

# **Field Artillery**

*A Professional Bulletin for Redlegs*

March-April 2003

**Lethal  
and  
Nonlethal  
Fires and  
Effects**

# Field Artillery

A Professional Bulletin for Redlegs

March-April 2003

HQDA PB6-03-2

## ARTICLES: Lethal and Nonlethal Fires and Effects

### 4 Future Options for Nonlethal Artillery

By Kenneth L. Black

### 10 Engineering the Nonlethal Artillery Projectile

By Stephen G. Floroff

### 13 Excalibur: Extended-Range Precision for the Army

By Major Danny J. Sprengle, ARNG, and  
Colonel Donald C. DuRant, USAR

### 17 Transformation-Bringing Precision to MLRS Rockets

By Lieutenant Colonel Jeffrey L. Froysland, USAR

### 20 Transforming the FIST for the 21st Century

By Major David S. Flynn

### 22 JCAS in Afghanistan: Fixing the Tower of Babel

By Lieutenant Colonel John M. Jansen, USMC; Lieutenant  
Commander Nicholas Dienna, USN; Major Wm Todd Bufkin II, USMC;  
Major David I. Oclander, USA; Major Thomas Di Tomasso, USA;  
and Major James B. Sisler, USAF

### 31 Observation Planning-Where Are the Eyes of Death?

By Sergeant First Class Kevin M. Mitchell

### 32 Targeting in the SBCT-Taking Advantage of 1-14 Cav's RSTA Capabilities

By Lieutenant Colonel Steven A. Sliwa and Major Robert O. Kirkland

### 35 ECOORD vice FSCOORD-More Than Just a Name Change

By Lieutenant Colonel Steven A. Sliwa and Major Robert O. Kirkland

### 38 Extending the Eyes of the ETAC via FO ECAS Training: The 101st Joint Fires Training Strategy

By Lieutenant Colonel Kevin M. Felix and  
Lieutenant Colonel Zane W. Mitchell, Jr., USAF

### 42 The Leaders' Reconnaissance: Company FSO Recon of an Objective

By Captains Colin J. Williams and Timothy K. Hight

### 43 FO Battle Drills-The Time is Now

By Majors Daniel A. Pinnell and Kelly W. Ivanoff

## DEPARTMENTS

### 1 THE UPDATE POINT

### 2 INCOMING

**Front Cover:** A multiple-launch rocket system (MLRS) fires a guided MLRS (GMLRS) precision rocket during testing at White Sands Missile Range, New Mexico. Scheduled to be fielded in FY06, GMLRS has test fired successfully out to 73.5 kilometers.

**DISCLAIMER:** *Field Artillery* is published bimonthly by Headquarters, Department of the Army, under the auspices of the US Army Field Artillery School (Building 758), Fort Sill, OK. The views expressed are those of the authors, not the Department of Defense or its elements. *Field Artillery's* content doesn't necessarily reflect the US Army's position and doesn't supersede information in other official Army publications. Use of news items constitutes neither affirmation of their accuracy nor product endorsements.

**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.

**OFFICIAL DISTRIBUTION:** US Army and Marine Corps Active and Reserve Components FA units: seven copies to corps artillery, division artillery, brigade and regimental headquarters; 13 copies to battalions; and seven copies to separate batteries or detachments. In addition, other Department of Defense or government agencies that work with Field Artillery or fire support personnel, issues, material, doctrine, training, organization or equipment may request a limited number of free copies of the magazine. These include, but are not limited to, other coordination and support units, training centers and branch schools, recruiting commands, readiness groups, libraries and education centers, program/project managers, military arsenals and laboratories, state adjutant generals, liaison officers, military academies, ROTCs, major command headquarters, military attaches and public affairs offices.

**PAID SUBSCRIPTIONS:** Those ineligible for Official Distribution may subscribe through the US Field Artillery Association, P.O. Box 33027, Fort Sill, OK 73503-0027 or usfaa@sirinet.net. Telephone numbers are (580) 355-4677 or FAX (580) 355-8745 (no DSN). Dues are \$20 per year to US and APO addresses. The international rate is \$55 for a one-year subscription.

**SUBMISSIONS:** Mail to Editor, *Field Artillery*, P.O. Box 33311, Fort Sill, OK 73503-0311. Telephone numbers are DSN 639-5121/6806 or commercial (580) 442-5121/6806 or FAX 7773 with DSN or commercial prefixes. Email is famag@sill.army.mil. Material is subject to edit by the *Field Artillery* staff.

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

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

### Redleg Hotline

(Organization, Material, Doctrine and Training)  
DSN 639-4020 or (580) 442-4020 (24-Hours)

### Tactical Software Hotline

DSN 639-5607 or (580) 442-5607 (24-Hours)

### Field Artillery Home Page

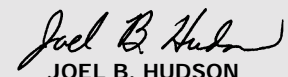
sill-www.army.mil/famag

By Order of the Secretary of the Army:

**Eric K. Shinseki**

General, United States Army  
Chief of Staff

Official:



**JOEL B. HUDSON**

Administrative Assistant to the  
Secretary of the Army, 0235010

**Michael D. Maples**

Major General, United States Army  
Field Artillery School Commandant

**Editor:**

Patricia Slayden Hollis

**Assistant Editor:**

Wenda L. Meyers

**Art Director:**

Bob T. Coleman

## Lethal and Nonlethal Fires and Effects

**T**he Field Artillery serves to *destroy* our enemy's warfighting capability...his military personnel and equipment...the momentum of his efforts...the cohesion within his formations...the morale of his soldiers and the hope of those who lead his formations. The Field Artillery has always brought devastating physical and psychological effects to the battlefield and will continue to do so today and in the future.

Across our Army, Redlegs are prepared to answer the nation's call. Field Artillery units already have deployed to the Central Command (CENTCOM) area of responsibility and are training intensely for the possibility that their fires will be called for in the near term. Other Field Artillery units, both active and Army National Guard, have prepared their soldiers and equipment and are deploying or mobilizing. Still other Field Artillery soldiers stand ready to defend freedom on the Korean peninsula, where the destructive potential of their fires serves to deter aggression.

These soldiers are well trained, a reflection of the tremendous leaders who command our FA formations. They have the capabilities to enable the employment of joint systems and deliver incredibly lethal effects in support of our maneuver formations. If called upon, they will deliver—with accuracy and timeliness—the destructive fires that are the Field Artillery's reason for being.

Every view we have of future warfare indicates that indirect fires applied with precision to achieve destructive effects will remain the most lethal capability in our formations. In fact, our emerging Objective Force doctrine gives every indication that the importance of indirect fires will increase.

Operations in the future will be characterized by our employing a robust suite of targeting platforms, engaging enemy forces beyond the range of their weapons and destroying them with fires. This will enable us to enter close combat, if required, at a significant advan-

tage. In addition to destructive fires, the force will require suppressive, protective and special purpose fires.

We must be able to deliver each of these types of fires in varied terrain conditions, including complex, open rolling, jungle and urban environments. We must have munitions that can achieve precision with area options. We also need discriminating capabilities.

And, significantly, to achieve full spectrum relevance, the Field Artillery must be able to coordinate and deliver a wide range of nonlethal effects. Nonlethal effects certainly include information operations (IO) and psychological operations (PSYOP) that our fires and effects cells will coordinate. They also should include the many capabilities the science and technology community is now developing that can be employed by Field Artillery delivery systems.

The ability to deliver nonlethal effects is particularly important in the urban



environment where we may want to limit collateral damage or effects on noncombatants. Nonlethal munitions will enable the Field Artillery to make a significant, essential contribution to the force at any point on the spectrum of operations. In particular, our relevance in small-scale contingencies and peace support operations will be greatly enhanced by having additional nonlethal capabilities.

The Army will be dominant across the operational spectrum. The Field Artillery must provide capabilities to enable the Army to achieve that dominance. The Objective Force is being designed with characteristics to enable full-spectrum dominance—they apply equally to the Field Artillery. (See the figure.)

These characteristics provide insight into how future Field Artillery systems and capabilities will be designed and how the Field Artillery will operate. They indicate that the Field Artillery can be the instrument to employ a broader range of nonlethal capabilities effectively in many environments, across the entire spectrum of military operations. Ultimately, however, the force must be highly lethal in high-intensity combat—and so must the FA.

The Field Artillery is recognized as “The Greatest Killer on the Battlefield” for good reason. I don't expect that to change as a result of transformation. Let there be no doubt that the primary purpose of Field Artillery fires, both today and in the future, will be to *destroy* our adversaries.

- **Responsive** in providing fires and effects to joint and combined arms formations at every echelon to dominate over a dispersed battlefield against an adaptive threat that is not templatable.
- **Deployable** as an integral element of the joint task force and our maneuver formations.
- **Agile** to enable rapid tailoring of capabilities to meet the requirements of any mission.
- **Versatile** to contribute in a significant, essential way across the spectrum of operations and in all environments, applying the right effect at the right place at the right time.
- **Lethal** through networked battle command, detection of targets and application of fires and effects.
- **Survivable** by proactively attacking threats to shield units and protect soldiers.
- **Sustainable** through more efficient and effective target attack to reduce logistical demand.

FA Characteristics to Enable Objective Force Full-Spectrum Dominance



## CAS: A Modified Paradigm

*In this letter, Brigadier General (Retired) Huba Wass de Czege weighs in on the joint discussions about close air support (CAS) sparked, at least in part, by the Field Artillery interview with Major General Franklin L. Hagenbeck, the commander of ground forces in Operation Anaconda (“Afghanistan: Fire Support for Operation Anaconda,” September-October 2002).*

*However, General Wass de Czege takes a unique approach. He examines the principles for effective close supporting fires and, for each principle, evaluates the assets that best can provide that firepower, including ground force indirect fire and joint CAS assets. From this analysis, he proposes modified CAS procedures to take advantage of the strengths of the various firepower assets.*

*General Wass de Czege, who started out in the Infantry, was the primary author of the Army’s AirLand Battle fighting doctrine. He is a prolific military writer and has been a consultant to the US Army, Joint Staff and other Department of Defense agencies in efforts to study future warfighting concepts since 1994.*

Editor

**Principles of Effective Fire Support.** After 24 months in the Republic of Vietnam as either a rifle company commander or a Ranger advisor, I became a connoisseur of fire support. The principles of effective firepower at the core of the lessons I learned in Vietnam still apply today. Fire support assets must be able to provide responsive, accurate fires; be flexible; in the case of air support, have a pilot willing to take the risks necessary; have a system to handle the CAS requirements efficiently and rapidly; and be able to provide concentrated effects.

- *Responsiveness and Accuracy.* These two capabilities are paramount. In this, organic mortars and artillery excel. Seconds matter and single-digit (or at least double-digit) meters matter. Trust in

the accuracy of the assets also matters: “How close can I bring the fires in before there is a probability of friendly injuries?”

The limitations of mortars and artillery are that their base of fires is fixed and their ammo on hand is fixed. So you can have only so much of their fires at any point in time.

Naval gunfire was also very accurate and responsive when I had an ANGLICO [air naval gunfire liaison company] team and the ship was within range. When naval gunfire is dedicated to you, it is awesome—especially when you are perpendicular to its axis of fires.

But even in the near future, once the ship is very far from the coast, the amount of support you can expect drops rapidly.

- *Flexibility.* This is also important. There are times you need fire support where you hadn’t planned to fight or hadn’t been able to establish the organic base of fires to cover an expected/possible fight. At these times, two kinds of air support were most effective: Army helicopter gunships in the air or on “strip alert” and a dedicated Air Force FAC [forward air controller] already in the air. The helicopters in the air were the first responders, and those on strip alert reinforced or relieved those in the air. By that time, the FAC could rally fixed-wing aircraft in the region that were engaged in lesser priority missions. (Air Force aircraft on “strip alert” to respond fast enough to support CAS is only theoretically possible and extremely rare in practice.)

At times, we had five or six sets of fighters circling to go in against the target-rich environment below. Orchestrating the deconfliction of airspace limited the pace at which the fighters could engage the targets and, thus, the suppressive effects of the support. Also, helicopters and strike aircraft can carry only so many munitions.

- *Risk Taking and the Total System’s Capabilities.* These were two other important variables in the equation. Pilots must be willing to take risks in order to deliver the ordnance. In this, Army pilots ranked first, Marine pilots second, Navy pilots third and Air Force pilots last.

I am convinced this ranking had nothing to do with the innate courage of a type of service pilot but rather his understanding of the consequences to the ground forces of his not taking risks—his understanding of why the risks were worth taking. Marines lived to provide CAS, and Navy pilots often reinforced them. In the northern provinces of Vietnam, Air Force pilots lived to take the fight home to Ho Chi Minh. For them, CAS was an occasional diversion of focus.

The second variable was the ability of “the system” to deliver on target. The system included me as the orchestrator of the fight, the spotter who knew exactly where the ordnance was needed, the FAC who had to describe what needed to be done, the pilot with his will and skill, the pilot’s hardware with its

accuracy parameters and the communications system with its ability to carry the intended messages amongst these nodes.

In this also the all-Army system worked best. The system including the Marines was second. The system that included either Navy or Air Force pilots was an indistinguishably third.

Modern technology will improve the performance of any of these systems, but the principles to be distilled do not change. Performance of the system is a function of whether or not the task is a primary or secondary purpose of the weakest link in the system. This link, in most cases, was the aircraft/pilot subsystem.

Performance of the system is also a function of the simplicity or robustness of the system as a whole. The fewer nodes/links the better.

Another aspect of the system's performance is the distortion of the message between my mind and that of the pilot in this daisy chain of transmissions. The ability to communicate is not wholly a hardware issue. Good communications is a function of our ability to bridge our different perspectives and cultures and our articulation skills.

Only some of these system challenges can be fixed with technology. The people involved must share a common cultural perspective. Being able to share a "common operating picture" will help somewhat, but translating the theory of this idea into practice will be challenging across service cultures.

In the current context, I rank Air Force A-10 pilots as I ranked Marines in providing effective CAS and for most of the same reasons I've attributed to Marines.

• *Concentration of Effects.* The ability to concentrate firepower effects from both local and regional sources is also very important. My preferences for fire support overall has organic mortars and DS [direct support] artillery at the top. Next come helicopter gunship support. Then come naval gunfire support with an ANGLICO present. The awesome amount of firepower naval gunfire can provide (when within gun range) offsets its difficulties with range dispersion inaccuracies. Then comes CAS-oriented fixed wing, then multi-role fixed wing.

Given resources at hand, there is always a limit to what can be concentrated. There is value in being able to



draw on outside resources, initially from local sources and then from regional sources. Artillery has fixed ranges, now relatively short. Helicopters can flex, but their speed and support requirements also place them on a limited tether. Fixed-wing aircraft are on the longest tether and can move to concentrate the swiftest.

I had to learn to employ these layers of responders according to their strengths and avoid their weaknesses. I never looked at these various kinds of resources as possible substitutes.

**Modified CAS.** Now, fast-forward to the 1980s. When I was engaged in writing AirLand Battle doctrine, I was almost prepared to support relieving the Air Force of its CAS responsibilities. But one thing held me back. In the case of a combat emergency, such as a breakthrough by Soviet forces, I saw the need to be able to concentrate air support against massed Soviet armor rapidly. The limitations, even then, were the requirement to have Air Force-certified people on site to call in and control the air support and the difficulties of having them on the ground where they would be needed.

At that time, JAAT [joint air attack] tactics were being developed. JAAT appeared to be the solution. The tactics had a formation of attack helicopters as the first responders under mission orders "To get control of the breakthrough while ground forces maneuver to reestablish a coherent defense." Air Force A-10s within the sector would be the first fixed-wing responders, and then gradually more and more of the multi-role assets would be concentrated from within the region and the theater, if necessary.

The idea was that the helicopter command team would orchestrate the battle through a "battle captain" in a helicopter. Ideally an Air Force FAC would be with him. The theory back then was that even in the absence of a FAC, the Army

battle captain could talk to and direct Air Force strike aircraft.

This appeared to be the best of all worlds. JAAT took advantage of the attack helicopter's strength: the combination of its responsiveness and flexibility. At the same time, we could "keep a string on" access to Air Force assets to take advantage of the Air Force's strength: the ability to concentrate effects rapidly from far away. We could use Air Force strike aircraft to reinforce our attack helicopter formations but not make the Air Force aircraft part of "normal" assets providing fire support for close combat operations. In other words, we could modify the CAS paradigm.

I couldn't rally support for this idea then. Maybe now's the time. The firepower principles I outlined still seem valid, and the firepower assets' strengths and weaknesses are clear in support of those principles.

