Field Artillery

A Professional Bulletin for Redlegs

January-February 1999

LIGHTFIGHTER FIRES

HQDA PB6-99-1

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INTERVIEW

ARTICLES: Lightfighter Fires

ARTICLES- Features

DEPARTMENT

In Memorial: This edition is dedicated to the memory of Joanne Alexander Brown, who served Army and Marine Field Artillerymen around the world as the Assistant Editor of *Field Artillery* from 1984 until her death on 22 November 1998. Her untimely death was a personal and professional loss for the magazine staff, Fort Sill, the Field Artillery and the US Army and Marine Corps. This January-February 1999 edition is the last to which she contributed.

Cover Photo: A prototype HIMARS launcher of 3-27 FA, 18th FA Bde, fires a 28A1 reduced-range practice rocket on Nijmegen Drop Zone at Fort Bragg, North Carolina, in September 1998.

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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Force Modernization… It isn't Just for Heavy Forces Anymore

The United States Army must be ever mindful of changes occurring almost daily in the geostrategic environment and ready to respond with full-spectrum dominance anywhere in the world at a moment's notice. The Field Artillery, guided by the experience of our lightfighting Redlegs, utilizing cutting-edge technology and cognizant of the vision set forth by our Army leaders, has several force modernization programs for our light forces. These units must be ready to respond quickly to shifts in world situations and accomplish any military operation from peace enforcement to humanitarian assistance to war.

Our highly trained light units—the 82d Airborne Division, 101st Airborne Division (Air Assault), 10th Mountain Division (Light Infantry), 25th Infantry Division (Light), 2d Armored Cavalry Regiment (Light), the Lion Brigade of the Southern European Task Force (SETAF), our Army National Guard's 29th Infantry Division (Light) and separate infantry brigades—bring unique capabilities to the warfighting arena. The Field Artillerymen of these units must have capabilities as strategically deployable and tactically mobile as the soldiers they support with fires effects. We are at a juncture where the Army is turning additional emphasis on light force modernization, emphasis that will give our light forces the firepower they need for success in all light scenarios for decades to come.

Pathfinders for the Future. Our guidance for light force modernization comes from a variety of sources, but most importantly, it comes from the lightfighter soldiers and leaders who will be using this equipment in combat. Everyone from Lieutenant General William F. Kernan, the Commander of XVIII Airborne Corps, and Brigadier General Larry D. Gottardi, the Commander of the XVIII Airborne Corps Artillery, to the young soldiers throughout our light community have helped identify force requirements. This continued exchange of information is crucial in developing capabilities that will meet light force needs in future operations.

Fires platforms and munitions for light forces are also influenced by exercises and warfighting experiments that examine the efficiency of current and projected weapons and tactics in realistic, demanding environments. The Joint Contingency Force (JCF) Army Warfighting Experiment (AWE), Urban Warrior, and the Military Operations in Urbanized Terrain (MOUT) Advanced Concepts Technology Demonstration (ACTD) are all scheduled for 2000. Such experimentations may create fires requirements that are challenging for the Field Artillery, but the initiatives we have on-going are flexible enough to meet those challenges.

We anticipate that any new developments geared for lightfighting will have at least these characteristics: incorporation of digital architecture for total situational understanding; exploitation of leap-ahead technologies, both off-the-shelf and of military design; the ability to gain and maintain information dominance; a focus on asymmetrical operations by hitting the enemy with capabilities for which he has no defense while protecting our forces from his capabilities; and above all, delivery of the right mix of effects that fulfills the commander's intent, regardless of the effects' origins.

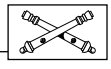
Weapons Platforms, Munitions and Effects. There is much activity in improving our current fleet of towed howitzers and designing a new direct support weapon system relevant to military operations beyond 2010. These improvements are as simple as adding a bogey wheel to the trails of our M198 howitzers to ease aircraft loading and adding lifting handles to the trails of our M119s to help our soldiers manhandle their guns on the firing point…and they are as complex as designing the advanced technology light artillery system (ATLAS). Simple or complex, they are all intended to give our light forces the best firing platforms in the world.

The high-mobility artillery rocket system (HIMARS) capable of firing the entire multiple-launch rocket system family of munitions (MFOM), including the Army tactical missile system (ATACMS), will benefit from existing programs designed to improve MFOM range, accuracy and lethality.

Other effects the light community seeks are infrared illumination, red smoke and antipersonnel and antiarmor capabilities. In many circumstances, these munitions will give our lightfighters distinct warfighting advantages in future conflicts.

Leaping Ahead…With Caution. As Lieutenant General John A. Dubia, the Director of the Army Staff and a former Chief of the Field Artillery, has pointed out, the Field Artillery must adhere to three overarching principles as we bring our lightfighters to the same level of modernization as the mechanized forces. First, we must ensure that all systems we field will enable our forces to achieve the visions outlined by the Chairman of the Joint Chiefs of Staff and our Army leaders. Second, we must not fall into the trap of modernizing legacy weapon systems whose capabilities and effects may be irrelevant to our 21st century mission. There comes a point in the life cycle of all weapons systems when *tried-and-true* becomes *tired-and-through*. And third, we must design all weapons platforms, munitions, and command and control devices to function fully in joint and combined operations.

With these principles in mind and with our lightfighting Redlegs overwatching our course, our modernization program will guarantee decisive victory and overwhelming success on future battlefields and all other operations well into the next century.



Lieutenant General William F. Kernan, Commanding General, XVIII Airborne Corps

XVIII Airborne Corps:
Fires for Forced-Entry Operations

Interview by Patrecia Slayden Hollis, Editor

The XVIII Airborne Corps, headquartered at Fort Bragg, North Carolina, is the Army's "Crisis Response Corps" with airborne, air assault, armor, mechanized and special purpose forces. It is the Army's forced-entry/early-entry force. The Corps remains ready to deploy anywhere in the world within 18 hours of notification—desert, mountain or jungle. Its soldiers must be physically tough, mentally disciplined, strategically deployable and tactically mobile.

Q *What is the role of indirect fires in the XVIII Airborne Corps?*

A In many respects, it's no different than the role of indirect fires in any maneuver force—with a twist. And that twist is the unique mission we have at the XVIII Airborne Corps: forced entry. We're a rapid response force that's constrained by strategic and in-theater lift. We have to maximize combat power in a forced-entry mission to get into our battlespace very quickly with combat overmatch that ensures not only mission accomplishment, but also survivability of the force.

The support the Field Artillery provides the armor and infantry, the maneuver force on the ground, is crucial in any battle. But in the forced-entry mission, you're usually going in at night under a parachute or underneath a helicopter to secure an airfield, a port or some restricted terrain occupied by the enemy. You literally *force* your way into someone else's territory and are immediately in the close battle.

You are at the mercy of the winds on the drop zone—where the Air Force drops your equipment and where you land in relation to that equipment—yet you must get to your systems and provide accurate precise fires, most likely 360-degree fires, as quickly as possible. So FA TTP [tactics, techniques and procedures] in the XVIII Airborne Corps are unique.

That forced-entry mission also brings the requirement for joint fires. Most of our pre-assault fires will come from other services until we get forces on the ground. So our Field Artillerymen must be very versatile, *universal* fire supporters. They must understand not only FA and Army fires capabilities, but also those the Marines, Air Force and Navy bring to the battlefield. Our fire supporters must plan, coordinate, synchronize and deconflict all fires while firing our organic indirect fire assets.

One other point—we sometimes erroneously assume that those not in our business understand the uniqueness of the application of fires in the XVIII Airborne Corps. The limitation on our strategic airframes coming into the theater restricts the number of howitzers and amount of ammunition we can bring in. Ideally, we want to *destroy* the enemy, but it takes a tremendous amount of ammunition to fire a destruction mission. In a forced-entry mission, we deploy into the close fight. That means our fires need to suppress the enemy as rapidly as possible to prevent him from engaging us with his direct and indirect fire systems, allowing our infantry to secure the airfield, port or whatever. We need to separate the enemy's forces operationally by echelon to buy time and expand our battlespace for follow-on forces. Forced-entry artillery fires complemented by fires from other services give us a combination of suppression and destruction missions.

Q *The FA is beginning to define the operational requirements for the advanced technology light artillery system (ATLAS) that would maximize firepower while minimizing weight and, with its prime mover, be air-droppable and roll-on/roll-off from a C-130 or larger aircraft. What capabilities do you want in your new howitzer?*

A Our forced-entry mission demands a rapid introduction of highly lethal systems, so our weapon's weight is crucial to us. Air Force load plans are driven by size and weight. Army helicopters that transport fire support systems around the battlefield are driven by weight. Ideally, ATLAS will weigh 3,000 pounds or less to ensure we can get the howitzer, the crew and the ammunition rapidly into the battle with strategic or tactical aircraft. It is essential that we can employ ATLAS with its crew and ammunition using UH-60 Blackhawks.

This lighter weight howitzer will allow us to more easily manhandle it—de-rig ATLAS off its air-drop platform, get it into position, put it in firing order and engage the enemy very quickly. That's just raw, hard work.

ATLAS also must be lethal and reliable. It ideally will give us greater range than our adversaries so we can, in fact, suppress their indirect fire systems. We need a suite of munitions to employ so we can tailor the munitions for the mission. ATLAS promises great potential. But if it's too big or heavy, it won't be relevant to our operations.

Our corps artillery and division artillery commanders are working closely with Major General [Leo J.] Baxter [Chief of Field Artillery] and the FA

School at Fort Sill to identify our requirements for future systems. Ideally we'll be able to develop one system that everybody can use: heavy and light forces—airborne and air assault.

Q *The corps has been testing HIMARS [high-mobility artillery rocket system] prototypes and the AH-155 [advanced howitzer, 155-mm towed], an improved M198. You had them for the four-week RFPI [Rapid Force Projection Initiative] this summer at Fort Benning, Georgia, followed by a two-year user evaluation period. How have they performed?*

A They have performed *superbly*. The corps artillery has fired HIMARS both at White Sands [Missile Range, New Mexico] and here at Fort Bragg and also the AH-155 at Fort Bragg. The results are very, very positive.

Deployable in a C-130 aircraft, HIMARS significantly increases the lethality and reach of our early-entry/forced-entry forces. The AH-155's new digital fire control system and new hydraulic power assist allow us to occupy, fire and displace faster and easier. We now can place the AH-155 into action quickly with greater precision.

HIMARS is paramount to our success and survivability. Forced-entry missions often will have battlespace out to HIMARS' maximum range of 300 kilometers when firing ATACMS Block IA. With the fielding of HIMARS and its new precision munitions early in the turn of the century, for the first time, we'll be able to leave CONUS [continental US], go right into the objective area and start precision engagement.

Previously, to gain access to HIMARS-like lethality, we had to seize an airfield big enough for a C-17 or C-5 aircraft to bring in MLRS [multiple-launch rocket system]. The lethality and range of the C-130-deployable HIMARS gives us tremendous flexibility and much more versatility, capabilities the corps has needed for some time.

Q *How do you envision tactically employing and protecting HIMARS?*

A You don't necessarily have to mass systems to mass fires. In future operations, we talk "distributed operations," which basically means we'll hit a multitude of targets simultaneously throughout our battlespace. HIMARS' ability to shoot and reposition rapidly—shoot and scoot—gives it great survivability. It doesn't have to go to a location and be secured by precious infantry forces that reduces combat power or, worse yet, try to protect itself in a fixed location. HIMARS can move and shoot, move and communicate very, very quickly and precisely. It can engage targets in distributed operations throughout the battlefield, still massing fires and survive.

Q *What other Field Artillery or fires modernization improvements does the Corps need?*

A We're working with the Field Artillery School to implement a series of product improvements to the M119 that will facilitate its mobility, recoil and high-angle firing, among other things. The M119 is not an ideal weapon system. I employed it when I was a company commander in the British Parachute Regiment and thought it was awkward. I was surprised when I came back to the 82d [Airborne Division, Fort Bragg] and we had bought it. The M119 improvements will reduce the operations and support costs of the system and allow us to bridge the gap between where we are now and where we're going to be when we get ATLAS or whatever ATLAS evolves into.

Another improvement crucial to Field Artillery operations is ensuring we are digitally linked with the systems the other services bring to the battlefield. We must be able to interface with the JFACC, the Joint Force Air Component Command. Our sister services have brought on different systems and software programs that don't all talk to each other digitally. We need compatibility among the systems to operate on a joint battlefield.

We've done some work in this arena. In the 1998 exercise Purple Dragon, XVIII Airborne Corps Artillery put the FAIO [Field Artillery intelligence officer] in the forward sensor enclave, which is really a mobile sub-set of the ACE [analysis and control element]. Once the ACE identified high-payoff targets, the FAIO transmitted this information digitally via AFATDS [advanced FA tactical data system] down to the firing battery and, in essence, established a quick-fire net for precision engagement. This worked very well.

If we're going to get the synchronization, the fires, the synergy we need on the joint battlefield, we'll have to do it primarily through a digital mode. Fort Sill has identified this compatibility problem and is working with the other services to solve it, but we still have a way to go.

Q *The XVIII Airborne Corps has deployed in contingency operations more often as a JTF [Joint Task Force] than a corps but always joint. In terms of the different joint doctrinal interpretations and TTP, what are the challenges for the corps?*

A Right now, the four services each has its own doctrine. We are trying to refine our joint doctrine, but it's a challenge because the individual service doctrine came first.

One challenge we face is that each of the numbered air forces brings different doctrinal interpretations to the table. Because we train with them routinely, we work through a lot of these differences. But the different lexicon, the different doctrinal interpretations, is a problem. For example, what constitutes "control measures" from an Air Force perspective? Which control measures do we employ—"kill" boxes? An FSCL [fire support coordination line]? What does "close fight" mean to the JFACC and what are the JFACC's and JFLCC's [Joint Force Land Component Command's] responsibilities in the close fight?

As we start to leverage weapons that have much greater range and lethality, such as HIMARS' ATACMS [Army tactical missile system], how do those weapons play in the JFACC's interpretation of who is responsible for what part of the battlefield? That's one of the biggest challenges facing us today.

Another challenge is the force structure to support operations as the JTF. We recently conducted a XVIII Corps Warfighter [Battle Command Training Program] exercise that was embedded in Unified Endeavor run by the US Atlantic Command [Norfolk, Virginia]. Our exercise was unique in that the corps was being validated as a JTF. I

was the JTF commander. I also was the JFLCC commander. I had an Army Force [ARFOR] commander under me, who also commanded the 101st [Airborne Division (Air Assault), Fort Campbell, Kentucky], in this case.

Likewise, the corps artillery commander wore a multitude of hats. He was responsible for the fires of the JTF, JFLCC and ARFOR plus served as the force FA commander. So he had to plan, coordinate and synchronize joint, land component, Army and naval fires while commanding and controlling Field Artillery assets of up to eight brigades. That's a *tremendous* challenge.

Unfortunately, we're not resourced or structured to accomplish those missions. Without augmentation, we can do them for a short time. But in protracted operations, it really strains the capabilities of our commanders and staffs. Currently, the Army is trying to determine whether or not to provide permanent force structure and resources for a Joint Force Land Component Command headquarters at the corps or at the Army level.

Q *The new Strike Force being defined by the Army would be a "medium" weight, brigade-sized (probably) force that, among other missions, could follow forced-entry forces into an objective area to shape the battlefield for the heavy forces as they deploy into the theater. How do you see the Strike Force complementing XVIII Airborne Corps operations?*

A The Strike Force is a concept in the infant stage that's inciting a lot of interest. I see its potential as a transitional force between the forced-entry forces and the follow-on heavy forces that come in after we've seized enough battlespace for their uninterrupted flow into the objective area. The Strike Force's mobility, size, weight, lethality—all these are going to be very important because the Strike Force will compete for the same resources, the same precious strategic air and sealift.

The XVIII Airborne Corps offers options, right now, that could allow the Army to achieve the Strike Force end state sooner. The command and control infrastructure already exists in the corps, for example the 82d and 101st, coupled with the combined arms team organic to those divisions. If we added the Strike Force's mobility, lethality and survivability to that structure, then we may not need a third type of force. In short, we could imbed the additional capabilities into the existing contingency force. With that force, we could tailor it, task organize it, to come into a given objective area, seize the airfield immediately, rapidly expand the battlespace and start pulling in heavy forces very, very quickly.

A consideration is the Army's ability to resource a third type of force—a separate transitional force. The Strike Force concept has tremendous potential. There are a lot of options that need to be investigated before we commit to a final course-of-action.

Q *As resources and opportunities for live-fire training decrease with the Army's budget, how do you train your soldiers in the critical task of integrating fires and maneuver?*

A Bottom line is combined arms live-fire exercises [CALFEXs] are critical to validate our capabilities. At no time should a soldier experience something in combat that he has not experienced in training. To ensure that does not occur, CALFEXs are an integral part of our training regimen.

We resource CALFEXs at the expense of infrastructure and quality of life programs and have for quite some time. Ideally, CALFEXs need to be conducted at the battalion task force level. But CALFEXs at that level demand a tremendous investment in time, resources and training area. Routinely we conduct CALFEXs at the company and platoon levels.

When you factor in fewer training opportunities with personnel attrition and the operational tempo the Army experiences today, it's a real challenge to maintain a trained status in the combined arms arena, a challenge we're absolutely committed to meeting.

The combined arms fight is a very precise operation. Leaders just have to get out there and *do it* in a combat-like environment. And they have to do it at night.

Coupled with that, we routinely conduct fire coordination exercises [FCXs] with our senior leaders. The platoon leader and platoon sergeant must *know* how to plan, coordinate and synchronize all direct and indirect fire systems available to them. Some capabilities can be trained initially through simulations. But, ultimately, the soldier has to go *do* them—parachute or air assault into the objective area deep in enemy territory, at night, in the rain and quickly coordinate fires or fire his howitzer while an infantry fire fight is going on.

To help us with this resourcing challenge, the Department of the Army has revised its STRAC [Standards in Training Commission] XXI that should allocate more munitions for live-fire exercises.

Q *What message would you like to send to Field Artillerymen stationed around the world?*

A First, no one admires the artillery more than the infantryman. I've been in a lot of different conflicts. Only twice have I been subjected to indirect fires, been on the "receiving" end. I can tell you, they were *horrific*—psychologically devastating. As an individual infantryman, there is little you can do until somebody suppresses or negates those fires.

I have never called for artillery where I didn't receive it when and where I needed it. That holds true in Vietnam through Desert Storm. Truly, you are the King of Battle.

★★★

Lieutenant General William F. Kernan commands the XVIII Airborne Corps at Fort Bragg, North Carolina. In his previous assignment, he commanded the 101st Airborne Division (Air Assault) at Fort Campbell, Kentucky. He also served as Director of Plans, Policy and Strategic Assessments, J5, of the US Special Operations Command at MacDill AFB, Florida, and Assistant Division Commander (Maneuver) for the 7th Infantry Division (Light), Fort Ord, California. He served as Deputy Commander and then Commander of the 75th Ranger Regiment, Fort Benning, Georgia, and led the regiment in its combat parachute assault into Panama during Operation Just Cause. He commanded battalions in the 75th Ranger Regiment and the 82d Airborne Division, Fort Bragg; and five companies.

Targeting on the LIC and PKO Battlefield: A Paradigm Shift

by Major David A. Bushey, Major Douglas L. Flohr, IN,
and Captain Michael J. Forsyth

The nonlinear battlefield of the Joint Readiness Training Center (JRTC), Fort Polk, Louisiana, allows brigade and battalion staffs to conduct targeting in an environment that increasingly reflects the post-Cold War world. On this battlefield, the "21st Infantry Division (Light)" JRTC staff routinely struggles to construct target synchronization matrices (TSMs) for rotational brigades. The division staff's greatest challenge is to fit high-payoff targets (HPTs) neatly into the target categories identified in doctrine. In low-intensity conflict (LIC) and peacekeeping operations (PKO), these nontraditional targets fall outside the doctrinal template.

Because by definition these targets are "high payoff" and important to brigade operations, we propose the expansion of target categories by two—civilian populations and terrorist groups—and expansion of the existing Engineer target category by the subset of minefields.

While relevant at all echelons, the two target categories traditionally have been executed by intelligence and psychological operations (PSYOPS) at the division or higher levels. In today's conflicts, it is critical to shift this emphasis lower as the categories, civilian population and terrorist groups, can have devastating effects on the brigade's ability to accomplish its mission. Although this article addresses the addition of the target categories in LIC, the categories apply to brigades in mid- to high-intensity conflict as well.

Doctrinal Dilemma. The typical JRTC scenario places a brigade task force in a low-intensity fight for the first five to seven days of a rotation. During this timeframe, the brigade routinely must deal with civilians on the battlefield, terrorist groups and minefields.

Current doctrinal manuals address the targeting process in mid- and high-intensity conflicts but provide limited guidance for elements engaged in low-intensity efforts. The traditional paradigm maintains that targets are enemy combat systems and combat support

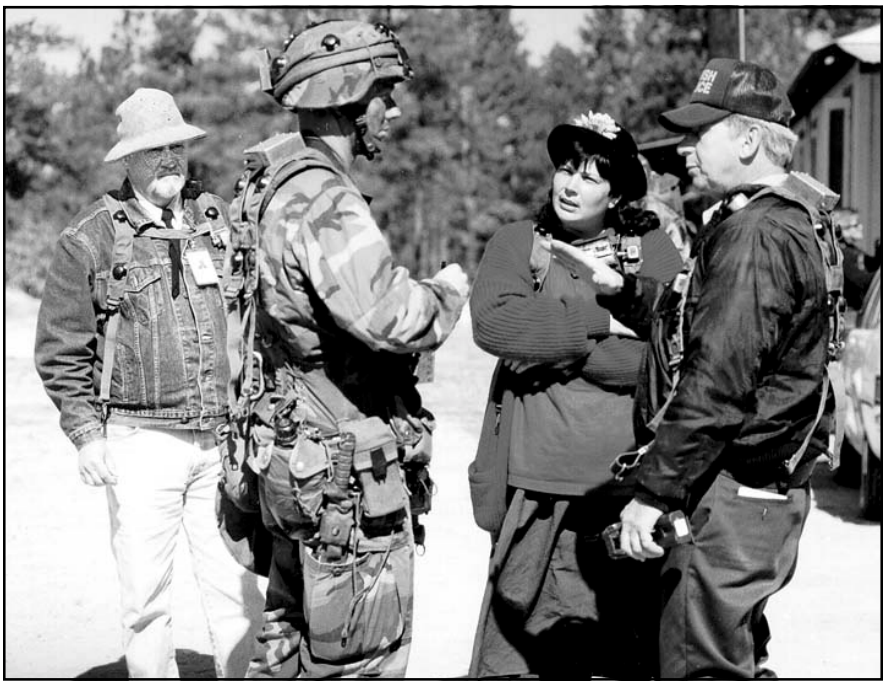
(CS) or combat service support (CSS) functions. Accordingly, targets are addressed in the 13 doctrinal targeting categories (see Figure 1), and delivery systems are identified to suppress, neutralize or destroy them.

Unfortunately, the doctrinal sets don't address the wide range of targets in low-intensity conflict and certainly do not address civilians or terrorist groups. Basically, doctrine ignores their impact on operations at the tactical level.

Current targeting doctrine fails to give the specifics required to target the enemy in a LIC environment. *FM 6-20-10 Tactics, Techniques and Procedures for the Targeting Process*, 08 May 1996, states that, "Planning is different for a conventional war against a sophisticated enemy, requiring interdiction of operational targets, than that of operations other than war against a guerrilla force where targets are difficult to locate." This is not exactly the "nuts and bolts" targeting guidance a staff needs in a low-intensity conflict. An effective rapid response to an ongoing crisis does not lend itself to a "trial and error" targeting process. Doctrine should expand to include civilians and terrorist groups as target categories and minefields as a subset to an existing category: Engineer. In addition, doctrine should expand attack guidance terms to include effects for the new categories and subset—not just destroy (D), neutralize (N) and suppress (S) but also "influence" (I) and "reduce" (R). For example, the force influences civilians for information or reduces minefields.

1. Command, Control and Communications
2. Fire Support
3. Maneuver
4. Air Defense Artillery
5. Engineer
6. Reconnaissance, Surveillance and Target Acquisition (RSTA)
7. Radio Electronic Combat
8. Nuclear-Chemical
9. Petroleum, Oils and Lubricants
10. Ammunition
11. Maintenance
12. Lift
13. Lines of Communications

Figure 1: 13 Target Categories *(FM 6-20-2 Division Artillery, Field Artillery Brigade and Field Artillery Section (Corps)).* Unfortunately, this doctrinal set doesn't address the wide range of targets in low-intensity conflict-for example, terrorist groups.



Failure to manage and interact effectively with a civilian populace can be devastating for operations. Most likely, more civilians-both those sympathetic and nonsympathetic to the cause-will be on the LIC battlefield.

Civilian Population. The ability to influence a civilian population through nonlethal means can be a valuable tool on a nonlinear battlefield. Clausewitz stated "The people who have not yet been conquered by the enemy will be the most eager to arm against him; they will set an example that will gradually be followed by their neighbors. The flames will spread like a brush fire until they reach an area on which the enemy is based, threatening his lines of communication and his very existence."

Failure to manage and interact effectively with a civilian populace can be devastating for operations. A brigade plan to influence civilians via civil affairs PSYOPS teams, unit civil-military staff officers and commanders can facilitate operations.

Uncoordinated resistance efforts that fail to incorporate civilian support are doomed. Brigadier Mohammed Yousaf, former coordinator of Pakistan's Inter-Services Intelligence, successfully directed Mujahdeen resistance strategy against Soviet operations in Afghanistan. In his book *The Bear Trap*, Brigadier Yousaf outlined criteria essential for conducting guerrilla operations. His first criteria for a resistance movement to succeed is to have the loyalty of civilian population—its willingness to support the effort at great personal risk.

Both Clausewitz and Yousaf stress the significance of civilian support to a resistance element, realistically the foundation of the movement. Civilians supporting the resistance must be prepared to supply guerrilla forces with shelter, food, recruits and information. In Cortina, that means supporting the Cortinian Liberation Front (CLF).

One historical example, the Russians in Chechnya, show us "how not to" influence civilians to support the effort. A review of Russian operations in Chechnya show inadequate civil-military operations (CMO) and open acts of aggression toward civilians that increased civilian hatred of the former Soviet Army. Soviet indiscriminate bombing of Chechen population centers caused enormous civilian casualities and dramatically increased support for the rebel forces. In fact, many individuals who initially fled the despotic rule of the Chechen leadership returned home to fight the Russians. The Russians' effort to create a rift between civilians and rebel forces in Chechnya was destroyed by their own aggressive acts and inability to positively influence the civilian population.

The benefits derived from targeting civilian populations with civil-military information campaigns can be signifi-

cant for US forces. For example, as shown in the TSM in Figure 2, the division staff identified that the civilian population of Carnis village had adopted a neutral stance toward the American presence in Cortina. Accordingly, the staff launched an effort to ensure the Carnis civilian wouldn't drift into an anti-government/anti-American stance.

