

# Field Artillery

A Professional Bulletin for Redlegs

September-October 1996



**Digitizing  
the Force**

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HQDA PB6-96-5

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Cover by Lee Gibson, Fort Sill TSC

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

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**SUBSCRIPTIONS:** May be obtained through the US Field Artillery Association, P.O. Box 33027, Fort Sill, OK 73503-0027. Telephone numbers are DSN 639-5121/6806 or commercial (405) 355-4677 or FAX (405) 355-8745 (no DSN). Dues are \$18.00 per year (\$35.00 for two years and \$52.00 for three years) to US and APO addresses. All others add \$12.00 per subscription year for postage. Subscriptions are also available through the Superintendent of Documents, US Government Printing Office, Washington, DC20402. The telephone number is (202) 512-1800; FAX is (202) 512-2233.

**SUBMISSIONS:** Mail to Editor, *Field Artillery*, P.O. Box 33311, Fort Sill, OK 73503-0311. Telephone numbers are DSN 639-5121/6806 or commercial (405) 442-5121/6806 or FAX 5127 with DSN or commercial prefixes. Email is famag@ionet.net. Material is subject to edit by the *Field Artillery* staff; footnotes and bibliographies may be deleted due to space limitations.

**REPRINTS:** *Field Artillery* is pleased to grant permission to reprint articles. Please credit the author and *Field Artillery*.

**ADDRESS CHANGES:** *Field Artillery* (ISSN 0899-2525) (USPS 309-010) is published bimonthly. Periodicals postage is paid by the Department of the Army at Lawton, OK 73501 and an additional mailing post office. POSTMASTER: send address changes to *Field Artillery*, P.O. Box 33311, Fort Sill, OK 73503-0311.

### 24-Hour Field Artillery Hotlines

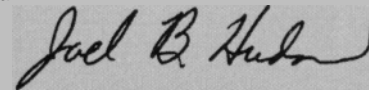
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## AFATDS: Learning to Interoperate—Not Just Interface



As the Army moves forward in its efforts to digitize the force, we find ourselves at the threshold of determining how to maximize the benefits of new technological possibilities. With the fielding of the advanced Field Artillery tactical data system (AFATDS) already underway, we in the fire support community continue to take the lead in digitizing the Army for the 21st century. However, realizing the potential benefits of automated systems will not be a quick process or one without collective, focused energy.

The value of digitization is its speed, reliability and interoperability. These characteristics will permit us to acquire, exchange and employ battlefield information far more effectively and efficiently throughout the force. However, as much as we desire interoperability, it could prove difficult to achieve. Until the Army becomes fully digitized, we will interface more than we will interoperate.

**The Challenge.** Determining how to best use information rather than how to merely pass it to each other in the Army—inevitably among the services—is the primary interoperability question. Potential users don't yet fully understand the information requirements of each battlefield operating system (BOS) and disagree on the best means of sharing this information. The opportunity for solutions will come from many sources.

**The Solutions.** The current version of AFATDS software permits only limited exchange of data with other BOS command and control systems, such as the all-source analysis system (ASAS). This deficiency is due to incremental development schedules and our inexperience in fully automated operations. The problem will diminish as software compatibility issues and common message formats emerge in follow-on software versions for each BOS system.

At the same time, you, the units in the field, have an opportunity to help refine AFATDS capabilities as we develop future software versions. As more and more units train with it, we'll discover capabilities and uncover limitations. By communicating with our maneuver counterparts through the maneuver control system (MCS) or transmitting and receiving targeting data with ASAS, needed improvements will quickly become evident. Software requirements should come from you, the users and operators, not the system programmers.

When different software versions appear, tactics, techniques and procedures (TTP) will change. Each follow-on version with enhanced capabilities could produce both new TTP and revisions to existing ones. Input for the software refinements and TTP also will come from the Army warfighting experiments (AWEs) conducted at the Combat Training Centers

(CTCs) and other sites. The school-house must contribute too—not just the FA School, but those from across the entire BOS spectrum.

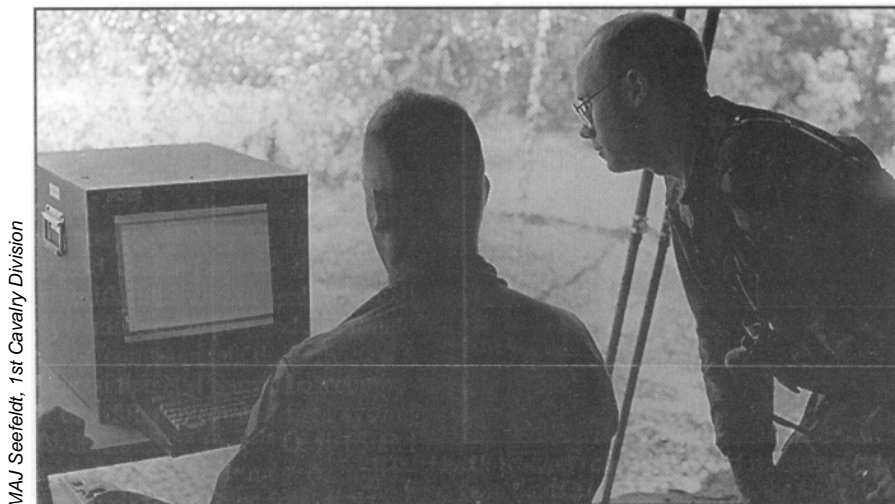
The how-to manual we use cannot be a single-source document. Interoperability is a combined arms issue; we can ill afford to have a narrow focus. There is still much work to do in this area.

These new opportunities do not come without costs. Training to a desired level of interoperability requires bringing the entire digitized battle staff on board. In addition to the fire support piece, we have to incorporate and exercise the other BOS representatives. With the Marine Corps committed to AFATDS, development of an automated link to the Air Force command and control system and the Navy's exploring AFATDS or a similar naval surface fire support (NSFS) system on ships, training becomes even more challenging. The fire support community must take advantage of every opportunity to work fire support into joint operations, exercises and simulations using our automated systems.

The time required to conduct unit-level sustainment training does not diminish with the fielding of AFATDS. Unlike sustainment training for the tactical fire direction system (TACFIRE), operators now must link with the other BOS or even joint systems. It's not enough to just be familiar with our own system. We've got to understand the information requirements of everyone in maneuver tactical operations centers (TOCs) at every echelon and work toward meeting those needs.

Fire support leaders must develop the system "smarts" to make this happen. We must be expert in the use of the fire support automated tools as a prerequisite to integrating them into emerging top-level command and control systems. We can't afford to maintain a "stove-pipe" approach to information dissemination.

Interoperability requires unity of effort among the BOS. This unity is even more important in the joint fight. Getting to the point of true BOS interoperability will not be easy, but the process offers endless possibilities. Ultimate success demands the attention of every fire support professional



MAJ Seefeldt, 1st Cavalry Division



## Response to "Air Power's Battlespace"

### "Deep" FSCL—An Unacceptable Limitation?

I read with great interest "Air Power's Battlespace" by Lieutenant Colonel Ricky Ales, USAF, in the May-June *Field Artillery*. In the article, Lieutenant Colonel Ales provides some excellent thoughts about integrating joint fires and the contributions of air power on the battlefield as well as insights into the Air Force perspective on air employment, a perspective "green-suiters," especially Field Artillerymen, need to be familiar with.

I have some concerns, however, with his discussion of the use and placement of the fire support coordination line (FSCL), in particular with his statement that "deep" placement of the FSCL "...may impose unacceptable limitations on the air component's ability to support operations short of the FSCL...." My questions—"What limitations?" and "How are they unacceptable and to whom?"

**What limitations?** First, Lieutenant Colonel Ales does not define what he means by "deep" vice "close-in" placement of the FSCL. Generally, the Air Force position is that the FSCL should be placed at the limit of range for most of our surface-to-surface attack systems, i.e., approximately 30 kilometers from the forward line of troops. Placing an FSCL this close may complicate the land commander's operational synchronization, limit his flexibility and ability to employ his assets (particularly aviation) and even endanger friendly forces. On the other hand, placing the FSCL at a depth where it best facilitates his operation can enhance the land commander's ability to coordinate and bring to bear all forms of combat power, including air power.

The only limitation the FSCL places on the air component and other supporting

commands is the requirement to have fires short of the measure approved by the establishing land commander—the commander responsible for conducting and synchronizing operations within that area and whose forces are operating in the area. This is crucial to coordinate the application of combat power and avoid fratricide.

In the majority of cases, fires delivered in this area will be planned or controlled by the ground forces; the air assets involved, generally, will be those allocated in support of these forces. If the air commander wants to attack targets short of the FSCL in addition to those already planned or nominated by the land commander, approval surely will be granted, provided the targets contribute to the land commander's operations and can safely be engaged. Our joint procedures and organization for integrating air with ground operations are in place and work—their practice has not resulted in insurmountable difficulties in the application of air short of the FSCL to date. The enemy is *not* given sanctuary from air attack as Lieutenant Colonel Ales suggests.

**How are the limitations unacceptable?** To determine an acceptable placement of the FSCL, we need to look to its doctrinal function. *Joint Pub 3-0 Doctrine for Joint Operations* tells us the joint forces commander (JFC) assigns areas of operations (AOs) to land and maritime force commanders based on the missions he assigns to those components. These AOs are generally defined by lateral, rear and forward boundaries. Within his boundaries, the land commander is the supported commander and is responsible for synchronizing all fires, maneuver and interdiction efforts and establishing the priorities and timing of operations. An

FSCL is a permissive fire support coordinating measure (FSCM) the land commander has the *option* of establishing within his boundaries (in consultation with superior, subordinate, supporting and affected commanders) to facilitate his operations—specifically to allow the expeditious attack of targets beyond the measure. The point is, the JFC determines what area the land commander controls and operates within, and the land commander may establish coordinating measures, such as an FSCL, within that area if and where they facilitate his operations.

AOs are not assigned to air component commanders (ACC). However, the JFC may task the ACC to be the coordinator for operations within an area, perhaps covering the entire theater *outside* the boundaries of the land and maritime commanders' AOs. Within this potentially expansive area, the JFC may give the ACC significant responsibility for setting priorities and synchronizing operations in support of the JFC's overall concept. By orchestrating his operation through the appropriate assignment of missions, AOs and coordinating authority, the JFC maximizes the contributions of his component commands to provide the greatest advantages and to best support his plan.

Bottom line: The FSCL is but one of a number of measures the land commander can employ to help coordinate and synchronize operations in his boundaries—as assigned by the JFC. The "acceptability" of its placement is determined only by the degree to which it contributes to his efforts in applying integrated combat power to accomplish his mission.

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## Just What is the *FA Journal*?

The US Field Artillery Association, a private, nonprofit organization, began publishing its own version of *Field Artillery* with the March-April 1996 edition, calling it the *FA Journal*. Except for the addition of advertising and some Association news items (in lieu of the "Forward Observer" newsletter), the contents

of the two magazines are the same. (It is against Federal law for the Army's *Field Artillery* to accept advertising.) The *FA Journal* also is printed on a better grade of paper using more color. The *FA Journal* is available to Association members only (see the "Subscriptions" paragraph in the inside front cover).

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Editor





General Ronald R. Fogleman, Chief of Staff of the Air Force

# Making the Most of Air Power

Interview by Patrecia Slayden Hollis, Editor

**Q** *What is air power's role in modern warfare?*

**A** Air power's top priority is to gain control of the air—as much as we can, as fast as we can. Removing the enemy's theater-ranging attack capabilities, whether aircraft or missiles, allows our ground and sea forces freedom of action without fear of a potentially devastating enemy air attack.

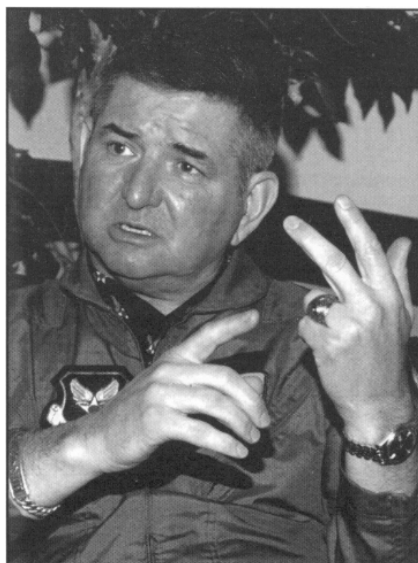
At the same time, air power can attack targets throughout enemy territory to establish advantages for our forces: The insightful joint force commander will capitalize on air power's strengths—speed, theater-ranging capabilities, freedom of maneuver, precision, lethality and situational awareness—to gain every advantage in pursuit of rapid and efficient victory.

**Q** *In future operations, do you foresee closer coordination between the JFLCC [joint force land component commander] and JFACC [joint force air component commander] on deep targets?*

**A** Yes. Clearly, weapons systems developed by both the Army and the Air Force can be deployed in the deep arena. So, to get the optimum amount of firepower in the right place at the right time for the theater commander, the Army and Air Force are going to have to coordinate closely. This is fairly well explained in joint doctrine.

We have good a beginning in joint doctrine, but there is room for improvement. Doctrine has to evolve; otherwise, it becomes dogma. Doctrine evolves as a result of experience, technology and our vision of the future—all those things we see coming down the road. The challenge is to ensure our doctrine follows through, evoking the full potential of those weapon systems and that those suitably support the doctrine.

For example, if you have doctrine that calls for employing a weapon system that does not exist, that does not exist in



the numbers required or is too expensive to employ, then that weapon is not of practicality on the battlefield, and doctrine is deficient. Based on that deficient doctrine, people will train improperly and be taught to depend on a system that will not be capable of influencing the battle as they think it will.

Any discussion about the land and air component commanders' abilities to influence the deep battle needs to be tempered by practicality. What do we have in the inventory? How much does it cost per shot to put certain kinds of rounds down range? How much lift does it take to get the firing systems into a theater? Certainly, prepositioning helps the latter.

But there is more than one way to solve a problem. The more we know about each other's weapon systems, the more we know about inventories and suitability, the better we'll be at determining the best joint means to get the job done.

By joint doctrine, the air component commander normally manages the CINC's [commander-in-chief's] airspace. For this reason alone, the two component commanders must coordinate closely on deep targets.

**Q** *Should Army deep attack systems, such as the AH-64 helicopter with a radius in excess of 200 kilometers and ATACMS [Army tactical missile system] with a range of more than 100 kilometers (in 1998, a range of 300 kilometers with Block IA), be on the ATO [air tasking order] and tasked by the JFACC?*

**A** Planned ATACMS missions should be on the ATO. The ATO provides the total view of what's going to happen in the deep battle. But the components plan their own operations and put their operations on the ATO by providing their plans to component liaison sections that reside in the air operations center [AOC].

In terms of the JFACC tasking those Army assets, that's the CINC's or task force commander's call. But the issue isn't whether or not the JFACC should task systems such as ATACMS, but whether or not the JFACC's command and control tool—the ATO—needs to reflect all systems that will impact the deep battle.

Battlefields are not linear from several perspectives. They are not linear from a geographic perspective and certainly not from a time perspective. A comprehensive ATO is the only document coming out of the targeting process that shows the total target servicing plan in time and space for the deep battle. All systems affecting that time and space should be on the ATO. But we also need to recognize that the ATO is just a blueprint. We can readily adjust from it to take advantage of opportunities we haven't foreseen.

The Army's battlefield coordination detachment and the naval-amphibious liaison element play pivotal roles in helping the components work together, adapt quickly and keep risks to prudent levels.

**Q** *How should the fire support coordination line (FSL) be employed?*

**A** Doctrine pretty well addresses the FSCL. The big argument about the FSCL is how far out it should be established. When you establish the FSCL too far out, you literally cut the joint task force commander's ability and flexibility to employ the air component's air power in many respects. On the other hand, if you establish the FSCL too close to troops, you could impact the land component's ability to maneuver, etc.

One advantage of positioning the FSCL close to troops would be to allow air power the freedom and flexibility to protect early entry ground forces. Such a ground force could then be relatively light without a lot of organic firepower. In that situation, it would be to the land component commander's benefit to have his FSCL in fairly close and take advantage of the air assets in the theater. For example, in the Korean War, FSCLs were sometimes kept inside 300 meters to maximize firepower and minimize coordination delays.

As the situation evolves and more ground forces with organic assets close, it may be advantageous to increase troop safety and poise our forces for offensive movement by moving the FSCL deeper.

But if the FSCL is established too far out, you slow and reduce air power's access to enemy targets. This isn't so much a challenge for the air component commander as it is a challenge for the CINC. If the FSCL is so far forward that ground troops don't have the sufficient organic sensors and shooters to cover the targets, then you give the enemy a sanctuary.

Air component assets can't attack targets inside the FSCL without tremendous coordination. The last thing we want is to give an enemy sanctuary on the battlefield.

So, placement of the FSCL must be flexible based on the situation.

The best construct is in Korea; it's a construct that has remained through a series of CINCs in a theater where rapid execution of a war plan is a continuous possibility. The construct in Korea is a fire support coordination line augmented by a deep battle synchronization line [DBSL]. The DBSL sets a boundary for the land component commander and, having been in Korea as the air component commander, I can tell you it works.

[Editor's Note: the DBSL in Korea establishes the boundary of the land component commander's operations at a maximum of 40 to 50 kilometers from his line of troops. The land component commander can set the FSCL as a doctrinal permissive measure, but normally only out to about 20 kilometers from his troops. The air component commander is the coordinating authority for all attacks between the FSCL and DBSL.]

**Q** *Sir, isn't that a model specifically tailored for Korea because of our emphasis on air power in that theater?*

**A** It's a model we should use in all theaters—I can't imagine a theater in which it wouldn't apply. For example in the Central Command AOR [area of operation], it's as applicable, if not more so, because of the size of the theater. We'll have a lot of air power in any theater in which we engage an enemy, so the DBSL construct makes sense.

**Q** *For the first time in joint doctrine, rotary-wing, in addition to fixed-wing, aircraft are listed as CAS [close air support] assets. What is your vision of Air Force CAS support for the Army of the 21st century?*

**A** CAS is an Air Force core mission; however, when you need CAS, something has gone terribly wrong with the battle plan. CAS has always been a high priority for the Air Force, and we'll continue to provide as much CAS as required when American lives are in danger.

We're trying to develop concepts, doctrine and strategy to keep our soldiers from needing CAS. It's better to disable enemy forces before CAS becomes necessary—to apply lethal air strikes against enemy ground forces to diminish their combat effectiveness before they engage US ground forces. But when CAS is necessary, we'll pitch in with all the weight available.

**Q** *In the near future, do you see more emphasis on Army aviation for CAS missions?*

**A** Of course, it depends on the situation, but helicopters do offer advantages as CAS assets. In many cases,

METT-T [mission, enemy, terrain, troops and time available] will make the modern attack helicopter the best CAS platform on hand.

As the Army fields more capable attack helicopters, such as the Apache, the lethal support they provide ground forces increases enormously. Attack helicopters have the ability to hide in terrain and foliage and watch a target area for extended periods with powerful sensors. That gives helicopters the ability to find well-concealed targets and apply their lethal array of munitions with great effect.

**Q** *CTAPS [contingency theater automated planning system] automates Air Force mission planning, including the ATO, weaponeering and airspace management. What do you see as the benefits of the initiative to connect CTAPS with the Army's AFATDS [advanced Field Artillery tactical data system]?*

**A** Interoperability—we both benefit from the ability to exchange information on what the target sets are, how they're going to be serviced, when, and with which weapons. CTAPS provides a fairly comprehensive collection of intelligence and mission planning data as well as the system that ultimately produces the ATO.

Connectivity between CTAPS and AFATDS will facilitate coordination for joint operations. It will link Army fire direction capabilities with the AOC and ASOC [air support operations center].

To help establish this connectivity, we have funded additional CTAPS sets. We are also working the CTAPS-AFATDS link in joint exercises. All this is aimed toward more clearly and closely linking us on the battlefield.

**Q** *What impact do you see advances in joint command and control systems having on the joint battlefield?*

**A** The information revolution we all talk about will affect the joint communications, command and control area more than any other. For the first time, all services will take advantage of available technology to share the complete battlefield picture.



The Air Force has had the digitized air picture for years, but we keep working to make the picture better. The air operations center gets feeds from AWACS [airborne warning and control system], from ground radar and other systems. When you correlate this information, you get a very valuable picture of what is going on in the theater air battlespace.

The Navy has a system called JMCIS [joint maritime command information system], which gives a fairly comprehensive naval and air picture and, via satellite, the ground picture. JMCIS, including its predecessor JOTS [joint operational tactical system], has been around for a while.

What has been missing is the comprehensive picture of the ground surface forces. That's where the digitization of the Army is really paying off.

We developed the combined air operations center at Vicenza, Italy, that orchestrated NATO air operations over the Balkans. This includes such operations as Deliberate Force where we launched precision air strikes against high-value Bosnian Serb targets to compel the Serbs to cease hostilities and negotiate seriously.

From the Vicenza center, the CINC can see where friendly and enemy ships and air assets are for all NATO operations. We don't have automatic information feeds yet, but at least we have the picture. As we are able to share digitized information via automatic feeds used in conjunction with GPS [global positioning system] technology, the real-time picture will come together. Theater commanders truly will understand what's happening, as it happens, on the battlefield.

**Q** *In the past, the Army and Air Force have had some pretty heated discussions about roles and missions. Although we have come to agreements on many points, what do you see as obstacles remaining to our joint effectiveness?*

**A** The remaining obstacles are the ones we've always had: a general lack of understanding of what each can do and how each does it. In times of declining resources, too often services suspect actions taken by another service as, somehow, motivated by the resource allocation process and ultimately having

negative consequences down the road. The limitation of resources, unfortunately, isn't going to change—it's something we're going to have to live with.

But if we understand what we each do and we've built a general trust among our people at all levels, then we can overcome almost any obstacle. That's why it's so important we train together as often as possible.

It's also important we train in accordance with doctrine so we'll all be on the same sheet of music when it really counts—what we do is too important not to be. We must not tolerate units conducting joint training with separate agendas; we have joint laboratories and agencies to test new ideas and concepts.

So in the end, trust becomes the biggest factor in mutual cooperation. And trust is built by working together and making the effort to understand one another. If we didn't work together, we could waste resources attacking the same targets; worse, we could interfere with one another; worse still, we could endanger each other.

Going the other way, we can provide mutual support, create advantages for each other and seek the best overall result regardless of how big a role we individually play at any particular point. When you think about the potential our armed forces have when they work together, you realize how important working together is.

**Q** *What new capabilities would the F-22 bring to modern warfare, and how would it enhance joint operations?*

**A** The F-22 is the air superiority fighter of the 21st century. It will be able to defeat the most sophisticated enemy defenses to seize control of the air over the theater of operations. The aircraft will offer maneuverable stealth, the ability to go supersonic without going into afterburner and highly sophisticated, integrated avionics.

These avionics make it one of the few truly revolutionary weapon systems under development. They'll give the pilot unprecedented situation awareness. In the end, they'll enable him to fight outnumbered and win. The F-22 also will provide a precision attack capability with the internal carriage of two joint direct attack munitions.

Gaining air superiority is not just operationally important; it's also a strategic imperative for protecting American lives throughout a crisis or conflict. It is the precursor for dominant maneuver. Strategic attack and interdiction—crucial to the outcome of any battle—are not possible without air superiority. Effective surface maneuver is impossible without it. So is efficient logistics. No meaningful military undertaking is possible.

The bottom line is everything on the battlefield is at risk without air superiority.

**Q** *What message do you want to send Army and Marine Redlegs stationed around the world?*

**A** We, as members of the US armed services, have a tremendously demanding profession. The more time we spend working or training in a joint environment, the more interoperable we'll be.

The proper use of air power combined with ground fires and surface maneuver creates a synergistic effect and a decisive advantage for America. After all, that's what we're all about.



**General Ronald R. Fogleman has been Chief of Staff of the US Air Force since October 1994. In his previous assignment, he was the Commander-in-Chief of the US Transportation Command and Commander of the Air Force's Air Mobility Command at Scott AFB, Illinois. General Fogleman also served as Commander of the 7th Air Force, Deputy Commander-in-Chief of the United Nations Command and Deputy Commander of the Combined Forces Command in Korea. Among other jobs at the Pentagon, he was Director of Programs and Evaluation and Chairman of the Air Staff Board for Headquarters, US Air Force. He commanded the 836th Air Division at Davis-Monthan AFB, Arizona, and 56th Tactical Training Wing at MacDill AFB, Florida. He is a Command Pilot with more than 6,300 flight hours. Among other aircraft, he has flown the C-17, C-5, UH1 Helicopter, A-10, F-16, F-15 and F-4. He is a graduate of the Army War College at Carlisle Barracks, Pennsylvania.**





# Massing Combat Effects: 1st Cav Fire Support TTP

by Major General Leon J. LaPorte and Colonel Raymond T. Odierno

**D**uring a recent III Corps simulation exercise, the 1st Cavalry Division, Fort Hood, Texas, experimented with some new approaches to combat in a tough theater of operations. Several factors in the scenario caused us to revise our tactics, techniques and procedures (TTP) and redefine how we conduct fire support at the division level. First, the simulation scenario had unique mission, enemy, terrain, troops and time available (METT-T) considerations. Second, the division commander had increased

intelligence-gathering systems available. Third, we learned to take full advantage of the advanced Field Artillery tactical data system's (AFATDS) ability to distribute fire missions quickly across the fire support spectrum.

Based on the corps' and our own intelligence preparation of the battlefield (IPB), the combination of terrain and enemy required us to rethink how to plan and execute division operations in this area of operations (AO). We were confident our M1A2 tanks and M2A2 Bradleys could

win any direct fire engagement; our concern was the enemy artillery's ability to destroy our maneuver forces with artillery in very restrictive terrain.

