army. I knew at that time my current assignment as an instructor at West Point would not be useful to a board in making that determination. Nonetheless, I sought, obtained and was recognized for my performance in academic "leadership" positions. Most seem to agree, however, that it simply doesn't count or, in another way, it neither hurts nor helps.

As a field grade, as we know, what counts is S3 or XO [executive officer] time in a battalion. My time came in 1989. I felt good that I was picked to get that opportunity and finished with an above mass report and a "best S3 in the Div Arty [division artillery]," along with a "promote now" and "must command," etc. Still, this is a competitive business, and I knew more could be done.

Again, opportunity presented itself when my Div Arty commander postponed my PCS [permanent change of station] so I could become his S3—a lieutenant colonel's position senior rated by a general

officer. My responsibilities took on greater significance when our division (the 3d Armored Division) went to combat in the Gulf War. A "top block" backed up with words like "best Div Arty S3 I've ever seen" and "promote to Colonel" made me feel confident I had demonstrated the potential necessary for promotion to lieutenant colonel.

In May, while I was wrestling with the problems associated with deploying back to home station from Saudi Arabia, the board met and found I had *not* demonstrated the potential to serve as a lieutenant colonel. I asked both the FA and AAC branches their "opinions" as to the factor(s)—what they refer to as "discriminators"—contributing to my failure. Their conclusion was I was "a victim of the selection board's focus on the command OER as a means to reduce the selection rate to the required level."

Ten years ago, my rater put two "2s" on the front and a "usually" instead of "always" on the back of my OER. AAC, they told me, selected me last year

because they felt I was "a low-risk selection to lieutenant colonel." Unfortunately, the selection board felt that my command report indicated my lack of potential and that it was more significant than six years of performance as a major (a promotion I received with that same OER considered).

What's the moral of the story? In my case, that OER from 10 years ago could have been avoided had I communicated with and gained a better understanding of my commander. Hindsight is 20-20.

For everyone else, I am in agreement with Major Pope. The selection board system isn't robust enough to evaluate you for your future potential. Its focus is in locating the discriminators (the 2s) to go about the difficult task of building down the force.

MAJ Ray Riddle, FA
System Integration Officer,
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Picatinny Arsenal, New Jersey

Response to Major Riddle's Letter "Reality Therapy"

My remarks concerning Major Riddle's letter are based on the Secretary of the Army's Memorandum of Instruction (MOI) to the FY91 Lieutenant Colonel Board found at the beginning of the published promotion list. That guidance conflicts with Major Riddle's statement about a promotion board's focus ". . . in locating the discriminators (the 2s) to go about the difficult task of building down the force."

In fact, the board is directed to use the "best qualified" methodology. This

method allows it to identify all officers eligible for board consideration as either fully qualified for promotion or not qualified. It's an unfortunate fact that, in virtually every board, many "fully qualified" officers aren't selected due to strength constraints imposed by the Secretary of the Army's MOIs to meet the needs of the Army.

The board also is directed to review an officer's entire duty performance record. The board's guidance states, "Today's Army assignment philosophy is that all

assignments are important assignments."

I will close by fully endorsing Major Riddle's conclusion that communication between the rater and ratee is *very* important—not only to avoid unintended discriminators, but also to provide the additional guidance necessary to provide the rated officer an opportunity for success.

LTC(P) Richard E. Evans, FA
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Enhance Firefinder Survivability

Analysis of lessons learned from Operation Desert Storm has focused on correcting operational deficiencies experienced during the war. But the Army also should consider appropriate counter-counter-measures (CCM) for successfully demonstrated operational capabilities an enemy could countermeasure in a future conflict.

The Firefinder radars are a case in point. These weapon-locating radars played a key role in suppressing Iraqi artillery and rocket launchers.

However, radars aren't too difficult to counter. In 1982, the Israeli Defense

Force successfully employed hunter-killer tandems of unmanned aerial vehicles (UAVs) to locate and suppress Syrian air defense radars in Lebanon's Bekaa Valley. A modest investment in UAVs and helicopter-launched high-speed anti-radiation missiles (HARM) could provide a potential adversary an effective countermeasure to Firefinder radars.

Firefinder radar teams routinely train to employ a variety of battlefield survivability measures, including periodic cueing, defilade emplacement and jammer-location techniques. Further, stationary scanning also minimizes

signature detection.

The Army should evaluate CCMs designed to enhance survivability in an active enemy counterfire and counter-radar environment. Some options include:

● Armor shielding to protect trailer-mounted radar configurations—and future high-mobility multipurpose wheeled vehicles (HMMWVs)—in light forces against artillery fragments and submunitions.

● A reconfigured Firefinder radar mounted on a disappearing pedestal inside a converted M577 command post

carrier in heavy forces. The predecessor to the current M-901 improved tube-launched optically tracked wire-guided missile (TOW) vehicle (ITV) was the TOW launcher, which was pedestal-mounted on an M-113 armored personnel carrier.

● Employment of a field of unmanned

decoy emitters operating on a similar frequency band.

● An increase in the number of Fire-finder radars. The increase could complicate the enemy's ability to target us but also would increase the manpower in a target acquisition battery.

In summary, post-Desert Storm

complacency could erode the Firefinder's outstanding target acquisition capability. Although funds are limited, some investment in enhanced survivability could pay large dividends in a future conflict.

COL(R) Richard K. Fickett, FA
Annandale, VA

Response to "The New Heavy Div Arty"

In his article "The New Heavy Div Arty" (June 1991), Major Peter S. Corpac proposes to revamp the current heavy Div Arty [division artillery] table of organization and equipment (TOE). He would adjust some personnel and equipment, significantly upgrade some equipment and create a new multiple launch rocket system (MLRS) battalion TOE. While some of the proposals seem like good ideas, in the case of a new MLRS battalion TOE, Major Corpac's idea is first, unnecessary and second, not a doctrinally sound move.

I've been involved with MLRS since 1983 and have some knowledge in the TOE and tactical operations of MLRS battalions and batteries. So I'll address the need for an organic MLRS battalion in the Div Arty as well as some misconceptions about MLRS presented by Major Corpac and prevalent throughout the Field Artillery (FA) Community.

The MLRS battalion TOE could certainly stand a little "beefing-up" in the nonexistent headquarters, headquarters and service battery's survey capability and the understaffed battalion staff areas. But Major Corpac's proposals for a new battalion TOE do not address MLRS weaknesses, and they dilute MLRS strengths.

Before the conventional force reduction decisions and Operations Desert Shield and Storm, there had been an ongoing, funded plan to upgun the FA with more MLRS battalions. In fact, nearly 60 percent of the FA force was to have been MLRS by about the year 2010. Sixteen battalions of MLRS were programmed for US Army Europe (USAREUR) by the year 2000 through the conversion of Lance missile, 8-inch and some 155-mm battalions to MLRS.

While the single "divisional" MLRS battery was to remain as the only organic general support (GS) asset of the Div Arty, the preponderance of MLRS battalions in the habitually associated FA brigades

would have more than adequately covered the GS needs of the heavy divisions. The current draw-down plans have not significantly changed the FA azimuth to weight the overall force with proportionally more MLRS battalions.

In USAREUR, for example, today there are three MLRS battalions with a fourth in the process of converting or being fielding. Only one has an Army tactical missile system (Army TACMS) and MLRS family of munitions (MFOM) capability at this time. What this gives our near-future, two-division USAREUR corps is an MLRS battalion per division plus a third to weight the main effort and a fourth with an Army TACMS capability to fight the corps' deep fight. (In USAREUR, Lieutenant General David Maddox, Commander of V Corps, has made it crystal clear the Army TACMS battalion shoots for him—it isn't a division asset.)

Will there be enough MLRS battalions to provide GS fires to the heavy divisions? Yes. For example, the 8th Infantry Division (Mechanized) started converting an inactivating 155-mm battalion to an MLRS battalion many months ago. The Div Arty's GS MLRS battery provided a cadre experienced in MLRS for the new battalion and became the battalion's first battery. The second and third batteries are being filled with launchers drawn from prepositioning of materiel configured to unit sets (POMCUS) reserves in Europe.

Whether the battalion will remain an organic component of the Div Arty or be assigned to an FA brigade is unknown at this point. In either case, its primary mission undoubtedly will be GS to the division as a reinforcing or assigned asset. To answer Major Corpac's general area of concern, at least one MLRS battalion will be available to provide GS fires to each of USAREUR's heavy divisions.

Now to address some of his specific points about the organization and employment of MLRS battalions. He

states, "We must equip the (Div Arty) MLRS battalion with launchers that can fire MLRS rockets or the Army TACMS. . .and the MFOM." That's the plan. All launchers in production since 1989 have been the newer MLRS/Army TACMS/MFOM type (known as Version 6 launchers). The older MLRS launchers will be upgraded to Version 6, depending on product improvement program (PIP) funding and scheduling. All probably will be converted in the next five to seven years.

However, the limited production run of Army TACMS missiles may restrict Army TACMS employment; division and Div Arty commanders never may have direct control of such assets, as alluded to earlier.

Much of the remainder of Major Corpac's information needs comment. The "hot platoon" is a good example. MLRS units doctrinally operate using hot launchers in each platoon, not hot platoons or batteries. To have platoons or batteries hot would be unnecessary.

Leaving the firing batteries with "small ammunition, maintenance and logistics sections" while reconfiguring the MLRS battalion headquarters, headquarters service battery and forming a separate MLRS service battery all run counter to the MLRS design purpose, built-in flexibility and employment doctrine. The changes won't increase the battalion's effectiveness. When understood and properly used, the current TOE works well.

The concept that "individual firing batteries be detached from the battalion and given the mission of R (reinforcing) or GSR (general support reinforcing) to a DS (direct support) battalion" or of MLRS batteries "answering calls-for-fire from the brigade's observers" goes directly against MLRS doctrinal employment as espoused in *FM 6-60 MLRS Operations*. MLRS is not a DS weapon system; it has neither the target precision nor the suite of munitions types—currently only dual-purpose improved

conventional munitions (DPICM)—to effectively perform a DS mission or reinforce a DS battalion.

MLRS was designed and performs best as a counterfire weapon system (amply demonstrated in Southwest Asia) that can quickly respond to and utterly destroy enemy artillery as well as command posts and other lightly armored targets. It is designed to engage large or inaccurately located targets, such as those located by radar and other means with attendant high-target location error (TLE).

Finally, an MLRS battery does not have a liaison team to send to the reinforced DS 155-mm battalion—a critical requirement when most Field Artillerymen don't yet fully understand the system's capabilities and limitations.

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Assistant S3/ S2, 2-32 FA
42d FA Bde, Germany

Another Response to "The New Heavy Div Arty"
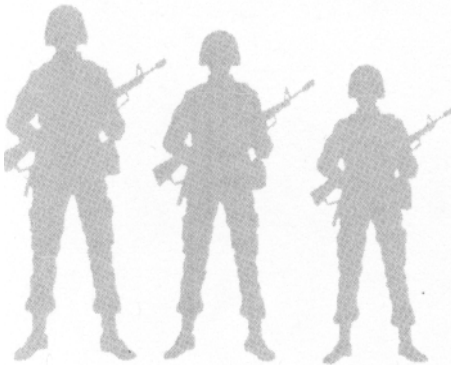
The article "The New Heavy Division Artillery" by Major Corpac is an interesting discussion of how to manage a mandated reduction in personnel. This is a recurring problem in our Army, so it may be useful to draw on past experience. I would like to comment on one portion of the proposed plan that's not generally given enough attention.

While the writer emphasizes an increase in counterfire firepower, he largely achieves this at the expense of the unit that will find targets to fire at. It seems that each generation has to learn the hard way (assisted by some devastating incoming rounds) that counterfire intelligence is not a luxury to be given a token place on the table of organization and equipment (TOE). A platoon is inadequate for this purpose.

Historically, such small units have been tried numerous times in many variations, and they have consistently failed to function effectively. In World War I, our first sound-ranging section reported its support was inadequate, especially in a moving situation, even though there was a special officer to represent it on the Army staff.

We went into World War II with an observation battalion for each corps, and it generally functioned as a unit with great effects. According to the standing operating procedure (SOP), when detachments were sent to division, they would be reinforced, *self-sustaining* batteries. Where this was followed, results were still good. But it was not always followed.

In Africa, a smaller detachment was sent out and captured. Separate platoons were activated for the Pacific Theater, but these were eventually absorbed by observation battalions or batteries in order to operate effectively.

Even in short field training exercises (FTXs) at Fort Sill, Oklahoma, small observation sections were rarely used properly.

It is interesting to note the ratios of target acquisition units (observation battalions) to corresponding firing units as World War II progressed. For example, landing operations, where space is figured to the man, the ratios ran as follows:

1942	North Africa	1/28
1944	Normandy	1/16
1945	Honshu (planned)	1/8

The "powers that be" were learning the hard way you have to "find 'em" before you can "fight 'em."

The June article does not give the strength of each Q-37 Firefinder radar section, but the proposed target acquisition resources are considerably less than any World War II ratio, even neglecting reinforcing artillery. And the implied greater efficiency of the Q-37 over sound-ranging becomes questionable when its cueing problem and vulnerability to enemy EW [electronic warfare] locators are taken into account. We still need some method of *continuous* surveillance of enemy artillery activity.

The article stresses increased mobility but only in terms of hardware. In the combat zone, other factors—such as exposure to enemy observation, road conditions and priorities, obstacles (minefields, damaged bridges, etc.) weather conditions and others—also affect mobility. The following highlight the reasons why such smaller units dependent on outside support have consistently failed. Some of the activities required of the unit commander include:

(1) The usual administration, maintenance and welfare of the troops.

(2) Supervision of technical operations.

(3) Liaison to division headquarters to be ready for changing situations and to coordinate target area coverage, moves, etc.

(4) Liaison with neighboring troops for local protection, concealment, coordinate moves, etc. (Incidentally, when the word is our that radars draw enemy fire, they won't be popular neighbors.)

(5) Position and route reconnaissance for the next move.

All this for four widely dispersed sections.

The last item, reconnaissance, is generally underestimated, most particularly for radars that will have to move relatively often. Even with older systems, when there was any appreciable war of movement, reconnaissance alone was a full-time, seven-day-a-week job for the most experienced officers. Even the US Field Artillery School-trained lieutenant has problems being in more than one place at a time for 168 hours a week. The idea that a staff section at headquarters can micromanage many of the listed functions without being "on the ground" is more hazard than help.

We claim our artillery is "the greatest killer on the battlefield." We had better acknowledge the enemy has similar capabilities and be ready to root him out. Anything less that a self-sustaining battery is a waste of manpower. It's false economy. We're only kidding ourselves when we reduce our counterfire intelligence below the point of diminishing returns.

COL(R) A. R. Hercz, FA
Ann Arbor, Michigan

Lieutenant General Wilson A. Shoffner,
Deputy Commanding General Combined Arms of the Training and Doctrine Command;
Commander of the Combined Arms Command and Fort Leavenworth, Kansas;
and former Commander of the 3d infantry Division (Mechanized), Germany

Think Fire Support—
Simple, Adaptable Plans Executed with Violence

Interview by Patrecia Slayden Hollis, Managing Editor

Overall, how has the Berlin Wall coming down, the end of the Cold War and the major changes in the Soviet Union affected the US Army's mission and training in Germany?

The past couple of years have been very interesting times to serve in the Army in Europe. We've seen historic events take place as the Soviets have gone through some unpredicted, unprecedented changes as well as the rest of Eastern Europe. All of that was going on when Desert Shield and Desert Storm occurred.

And as we were negotiating the Conventional Forces and Enhancement (CFE) strategy—which had already committed us to a smaller presence in Europe—we found many plans we were executing that needed only minor changes. In some cases, we only had to accelerate them to "build down" the Army in Europe. This year, the Army in Europe comes down to one corps with two divisions, an ACR [armored cavalry regiment], aviation brigades and other support troops.
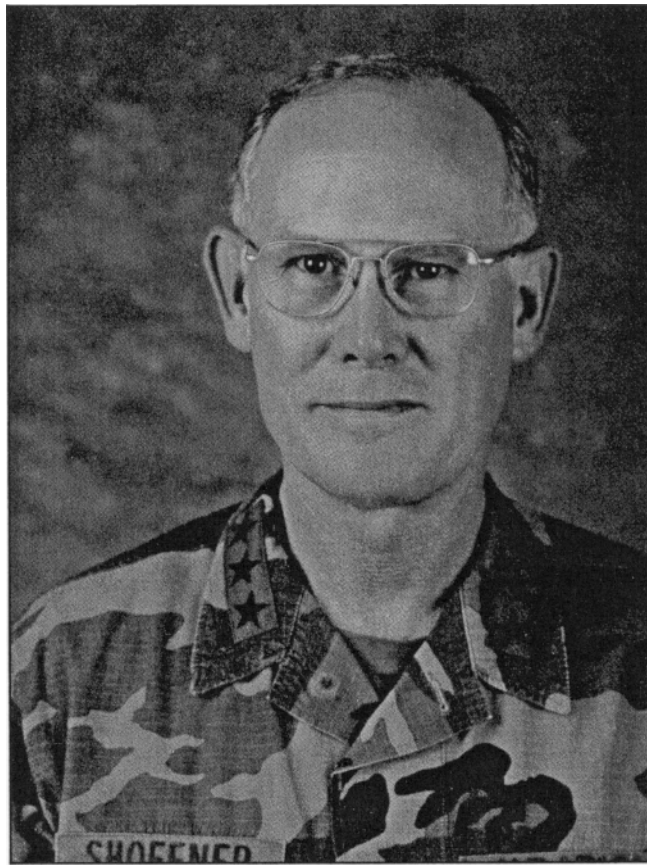
> **" . . . in the 3d Division, we kept it very simple. We developed 'about right' fire plans and groups of fires . . . and used a process we called the 'percolator.' "**

As we build down, European forces will significantly broaden their perspective as a part of our force projection Army. First and foremost, they will provide a stabilizing presence during this period of unprecedented change by being a trained and ready force . . . that won't change. If required, they must be prepared to fight not only in Europe, but anywhere they are called upon. Forces in Europe provide our country a number of options for responding to a variety of contingencies throughout the region. So you'll see increased emphasis on contingency planning, deployment exercises and, what they've been doing all the while, training as part of a multinational force. Inside the battalions—inside the companies, batteries and troops—training will be much like it has been in the past.

At the brigade level and above, the Army picks up the increased requirement to deploy quickly and move rapidly over operational distances—100 to 200 kilometers. That's not new for the Army in Europe because it knows how to train on major deployment

exercises through REFORGER [return of forces to Germany] and moves to and from training areas over those distances.

I understand you used a technique to shrink the commander's decision cycle in the 3d Infantry Division, called the "One-Fifth—Four-Fifths Rule." Would you explain the concept and its impact on executing fire support?

Our approach in the Marne Division was to try to be more timely in the decision making and orders process so we could maximize the time available to those who must prepare for and execute operations. Typically, one uses a rule of thumb of "one-third—two-thirds" to allocate the time from the commander's receiving the mission until he issues the order to subordinate commands, so that two-thirds of the time available can be used to prepare to execute the operation. Giving the commander a full one-third of the time seemed to me to be a disproportionate rule of thumb. It also gave us too much time, and we prepared overly complex orders and plans that were too difficult too execute.

So we adopted the thesis that, for this operation, less is better. We maximized the time available for preparation and execution and emphasized executing an "about right" but simple plan. To do that, we allowed a commander only one-fifth of the time to issue the order.

That created a challenge for the fire supporter. He clearly couldn't execute a measle sheet—plan a great number of detailed targets. So, in the 3d Division, we kept it very simple. We developed "about right" fire plans and groups of fires at the company, battalion and brigade levels, and used a process we called the "percolator." Just like a percolator, the commander's concept went from top to bottom, then each fire support echelon nominated and adjusted targets and sent them back up for integration, deconfliction, simplification and approval. Then they went from top to bottom again for final planning and preparation.

It all starts from the commander's concept. The commander has to give you a concept for movement and fires. In fact, we used standardized subparagraphs to Paragraph 3B ["Tasks to Maneuver Units"] of the Operations Order. Subparagraph 3B(1) was always the commander's assessment of what the most probable enemy course of

action would be; 3B(2) was the commander's scheme of maneuver; and 3B(3) was the commander's scheme for fires.

The commander must visualize and articulate what he wants his fire support to do as part of his concept of operations. That's not the fire support coodinator's job. The fire support coordinator's job is to make it happen.

Where should the fire support coordinator [FSCOORD] position himself to be most effective on the battlefield?

He needs to postion himself so the commander can best use fire support during the fight. Artillerymen have a great penchant for doing detailed planning and then being disturbed when the battle plan doesn't fit the situation. I know that from my own experience. Most plans don't fit the battle situation as it develops. It's a chaotic environment—some mistakes are made, but a lot of opportunities also present themselves. Through it all, the fire support coordinator's primary mission is to ensure fires are integrated into the operation as it goes down. Fire Support can make a big difference.

We have many fire support coordinators, from the company through the corps levels, who want to build a nice, neat plan and then execute it in isolation. You can't do that. You must be relevant—and to be relevant, you've got to get fire and maneuver at the right place at the right time. So, the fire support coordinator must be wherever on the battlefield the commander is to influence his decisions.

At the company level, the fire support coordinator—the FIST [fire support team] chief or COLT [combat observation lasing team] chief—is mainly in the execution business. He's a big-time shooter. He must see the enemy and pull the trigger. The maneuver company commander is also in the execution business. Both are very busy leaders upon whom the success of our operations hinges. Both must see and understand the battlefield the same. They need to have a common perception of the battlefield and good communications between them. That's one of the primary reasons for their being habitually associated. Effective teams speak a special shorthand with very clear, very specific understanding.

But at the moment of execution, the

company commander may need to be in one location and the FIST in another. So, if the FIST is in the business of executing, he may not be with the company commander. Occasionally he'll be able to be in the same location. Offensive operations and movements-to-contact pose different challenges than prepared defensive operations.

At the battalion level and above, the fire support coordinator should be within arm's reach of the commander. He should be "cheek-by-jowl" with him when they're formulating the concept and executing the operation. During the planning and preparation phase, frequently the fire support coordinator will be out supervising the work of other fire support coordinators. But during the concept formulation and execution phases, he needs to be right beside his commander.

What involvement did you have in the targeting process as the Commander of the 3d Infantry Division?

That's a good question because the division commander's focus is basically a simple one. Though he fights as part of a corps on a complex battlefield and he isn't isolated, he primarily focuses on executing a number of close battles.

Brigade commanders are the primary agents for integrating the combined arms teams and executing a particular battle given them by the division. The division commander must ensure enemy artillery is kept off their backs and the plan is adjusted as required to accomplish the mission. That type of targeting is fairly straightforward.

That doesn't mean the division commander is oblivious to all else. He's always looking a day or two downstream—always posturing for the next battle. In doing so, he has a very active dialogue with the corps commander on what forces—targets—are going to show up and his preferences, needs and priorities to set up the battle so the division can best execute it. There's a dialogue between the staffs to ensure all have a common perception of future battles that must be set up.

The division commander has great interest in what targeting the corps is doing. That's his business as well as the fire support coordinator's.

As far as intelligence is concerned, the commander must be the best in the division

> **❝ . . . where fire support is done well, it's generally well-integrated into combat operations . . . had a simple plan adjusted to fit the situation . . . [and] was executed violently. ❞**

in understanding the enemy. Intelligence is central to his seeing and understanding not only the current battle, but also future ones.

Intelligence also must be wired very closely to the Div Arty [division artillery] commander. With respect to targeting, the division's CEWI [combat electronic warfare and intelligence] battalion commander and the Div Arty commander must tie their operations together. The division gains tremendous leverage when the intelligence apparatus and the fire support machine are integrated.

What are the fire support implications for the emerging AirLand Operations concepts in terms of heavy and light and artillery?

The AirLand Operations concept, which General John Foss [former Commander of the Training and Doctrine Command] developed, gave us a good view of a future battlefield, and it was very useful, thoughtful work. Concurrently, while he was evolving this concept, many in the field also were significantly changing the neanderthal-like GDP [general defense plan] mentality. The GDPs had neat, fixed solutions that were quickly becoming overtaken by events. These changes were being made as Desert Storm came about.

Future battlefields won't be in the traditional "layer cake" configurations and allow extensive time for preparations. Our forces won't necessarily be contiguous; there will be increased unknown areas on the battlefield. We'll need forces capable of moving over operational distances to gain a position of advantage before engaging in combat operations, and while posturing and executing engagements, we'll have an increased demand for reconnaissance and security operations.

Those characteristics will present an interesting challenge to the fire support coordinator and the Field Artillery. They must be agile—not only to move rapidly, but also to quickly reorganize formations and realign forces on the battlefield.

A battalion must be able to unplug from a brigade and plug into another that's moving from one division to another. We must have standard "plays" so we can take a platoon from one battery and fold it into another or a battery from battalion to battalion. This agility—flexibility—will be extremely important as we constitute and reconstitute our combat capability. Our commanders must place a premium on agility, adaptiveness, creativity and competence.

The ability to rapidly realign and concentrate the force will be key to our success on a future battlefield as well as our ability to deploy. Further, we need to lighten the force for deployment so we can get the essential elements on the ground early. We need a maximum buildup of lethality early on in an operation, the ability to sustain our forces moving rapidly over extended distances and then the ability to rapidly concentrate decisive combat power when it's time to execute the operation.

The long range for fires we've already invested in is extremely important. That will prove to be a smart solution in the future.

What changes are necessary in our logistical community to meet the demands of the fast-paced, nonlinear battlefield in AirLand Operations? Specifically, for the Field Artillery?

We've got some work to do. Our ammunition resupply system is a very important piece of the battlefield. Artillery ammunition distribution drives the logistics distribution system—85 percent of the ammunition tonnage is artillery ammo. We have to rework the previous

scenarios. There are ongoing reviews that will reshape our ammunition resupply structure and give us better insight as to how best to accomplish resupply.

The other logistical problem we're examining relate to how to sustain the force operating over extended lines of communications, both for projecting the force in a theater and for combat operations during the campaign.

In terms of whether the system should be more centralized with less resupply capabilities organic to the unit or more decentralized, we need to examine that issue in greater depth. Centralized resupply implies the need for an omniscient observer who knows exactly what needs to be done and, thus, can efficiently distribute critical resources. I'm not sure we've found that omniscient observer.

I expect fire support coordinators and logistics officers at each level will continue to have close and continuous dialogue on where the ammunition needs to be when. I think the procedures we use for forecasting and pushing the ammunition inside the division will be revised as well as the procedures for estimating and requesting our needs at the corps and higher levels.

Fortunately, the pallatized loading system will be fielded in the near future and will greatly facilitate materiel handling. But I expect our logistics procedures will be overhauled as we review the scenarios and understand the full implications of force projection.

What role did simulations play in preparing 3d Infantry Division soldiers for Desert Storm? What role will it play in training the combined arms team of the future?

About a third of the Marne Division participated in Desert Storm. We sent a full-up brigade slice from Aschaffenburg to Ron Griffith [Major General] in the 1st Armored Division. With the brigade's normal slice of direct support artillery, we sent an additional direct support battalion and converted it to general support to deploy with Creighton Abrams [Brigadier General, Commander of VII Corps Artillery].

Interestingly, our BCTP [battle command training program] in July 1990 had us moving over operational distances with the lead brigade of that formation

the corps' main effort. The lead brigade was the Aschaffenburg brigade, and the role it played in BCTP was essentially the same as it played in Desert Storm.

So it simulated a formation and a role it was to rehearse in the desert and execute on the ground. Serendipity.