The TSM in Figure 2 places civilians as HPT Number 3, and the staff identifies the 1st Brigade, 21st Infantry Division (1/21st ID) as the detecting asset and the brigade's civil affairs direct support team (DST) as the asset designated to "attack" the target—deliver the effects on the target. The civil affairs team focuses on gathering information on the concerns of village leaders while conveying the "theme" of the American mission within the area of operations. A theme is an underlying message the US forces are attempting to convey. A theme can be as broad as "US forces are here to protect Cortina" and as regional-specific as "Purify your water before drinking to keep from getting sick."

Unit: 21st Infantry Division (Light) **Phase:** **FRAGO No.** **As of:**

Decide				Detect			Deliver			Assess
Pri	Cat	HPT	Location	NAI/ TAI	Agency	Asset	When*	Asset	Effects**	Asset
1	ADA	DSHK	WQ048424	50	21 Avn, AC-130, 21 MI	OH-58D, LRSD	I	OH-58D, AC-130, FA, NGF	D	21 Avn, AC-130, 1/21 ID
			WQ015423	49						
			WQ046409	31						
2	FS	82-mm Mort	WQ053412	28	2/21 ID, 21 MI, 21 Avn	Q-36, TLQ17, OH-58D, INF	A	FA, NGF, 2/21 ID, 21 Avn, EW	D	2/21 ID, 21 Avn
			WQ136265	32						
3	Civ	Village Leaders	Carnis Village WQ0244	53	1/21 ID	Civil Affairs DST	P	1/21 DST, Themes, CMO	I	1/21 DST, CMO
4	EN	Minefield	WQ061427 WQ016373 VQ997339 WQ020295	61 62 63 64	1,2,3/21 ID	Bde ENs	A/P	1,2,3/21 ID, 21 EN	R	Bde ENs, 21 EN
			VQ956273 VQ887330 VQ852334 WQ082426	71 72 73 74	21 EN, Civ, RCNG		A/P		R	
			WQ899429 VQ807232 VQ966375 VQ887330	81 82 83 84			A/P		R	
5	TGrp	Log Site	VQ795680	16	21 MI, Civ	LRSD, HUMINT, CI	P	2/21 ID	I/D	2/21 ID, 21 MI
6	Ammo	Bn Supply Point	WQ124378	20	2/21 ID, 21 Avn		P	2/21 ID	D	2/21 ID
			VQ863278	23	3/21 ID		P	3/21 ID	D	3/21 ID
7	Man	CLF Company	WQ036445		1/21 ID, 21 Avn	Scouts, OH-58D	A	1/21 ID, 21 Avn, FS Assets	D	1/21 ID, 21 Avn
			WQ152369		2/21 ID, 21 Avn		A	2/21 ID, 21 Avn, FS Assets	D	2/21 ID, 21 Avn
			VQ887300		3/21 ID, 21 Avn		A	3/21 ID, 21 Avn, FS Assets	D	3/21 ID, 21 Avn

*When: Immediately (I), As Acquired (A) and As Planned (P)

**Effects: Destroy (D), Neutralize (N), Suppress (S), Influence (I) and Reduce (R)

Legend:

ADA = Air Defense Artillery
Avn = Aviation
Bde = Brigade
Bn = Battalion
CI = Command Information
CMO = Civil-Military Operations
CLF = Cortinian Liberation Front
DSHK = Soviet-made ADA Weapon
DST = Direct Support Team
EN = Engineer
EW = Electronic Warfare
FS = Fire Support
HPT = High-Payoff Target
HUMINT = Human Intelligence
LRSD = Long-Range Surveillance Detachment
MI = Military Intelligence
NGF = Naval Gunfire
RCNG = Reserve Component National Guard
TGrp = Terrorist Group

Figure 2. Target Synchronization Matrix (TSM)

If mines can impede a peacekeeping operation, imagine their effects on operations conducted in a combat scenario.

As a part of the total effort, the maneuver commander meets with the village mayor to reassure him of the positive nature of American operations. Opening a dialog with the civilians significantly increases the amount of critical intelligence available for operations and the chance that the village will remain pro-government/pro-American.

Finally, the DST and the civil-military affairs officer (S5) assess the effectiveness of the operation and report their findings to the division. The commander's intent the targeting effects will bring about is a pacified civilian populace that aids divisional elements with intelligence and support. This robs the enemy of the opportunity to incite unrest and disrupt operations and causes him difficulty in gathering information and getting logistical support from the civilians.

Terrorist Groups. The second target category offered is terrorist groups. The goal of terrorism is to erode psychological support by spreading fear among governmental officials and their domestic and international supporters.

This concept worked with remarkable effectiveness in the October 1983 bombing of the Marine barracks in Beirut, Lebanon. The attack left 241 American Marines dead and resulted in major changes to US foreign policy in the region.

In Vietnam in the late 50s and 60s, the Viet Cong forced the Army of the Republic of Vietnam (ARVN) into a decidedly defensive posture via a series of terrorist attacks. The South Vietnamese Army felt compelled to protect all potential terrorist targets, essentially handing the Viet Cong the initiative in the war. The result was ARVN forces appeared weak as a force of occupation rather than a protector, effectively alienating the very civilian population they were attempting to protect from the terrorists.

Commanders have to acknowledge that terrorist groups are a military threat to operations and take steps to negate their impact. Incorporating terrorists as a targeting category can have a two-fold positive effect on friendly operations. First, friendly units become increasingly conscious of the threat and, therefore, take force protection measures. Second, early targeting of terrorist groups ensures friendly forces maintain the initiative, presenting the opportunity to operate within the enemy's decision cycle while continuing to erode critical support for his operations—civilian empathy for his goals.

Minefields. Our final proposal is to add minefields as a subset under the target category Engineer. In increasingly more operations, minefields are a threat to US forces. During the Second World War, mine incidents accounted for 4.4 percent of total casualties. In the Vietnam conflict, that number increased to 33 percent, and a 1997 UN estimate placed the number of live mines in Bosnia between four and five million.

In Bosnia, the former warring factions emplaced mines randomly along major ground lines of communications (LOCs). By mid-1997, implementation force/stabilization force (IFOR/SFOR) casualties totaled 67 injured and 10 deaths. A lot of international effort had been expended to clear or identify/mark minefields in Bosnia-Herzegovina.

If mines can impede a peacekeeping operation, imagine their effects on operations conducted in a combat scenario. The mobility of the force can be degraded to the point where the unit's combat effectiveness is questionable. Battalions could be unable to rapidly exploit opportunities and quickly project combat power throughout the battlefield. For example, although rear operations only constitute one-fifth of the offensive framework, even small disturbances in maintenance of lines can significantly disrupt a battalion's momentum.

Actively targeting known and suspected minefields facilitates their reduction and enhances freedom of maneuver for friendly forces. During the intelligence preparation of the battlefield (IPB) process, the S2 and engineer identify the most probable threat minefield locations, and the S2 focuses his reconnaissance effort on the minefields by designating them as named areas of interest (NAIs). These NAIs are listed as a subset under the HPT target category Engineer and are incorporated into the targeting process and TSM. The process helps to identify and synchronize detection/delivery assets to develop countermeasures to maintain ground LOCs.

What we're recommending in this article is a shift in the structural design of targeting in low-intensity conflicts and peacekeeping operations. The constant evolution of threats to US forces deployed in support of these operations demands innovative responses from maneuver staffs.

The concept of targeting civilians with nonlethal means and terrorist groups with lethal means applies in not only low-intensity conflict, but also in mid- to high-intensity conflict. Expanding the traditional targeting categories will enhance US responses to today's threats and significantly increase combat readiness and effectiveness.

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Fire Support Challenges in Arctic Operations

by Captain Thomas J. Weiss II

A shivering, exhausted fire support officer (FSO) trudges painfully up the last hill before the objective. He is cold-not because it is 20 degrees Fahrenheit below zero, but because he did not properly ventilate himself during the three-hour ski march to the attack position and sweat has soaked his clothing. This sweat started to freeze the moment he stopped, quickly sapping his body heat and morale.

The FSO is not really sure where the unit is. His precision lightweight global positioning system receiver (PLGR) froze up three kilometers ago, his M2 compass is at the bottom of his rucksack and he didn't mark the route on his map. At this point, he doesn't care about anything except the warm Yukon stove and the sleeping bag waiting for him back at the tent.

Ambush! The commanding officer (CO) yells for a fire mission, and the newly energized FSO grabs the hand mike but can't raise anyone.

"Might be the radio battery," says his sergeant. "When they get cold, they don't last long."

But there's no time.

The CO gives the FSO his radio, and he quickly switches the hopset, frantically raises the fire direction center (FDC) and calls in the fire mission. He doesn't know exactly where they are, so he calls in an immediate suppression mission to a hill he thinks is behind the ambushing enemy, hoping to adjust the initial rounds.

He guesses wrong. Traveling two kilometers to the west, B Company takes 12 rounds of 105-mm high-explosive (HE). Six people die. Many more are injured.

This story illustrates some of the unique challenges an FSO faces in an arctic climate. Tactics, techniques and procedures (TTP) for modern contingency operations generally focus on areas with more temperate climates, such as Southwest Asia or the Pacific Rim. FSOs deploying to a Combat Training Center (CTC) in Louisiana or California often will encounter oppressive heat. But as a fighting force that has the potential to be deployed to any part of the world, we must be prepared for the opposite extreme.

The light fire supporters of the 4th Battalion, 11th Field Artillery based at Fort Wainwright, Alaska, the Army's only arctic artillery battalion, train regularly for a contingency in a harsh winter climate. In the interior of Alaska during winter training, temperatures range down to 60 degrees F below zero.

This article discusses the FSO's leadership challenges in surviving and helping his soldiers to survive the elements and maintaining equipment readiness and ammunition effectiveness. It also outlines some techniques the battalion uses to accomplish the mission under extreme winter conditions.

Surviving the Elements. To have any hope of defeating the enemy in an arctic climate, you must first defeat the cold. Fire supporters consumed with attaining personal warmth and comfort can't provide effective fires for their maneuver counterparts.

The human body must be clean, dry and reasonably warm to remain functional. To accomplish this, the Northern Warfare Training Center in Fort Greely, Alaska, teaches us four basic rules.

1. *Keep in shape.* Cold weather clothing is a heavy, clumsy addition to an already over-burdened light fire supporter. Good physical conditioning prepares the body for the rigors of moving across country in deep snow and reduces the soldier's susceptibility to fatigue.

In the winter months, 4-11 FA snowshoes or cross-country skis one day a week while doing regular physical training (PT) the other four days to build and maintain cardiovascular endurance and strength. During the summer, we road-march one day a week and run three to five miles at least three days a week.

2. Drink plenty of water. Normally in cold climates, soldiers drink only when they're thirsty—cold soldiers don't want to drink water from a cold canteen. Leaders need to stress hydration. One technique is to fill the canteens in the morning with hot water (but not coffee, which does nothing to hydrate the body), so the water is more pleasant to drink in the cold and takes longer to freeze.

Additionally, soldiers must *not* eat snow as a water substitute. The moisture content of snow is relatively low, and it lowers the body's core temperature.

3. Eat to keep fit. Soldiers must eat balanced meals regularly—even when they aren't hungry. To keep itself warm, the body burns more calories in cold weather than normal. The soldier needs calories to maintain his core temperature. Arctic meals ready to eat (MREs) are issued in Alaska and are designed to

meet the higher caloric needs for work in extreme cold.

4. *Maintain a positive attitude*. There are many new challenges in operations in extremely cold weather, all of which a properly trained soldier can overcome. The soldier's attitude will reflect his leader's. Aggressive, confident leadership in the cold-weather environment is essential for accomplishing the mission.

I would add one rule to the Northern Warfare Training Center's rules for arctic operations.

5. *Trust your equipment*. The Army's extended cold-weather clothing system (ECWCS), consisting of the Gore-Tex jacket and trousers coupled with polypropylene undergarments and rubber vapor barrier (VB) boots, will keep soldiers functional, if not completely warm. In fact, many times the main worry is overheating when soldiers physically exert, such as in the case of the FSO in the introductory scenario.

When physically exerting, the soldier should ventilate the body by opening the zippers of the jacket under the arms and even in the front. He may be colder initially, but throughout the movement, he actually will stay warmer by not allowing sweat to build up.

Equipment Readiness. Fire supporters fight the war with a map, a hand mike and a computer. If our equipment fails and we can't communicate, we can't provide fire support for our maneuver brethren. Much of the equipment fire supporters use generally isn't manufactured to function in extreme cold. When you get down to it, the howitzer and the radio are the two pieces of equipment the fire supporter needs to do the job and they still work when the temperature plummets.

M119A1 Howitzer. Time and again the M119A1 105-mm howitzer fires in extremely cold weather at its minimum operating temperature of -50 degrees F. But at that temperature, there are limitations unique to the arctic. Some examples: the howitzer may take slightly longer to return to battery, the rubber boot on the elevation and traversing hand wheels will break and firing high angle on extremely hard frozen ground or ice may crack the base plate.

But most importantly, crews working in bulky clothing and thick mittens take additional time to perform their tasks. 4-11 FA gunners pride themselves on being able to meet time standards in any weather conditions, but untrained crews will find it extremely difficult to come anywhere near Army training and evaluation program (ARTEP) time standards in the extreme cold.

A proven technique used by 4-11 FA FISTs is to have the FSNCO run the FED from the team's HMMWV.

The normal shift time for the M119A1 is one minute, but under extreme conditions, the shift probably will take longer than one minute. This has a major impact on battlefield calculus and the scheduling of fires. The FSO most likely won't get the same number of rounds fired in the same amount of time that he usually does. Before he "signs up" the artillery for a mission that the gunners physically cannot complete, he needs to understand their cold-weather limitations and either allocate more time or reduce the number of rounds to be fired.

Additional time also must be allotted for movement and occupations. The maximum speed of the small unit support vehicle (SUSV) while towing a howitzer is 15 miles per hour. But on treacherous icy roads, oftentimes that speed will drop to five or 10 miles per hour. During occupations, deep snow and bulky clothing slow the gun crews, adding perhaps five to 10 minutes to the time it takes for a battery to fire. Commanders and FSOs must weigh these factors when determining how to support an operation while protecting the survivability of the firing units.

Single-Channel Ground and Airborne Radio System (SINCGARS). The battalion has had SINCGARS since 1996. It has performed well in the extreme cold with forward observers (FOs) communicating reliably by voice and digital.

However, the system has two drawbacks in very cold weather. First, the SINCGARS' battery life is significantly reduced. FOs must carry plenty of spare batteries to compensate for the loss, adding to their already heavy load. If the FO can keep one spare battery in the breast pocket of his Gore-Tex parka, his body heat will keep it warm enough to extend the life of the battery. After changing batteries, the FO puts another spare battery in the parka to warm it before use.

The second drawback is that the automated net control device (ANCD) required to down load the radio with communications security (COMSEC) only operates in weather that is 25 degrees or warmer. Because of the sensitive nature of this piece of equipment, the FO should tie it around his neck with 550 cord and place it underneath the parka to keep it warm.

Other pieces of equipment do not fare as well in the cold. And while the equipment is not vital to accomplish the mission, it does aid the FO and is used elsewhere in the fire support community with great effect.

Forward-Entry Device (FED). The operator's manual for the FED states that it will operate in temperature ranges from +125 degrees F to –25 degrees F. However, at –15 to 20 degrees F, the screen becomes sluggish and may freeze up. Couple this with the fact that the operator must take off his mittens to push the small buttons that operate the FED and it soon becomes clear that digital communications from the FO level will be very difficult, if not impossible.

A proven technique used by 4-11 FA fire support teams (FISTs) is to have the fire support NCO (FSNCO) run the FED from the high-mobility multipurpose wheeled vehicle (HMMWV) normally located with the company trains. He serves as a communications platform and an emergency resupply vehicle while taking voice calls-for-fire and translating them into digital messages.

AN/PSN-11 PLGR. The PLGR operates at temperatures from +158 to –4 degrees F, according to its technical manual (TM). Experience shows it will operate at temperatures slightly lower than –4 degrees F; however, fire supporters can't count on this.

Land navigation must be done on the assumption that the PLGR won't func-

tion in extremely cold weather—FOs must *know* land navigation techniques. The PLGR is a wonderful piece of equipment, but too many fire supporters have become dependent upon it and land navigation skills have suffered. Again, to keep the PLGR warm, we put it in the breast pocket of the Gore-Tex parka.

The FED and PLGR both use the same lithium battery. This battery, if not stored in a warm area or slowly warmed before use, is greatly affected by cold weather. At temperatures below zero, the battery life will decrease by half.

So the question arises, how does an FO fit all of this equipment plus water (because that freezes quite easily) in his breast pockets. The answer: plan the use of this space. As a pre-combat check, 4-11 FA ensures the items needing warmth are distributed among the breast pockets of an FO team or a headquarters element.

AN/TVQ-2 Ground/Vehicular Laser Locator Designator (G/VLLD). Another piece of equipment, the G/VLLD, has an operating temperature down to –25 degrees F, according to its TM. It will function at lower temperatures; however, another problem arises. Its battery life is only about one-fifth of its normal life or two minutes of continual lasing. This means that combat observation lasing teams (COLTs) are generally confined to their vehicles, decreasing the flexibility of the FSO's plan. We found that a COLT with a SUSV, a vehicle specifically designed to operate in deep snow, gives an FSO effective, mobile, deep eyes while solving the problems of battery life and operating temperature.

HMMWV. A vehicle used to move around the arctic must be specially winterized to survive the cold. The SUSV is wonderful in deep snow, but it is very expensive to repair. Budget considerations often preclude its extensive use. The battalion uses the HMMWV on roads. But it must have arctic doors, an arctic heater, an outlet for a swing fire heater and tire chains.

The roads in the Yukon Training Area of Fort Wainwright are unforgiving and have claimed the lives of many soldiers. Because of this, our drivers undergo an annual, rigorous winter driving training program that must be completed before they're allowed to get behind the wheel.

Ammunition Effectiveness. Once an FSO learns the limitations of his men and equipment in an arctic environment, he must go one step further. He must ask, "What is the best way to optimize my assets and plan for the most effective fire support?" At the tactical level, fire supporters can select ammunition to optimize the impact the FA has in arctic warfare.

Not much has been published on the effectiveness of artillery ammunition on deep snow or ice. Fire supporters must be aware of several considerations for employing a munition in cold-weather operations.

Fuzes. Point detonating (PD) and delay fuzes are less effective in deep snow and ice. A PD fuze won't detonate upon impact with snow, and once its does impact with the ground and detonate, the surrounding snow muffles the blast. This decreases the fragmentation effect and, occasionally, even masks the blast from the FO, making adjustment difficult.

Delay fuzes won't penetrate the frozen ground, called permafrost. (For the same reason, the enemy can't dig himself in without great difficulty.)

Mechanical time and variable time fuzes are very effective and are the preferred fuzes in an arctic environment. They are not affected by snow and ice because they detonate well above ground. Additionally, the rounds are easier to spot and adjust because their blast isn't masked.

Extremely cold temperatures do affect the fuzes. At –40 degrees F and below, the number of "dud" fuzes that fail to achieve the optimum seven-meter height-of-burst (HOB) increases significantly.

Illumination Rounds. These rounds increase in importance during the winter months. In late December, the Arctic has only three to four hours of sunlight, meaning most operations occur in the dark. Illumination is an invaluable tool to help the maneuver commanders "see" the battlefield.

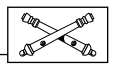
The rate of dud illumination rounds also increases in the extreme cold. Often the rounds' parachutes fail to deploy properly; sometimes a round fails to function at all. These malfunctions in mortar illumination rounds lead us to believe the problem stems from the temperature and not the performance of gun crews or of a particular ammunition lot. The bottom line is that FSOs and fire direction officers (FDOs) need to plan for more illumination than the battlefield calculus calls for to account for possible dud rounds.

Smoke Rounds. Smoke can be very effective, depending on the type of arctic environment. Deep snow smothers the smoke canisters and can decrease the effectiveness of the smoke. In calm, cold weather, the smoke simply lingers indefinitely low to the ground. If you want a smokescreen that may not dissipate, this is an option.

In the interior of Alaska, wind is sometimes non-existent, and a peculiar weather phenomenon, called ice fog, occurs. Ice fog is a very dense bank of fog that occurs near populated areas where the atmosphere traps the carbon dioxide; visibility is severely limited, sometimes to a few feet. This sometimes occurs around firing points, tactical operation centers (TOCs), brigade supply areas (BSAs) or anywhere a mass of people or vehicles are together. To a scout team or an FO, this is a good indication of an enemy encampment. Conversely at friendly encampments, it's also a good indicator to the enemy.

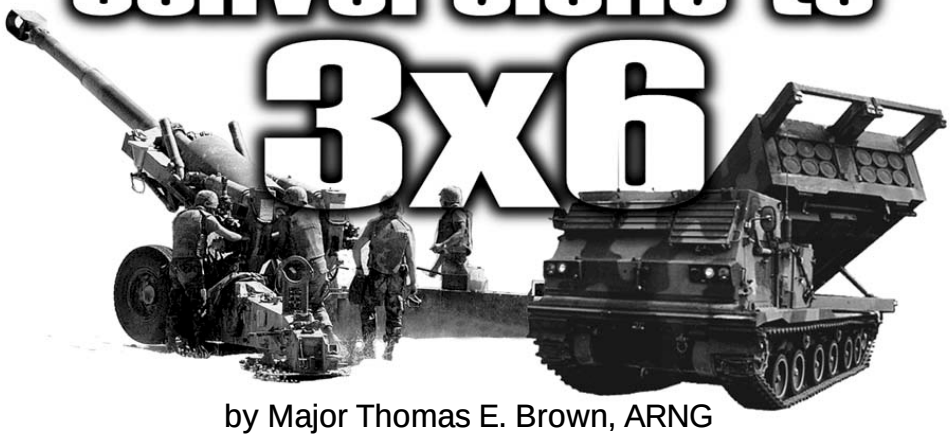
In other places in the Arctic, high winds make smoke rounds inefficient. FSOs must clearly understand the commander's intent for smoke and advise him on the appropriate means to accomplish his intent, based on the prevailing weather and snow conditions.

Fire supporters face a myriad of challenges on an arctic battlefield. No article or even field manual can adequately prepare the FSO and his FOs to fight in extreme winter conditions. This article highlights some leadership challenges the FSO will face in surviving the elements and maintaining his equipment and ammunition effectiveness—maintaining combat readiness.



Captain Thomas J. Weiss II until recently was the Fire Support Officer (FSO) for E Troop, 3d Squadron, 17th Cavalry, a light cavalry troop supporting the 172d Infantry Brigade (Separate) at Fort Wainwright, Alaska. Currently, he is a student at the Combined Arms and Services Staff School, Fort Leavenworth, Kansas. Captain Weiss spent three and one-half years in Alaska, originally as part of the 6th Infantry Division (Light) Artillery, serving two of those years as an FSO. During that time, he participated in two Joint Readiness Training Center (JRTC) rotations at Fort Polk, Louisiana; one National Training Center (NTC) rotation at Fort Irwin, California; and eight winter field exercises. Among other duties, he served as Executive Officer and Fire Direction Officer (FDO) for B Battery, 4th Battalion, 11th Field Artillery and as FSO for B Company, 1st Battalion, 17th Infantry (Light), all with the 172d Infantry Brigade in Alaska.

Field Artillery Conversions to 3x6



by Major Thomas E. Brown, ARNG

The Chief of Staff of the Army recently directed the conversion of all multiple-launch rocket system (MLRS) and 155-mm towed (155 T) Field Artillery units to a six-launcher/howitzer battery design. This decision will complete the transformation of all FA units to 3x6—six weapons per battery with three batteries per battalion. In 1996, 155-mm self-propelled (155 SP) units converted to 3x6. The 105-mm howitzer units have remained 3x6.

Most active component (AC) MLRS and 155 T units will convert to 3x6 in the third quarter of FY 99. AC units outside of the continental US (OCONUS) have unique conversion schedules. Army National Guard (ARNG) 155 T units will convert to 3x6 in the fourth quarter of FY 99; ARNG MLRS units will convert to 3x6 from FY 00 to FY 04.

Background. MLRS units currently are organized with nine launchers per battery split into three firing platoons of three launchers each. Corps MLRS battalions have a headquarters, headquarters and service (HHS) battery and three MLRS batteries. Heavy divisions have either a single MLRS battery or an MLRS battalion, consisting of a HHS battery, two MLRS batteries and a target acquisition battery (TAB).

Currently, most 155 T units are organized with eight howitzers per battery split into two firing platoons of four howitzers each. Corps 155 T battalions have a headquarters and headquarters battery (HHB), three 155 T batteries and a service battery. Each cavalry squadron in the light armored cavalry regiment has a 155 T battery (commonly know as "How" battery). Each light infantry division has a separate 155 T battery, which serves as the general support (GS) battery for the division.

Corps MLRS Battalions. (See Figures 1 and 2, the latter on Page 14.) The battalion retains its HHS battery/three firing battery design. The HHS battery gains several new positions in existing sections. These include a master gunner/assistant operations sergeant in the operations section, who is a sergeant first class (SFC) in Military Occupational Specialty (MOS) 13M MLRS Crewman; a targeting officer, who is a chief warrant officer 2 (CW2) in MOS 131A Targeting Technician; and in the intelligence section, a sergeant (SGT) who is MOS 96B Intelligence Analyst. These positions were added to standardize the battalion headquarters and help the MLRS commander perform the four standard tactical missions.

HHS battery also gains automation management and ammunition management sections. The automation management section will manage and repair the ever-growing quantity of tactical computer equipment. The ammunition management section will help the commander manage the expanding MLRS family of munitions (MFOM).

The MLRS battery loses one firing platoon, reducing the quantity of launchers from nine to six per battery. The battery retains 12 M985 heavy expanded-mobility tactical trucks (HEMTTs) and 12 M989A1 heavy expanded-mobility ammunition trailers (HEMATs), bringing the truck-to-launcher ratio up to 2:1. The current ratio is 1.3:1, which doesn't provide the ammunition haul needed for the MFOM quantities on the battlefield.

The battery operations center (BOC) gains a battery operations NCO position, who is an SFC in MOS 13P MLRS Fire Direction Specialist. This position was added to help the commander control the battery in extended battlefield operations and during deployments when the battery is separated from the battalion headquarters.