The tendency in our Army, as well as in the 1st Cav, is to plan the infantry, armor and cavalry scheme of maneuver and then have the fire support coordinator (FSCoord) or officer (FSO) develop a scheme of fires that supports the maneuver plan. Often this is manifested by separate intent statements, one



MAJ Larry Seefeldt, 1st Cavalry Division

for maneuver and one for fires. The METT-T factors we faced in this exercise caused us to realize how dependent we were on timely and accurate fires. This led us to shift the paradigm from fires supporting the scheme of maneuver to maneuver supporting the scheme of fires.

This article discusses some of the lessons we learned during that process—lessons about the enemy, terrain and troops available; how the mission focused artillery fires, to include counterfire; and some *First Team* TTP developed for the fight.

## Enemy

During this exercise, we fought an artillery-based opposing force (OPFOR) order of battle. The adversary was an army that has long used maneuver to exploit the effects of artillery. His fire support system has three distinctive

subsystems: the delivery means, observers and command, control and communications that link the two.

The OPFOR's delivery systems are dominated by two exceptional "long-shooters": the 170-mm Koksan gun and the 240-mm M1991 multiple rocket launcher (MRL). The Koksan gun's unclassified range of 50 kilometers and the 240-mm MRL's unclassified range of 43 kilometers provide the OPFOR a significant standoff range advantage.

In addition, we consistently faced more than 1,000 artillery pieces at any time and well over 2,000 in the exercise; we learned the OPFOR's significant numerical tube-to-tube advantage is the most critical factor in the correlation of forces matrix (COFM).

The OPFOR relies on relatively unsophisticated observers who straddle the limited highway networks and call

fires onto *his* high-payoff targets: multiple-launch rocket system (MLRS) launchers, target acquisition radars, air defense systems and attack helicopters along with our forward area rearm/refuel points (FARPs). Their observers and shooters proved to be the most difficult for friendly fires to destroy.

The enemy is quite adept at using burst transmissions and hard wire communications. The only way to adequately address this dismantled threat is to conduct continuous and aggressive counterreconnaissance throughout the AO.

The OPFOR also employs a significant dismantled infantry force to maximize the use of the restrictive terrain. A common tactic is to temporarily block the lead maneuver element, form a kill sack and call for all available fires from the regimental artillery groups (RAGs),



1st Cavalry Division Paladin (left) stands ready to provide indirect fires to mass combat effects with the M1A2 tank (top) and M2A2 Bradley (bottom).

divisional army groups (DAGs) and corps artillery groups (CAGs).

We knew we had a significant advantage in weapons systems and training; our Bradleys and Abrams tanks would decisively win any direct fire engagement. Therefore, we focused our tactics on defeating his most challenging killing system—artillery.

## Terrain

What distinguishes this exercise theater more than any other factor is the restrictive terrain. Off-road maneuver by a heavy division is extremely limited, and the AO has few usable roads. A typical zone had two usable routes. This required friendly dismounts to clear the ridge lines that paralleled the friendly avenues of approach.

The terrain also prevents mutual support from adjacent units, an advantage we're accustomed to in other theaters. The lack of adequate road networks prevents the rapid maneuver of one unit to support another, and the narrowness of the defiles often prevents the maneuver commander from massing the fires of more than one company at a time. Consequently, the division commander rigorously enforced the guidelines found in *FM 71-100 Division Operations*, which discusses the importance of massing the effects of combat power as opposed to massing combat systems.

In this theater, the ability to mass combat effects is largely dependent on artillery, close air support (CAS) and attack helicopters. Properly positioned artillery provides mutual support, as opposed to the more traditional concept of mutual support by maneuver killing systems.

The restrictive terrain provides very few battery-sized artillery position areas because of slope and site-to-crest problems. Our division terrain team provided multi-spectral imagery processing system (MSIPS) and terra-base products that highlighted the few tenable firing positions. These products were extremely valuable as we templated likely enemy firing positions.

## Troops Available

As the corps' main effort, the 1st Cavalry Division had some significant combat power in addition to its organic brigades. Attached were an armored cavalry regiment (ACR), a light infantry brigade, a military police battalion and an attack aviation battalion. We also had two Field Artillery brigades reinforcing (R)

and one Field Artillery brigade with a general support reinforcing (GSR) mission. These corps artillery assets brought six MLRS and three cannon battalions to the fight, significantly increasing our ability to mass fires.

## Mission

To mass the effects of our combat power, we optimized the Field Artillery assets available to the division. Throughout the orders process, we highlighted the artillery organization for combat; we did not want the artillery organization for combat lost in an annex that only artillerymen read. The purpose was to paint a better picture of the combat power available to the brigade combat team (BCT) commanders and emphasize their responsibility for moving, positioning and securing the artillery.

Second, we determined that the only method of defeating the OPFOR artillery was to reduce its significant range advantage (standoff). Therefore, maneuvering artillery well forward in zone was critical. During the war-gaming process, we considered the movement and positioning requirements of all artillery before we considered maneuvering our ground brigades. We developed position areas for artillery (PAAs) and then built maneuver brigade graphics to support the artillery's occupation of those PAAs.

With the fielding of the M109A6 (Paladin) and MLRS, we no longer limited ourselves to the stationary, linear firing positions. For example, the position area for the Paladin is two kilometers by two kilometers and for MLRS, three kilometers by three kilometers.

Artillery was emphasized in the division commander's intent (see Figure 1). The intent statement from the our initial plan focused the BCT and captured the importance of artillery movement and positioning. Artilleryman Napoleon Bonaparte's Maxim Number 47 said, "The infantry, cavalry and artillery cannot dispense with each other. They must be positioned in such a manner as to always support each other."

The maneuver and positioning of artillery was further highlighted in the "Concept of the Operation" and "Tasks to Subordinate Unit." Here are two examples:

Concept of the Operation—3ACR  
ATTACKS IN ZONE AS DIVISION  
MAIN EFFORT TO PENETRATE AND  
SECURE PAA 3A1.

Task to Subordinate Units—2BCTINTEGR  
ATES 1-171 FIELD ARTILLERY

BATTALION INTO UNIT MOVEMENT  
BEHIND THE LEAD TASK FORCE  
AND CLEARS PAA 2B1 FOR  
OCCUPATION NLT H+4.

By giving a specified task and purpose to the BCT commanders, we clearly portrayed the commander's intent and focused their efforts. The PAAs were selected during the war-gaming process, and responsibility for supporting them during various phases of the operation was assigned to the different BCTs.

We also recognized the importance of force protection for our critical fire support assets. The significant enemy special operations force (SOF) threat was oriented on killing high-payoff target systems, such as our MLRS and radars. Therefore, we devoted considerable protection assets to these units. Although it reduced the maneuver assets available for the close fight, we considered this force protection an investment in combat power.

**Purpose:** Attack to destroy OPFOR [opposing force] in zone to PL YYY [Phase Line YYY] and, on order, to PL ZZZ, leading to the isolation of (city).

**Method:** As the corps' main effort, we must be prepared to attack immediately upon passage-of-lines. Rapidly penetrate the enemy's defenses by infiltrating his security zone and quickly destroying three divisions. Aggressive reconnaissance, well forward, must identify and report enemy obstacles. Gain and maintain contact with the enemy. OUR MANEUVER IS PLANNED TO ADVANCE OUR ARTILLERY INTO SECURED FIRING POSITIONS FROM WHERE WE CAN ATTACK THE ENEMY ARTILLERY IN DEPTH AND REDUCE HIS RANGE ADVANTAGE. THIS ARTILLERY-ORIENTED MANEUVER, COMBINED WITH THE MASSING OF LETHAL AND NON-LETHAL FIRES, DEEP ATTACKS BY OUR MLRS, AH-64s AND AIR INTERDICTION WILL ALLOW US TO DEFEAT THE ENEMY'S ARTILLERY—HIS TACTICAL CENTER OF GRAVITY.

**Endstate:** Our division has destroyed the first and second operational echelons in zone, including all organic and supporting artillery. The division is positioned along PL YYY at 70 percent strength, prepared to conduct offensive operations to PL ZZZ.

Figure 1: 1st Cavalry Division Commander's Intent



We attached one mechanized platoon to our divisional MLRS battery and another platoon to protect the two Q37 radars. BCT commanders protected the Q36 radars. Our reinforcing brigades each came to us with six Avengers, four Chaparrals and two Allied infantry companies for protection. The aggregate cost for enemy high-payoff target protection was two mechanized infantry battalions.

## The Counterfire Battle

Over the years, several means of providing counterfire have been established and tested, and most have been successful. Improvements in our capability to disseminate intelligence down to the division level have significantly enhanced our ability to target and fight the counterfire battle. Improved intelligence and AFATDS mean we can quickly prioritize and then digitally transmit fire missions.

These new capabilities caused us to shift our counterfire TTP development. We subdivided counterfire into two separate and distinct missions: proactive and reactive. The division artillery tactical operations center (TOC) executed proactive fires. The natural link to the division main command post (DMAIN) through the fire support element (FSE) facilitated the execution of these fires. One of our reinforcing units, the 75th FA Brigade from Fort Sill, was responsible for reactive fires.

**Proactive Counterfire.** This is defined as destroying the enemy artillery system *before* it can bring its fires to bear on the fight. The success of our proactive counterfire effort is directly attributable to the division's ability to manage the suite of intelligence assets and quickly incorporate targetable data into the decide-detect-deliver-assess (D<sup>3</sup>A) methodology. We found we could best accomplish this at the DMAIN. The key was the organization and management of data.

The ability of the commanding general, chief of staff, division artillery commander and aviation brigade commander to readily gain access to targetable data and make timely decisions was crucial to fighting the proactive counterfire fight. AFATDS played an important role. With its ability to quickly disseminate targets and fire plans and then allocate fire missions, AFATDS allowed us to attack critical enemy assets pre-emptively (see Figure 2).

Human intelligence (HUMINT) resources proved valuable; the combined

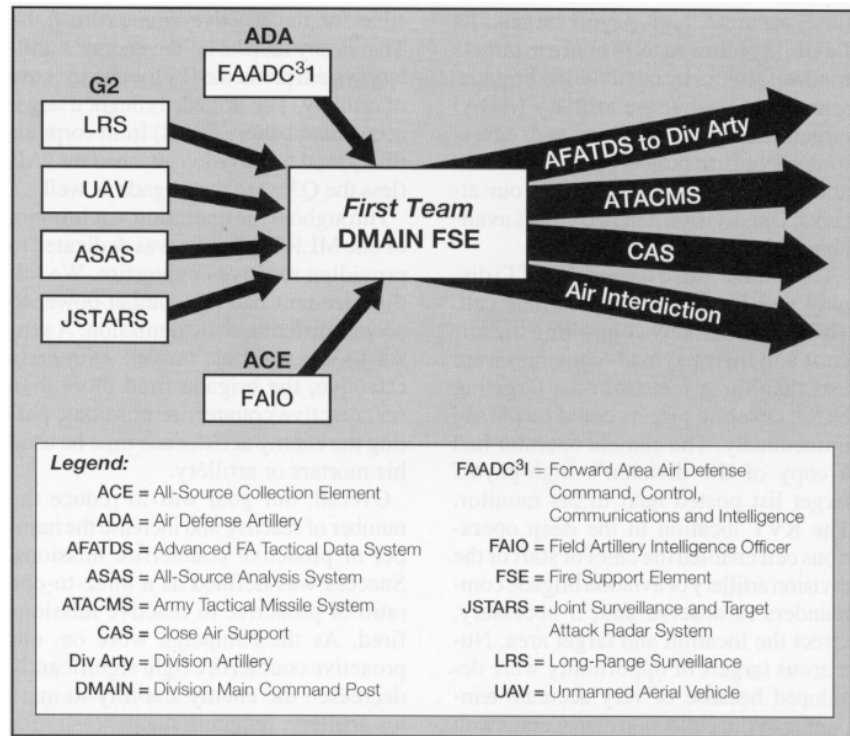


Figure 2: Proactive Counterfire Mission Flow

input from US and other SOF, the corps' long-range surveillance detachment (LRSD) and combat observation and lasing teams (COLTs) provided several key targets and instantaneous battle damage assessment (BDA) reports.

Positioning the LRSD liaison officer (LNO) in the DMAIN FSE enabled us to quickly attack targets. In one case, the enemy massed six battalions of 240-mm MRLs approximately 34 kilometers from our forward-most artillery units. A US SOF team observed this and reported it as a high-payoff target.

The report was received in the all-source collection element (ACE) in three minutes, and the Field Artillery intelligence officer (FAIO) passed it immediately to our targeting NCO. Although the target was out of range of our artillery, the targeting NCO passed it to corps as an Army tactical missile system (ATACMS) nomination. While waiting for the approval and clearance of airspace, the deputy fire support coordinator (DFSCOORD) coordinated with the division artillery S3 and repositioned an MLRS unit to range the target. ATACMS missiles fired within 20 minutes, followed by MLRS rockets, destroying 57 240-mm MRLs.

The joint surveillance and target attack radar system (JSTARS) also contributed to our targeting capability during the exercise. JSTARS captures moving

target indicators (MTIs) and displays and updates them graphically. We positioned the JSTARS ground station module (GSM) so the targeting NCO in the FSE could observe it.

JSTARS doesn't always provide targetable data, but it can cue other assets, such as unmanned aerial vehicles (UAVs), to confirm targets. JSTARS also provided targets for harassment and interdiction fires.

In one technique, the assistant division engineer analyzed the GSM's grid coordinate and recommended where to emplace scatterable mines in conjunction with a natural obstacle. After gaining approval to use family of scatterable mines (FASCAM), the minefield would be Field Artillery-delivered area denial artillery munition (ADAM) or remote anti-armor mines (RAAMS) munitions, helicopter-delivered Volcano, or Air Force-delivered Gator bombs. The effectiveness of the obstacle could be monitored by observing the MTIs on the JSTARS GSM.

Once the target was confirmed, the JSTARS GSM provided a 10-digit grid and allowed us to attack the enemy simultaneously and incrementally by CAS, attack helicopters and indirect fires. This technique proved to be extremely effective.

The UAV is an effective sensor platform for the division. It produced real-time,

accurate, high-payoff targets. Its flexibility allowed us to confirm targets for deep attacks by our aviation brigade, search for air defense artillery (ADA) targets along the ingress and egress routes, confirm targets by other sources and assess the effectiveness of our attacks. Our division had two UAVs available 16 hours a day.

The remote video terminal (RVT) display was in our deep operations cell. The pilots remotely controlling the aircraft and their payload (cameras) were less than three feet from the targeting NCO, ensuring targets could be passed immediately. The camera operator had a copy of the division's high-payoff target list posted next to his monitor. The RVT location in the deep operations cell enabled the chief of staff or the division artillery or aviation brigade commanders to observe and, if necessary, direct the location and target area. Numerous targets of opportunity were developed because of very accurate templating by our collection managers as well as real-time BDA. This enabled us to decide quickly and accurately if we needed to re-attack as part of the D<sup>3</sup>A process.

Also, the forward area air defense command, control, communications and intelligence system (FAADC<sup>3</sup>I) provided targets as it observed the taking off and landing of fixed- and rotary-wing aircraft. The air defense officer provided those grids to our targeting NCO, and we either attacked the aircraft immediately or confirmed them with UAVs.

A well-thought-out D<sup>3</sup>A process developed during war-gaming allowed us to decide in advance which targets warranted immediate engagement and which required confirmation. We must add, however, that we chose to err on the side of shooting questionable targets—as long as they were cleared—rather than not shooting targets.

The DMAIN FSE was the coordinating node for all targets and truly fought in a proactive manner. The AFATDS sent digital transmissions to the division artillery fire control element (FCE), which immediately passed them to a R or the GSR brigade. Additionally, AFATDS tracked active and inactive missions on the screen. AFATDS's ability to assign values to targets, which ensured rapid attack, coupled with improved communications enabled us to mass fires on targets with remarkable speed and precision.

**Reactive Counterfire.** The 75th Field Artillery Diamond Brigade was responsible for the reactive counterfire fight. That is any attacks on the enemy's artillery system predicated by the enemy's

use of artillery. The brigade brought a target acquisition battery (TAB) from corps artillery, and the division attached its TAB (less the Q36s) to the brigade as well.

Throughout the operation, a minimum of one MLRS battalion was dedicated to providing reactive counterfire. We felt this size unit had the combat power to accomplish this critical mission. A sensor-to-shooter link proved extremely effective; the brigade fired more than 650 reactive counterfire missions, putting the enemy at risk each time he used his mortars or artillery.

Overall, our goal was to reduce the number of reactive and increase the number of proactive counterfire missions. Success was defined as a three-to-one ratio of proactive to reactive missions fired. As the campaign wore on, our proactive counterfire fight significantly decreased the enemy's ability to mass his artillery, reducing the necessity for reactive counterfire. The dual reactive and proactive counterfire fights systematically defeated the enemy's indirect fire capability.

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## Fire Support TTP

Our inherent intelligence capabilities at the division level coupled with the digitization of the fire support system using AFATDS caused us to develop and further refine some TTP. Although none of these are new concepts, our ability to refine and execute them improved substantially.

**Artillery Raids.** As stated in *FM 6-20 Support in the AirLand Battle*, "Maneuver is the movement of forces in relation to the enemy to secure positional advantage. It is the means of concentrating forces at the critical point to achieve surprise, psychological shock, physical momentum and moral dominance which enable smaller forces to defeat larger ones."

Our concern over the enemy's artillery range advantage forced us to assume some risk and maneuver artillery to conduct raids. The criteria for determining whether or not to conduct the raid was if we could locate high-payoff targets accurately enough. Before crossing the line-of-departure in our initial attack, we discovered 240-mm MRLs that were about 12 kilometers out of range. We determined the potential payoff was well worth the risk and employed an MLRS battalion from our other reinforcing brigade (45th Field Artillery Brigade, Oklahoma Army National Guard) to conduct the raid.

After refining the targets to be attacked, we selected PAAs that would allow us to close the range disparity and destroy the targets. Our first concern was force protection for the MLRS battalion—we knew we had to husband our critical long-range artillery assets.

As part of our counterreconnaissance force, we infiltrated two companies of light infantry into the enemy's territory. They had the additional task of identifying tenable PAAs from which to fire during the raid.

The MLRS battalion had its habitual force protection package of two Avengers, two Chaparrals and one infantry company. This was augmented with a mechanized task force and an engineer company whose sole purpose was to clear the route and PAA for the raid unit.

The result of the raid was the destruction of 10 240-mm MRLs, 57 combat vehicles, eight mortars and six ADA systems with no loss of friendly artillery. From this mission we established new TTP, and incorporated standing operating procedures (SOP) into the division tactical SOP (TACSOP).

**Penetration Box.** This concept was first developed by Lieutenant General Thomas A. Schwartz, the III Corps commander, when he commanded the 4th Infantry Division (Mechanized) at Fort Carson, Colorado. The penetration box focuses all intelligence and fire support resources at the critical point in time and space to destroy the enemy in order to gain a decisive advantage.

During initial war-gaming, the pen box is established at the intended point of penetration of the enemy defenses. Its exact location is continually refined, based on the enemy's disposition. The division commander's collection capability then identifies all targets in the area. Finally, all fires available in the division and corps are positioned to attack those targets with the end state's being the rapid defeat and penetration of the enemy.

Pen box fires are executed in three phases (see Figure 3). Phase I is the attack of all enemy artillery that can influence the pen box, such as the artillery associated with the RAGs, DAGs, CAGs and, sometimes, battalion artillery groups (BAGs). This requires forward positioning of MLRS assets and the use of a nominal number of

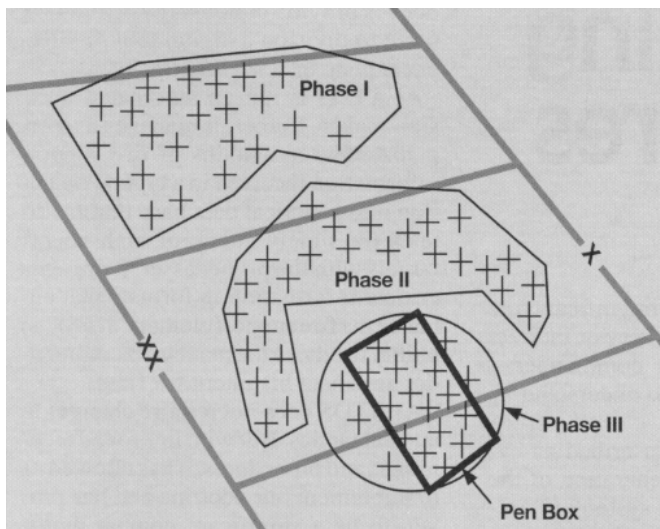


Figure 3: Penetration Box

ATACMS from corps artillery. This phase generally lasts 30 minutes, depending on the number of targets.

Phase II fires attack all command and control nodes, counterattack forces and observers in and around the pen box that can influence friendly maneuver. Phase III is an intense attack of all targets in the pen box with cannon and MLRS fires to neutralize killing systems. This phase lasts approximately one hour. The timing is such that the friendly maneuver units should be within direct fire range as the last round of Phase III fires lands.

The orchestration of intelligence assets and the synchronization of COLTs and Kiowa Warriors for Copperhead fires was a monumental task. The planning was conducted in the deep operations cell under the guidance of the chief of staff and division artillery commander and executed from the division tactical command post (DTAC).

One of the essential elements of our pen box methodology was the role of the maneuver brigade commander. He selects the exact grid locations for the pen box and establishes and executes the trigger to begin the planned two-hour program of fires.

The results of our pen box execution is equally as important as the process we used. The first pen box we fired was in support of the ACR's attack of the enemy's main defensive belt. Sixteen units fired 82 missions (2,361 rockets) and destroyed 28 artillery systems, 96 combat vehicles, 32 ADA systems and six antitank systems. We eliminated several of the enemy killing systems but, more importantly, allowed the ACR to maneuver quickly through the main

defensive belt with no loss of momentum or combat power. This rapid maneuver disrupted the enemy's tempo and allowed us to continue to maneuver artillery well forward to attack his long-range systems.

AFATDS played a key role in this process. Its ability to simultaneously prepare fire plans and conduct current operations

and then quickly disseminate those plans allowed us to fight the current fight and prepare for the next one.

**Red Team Rain.** The last TTP developed and refined was Red Team Rain. The division initially developed this concept to preclude the enemy from using a blocking force to temporarily halt our maneuver brigades and then kill us with his artillery.

Red Team Rain consisted of indirect fires from all assets available to the division. This included all direct support (DS), R, GSR and general support (GS) units supporting the division, except for the one MLRS battalion dedicated to executing reactive counterfire. Initially, we executed Red Team Rain to maintain momentum and deny lucrative targets to the OPFOR by engaging his blocking force.

We expanded the Red Team Rain concept to the defense, engaging enemy maneuver forces massing for the attack. Our massing artillery fires can destroy entire enemy battalions and regiments. One Red Team Rain mission during our exercise destroyed 25 tanks, 46 BMPs, 18 ADA systems and 387 troops—a regiment.

The cost of executing this mission significantly drains available artillery and has the potential to disrupt established fire plans. Because of this, we established a strict procedure for its use. First, the target must be stationary and be a threat to the division's mission. Second, a brigade commander must request it on the division command net (FM). Third, only the commanding general or the assistant division commander for maneuver can approve it. We fired Red Team Rain on

13 occasions and destroyed a minimum of a battalion of enemy combat vehicles each time.

## Conclusion

The exercise discussed in this article enabled us to hone our warfighting skills, particularly in terms of integrating fire and maneuver. We hesitate to draw too many conclusions from the results of a computer simulation, but we are convinced that our emphasis on moving and positioning artillery is appropriate.

Counterfire was the most critical fire support task. Our emphasis on force protection at the division level, harnessing and focusing intelligence assets and the digitization of the fire support system allowed us to proactively and aggressively attack enemy forces while reducing friendly losses. Our habitual training relationship with the corps artillery reinforced this capability.

All divisions have TTP, such as artillery raids, pen boxes and Red Team Rain. These were particularly successful for us because of the time dedicated to integrating them into the campaign. Across the force, we must continue a dialogue as we develop TTP to maximize technology for all combat functions.



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**Colonel Raymond T. Odierno commands the 1st Cavalry Division Artillery at Fort Hood. He also commanded 2d Battalion, 8th Field Artillery, 7th Infantry Division (Light) at Fort Ord, California, and Fort Lewis, Washington; and A Battery and Service Battery of the 3d Battalion, 8th Field Artillery, 18th Field Artillery Brigade, Fort Bragg, North Carolina. Among other assignments, he was the Executive Officer for the 3d Armored Division Artillery during Operations Desert Shield and Storm, and Executive Officer for the 2d Battalion, 3d Field Artillery, also in the 3d Armored Division, Germany.**



# AFATDS: Digitizing Fighting with Fires

by Colonel Raymond T. Odierno and Major Thomas L. Swingle

**D**uring the past 12 to 14 months, the 1st Cavalry Division *Red Team*, Fort Hood, Texas, has deployed to the National Training Center (NTC), Fort Irwin, California, four times and Kuwait twice and has participated in several joint command post exercises and a Battle Command Training Program (BCTP) Warfighter exercise. In every instance, the advanced Field Artillery tactical data system

(AFATDS) has played a significant role in streamlining our delivery of indirect fires for the maneuver commander—and we've just begun to understand its potential.

AFATDS has been described as everything from a new generation of the tactical fire direction system (TACFIRE) to a system that will revolutionize the way the Field Artillery does business. In fact, it's neither. What it

does is provide commanders from task force to division a digital tool to influence, plan, execute and track fires.

AFATDS is not an automated decision maker. Rather, it manages and organizes the mountains of fire support information received in a typical operation into a tactical data base that facilitates the timely attack of high-payoff targets with the proper asset. It presents critical information in formats that enhance the fire support element's (FSE's) ability to advise the maneuver commander and meet his intent for fires.

AFATDS does not require changes to current tactics. But with improved techniques and procedures, it has allowed us to implement our doctrine and has proven to be a significant combat multiplier for the commander. In short, AFATDS digitizes fighting with fires.

In this article, we address the impact AFATDS has had on the 1st Cavalry Division Artillery fire support planning, execution and training. Many of these ideas are not new, just improved with AFATDS.