Our simulations have been invaluable in integrating the combined arms team because force-on-force training above the battalion level is very difficult to execute. As we go forward in training the brigade and above, we'll rely heavily on simulations. And fire support will be an integral part of the training—just as it is today in some of the company-, battalion- and brigade-level training in SIMNET [simulation network] and the Combined Arms Tactical Trainer. Fire support is integrated from the FIST up in our current simulations and in the BCTPs for division and corps commanders.

Future Field Artillerymen will have to be very comfortable with simulations if they're going to be successful.

How would you characterize the Field Artillery's performance at the Combat Training Centers? How can we improve our support of maneuver forces?

Let me talk about fire support performance at the Combat Training Centers as opposed to Field Artillery. Fire supporters' performance is mixed. Some do it very well. Some don't.

In those cases where fire support is done well, it's generally well-integrated into combat operations by a fire support coordinator who has been habitually associated, side-by-side, with the maneuver commander. The fire support coordinator had a simple plan adjusted to fit the situation, which was executed violently. He didn't hold back when it came time to execute. He put all the fire support he could get his hands on into the fight, so the enemy didn't have a chance. When that's done properly, a company commander and a FIST can kill a battalion and a battalion commander and his FSCOORD can kill a regiment.

In those cases where fire support doesn't do so well, you typically find a Field Artillery plan, not a fire support plan. It's one that was worked in great detail and rehearsed independently of the rest of the combined arms team. The plan is precise and complicated, frequently isn't relevant to the situation that has evolved and is poorly executed, if executed at all.

My plea for fire supporters is to keep it simple. Make sure your plan is fully integrated and adaptable. In the task force, companies frequently get tangled up, and the task force commander may have to send Alpha Company to do Charlie's mission. When that occurs, the FIST has to pick up and execute the new fire support part of the fresh mission their company team has. That's why I required FISTs in the 3d Division to be able to shoot their brother's plan. And if a FIST could handle three targets, I was pleased. So, keep it simple. Things will probably get "screwed up" after you cross the line of departure.

So, the challenge to improving fire support performance at the Combat Training Centers is to get into the fight. Don't let your commander leave home without his fire supporter "tucked in his pocket." When the commander formulates the concept for an operation, get fires integrated—integrated in enough quantities to make a difference. If the fire support coordinators do that, then the Field Artillery performance at the Combat Training Centers will improve greatly.

Field Artillery does very well on artillery functions but not so well on fire support functions.

In your opinion, is the Army "filling the bill" in training our senior NCOs to accomplish their role as Training Managers outlined in **FM 25-101 Training the Force: Battle-Focused Training?**

Our Field Artillery sergeants are absolutely outstanding. I've never had a Field Artillery command sergeant major who wasn't technically and tactically competent—a command sergeant major in a Div Arty who couldn't perform any battalion or battery task. That's because they grew up in the system and knew it. They knew the standards and enforced them. Cannoneers' Hop, gun drills and section evals are old terms. Training to standard is an old idea. Our NCOs understand their business. They've eliminated from their ranks those not worthy to be associated with competent NCOs—those incapable of handling the special trust we must place in them.

I have great confidence in the ability of the Field Artillery sergeant to carry his weight in training and on the battlefield. But he can improve his ability to plan and execute training and use his time more wisely. He doesn't do very well at those

tasks sometimes. Some units are better at them than others and have developed techniques to see that that which the commander intended to do during training can in fact be executed.

By and large, our sergeants are fully capable of doing the work if you give them the opportunity and resources and then hold them accountable for it. I'm very comfortable with the role our senior Field Artillery NCOs are performing for our Army.

What message would you like to send Field Artillerymen worldwide?

Think fire support. If you're not in the fight, get in it and fight as a combined arms team. As a fire support coordinator, you should always ensure your commander makes the most of his fire support assets.

The commander should have at least three different ways to kill the enemy: infantry, armor and artillery—give the enemy at least three different ways to die and do it all at once. If he can focus those primary killing systems at the right time and place, then we'll all be victors, and you can help him make it happen.

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TARGETING—
Keeping It Simple

by Colonel John A. Gloriod and Lieutenant Colonel Scott E. Nahrwold

Few would argue that the goal of fire support is to provide timely, accurate fires in depth in keeping with the commander's intent. If fire support systems are successful in this regard, they'll attrit the enemy's critical combat systems to such a degree that friendly forces can attack, defend or counterattack with highly favorable force ratios at the point of penetration.

Achieving the commander's intent for fire support is no easy task. It requires planning, coordination and the synchronization of a variety of diverse attack assets that include mortars, cannons, rockets, missiles, offensive electronic warfare (OEW) platforms, attack helicopters, close air support (CAS), naval gunfire and air interdiction. The process that ensures the effective and efficient employment of these assets is targeting.

This article suggests ways to refine this essential process at the division level to make it more responsive and flexible in dealing with the needs of the maneuver commander. To guide you through the discussion, we use the Decide, Detect and Deliver functions of the targeting process as a framework. With respect to each function, we discuss key personnel involved and critical doctrinal issues that must be addressed. We follow those with recommendations to simplify and accelerate the development and dissemination of the products we derive from the functions. While we discuss each function as a separate entity, they're "inherently intertwined" as stated in *FM 6-20-10 Tactics, Techniques and Procedures for the Targeting Process*.

Decide

Decisions made early in the planning stages of an operation are what drive the targeting process and form the basis of the decide-detect-deliver methodology.

These decisions not only help identify high-payoff targets (HPTs), but also focus the collection effort and enable us to identify the most efficient and effective method(s) of engagement.

In this regard, the G3, G2 and assistant fire support coordinator (AFSCOORD) need to act as one. Their confidence in one another is critical, and the G3 needs to be comfortable in the knowledge that the AFSCOORD and G2 know how he thinks and can take appropriate actions in his absence. Additionally, the entire targeting cell needs to be packed with top-notch personnel if the division is to perform to its potential.

According to our doctrine, the decisions that comprise the decide function include:

- What targets should be acquired and attacked.
- Where and when the targets will likely be found and who can locate them.
- How the targets should be attacked.
- Whether target damage assessment is required.

Visual products should be created at the division level to reflect these decisions. These doctrinal products are as follows:

- HPT List
- Target Selection Standards Matrix (what accuracy is required for target attack)
- Collection Plan (where and when to acquire targets and who should find them)

- Attack Guidance Matrix (how the targets will be attacked)

Before any decisions can be made, we must know what the enemy's most likely courses of action will be. Identifying probable enemy courses of action is the goal of the intelligence preparation of the battlefield (IPB).

The initial IPB results in enemy doctrinal templates that enable us to graphically portray the enemy order of battle. This facilitates our identifying high-value targets (HVTs)—those the enemy commander requires for the successful completion of his mission. The HVTs are derived from target spread sheets and target sheets found in Chapter 3 of the *Fire Support Mission Area Analysis* (FSMAA). A detailed discussion of target spread sheets and target sheets can be found in Appendix A, *FM 6-20-10*.

The target spread sheets address various threat operations (e.g., hasty defense, movement-to-contact, etc.) and contain applicable doctrinal templates and relative value matrices that portray the value of various target categories to the enemy commander. The target sheets address specific target categories by providing the target function, description, signature, effect of degradation on the enemy course of action and a graphic representation.

HPT List. The HPTs are identified during the war-gaming process. HPTs are those HVTs that, if acquired and attacked, will result in the successful completion of the friendly mission. The selection of HPTs requires careful staff coordination and should involve all the members of the targeting team. The G2 submits the list of HVTs to the targeting team. The team then nominates selected HVTs to be HPTs. Once selected, the HPTs may be formatted in a list for easy reference.

When the list is approved by the commander, it should be passed to the operations, intelligence and fire support cells for use as a planning tool in developing

Priority	Category	Sheet Number	Description
1	8N/CH (TS)	77, 79	PRTB, Nuclear Depot
2	1 C³ (TS)	29, 34	Division, Army Main CP
3	2 FS (TS)	5	Division Artillery Command Btry
4	2 FS	1, 2, 18	Arty Bn FDC, COP, FA Btry
5	1 C³	25, 30	Regimental Main CP, Div Fwd CP
6	3 MAN	51, 50, 46, 48	Bn Assy Area, March Column, MR/TK Co
7	4 ADA	63, 64	AD
	7 REC	91, 92	EW Site, Radio/Radar Inter Sites
8	9 POL	115, 116	Regimental/Division POL Points
9	10 AMMO	120, 121	Division/Army Ammo Depots

Note: The list may have any number of target priorities.

Legend

AD = Air Defense	Co = Company	MAN = Maneuver
ADA = Air Defense Artillery	COP = Command	MR/TK = Motorized Rifle/Tank
AMMO = Ammunition	Observation Post	N/CH = Nuclear/Chemical
Assy = Assembly	Div = Division	POL = Petroleum, Oil and Lubricants
Bn = Battalion	FA = Field Artillery	PRTB = Mobile Repair Technical
Btry = Battery	FDC = Fire Direction Center	Base (Rocket and Missile)
C³ = Command,	FS = Fire Support	
Control and	Fwd = Forward	REC = Radio Electronic Combat
Communications	Inter = Intercept	TS = Time Sensitive

Figure 1: Doctrinal HPT List. At the division level, which has experienced targeting personnel, this doctrinal list is more detailed than it needs to be.

the intelligence collection plan and attack guidance. This is the doctrinal approach to the development of an HPT list, something with which all fire support personnel should be familiar.

However, with personnel more experienced in targeting, the development of the HPT list doesn't need to be so complex. At the division level, it's a rare commander, G2, G3 or FSCOORD who can't immediately discern the HPTs. Almost without exception, the keys to success involve destroying enemy artillery; suppressing his air defenses to enable friendly employment of CAS and attack helicopters; and subsequently, destroying his maneuver forces, command and control and logistics. Whether in the offense or defense, these priorities generally remain the same.

Therefore, the doctrinal HPT list (Figure 1) is far more detailed than it needs to be. By including a "category" column, we introduced a redundancy with the description column that's unnecessary and of no practical use. Experienced targeting cell personnel at the division level don't need to refer to target spread sheets or target sheets; therefore, the sheet number column of the doctrinal HPT list is also unnecessary. A usable HPT list needs to consist of nothing more than a prioritized list of detailed target descriptions as reflected in the sample at Figure 2.

TSS Matrix. The next product to be discussed is the target selection standards (TSS) matrix. As with the HPT list, targeting personnel need to understand what must be considered in the development of a formal TSS matrix. However, we must again recognize that experienced personnel are very familiar with the detection means that qualify a sighting as a target versus a target indicator. Therefore, the TSS matrix depicted in Figure 3 is an unnecessary product at the division level. Nevertheless, the criteria that go into discriminating between a target and a target indicator must be understood.

Such things as target location error (TLE), target size (e.g., battalion, company), activity (e.g., is the target moving or stationary) and time of acquisition (i.e., how "old" is the target) all need to be considered in deciding whether or not to attack a particular target. This information is not reflected in a TSS matrix

but can be effectively incorporated in the attack guidance matrix (AGM).

AGM. The doctrinal version of an attack guidance matrix is depicted in Figure 4. Again, this document can be modified to make it more useful and practical at the division level.

The "category" column is too generic to be useful. The "high payoff" column implies we'll employ attack assets against some targets that aren't high payoff. We can't afford to do that. If we accept the premise that the destruction of HPTs will defeat the enemy (i.e., preclude successful completion of his mission), then we must concentrate our limited resources on HPTs and HPTs *only*. Rule Number 1 in the targeting business should be *If a target doesn't qualify as an HPT, it doesn't get shot.*

Priority	Description
1	502 DAG
	503 DAG
2	54 ADA Regt
3	507 MRR
	59 TR
4	30 Hvy Lft Regt
5	85 Signal Regt

Legend

MRR = Motorized Rifle Regiment

TR = Tank Regiment

Figure 2: Simplified HPT List. This list is nothing more than detailed descriptions of priority targets, a simplification of the format in Figure 1.

The "when" column is also unnecessary for the division targeting cell. Division targeting personnel understand that suppression of enemy air defenses (SEAD) and preparation missions are planned and executed at a specific time.

Source	Target	Suspected Target
G2, S2 or FAIO	Must Specify	
AN/TPQ-37	X	
AN/TPQ-36	X	
AN/TPS-25		X
AFSO	X	
COLT		X
FIST	X	

Legend

AN/TPQ-37/36	= Firefinder Radars	COLT	= Combat Observation Lasing Team
AN/TPS-25	= Moving Target Locating Radar	FIST	= Fire Support Team
AFSO	= Aerial Fire Support Observer		

Figure 3: Doctrinal TSS Matrix. Though all targeting personnel must understand the criteria for discriminating between a target and a target indicator, this matrix is unnecessary at the division because of the targeting expertise at that level.

Category	High Payoff	When	How	Restrictions
1 (C³)	46, 48	I	N/EW	Coordinate Attack with EW
2 (FS)	1, 2, 7	A	N	DNE MRL Older than 10 Minutes
3 (MAN)	25, 28	A	25%	Last Volley RAAMA/ADAM
4 (ADA)	58	P	G/S2	SEAD Program 120800A
5 (ENGR)		P	N	Countermobility Program 0/0
6 (RSTA)		P	EW	
7 (REC)		P	N	

Legend

DNE MRL	=	Do Not Engage Multiple Rocket Launcher
RAAMS/ADAM	=	Remote Anti-Armor Mine System/Aerial Denial Artillery Munition
ENGR	=	Engineer
0/0	=	On Order
RSTA	=	Reconaissance, Surveillance and Target Acquisition

Figure 4: Doctrinal AGM. Because of limited resources, we must shoot HPTs—only HPTs—and shoot to destroy them. Therefore, we can change this AGM format to make it more useful for the division.

Attack Systems	502 DAG / 503 DAG	(priority)	54 ADA Regt	507 MRR Regt	30 Hvy Lift Regt	85 Sgn Regt	Remarks
DS Arty	1-100M; 2-Btry; 3-STAT; 4-1 Hr	4	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	
R Arty	1-100M; 2-Btry; 3-STAT; 4-1 Hr	3	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	
GSR Arty	1-100M; 2-Bn; 3-STAT; 4-1 Hr	2	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	
GS Arty	1-200M; 2-Bn; 3-STAT; 4-1 Hr	1	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	
Helicopters Attack	1-3 Km; 2-Bn; 3-STAT/MOV; 4-1 Hr/30 Min	1	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	
CAS	1-3 Km; 2-Bn; 3-STAT; 4-1 Hr	1	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	
OEW	1-1 Km; 2-Btry; 3-STAT; 4-1 Hr	2	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	
ATACMS*	1-; 2-; 3-; 4-		1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	1-; 2-; 3-; 4-	

Remarks:

Legend

1 = Required TLE   3 = Stationary (STAT)/Moving (Mov)
2 = Size of Unit   4 = Time of Acquisition
* ATACMS = Army Tactical Missile System

Figure 5: Modified AGM. This document includes only HPTs, takes only minutes to prepare after a target cell meeting and can be formatted in the MCS for immediate transmission to all who need it. (Note that only the DAGs' column is filled out; the other HPT columns would have to be filled out to complete the form.)

If we shoot only HPTs, the distinction between "as acquired" and "immediate" becomes blurred to the point they're indiscernible. Therefore, that column too, becomes unnecessary.

The "how" column loses most of its utility for a couple of reasons. The terms "suppress" and "neutralize" are too subjective for maneuver commanders and FSCOORDs to clearly understand. Besides, if we're going after HPTs, when we find them, we want to destroy them. After all, it's their destruction that will result in the enemy's defeat.

Additionally, a "percentage of destruction" is beyond our capability to measure or verify at this juncture. Target damage assessment capabilities are extremely limited and need to be discussed. However, they'll have to be the subject of another article.

While it may seem too simplistic, whenever we find an HPT that meets our criteria for attack, we must destroy it. Of course certain targets, such as command and control targets, may have a high degree of intelligence value; we would delay the destruction of such a target as long as its existence serves our purposes.

Well then, if the doctrinal version of the AGM has so many apparent shortcomings, what should an AGM look like? We recommend units adopt an AGM similar to the one in Figure 5.

This AGM lists only HPTs across the top—specific targets, not generic categories. Down the left side we've listed the attack systems available to the division and corps. Within each block of the matrix, we've included the TSS consisting of TLE, required target size, target activity (i.e., moving or stationary) and time of acquisition (i.e., how old can the acquisition be and still be attacked).

When these criteria are met, the applicable attack system(s) is notified to engage the target. In the case of targets that qualify for attack by more than one system, attack systems are prioritized, and the priority is listed in the upper right corner of the matrix block. The remarks columns along both axes allow us to address restrictions, restraints or constraints involving HPTs or attack systems.

Note the sample AGM in Figure 5 has only been completed for the first priority HPT. The form should be completed for the HPTs, as appropriate.

This simplified document takes only minutes to prepare after target cell meetings and can be formatted in the maneuver control system (MCS) and immediately transmitted to all who need it. Each AGM also has an effective date-time group to eliminate confusion over which version is in effect.

These, then, are the essential products we derive from the decide function of the targeting process.

Detect

According to *FM 6-20-10*, the key to the detect function is focusing on the

HPTs. By simplifying our targeting products, we greatly reduce the administrative workload of the G2 and the Field Artillery intelligence officer (FAIO).

The G2 is literally swamped by the volume of raw data and analysis that comes to him through the host of collection systems available at division, corps and echelons above corps (EAC) levels. If we are to engage targets in a timely manner, the targeting effort can't afford to wait on the analysis being performed in the technical control and analysis element (TCAE), collection management and dissemination (CM&D), electronic warfare section (EWS) or all source production section (ASPS). For this reason, the revised AGM becomes an invaluable tool in "focusing" the intelligence community on what is foremost in the battle—the *attack* of HPTs.

Additionally, by providing the attack criteria for HPTs in the revised AGM, we enable the intelligence collector to immediately recognize a shootable target, rather than having such targets wind up in the analysis process only to be passed to the shooters after they're too old to be reliable.

Without a doubt, the most timely target acquisition assets at the division level are the Firefinder radars. Their real-time acquisitions allow us to go after enemy artillery in a variety of ways. But, just because the enemy artillery is firing, we need not automatically engage him in a counterbattery duel.

By using critical friendly zones (CFZs), we can monitor our key assets. If enemy artillery targets them, we'll attack with our most responsive systems—cannons and rockets. However, if his fires are ineffective, we won't divert higher priority missions to engage him. Instead, we'd use Firefinder to plot his location and attack with CAS or attack helicopters.

Pilots, OH-58D observation helicopters and human intelligence (HUMINT) are the best real-time targeting sources, other than Firefinder. Although there are many sophisticated collection systems at the corps level and above, it's rare to receive target information at the division level from those sources that's less that two hours old.

The key to taking advantage of these other intelligence collection systems is to ensure they have a copy of the AGM and (or) position one of your own targeting personnel with them to help screen the flood of information to find the HPTs and then immediately notify the shooters to attack.

Deliver

The deliver function, as described in *FM 6-20-10*, consists of tactical decisions (e.g., time of attack, desired effects and the attack system to be used) and technical decisions (e.g., precise delivery means, number and type of munitions, unit to conduct the attack and the response time of the attacking unit). Ideally, we want to detect the enemy at great distances, giving us the time to synchronize our attack assets (cannons, rockets, CAS and attack helicopters) to engage the enemy at a time and place of our choosing and under conditions we set. Unfortunately, at the division level, this is easier said than done.

The lack of an inherent ability to see deep at the division level causes us to depend on acquisition assets at the corps level and higher. As was mentioned, it's rare to get intelligence on a moving enemy that's less than two hours old. The enemy can travel quite a distance in two hours, and unless organic assets spot him, we can be in for a big surprise. As one Desert Storm veteran mentioned at the recent Fire Support Conference at Fort Sill, Oklahoma, "Deep targets become close targets real fast!"

We've found it necessary to depend heavily on the quality of the G2's IPB and time line in dealing with the enemy during the battle command training program (BCTP). We've also discovered the division close fight ranges from the line of departure or line of contact (LD/LC) to the coordinated fire line (CFL), and the deep fight ranges from the CFL to the fire support coordination line (FSCL). While every fight is a function of mission, enemy, terrain, troops and time available (METT-T), we've developed an approach to defeat the opposing force (OPFOR) in BCTP that we believe would be just as valid on the battlefield.

In a movement-to-contact, for example, our maneuver units will get their scouts out to find the enemy, fix his location and develop the situation. In an effort to strip away our reconnaissance elements, enemy artillery will engage, thereby giving our Firefinders a "fix" on their location.

By combining known enemy artillery locations with doctrinal templates, the G2 can give us a "good enough" location for division artillery groups (DAGs) and army artillery groups (AAGs) so we can launch CAS and attack helicopters with multiple launch rocket systems (MLRS), allowing us to "shoot and scoot." At this point, our main body will still be moving and not yet in contact with the enemy.

The success of our air attacks enables us to focus our Field Artillery assets and attack

helicopters on the enemy's main body dispositions our scouts found earlier. We can mass all available fires at the point of attack, reducing enemy maneuver forces to less than 30 percent strength. Then our main body can "blow through" them, and we can repeat the process with the next echelon.

Our attack guidance matrix is the tool that allows us to orchestrate these engagements. It tells us specifically who we're looking for; the G2 tells us where and when to expect them; the attackers know who will engage which targets (in priority); and when the targets are spotted, we can launch the attack before the enemy can react.

We want to emphasize that the information in *FM 6-20-10* is sound, and everyone involved in targeting should understand it. However, we're convinced that trained targeting personnel can function more effectively using simplified products similar to the ones we're recommending.

Regardless of format, the objectives of any improved targeting products should be simplicity of design, ease of understanding, speed of dissemination and an exclusive focus on high-payoff targets.

Colonel John A. Gloriod took command of the 4th Infantry Division (Mechanized) Artillery, Fort Carson, Colorado, in June 1991. He came from Fort Sill, Oklahoma, where he was the Deputy Commander of the Field Artillery Training Center and, subsequently, the Chief of Systems Integration in the Directorate of Combat Developments at the Field Artillery School. He's a graduate of the Army War College, Carlisle Barracks, Pennsylvania, and commanded 2d Battalion, 3d Field Artillery, which was the direct support battalion to the 1st Brigade, 3d Armored Division, Germany.

Lieutenant Colonel Scott E. Nahrwold currently serves as the Assistant Fire Support Coordinator for the 4th Infantry Division Artillery. He commanded C Battery, 2d Battalion, 83d Field Artillery, part of the 41st Field Artillery Brigade, Germany. He was Aide-de-Camp to the Commanding General of the Training and Doctrine Command, Fort Monroe, Virginia, and to the Commander-in-Chief of Forces Command, Fort MePherson, Georgia, before being assigned as Executive Officer, 4th Infantry Division Artillery. Lieutenant Colonel Nahrwold will assume command of 1st Battalion, 15th Field Artillery, the direct support battalion to the 1st Brigade, 2d Infantry Division, Korea, in May.

False Targets:
Mirages in the Desert

By Captain Michael D. Farris and
First Lieutenant Peter A. Catanese

This article presents a phenomenon encountered by our target acquisition (TA) battery immediately following Operation Desert Storm—the acquisition of false targets by Firefinder radars. I hope this article spurs discussions about and solutions for the problem and benefits other Redlegs working in the challenging field of TA.
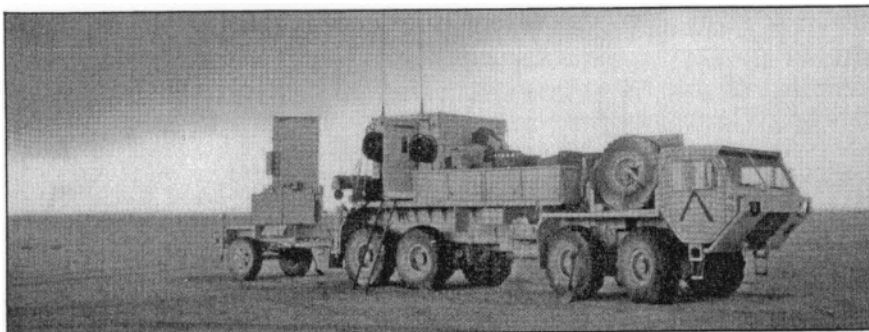
F/333's Firefinder Radar Section #3 monitors the cease-fire during Operation Desert Storm.

On 8 March, eight days after the unofficial Desert Storm ceasefire, the 3d Armored Division received the mission to conduct a relief in sector of the 1st Cavalry Division. Battery F, 333d Field Artillery (F/333 FA), as part of the 3d Armored Division Artillery (Div Arty), assumed responsibility for TA radar coverage of the new area of operations. The division's sector stretched some 100 kilometers northeast to southwest along the border between Iraq and the newly liberated Kuwait.

The battery's three AN/TPQ-36 and two AN/TPQ-37 Firefinder radars, located with the Div Arty's direct support (DS) battalions, were given positions, search azimuths and instructions to radiate 24 hours a day until the official cease-fire was signed on 12 April 1991. The mission was to end when United Nations Peacekeeping forces were in place.

False Targets

The lessons learned in Southwest Asia were many, but none more important than those resulting from our experiences with false targets. Until we had false targets, we had limited knowledge of them and their negative effect on our TA mission. As one consequence, those who depend on the radar for accurate and reliable target information lost confidence in its abilities.

This subject is one of the least talked about in TA, although an excellent memorandum exists that discusses it thoroughly. The memorandum, dated 18 September 1990, is titled "Firefinder Radar False Targets" and was written by Jerry D. Shelly, former Chief of the Development Coordinating Center in the Target Acquistion Department, Field Artillery School, Fort Sill, Oklahoma. It was his intent to point out a number of problems that negatively impact on the Firefinder's credibility. He uses the experiences of Redlegs who deployed to Panama for Operation Just Cause and the exercise that took place in Lebanon to illustrate his points.

The most pertinent and overriding point made in Shelly's memo is "...there is no formalized method to identify and eliminate false targets." This deficiency in our doctrine became readily apparent as we tried to differentiate between real and false targets acquired in the desert.

Between 8 March and 12 April, the battery's Firefinders detected more than 60 targets. This doesn't seem like an excessive

number until you relate it to our mission and the consequences of reporting these acquisitions to higher headquarters. Each acquisition required painstaking scrutiny as each meant a potential violation of the US-imposed cease-fire and had to be reported through channels to the US State Department.

The method we used to confirm the authenticity of each target was to compare the point of impact of an enemy round fired with the weapons location grid and, if possible, task a ground unit in the vicinity of the impact point to search the area for craters. In every incident, no evidence was found to validate the existence of real enemy incoming artillery or mortar rounds.

The closest thing to an impact indicator was the mark made by illumination flares fired on the other side of the Demarcation Line that had drifted to our side. These accounted for approximately one-third of our target acquisitions. Since there was no visual or audio verification of an actual impact for the other targets, we attributed the acquisitions to ricocheting small-arms fire exchanged between the Republican Guards units and the rebels fighting on the Iraqi side of the Demarcation Line. Consequently, none of the acquisitions were forwarded through channels; instead, they became another entry in the "false target log."

We were greatly dissatisfied with this method of target validation. The importance of our mission demanded a far more stringent validation process with a greater degree of certainty. It was very frustrating to be unable to identify the reasons for the false target acquisitions and the steps needed to prevent them in the future. We used all the means at our disposal to accomplish the mission, which validates the real root of the problem—an argument Shelly made.