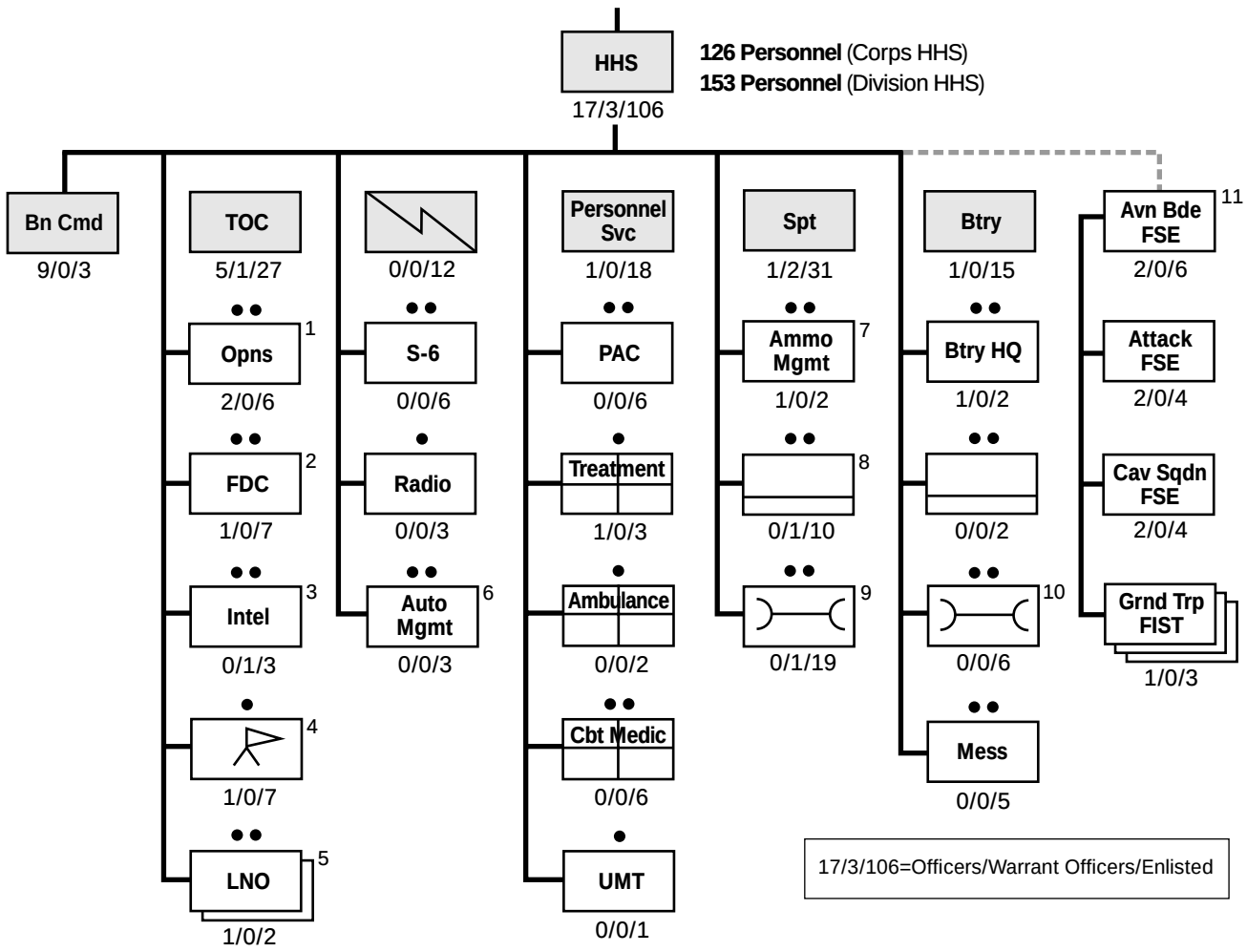
The survey section of the firing battery was moved to the HHS battery and put under the supervision of a chief of party, who is a staff sergeant (SSG) in MOS 82C FA Surveyor.

The ammunition platoon headquarters was renamed support platoon headquarters to reflect duties assigned. The MLRS battery retains organic mess, maintenance, recovery (track and wheel), fuel haul and supply.

Heavy Division MLRS Battalion. (See Figure 2 on Page 14.) The battalion is restructured from an HHS battery/two firing battery/TAB design to an HHS battery/three firing battery/TAB design. The number of MLRS launchers in the battalion remains 18; however, they're reorganized from two nine-launcher batteries into three six-launcher batteries.

The HHS battery gains the same positions/sections as noted in the corps battalion. In the Force XXI Division, the battalion gains the aviation brigade fire support element (FSE) slice, which includes the aviation brigade, attack helicopter battalion, cavalry squadron and ground troop FSEs. The FSE slice is currently located in the HHB of the division artillery. Moving the FSE to the MLRS battalion HHS battery creates a habitual relationship between the MLRS battalion and the aviation brigade. The relationship will facilitate the MLRS battalion's direct support (DS) of aviation elements in division deep attack and cross-forward line of own troops (FLOT) operations.

The TAB design remains basically unchanged: three mortar-locating radars (Q-36 Firefinders) and two artillery-locating radars (Q-37 Firefinders) and a target processing element (TPE). The reconnaissance and survey officer (RSO), chief surveyor (SFC in MOS 82C) and conventional survey positions were eliminated as part of a planned downsizing for survey across the FA. The TAB retains a position and azimuth determining system (PADS) team in the radar platoon headquarters.



Force Structure Notes:

1. Operations Section: Add 13M40 master gunner and 13D10 advanced Field Artillery tactical data system (AFATDS) operator.

2. Fire Direction Center (FDC): Change enlisted grading structure to support two shifts for 24-hour operations.

3. Intelligence Section: Add CW2 targeting officer and 96B20 intel analyst to increase targeting/intelligence operations in support of MLRS performing all four tactical missions. Add M577 command and control vehicle to standardize FA battalion designs.

4. Survey Section: Consolidate position and azimuth determining system (PADS) teams from firing batteries and add 82C30 chief of party to supervise PADS teams and advise battalion commander on survey.

5. Liaison Officer (LNO) Teams, Corps Battalion Only: Retain two LNO teams to support normal and USMC.

6. Automation Management Section: Add new section to service and maintain tactical computers/AFATDS, combat service support control system (CSSCS), etc.

7. Ammunition Management Section: Add section to assist battalion commander in managing MLRS family of munitions (MFOM).

8. Battalion Supply Section: Delete M989A1 heavy expanded-mobility ammunition trailer (HEMAT) and fuel pods due to reduction in fuel haul requirements (3x6). Corps Only: Retain property book officer/property book NCO (PBO/PBNCO).

9. Battalion Maintenance Section: Delete M984A1 heavy expanded-mobility tactical truck (HEMTT) wrecker due to reduction in wheeled vehicles (3x6). Direct support (DS) maintenance support team (MST) provides wrecker for battalion-level operations.

10. Battery Maintenance Section: Add section to assist HHS battery commander manage battery maintenance operations.

11. Force XXI Division Only: HHS will have the aviation brigade, attack helicopter battalion and cavalry squadron FSEs plus three ground troop FISTs. These elements moved from headquarters and headquarters battery (HHB) of the division artillery to align the Force XXI Divisional MLRS battalion to support the aviation brigade in division cross-forward line of own troops (FLOT) or deep attack missions.

Legend:

Avn Bde = Aviation Brigade
Bn Cmd = Battalion Command
Btry HQ = Battery Headquarters
Cav Sqdn = Cavalry Squadron
Cbt = Combat
FDC = Fire Direction Center
FSE = Fire Support Element
Grnd Trp FIST = Ground Troop Fire Support Team
HHS = Headquarters, Headquarters and Service Battery
LNO = Liaison Officer
Opns = Operations
PAC = Personnel and Administration Center
Spt = Support
Svc = Services
TOC = Tactical Operations Center
UMT = Unit Ministry Team

Figure 1: Headquarters, Headquarters and Service (HHS) Battery of a 3x6 MLRS Battalion

Corps 155 T Battalion. (See Figure 3.) The battalion is restructured from a HHB/three firing battery/service battery design to a HHS battery/three firing battery design similar to MLRS. This action consolidates the battalion-level staff functions into a single headquarters and breaks the logistical elements (mess and ammunition resupply) into the firing batteries to facilitate modular operations over an extended battlespace.

Like MLRS, the HHS battery gains the automation and ammunition management sections. The battalion supply and maintenance sections from the service battery are moved to HHS battery. HHS battery loses the survey platoon headquarters and conventional survey team, retaining a chief of party (an SSG in MOS 82C) and two PADS teams.

The 155 T firing battery is restructured from two four-howitzer platoons to two three-howitzer platoons (like 155 SP and MLRS units). Each firing platoon retains a platoon headquarters and fire direction center (FDC). The gunnery sergeant position (an SFC in MOS 13B Cannoneer) in each firing platoon headquarters was consolidated into a single position in the battery headquarters. The second position was used to create the platoon sergeant position in the support platoon headquarters. Each firing platoon headquarters gains a reconnaissance sergeant (an SSG in MOS 13B) to help the platoon leader/sergeant in reconnaissance, selection and occupation (RSOP) procedures and platoon supervision.

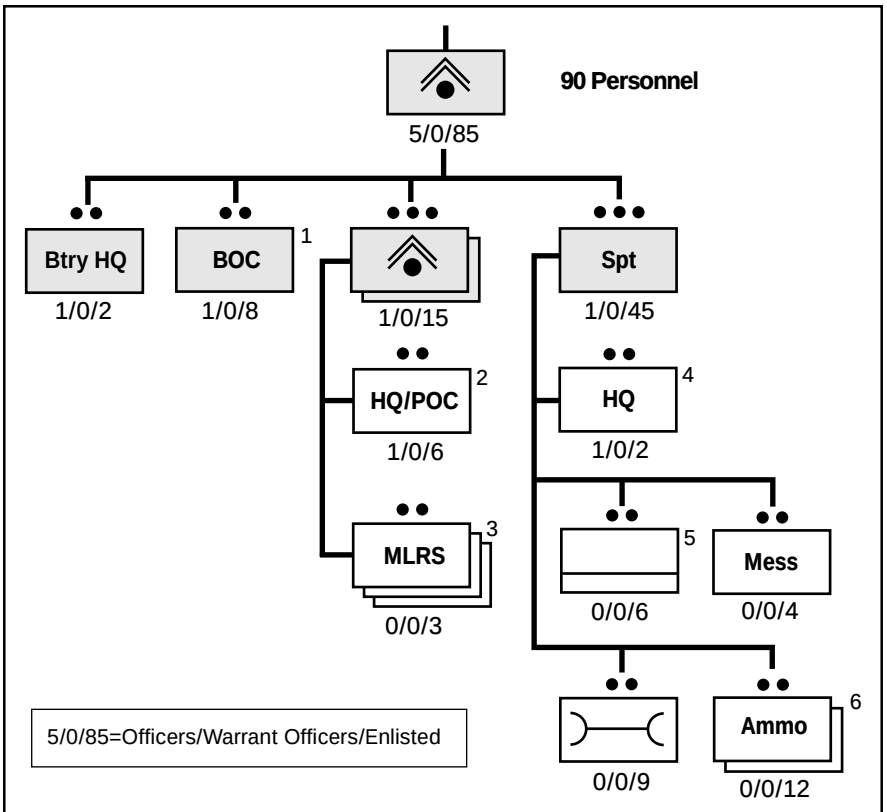
The support platoon headquarters was added to manage ammunition, mess, maintenance and supply operations. The three ammunition sections from service battery were split among the firing batteries. The quantity of ammunition trucks with trailers was adjusted based on the reduction of howitzers and wartime ammunition consumption estimates.

Separate 155 T Batteries. (See Figure 4 on Page 16.) The howitzer batteries in the cavalry squadrons of the 2d Armored Cavalry Regiment (Light) and the 155 T battery in each light infantry division are affected in a similar manner as shown in the corps 155 T battalion (Figure 3). The detail platoon headquarters in the howitzer battery is renamed support platoon headquarters, and the platoon sergeant position is changed from MOS 82C to 13B.

Implementation. Most AC MLRS and 155 T units will convert to these new designs during the third quarter of FY 99. OCONUS units may convert based on local major Army command (MACOM) requirements.

Most of the ARNG 155 T corps battalions were scheduled to convert from 3x6 battery operations to 3x8 in FY 98 and FY 99. Instead, their 3x6 structure will convert to the 3x6 design discussed in this article in the fourth quarter of FY 99.

The ARNG MLRS force will grow significantly due to the availability of MLRS launchers from AC and ARNG unit reorganizations from 3x9 to 3x6. The ARNG now has ten corps MLRS battalions and an additional 11 corps 155 SP battalions filling MLRS requirements. Due to this reorganization, these 11 155 SP battalions will receive displaced MLRS launchers, starting in FY 00 and ending in FY 04. Much work remains to complete this project and additional funding is critical for procurement of associated support items of equipment, such as M985 HEMTTs, M989A1 HEMATs, fuel trucks, wreckers, special tools and test equipment (STTE) and repair parts.



Force Structure Changes:

1. Battery Operations Center (BOC): Add 13D40 battery operations NCO to support autonomous operations. Move nuclear, biological, chemical (NBC) NCO to BOC. Add M998 high-mobility multipurpose wheeled vehicle (HMMWV) for jump operations.

2. Firing Platoon Headquarters/Platoon Operations Center (HQ/POC): Reduce platoons from three to two (3x6). Upgrade reconnaissance NCO from E5 to E6 to support autonomous operations.

3. MLRS Sections: Reduce sections from nine to six per battery or three per platoon (3x6).

4. Support Platoon Headquarters: Rename the ammunition platoon headquarters to support platoon headquarters to better reflect combat service support (CSS) duties.

5. Supply Section: Delete M989A1 heavy expanded-mobility ammunition trailer (HEMAT) and fuel pods due to the reduction in fuel haul requirements (3x6).

6. Ammunition Sections: Reorganize sections from three to two (3x6). Retain 12 M985 heavy expanded-mobility tactical trucks (HEMTTs) and HEMATs to support MLRS family of munitions (MFOM) haul requirements.

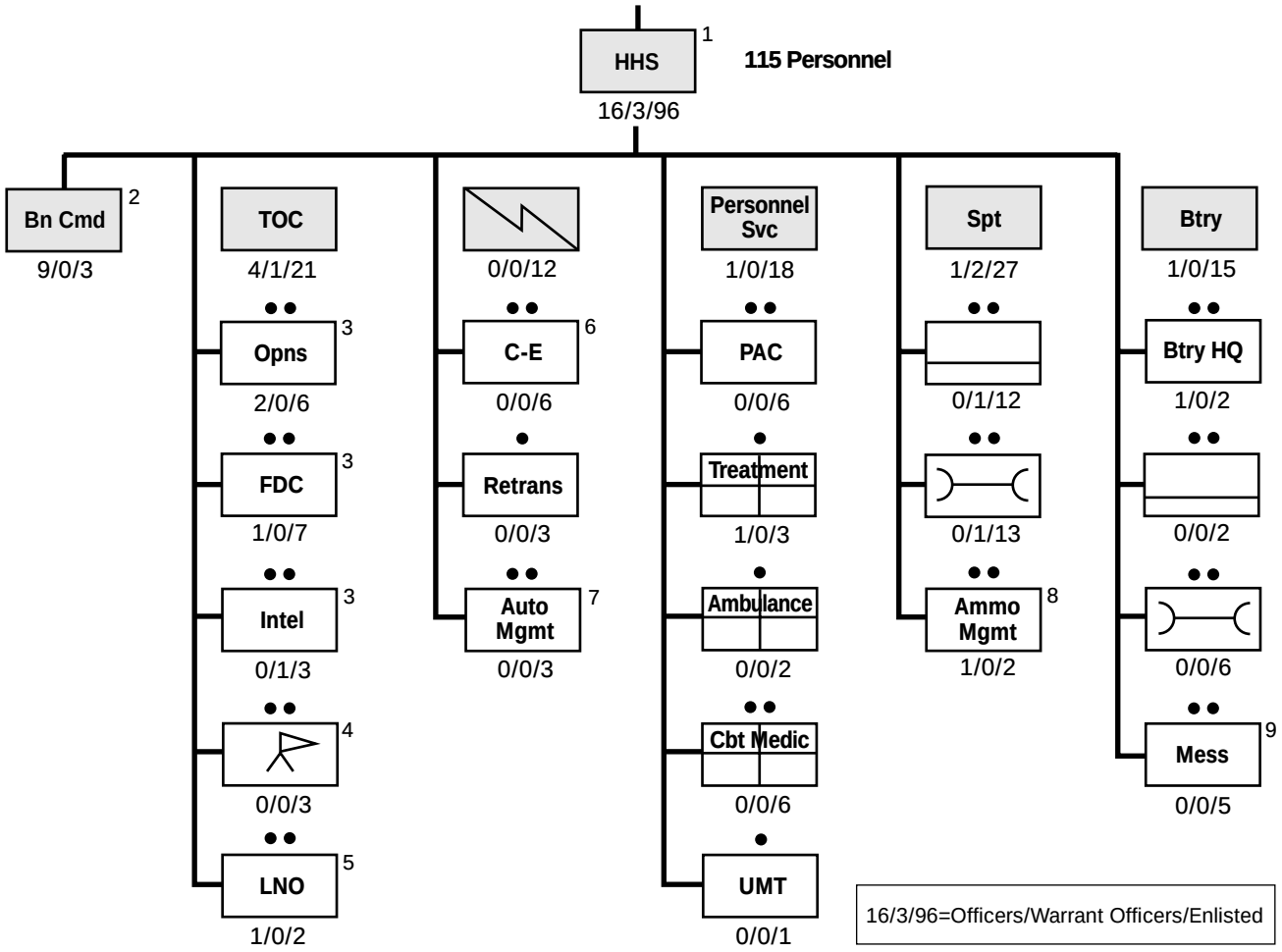
Legend:

BOC = Battery Operations Center
Btry = Battery
HQ = Headquarters
MLRS = Multiple-Launch Rocket System
POC = Platoon Operations Center
Spt = Support

Figure 2: MLRS Firing Battery in MLRS 3x6 Battalion

A concurrent MLRS issue that affects AC and ARNG units is the MLRS firing battery support for the CONUS-based AC heavy divisions. Under this plan, the ARNG would provide the third firing battery of the divisional MLRS battalions in the 1st Cavalry, 3d Infantry (Mechanized) and 4th Infantry (Mechanized) Divisions. This plan further integrates the AC and ARNG by building cohesive teams. Upon alert and deployment of the active division, the ARNG MLRS firing battery would mobilize and deploy with the AC divisional MLRS battalion.

Conclusion. The FA force (both AC and ARNG) will restructure to remain an affordable yet lethal and viable force.



Force Structure Notes:

1. Headquarters, Headquarters and Service (HHS) Battery: Consolidate headquarters and headquarters battery (HHB) and service battery into HHS, like MLRS.

2. Battalion Headquarters: Add battalion maintenance officer (BMO) to manage maintenance operations.

3. Operations/Fire Direction Center (FDC)/Intelligence Sections: Standardized section designs (see MLRS Notes 1, 2 and 3 of Figure 1 for details).

4. Survey: Eliminate survey platoon headquarters and conventional team (in accordance with the survey master plan). Retain two position and azimuth determining system (PADS) teams and chief of party (see MLRS Note 4 of Figure 1 for details).

5. Liaison Officer (LNO): Change military occupational specialty (MOS) of the two enlisted positions from 13F to 13D (13F not common in corps units—13D better able to advise supported commander of cannon unit requirements/capabilities).

6. Communications and Electronics (C-E): Eliminate the C-E platoon leader (FA standardization).

7. Automation Management Section: Add this section (see MLRS Note 6 of Figure 1 for function).

8. Ammunition Management Section: Move ammunition platoon headquarters from service battery to HHS battery. Provides battalion-level ammunition management capability. (All ammo section personnel/equipment from service battery split to the firing batteries.)

9. Battery Mess Section: Break up the mess section from service battery into individual battery mess sections to better support autonomous operations and concepts of modularity.

Legend:

Bn Cmd = Battalion Command
Btry = Battery
Cbt = Combat
HHS = Headquarters,Headquarters and Service Battery
HQ = Headquarters
Intel = Intelligence
LNO = Liaison Officer
Opns = Operations
Retrans = Retransmission
Spt = Support
Svc = Services
TOC = Tactical Operations Center
UMT = Unit Ministry Team

Figure 3: Headquarters, Headquarters and Service Battery in a General Support (GS) 3x6 155-mm Towed Battalion

The restructure of the current MLRS force to 3x6 will allow for the modernization of the remaining MLRS requirements without buying additional launchers. The AC will have 12 corps and six heavy division MLRS battalions while the ARNG will have 21 corps battalions and three MLRS batteries supporting AC divisions.

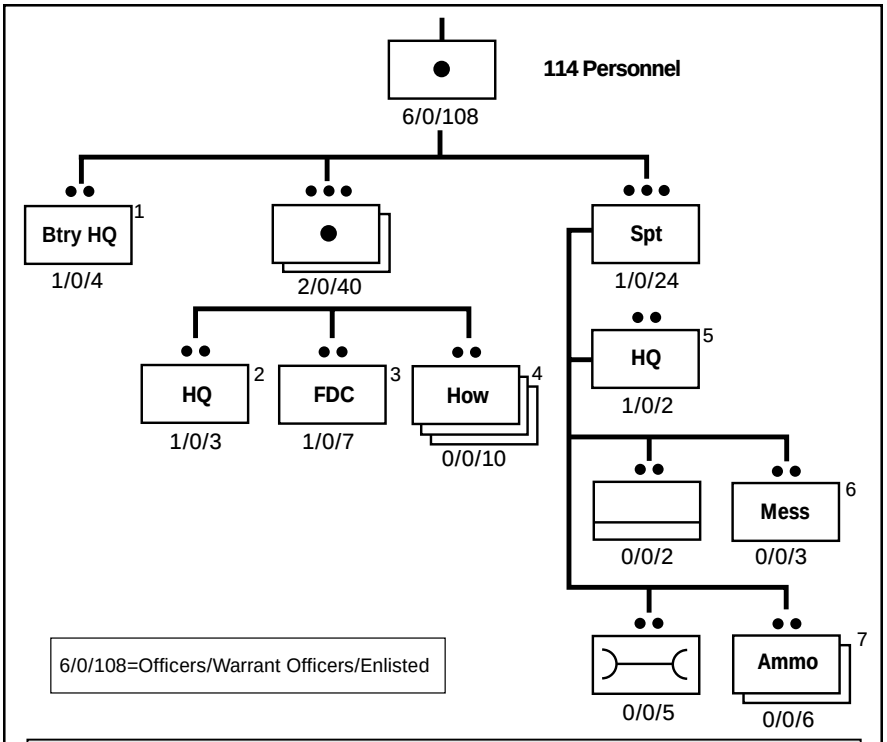
After the M270A1 MLRS launcher completes fielding in FY 11, the ARNG will gain an additional three to four battalion sets of launchers. These launchers will be used to form MLRS battalions in the ARNG heavy divisions, which currently each have a 155 SP firing battery as a place-holder.

The restructure of the 155 T force will complete the conversion of all cannon units to 3x6. In recent history, 105-mm towed units have remained 3x6 and will remain battery-based (as opposed to platoon-based) at this time.

If units want more details on their units' tables of organization and equipment (TOEs), see www.usafmsardd.army.mil.

The decision to convert the force to pure 3x6 was greatly influenced by future developments in munitions lethality—the new Army tactical missile system (ATACMS) missiles, guided MLRS (GMLRS), MLRS smart tactical rocket (MSTAR) and the M982 family of smart cannon munitions. Also improvements in munitions range and the development of new weapons platforms, such as the MLRS M270A1 launcher and future advanced towed light artillery system (ATLAS), affected the decision. These munitions and weapons are the enablers for the weapons platform reductions discussed in this article.

If we move to the 3x6 configuration without these enablers, our fires lethality *will* be reduced. Support for continued development and procurement for the enabling munitions and platforms is critical.



Force Structure Notes:

1. Battery Headquarters: Add 13B40 gunnery sergeant, vehicle driver and M998 high-mobility multipurpose wheeled vehicle (HMMWV).

2. Firing Platoon Headquarters: Delete 13B40 gunnery sergeant (see battery headquarters) and add 13B30 reconnaissance sergeant to perform reconnaissance, selection and occupation of position (RSOP) for firing platoon.

3. Firing Platoon Fire Direction Center (FDC): Add one M998 high-mobility multipurpose wheeled vehicle (HMMWV) to haul section personnel/equipment.

4. How (Firing) Sections: Reduce sections from four to three per platoon (3x6).

5. Support Platoon Headquarters: Add new platoon headquarters to manage combat service support (CSS) within battery. Support platoon leader serves as battery executive officer/senior logistician. Armored Cavalry Regiment (ACR) Only: Detail platoon headquarters renamed support platoon headquarters. Support platoon sergeant position changed from 82C40 to 13B40 for standardization.

6. Battery Mess Section: Add new section to support autonomous operations and concepts of modularity. Personnel/equipment come from service battery mess section.

7. Ammunition Sections: Sections from service battery split to firing batteries to support modularity. Truck/trailer reductions across battalion (33 to 18) due to reduction from 3x8 to 3x6 and change from 1.5-ton M332 ammo trailer to 5-ton medium tactical vehicle (MTV) trailer. Units not yet equipped with family of medium tactical vehicle (FMTV) trucks/trailers retain 24 5-ton trucks/M332 ammo trailers (eight per battery).

Other Notes (Not Shown in Figure):

• ACR/Light Division Only: Survey section retains one position and azimuth determining system (PADS) team and chief of party for supervision/planning.

• Howitzer Battery Only: Retain the fire support element (FSE) to support its cavalry squadron.

Legend: Btry = Battery; FDC = Fire Direction Center; How = Howitzer Battery; HQ = Headquarters; Spt = Support

Figure 4: 155-mm Towed Battery in a General Support (GS) 3x6 155-mm Towed Battalion in the FA Brigade/Howitzer Battery of in the Light Armored Cavalry Regiment (ACR)/155-mm Towed Battery in the Light Infantry Division

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HIMARS

Firepower for Early Entry Forces

by Lieutenant Colonel Donald E. Gentry and Cullen G. Barbato

At 0300, 3d Battalion, 27th Field Artillery (3-27 FA), Fort Bragg, North Carolina, was alerted to report to the 18th FA Brigade headquarters to receive orders. The 82d Airborne Division Ready Brigade (DRB) had been alerted for a contingency into a country with no US or friendly standing bases. The plan was for an airborne operation to seize an airfield and secure vital areas in support of the foreign government. The opposing force had little armor but had a significant amount of artillery well within range of the lodgment area.

The DRB commander and commander-in-chief requested increased artillery support for this mission. 3-27 FA was to provide that support with its high-mobility artillery rocket system (HIMARS), a highly deployable wheeled version of the multiple-launch rocket system (MLRS), capable of firing all the MLRS family of munitions (MFOM).

Eighteen short hours later, three HIMARS launchers and associated support equipment were in route via C-130 aircraft to provide the immediate fire support necessary to accomplish the mission.