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## Planning

AFATDS requires a paradigm shift in how to plan fire support. Perhaps the most significant change we've found in planning with AFATDS is in constructing the initial data base. This has become a function of the entire fire support community under the lead of the FSE. AFATDS allows the maneuver commander to influence fire support priorities in near real-time through those individuals who understand his intent the best—the fire support coordinator (FSCOORD) and fire support officer (FSO).

Early in the planning process when enough information is available to conduct parallel planning, the FSE and fire control element (FCE) computers share information and simultaneously develop their portions of the data base. The FSEs build in the graphics and fire support guidance, such as the high-value target list (HVTL), high-payoff target list (HPTL) and target selection standards (TSS). It then establishes how much weight to give targets by type, on-call precedence, priority-of-fires and location of a target in a target area of interest (TAI), considering mission precedence. The FSE can tell the computer which fire support system to select first for mission values and set separation distances to preclude target duplication



CPT Tim Raymond, 1st Cavalry Division PAO

and buffer distances around fire support coordinating measures (FSCM). As determined by the planning input, missions will be prioritized and executed based on the commander's intent for fires—unlike previous fire direction systems, AFATDS missions are *not* first in, first out.

At the same time, the FCE builds the master unit list and FA preferences. The master unit list assigns a number to units to which AFATDS may communicate. The FA preferences establish which FA units receive which types of fire missions, what the preferred fire order is by target type and which units to exclude from selection for firing certain missions.

Once the master unit list is complete, the FSE builds the command and supported relationships. These roughly equate to the FA organization for combat and determine how fire missions will be routed for processing and messages will be distributed. Essentially, fire missions are distributed across the spectrum of the division's fire support assets, increasing responsiveness and lethality.

It is imperative that all division artillery units begin the operation with an accurate, common data base, even though it probably will change during execution. Every data item entered during planning will affect the commander's intent and his fires.

The common data is the basis for a digital fire support plan issued through both the FSE and fire direction center (FDC) channels. The brigade FSEs receive the data from the division tactical command post (DTAC) FSE as part of the transition from planning to operations. The FDCs receive the data from their corresponding FSEs, combine it with the FDC-specific data and automatically disseminate the information to subordinate FDCs. AFATDS attempts to keep all data bases up to date in near real-time.

Once all subordinates have received the data base, they adjust it to meet individual needs. This includes the unit's communications configurations and local guidance per the unit tactical standing operating procedures (TACSOP) and the tactical situation. The unit FDC updates the distribution scheme to ensure all messages are received at the appropriate levels of command. Additionally, it selects the units it wishes to display and track on its AFATDS screen. Brigade FSEs and direct support (DS) battalions include their brigade commander's fire support guidance to support the division

commander's guidance.

## Execution

AFATDS dramatically improves the FSCOORD's ability to execute the commander's intent. It provides better situational awareness, including more accurate battle tracking; more effective control of fires; quicker and more reliable clearance of fires and easier fire planning. This all adds up to faster, safer and more lethal fires than ever before.

**Situational Awareness.** The biggest advantage AFATDS offers during execution is in the area of situational awareness, particularly for the FSEs. When a unit updates its tactical situation in its AFATDS, that information is automatically updated in all division AFATDS established as needing that information during planning setup.

Information that is not automatically updated is available simply by requesting a current status from the unit. FSOs can monitor and control their subordinates' fires through the use of intervention points (IPs) that allow the FSOs to choose which types of fire missions to review and which to process automatically. The AFATDS box automatically transmits a request for clearance to the responsible unit when clearance of fires is necessary. By automating and speeding these routine processes, AFATDS allows the FSCOORD and FSOs to track the battle and concentrate on executing the fire plan and advising the maneuver commander.

As the division planners develop contingency plans, the division main command post (DMAIN) FSE puts the graphics and guidance into a plan in AFATDS and transmits them to all subordinates for implementation at the appropriate time. Using this method, division artillery units consistently have the most up-to-date information on both current and future operations.

Our brigade FSEs take the process a step further and use AFATDS word processing to send the written fire support plan. Similarly, DS battalions use their operations AFATDS to input FA support plans (FASPs) and fragmentary orders (FRAGOs) and disseminate new plans digitally to their platoons as well as their brigade and battalion FSEs. This rapid dissemination of "hard copy" written orders facilitates parallel planning from the platoon to division.

The change to decentralized input on guidance, geometry and unit data relieves

the workload on the FDC and provides a near real-time situation awareness to all AFATDS-equipped units—thus provide more accurate, usable information.

**Fire Mission Processing.** AFATDS allows the FSE to control fires. Command and supported relationships are set up to route all calls-for-fire through the FSE that controls the firing unit. Calls-for-fire for DS and reinforcing (R) battalions are routed from task force FSEs through the brigade FSE to the DS battalion. Requests for additional fires and other fire missions for general support (GS) and general support reinforcing (GSR) units are routed through the division tactical command post (DTAC) or DMAIN FSE. The FSOs or assistant FSCOORDs (AFSCOORDS) can then allow high-priority fire missions to flow directly to the FDC while stopping lower priority missions for review and redirection, if necessary.

FSEs can intervene, based on mission type, target description, mission value, priority-of-fires, recommended fire support assets, denied missions, battlefield area or any combination of the above. Once an FSE receives a mission, it can allow the mission to continue as requested, deny the mission, assign a different fire support asset (close air support, for instance) or request additional fires from a higher headquarters.

AFATDS displays active and inactive targets as target symbols on the map display. By observing the location and density of these target symbols, the FSE maintains a sense of the intensity of firing as well as the focus of fires. The G2 uses this information to help confirm or deny the situation template. By properly organizing and regularly purging targets from the screen, the FSO can maintain situational awareness without becoming overwhelmed with targets.

This improvement in situational awareness allows the DTAC FSE "to watch" the proactive and reactive counterfire fights conducted by the DMAIN and division artillery and prepare for the upcoming close fight. This makes for a much smoother hand-off from deep to close operations.

**Fire Planning.** AFATDS has greatly simplified the continuous fire planning process. The FSE establishes new targets in the plan by simply adding them to the target list or selecting existing targets from the on-call target list. As in



AFATDS Hard Shelter

the initial plan, subordinate FSEs can nominate targets for inclusion in the plan by adding them to the on-call target list through their AFATDS box. The FSE building the plan then reviews and includes these targets, as necessary.

As FSEs add targets to the plan, they have the option of scheduling the fires by time or by priority or allowing the FDC to schedule the fires. The FDC then simply assigns the targets to a firing unit. This process at the FSE level takes little more time than it does to fill out a target list manually and puts the responsibility for building the plan where it belongs—with the FSO.

**Clearance of Fires.** AFATDS has greatly improved our ability to clear fires throughout the division. When a fire mission is processed, AFATDS automatically checks to see if the target location plus buffer distances will violate FSCM. AFATDS then sends a request for coordination to the agency that established the FSCM and puts the mission on hold until it is cleared by all agencies affected by the fires.

AFATDS' automated request for clearance of fires coupled with its improved situational awareness enhances our ability to clear fires efficiently. It does, however, present some challenges.

The first challenge is overcoming the temptation to clear fires based only on the map display in AFATDS. Positive clearance of fires remains the standard. While AFATDS greatly improves our situational awareness, it displays only that data it "knows." Non-AFATDS unit data is not as up-to-date as units with

AFATDS. FSEs at all levels *must* continue to check with their maneuver commanders to ensure fires are cleared to the lowest level.

Next is the challenge of FSCM management. Thoroughly understanding the meaning of FSCM has always been an integral part of the FSO's job. With AFATDS, it is just as critical to understand how AFATDS defines and uses the FSCM to make the automated clearance of fires process work properly. Also, it's critical that units responsible for implementing FSCM update them quickly and accurately.

## Training

AFATDS is easy to use for basic tasks, but mastering the intricacies of the system requires computer literacy and a desire to understand the system. Once operators are proficient on AFATDS, units must sustain that proficiency. Specifically, Military Occupational Specialty (MOS) 13F Fire Support Specialist must receive the same level of training currently provided to MOS 13C Fire Direction Specialist.

Both 13F AFATDS operators and supervisors need special training. The Field Artillery School at Fort Sill, Oklahoma, is training 13Fs to that level in the AFATDS Operator's Course. The FA School's AFATDS Command and Staff Course also provides initial training to AFATDS supervisors.

To maintain proficiency beyond initial training, the 1st Cavalry Division Artillery has developed and is refining a

fire support sustainment training (FSST) program. This consists of weekly individual training on AFATDS and a monthly 36-hour field training exercise (FTX) where we concentrate on division-wide collective tasks that develop the entire fire support team from the division FSE down through the platoon FDC.

The primary difference between FSST and previous technical fire direction sustainment training is the involvement of the FSE. The division FSE is integrally involved in establishing training objectives, coordinating with other division fire support assets and reviewing the training objectives of the brigade FSEs. Brigade FSEs also are involved in planning and executing FSST at their level. This approach to training has been well worth the effort as evidenced by our success in the recent BCTP exercise and our NTC rotations, despite a turnover of AFATDS-trained personnel.

AFATDS has significantly improved *First Team's* fire support. The FSE is in the loop digitally, enhancing our capacity to coordinate fires across the division. With AFATDS and the hard work of *First Team* Redlegs, we can now fight with fires with more speed and reliability than ever before.



**Colonel Raymond T. Odierno commands the 1st Cavalry Division Artillery at Fort Hood, Texas. He also commanded 2d Battalion, 8th Field Artillery, 7th Infantry Division (Light) at Fort Ord, California, and Fort Lewis, Washington; and A Battery and Service Battery of the 3d Battalion, 8th Field Artillery, 18th Field Artillery Brigade, Fort Bragg, North Carolina. Among other assignments, he was the Executive Officer for the 3d Armored Division Artillery during Operations Desert Shield and Storm and Executive Officer for the 2d Battalion, 3d Field Artillery, also in the 3d Armored Division, Germany.**

**Major Thomas L. Swingle, until recently, was the Assistant Fire Support Coordinator for the 1st Cavalry Division. Currently, he's the Fire Support Officer for the 1st Cavalry Division's Aviation Brigade. His previous assignments include serving as Training Officer in G3 at III Corps, Fort Hood; Chief of the Training Division, Directorate of Plans, Training and Mobilization at Fort Devens, Massachusetts; and Commander of C Battery, S2 and Battalion Fire Support Officer for 2d Battalion, 3d Field Artillery, 3d Armored Division, Germany.**

# Digitizing the Joint LW 155-mm Howitzer

The US Army's Paladin, Germany's PzH2000, and the United Kingdom's AS90 represent the pinnacles of self-propelled artillery digitization—with our Crusader to follow. Each howitzer can operate independently far from its command and control hub while on-board electronics allow it to rapidly and accurately mass devastating fires. Yet, less than four years from the 21st century, cannoners in US Army light and Marine Corps artillery still rely on glass and iron components that call for procedures familiar to cannoners 80 years ago.

Two of the biggest roadblocks to digitizing towed artillery have been weight and power. Army light and Marine forces need systems that can be transported by helicopter, as well as carried and air-dropped from C-130 and larger cargo aircraft. Unlike their self-propelled counterparts, electronics for towed howitzers have to be hardened to withstand exposure to the weather and tactical operational conditions—air drop, fording, amphibious operations, debris from tactical movements, etc. This hardening has required too much weight and, often, too large a size.

Additionally, a towed howitzer would need an external power supply to run these electronics, if its prime mover isn't available. The power supply would be needed during airmobile operations, in the early phases of an air-drop operation or simply when the prime mover's electrical system isn't functioning.

Enter modern electronics. The Army and Marine Corps have teamed up to produce the joint lightweight 155-mm howitzer (LW155), previously called the advanced towed cannon system (ATCAS). The goal is to field a 9,000-pound, towed 155-mm howitzer with state-of-the-art electronics that will provide light force howitzers Paladin-like capabilities.

The centerpiece of the LW155's digitization effort is an on-board computer with an integrated radio modem. Linked with a single-channel ground and airborne radio system (SINCGARS), it will provide rapid, secure communication to the fire direction center (FDC) or platoon operation center (POC) and directly to target acquisition sources.

By interfacing with the M93/M94 muzzle velocity system (MVS), the computer will automate and improve the accuracy of muzzle velocity management and predict muzzle velocities. Using highly accurate self-determined location, projectile specifications, meteorological data and predicted muzzle velocities, the computer Prototype Automation for the M198



Howitzer: (from top to bottom) SINCGARS radio, on-board ballistic computer/radio interface and power supply.

will be able to compute more accurate firing data. It also will automate recording of fire mission data, weapons data and the ammunition on hand. Other components integrated with the computer will provide additional capabilities.

**Self-Locating.** More than a global positioning system (GPS) receiver, this device will quickly provide the howitzer an accurate location and elevation even when GPS signals are lost. It will do away with the need for the advanced party line-of-sight to an aiming circle and calculation of subtense and individual howitzer locations based on the location of the aiming circle. In the process, it will eliminate compounding errors and increase location accuracy.

**Self-Orienting.** This device would be able to calculate the precise orientation or lay of the howitzer for both direction and elevation of the cannon tube. This would eliminate the need for line-of-sight to an aiming circle to lay the howitzer and external reference points, such as collimators and aiming stakes, when setting off firing data.

**Rapid, Accurate Laying.** Electronic sights that are quicker and easier to use than current optical sights will increase responsiveness and help reduce inherent and compounding inaccuracies.

**Improved Direct Fire Lethality.** The current optical direct fire sights require human estimation of range and are of limited value at night, during inclement weather and in smoke. Besides using

technology currently available on tanks to overcome these deficiencies, an advanced direct fire sight can be integrated with the ballistic computer to determine and set off "leads" to increase the probability of a first-round hit.

**Autonomous Power.** Carried on the howitzer, it will be small, light, self-contained and Air Force-approved yet able to power the computer and other electronics for several hours without recharging or servicing. It also will be able to convert various AC voltage currents to acceptable DC levels.

**LW155 Testing.** Last year, 3d Battalion, 8th Field Artillery (3-8 FA), now named 3-321 FA, of the 18th FA Brigade, Fort Bragg, North Carolina, experimented with a four-gun platoon set of this equipment for almost two months. Included was a Joint Readiness Training Center (JRTC) rotation at Fort Polk, Louisiana, in support of the 10th Mountain Division's advanced warfighting experiment (AWE) Warrior Focus. While the equipment was only advanced prototypes, reports were favorable. (See Lieutenant Colonel Theodore S. Russell, Jr. and Major Harold B. Worrell, Jr.'s "Focus on Light Force XXI: AWE Warrior Focus," May-June.)

Under the rapid force projection initiative (RFPI) program, this early equipment is being improved and will be fielded as an eight-gun package to the 18th FA Brigade for participation in the RFPI's advanced concept technology demonstration (ACTD) in the fourth quarter of FY 98. After the exercise, it will be left with the player unit for two years as war-ready "residuals." The final version of these devices will be incorporated into the new 9,000-pound towed howitzer currently being developed and is expected to be fielded to the Marine Corps beginning in FY 02 and the Army in FY 06. Whether similar devices can be made sufficiently small, light, durable and operationally useful for the M119A1 105-mm towed howitzer remains to be seen.

While by no means a complete answer to the needs of our rapid response forces, the digitized LW155 will help provide the increased accuracy, responsiveness, lethality and survivability our forces need to survive and win on the battlefields of the early 21st century.

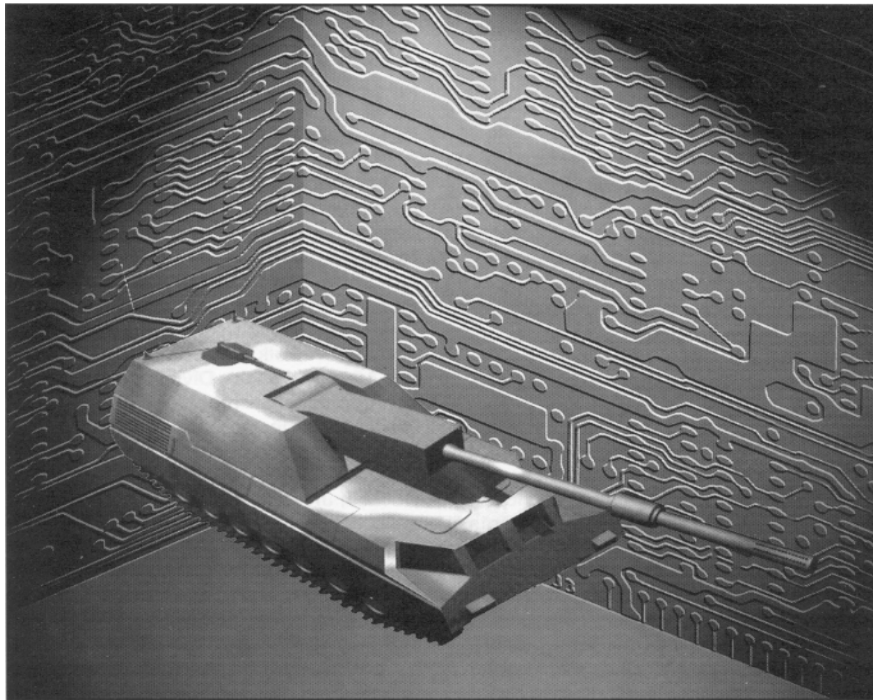


John K. Yager, FA Specialist  
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# AFATDS Future— Fire Support C<sup>2</sup> for the Next Generation

by Majors John A. Ellis and Daniel J. McCormick

Art by Lee Gibson, Fort Sill TSC



Even as the advanced Field Artillery tactical data system (AFATDS) brings information warfare tools to a division near you, work has begun to leverage cutting-edge technology for "Third Wave" improvements. Understanding how this next generation command and control (C<sup>2</sup>) system will support the maneuver commander is a prerequisite for the entire fire support community. This article gives you a view into the future of automated command and control.

The road map AFATDS Version 2 will be fielded with three annual releases of software from 1997 through 1999. AFATDS Version 3, the objective system, will be released in 2000. Incrementally, the releases enhance corps and echelons-above-corps deep operations functions, joint capabilities and multiple-launch rocket system (MLRS) and Paladin howitzer interfaces—ultimately, leading to full technical fire direction capabilities. Resolving operational requirements

and supporting training and users needs are the reasons for this incremental fielding methodology.

**AFATDS 97.** AFATDS 97 provides corps and echelons-above-corps (EAC) functionality, modifies the MLRS/Army tactical missile system (ATACMS) C<sup>2</sup> processes and enables us to plan and execute deep battle operations faster and safer than ever before. It provides the ability to coordinate deep targets for attack between various sections of a tactical operations center (TOC).

A mechanism has been developed that will allow AFATDS to automatically coordinate deep targets in the deep operations coordination cell (DOCC) at corps. This coordination is maintained and updated by the system based on the commander's guidance. As specific target types are presented and paired to a weapon system (i.e., ATACMS, air, aviation, etc.), the target information will be presented to appropriate DOCC sections—Army airspace C<sup>2</sup> (A<sup>2</sup>C<sup>2</sup>), Special Operations Forces

(SOF) and air defense, for example—for coordination and clearance of fires. Once all sections have cleared a mission, AFATDS will automatically process it by sending the order to fire (OTF) directly to the firing unit.

AFATDS 97 also will be able to create and monitor trigger events. The operator will input the trigger (an action or event on the battlefield) that, when it occurs, automatically causes an AFATDS response. For example, a brigade fire support element (FSE) may be watching to see if enemy forces attack along an avenue of approach that would make friendly forces particularly vulnerable. If enemy reconnaissance forces are reported in that area—possibly by the all-source analysis system (ASAS) or a maneuver control system (MCS)—then AFATDS automatically will initiate the fire plan designed for that enemy intrusion. Trigger events will be able to implement a plan or phase, activate an on-call geometry or fire plan, execute an on-call schedule of fires, transmit a pre-composed sensor tasking order, implement a fire mission on a specified target, or transmit posturing or movement orders.

The software also will improve how AFATDS processes ATACMS missions. New ATACMS munitions and range fans adjusted to account for their extended ranges will be included. Additionally, the ability to automatically generate platoon area hazards (PAH) and target area hazards (TAH) is being refined for AFATDS 97. PAHs and TAHs are three-dimensional areas that represent hazards to aircraft during the firing of ATACMS.

The first AFATDS 97 workstation in the mission chain will prepare and distribute PAHs and TAHs when an ATACMS fire mission is generated. This allows PAHs and TAHs to be built for plans like any other fire support coordinating measure (FSCM). AFATDS minimizes potential fratricide through automatic FSCM coordination and notification.

Integration of the tactical air support module (TASM) began with AFATDS Version 1. AFATDS 97 refines its implementation and provides deep planners a more direct means of planning for and executing air operations.

The TASM will allow fire supporters to enter the air planning stream digitally. It allows pre-planned fires to be included in the Air Force's air tasking order (ATO) and air coordination order (ACO) and provides a means to digitally submit immediate air requests and, for certain missions (determined by the commander's



guidance), to automatically select air assets. The Air Force's completed ATO and ACO will enter the fire support system at the battlefield coordination detachment (BCD) at echelons-above-corps. From there, the message will be broken down (parsed), and applicable pieces will be shipped to subordinate units.

**AFATDS 98.** This release concentrates on USMC/joint functionality and compliance with Department of Defense (DoD)-wide computing standards: Package 11 Variable Message Format (VMF) messages and the common operating environment (COE). The software will be fielded by not only Army units, but also by Marine and Navy units.

AFATDS 98 allows for greater interoperability among the services. It implements joint symbology in accordance with MIL-STD 2525 and includes Joint VMF (JVMF) and Package 11 VMF message sets. It also adds a DoD-compliant message server.

USMC-specific functionality will be included in this version. Amphibious task force (ATF) fire support planning and execution tools will be added. Naval surface fire support (NSFS) will be expanded, to include specific reports for managing NSFS assets and maintaining the current NSFS picture.

The ability to plan and execute heliborne moves will be in AFATDS 98 software. This function will allow operators to input and graphically display heliborne movements to determine fire support requirements and help with routing or deconflicting the plan. The operator will be able to coordinate air corridors with the air defense, Air Force and other C<sup>2</sup> systems and disseminate them, as applicable.

A DoD requirement for all C<sup>2</sup> systems is the inclusion of 19 COE modules. The Army, Air Force and Navy each are developing six modules while the Defense Mapping Agency is developing one. These modules represent a set of common applications that will allow joint C<sup>2</sup> systems to exchange information with a common interface and common set of inputs and outputs. The flexibility of adopting this system allows information to flow from the highest levels of command to soldiers in the field.

One of the first COE enhancements used in AFATDS 98 will be the joint mapping tool kit (JMTK), part of the mapping and graphics module. JMTK will allow planners to have a better view of the terrain where military operations will occur. With the JMTK, planners will be

able to analyze terrain for obstacles, transportation systems, elevation, slope, vegetation, soil content and surface drainage. Planners also will be able to determine line-of-sight (LOS) intervisibility between points for visual, electromagnetic (including communications systems) and weapons requirements.

The correlation module will be used with the commander's tactical terminal host processor (CTT-HP) located at the MLRS battalion TOC. The module will support "quick-fire" channels for rapid strikes upon deep targets by allowing direct feeds of intelligence data into AFATDS. The correlation module reduces the incoming data into manageable chunks that then can be processed into data for fire missions, based on the commander's attack guidance established in AFATDS.

One of the most desirable new functions of AFATDS 98 software is the commanders' and other key personnel's ability to monitor digital nets for better situational awareness. Similar to the old days when commanders monitored radios to hear what was happening and interjected guidance, AFATDS 98 will build these functions into the digital C<sup>2</sup> world—called fire mission monitoring.

Fire mission monitoring will have two operational modes: active and passive. Based on the monitoring rules established by the AFATDS operator, both modes allow commanders and other key personnel to monitor particular situations. With active monitoring, operators will be able to affect missions as they are occurring. In other words, the commander will be able to stop, start or modify a mission while it's happening. With passive monitoring, the commander basically "listens in" on events as they take place. Passive monitoring can be switched to active monitoring at any time.

**AFATDS 99.** The AFATDS 99 release begins the move toward technical fire direction on a single platform by building direct interfaces with MLRS and Paladin. It contains ATACMS special application program (SPAP) processing (with the MLRS launcher interface) and a direct interface with Paladin.

The fire direction system (FDS) used in MLRS units will be removed and ATACMS SPAPs implemented in AFATDS 99. Instead of FDS computing the SPAPs portion of a MLRS/ATACMS mission, AFATDS will perform those functions. Then the mission will be sent directly to the launcher for processing by the internal fire control system (IFCS).

Because the technical solution is computed by the launcher, we'll no longer need FDS.

This methodology also is applied to cannon systems. AFATDS 99 will send and receive data directly to and from Paladin. This supports removing the battery computer system (BCS) from Paladin units because AFATDS will pass mission requirements directly to the guns, which will compute the technical solution. This C<sup>2</sup> system evolution will be carried forward with successive generations of AFATDS and weapons systems, such as Crusader.

**AFATDS 00.** This release completes AFATDS' technical fire direction capabilities. The implementation of Version 3 software will give the FA true multiechelon technical computation continuity of operations. The release also will contain improved user interfaces, making AFATDS even more user friendly.

**Conclusion.** The next generation of AFATDS will provide the fire support community a new level of jointness and interoperability. Increased functionality will give us greater flexibility in meeting the mission requirements of combined arms and joint commanders.

As Redlegs move toward the 21st century, our C<sup>2</sup> system, AFATDS, will provide the critical link between warfighters and the weapons they'll use to win future conflicts.



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**Major Daniel J. McCormick, Acquisition Corps, until recently was the Systems Integrator for AFATDS in the office of the TSM-FSC<sup>3</sup> at the Field Artillery School. Currently, he's a student at the Command and General Staff College, Fort Leavenworth, Kansas. He commanded A Battery and Headquarters, Headquarters and Service Battery of the 1st Battalion, 7th Field Artillery, 10th Mountain Division (Light Infantry) at Fort Drum, New York.**

# 3x6 Cannon-2x9 MLRS Transition

by Major General Randall L. Rigby

The Chief of Staff of the Army recently announced two major Field Artillery force structure modifications: a slight reduction in the number of 155-mm self-propelled cannons in the total force while doubling the number of multiple-launch rocket systems (MLRS) per active heavy division. The reduction in the howitzers will allow Paladin fieldings to cascade into Army National Guard units, giving them the more lethal, responsive M109A6s. The impact is the Army's overall firepower increases along with its ability to kill targets with fires deeper and faster.