Helicopter CAS is very different than fixed-wing CAS in some significant ways. Employing helicopters, you cut out the middleman in communicating what needs to be done. The platform and the pilot's culture facilitate a better appreciation of the context of the fight and, thus, better decision-making about how to weigh the risks. We can use technology to improve the helicopter's ability to sustain support and enhance the throw-weight of its munitions.

Helicopters also bring a much-overlooked advantage to the fight. Sometimes the commander knows exactly where he wants fires, but often he has only a general idea because he or the observer for a forward element are on the ground. A pilot in a flexible air platform who understands the situation can more readily pinpoint the source of combat problems and get fire on target rapidly and accurately.

BG(R) Huba Wass de Czege  
Easton, Kansas

Gone is the Berlin Wall. Gone is the Soviet Union. Gone also is the clearly defined enemy of the past. In its place is an amorphous, loosely knit network of terrorist cells and other hostile forces that do not wage war by the "old rules." The Global War on Terrorism now dominates the daily headlines. Much of what we knew about war has changed dramatically in the past few years.

# Future Options for NonLethal Artillery

By Kenneth L. Black

Photo by Senior Airman Matthew Hannen, 1CTCS

Americans have grown more intolerant of war casualties. The public expects more sterile battles as precise weaponry demonstrates ever-increasing capabilities. Meanwhile, network television beams real-time war footage worldwide, allowing global audiences to scrutinize battlefield activities.

While Americans and our allies place a high value on life, many of our enemies do not. This growing ethical divide has given the enemy a new tool to use. For example, the Iraqi regime would not hesitate to put anti-aircraft weapons or radar systems in a schoolyard or next to a hospital.

The enemy knows we are reluctant to bomb these installations because of the potential for the loss of innocent lives. The result could be a propaganda dividend for the enemy, rallying anti-American sentiment abroad and criticism at home. This is called the “CNN Effect.”

Such circumstances have created a growing need for nonlethal alternatives. We can not only save the lives of both combatants and non-combatants, but also reduce the collateral damage to structures and the environment.

The use of nonlethal weaponry is not new, but the level of interest has grown dramatically in recent years. The term “nonlethal artillery” might seem like an oxymoron to some, but as a concept, it must be pursued if the Field Artillery is to maintain relevance in all aspects of the future spectrum of combat. In fact, the Field Artillery has been firing nonlethal smoke and illumination for many years.

“Less lethal” and “scalable effects” are terms often used interchangeably with nonlethal. While the intent of nonlethal technologies is to *avoid* lethality, unintentional casualties could result from such things as falling debris or the loss of electrical power in a hospital.

This article reviews a few alternatives that could be considered for artillery delivery. It is not intended to be comprehensive in its description of all possible technologies.

Many excellent reviews of this nature have already been published. One such study is “An Assessment of Nonlethal Weapons Science and Technology” (2002) by the Naval Studies Board of the National Research Council. (The reader can access the study online at the National Academies Press at <http://www.nap.edu/books/0309082889/html/>.)

Between the concept and reality of artillery-delivered nonlethal munitions lie many implementation challenges and questions we must address.

The first set is political. We need a paradigm shift to address the mental inertia that defines artillery only in terms of high explosives. We must consider the Chemical Weapons Convention and other treaty limitations. Technology substance must be separated from hype with funding provided to develop the weapons. We also need to consider the implications of proliferation.

Next we need to address design challenges. Can we apply the technology both reliably and predictably? Can we deliver it with sufficient accuracy? How do we disperse the payload and control the distribution or concentration levels of the material? Are volume limits too restrictive, and can the technology be weaponized and survive the launch environments?

Finally we must consider operational issues. How useful and long lasting are the effects? Do they create a problem for friendly forces? What are the countermeasures? Will the terrain, wind or other weather conditions significantly affect the technology? What are the effects of aging and environmental exposure? Are training and logistics requirements reasonable? Do the benefits justify the artillery’s not firing lethal rounds—justify storing nonlethal rounds in place of lethal rounds on board? Are there more effective ways of achieving the same results? Is it safe for the user?

All these questions must be answered as potential nonlethal technologies are considered. Here are several with potential for delivery by artillery.

**Carbon Fibers.** Electrically conductive carbon fibers have disabled power grids in Serbia and Iraq. Thousands of thin filaments are dispensed over electrical facilities, such as substations, transmission lines or generating stations. Floating down like a cloud, they short the electrical circuits and disrupt the enemy’s ability to access power. Depending on the target, damage can be slight or extensive, localized or widespread.

Adversaries might implement countermeasures, such as covering substations or switching off circuit breakers, but doing so might invite a more destructive response.

The delivery of the carbon fibers might be accomplished by low-altitude, pre-

cisely timed, rapid expulsion. Perhaps more likely would be to extract the payload at a higher altitude, then guide it to a precise location and altitude before dispensing the fibers.

Current bomb versions of carbon fiber weapons reportedly are costly, which might hinder the development of this technology. Implementing an artillery shell with carbon fibers may be challenging, but the shell could provide a useful tool on the battlefield where power systems are a factor.

**Thermobarics.** As the name implies, heat and pressure are important characteristics of thermobaric weapons. Rapid pressure spikes are characteristic of conventional explosives. By comparison, thermobarics have a much longer pulse of high temperature and pressure. This makes them much more effective against convoluted targets, such as caves and complex buildings.

Fuel-air explosives (FAE) and nanoparticle explosives share some commonality with thermobarics. A small explosive or dispenser initially distributes the energetic material. An automatic (oxygen-induced) or triggered initiation of the material follows that creates the tremendous pressure and heat.

Whether or not and how thermobarics could be used in a nonlethal scenario is a topic of consideration. The difference between lethal and nonlethal pressures and temperatures may be small and could require both triggering and operational solutions to provide reliable nonlethal effects. The potential for scalable output where the destructive force could be field-adjustable makes this technology worthy of consideration as a less-lethal option.

Thermobaric weapons have been used in several armed conflicts. Reasonable countermeasures are virtually nonexistent. Further research probably is warranted to determine the value of a potential scalable-lethality artillery shell.

**Engine Disruption.** Short- or long-term engine disruption can be an effective nonlethal tool. One way is to block the air filter. An aerosolized solution of polyvinyl alcohol/borate will combine with carbon dioxide to create a sticky polymer that readily adheres to the air filter upon ingestion. With a sufficient quantity ingested, the engine ceases to function as it is starved of air.

The materials are inexpensive and nontoxic, but targeting accuracy is important.

By replacing the air filter, engine operations can resume. Clogging a radiator would be more difficult to remedy. If the air filter is breached, the engine's inhalation of the material will result in severe gumming and its incapacitation.

Various reactive species of materials might disable an engine effectively. Designing the materials for a particular application and delivering the materials to the right place, then dispensing them at the right time are all issues to be addressed.

Immediate engine shutdown might be the only countermeasure and then only if initiated before any active material reached the engine.

**Malodorants.** These are safe chemical compounds that, due to their characteristic smell, are highly repulsive to personnel. (See Figure 1.) Because the effect is primarily psychological, the response to the stimulus cannot be predicted with accuracy. Temporary in nature, malodorants have little collateral effects.

Liquid malodorant could be dispersed directly from a passing artillery shell. Alternatively, the payload could be ejected from the shell, aerosolized and then dispersed at a prime altitude above the target area.

Another malodorant approach involves using "paint balls" or "Calgon" beads that are ejected at a predetermined altitude and rupture upon impact. A microencapsulated version could survive ground impact and remain

poised for passing enemy troops to rupture.

Further, malodorants could be combined with another material, such as an irritant, to create a more effective tool.

Studies have shown cultural and ethnic variability in the degree to which any particular malodorant is objectionable. Further study might be required to find a substance that is universally repulsive. Some success has been found by creating a cocktail of biological odors, such as human waste and vomit.

The quantity of material carried in a shell is obviously limited. Weaponization might be required, although many applications relevant to artillery exist due to the developments of an aerosolizing dispersion generator and a frangible mortar round. ("Frangible" means the shell breaks up into small, lightweight pieces before or during impact.)

A malodorant artillery application warrants further consideration. Because some development work on malodorants already has been completed, costs to deploy this technology could be less than many other options and it could be implemented more quickly.

**Irritants.** These are natural or synthesized chemicals that irritate the respiratory tract, eyes or skin. They can cause burning and watering of the eyes, making it temporarily difficult or impossible to see. Other possible effects include coughing, choking, and skin itching and burning.

One common irritant is tear gas. Another is oleoresin capsicum (OC) derived from chili peppers. Many others are available, and some are in use. They can be dispensed as powders, liquids or fogs.

Most people quickly seek relief from irritants' effects. Less predictable is the response from highly trained and disciplined troops.

Irritants could be dispensed in microencapsulant form, sitting idly until activated by passing troops. Their effectiveness might be further enhanced in combination with another technology, such as malodorants.

Although irritants have the potential to be quite effective, treaty concerns and predictability of response could affect the development of this option.

**Combustion Inhibition.** This is a technology to use against air-breathing motorized vehicles. A chemical agent is introduced into the combustion chamber air intake that interferes with proper combustion of the fuel and stops the engine.

Ferrocene seems to be one of the more promising compounds. A common anti-knock compound in gasoline, it has low toxicity and is effective in very low concentrations.

The chemical could be released by aerosol dispersion, by ruptured encapsulants or in conjunction with another technology, such as airborne microencapsulants.

The engine stoppage is temporary. Once the ambient air and the internal engine air clears, the engine can be restarted.

High winds and rapidly moving vehicles obviously would present a greater challenge. However, if the enemy halted his vehicles briefly at a strategic location, combustion inhibitors could provide a useful advantage. Once the vehicles are halted, friendly forces could fire a continuing barrage of rounds to further inhibit the mobility of the vehicles.

Combustion inhibition could be a useful tool in a commander's arsenal.

**Obscurants.** As a class, obscurants deny or impair the vision of people or equipment. Smoke generators have been in use for many years, obscuring friendly forces from view and impairing the adversary's viewing capability.

Aerosol fog or particulate obscurants are most common. With advancing technology, more capable obscurants are required.

No single obscurant is effective against all sensors and optics. Fog oil and other



Figure 1: Potential Nonlethal 155-mm Artillery Shell with Malodorant Beads



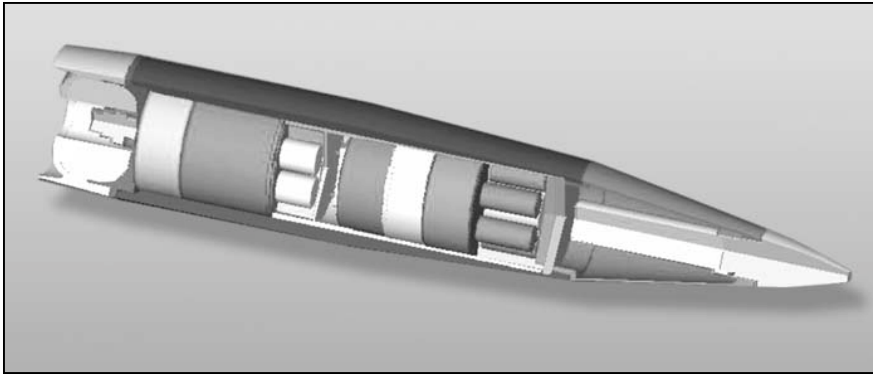


Figure 2: The Compact Biological Unattended Ground Sensor (CBUGS). This small ground sensor originally was designed to be packaged in an artillery shell and will detect biotoxins.

smokes are effective in the visual spectrum. Brass and carbon-based particulates are effective in the infrared (IR) spectrum, but they are toxic, causing respiratory irritation and environmental concerns. Tailored hybrids are being researched that could be effective against both IR and millimeter wave (MMW) technologies. A different type of obscurant designed to coat and harden on the surface of exposed optics and viewing ports could be effective but more challenging to deliver. Further development of obscurants may be warranted.

Properly selected and deployed, obscurants are difficult to counter.

**Flash-Bang and Light Devices.** These interfere with viewing. A flash-bang device typically combines a very loud report with a blinding flash. The combination results in temporary surprise, vision loss, confusion and disorientation without long-term effects. Studies also have shown that intense stroboscopic light will induce nausea and disorientation.

Still other device variations can generate a broadband output of light at high intensity. This explosive device would serve a defensive role and be capable of disabling night-vision optics, heat-seeking sensors and other low-level heat or light equipment.

Flash-bang grenades and similar devices are a mature technology currently in use. The major limitation seems to be the short time of their effectiveness.

Stroboscopic technology is well established, but packaging and delivery are not. These devices probably would need to remain airborne to be effective for an extended period of time. Developing the proper approach and hardware to accomplish this will require some effort.

One concern applicable to all these devices, but probably more so to the

broadband light, is the risk to friendly forces. Friendly personnel and light-sensitive equipment could be affected if these tools are not carefully and thoughtfully employed. However, the extended range of artillery systems could negate this issue.

Flash-bang devices seem to be limited to harassment and demoralization of an enemy. A stroboscopic device would be more effective in disrupting operations for a useful period of time, while high-intensity broadband devices could be very effective against optics.

**Ground Sensors.** These are situated in a relatively fixed location, autonomously collecting and relaying or storing data. Collected data could either be telemetered or archived for later interrogation. Because sensors are passive in nature, they have no direct effect on an adversary.

These devices could sense chemical, biological or radiological materials. They could measure vibration or sound, detect motion or monitor an area with a microphone or video camera. The possibilities are many, depending on the need.

One example is the compact biological unattended ground sensor (CBUGS) that originally was designed to be packaged in an artillery shell. (See Figure 2.) The device monitors the air for the presence of biotoxins. Airborne species are collected and analyzed using laser-induced fluorescence. Having this kind of information available would increase troop safety and allow for a more informed, potentially less-lethal response to an adversary.

Sensors could monitor their surroundings for weeks or months, storing or transmitting the data. Without camouflage, they might be spotted and disabled by the enemy. The technology has been demonstrated, but further weaponization is needed.

**“Smart Dust.”** The miniaturization of hardware and growth of microelectromechanical systems (MEMS) technology has led to the development of smart dust and other tiny sensors. (See Figure 3.) Small enough to be blown in the wind, such a sensor can monitor temperature, motion, humidity and other parameters. Each sensor is self-sufficient with its own power supply and electronics and communications hardware.

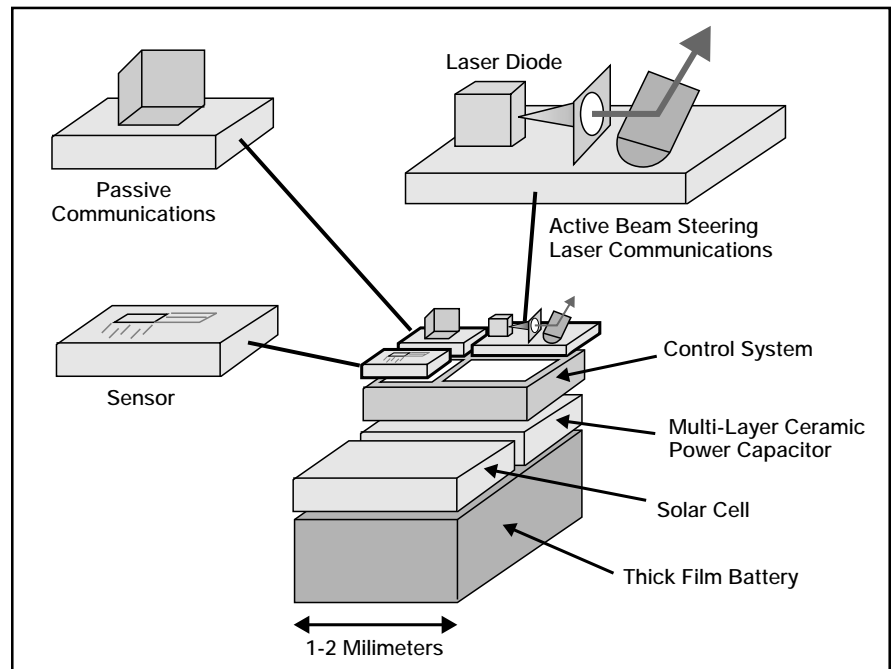


Figure 3: Smart Dust Components



Currently several cubic millimeters in volume, these sensors soon will be the size of a grain of sand. Dozens, hundreds or thousands could be deployed to create a massive network of sensors that would be queried by an interrogator.

Smart Dust could act as “sentries” to provide advanced warning of enemy activities, protecting friendly forces and allowing them to deny the enemy specific terrain. It also might provide battle damage assessment (BDA).