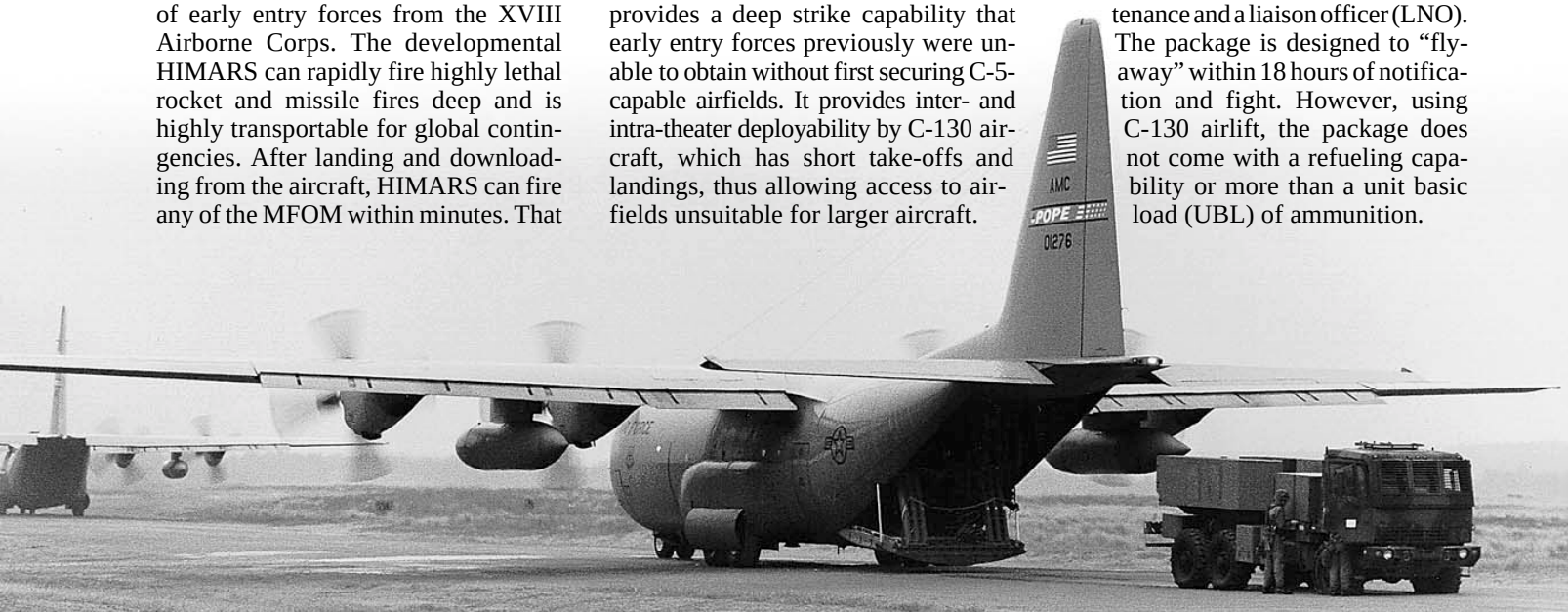
An early morning alert notification is not unusual for the *Steel Rain* battalion. And sometime in the not-too-distant future, the call could come for a HIMARS mission package to provide deep fires in support of early entry forces from the XVIII Airborne Corps. The developmental HIMARS can rapidly fire highly lethal rocket and missile fires deep and is highly transportable for global contingencies. After landing and downloading from the aircraft, HIMARS can fire any of the MFOM within minutes. That includes the extended-range rocket (ER-MLRS) that engages targets out to 45 kilometers and the Army tactical missile system (ATACMS) Block 1A missile with a 300-kilometer range.

This mobile artillery rocket system provides a deep strike capability that early entry forces previously were unable to obtain without first securing C-5-capable airfields. It provides inter- and intra-theater deployability by C-130 aircraft, which has short take-offs and landings, thus allowing access to airfields unsuitable for larger aircraft.

Currently, only one platoon of three HIMARS launchers exists, and the launchers are developmental prototypes in 3-27 FA for two-year user evaluation and employment testing. The battalion has had the prototypes since April 1998 and has put them through their paces in the four-week Rapid Force Projection Initiative exercise this summer at Fort Benning, Georgia, and other training events. The system is scheduled to start fielding in FY 06.

Based on our experience with the developmental HIMARS launchers, this article discusses considerations for HIMARS deployment, liaison/command and control, positioning, tactical employment, security and support. This article begins the process of defining the capabilities/limitations and operations of the lethal new system for light-fighter deep fires.

Deployment. The HIMARS platoon package mirrors the current M270 platoon package employed by the MLRS battalion, consisting of a firing platoon, an attached ammunition section, organizational and direct support (DS) maintenance and a liaison officer (LNO). The package is designed to "fly-away" within 18 hours of notification and fight. However, using C-130 airlift, the package does not come with a refueling capability or more than a unit basic load (UBL) of ammunition.



Liaison/Command and Control. Given its increased deployability, the nature of its supporting relationship and projected missions, HIMARS will be deployed primarily into low- to mid-intensity situations where additional forces may be either unsupportable by the deploying force or undesirable due to non-military considerations. The package probably will be deployed with and attached to the contingency force FA headquarters. The package includes an LNO, who most likely will be the battery commander.

It is important to note that the light infantry maneuver and FA force staffs don't have experience in planning for and integrating rocket fires into their combined arms plans. Fire support officers (FSOs), S3s and commanders of the supported units must understand the capabilities and limitations of this new fire support system. The schoolhouse at Fort Sill, Oklahoma, has incorporated MLRS operations into its curriculum to some degree, but units need additional training and hands-on experience with the system to ensure an integrated effort in time-sensitive operations.

As other MLRS units are doing, 3-27 FA is developing a light MLRS tactical operations center/battery operations center (TOC/BOC) deployable via C-130 to help provide staff integration. For the battalion TOC, this setup employs two high-mobility multipurpose wheeled vehicles (HMMWVs) with S787 shelters instead of the traditional M577 command post carrier.

We've remoted a monitor out into the work area for the fire direction system (FDS) and the initial fire support automation system (IFSAS) so the battle captain and fire direction officer (FDO) can monitor their computers while outside the vehicle. IFSAS significantly improves our ability to receive information in the TOC from our supported headquarters along with messages from the Q-37 Firefinder radar.

When employed without the battalion TOC, the BOC likely will consist of one S787 shelter with an IFSAS, allowing it to do the tactical integration while the platoon operations center (POC) conducts fire control. The concept is that the highest MLRS operations center concentrates on tactical fire control and integration, as determined by the deployment. Because HIMARS could be employed in so many different types of contingencies, this shift in coordination responsibilities becomes critical in training and execution. Using these different configurations and techniques, we can deploy a robust command and control cell to help integrate HIMARS and accept additional forces as they arrive.

Positioning. Maintaining continuous fires on a nonlinear battlefield with only one platoon to fire requires an alternate method of maneuvering. This means eliminating the rigid three-by-three-kilometer operations area (OPAREA) outlined in *FM 6-60 Tactics, Techniques and Procedures for MLRS Operations* and also the one-by-three-kilometer OPAREA discussed in the letter-to-the-editor by Captain William T. Harmon, "Alternate MLRS Emplacement—1x3-Kilometer Formation" (March-April 1996). Spreading the platoon out across the maneuver area allows the launchers multiple firing points without shutting fires down to move into a new OPAREA.

The OPAREA was created for command, control and survivability; however, with improved voice and digital communications and the self-locating improved position determining system (IPDS) on board, HIMARS negates the need for the conventional OPAREA to meet the challenges of a nonlinear battlefield.

By spreading out, the platoon increases its survivability by taking advantage of its strengths: shooting, moving and communicating. The limits of the platoon's maneuver area are dictated by the zone of the supported maneuvering unit, communications restraints, terrain and range considerations. This expanded area provides almost unlimited firing points by allowing the launchers to bound in all directions to maintain 360-degree firing capabilities and keep pace with their maneuver forces.

Soldiers of 3-27 FA (MLRS), part of the 18th FA Brigade, fire an ATACMS from a HIMARS prototype at White Sands Missile Range. *(Photo courtesy of Lockheed Martin)*

In addition, the expanded operations area increases the launchers' security by allowing them to move constantly without constraining them to a nine- or three-square-kilometer OPAREA. The launchers are more survivable against enemy radars and observers trying to determine accurate launcher positions.

Constant movement within an uncertain battlefield requires the command and control node to provide accurate intelligence updates to the launchers and track the location of each vehicle to coordinate with the force FA headquarters. The POC needs to be relatively stationary and hidden. This is facilitated by establishing a separate platoon administrative and logistics center (ALOC) controlled by the platoon sergeant and ammunition section chief and positioned separately within the platoon's maneuver area.

The platoon leader controls the platoon from the POC, which consists of the fire direction center's (FDC's) M1097 HMMWV with S787 shelter and his high-backed M998 HMMWV with radio and map boards. This enables the FDC to control fires and coordinate with its higher headquarters while remaining hidden, reducing its battlefield signature.

Employment. With its unique deployability and capabilities, HIMARS provides the force options not previously available. At the same time, its deployability creates unique requirements that must be considered in planning and employment.

Inter- or Intra-Theater Raids. Whether the raid is launched from the US via C-5 or C-17 aircraft to an established staging base or conducted intra-theater via C-130, the ability to load a launcher onto an aircraft, land the aircraft and off-load, fire and then reload the weapon onto the aircraft significantly increases the lethality of early entry forces. HIMARS could be used for suppression of enemy air defenses (SEAD), allowing aviation assets to engage high-payoff targets (HPTs). The weapon also can be flown farther inland to shoot its ATACMS with devastating effects on HPTs in an area too dangerous for attack helicopters. These air/land raids offer significant operational and tactical options to commanders at many levels.

Attack Guidance. The major employment consideration is that HIMARS only can carry one pod of munitions—as opposed to the two in the MLRS M270 self-propelled launcher-loader

Soldiers of 3-27 FA (MLRS), part of the 18th FA Brigade, work with a high-mobility artillery rocket system (HIMARS) prototype at Fort Bragg, NC. *(Photo courtesy of Lockheed Martin)*

(SPLL). That's six versus the MLRS load of 12 rockets.

This limitation affects the commander's attack guidance and munitions planning. If the commander wants to attack all radar acquisitions with 36 rockets to ensure their destruction and all he has available is the platoon package, he must use battlefield calculus to plan his fires and consider the UBL and the time required to reload the launchers.

As fire supporters, we must advise our maneuver commanders to focus limited assets on the HPTs; in the *decide* function of the targeting process, we must consider ammunition consumption against the need for continuous fires. There is some credence to the projection that fewer targets will be suitable for HIMARS attack. But in any given situation, the FSO and commander must consider the implications of HIMARS ammunition limitations—to do otherwise would be dangerous and unacceptable.

Escalating Conflicts. HIMARS is ideal for supporting initial entry forces. So what happens if the conflict escalates? Obviously as heavy formations such as M270s arrive, the need for HIMARS diminishes. Just as obviously, as the enemy introduces heavier forces, the threat to HIMARS increases. There are several techniques we can use in this situation.

HIMARS can be loaded with the ATACMS Block IA missile and positioned away from the maneuvering heavy forces to provide deep fires. By doing this, other launchers can focus on providing *rocket* fires in support of our maneuver brethren.

Another option to improve the survivability of HIMARS is to redeploy it out of theater to respond to other contingencies. HIMARS' deployability gives us the freedom to move this firepower to any hot spot in the world rapidly without overtasking our strategic assets.

Security. Spreading the platoon out in a maneuver area increases its survivability by keeping the FDC hidden and the launchers mobile. Taking this wheeled system and placing it where improved roads are plentiful plays to HIMARS' speed and helps to obviate its lack of armored protection. The platoon must coordinate carefully with adjacent maneuver units to gain route security and early warning. The LNO plays a critical role in this function, tracking the battle from the force FA headquarters and ensuring the POC receives the necessary information and support.

The system is mounted on a truck chassis with very little extra protection added due to weight considerations. (The cab has light armor and protective glass.) However, in the most likely HIMARS situations—low- to mid-intensity—we can reduce the risk through movement and intelligence.

Like the M270, the HIMARS launcher has no means of self-defense. A section chief trying to hold on to both the vehicle and an M16 as he's bouncing down the road cannot provide even suppressive fires.

We need to develop and add to the modification table of organization and equipment (MTOE) means for the launcher to protect itself. Mounting an M249 squad automatic weapon (SAW) for the chief would help as would the vehicular smoke grenade launchers similar to those found on the Bradley fighting vehicle and M1 Abrams tank. These same upgrades need to be considered for the M270A1 fleet.

Logistical Support. While the platoon can deliver significant fire support, it is far from completely self-supporting. Simple things like food and fuel become hard for a platoon in the middle of the fight. Supported commands must be aware of the logistics requirements for a rocket platoon. After he's on the ground, the LNO will help coordinate support.

HIMARS' logistical tail is large. Its UBL of 19 5000-pound rocket pods is not something an airborne or light brigade necessarily is prepared to support. The organic ammunition vehicles, when developed, will be working at full capacity to keep pace with the launchers, especially with the increasing types of munitions in the MFOM. HIMARS units will have to be innovative and take the initiative to keep their systems supplied.

HIMARS is a significant leap forward in fire support for early entry and light forces. Light force commanders who must deploy to undeveloped areas soon will have the firepower normally associated with heavier forces. But it will take a combined arms effort to make the most of this firepower to protect the force and defeat the enemy.

Lieutenant Colonel Donald E. Gentry commands the 3d Battalion, 27th Field Artillery, 18th Field Artillery Brigade, part of the XVIII Airborne Corps at Fort Bragg, North Carolina, which includes the Army's first platoon of high-mobility artillery rocket system (HIMARS) prototypes. He also commanded a firing battery in the 1st Battalion, 82d Field Artillery for 17 months and A Battery, 21st Field Artillery (Multiple-Launch Rocket System, or MLRS), both in the 1st Cavalry Division, Fort Hood, Texas. He served as the Executive Officer and S3 of 6th Battalion, 27th Field Artillery (MLRS), 75th Field Artillery Brigade, III Corps Artillery at Fort Sill, Oklahoma. Just prior to taking command of 3-27 FA, he was the Deputy Fire Support Coordinator for the 1st Marine Division at Camp Pendleton, California.

Cullen G. Barbato until recently was a First Lieutenant in the Army and leader of 2d Platoon, C Battery, 3-27 FA, the HIMARS platoon, including during the Rapid Force Projection Initiative demonstration at Fort Benning, Georgia, this summer. Prior to becoming the HIMARS platoon leader, he was the leader of an M270 MLRS firing platoon for 18 months, also in 3-27 FA. Currently, he is a civilian working on an MBA at Louisiana State University. He's a graduate of the MLRS Cadre Course at Fort Sill, Oklahoma, and the Air Movement School at Fort Bragg.

The authors wish to acknowledge the assistance of Captain James S. Vizzard, the first HIMARS battery commander; Sergeant First Class Robert E. Barto, HIMARS platoon sergeant; and soldiers of 2/C/3-27 FA in writing this article.

Linking the FA METL to

The light infantry division artillery commander took notes during one of his battalions' after-action reviews (AARs). The direct support (DS) battalion supported its brigade task force (TF) during an attack in military operations in urban terrain (MOUT)- a primary mission in preparation for the Joint Readiness Training Center (JRTC), Fort Polk, LA.

Session should be interesting. Looking forward to identifying keys to TF success in the attack. Still a few areas for improvement, but the team integrated fires and maneuver effectively.

Maneuver losses lower than expected. Indirect fires had major impact on the operation. FSO [fire support officer] able to articulate key tasks with sufficient detail to plan, rehearse and execute effectively. Sharp FSE [fire support element], nine days into the operation, 48 hours without sleep. TOCs [tactical operations centers] forced to relocate during decision-making process—how did they do it?

Brigade Task Force Mission

3d Brigade TF attacks Obj [Objective] Blue 020001JUN98 to defeat the CLF [Cortinian Liberation Front] and establish control of Shugart-Gordon; o/o [on order] conducts transfer of control to Cortinian government officials.

Nothing unique in the situation and mission. Standard JRTC scenario. The CLF concentrated its combat power and seized the town of Shugart-Gordon. CLF joined by remnants of the mechanized force, which attacked from neighboring country—one tank, two BRDMs [armored infantry vehicles] and a handful of dismounts. CLF forced inhabitants of the town and NGOs [non-governmental organizations] to leave except for a small number of hostages. JTF [joint task force] directed the brigade TF to attack to defeat the CLF and gain control of Shugart-Gordon.

TF Commander's Intent

- Portray breaching capability in the supporting attack.
- Mass combat power at the breach.
- Protect breaching force through surprise, obscuration and suppression.
- Eliminate CLF ADA [air defense artillery] threat- OH-58Ds in the air early.
- Use the OH-58Ds to destroy CLF mortars and armored vehicles.
- Establish and maintain overwhelming momentum.
- Make the passage-of-lines between the battalions smooth and quick.
- Limit collateral damage and noncombatant casualties.

Nothing surprising here either. The commander faced a determined opponent who established a substantial defense. The enemy employed plenty of wire and mine obstacles, armored counterattack force, combat OPs [observation posts] along likely AAs [avenues of approach], SA14s and captured Stingers inside the city, a couple of 82-mm mortars and 40-50 CLF soldiers.

Brigade commander appears to have covered the key points. Only a couple of feasible AAs—must get the enemy to focus combat power on the wrong side of the town. The actual breach site is the decisive point. Brigade commander must concentrate combat power there—for light infantry in close terrain and this situation, it means concentrating companies, platoons, squads and soldiers at the breach site to penetrate the defensive perimeter and move through the narrow passage.

Must protect the force at the breach site. Suppression of enemy air defenses and his forces covering the AAs and obstacles will be critical. Obscuring the enemy's observation of the breach also will be key to the TF success.

DS Artillery Battalion Mission

3-32 FA disrupts CLF ADA, disrupts CLF direct fire weapons affecting the breach, obscures CLF observation of the breach and provides other fires in support of 3d Brigade TF attack of Obj Blue 020001JUN98; o/o ...

This mission statement says a great deal more than the ones I wrote as a battalion commander—"7-15 FA provides DS artillery fires in support of 3d Brigade TF attack of Obj Fire 030200AUG92; o/o ..." Those statements were consistent with an item in my METL [mission essential task list]:"Provide timely and accurate fires." Unfortunately, they contained very little substance.

This FA battalion mission statement focuses on tasks prerequisite for accomplishing the mission. That might be one of the keys to the success of this task force.

JRTC Observer/Controller (O/C) Observations

- FSO identified all EFSTs [essential fire support tasks] and EFATs [essential FA tasks].
- TF commander integrated fires and maneuver by coordinating and executing the EFSTs.

Essential fire support tasks? A few years ago, the NTC [National Training Center, Fort Irwin, California] fire support O/Cs created a process to help us identify tasks critical to the maneuver mission. They wanted a tool that would ensure we could plan, coordinate and execute those tasks. The tasks first were called "critical" and now "essential" fire support and FA tasks. The process included identifying the task, purpose, method and end state, the latter now called "effects." This was more consistent with the military decision-making process where essential tasks become part of the mission statement. That's it—the DS battalion linked its essential tasks, METL and mission statement!

Brigade TF Success

by Colonel Robert J. Reese

Our current procedures for identifying METLs create inconsistencies between the missions of maneuver units and their supporting artillery. The vignette reflects an after-action review (AAR) of a combat training center (CTC)-type operation. In this training event, the artillery mission contains tasks that relate directly to the brigade TF mission. The artillery commander achieved this continuity by *not* following established procedures as he formed his mission statement.

In the late 1980s, the Army developed a system to identify the most important tasks for training and mission execution and published it in *FM 25-100 Training the Force*. Within the Field Artillery community, we implemented this new doctrine in a manner that provided maximum stability in our training programs, consistency/standardization in our doctrinal procedures and close links to our basic FA tasks. Unfortunately, performance at our CTCs demonstrated problems in our ability to link FA battalion and battery missions to those of the brigade TFs and combat teams we supported.

This article looks at the inconsistencies our procedures create, their impact on training and how we might improve the process. I address the issues from the perspective of the light DS artillery, but the discussion is relevant for heavy DS and general support (GS) artillery as well.

Doctrinal Procedures Outlined. FM 25-100 orients commanders on wartime missions and external directives as the basis of their training programs and the framework for their tactical missions. Most leaders are familiar with this doctrine, which prescribes wartime operations and contingency plans as the most important sources of mission essential tasks.[1] The FM identifies mission training plans (MTPs), mobilization plans and force integration plans as examples of external directives. These secondary sources of essential tasks also represent important sources of guidance for training and operations. The list of key tasks mined from appropriate sources forms the basis of a unit's METL.

The doctrine requires the next higher commander review and approve the list. In doing so, he helps the subordinate leader shape his training program to the most important missions they expect the unit to receive. The senior commander's approval also serves as a commitment to frame operational tasks to the subordinate unit in terms of the METL, whenever possible. In this respect, the METL becomes more than a training tool. It also provides a set of tasks to use when crafting the majority of missions assigned to subordinate units.

Within our battlefield operating system (BOS), many commanders developed METLs 10 years ago that never required modification. We used our MTPs and FMs as primary sources of essential tasks instead of focusing on the specific tasks we would perform in combat. Even though this approach differed from the basic procedures described in FM 25-100, the manual offered it as an example of BOS integration at the division level.

On one hand, doctrine told commanders to concentrate on their wartime missions and contingency plans. On the other, it identified "Plan, coordinate and integrate indirect fire support" as an artillery METL task supporting the division-level task of "Conduct a hasty attack."[2] This FA battle task was very close to the wording of the basic artillery task of "Coordinate fire support."

Most of us took the same approach at the battalion level. We looked beyond our most likely missions to doctrine and MTPs for the key tasks reflecting how we would fight. We focused on the seven basic artillery tasks identified in *FM 6-20-1 Field Artillery Cannon Battalions* (Figure 1 on Page 22) and our MTP to develop our METLs.[3] The resulting METL remained stable throughout the 1990s.

Our MTPs gave us a structure and process we could hardly resist. The 1990 artillery battalion MTP offered its training matrices as the location "…where mission essential task list (METL) development takes place."[4] The MTP matrices and training outlines provided a crosswalk between the seven basic artillery tasks, the BOS and all fire support and artillery collective tasks.[5] Using the seven tasks as the basis for our METL provided a training road map to collective and individual tasks ready for implementation.

This approach seemed logical. We all agreed each of the seven tasks applied to all combat operations conducted by

A Light Brigade Tactical Command Post (82d Airborne Division, Joint Readiness Training Center, 1998).

Seven Basic Tasks	Example of Early Battalion METL
1. Coordinate fire support.	• Provide fire support.
2. Acquire targets.	• Acquire targets.
3. Deliver fires.	• Provide timely and accurate artillery fires.
4. Move.	• Conduct tactical movement operations.
5. Maintain and resupply.	• Conduct sustainment operations.
6. Survive.	• Conduct survivability operations.
7. Communicate.	• Deploy rapidly.

Figure 1: As specified in 1990 mission training plans (MTPs), the seven basic FA tasks that apply to all combat situations were used as the basis for battalion mission essential task lists (METLs). The METLs were all similar. The Seven Basic Tasks are found in ARTEP 6-115-MTP, 1990, Page 1-7, and FM 6-20, 1990, Page 1-1. The example battalion METL tasks were taken from "Memorandum, Headquarters, 7th Battalion, 15th Field Artillery (7th Infantry Division (Light))," Subject: "Tactical Standard Operating Procedures," 4 June 1991, Page 1-1.

our supported brigades. We also appreciated the stability of this approach; our infantry and armor brigades could add and delete tasks from their METLs without causing a change in our list.

We never thought about FM 25-100's assertion that similar organizations might have very different METLs because of the situation or wartime mission or that a change in mission would generate a change in the METL. [6] We never asked if units with different tactics, techniques and procedures (TTP) would have different mission essential tasks. Generally, all DS battalions had the same list.

Procedures Fall Short. The process seemed to work well until observer/controllers (O/Cs) at the National Training Center (NTC), Fort Irwin, California, identified a gap in our procedures. The fire support O/Cs noticed we had difficulty recognizing the fire support and artillery tasks necessary to integrate maneuver and fires. They created the concept of "critical fire support and FA tasks" to address this problem.[7] Their critical tasks linked actions required for success at the brigade combat team (BCT), maneuver TF, FA battalion and lower levels. This was a powerful concept, but in many respects its goals were no different than those found in FM 25-100.

In recent years, representatives from the CTCs agreed to refer to the critical tasks as essential tasks.[8] This change emphasized the importance of the tasks by identifying them in the same terms used in the military decision-making process (MDMP).[9] Unfortunately, the CTC approach did not follow MDMP procedures that include essential tasks in the unit's mission statement. Likewise, FA commanders did not incorporate the new essential tasks into their METLs.

The CTC concept addressed symptoms of a problem without identifying the problem itself. It provided a bridge between maneuver and fire support/artillery tasks and associated purpose, method and effects. However, the process overlooked the ineffective DS artillery battalion METLs. Artillery commanders wrote mission statements such as, "9-99 FA provides DS artillery fires in support of 9th BCT's attack on Obj Black…" When commanders experimented with missions that included some of the essential tasks, the missions statements became more specific and relevant, such as, "7-77 FA delivers FASCAM [family of scatterable mines], disrupts enemy RAGs [regimental army groups] and provides other fires in support of 8th BCT's attack on Obj Blue…." These commanders operated outside the procedures contained in our MTPs. In both cases, commanders focused on essential tasks for the operation during their planning. But only the latter ensured the tasks essential to the BCT/TF success formed the basis of their DS battalions' missions.

At home station before deployment to a CTC or combat, commanders trained on a set of commonly agreed upon essential tasks for their type of unit. One could argue the lists of essential tasks, based on how the units fought, were the unofficial METLs. Commanders found examples of these tasks in Center for Army Lessons Learned (CALL) bulletins, CTC lessons, tactical standing operating procedures (TACSOPs) and articles. Unfortunately, they didn't find those essential tasks in their official METLs or MTPs.

By 1995, the O/Cs felt battalion commanders had learned to develop higher level fire support tasks but that battery commanders often failed to identify subordinate FA tasks.[10] We had an informal process to identify key tasks but no official guide to develop subordinate essential tasks.

Today, we face the same problems when creating our METLs, designing training and preparing for tactical operations. We have the same FM 25-100. Its guidance remains firm: wartime missions and contingency plans take precedence over MTPs and other secondary sources for developing the METL. Likewise, our future artillery battalion MTP offers the basic artillery tasks as the starting point for the METL. The basic tasks now include "Deploy," but the

FM 25-100 states that wartime missions and contingency plans take precedence over MTPs and other secondary sources for developing the METL. 10th Mountain Division, Fort Drum, New York, in the Air Assault.

others remain the same. Commanders are told they can add additional tasks. However, the list is identified as missions for a cannon battalion.[11] The new MTP also provides commanders a sample METL (Figure 2) for an artillery battalion, presumably that of a GS battalion.

- Prepare for deployment.
- Deploy to operational theaters.
- Command and control battalion operations.
- Move.
- Deliver artillery fires.
- Sustain combat operations.
- Perform survivability operations.

Figure 2: Sample Artillery Battalion METL in the New MTP (ARTEP 6-115 MTP (Draft), 12 November 1997, Table 3-1, Page 3-1).