The 3x6 cannon change reduces the number of guns per battery from eight to six in a two-platoon configuration. This change applies to all 155-mm self-propelled units, active and National Guard.

The second change creates a general support (GS) MLRS battalion in the active Army heavy division artilleries. This 2x9 battalion will be composed of two MLRS firing batteries with nine launchers each, a target acquisition battery and a headquarters, headquarters and service battery (HHS).

## Background

The Legal Mix V Study conducted in the late 1970s led to the development of the

3x8 cannon battalion—that is three batteries with eight cannons each for a total of 24 cannons per battalion. The study's recommendation was based on a single overwhelming Warsaw Pact threat. The Legal Mix V Study also led to structuring a reinforcing Field Artillery brigade for the heavy division, a brigade composed of a mix of cannon and rocket battalions. The objective was for a division sector to have a density of 96 155-mm self-propelled cannons and 63 MLRS launchers, including the reinforcing brigade.

During Operation Desert Storm, many division commanders expressed concern about the sufficiency of reinforcing artillery on a nonlinear battlefield. They were particularly concerned about the limited GS artillery in the division. In response, the Field Artillery School, Fort Sill, Oklahoma, submitted a concept for a 2x9 composite MLRS/target acquisition (TA) battalion to the Chief of Staff in the summer of 1992. The Chief approved the concept, which was not resourced due to manpower and equipment constraints.

An Army Science Board Study on innovations in artillery force structure was chartered in November 1993 to address the issue of the sufficiency of corps reinforcing artillery units. The study concluded that the corps had insufficient reinforcing

artillery and that each active division needed two fully modernized Field Artillery brigades to win major regional contingencies quickly, decisively and with minimum friendly casualties. Subsequently, additional Field Artillery brigades were structured in the Army National Guard.

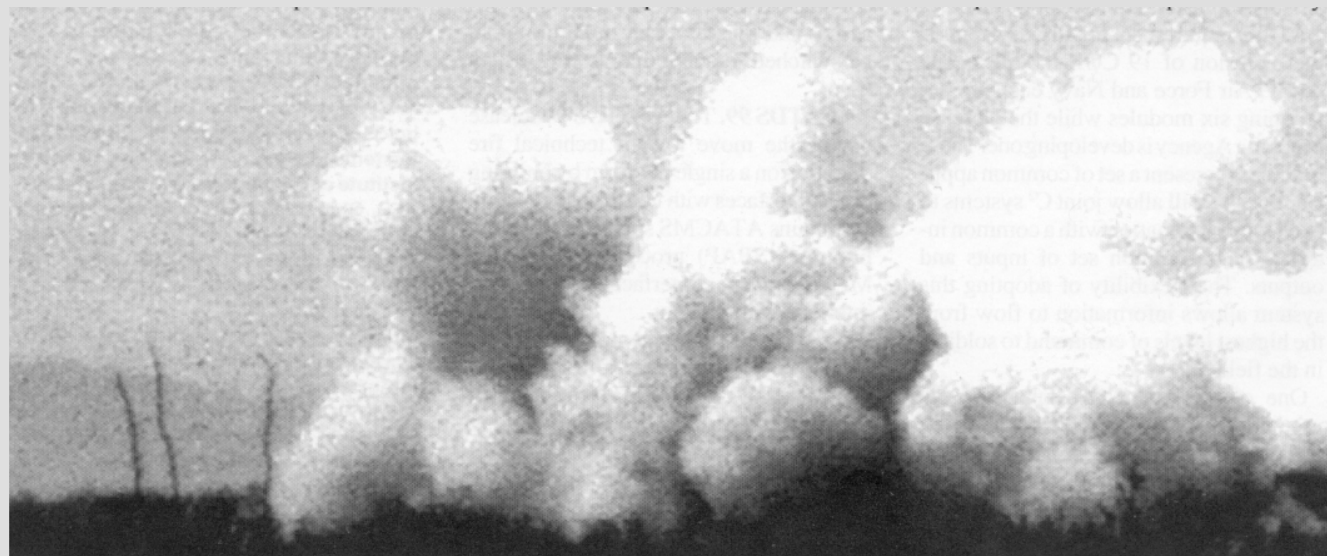
## 3x6/2x9 Concept

We'll implement the Chief's decision in three parts. First, the Field Artillery will convert all self-propelled cannon batteries to the six-gun, two-platoon configuration at the earliest possible date. This conversion has begun in the active Army in conjunction with Paladin's fielding. Second, the Field Artillery is to modernize the early deploying Army National Guard Field Artillery brigades with Paladin. Finally, we will use personnel savings from the 3x6 conversion to field the active component heavy division's 2x9 MLRS/TA battalion.

These changes will facilitate our transition to Army XXI's smaller, more modular, tailorable and highly lethal FA units. The end state will be a Field Artillery force of 90 155-mm self-propelled cannons and 126 MLRS launchers in a division sector, including the two reinforcing brigades.

## Unit Designs

The 3x6 cannon battalion being implemented looks exactly like a 3x8 unit—minus one howitzer section per platoon (see Figure 1). The battalion still has a headquarters and headquarters battery



(HHB) and a service battery to support the firing units. Each firing battery has a headquarters section, ammunition section and two firing platoons. The firing platoon has a platoon leader, platoon sergeant, gunnery sergeant, platoon operations center (POC) and three howitzer sections. Keeping change to a minimum was a goal to facilitate rapid transition to the configuration and make the most of the flexibility of the new design.

The divisional GS MLRS battalion will have batteries more capable of semiautonomous operations than those of the cannon battalion (see Figure 2). Although it has no service battery, per se, most of the MLRS battalion's support and sustainment capabilities are built into the firing batteries. The unit will have an HHS capable of providing command and control as well as essential services the batteries can't provide for themselves.

The battalion will have two nine-launcher batteries, each with three firing platoons, an ammunition platoon, a maintenance section and a survey section. The battalion's TA battery will have a target processing section, survey section, two Q-37 Firefinder radar sections and three Q-36 Firefinder sections.

### Transition Plan

The 3x6 cannon conversion is in progress. Paladin units fielded as 3x6 began in the 4th Infantry Division (Mechanized), Fort Hood, Texas, in the second quarter of FY 96. Units that already have Paladin in the 3x8 configuration will convert to 3x6 from late FY 96 to early FY 97.

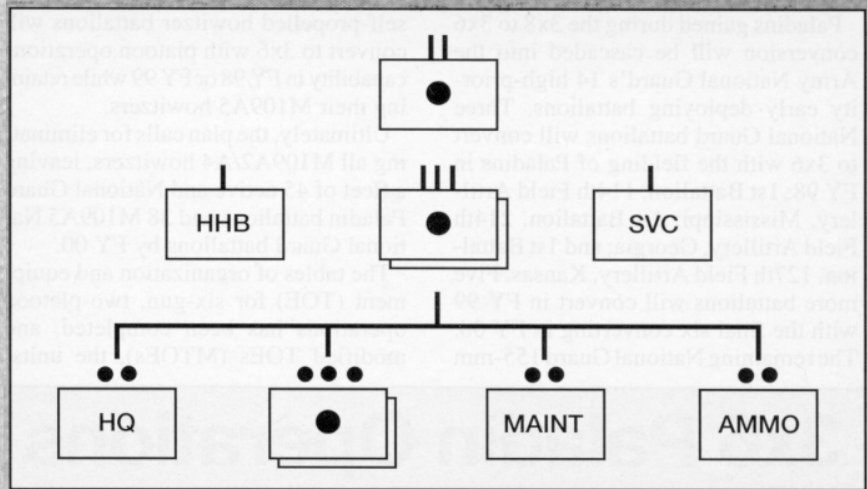


Figure 1: 3x6 155-mm Self-Propelled Cannon Battalion Design, Each battalion has 18 cannons.

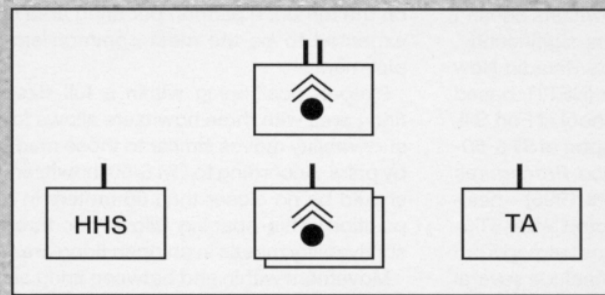


Figure 2: 2x9 MLRS Battalion Design for Active Army Heavy Divisions. Each battalion has 18 MLRS launchers.

Paladins gained during the 3x8 to 3x6 conversion will be cascaded into the Army National Guard's 14 high-priority early deploying battalions. Three National Guard battalions will convert to 3x6 with the fielding of Paladins in FY 98: 1st Battalion, 114th Field Artillery, Mississippi; 1st Battalion, 214th Field Artillery, Georgia; and 1st Battalion, 127th Field Artillery, Kansas. Five more battalions will convert in FY 99 with the final six converting in FY 00. The remaining National Guard 155-mm

self-propelled howitzer battalions will convert to 3x6 with platoon operations capability in FY 98 or FY 99 while retaining their M109A5 howitzers.

Ultimately, the plan calls for eliminating all M109A2/A4 howitzers, leaving a fleet of 45 active and National Guard Paladin battalions and 38 M109A5 National Guard battalions by FY 00.

The tables of organization and equipment (TOE) for six-gun, two-platoon operations has been completed, and modified TOEs (MTOEs), the units'

authorization documents, are being developed. Execution dates for active Army conversions are shown in Figure 3.

Personnel authorizations available with the conversion of DS battalions to 3x6 will be reinvested in divisional GS battalions. The battalion will incorporate the existing divisional MLRS battery and TA battery, adding a second MLRS firing battery and HHS. To reduce costs, launchers and associated items of equipment will come from redistribution of existing stocks, when possible.

## 3x6 Paladin Operations

The Army's decision to reduce heavy FA battalions from 24 to 18 howitzers doesn't change Paladin operations significantly. The Gunnery Department's Paladin New Equipment Training Team (NETT), based out of the Field Artillery School at Fort Sill, revised the operations chapter of *ST 6-50-60 Tactics, Techniques and Procedures for M109A6 Howitzer* (April 1996)—basically, the only chapter affected. After *ST 6-50-60* is validated by lessons learned from unit and NETT training—to include several 3x6 National Training Center rotations at Fort Irwin, California—the school will publish *FM 6-50-60*. This article discusses changes in Paladin operations.

**Position Area (PA) vice Firing Area.** The new manual redefines a PA as the land identified for an artillery unit to occupy; a firing area is the circular area with a maximum of a 500-meter radius from which Paladins fire. Therefore, one or more firing areas may be inside a PA. (The firing area's maximum radius is limited by software and will increase with an upcoming version.)

**Battery Operations.** With the 3x6 structure, the battery employment method was added to the manual. Even though the battery operations method was not listed in the old manual, it was always a possibility.

In the battery employment method, one platoon operations center (POC) controls all six howitzers, whether they're in one or six firing areas. Having one POC down or leap-frogging POCs are the primary reasons for one POC to control all the howitzers.

**Platoon Operations.** Although mission, enemy, terrain, troops and time available (METT-T) considerations dictate a unit's employment method, paired operations tended to be the most common under 3x8. This was largely due to the fact it is easier for two instead of four howitzers to operate

in a firing area. Under 3x6 and based on the terrain, a platoon per firing area is expected to be the most common employment.

Platoon positioning within a full-sized firing area with three howitzers allows for survivability moves similar to those made by pairs. According to *FM 6-50*, howitzers should be no closer than 50 meters in a position. This spacing allows for three survivability moves in an open firing area.

Movement within and between firing areas is a little more difficult because a section chief will have to control two wingmen. When the platoon occupies the firing area, a flank howitzer may be the best one to verify the direction of the other two Paladins when using the tube-to-tube verification method. Direction verification by compass is still the preferred method, but METT-T considerations may not allow it.

**Paired Operations.** In this option, two howitzers occupy a firing area. For a battery commander to conduct paired operations, he will have to move one gun from one platoon to another. Unless a platoon has one Paladin on a single-howitzer mission or a howitzer down, firing area restrictions are probably the main reason units will employ paired operations.

The concept of employing a single howitzer in its own firing area has not changed. This method may be used when survivability moves are not possible against counterfire or when the danger of air attack demands it. A single howitzer also may be employed when terrain is restrictive or for a special mission, such as for a Copperhead target.

If the paired concept is the primary method of employment, then one section always will be controlled by another platoon to form the third pair. That section chief would be operating outside his platoon chain of command. Even though

movement and tube-to-tube direction verification is a little harder, occupying a firing area by platoon simplifies command and control and training continuity.

**POCs.** Downgunning the battery to six howitzers naturally invites the question: "Do we need two POCs?" With two POCs, the battery has a backup if one of the battery computer systems (BCSs) goes down. Two POCs also give the commander more options for dispersing his howitzers because of radio ranges and gives him the flexibility to accomplish other missions without the entire battery's assets.

**Leader Ratio.** Another question arises: "Do we still need the same number of leaders in a platoon?" The ratio of leaders (platoon leader, platoon sergeant, and gunnery sergeant) in a Paladin platoon to the number of guns is one-to-one. Each of these leaders have specific jobs that maximize the effectiveness of the platoon. The platoon leader still leads, plans and issues platoon operations orders, conducts rehearsals, oversees the platoon logistics and support status, etc.

In addition to assisting the platoon leader, the platoon sergeant supervises the firing element. He must check data bases, conduct crew drills, prepare the defensive plan, coordinate ammunition distribution, determine the platoon logistical requirements and enforce navigation updates—among other things. The gunnery sergeant performs the platoon's reconnaissance and may spend much of his time away from the unit in a fast-moving scenario. The NETT believes deleting any of these leaders will hinder Paladin operations.

The Paladin NETT invites units to provide their lessons learned or thoughts on 3x6 Paladin operations. Feel free to call DSN 639-5301/4418 or commercial (405) 442-5301/4418.

MAJ Jeffrey A. Taylor, FA  
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Unit	Parent	Fielding
4-42 FA	4 Mech	3QFY96
1-82 FA	1 Cav	3QFY96
3-16 FA	4 Mech	3QFY96
2-82 FA	1 Cav	3QFY96
3-82 FA	1 Cav	4QFY96
FA Btry*	3 ACR	4QFY96
FA Btry*	3 ACR	4QFY96
FA Btry*	3 ACR	4QFY96
3-29 FA	4 Mech	1QFY97
2-5 FA*	III C/Arty	1QFY97
1-41 FA*	3 ID	1QFY97
1-9 FA*	3 ID	1QFY97
1-10 FA*	3 ID	1QFY97
1-17 FA	III C/Arty	1QFY97
3-18 FA	III C/Arty	2QFY97
2-17 FA	2ID/Korea	3QFY97
1-15 FA	2ID/Korea	4QFY97
1-37 FA	2ID/Lewis**	1QFY98
2-3 FA	1AD/GE	1QFY98
4-27 FA	1AD/GE	2QFY98
1-6 FA	1ID/GE	3QFY98
1-7 FA	1ID/GE	3QFY98
4-1 FA	1AD/Riley***	4QFY98
1-5 FA	1ID/Riley***	4QFY98

\* Previously fielded, convert to six-gun battery.  
\*\* Fort Lewis, Washington  
\*\*\* Fort Riley, Kansas

**Legend:**  
**ACR** = Armored Cavalry Regiment  
**C/Arty** = Corps Artillery  
**Btry** = Battery  
**Cav** = Cavalry  
**GE** = Germany  
**Mech** = Mechanized

Figure 3: Paladin Fielding/3x6 Conversion Dates for Active Army Units

Although we're still working on the details of the 2x9 battalion transition, the current plan calls for all six active heavy divisions to receive a GS 2x9 MLRS battalion. We completed the battalion's TOE in August.

The Army Staff has programmed funds into the budget to convert one divisional battalion per year, beginning in FY 00. The staff also is exploring alternatives to reduce costs and accelerate the execution of the plan. We have not yet developed a schedule for converting specific units.

## Personnel Impact

We are trying to minimize personnel turbulence by reclassifying Military Occupational Specialty (MOS) 13B Cannoneers into other Career Management Field (CMF) 13 shortages. Conversions to 3x6 will eliminate 1,188 13B10/20/30 authorizations, about 11 percent of the authorizations, during the next three

FYs.

The FA Branch at the Total Army Personnel Command (PERSCOM) in Alexandria, Virginia, will target the heavy divisions for CMF 13 reclassifications to minimize soldier turbulence and manpower army (MPA) costs. The recruiting liaison officer and the 95th Adjutant General Reception Battalion at the Field Artillery Training Center, Fort Sill, are briefing 13B recruits on the option of renegotiating their contracts to change from 13B to MOS 13M MLRS Crewman, 13F Fire Support Specialist, 13R Firefinder Radar Operator or 13P MLRS Fire Direction Specialist. This will ease some of the impact on soldiers and units in the field. Our goal is to take care of the 13B soldiers, maintain a glide path for 13B non-prior service accessions, solicit volunteers to reclassify and maintain promotion and professional development opportunities for CMF 13.

The proposed 2x9 MLRS fielding plan coupled with our CMF 13 shortages will create enough end state requirements to absorb projected 13B overages. This will allow the Field Artillery branch managers to improve manning levels of other 13 series MOS across the Army. It also is expected to improve the promotion potential for CMF 13 by reclassifying 13B soldiers into other CMF 13 MOS that have greater upward mobility. We have already witnessed 13B sergeant (promotable) soldiers reclassified and promoted once they completed 13M Advanced Individual Training (AIT) and were awarded the 13M MOS.

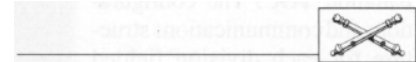
As downsizing to 3x6 occurs, self-propelled cannon battalion 13B10 and 13B20 soldiers who meet the requirements for other CMF 13 MOS will become eligible for reclassification. The intent is to make the transition for 13Bs to other MOS as smooth as possible. Qualified soldiers and NCOs will be able to volunteer for reclassification.

If all shortages are not filled voluntarily, the Department of the Army will direct some reclassifications both in and outside the Field Artillery. Most shortages are expected to be filled voluntarily; consequently, involuntary reclassification is seen only as a last resort. PERSCOM is sending teams worldwide to help enlisted 13B Field Artillerymen understand the options and select the one best for both the soldier and the Army.

## Conclusion

The Chief of Staff of the Army's decision is great news for the Field Artillery. It provides a second, modernized reinforcing corps Field Artillery brigade for each active division and cascades Paladins into the National Guard FA brigades. With 17 of our 23 Field Artillery brigades in the Army National Guard, it's crucial that Guard units have Paladin, our most lethal howitzer. The personnel savings garnered from reducing one self-propelled howitzer crew in each firing platoon allows us to man the GS MLRS battalion in the heavy division, significantly increasing the long-range firepower at the division commander's immediate disposal.

These force structure changes maintain nearly the same density of self-propelled cannons in a division sector while doubling the amount of MLRS available to our early deploying contingency force divisions. They posture the Field Artillery for assimilation into Army XXI and entry into the next century of warfare where our forces must be smaller, more agile and lethal—from top to bottom. With declining resources and increasing commitments, we must leverage every opportunity to enhance America's Total Field Artillery firepower.



**Major General Randall L. Rigby, Chief of Field Artillery, is the Commandant of the Field Artillery School and Commanding General of the Field Artillery Center and Fort Sill, Oklahoma. Other assignments include serving as Deputy Commandant of the Command and General Staff College at Fort Leavenworth, Kansas; Deputy Director for Assessment, J8 of the Joint Staff at the Pentagon; and Executive Officer to the Vice Chief of Staff of the Army, also at the Pentagon. He commanded the 6th Infantry Division (Light) Artillery in Alaska; the 4th Battalion, 4th Field Artillery (now 5th Battalion, 18th Field Artillery), 75th Field Artillery Brigade of III Corps Artillery at Fort Sill; and two batteries: one in the 172d Infantry Brigade (Mechanized), also in Alaska, and one in the 1st Cavalry Division (Airmobile) in Vietnam. He holds a Master of Science in Experimental Psychology from the University of Oklahoma and a Master of Business Administration from Long Island University.**



# AFATDS in the 1st Cav:

## A Laydown from DMAIN to Battalion TOC

By Sergeant First Class Geoffrey E. Youngblood and  
Captains Geoffrey P. Buhlig and Christopher J. Love

Discovering the full capabilities of the advanced Field Artillery tactical data system (AFATDS) in the 1st Cavalry Division Artillery (*Red Team*), Fort Hood, Texas, is a dynamic process. AFATDS is the fire supporter's automated system of the future—fielded today. It uses state-of-the-art technology to perform fire mission processing, fire support planning, fire direction and command, control and communications (C<sup>3</sup>) functions throughout the division artillery (Div Arty). AFATDS is the automated system other battlefield operating systems are scrambling to emulate.

This article provides a "snapshot" of AFATDS (Version 1.0.03) configuration and function in the 1st Cav, focusing on the division main (DMAIN) fire support element (FSE), Div Arty tactical operations center (TOC) and the direct support (DS) FA battalion TOC. The configurations and communications structure for each division fielded AFATDS will be somewhat different. The intent of this article is to serve as a general laydown of how the first division to receive AFATDS configured the system, hopefully, providing a road map for divisions that follow.

As a brief overview, we provide generic information before explaining the 1st Cav configuration. In a multi-workstation facility, such as the DMAIN FSE or Div Arty TOC, the AFATDS workstations share a common data base via an internal local area network (LAN). One workstation is designated as the "master" workstation or system administrator

(usually, also the communications administrator). This workstation displays communications alerts and system warnings.

Without operator intervention, this workstation transitions between communications routes (as established) when the preferred (or primary) route is nonfunctional. Other AFATDS workstations in the local LAN depend on the master AFATDS to communicate via its external LAN with divisional functional area devices: maneuver, air defense, intelligence and combat service support.

### DMAIN FSE

The *First Team* DMAIN FSE's primary battle focus is planning the division's future operations, tailoring the FA organization for combat, finding and killing the enemy's high-value/high-payoff targets, synchronizing and executing the deep fight—the area beyond the coordinated fire line (CFL) and short of the fire support coordination line (FSCL)—and providing the fire support coordinator (FSCoord) and commanding general (CG) accurate, timely information.

The DMAIN FSE has three workstations with separate functions: Current Operations, Planning and Targeting.

### Current Operations Workstation

The Current Operations workstation is the master workstation for the FSE (see the figure). It performs several functions: it provides communications for the FSE, establishes AFATDS command-support relationships and provides a division common picture.

**Communications.** The master AFATDS is connected to the mobile subscriber equipment (MSE) network as its preferred means of digital communications and with the single-channel ground and airborne radio system (SINCGARS) as an alternate route for digital communications. Our standard communications configuration also provides for a tertiary communications route through other AFATDS, using a combination of both the MSE network and FM frequency-hopping channels.



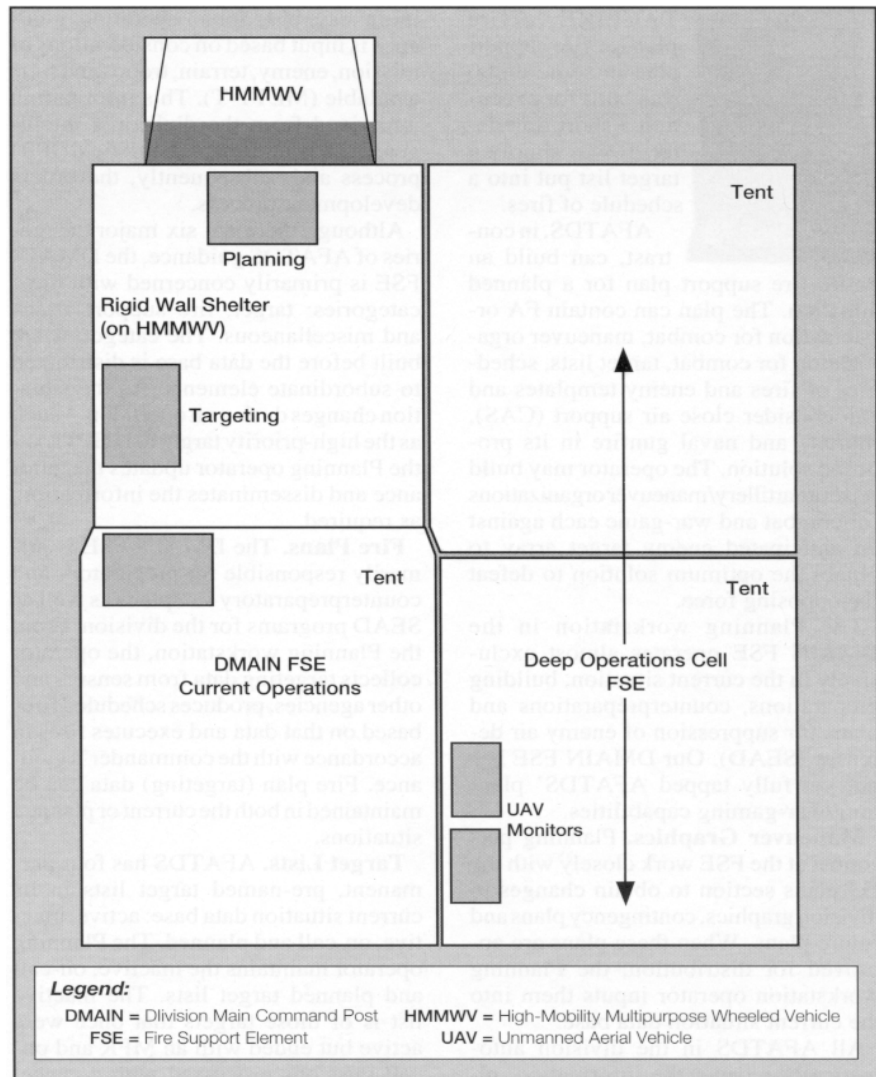
The Current Operations master workstation is the key to the DMAIN FSE's success or failure. The other workstations depend upon it to communicate, maintain the data base and keep the system functioning. If it "crashes," the Planning workstation automatically assumes the role of master workstation. However, this puts Current Operations in a degraded mode without access to external LAN communications. FM communications can be rerouted to the Planning workstation within a matter of minutes, but the loss of the external LAN inhibits accomplishing the mission due to the limited range of FM radios.