Throughout Shelly's memorandum, he promotes the idea that we need more emphasis on educating Reglegs on the effects of radar false targeting. He uses the experiences of Reglegs in Panama's Just Cause and those TA actions in Lebanon to support his argument. In both these operations, Firefinder (Q-36) radars acquired many false targets. Shelly states that two types of false radar targets exist. One type "...is from electronic returns from objects that appear to be projectiles but are not." The other type, Shelly says, are those generated by the radar itself and
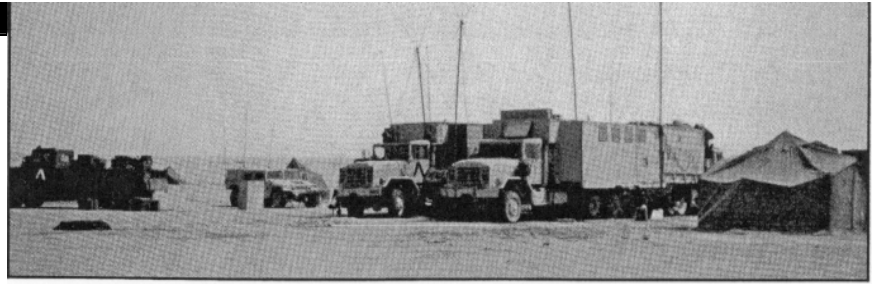
The F/333 Counterfire/Target Production Section operates from the 3d Armored Division Tactical Operations Center (TOC) during Desert Storm.

may be attributed to faults in the software design.

In our experiences in Southwest Asia, the second type of false target acquisition happened only a few times, but on at least one occasion, it caused a great deal of confusion. The false acquisition happened in the initial stages of the division's relief-in-sector mission of the 1st Cavalry Division (1st Cav). At that time, operational control of the radars was with the DS battalions. The Q-36 positioned with one of those battalions acquired a target and forwarded it through the tactical fire direction system (TACFIRE) to the battalion intelligence section (S2) for processing. The S2, acting as the target processing agency, forwarded the acquisition to the corps fire support element (FSE), as instructed. Fortunately, the variable format message entry device (VFMED) operator at the Div Arty counterfire cell caught the discrepancy and, after some embarrassment, voided the TA before it developed into a violation of the cease-fire. Shortly thereafter, it was decided that all TAs would be reported to the counterfire cell first, plotted on the target production overlay and, if appropriate, forwarded to higher headquarters.

After this incident, we had many discussions about false targets with the radar technicians and section members. We could arrive at no clear consensus as to what might cause the Q-36 to generate this type of false target. Our best guess was that there's a software glitch that, up until this time, hadn't been detected and, therefore, had gone uncorrected. The disturbing aspect of this problem is that no one in the battery is qualified to say for certain.

Conclusion

Our experiences in Southwest Asia and those of fellow Redlegs that Shelly wrote about in his memorandum indicate that the Field Artillery community sorely

needs to revise doctrine and increase emphasis on education to optimize the effectiveness of Firefinders. Immediate action is needed to expose more Reglegs to—not only the capabilities of Firefinder—but also its limitations.

Shelly's recommendation that training on discriminating between false and real targets become a part of courses for military occupational specialties (MOSs) 13R Field Artillery Firefinder Radar Specialist, 13F Fire Support Specialist and the warrant officers' 131A TA Radar Technician and officer specialty 13D Field Artillery TA is well-founded. The sooner we get started, the quicker we'll realize the full potential of this great combat multiplier.

Captain Michael D. Farris, who recently branch transferred to Quartermaster, was the Counterfire Officer of F Battery, 333d Field Artillery (Target Acquisition), 3d Armored Division in Operations Desert Shield and Storm. Before deploying to Saudi Arabia, he was the troop Fire Support Team Chief and the squadron Fire Support Officer for the 4th Squadron, 7th Cavalry, also part of the 3d Armored Division, Germany. Captain Farris is currently a student at the Quartermaster Officer Advanced Course, Fort Lee, Virginia.

First Lieutenant Peter A. Catanese, who recently branch transferred to Quartermaster, was a Radar Platoon Leader and Counterfire Officer for F Battery, 333d Field Artillery (Target Acquisition) in Operations Desert Shield and Storm. Before Desert Shield, he was a Survey Platoon Leader in the same battery in Germany. Currently, First Lieutenant Catanase is a student at the Quartermaster Officer Advanced Course. He's a graduate of the Field Artillery Target Acquisition Staff Officers Course, Fort Sill, Oklahoma.
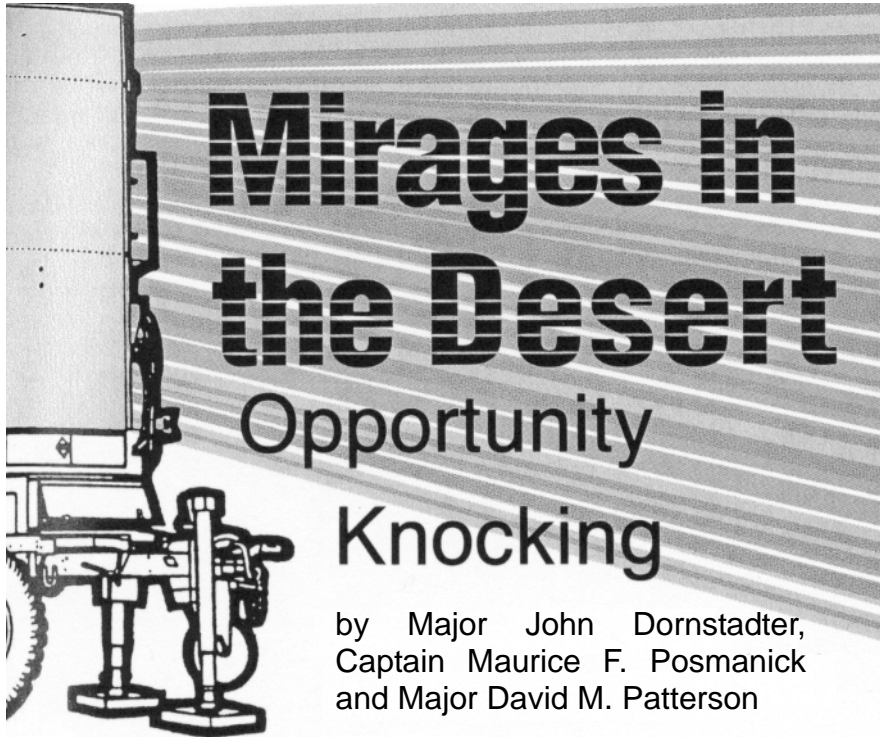
Mirages in the Desert
Opportunity Knocking

by Major John Dornstadter,
Captain Maurice F. Posmanick
and Major David M. Patterson

Editor's Note: This article responds to "False Targets: Mirages in the Desert" by Captain Michael D. Farris and First Lieutenant Peter A. Catanese, also in this edition. Captain Farris and Lieutenant Catanese identify targeting problems with the Q-36 Firefinder radar during Operation Desert Storm. This article explains the problems and outlines solutions to it.

Captain Michael Farris and Lieutenant Peter Catanese's article about Q-36 Firefinder false targets captures some of the perceptions that exist about our highly sophisticated, highly technical firefinder radars. What they saw and reported highlights a number of problems we need to correct.

This article reviews Captain Farris and Lieutenant Catanese's observations in the context of other such observations, explains why and how the problems exist and suggests solutions to the problems. The fire support community has a professional mandate to examine these observations and to improve our part on the combined arms team as we embark into the era of joint AirLand Operations.

Mirage Analysis

"False targets" exist, have existed since the first radar was fielded and probably will continue to exist well into the

future. "Mirages in the Desert" correctly states false targets were reported in Panama on Operation Just Cause and in Lebanon. Additionally, they've shown up in exercises where radars were observing live fire or where aircraft were operating in a close support role. Sometimes they occur for no apparent reason.

While this phenomena has been the subject of substantial debate in the radar and target acquisition community, it has rarely gained attention outside that community. The current controversy is similar to those that emerged after Lebanon and Just Cause that slipped to the side as more pressing "peacetime" priorities drew attention away from this serious situation.

To discuss false targets, we must first accurately define the problem. Part of the problem is the targets aren't technically false. Such terminology suggests an attitude about the phenomena and the radars that isn't altogether correct.

Essentially, the problem exists when you accept the radar reports as 100 percent perfect. Few things, if any, are accepted 100 percent of the time as perfect. Firefinder reports should be no different. Firefinder is a radar emitter and collector mated to a computer. It produces errors in precision, accuracy and reliability (three entirely different measures) to a degree as do all machines. It's a tool.

Firefinder as a Tool

A review of how Firefinder works underscores the terminology problem inherent in false targets. Firefinder doesn't report targets to the operator or to the tactical fire direction system (TACFIRE). It reports the extrapolated location of an object's origin and impact. In the hostile fire (vice friendly fire) mode, Firefinder lays a blanket of thin radar beams on the topography of what it sees as the horizon; these are the "fence beams." When an object penetrates this fence (more aptly blanket), Firefinder tags it with several verification beams to see if it's behaving as Firefinder's computer algorithms describe a ballistic projectile would behave.

This is an important point in the discussion of false targets. The radar "sees" anything that penetrates its fence (birds, insect swarms, rifle bullets, artillery rounds, airplanes, etc.) if the object has enough surface area, given the acquisition distance, to reflect radar energy back to the radar.

When the computer has enough "tags" to meet its test that the object is traveling on a ballistic trajectory within certain velocity parameters, it then causes the radar to send a series of tracking beams at the object. The results of this tracking give the computer enough information about the segment of the projectile's ballistic arc that the computer can mathematically extrapolate or project from that segment where the arc began and where it will end. The radar basically "number crunches" a prediction, not an absolute. And this prediction is of launch and impact points. We get into trouble when we refer to the prediction as a target. It's a "predicted" target indicator or suspect target.

Analysis of this report with other reports (by the radar or other sources) allows us to describe the location as a confirmed target. If what the radar saw and tracked behaved ballistically over the

entire arc of the trajectory, we have an accurate predicted origin and impact point. If the object was an artillery round (without rocket-assisted projectile or other ballistically modifying capability), we have a relatively good, precise and accurate target location to engage.

But if the object behaved non-ballistically later or earlier in its trajectory than the observed segment of the arc, we still get a precise predicted grid of origin and impact. But, at best, it's inaccurate and generally worthless for counterfire purposes (maybe not for intelligence).

The radar has behaved exactly the same in each instance, but we have to understand and properly use the information it gives us. In the second instance, there was no "false" target. That report indicated a target may exist, unconfirmed by other information. And as is usually the case, we blindly accept it as a target. ("Blindly," I say, because that's what we've been taught.)

In addition, about eight times in a 24-hour period, the radar (whether radiating or not) will generate a diagnostic target internally. This is eventually reported to the operator just as an external acquisition would be. The target indicator isn't based on any external action, yet the operator can't distinguish it from an externally generated target. If accepted without confirmation, we've erred.

So we have three classes of observations reported to the operator. First, there is an externally observed object that behaves ballistically from origin to impact. Firefinder accurately and precisely reports its predicted origin and impact point. Only with confirmation (volley fire, a second adjusting round from the same location, a decision that this is a tactically sound location for an indirect fire system, etc.) can we call the report a target and properly engage it.

Second, there is the externally observed object that behaved ballistically while the radar was tracking it. But before or after the radar tracked it (under the fence), it behaved nonballistically. The radar report gives us a precise but inaccurate origin and (or) point of impact. If we don't confirm it as a target, we've erred.

Third, some targets generated are part of the radar's diagnostic test. Again, we must confirm it as a target.

Mirage Control

There's nothing we can do to alter the physics and mechanics of Doppler radar beams or how and when they reflect. But we can do some things to keep from falling into the false target trap. Here are nine solutions.

(1) We can seek a software solution to the diagnostically generated targets. If the test needs to be reported to the operator at all, he should see it with some sort of software "flag" so he knows it isn't a valid acquisition.

(2) We shouldn't become complacent and treat this good machine and its outputs as anything other than a machine. Its reports aren't perfect.

(3) We should recognize Firefinder target reports are really target indicators or suspect targets so we must confirm them. We must never take the man "out of the loop"—always have a fire supporter clearing fires. It could be tragic to link a Firefinder (or any other sensor) directly to a shooter without analysis and clearing fires.

(4) We need to "get the word out." We shouldn't oversell this wonderful machine as perfect. We should describe its operation, capabilities and limitations accurately to those who rely on its reports. But first, we, as artillerymen, must fully understand this tool of our trade.

(5) In the schoolhouse, we need to emphasize the pros and cons of Firefinder and improve student understanding of the target processing chains.

(6) The leadership in the field must demand that those who serve in target processing or counterfire positions be properly trained. For many that means TACFIRE courses and the 13D: Field Artillery Target Acquistion Staff Officer's Course (FATASOC). This hasn't been a priority in the past, and the misperception of false targets as radar faults vice a characteristic of the machine points to a lack of education in those positions.

(7) The schoolhouse must demand that this issue be resolved.

(8) We must have quantifiable measures of success for our radar and counterfire teams. We must have clearly delineated standards in our doctrinal publications and our Army training and evaluation programs (ARTEPs) to guide us and to measure the knowledge and execution capabilities of our teams. We don't have them now.

(9) We must train as we'll fight. Had our Firefinder radars been exercised in the hostile fire mode with the frequency that our gun crews exercise in the hostile fire mode, the central observations of "Mirages in the Desert" would have been common knowlege to all well before Desert Storm.

Conclusion

We have a lot of work to do to make the most of our Firefinders. Our radars perform today as they have for years. We are more aware of the radar's operational characteristics today, including what more we must learn. That presents us opportunities—not obstacles.

Our hope is our senior leadership won't repeat the post-Lebanon and post-Panama experiences of letting other peacetime priorities again push this issue into the shadows.

Well done, Captain Farris and Lieutenant Catanese.

Major (P) John Dornstadter is the Deputy Director of the Target Acquistion Department, Field Artillery School, Fort Sill, Oklahoma. He previously served as an advisor to the El Salvadoran Army during the 1989 FMLN (guerrilla/terrorist group) offensive. Other assignments include 1st Brigade Fire Support Officer and Assistant Plans Officer, G3, both in the 5th Infantry Division (Mechanized), Fort Polk, Louisiana, and S3 of 2d Battalion 34th Field Artillery, 75th Field Artillery Brigade, Fort Sill.

Captain Maurice F. Posmanick is an Instructor in the Target Acquisition Department. He commanded H Battery (Target Acquisition), 25th Field Artillery, and served as a G3 Training Officer, Battalion Fire support Officer and Battalion Motor Officer, all in the 5th Infantry Division (Mechanized).

Major David W. Patterson is the Chief of the Radar Division, Target Acquisition Department. Previous assignments include Officer Advanced Course (OAC) Small Group Instructor, Field Artillery School, and Commander of Headquarters and Service Battery, 4th Battalion, 11th Field Artillery, 6th Infantry Division (Light), Fort Richardson, Alaska.
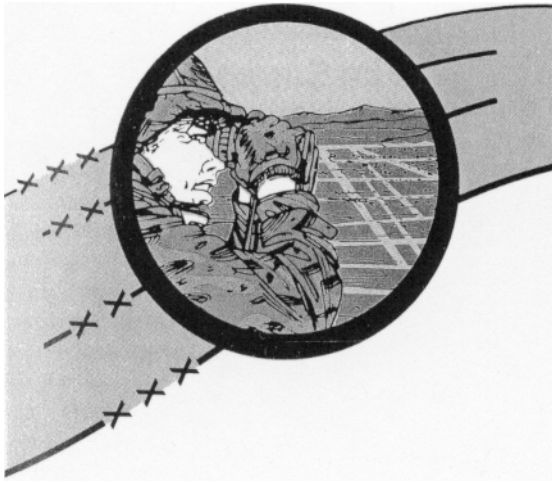
Fire Support Coordination—
It's Time for a Relook

By Major Jay F. Grandin

F ire support has changed, and we're seeing an even greater change as we move into the next century. Aircraft carry smart bombs, and attack helicopters strike deep; we're looking at Field Artillery capabilities that make those of the past pale by comparison. We also are looking at a new warfighting doctrine—AirLand Operations—a concept that capitalizes on advancements in our fire support capabilities. With all this, it's time for a "relook" of our fire support coordination doctrine—fire support coordinating measures (FSCMs), in particular.

The need for such a relook is further substantiated by our experiences in Operation Desert Storm. After-action reports indicate that the coordination of fires in the desert was anything but doctrinal, and we've heard some horror stories of it taking up to several hours just to clear a single mission.

Not too far back in history, fire support coordination was a rather simplistic task. We essentially relied on two attack systems: tactical aircraft and cannon artillery. Our ability to acquire targets was pretty much a matter of the human eyeball.

Detailed integration of the two systems was not a big deal. With its shorter ranges, cannons took on the closer targets while aircraft attacked the enemy at the deeper ranges. Duplication of attack might occur, but it was of little concern. Limited to iron bombs and high-explosive munitions, a few more rounds on the target generally just did that much more damage.

AirLand Operations

Since those days of rather simplistic fire support coordination, a great deal has happened. With AirLand Battle doctrine and its focus on a massive Soviet threat, we looked at greater refinement in the application of fires. Our objective for deeper fires shifted from merely throwing as much explosive on the enemy as possible to a more purposeful application of fires to slow the presentation rate of the enemy's second echelon.

Now we're moving into the concept of AirLand Operations, a future doctrine that calls for even more precise fires. In AirLand Operations, commanders must carefully orchestrate the precise and integrated application of all available fire support to achieve specific results on specific enemy forces.

AirLand Operations is both driving and being driven by technological advances in acquisition and attack systems. Probably the greatest impact technology is having on the requirement for fire support coordination is the Army's relatively new-found capability to strike deep with organic systems.

But our advanced capability to acquire and attack targets at depth is just one aspect of what technology has brought. We also must consider the increased lethality of our systems and munitions. In the past, lethality was achieved by massing—concentrating the fires of multiple Field Artillery cannon battalions or saturating a target with bombs. Today, we can achieve this lethality with precision-guided bombs and systems such as the multiple-launch rocket system (MLRS) that deliver massive volumes of lethal bomblets. These advancements not only have closed the gap between Air Force and Army capabilities, but also have dramatically increased the requirement for the detailed application of individual fires.

Future advancements in Field Artillery systems will bring an even greater need for detailed fire support coordination. In the past, there wasn't much question about how to destroy an enemy tank battalion at depth—you used tactical aircraft. Advancements in the attack helicopter and its munitions have provided the commander a second option for attacking the tank battalion. In the very near future, the list of options will become even longer with the introduction of the Block II Army tactical missile system (Army TACMS), a munition with multiple, terminally guided warheads.

The Boundary is Key

Paramount to the efficient and effective use of fire support is our establishing single managers for the application of fires in specific areas. Just as there must be a single commander for a unit, there also must be a single commander to manage the application of fires. The responsibility for managing fire support is specified in terms of areas—areas delineated by boundaries. The boundary is key to fire support coordination. It defines the area in which a commander is responsible for all combat operations and, consequently, for integrating and coordinating fires.

Even though the boundary is key to fire support coordination, there seems to be a tendency in AirLand Operations to deemphasize it. The fear seems to be that using a boundary implies linearity of the battlefield, and AirLand Operations is based on nonlinearity—focusing on the

enemy instead of the terrain. But boundaries don't necessarily imply linearity—they merely provide a means of defining which commander is responsible for what area.

Redefining the Boundary

The way we currently apply boundaries is not without fault. The first problem is the boundaries aren't continuous—don't connect. The purpose of the boundary is to define an area, and two lines running along the flanks of a unit—say, a division—don't define the division's area. To complete the definition of his area, the division commander only gets a rear boundary and either a front extension of his lateral boundaries or forward line of own troops (FLOT) as "guidance." Our automated systems get around this by connecting the ends of the lines at the FLOT with a straight line (see Figure 1).
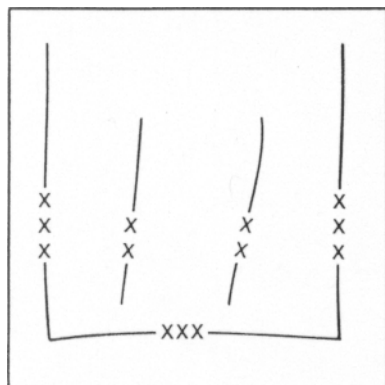

Figure 1: Current Boundary. As now defined, the boundary isn't continuous and is vague as to the forward area a commander is responsible for. Note the boundaries that are lateral only for the two divisions in a corps area.

However, as we look more and more to fighting fires at depth, the delineation of the forward extent of commander's area becomes more critical. There may be some instances when a straight line connecting the forward extents of the lateral boundaries is appropriate. But more than likely, there will be one or more factors that dictate other than a straight line.

A side benefit of specifically establishing the forward boundary is that it forces commanders and operations officers to focus on fighting with fires. How many times have you watched a G3 draw boundaries with the utmost of care

until he extended the area beyond the anticipated close battle, then give little or no thought to his extending it into the area where the commander will fight using fires?

Given that we need to make boundaries continuous, specifically defining an area, we should consider other factors when establishing them. Boundaries are excellent tools for controlling the battle, but we don't need to be too rigid when we apply them.

Some years ago, as Commanding General of the Training and Doctrine Command, General Donn Starry recognized what the boundary should be and how it defined our warfighting philosophy. The boundaries used by General Starry were continuous, specifically defining areas of responsibility. But he went even further in his innovative application of boundaries. He depicted a battlefield where there could be, and likely were, gaps between battle areas. His battle areas were far from linear, depicting dispersed forces and a nonlinearity that's the basis of today's AirLand Operations (see Figure 2).

Figure 2: Boundaries for AirLand Operations. These boundaries depict divisions operating dispersed in a corps area, a nonlinearity that's the basis of AirLand Operations.

Aside from maneuver control considerations, any commander who's going to use fire support in a specific area should have that area defined by boundaries.

A single manager for fires combined with continuous, nonlinear boundaries form the basis for solid fire support coordination. Boundaries should be the norm for echelons above corp through battalions, and we shouldn't hesitate to use them for cavalry and attack helicopter units.

Fire Support Coordinating Measures

FM 6-20-30 Fire Support for Corps and Division Operations, cites the boundary as a FSCM. In addition to the boundary, doctrine provides seven other graphical measures intended to facilitate employing fire support. With the exception of the airspace coordination area (ACA) that impacts on airspace, each of these measures amplifies the basic intent of the boundary.

Restrictive FSCM

Of the seven FSCM, four are restrictive. That is, they limit what otherwise would be freedom to employ fires. The intent of these measures remains valid as we look to the future, but they do need some work.

No Fire Area (NFA) and Restrictive Fire Area (RFA). When a commander establishes a restrictive measure, he's really restricting the degree of authority granted his subordinates. For example, when a division commander establishes areas of responsibility for his brigades, he has delegated control of fires in those areas to the brigade commanders. However, he also can establish restrictive measures in those areas, limiting his brigade commanders' authority to deliver fires. In addition to governing the level of control a subordinate commander has over fires, restrictive measures disseminate a commander's desires regarding restrictions within his own area of operations.

While the intended purpose of the NFA is valid, this measure really isn't needed. The RFA can serve the same purpose. Eliminating the NFA would be one step toward simplifying doctrine—something we must do as we look to joint and combined operations as the norm.

The Restrictive Fire Line (RFL). The third restrictive FSCM—the RFL—also should be eliminated. Designed as a dividing line between two converging forces, it serves as a boundary, one that applies only to fires. A continuous boundary that defines who's responsible for the application of fires in what area would be more appropriate.

For example, if we have two converging forces in a corps area with only a RFL and no boundaries, it isn't clear where the converging units' responsibilities for fire support ends and the

corps' begins (see Figures 3 and 4). The bottom line: we don't need the RFL—the continuous boundary does a better job of defining fire support responsibilities.
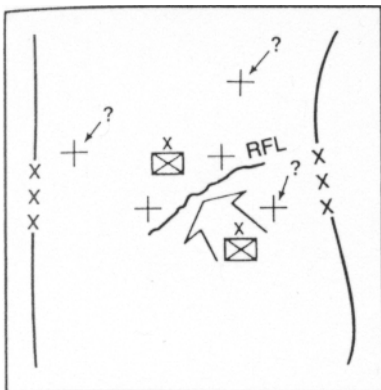

Figure 3: Current Restrictive Fire Line. If two converging friendly forces in a corps area have only an RFL and no boundaries, it isn't clear where the different forces' responsibility for fire support ends and the corps' begins.
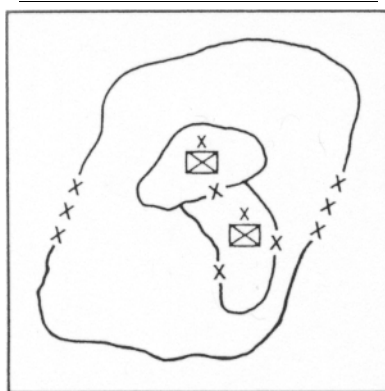

Figure 4: Continuous Boundary. The bottom line: we don't need the ambiguous restrictive fire line; the continuous boundary does a better job of defining fire support responsibilities.

Permissive Measures—The Real Problem

The real problem with our current FSCMs lies with the so-called permissive measures: the free fire area (FFA), the coordinated fire line (CFL) and, worst of all, the fire support coordination line (FSCL). With their current definitions and intents, they have no place on the battlefield of today—let alone the battlefield of tomorrow.

Each of the permissive FSCMs has one thing in common: they permit the uncoordinated, unsynchronized use of fire support. We're in an era of high-cost, high-lethality weapons, an era where we look to the precise application of fires to achieve very specific objectives. Our fire support resources are becoming precious from the standpoint of limited attack platforms and high-dollar munitions and our ability to deploy those systems and munitions to meet contingencies.

The Free Fire Area. The FFA had its place when our philosophy was to dump as much high explosive on the enemy as possible. Given large numbers of attack systems and munitions, it was very appropriate to open up known enemy areas to uncoordinated fires. As a general rule, our ability to deliver fires far outstripped our ability to acquire targets, so commanders couldn't go wrong by identifying areas where it was safe to fire and turning anyone who could attack targets loose.

In today's world, the commander who establishes an FFA is saying he doesn't want to control fires in that portion of his area of responsibility. He's saying that fires applied in his FFA couldn't have a bigger "payoff" if they were employed against other targets in his area. He's also saying that unsynchronized combat power in his area of responsibility is acceptable. The bottom line: eliminate the FFA.

The Coordinated Fire Line. Whenever a commander establishes a CFL, he has just established what amounts to an FFA, albeit one that applies only to artillery, mortars and naval gunfire. Even the definition of the CFL is antiquated. The reason a CFL doesn't apply to air firepower is that back in the days when it was conceived, aircraft navigation wasn't what it is today. Aircraft needed readily identifiable terrain features to determine their locations. Just as the FFA makes a statement that the commander doesn't want to control all the fires in his area, so does the CFL.

For his own fires, the CFL means nothing to the commander. He can fire into his own area whether the line exists or not. What the CFL does do is open up a commander's area for uncoordinated fires delivered by outside agencies. This should be an unacceptable situation for the commander. If someone wants to deliver fires into an area for which he's responsible for combat operations, then he should have some say as to how to best use those fires to meet his objectives.

Of particular concern to the commander are munitions whose effects can linger. Those are the bomblet-type munitions and the duds they produce. No commander should want an outside agency delivering improved conventional munitions into his area without specific approval.

Interestingly, the origin of the CFL more or less exemplifies our past thinking on employing fires. Originally we called it the "no fire line," a line short of which you couldn't fire without coordinating. Its purpose essentially was to ensure the safety of friendly troops. Its use exemplified the philosophy of those past times—a philosphy that basically said that anytime you could fire at something, that was good. Those times are gone, and the CFL should be too.

The Bomb Line. Back in history, we came up with something called the "bomb line." This goes back to the days of iron bombs, short-range artillery, high-explosive munitions and a limited capability to acquire the enemy. In those days, the bomb line was drawn to let aircraft acquire and attack targets, knowing they wouldn't endanger friendly forces. Those days are gone, and so also should be the "bomb line"—or, as we now call it, the FSCL.