Among the challenges is the development of low-powered, robust communications and energy storage or generation that could operate sensors for months or years. Properly designed, some sensors might be able to stay aloft for hours. Artillery application would require packaging, dispersion and a method for interrogating the sensors.

This evolving technology is being explored by many organizations. The suite of sensors available is likely to expand greatly over the next several years. Though many will be larger than a cubic millimeter, they should be small enough to provide discreet monitoring in the air or on the ground. Smart dust could have a great future as a military tool.

**Taggants.** These mark or identify personnel or equipment for subsequent monitoring or identification. Various paints and dyes, both visible and invisible, can be applied either overtly or covertly. Some are designed to be fluorescent under ultraviolet or other types of light. Taggants may provide the opportunity for a less-lethal response in certain conditions.

The type of taggant that is more likely to be artillery-delivered is the electronic tag. These small devices could be active or passive, providing information to the observer about motion or location. Ac-

tive tags would have batteries and initiate data transmission, while passive tags must be interrogated to provide information. Transmission distances in these devices are currently quite limited.

As a corollary to the smart dust sensor technology, the taggants could be so small and inconspicuous that they might be readily deployed without detection.

**High Power Microwave (HPM).** These devices are in the directed-energy class. A brief, high-powered pulse induces a high-voltage spike in the electronic circuit of the targeted system.

The ability of the microwave energy to damage the intended circuitry is affected by factors such as the surrounding structure, the physical design of the target, design of the circuitry and duration of exposure. The voltage spike can result in electronics that are confused, damaged or destroyed, thus degrading or terminating the device’s ability to operate.

The high microwave frequency (typically between 300 MHz and 300 GHz) is more effective at coupling with the circuits than are lower frequency emissions. Especially vulnerable to HPMs are those systems with an antenna, providing a ready conduit for microwave energy to enter the system.

Countermeasures to HPM are difficult and expensive.

As with many technologies, HPM is size-limited in an artillery application. This in turn will limit the power available and radius of influence. The use of HPMs seems feasible but challenging due to size constraints and flight environments.

A properly designed, built and delivered weapon could be very effective in limiting the warfighting capabilities of an enemy without unnecessary loss of life or collateral damage. With the growing dependence on electronic circuitry on the battlefield, HPM weaponry looks very appealing.

**Foams.** Several types of foams have nonlethal applications. Hardening foams can be used to deny or limit access to vehicles, equipment or buildings. Neu-

tralizing foams are able to decontaminate and neutralize biotoxins and chemical agents.

Sticky foams are useful for crowd control, access denial and mobility restriction. This incredibly aggressive foam sticks so well that it can quickly incapacitate an individual. Sprayed on a door handle, the person would get stuck trying to open the door.

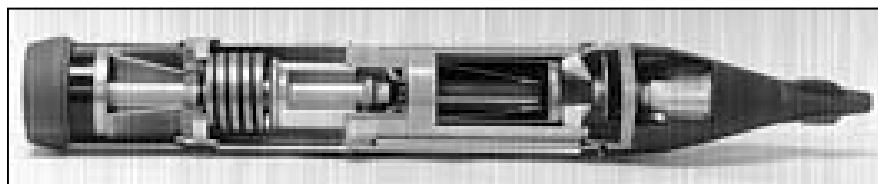
While possessed of intriguing potential, the utility of foams in artillery applications is questionable. The foam’s volume is limited by the projectile size. Coupled with requirements for precise delivery followed by precise application, foams of any type don’t appear to be good candidates for artillery applications.

**Other Technologies.** Dozens of other technologies that are potentially nonlethal in nature probably are not well suited for artillery consideration. For example, super lubricants that are slippery agents and anti-traction compounds are not suitable for artillery delivery. The challenges include volume limits, precision targeting, material dispensing and the general weaponization of lubricants into an artillery projectile.

Other technologies also are not practical for artillery delivery or pose legal or ethical issues that may prevent their coming to fruition in the US. These include super caustics and super acids that attack metal, rubber, glass, concrete or asphalt. Gel agents could cause fuel to gel. Contaminants could destroy the lubricating characteristics of engine oil. Super glue bombs combined with fibers could effectively seal doors to vehicles. Depolymerizers would attack plastic and rubber materials, such as tires. Embrittling agents could severely weaken metal structures.

By class, there are several technologies whose effects are not understood completely and (or) are unpredictable with the potential to cause unintended casualties.

**Acoustics.** Audible or sub-audible acoustics can have significant effects on individuals. Already in use are playing loud, irritating music or shrill tones for long periods of time.



Mock-Up of a 155-mm High Power Microwave (HPM) Round

The indiscriminate effects of this approach could be eliminated by a recent development, called a “sonic bullet.” Precise targeting of the acoustic device allows high-intensity sound to be delivered at a distance while being inaudible to people standing nearby.

Another option, infrasound, that has frequencies below 20 Hz, cannot be detected by the human ear. But infrasound can resonate in human organs and cause pain and other serious effects.

The effects of acoustic devices are unpredictable and not completely understood. In addition, the delivery mechanism must include high-powered, large speakers or very precise targeting.

*Entanglements.* These are designed to mechanically constrain or terminate the mobility of vehicles or equipment. Typically involving some form of a net or wire, the deployed entanglement engages rotating or moving parts, such as wheels, drive shafts, radiator fans and tank treads that are difficult to remove.

Steel can entangle effectively but is heavy, bulky and unwieldy. Better options include high-strength synthetic fibers with strength-to-weight ratios nearly 10 times that of steel.

Attaching metal cubes or wedges could jam tank treads or wheels. Sharpened metal “caltrop” stars caught by rotating engine parts could cut coolant lines and drive belts or perforate radiators.

One option for engaging a passing vehicle could be small barbed caltrops that embed themselves in tires and interfere with the vehicle’s operations. Another possibility might be pre-emplaced, target-activated dispensers. Camouflaging and precision targeting probably would be required.

Packaging and deployment challenges, along with volume limits, make this option difficult to pursue. The affected area would have to be rather small, and countermeasures or subsequent counter-deployment by the enemy are possible.

*Thermite.* These are highly exothermic powdered pyrophoric materials—materials that give off heat during a chemical reaction. Composed of fuel and oxidizer components, reacting materials can reach nearly 3,000 degrees Celsius. Thermite can be designed to ignite under conditions of heat, shock or pressure. The energy liberated in the reaction is similar to high explosives but occurs at a much slower rate.

With an adequate delivery method, thermite could incapacitate vehicles



This shows the aftermath of the Moscow theater siege where a caltivate was used, a class of nonlethal technology that has been banned by the US Department of Defense.

and equipment. Relatively small amounts could burn through aircraft surfaces or vehicle air cleaners with the resultant slag causing the engine to seize. A larger quantity could burn a tire, melt a hole in an intake manifold or burrow holes into a power transformer.

Personnel injury and fire are potential unintended side effects.

*Calmatives.* A class of nonlethal technology that has been banned by the Department of Defense is calmatives. These are chemicals that to some degree have a calming effect on individuals. These effects range from mild relaxation to substantial lethargy to comatose incapacitation.

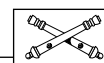
Although the technology is mature and the mechanisms are well understood, the upper bounds of the effects approaching lethality are often unclear. Administration of the appropriate dosage is a challenge. Calmatives often have less than a ten-fold difference between effective and lethal dosages.

The application of a caltivate during the October 2002 siege of a theater in Moscow illustrates the problem. Russian Special Forces pumped a caltivate gas into the theater held by terrorists in hopes of incapacitating the terrorists and, by co-exposure, their hostages. Due to an overdose or an excessively toxic mixture, more than 100 of the 850 hostages died from the effects of the gas.

**Conclusion.** As the battlefield grows increasingly complex, so will demands for nonlethal options. Artillery must be included in this evolutionary process. Thermobaric, high power microwave,

smart dust and malodorants all seem worthy of near-term pursuit. Consideration also might be given to anti-optics (obscurants and light), engine technologies, irritants, carbon fibers and other sensors. With more detailed scrutiny and as technology and the political landscape evolve, these technologies may become more viable candidates.

In the contemporary operational environment, nonlethal artillery is relevant. Such capabilities will prove useful tools in the arsenal of future ground force commanders.



Kenneth L. Black is an Engineer in the Exploratory Systems Technologies Department at Sandia National Laboratories, Livermore, California. He is the Lead Engineer for the “Technology Options for Nonlethal Artillery,” a study that is funded by the Armament Research, Development and Engineer Center (ARDEC), Picatinny Arsenal, New Jersey. Also in the Exploratory Systems Technologies Department, he is involved in defense- and energy-related feasibility studies, as well as global climate change research using high-altitude manned and unmanned aircraft. During most of the previous decade, he served as the Lead Propulsion System Engineer for the Operation and Deployment Experiments Simulator (ODES) Post-Boost Vehicle, an experimental payload deployment bus flown on the Strategic Defense Initiative (SDI)-related Strategic Target System Missile (STARS II). Prior to that, he was a Project Engineer for strategic defense payloads, fusion energy research and nuclear weapons.

# Engineering the Nonlethal Artillery Projectile

By Stephen G. Floroff



As Field Artillery evolves to meet the challenges of future wars against terrorism, the tactical concept of nonlethal fires will undoubtedly gain increasing emphasis. By generating nonlethal protective and suppressive fires as well as special-purpose fires (incapacitants, countermobility and thermobaric effects), the FA will be poised to participate in all aspects of the future spectrum of conflict.

For the first time, the potential exists for both general support (GS) and direct support (DS) artillery units to engage in non-combat scenarios, providing large standoff, nonlethal indirect fires in support of maneuver forces. Nonlethal payloads are being contemplated to control crowds, disable vehicle mobility, provide networked detection and sensing, as well as disrupt radar and communications and electrical power. To achieve these goals, we must re-think the entire munitions delivery concept, emphasizing non-destructive payload delivery mechanisms.

Department of Defense Directive 3000.3, Policy for Non-Lethal Weapons defines them as those that “are explicitly designed and primarily employed so as to incapacitate personnel or material, while *minimizing* fatalities, permanent injury to personnel and undesired damage to property and the environment”[emphasis added].

These seemingly disparate requirements pose unique engineering challenges for the munitions community that, up until now, has concentrated on maximizing destructive terminal effects. The goal now becomes to create a nonlethal carrier or payload delivery mechanism to minimize, as opposed to maximize, collateral damage within a defined target area. The unique challenges associated with achieving this goal form the basis of this article.

Within the nonlethal community, it is generally accepted that any impact exceeding 58 foot-pounds of kinetic en-

ergy will result in a potential fatality. To put this metric into real-world perspective, 58 foot-pounds equates to roughly one-half the impact one would feel being hit by a baseball thrown by a professional pitcher.

How can this metric realistically be evaluated in an indirect fire scenario? One simple and comparatively inexpensive approach is to employ a mortar as a “first cut” tool to evaluate potential nonlethal collateral damage terminal effects.

In September 2000, engineers at the Tank-Automotive and Armaments Command-Armaments Research, Development and Engineer Center (TACOM-ARDEC), Picatinny Arsenal, New Jersey, initiated a program to develop a nonlethal 81-mm mortar munition or “cartridge” using non-traditional materials. The purpose was to develop a cartridge that impacts with nonlethal kinetic energy as described. (See Figure 1 for the cartridge design goals and the technical challenges associated with them.)

## Design Goals

- Minimize mechanical and deployment complexity.
- Minimize negative impact to payload volume.
- Require no special handling, storage or training.
- Be scalable to artillery projectile and missile applications.

## Technical Challenges

- Survive typical muzzle-launch environments.
- Have appropriate fuzing for optimum payload dispersal and effect.
- Require accurate meteorological data at the *target* location—
  - To compute payload dispersal and effect.
  - To ensure kinetic energy criteria is met.

Figure 1: The Design Goals and Technical Challenges Associated with Developing a Nonlethal Mortar Cartridge

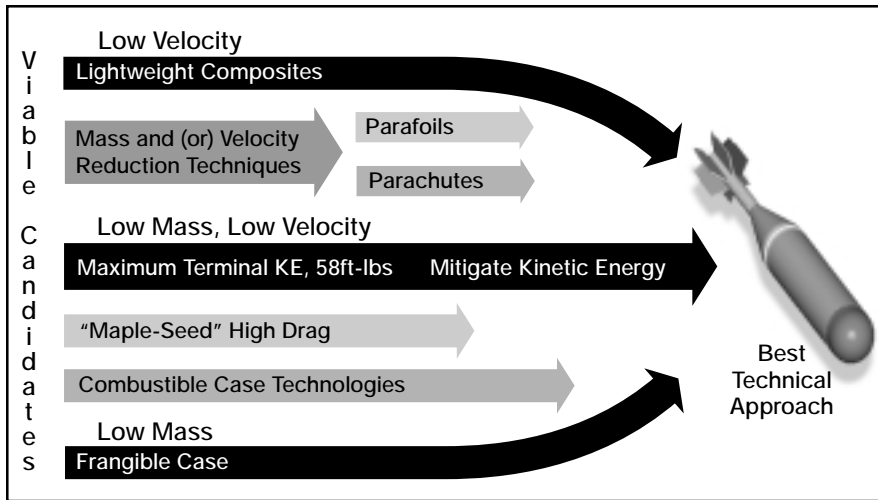


Figure 2: Process to Reduce the Kinetic Energy of a Nonlethal Mortar Cartridge

Many conceptual approaches to reduce the kinetic energy impact of the mortar cartridge are being investigated. Because kinetic energy is mass- and velocity-dependent, minimizing these constituents, either independently or to-

gether, will produce the best technical approach for continued development. This process is shown in Figure 2.

Current considerations include the introduction of “non-traditional” cartridge materials, such as frangible and organic

composites, as well as a completely combustible cartridge case that burns up after dispensing a nonlethal payload over the target area. (“Frangible” means the shell casing will break into small, lightweight pieces before or upon impact.)

More radical approaches to reducing kinetic energy impact include deployable rotors to induce a “winged maple-seed” effect (Figure 3) and the more traditional parachute (Figure 4) to reduce impact velocity. Both of these concepts have advantages and disadvantages and both will be screened against “exit criteria” to rank their relative effectiveness. (See Figure 5.)

While the mortar presents a cost-effective method to evaluate methodologies for delivering nonlethal indirect fire payloads, the technology associated with kinetic energy mitigation is directly applicable to nonlethal payloads for cannons or missiles. One possible approach to a cannon-launched

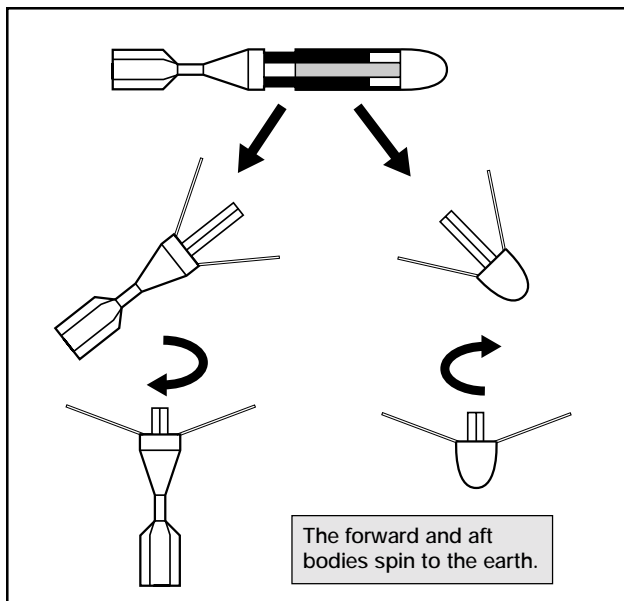


Figure 3: Double-Vane Decelerator. To reduce kinetic energy, the mortar cartridge could deploy rotors to induce the “winged maple seed” effect.

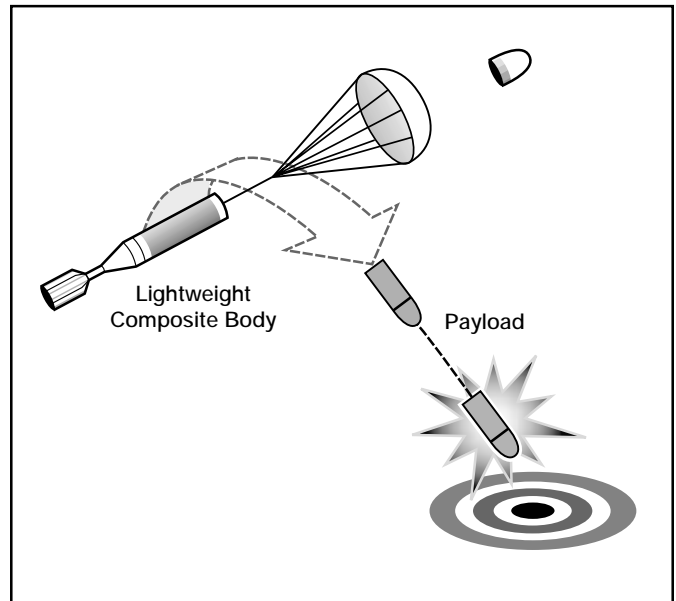


Figure 4: Single Parachute Forward Ejection Cartridge. This is a more traditional approach to reducing the impact velocity of a cartridge. This cartridge would have a fuze in the rear.