**Command-Support Relationships.** As the battle progresses, the FA organization for combat changes. Known to AFATDS as "Command-Support Relationships," the organization affects mission processing and automatic data distribution routes. Upon receiving a changes to the organization for combat, the Current Operations operator inputs those changes and disseminates them as appropriate. He also may need to change the communications configuration to support this reorganization.

**Division Common Picture.** In addition to the standard 15-inch color monitor, this workstation has a 21-inch color monitor. The monitor is easily moved around the FSE, but it usually remains in the Deep Operations Cell. It is used as a briefing screen for the commanding general and window through which the FSCOORD can monitor the FA and FSE/fire support team (FIST) locations. AFATDS is flexible enough to display any information requested—for example, all multiple-launch rocket system (MLRS) units with their range fans and Q-37 radar locations with range fans.

Counterfire is a priority in the 1st Cav. Through the "Mission Information Routing" function, AFATDS can automatically print "Mission Fired Reports" (MFRs) for counterfire targets as they're processed by the Div Arty fire control element (FCE). This provides the division's decision makers rapid access to information on the reactive counterfire fight.

The Current Operations workstation also can automatically print unit location updates. The operator then hands the print-out to the graphics specialist, who moves unit icons on the situation map (SITMAP) to reflect the updated locations. The SITMAP is a backup for the common picture displayed in AFATDS.



The DMAIN FSE has three AFATDS workstations: Current Operations, Planning and Targeting.

AFATDS will allow the DMAIN to operate its FSE without maps, overlays or mission logs. But the 1st Cav does not yet have the electronic maps that consider terrain and elevations. Therefore, until this capability arrives, we must have standard map sheets and acetate overlays. The challenge is to man both the AFATDS workstations and the "manual" backup system. But once we build the initial data based on terrain considerations, we'll fight the battle from AFATDS and keep the map sheets on the shelf.

### Planning Workstation

The Planning workstation is "slaved" to the master workstation through the internal LAN and has no independent communications capability. Through the

local LAN, the Planning operator has the division's common picture in "current situation" or "planned situation," as the operator chooses.

Most of the time, the Planning workstation is tuned to the current situation: tracking and updating geometries, fire support coordinating measures (FSCM) and fire plans in support of the division's current battle. In the event it becomes necessary to war-game different fire support courses of action (COAs) for a future battle, the workstation can tune into the planned situation.

Terms in AFATDS can be confusing if one is familiar with the same terms used many years with the tactical fire direction system (TACFIRE). In



TACFIRE, a fire plan (or fire support plan in some units) was built for execution a short time later. It was simply a target list put into a schedule of fires.

AFATDS, in contrast, can build an entire fire support plan for a planned situation. The plan can contain FA organization for combat, maneuver organization for combat, target lists, schedules of fires and enemy templates and can consider close air support (CAS), mortars and naval gunfire in its proposed solution. The operator may build separate artillery/maneuver organizations for combat and war-game each against an anticipated enemy target array to obtain the optimum solution to defeat the opposing force.

The Planning workstation in the DMAIN FSE operates almost exclusively in the current situation, building preparations, counterpreparations and plans for suppression of enemy air defenses (SEAD). Our DMAIN FSE has not yet fully tapped AFATDS' planning/war-gaming capabilities.

**Maneuver Graphics.** Planning personnel at the FSE work closely with the G3 plans section to obtain changes to division graphics, contingency plans and future plans. When these plans are approved for distribution, the Planning workstation operator inputs them into the current situation data base.

All AFATDS in the division automatically receive the information, allowing Redlegs the first look at the division's upcoming operation. AFATDS disseminates graphics faster than division liaison officers (LNOs) can carry them to their command posts. AFATDS' common picture is a great asset to subordinate commanders and their staffs in the division.

**FSCM.** The DMAIN FSE Planning workstation is responsible for no-fire areas (NFAs) and restrictive-fire areas (RFAs). Additions, deletions and changes are input by the Planning workstation operator. Until the corps FSE fields AFATDS, this workstation also manages the FSCL and any other applicable corps-level FSCM specified in corps operations or fragmentary orders.

**Fire Support Guidance.** Target attack guidance, which is updated and changed by the Planning operator, is a main focus

of the DMAIN FSE. In the initial data base for an operation, guidance is input based on considerations of mission, enemy, terrain, troops and time available (METT-T). This information is derived from the division's intelligence preparation of the battlefield (IPB) process and, subsequently, the orders development process.

Although there are six major categories of AFATDS guidance, the DMAIN FSE is primarily concerned with three categories: target, fire support attack and miscellaneous. The categories are built before the data base is distributed to subordinate elements. As the situation changes during an operation—such as the high-priority target list (HPTL)—the Planning operator updates the guidance and disseminates the information, as required.

**Fire Plans.** The DMAIN FSE is primarily responsible for preparatory and counterpreparatory fire plans as well as SEAD programs for the division. From the Planning workstation, the operator collects targeting data from sensors and other agencies, produces scheduled fires based on that data and executes fires in accordance with the commander's guidance. Fire plan (targeting) data can be maintained in both the current or planned situations.

**Target Lists.** AFATDS has four permanent, pre-named target lists in its current situation data base: active, inactive, on-call and planned. The Planning operator maintains the inactive, on-call and planned target lists. The inactive list is of those targets that once were active but ended with an MFR and on-call missions processed with a cancel target record (CTR).

The on-call list contains targets from fire missions ended with "End of Mission, Record as Target" (EOM RAT) as well as targets copied from implemented plans. The planned target list contains all artillery target intelligence (ATI) messages (that meet target selection standards, or TSS) with a "Planned" precedence. Other AFATDS in the division can add targets to this list by sending an "Establish Target" message to the DMAIN FSE. The operator then can plan groups, series or programs of targets from these target lists.

Each AFATDS can store, share and disseminate ATI data. Using these fixed target lists can be confusing and frustrating for those who are accustomed to operating with TACFIRE, where a central computer maintained all ATI data.

It is imperative that leaders understand the importance of well-trained operators to managing these lists to maximize AFATDS' ATI potential.

**Fire Support Plans.** AFATDS lumps a fire support plan and a maneuver COA into the term "Plan." The AFATDS fire support plan contains the information required by the Div Arty S3 to develop the FA support plan (FASP). This single plan meets the needs of both the fire support and FA planners. Once completed, the fire support portion is sent to the Div Arty TOC for its input.

AFATDS creates a separate plan for each maneuver COA. COAs then can be compared for simplicity, tasks supportable or the number of rounds required, etc.

The plan can contain up to 99 phases with unique units, geometries or guidance. (Each phase represents a change to the task organization or maneuver scheme.) These phases may contain between one and three COAs. Each COA can have unique guidance (i.e., different TSS, fire support system preferences or FA attack methods) and unit task organization. Once these different COAs are built and compared to one another using the system's estimate tools, AFATDS recommends the "best COA." The best COA can be based upon the number of supportable tasks, the relative simplicity of the plan, number of tubes in sector, massing capability, rounds required or optimum systems used. This COA then becomes the basis for that phase of the plan.

Each plan has an associated written portion, such as an operations order (OPORD), fire support annex (FS Annex), FA annex to an OPORD or fire support execution matrix (FSEM). AFATDS provides basic word processing tools that allow the operator to copy, insert and edit portions of written text. It also allows the operator to copy estimate results into the text portion of the order.

Once finalized, the plan may be moved into the current situation from the planned situation—or, in AFATDS terms, "implemented." This allows the operator to make the planned data current. The current situation then contains new guidance, geometries, units, target lists, fire plans, etc.

The FSE's Planning workstation cannot cause all division AFATDS to automatically transition to a plan. Such transitional procedures should be outlined in the division's tactical standing operating procedures (TACSOP). Ideally,

all facilities in the division—FSEs, fire direction centers (FDCs) and fire units—would implement the new plan simultaneously.

### Targeting Workstation

This workstation must be continuously manned because both the mission monitor and active mission monitor are continuously displayed. Targets of opportunity received from multiple sources are processed at this workstation.

**Mission Monitor.** This window contains four icons that require an operator response. The "Coordination" icon allows the operator to see a fire mission that requires further coordination. It displays fire missions established by the DMAIN FSE or other units in the division that violate FSCM. After receiving a coordination request, the operator checks with the FSE's targeting NCO before sending an approval or denial to the requesting unit.

The second icon is "Intervention," which displays information on missions that meet intervention criteria previously established by the operator. This criteria is METT-T dependent and varies by situation. The intervention window lists attack options, fire support delivery systems and fire units using a color-coding "gum-ball" system.

The targeting operator then decides to accept the AFATDS recommendation, override it (and specify another fire unit), deny it or declare the mission unsupportable. When a mission is determined to be unsupportable, it is sent to the next higher echelon that, theoretically, would have additional assets to attack the target.

Because III Corps does not yet have AFATDS, we don't routinely try to

engage unsupportable targets outside the division using AFATDS. The current work-around involves recording the target number, its location, target description and processing the mission manually with an MSE call to the III Corps FSE.

The third icon is "Mission Denied." The operator can view the basic mission data for denied missions and resend or reprocess selected missions.

The fourth and last icon on the mission monitor window is "More Information Required." This icon displays missions requiring additional information, such as a time-on-target (TOT) mission. Selecting this icon prompts the operator to provide additional information.

The Targeting workstation eventually will interface with the all-source analysis system (ASAS) collateral workstation in the DMAIN G2 section. The Targeting workstation operator then will be able to query ASAS for targets meeting predetermined criteria and process fire missions on those targets that pass the TSS specified in the system guidance.

We have experienced some compatibility problems processing messages from ASAS. As with all new systems, operator training and familiarity are essential to realize the full potential of this interface.

**Targets of Opportunity.** The FSE's FA intelligence officer (FAIO) continuously searches for HPTs for which the Targeting operator initiates an AFATDS fire mission. Eventually, the ASAS interface will automate this search and, possibly, could preclude the need for an FAIO in the G2 section.

In the Deep Operations Cell, there are two unmanned aerial vehicle (UAV) monitors. Targets obtained from these monitors are processed at the Targeting workstation, and FSE personnel, for the first time, can observe these fires from the DMAIN. Adjustments are made, as necessary, and battle damage assessments (BDA) are instantaneous. The Targeting workstation also processes targets obtained from other sources in the DMAIN—for example special operations forces: aerial scouts; the forward area air defense command, control, communications and intelligence system (FAADC<sup>3</sup>I); etc.

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### Div Arty TOC

The Div Arty TOC has a four-workstation configuration that has proven its effectiveness during 10 division- and corps-level training exercises. The workstations are Counterfire, FCE, Current Operations and Plans.

### Counterfire Workstation

This workstation processes acquisitions from the division's two Q-37 Firefinder radars, inputting call-for-fire zones (CFFZs) and critical friendly zones (CFZs). Acquisitions generated by the radars may automatically be processed as fire missions if they fall within established zones or are high-payoff targets. If the acquisitions do not meet established criteria, they're filed as ATI.

Once an acquisition becomes a fire mission, it's sent to the FCE. The FCE assigns the mission to a reinforcing FA (reactive) counterfire unit and sends it digitally to the shooter.

The Counterfire workstation operator transmits all information regarding orientation and radar zones using a radar deployment order (RDO) format. The radar then can process the information automatically. The Counterfire operator also displays range fans for all radars supporting the division. This procedure ensures the radar is correctly oriented and can cover CFZs and CFFZs adequately.

### Div Arty FCE-Current Operations Workstation

The Div Arty FCE operates a dual-station facility, sharing functionality with Div Arty Current Operations. The FCE enters all FA attack and restriction guidance into the data base. The FA attack guidance assigns a specific round



Part of the 1st Cavalry Division Main Command Post (DMAIN)



and number of volleys for particular target types. The FA restrictions keep selected units from firing certain shell-fuse combinations.

The FCE workstation is the Div Arty TOC's mission monitor and processes fire missions and executes fire plans. Its operator also processes requests for additional fires from the three DS FA battalions.

Fire missions are prioritized based on target values. The DMAIN FSE assigns these values to ensure that HPTs are fired first. Based on the commander's criteria entered into the FA guidance, AFATDS determines the order to fire (OTF) and all the unit and round data necessary to engage the target. The OTF can be sent to the divisional MLRS battery FDC or the R brigade for execution.

The Current Operations workstation is the master station, communications administrator and system administrator for the Div Arty TOC. As system administrator, the Current Operations operator conducts hourly data base backups to ensure current data are archived on an optical disk in the event of a catastrophic system failure. Also, meteorological data is managed, processed and disseminated from this workstation.

Displaying the division's common picture, Current Operations is the situational awareness terminal for the Div Arty S3. He monitors FSCM, geometries, unit data and range fans for Div Arty units.

### Plans Workstation

The fourth workstation in the Div Arty TOC is Plans. It has several uses, but its main purpose is to plan and disseminate the FASP, conduct FA estimates and plan movements. It enables the S3 section's planners to conduct long-term planning without interrupting current operations and conduct advanced planning of movements and survey control measures.

The Div Arty S2 uses this workstation to update subordinate facilities on the enemy forces arrayed against the division. He may build a detailed enemy order-of-battle in AFATDS portraying the enemy's disposition, location and unit identification. The S2 is responsible for altering this template to depict the current enemy situation.

Changes to the enemy's disposition are not automatically updated as they occur. The Plans operator must obtain this information from another source and manually enter and disseminate it, as required.

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## DS FA Battalion

The DS FA battalion has 15 AFATDS workstations: four in the TOC, two in the brigade FSE, one in each battalion FSE and one per firing platoon FDC. They're single-station facilities, except for the battalion FDC and brigade FSE, which have dual-stations, each on an internal LAN. Additionally, each firing platoon has a lightweight computer unit (LCU) to conduct technical fire direction.

### FA Battalion TOC Workstations

Having four systems in the TOC provides an abundance of capabilities at the battalion level. By AFATDS' sharing of a common picture at each facility, the S3 has the newly acquired ability to focus each section (operations, fire direction and intelligence) on those tasks crucial to the success of the mission.

**Operations Section.** This section concentrates on managing unit data (i.e., locations, ammunition data, weapon strength, class III status), issuing movement orders and disseminating the FASP. These tasks are accomplished digitally and available for review in an easily understood format. For example, a unit's status is displayed using "pie charts" with the familiar green, amber, red and black color coding system.

Movement control is enhanced with the ability to store and disseminate movement routes and survey control points. The FASP (along with an execution matrix) is digitally disseminated to all AFATDS workstations in the battalion.

**Fire Direction.** The battalion FDC continues its traditional role of tactical fire direction but with enhanced capabilities. This dual-station facility has one workstation to function as the system administrator while the other is dedicated to fire mission processing.

With AFATDS, the S3 and fire direction officer (FDO) now can tailor the commander's attack criteria in a quantitative manner while concurrently fighting the battle. The system uses this attack criteria, along with current FSCM to filter missions and produce a recommended solution for the FDO.

Massing the battalion's fires or engaging multiple targets is achieved by careful management of attack criteria.

The battalion FDC remains a central hub for communications and the flow of information to and from the platoon FDCs.

**Intelligence Section.** This workstation allows the S2 to receive, analyze and process Q-36 radar acquisitions quickly and accurately. An acquisition automatically generates a fire mission and is displayed on the monitor. The S2 can quickly analyze the target, based on established CFFZs, and provide an attack recommendation to the S3. Acquire-to-fire times are greatly reduced because manual plotting is eliminated and missions are automatically routed to the FDC, once they're approved.

If there is a designated counterfire shooter, the FDC can set up the attack criteria to ensure AFATDS selects this unit to fire the target. The operator only has to "OK" the window containing the fire order, and the mission is sent to the firing unit.

The S2 also can update the firing batteries with the enemy situation. This update may be sent either via plain text message or by using enemy unit icons to provide the enemy situational template.

An important benefit of the system is its ability to maintain continuous operations during "Jump TOC" procedures. Having the operations section assume the role of the battalion FDC (when the FDC displaces) maintains a digital fire mission processing capability and allows the battalion to track the current situation. The S3 may either go forward with the FDC or stay back with the operations section and never lose the pulse of the battle.

### Platoon FDC Workstations

Finally, each platoon FDC has access to AFATDS via its LCU, providing a myriad of new capabilities at this level. Situational awareness and access to battlefield information are the two principal advantages in an AFATDS-equipped platoon FDC.

The platoon FDO now can see the battlefield with on-screen graphics and understand the FSCoord's intent by reviewing both the fire support and FA attack guidance. These two areas focus the platoon FDO and allow him to plan and prepare the FDC and gun sections for an upcoming battle. Although the platoon FDC is generally in the receive



mode, it still is responsible for ensuring all platoon data is maintained, updated and disseminated.

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## Brigade/Task Force FSE

The brigade or task force FSEs now have a digital capability equal to the DS FA battalion and play a larger role on the battlefield. With these increased capabilities come greater responsibilities.

The brigade FSE is equipped with dual workstations: Current Operations and Plans.

## Current Operations Workstation

This workstation is the system and communications administrator for the brigade, maintaining the division's common picture. It allows the brigade battle staff access to all information contained in the division's AFATDS data base, thus providing a near real-time status of fire unit and observer locations.

At the brigade FSE, the Current Operations workstation disseminates all FSCM, executes fire plans and serves as the mission monitor. This workstation also consolidates the brigade's operational graphics from subordinate units and tracks the combat observation lasing teams (COLTs).

## Plans Workstation

Unlike the battalion FDC, the brigade FSE uses the second workstation for planning. Future operations are planned, stored and disseminated without interrupting current operations. When directed by the commander, the plan can be implemented and, almost immediately, the DS battalion, firing batteries and battalion FSE's are prepared to fight the upcoming battle.

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## Theoretical Fire Mission

Unlike TACFIRE, AFATDS allows each FSE in the fire mission processing chain to intervene (as required) and employ additional assets to defeat a given target. Depending upon command-support relationships and the assets available, AFATDS can select mortars, naval gunfire or air-delivered munitions to attack targets.

The significance of this capability is that requests for additional fire support

assets are processed digitally through FSE channels (from battalion to corps) rather than by voice communications as they once were. The best way to describe mission processing at this level is via a theoretical fire mission.

For example, assume a maneuver battalion has located a concentration of enemy forces that may significantly inhibit the battalion's ability to accomplish its mission. The FA battalion FSE has requested a volume of fire that exceeds the capabilities of the battalion's organic mortars as well as the DS and R artillery. The mission is then sent digitally to the brigade FSE, which has additional fire support assets in the form of naval gunfire and CAS. The fire mission arrives at the brigade FSE, but it is out of range of the naval gunfire units and there's no CAS on station in the brigade's zone. Having made the determination that this target is crucial to the brigade's success, the brigade FSE transmits the mission digitally to the division tactical command post (DTAC) FSE, which has additional CAS assets.

At the DTAC FSE, AFATDS automatically selects the supporting tactical air wing that has the munitions required to defeat the target, can deliver those munitions within the required response time and is available. Fire support personnel at the DTAC FSE hand the CAS request to the air liaison officer (ALO) and aircraft are on station within 10 minutes.

Noteworthy in this scenario is that the entire process for requesting additional fires was digital and that the AFATDS program recommended the optimum means for defeating the target array. The mission was processed by using intervention points and took less than one minute.

Also note that the battalion FDC's involvement was limited to having its workstation process the mission, determine it was beyond the battalion's capabilities and then retransmit the mission back to the FSE.

Fire support coordination issues are handled directly through the fire support channels—unlike in the past when this information was processed through fire direction channels. Dissemination of information is rapid and more precise. Commanders now can focus FDCs and FSEs on critical battle tasks while AFATDS processes and disseminates routine battlefield information.

As depicted in the theoretical fire

mission, the battalion FSE has almost instantaneous (digital) access to the indirect fire support for the entire division. The AFATDS mission processing flow allows targets meeting predetermined criteria to "jump" to the top of the mission processing queue, giving the maneuver battalion commander the extra punch he needs to break through an enemy strongpoint, thus maintaining the momentum of his operation.

As commanders and staff officers become comfortable with AFATDS automated mission processing and fully understand its capabilities, "sensor-to-shooter" mission times will be measured in mere seconds—rather than in minutes. Judicious use of intervention points is the key to maximizing the system's potential at the maneuver battalion level.

For the 1st Cavalry Division, AFATDS continues to evolve into an extremely useful tool for both the artillery and maneuver communities. It is not, by any means, a finished product, but it will become more functional with each software and hardware revision fielded. AFATDS automates the sensor-to-shooter link, making an AFATDS-equipped division the most lethal combined arms entity on the modern battlefield now and well into the next century.



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**Captain Geoffrey P. Buhlig is a Brigade Fire Support Officer (FSO) in 2d Battalion, 82d Field Artillery, 1st Cavalry Division. He has been part of AFATDS testing since August 1993, serving as a Task Force FSO, Battalion Fire Direction Officer (FDO) and, most recently, Brigade FSO.**

**Captain Christopher J. Love commands Bravo Battery, 2d Battalion, 82d Field Artillery, 1st Cavalry Division. Previously, he was the 1st Cavalry Division Artillery FDO during the AFATDS IOT&E. Other assignments include serving as a Battalion FSO for 3d Battalion, 8th Cavalry, also in the 1st Cavalry Division.**

# 1996 MACTF Fire Support Conference

by Major Kevin M. McConnell, USMC

The definition of Marine air ground task force (MAGTF) is "a task organization of Marine forces (division, aircraft wing and service support groups) under a single command and structured to accomplish a specific mission." Regardless of the size of a MAGTF, which varies from a few dozen to more than 100,000 Marines, each consists of the same four elements: a command element (CE); aviation combat element (ACE); ground combat element (GCE); and combat service support element (CSSE). Fire Support is a common concern to each of the elements.

The purpose of this year's conference was to bring together representatives from each of the MAGTF's elements to identify fire support concerns, develop Marine Corps positions on near-term fire support issues (0-10 years) and explore fire support challenges for the 21st century.

With more than 150 attendees, the conference was held from 4 to 6 June at Camp Pendleton, California. It was sponsored by Fort Sill's Marine Artillery Detachment and hosted by the 11th Marine Regiment. Colonel Lynn A. Stuart, the Marine Artillery Detachment Commanding Officer, chose Camp Pendleton as the conference site to make it more accessible to the warfighters.

Senior leaders at all levels of the Marine Corps' operating forces, Reserves and the supporting establishment addressed their initiatives and fire support concerns. Army and Navy representatives also attended the conference to provide insight on fire support initiatives within their respective services. (See the figure for a selected list of speakers and the organizations they represented.)

The keynote address delivered by Lieutenant General Paul K. Van Riper, Commanding General of the Marine Corps Combat Development Command (MCCDC), focused on the necessity to develop or refine our ability to conduct military operations in the littorals. His portrayal of the world's heavily populated



coastal regions combined with the reality of force reduction and dwindling forward bases highlighted the need for mobile, relevant naval expeditionary

forces able to conduct Operational Maneuver from the Sea (OMFTS).

In charting the course toward OMFTS, the General discussed six major waypoints: taking advantage of technology, implementing top-down modeling analysis to determine the optimum mix of fire support systems, increasing our sea-based fires capability, increasing our at-sea logistics capability, ensuring the proper mix of smart versus dumb munitions and continuing to pursue the joint development of fire support systems. General Van Riper's OMFTS waypoints served as central themes or supporting issues in virtually every presentation that followed.

## 1996 MAGTF Fire Support Conference Selected Guest Speakers

### Lieutenant General Paul K. Van Riper

Commanding General, Marine Corps Combat Development Command: *"Fires in Support of Operational Maneuver from the Sea"*

### Major General Carol A. Mutter

Commander, Marine Corps Systems Command: *"Update on Combat Developments"*

### Major General Leslie M. Palm

Commanding General, Marine Corps Air Ground Combat Center: *"Combined Arms Exercise Lessons Learned"*

### Brigadier General Raymond P. Ayres, Jr.

Commanding General, 3d Marine Division: *"Division's Role, Needs and Concern"*

### Brigadier General Charles F. Bolden, Jr.

Assistant Wing Commander, 3d Marine Air Wing: *"Fire Support and the ACE"*

### Brigadier General Jan C. Huly

Assistant Division Commander, 1st Marine Division: *"Fire Support and the GCE"*

### Brigadier General William J. Lennox, Jr.

Assistant Commandant, US Army Field Artillery School: *"Focusing Fires for Force XXI"*

### Captain Dennis G. Morral

Project Manager, Naval Surface Fire Support: *"NSFS Weapons and Ammunition Developments"*

### Colonel Dale S. Town

Chief of Staff, 1st Force Service Support Group: *"Precision Logistics"*

### Colonel Keith J. Stalder

Commanding Officer, Marine Aviation, Weapons and Tactics Squadron One: *"ACE Weapons and Tactics"*

Working groups consisting of conference attendees consolidated topics and issues that arose during the presentations and discussions. The working groups attacked the issues, developed recommendations and achieved consensus on 18 issues that culminated in a report to the Commanding General of MCCDC. This article presents a condensed version of that report.

**1. Marine Corps ground fire support assets do not adequately support Marine Corps operational concepts.** With the retirement of the M101A1 howitzer, the remaining indirect fire weapons are the M224 and M252 mortars and the M198 howitzer. The mortars do not have automated fire control equipment and are not tied into the automated command and control (C<sup>2</sup>) system, which increases the difficulty of planning and coordinating their fires.