What started out to be a control measure with utility, has grown into a monster. What if you were told that without a FSCL, the corps commander couldn't expeditiously attack targets of opportunity in his area of operations? Ridiculous as that may sound, it's an accurate interpretation of what doctrine says about the FSCL. This same doctrine says that without an FSCL, the corps commander can attack any target in his area without coordinating with any outside agencies, but that with the FSCL, he should coordinate with the Air Force.

Not too many years ago, one could have drawn a line and said that short of the line, it was the Army's battle and that beyond the line, it was the Air Force's battle (see Figure 5). This didn't mean the Air Force wasn't going to support the Army's fight. But the big difference in capabilities between Army and Air Force systems and the relatively limited lethality of the individual munitions allowed the Army commander to just turn his Air Force support loose.

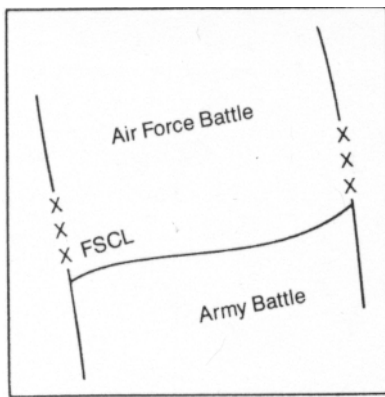With the attack helicopter and the long-range Army TACMS, the Army

Figure 5: Fire Support Coordination Line. Not too many years ago, the difference in Air Force and Army system capabilities allowed the commander to draw a FSCL, basically separating the two services' battles. But with the advent of Joint STARS and the advancements of the Field Artillery missile system, the Army's capabilities parallel the Air Force's, making the FSCL obsolete.

commander now has the capability to project significant combat power to extended depths. With its ability to acquire and attack at depth, the attack helicopter gives the Army commander a system whose capabilities significantly overlap those of the Air Force's. As for the long-range Field Artillery missiles, the secret lies in our enhanced ability to acquire the enemy at depth. Linking acquisition systems like the joint surveillance and target attack radar system (Joint STARS) with the Field Artillery missile system gives us a combination that parallels the Air Force's abilities to fly out, find and attack the target.

The FSCL has turned into what amounts to a boundary that divides the Army and the Air Force battles. However, by the FSCL's definition, the Army still can throw combat power out into the area where the Air Force controls fires. And while the Army should coordinate first with the Air Force, there's no stringent requirement to do so. Such thoughts get rather ridiculous when one considers the type of combat power corps commander would use beyond the FSCL—attack helicopters and Army TACMS missiles.

When the corps commander establishes an FSCL, he's essentially saying he relinquishes control of the application of combat power in a portion of the area in which he's charged to conduct combat operations. Interestingly, when it comes to employing air power, he relinquishes control back to a higher echelon. If that's what the corps commander wants, then he doesn't need responsibility for the area in the first place.

It all goes back to the valid warfighting philosophy that calls for precise, synchronized fire support to achieve specific operational and tactical objectives. When it comes to employing a combination of sophisticated aircraft, attack helicopter units and the high-lethality Army TACMS missiles, there must be a single manager. This manager must synchronize these valuable assets to achieve the specified objectives. If a joint task force commander wants his air component commander to control some combat power in his area, then the air component commander should orchestrate *all* combat assets in that area.

That the FSCL tends to negate the synchronized application of fires is brought out in FM 6-20-30. It states that conditions for using the FSCL include the commander's willingness to accept possible duplication of effort. Another condition cited is that when the corps commander establishes an FSCL, he acknowledges that that portion of his area beyond the FSCL doesn't require selective targeting to shape the deep battle. In this day of high-lethality attack systems and a doctrine that emphasizes the careful orchestration of operational fires, such a situation should never be the case.

The proper control measure to articulate who the single manager of combat power is within a specified area is the boundary—not the FSCL. In fact, reports coming out of Desert Storm indicate that the FSCL essentially was used as a boundary. If the FSCL were used as a boundary, then there wouldn't be a problem. However, we also must specify which commander is responsible for managing combat power in the area beyond the FSCL. The bottom line: the boundary is much clearer.

Fixing the FSCL

Proposing elimination of the FSCL from doctrine probably would cause an uproar something akin to the eruption of Mount Saint Helen's. So let's consider how we might fix the FSCL to make it more valid. The implication in the definition of the FSCL is that it expedites the Air Force's attack of targets of opportunity. This intent is valid, if we put some parameters on it. First, the FSCL must be strictly for targets of opportunity acquired by the Air Force. Such targets should be rare exceptions. With enhanced acquisition, highly specialized munitions and the extensive coordination required to execute air strikes, there should be virtually no instance where air assets aren't targeted against specific targets or target areas. However, the possibility does exist that an aircraft returning from a planned mission could encounter a target of opportunity. If such a target were beyond the FSCL, the Air Force could attack it without coordinating with the corps, assuming there would be enough time to coordinate with the corps. Just as targets of opportunity should be rare, the instances when the Air Force can't coordinate with corps before attacking the target should be even more rare. The corps air support operations center (ASOC) should be able to quickly affect the necessary coordination.

Stipulating that the FSCL applies strictly to targets of opportunity and only when coordination isn't possible is the first step in fixing the FSCL doctrine. The second is to specify a single manager of the area. The corps commander still must be the single manager of fires in the area beyond the FSCL. All fires delivered into this area should be oriented on achieving the operational goals of the corps commander or on contributing to the operational goals specified by the echelon-above-corps commander.

Any attacks of targets of opportunity beyond the FSCL should be in accordance with the guidance and directives of the corps. They might include types of targets that are high-priority and those not to be attacked. The corps commander also might specify broad restrictions. For example, he could specify that no attacks are to be conducted with cluster bomb-type munitions. Another example: he might specify that the only uncoordinated attacks beyond the FSCL will be against a specific type of target (say, missile launchers).

With these caveats, the FSCL is still valid as we look to future battlefields. The key is it isn't established in all

situations—it may be rarely established. Likewise, when it is established, using the FSCL provisions should be rare.

Airspace Coordination Area

The ACA is unique among FSCMs. Whereas the other measures deal with the effects on the ground, the ACA ensures safety for friendly aircraft. It's a valid measure, one we'll find even more useful with our future command, control and communications systems. Current doctrine calls for limited use of the formal ACA because of the time required to establish and disseminate them. But as we look to the new automated systems, complex ACAs could be quickly established and disseminated and, through enhanced communications links, could be quickly placed into and out of effect.

Summary

As we look to enhanced capabilities and a doctrine that calls for the precise synchronization of fires, each attack should be thoroughly coordinated. We must maximize the efficiency and effectiveness of our high-payoff systems to best contribute to specific operational and tactical objectives. Using the boundary is step one, but we must refine the way we use it and expand its use to maximize its benefit.

Of the restrictive measures, only one is needed: the restrictive fire area. The intent of the no fire area can be easily incorporated into this measure, simplifying doctrine and automation software. The restrictive fire line falls short of meeting its intended objective—the boundary does a better job.

On the permissive side of the house, the free fire area and the coordinated fire line are due for the "trash can." We need to keep, but add caveats to, the FSCL and recognize it for what it is—a measure that's used as the exception, not the norm.

This article has focused on our fire support coordinating measures, but it isn't the measures that are at fault, it's the philosophy by which we apply fires. As we look to significant enhancements in our acquisition and attack capabilities, the detailed coordination and integration of fires becomes critical. Commanders must "think fires" in specifics, not generalities. Assets must be applied to achieve maximum efficiency and effectiveness, and each attack must be focused on attaining our operational and tactical goals.

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REDLEG REVIEWS   BOOK REVIEWS

A Time to Leave the Ploughshares: A Gunner Remembers, 1917-1918

William Carr. London, England: Robert Hale, 1985. 175 pages.

With the German Guns: Four Years on the Western Front, 1914-1918

Herbert Sulzbach. Hamden, Connecticut: Archon Books, 1981. 250 pages.

In the early morning hours of 21 March 1918, the world awoke to a massive eruption centered around the French town of St. Quentin near the Belgian border. With a crash that could be heard as far away as London, 6,600 German guns and 3,500 trench mortars opened up against some 2,700 guns of the Royal Artillery.

The German side alone fired more than 3.2 million rounds that day, one-third of which was gas. That amounted to an average of 2,500 rounds per minute all day long on Allied positions. Even the Iraqi troops shelled during Operation Desert Storm didn't experience firepower like that.

St. Quentin was history's greatest artillery fight to that time. Guns were massed on such a huge scale only twice more during World War I (at Chemin des Dames and Champagne-Marne) and only a handful of times on the Eastern Front in World War II (but without the use of gas). It's unlikely (and just as well) that warfare will ever see anything like St. Quentin again.

Today's artillerymen can only imagine what it must have been like to operate under those conditions. Fortunately, there are two books that give vivid firsthand accounts on what life was like in the firing batteries on either side of the line.

William Carr, who wrote *A Time to Leave the Ploughshares: A Gunner Remembers, 1917-1918*, was a Scottish farmer who

didn't reach the Western Front until well into the war. Drafted in 1916, he was selected for officer training and received his commission in the Royal Artillery (RA) at the ripe old age of 33—considered over-the-hill for a second lieutenant, even at the height of the Great War. In June 1917, Carr joined the 377th Battery of the RA's 169th Brigade and remained with that unit throughout the war. He fought in Cambrai, St. Quentin and several other major battles of 1918.

An interesting thing about Carr's book is he started writing *A Time to Leave the Ploughshares* in 1976 after making his first visit to the old battlefields he last saw in 1918. He was 92 at the time. With an amazingly clear memory, Carr describes events, places, names and dates and faithfully recreates the day-to-day life of grinding drudgery and sheer terror in a horse-drawn firing battery.

Despite the time gap between the events and the writing, it all holds together and rings true. Carr's editor further strengthened the book by painstakingly cross-checking Carr's facts with the standard published histories and the battery and operational records in the archives of the Royal Artillery Institution.

Herbert Sulzbach, author of *With the German Guns: Four Years on the Western Front, 1914-1918*, was the young son of a prominent Frankfurt baking family and enlisted virtually on the first day of the war. Assigned to the German Army's 5th Field Artillery, he fought on the Western Front for almost 50 continuous months.

In 1916, he earned a battlefield commission and became a firing battery officer and then, later, a battalion adjutant (in the old German Army, more like our battalion S3 of today). Sulzbach's battalion fought on the bloody Somme in 1916 and at St. Quentin, Chemin des Dames and Champagne-Marne in 1918. He earned the Iron Cross Second Class and First Class in the process. Sulzbach came through the Great War without a scratch although every one of his close friends was killed. Between 21 March and 11 November 1918, his regiment suffered more than 90 percent officer casualties.

Sulzbach's *With the German Guns* (published in Germany in 1935 as *Zwei Lebende Mauern*) was based on a series of diaries he carefully kept throughout the war. The book itself is presented in diary style and gives a sharp picture of a frontline artilleryman's view of war in the trenches. It also provides interesting insight into small-unit social dynamics in the old German Army.

Along with the firsthand accounts of some of history's most important battles are descriptions of the mundane daily events in a soldier's life. Sulzbach also recounts some truly unusual personal experiences. For example, it was Herbert Sulzbach, while out on reconnaissance, who discovered the airplane wreckage that contained the body of General Luddendorf's stepson.

When it was first published, Sulzbach's book received critical acclaim in Germany; then it was banned because the author was Jewish. Stripped of his German citizenship, Sulzbach fled to England. When World War II started in 1939, the British interred him as an enemy alien. After repeated attempts, Sulzbach finally was allowed to enlist in the British Army. He was 44. By the time that war ended, Sulzbach was a captain in charge of reindoctrinating German officer prisoners of war. He was probably the only officer ever to be commissioned by both the Kaiser and the King of England.

After World War II, Sulzbach's German citizenship was restored. He retained dual British-German citizenship, started a new career in the German foreign service and spent the rest of his life promoting the cause of intra-European friendship. For that work he received many high awards from the German, British and French governments. This remarkable artilleryman died just two years ago at the age of 96.

Both books are worth reading. Although written from different sides of the line with vastly different personal backgrounds, the books are amazingly similar in tone and point of view. They both give gripping accounts of the reality of the Western Front without wallowing in obsessive emphasis on the horrors of war.

Both Carr and Sulzbach also had a good eye for the technical details of firing battery operations. World War I saw the earliest forms of most of the elements of the fire support systems of today—indirect fire, registrations, fire planning, meteorological corrections, counterbattery, etc. Both authors provide plenty of details of how these things were done at the beginning.

Although a modern artilleryman never has to operate with horses, he'll instantly identify with the authors' descriptions of the problems of night occupations, ammunition supply and feeding gun crews in the rain and snow. The average general reader might pass over most of these little details without so much as a thought. The artilleryman will feel right at home.

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3d ID (Mech), Germany

"And tell them, 'We are under intense enemy attack and would sincerely appreciate any help that you might possibly render to minimize this extremely critical situation, including . . .'"

Joint STARS Goes to War

by Colonel Martin S. Kleiner, AV

Immediately following the Iraqi invasion of Kuwait on 2 August 1990, the Army considered deploying the joint surveillance and target attack radar system (Joint STARS) to Southwest Asia. As part of the system's full-scale development program, it was scheduled to deploy to Europe for a six-week operational field demonstration (OFD) in the fall of 1990. While many of the people closely associated with the program felt Joint STARS should deploy to Saudi Arabia for its OFD, others were concerned about its immaturity and questioned its supportability. In late August, a decision

was made to continue with the European plan and evaluate the system's performance.

As a part of this OFD, Joint STARS participated in a VII Corps deep-strike exercise, which occurred during the system's third flight in theater. It involved locating three 25-vehicle convoys moving out of the Hohenfels Training Area at night and targeting them for the corps' Apache brigade.

The corps commander, (then) Lieutenant General Frederick Franks, oversaw the operation. After observing the convoys on the radar screen in the ground station module (GSM) and closely questioning

the operator, General Franks ordered the launch of the AH-64 Apache helicopters. Based upon analysis performed in the GSM, the AH-64s were directed to one of six preplanned attack areas.

The first of the convoys arrived within one minute of the predicted time of arrival. (More accurate arrival times could have been passed to the AH-64s, but due to European flying restrictions, the E8 aircraft departed its station approximately 15 minutes before the engagement. The analysis was made from "real-time" data, but the convoy's arrival time in the engagement area was extrapolated from historical data.)

Based upon this engagement and Joint STARS' continued success throughout the rest of the OFD, a briefing team was dispatched to Saudi Arabia in early December 1990. This team consisted of Army and Air Force program managers, the US Army Training and Doctrine Command (TRADOC) systems manager and the Tactical Air Command's deputy director for requirements. After a series of joint and component staff briefings, a decision briefing was presented to General Norman Schwarzkopf, Commander of Central Command, on 16 December. On 17 December, he requested the system be deployed to Saudi Arabia and directed it be operational no later than 15 January 1991.

The E8-A Joint STARS aircraft in Saudi Arabia takes off for a mission.

During the ensuing weeks, the Army formed the Joint STARS Operational Detachment (JSOD), and the Air Force formed the 4411 Joint STARS Squadron (JSS), both activating at the contractor's facility in Melbourne, Florida. During this time, flight and GSM crews were formed, training was conducted, final hardware and software changes were made to the prototype aircraft and the GSMs and employment concepts were developed. On 8 January, the first GSM and crew were deployed, followed incrementally by the other five.

On 11 January, the two E8 aircraft departed Melbourne and flew 17 hours nonstop to Riyadh Air Base in Saudi Arabia. During this flight, the airborne mission crews concluded their final 12 hours of integrated training.

Final Preparation

On 6 January, the commander of the Army's JSOD arrived in Riyadh to plan operations and coordinate Joint STARS support of the ground forces. Because there weren't enough GSMs and aircraft to provide dedicated support to the three corps equivalents—VII Corps, XVIII Airborne Corps (ABC), I Marine Expeditionary Force (I MEF)—a theater support concept was devised. This placed one GSM at each of the corps and I MEF, one at the tactical air control center (TACC) and one at Riyadh Air Base where the JSOD and the 4411 JSS established a joint operations center. The Riyadh GSM provided direct support to both the Army Central Command (ARCENT) G2 and Central Command (CENTCOM) J2.

When the sixth GSM arrived in theater, it required significant upgrading. (It had been in England participating in a cooperative research and development program.) Eventually, it was dispatched to ARCENT Forward at King Kahlid Military City.

Because the first four phases of the campaign were to consist primarily of offensive air operations (mistakenly referred to as the air campaign), it was decided that the air component would receive priority Joint STARS support during this time. This priority then would shift to the ground components during phases five and six, which constitued the major land warfare.

Joint STARS

The joint surveillance and target attack radar system (Joint STARS) is the world's most advanced tactical radar. It's designed to allow both ground and air commanders to see and, in conjunction with our most modern weapons systems, destroy the enemy before he can employ his forces.

Joint STARS is comprised of an E8 aircraft (modified Boeing 707) containing a multi-mode radar, various communication and data link systems with operations and control (O&O) consoles and an array of ground station modules (GSMs). It enables commanders to detect, locate, track and attack the enemy.

Operations. The Joint STARS concept of operations calls for it to provide dedicated support to US Army corps on an around-the-clock basis. In this role, the radar's primary mode is moving target indicator (MTI). It'll continually sweep the corps commander's area of interest and detect, locate and display moving targets from individual vehicles to brigade- or larger-sized units. The radar will revisit the area rapidly enough to cohesively track these elements and provide location accuracies sufficient for targeting for Army and Air Force weapons systems. Additionally, upon operator request, the system can shift to a synthetic aperture radar (SAR) imaging mode to provide information on fixed targets.

Distribution. The radar information is simultaneously distributed to both the O&C consoles in the rear of the aircraft and the GSMs in its area. At each of the processing locations (the aircraft has 15 work stations; each GSM has two), the operator displays radar data on a screen overlaid on map and terrain data bases. As the detected vehicles and units move about the battlefield, this information

is displayed and recorded. The operator then can use a variety of software tools and techniques to analyze the information and develop intelligence and targeting data. This information is continuously fed in near real-time to commanders, staff elements and fire control systems to support planning, decision making and execution.

Current Army concepts call for assigning 15 GSMs to a notional three-division corps. These GSMs will be allocated as follows: one per division artillery, two per division tactical operations center (DTOC), one per corps artillery, two per corps tactical operations center (CTOC) and one in each of the three Army tactical missile system (Army TACMS) battalions. Approximately 43 percent of the GSMs will be operating in the Field Artillery arena. Specially trained intelligence analysts organic to the units they support will man the GSMs.

The Army concept of operations for Joint STARS is being refined. It's likely the number of GSMs will be increased to provide them to maneuver brigades, armored cavalry regiments (ACRs) and corps aviation units.

Because each GSM will receive all the radar data produced by the E8 and will be located with its supported unit, it'll produce real-time products tailored to the needs of each commander. Eventually, the GSMs will be able to simultaneously receive and process unmanned aerial vehicle (UAV) data, creating an unprecedented view of the battlefield.

Currently, Joint STARS is still in its development phase, and only two prototype aircraft and a limited number of GSMs exist. It isn't scheduled for its initial operating capability (IOC) until 1997. But the system demonstrated such excellent capabilities during a European operational field demonstration (OFD) in the fall of 1990 that General Norman Schwarzkopf requested it be deployed to Southwest Asia in January 1991.

Coordination was conducted at each of the corps and I MEF to inform the command and staff elements of what they could expect from the system and to arrange for the integration of the GSMs. Each combat headquarters chose a slightly different approach to employing its GSM, but this didn't seem to affect Joint STARS' ability to support the unit. Its overall utility tended to be a function of the unit's mission, its area of responsibility and, naturally, the amount of coverage the unit received.

Because the Joint STARS' operational capabilities were not fully known, the initial concept for support of the air component called for it to validate the preplanned targets of attack aircraft just before their final penetration. This type of operation would use the synthetic aperture radar (SAR) imaging mode for fixed targets intensively. Its purpose was to preclude attack aircraft from attempting to engage target areas that had lost their value.

Because of the length of the preplanning and air tasking order (ATO) processes, this concept held great promise for increasing the efficiency of air attacks. However, it didn't exploit Joint STARS tremendous offensive capability against moving targets. Luckily, we rapidly evolved concepts and procedures and, by the final phases of the campaign, much more fully exploited the system. During the time of priority support for the air component, the land components also were receiving all the radar data as they were being produced and were able to exploit it for targeting and intelligence purposes.

Execution

Joint STARS performed its first mission on 14 January 1991. It began as an engineering test flight to determine what the system could produce. After establishing connectivity with the GSM at Riyadh (the other GSMs were still in transit), the system began surveillance of friendly occupied areas inside Saudi Arabia. After a short time, the product looked like what was expected, and we shifted coverage to Kuwait and Iraq. Again, a very clear picture of what the system could do began to emerge, and this flight turned into an eight-hour intelligence-gathering mission. This was to be the first of 49 consecutive, successful missions.

Because of the availability of other daylight monitoring systems, Joint STARS was to fly missions primarily at night. This was done in the belief the enemy would use the hours of darkness for the majority of his moves. During the night and early morning hours of 15 to 16 January and again on 16 to 17 January, Joint STARS went airborne and produced a variety of moving target indicator (MTI) and SAR imagery products for situation and target development. Although the offensive began during the early hours of 17 January, Joint STARS didn't play an active role in it as the targets were primarily strategic; they tended to be (semi-) fixed.

After the first night of the war, Joint STARS began validating targets in the Kuwaiti Theater of Operations (KTO) and also began developing real-time targets through a combination of MTI and SAR products. This occurred in both the E8 aircraft and those GSMs receiving data.

Initially, these real-time targets were handed off to the TACC, airborne warning and control system (AWACS), airborne battlefield command and control center (ABCCC) or, in the case of the I MEF, through its targeting channels. In several instances, these targeting efforts weren't successful because attack aircraft were unable to respond to real-time data and because Joint STARS was unable to maintain continuous surveillance of those targets. Quite often, because of the tactical situation or standing requests, Joint STARS shifted its coverage from one area of the battlefield to another. Also, because the systems are engineering prototypes, there were frequent periods of down or "reboot" time. (The airborne portion of the system always flew with a complement of civilian contractors on board, including the Phds who developed the hardware and software.)

Often Joint STARS developed a moving target, say a convoy, reported at a certain grid coordinate with a given velocity (i.e., southwest bound at 25 kilometers per hour). In some instances, the target was passed to alert aircraft, which responded within one to two hours. But because there was no procedure for the aircraft to contact Joint STARS for an update and Joint STARS might not have been covering the target recently, they flew to the original grid and found nothing. It was obvious we needed to develop more responsive procedures.

At about this time, Saddam Hussein launched his Scud campaign against Israel, and Joint STARS was sent to the west to help target fixed and mobile Scud launchers. These targets were important and could be of fleeting value (a launch could occur at any time), so strike aircraft were placed on combat air patrol

A Joint STARS ground station module (GSM) in a travel configuration.

Motorola Inc., Government and Electronics Group

(CAP) to respond immediately to Joint STARS-derived real-time targets. This methodology proved so successful it was carried over to the operational air offensive in the KTO.

One early example of the system's great capability occurred during the Battle of Kafji. When this engagement began, there was some concern that it might be an Iraqi preemptive attack aimed at drawing the allies into a premature land battle, disrupting our campaign plan. As Joint STARS provided surveillance of Kafji and the area to its north, it became clear there were no second-echelon forces en route poised to exploit any early successes. This strongly indicated the attack was limited in nature and could be dealt with without major alterations to the ongoing campaign.

Additionally, when the Iraqis tried to resupply and relieve the engaged units, this was detected early on, and an AC-130 gunship and two A-10 aircraft were employed against the target. These aircraft destroyed approximately 70 percent of the vehicles and caused the others to disperse and flee the area.

By then, the daily ATO began tasking numerous sets of strike aircraft to respond primarily to Joint STARS-derived targets; if none were available, the aircraft proceeded to preplanned targets or preassigned "kill boxes." This dictated that the Joint STARS airborne crew begin organized and consistent target genera-lion. In this generation process, the Army airborne crew members came strongly into play.

On board the aircraft was an airborne coordination element (ACE) that consisted of the mission crew commander (an Air Force colonel) and an Air Force intelligence officer. In addition, there was a radar management officer; several Air Force targeting officers, primarily with backgrounds in AWACS; and an Army element that consisted of a field-grade intelligence officer and a target development officer.

Because the Army crew members thoroughly understood the enemy order of battle and our targeting process, they provided tremendous insight to the Air Force crew members, many of whom had no experience with land warfare. Additionally, the Army members brought the ground commander's perspective to the aircraft and advised the ACE so that

targets generated were high-value for both the air and land components. (Several of the Air Force crew commanders also had extensive experience working with land forces, which proved invaluable to the system's performance.)

In one successful procedure, one of the Army field-grade officers attended the daily ARCENT G2/G3 targeting meeting. During this meeting, he absorbed the commander's intent and his priority for target attacks. Additionally, the Joint STARS Army officer received from the targeting cell a prioritized, updated list of Army targets and sorted them by geo-reference. The officer then provided the Joint STARS flight crew the list and commander's priority just before take-off. This information became the basis for much of the night's targeting.

A strong indication of the effectiveness of these procedures came from the F-15E (Strike Eagle) wing commander. He stated that when his aircraft were targeted against preassigned kill-boxes, they usually ran low on fuel before they expended all of their ordnance. Conversely, when they received real-time targets from Joint STARS, they always ran out of ordnance before they ran low on fuel.

During this same time, the Army began employing the Army tactical missile system (Army TACMS), and Joint STARS was called upon to support these engagements. Frequently, Army TACMS targets were generated by other means. But because of the time it took to analyze and develop the targets, there was concern they may have lost their value. In many instances, Joint STARS was called upon by the VII Corps deep-strike cell to validate a target just before missile launch, and when this could be effected, it proved very successful. There was at least one instance of an Army TACMS being launched against a very lucrative target derived solely from Joint STARS real-time data.

One of the biggest disappointments for the system was our inability to coordinate and execute the support of an AH-64 deep strike, as had been accomplished during the European OFD. Although this

type of operation was attempted on several occasions, our low density of assets and consequent inability to provide dedicated support precluded our accomplishing that mission. Examples of factors eroding our dedicated support were Joint STARS diversions to Scud hunting or conflicts with other preassigned missions that resulted from the variance in mission planning cycles.

As the gound phases of the campaign began, the system focused primarily on the enemy's reinforcing-capable, second-echelon units and the Republican Guards forces in the northern KTO. This kept the Iraqis from catching our forces in the breaching operations or, in the case of VII Corps, from impeding our forces' high-speed approach up the Wadi al Batin. The success of this concept proved itself repeatedly.

At H-Hour, G-Day and for the next several hours, Joint STARS supported Marine Corps operations. It confirmed the Iraqis weren't going to oppose their breaching operations with reinforcing armored or mechanized elements and the amphibious feint being conducted in the Gulf was drawing forces to the coastline. This intelligence was of significant value to the attacking commanders.

After VII Corps and the Joint Forces Northern Command had initiated their attacks, Joint STARS concentrated on the western border of Kuwait and Iraq. Shortly after arriving on station, the E8 detected the movement of what appeared to be reconnaissance or lead elements moving out of the Tawalkalna Republican Guards Division area into the Wadi al Batin. This movement was simultaneously observed at ARCENT and VII Headquarters. Having tactical aircraft available, the airborne mission crew commander immediately targeted the elements, and in a brief time, the movement ceased. Shortly thereafter, Joint STARS detected the surviving vehicles dispersing.