Criterion	Threshold	Objective
1. Survive Muzzle Launch Environment	Successful Launch from 200 to 2,500 Meters	150 to 4,000 Meters
2. Projectile Accuracy using Lightweight Nonlethal Casing	Delivery Accuracy to 1 Probable Error (PE) <15 Meters to 1,500 Meters	<1% of Impact Range Beyond 1,500 Meters
3. Fuzing Concept for Optimum Payload Dispersal and Effect	Successful Nonlethal Delivery and Dispense of Generic Payloads Over the Area	
4. Maximum Terminal Kinetic Energy	58 Foot-Pounds	25 Foot-Pounds
5. Scalable Technology		

Figure 5: “Exit Criteria” for the Nonlethal Mortar Cartridge Development Program

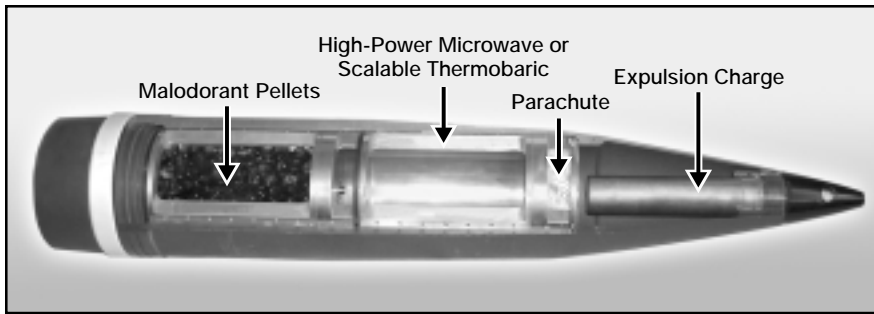


Figure 6: Potential Nonlethal Artillery Shell. This would be a 155-mm improved conventional munition (ICM), requiring no additional crew training to load or fire the round.

nonlethal artillery shell is shown in Figure 6.

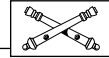
Using a conventional 155-mm improved conventional munition (ICM) round as a carrier, no additional or specialized crew training would be required to load and fire it. Once the round was over a target area, it could eject two cartridges containing various nonlethal payloads. Conceptually, the cartridges could contain malodorant pellets for crowd control and (or) thermobaric or high-power microwave payloads for more specialized mission scenarios.

Nonlethal indirect fire munitions present a unique opportunity for the FA to move into more nontraditional fire missions. The engineering associated with creating and employing these munitions in an indirect fire role is still in

Thanks to the following for their input: Matthew P. Evangelisti, Project Engineer, and Robert D. Worth, Consultant, on the TACOM-ARDEC 81-mm Nonlethal Mortar Program, Picatinny Arsenal, New Jersey, and Susan I. Walker, Science and Technology Advisor in the Depth and Simultaneous Attack Battle Lab, Fort Sill, Oklahoma.

its infancy; however, we understand and are working the technical challenges. We are building and testing prototypes.

What remains is to create and maintain a dialog within the FA community as to the potential and relevance for nonlethal indirect “fires” in the future spectrum of conflict.



Stephen G. Floroff is a Senior Artillery Engineer employed at TACOM-ARDEC at Picatinny Arsenal. During his 24-year federal career, he has been involved exclusively in research and development activities associated with future artillery development. He has been responsible for many artillery weapon prototypes demonstrating robotic ammunition handling, novel recoil attenuation techniques, towed artillery digitization, lightweight howitzer design and, most recently, nonlethal indirect fire initiatives. He has published many technical reports on artillery-related research and development topics and has spoken at national and international weapons and munitions symposia. He holds a Bachelor of Science in Mechanical Engineering from the New Jersey Institute of Technology.

## Branch-Mix CCC: Making a Good Program Even Better

In the Army’s “branch-mix” program, senior first lieutenants and junior branch’s captain’s career course (CCC) in lieu of their own. This program develops junior leaders to better function in the combined arms environment.

In the case of Field Artillerymen participating in the program, adding a distance learning module would improve Redleg skills while increasing their understanding of the combined arms team—making a good program even better.

The FACCC mission is to prepare officers to become battalion and brigade staff officers, fire direction officers (FDOs), task force fire support officers (FSOs) and battery commanders. Students undertake a rigorous 20-week course in gunnery, communications and fire direction systems in a large group followed by small group instruction (12 to 18 students) focusing on tactics, fire support and leadership instruction.

Branch-mix CCCs place FA officers in small group seminars to diversify the course. In these groups, Redlegs improve relations with other combat arms branches and increase their understanding of the combined arms team.

The branch-mix program provides a forum for Infantry, Armor, Air Defense, Engineer and Aviation officers to teach future artillery commanders and fire supporters. Understanding the supported combined arms tactics and procedures enables artillery officers to plan more effective fires and place munitions where and when maneuver commanders need them most. Artillery officers, in turn, educate future combined arms commanders about FA capabilities.

Although FA officers learn a great deal about other branch tactics, techniques and procedures (TTPs) in this program, the lack of gunnery and fire support reviews introduces a sharper learning curve for branch-mix CCC graduates expected to have the latest knowledge of FA TTPs.

Furthermore, branch-mix officers have had less contact with their artillery peers. Career course students benefit from sharing varied experiences, particularly in the FACCC due to the large amount of technical diversity in the branch. For example, those at the FACCC unfamiliar with the advanced Field Artillery tactical data system (AFATDS) learn the textbook directions as well as common

mistakes from experienced FACCC students.

One solution to the disadvantages of the branch-mix program would be distance learning module(s) for FA officers attending another branch’s career course. By way of example, Marine officers complete correspondence course work for the Marine Amphibious Warfare School before attending an Army career course. By completing the FACCC through correspondence, artillery captains would learn the most important skills taught in the FA career course as well as gain a better understanding of the combined arms system.

Fighting to win the nation’s wars requires accurate, responsive fires provided by officers who have a broad understanding of the combined arms team. Adding an FA distance learning module to the current branch-mix CCC requirements for FA officers will increase the artilleryman’s ability to provide these fires and improve his overall career course experience.

CPT Kevin J. Terrazas, FA  
Recent Student, Infantry CCC  
Fort Benning, GA

**N**ovember 2006, a Port City in Southwest Asia: While a Stryker Brigade is engaged in peace enforcement operations, separatists control a key road at the edge of town that feeds into the main markets. In defiance of a UN resolution, the separatists are using their checkpoint to screen various ethnic minorities and prevent them from entering the city. The separatists have set up a roadblock and are guarding it with a squad of soldiers armed with a heavy machine gun.

The Stryker Brigade Commander wants to attack the target, but he must take into consideration the proximity of non-combatants and religious structures. With his effects coordinator (ECOORD), he determines the M982 Excalibur is the best means to attack the target.

A tactical unmanned aerial vehicle (TUAV) accurately locates the manned roadblock. Then a platoon of M777E1 joint lightweight (JLW) 155-mm howitzers from the brigade's direct support FA battalion located 25 kilometers north

of the city receives the fire mission. After all non-combatants clear the checkpoint, the platoon fires three rounds of Excalibur in accordance with established criteria in the fire control system.

The rounds have the impact fuzing option and detonate from one to 10 meters from the separatist squad, killing six, wounding three and destroying the position. Because the impacts were so accurate, the closest buildings suffered only minor damage (broken glass) and none sustained structural damage.

By employing Excalibur, the Stryker Brigade achieved its tactical objective without undermining strategic goals—decreasing the potential for a “CNN effect.”

In this futuristic scenario, the JLW 155 battalion (USMC fielding in FY05 and Army in FY06) fired only three Excalibur rounds to destroy a key target. Today it would take many more rounds to achieve the same effects and likely would result in non-combatant casualties and other collateral damage.

Excalibur will be the Army's first precision, fire-and-forget indirect-fire family of munitions. Excalibur munitions will be cannon-delivered, extended-range, self-guided projectiles. They will be global positioning system (GPS)-guided and inertial measurement unit (IMU)-aided 155-mm munitions fired from digitized cannons.

# Excalibur: Extended-Range Precision for the Army

By Major Danny J. Sprengle, ARNG, and  
Colonel Donald C. DuRant, USAR



M777E1 Joint Lightweight (JLW) 155-mm Howitzer

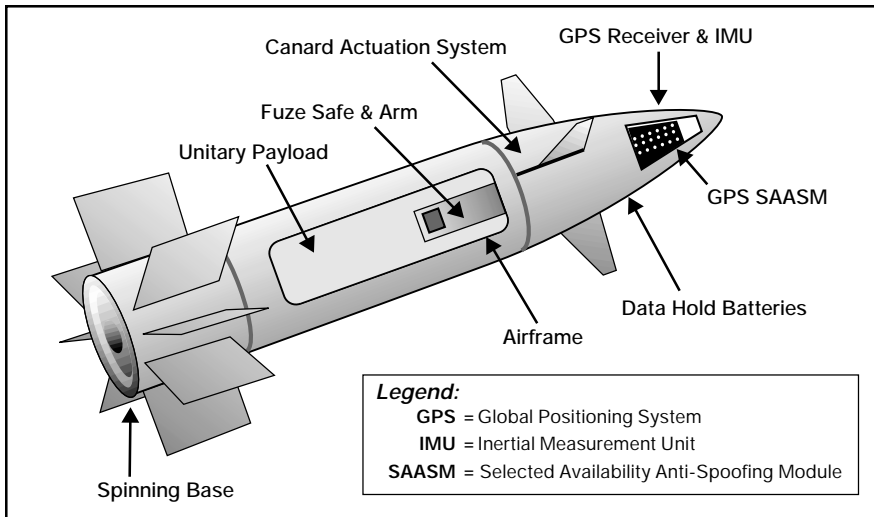


Figure 1: Excalibur Unitary Projectile

Excalibur will be highly accurate. Target and fuze data will be programmed into the projectiles via an inductive projectile programmer, giving it 10 meters circular error probable (CEP) accuracy at ranges of at least 35 kilometers.

The projectiles will accommodate follow-on advanced technology submunitions and (or) guidance and control packages. Munitions planned for development are unitary, smart and discriminating. The first in the family of

Excalibur munitions being developed is the XM982 unitary round, the subject of this article. It is projected for fielding as early as FY06.

**Excalibur Unitary Munition.** The Army's most recent operations have reinforced the need for responsive precision attack of critical point targets, to include those in urban environments or restrictive terrain, under all weather conditions while minimizing collateral damage. The versatile Excalibur will

give the Army that capability; it will have a high-explosive fragmenting/penetrating warhead that has an integral fuze capable of airburst, point-detonating or point-detonating with delay-fuze options. (See Figure 1.)

Excalibur will be stored, requisitioned and distributed through the Class V ammunition supply system that supports the Objective Force. The projectile will require no scheduled maintenance and accommodate technical updates at the depot level to preclude obsolescence. This "technical refresh" will improve the projectile as better technology becomes available, such as an enhanced GPS or IMU capability.

The round will be fired at high-angle quadrant elevations (QEs). High-angle QEs gain maximum acquisition time for the GPS receivers and for guidance components to make corrections along the guided portion of the trajectory. In addition, high-angle QEs optimize range.

Upon leaving the tube, the basal fins will deploy to stabilize the projectile; soon after, the four-axis canards will deploy, moving independently. In conjunction with the slipping obturator, the canards will reduce the "roll-rate" or spin of the projectile. This will allow the round to orient its GPS antennas

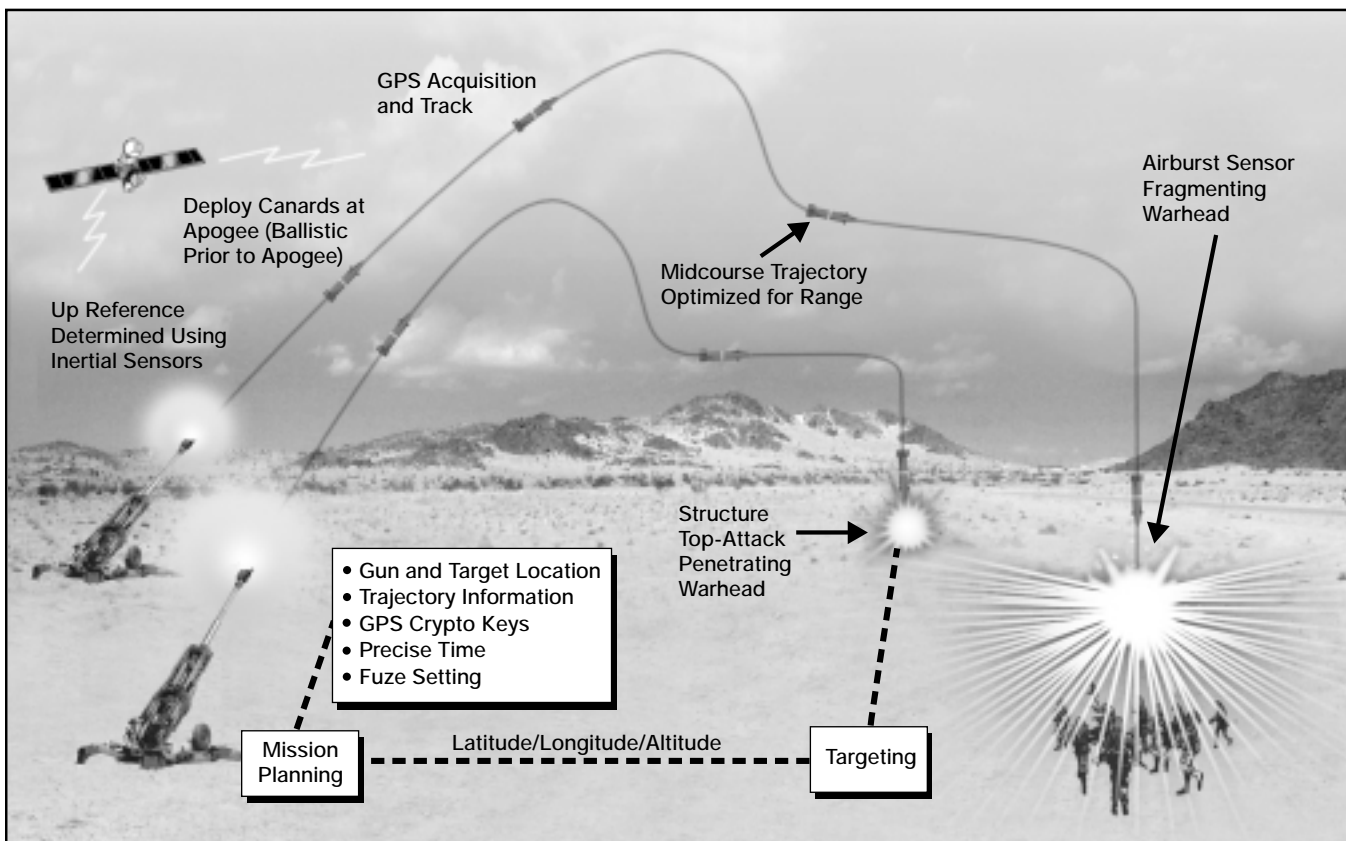


Figure 2: Excalibur Unitary Round Operational Sequence



toward the satellite constellation for rapid acquisition of the GPS signals. The canards then will glide or “fly” the projectile to the target.

Throughout its flight, the round’s GPS position coordinates will be fed into the IMU to steer the round to the target. In the event the GPS signal is jammed after it’s acquired, the IMU will use the last data available to fly the round accurately to the target.

Excalibur’s guidance system will account for winds while gliding. As it nears the target, the round will orient itself to an almost perpendicular angle of attack to the target (which optimizes the blast effects). The fuze will function according to the option selected, and the high-explosive round will detonate on the target. The round’s objective accuracy is a plus or minus 10-meter CEP at any range in its operational sequence. Figure 2 depicts its operational sequence.

Precision will make the Excalibur unitary the indirect-fire projectile of choice for point targets requiring fragmentary effects and for penetrating urban structures. Its fragmenting warhead will be effective against personnel and light materiel targets, such as dismounted infantry and weapons crews, air defense systems, radars and wheeled vehicles. Its ability to penetrate targets will allow for the warhead’s maximum effects inside structures, such as command posts.