Additionally, commanders still write mission statements that do little to drive planning and operations. And battery commanders still experience difficulty identifying subordinate FA tasks essential to brigade success.[12]

A Solution: Change the METL. One approach we could take to address these issues is to change the METL. A light artillery battalion might consider a METL with closer linkage to expected contingency operations and the way it needs to train to fight. That METL might look like the one in Figure 3. The heavy artillery battalion METL would differ from the light example, unlike today's versions that are quite similar.

This approach supports the DS battalion commander's link to the brigade's METL and its combat mission in the vignette. The tasks of "Obscure enemy observation of friendly maneuver" and "Disrupt enemy air defense and direct fire weapons" provide more substance for the fire support elements (FSEs), firing batteries, remainder of the DS battalion and reinforcing artillery than those described in the current METL. They also serve as a solid basis for the mission statement, "3-32 FA disrupts CLF ADA, disrupts CLF direct-fire weapons affecting the breach, obscures enemy observation of the breach and provides other fires in support…."

The battalion would perform additional METL tasks that did not make it into this mission statement. "Disrupt enemy mortars" is an example. It is an important task, often essential due to aspects of mission, enemy, terrain, troops and time available (METT-T) but not as important as obscuring the breach and ensuring the SA14s are ineffective in this situation.

An alternative approach for improving the integration of maneuver and fires would include using the generic METL items with more descriptive battle tasks. This technique would preserve the current METLs while linking the essential tasks performed at the battalion and battery levels with the essential tasks performed by the brigade.

There are two disadvantages with this approach. First, the hierarchical relationship among the tasks is inconsistent. For example, the battalion's "Provide timely and accurate fires" is too generic to serve as an effective subordinate battle task for the brigade's task of "Attack." Likewise, "Disrupt enemy air defenses," while contributing to the desired end state, doctrinally would not be considered a subordinate battle task of "Provide timely and accurate fires."

Second, the relationship between essential tasks, the mission statement and the METL would be lost. Experience tells us other specific tasks are more important to brigade success than "Provide timely and accurate fires." If we believe FM 25-100's concepts remain relevant, those tasks should be in the METL and our mission statements.

The METL's current focus also impacts on home station training. Generic METL tasks such as "Acquire targets" and "Provide timely and accurate fires" do not orient trainers on the strict battle tracking, application of restrictive rules of engagement (ROE), predictive targeting and countermortar battle drills necessary to safely destroy fleeting enemy mortars in military operations other than war. A task like "Disrupt enemy mortars and direct support artillery" could help by focusing us on the mortars instead of basic skills.

"Disrupt enemy direct fire weapons" is a second example of an essential task that could guide training better than our seven core competencies. Careful integration of available indirect fires and maneuver is critical to limit enemy response to the attack as our soldiers cross the last few hundred meters to the objective. Light artillery commanders train their fire support teams (FISTs) and batteries to plan and execute echelonment of fires in conjunction with infantry mortars and other means of indirect fires. Unfortunately, the current METL tasks of "Provide fire support" and "Provide timely and accurate fires" don't drive the requirement to provide closely controlled suppression fires. We could provide tighter linkage for training by starting with the task "Disrupt enemy air defense and direct fire weapons." We would then link it through battle tasks and new artillery collective tasks to MTP tasks like "Plan fires in support of maneuver operations," "Conduct fire missions," "Supervise FA operations," and "Perform risk management."[13]

The material in the training and evaluation outlines is current. For example, the outline for "Plan fires in support of maneuver operations" directs the FIST chief to identify *essential* tasks.[14] However, FA commanders need to develop the links between generally accepted essential tasks and the collective tasks in the training and evaluation outlines.

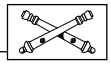
The bottom line is the current approach to the METL focuses artillery commanders on the basic artillery tasks rather than the tactics and techniques required to support their maneuver task forces and combat teams. Without linkages between essential tasks and the collective tasks contained in the MTP,

- Obscure enemy observation of friendly maneuver.
- Disrupt enemy air defense and direct fire weapons.
- Destroy dismounted enemy formations and other targets.
- Disrupt enemy forces and react to contact.
- Distrupt enemy mortars and direct support artillery.
- Protect artillery firing capability.
- Sustain the artillery force.
- Deploy the artillery force.

Figure 3: Potential Light Artillery Battalion METL. A light direct support (DS) FA battalion commander selects a set of essential fire support tasks (EFSTs) and essential FA tasks (EFATs) to form the basis of his METL. This links his METL to expected operations and the way his unit trains and fights.

our focus can cause us to over emphasize the basic techniques required to attack targets. For example, we can become too concerned with the procedures involved in firing large irregular shaped targets and coordinated illumination or the time standards for a time-on-target mission at the expense of identifying how our maneuver units will fight and determining how to support them.

It has been 10 years since the Army fielded FM 25-100. It's time to reexamine the process of developing our METLs. We must continue to train the core competencies, but it's time to base METLs and mission statements on the our contingency plans and the tasks we perform as part of the combined arms team.



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Notes:

1. *Field Manual 25-100 Training the Force* (Washington, DC: Headquarters, Department of the Army, 15 November 1988), 2-1 through 2-9.
2. Ibid., Figure 2-7 on 2-8. The example gives generic tasks for each supporting battlefield operating system (BOS).
3. *Army Training and Evaluation Program (ARTEP) 6-115-Mission Training Plan (MTP) for Field Artillery Cannon Battalion Command and Staff Section and Headquarters Battery, Headquarters and Service Battery, or Service Battery* (Washington, DC: Headquarters, Department of the Army, 23 November 1990), 1-7; and *FM 6-20-1 Tactics Techniques and Procedures for the Field Artillery Cannon Battalion* (Washington, DC: Headquarters, Department of the Army, 29 November 1990), 1-1.
4. ARTEP 6-115-MTP, 1-5.
5. Ibid., Chapters 2, 3 and 5.
6. FM 25-100, 2-4.
7. *National Training Center Newsletter 95-6, Fighting with Fires* (Fort Irwin, California: National Training Center, May 1995), 3-6. The concept originated prior to 1995. The newsletter's description of the critical FA tasks outlines the process of developing critical fire support tasks and subordinate FA tasks.
8. Telephone interview with Major Robert Morschauser, former National Training Center observer/controller, who was at a fire support conference involving Combat Training Center representatives who agreed to the change from "critical" to "essential" tasks; and "White Paper: Fire Support Planning for the Brigade and Below" (Final Draft), Fire Support Division, Fire Support and Combined Arms Operations Department, US Army Field Artillery School, Fort Sill, Oklahoma, 16 September 1998, 7-9 and 20.
9. *FM 101-5 Staff Organization and Operations* (Washington, DC: Headquarters, Department of the Army, 31 May 1997), 5-7 and 5-8.
10. *National Training Center Newsletter 95-6,* 3-6.
11. *Army Training and Evaluation Program (ARTEP) 6-115-Mission Training Plan (MTP) for Field Artillery Cannon Battalion Command and Staff Section and Headquarters Battery, Headquarters and Service Battery, or Service Battery (Draft)* (Washington, DC: Department of the Army, 12 November 1997), 1-3.
12. Memorandum, US Army Field Artillery School, Fort Sill, Oklahoma, ATTN: ATSF-A, Subject: "NTC Perceptions," dated 24 December 1997, 2.
13. ARTEP 6-115-MTP (Draft), 2-2 through 2-6.
14. Ibid., 5-49.

1999 Senior Fire Support Conference Update

The theme of the 12-16 April Senior Fire Support Conference, Fort Sill, Oklahoma, is "Fires!.. Full Spectrum Effects for 21st Century Warfighting." The conference will focus on fires for light and medium forces, Active Component (AC) and Reserve Component (RC)- *One Army, One Field Artillery.*

The April conference consists of two distinct events. The first two days, 12-13 April, are for division artillery and Field Artillery brigade commanders and their command sergeants major. The two days provide the opportunity for greater in-depth discussion and feedback. To the usual personnel briefings and Field Artillery School director's updates, we've added panel discussions, selected briefings by commanders on the challenges of preparing and executing Battle Command Training Program Warfighter exercises and a special session with the Chief of Field Artillery. These additions resulted from feedback from AC and RC commanders requesting more time to discuss specific FA unit issues and concerns.

The second part of the conference follows the more traditional conference agenda. The Field Artillery General Officers' Session is scheduled for Tuesday 13 April while the main conference begins Wednesday 14 April and continues through noon on Friday 16 April. Each of the three days of the main conference has a focus central to the theme. On Wednesday, the focus is *Joint* with speakers scheduled from our sister services and the discussion centering on integrating fires among air, sea and land platforms to achieve the desired effects. Focusing on the *Future* on Thursday, discussions will identify the resources we need now to secure the most effective fires for the future, capitalizing on our AC and Army National Guard modernization efforts already in progress. Finally, Friday's theme is *Light Warfighting* and the concept that dominant fires are essential to light force lethality and survivability. As with previous Senior Fire Support Conferences, several socials are planned for the evenings.

The 1999 Senior Fire Support Conference promises to be an extremely informative and rewarding event. Invitations for the conference will be mailed in early January. Please note the conference Email address has changed from the address listed in the last *Field Artillery*. The address is now SFSC99@doimex1.sill.army.mil. Email this address to respond to your invitation or with any questions you may have. Also, the Fort Sill Home Page has additional information and updates on the 1999 Senior Fire Support Conference. The web site is http://sill-www.army.mil/index.htm.

Fires for Future Amphibious Operations: OMFTS

by Major Kevin C. Rogers, USMC

A new concept in amphibious operations is developing within the Marine Corps, called operational maneuver from the sea (OMFTS). This concept significantly changes how we historically have conducted amphibious operations, dictating a new way of doing business for the Navy-Marine Corps team.

OMFTS calls for the majority of the amphibious force to remain seabased with the rest maximizing speed, shock and firepower far inland while minimizing the force's footprint and vulnerability. Maintaining the command and control structure, at least initially, and the logistical support at sea, the Naval Task Force is strategically maneuverable.

The intent of OMFTS is to apply combat forces against enemy weaknesses while limiting friendly exposure to enemy attack. The concept envisions extending ground operations up to 200 miles inland and, as an option, bypassing an assault across a defended beach. (See the figure on Page 26.)

OMFTS dictates naval shipping will remain 20 to 25 miles off shore. Due to these increased distances, changes in ground-based and naval surface fires are essential. The need for longer range and greater precision resulting in increased lethality are the driving forces behind these changes.

An additional challenge for ground-based fire support is in the area of logistics. Technology must reduce the assets required to employ and sustain ground-based fire support platforms.

To implement OMFTS, equipment challenges exist across every aspect of amphibious operations. Weapons platforms, digital communications, ammunition, command and control systems, and transportation all require more advanced technologies with greater capabilities than currently in the inventory.

This new warfighting philosophy is grounded in white papers by the Marine Corps Combat Development Command (MCCDC): "From the Sea," "Forward From the Sea" and "Ship to Objective Maneuver (STOM)" written from 1992 to 1997. Copies of these white papers can be obtained from the Concepts Division of MCCDC at Quantico, Virginia. The papers can be accessed through http://www.doctrine.quantico.usmc.mil/atMCCDC.

OMFTS serves as the catalyst for adapting the Marine Corps structure, equipment, and tactics, techniques and procedures (TTP) to conduct an additional form of amphibious operations. This article examines the fires portion of these adaptations and their applicability to OMFTS. One must note that while OMFTS presents a tremendous capability, implementing the concept will not come without costs.

DD-21 Land Attack Destroyer and Naval Surface Fire Support. The Navy and Marine Corps are looking to the future and experimenting with capabilities to satisfy the requirements of OMFTS. The Navy has undertaken several initiatives to increase their capabilities in the littoral environment. On 3 December 1996, Headquarters United States Marine Corps forwarded a letter to the Department of the Navy titled, "Naval Surface Fire Support for OMFTS," which outlines the Marine Corps' requirements for Naval Surface Fire Support (NSFS). The Navy has responded by developing a program to meet the Marine Corps needs.

The ultimate objective is the construction of 32 DD-21 Land Attack Destroyers. The DD-21 will be the first ship in the Surface Combatant 21st Century (SC-21) family of ships. The mission is "to provide an advanced level of land attack in support of the ground campaign and contribute to Naval, Joint and Combined battlespace dominance in littoral operations."

DD-21 will have a mix of guns: a 5"/62 and (or) the 155-mm advanced gun system (AGS) and the land attack standard missile (LASM). The ship also will incorporate an over-the-horizon counterfire detection capability and, potentially, a vertical take-off and landing unmanned aerial vehicle (VTOL UAV). The naval fire control system (NFCS) will tie all these systems together. Currently, 32 ships are scheduled to be fielded, beginning in FY09.

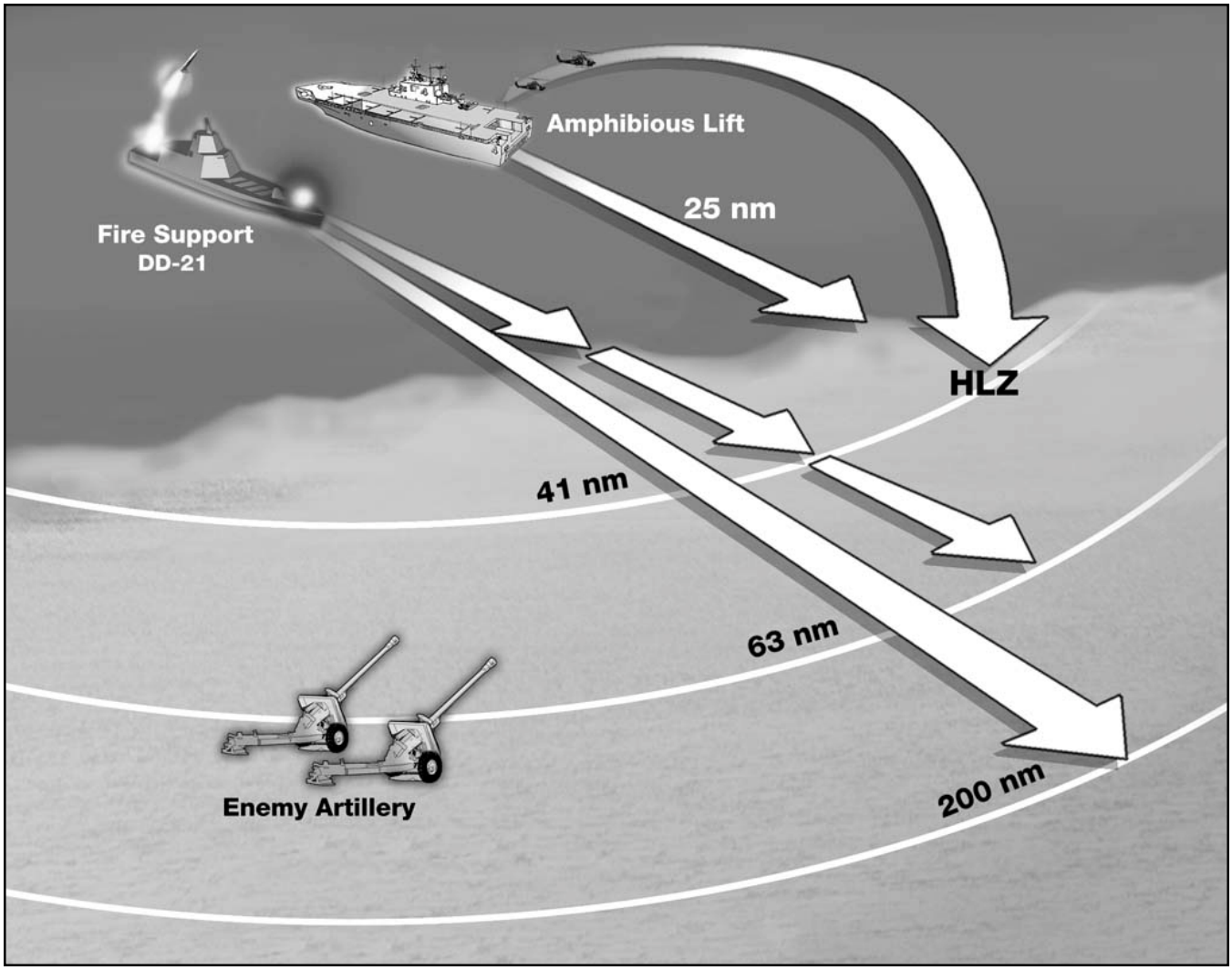
Until DD-21 comes on line, the following systems will be retrofitted to ships already in the operational fleet: *5"/62 Mark 45 Gun.* To achieve the ranges necessary for OMFTS, the Navy is upgrading its 5"/54 guns. The Mark 45 will use a new 62-caliber barrel and have a new breech, data communications interface, and gun barrel housing/recoil/counter recoil to double the ballistic range. It will be able to fire all standard 5" ammunition and the extended-range guided munitions (ERGM) at a rate of 10 rounds per minute. The first ships are schedule to receive the new gun in FY00.

Extended-Range Guided Munition (ERGM). ERGM is a rocket-assisted 5" projectile with a range of 41 to 63 nautical miles (76 to 116 kilometers) that primarily will be employed for precision missions. It will carry a payload of 72 XM-80 dual-purpose improved conventional munition (DPICM) bomblets and will be guided by a global positioning system (GPS)/inertial navigation system (INS) for increased accuracy. This is a fully funded program with fielding anticipated in FY01.

Advanced Gun System (AGS). This is a funded research, development, testing and evaluation (RDT&E) effort that focuses on developing a gun to provide volume fires for close-in fire support at ranges out to 100 nautical miles (185 kilometers). This system is being developed specifically for DD-21.

AGS is anticipated to be fully automated and capable of firing the full suite of 155-mm ammunition. Fielding is projected for FY09.

Land Attack Standard Missile (LASM). This is the Navy's near- to mid-term choice for a supersonic land attack missile. It consists of a Mark 125 blast-fragmentary warhead, GPS/INS guidance system and will have a range of 110 to 150 nautical miles (203 to 277



Operational Maneuver from the Sea (OMFTS) Scenario. Assault and fire support ships remain 25 nautical miles (nm) (46 kilometers) off shore and conduct operations over the beach to the helicopter landing zone (HLZ) and beyond-up to 200 nm (370 kilometers) from the ships.

kilometers). It is a retrofit of the standard missile Block II/III and can be fired from any platform with a Mark 41 vertical launch system (DDG-51, CG-47 or DD-21). LASM is a fully funded program with fielding projected for FY02.

Naval Fire Control System (NFCS). NFCS will be the Navy's fire support and planning control system. It will automate shipboard fire support planning, coordination, deconfliction and management in the supporting arms coordination center (SACC) of amphibious and command ships. NFCS will be fully interoperable with the Marine Corps and Army's advanced Field Artillery tactical data system (AFATDS). Fielding currently is scheduled for FY03.

USMC Ground-Based Fire Support. The OMFTS fire support philosophy is predicated on a three-pronged approach incorporating air, naval surface fires and ground-based fires to attack the enemy. To satisfy the challenges of fire support in maneuver warfare, combined arms and OMFTS in a maritime environment, the Marine Corps has initiated several ground-based fire support programs. These programs will complement air and naval surface fires for OMFTS.

Field Artillerymen are taught from the first days of fire support training at the Field Artillery School, Fort Sill, Oklahoma, that the artillery is comprised of three components: eyes (target acquisition), brains (technical and tactical fire direction) and muscle (weapons platforms).

Target Location Designation Handoff System (TLDHS). TLDHS, the "eyes" of the fire support system, will provide forward observers (FOs), forward air controllers (FACs) and naval gunfire spot teams the ability to accurately locate and designate targets and digitally transmit a call-for-fire or a request for close air support (CAS). It incorporates a modular design using an eye-safe laser rangefinder, thermal imaging system, GPS and a lightweight laser designator to acquire targets out to seven kilometers during the day and three kilometers at night. Observers will be able to designate targets to five kilometers in the day and two kilometers at night.

Digital hand-off will be accomplished using the rugged hand-held computer (RHC). The RHC will have a Pentium processor, passive touch screen display and an internal GPS. The required total weight of the system is 43 pounds with the system designed to be two-man portable. The Marine Corps is scheduled to purchase 442 systems with fielding to begin during the 2d quarter of FY02.

Advanced Field Artillery Tactical Data System (AFATDS). The "brains" of the

fire support system for the tactical side of OMFTS will be AFATDS. It is a distributed architecture computer network that provides command and control functions for artillery, mortars, naval gunfire and Marine Corps, Navy, Air Force and Army attack aviation.

AFATDS uses the results of target value analysis to establish target priorities to plan and execute fires appropriately. It evaluates and prioritizes targets then selects the best available system and munition to engage the target. It ties in target acquisition and sensor assets to provide targeting information and target damage assessment data. The tentative Marine Corps hardware platform will be the Codar compact computer unit AXI that weighs less than 50 pounds. It will have a Pentium II processor and be mountable in a C-7 amphibious assault vehicle.

What will AFATDS mean to the fire support coordinator (FSCOORD)/artillery battalion commander? It will reduce the time it takes for him to clear and coordinate fires. It will provide greater situational awareness and enhance information processing, resulting in more effective decision making on the battlefield. After the procurement decision in March 1999, the Marine Corps will field AFATDS during the Fourth Quarter of FY99 with version A98. The Marines Corps' planned updates to the AFATDS software versions will parallel those of the Army.

LW 155 (XM777). The "muscle" of the artillery is made up of a weapons platform and its ammunition suite. The artillery platform currently envisioned for the Marine Corps is the lightweight 155-mm howitzer (LW-155) or XM777 howitzer. It's a synergistic system building on the towed howitzer, its preplanned product improvements (P^3I) and its prime mover, the medium tactical vehicle replacement (MTVR). Weighing 9,000 pounds, the howitzer will emplace in three minutes or less, displace in two minutes or less, fire five to eight rounds per minute and fire an out-of-traverse mission in three minutes or less.

The XM777 is an expeditionary weapon in that it has a 25 percent smaller footprint and is 7,000 pounds lighter than the current 155-mm M198 howitzer. It can be transported ship-to-shore by the MV-22, CH-53E, CH-53D, landing craft air cushion (LCAC) and a variety of other amphibious craft.

The P^3I, consisting of a digital fire control system and other automation enhancements, will revolutionize artillery tactics and doctrine. The digital fire control will incorporate a technical firing solution, position location, altitude, directional control, muzzle velocity management and digital communications on each howitzer. A new direct fire sight provides an 85 percent probability of a first-round hit at 1,500 meters on a stationary standard NATO-sized target.

The MTVR will provide significantly greater system speed and mobility. With its increased ammunition haul capacity, this new prime mover will reduce the logistical burden. The MTVR will be fielded in FY02 followed by the XM777 FY03 and the P^3I in FY04.

Ammunition Suite. The second part of the weapons platform consists of ammunition. The Marine Corps is closely tracking the Army in the development of several ammunition programs. The Marine Corps has a valid mission needs statement (MNS) titled, "Family of Artillery Munitions." This MNS is broad-based, covering propellants, projectiles and fuzes. Two of the projectiles that fall under this MNS include the sense and destroy armor munition (SADARM) and the XM982 smart munition. Both of these programs will aid ground-based fire support for OMFTS by significantly increasing artillery lethality and reducing the logistics footprint associated with artillery fire support.

SADARM, a smart munition, will provide enhanced fire/counterfire support against stationary armored vehicles out to a range of 22.5 kilometers when fired from the XM777. It will have two submunitions per round. Each submunition will have four sensors to locate the target and then trigger the firing of an explosively formed penetrator to kill the target.

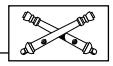
The Marine Corps strategy is not to purchase first-generation SADARM rounds, opting instead to buy the product improved (PI) round that will offer a larger search footprint. SADARM is scheduled for Army fielding in FY00 with the PI version to follow in FY03.

The XM982 will be a 155-mm extended-range artillery projectile with a modularly configured, fin-stabilized glide airframe using GPS/INS guidance. It will combine the capabilities of a missile with the durability of artillery and is the newest generation of extended-range smart munitions.

The XM982 provides the maneuver force with improved fire support through greater range and an accurate first-round fire-for-effect capability. It will extend the DPICM/SADARM maximum range of the XM777 from 28 kilometers to at least 37 kilometers. The modular design allows for a variety of payloads, such as the DPICM, SADARM or a unitary warhead penetrator. The DPICM projectile variant is scheduled for fielding in FY05, the SADARM variant in FY07 and the unitary warhead variant in FY08.

The systems and programs highlighted in this article are by no means a complete list of fire support initiatives being considered to assist the Navy-Marine Corps team fulfill the requirements for OMFTS. But these programs do provide insight as to what naval forces may have available to address the broad spectrum of conflict anticipated during the early 21st century.

The Navy is well "underway" in answering the needs the Marine Corps delineated in "Naval Surface Fire Support for OMFTS." The Marine Corps' new ground-based fire support programs serve to better enhance deployability, mobility, sustainability, survivability and lethality. With the improvements in landing force mobility provided by the MV-22 (Osprey vertical landing/take-off aircraft) and the advanced amphibious assault vehicle (AAAV), our expeditionary fire support systems will enable the next generation of Marines to get to the fight faster with more punch and achieve the advantages envisioned in OMFTS.



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Rakkasan's COLT Sergeant Tim Andrews—
Hero of the JRTC

by Major G. Richard Wise and First Lieutenant Hans-Jorg W. Dochtermann

Every year, artillery battalions deploy to the Joint Readiness Training Center (JRTC), Fort Polk, Louisiana, to execute their missions with the efficiency and professionalism that are the trademarks of the Field Artillery and then re-deploy back to their permanent duty stations. Ask Redlegs who have experienced the JRTC, and they will spin war stories of lost advanced parties, missed link-ups, logistical foul ups and problems with coordination and execution of the fire plan. They will ponder the difficulties created by the "friction of war," and having learned from their mistakes, anticipate going back to take their revenge on the JRTC's opposing force (OPFOR). Once in a while, a story is told in which everything did not go wrong. The plan was executed, the commander's intent achieved and the enemy was defeated. Sometimes the lessons learned were from success, not failure. And at the point of that success is the soldier and, perhaps, even a hero of the battlefield.

If returning home the victor from the JRTC has proven to be the exception, then the *Red Knights*, 3d Battalion, 320th Field Artillery (3-320 FA) in direct support to the 3d Brigade *Rakkasans* of the 101st Airborne Division (Air Assault) out of Fort Campbell, Kentucky, had an exceptional JRTC rotation in April 1998. While in the defense, 3-320 FA was able to destroy several large elements of the OPFOR's armored offensive, pounding them under massed FA fires, naval surface fire, attack aviation and close air support (CAS), resulting in a resounding victory.

When questioned, the leadership and observer/controllers (O/Cs) attributed the unit's success to a simple plan and the actions of one well-trained combat observation lasing team (COLT) and the chief of that team, Sergeant Timothy T. Andrews. What could one COLT have done so decisively, so well that its actions decimated an enemy armored task force? Simply put, its job.