Later, a large enemy formation moved down the Ipsa Pipeline Road to the southwest. The E8 also targeted these elements, but in accordance with preestablished procedures, Joint STARS didn't control strikes within 20 kilometers beyond the fire support coordination line (FSCL). In this area, targets were passed on to the ABCCC.

Although the air attacks had damaged the moving element, it continued to

just within Phase Line Smash, which was the FSCL. The element then proceeded northwest along the FSCL and, at what appeared to be a release point, broke up into company- to battalion-sized units.

Again, all locations observed these actions, and the VII Corps TOC passed the information to the 2d Armored Cavalry Regiment (ACR). The 2d ACR then adjusted its axis of advance and closed with the elements seven hours later.

As Joint STARS began its third mission in support of the ground offensive, it detected an extremely heavy and continuous flow of traffic north out of Kuwait City on the major highway and the coast road both leading into Iraq. The E8 and the Marines targeted this movement, including on the major highway, which became known as the "Highway of Death." The results of this targeting were featured on CNN and the cover of *Time* magazine.

Later in the night, Joint STARS detected a massive withdrawal of forces from the southern and eastern areas of Kuwait. It detected little or no movement from the major forces in western Kuwait.

As the battle of the annihilation of the Iraqi Army began, Joint STARS information supported decision making and targeting at all echelons. At least one brigade commander of the 24th Infantry Division (Mechanized) used Joint STARS reports to target his artillery and adjust his maneuver. Joint STARS'

ability to detect movement across the Euphrates River and support the interdiction of bridges and river crossings proved invaluable in keeping the Iraqi forces bottled up in the Basra basket. The visual depiction that the system provided in near real time continued through the final victory and the consolidation phase.

After-Action Analysis

Much of Joint STARS set up and operation occurred in a dispersed manner with rapid change. Currently TRADOC, TAC and the Army's Operational Test and Evaluation Command (OPTEC) are consolidating and evaluating information on Joint STARS during Operations Desert Shield and Storm. Readers wishing to contribute to this effort are encouraged to contact the office of the TRADOC Systems Manager, Joint STARS. Write the Commander, US Army Intelligence Center, ATTN: ATSI-TSM-J (COL Kleiner), Fort Huachuca, Arizona 85613 or call AUTOVON 821-5301 or commercial (602) 533-5301.

While there's no doubt Joint STARS contributed significantly to the war effort and our quick victory, we must recognize there was some dissatisfaction with the system. Most of this dissatisfaction was due to Joint STARS' inability to provide dedicated support and any given commander's inability to plan for and

count on the system being available when he needed it. Most of this dissatisfaction will be alleviated when we achieve our objective number of systems, but we've learned there are some underlying operational issues we must resolve to fully exploit Joint STARS' unique capabilities.

As the Joint STARS finishes its development and our Army becomes more familiar with its capabilities, we'll refine operational procedures to be most effective in any contingency. Joint STARS' value, so amply demonstrated by the prototype system in Desert Storm, will only expand, providing even greater benefit in any future conflict.

Colonel Martin S. Kleiner, Aviation, is the Training and Doctrine Command System Manager for the Joint Surveillance and Target Attack Radar System (Joint STARS) at the US Army Intelligence Center, Fort Huanchuca, Arizona. He commanded the Army's Joint STARS Operational Detachment (JSOD) In Operations Desert Shield and Storm. Among other assignments, he served as a Field Test Officer for the Army's Operational Test and Evaluation Agency, Falls Church, Virginia. Colonel Kleiner also commanded the Airborne Electronic Research Activity, Lakehurst, New Jersey, and Headquarters Company, 1st Brigade, 7th Infantry Division (Light), Fort Ord, California, and is a graduate of the US Army War college, Carlisle Barracks, Pennsylvania.
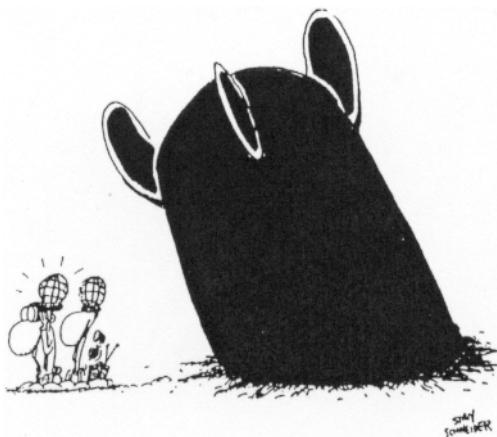
"I think we've been spotted!"

"Looks like Eggworthy has the hiccups again."

Falling Prey to a BAT Out of Hell

TSSAM with BAT Strikes Deep and Deadly

by Major Kenneth M. Roberts

The regimental commander located on his map the road junction his vehicle was approaching and checked his convoy's progress. The convoy was proceeding on schedule. In less than two hours, his unit would reach its release point and deploy as part of the counterattack force. He was confident his soldiers were the best trained and his equipment the best maintained in the division.

Looking up from his map, he noticed the convoy was entering a valley with a stream paralleling the road. He thought abut the reconnaissance report, "No enemy activity in the valley," and the air defense assets he had protecting his convoy. He felt confident though he knew the convoy was vulnerable to air attack while its lateral movement was restricted in the valley.

What he didn't know was that passing that road junction was a "trigger event" and one-third of his armored vehicles wouldn't leave the valley. They would fall prey to the BAT.

Dynamic Duo

Two former "Black" or classified materiel acquisition programs recently came into the "White" world: the Tri-Service (Army, Air Force and Navy) Stand-off Attack Missile (TSSAM) and BAT anti-armor submunition, which is carried in a missile warhead. Black programs are so designated to protect the technology involved in the development process and to prevent the development of countermeasures to the system.

Perhaps the most famous recent Black program is the US Air Force's F-117A Stealth fighter. The TSSAM and BAT program are the latest Army programs to be declassified.

The TSSAM is a joint program to develop a stand-off cruise missile capable of being launched from both the air and ground. The multiple launch rocket system (MLRS) will launch the Army's version of TSSAM. The missile will employ low-observable (stealth) technology to enhance survivability.

Both the TSSAM and a variant of the Army tactical missile system (Army TACMS) can deliver the BAT. Because both these missiles are only delivery means, this article focuses on the BAT.

The BAT

Six years of intense development by the Army's Missile Command and Northrop Corporation paid off on 20 June 1991. On that day, Department of Defense decision makers announced the BAT submunition was ready to enter engineering manufacturing development (the final phase of system development before production and fielding) and declassified the program.

BAT is an autonomous (fire and forget) anti-armor submunition that uses acoustic and infrared sensors to acquire, attack and kill moving armored combat vehicles (ACVs) at depth on the battlefield. Several BAT submunitions will be in the warhead section of the Army TACMS Block II or TSSAM missile to be dispensed at ranges beyond 100 kilometers.

Once free of the carrier, each submunition deploys four wings that take commands from the sensors and fly each BAT to its ACV. Each BAT is programmed to attack a specific ACV, minimizing the possibility of multiple BATs engaging a single ACV.

BAT gives the Army a capability to engage ACVs at depth with minimal risk to personnel and equipment. It'll be fired from corps-level MLRS battalions. Employing "shoot and scoot" tactics, the MLRS launchers will only remain exposed on the firing point a matter of minutes to fire their munitions. No longer will we be limited to attack helicopters or battlefield air interdiction assets to engage deep targets.

MLRS Family of Munitions

The BAT is one of many munitions being developed for the MLRS family of munitions (MFOM). MFOM is a group of munitions, each of which remedies an existing battlefield deficiency. All will be transported, loaded and fired by the same MOS 13M crew members who fire the MLRS rockets and Army TACMS missiles. Other munitions in the MFOM are depicted in Figure 1.

Rockets	Missiles
Dual-Purpose Improved Conventional Munitions (DPICM)	Army TACMS TSSAM
Sense and Destroy Armor (SADARM)	
Terminal Guidance Warhead (TGW)	

Figure 1: MLRS Family of Munitions (MFOM)

Every M270 MLRS launcher produced since July 1989 can fire all the MFOM with only reprogramming of the launcher software. A retrofit program will upgrade launchers produced before that date, bringing them to MFOM standards.

Improvements to the old launcher deal primarily with upgrades to the position/location system and the electronics. An improved stabilization reference platform (ISRP) provides the increased accuracies required for the longer range missiles. An improved electronics unit (IEU) and program interface module (PIM) permit faster software processing and enable munition-specific programming.

In planning rocket and missile fires, we'll be able to categorize targets with respect to their activities and degree of armor protection. These categories are shown in Figure 2.

The target sets the corps planners are most interested in fall primarily in the "soft sitters" and "hard movers" subsets of Figure 2. Army TACMS, with its approximately

	Hard (44%)	Soft (56%)
Moving (43%)	Maneuver Regiments Maneuver Battalions Self-Propelled Artillery Battalions	
Sitting/Emitting (57%)		Command Posts Air Defense Artillery Helicopter Bases (FARRPS) Logistics Installations Surface-to-Surface Missiles Towed Arty/Multiple Rocket Launchers Electronic Warfare Installations

Figure 2: Target Groupings/Mission Profile. In planning rocket and missile fires, we'll be able to categorize targets with respect to their activities and degree of armor. BAT will help alleviate our deficiency in munitions to attack hard, moving targets and with more development, hard, sitting targets.

950 anti-personnel anti-materiel (APAM) payload, proved very effective during Operation Desert Storm against soft sitters. The BAT addresses our current deficiency in munitions to attack hard movers and, later, with additional development, hard sitters.

BAT Employment

Fire planning for employing BAT is the most extensive of all the MFOM. The planning begins early in the intelligence preparation of the battlefield (IPB) process. IPB is a methodical process that
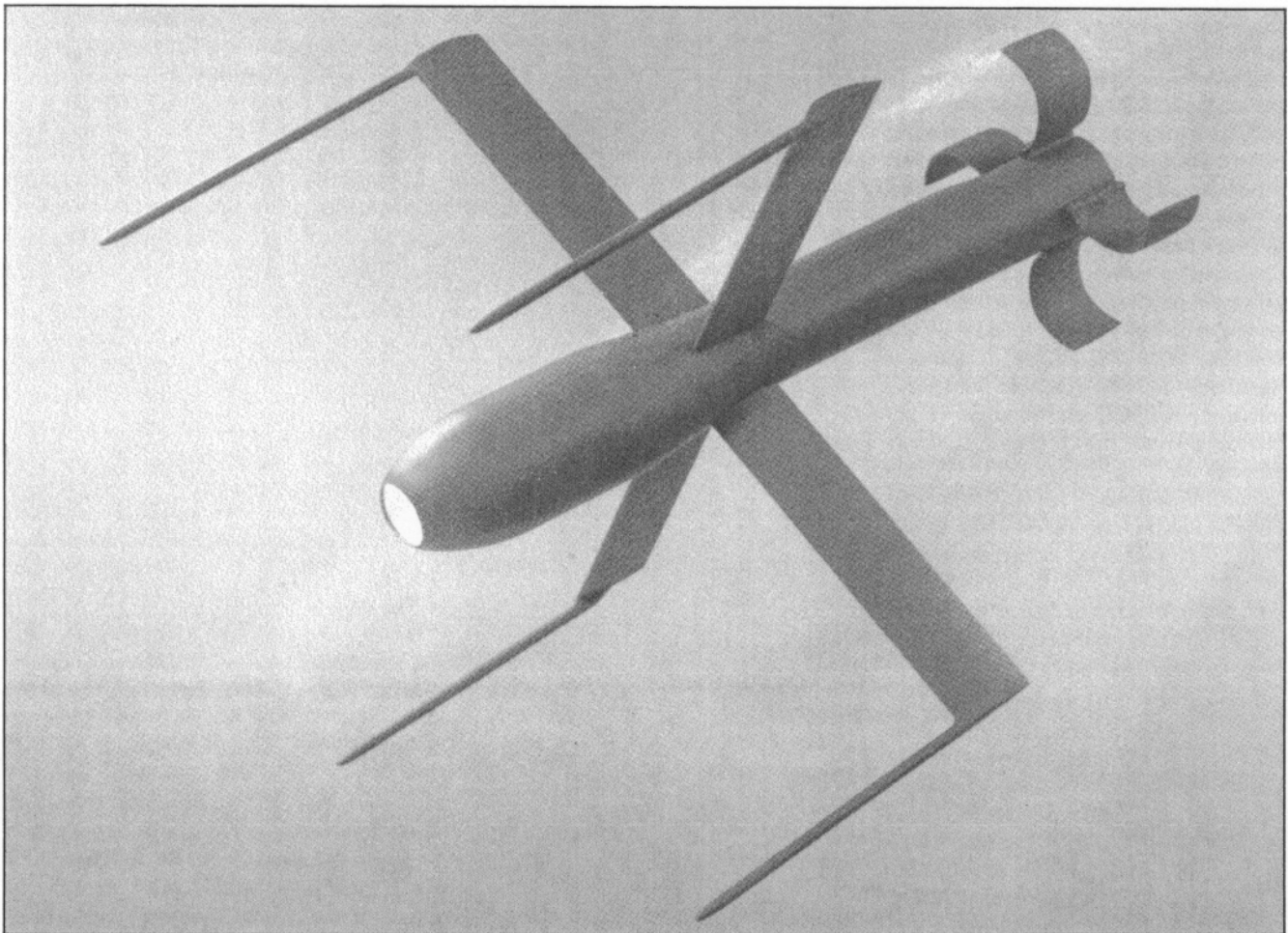
The BAT - a deadly anti-armor submunition that's fired deep.

uses knowledge of the enemy's order of battle, his doctrine, terrain, weather and current enemy activity to determine his probable courses of action.

The IPB also identifies critical threat activities the enemy must perform to accomplish his mission. Frequently, one such threat activity is the commitment of his reserve or reinforcing forces (tank and mechanized forces with many ACVs).

Locations on the battlefield where these critical threat activities are expected to occur are identified and "tagged" as named areas of interest (NAIs). Sensors are then allocated to monitor and report the presence or absence of enemy activities in those NAIs. The best places to attack these enemy activities or functions in relation to a friendly course of action are then identified and expressed as target areas of interest (TAIs). This analysis, including terrain, frequently identifies the most effective battlefield locations for BAT employment (e.g., choke points that restrict lateral movement).

The attack process for BAT is easy to understand but can be difficult to execute. First the easy part: targets are acquired in the NAIs and predictions and computations occur to engage the targets at the right time and place in the TAIs. Now for the hard part.

Long-Range Fire Planning and Execution. For BAT to be effective against moving targets, the time lapse from target acquisition to the submunition's dispensing must be as short as possible. Fortunately, a methodology exists to streamline the targeting process.

Decide-detect-deliver is a methodology used to employ long-range fires, including BAT. The corps tactical operations center (DTOC) uses it with the intelligence

estimate, commander's guidance and probable enemy courses of action serving as its framework.

The NAIs and TAIs are identified in the *decide* phase. Sensors are identified and assigned NAIs to monitor and collect information. The unit(s) to fire BAT is identified and issued the munitions. The planning in this phase is crucial for successful events to occur in the detect and deliver phases.

The most important process that occurs in the *detect* phase is "separating the wheat from the chaff." This means identifying only prioritized, high-payoff targets to engage—a difficult task. The amount of information sensors of the near future will provide could be overwhelming, even with the discrimination routines many sensors will employ. The information will have to be analyzed and fused with other all-source data and targets developed as a result.

The *deliver* phase is no different than any other MFOM fire mission. The most crucial element in the fire mission for BAT employment against moving targets is time. The capability to accurately predict the target velocity, variance in speed and (or) change in direction all contribute to the total targeting uncertainty. As the amount of time spent processing a mission increases, the distance the target has traveled increases proportionately.

Command and Control. One method available to shorten the time line between target acquisition and engagement is by delegating the delivery authority to the MLRS battalion. As with other MFOM types, you can command and control BAT missions using two basic methods: centralization at the corps fire support element (FSE) and decentralization at the MLRS battalion. In both methods, the sensor confirms the target's type, size and activity before launch.

Sensors. A key target acquisition sensor for BAT is the joint surveillance and target attack radar system (Joint STARS). Also, the Air Force airborne synthetic aperture radar system (ASARS), the Army Mohawk aircraft's side-looking airborne radar (SLAR) system and the unmanned aerial vehicle (UAV) can be used.

The Joint STARS ground-station module (GSM) supports both centralized and decentralized missions. GSMs will be present at the corps FSE and the MLRS battalions. The GSM operator programs his equipment to receive only that portion of Joint STARS information that's pertinent to the corps' area of interest. This filters out information not required for the mission and prevents the GSM operator from becoming overwhelmed with data.

The GSM also has a target prediction routine that's useful in predicting when the target will arrive in the TAI. Target prediction with other systems is much more time-consuming than with Joint STARS because the other systems primarily calculate the predictions manually.

BAT provides a quantum leap in our long-range fires capability. It's an organic, near-all-weather munition that allows us to alter the enemy's plan by interdicting his uncommitted armored forces. As it comes out of the Black shadows, it comes with a new delivery system for it—TSSAM.

Using munitions such as BAT, we'll be able to attrit enemy ACVs at depth and "meter the flow" to make the close battle more manageable and victory more likely.

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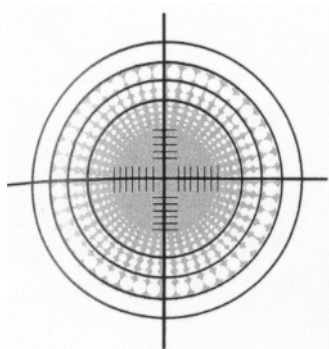
Targeting During Desert Storm

By Captains Richard A. Lacquement,
Joseph V. Pacileo, MI, and Paul A. F. Gallo
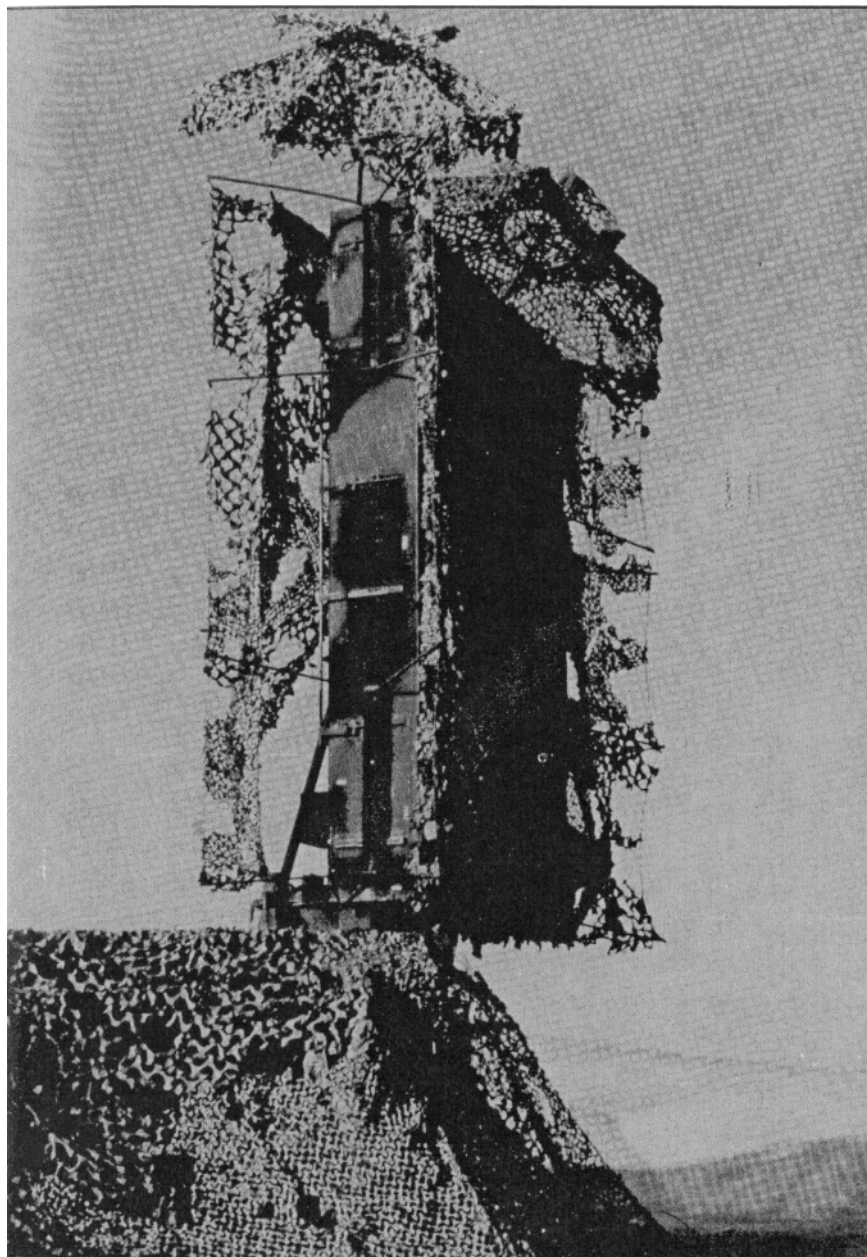
During the ground campaign against the Iraqi Army, the overwhelming majority of the missions we fired in the 1st Armored Division Artillery (1st AR Div Arty) were unobserved. The effectiveness of these fires was primarily a function of the targeting process. To engage the Iraqi military, we relied heavily on intelligence to provide targets and on our organic radars (Q-36 and Q-37 Firefinders) to alert us to enemy artillery fires.

To make this targeting process successful, we had to develop, train on and execute a plan that integrated the Div Arty-level intelligence, counterfire and operations elements. With input from other agencies, such as the radars, the division fire support elements (FSE) and the division's military intelligence battalion (MI Battalion), we developed and executed fire plans that kept the Iraqi Army constantly off balance and supported the division's scheme of maneuver.

In this article, we discuss aspects of our combat experience in Operations Desert Storm that may be useful in other operations. First, we discuss the planning, training and rehearsals we used to build the Div Arty intelligence-counter-fire-operations team. Second, we describe some key events during the war that show the team's effectiveness. Last, based on our combat experiences, we make some recommendations that might help units in future operations.

It's important to note the doctrinal elements that influenced us. Although we refer to functions of intelligence, counterfire and operations as separate in this article, in fact, all three elements are part of the Div Arty operations section. With the Div Arty tactical fire direction system (TACFIRE) also part of this section, doctrine recognizes their interwoven importance. The one element that isn't included in the Div Arty operations section's table of organization and equipment (TOE) is the counterfire section that's organic to the Div Arty's target acquisition battery.

Training

The first order of business when we arrived in Saudi Arabia was to train. In our tactical assembly area (TAA), we focused on training individual and section mission essential tasks.

For the operations section, training included emphasis on voice mass-fire mission processing, plotting and tracking unit locations, developing and war-gaming

plans and orders to support the division's plans and commanding and controlling the 1st Armored Division's Force Artillery. The intelligence section concentrated on understanding the Iraqi Army, particularly the Iraqi artillery; artillery intelligence preparation of the battlefield (IPB); and the enemy's situation and order of battle. The counterfire section emphasized training on fire planning (both manual and digital), employing the Div Arty's radars, interfacing the variable format message entry device (VFMED) and TACFIRE and delivering digital and voice fires on counterfire targets.

All three elements trained on mobile operations and emplacement and displacement drills in conjunction with the new movement formations the Div Arty had developed for the desert. One of the most important aspects of our maneuver training involved shakedown exercises using three recently acquired M577 command post carriers as the Div Arty tactical operations center (TOC).

Next, we pulled the three sections together to build a team. The framework we used to define key responsibilities was a matrix based on the decide, detect and deliver functions (see the figure).

Counterfire

Given the degree of emphasis on the Iraqi artillery threat and its chemical capability, the counterfire mission was one of the force artillery's primary missions. To be able to adequately employ the shorter range Q-36 radars well forward of the division front, we allocated one Q-36 radar to each of the three direct support (DS) battalions. The mission of the Q-36s, as well as the Q-37s, was general support (GS). The battalions maintained operational control (OPCON) of the Q-36 radars for movement and logistical support. If appropriate, the Div Arty commander could change the Q-36s' mission to direct support of the cannon battalions.

Intelligence

Our S2 section was responsible for the enemy artillery order of battle for the division and was the enemy artillery expert for the division's intelligence network. To support these responsibilities, we increased the Div Arty S2 section from five personnel (authorized by our modification TOE) to eight just before we deployed from Europe.

Additionally, the Div Arty established a liaison officer (LNO) in the MI battalion technical control and analysis element (TCAE), using one of the captain's slots designated for the S3 section (the survey platoon commander). This LNO gave the Div Arty S2 section direct access to the raw intelligence data generated by the division's organic collection assets (EH-60 Quick Fix helicopters and the MI Trail Blazer direction finding systems) as well as other data funneled through the MI battalion from corps assets.

We used this information for artillery targeting without the data's going through the usual filter of the division all source intelligence center (ASIC). The result was the Div Arty S2 received targeting data much more quickly.

Terrain. For the artillery IPB, the biggest difference from analyzing Soviet artillery employment in Europe and Iraqi employment in the Kuwait Theater of Operations (KTO) was the terrain. The desert made every place a reasonable firing point and any direction a viable avenue of approach. Because the US Army would be in the offense and our enemy in the defense, we had to determine the weaknesses of the enemy's defensive posture and ways to exploit them.

	Operations	Intelligence	Counterfire
DECIDE	Target Types Engagement Means Method of Engagement Use of GS vs DS/R Artillery Positioning Guidance for Radars	Know	Know Develop Radar Zones Position/Command & Control Radars
DETECT	Sources: Div Arty Command Net (FSO/FSE Input) FSE Targeting Division Command Net (Maneuver Unit Input) Miscellaneous Targeting Data	Sources: TCAE LNO Division G2 Other Intel Sources	Sources: Radars Zones Search Orientation Other TACFIRE Input
DELIVER	Voice on Command Net (Div Arty Mass Msns, Use of DS & R Cannons, MLRS Missions) Establish Quick-Fire Nets/Channels Clear Fires for Counterfire (Other than Pre-established Clearance Zones	None	Deliver MLRS Fires on Radar Acquisitions within Pre-established Zones Recommend to Operations the Use of other than GS Assets
INFO FLOW	Pass Key Intelligence Reports on Div Arty Command Net (Voice)	Pass Intel Reports to Subordinate Battalions	Send CBTIs and Other Messages to Subordinate Battalions and FSEs
		[Use TACFIRE (1st Priority) or Voice (2d Priority)]	

Decide-Detect-Deliver Functions for the Operations-Intelligence-Counterfire Team. The 1st Armored Division Force Artillery pulled the operations, intelligence and counterfire sections together as a team for Desert Storm, defining key responsibilities in terms of the decide, detect and deliver functions.

Given the lack of terrain choke points that would define probable Soviet-style fire sacs, we sought other techniques that might indicate how the Iraqis were focusing their artillery effort. Although templating enemy artillery usually would have been extremely difficult in such featureless terrain, the Iraqis reliance on a fixed network of defenses allowed intelligence systems at the strategic level to easily identify almost all their unit locations. Hence, for templating, we knew where most of their positions were and what types of artillery units were in those positions.

The intensity of the Allied air campaign and the particularly ferocious attention given to the Iraqi artillery (a theater priority) made it very difficult for any of the enemy artillery units to relocate even after the air war began. We accurately judged the Iraqis would stick to their dug-in artillery sites rather than move in the open.