**Tactical Applications.** As with many munitions, target description is a key factor in the decision to use Excalibur. But unlike other cannon munitions, target environment is also a key factor.

Excalibur will be the munition of choice when the following requirements or conditions exist—

- *Collateral damage must be minimized.* Commanders will be able to engage targets with the Excalibur unitary in urban operations, making the most of the round’s accuracy to limit collateral damage to the immediate target area. For example, it will be the optimum munition when the enemy uses “hugging tactics”—operates on the periphery of schools, hospitals, churches or congregations of innocent civilians.

- *Complex terrain limits conventional projectiles’ effectiveness.* Excalibur’s accuracy and fuzing options will allow commanders to engage targets protected by these terrain variations.

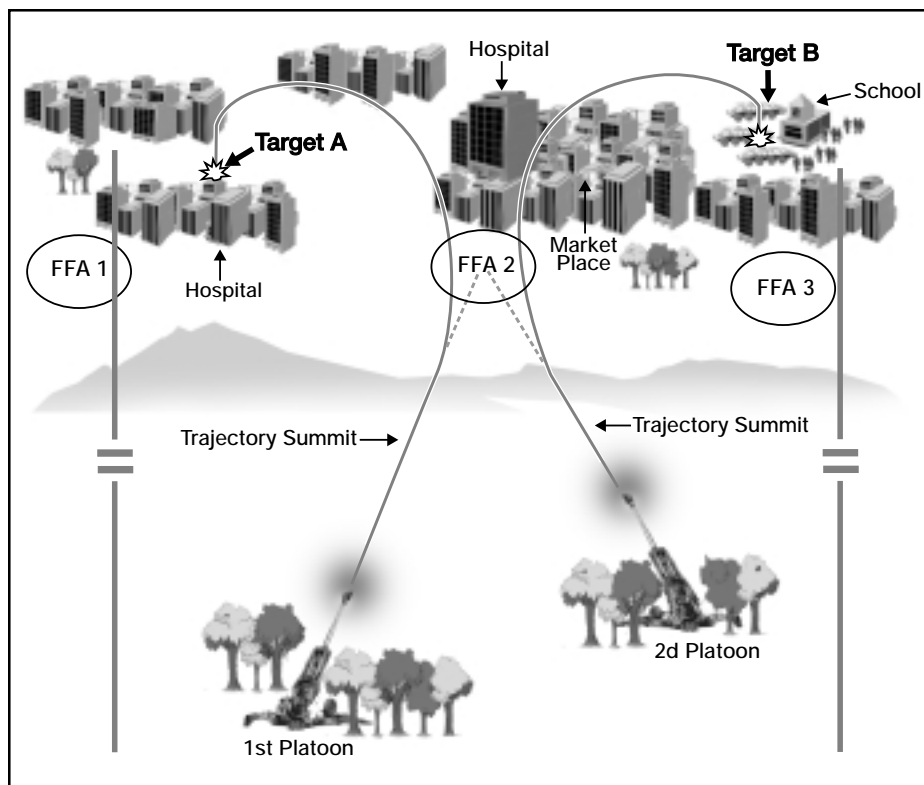


Figure 3: Excalibur Unitary Round in Urban Operations. The trajectory summit is a “decision” point. If the projectile has received orienting data from a satellite, it will continue to the target. If it has not received its data, it will proceed to the indicated free-fire area (FFA).

- *The target is beyond the range of conventional cannon projectiles.* Often Excalibur will be the only cannon projectile able to range a given target.

- *Precise fires on an objective must be maintained to allow friendly assaulting troops to close to within 150 meters of their indirect fires.*

- *Tactical or survivability considerations require platforms to fire from compartmentalized terrain (forest, defiles, urban areas, etc.), in a direction other than directly on line with the target.* The self-guiding projectile will travel nearly vertically (high-angle) as it leaves the firing platform and then alter its flight path (left/right, up/down) to reach the target location.

**Target Location Requirements.** Of the five requirements for accurate, predicted fire, “accurate target location” will become the most critical for employing Excalibur. Because the round is so inherently accurate, the target must be located accurately. Firing Excalibur at an imprecisely located target will result in its precisely missing the target.

The precision of Excalibur dictates the optimum target location error (TLE) be plus or minus 20 meters to defeat targets with fragmentary effects (a 30-meter TLE is acceptable for engaging

exposed personnel) and a plus or minus 10-meter TLE to strike targets within structures (requires a direct hit) and lightly armored targets.

The target acquisition systems on the Knight (formerly called “Striker”), Bradley fire support team vehicle (BFIST) and Comanche helicopter are able to provide this target location accuracy. The future combat system’s (FCS’) reconnaissance and surveillance platform and TUAV also will be able to achieve these TLE accuracies.

While a failure to receive the GPS signal is remote (which would produce a ballistic, unguided trajectory that won’t detonate upon impact), fire supporters must plan for it. A 500-meter radius free fire area (FFA) can be established over a “fail-safe” location to allow the round to safely impact if the GPS signal fails to be acquired. (The fail-safe areas are illustrated in Figure 3 as FFAs 1, 2 and 3.)

The fire control system computes the fail-safe location based on the firing solution. The gun and tube orient toward the FFA without affecting the round’s accuracy as the round guides itself to the target. As with other indirect fire munitions, all other fire support coordinating measures (FSCM) can be applied when using Excalibur.

**Employment Options.** Figure 3 depicts a task force zone in which Targets A and B have been located and selected for attack with Excalibur. Howitzer Platoons 1 and 2 have been chosen to fire these missions. Theater rules of engagement (ROE) strictly limit collateral damage and require positive identification of combatants for indirect fire targets before engagement.

Target A is a communications and command and control (C<sup>2</sup>) node in a densely populated urban area. A TUAV has located it precisely, and a patrol has confirmed the target with “eyes-on.”

Target B is the command post (CP) of a lightly armored battalion-sized force near the edge of the city in an assembly area. The force is not dug in, but it does have local patrols and perimeter security. Friendly forces have positively identified the target. This target is in fairly well-concealed, but not covered, and is in close proximity to farmhouses and a school on the edge of the city.

1st Platoon engages Target A, the commo and C<sup>2</sup> node, and 2d Platoon engages Target B, the CP. With the rounds programmed to glide to their respective targets, they are aimed toward FFA 2. (FFAs 1 and 3 also were aiming options.) The guidance system will correct the course of the round to its target. Aiming toward FFA 2 is only a safety precaution.

From a single, high-angle gun-tube orientation, Excalibur projectiles can maneuver to attack targets anywhere in an “inverted” heart-shaped footprint approximately 40 kilometers long and 60 kilometers across at its widest point with the bottom of the footprint to the rear of the platform. (See Figure 4.) The advantage is that cannon positioning and gun-tube orientation is not rigidly tied to the gun-target line or limited to clear fields of fire to engage targets accurately.

Cannons can fire from small clearings in the middle of a forest, from defilade positions or from behind a tall structure or cliff. These positioning options increase the flexibility and responsiveness of Excalibur fires and cannon survivability. The Excalibur unitary projectile will give Field Artillerymen new ways of delivering steel on target. How-

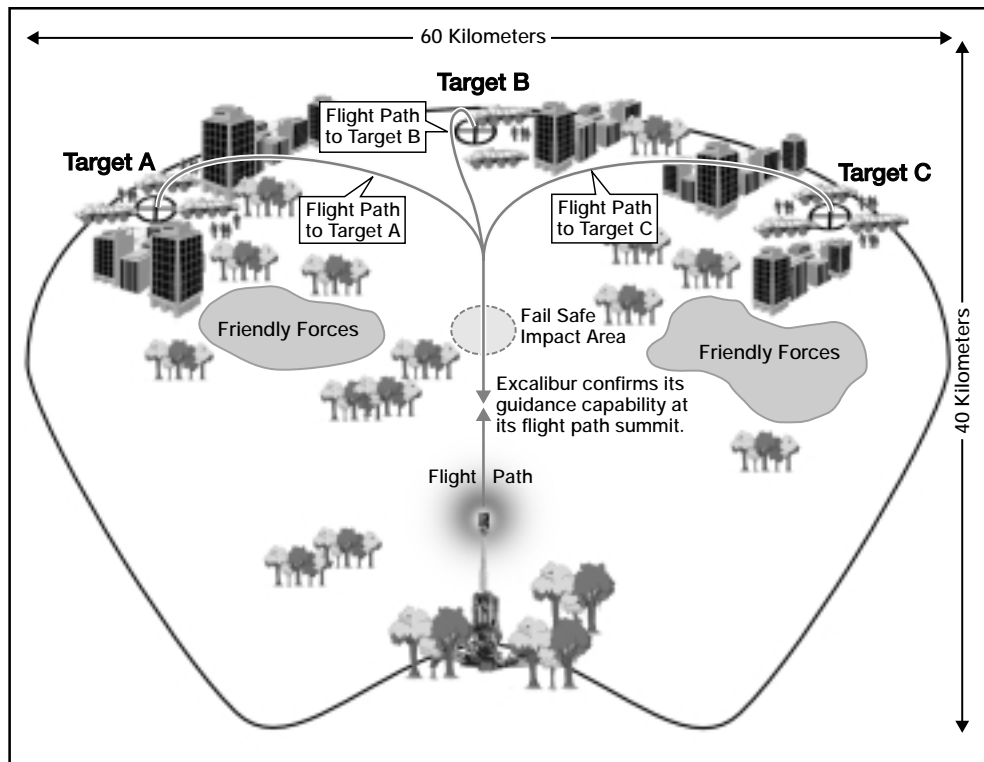
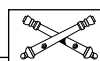


Figure 4: Excalibur's Guided Trajectory Induced Footprint

ever, the mission remains the same: provide responsive, effective fires in support of maneuver operations.

The versatile Excalibur unitary round will give the maneuver commander more options for effects across the spectrum of conflict when fighting an enemy in the contemporary operational environment (COE).



Major Danny J. Sprengle, Army National Guard (ARNG), a Title 10 Active-Guard-Reserve Officer, is the User Representative for the Excalibur Program in the Office of the Training and Doctrine Command (TRADOC) System Manager Cannon (TSM Cannon), Fort Sill, Oklahoma. He has served

in various fire support positions and commanded C Battery, 6th Battalion, 1st Field Artillery, 1st Armored Division in Germany. He is a graduate of the Command and General Staff College, Fort Leavenworth, Kansas. He will graduate from the University of Oklahoma with a Master of Public Administration with a concentration in Emergency Management in April 2003.

Colonel Donald C. DuRant, US Army Reserve (USAR), is the Smart Munitions User Representative in the Office of the TSM Cannon, Fort Sill. He has 17 years' experience in Field Artillery Combat Developments. In the USAR, he is the Chief of Task Force Alpha, 2d Simulation Exercise Group, 1st Brigade, 75th Division (Training Support) at Fort Sill. He holds an MA in Management from Webster University, St. Louis, Missouri.

## Joint Standardization with the Acronym DOTMLPF

Given the inherent jointness of contemporary operational environment (COE) military operations, the Training and Doctrine Command (TRADOC) is replacing the Army acronym “DTLOMS” with the joint acronym “DOTMLPF”: doctrine, organizations, training, materiel, leadership and education, personnel and facilities. The new acronym applies to all services. The Chairman of the Joint Chiefs of Staff Instruction 3010.020A, “Joint Vision Implementation Plan” introduces the joint acronym.



# TRANSFORMATION

## Bringing Precision to MLRS Rockets

By Lieutenant Colonel Jeffrey L. Froysland, USAR

**I**ncreasing the precision of multiple-launch rocket system (MLRS) rockets will provide greater lethality and effectiveness and, for the first time, allow MLRS to engage targets near friendly forces or noncombatants. Pre-

viously, it was considered too dangerous to engage these targets with MLRS fires.

This article discusses the guided MLRS (GMLRS) rocket and guided unitary rocket, both under development,

that will increase MLRS employment options in future combat scenarios, limiting dangers to friendly forces and non-combatants and damage to structures protected by the rules of engagement (ROE).

These new precision rockets also will eliminate some of the disadvantages of MLRS fires, such as lack of range relative to potential enemy multiple rocket launch systems (MRLs) and MLRS' submunition dud rate. First, a quick look at MLRS history illustrates a few challenges in employing MLRS fires.

**MLRS History.** In the early 1980s, MLRS, first known as the general support rocket system (GSRS), was designed to supplement division- and corps-level cannons and deliver large volumes of fires in a very short time against critical, time-sensitive targets. At that time, MLRS was a free-flight artillery rocket system that greatly improved the conventional, indirect fire capability of the Army. It was used for counterfire, suppression of enemy air defenses (SEAD) and to destroy light materiel and personnel targets. The natural dispersion of its rockets' payloads allowed most targets to be engaged without multiple aiming points.

However, the system presented some challenges. MLRS accuracy restricted it to area targets in open terrain where collateral damage was not an issue. Additionally, with a range of 31.5 kilometers, MLRS was outranged by a majority of foreign MRLs. Therefore, during the last 10 years, MLRS improvements have focused on upgrading launcher responsiveness and enhancing the range and precision of its munitions.

Although MLRS performed well during Operation Desert Storm in 1991 in the Gulf, its rockets and submunitions raised serious concerns. Many Iraqi artillery assets outranged MLRS rockets. Also, the high submunition dud rate caused concern for the safety of friendly soldiers or noncombatants passing through impact areas.



Guided MLRS (GMLRS) at White Sands Missile Range, NM. Photo by Tom Moore

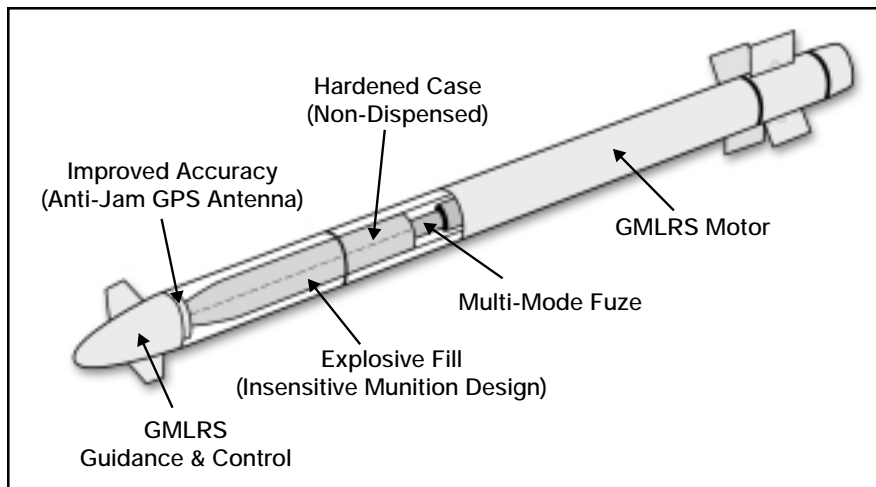
These shortcomings resulted in the requirement for a rocket with extended range and a substantially lower submunition dud rate. As an interim measure until a guided MLRS could be produced, the extended-range MLRS rocket (ER-MLRS) that has a range of 45 kilometers was developed, although limited quantities of the rocket were manufactured.

In Bosnia and Kosovo, the MLRS family of munitions (MFOM) with a dual-purpose improved conventional munition (DPICM) warhead severely restricted the targets considered for engagement. Even though MLRS was deployed, not one rocket was fired because of the lack of precision and potential for collateral damage as well as the high submunition dud rate.

**GMLRS.** In more recent years, the Army's ability to protect itself from long distance attack has been eroded with the proliferation of long-range rocket and cannon systems. To counter this, the US Army Missile Command's Research, Development and Engineering Center, Redstone Arsenal, Huntsville, Alabama, with support from private industry, began working on a GMLRS to replace the basic (M26) and ER-MLRS (M26A2) rockets. GMLRS will extend the range of MLRS fires to more than 60 kilometers and substantially improve MLRS accuracy. GMLRS will provide the same lethality as the M26 and M26A2 with far fewer rockets.

Unlike the accuracy of the traditional free-flight MLRS rocket that degraded as the range to the target increased, GMLRS' guidance system will provide consistent, improved accuracy from the minimum range of 15 kilometers to a maximum of 60 to 70 kilometers. The guidance system is based on an inertial measuring unit (IMU) aided by a global positioning system (GPS) that produces an accuracy deviation of less than one mil at all ranges.