L to R: PFC Faison, SGT Andrews and PV2 Hop, COLT 3

COLT 3, Sergeant Andrews and his crew of Private First Class Terrille Faision and Private Second Class Matthew Hop, executed the fire plan and the commander's intent so well that their position at Dugout 7 proved to be the decisive point on the battlefield. While it's true that Sergeant Andrew's quick thinking and initiative were two key factors in determining the outcome of the battle, paramount to the success of 3-320 FA was the adherence to the fire plan and training to doctrine. Specifically, the fire plan ensured that obstacles would be covered with fires, and observer teams would be employed to overwatch them—sticking closely to the guidelines for defensive fire planning laid out in *FM 6-20-50 Tactics, Techniques and Procedures (TTP) for Fire Support for Brigade Operations (Light)*. Target groups were established and adjusted-in for each obstacle, thereby facilitating the massing of fires to slow the enemy's rapid advance. An area denial artillery munitions (ADAM)/remote anti-armor mine system (RAAMS) minefield was planned to reinforce the obstacle at Dugout 7, triggered by enemy armor moving south of a designated phase line or by time, based on the enemy's doctrinal timeline.

Sergeant Andrews' success began with the top-down fire planning. The brigade fire support coordinator (FSCOORD) gave his guidance in support of the brigade commander's intent to establish a defense in depth and to emplace obstacles at critical points in the brigade's sector. The three COLTs were kept under brigade control and assigned to cover the three key obstacles supporting the brigade plan. COLT 3 was to cover Dugout 7, the key chokepoint in the western sector.

The brigade fire support officer (FSO) and the brigade engineer determined that Dugout 7 was also the best place to employ the one 400 x 400 ADAM/RAAMS minefield allocated. COLT 3 was given the mission to: (1) Use its precision lightweight global positioning system receiver (PLGR) to determine the exact location of the obstacles, ensuring accurate covering fires; (2) Adjust-in the ADAM/RAAMS minefield with dual-purpose improved conventional munitions (DPICM); (3) Adjust-in a three-target group, codeword "Cowboy," to quickly mass fires; and (4)

Select a position to observe the obstacle, minefield and target group. Finally, all aspects of fire support were incorporated into the brigade plan, including mortars, artillery, naval surface fire support, attack aviation and CAS, each having a role in defeating the OPFOR.

The bottom-up refinement process proved to be the key to COLT 3's execution of the plan. Sergeant Andrews knew his team was responsible for refining the plan, based on the conditions it encountered while emplacing and preparing for battle. He began by coordinating in sector with the engineers to PLGR-in the exact grid for the obstacle he was to cover. He established a target for that grid, providing an accurate location to mass mortars and FA fires.

Sergeant Andrews next began the process of determining the best place for the minefield and then adjusting it in. This and adjusting fires on target group Cowboy proved very difficult to execute. The preparation of the defense caused many friendly elements to be moving about the battlefield. Company and platoon elements were conducting reconnaissance and repositioning their defenses to use the terrain to best advantage. This caused several attempts by COLT 3 to adjust-in fires to be cancelled, as clearing fires was difficult with so many elements moving about, risking fratricide.

Efforts to refine the targets literally took hours with constant prodding from the brigade and battalion FSOs to push the process. The friction of war was present everywhere, making simple things difficult. It is to Sergeant Andrews' credit that he doggedly stayed with his mission, finally getting his targets adjusted and preparing his observation post (OP), even as the OPFOR's lead recon elements began to come into sector.

Heroes often display an innate quality known as initiative. Besides choosing an OP so well camouflaged that the OPFORs recon could not locate it, Sergeant Andrews facilitated his own defense. While coordinating with the engineers, he asked for and received six anti-armor mines. He anchored the approach to his flank that the OPFOR would take if they attempted to bypass the minefield with his own anti-armor effort. This initiative was to pay big dividends for COLT 3.

As the OPFOR moved his recon effort into the brigade sector, his dismounted elements passed through Dugout 7, reported the obstacle and continued on. That same element was destroyed by indirect fires while attempting to reduce the next obstacle, proof of the effects of adjusted fires covering obstacles. More importantly, the enemy recon team was then unable to report that an ADAM/RAAMS minefield had just been fired in behind them at Dugout 7. The minefield, triggered by time, was fired early to ensure that it was in place before the armor and mechanized elements of the OPFOR could roll unimpeded through the defense.

As the OPFOR attack progressed, COLT 3 first marked the presence of the OPFOR's advance by announcing "Fire Cowboy!" beginning a rain of indirect fires onto an enemy who was surprised to have encountered a minefield at Dugout 7. Reacting quickly, Sergeant Andrews apprised his command element of the situation, reporting as many as 10 T-62 tanks were being delayed by the ADAM/RAAMS minefield. The numbers of vehicles involved soon showed that the main effort had come west into the brigade sector, and that COLT 3 was positioned perfectly to maintain massed fires as the OPFOR attempted to push disabled vehicles through the minefield in order to breach it.

As Andrews kept adjusting and repeating "Cowboy," the FSCOORD and brigade FSO in the brigade tactical command post (TAC) were coordinating through the air naval gunfire liaison company (ANGLICO) for naval surface fires, CAS in the form of A-10 Thunderbolts through the brigade air liaison officer (ALO), and AH-64 Apache attack helicopters to destroy the armor and mechanized elements in the vicinity of Dugout 7.

Sergeant Andrews was busy too, keeping his team hidden as enemy armor moved in close and keeping up a relentless mass of fires on the enemy's vehicles still searching for a way around the minefield and obstacle bottling them up. The enemy's last T-62 was stopped in the minefield...the one Sergeant Andrews put in to protect the flank of his OP.

When the mission ended, the area around Dugout 7 was lit by the flashing lights of the OPFOR's "killed" vehicles and a hero of the battlefield was hailed. COLT 3 played the key role in destroying 14 of 19 T-62 tanks and 10 of 17 BMPs with more than 100 "casualties" assessed to an OPFOR unaccustomed to defeat on the JRTC battlefield.

The lessons learned by the *Red Knights* are nothing new. The battalion's success in the defense was because of the application of the TTP outlined doctrinally in *FM 6-20-20 TTP for Fire Support at Battalion Task Force and Below* and FM 6-20-50. While there's no doubt that Sergeant Andrew's tactical competence and quick thinking were critical to the outcome of the battle that day, any COLT or forward observation (FO) team that knows its job and takes the initiative can become the hero on its battlefield.

Some will say that luck played a role in Sergeant Andrews' success at the JRTC. Perhaps. However, luck is where preparation meets opportunity. Sergeant Timothy Andrews and COLT 3 are heroes of the battlefield at the JRTC because they were prepared to execute their mission.

When the command environment fosters the aggressiveness and initiative of junior leaders during training, COLT and FO teams become more responsive, providing feedback that allows the FSCOORD at the brigade and higher levels to make realistic, effective fire plans that are refined and executed violently by the FO. And, when it all comes together, it's the stuff from which heroes are made. Just ask Sergeant Andrews and COLT 3.

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Leader Checks on the Gun Line:

Teaching New Dogs Old Tricks

by Captain Michael J. Forsyth and Sergeants First Class Jeffrey M. Hoppert and Kevin B. Loveland

First Platoon, Alpha Battery, part of a 155-mm towed howitzer battalion, is deployed to Cortina for combat operations. At 0715, the platoon receives a fire mission and a fire order is sent to the gun line: "Platoon, one round, shell HE [high explosive], charge six white bag, fuze quick, deflection 3386, quadrant 361." The platoon fires the mission.

Forty-five seconds later, the fire direction center (FDC) receives a frantic call over the net—"Checkfire!" Two rounds had fallen short; one round unobserved had wounded three friendly soldiers.

What happened? An investigation-conducted in accordance with AR 15-6 Procedures for Investigating Officers and Boards of Officers revealed that the First Platoon failed to follow proper procedures at the guns. First, one gun section did not have its spade key retainer pins locked in place, resulting in one short round when the pins slipped. Second, one gun was 250 mils off the azimuth of fire because the gunner recorded the wrong data for his aiming references on the gunner's reference card after the gun was laid. Finally, one gun fired quadrant 316, resulting in one short round. All the problems were systemic—were functions of leaders failing to check and verify soldier actions on the line of metal before and during firing.

"Safety and verification of tasks by leaders are disciplines that exist in the Field Artillery, regardless of whether operations are performed in combat or in peacetime. For every task that is performed, there is another person in a leadership position (section chief, platoon sergeant, platoon leader or executive officer, fire direction officer [FDO], or battery commander) who verifies the accuracy of the action performed....**performing independent checks is a continuous process and must be rigidly enforced to ensure fires are timely, accurate and safe**" (Paragraph 4-25, *FM 6-50 Tactics, Techniques and Procedures for the Field Artillery Cannon Battery*; bold type quoted from the field manual).

This article reiterates the importance of leaders habitually checking the line of metal. At the Joint Readiness Training Center (JRTC), Fort Polk, Louisiana, we're witnessing the disturbing trend of firing batteries failing to perform independent checks. Unit leaders become so engrossed with other tasks, such as force protection, that they are forgetting the most important part of their job: ensuring the guns use sound gunnery procedures.

The leaders' challenge is to manage the unit timeline, incorporating their independent verification into the priorities of work. This article offers an example timeline and leaders' checklist and simple techniques to assist battery leaders—The Big Three on the Line of Metal: platoon leader/executive officer, gunnery sergeant and chief of smoke—to do their jobs.

The Challenge: Juggling the Tasks. There are a lot of tasks a battery must accomplish in conjunction with the occupation of a position. These include establishing a firing capability, force protection (with or without engineers), and facilitating 6400-mil operations. Accomplishing these functions can take hours, and the battery leadership must establish realistic priorities of work to ensure they can be completed.

Priorities of work may be standardized in unit standing operating procedures (SOP). If the unit doesn't have an SOP stating the priorities of work, the leaders should establish the priority as a part of the battery operations order. Each task should have a target time as to when the leaders expect it to be completed. The times are "targets" the leaders can slip when the situation dictates.

Once battery leaders establish the timeline to accomplish the work, the leaders must then enforce the execution of their priorities. Leaders must follow-up on their guidance.

For example, if the platoon leader gave guidance to establish a 6400-mil firing capability and eight hours after occupation, the guns still have only site-to-crest for their primary azimuth, then the platoon failed to perform. Further, the platoon leader failed to ensure they performed in a reasonable amount of time. The platoon Big Three must actively walk the gun line, pushing for all tasks to be accomplished and checking the accuracy of the data.

Systematic Verification: Checking the Line of Metal. To ensure priorities are accomplished, the leaders should incorporate systematic verification checks into the work timeline. These checks begin with occupation of the position and continue throughout field operations. Leaders check for safety, accuracy, and task completion at significant points during the operation. (See Figure 1 "Sample Priority of Work with Leader Checks Incorporated.") This list outlines a method for the Big Three to systematically check their line of metal.

Establish firing capability.

- Lay the howitzer: TLABSPAP—Trails, Lay, Aiming Point (Identified), Boresight (Verified), Safe (Verification of Lay), Pre-Fire Checks Performed and Position Improvement.
- Establish voice communications.
- Prepare minimum of one round.
- Sandbag primary aiming reference.
- Verify the cant.
- Conduct leader checks (see Figure 2 on Page 32).

Begin howitzer position improvement.

- Verify site-to-crest.
- Establish aiming references.
- Measure max elevation.
- Emplace azimuth markers.
- Establish digital communications.
- Prepare ammunition racks.
- Prepare howitzer range card.
- Dig survivability positions.
- Erect camouflage net.
- Dig in communications wire.
- Conduct leader checks (Figure 2).

Establish 6400-mil firing capability.

- Determine site-to-crest.
- Establish terrain gun position corrections (TGPCs) for all octants.
- Establish/verify aiming references for all octants.
- Ensure howitzer can traverse all octant unimpeded.
- Dig trails in for all azimuths.
- Conduct leader checks (see "Double Checking Your Gunner," Page 33).

Protect and segregate ammunition.

- Segregate the ammunition by lots.
- Cover the ammunition with tarps but allow for ventilation.
- Dig ammunition bunker.
- Store ammunition on six inches of dunnage.
- Conduct leader checks.

Harden the position (force protection).

- Emplace crew-served weapons.
- Emplace concertina wire.
- Establish listening/observation posts.
- Identify defensive targets.
- Emplace early warning devices.
- Dig fighting positions with overhead cover.
- Harden key pieces of equipment.
- Leaders draw a sector sketch to verify the defense (check each fighting position). If Engineers are available, designate a NCOIC to ensure all positions are dug to standard and battery/platoon specifications.

Prepare alternate and supplemental positions.

- Designate gun positions.
- Provide survey.
- Record initial data.
- Sketch the sector.
- Conduct leader checks.

Figure 1: Sample Priority of Work with Leader Checks Incorporated. This is but one example of priority of work. Mission, enemy, terrain, troops and time available (METT-T) dictate the priorities in any given situation.

Verify Gun Data. When the battery (or platoon) is laid, safe and in order, leaders move to the guns to verify the data. An old timer's system is to have the executive officer/platoon leader start at one flank checking the guns and the smoke or gunny start checking at the other. They meet in the middle.

Next, the two leaders compare their findings with the leader checklist (Figure 2) to determine what tasks remain or require correction. They allot a reasonable time for correction and then recheck the guns for the deficiencies.

Determine 6400-Mil Firing Capability Established. Leaders check the completion of preparation for 6400 mil firing (see the math steps in "Double Checking Your Gunner's Sights for an Alternate Aiming Reference"). When the guns report to the FDC that they've completed their tasks, the battery leaders employ the same methods, once again, to verify the tasks are completed to standard.

The key to the effectiveness of leader checks is to conduct them habitually for every major task to validate the data.

Conduct Checks for Changes. Battery leaders also conduct checks any time something changes in the position. For example, if the battery or platoon relays on a new azimuth, the leaders walk

Howitzer Checks	1	2	3	4	5	6
1. Firing platform properly emplaced.						
2. Collimator emplaced in accordance with (IAW) the -10 manual with legs sandbagged, bubble level and azimuth recorded accurately on gunner's reference card.						
3. Verify lay of the piece. Refer to aiming circle with howitzer on primary aiming reference. Deflection counter should read 3200 mils. Azimuth properly recorded on gunner's reference card.						
4. Lay of howitzer within tolerance for center of traverse.						
5. Direct fire telescope mounted.						
6. Lay of howitzer checked by safety circle or safe howitzer to within tolerance of +/- 2 mils.						
7. Aiming posts at zero mils displacement. Azimuth properly on gunner's reference card. Emplaced at an azimuth of at least 1600 mils difference from the collimator. Poles equal distance. Far pole 100 meters away, if possible.						
8. Distant aiming point selected and described on gunner's reference card. Azimuth properly recorded.						
9. Fire direction center (FDC) fire order standards, priority targets and position corrections recorded on gunner's reference card.						
10. Boresight verified using alignment device.						
11. Prefire checks performed IAW -10.						
12. Ammunition segregated by lot, fuze, weight and type. Fuze properly mated with projectile. Ammo protected from elements.						
13. Powder thermometer placed in canister and marked.						
14. Powder pit of adequate size dug 20 meters from howitzer.						
15. Range cards properly filled out for howitzer and crew-served weapons.						
16. Camouflage net emplaced and windshields covered on trucks.						
17. Voice and digital communications established with FDC. Wire buried.						
18. Gun display unit (GDU) set up and running off vehicle power. Ring established with FDC.						
19. Section knows location of and route to alternate and supplementary positions.						
20. Preventive maintenance checks and services (PMCS) performed on howitzer IAW -10.						
21. All sensitive items accounted for.						

Figure 2: Howitzer Leader Checks

the line again, using the checklist to verify the validity of the data recorded on the gunner's reference card and set on the pieces.

Establish Leader Presence. The Big Three also establish a presence on the gun line during firing. Too many times, units conduct fire missions without the benefit of a key leader on the line of metal. This sometimes leads to sections' cutting corners on crew drill, resulting in firing incidents.

The presence of one or two members of the Big Three strategically located on the line can, in many instances, shortstop a potential problem. It also puts them in the right place when quick, critical decisions are required. For example, when one gun calls itself out of action due to a sudden maintenance problem, shuffling the out-of-action gun's ammunition can cause confusion and be disruptive. The Big Three leader on the spot can bring this kind of situation under control quickly.

Continue Leader Checks. After a position area is fully established with all priorities of work complete, checks don't stop. The leaders periodically check to ensure the data remains valid.

During extended firebase operations, a good time to verify the data on the gun line and from the FDC is after the firing unit is re-laid daily. Leaders actively supervising their subordinates and ensuring high standards are met prevent complacency on the line of metal.

To ensure their fires are fast, accurate and safe to friendly forces, leaders must check their firing units continuously from the beginning to the end of operations. Catching a mistake and correcting it before rounds go down range saves the firing unit and supported maneuver unit unwanted grief. An established system of leader checks habitually conducted in an uncompromising manner is the key.

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Double Checking Your Gunner's Sight for an Alternate Aiming Reference

Here's a simple way for any section chief, chief of smoke, gunnery sergeant or platoon leader/executive officer to check the gunner when he has changed from his primary to alternate aiming references. These simple math checks are not written in any book, yet many "old dogs" use them to ensure their gunners have used the correct steps when releasing and engaging the 100 series sights. These steps should be used every time the gunner changes his aiming reference before and during live firing.

1. Set the bottom scale on the fire mission deflection as given by the fire direction center (FDC).

2. Determine the difference between the fire mission deflection and the common deflection (3200).

Example

Fire Mission Deflection:	3919
Common Deflection:	-3200
	719 mils

3a. Because the fire mission deflection increased 719 mils from the common deflection, you ADD 719 mils to your aiming post deflection.

Aiming Post Deflection:	1700
Increased Mils:	+719
	2419 mils

3b. Open the azimuth counter cover; it must read 2419 mils. If not, the gunner didn't follow the correct steps on setting the sight.

Example

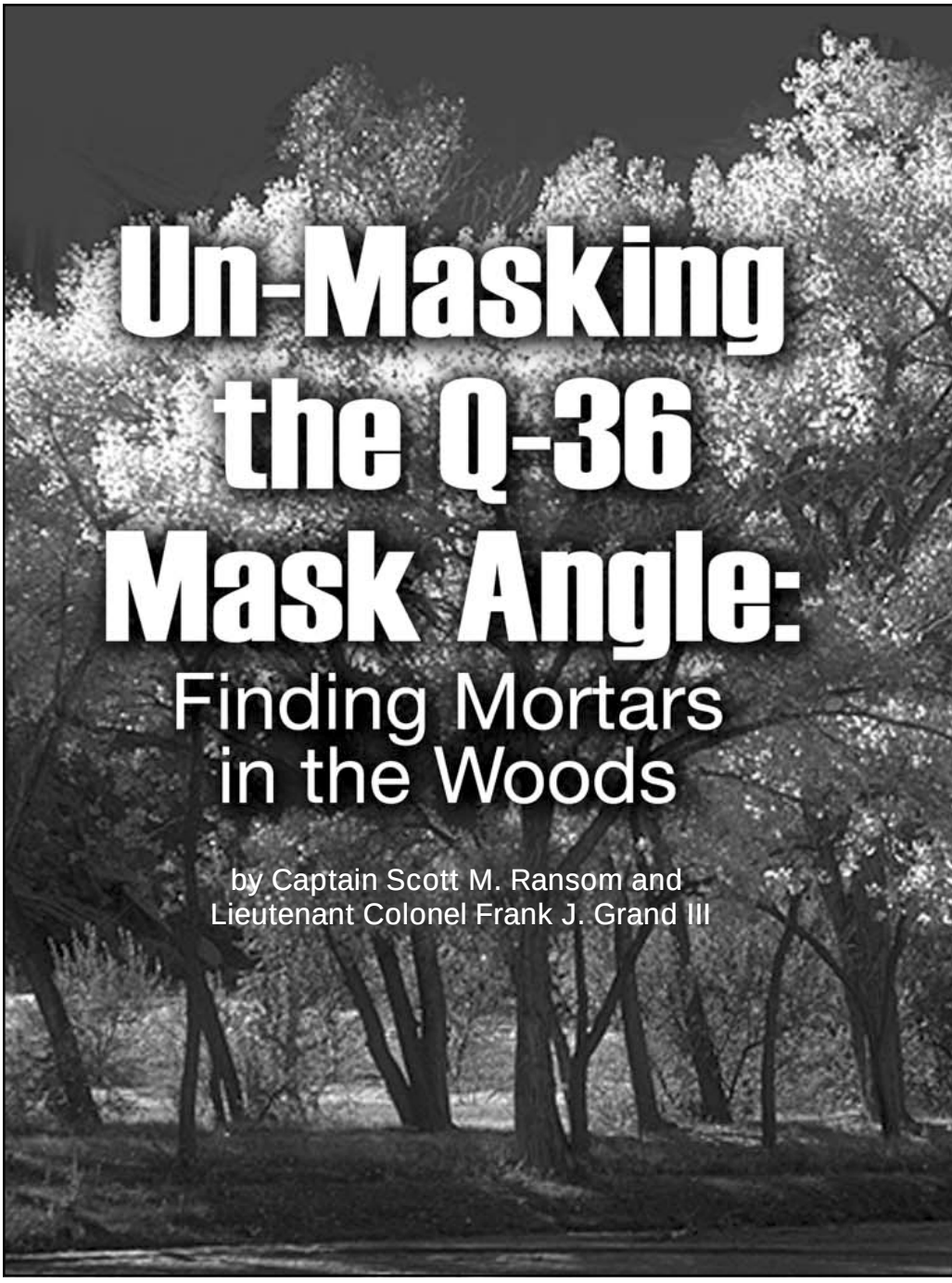
Common Deflection:	3200
Fire Mission Deflection:	-2800
	0400 mils

4a. If the fire mission deflection decreased by 400 mils from the common deflection, you SUBTRACT 400 mils from the aiming post deflection.

Aiming Post Deflection:	1700
Decreased Mils:	-0400
	1300 mils

4b. Open the azimuth counter cover; it must read 1300 mils. If not, the gunner didn't follow the correct steps.

This math process can be used on any aiming reference the gunner has recorded on his gunner's reference card. Just remember that if the fire mission deflection increases from 3200 mils, you add the difference to the alternate aiming reference. If the fire mission deflection decreases from 3200 mils, you subtract the difference from the alternate aiming reference.



Un-Masking the Q-36 Mask Angle:

Finding Mortars in the Woods

by Captain Scott M. Ransom and
Lieutenant Colonel Frank J. Grand III

The Joint Readiness Training Center (JRTC), Fort Polk, Louisiana, has time and again shown the effectiveness of enemy mortars during search and attack operations. The fire support coordinator (FSCOORD) must use the Q-36 Firefinder radar to kill these mortars for his brigade. Careful positioning of the radar in such a heavily wooded environment maximizes its survivability and enhances its ability to acquire mortars. The result is increased force protection for the brigade.

This article discusses how to position the Q-36 radar to increase the probability of detecting the enemy's mortars in wooded terrain.

Positioning. The FSCOORD must position the Q-36 to accomplish the mission. Staff officers' misunderstanding positioning and failing to integrate the radar warrant officer (WO) into the planning process have made this a difficult task.

Also, the Field Artillery community has yet to define the operational requirements of the Q-36 for many of the missions found in light, low-intensity operations, such as the detection of a solitary mortar near the radar. Instead, we have focused on the traditional linear battlefield and the detection of indirect fire weapon systems far beyond the forward line of own troops (FLOT). We have taught radar technicians and FSCOORDs that radar positions must meet certain technical requirements for successful operations, based on this traditional battlefield. In actuality, the radar often can complete its mission in a light, wooded environment without meeting these "linear battlefield" requirements—albeit with somewhat degraded detection probabilities and increased target location errors (TLEs).

During traditional light infantry search and attack operations, the FSCOORD's primary requirement lies in finding 82-mm mortars with a firing range of approximately 3,040 meters. These mortars, usually used in guerrilla-style raids, often lie within seven or eight kilometers of the radar. Dense vegetation, a small area of operations and many other assets competing for terrain reduce the number of doctrinally "perfect" locations for the radar. Using some trigonometry and knowledge of the radar's mission, we can determine actual positioning requirements and usually increase the number of radar sites available.

When a radar technician examines a site to position the radar, he tries to maximize the radar's performance by taking into account various positioning suggestions or requirements found in the Q-36 radar specifications and in *FM 6-121 Field Artillery Target Acquisition*. One suggestion involves trying to keep the radar at least 200 meters away and slightly uphill from the nearest screening object to the radar's front to minimize multi-path errors that decrease the radar's range and accuracy. If we position the radar within 200 meters, these multi-path errors increase, and we must accept degraded radar operations (decreased detection probability and increased TLE).

We must remember, though, that 200 meters is not some magic distance where the radar ceases to work, but is a "default value" assigned to maximize the radar's performance. *FM 6-121* uses this same idea of a "default value" when discussing another positioning suggestion involving minimizing the radar's mask angle.

FM 6-121 defines mask angle as "the vertical angle from the radar to the top of the mask, or screening crest, at a given azimuth." According to the *FM 6-121*, the mask angle should not exceed 30 mils and should optimally equal 22 mils. But the manual doesn't explain why. Mask angles under 30 mils

optimize the performance of the radar out to its maximum range of 24 kilometers. Mask angles near 22 mils allow this optimum performance yet still provide enough screening to help protect the radar from detection and jamming from ground-based enemy electronic intelligence (ELINT) systems.

During operations in heavily wooded areas, though, the radar often must emplace in small clearings. These clearings, while affording a more protected radar, usually cause large but relatively constant mask angles over the full search sector of the radar. According to *FM 6-121*, large mask angles greatly inhibit the effectiveness of the Q-36.

Assuming we orient the radar in the right direction, three other factors impact whether the radar observes an enemy round or not: the range to the observed indirect fire weapon system, the maximum ordinate of the rounds it fires and the amount of time the rounds spend in the radar beam. If the terrain allows a mask angle under 30 mils, these factors will not significantly affect the radar out to its maximum range.

The Q-36 was designed to track and acquire most mortars only between ranges of 750 meters and 12 kilometers. At ranges greater than this, the Q-36 will detect fewer and fewer rounds, and the rounds it does detect will have a much larger TLE. These effects are due primarily to the decreasing signal strength of the returning radar signals. If we have mask angles larger than 30 mils, the radar, while degraded, *may* still observe rounds.

We must analyze the other three factors mentioned to determine how much the mask angle degrades our operations. To do this, we use a modified version of the track volume computation found in appendix H of *FM 6-121*. The track volume computation lets the radar technician determine if the radar can observe artillery rounds if he knows or assumes the Q-36 mask angle, the location of the artillery, the artillery muzzle velocity and the quadrant elevation fired by the artillery. Our version of the calculation applies primarily to mortars and uses slightly different assumptions.

Mortar Detection Calculations. We first assume a range to the indirect fire weapon system and the maximum ordinate it fires based on the mission, enemy, terrain, troops and time available (METT-T). For light operations, we use the maximum range of 3,040 meters for an 82-mm mortar and choose a typical maximum ordinate of 1,000 meters. For the time the round spends in the radar beam, we make a worst-case assumption that applies to almost all indirect fire weapons systems. The Q-36 needs to track a round as it ascends on its trajectory for approximately two to six seconds to accurately determine a weapons' location. The higher the radar tracks the round on its trajectory, the more TLE we'll have.