The lack of general support (GS) artillery brings into question our ability to provide adequate support to maneuver forces. The M198, a medium-range howitzer, is much criticized for its weight and size. Its maximum range of 30 kilometers is significantly less than the ranges of many threat artillery systems.

The howitzers under evaluation to replace the M198 are considerably lighter but offer no increase in range and minimal reduction in size. The weight/size of the 155-mm howitzer (M198 or lightweight 155-mm) is expected to remain an issue, especially in short-duration, low-intensity operations.

*Doctrine:* Reexamine the various missions in which the MAGTF's ground fire support assets may be employed throughout the warfare spectrum.

*Organization:* Determine if the current indirect fire organizational structure meets the needs of the commander at all levels.

*Equipment:* (1) Examine alternative weapon systems, subsystems and ammunition that will enhance our flexibility and effectiveness. (2) Examine mobility, range, maneuverability, transport-ability, lethality and logistical support-ability to determine what factors dominate the decision process and where the emphasis should be placed. (3) Procure a ground indirect fire weapon(s) capable of fulfilling the full spectrum of missions required to meet the challenges of maneuver warfare in the littorals. (4) Consider a memorandum of agreement (MOA) with the Army for the joint development of the high-mobility artillery rocket system (HIMARS). (5) Acquire a mortar fire control system that is integrated into the MAGTF command,

control-communications, computers and intelligence (C<sup>4</sup>I) architecture.

**2. The Marine Corps lacks sufficient target acquisition (TA) capabilities.** Current TA assets do not allow for the adequate, proactive location of high-payoff targets (HPTs). To quote Major General Leslie M. Palm, Commanding General of the Marine Corps Air Ground Combat Center, "...the forward observer [FO] is the weakest link in the fire support system." Correcting this deficiency is especially critical to accomplish evolving doctrinal procedures and support organizations that will rely heavily on accurate, responsive fires.

The unmanned aerial vehicle (UAV) has

The Marine Corps does not have a UAV to meet current or future requirements. The existing UAV is expensive, difficult to transport and requires significant operator training time. It also requires a long, prepared runway and is prone to critical operational failure.

The artillery regiment's Q-36 Fire-finder radar lacks sufficient range to accurately locate targets beyond 24 kilometers. The Q-36 is also a reactive system that requires friendly units to be fired upon before enemy systems can be located.

Our naval surface fire support (NSFS) ships lack the ability to locate shore-based indirect fire units. It is essential that NSFS ships have a TA



The M198 is much criticized for its weight and size. Its maximum range of 30 kilometers is significantly less than the ranges of many threat artillery systems.

been largely ignored as a TA/location platform. UAV missions are currently allocated and directed by the Marine expeditionary force (MEF), and the information from the flights is not downlinked to subordinate elements of the MAGTF.

A real-time down link would allow mobile subscriber equipment (MSE) to quickly convey the information needed to attack targets located by the UAV. Currently fielded fire support command, control and communications (FSC<sup>3</sup>) systems require that UAVs be linked directly to the shooter for the best responsiveness. Fielding the advanced Field Artillery tactical data system (AFATDS) and associated MAGTF C<sup>4</sup>I equipment eventually may preclude the need for a direct sensor-to-shooter link.

capability that matches developments in weapons systems.

*Doctrine:* Develop tactics, techniques and procedures (TTP) for tasking UAVs to support MAGTF elements as a TA platform.

*Training:* (1) The regimental artillery training schools should develop an FO sustainment training program. (2) Artillery headquarters should continue to train using UAVs as a TA device.

*Equipment:* (1) Speed up the acquisition of the target location designation hand-off system (TLDHS) as a means of reducing target location error. (2) Develop and field a vehicle mount for the modular universal lasing equipment (MULE). (3) Provide remote UAV terminals for MAGTF elements. (4) Explore technologies in the area of bistatic radars and tilt-rotor UAVs.

**3. Lack of long-range communication equipment severely restricts the MAGTF's ability to conduct OMFTS or sustained operations ashore with widely dispersed forces.** The lack of adequate communications equipment seriously affects the MAGTF's ability to exercise C<sup>2</sup>. With the progressive movement to more automated MAGTF C<sup>4</sup>I systems that rely on digital communications paths, we need to review and update doctrinal MAGTF communications topology and equipment architecture.

*Doctrine:* Review doctrine to ensure that documented communications procedures and networks are efficient, effective, accurate and current. Publish TTP for digital communications equipment concurrently with equipment fielding to enhance user acceptance.

*Equipment:* (1) Ensure procurement of communications equipment that meets joint standards for interoperability. (2) Develop and field new communications equipment to maximize the benefits associated with automated C<sup>2</sup> systems.

**4. The digital message system (DMS) is an inadequate FO/forward air controller (FAC) forward entry device (FED).** A replacement for the DMS that is compatible with Marine Corps fire support system (MCFSS)/AFATDS is required. Additionally, the functionality of the software application for calls-for-fire must be comprehensive enough to incorporate artillery special situations, such as coordinated illumination, suppression of enemy air defenses (SEAD), close air support (CAS) and NSFS calls-for-fire.

*Equipment:* Pursue early fielding of the digital automated communications terminal (DACT) to the operating forces while assuring complete call-for-fire functionality in the process.

**5. Marine Corps generators are not adequate to support current/future operational concepts and requirements.** The generators in use today are too heavy and noisy to support MAGTF units. The increased use of automated systems will continue to place heavy demands on efficient, reliable power sources. The new tactical quiet generator (TQG) in the 10/30/60/100 kilowatt power range is lighter, quieter and more rugged than currently fielded mobile generators.

*Equipment:* (1) Continue efforts to procure and field the new TQG throughout the MAGTF. (2) Continue the development of lighter and quieter generators.



The RT4000 fork lift, which is used to move ammunition in battery positions, is old and unreliable.

**6. Current artillery ammunition packaging and transport capabilities are ineffective.** Separate loading ammunition presents a logistical burden to artillery units from the firing battery to regimental levels. Bulky propellant systems account for much of the transportation required by artillery units. The many different types of fuzes required of artillery ammunition serve to increase transportation requirements. The RT4000 fork lift, which is used to move ammunition in battery positions, is old and unreliable.

*Equipment:* (1) Buy improved (or low-cost) competent munitions that reduce the number of rounds required and the improved, modular propellant, such as the modular artillery charge system (MACS), to reduce the logistics footprint of our current propellant. (2) Explore modularized ammunition packages. (3) Buy a new tactical forklift.

**7. Current tactical C<sup>2</sup> shelters are inadequate to support MAGTF operations.** We urgently need a modular, highly mobile, integrated command post shelter system at every tactical level—from the firing battery to the MAGTF combat operations center (COC).

The MAGTF C<sup>4</sup>I architecture should include the "facilities" component as part of the overall concept. This component would be a single C<sup>2</sup> shelter system with climate control for computer protection in temperature extremes (i.e., hard shelter), TQGs, modular easy-to-erect soft shelters, large flat screen displays for situation maps, a plug-in or snap-on communications capability and an uninterrupted power supply.

*Equipment:* Procure shelters that

function for all MAGTF elements; that are easy to transport, erect and dismantle; and that provide environmental protection for personnel and equipment.

**8. Current artillery training ammunition allowances are inadequate.** The current edition of Marine Corps Bulletin 8011 attempts to link training ammunition to training standards. This directive, which allows operating forces to calculate their ammunition requirements for training for the upcoming FY, was a move in the right direction.

However, an analysis of the actual requirements for Military Occupational Specialties (MOS) 0802 Field Artillery Officer, 0811 Cannoneer, 0844 Fire Direction Controlman, 0848 Chief Fire Direction and 0861 Scout Observer reveals a significant discrepancy exists between validated ammunition requirements and the planning factors used in the bulletin. In areas where there are severe training restrictions and limitations (such as in the Western Pacific), the equations used for this bulletin resulted in an almost 50 percent reduction in ammunition.

*Support:* That Commanding General of MCCDC direct the Ammunition Requirements Office survey each of the MEFs and determine the extent of the artillery training ammunition shortfall for FY97. A special allowance to correct the problem for this coming FY must be made in conjunction with a mini-conference for representatives from the MEFs, the Marine Corps Systems Command (MARCORSYSCOM) and MCCDC to determine the mathematical formulas for future ammunition planning.

**9. All elements of the MAGTF need digital equipment in a shared operating environment.** There are two serious limitations to digital communications in the MAGTF. First, the MAGTF does not have enough radios. Second, very few MAGTF elements have digital systems, and those systems the elements do have are not interoperable with other systems. These two limitations cause a reliance on voice communications and, in the case of the artillery, a duplication of radio nets to cover both voice and digital.

To be effective, we must develop C<sup>4</sup>I equipment that will allow commanders and staffs at all levels of the MAGTF to share information in a common operating environment. This computerized network is extremely complicated, requiring us to integrate the research, development and fielding of all subsystems. While it appears this integration is loosely grouped under MAGTF C<sup>4</sup>I, there is a lack of understanding in the Marine Corps of how this system will ultimately work. The MAGTF C<sup>4</sup>I concept should be published in a "campaign plan"—which already may have been done but either is outdated or not well publicized.

*Doctrine:* Publish a MAGTF C<sup>4</sup>I plan.

*Equipment:* Eliminate "stove-piped" production of C<sup>4</sup>I equipment. All equipment must be developed based on Department of Defense-directed operating systems, and all equipment must have common message sets.

**10. The Marine Corps needs to integrate NSFS control digitally.** Although the Navy has several NSFS weapons and ammunition initiatives, there is a deficiency in the control of naval surface fires, especially within the context of OMFTS. The added range and improvements in ordnance effectiveness will be obviated by our failure to modernize coordination and communication assets concurrently.

Under the MAGTF C<sup>4</sup>I concept, fire support functions are to be performed using AFATDS. While AFATDS is nominally an artillery system, its fielding in the operating forces will support more generic fire support requirements. Naval Weapons Dahlgren already has worked with MARCORSSCOM, the AFATDS Army Program Office and the Second Fleet to experiment with integrating AFATDS as the NSFS node in the overall MAGTF C<sup>4</sup>I architecture. The initial work has proven successful and promises significant improvements in control and

interoperability. There is currently no more funding available in the Marine Corps or the Army to continue these experiments.

*Equipment:* That Commanding General of MCCDC urge/request/direct/recommend that Naval Expeditionary Warfare (N85/86) become more proactive in this area and identify and secure research, development and procurement funds to integrate NSFS completely into the MAGTF C<sup>4</sup>I architecture.

**11. The Marine Corps needs to change its policy to allow enlisted and (or) non-aviator forward air controllers (FACs).** Marine Corps policy requires an aviator to control close air support (CAS). However, there are not enough FACs to meet CAS contingency and exercise requirements. Technology has advanced enough to warrant a revision to the policy requiring a certified pilot to control CAS missions.

Recently, several articles in professional journals have proposed using enlisted universal observers. Training enlisted Marines to assume this responsibility will not only recognize technical capabilities available to our observers, but also may help address several manpower deficiencies in our operating forces. Using enlisted and (or) non-aviator observers will minimize the requirements for FACs as well as reduce the large FO base required for the MOS 0802 community.

*Doctrine:* Allow non-aviator Marines who are formally trained and current by training and readiness standards to control CAS.

*Organization:* Explore observer/controller organizations at the battalion level that would enhance the CAS control options available to the maneuver commander.

*Training:* Establish a course emphasizing terminal control and assault support for Marines selected by commanders for the training.

*Equipment:* Buy a TLDHS that includes software and message formats for all types of indirect fire support.

**12. The Marine Corps does not have enough supporting arms coordinators (air)—SAC(A).** With the inactivation of USMC OV-10 squadrons, the Marine Corps has lost its ability to control supporting arms from an aerial platform. The F/A-18D and the Cobra are obviously the platforms from which this function can best be performed. The Marine Aviation Weapons and Tactics Squadron-1 (MAWTS-1) has no training package

oriented toward maintaining these skills in our MEFs.

*Equipment:* The FED (i.e., DACT) must be compatible with aviation communications equipment and should be fielded to squadrons with an aerial observer/controller mission.

*Training:* Establish a SAC(A) training and certification program that provides qualified SAC(A)s in sufficient numbers to the operating forces.

**13. The Marine Corps lessons learned system (MCLS) is an ineffective means of distributing lessons from the combined arms exercise (CAX) program.** The lack of access to MCLS by the operating forces has limited its usefulness as an information tool. It is essential—especially during this period of revolutionary changes to our doctrine—that our warfighters can easily access lessons learned through the CAX program and operational deployments.

*Support:* (1) That MCCDC establish an MCLS Lotus Notes software server with instructions on how to access the server from remote locations. (2) Establish a bulletin board for lessons learned on the USMC Home Page on the Internet and provide USMC Internet users easy access to a directory of MCLS topics that is continuously updated. (3) Incorporate CAX lessons learned in the MCCDC "Out Reach" similar to the "CTC [Combat Training Centers] Quarterly" published by the Center for Army Lessons Learned.

**14. The Marine Corps needs artillery simulators to reduce training costs while enhancing training.** The realities of reduced training budgets and constraints imposed by environmental or political concerns point to a need to develop effective, alternate training. While simulators cannot effectively replace live-fire training, they may provide a reduced-cost alternative or enhancement. Artillery and fire support training simulators, such as the fire support combined arms tactical trainer (FSCATT), show promise in providing sustainment training to all parts of the artillery team.

*Equipment:* (1) Proceed with the concept studies approval of the mission needs statement for a closed-loop artillery simulation system. (2) Explore simulation technologies that would enhance live-fire training and be distributive interactive simulation (DIS)-compatible with simulators under development for other ground and aviation systems.



**15. We need a program to exploit opportunities to enhance cannon crew operations that has a funding line similar to the Marine enhancement program (MEP).** There is no funding line to take advantage of low-cost, off-the-shelf cannon crew enhancements. This program would allow us to rapidly procure newly developed cannon crew enhancements, such as the hydraulic pump for the M198. These enhancements often are developed as a result of Marine/soldier suggestions, are relatively low-cost and provide immediate efficiency.

*Support:* Open a funding line for cannon crew enhancements.

**16. The Marine Corps needs to establish a position on fire support coordinating measures (FSCMs).** MAGTFs work for different unified commands and often run into different terms and rules for using the various FSCMs. The ongoing debate over the purpose and employment of the fire support coordination line (FSCL) is an example. The adoption of *Joint Pub 3-0 Joint Operations* and the final approval of *Joint Pub 3-09 Doctrine for Joint Fire Support* should standardize the debated definitions.

However, several of the conference speakers indicated that even with jointly agreed upon definitions of doctrinal FSCMs, we need additional measures to ensure responsive fires while safeguarding friendly forces. Some commanders-in-chief (CINCs) and, in some cases, our MEFs have devised local solutions to the problem by creating non-doctrinal measures such as the reconnaissance and interdiction line (RIPL), battlefield coordination line (BCL), the direct air support coordination line (DASCL) and others. This kind of "local solution" only serves to confuse commanders and, in the case of rapidly integrated joint forces, may even reduce responsiveness and safety while staffs learn the non-doctrinal measures.

*Doctrine:* (1) That the Marine Corps approve *Joint Pub 3-09*. (2) That Doctrine Branch at MCCDC study the various applications of the non-doctrinal FSCMs and determine the feasibility of incorporating them into joint doctrine.

**17. Marine Corps infantrymen and aviators need to "own" MCFSS as a means to integrate the supporting arms.** The current way we do business is the artillery units bring their MCFSS equipment with them every time they support maneuver units or higher

headquarters. This facilitates training the artillery unit's perishable fire support automation skills. However, this approach often causes the supported forces to view the equipment as "the artillery computers." This view is not conducive to infantrymen and aviators fully accepting the technology that facilitates the maneuver commander's responsibility for fire support coordination and supporting arms integration.

*Doctrine:* Emerging doctrine and TTP for maneuver operations must include automated C<sup>2</sup> procedures, the communications network architecture and COC organization.

*Training:* (1) The fire support coordination courses conducted at expeditionary warfare training groups (EWTGs) must integrate automated C<sup>2</sup> into their program of instruction. (2) Regardless of their MOS or unit assignment, all fire support coordinators need to be fully trained on the use of MCFSS in their fire support coordination center (FSCC)/COC.

**18. The Marine Corps needs a senior sponsor for fire support concepts and requirements.** For the Marine fire support community, the concept-based requirements system (CBRS) as well as sponsorship for fire support issues has been less than totally effective. The integration of supporting arms within the MAGTF is a trademark characteristic that sets the MAGTF apart from other military warfighting organizations.

While the ground forces in general have de facto senior officer representation at Headquarters, Marine Corps and in the MCCDC arena, we have no sponsor of real influence who can pull together the Marine Corps and the fire support community to resolve supporting arms-related issues.

*Organization:* That a senior officer from MCCDC be designated as the sponsor for

all matters pertaining to fire support in the Marine Corps. This billet should be manned by a general officer with extensive experience in maneuver, fire support and (or) CAS operations. This billet will be responsible for advising the Commandant of the Marine Corps on all supporting arms integration, doctrine, equipment and structure issues.

The consensus of this year's conference attendees was that it was a big step in the right direction. The effort to involve all elements of the MAGTF to shape the future of Marine fire support is essential. But the true measure of success will come in the months ahead as these issues are staffed through various MCCDC action offices.

The Marine Artillery Detachment will monitor and report the progress of the issues through its triennial newsletter of the "Eagle, Globe and Blockhouse." The report card on the status of the 1996 issues will kick off next year's conference in Camp Lejeune, North Carolina.



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## Training Video Available for the 60-Kilowatt Tactical Quiet Generator

Because of problems noted in the field concerning the operation of the 60-kilowatt tactical quiet generator (TQG), the video "Operation and Set Up of the 60 KW Tactical Quiet Generator" has been produced through the joint efforts of the Combined Arms Command Training Directorate at Fort Leavenworth, Kansas, and the Ordnance Center and School at Aberdeen Proving Ground, Maryland. The purpose of the film is to provide soldiers training that will help prevent damage to the generator sets. The goal is to reduce the significant costs involved in repairing the sets and save man-hours.

The video is available through Army-wide distribution and is listed as TVT 9-312, PIN # 710844DA.

All Q-37 Firefinder sections have (or will have) two 60-kilowatt TQGs as prime power sources for their radars.



by Captains Brian A. Hodges and Jay W. Hallam and Major Brian T. Camperson

*"Red rain, red rain!" is the call alerting the Gunner tactical operations center (TOC) that a radar acquisition has occurred and the counterfire clearance-of-fires drill will begin. This process occurred many times daily from December 1995 through January 1996 for the 2d Battalion, 3d Field Artillery (2-3 FA) of the 1st Armored Division Artillery (Div Arty) deployed to Bosnia-Herzegovina. The 1st Armored Division, known as Task Force Eagle, supports NATO's Operation Joint Endeavor. Fortunately, now the number of radar acquisitions has decreased.*

The battalion deployed to Bosnia-Herzegovina in December as a miniature Div Arty, called Task Force 2-3 FA. It consists of 2-3 FA, a direct support (DS) 155-mm self-propelled battalion; C Battery, 333 FA, a target acquisition battery (C/333 TAB); and 1st Platoon, A Battery, 94th FA, a multiple-launch rocket system (MLRS) platoon (1/A/94 FA). Task Force 2-3 FA provides DS fires to the 1st Brigade (the Ready First Combat Team), whose large sector includes the crucial Posavina Corridor; the battalion also supports a second brigade, the Nordic-Polish Brigade, a challenging task considering the terrain and mission.

During our pre-deployment training at the Grafenwoehr Training Area and

the Combat Maneuver Training Center (CMTC), both in Germany, all simulated acquisitions were treated as hostile mortar or artillery fires. We developed procedures to quickly clear and provide counterfires.

To streamline and simplify procedures for radar acquisitions, the TOC developed a counterfire flowchart (see Figure 1 on Page 34). To illustrate this process, we discuss an actual target acquisition.

### Counterfire Mission Processing

One evening, a 2-3 FA firing platoon reported hearing a detonation near its position. At the same time, the C/333

FA processing section in Gunner TOC received an artillery target intelligence coordinate report (ATI:CDR) from one of the five Firefinder radars deployed throughout the 1st Brigade's area of operations (AOR). The impact predict was in the vicinity of the firing platoon, prompting the battle captain to immediately begin the counterfire clearance-of-fires drill.

**Acquisition In/Across the Zone of Separation (ZOS).** The ATI:CDR is displayed on a remote screen located on the battle captain's table (Figure 2 on Page 35 shows the TOC setup). The assistant counterfire officer pages through the message and plots the acquisition on the counterfire map using color-coded dots. Each color represents a period of time the acquisition occurred. Once plotted, the battle captain determines whether the "round" was fired from within the ZOS or across it. (Either case violates the Dayton Peace Accord.) If it wasn't fired from within the ZOS or across it, the acquisition is checked to see if it affects Implementation Force (IFOR) units in the area.

**Conduct Analysis and Determine Credibility.** If the acquisition is across the ZOS, the battle captain, the TAB processing cell shift officer and the S2 analyze it to determine if it's "credible." This includes the determination of the suspected firing unit location and the "does it make sense" test; weapon's characteristics analysis, determination of operations in the radar's AOR that could affect operations, confirmation of firing by a maneuver or other unit and the battle captain's judgement call.

- Is the firing location a known or suspected location of belligerent faction artillery or mortars on the S2's map, and does it make sense? For example, Serbian artillery firing on Serbian forces would not make sense while Serbian artillery firing on Croatian or Muslim forces would. The acquisitions also help to confirm weapons' locations declared by the factions; however, caution is required because truck-mounted mortars are not uncommon in our sector.

- Do the weapon characteristics make sense? The Firefinder radar system identifies the type of projectile by the speed it is traveling when it breaks through the radar's search beam. Early in our deployment, we learned that if an AK-47 rifle burst was fired at the correct angle, the radar could identify it as an artillery or a mortar round.

The vast majority of our acquisitions were analyzed to be small-arms fire. This can be explained by the local custom of firing a weapon when celebrating (the most common weapon being the AK-47 rifle). During New Year's Eve 1996, we received in excess of 300 radar acquisitions (200 of them from 0001 to 0030 hours). Obviously, treating every acquisition as a potential hostile incoming round would quickly overwhelm our system.

Also the projected range the projectile traveled helps to clarify the acquisition. Several times we received "artillery" with a range-to-impact of two kilometers, which was not credible.

- Are other factors causing false acquisitions? These include flight operations being conducted in the area and vehicle traffic along roads, which can cause "side lobe" acquisitions.

When hovering, taking off or landing, helicopters can be identified as artillery or mortar rounds. This happens often when Blackhawk and Apache helicopters are taking off quickly from the 1st Brigade helipad. We found the reason for these acquisitions is the side lobe radiation.

The side lobes emit much less energy than the main beam. The returning reflected energy is small enough to confuse the system into thinking it is tracking a hostile projectile.

The radar can acquire targets on roads running along the edge of its 1600-mil coverage fan. This is especially true when there is little or no masking terrain in front of the radar to absorb the side lobes. Often, no masking terrain is available because the radars are positioned with a firing battery to provide it force protection.

The radar's 6400-mil coverage is critical to maximize force protection in a base camp configuration. But in base camp, it's difficult to position a radar to see 6400 mils. In the past during training exercises, we built a berm to elevate the radar above soldier head level. But in Bosnia-Herzegovina, we discovered, this practice only increases the number of false acquisitions because there's little or no masking terrain in front of the radar to absorb the side lobes.

- Is the acquisition confirmed by other elements (i.e., did someone hear a detonation or see an impact at the predicted impact location)? Fire support teams (FISTs) traveling with their company teams provide the battalion eyes and ears throughout the brigade sector. The TOC calls the brigade to determine

whether or not a detonation occurred in its vicinity.

- The final decision on the acquisition's credibility lies with the battle captain. If

he determines it's credible based on his experience and the other factors, then he contacts the brigade TOC (Ready Main) and requests verification of the target.