GMLRS will enhance the ability to conduct precision strikes, reduce the number of rockets required to defeat a target and extend MLRS' range 15 kilometer beyond that of the ER-MLRS. The extended range will allow commanders the flexibility to attack more targets farther away, both laterally and at depth. MLRS fires will protect the force by fixing and destroying the enemy at depth, thus helping to achieve favorable force ratios to set the conditions for tactical success.



Guided Unitary Rocket. This precision rocket will be guided by an inertial measuring system (IMU) that is aided by a global positioning system (GPS) and have a range of 15 to 60 or 70 kilometers. It will have a multi-mode fuze: proximity, point-detonating and delay.

However, as effective as GMLRS will be against long-distance targets, it will not be well suited for target engagements in heavy snow or forested, urban, complex and restrictive terrain. Debris caused by the warhead skins, nose cone and rocket motor could cause unwanted collateral damage. Knowing and understanding the limitations of GMLRS will be critical for its optimal employment.

GMLRS is a five-nation system development and demonstration (SDD) effort (United Kingdom, France, Italy, Germany and the US). The program is in the production qualification testing phase of the SDD life-cycle model. MLRS has test fired GMLRS 73.5 kilometers very successful to date. Initial operational capability (IOC) will be in FY06.

**Guided Unitary Rocket.** The Army's Objective Force must have an organic capability to deliver fires in all types of terrain and weather within a fully networked architecture to provide destructive fires at both point and area targets and protective and suppressive fires in the required scalable quantity to support the maneuver commander. (See the figure.)

The guided unitary rocket will provide these capabilities. It will reduce collateral damage to civilian property and noncombatants, decrease the risk of unexploded ordnance on the battlefield and be employable in heavy snow and forested, urban, complex and restrictive terrain.

It is envisioned that the guided unitary rocket will have a GMLRS motor and a 200-pound insensitive munition (IM) fragmentation warhead. The unitary

rocket will use the same guidance hardware as GMLRS with modified GPS filters combined with an anti-jam antenna and have the same range as the GMLRS rocket.

Its fuze mechanism will have multiple options: proximity, point-detonating and time-delay fuzes. The proximity fuze will provide a large burst over the target that will equal the radius of the GMLRS DPICM rocket. The point-detonating fuze will reduce the size of the burst and collateral damage, while the time-delay option will permit the rocket to penetrate certain types of structures or targets and then detonate.

The tri-mode fuzing will allow military planners to tailor the munition's effects to the mission requirements. The effects coordination center (ECC) will be able to rapidly deliver discrete or volume fires with superior munitions effects from the same rocket pod. In fact for the first time, rockets may be an option for "danger close" missions.

Current MLRS must fire relatively large numbers of rockets per engagement, which limits the number of targets it can engage and increases the firing unit's exposure to counterfire. It also limits the commander's operational flexibility. The guided unitary rocket could eliminate these inherent problems while achieving the desired effects with fewer rockets/less ammunition support and less collateral damage.

Bottom line—the guided unitary rocket will provide the maneuver commander a wider range of attack options and more effective support.

**Supporting the Objective Force.** The Army requires systems that will enable

the Objective Force to dominate future ground combat across the full spectrum of operations and provide responsive, strategic maneuver as part of a joint task force.

The guided unitary rocket is the next step in the evolutionary development of MFOM. This is especially true as the high-mobility artillery rocket system (HIMARS) will be able to fire all the MFOM, including the guided rockets. HIMARS and the MLRS guided family of munitions will support distributed operations on a nonlinear battlefield or in a forced-entry scenario.

Although the Objective Force certainly requires precision missiles and rockets carrying discriminating submunitions, future munitions must be smarter, faster to the target and communicate not only with the supported force, but also with each other. They must be able to loiter within the target area, recognize and identify specific targets, provide targeting information and intelligence, en-

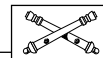
gage the designated target and provide battle damage assessment (BDA).

Future munitions will be able to defeat a range of point targets, whether moving/stationary or hard/soft. They may incorporate both user-assisted and robust automatic target recognition (ATR) and growth potential to accommodate future technological advances.

They may be compatible with our current platforms or be vehicle independent. Such systems may consist of a loitering, precision attack missile shipped and fired from its own missile canister that has a computer, communications system and mission management application software on board.

They will be able to operate with and support coalition and joint forces or operate independently in a widely dispersed environment. Before and after hostilities, these systems will provide a responsive deterrent presence for peacekeeping operations with the potential to include less-than-lethal or nonlethal capabilities.

The precision of the MLRS guided family of munitions is the first step in providing the maneuver commander the long-range rocket fires and effects he needs to win on any battlefield.



Lieutenant Colonel Jeffrey L. Froysland, US Army Reserve (USAR), Acquisition Corps, is an Assistant Training and Doctrine Command (TRADOC) System Manager for Rocket and Missile Systems (TSM RAMS) at Fort Sill, Oklahoma. He is responsible for all the Multiple-Launch Rocket System (MLRS) rocket programs in the TSM office. He served in the active Army Field Artillery in Korea and Germany, leaving the Army as a captain in 1989 to go to work for the Directorate of Combat Developments at the Field Artillery School, Fort Sill. He is a graduate of the Materiel Acquisition Manager's Course, Fort Lee, and Program Manager's Course, Fort Belvoir, both in Virginia, and holds an MBA from Oklahoma City University.

# Online Go-to-War Primer:

## FA Bulletin Articles 1990-2003

Online at the *Field Artillery's* homepage ([www.army.mil/famag](http://www.army.mil/famag)) are more than 100 articles published since 1990 that outline tactics, techniques and procedures (TTPs) for operating in remote areas of the world and for meeting challenges Army and Marine Field Artillerymen/fire supporters face in combat.

The Primer lists each article/interview and includes the author(s), the author's unit or organization, the edition in which it was published with the page numbers, and a brief description of its contents. The articles are grouped in seven categories, as shown in this article with an eighth grouping listing the acronyms used in the descriptions of the articles.

Users can open each article by double-clicking on the underlined edition/page listing, which is linked to the article. The articles are in PDF format. On the first page of the instructions, users have the option of downloading the free Adobe Acrobat PDF Reader software by double-clicking on the link, as necessary.

**1. Desert and Related Articles**—Covers Gulf War, Afghanistan and Kuwait plus has articles such as "Survey for Remote Areas," "Firefinder Initialization with Limited Map or Survey Data," "Paladin Defensive Positioning in Open Terrain," "Low-Angle Fires for MOUT," "The Scud Battery," etc.

**2. Faster and More Accurate Fires**—Includes recent articles with TTPs specifically designed to reverse fire support negative trends at the Combat Training Centers (CTCs).

**3. Digital Assistance**—Covers initial fire support automation system (IFSAS)-advanced FA tactical data system (AFATDS) interface challenges, the advancing capabilities of AFATDS, TTP for a digital interface between AFATDS and Kiowa Warrior, etc.

**4. FA Battalion Operations**—Covers the platoon, battery, battalion and task force levels.

**5. Forward Observer (FO)/Fire Support Team (FIST) and Fire Support Officer (FSO)**—Covers the FO/FIST and company, battalion and brigade FSO levels.

**6. Division, Corps and Above**—Covers division task force operations in Kosovo, Bosnia and Panama; information operations (IO) and nonlethal targeting; joint air operations; Marine expeditionary force (MEF) and Marine air ground task force operations; and Q-37 operations.

**7. Foreign Artilleries**—Covers Egyptian, Israeli, Ukrainian, Bosnian, German, Russian, Republic of Korea and North Korean artilleries.

If users have questions or problems accessing the articles, email the magazine staff at [famag@sill.army.mil](mailto:famag@sill.army.mil).

Ed.



C/1-319 FA, 82d Div Arty, Afghanistan

# Transforming the FIST for the 21st Century

By Major David S. Flynn



**A**fter Operation Anaconda in Afghanistan, much has been written pertaining to fire support in the contemporary operational environment (COE). Major General Franklin L. Hagenbeck (the interview “Afghanistan: Fire Support for Operation Anaconda”) and Lieutenant Colonel Christopher F. Bentley (in his article “Afghanistan: Joint and Coalition Fire Support in Operation Anaconda”) articulated in the September-October 2002 edition of the need for forward observers (FOs) to transform into Universal Observers. Lieutenant Colonel Vance Nannini outlined this need in the article “Universal Observers: Punching Our FIST into the 21st Century,” May-June 1997. Major General Michael D. Maples, Chief of Field Artillery, indicated in his “2002 State of the Field Artillery” article in the November-December 2002 edition that the Field Artillery will pursue the Universal Observer concept.

The time to act is *now* as we move toward the Objective Force in 2008.

This article focuses on specific needs of the dismounted FO. The FA community must demand that we adjust modified tables of organization and equipment (MTOEs) across each of the light divisions to ensure our FOs have the latest technology that can be acquired off-the-shelf today. To move the FO toward becoming the Universal Observer, he needs better radios, night-vision goggles (NVGs), an infrared (IR) laser pointer and a radar transponder beacon.

**Radios.** The cornerstone of an FO’s ensemble is the radio. Essentially, it is more important than his individual weapon.

We as Field Artillerymen take our communications seriously. Take a look at the communications suite we provide an M119 howitzer section; it includes a

mounted single-channel ground and airborne radio system (SINCGARS), gun display unit (GDU), PRC-126/127 or variant and a GRA-39 for wire communications. That’s four communications platforms that can process both voice and digital messages.

We need to place similar emphasis on communications for our dismounted FOs in terms of expanded capability and redundancy. A mechanized fire support officer (FSO) fights from a fire support team vehicle (FIST-V) or Bradley FIST vehicle (BFIST-V) equipped with four radios for maximum flexibility. Traditionally, a dismounted FSO/FO carries only one FM radio due to weight and carrying-capacity restrictions.

However, technology has evolved and produced radios light enough for one man to carry multiple communications platforms. A dismounted FSO now can approach the communications capabilities

of a mechanized FSO. FISTs need expanded communications to enhance their situational awareness and interface with Army and joint sea and air fires assets.

Two radios that Lieutenant Colonel Bentley said the FISTs must have are the multi-band inter/intra team radio (MBITR) and the PRC-117F.

The MBITR has been fielded to Special Operations Forces (SOF) as well as to selected conventional infantry units. The problem is that the MBITR has not been uniformly fielded to FISTs.

This radio weighs 2.2 pounds, including the battery and antenna, and can communicate ground-to-ground or ground-to-air via FM, UHF or VHF frequencies and is satellite communications- (SATCOM)-capable. For the FIST, its primary function would be for intra-team communications and enhanced situational awareness throughout the company fire support system. It also could serve as back-up communications with a firing asset, whether or not the asset is an indirect fire system or an aerial fire support platform.

The MBITR is programmed to be a component of the Land Warrior ensemble for infantry soldiers beginning in FY05 and beyond. The FO assigned to a unit equipped with Land Warrior also will receive an MBITR. Full fielding of Land Warrior for the entire Army will not be complete until 2012.

We cannot wait that long to field a radio that is available today and has been battle-tested during Operation Enduring Freedom in Afghanistan. We must act *now*.

Each FIST would require five MBITRs—one per FO, fire support NCO (FSNCO) and FSO. The MBITR



FIST's Multi-Band Inter/Intra Team Radio (MBITR)

would serve as one of two radios carried by each fire supporter.

The primary radio for each fire supporter should be the PRC-117F also currently fielded in SOF. The PRC-117F is UHF-, VHF-, FM- and SATCOM-capable. The expanded capabilities of this radio are beyond the scope of this article, but the point is it would enable the FO to talk to aircraft or fire direction centers (FDCs) at great distances across multiple frequency bands.

Given the joint environment in which we are fighting and will continue to fight, a single-band FM radio, such as the current SINCGARS with advanced system improvement program (ASIP), limits our abilities to execute fires on the battlefield. The PRC-117F would be the FO's primary radio to direct fires and provide terminal control.

With two radios, each fire supporter would be able to coordinate and call-for-fire simultaneously, thus streamlining the sensor-to-shooter link. Today's FIST cannot do that effectively with current radio densities.

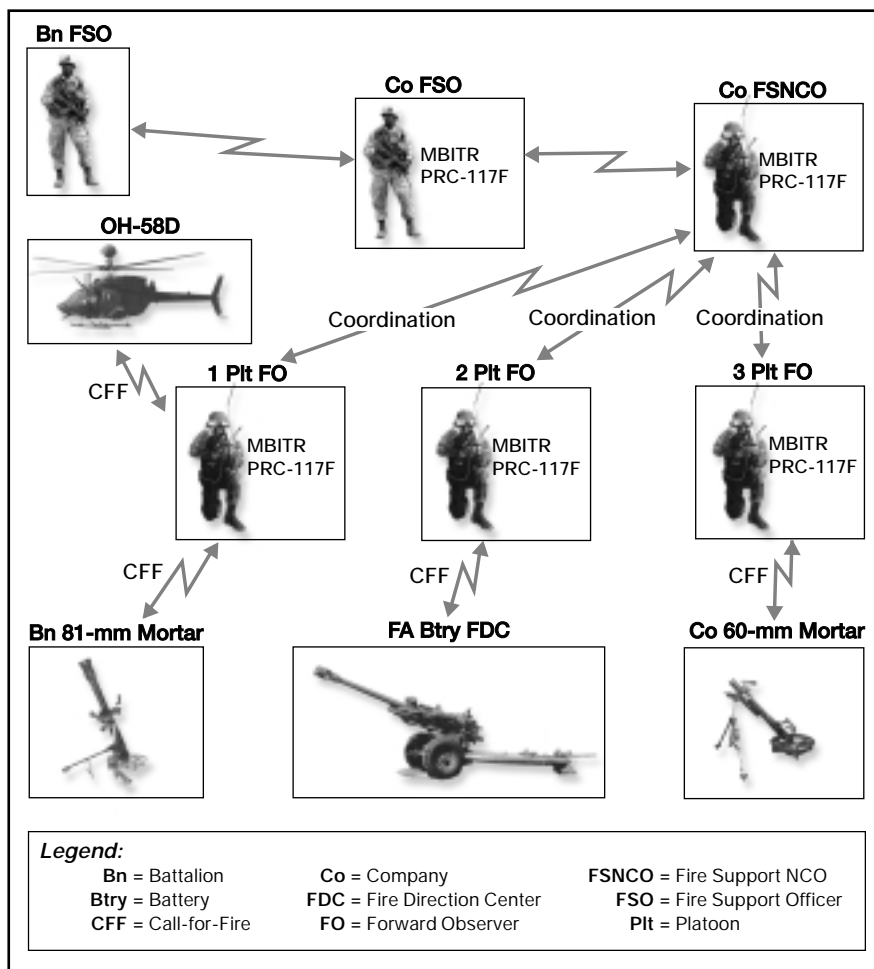
With two radios, a company FSO would be able to employ the pre-designated or decentralized method of control without losing situational awareness. An FO could communicate with his FSNCO via an MBITR and talk to a mortar or artillery FDC via the PRC-117F.

Too often today's platoon FOs must relay calls-for-fire when they should be able to speak directly to the asset. The figure depicts coordination conducted via the MBITR while the FO executes calls-for-fire with the PRC-117F.

**NVGs, IR Laser Pointer and Beacon.** In addition to acquiring radios, the FO needs much of the equipment common to infantry soldiers, such as a pair of PVS-14 night vision goggles (NVG) and the PEQ-2A or B model IR laser pointer. Some units are beginning to field this equipment but not as a standard.

Every FO who walks beside an infantryman should have the ability to employ an IR pointer to direct an aerial platform onto a target or his commander to a target for approval to engage under night conditions. It seems these items have not drawn significant attention in the FA community because they have been viewed as infantry-specific but, nonetheless, are critical to an observer's success at night.

If we expect our observers to be terminal air controllers, and we should, they'll also need a beacon, such as the SMP-100 microponder. This small hand-held



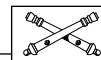
Pre-Designated or Decentralized Method of Control Using MBITRs and PRC-117Fs

device enables aircraft with I-band radar systems, such as the AC-130 or F-15E, to track friendly units precisely under all weather conditions. This device helps the controller provide an aircraft the precise location of the target under adverse weather conditions as well as self-location to prevent fratricide.

The challenge to acquiring this equipment for our observers is getting the funding. It's time we start looking at our FO teams as systems rather than simply as personnel. It seems much money is devoted to acquiring new systems to make the Army more effective, and the FO team should fall into this realm.

Whether or not one agrees with the need for the specific equipment mentioned in this article is not important. What is essential is that we transform our observers into the unique entities their potential for Army effectiveness warrants—take action to ensure they remain relevant—as we proceed toward the Objective Force. We can start this process through a robust force modernization program that equips our FISTs with the latest technology reasonably available.