Range Fans. Knowing what type of Iraqi artillery was at which locations allowed the S2 to understand the Iraqi artillery's focus through an analysis of the range fans of the various systems. The dug-in positions the Iraqi Army created for its artillery also gave us a good idea of the constraints they'd face trying to fire in any direction other than the one supported by their initial emplacement. Knowing the traverse limits of the towed systems in the Iraqi inventory, we factored them into our analysis. Our end product was a series of range fans for the Iraqi artillery units, which incorporated the range arcs of the systems with the traverse limits indicated by the observed direction of lay for the different positions. When we laid each position's fan on a map, the resulting diagram showed the areas where the Iraqi artillery battalions' fires would overlap. By indicating the number of enemy battalions that could engage a given area, the S2 produced a diagram showing the areas of greatest risk to our forces. The diagram also showed areas where Iraqi artillery coverage was minimal, those areas we could best exploit.

Operations

The operations section overlaid the diagram on maneuver graphics, allowing us to determine the best way to approach the Iraqis. This limited our exposure to their fires and allowed us to devise

counterartillery fire plans to engage their artillery from the most effective positions.

On the operations side, we used our range fans to determine the limits of advance we would have to reach before we could effectively engage the enemy artillery systems or other targets. In conjunction with this, the radars were given positioning guidance to focus them on identified Iraqi artillery positions.

Using the enemy situation, we rehearsed how we'd attack the Iraqi artillery in several different scenarios. We incorporated this technique into our TOC training on several occasions, to include the fire support command post exercise (CPX).

Command Post Exercise

Our last major training events were a Div Arty CPX and a Div Arty fire support rehearsal of the war plan and our contingency plans. The CPX incorporated the Div Arty and battalion TOCs, battalion fire direction centers (FDCs) and the brigade and division FSEs. Participants often not included in peacetime training were our air liaison officers (ALOs) at the division and brigade levels (Air Force personnel), who played critical roles in our execution of the fire support plan.

During the CPX, we rehearsed reporting and other procedures for a division movement-to-contact, developing and executing fire plans against deep targets and executing force artillery mass fire missions. A point of emphasis in the CPX was the use of TACFIRE to support planning and execution.

One of the most beneficial parts of the CPX was the after-action review (AAR) conducted the next day. With all the key fire support leaders and the assistant division commander for maneuver present, we solidified the fire support concept we had developed in Germany and Saudi Arabia.

Ultimately, the CPX proved to be the single most valuable training event in the

Div Arty TOC's preparations for the ground war. Although the actual situation in the ground war differed from our initial plans, the concepts remained the same, so our actions during the war were directly related to our training.

On 23 February 1991, we assembled the same participants we had for the CPX and conducted a detailed briefing and back-brief rehearsal of the fire support plan for the actual attack. In many respects, the CPX of a couple weeks earlier laid the foundation for all fire supporters to clearly understand the maneuver concept of the operation and the Div Arty commander's fire support concept.

The Attack

On 24 February 1991, the 1st Armored Division crossed the Saudi-Iraqi border as part of the VII Corps flanking movement against the Iraqi Army. The division moved in a wedge formation on a movement-to-contact with every element moving at the same time. As planned, we didn't maintain continuous firing capability. As expected, we didn't encounter any resistance the first day or evening as we moved approximately 50 kilometers inside Iraq.

The major difference during the war from our training in the TAA was our reliance on the mobile (tracked) Div Arty TOC. Because of the speed of the division's movement, the two vans that normally served as the operations-intelligence-counterfire work space were never put into action during the ground war. The only significant effect was that the counterfire section did not have its VFMED, but we easily made up for it by conducting the section's digital operations from the Div Arty TACFIRE shelter.

PL Colorado. On the move, the three elements of the TOC maintained communications with each other over the Div Arty command net. Each track had a Motorola hand-held radio to carry on more lengthy coordination while on the move. During short halts, the S2 section ran spot-report summaries and other intelligence data over to the operations track. Also during the halts, the three sections coordinated face-to-face.

On the second day of the ground war, the division continued the movement-to-contact toward our 3d Brigade's first objective in the vicinity of Phase Line (PL)
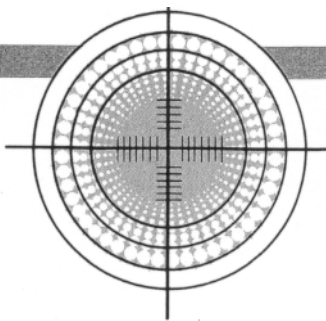
Colorado. About 30 kilometers from the objective, the division G2 reported two BM-21s (Soviet-made truck-mounted multiple rocket launchers) south of the objective. We stopped the force artillery (at that time, only the multiple launch rocket system, or MLRS, battalion and Q-37 radars) and fired 12 rockets at the site.

Although this later proved to be an effective counterartillery mission, the lag created between the lead maneuver elements and the force artillery because of our stop caused the 3d Brigade to close on its objective before the force artillery was in position to fire two plans scheduled for the vicinity of PL Colorado. To maintain the momentum of the attack, 3d Brigade fired the plans using only their DS artillery battalion.

As the division completed the fight near PL Colorado and began moving toward Al Busayyah, we received updated intelligence reports and spot reports from helicopter reconnaissance missions giving more information on the enemy dispositions near Al Busayyah. The three sections worked on the fire plans for the objective while moving, modifying the plan and creating a new one to support a planned attack helicopter raid. Using the TACFIRE system, which we also operated on the move, we transmitted the updated fire plans to the MLRS battalion and then later to the two DS battalions that would support the plans.

Al Busayyah. We got clearance to fire on the targets from the fire support officers (FSOs) of the two brigades with sectors in the Al Busayyah area as soon as we reached the position from which we'd execute. From the Div Arty TOC, we directed a suppression of enemy air defense (SEAD) and a brief preparation fired by both the MLRS and DS cannon units.

The cannon units struck several key targets during the night, using harassment and interdiction fires. We continued to receive updated targeting data from the division G2 and our 4th (Aviation) Brigade. We used this information to refine the target list for the following morning's preparation on the maneuver objectives near Al Busayyah. Using TACFIRE, we quickly modified the target lists, transmitted them to the units participating in the prep and sent the lists to the brigade and division FSEs to clear the plan's targets.

After the fight at Al Busayyah, we had expected a tactical pause of 24 to 36 hours when we would have worked out the fire plans with the division FSE for the attack against the Republican Guards. But our division continued to move and attacked into the Republican Guards Madinah Division as soon as it could. With the division main FSE trailing far to the rear, we couldn't get its input for the targeting process. But our links with the division intelligence system allowed us to develop the same targeting data the FSE would have had to work with.

On the move, we once again created and disseminated the fire plans we would need for the artillery attacks against the division's main objectives. We continued to update and improve the plans as we received more information on our objectives.

Republican Guards Division. During the move toward the Madinah Division, we received information on locations of units in the Tawakalna and Adnan Republican Guards Divisions. Both had moved elements into the path of the 1st Armored Division, presumably to block our movement while other Iraqi units slipped out of the theater. We targeted these units quickly, primarily with MLRS, and then the maneuver units fought through them with their DS artillery to maintain the momentum of the division's movement toward the Madinah Division.

As we moved within the range of the first elements of the Madinah Division, the division commander directed we fire on three theater logistics sites behind it. Because we were moving forward when we received the directive and there were only three targets (albeit very large ones), we sent the fire plan instructions by voice over the Div Arty command net to the MLRS battalion and the 75th FA Brigade, which had just joined our formation "on the fly." We stopped at our next firing location, and our MLRS battalion and the 8-inch battalion from the 75th FA Brigade fired on the three sites.

These fire missions occurred while the maneuver elements were still fighting through the Adnan units to our front. As soon as the maneuver brigades pushed through the Adnan Division, we began moving again, this time, with the 75th FA Brigade arrayed around our MLRS battalion, radars and TOC. As we moved near the main body of the Madinah Division, we had two more cannon battalions and an additional MLRS/Army tactical missile system (Army TACMS) battery to add to the artillery fight.

We had already hit part of the Madinah Division and were within the extended range fans of the Madinah's artillery, so we dropped off one of our Q-37 radars to look for any enemy artillery fire and continued east with our division.

The original plan had been to stop the division outside of the Madinah's extended artillery range fans and conduct MLRS counterartillery raids to eliminate its artillery. But our division commander decided to accept the risk of enemy artillery fire and maintain the momentum of our attack. To guard against enemy artillery fires, we began to leapfrog the two Q-37 radars every 10 kilometers to maintain continuous counterfire surveillance of the Madinah's artillery.

CPT Hartigan, 75th FA Bde

A 75th FA Bde TACFIRE Shelter. The brigade joined the 1st Armored Division Artillery just before engaging the Republican Guards.

MLRS launchers fire on Iraqi positions during Desert Storm.

At about 0930 on 27 February, as our lead maneuver elements began closing on the enemy division, we received the first reports of incoming artillery fire in the division sector. At first, we didn't have any radar acquisitions. But 2d Brigade knew enemy forces were northeast of the division sector and directed its Q-36 radar to orient to the northeast. As the radar began picking up acquisitions, we stopped our other Q-37 radar and oriented it to the northeast. Soon we had multiple acquisitions coming form the same location in the XVIII Airborne Corps sector.

We immediately sent the mission to oar MLRS units with "Do Not Lay" status and called the division to get clearance to fire. The division passed the request to the XVIII Airborne Corps, and 39 minutes later, we received clearance to fire. As soon as we fired, the enemy fire from that sector ceased. Fortunately, the enemy artillery was erratic and completely ineffective, causing no casualties in the division while we waited for clearance to fire.

Because the acquisitions came while we were moving, we sent the fire mission grids by voice over the command net before we had digital communications set up. Additionally, we ran the Q-37 acquisitions from the radar shelter to the counterfire M577 50 meters away. We used the tape readouts from the radar to plot the enemy fire unit centers of mass and decide on the fire mission grids.

After firing on these counterfire targets, we prepared the MLRS to execute a counterartillery fire plan against the Madinah Division's artillery. The division's Apache helicopters also were involved in attacks on the Madinah at this time, so we coordinated the fire plan with the cycling in and out of the Apache companies. The MLRS was well-suited to the task; we fired on all the targets in the plan

in less than two minutes and reopened the airspace for continued Apache attacks.

Soon afterward, the division moved again, and the Q-37 we had left behind began acquiring targets from the Madinah Division. We immediately stopped the force artillery and went into an aggressive counterfire fight to silence the Madinah's artillery.

As with the first counterfire targets, we received the acquisitions by voice from the Q-37 and quickly passed the missions down to the MLRS units. When the second Q-37 was set up and radiating, we again ran the acquisition tapes from the Q-37 to the counterfire and operations tracks. Here we plotted the acquisitions, determined the most threatening targets, cleared the targets through the division and brigade FSEs and passed the missions to the MLRS units. We quickly silenced the enemy units; later we determined we had fought six Iraqi artillery battalions.

In some instances, restrictive fire support coordination measures to support the Apache operations prevented us from firing on certain targets with MLRS. In these situations, we passed the targets to the Apaches over the division command net so they could attack the artillery firing at the division. Twice we received confirmation that our handoffs led to the Apaches' destroying Iraqi artillery positions.

The Iraqi artillery fires—even those landing amongst division units—led to no serious injuries. It was clear the Iraqi targeting system was extremely ineffective.

Our last major artillery event of the war came as the division prepared for its final assault on the Madinah Republican Guards Division. After dark on 27 February, the division stopped to reorganize, refuel and prepare for the final push to start the following morning

at first light. The division already had fought through almost half the Madinah Division and had its frontline maneuver units within five kilometers of the Iraq-Kuwait border.

The maneuver units stopped operations for the night, but the artillery went into high gear. Using targets from fire plans already developed as well as new targets developed from intelligence sources throughout the day, our own counterfire fight and the feedback from the Apaches, we drew up a brief MLRS prep. The prep was to be fired at 2230 hours and harassment and interdiction fires were to be fired throughout the night. We knew the Iraqi Army was trying to withdraw to the northeast, so some of our main targets focused on interdicting the few north-south roads we were aware of in the area.

The *coup de grace* was a prep we fired with all elements of the force artillery from 0530 to 0615 the next morning. Right on the heels of this prep came a final Apache attack that immediately preceded the maneuver elements crossing the line of departure.

By 0800 that morning, we complied with the theater cease-fire and stopped where we were. The division's lead elements were just inside Kuwait.

Observations

From the operations, counterfire and intelligence standpoint, we made several key observations during the war with Iraq.

Training. A unit fights as it trains, and for us, preparations in Germany and after we arrived in the desert significantly impacted on our success. Everything we did during the ground war—especially those tasks for which our training in Europe didn't prepare us—was performed in accordance with plans and techniques we established before the war and rehearsed with all parts of the team. In particular, the Div Arty-level CPX in early February was tremendously valuable in preparing us for the ground attack.

Mobile Operations. As we first analyzed the likely speed of maneuver operations in the offense, it was clear that our doctrinal TOC configuration was inadequate to support our plans (i.e., the expandable van TOC). Although FA battalion TOCs have M577 command post tracks that allow them to operate on the
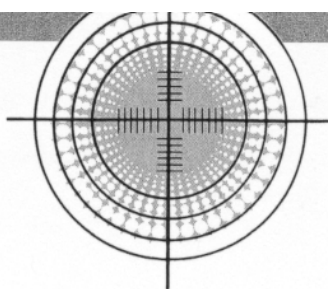
move, the Div Arty TOC does not. We were able to get three M577s from an inactivating unit before we left Europe, allowing us to fix this problem for the war. Based on our success relying on the M577s, the Div Arty TOC TOE must allot vehicles that support similar operations in the future.

TACFIRE. Another observation is one we've heard often at the National Training Center (NTC), Fort Irwin, California. TACFIRE is an outstanding planning tool. But, because of communications problems during mobile operations, it was much easier and more reliable to execute plans and missions using voice radio communications instead of digital TACFIRE communications.

In the long run, the answer isn't to give up on digital means for execution. But, as it currently stands, TACFIRE doesn't easily support this. The age, bulk, and complexity of TACFIRE are all liabilities we have to work very hard to overcome. As soon as possible, we need a more technologically up-to-date, reliable compact and easy to operate system. Under current plans, this equates to the advanced FA tactical data system (AFATDS).

With respect to TACFIRE fire planning, we also found it much easier to input the target list into the TACFIRE computer, send the list digitally to the appropriate subscribers and then send fire planning instructions to the firing units by voice. Our battalion TOCs preferred this method as it made it easier to generate and disseminate the instructions for their firing batteries in accordance with their current situation.

Intelligence. According to our doctrine, targeting data generated by the military intelligence system gets to the artillery through the FA intelligence officer in the division FSE who gets his information from the division ASIC. Because of the raw information filtering system at the MI battalion and ASIC, this data often arrives too late to be of any targeting value. This is particularly true with respect to fleeting or relatively mobile enemy targets. Creating an artillery liaison section in the MI battalion TCAE (as we did in our division) would significantly improve the ability of the MI system to provide timely targeting data.

Counterfire. Our most important observation goes back to the old debate

about which headquarters should control the counterfire fight. In general, when a Div Arty receives a reinforcing FA brigade, the norm has been for the brigade to control the counterfire fight. From our perspective, this seems almost ludicrous.

Before the war, we didn't have a reinforcing brigade to support us. During the war, we eventually received the 75th FA Brigade after it had participated in the prep fights against the 1st Infantry Division's breach site. The intent was for them to join the 1st Armored Division Force Artillery before our assault on the Madinah Division. Although they joined the division just in time for the main attack, the idea that we could effectively transfer control of the counterfire battle to them on the fly was unworkable.

There are several reasons for this. The Div Arty headquarters is the force FA headquarters for the division and, as such, has a much better grasp of the maneuver commander's intent and how to support it. The target acquisition battery belongs to the Div Arty and generally trains with the Div Arty. Additionally, the processing cell of the target acquisition battery works and trains with the Div Arty TOC regularly and is an integral part of the Div Arty's command and control team.

The intelligence assets the division has access to far exceed those available to the FA brigade. Additionally, the division intelligence system is designed to feed artillery targeting information to the Div Arty TOC through the FSE, the division G2 or, in our case, the FA LNO with the MI battalion. Because the most important part of the battle against enemy artillery is the proactive counterfire or counterartillery battle, the intelligence system is critical to the process.

Finally, the fire support coordination system to clear fires both in the division sector and outside focuses on the division's organic fire support coordination network—from the company FSOs up through the division FSE.

The assets available, the relationships

of the members of the process and the reliability of the relationship between the Div Arty TOC and its division headquarters all point toward the Div Arty TOC as being the best focus for the counterfire battle.

We shouldn't rely on FA brigades with fleeting associations and different standing operating procedures (SOPs) to join a division on the fly, or even with short preparation time, and suddenly step in and control one of the force artillery's most critical missions.

As a caveat, under a system of habitual association and long-term training relationships (as we had in Germany), we can rely on the FA brigade to run the counterfire battle (usually by giving the brigade control of the Div Arty's target acquisition battery and the target acquisition processing cell).

Conclusion

Without question, training as you'll fight and rehearsing your plan is critical to success in battle. Though the plan may not stay intact after the first encounter with the enemy, the procedures, integrated elements and coordinating relationships you develop greatly enhance your ability to most effectively target him.

We learned a great deal in Desert Storm. Much of what we learned may not apply in different terrain against a different enemy. But we've outlined some experiences and observations we perceive as basic to our ability to target the enemy and kill him in any conflict.

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Captain Paul A. F. Gallo was a 1st Armored Division Artillery Counterfire Officer during Desert Shield and Storm. He's currently a Fire Support Officer in the 3d Battalion, 1st Field Artillery, 3d Infantry Division Artillery.

AFATDS— It's Not a New TACFIRE

by Major (Retired)
Edward J. Stiles

To say the advanced Field Artillery tactical data system (AFATDS) is a new tactical fire direction system (TACFIRE) is like saying the office computer is a replacement for the typewriter. AFATDS will certainly supplant TACFIRE as an FA tactical fire control system, but beyond that, there's little comparison between the two systems. AFATDS is a total fire support system, and with its fielding in 1995, it will virtually revolutionize the way we do business.

AFATDS Advantages

TACFIRE and most of our other military automation programs have been based on the development of hardware. But the heart of AFATDS' development has been the software.

The first step in the AFATDS program was to establish the command and control functions of the fire support system, a detailed analysis that identified the inputs, the processes and the outputs. The results of this analysis have driven the AFATDS software. What follows are the highlights of the AFATDS advantages.

Easy Upgrades. AFATDS software is state-of-the-art. It's written in Ada, the standard Department of Defense programming language, a highly structured language that facilitates the development of the complex software.

The structured nature of Ada also will facilitate maintaining and upgrading AFATDS capabilities.

A key aspect of the AFATDS software design is its modular approach. Many large automated systems basically employ only one program. AFATDS, on the other hand, is designed to use a number of smaller, stand-alone programs that interoperate with each other. This architecture will avoid the software maintenance pitfalls of traditionally designed programs, which frequently can involve tackling the entire program to make a change and end up fixing one area at the expense of another.

With AFATDS, each of the major programs is in a separate module. These modules can be modified or upgraded with little impact on each other. The result is the ability to add new functions easily and to more expeditiously field

software upgrades to incorporate new weapons systems and munitions and (or) to accommodate changes in doctrine.

No More Mutual Support Units (MSUs). Here again, AFATDS will employ leading-edge technology—it has a distributed architecture in the maintenance of its data bases. That is, each of the AFATDS nodes continually will be updated with the latest information. By comparison, TACFIRE uses a centralized data base, dumping this data base to another TACFIRE to provide backup.

Each AFATDS node maintains the necessary data, to include that of the associated fire support elements (FSEs). This data-base architecture, combined with the modular software, provides continuous redundancy throughout the system.

Comprehensive Functionality. The payoff of the software is, of course, its functionality, and it's here that AFATDS

will really shine. From an FA standpoint, AFATDS will accomplish all aspects of technical and tactical fire control. It will align targets with fire units and munitions and help manage survey and meteorological operations, movement and positioning and the tedious process of managing logistics.

At the FSEs, AFATDS will pick up where TACFIRE left off, lending an automated assist to the total process of fire support planning and execution. AFATDS will take into account all available fire support means, to include attack helicopters, tactical air, naval gunfire and offensive electronic warfare. It will employ sophisticated routines to recommend the right systems for the targets under analysis and facilitate the synergistic integration of efforts.

By automatically routing fire missions and graphically displaying targets on a map background, fire supporters will be able to quickly clear and expedite fires. Gone will be the days of having to print, read and plot a message and then "chase" it through the fire direction center (FDC) chain. Through its added functionality, AFATDS will optimize the collective employment of all fires.

Interoperability. The current TACFIRE essentially is isolated from the rest of the Army command and control system and from other services. A key aspect of AFATDS software will be its interoperability. As a component of the Army tactical command and control system (ATCCS), AFATDS will interface with maneuver, intelligence, air defense and combat service support systems. It's also being designed to interface with the Air Force and Marine automated systems and with the German (Adler) and British (BATES) systems.

These interfaces will significantly enhance the total integration of the joint and combined team. The exchange of targeting and intelligence information, the coordination of movement and positioning and the management of airspace are a few examples of the utility of AFATDS' interoperability.

No AFATDS MOS Necessary. AFATDS will capitalize on its software to ease the burden of training. With AFATDS, training will be simplified. The software will be user-friendly, and embedded programs will facilitate both initial and sustainment training.

Unlike TACFIRE, there will be no distinct military occupational specialty (MOS) for the AFATDS user. While the 13C Tactical Fire Direction Specialist and 13E Fire Direction Specialist MOSs will be combined into the new 13D, members of this future fire support specialist MOS won't attend an AFATDS class; they'll attend, for example, a fire planning class that includes instruction on employing AFATDS.

Common Hardware Army-wide. Software is the heart of the AFATDS program, but the hardware also will significantly impact on the system's operations. AFATDS will use the hardware of ATCCS. This is a suite of hardware components designed to meet the collective needs of all Army branches. This hardware capitalizes on advancements in the private sector, using off-the-shelf technology. In fact, some ATCCS components are little more than commercial hardware in rugged cases, to include the basic computer units.
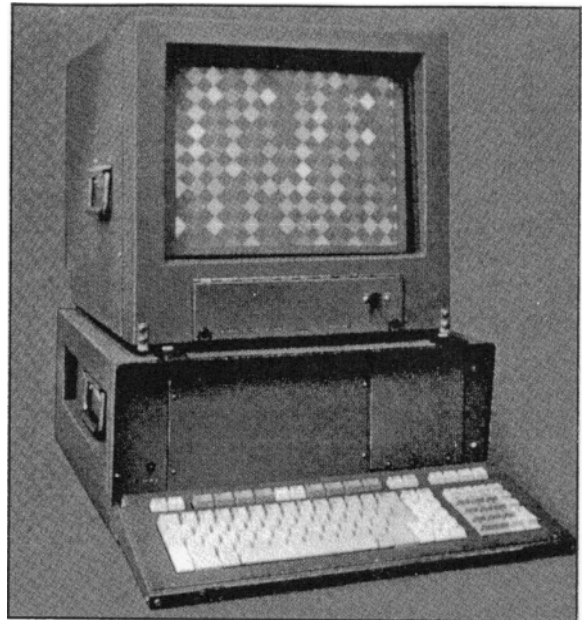
AFATDS Tactical Computer with a stand-alone, large-screen display on top.
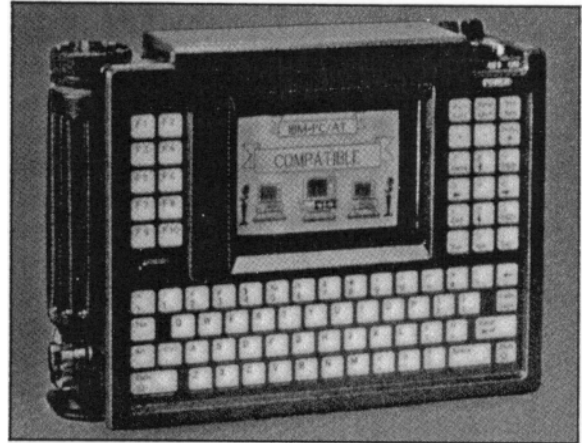
Hand-Held Terminal
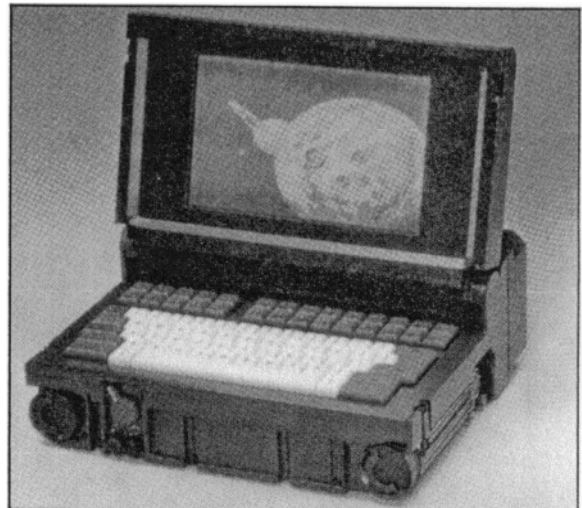
Lap-Top Computer

The "workhorse" of AFATDS is the fire support control terminal (FSCT). The FSCT is essentially a desk-top office computer with a large capacity hard drive and a high-resolution color monitor. Compared to the TACFIRE mainframe, AFATDS will have 50 to 100 times the memory and a multifold increase in processing speed.

FSCTs will form the hub of the AFATDS system at primary FA and fire support nodes. Maneuver FSEs, artillery command posts (CPs) from battalion through corps and FA FDCs down to the platoon level will be equipped with one or more of the FSCTs.

Large Screen Display. Other ATCCS hardware will augment the FSCTs at the major command and control nodes. These devices include printers, archive devices, power supplies and tactical displays. Two versions of the tactical displays are planned: large and medium screen versions.

The displays will portray a vast amount of battlefield information in a graphical format, which allows the commander and his staff to view the information simultaneously, enhancing the decision-making process. They no longer will have to lean over the TACFIRE operator's console to see what's happening.

No More Dedicated Shelters. TACFIRE hardware is housed in dedicated shelters carried on 5-ton trucks. The first and most obvious effect of this is the unsuitability of the heavy TACFIRE for light forces. While the Light TACFIRE system has been fielded to the light divisions and a National Guard brigade, it's an interim system that doesn't have all the capabilities being designed into AFATDS. A second and more significant result of the dedicated shelters is the separation of automation support from other command and control functions.

With AFATDS, dedicated shelters will be a thing of the past. The desk-top size of the AFATDS FSCT will allow it to be mounted in standard command and control vehicles, tracked CP carriers, tactical wheeled vehicles and expansible vans. For example, a direct support battalion's AFATDS in an armored division will be housed in a M577 CP carrier. The effect will be automated support freed from dedicated shelters and integrated into the command and control

centers—the decision nodes.

FSEs Linked from Battalion Through Corps. As important as the hardware is its distribution on the battlefield. TACFIRE computing power is centralized at the major FA CPs: battalion, brigade, division and corps artillery. This has caused somewhat of a "stovepiping" of FA control, with its being isolated from the maneuver command and control hubs. FSEs with the maneuver CPs have had only the variable format message entry device (VFMED). The VFMED is a "dumb" terminal, one that relies on messages to the artillery TACFIRE shelter to gain computer support and one whose ability to communicate with other elements is limited to routing through the mainframe computers.

By comparison, AFATDS will provide automation support to FSEs from battalion through corps. The impact of this is more dramatic than it may appear on the surface. While the artillery CPs were the focal points in the TACFIRE system, it's the maneuver CPs, specifically the FSEs, that are the focal points of the AFATDS system. The FSEs at each echelon will link directly with their higher and lower FSEs and to the CPs of their supporting artillery. From these locations, the fire support personnel will be able to coordinate with other elements of the combined arms team and orchestrate fire support planning and execution.

The significance of the FSEs in the AFATDS system is reflected in the computing power provided by the various CPs. For example, the heavy-brigade FSE will have two of the powerful FSCTs, and at the corps and division levels, there will be six FSCTs supporting fire support operations at the main, tactical and rear FSEs. The corps and division artillery headquarters each will have two FSCTs.