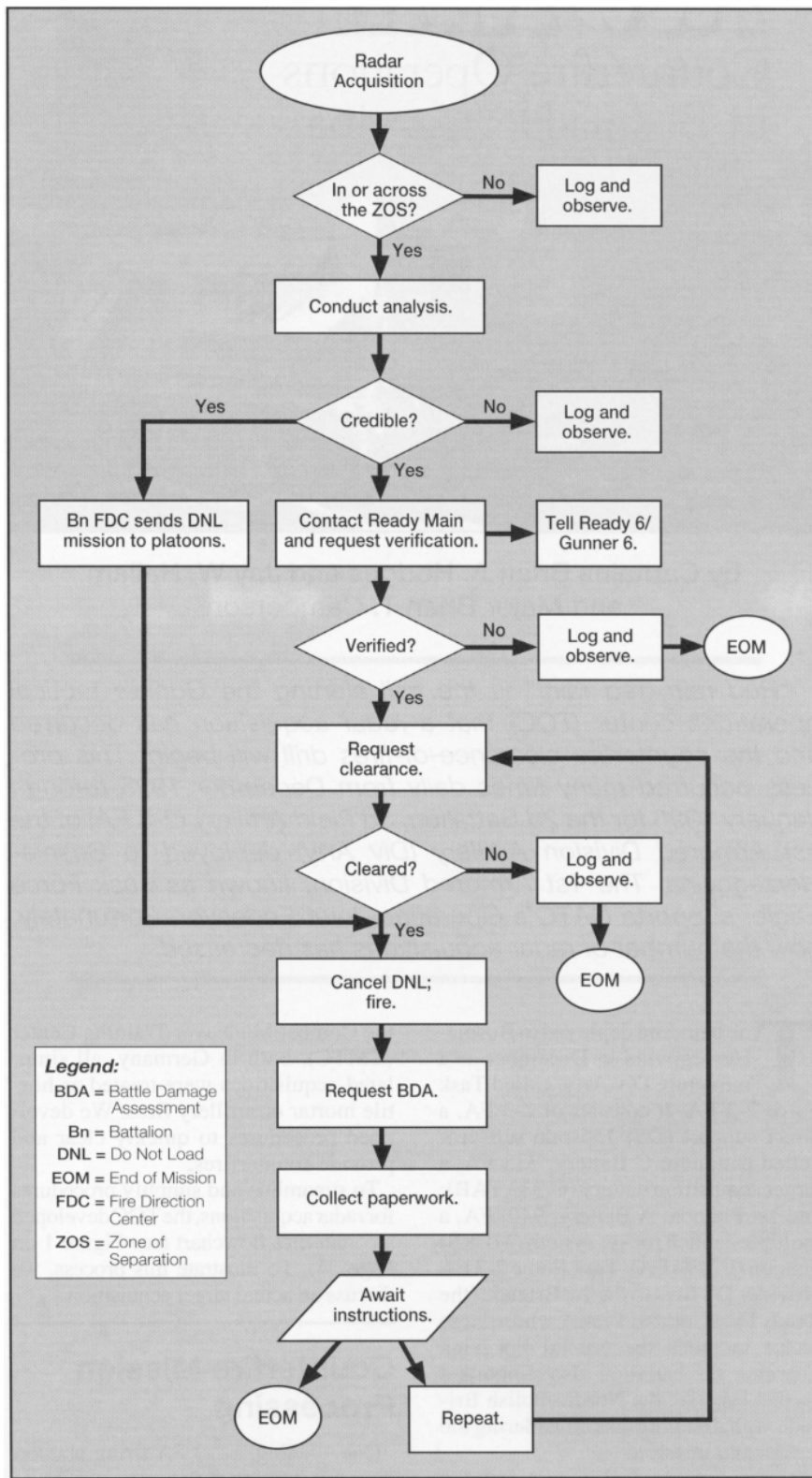


Figure 1: Counterfire Mission Processing

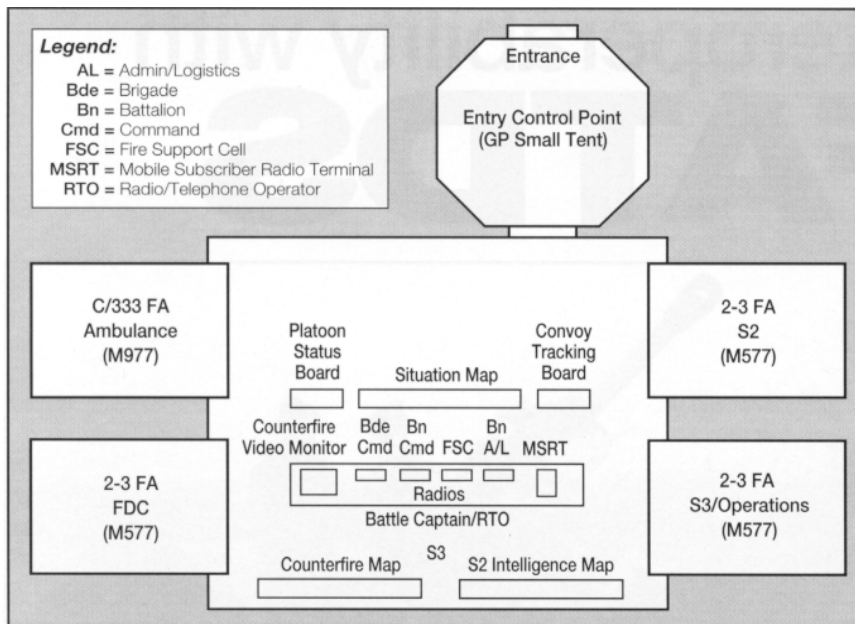


Figure 2: Task Force 2-3 FA Tactical Operation Center

If he determines the acquisition is not credible, it is logged as what it was analyzed to be (i.e.: helicopters, small arms, etc.).

**Verification and Request for Clearance.** In our example, the firing platoon was located on one side of the ZOS and the weapon's location was on the other. This a violation of the Dayton Peace Accord. The firing platoon heard an impact that confirmed the radar acquisition. The battle captain declared the acquisition "credible" and requested verification of the weapon's location from the brigade.

Verification occurs in different forms. It can range from an aerial observer in a OH-58D to a Bradley dismounted platoon going to the suspected firing weapon's location. The potential target normally will be confirmed visually before fires are processed. The 1st Brigade (Ready 6) and Task Force 2-3 FA (Gunner 6) commanders are notified simultaneously of the pending mission.

If the target is verified and an observer is in place, formal approval to fire is requested from the commander of NATO's Allied Rapid Reaction Corps (ARRC). During this time, the battalion fire direction center (FDC) selects a platoon to fire and sends a "do-not-load" (DNL) fire mission.

Once approved the "do-not-load" status is canceled and the mission fired. If the fire mission is not approved, "end-of-mission" (EOM) is given to the selected firing platoons and the suspected target is logged and observed.

### Battle Damage Assessment (BDA).

BDA is requested for each mission fired. Depending on the BDA received, approval may be requested to fire again or the mission ended.

**Documentation.** After each fired mission, all observer, FDC and gunline computer printouts and records are collected and consolidated into a "target file" by target number. The target file's information is based on the five principles of accurate predicted fire: accurate target location, accurate weapon location, meteorological data, accurate weapon and ammunition characteristics and correct firing data computations. The intent is to have a package available to document the procedures followed to fire each mission. The target files are kept by the battalion FDC.

### Conclusion

For the example acquisition, the brigade sent an OH-58D from 1st Squadron, 1st Cavalry to observe the potential target. At the same time, the brigade fire support officer (FSO) requested an AC-130 Spectre Gunship from Aviano Air Force Base, Italy, to attack the suspected firing unit, as necessary. During the C-130's travel time to the area from Italy (approximately 30 minutes), the OH-58D scanned the area with its night-vision devices for hostile weapons. When the AC-130 arrived on station, it also scanned the area for weapons. Neither aircraft identified a potential target. They

did identify a farmer driving up and down a farm road. We believe the farmer may have set off a mine in the area while clearing the field.

In this instance, the "do-not-load" fire mission was prepared by the battalion FDC but not transmitted to a platoon. Once the aircraft were released from the target area, the fire mission was purged from the data base.

All acquisitions are processed using this flowchart in a calm, deliberate manner. As illustrated in our example, the requirement for "eyes on" the target prevents unwanted civilian casualties.

The tactics, techniques and procedures (TTP) developed by the Gunner Battalion during its pre-deployment training for counterfire operations at Grafenwoehr and the CMTC have proven successful. As Operation Joint Endeavor continues, we will refine the TTP to ensure the best fire support is provided to Task Force Eagle. *Gunners.*



**Captain Brian A. Hodges is the Assistant S3 for Task Force 2-3 Field Artillery (TF 2-3 FA), part of the 1st Armored Division's Task Force Eagle in Bosnia-Herzegovina. Previous assignments include serving as a Cannon Platoon Leader and Battery Executive Officer in the Field Artillery Training Center, Fort Sill, Oklahoma; Assistant S3, Multiple-Launch Rocket System (MLRS) Battery Operations Officer and MLRS Firing Platoon Leader for 6th Battalion, 37th Field Artillery in the 2d Infantry Division, Korea.**

**Captain W. Jay Hallam commands C Battery, 333 Field Artillery (Target Acquisition), part of TF 2-3 FA. Among other assignments, he was Assistant S3 for the 6th Battalion, 29th Field Artillery, Germany, also part of the 1st Armored Division, and Battalion Fire Direction Officer and Company Fire Support Officer for 1st Battalion, 41st Field Artillery, 24th Infantry Division (Mechanized) Artillery at Fort Stewart, Georgia.**

**Major Brian T. Camperson is the S3 of TF 2-3 FA. Previous assignments include serving as the 1st Armored Division Artillery Assistant S3; Executive Officer to the Commanding General of the 7th Army Training Center; Commander of the Headquarters and Headquarters Battery of the 3d Armored Division Artillery; and Commander of C Battery, 2d Battalion, 6th Field Artillery, also part of the 3d Armored Division—all in Germany.**

# Allied Interoperability with AFATDS

by Captain Patrick V. Miller  
and Samuel R. Dies

**W**ith the downsizing of our Army and the armies of Europe, allied interoperability begins to play a more significant role in the architecture of automated command and control (C<sup>2</sup>). Automated C<sup>2</sup> is the means through which allied forces will be commanded as in the recent multinational missions during the Gulf War and in Bosnia. These missions have highlighted the importance of interoperability and so has the fact that both US divisions in Germany are part of a multinational corps—the Allied Rapid Reaction Corps. The advanced Field Artillery tactical data system (AFATDS) is at the forefront of this new interoperability architecture.

Steps to ensure automated interoperability started under the auspices of the Germany/United States, United Kingdom/United States staff talks and Germany/United Kingdom armament agreements. Germany, United Kingdom and the United States forged three bilateral programs aimed at achieving interoperability among their artillery C<sup>2</sup> systems. Germany's system is the artillery data, situation and deployment computer network (ADLER); the United Kingdom's system is the battlefield artillery target engagement system (BATES). After the France/United States staff talks, France joined the Artillery Systems Cooperation Activities (ASCA) Program with its artillery fire support C<sup>2</sup> automation system (ATLAS).

Based on these international agreements, ASCA has four member nations. Its mission is to achieve an operational interface between each of the automated artillery/fire support C<sup>2</sup> systems of the member nations. It will accomplish its mission by developing a common tactical concept (CTAC) that identifies the procedures, principles and terms for the common tactical and technical interface requirements (CTTIR) that artillery automated data processing systems need to achieve interoperability. The common technical interface design plan (CTIDP) defines the interface among artillery C<sup>2</sup>



BATES Gun Display Unit with the L 118 Light Gun

systems. The common interface operating procedures (CIOP) lays out the procedures to implement the interface.

**ASCA Organization.** The ASCA management structure is composed of an Interoperability Committee (IC) and supporting subcommittees. The IC, the highest body, consists of the chief delegate and members of each nation. Responsibilities of the IC are to ensure national assets are available to support the program, make decisions that affect the program as a whole and approve ASCA documents.

The Joint Tactical and Technical Subcommittee (JTTSC) consists of the deputy chief delegates, test directors, tactical and technical experts and also may include contractor personnel. The JTTSC prepares technical documents and prepares and executes tests.

The Demonstration Subcommittee (DSC) has demonstration directors and other members of the national delegation and is supported by national tactical and technical experts who represent the user community. The DSC prepares demonstration documentation, coordinates with the JTTSC for technical testing and prepares and executes demonstrations.

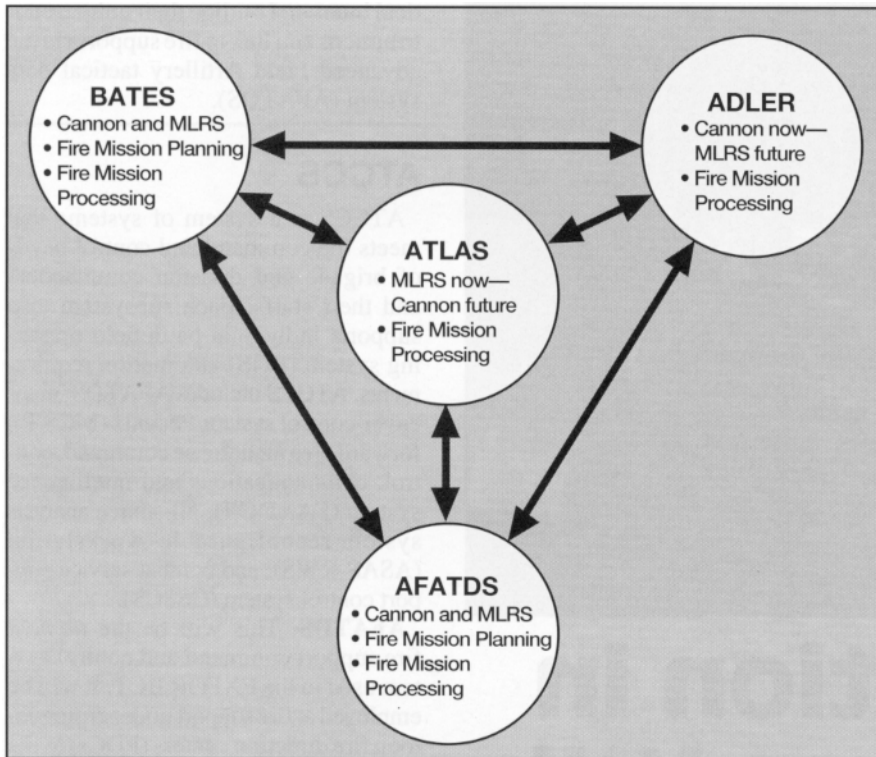
The Configuration Control Subcommittee (CCSC) and Secretariat support the IC, JTTSC and the DSC. They manage ASCA documents and all administrative aspects of the program.

**The CTIDP.** One of the most important documents in the ASCA Program is the CTIDP. This document is based on Standardization Agreements (STANAG 5620, Edition 1, Aartys P-1, ATP-45, to name a few). The messages are modified to achieve better exchange efficiency and support the tactical and technical requirements of the CTAC and CTTIR.

The CTIDP establishes a common interface using message formats. It contains 35 messages that allow for ammunition fire unit; artillery target intelligence; fire mission; meteorological; non-nuclear fire planning; support; system; and defensive nuclear, biological and chemical messages to be transmitted, received and executed in each of the nation's systems. The objective is to have full compliance with the capability of each nation's system using all 35 messages. When fully implemented, the interface will be in a dynamic, tactical, multinational environment.

The baseline message interface diagram in the figure shows the capabilities each nation wants to achieve. Of the





ASCA Baseline Messages in the Tactical Interface Design Plan (TIDP). The arrows indicate the message traffic among allied command and control systems—currently 13 messages.

35 messages, 13 are common messages between each country and are to be tested in Greiding, Germany in October. If the technical test is a success, ASCA will go forward with the live-fire demonstration in October-November of 1997 in Baumholder, Germany.

The demonstration will consist of units from each member nation and their fire support C<sup>2</sup> system. The goal is to assess the extent of the systems' interoperability for tactical use under operational conditions and to verify that personnel can be trained to use the interface without formal instruction. In addition, the demonstration will determine if the systems can interoperate in compliance with the CTAC and conform to the CTTIR, CTIDP and CIOP.

**International Interoperability.** With a successful demonstration, the interface will allow ASCA units to complete artillery tactical direct support (DS), general support (GS), general support reinforcing (GSR) and reinforcing (R) missions. This will enable the four nations' automated C<sup>2</sup> systems to simultaneously attack targets across a shared boundary.

The interface also will enable units from one ASCA nation to be attached to another member nation without degrading functionality. This is vitally important because of the multinational corps in Europe and the potential for multinational

peacekeeping operations, such as those currently ongoing in Bosnia.

Some constraints on the development of the interface are the varying progression of different national systems. Each nation is building its system; some designs and national doctrine may have to be tailored to achieve the goal of interoperability. Nations tend to be slow in changing doctrine to keep pace with changes in automation. Finally, national resources are not always available to

progress the C<sup>2</sup> systems' developments at the same rate.

Despite the limitations, the program has been successful. The four nations already have limited interoperability. With the implementation of all 35 messages, the ASCA Program will come under the auspices of NATO for further development and participation by more NATO nations.

The FA and AFATDS are, again, leading the way on the digitized battlefield. AFATDS in support of ASCA and future international interoperability is just one way the US FA of tomorrow will stand at freedom's frontier.



**Captain Patrick V. Miller, Acquisition Corps, is the Advanced Field Artillery Tactical Data System (AFATDS) System Integrator for the Training and Doctrine Command (TRADOC) System Manager-AFATDS (TSM-AFATDS) in the Field Artillery School, Fort Sill, Oklahoma. Among other assignments, he commanded Headquarters and Headquarters Battery of 2d Battalion, 3d Field Artillery in the 1st Armored Division, Germany.**

**Samuel R. (Rick) Dies is the Deputy TRADOC System Manager for AFATDS in the Office of the TSM for Fire Support Command, Control and Communications (TSM-FSC<sup>3</sup>) at the Field Artillery School. He also served as Chief of the New Systems Division and Training Developer for the Tactical Fire Direction System (TACFIRE), both in the Gunnery Department of the Field Artillery School. Rick Dies has worked with tactical fire direction systems for more than 15 years.**

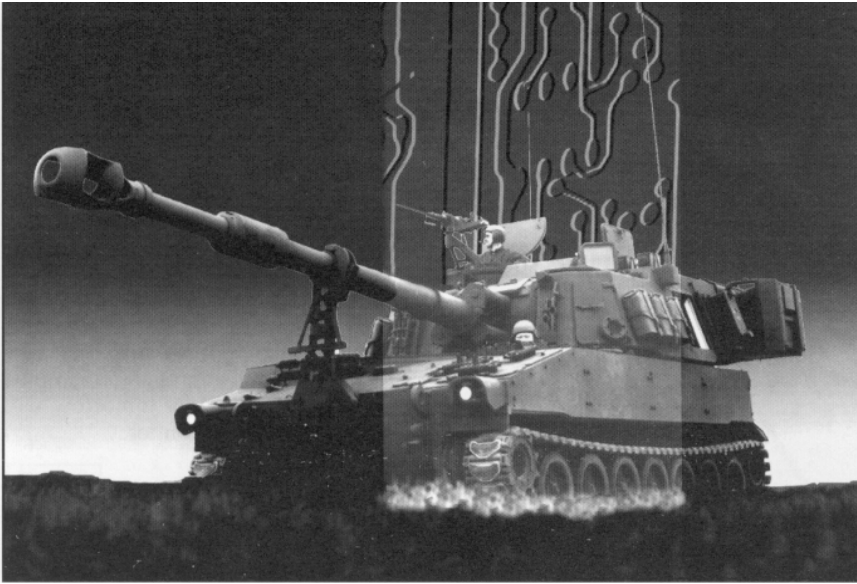
### Redlegs Needed for ARNG Paladin NETT

The Army National Guard (ARNG) is seeking applicants for Paladin New Equipment Training Team (NETT) members to field the Paladin weapons system to 14 FA ARNG battalions. The fielding will begin in FY 98 and extend through FY 00—perhaps beyond. Fielding team members will serve in Title 10 Active Guard Reserve (AGR) status for the duration of the fielding. Home station will be Fort Sill, Oklahoma, with 60 to 75 percent of the members time spent TDY to support the mission.

Individuals must agree to be appointed/enlisted in the ARNG before applying. Effective date of appointment/enlistment may be after the acceptance date of the application. ARNG, US Army Reserve and Active Component (RA) personnel may apply. Applications will be accepted until all positions are filled.

The following grades/skills are required: one lieutenant colonel 13A; one major 13A; one captain 13A; one sergeant first class 13C; five (plus or minus) sergeants first class 13B; five staff sergeants 13E; sixteen staff sergeants 13B. All personnel will serve as instructor-writers and also may be supervisors. All personnel will be required to travel.

If interested, please contact Lieutenant Colonel Jim Scott, Captain Tim Keasling or Sergeant Major R.J. Moulton of the Tour Management Office at the Army National Guard Readiness Center in Arlington, Virginia, at DSN 327-9790 or commercial (703) 607-9790. Email is scottj@arngrc-emh2.army.mil and the fax is 7189, which works with the DSN or commercial prefixes.



# Digitization in Task Force XXI

by Captain Henry M. Hester, Jr.

*The ability to move information rapidly and to process it will likely change the way we command military operations.*

## **Training and Doctrine Command Pam 525-5 Force XXI Operations**

**D**ominating information on the battlefield will enable leaders at every level to make rapid, informed decisions while the enemy remains guessing. In March 1997, the Army's National Training Center (NTC), Fort Irwin, California, will serve as the battle laboratory to assess information dominance using a new suite of digital systems and communications technology during the Task Force XXI advanced warfighting experiment (AWE). These new systems have been fielded to the 1st Brigade Combat Team (BCT) of the 4th Infantry Division (Mechanized) at Fort Hood, Texas—the exercise force (EXFOR) for the AWE. (See the figure.) The AWE will be an important first step in making information dominance a reality.

To gain information dominance, we must leap beyond traditional "stovepiped" information systems. We must tear down the information barriers

caused by incompatible protocols, message formats and communications media. We also must put behind the notion of "planning digital and executing voice."

Emerging digital systems of Task Force XXI will use common protocols and message formats and provide improved digital communications over greater distances to enable us to plan and execute digitally. More importantly, the systems will automatically perform many of the routine information management and decision-making tasks that have traditionally proven to be both manpower-intensive and time-consuming. These digital systems will automatically exchange information among themselves, thus freeing leaders and their staffs to focus on more critical aspects of battle command.

This article discusses three key elements of the digitized battlefield: the Army tactical command and control system (ATCCS), applique and the tactical

internet. I outline their unique contributions and link to fire support via the advanced Field Artillery tactical data system (AFATDS).

### **ATCCS**

ATCCS is a system of systems that meets the command and control needs of brigade and division commanders and their staffs. Each subsystem also supports individual battlefield operating system (BOS) automation requirements. ATCCS includes AFATDS; maneuver control system/Phoenix (MCS/P); forward area air defense command, control, communications and intelligence system (FAADC<sup>3</sup>I); all-source analysis system-reconfigurable workstation (ASAS-RWS); and combat service support control system (CSSCS).

**AFATDS.** This will be the *tactical* fire support command and control system used in the EXFOR BCT. It will be employed at fire support nodes from platoon fire direction centers (FDCs) to the brigade fire support element (FSE) and in the battle tracks of the brigade fire support coordinator (FSCoord) and each battalion task force fire support officer (FSO).

AFATDS uses detailed targeting and attack guidance to focus fires on the right target at the right place and time and with the right fire support asset and target effects to meet the commander's intent. It also automatically distributes a common, relevant fire support picture of the battlefield, including mission and intelligence information, geometry (graphics), fire support asset locations and ranges, and unit CSS information.

Company fire support teams (FISTs) and forward observers will have forward observer software (FOS) installed in a lightweight computer unit (LCU) for mounted use and in a hand-held terminal unit (HTU) for dismounted use. FOS will give artillery observers the fire support-specific functions needed to interoperate with AFATDS in task force and brigade FSEs.

**MCS/P.** This maneuver system will be in the brigade tactical operations center (TOC) as well as in every battalion TOC in the BCT. MCS/P also will be in the battle tracks of the BCT commander and armored and mechanized infantry task force commanders.

The system is designed to provide leaders and their staffs an automated, near real-time ability to prepare and distribute operational plans, graphics, orders

and reports and provide a common, relevant maneuver picture of the battlefield for controlling tactical operations.

In each TOC, MCS/P will be linked with AFATDS via a local area network (LAN). The systems will share graphics information, and AFATDS will automatically keep MCS/P updated with fire support unit locations. In MCS/P, an operator will be able to generate calls-for-fire and pass them to AFATDS. In return, AFATDS will provide mission information and pass mission fired reports (MFRs) and artillery target intelligence information (ATIs) to MCS/P. AFATDS will receive orders generated in MCS/P and exchange commanders situation reports (SITREPs) as well as nuclear, biological and chemical (NBC) reports.

**FAADC<sup>3</sup>I.** This air defense system provides command and control, early warning and targeting information to a variety of integrated air defense weapons and sensors as well as to supported units via ATCCS. The FAADC<sup>3</sup>I system receives a long-range air picture from an airborne warning and control system (AWACS) aircraft. It then disseminates and integrates the air picture with local sensor air tracks and distributes the information down to individual forward area air defense (FAAD) weapons: Avenger and Stinger missile teams and Bradley Stinger fighting vehicles.

The FAADC<sup>3</sup>I system will be with the air defense officer in the brigade TOC and communicate with AFATDS via the TOC's LAN. The two systems will exchange automated commanders' SITREPs and battlefield geometry. This will allow air defense teams, for example,

to protect themselves with restricted fire areas (RFAs) and ensure friendly airspace coordination areas (ACAs) and air corridors are disseminated to FAAD systems to protect friendly rotary- and fixed-wing assets. AFATDS will receive air threat information via an air strike warning message transmitted from FAADC<sup>3</sup>I. AFATDS also will receive calls-for-fire generated in FAADC<sup>3</sup>I and share MFRs.

**ASAS-RWS.** The workstation will provide combat leaders the all-source intelligence needed to view the battlefield and more effectively conduct the land battle. It will receive and correlate strategic and tactical intelligence at the collateral level, produce enemy situation displays, rapidly disseminate intelligence information, nominate targets and manage collection requirements. During the AWE, ASAS-RWS will be deployed in the brigade TOC as well as in the armored, mechanized infantry and light infantry task force TOCs.

AFATDS will be connected with the ASAS-RWS via the TOC's LAN. Commanders and their staffs will have a two-way interface between fire support and intelligence channels to exchange targeting information. They will be able to swiftly attack high-payoff targets (HPTs) by providing a digital link between intelligence sensors/sources and fire support assets.

As a result of the collection plan, targeting information on detected HPTs will be transmitted digitally from the ASAS-RWS to AFATDS. If the targeting information passes the commander's filtering and screening guidance in AFATDS (e.g., meets the criteria established in the attack guidance matrix), it will result in a fire mission.

AFATDS will pass MFR data to the ASAS-RWS for each mission fired in support of the brigade. For fire requests that don't meet the commander's attack guidance, AFATDS will recommend denying those missions and generate the appropriate ATI information to ASAS-RWS, notifying the S2 of the target information in that request. These capabilities will eliminate the need to manually record and exchange data between the two BOS. As with the other ATCCS systems, AFATDS and ASAS-RWS also can exchange commander's SITREPs and battlefield geometry, enabling the ASAS-RWS operator, for example, to build RFAs around intelligence sensors.

**CSSCS.** The system will manage the tremendous amount of CSS information from the brigade or BCT through to the theater levels. Located in the support operations of the forward support battalion (FSB), the system will provide commanders timely, critical information on ammunition and fuel supplies, medical and personnel status, transportation, maintenance services, general supply and other field services.

## Applique

The applique is the cornerstone digital system of the Task Force XXI AWE. It is a system of hardware and software that extends digitization to virtually every vehicle in the BCT and to dismounted soldiers in the BCT's light infantry companies.