Finally we must upgrade our tactics to leverage current and emerging technology. We owe it to our FOs and the infantry they support to transform our FOs into Universal Observers.



Major David S. Flynn, until recently, was a Fire Support Instructor for the Field Artillery Officer Basic Course at the FA School, Fort Sill, Oklahoma. Currently, he is a student at the Command and General Staff College, Fort Leavenworth, Kansas. In his previous assignment, he was a Battalion Fire Support Officer (FSO) for the 3d Ranger Battalion, Fort Benning, Georgia. In the 82d Airborne Division at Fort Bragg, North Carolina, he was the Commander of B Battery, 2d Battalion, and Executive Officer of A Battery, 3d Battalion, both with the 319th Field Artillery Regiment; Assistant S3 of the 82d Division Artillery; and Rifle Company FSO for A Company, 2d Battalion, 504th Parachute Infantry Regiment. In addition, he was a Multiple-Launch Rocket System (MLRS) Platoon Leader in A Battery, 6th Battalion, 37th Field Artillery, part of the 2d Infantry Division in Korea.

# JCAS in Afghanistan: Fixing the Tower of Babel

By Lieutenant Colonel John M. Jansen, USMC; Lieutenant Commander Nicholas Dienna, USN;  
Major Wm Todd Bufkin II, USMC; Major David I. Oclander, USA;  
Major Thomas Di Tomasso, USA; and Major James B. Sisler, USAF

*This article is a combination of two submitted by the authors itemizing joint close air support (JCAS) shortcomings in Operation Anaconda and recommending doctrine and tactics, techniques and procedures (TTPs) to fix the shortcomings. The authors' contend that JCAS procedures in Afghanistan were dangerous for our joint forces and imply that JCAS in Iraq, if we go to war in Iraq and use the same procedures, could result in fratricide—given the predictable increase in the size, tempo and intensity of combat operations.*

*Two of the authors are pilots who flew in Operation Anaconda. Two more are pilots who have flown combat missions over Afghanistan in support of Operation Enduring Freedom.*

*This article deserves a serious read. The two original articles in their entirety, along with this article, are online in PDF format in our Go-to-War Primer, Category 1, "Desert and Related Articles," at [sill-www.army.mil/famag](http://sill-www.army.mil/famag).*

Editor

**“Babel: In the Old Testament, a city in Shinar where the construction of a heaven-reaching tower was interrupted when the builders became unable to understand one another’s language.”**

*The American Heritage Dictionary of the English Language  
Houghton Mifflin Company, New York, 1992, Page 132*

**P**arked in the North Arabian Sea, the *USS John C. Stennis* catapults a section of F/A-18 Hornets into the night. Lead and Wingman each are armed with one joint direct attack munition (JDAM), one air intercept missile (AIM)-9 and 500 20-mm rounds. They head north to provide on-call CAS in support of Operation Anaconda.

As they arrive over the Shah-e-Kot Valley, Lead switches the auxiliary radios to the tactical air direction (TAD) frequency given to him by the airborne warning and control system (AWACS). He maintains AWACS in the prime radios.

He has been given no mission brief up to this point. He has not been given a control point (CP) that designates his CAS holding point. He knows what unit



is on the air tasking order (ATO) and that that is where the action is, but he doesn't know where other friendly forces are or what the enemy situation is on the ground. He has a frequency and a terminal controller's call sign.

After establishing communications with the terminal controller, the controller has Lead advise when he is ready to copy the 9-line CAS briefing. "Ready," Lead responds.

The controller starts off: "Lines 1-3, N/A."

"Roger that..." says Lead as he and Wingman dodge the co-altitude EP-3 and pass over a Predator, an unmanned aerial vehicle (UAV), flying a couple of thousand feet below them. They copy the abbreviated 9-line briefing and prepare for the attack.

All the controller wants is to give the pilots a precise coordinate, have them program the JDAMs and "Let em' rip." The target is a "mortar pit."

Lead asks for an attack axis, which the controller provides. The altitude is a round number: 9,800 feet. (Hmmm...)

Wingman takes the high-cover position as they go through the careful process of verbally crosschecking the accuracy of the precise coordinates.

Then another voice breaks in on the TAD frequency. It is another controller who immediately proceeds to provide a different 9-line briefing. The two controllers then engage in a free-text, plain English discussion of who gets the aerial fire support.

"What's your target?"

"Mortars."

"So is mine."

"Well, are yours *firing* at you?!?"

"No."

"Hey *listen*, have you cleared this through the brigade ALO [air liaison officer] or the FSC [fire support coordinator]?"

Gas for the jets starts to become an issue. The terminal controllers sort out the priority of fires and Lead delivers his JDAM. It misses the target by 200 feet. (*JDAM?*)

The controllers decide to switch to a different mortar pit and the pilots again go through the process of crosschecking the coordinates being entered into the weapons system. The altitude given is, again, a round number: 10,200 feet. (What are the odds of that?)

As Wingman (Dash 2) sets up his attackrun, the AWACS controller comes on the common frequency to let them know a B-52 is "Cleared Hot" to drop leaflets. Dash 2 jumps on the auxiliary radio to assure Lead that he has not been fooled by the terminology and that he knows the clearance given on prime radio was not his.

Dash 2's JDAM misses. It is off by 150 feet.

Lead asks for the bomb hit assessment. The controller reports that the JDAMs did not hit the targets but did hit close to the targets. After a couple of questions from Lead, the controller acknowledges that there were "No effects on target."

Off target, the outgoing F/A-18s dodge an inbound section of A-10s as the Hornets head toward the fuel tanker.



F/A-18 Hornet launches off the flight deck of *USS John C. Stennis* to strike targets in Afghanistan. (Photo by Photographer's Mate 3d Class Jayme Pastoric).

***“Joint force performance in executing CAS missions is one of the defining expressions of joint operations at the tactical level of war...In Operation Anaconda, we did not execute CAS as an effective joint force.”***



This mission scenario was ineffective and inefficient. Piecemeal situational awareness, an absence of any agreed upon joint procedures, communications discipline that bordered on the dangerous and, ultimately, no effects on target characterized this mission.

This tale is not an embellishment or a composite picture from various missions. It is the summary of an actual mission flown in Afghanistan during Operation Anaconda. Unfortunately, in terms of procedures, communications discipline and situational awareness, this JCAS mission is representative of those flown during that operation.

In the sense that neither aircraft had effects on target, the scenario is not representative of overall operations in Anaconda. Extremely competent and highly trained professionals on the ground and in the air worked together to “make it happen” and delivered deadly fires to the enemy. Ground controllers identified targets and, more often than not, attack aircraft hit those targets.

However, there are enduring themes in this mission that bring into question our ability to effectively and efficiently provide aerial fires in support of the ground combat commander (GCC). Is this a problem? Yes. Will it repeat itself? Maybe.

Joint force performance in executing CAS missions is one of the defining expressions of joint operations at the tactical level of war. At the operational level of war, joint CAS effectiveness can be measured by how well command and control (C<sup>2</sup>) is executed—common operational pictures, ATO, rules of engagement (ROE), control measures, etc. Although some of the most important planning, coordinating and support procedures for JCAS are at the operational level, the net effectiveness and efficiency of JCAS is manifested at the tactical level where it is executed.

In Operation Anaconda, we did not execute CAS as an effective joint force. Poor CAS performance resulted from a lack of adherence to or even understanding of joint doctrine. Given the prospect for the continued application

of joint operations in the Global War on Terror, we must examine this performance and commit to change...and fast. We must agree to build the operational architecture that’s provided for in *Joint Pub 3-09.3 JTTP for Close Air Support* (online at [http://www.dtic.mil/doctrine/jel/new\\_pubs/jp3\\_09\\_3.pdf](http://www.dtic.mil/doctrine/jel/new_pubs/jp3_09_3.pdf)).

This article examines the shortcomings of JCAS performance in Afghanistan and provides specific operational- and tactical-level TTPs for improving JCAS on a future battlefield.

**Observations from Afghanistan.** The operational and tactical levels of JCAS did not adhere to agreed upon fundamental mechanics. The following section catalogues how the poor implementation of warfighting basics resulted in a level of performance that fell short of the mark.

These performance issues are not “news.” The amount of self-induced friction experienced by all players during the Operation Anaconda was so significant that a JCAS Conference was convened at Al Jaber Air Base in Kuwait immediately after the operation in an attempt to identify and correct the problems.

- While there was some understanding by aircrews of the commander’s intent and the ground scheme of maneuver at the outset of the operation, there was little understanding of how aerial fires supported the ground scheme of maneuver after the infantry took the field. There was even less awareness of where the forces were located and what their objectives were as the operation progressed.

- There was no dedicated, traditional airborne C<sup>2</sup>. The Air Force airborne battlespace command and control center (ABCCC) C-130 was not on the force list. The role was given to AWACS, but it did not have the workstations or the personnel with the right experience to fill the gap. Consequently, aircrews did not receive check-in briefings, updates or procedural control.

- The Army did not have a full-up air support operations center (ASOC) capable of translating the commander’s

intent into a priority of fires. This created confusion/friction as terminal controllers fought for aerial fire support assets on an ad hoc basis over a single TAD frequency.

- There was no traditional control point/initial point (CP/IP) matrix. What was used was a holdover from the initial armed reconnaissance phase of Operation Enduring Freedom, which was nothing more than a simple grid system based on latitude/longitude coordinates that subtended 30 by 30-nautical mile blocks.

This system was adequate for positioning attack/support aircraft for presence missions, holding tracks and refueling tracks, but it was not adequate to enable controllers to construct effective attack missions. This was because no IPs were established for which optimal geometry could be created for the aerial attack runs.

The absence of a satisfactory CP/IP structure and standard procedural control resulted in heavy bombers making attack runs over the top of tactical aircraft that were on attack runs in the same airspace with various helicopters in the same target area.

- A standard communications architecture was not adhered to. Rather than having a discrete TAD frequency assigned to individual terminal controllers or units, a single TAD was used. This was in part due to the requirement for the combined air operations center (CAOC) to monitor all release clearances through AWACS. This created confusion when multiple controllers attempted to control a single aircraft element.

- Standard comms brevity was not used and comms discipline was poor to the point of being dangerous. The following are three examples of joint forces using incorrect or misusing joint military terms, causing confusion.

First, AWACS transmitted “Cleared Hot” relay calls from the CAOC to aircraft on the strike common frequency. Other attack aircraft monitored that same frequency while working with terminal controllers over the TAD frequency in

their other radio. Aircrews in CAS aircraft for whom the clearance was *not* intended stood a chance of mistakenly delivering ordnance based on a “Cleared Hot” intended for other strike aircraft being controlled by the CAOC through AWACS.

Next, some terminal controllers shied away from the responsibility of clearing aircraft “Hot” by using the terms “Cleared to engage” or “Cleared to fire.” Aircrews were not sure what these terms dictated or even implied.

The third example is that some terms used looked and sounded like traditional, doctrinal fire support coordinating measures (FSCM) but were not and sometimes proved dangerous. Free-fire areas (FFAs) were not FFAs as defined by joint doctrine or the *Department of Defense Dictionary*.

In this example, FFAs were plotted on maps in the Navy’s carrier intelligence center as promulgated through the ATO special instructions (SPINS) and the intelligence network. When aircrews sought clarification on this control measure, they were told these FFAs were not really FFAs that allowed all firepower sources free engagements in that area, but were some type of control measure intended for ground forces only. Such misuse of common terms caused great confusion and bore the potential for disaster.

- Terminal controllers seldom used JCAS 9-line briefs—and when they did, they listed lines 1 through 3 as “N/A.” (More on this later.)

- Times-on-target (TOTs) were not used. The use of a TOT is not always required and sometimes is inappropriate. This is especially true when permissive CAS procedures are being used, the volume of fires is not an issue and (or) targets are relatively static.

However, in Operation Anaconda, the absence of TOTs as a control measure created a very open-ended enterprise that increased individual aircraft time over the target area. This had the net effect of reducing the aggregate number of aircraft that delivered fires in that target area.

- Aircrews were very rarely provided a “mark.” Like the TOT, a mark is not a requirement for CAS. Marks may not be appropriate when employing joint-weapons (J-weapons) and positive visual identification of the target by the aircrew is not required.

But J-weapons are not the only weapons in the inventory. For example, MK-82s with variable-time fuzes were used

as a weapon/target match against personnel in the Shah-e-Kot Valley and positive identification often was required. And while a mark may not be a requirement for CAS, it is listed in JP 3-09.3 as being one of the nine determining conditions for *effective* CAS.

Historically, artillery or mortars fire marking rounds, such as white phosphorous. When a mark was used in Operation Anaconda, it was generally a laser mark that worked extremely well for aircraft with laser trackers. But not all controllers had suitable lasers, and not all aircraft had laser trackers.

The absence of a visual mark increased the time required for the aircraft to acquire the target, which increased time-to-kill and decreased the overall number of aircraft available to the ground combat commander.

- The quality of visual “talk-ons” by terminal controllers to a target was poor and took a long time. Often an aircrew had to terminate a talk-on to go to a fuel tanker to extend its time-on-station. Sometimes aircraft were sent home.

Once again, this decreased the overall number of aircraft available to the ground combat commander.

- Target elevations were sometimes only very roughly estimated, which detracted from the effectiveness of global-positioning system- (GPS)-guided munitions, such as JDAM.

- Procedures and requirements for using airborne forward air controllers (FAC(A)) were confused with procedures and requirements for working with a ground FAC or enlisted terminal controller (ETAC).

- Predators used the term “Cleared Hot” when cueing attack aircraft onto targets that were patently interdiction targets. “Cleared Hot” is a term used *exclusively* by terminal controllers engaged in a CAS mission.

While UAVs may have utility in a CAS environment, they also have limitations that may preclude commanders from using them. It is safe to say, however, that UAV controllers who are not executing a CAS mission should not use CAS terms.

In spite of these violations or aberrations of joint doctrine, we succeeded in Operation Anaconda because we had professional warriors on the ground and in the air making it successful. But even in the face of mounting evidence that our joint forces in Operation Anaconda were dysfunctional, there was an inexplicable reluctance to impose operational and tactical discipline in the form of previously agreed upon joint TTPs.

**Special Operations Forces (SOF) CAS and Conventional CAS.** Operation Anaconda was a small operation that took place within the larger context of Operation Enduring Freedom. Operations prior to Anaconda relied primarily on SOF who employed precision munitions delivered by coalition aircraft to break the back of Taliban and al Qaeda forces.

Operation Anaconda on the other hand, used conventional forces and somewhat more conventional tactics in an attempt to target remaining pockets of al Qaeda fighters. However, the procedures and tactics used during Anaconda were largely the same as those used during the SOF phase of combat.



E-3 AWACS during a mission over Afghanistan. (Photo by SSGT Jerry Morrison, 1st Combat Camera)

During the Post-Anaconda CAS Conference in Kuwait, all agreed that poor performance in Anaconda was due to unsatisfactory procedures and execution. This led to an examination of procedures and tactics used with SOF teams and a discussion of whether or not the delivery of aerial fires in support of SOF is CAS. Many argued that it is not.

That is a tenuous and dangerous position.

The two defining components of CAS are proximity of friendly combat forces to enemy forces and a requirement for detailed integration between the ground forces and air forces. The *Joint Doctrine Encyclopedia* says, “CAS can be conducted at any place and time friendly combat forces are in close proximity to enemy forces. The word ‘close’ does not imply a specific distance; rather, it is situational. The requirement for detailed integration because of proximity, fires or movement is the determining factor. CAS provides firepower in offensive and defensive operations to destroy, disrupt, suppress, fix or delay enemy forces.”

Given this definition, the most compelling of the two requirements is “detailed integration.” The most common mistake is to assume that “integration” is the coordination required to deliver fires short of the fire support coordination line (FSCL).

This argument says that fires beyond the FSCL are permissive and there is little need for integration. It says there is no need for CAS TTPs when supporting SOF operating very deep—that chances for fratricide are small because of the SOF team’s small footprint and the absence of a defined forward-line-of-own-troops (FLOT) beyond the FSCL. It argues that tactical procedures are inappropriate for forces that may be executing a strategic mission.

This argument is flawed. There may be less of a chance of CAS fratricide due to the small footprint of a SOF team, but the level of detailed integra-

tion required between a section of aircraft with live ordnance and an SOF team on the ground is no less important.

SOF teams deploy early in an operation and have little opportunity for planning and coordination. This creates a requirement for shared language and standardized procedures. In SOF CAS, there is still a potential for fratricide and unacceptable collateral damage by misidentifying a target or implementing a poor attack plan.