Lap-Top Computers for FSOs and Commanders. AFATDS will correct a major shortcoming of the TACFIRE system: lack of support for commanders and fire support officers (FSOs) when they're separated from their command posts. As an interim device, FA commanders from battalion through corps and FSOs in heavy forces will have the fire support hand-held terminal unit (FSHTU). It will be essentially a version of the FSCT with a built-in screen to make it more compact.

This device is scheduled to be fielded as the ATCCS lightweight computer unit

(LCU), a device very much akin to the commercial lap-top computer. It will also replace the current fire support team digital message device (FIST DMD) in the heavy divisions.

In the light forces, the forward entry device (FED) will provide automated support to the FSOs. The FED is a much upgraded replacement for the TACFIRE DMD and, in addition to supporting the FSOs, will be used by forward observers, battery commanders and others requiring an interface with the system in both light and heavy divisions.

On Track and Focused on the Future

The AFATDS program is on track, with fielding scheduled to begin in the mid-1990s. It will be fielded as a total system—heavy and light, Reserve and Active Components.

The software is being designed as three separate versions that will incorporate increasingly expanded degrees of functionality. Version 1 is a test/limited fielding prototype. Version 2 will be fully fielded, and Version 3 will have the latest technology and functionality and be fully interoperable with all other ATCCS systems. Version 3 will be distributed before the turn of the century.

More efficient and effective fires, mobility and deployability, survivability and maintainability and simplified training—AFATDS will provide it all. It's not just a new TACFIRE, it's a totally new system, one that will virtually revolutionize the fire support command and control process.

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Joint Assignments:
Facts and
Myths

by Lieutenant Colonel Richard E. Evans and Captain Ricki L. Sullivan

Why is joint duty important to you as an Army officer? More specifically, why is joint duty important to you as a Field Artilleryman? Whether you're a second lieutenant or a colonel—whether you're contemplating a career or starting your 18th year of service—you should appreciate the impact of joint service on the professional development process.

After reading this article, you won't be an expert on joint assignment policies or on all requirements dictated by the law that governs joint assignments. The intent of this article is to familiarize you with the basic tenets of the Goldwater-Nichols Department of Defense (DoD) Reorganization Act of 1986, commonly known as Title IV. You will better understand the law's possible impact on your future assignments and find information that's useful when planning your professional development.

Professional development is a never-ending process. Every job and school in the Army develops you to serve in the next higher grade or in a position of increased responsibility. Most of you know what jobs traditionally prepare you for continued progress in the Field Artillery. You can add another type of job for consideration in your development process—**joint assignments.**

Goldwater-Nichols Act of 1986

Since the end of World War II, more than 20 major studies have proposed changes to the Joint Chiefs of Staff (JCS) and joint duty assignments. The DoD came under intense scrutiny from the Senate Armed Services Committee (SASC) and the House Armed Services Committee (HASC) from 1983 to 1986.

The SASC focused on its perception that the uniformed services weren't giving enough attention to joint assignments. The SASC ultimately made two key recommendations that formed the basis for the Goldwater-Nichols Act. First, it recommended the military education system be revised to produce officers with heightened awareness of and greater commitment to DoD-wide requirements. A genuine multi-service perspective and an improved understanding of joint operations was needed. The second recommendation was to establish a joint duty career specialty in each service. These and other recommendations were signed into law on 1 October 1986.

Title IV of the Goldwater-Nichols Act outlines the statutory requirements for joint assignments. But the first step in understanding these assignments is to familiarize yourself with joint terms.

Joint Terms

Joint Duty Assignment (JDA) is "an assignment to a designated position in a multi-service or multi-national command or activity involved in the integrated employment or support of the land, sea and air forces of at least two of the three military services. Such involvement includes, but is not limited to, matters relating to national military strategy, joint doctrine and policy; strategic and contingency planning; and command and control of combat operations under a unified command" (JCS Administrative Publication 1.2 Joint Officer Management, 30 June 1989).

Joint Duty Assignment List (JDAL) is a list of assignments approved by the Secretary of Defense as joint. These are the only billets in which you can get credit for joint duty. As of August 1991, the list has 3,164 positions for Army majors through colonels. Office of the Secretary of Defense policy prohibits billets coded for captains and below to be included on the JDAL.

The JDAL has two categories of billets: critical and non-critical. There are 370 critical billets included on the JDAL. Critical billets require a joint specialty officer.

Critical Occupational Specialty (COS) is a joint term that identifies all combat arms officers. These include Army officers in Branch Codes 11 (Infantry), 12 (Armor), 13 (Field Artillery), 14 (Air Defense Artillery), 15 (Aviation), 18 (Special Forces) and 21 (Combat Engineers).

Joint Specialty Officer (JSO) is "an officer educated and experienced in formulating national security and national military strategies and in employing, deploying and supporting the unified commands, joint forces and combined forces to achieve national security objectives" (Office of the Chairman, JCS CM 344-90 Joint Military Policy Education Document, 1 May 90). A JSO must have completed both phases of joint professional military education, have served in a joint assignment and received full joint tour credit and, finally, have been selected by a JSO board for award of the Skill Identifier 3L. JSOs are designated by the Secretary of Defense in accordance with Title 10, US Code Section 661 (B).

Joint Professional Military Education (JPME) consists of the accredited programs of the National Defense University. The Chairman of the JCS has oversight in the joint education process and serves as the principal advisor to the Secretary of Defense on JPME matters. (The two phases of JPME are discussed later in this article.)

JSO Nominee is "a designation assigned by a service secretary to an officer who has completed JPME or who has a COS and has been assigned to a JDAL billet" (JCS Administrative Publication 1.2). This term designates an officer as a potential candidate for award of the joint specialty, but it doesn't constitute a recommendation for the award.
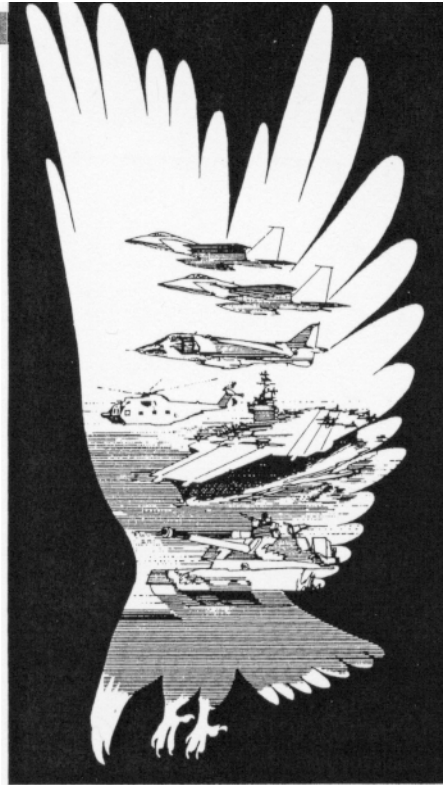
Joint Tour Credit

The intent of the Congress was to better prepare officers in the different services for duty on the joint staffs, so mechanisms were needed to educate and train them for joint assignments. Stability in joint assignments is key to developing and sustaining officers' joint perspective. Additionally, a system was devised to credit and track joint-experienced officers for promotion objectives.

Title IV mandates tour lengths for joint assignments. Each colonel and below must complete three years in a joint assignment to receive full joint credit.

What does joint tour credit do for you? First, for you to be selected for brigadier general, you must have received full joint tour credit or a waiver from the Secretary of Defense. Second and more importantly for the majority, full tour credit identifies that you have completed a demanding and unique assignment. This allows you and your assignment officer to focus on the next step in your professional development.

There are several ways to get joint credit as well as a couple of exceptions to the requirements. The most common way to receive full credit is to complete three years in a joint assignment. But if you're a JSO nominee and have served 24 months in your initial joint assignment,

you can be assigned back to your branch or to another assignment and given full joint duty credit. To get credit before you complete three years of joint duty, your reassignment must be either to (1) prevent deterioration of your warfighting skills, (2) alleviate a personnel shortage in a combat arms branch or (3) develop you professionally with the reassignment timing essential. This is called the "COS takeout provision" of Title IV, which is a legal way to give combat arms officers joint tour credit then assign them back to branch or other professionally developing tours without deteriorating their war-fighting skills.

Field Artillery Branch at the US Total Army Personnel Command (PERSCOM) can't assign an officer to just any job when exercising the COS takeout provision. The list of acceptable jobs is small. They include, but aren't limited to S3, executive officer or brigade fire support officer positions; battalion command; command and staff college and senior service college attendance; and certain assignments to the Joint Readiness Training Center (JRTC), Fort Chaffee, Arkansas, and the National Training Center (NTC), Fort Irwin, California.

Normal joint tour lengths are three years—all stateside joint assignments are 36 months. But if you're in a joint assignment in an area that has a "with dependent tour rate" of less than 36 months, you get full credit for a joint tour after 24 months.

If you're assigned to joint duty in an "all-others" short-tour area (12 months), you still must serve an additional 24 months in a joint assignment to receive credit for a full tour. For example, if you opt for a 12-month tour to a joint position in a short-tour area (say, Korea), you'll receive cumulative credit for that tour. But you must be assigned to additional joint duty and complete a minimum of 24 months (a total of 36 months) to be awarded full joint tour credit.

Unlike regular Army assignments, joint assignments are monitored to the day. If you sign into a joint job on 1 August 1991, you can expect to sign out on or after 1 August 1994. This information is placed in your orders and tracked quite closely. Since 1987, eight General Accounting Office (GAO) audits have been conducted on the services' joint management assignment and tracking procedures. Departing early from a JDA could result in your losing credit as well

as a requirement to explain in writing to the Secretary of Defense why you separated before meeting the statutory tour-length requirements.

Joint Specialty Officers

As mentioned earlier, SASC recommended the services overhaul their military education systems, particularly in the joint education arena. Title IV subsequently dictated that the services establish a career specialty for officers educated and experienced in joint matters.

But the Congress didn't intend to create a select group of officers to serve in joint positions for the rest of their military careers. Rather, it wanted to ensure the services were developing jointly oriented officers through a professional education system. These officers would provide continuity for joint matters critical to strategic and operational planning. They also could serve as mentors in the joint arena and their own services. Thus, the JSO and the additional Skill Identifier 3L were created.

Many officers were awarded JSO status based on pre-law (1986 Goldwater-Nichols Act) tours, education or a combination of the two. On 1 October 1989, all transitional measures to award officers JSO status and (or) joint duty credit expired.

For you to earn the 3L Skill Identifier today, you must follow a strict sequence of events: Education + JDA + JSO Board=JSO. This formula shows how you become a JSO.

Education. The education is JPME Phases I and II. You get JPME Phase I credit by attending a resident command and staff college or senior service college. As a staff college graduate, you get a JPME Phase II credit by attending a 12-week course at the Armed Forces Staff College (AFSC) at Norfolk, Virginia. As a senior service college graduate, you attend a five-week course at AFSC. If you attend the National War College or the Industrial College of the Armed Forces (both in Washington, D.C., part of the National Defense University), you receive credit for JPME Phases I and II upon graduation.

The Chairman of the JCS designates JPME-producing institutions for all services. Because JPME Phase I and II schools are joint, the Joint Military
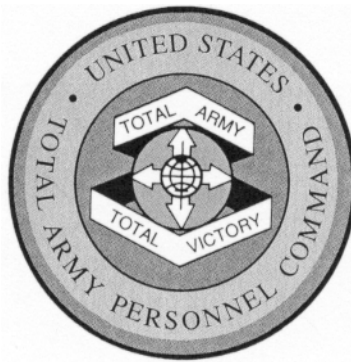
Education Policy Document determines attendance criteria—not a service's standard attendance policies.

The Army has a maximum of 333 Phase II slots spread over four classes per year at the AFSC. You may attend the AFSC TDY en route to a joint assignment or TDY and return upon signing into a joint assignment. Your joint command selects the JPME Phase II class date for you to attend. The Chairman of the JCS' policy is that eligible officers attend JPME Phase II within the first 12 months of assignment to joint duty. The joint commands are responsible for ensuring only qualified officers attend JPME Phase II.

Recent initiatives by the Chairman of the JCS enable the services to give Phase I equivalency for attendance at most, but not all, foreign command and staff colleges, foreign senior service colleges and a few fellowship programs. Because the list of schools and fellowships qualifying is too lengthy for this article, your Field Artillery Branch assignment officers have copies of it. Your assignments officer can tell you if a specific school is on the list.

The Chairman of the JCS also approved and accredited the Command and General Staff College (CGSC), Fort Leavenworth, Kansas, non-resident program for JPME Phase I equivalency, beginning with graduates in the summer of 1992. Procedures for implementing this policy are under development and will be published once approved.

JSO Board. The last step in the JSO process is the board, which is handled like any promotion or command selection board. Those who meet the education and JDA requirements will be considered for the joint specialty. If selected, you receive Skill Identifier 3L.

Because the Army considered its entire eligible population for JSO status

during 1988 and 1989, currently there isn't a large enough pool of JSO-eligible officers to convene a board. The next JSO board probably will convene in FY92 or FY93. More than 6,400 officers were awarded JSO status during the initial JSO boards, with approximately 4,700 of them still on active duty.

If you complete JPME Phases I and II plus a JDA, you won't automatically be selected for JSO status. As a result of promotion objectives outlined by the Congress in Title IV, the number of JSOs must be carefully managed to ensure service compliance with the law. Your promotion potential is a key factor for selection to JSO. Failure to meet established promotion objectives could result in the Congress passing legislation restricting the services more in the selection and promotion of JSOs.

Myth and Truth

Without question, Title IV is an extremely complex law that impacts on your professional development. Because the joint management procedures differ vastly from Regular Army assignment practices, many misconceptions have surfaced. We'll try to dispel some of the more common myths about joint assignments and JSOs.

Myth #1. *My chances for promotion are greater if I've served or am currently serving in a joint duty billet.*

Sorry, this isn't true. Promotion boards are told to give officers serving in joint positions due consideration for promotion but not anymore consideration for promotion than officers serving in recruiting, ROTC, NTC or any other assignment. The FY91 Colonels and Lieutenant Colonels Boards bear this out. The bottom line: it isn't the job that gets you promoted, it's your performance in the job.

Myth # 2. *With the joint specialty, I get better assignments than those who don't have 3L.*

Not so. There are 370 Army joint critical positions on the JDAL across all branches and functional areas. These positions require JSOs. The maximum number of joint critical functional areas and Field Artillery positions in which Field Artillery officers can serve is 154—63 for lieutenant colonels and 91

for colonels. When you consider the total Army assignments available for lieutenant colonels and colonels, 154 joint critical assignments barely scratches the surface.

Myth # 3. *I must be a JSO to be promoted to brigadier general.*

No. You only need full joint duty tour credit for promotion to brigadier general. General officer joint billets are no different than field-grade joint billets, except the tours are only two years (as apposed to three) and there are no COS takeouts. While a waiver from the Secretary of Defense can exempt an officer from having to complete a joint tour yet allow him to be considered for brigadier general, the DoD goal is for all brigadier generals selected in FY94 and later to have completed a joint assignment. Use of this waiver authority will be at a premium.

Myth # 4. *All officers need joint assignments.*

False. Your professional development needs should drive your next assignment, not a particular type of assignment. If a joint assignment doesn't fit in your professional growth and timing scenario, then so be it. This doesn't mean you won't be promoted or you aren't good enough to serve in a joint billet. You don't have to serve in every type of assignment available in the Army, and joint positions are no exception.

Myth # 5. *If I'm serving in a joint position and don't have JPME Phase I credit, I can still qualify for JSO by getting a waiver to attend JPME Phase II.*

Sorry, not true, While a waiver process does exist that allows a few, *very few*, officers to attend JPME Phase II without Phase I, those officers still aren't eligible for JSO boarding until they meet all the JSO prerequisites. A waiver only allows you to attend Phase II out of sequence.

Myth # 6. *I can request exemption from JPME Phases I and II, based on previous joint experiences and other joint-related educational courses.*

The truth: there are no substitutes for JPME Phases I and II. You either have them or you don't. No other joint education programs will qualify you for JSO. As mentioned before, the Chairman of the JCS determines which schools are accredited as JPME-producing institutions.

Your Career and Joint Assignments

There are many factors to consider when deciding whether to go joint. You should review your assignment history with your assignment officer. You need to weigh your potential for promotions, command and command and staff and senior service colleges with your personal desires. This will help you determine the best time to consider a joint assignment or whether to consider one at all.

If you're a promotable captain or new major, you could consider a joint assignment immediately after CGSC. If you go joint right out of CGSC, you could receive credit in as little as two years (COS takeout or short tour) and then return to a branch assignment. This scenario gives you enough time to have an opportunity to serve in those assignments that prepare you for lieutenant colonel and positions of greater responsibility. But if you're a more senior major, you may not be considered for a joint assignment immediately following CGSC because of different professional development needs. There are many career assignment combinations for you to pursue.

If you're a lieutenant colonel or colonel without joint credit, you have a completely different set of planning factors to consider. You need to review your file and see if you have been credited with JSO status and (or) joint duty under the transitional provisions of Title IV. If you have questions, call your assignment manager at PERSCOM. (See Page 33 of the December 1991 edition of *Field Artillery* for the names and telephone numbers of your assignment officer.)

Parting Thoughts

There are many transitional rules, exceptions, waivers and policies not discussed in this article that effect joint management. Changes in policies and legislation are pending that probably will alter some of this article's information. A DoD directive "Joint Officer Management" outlining the legislative requirements and DoD policies concerning Title IV is scheduled to be published this month and will be distributed worldwide to major, unified and allied commands and DoD agencies. This document provides the field much-needed information about joint assignments, policies and procedures.

The traditional requirements for Field Artillery officers to succeed remain fundamentally the same. However, some of you may be asked to serve in joint assignments whereas your senior and successful predecessors weren't asked to do so.

You must recognize that the professional development needs of our officer corps change over time. What was in place 10 years ago may not be what's suggested today. Title IV and its ramifications are but one example of this.

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Captain Ricki L. Sullivan is the Joint Professional Military Education (JPME)/Joint Specialty Officer (JSO) Manager for PERSCOM. He commanded B Battery, 3d Battalion, 8th Field Artillery, and Headquarters and Headquarters Battery, both in the 18th Field Artillery Brigade, Fort Bragg, North Carolina. Captain Sullivan also served as the Aide de Camp to the Commanding General of the Berlin Brigade in Germany and as a Platoon Leader in 3d Battalion, 79th Field Artillery (Lance), 42d Field Artillery Brigade. He's a graduate of the Combined Arms and Services Staff School, Fort Leavenworth, Kansas.

Focusing Combat Power—

The Role of the FA Brigade
by Colonel Morris J. Boyd and Major Randall A. Mitchell

Colonel Morris J. Boyd

> **66 *Wheel Horse X-Ray, this is Red Storm Six; execute your on-order mission to reinforce the 1st Cavalry Division. 99***

These are the words the Redlegs of the 42d Field Artillery (FA) Brigade heard from the VII Corps Artillery commander that launched the Wheel Horse Brigade on six weeks of around-the-clock combat operations in support of Operation Desert Storm.

During those six weeks of mobile armored desert warfare, we learned a lot about our doctrine, tactics, techniques and soldiering. Working with three great divisions during the key phases of the VII Corps fight, we also learned how each division commander focused his combat power. But most of all, we reaffirmed the importance of the FA brigade as a responsive, flexible and powerful force available to the corps and corps artillery commander to do what the artillery does best—focus and mass combat power to destroy the enemy's will to fight.

Setting the Stage

The 42d FA Brigade is a V Corps Artillery unit stationed in Germany. The brigade was notified on 8 November 1990 to deploy to Southwest Asia (SWA) as a part of Operation Desert Shield. Before notification, the brigade was in the initial stages of a time-phased inactivation mandated by the Council for Disarmament in Europe. Once alerted for deployment, all inactivation planning stopped, and the brigade staff was reconstituted to a fully operational level. Simultaneously, the brigade underwent a complete reorganization; it was divested of its five assigned battalions (2-20 FA, 4-7 FA, 5-3 FA, 2-32 FA and 3-32 FA) and assigned three new battalions. Two of the new battalions were transferred from the 41st FA Brigade while the third came from the 8th Infantry Division (Mechanized) Artillery, both also in Germany.

During the next six weeks, our brigade hammered out command and staff relationships and raised personnel levels in the three battalions to the required tables of organization and equipment (TOE) strengths. The final deployment configuration consisted of the Headquarters and Headquarters Battery (HHB); 3-20 FA (155-mm, self-propelled howitzers); 1-27 FA (multiple launch rocket system or MLRS); and 2-29 FA (155-mm, self-propelled howitzers).

Throughout the reorganization, the brigade planned and conducted multi-echelon desert warfare training and executed accountability and maintenance programs. Due to the ongoing requirements in V Corps and the need to prepare for the new mission with VII Corps, the brigade staff essentially worked for both corps artillery commanders until deployment. Although initially viewed with skepticism, it was quickly apparent that you can reorganize a brigade, attach it to another headquarters and change the mission as long as you have the solid doctrine, tough training and the superb soldiers that we have in our Army today.

The brigade advance party departed for SWA on 15 December followed shortly by the rest of the brigade. After arriving at the seaports of Damman and Jubail, Saudi Arabia, all units off-loaded their equipment and prepared to move to Tactical Assembly Area Henry (TAA Henry), 570 kilometers inland and east of King Kalid Military City, which is

about 120 kilometers south of the Iraqi border.

During the weeks that followed, the brigade supported the 1st Cavalry, 1st Infantry (Mechanized) and 3d Armored Divisions in key phases of the VII Corps portion of Operation Desert Storm.

Supporting the 1st Cavalry Division

Defensive Blocking. On 13 January, the brigade began combat operations with the VII Corps Artillery order to move north out of TAA Henry to reinforce the 1st Cavalry Division Artillery (Div Arty). With poor visibility due to rainy weather, the Army Central Command (ARCENT) became increasingly concerned about the possibility of an Iraqi attack under the cover of poor weather down the Wadi al Batin and across Tapline Road, the latter about 45 kilometers north of TAA Henry. The Wadi al Batin is a historic avenue of approach that runs from Kuwait and Iraq into Saudi Arabia. Our mission was to be in blocking positions in the event of this preemptive Iraqi strike down the wadi. The brigade headquarters moved north about 35 kilometers at dusk in a driving rainstorm that turned the desert into quicksand. After negotiating a treacherous escarpment and several flooding wadis, the brigade closed in to its blocking position. We linked FM radio and mobile subscriber equipment (MSE) with the 1st Cav Div Arty. Although the two headquarters were working on two separate secure codes, prior coordination allowed the brigade to preload the Cavalry "fill" so that the link could occur. The coordination was through liaison team contact.

Liaison Teams. As would become standing operating procedure (SOP), the brigade dispatched one of its two liaison teams to the 1st Cavalry Div Arty several days before the contingency operation to develop the concept of support. This early and comprehensive liaison with the reinforced unit served the brigade well throughout Desert Storm as it proved to be the critical link in the brigade's ability to move about the battlefield, reinforcing different units on short notice. Actively seeking and disseminating information, liaison teams didn't limit themselves to remaining in the Div Arty area but "touched base" regularly at the

The 1st Cavalry Division Artillery fires on Iraqi positions.

a. Mission (METT-T)
b. Task Organization
c. Positioning
d. Azimuth of Fire
e. TACFIRE (Subscribers Tables and Matrix)
f. Commanders Attack Criteria (TACFIRE)
g. High-Payoff Target List
h. Fire Support Coordination Measures
i. Survey Control Measures
j. Met Schedule
k. Eyes for Fires (FIST, OH58D, etc.)
l. Counterfire Mission
m. Radar Employment
n. Rendezvous/Linkup Points
o. MLRS Employment (Technical Data, Capabilities/Limitations)
p. Combat Service Support Coordination (May require separate meeting with XOs and S4s.)
q. Class V Considerations for Planning and Target Engagement
r. Frequencies, Call Signs, Fills MSE/TASS Support
s. TOC Locations

Figure 1: Change of Mission Coordination Checklist for LNO Teams. This included face-to-face coordination (initiated by the LNO) with the FA brigade commander, S3 fire control officer, communications and electronics officer, S1 and S4 representatives and their counterparts at the division artillery one to three days before the mission change.

division main command post (DMAIN) and division tactical command post (DTAC) as well. Additionally, the brigade commander, S3, fire control officer, communications-electronics staff officer (CESO) and a logistics representative coordinated face-to-face with their counterparts at Div Arty.

The artillery brigade is authorized two liaison teams on its TOE. In coordinating support to three divisions and simultaneously
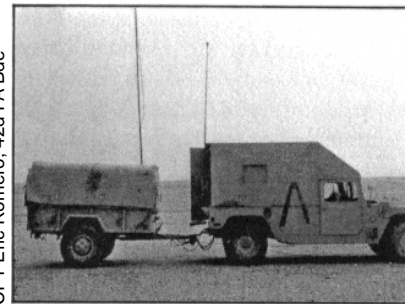
A modified HMMWV with a shelter and VFMED mounted on the back served as a brigade liaison team vehicle.

HMMWV
2 AN/VRC-46 Radios, (one net for voice and remoted from the Div Arty TOC using a AN/GRA-39 and one for digital)
Variable Format Message Entry Device (VFMED)
Night-Vision Goggles
Trailer (for greater self sufficiency)
Global Positioning System (GPS)

Note: Battalion LNO teams had the same equipment except for having only one radio and a digital message device (DMD) instead of a VFMED.

Figure 2: Brigade LNO Team Equipment. Each team had a driver, NCO and an officer. A fourth person is recommended to allow two-man shifts for 24-hour operations.

conducting live-fire training, the brigade needed a minimum of three liaison teams. We took assets "out of hide" to cover the requirement, but this may not always be feasible. (See Figures 1 and 2 for a liaison officer, LNO, checklist and a LNO equipment list.)

Position Location and Navigation Devices. Other valuable tools employed during this first phase were the global positioning system (GPS) and long-range

aid to navigation system (LORAN). We used them for unit displacements and in communications and supply elements to help them keep pace with the battle tempo. These systems gave the brigade day and night, all-weather capabilities the enemy didn't have—key in mobile desert warfare.

Heavy Reinforcing Light. The 1st Cavalry Division was tasked with defense-in-zone around the city of Hafir al Batin just north of Tapline Road. During the early phase of operations, the 2d Brigade of the 101st Airborne Division (Air Assault) operated with the 1st Cav Div as its "Third" brigade. This brigade was to defend the airfield at Al Quay-sumah on Tapline Road. To bolster the firepower of the 2d Brigade, 1-27 FA and 3-20 FA moved into position to provide general support (GS) and reinforcing (R) fire for the 2d Brigade's direct support (DS) battalion (1-320 FA, 105-mm, towed). The 3-20 FA commander served as the fire support coordinator (FSCOORD) and LNO for this mission.

This reinforced the importance of the FA brigade's augmenting the fires of light forces and bolstering them with munitions and capabilities not usually found in light units. Lieutenant General Frederick Franks, the VII Corps Commander, later said the 2d Brigade "breathed a sigh of relief with the addition of the 42d FA Brigade's MLRS and 155-mm self-propelled battalions."

In addition to the defense mission, the 1st Cavalry Division was to deceive the Iraqis into believing the main attack of the Multinational Coalition Forces (MCF) would come up the Wadi al Batin. Part of this deception operation was a series of artillery raids and division and corps attack helicopter feints. The role of the Div Arty and 42d Brigade was to suppress or destroy enemy air defense (SEAD or DEAD) assets.