To make things worse, the Q-36 specifications state that the target round's velocity should be at least 50 meters per second during this full six-second track to separate the round from radar clutter. To achieve a velocity of at least 50 meters per second while inside the beam for six seconds, the round must enter the beam traveling about 100 meters per second vertically (allowing for some horizontal velocity as well). This causes the vertical length of the track to be, at a minimum, approximately 400 meters long.

It's important to remember that the mortar round's significant horizontal component of velocity usually causes the track lengths to be quite a bit longer than this. We use the 400-meter track length as our worst-case scenario.

The one formula we need involves the *tangent* function *tan()*. (See Figure 1.) Trigonometry defines *tangent* as the side opposite to some angle *x* divided by the side adjacent to angle *x* in a right triangle. If we know the lengths of the opposite and adjacent sides, we can determine what value *x* must have, using the *inverse tangent* or *arctangent* function, $tan^{-1}()$, where $x = tan^{-1}(opposite/adjacent)$. Note that all but the simplest calculators will compute these functions.

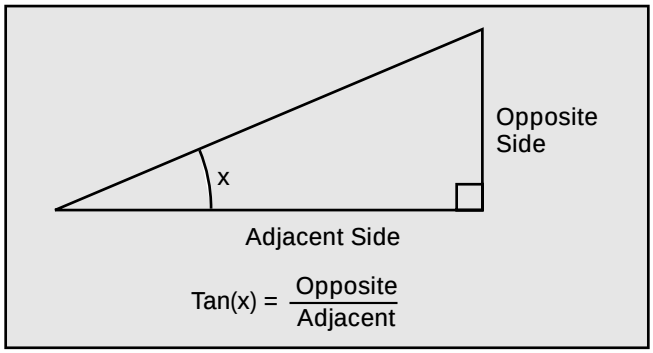


Figure 1: Tangent Function Formula

Now we ask, "What mask angle can we accept and still detect an 82-mm mortar?" As shown in Figure 2, the range to the maximum ordinate of the mortar round, which we assume to be approximately the range to the mortar, represents our *adjacent side* for the formula in Figure 1. Note that for artillery weapon systems that have a much flatter trajectory, we can't assume the maximum ordinate is approximately equal to the range of the weapon.

The maximum ordinate of the round minus the 400 meters the round travels up into the beam, makes our *opposite* side for the formula in Figure 1. This side equals the height of the bottom of the radar beam at the range to the round's maximum ordinate. The radar automatically adds 15 mils to the inputted mask angle and places the bottom of the beam at this angle to ensure it clears all screening crests. The angle of the bottom of the beam represents our angle *x*.

Now, using the *arctangent* function we can determine our acceptable mask angle as 15 mils.

$$\text{Mask Angle} = 17.78 \tan^{-1}\left(\frac{\text{Maximum Ordinate} - 400\text{m}}{\text{Range to Maximum Ordinate}}\right) - 15 \text{ mils}$$

The 17.78 converts from degrees to mils. Substituting values from our example, the allowable mask angle equals 183 mils.

$$\text{Allowable Mask Angle} = 17.78 \tan^{-1}\left(\frac{1000\text{m} - 400\text{m}}{3040\text{m}}\right) - 15 \text{ mils} = 183 \text{ mils}$$

This means we can place the radar anywhere with a mask angle below 183 mils and still detect the mortar out to a range of 3,040 meters.

We might also wonder, "At what range can we detect the mortar if our radar has a certain mask angle?" By inverting the equation for the "Allowable Mask Angle" and remembering that the range to the maximum ordinate approximately equals the range to the mortar, we get the following formula.

$$\text{Range to Maximum Ordinate} = \left(\frac{\text{Maximum Ordinate} - 400\text{m}}{\tan\left(\frac{\text{Mask Angle} + 15 \text{ mils}}{17.78}\right)}\right)$$

For our example, assume our radar technician finds a position with a mask angle of 120 mils. Therefore, we can detect the mortar out to a range of 4,500 meters.

$$\text{Approximate Detectable Range to Mortar} = \left(\frac{1000\text{m} - 400\text{m}}{\tan\left(\frac{120 \text{ mils} + 15 \text{ mils}}{17.78}\right)}\right) = 4500\text{m}$$

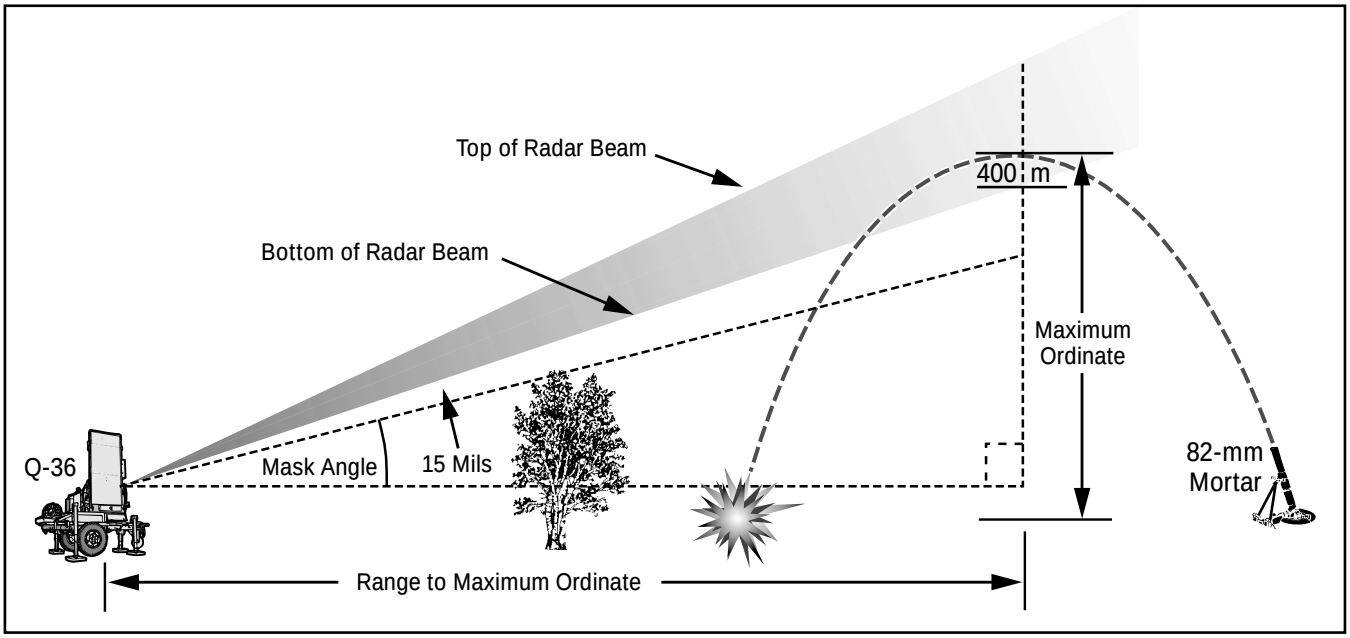
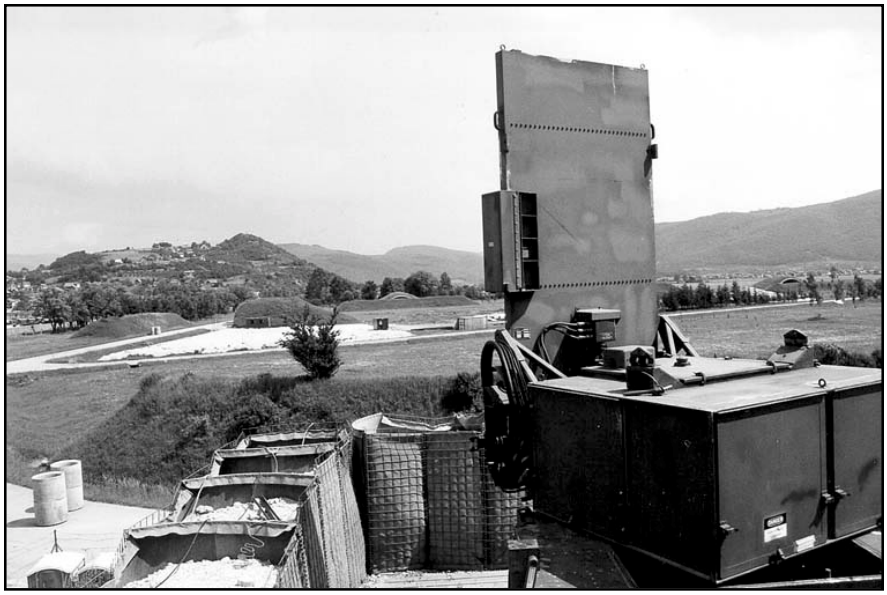


Figure 2: Example Scenario. The 82-mm mortar's maximum range is 3,040 meters, and it was fired at a typical maximum ordinate of 1,000 meters, which results in a 400-meter Q-36 track length.



Q-36 in Bosnia. The formula in this article gives the radar WO positioning options for radar survivability and enhances his probability of detecting mortars.

If we enter this formula into a spreadsheet with various values for the maximum ordinate and mask angles, we get a table showing detection ranges for indirect fire weapons (see Figure 3). The radar technician and the FSCOORD can use this table or one like it to determine the applicability of various radar sites, given the mission of the radar.

The table does *not* eliminate the need for the radar warrant to perform a thorough analysis of his site using either track volume computations from *FM 6-121* or the new Firefinder position analysis system (FFPAS) to begin fielding in mid-1999. FFPAS is a computer program that enables the operator to fully analyze his position based on a terrain database, various threat weapon characteristics and radar operating conditions. It provides a very accurate estimation of the expected detection probabilities and TLEs the radar can expect from each site. But even though the table in Figure 3 is simply a rule-of-thumb and doesn't provide the full accuracy of the FFPAS, it does allow the radar warrant to quickly determine if he can detect enemy mortars from his position. This allows him greater flexibility in positioning his radar and increases his radar's survivability without significantly decreasing its ability to acquire targets.

When we realize that the positioning requirements of the Q-36 depend as much on the mission requirements as they do the technical aspects of the radar, we can increase the survivability and potential of the radar significantly. The radar warrant becomes much less constrained when positioning the radar to accomplish his mission, and he gains access to more survivable positions. Simultaneously, he increases the probability of his radar's detecting mortars and protecting the force.

Mask Angle (Mils)	Max Ordinate (Meters)				
	500	1000	2000	3000	4000
10	4.07	24.00	24.00	24.00	24.00
30	2.26	13.57	24.00	24.00	24.00
50	1.56	9.39	24.00	24.00	24.00
70	1.20	7.17	19.13	24.00	24.00
90	0.97	5.80	15.47	24.00	24.00
110	0.81	4.86	12.97	21.08	24.00
130	0.75	4.19	11.16	18.14	24.00
150	0.75	3.67	9.79	15.91	22.03
170	0.75	3.27	8.71	14.16	19.60
190	0.75	2.94	7.84	12.74	17.65
210	0.75	2.67	7.13	11.58	16.03
230	0.75	2.45	6.52	10.60	14.68
250	0.75	2.25	6.01	9.77	13.52
270	0.75	2.09	5.57	9.05	12.53
290	0.75	1.94	5.18	8.42	11.66
310	0.75	1.82	4.84	7.87	10.90
330	0.75	1.70	4.54	7.38	10.22
350	0.75	1.60	4.27	6.94	9.61

Figure 3: Q-36 Radar Detectability Range of Indirect Fire Weapons (Kilometers). The maximum range of the Q-36 is 24 kilometers; however, the radar reliably can detect 82-mm mortars only between the ranges of 750 and 12 kilometers. The shaded portion of the table indicates ranges outside of the Q-36 specifications for detecting mortars where it is technically possible to detect a mortar but with a greatly increased target location error (TLE) and greatly reduced detection probability. This table is used only as a "rule of thumb." It does not substitute for thorough site analysis using manual (Track Volume) or automated (Firefinder Position Analysis System) methods.

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Operation Desert Thunder and the Force FA Headquarters

by Major Thomas I. Eisiminger, Jr., Lieutenant Colonel James M. Waring and Colonel John A. Yingling

On 23 February 1998, the colors of the 3d Infantry Division (Mechanized) Artillery (Div Arty), Fort Stewart, Georgia, were unfurled in the Kuwaiti Theater of Operations (KTO). This was the first time since 1951 that the Div Arty colors were unfurled in an active theater.

Due to a unique set of circumstances, the Div Arty found itself deployed as the force Field Artillery (FFA) headquarters for the coalition task force (CTF). The CTF was a task force representing several coalition partners and our sister services. This article provides details of the composition and rationale for the formation of the FFA and several lessons learned during Operation Desert Thunder.

The genesis of this deployment was the impasse between the UN chemical and biological inspection teams and Saddam Hussein's Iraqi regime. Saddam Hussein continued to obstruct UN inspection teams in their search for evidence of Iraqi chemical and biological weapons programs. He used these inspections in an attempt to gain international support to lift economic sanctions imposed in the aftermath of the 1991 Gulf War.

Unfortunately for Hussein, he underestimated UN resolve and the result was the deployment of the CTF, including elements of the 3d Division.

Composition and Rationale for FFA. Initial planning indicated that there was a real probability that US Army, USMC, Kuwait and at least one other country would send artillery units to counter the threat posed by Iraq. It was evident that there was a need for a FFA headquarters to coordinate the fires of all coalition artillery units.

The initial command and control structure called for the commander of the 3d Infantry Division to serve as the land component commander. Because the initial troop list also called for the 3d Infantry Division to send a divisional command and control (C^2) element in addition to a brigade combat team (BCT), it naturally fell to the 3d Div Arty to provide the FFA. As the division was to be the largest ground force component, the Div Arty was clearly the best C^2 structure to simplify control of all fire support assets in theater.

Central Command (CENTCOM) at MacDill AFB, Florida, also directed a deep strike capability be included in the CTF. As such, division planners included other units from the Div Arty: A Battery, 13th Field Artillery (Multiple-Launch Rocket Systems, or MLRS), and two Q-37 radar sections from A Battery, 39th Field Artillery, a target acquisition battery (TAB). The FFA then had the capability of acquiring targets and returning deep, accurate, timely fires.

Additionally, one of the division's attack helicopter battalions and its brigade headquarters were included in the deployment. This ensured the CTF commander had deep suppression of enemy air defenses (SEAD) and deep strike capabilities.

Factors that affected the composition of the FFA included the lack of equipment in Army pre-positioned stockage (APS) and the need to maintain a viable Div Arty headquarters at Fort Stewart. The APS in Kuwait did not include any equipment for headquarters elements above the brigade level. This resulted in the Div Arty's having to plan and deploy with all the equipment it needed. This equipment was designated as "to accompany troops" (TAT). Because this TAT would be competing for space on critical strategic air lift assets, planning concentrated on keeping the FFA headquarters as small as possible while still maintaining a deep strike, counterfire and coordination capability.

Only one BCT—including the 1st Battalion, 41st Field Artillery (1-41 FA), its habitual direct support (DS) artillery battalion—was part of the initial troop list, which meant that two-thirds of the Div Arty units would not deploy.

The package developed required only one C-5 and two C-141 aircraft. It consisted of 73 personnel representing the operations and intelligence sections (O&I), target production center (TPC), communications section, meteorological section, survey section and liaison sections. (See Figure 1.) All sections were manned to conduct continuous operations.

Headquarters. The Div Arty commander and his driver comprised the headquarters section. The equipment from the headquarters section consisted of the Div Arty commander's high-mobility multipurpose wheeled vehicle (HMMWV).

The Div Arty commander, as the FFA commander, had to be prepared to control the fires of one US Army Paladin battalion (1-41 FA), a US Army MLRS battery (A/13 FA), two Kuwaiti M109A2 artillery battalions, a Kuwaiti Smerch 9A52 battalion, a USMC M198 battery (R Battery, 5th Battalion, 11th Marines from Los Flores, California), our target acquisition systems and any other coalition artillery assets that might be in the theater.

O&I Section. O&I consisted of 30 soldiers: eight officers, 13 NCOs and nine soldiers. The section was the mainstay of C^2 operations. The Div Arty S3, assistant S3 and operations sergeant major deployed, leaving the Div Arty

training officer and NCO to run the day-to-day operations at Fort Stewart.

The S2, S2 NCO and order of battle analyst deployed with the FFA to provide intelligence support. (A third soldier was left to run day-to-day operations at Fort Stewart.) All members of the fire control element (FCE) deployed with the FFA to control the fires of all coalition partners as the mission dictated. This robust crew also facilitated manning the tactical operations center (TOC) for 24-hour operations.

In addition to the organic Div Arty sections, an engineer liaison officer (LNO) and air defense team with a forward area air defense command, control, communications and information (FAADC^{3}I) device were part of the O&I section. These LNO sections were essential during our Battle Command Training Program (BCTP) Warfighter exercises and proved just as critical on this real-world deployment.

Having the engineer LNO paid big dividends by his ensuring our radar assets were protected with survivability positions. He also assisted in constructing the life support area, to include flooring for tents, latrines and shower facilities. The engineer LNO must be part of any FFA package that deploys.

The air defense team brought its FAADC^{3}I to give the FFA early air defense warning. The FFA was linked to the entire theater air defense early warning network. Again, this team is a critical asset and should be part of any deployment package.

In addition, we took drivers from the Div Arty's headquarters and headquarters battery (HHB) with the specific skills the FFA needed. The drivers doubled as medics, commo soldiers and mechanics, giving the FFA additional support capabilities.

The O&I section deployed with two of the three organic M923 5-ton expando vans. These vans each towed a generator to run the communication systems. The jump TOC's and S3's HMMWVs also were part of the FFA package.

A conscious effort was made to ensure that at least two M-249 squad automatic weapons were deployed with qualified soldiers. This increased what little organic force protection that was available to the FFA.

Target Production Cell. The entire TPC deployed to complete the Div Arty's counterfire system. This section consisted of six soldiers: one officer, three NCOs and two soldiers. We routinely rehearsed and exercised this cell with our two Q-37 and Q-36 radars, including tracking the Russian manufactured 9A52 Smerch rockets fired from the Kuwaiti rocket battery. During this deployment, the TPC reduced sensor-to-shooter times down to an average of three to four minutes.

Communications Section. The communications section consisted of seven personnel: the Div Arty signal officer (DSO), three NCOs and three soldiers. The Div Arty signal NCO assisted with radio repairs and management of retransmissions assets. Two retrans teams

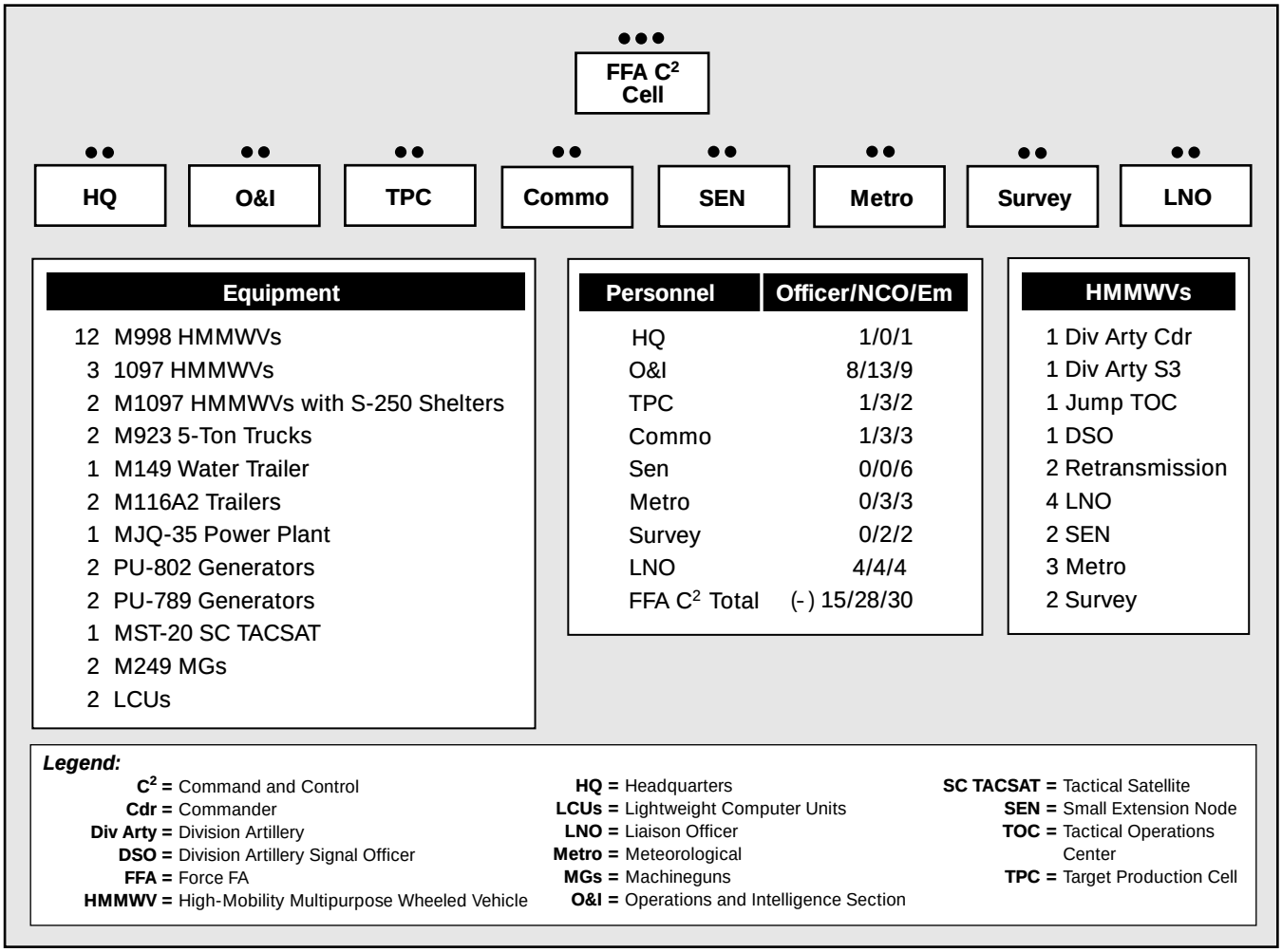


Figure 1: FFA Command and Control Cell- "To Accompany Troops" (TAT) Deployment Package. This package requires one C-5 or one C-17 and two C-141 aircraft to deploy.

deployed to help maintain communications with coalition assets. Each team had an NCO and driver. The final soldier was a communications repairman.

The communications section used three HMMWVs, two as retrans vehicles and one to allow the DSO to position retrans assets. This section was also critical. It worked with a multitude of systems, including communications that ranged from the single-channel ground and airborne radio system (SINCGARS) to satellites and computer automation that ranged from email to the repair of the initial fire support automation system (IFSAS) lightweight computer unit (LCU).

In addition to these organic assets, a small extension node (SEN) from the divisional signal battalion deployed with the FFA to provide communications connectivity to the rest of the assets in theater. The SEN consisted of six personnel, two M1097 HMMWVs with S-250 shelters and two generators to run the system.

Meteorological Section. To increase the effectiveness of fires across the coalition sector, one of the two Div Arty meteorological sections deployed with the FFA. The section was imperative to provide accurate deep MLRS fires. The section provided meteorological support not only for the US units, but also for the Kuwaitis' 155-mm and Smerch fires. Each section consisted of six personnel: three NCOs and three soldiers. Each deployed with all of its equipment to include three HMMWVs, two generators and a trailer.

Survey Section. Two Div Arty survey sections were part of the FFA package. This enabled the FFA to develop a survey plan for all artillery assets in the coalition sector. It also allowed the FFA to have everyone on common survey, thereby increasing the effectiveness of its fires. The survey section consisted of four personnel: two NCOs and two soldiers. The equipment for each section consisted of two HMMWVs with position and azimuth determining systems (PADS).

Liaison Teams. Based on our predeployment mission analysis and lessons learned from Operation Bright Star, an exercise in the Egyptian desert, we recognized the need for LNOs to interface with coalition forces' higher headquarters and all artillery units, so we brought four LNO teams with the FFA. The number of LNO teams was based on the number of expected coalition partners for the deployment. Each team consisted of three personnel: one officer, one NCO and a driver. Each had a HMMWV with very specific equipment, as listed in Figure 2.

The liaison teams came from 1-10 FA, the DS battalion for the division's 3d Brigade, which was the division ready brigade 3 (DRB3) at the time, and the Div Arty's HHB. Even though this, in effect, stripped the fire support element (FSE) of the DRB3, it was necessary and paid tremendous dividends in the long run.

One LNO team was assigned to the CTF headquarters, which primarily was comprised of personnel from the Army component of CENTCOM's Army Central Command-Kuwait (ARCENT-K). This LNO team kept the FFA apprised of all current planning and facilitated the orders process among all coalition partners.

A second LNO team was assigned to the Kuwaiti Land Force (KLF) Artillery. This was an extremely critical team because of the nuances of the Arabic culture. Arabs traditionally operate by personal relationships more than time constraints, mission requirements, professional skills or anything else. One of the keys to establishing a good working relationship is to establish a good personal relationship. The LNO developed that relationship and enabled the FFA to quickly integrate the KLF Artillery in all planning and orders development. The KLF Artillery sent a reciprocal liaison team to the FFA headquarters to further facilitate operations between the two units. Time and again, our good relationship with our Kuwaiti allies proved *critical* to our ability to accomplish the mission accomplishment.

1	Mobile Subscriber Radio Terminal (MSRT)
2	OE-254 Antennas
1	Forward Entry Device (FED)
1	Binoculars
1	Night-Vision Goggles
1	Cellular Phone (Purchased Locally by Contracting Agent)
9	5-Gallon Water Cans
4	5-Gallon Fuel Cans
	Division Artillery Tactical Standing Operating Procedures (TACSOP)
	Division Artillery Initial Fire Support Automated System (IFSAS) SOP

Figure 2: LNO Teams. The teams each have one lieutenant, staff sergeant and driver in an M998 HMMWV with two high-powered radios and the equipment listed.

The last two LNO teams were reserved for adjacent unit coordination. One team operated with the USMC battery and the other with Kuwaiti maneuver brigades. The LNO teams helped to solve many of the problems associated with coalition warfare and were critical to the success of the FFA. LNO operations set the standard in the Marne Division—the division staff employed our LNOs for numerous key tasks.

Training Focus. Once UN Secretary General Kofi Annan brokered an agreement with Iraq, the deployed troops in the KTO gradually started to shift from posturing for combat operations to maintaining a US presence to deter any Iraqi aggression against Kuwait. With this shift, the 3d Division developed a very challenging and ambitious training plan for deployed forces to help develop future KTO contingency operations plans (OPLANs). The focus also maximized our unique opportunity to train with joint and combined forces for more than four months in a multitude of planning and coordination sessions, staff drills and exercises.