Combined with a positioning capability and radio, each applique device will maintain its own position and transmit it automatically at regular intervals to other applique devices throughout the brigade. This positioning information is then received, processed and automatically displayed on applique screens within the BCT. Thus, each applique-equipped vehicle or soldier will have timely, accurate awareness of other vehicles and soldiers in its battlespace.

Here are some unit examples in the EXFOR that illustrate the extent to which applique devices will be distributed. In the direct support (DS) artillery battalion, applique device will be mounted in Paladin howitzers, platoon FDCs, platoon sergeant and platoon leader vehicles, battery first sergeant and commander vehicles, the battalion TOC, company fire support vehicles, FSEs, a limited number of ammunition vehicles and maintenance and survey vehicles. In maneuver battalion task forces, applique devices will follow the same general pattern of distribution to key vehicles, including scout vehicles, M1A1 Abrams tanks and M2 Bradleys.

The devices will provide more than 20 different message formats ranging from a complete set of fire support messages to obstacle reports, SITREPs and spot reports.

Many of the messages will interface with ATCCS counterparts. For example, the applique fire support messages will interface with AFATDS, allowing any applique-equipped soldier or platform to be a digital sensor for indirect fires, providing redundancy for executing critical fire support tasks.

### TF XXI Brigade Combat Team EXFOR

1-22 Infantry (Mechanized)  
1-5 Infantry (Light)  
3-66 Armor  
Brigade Control  
TF 2-4 Aviation  
4-42 FA (155, Self-Propelled) (Direct Support)  
1-14 FA (155, Self-Propelled) (Reinforcing)  
A/2-8 FA (105, Towed) (Direct Support)  
A/1-44 Air Defense Artillery  
A/124 Signal  
299 Engineer Battalion  
4th Forward Support Battalion  
1st Platoon, 4th Military Police Company  
31st Chemical Company (-)  
A/104 Military Intelligence (Direct Support)

The 1st Brigade Combat Team, 4th Infantry Division (Mechanized), will be the EXFOR for the Task Force XXI AWE.

The applique system also will provide key CSS functions up to the brigade level, including personnel and logistics tracking for Classes I, III, IV, V, VII and VIII categories of supplies. It will anticipate CSS requirements and send logistics (Log) SITREPs at regular intervals through S4 channels to the brigade S4. The brigade S4 then will feed the unit roll-up information into the CSSCS in the FSB. For unanticipated CSS requirements, the applique will request support employing a call-for-support message.

The brigade will be the gateway CSS connection between the applique and ATCCS' CSSCS. From the platoon to brigade levels, applique devices will provide and manage CSS information. CSSCS then will manage that information from the brigade up through the division to, ultimately, the theater level.

The ATCCS and applique digital systems are the primary information systems of Task Force XXI. But as Field Artillerymen have learned, digital systems are only as effective as the means to transmit and receive the data.

## Tactical Internet

The tactical internet is a system consisting of the improved single-channel ground and airborne radio system (SINCGARS), enhanced position location reporting system (EPLRS) and mobile subscriber equipment (MSE) that electronically routes digital data. All digital data devices will use the tactical internet for communication.

Digital messages will be "packaged" and transmitted to their destinations using internet protocol addresses. The tactical internet then will transmit the message, finding the optimal route to the destination. As an example—two messages generated from the same applique to the same addressee could take two separate routes to reach the destination, depending on electronic line-of-site, intermediate nodes and the distances involved. By eliminating the need for electronic line-of-site and increasing the range of digital communications, the tactical internet will revolutionize digital communications.

However, the adequacy of the communications system architecture is yet untested. The system's ability to support the increased demands of communications traffic long distances on the digitized battlefield is a central issue of the Task Force XXI AWE.

This emerging technology presents new challenges—for example, in individual and collective training. First, soldiers and leaders must be comfortable using and understanding computers. We no longer can afford to have an elite few in the battalion understand and maintain our digital capability, as was often the case with the tactical fire direction system (TACFIRE).

Intra-unit training, in the tradition of weekly TACFIRE sustainment training, will be required throughout every unit. Inter-unit training, as well, will be important to train collectively with multiple ATCCS devices and validate

applique techniques and procedures across other BOS.

Finally, the digital rehearsal will no longer be just a fire support event. It will include a myriad of combined arms systems, each validating internal guidance and the automatic distribution of information among systems, ensuring decision-making capabilities are predictable and within the confines of the commander's intent.

The 1st BCT EXFOR has an exciting and challenging mission in the coming year. Its efforts and the lessons we learn from the Task Force XXI AWE next March will take a us giant step toward building the Army for the 21st century.



**Captain (Promotable) Henry M. (Chip) Hester, Jr., is an Action Officer in Task Force 2000, part of the Field Artillery School, Fort Sill, Oklahoma. Currently, he's writing tactics, techniques and procedures (TTP) for the advanced Field Artillery tactical data system (AFATDS) and working with the Experimental Force at Fort Hood, Texas, on digitizing the force. He commanded Headquarters and Headquarters Battery, 3d Battalion, 1st Field Artillery in the 3d Infantry Division (Mechanized), Germany, and served as Fire Support Officer for both Task Force 4-69 Armor, 3d Infantry Division, and Task Force 332 Armor, 1st Cavalry Division, Fort Hood. Prior to his assignment to Fort Hood, he served as a Platoon Leader in B Battery, 6th Battalion, 37th Field Artillery, part of the 2d Infantry Division in Korea.**

## AFATDS Goes to Kuwait

In August 1995, elements of the 1st Cavalry Division, Fort Hood, Texas, deployed with no-notice to Kuwait in support of joint exercise Intrinsic Action. The Field Artillery's newest digital computer system, the advanced Field Artillery tactical data system (AFATDS), deployed with them. Pictured on either side of AFATDS is (left) Staff Sergeant Lawrence Eistre and Major Al Bourque, S3, both of the 3d Battalion, 82d Field Artillery, 1st Cav. They are discussing AFATDS operations with Kuwaiti soldiers.

The battalion—Task Force Red Dragon—deployed with the 2d *Blackjack* Brigade to Kuwait with its headquarters and headquarters battery (HHB), two of its 155-mm self-propelled howitzer batteries, the division's multiple-launch rocket system battery, two radar sections from the division's target acquisition battery

and a meteorological section from the division artillery HHB. The exercise originally was planned for October 1995 but was conducted earlier amid concern that increased military activity in Iraq posed a threat to Jordan or Saudi Arabia. In the exercise, the battalion tactical operations center served as a force FA headquarters and executed fires for the ground component



commander by integrating US and Kuwaiti Field Artillery assets.

# Naval Surface Fires and the Land Battle

by O. Kelly Blosser

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*The US Navy is expanding its capabilities to conduct operations in the littoral regions of the world and to project power from the sea to achieve naval objectives and support joint forces operating over and on land. This new thrust comes from the strategic concept implemented by the Chief of Naval Operations and the Commandant of the Marine Corps in the 1994 paper "Forward...From the Sea."*

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Courtesy of Lockheed Martin Vought Systems



The Navy must remain the dominant naval force in the maritime or "blue water" regions of the world where the US has special interests or allies. In addition, strategic employment of the sea services, including the Marine Corps, is now being focused on naval expeditionary force operations over a continuum from peacetime forward presence through crisis response to regional conflict.

In concert with the strategic concept for naval force employment, an overarching concept of *naval fires* is being developed by the Naval Doctrine Command to guide the future development and use of naval weapons to project power near and over land in the littorals. Components of naval fires include carrier- and land-based tactical aviation and their air-to-ground weaponry and naval surface combatants and submarines launching tactical land attack weapons. Mobile Marine Corps artillery batteries employed as elements in a rapidly maneuvering expeditionary force also could be considered a naval fires component.

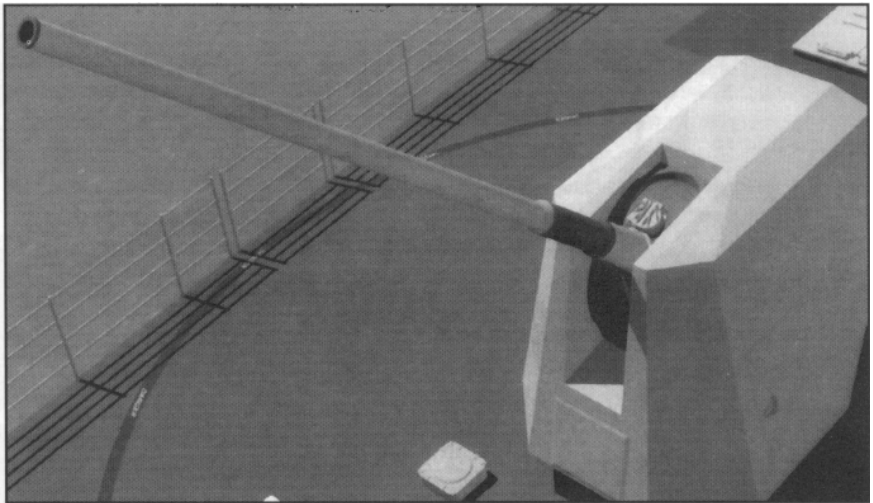
Naval surface combatants, including cruisers and destroyers, the focus of this article, are key components of this new drive to increase the Navy's ability to project power from the sea in the littoral environment. The Tomahawk land attack missile (TLAM) launched from surface combatants and submarines is a proven weapon for strike missions. Naval gunfire from surface combatants is one of three traditional supporting arms for amphibious assault operations.

For the future, new surface ship-launched land attack weapons are being developed or adapted for land attack, and mission planning and coordination capabilities will be improved to provide a true joint capability. The scope of operations for this system will include independent surface strikes from the sea, fire support for Marine Corps or joint amphibious operations and fires supporting the air-land battle. Naval surface-launched weapons will contribute to the land battle as well as to expeditionary operations in the littorals.

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## Traditional Naval Gunfire Support

In our history, naval firepower from surface combatants contributed to the success of military actions in nearly all littoral operations. Naval guns from destroyers, cruisers and battleships were employed to destroy and disrupt enemy



Courtesy of United Defense

Artist's conception of the new 5-inch/54 Mark 45 gun shield configuration; modifications to the gun will allow it to fire the ERGM 63 NM.

shore defenses in support of amphibious assault operations, conduct shore bombardment missions against enemy coastal installations and transportation and, occasionally, to support a maritime flank of a land campaign.

Traditional naval gunfire fire support (NGFS) encompassed all naval guns from 3-inch to 16-inch to support amphibious operations and contribute to the land battle (as long as the objectives were on or near the coast). Navy surface combatants today have one or two 5-inch/54-caliber gun Mark 45 guns with ballistic ammunition that can fire to a maximum range of about 14 nautical miles (NM) but with a much shorter effective range for precision fire.

The newest Arleigh Burke (DDG-51 Class) destroyers have a modern fire control system. Using global positioning systems (GPS), these ships can obtain a precise fix on their own positions instead of using dead reckoning or navigational references in in-shore waters.

However, fire support planning and coordination on the most modern cruiser and destroyer are still accomplished with a plot team and charts. Voice or naval text-formatted teletype messages provide communications between separate elements of the organization. Coordination conducted by the supporting arms coordination center (SACC) on amphibious command ships is done much as it was done in World War II; it's a manual, man-intensive operation using charts, maps, overlays and 3x5-inch file cards.

The Marine Corps is attempting to bring automated support aboard some amphibious command ships by installing

its initial fire support automation system (IFSAS). However, while IFSAS can communicate with other fire support elements (FSEs) via several commo systems, current Marine and Navy architectures aboard amphibious ships only support an IFSAS interface through the VHF single-channel ground and air radio system (SINCGARS).

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## Naval Surface Fire Support

In 21st century concepts of warfighting, our current naval weapons and the planning and coordination process, communications and organization will be inadequate in range, firepower and response to support operations from a seabase. The Marine Corps' new doctrine of Operational Maneuver From the Sea (OMFTS) stresses the use of rapid, decisive action with firepower and maneuver from the sanctuary of a seabase. US Army combat in the 21st century will be characterized by "full-dimensional operations" over an expanded battlefield; depth, simultaneous attack and the use of decisive firepower to support dominant maneuver are the underpinnings of the Force XXI concept.

In response to these new requirements, NGFS has been replaced in the naval lexicon by naval surface fire support (NSFS) to denote the expanded role asked of surface combatants. NSFS is the "fire provided by navy surface gun, missile and electronic warfare systems in support of a unit or units tasked with achieving the commander's objectives" (*Joint Pub 3-02 Joint Doctrine for Amphibious Operations*).

Weapon systems are being developed to provide surface combatants a greatly expanded capability to place ordnance rapidly and precisely on and around the expanded battlefield of the future. The concept of a system of systems is very applicable to the problem of evolving NGFS systems to the NSFS system of the future. Advances in the technology will give us effective weapons, and the judicious adaptation of other joint systems could provide automated mission planning and fire coordination. Adapting joint systems would allow us to operate "seamlessly" with Marine and joint land forces to provide firepower when and where needed.

The development of these new weapons is being paced by a program of critical experiments and demonstrations aimed at modernizing Navy tools for planning and coordination. Weapon development has the momentum provided by funding while development of the supporting system is in a conceptual phase.

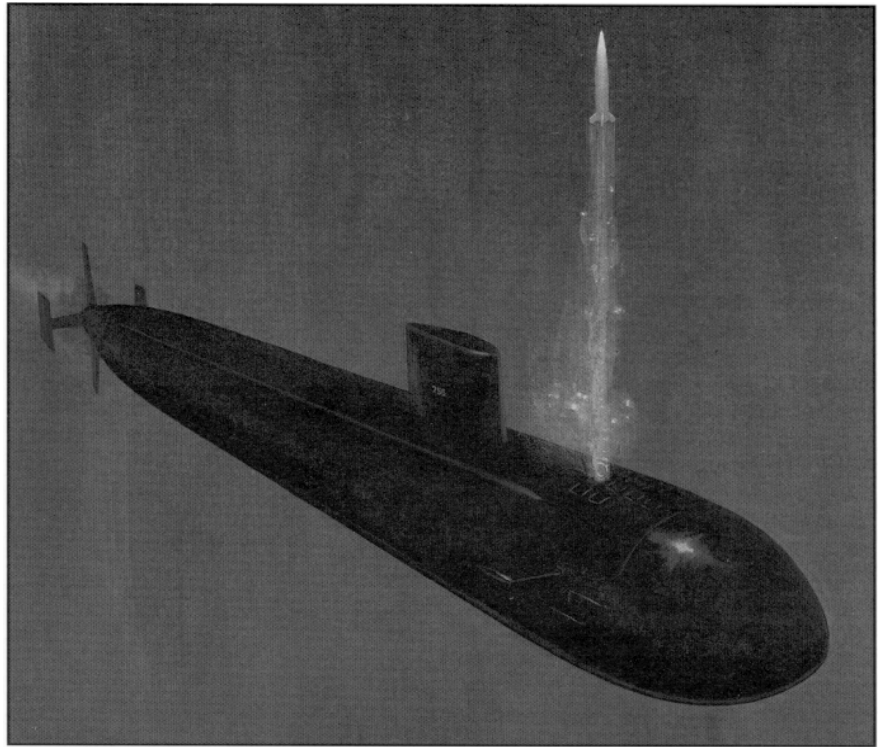
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## NSFS Weapons

The current Navy weapons program managed by the NSFS Program Office (PMS-429) of the Naval Sea Systems Command will develop and field an enhanced extended-range, guided munition Ex-171 (ERGM) fired from a modified 5-inch/62-caliber Mark 45 gun mount. Required but unfunded is the need to adapt and modify an existing missile airframe to provide a tactically responsive land attack missile.

The Ex-171 ERGM is being developed to meet near-term Marine Corps requirements for a weapon to support expeditionary operations, to initially take the place of and later supplement artillery in the close battle and to engage in counterfire against enemy indirect artillery. ERGM will incorporate a rocket motor to reach an objective range of 63 NM and an inertial guidance system (INS)/GPS to accurately place the weapon and a submunition warhead to attack a broad range of battlefield targets. It is scheduled to complete initial operational capability (IOC) testing in September 2000.

TLAM, the only conventional surface and submarine-launched land attack weapon, has been used in strike, interdiction and suppression of enemy air defense (SEAD) missions in Desert Storm and Bosnia. The missile employs GPS mid-course guidance and digital



Courtesy of Lockheed Martin Vought Systems

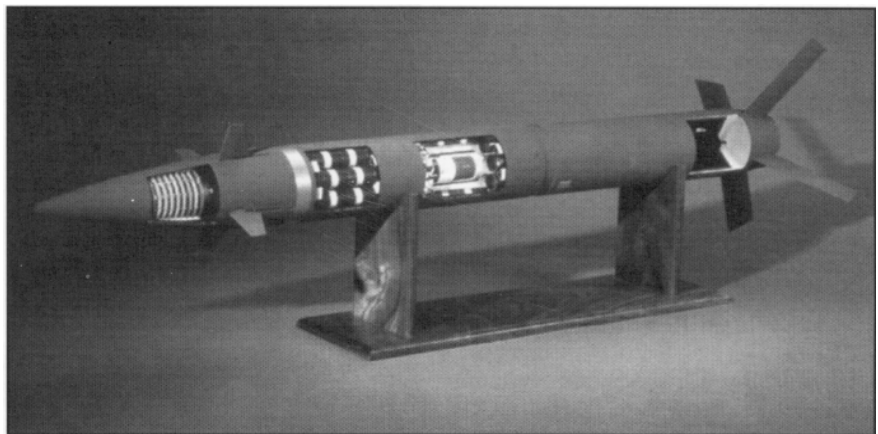
An artist's rendition of a submarine-launched ATACMS.

scene matching and area correlation (DSMAC) for preplanned strikes and to attack high-value targets. This missile and its supporting planning and targeting system requires a lengthy planning time due to the need to develop detailed mission plans. However, TLAM is being improved to provide a more tactically responsive weapon for certain types of high-value, time-critical targets.

Several candidates also are being evaluated to produce a fire support missile in the first decade of the next century to supplement both TLAM and the gun system. This weapon will provide surface combatants a quick response, deep

attack capability against high-priority battlefield and interdiction targets.

The Army tactical missile system (ATACMS) was tested at sea in February 1995, and a variant, the Naval tactical missile system (TACMS) has been proposed. The production version of Navy TACMS would be a modified Army TACMS Block IA with a range of about 150 NM carrying a payload of 300 M74 submunitions. This missile would be fired from the vertical launching system (VLS) Mark 41. A test of TACMS from a vertical launcher is scheduled at White Sands Missile Range, New Mexico, in late 1996.



Courtesy of Texas Instruments

Conceptual ERGM

A land-attack version of the Navy's standard missile 2 (SM-2) also has been proposed for standard missile strikes. It would use the SM-2 rocket motor and control set with a new INS/GPS navigation and guidance set and a submunition payload.

The sea-launched standoff land attack missile (Sea SLAM) is a proposed surface ship-launched variant of the air-launched SLAM missile. Sea SLAM capabilities were successfully demonstrated in early 1996. Sea SLAM has a range of about 75 NM; a control aircraft or a specially modified helicopter uses the missile's electro-optical seeker to lock on to the preplanned target.

Other more advanced weapons have been proposed for land attack. An advanced gun system concept, the revolutionary vertical gun for advanced ships (VGAS), features a vertically positioned pair of 155-mm/52-caliber barrels with automatic loaders. VGAS would fire rocket-boosted guided projectiles to ranges well beyond the current gun-range requirement. Projectiles fabricated from advanced composite materials or powered by a supersonic ram jet (Scramshell) also could attain ranges well beyond the 63 NM specified for the ERGM round.

Tomahawk stops the attacking regiments (TSTAR) is a concept by the cruise missile program for a TLAM variant to attack massed, mobile armored forces. The missile would be a variant of the TLAM missile with brilliant anti-tank (BAT) munitions or wide-area mine (WAM) payloads.

Also, a notional fast-response missile has been included in concepts to support the 21st Century Surface Combatant (SC-21). The notional ballistic missile would attack time-critical targets beyond 150 NM.

## Fire Coordination Systems

Outstanding weapons won't be effective without the ability to accurately designate targets and ensure fires are coordinated over an extended and fast-paced battlefield. These capabilities call for systems that can plan and coordinate fires and communicate digitally.

It's clear that NSFS must be a component of a fully integrated fires system within the Marine Corps' OMFTS and Army's Force XXI. It must communicate with all FSEs using joint

message standards over high-speed digital data paths and have interoperable mission planning and fires coordination capabilities. Such a system must meet several basic requirements. It must—

- Support NSFS weapons and other naval weaponry against assigned targets: prearranged, general support (GS) and direct support (DS). This requires precise target information to place ordnance within lethal weapon radius for a variety of targets.

- Operate with both digital and voice communications used by joint forces on the battlefield. Voice will be less important; but for the near future, voice communications must be retained as a parallel and backup capability.

- Ensure that surface combatants with NSFS capabilities are interoperable with the force fire support coordination system. Surface ships must have a relevant battlefield tactical picture shared with all echelons of tactical command afloat and ashore and must receive fire support coordinating measures (FSCM) to develop tactical fire control solutions for all weapons. The problems of the future battlefield include not only assigning resources, but also deconflicting the fires of aircraft, helicopters, missiles and gun-fired ordnance. Coordination must encompass joint fires and air coordination elements.

New NSFS operational concepts and requirements are determining candidate systems for a notional system of systems. Today, the requirements to develop a new system must be tempered with concern for development costs and retention of

flexibility in the combat system of the cruisers and destroyers. Reuse of joint systems, especially where they enhance capabilities and interoperability, is a system design goal.

Currently, fire support communications are via HF voice radio nets with force coordination centers afloat and ashore and forward observers (FOs). In expeditionary operations or in a land battle involving Marine Corps or Army combat elements, digital communications for fire support control and coordination is accomplished primarily using the VHF radio combat net and SINCGARS. This has some significant limitations where the fire units are over the visual horizon from the combat radio net. Navy surface combatants must participate in the digitization of the future battlefield. New communications solutions may be required to provide a reliable communications interface with cruisers and destroyers providing fires to support expeditionary operations or the land battle.

Joint systems are now being developed in a common operating environment (COE) with open system architecture standards, standard hardware and modular software. Future surface combatants will have fully integrated combat systems with a computing system backbone and common display terminals to run mission-specific applications. Cruiser and destroyer combat systems will include the functions required to plan, coordinate and execute missions for tactically responsive



USS Saipan and USS Mount Whitney used AFATDS to simulate airspace deconfliction for a notional TACMS firing from the USS Mitscher.

Courtesy of Naval Surface Warfare



The USS Mitscher provided direct support to Marines ashore during JTFEX 96.

land attack missiles. Weapons coordination and a relevant, shared tactical picture are key requirements in NSFS.

Several demonstrations have been conducted recently to explore integrating naval fires with forces operating ashore.

Demonstrations completed in Combined Joint Task Force Exercise (CJTTFEX) 96 in April and May of 1996 off the coast of North Carolina were ambitious attempts to showcase planning and coordination capabilities at the force and NSFS ship level. The Navy received generous support from the Marine Corps and the Army in conducting these demonstrations.

These demonstrations included mission planning, airspace coordination, GS and DS fire missions with the gun system and a notional engagement with a simulated shipboard ATACMS. Army advanced Field Artillery tactical data system (AFATDS) terminals were installed in the USS Mount Whitney (LCC-21), USS Saipan (LHA-2), USS Nassau (LHA-4) and USS Mitscher (DDG-57).

DS missions were conducted with an FO on shore using a digital communications terminal (DCT) to pass fire support messages to the USS Mitscher. A remote digital data link converted certain tactical fire direction messages sent from AFATDS and the digital devices carried by the FOs for display on the gunfire control console. This replaced the current procedure where targeting data is passed by voice from an FO and entered manually by the gun fire control system operator to designate targets for the 5-inch gun. SINCGARS and a SHF satellite communications link were used to exchange tactical data and coordinate fire missions among the amphibious command ships and shore terminals. Connectivity ashore included the fire support coordination center (FSCC) for II

Marine Expeditionary Force (II MEF) and the XVIII Airborne Corps FSE at Fort Bragg, North Carolina.

The demonstrations showed conclusively that VHF SINCGARS is inadequate to provide a reliable ship-to-shore digital net over the ranges and at the digital data rates that will be common in future littoral operations. A reliable and secure SHF satellite communications net for NSFS was established among command ships and ground component forces for the at-sea demonstration. However, this is not an operational capability: we are not assured of having SHF channels available and, in any case, cruisers and destroyers won't have a SHF communications capability.

In another effort, the Cruise Missile Program (PMA-282) and the Defense Advanced Research Projects Agency's (DARPA's) Information Systems Office conducted interoperability demonstrations of the advanced Tomahawk weapons control system (ATWCS), the Department of Defense (DoD) global command and control system (GCCS) and other systems. The objective was to share situational awareness data to plan and execute timely fire support for ground forces via digital calls-for-fire from Army FSEs as well as small units in the field.

In this demonstration, disparate systems from different services interoperated seamlessly and shared common tactical data. This demonstration and the CJTTFEX exercise illustrated the need for DoD systems to migrate to the COE as soon as possible to ensure joint interoperability and integration.

Army and Marine Corps systems will continue to be evaluated for use as building blocks with Navy-specific systems to develop a NSFS digital mission planning and coordination

system that is interoperable through the COE. For example, AFATDS is being examined to determine if its functions support naval surface fire support solutions. If AFATDS meets the requirements, the software probably will be used in a computer already on the surface combatant to avoid adding a console to a crowded combat information center (CIC).

Naval fires in future operations will employ a variety of advanced weapons and a unit-level mission planning and targeting system that will be integrated with a modern force-level fire support coordination system. The goal is for surface-launched weapons to provide close support, interdiction, counterfire and deep fires for the joint land battle. All ships will be closely integrated into the joint fire support planning and coordination system. These NSFS developments will ensure we're fully capable of supporting Marine Corps and Army operations in the 21st century.



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