"Mix and Match Missions." After the air war began on 17 January, the 1st Cavalry Division moved north along the Iraqi, Kuwait and Saudi tri-border areas. The division conducted its defense-in-zone with a cavalry screen (1-7 Cavalry) in front and two brigades abreast. The 42d Brigade's 3-20 FA was the DS to the 1-7 Cav, with the 2-29 FA general support reinforcing (GSR) to the 1st Cav's 1-82 FA and the 1-27 FA GS. In this manner, the brigade accomplished both centralized

control of FA fires (immediately responsive to the corps artillery commander, i.e., GS and GSR) and decentralized control with brigade fires immediately responsive to a particular maneuver force (DS and R). This flexibility to continually mix and match missions, depending on the situation, was another doctrinal "reaffirmation" of the FA brigade in Desert Storm.

Retrans Teams. With the lines of communications (LOCs) stretched, we sent a retransmission team out to ensure that the brigade could communicate with its units south at the VII Corps training area a few kilometers from TAA Henry in the event we had to recall them rapidly. The retransmission team did an outstanding job of establishing a double retransmission station (by combining their assets with 2-29 FA's retransmission team), thus allowing the brigade to maintain FM communications some 90 kilometers. This valuable asset proved itself again and again during Desert Storm.

MLRS Raids Forward. On 13 February, the brigade fired its first shots in anger. The 2-29 FA (Pathfinders) fired the first mission (also the first of a Germany-based element of VII Corps) against an Iraqi truck convoy.

Additionally, the 1-27 FA (MLRS) conducted a raid against three artillery

targets acquired using corps and division intelligence and targeting assets. The targets were passed through the Div Arty to the brigade for execution. This was an intensely managed operation that called for pushing the MLRS launchers well forward into the screen area to allow them to range the Iraqi targets. With few exceptions, Iraqi artillery was deployed so far to the rear that their maximum range only allowed them to reach their forward line of own troops (FLOT). With guidance from the 1st Cav Div Arty commander, the commander of 1-27 worked out the game plan with his battery commanders in what he called a "Thinkex."

The raid mission was to marshal the launchers and command and control vehicles in an assembly area and move them forward under maneuver escort to a survey control point. (This allowed the launchers to update their on-board fire control systems.) The 1st Cav's MLRS battery was "chopped" to 1-27 FA for this mission. From there, the launchers proceeded to their firing points where two of the three batteries engaged targets while the third remained silent, tied to a Q37 Firefinder radar to provide quick counterfire. If counterfire was unnecessary, the third battery was to fire on preassigned targets. After completing these missions, the launchers immediately displaced back to the update area (serving
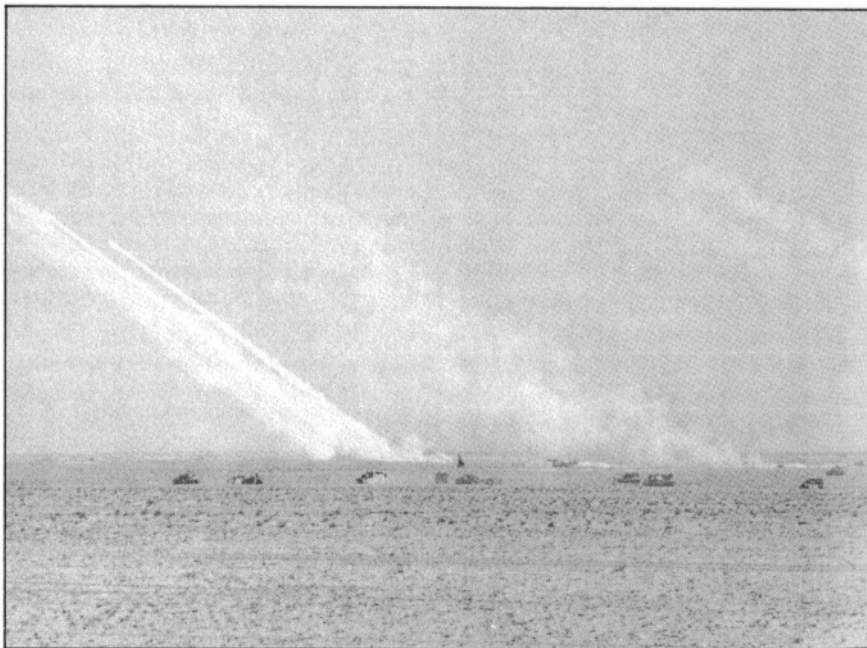
1-27 FA (MLRS), 42d FA Bde, participates in an artillery raid.

as a rally point), conducted personnel and equipment accountability and then proceeded back to their original positions.

One aspect of the raids that was to prove crucial was the importance of rehearsals. In the words of the British 1st Armored Div Arty commander (who also worked with the corps artillery), "What you don't practice, you can't do." This operation was rehearsed many times to "work out the bugs." The first rehearsal went almost too smoothly; subsequent ones proved that "Murphy" was alive and well but could be beaten.

The close coordination between the Div Arty and brigade commanders and S3s greatly facilitated this operation. As additional raids were fired and units became accustomed to the requirements, the time needed to plan and execute them dropped off markedly.

But the raids highlighted another problem, one that would continue throughout Desert Storm: the lack of timely and accurate battle damage assessment (BDA). We couldn't determine the effects of our raids. This highlights the urgent and chronic need for a system that will allow for effective, timely BDA (i.e., an unmanned aerial vehicle, or UAV).

On the night of 15 February and early on the 16th, both 3-20 and 1-27 FA participated in an AH64 helicopter raids and

CPT David Lawhorn, 42d FA Bde Surgeon
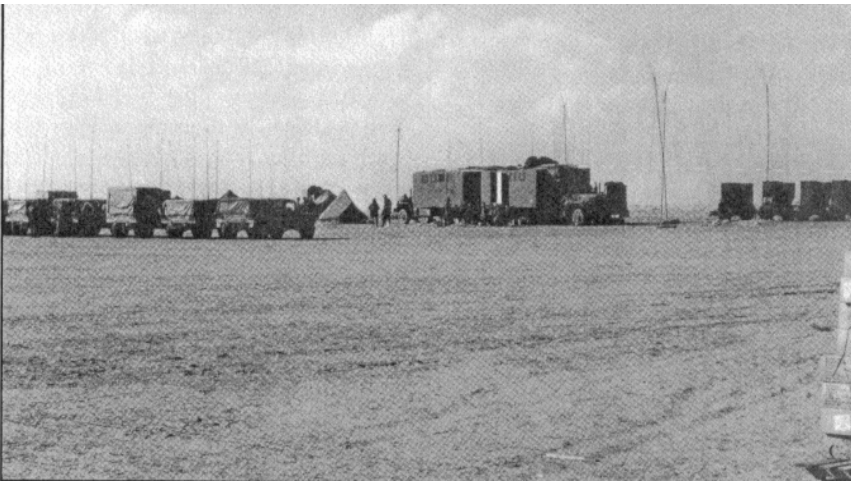
The 42d FA Bde's TOC in Southwest Asia.

feints, while 2-29 FA provided counterbattery coverage. This mission called for the units to conduct SEAD to allow elements of the corps 11th Combat Aviation Brigade (CAB) to attack preplanned targets and targets of opportunity in zone. This mission also called for strict adherence to a firing schedule to keep from endangering friendly aircraft.

Shortly before 0100 on the 16th, the night calm exploded with cannon and rocket fires. At precisely 0100, the weapons fell silent as the Apaches from the 11th CAB moved forward to do their work. In concert with the Div Arty, some

322 rockets and 219 rounds were fired. Once again, one of the MLRS batteries stayed silent to provide immediate counterfire or engage preplanned targets if no counterfire was necessary. The result was the successful suppression of the air defense network and an open corridor in the Iraqi lines that allowed the CAB's Apaches to attack their targets at will. The mission was complete at 0230 hours on the 16th.

Later that morning after only a few hours sleep and with the tubes and launchers still warm from the SEAD and feint, the 42d Brigade departed the 1st

A 42d FA Bde M109 howitzer battalion moves in column back to Saudi Arabia after the cease fire.

Cav zone to move to support the 1st Infantry Division (Big Red One) in a series of raids and a preparation for the breach operation.

Supporting the 1st Infantry Division

"Jump TOC." By 1300 on 16 February, the brigade tactical operations center (TOC) traveled 78 kilometers to the Big Red One's area just south of the Iraqi border and was mission ready within 12 hours of departing the 1st Cav zone. Here again, the brigade communications element established a long (75 kilometers) retransmission to allow the 42d Brigade to maintain crucial FM communications with VII Corps Artillery.

The remainder of the 16th was used to update the battalions on the current situation, perform maintenance and prepare to conduct future operations. This was facilitated by the brigade Jump TOC moving in advance of the brigade on 14 February into the Big Red One's sector to prepare the location for the brigade's arrival. The Jump TOC closed in its new position on 15 February, reporting that there was enemy mortar fire in the area of operations that was being engaged with friendly counterfire. A raid and feint communications exercise (COMMEX) took place in the evening.

FA Brigade as Div Arty Headquarters. As with the 1st Cavalry Division, the 42d Brigade participated in several artillery raids with 1st Infantry Division. In these raids we fired a mix of cannon and MLRS assets. In addition to attacking high-payoff targets and attriting Iraqi artillery in zone, these raids also were training for fire planning and to allow crews to gain additional confidence in their equipment.

A prime example of this was the attachment of A/40 FA (MLRS), the 3d Armored Division's MLRS battery, to the 42d Brigade for one raid. Due to operations security (OPSEC) considerations (the massing of the 1st Armored and 3d Armored Divisions to the west), the battery was precluded from firing from the 3d Armored Division zone. But by moving to the 1st Infantry Division zone, they could hone their skills and return to their division more proficient.

Also, the 1st Infantry Div Arty commander tasked the 42d Brigade to be the planning and controlling headquarters for two of these raids that included the attachment of divisional battalions and battalions of other artillery brigades. Our ability to act as the Div Arty controlling headquarters was critical in upcoming operations. Our ability to rapidly receive and shed units was well-tested.

Also of prime importance was the brigade tactical fire direction system's (TACFIRE's) ability to provide mutual support for the Div Arty. Our support was put to the test when, during the course of one raid, the Div Arty computer encountered a radio problem that prevented it from communicating with its units. In 15 minutes, the Div Arty system completely transferred the data to the brigade shelter, allowing us to assume control of the operations without a break in the raid sequence.

Submunition Duds. The massive use of dual-purpose improved conventional munitions (DPICM) for the first time in combat provided another valuable insight. In the intense, movement-oriented combat that took place in the following days, DPICM showed itself to be a "two-edged sword." While this munition was very effective against enemy targets, at times a number of unexploded "bomblets" were left littering the area that maneuver (and subsequently support units) had to cross.

Air Coordination. Finally, the raids required close coordination between Air Force "fast movers" and the artillery. This coordination was essential for the safety of friendly aircraft. However, the coordination wasn't always timely and, in at least one case, delayed the firing of a raid. A similar incident occurred with the 1st Cav. This is definitely a subject that requires additional emphasis during training exercises.

In addition to timely clearance, there was a problem with the definition of fire support coordination line (FSCL) and airspace coordination areas (ACAs) throughout Desert Storm. VII Corps used the FSCL as a restrictive fire control measure (i.e., any fires past the FSCL have to be coordinated with the Air
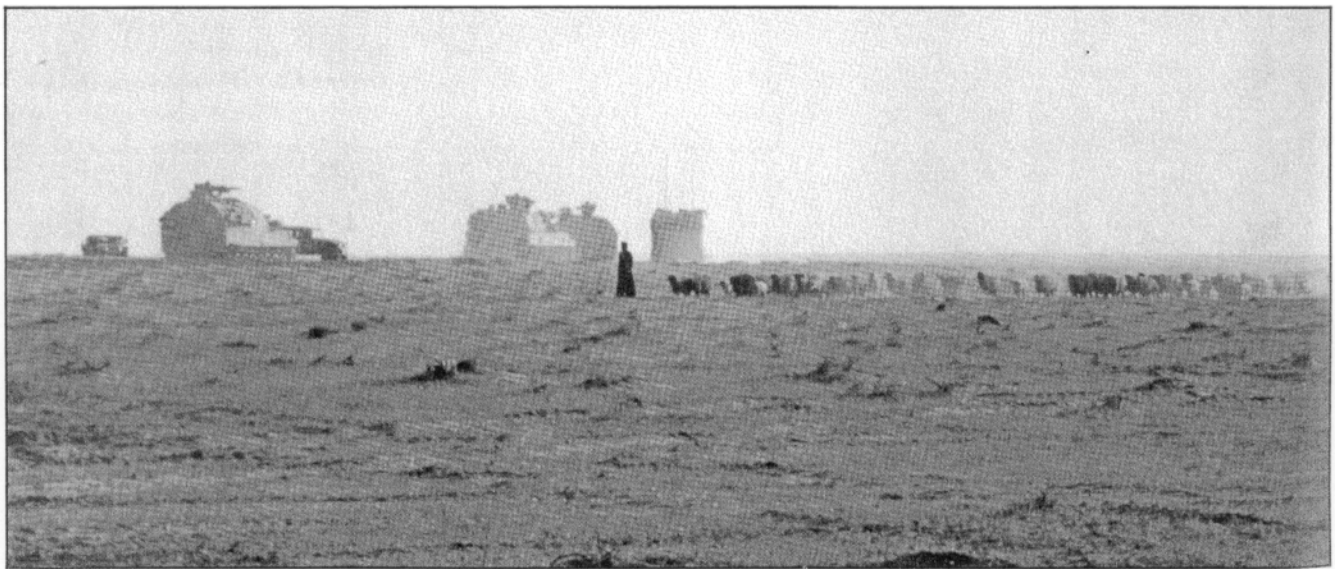
An M109 battalion passes a herd of sheep while redeploying to Saudi Arabia.

CPT David Lawhorn, 42d FA Bde Surgeon

Force). The Air Force also heavily used "informal" ACAs as opposed to formal ones. While the informal ACAs were much easier to establish, they presented numerous problems and areas of conflict between indirect fire systems and the aircraft.

Pre-Link-up Coordination. On 22 February, while continuing with raids and intense planning for the breach operation with 1st Infantry Division, the brigade also coordinated with the 3d Armored Division fire support element (FSE) for eventual link-up. For this change of mission and link-up, the 1-27 FA went to the 3d Armored Division immediately after our artillery preparation, fire with the 1st Infantry Division. The rest of the brigade followed within 12 to 18 hours. The 1-27 FA linked with the division between Phase Line (PL) Minnesota and PL Apple just across the Saudi Arabian-Iraqi border. Once again, early and constant coordination with the gaining unit was critical to success.

Flexible Planning. With the completion of the last raid on 23 February, the brigade turned its full attention to the breaching operation with the 1st Infantry Division. An integral part of this operation was an artillery preparation planned and continually modified to adapt to a changing tactical situation. The initial plan was for ARCENT, minus VII Corps, to attack on 24 February (Ground Day or G-Day) and the 1st Infantry Division to fire the prep and conduct breaching operations (along with the rest of the VII Corps attack) on G+1. Soon after the start of the ground assault on 24 February, it became obvious the advance would go swifter than expected. Thus the planned two-and-one-half hour prep became a one-half hour prep and was fired at 1430 on G-Day.

This quick change and repositioning of artillery not only demonstrated, again, the artillery's ability to respond, but also showed the criticality of having a solid fire plan. Also, with the basic plan set, modifications were much easier. This short but intense "firestorm" set the pace for the remainder of the conflict; close air support (CAS) stunned and attrited the Iraqi forces, artillery hammered them to the ground and maneuver forces "drove the nails in the coffin."

After the preparation, the brigade moved forward in the late afternoon and crossed the border into Iraq. That night the 2-29 FA was the first element of the Wheel Horse across the breach, followed the next morning by the rest of the brigade. Continuing north, the brigade departed the 1st Infantry Division sector at 1200 to begin operations with the 3d Armored Division for the final phase of the operation: the destruction of Saddam Hussein's highly touted Republican Guards Forces Command (RGFC).

Supporting the 3d Armored Division

Link-Up Facilitation. 25 February was breach breakthrough and link-up day. The brigade moved north through the breach and, after snaking its way through areas literally covered with minefields, improved conventional munitions (ICM) bomblets and other unexploded ordnance, linked up with elements of the 3d Armored Division cavalry squadron at noon, some 40 kilometers into Iraq. Again due to prior planning and rehearsal, the link-up came off without a hitch. Once in the 3d Armored Division sector, it was "pedal to the metal" to catch up to the front lines of "Spearhead."

Facilitating this was a Division movement-to-contact schematic the division commander and his staff developed especially for this operation. A few days before the link-up, the 3d Armored Div Arty commander, realizing that one picture was worth a thousand words, alerted the brigade commander to view a sketch of an entire division in movement-to-contact wedge formation, consisting of about 6,000 vehicles. Also, the use of "waypoints," checkpoints and GPS allowed the brigade to orient on the division and smoothly link-up. By 1730, the link-up was complete, and the division stopped for the night to rearm and refuel between PL Saigon and PL Smash in preparation for the anticipated swing east toward Kuwait in a meeting engagement with the Republican Guards.

The Division Wedge Formation. The division advance continued before dawn on the 26th with all elements again traveling in the wedge. The battalion and battery wedge worked well for movement during all phases of the battle. Our division wedge moved rapidly with maneuver forces leading and the artillery close behind. The logistical elements of the units followed the wedge in column along several paths, providing excellent fuel and maintenance support. This provided the logistic assets added security. The close proximity of support drastically reduced the amount of coordination required to recover disabled vehicles.

This formation, as well as the wide open terrain and the rapid advance, negated the need for the artillery's traditional advance party. By the nature of the formation, the batteries quickly were able to establish a firing capability.

Digital versus Voice Commo and the Demand for MLRS Fires. The advance continued at a brisk pace throughout the day, meeting only scattered, generally uncoordinated resistance. As dusk came, the situation changed dramatically. The 3d Armored Division (with the 2d Armored Cavalry Regiment and 1st Infantry Division in the south and the 1st Armored Division in the north) smashed headlong into elements of three Iraqi armored units: the Tawakalna Republican Guards Mechanized Division, the 17th Armored Division, and the 52d Armored Division in the vicinity of PL Bullet, at this point only 40 kilometers from the Kuwaiti border to our east.

In the furious night battle that followed, the brigade was heavily committed. The 3-20 FA and 2-29 FA fired continuously with their reinforced battalions. The 1-27 FA, in general support, constantly fired rockets on the Iraqi formations. The Iraqis referred to these devastating rocket barrages as "Iron Rain." By dawn, the triple punch of CAS, accurate and timely artillery fire and aggressive maneuver had "broken the backs" of the Iraqi divisions attempting a desperate defense.

This night action brought out several key points. First, the brigade found that both technical and tactical fire direction with TACFIRE worked best when using a combination of digital and voice methods. The best approach was to plan fires digitally and execute them by voice. Attempts to execute digitally were slow and didn't provide the fire direction officers (FDOs) enough information to attack targets properly. Also, while TACFIRE's centralized control was immensely helpful in controlling possible fratricide, it tended to slow down mission processing time dramatically.

Second and common throughout Desert Storm, the demand for MLRS fires was tremendous, with the expectation

for it to do more, faster. MLRS provides a massive, quick surge of firepower, but both maneuver and, at times, fire support personnel didn't fully understand the peculiarities of the system. Response times, launcher status and the current single munition capability were continually assessed as we employed the system.

The FA Brigade As Div Arty Headquarters, Again. On 27 February, the brigade initially stayed in position to allow the 3d Armored Div Arty to displace. Again the FA brigade's ability to function as the artillery headquarters for the division was proven. The 3d Armored Division continued its advance into the night with the Div Arty and brigade providing numerous supporting fires. By now it was obvious the Iraqi Army was rapidly losing its will and ability to fight. We encountered large groups of enemy prisoners of war (EPWs) and destroyed massive amounts of abandoned equipment.

From Offense Back to Defense. Up to the last minute before the cease-fire, the brigade's guns and launchers punished the now routed Iraqi units. At 0800 on 28 February, our guns fell silent, and the cease-fire went into effect. With the 3-20 and 2-29 FA already across the border in Kuwait, the brigade headquarters and the 1-27 FA followed. In a defensive "set," the brigade conducted accountability, maintenance, rearm and refit operations

to be able to continue the attack and provide force protection.

Lessons Learned. Throughout Operations Desert Shield and Desert Storm, our FA team adapted well to operations in the desert, mastering new tactics, techniques and technology "on the fly." We had the speed and agility to stay up with the M1 tank and Bradley equipped maneuver units, even during exploitation and pursuit. The GPS emerged as a critical piece of the land navigation and position location challenge. TACFIRE, light TACFIRE (LTACFIRE) and manual gunnery had worked in harmony due to the superb efforts of the fire direction centers (FDCs) at all levels. We also learned the "desert wedge," battery (vice platoon) and similar tactics should be incorporated into our training tasks. We reaffirmed the need for a UAV to keep a timely, accurate "eye on the battlefield."

In the final analysis, it was the spirit of our Redlegs that brought us through it all. Well-trained soldiers led by competent leaders made the difference.

As we entered the cease-fire and thought about our experiences in mobile armored combat, we kept coming back to the words Lieutenant General Franks spoke after our initial move in support of 1st Cavalry Division: "You were all I had. You were the only combat power I could generate at that time. Your positioning and responsiveness made the difference in establishing the initial defense." That's

the role of the FA brigade—to focus combat power when and where most needed.

Colonel (P) Morris J. Boyd commanded the 42d Field Artillery Brigade (Wheel Horse), Germany, and deployed his unit to Southwest Asia in Operation Desert Storm. Currently, he's the Executive Officer for the Commanding General of the Training and Doctrine Command, Fort Monroe Virginia. His previous commands include the 6th Battalion, 8th Field Artillery (M101A1 and M198 howitzers), a direct support battalion in the 7th Infantry Division (Light) Fort Ord, California, a battery in the 1st Cavalry Division in Vietnam, and a battery in the 2d Armored Division at Fort Hood.

Major Randall A. Mitchell is an Assistant S3 for the 42d Field Artillery Brigade. Commissioned in Artillery in 1979 from The Citadel, he has held a variety of artillery positions in the 11th Armored Cavalry Regiment, Germany; the Directorate of Combat Developments, Field Artillery School, Fort Sill, Oklahoma; and the 6th Battalion, 27th Field Artillery, III Corps Artillery, Fort Sill.

SGT Taylor directs traffic as HHB 42d FA Bde moves to reinforce the 3d Armored Division Artillery in Iraq.

CPT David Lawhorn, 42d FA Bde Surgeon

Lance—*The End of an Era*

The Lance missile system, a valuable part of US nuclear deterrence for the past 20 years, will soon be a part of history. It's being replaced by the Army tactical missile system (Army TACMS) in the conventional mode. The elimination of Lance will cause several changes in training and assignments of artillery officers, warrant officers, NCOs and soldiers.

Personnel

During FY92, Lance Missile Crewman MOS 13N will be deleted, and all soldiers in this MOS will be reclassified. Personnel affected include all enlisted soldiers with a primary MOS (PMOS) of 13N, 27L Lance System Repairer and 55G Nuclear Weapons Specialist and all warrant officers with a specialty of 130B Lance Missile System Technician and 911A Nuclear Weapons Technician. 13N personnel Army-wide have been deleted from levy and permanent change of station (PCS) assignments.

Soldiers excluded from reclassification are those on the promotion list, those with 18 or more years of service upon unit inactivation and who elect to retire rather than reclassify, those with bars to reenlistment and those pending medical review boards. Soldiers with a secondary MOS (SMOS) who meet entrance requirements will reclassify into that SMOS (depending on the MOS' strength). Others will likely be reclassified into a 13 Field Artillery Career Management Field (CMF) MOS. If possible, females will be kept in 13 CMF and go into MOS 93F Field Artillery Meteorologist. Some soldiers may elect to separate from the Army under the FY92 Voluntary Early Transition Program. 13N soldiers may reenlist for retraining only.

Training

All Lance entrance training and nuclear-related instruction in all courses have been terminated. Soldiers reclassified into another MOS will receive training when reclassified.

To ensure NCOs who serve in 13N are competitive for career advancement during and after the reclassification process, the Advanced NCO Courses (ANCOC) and Basic NCO Courses (BNCOC) scheduled for FY92 will be held. After FY92, 13N BNCOC and ANCOC will no longer be taught. *To ensure our Lance soldiers are fully competitive for promotions and selections, units with 13N Skill Levels 3 or 4 should schedule them for these courses immediately.* (See the figure.)

ANCOC

Class 1-92: *31 May - 8 Jul*
Projected 16
Max Cap 32

Class 2-92: *2 Aug - 9 Sep*
Projected 16
Max Cap 32

BNCOC

Class 3-92: *29 Mar - 18 May*
Projected 21
Max Cap 32

Class 4-92: *21 Jun - 11 Aug*
Projected 20
Max Cap 32

Class 5-92: *16 Aug - 6 Oct*
Projected 20
Max Cap 32

13N ANCOC and BNCOC Schedule for FY92. During FY92, MOS 13N will be deleted. To accommodate the professional needs of Lance soldiers, ANCOC and BNCOC will train at their maximum capacities in FY 92, increasing the student loads by 32 in ANCOC and 35 in BNCOC. *Units should schedule eligible Lance soldiers for these courses now.*

The Field Artillery NCO Academy will train more ANCOC and BNCOC students during FY92—an additional 32 students in ANCOC and 35 in BNCOC. The quality of training won't decrease; additional cadre are being trained to teach the increased student loads. Lance technical subjects have been deleted from ANCOC and BNCOC. Field Artillery subjects common to all Redlegs—with emphasis on the multiple launch rocket system (MLRS)—have replaced the Lance subjects.

Units with 13Ns needing to attend BNCOC or ANCOC must coordinate with the Field Artillery NCO Academy by calling the Commandant, Command Sergeant Major Harold Shrewsberry, or the Chief of Training, Master Sergeant George Putman, at AUTOVON 639-2417 or 3141 or commercial (405) 351-2417 or 3141. Units also can write them at the US Army NCO Academy, Building 3553, Fort Sill, Oklahoma 73503-5602.
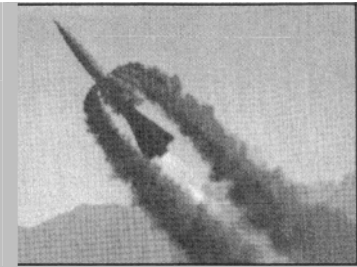
Unit Inactivations

Lance units Army-wide have taken initial steps toward inactivation. Units have been directed to turn in nuclear warhead section trainers and destroy nuclear-related material and publications. At this time, there's no confirmed date by which inactivations will be completed.

Equipment

The Missile Command (MICOM) has developed procedures for the elimination of all Lance-peculiar end items of equipment. If the demilitarization proposal is approved, multiple-use items—such as winches, slings, etc.—will be declared excess and processed to the Defense Reutilization and Marketing Office (DRMO). The M752 and M688 basic vehicles also will be declared excess with the Tank and Automotive Command (TACOM) providing disposition instructions.

Lance live-fire exercises currently are controlled by MICOM. The elimination process for Lance missiles not used in live-fire exercises or testing is still to be determined. The payload for the Lance conventional warheads will be downloaded and put into the Army TACMS warheads.

If units or soldiers have question, write the Commandant, US Army Field Artillery School, ATTN: ATSF-GR, Fort Sill, Oklahoma 73503-5600 or call Lance Branch of the Gunnery Department at AUTOVON 639-5424 or 5301 or commercial (405) 351-5424 or 5301 and talk to Chief Fred Couture or Captain Kerry Loudenslager.

Lance Branch, Gunnery Department
Field Artillery School
Field Artillery NCO Academy
Fort Sill, Oklahoma