Among the more significant exercises was the Coalition Joint Task Force (CJTF) CPX that included an entire observer/controller (O/C) package and simulations team from the BCTP team and National Simulation Center at Fort Leavenworth, Kansas. This brought all coalition partners together to exercise the contingency OPLAN developed for the defense of Kuwait. It was extremely beneficial for the FFA as we developed and refined tactics, techniques and procedures (TTP) and captured key lessons learned.

During the CJTF CPX, we exercised the C^2 of all US fire support assets in concert with the Kuwaitis, who had a jump command post (CP) collocated with our FFA CP. This reciprocal liaison structure provided us the greatest flexibility in clearing and providing fires to our coalition partners. We also exercised our deep operations planning and execution cycle with the division FSE by conducting a series of deep attacks.

The "Marne Training Center (MTC) Rotation" was also an excellent exercise. Initially it was designed

to replicate a National Training Center (NTC) rotation at Fort Irwin, California, for the 1st BCT, which missed its scheduled rotation due to the deployment. But we also used this exercise to administer 1-41 FA *Glory's Guns* its external evaluation (EXEVAL). Although the EXEVAL was not the same as the ones we administer at Fort Stewart, the tough conditions of the Kuwaiti desert and battle rhythm of the three-week exercise provided the battalion a very challenging evaluation. The MTC employed O/Cs from the NTC Operation Group's Tarantula Team and was a resounding success for the maneuver forces and fire supporters alike.

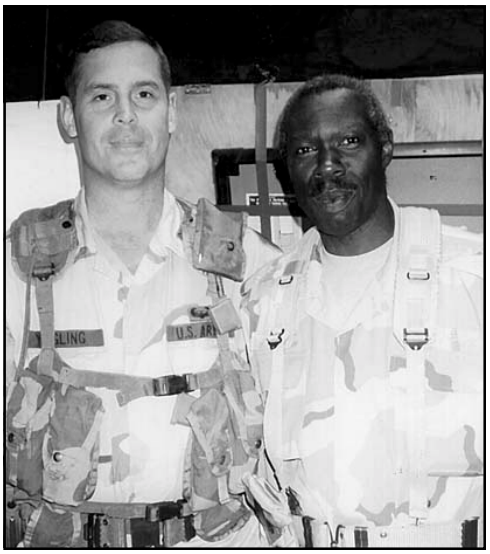
The training culminated with the collective Combined Forces Exercise (CFX) at the end of April. This exercise placed coalition units on the terrain they would occupy in accordance with the Kuwaiti defense OPLAN and that we exercised on the earlier CPX. It was yet another excellent opportunity to train on US-Kuwait interoperability with special emphasis on coordination between adjacent units, passage-of-lines and clearing fires. It also provided the FFA headquarters an opportunity to set-up, operate and move its jump CP over real-world distances and terrain—a definite challenge with the limited resources available in theater. During this exercise we also conducted a mini Interdiction Counterfire Exercise (ICE), employing the joint surveillance and target attack radar system (JSTARS) and the fires of USAF close air support (CAS) aircraft, the Army's Kiowa Warrior and AH-64 Apache helicopters, MLRS and Paladin. We employed these systems along with other intelligence gathering assets from the division as part of a series of deep attacks on actual moving targets in the Udairi Range training area.

In addition, the deployment and redeployment process provided excellent and scarce training for future contingencies. The FFA had to draw and turn in its APS equipment in Kuwait and develop and modify our own deployment training regulations and standing operating procedures (SOPs).

Lessons Learned. Although we never fired a round in anger in Operation Desert Thunder, we came prepared to do whatever it took to coordinate, clear and provide fires for the CTF and learned many, many lessons in the process. In the following paragraphs, we discuss four of the more significant lessons we learned.

Logistics Support. The FFA relied very heavily on the DS battalion for all forms of administrative and logistical support. While this was an effective solution, in most cases, the FFA headquarters needed its own S1 and S4 representative to send reports to the division and CTF headquarters. Without these representatives designated in the initial plan, we had to take these two officers "out-of-hide."

The TAB commander assumed the role of the S4 and the night-shift fire control officer assumed the role of the S1. This work-around allowed us to function and provide the necessary logistics reports. However these two officers would have served the FFA better in their originally intended roles. The FFA headquarters needed its administrative and logistics personnel integrated into all staff operations.



The commander of the KLF Artillery, Brigadier General Sami M. M. Al-Murjan (right) was a US Army War College classmate of the FFA commander, Colonel John A. Yingling.

IFSAS/AFATDS Interoperability. The CTF had the advanced FA tactical data system (AFATDS) while the FFA used IFSAS. If the level of command controlling the FA fires has AFATDS, then the systems are reasonably compatible. But if the controlling level of command, in this case the FFA, has IFSAS and AFATDS must interface digitally in subordination, the two systems don't operate together effectively—which caused the FFA significant problems in exchanging information. This was especially critical when attempting to pass Army tactical missile system (ATACMS) time-sensitive target information.

In the constantly moving battlefield, knowledge is power. Knowing where units are and who's moving greatly improves situational awareness. The current lack of an IFSAS-to-AFATDS interface can make critical information hours old.

When the IFSAS-to-AFATDS interface was attempted, the only message we could pass reliably was the plain text message (PTM). SPRT;BGEOM messages that IFSAS understands are compatible if they fall within the IFSAS mapmod; however, AFATDS has a much larger mapmod and many more message formats. Whenever these formats were transmitted, an error resulted, so automated exchanges IFSAS-to-AFATDS didn't work.

There were three solutions to our digital interface problem. The first was to provide the higher headquarters an IFSAS and operator. Based upon the number of personnel we deployed with the FFA, this was not a feasible solution.

The second solution was to provide the FFA with an AFATDS. This, again, was not feasible because there weren't enough trained operators. The final, yet not ideal, solution was to execute via voice communications—which we did.

Without establishing digital communications, battlefield awareness and control are greatly reduced. Until AFATDS is fully fielded, the Army will face this problem, and units must seek work-arounds to ensure digital connectivity.

International Military Education and Training (IMET) Program. The majority of international students who attend training in the US are part of the IMET program. The deployment of the 3d Div Arty highlighted the success of this program.

Many high-ranking members of the Kuwaiti military are graduates of US basic and advanced courses and our staff and war colleges. Their understanding of our doctrine and culture facilitated our combined planning and the execution.

It just so happened that the commander of the KLF Artillery, Brigadier General Sami M. M. Al-Murjan was a US Army War College classmate of the FFA commander, Colonel John A. Yingling. As was pointed out earlier, the Arab culture builds upon personal relationships before professional relationships. In this case, the personal relationship was built upon shared experiences at Carlisle Barracks, Pennsylvania. Because of the

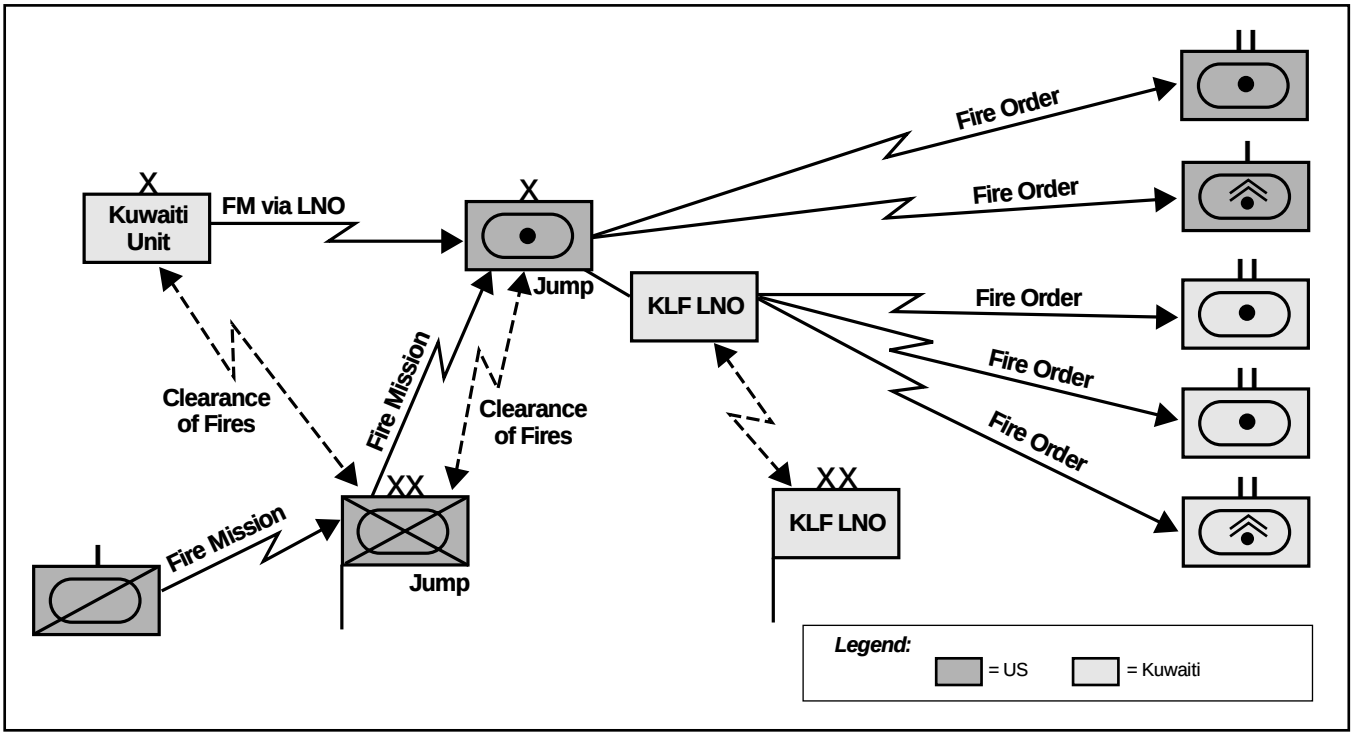


Figure 3 : Kuwaiti Land Force (KLF)- US Fire Mission Processing. The KLF artillery has Jaguar radios that are not compatible with our single-channel ground and airborne radio system (SINCGARS). To clear fires, the coalition forces used reciprocal liaison officers (LNOs).

IMET program, the KLF Artillery and US-led FFA were fully integrated from the beginning.

Clearance of Fires. The KLF Artillery is equipped with Jaguar radio systems from England, which are not compatible with US SINCGARS radios. This presented a problem in clearing fires. We resolved the problem by using reciprocal liaisons, again highlighting the importance of LNOs in coalition operations. (See Figure 3.)

A fire mission received from a Kuwaiti observer was cleared through KLF Artillery channels and then sent to the KLF Artillery LNO collocated with the FFA Headquarters where the final clearance was done. The same process was used for fire missions coming from US observers. The fire mission was cleared through US fire support channels and verified with the KLF Artillery LNO team.

The US FFA FCE issued fire orders to US firing units and the KLF Artillery LNO issued fire orders to Kuwaiti firing units. During the CJTF CPX, there were many opportunities to verify this system. A testament to its success is that we had no fratricides from indirect fires.

On 17 February 1998, the 3d Division was alerted for deployment to Kuwait. In addition to the 1st BCT, elements from the division headquarters, the military intelligence and signal battalions plus the Div Arty deployed. The entire force package was on the ground in Kuwait within eight days. Within a week of the deployment, UN Secretary Kofi Annan brokered an agreement with Saddam Hussein that allowed UN inspectors unimpeded access to all sites for chemical or biological inspections. Once again, Saddam Hussein backed down in the face of US resolve.

As this article is going final on 17 December, the 3d Div Arty is preparing to deploy as an FFA to Kuwait in Operation Desert Fox following the US-led bombing of Baghdad on 16 December. Saddam Hussein, once again, misjudged the resolve of the US to ensure his compliance with UN inspection requirements. The 3d Infantry Div Arty stands ready to deploy, fight and win in conjunction with its coalition and combined arms brethren.

Our deployment in Operation Desert Thunder taught us a lot and made us better prepared to accomplish the FFA mission, as might be required in future operations. It is our hope that this article might be similarly useful to other FA units as they face missions like the 3d Div Arty's.

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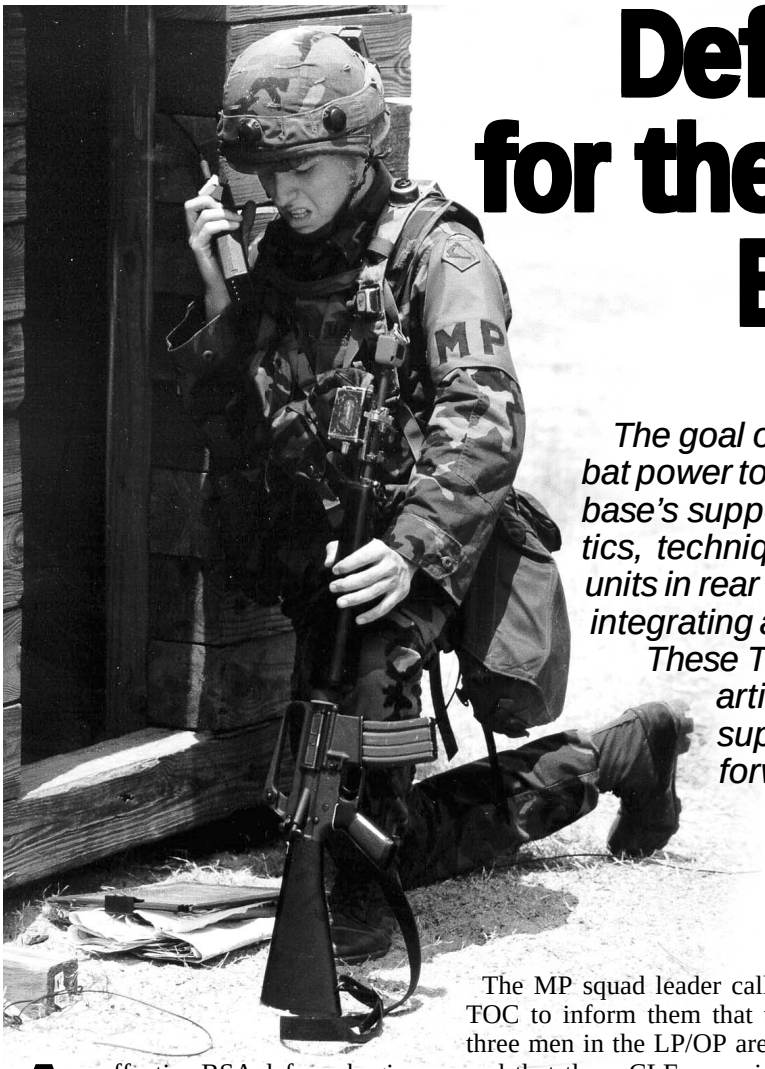

Defensive Fires for the Light Force Brigade Rear

by Major Joseph M. Irby

The goal of base defense is to synchronize combat power to deny the enemy's ability to interdict the base's support mission. This article discusses tactics, techniques and procedures (TTP) that static units in rear areas can use to be more successful in integrating all types of fires into their base defense. These TTP apply to any base clusters, but this article specifically discusses the brigade support area (BSA), its tenants and the forward support battalion (FSB).

An effective BSA defense begins with solid home-station training that includes battle staff planning for combat operations and targeting meetings focused on base defense. This training also must familiarize BSA members with calls-for-fires, control of Army attack aviation and risk estimate distances.

Example Scenario. A Cortinian Liberation Front (CLF) force makes contact with an listening post/observation post (LP/OP) 200 meters outside the BSA perimeter and knocks out a machine gunner from the FSB. The assistant gunner mans the machinegun, suppressing the CLF squad, and a third soldier calls the FSB tactical operations center (TOC) and submits a size, activity, location, unit, time and equipment (SALUTE) report.

The FSB battle captain dispatches the quick-reaction force (QRF), a military police (MP) platoon, to reinforce the LP/OP. The BSA fire support officer (FSO) calls for fire on a pre-planned smoke target that is "at his command."

The MP squad leader calls the FSB TOC to inform them that two of the three men in the LP/OP are casualties and that three CLF are sniping at the MPs as they try to assist the wounded. The FSB battle captain verifies the MP squad location and the CLF location with the squad leader. The BSA FSO monitors the radio traffic with the squad leader, cancels "at my command" and tells the MP squad leader to be prepared to adjust the smoke.

The smoke round impacts, and the MP squad leader adjusts the mission onto the CLF and requests high-explosive (HE) in effect. Twelve rounds of 105-mm HE impact on the CLF, causing two casualties and forcing the remainder to break contact.

This fire mission for defense was successful because the commander and his BSA battle staff came together and deliberately decided on how and where to kill the enemy. This allowed the soldiers to find, fix and finish him. The battle staff conducted planning that focused on the *decide, detect, deliver* and *assess* methodology during the decision-making process for the base cluster defense. The plan was disseminated, coordinated and completely rehearsed throughout the BSA and with the other appropriate agencies in the brigade combat team (BCT).

Planning for the Fight. The process begins with planning for the defense of the BSA. This is done by the FSB battle staff. The key members of the BSA's battle staff are the FSB executive officer (XO), S3, S2 and FSO. Frequently the FSB XO must focus on running the support battalion while synchronizing the staff, subordinate companies and tenant units.

The FSB XO's integration into the process is key for two reasons. One is because he has the experience and authority to work with the brigade staff. Secondly, he runs the BSA, ensuring tenants and subordinate companies fulfill their responsibilities to the BSA commander. The FSB S3, usually a non-branch qualified captain, is the linchpin in planning, coordinating and executing the defensive plans. The intelligence section occasionally consists of an NCO and officer, but one trend is that only one or the other is in the BSA. This thin staff section is responsible for predicting the enemy's actions toward the base cluster.

The FSB has no FSO, so filling that slot is done creatively. Infrequently, the position is filled by an excess officer or a fire support NCO—Military Occupa-

BSAs have a lot of heavy equipment coming and going- high-payoff targets for the enemy. This equipment must be protected.

tional Specialty (MOS) 13F Fire Support Specialist—from the direct support (DS) artillery battalion. Most of the time, the duty falls to the headquarters and service battery (HSB) commander who also commands a battery of 60 to 70 soldiers who are responsible for securing a portion of the BSA perimeter.

Whoever the FSO is, he must be knowledgeable and integrated into the BSA battle staff. Ideally, the unit would be able to train with the designated FSO at home station.

One option of integrating fire support personnel into the BSA command post (CP) is to collocate the DS artillery battalion's administrative and logistics operations center (ALOC) with the FSB TOC. Consequently, there is always a knowledgeable fire supporter with the proper communications platform in close proximity to the BSA's battle captain. It also allows for close coordination between the FA and brigade logisticians, as well as the FSB.

Another option is to assign one or more leaders from the FA ALOC as the BSA FSO/fire support element (FSE) and give the responsibility for planning, coordinating and rehearsing fires to them while the rest of the FA ALOC remains with the unit trains. This type of organization increases the difficulty in executing fires due to the added communications link. This option can work but takes thorough and repetitive rehearsals.

In planning fires for the BSA, the battle staff must conduct sound planning. A deliberate and integrated approach for planning is the doctrinal *decide, detect, deliver* and *assess* methodology used in targeting. The BSA targeting meeting is not as broad in spectrum as the one held at brigade or in a maneuver battalion because the BSA's targeting process is focused on force protection and defensive targets only. The methodology helps find, fix and finish the enemy as he tries to interdict the activities of the base cluster. The battle staff decides what the target is, where it is likely to be and what its purpose is. This information comes from the intelligence preparation of the battlefield (IPB) and predictive analysis by the intelligence personnel at the FSB TOC.

Once the target is established, it must be detected. In the BSA, detection/collection assets are limited and usually relegated to LP/OPs and perimeter security patrols conducted by members of the BSA. Occasionally, an infantry unit is provided to help protect the BSA. The BSA's reconnaissance and surveillance plan will rely heavily on organic and tenant units.

Delivery means more than who or what is going to deliver effects on the target. The battle staff needs to develop attack criteria for each target that includes the trigger to initiate the target and the type of munitions. The battle staff assesses and manages the risks inherent in engaging the targets, in light of the rules of engagement (ROE) and the proximity of friendly units. The staff adheres to the ROE and does everything within its power to mitigate possibilities of fratricide. The delivery assets are usually not dedicated to support the base cluster, i.e., a priority target, a maneuver unit or attack aviation. The BSA battle staff's careful coordination for external assets facilitates responsive support when required.

For a more in-depth discussion of the military-decision making and the targeting processes, see the White Paper, "Fire Support Planning for the Brigade and Below," dated 12 May 1998, written by the Advanced Fire Support Branch of the Fire Support and Combined Arms Operations Department in the Field Artillery School, Fort Sill, Oklahoma. The White Paper also discusses the development of each target by determining its task, purpose, method and effect, which ensures it supports the unit commander's intent and guidance. Readers can access the White Paper at website http://sill-www.army.mil.

Early Coordination. Battle staff coordination ahead will facilitate the timeliness and accuracy of the BSA future fires. The first is for the staff to request and coordinate for adequate terrain. Usually, the BSA boundary is the perimeter's protective wire obstacles while the terrain outside the wire belongs to a unit other than the FSB. This precludes timely clearance of fires because the fires must be cleared with the unit that controls the terrain outside the BSA's perimeter. Unit boundaries, by definition, are restrictive and permissive fire support coordination measures (FSCMs). Pushing the BSA boundary beyond the wire at least one terrain feature allows the BSA commander to clear fires internally.

The BCT could easily have a standing operating procedure (SOP) that allocates terrain to the base cluster, and through the targeting process, the BSA battle staff can further define the boundary. A well-defined boundary is easier to coordinate with adjacent units and higher headquarters, so when and where possible, the unit should use a global positioning system (GPS), such as an encrypted precision lightweight GPS receiver (PLGR), to accurately locate the boundary. These PLGR locations add definition and possibly target reference points to the BSA's defense diagram.

The extra terrain also provides freedom of maneuver for reconnaissance patrols and combat forces allocated to the BSA. With the terrain comes the responsibility of coordinating combat operations originating outside the BSA. These operations may include, but are not limited to counterfire missions or armed reconnaissance by aviation assets. Battle tracking units outside the wire identifies the units and helps clear fires rapidly.

The targeting process in the BSA produces a target list and a written order assigning responsibility to subordinate units for each target. Subsequent meetings update the target list that becomes part of BSA fragmentary orders, called FRAGOs. The BSA FSO submits the target list to the brigade FSE for approval, which then disseminates it to appropriate agencies. The fire support plan must be disseminated and rehearsed for the plan to be effective.

1 A trained forward observer (FO) with means of communicating with the brigade support area (BSA) fire support officer (FSO) informs the listening post/observation post (LP/OP) to react to the rehearsal scenario: a three-man enemy team moving along the avenue of approach (AA) overwatched by the LP/OP.

2 The LP/OP submits a size, activity, location, unit, time and equipment (SALUTE) report on the enemy sited to the forward support battalion (FSB) tactical operations center (TOC). The TOC then initiates a preplanned target that was located earlier by precision lightweight global positioning system receiver (PLGR). The FSB TOC warns the LP/OP of the ensuing fire mission and to adjust the smoke. The FSB TOC dispatches the quick reaction force (QRF) with a clear task and purpose.

3 The FSO at the fire support element (FSE) initiates the fire mission with the FA battalion fire direction center (FDC).

4 The FO who initiated the rehearsal scenario at the LP/OP gives the spottings to the radio/telephone operator (RTO) and coaches him to transmit the proper corrections to the FSO/FSE that, in turn, transmits them to FDC.

5 The QRF tactically maneuvers to an attack-by-fire position to engage the enemy and possibly assist in casualty evacuation (CASEVAC).

6 Smoke is adjusted on the desired location, the mission is ended, the target is recorded and a replotted grid is requested from the FDC.

7 The trained observer conducts an after-action review (AAR) with the LP/OP. The battle staff conducts an internal AAR that includes the QRF.

8 The FSO updates the target list with the brigade FSE. The BSA defensive diagram is updated, as required.

9 The immediate problems are corrected and the lessons learned are disseminated at the next tenant's meeting.

Rehearsal of the Combined Arms Defense of a Brigade Support Area. The rehearsal is thoroughly planned and coordinated among the battle staff and subordinate units. It occurs during stand-to and includes indirect fires and maneuver outside the perimeter by the QRF. The end state is one target has been registered and the QRF has maneuvered over terrain it may have to defend at a later time. The following are tested, trained and validated in the rehearsal: BSA communications plan, the QRF and fire support; danger-close FA target adjustment (including target location, calls-for-fire and adjustment procedures); QRF maneuver plan; and a realistic timeline for reacting to BSA's threats.

Rehearsals. The key to the swift and violent execution of any plan is rehearsals. The dissemination and rehearsal processes complement each other. They begin with the briefing of the fire support plan as part of the FSB operations order to the support companies and tenant units of the BSA. The information briefed is the target description, target number, location, responsibility for establishing and observing the target, ROE and shell-fuze combination. It also includes a detailed discussion of the communications plan for requesting fires and alerting the QRF. Each subordinate unit discusses its part of the fire support plan during the FSB commander's back brief.

After the daily targeting meeting, the battle staff updates the defense plan in writing and disseminates these changes at the daily tenants' meetings. The FSB XO or S3 discusses lessons learned from previous rehearsals and future rehearsal plans. The FSB S3 leads BSA members through limited rehearsals, so they understand the process and the standards. This allows leaders to inform their subordinates and fully integrate rehearsal.

Well-orchestrated rehearsals can be a deterrent, if observed by the enemy. During Vietnam, static nodes frequently practiced "mad minutes" and verified target locations by actually firing the target. That was as much for the benefit of the enemy as it was for training drills.

Rehearsals occur soon after the arrival of the units in the BSA—certainly no later than the first stand-to or stand-down. This allows the enemy to see the unit is serious about defense as early as possible. Rehearsals should include everyone because it is a time to maneuver the BSA's QRF and internal reaction forces, practice reporting, check communications links and validate defensive plans. Although not the only times to conduct rehearsals, conducting them at stand-to or stand-down are times when members of the BSA are focused on perimeter defense.

A good SOP, understood by all, improves rehearsals. Every member of the battle staff must fully understand his role in the conduct of the rehearsal. It is important that subordinate commanders and leaders understand and enforce the standards. The SOP paints a picture so all participants share the commander's vision for the rehearsal's end state.

There are some important actions to include in the rehearsal SOP. One is alerting units within the base cluster of the upcoming rehearsal. The alert notice validates part of the communications plan for the defense of the cluster. The FSB operations section notifies the brigade that a rehearsal is upcoming, its expected duration and the impact on logistics operations. The FSO notifies the brigade FSE and FA battalion TOC of upcoming missions, ensuring they understand the plan. Designated individuals should observe and record events in the rehearsal for an after-action review.

The scope and detailed execution of the rehearsal are limited only by the tactical situation and the imagination of those conducting it. The figure provides an example of a thorough rehearsal for the combined arms defense of a base cluster.

Timely and accurate fires are achievable in support of the BSA when they are planned, coordinated and rehearsed. By beginning the planning process early, mandating the battle staff's participation and focusing on the doctrinal decision-making process, the conditions are set for a successful perimeter defense.

Like all fires, rear area fires must be completely planned, fully coordinated and well-rehearsed.

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