SOF still require an aerial attack that brings the appropriate effects on target and minimizes risks to the SOF team. SOF still require high-tempo fires be available to the teams—that an attack is efficient so aircraft can get in and out to make way for the next attack element. And there is still a danger of mid-air collisions between attack and support aircraft if appropriate control measures are not used.

No TTPs exist outside of CAS TTPs to satisfy these requirements. By definition and by practicality, aerial fire delivered in support of Special Forces is CAS.

While it is understandable that the unique characteristics of SOF CAS produce doctrinal discussions, it is disconcerting that an argument should have to be made to support JCAS TTPs’ use to execute a conventional fight. Current JCAS doctrine is time-tested and relevant.

Born out of the requirement to orchestrate a high volume of aircraft originating from many different locations and operated by four different services supporting multiple ground units in contact with the enemy, JCAS TTPs match a perishable air support asset with a need efficiently and effectively.

Due to the fluid and relatively large (sometimes massive) footprint of conventional forces on the ground, the opportunity for fratricide is extremely high. The gun-target lines of indirect fires and their trajectories must be accounted for. The volume of aircraft probably

will be much higher than in a deep SOF team scenario, and the requirement for efficiency that provides tempo will be commensurately higher. There likely will be a much greater potential for attack aircraft to be exposed to the threat as commanders assume more risks to support and defend the ground combat element.

Both SOF and conventional CAS factors point to a compelling need for the disciplined employment of JCAS doctrine.

**Need for Joint Doctrine.** US armed forces do not like to adhere to doctrine. American fighting forces are known for this characteristic. There are a number of reasons why we don’t like to adhere to doctrine.

In general, we accord great respect to military leaders who are tactically and operationally agile in combat. In this light, doctrine is seen as prescriptive and stifling.

Also, doctrine is authoritative, not directive. While it provides structure through a common operational architecture as well as standardized tactical procedures, joint forces are not necessarily required to adhere to the architecture or procedures as long as the commander approves the deviations.

In addition, adhering to doctrine approaches heresy in an age of rapid change—an age of “Transformation” and “Revolutions in Military Affairs.” These are powerful impediments to the use of doctrine.

Properly implemented doctrine is a force multiplier, not a detractor. The joint forces’ application of doctrinal fundamentals facilitates an operational and tactical environment that reduces self-induced friction and fosters inventiveness and creativity. Joint doctrine frees combat leaders from having to negotiate basic ground rules every time joint forces are assembled for combat. When all participants adhere to agreed upon fundamentals, the result is a cohesive fighting force.

*“Born out of the requirement to orchestrate a high volume of aircraft originating from many different locations and operated by four different services supporting multiple ground units in contact with the enemy, JCAS TTPs match a perishable air support asset with a need efficiently and effectively.”*



**Operational-Level Recommendations.** The success or failure of JCAS control measures, comms architecture and operational-level C<sup>2</sup> functions are affected most by commanders and their operational-level planners who design the operation prior to its execution. Based on the discussion of shortcomings of JCAS in Operation Anaconda and the need for all forces to know joint doctrine, we make the following operational-level recommendations to improve JCAS on future battlefields.

- *Commanders:* Ensure all operators involved in an operation get an overview of the commander's intent, ground scheme of maneuver and priorities of fire. Ensure these are updated regularly. This information should be pushed to major subordinate commands—not merely posted on a secure Internet protocol router (SIPR) website.

- *Operational-Level Planners:* Design airspace control measures (ACM), especially CPs and IPs, as a team effort between the GCC and the air component commander (ACC).

- *C<sup>2</sup>:* Provide a check-in briefing for aircrews that maximizes their situational awareness.

- *GCC:* Ensure the Air Force ASOC or Marine direct air support center (DASC) coordinates with the FSC to establish and assign priorities of fire.

- *ATO Planners:* Declare the C<sup>2</sup> language that will be used and stick to it. For example, if the USAF tactical air command system (TACS)/USA Army air-ground system (AAGS) is being used, ensure that US Navy tactical air control system (NTACS)/USMC Marine air command and control system (MACCS) terminology is not used in the SPINS or in the area of responsibility (AOR).

- *Operational-Level Planners:* Ensure the communications architecture is constructed with the tactical end state in mind. The use of a common frequency (such as an air defense net or a positive control AWACS frequency) is acceptable as long as only correct, disciplined communications are used. Ensure terminal controllers are assigned discrete frequencies to the maximum extent possible.

- *All:* Know Joint Pub 3-09.3 cold. When arriving in theater, be prepared to comply with JP 3-09.3 procedures. Also be prepared to adapt or create tactics, based on the mission, commander's intent, threat and ROE. You first must know doctrine before you can implement it or decide how to deviate from it.



Navy E-2C Hawkeye

- *All:* Communicate. Understand where and how the commander is deviating from joint doctrine. Provide appropriate feedback during combat operations either in real-time or through the chain of command.

- *All:* Formally update doctrine immediately upon cessation of hostilities. Ensure that after-action items/reports get submitted to the Joint Universal Lessons Learned System (JULL).

**JCAS at the Tactical Level: Challenges and Solutions.** Tactics are the thoughtful outcome of planning by trigger-pullers who look to achieve mission objectives in consonance with the commander's intent with respect to a given threat and in accordance with the ROE.

Therefore, tactics can never be prescribed. Still, there must be a common understanding and appreciation of the various JCAS tactical and technical foundations employed during training in peace to ensure tactical interoperability during combat operations in war.

Given JCAS performance in Operation Anaconda, it is wise to reevaluate JCAS fundamentals, including the following selected CAS TTP that were underused in Afghanistan during that operation.

*Who needs a check-in brief?* "Get your gas. Check in with AWACS. Go hold where you're told. You'll get your information from the FAC or ETAC soon enough."

This is not the correct way to operate under any circumstances. Aircrews lose valuable time they could use to prepare for their missions.

Aircrews have questions that can be answered while in CAS holding. Where is the fight? Do I have the right chart out? What is the lay of the land? What is the current threat? How will the threat

affect my desired/required weapons delivery parameters? Where is the artillery? What batteries are Hot? Is there a prepared 9-line brief waiting for me that can be passed through the controlling agency? Is the controller using a hasty IP that was not in the SPINS?

Providing a check-in briefing gets the aircrew "out in front" in an enterprise that requires a clear mind for sound judgment and split-second timing to bring effects on target. It is critical the C<sup>2</sup> agency provide the interface and connectivity between the ground combat element and the attack aircraft.

C<sup>2</sup> platforms come in many shapes and sizes: USAF ABCCC in a C-130 or AWACS; Marine DASC or DASC-Airborne; and USN E-2C Hawkeye.

*What is the importance of the ASOC or DASC?* A primary task of the ASOC or the DASC is to translate the ground commander's intent for the many types of aircrews and tell them the priority of fires, as directed by the ground commander's FSC. This must be done in a very short time.

The ASOC or DASC is collocated with the FSC and provides the FSC updates on aircraft, ordnance and time-on-station available. The FSC tells the ASOC or DASC the focus of effort and priority of fires, helping it to decide which aircraft to assign to which units/controllers.

The ASOC or DASC also routes the aircraft to deconflict air and ground fires and its flight path with other aircraft. This is transparent to the aircrews but critical. Aircrews normally are based hundreds of miles from the ground elements and not privy to the latest developments of the ground battle. They may or may not talk directly to the ASOC or the DASC, depending on the C<sup>2</sup> architecture in place.

All an aircrew knows is that it has been assigned a TAD frequency and a controller—plus the information in its check-in brief that most likely will need to be updated due to the fluidity of the ground battle. The aircrew switches frequencies and executes. It's that simple and that critical.

*Why are lines 1 through 3 of the 9-line briefing applicable?* Of all the concepts, procedures and tactics that require an explanation, the need to explain the utility of the JCAS 9-line brief is the most troubling. (See Figure 1.)

Some operators in the Afghan operation argued that there is little requirement for a 9-line briefing. These operators contend that a derivation of precise target coordinates make it possible to

employ accurate weapons, such as JDAM, and obviate the need to plan attack geometry or coordinate timing and flow. Others see the utility in the standard briefing format, but do not appreciate the benefits of the first three lines.

Granted, there are times when a 9-line brief is not required, but they are rare. In a permissive, low-tempo environment with a relatively low number of targets, good weather conditions and attack aircraft with a healthy amount of time-on-station, a terminal controller is justified in bringing a section of aircraft or two over the target area and talking their eyes on to the target. Under the same conditions with a FAC(A) controlling, the FAC(A) probably is going to ar-

range for a rendezvous with the attack aircraft and lead it to the target area where he will provide a mark or a talk-on. However, in most other circumstances, a 9-line should be used.

The obvious circumstances that dictate the use of a 9-line is when the threat is moderate or high and restrictive CAS procedures are used. The standard attack format is used along with a TOT to reduce the exposure of attack aircraft to the threat. Not much argument here.

The argument arises when the threat level is medium to low. In this case, there are times when a more developed attack can be planned and transmitted via the 9-line brief. The entire brief can be used when aircraft time-on-station is low due to aircraft type, ship/airfield

location, availability of tankers, etc. The increased level of 9-line planning and the coordination of a mark pay great dividends in significantly reduced time for the aircraft to acquire and kill a target, maximizing the productivity of the aircraft's time-on-station.

The same can be said for the scenario with a low threat, good weather, good time-on-station but a relatively high number of targets. This scenario requires a greater number of aircraft over the target area to kill as many targets as possible before they either mass for an attack or flee.

The more restrictive measures of a 9-line brief impose geometry that improve the flow of aircraft and, if a mark is used, reduces the aircrew's time to acquire the targets. The net effect is a greater number of aircraft in the target area over a given amount of time, which increases the potential to kill targets.

Finally, the 9-line should be used when the controller wants to control the geometry of the attack because there is a remote chance of fratricide or unacceptable collateral damage.

Many operators accept the utility of the 9-line standard attack format but believe lines 1 through 3 are unnecessary—that the remaining lines provide the required information, such as target elevation and description. Or they transmit the 9-line because the joint task force commander requires them to but opt out by transmitting "Lines 1-3, N/A." They do

```
(Omit data not required, do not transmit line numbers. Units of measure are
standard unless otherwise specified. * denotes minimum essential in limited
communications environment. Bold denotes readback items when requested.)
Terminal controller: " Hawg 22 , this is November 18 "
                    (aircraft call sign)          (terminal controller)
*1. IP/BP: " Bravo "
*2. Heading: " 069 " (magnetic).
                    (IP/BP to target)
Offset: " Left " (left/right)
*3. Distance: " 9.1 "
                    (IP-to-target in nautical miles/BP-to-target in meters)
*4. Target elevation: " 1540 " (in feet MSL)
*5. Target description: " 3 tanks in open "
*6. Target location: " NP 433 395 "
                    (latitude/longitude or grid coordinates or offsets or visual)
7. Type mark: " laser Code: " 1384 "
                    (WP, laser, IR, beacon)          (actual code)
Laser to target line: " 090 " degrees"
*8. Location of friendlies: " 2 kilometers west "
Position marked by: " strobe "
9. Egress: " North then to Bravo "
In the event of a beacon bombing request, insert beacon bombing chart line
numbers here. (See Figure V-3.)

Remarks {As appropriate}: " (if time and conditions permit) "
(threats, restrictions, danger close, attack clearance, SEAD, abort codes,
hazards)

NOTE: For AC-130 employment, lines 5, 6, and 8 are mandatory briefing items.
Remarks should also include detailed threat description, marking method of
friendly locations {including magnetic bearing and distance in meters from
the friendly position to the target, if available} , identifiable ground
features, danger close acceptance.

Time on target {TOT}: " 1230 "
OR
Time to target (TTT): "Stand by _____ plus _____ , Hack."
```

Figure 1: CAS Briefing Form (9-Line). This example is for Thompson Hill Training Area at Fort Sill, Oklahoma. (Form is Figure V-2 from Joint Pub 3-09.3, Chapter V, Page V-3.)

***“While we cannot predict what circumstances of mission, intent, threat and ROE might require our ingenious tactical inventiveness, we do know we must all show up at the fight with the same tactical foundation, regardless of service.”***



not understand how critical lines 1 through 3 are in developing an effective, efficient attack.

Lines 1 through 3 are applicable. The first three lines provide the IP heading (as well as offset direction) and distance to the target in one burst transmission. Using lines 1 through 3 increases the odds of a successful attack to a degree that far outweighs the time it takes for a controller to generate the geometry and aircrew to copy the information down.

Precise attack geometry reduces the odds of fratricide by dictating the bomb fall line. (Offset direction is critical here.) Precise attack geometry ensures greater effects on target by taking into account the terrain in terms of target acquisition, uninterrupted laser energy and the impact angle of the ordnance (especially in mountainous terrain). It increases the odds of first-pass target acquisition by the aircrew. Pre-planned attack geometry also increases the odds of the controller's first-pass acquisition of the attack aircraft so he can provide the aircraft a "Cleared Hot."

Using lines 1 through 3 increases effectiveness throughout the AOR by optimizing aircraft flow and providing deconfliction. Because pre-planned CAS missions are vetted through the ATO planning process and the assignment of CPs are an essential part of that process, flow into and out of the target area can be optimized and the potential of mid-air collision reduced.

These benefits also occur in immediate-request CAS because it is a joint tactical air strike request (JTAR) routed through CAS request channels. If a JTAR is approved by the senior fire support control agency, the mission is transmitted back to the requesting unit with data that includes a CP. The optimal CP is chosen if the ASOC or DASC knows what IP the controller wants to use. The ASOC or DASC transmits the mission data directly to the aircraft or to other C<sup>2</sup> agencies that relay the information and the assigned CP.

Aircraft deconfliction takes place when a C<sup>2</sup> agency uses positive or procedural control to route aircraft to and from CPs throughout the AOR. This routing also provides deconfliction from other fires, to include mortars, artillery and naval gunfire.

Creating attack geometry for the pilot and transmitting it in a standard 9-line format optimizes the attack effects and provides efficient aircraft flow and deconfliction.

*Who creates IPs?* Somehow we no longer understand the importance and determining characteristics of the IP. Terminal controllers must have well-thought-out IP options from which to execute final attack planning. Terrain, location of friendlies, scheme of maneuver, threat axis and location, locations of indirect fire assets and aircraft flow into and out of the target area must be accounted for.

More importantly, we don't understand who creates IPs and gets them inserted into the ATO. Before ground combat forces take the field, the FSC and his ALO or air officer need to coordinate with the air operations center (AOC)—through the battlefield coordination detachment (BCD), if necessary—to plan the operation. Central to this planning is creation of IPs that will facilitate the ground scheme of maneuver.

But in Afghanistan, the CAOC developed all ACM. It was a simple grid system laid out in 30-by-30 nautical mile boxes. The corners of these boxes were labeled CPs/IPs. Grid points laid out in such a simple system are neither geometrically or geographically suitable for use as IPs. There was an effort to create useable IPs for Operation Anaconda, but this happened well into the operation and the terminal controllers never used them.

*What happened to the effective talk-on?* The general consensus of aviators in Afghanistan was that American ground forces' ability to provide a talk-

on to a target has deteriorated. Ground forces tended to think talk-ons simply took too long—some took 40 minutes.

Talk-ons are not hard to do. For example, talk-ons given by UN Protection Forces FACs in Bosnia were referred to as "Grey Line Tours." Those FACs took aircrews over the river and through the woods to a mortar position in a tree line very quickly. They used simple rules for a good talk-on, as follows.

- Start by looking at a map. This will help you create and expand a mental picture of the target area beyond line-of-sight and visualize what the aircrew may see.

- Use reference points, but stay away from those that are significant only in their vertical development. Aircrews at 10, 15 or 20 thousand feet above the ground can't pick out the "big ridgeline" if their world is nothing but ridgelines. They can't pick out the "big castle" in the middle of a city when nothing on the ground looks much like a castle from the air.

Look on the chart for the most significant man-made or natural feature within five nautical miles of your target. Use that as your starting point. Instead of a big castle, for example, the unique circular street in the middle of the city from which all streets emanate is a better anchor point. The aircrew will be able to see this unique reference from the air.

Color or significant changes in color, such as in the differences between types of sand, soil or fields, sometimes make excellent reference points. Be sure the color changes are unique and will stand out.

- Use a signal mirror to show the aircrew your position (which reduces the potential for your being fratricide). Your position also makes an excellent anchor point, especially if you have eyes on the target. (The light from the mirror is directional as you look through the sight on the mirror and will not give away your position, if you are careful.)

- Find a unit of measure on the ground that you can use to “walk” the aircrew to the target. Typical units of measure include airfields or distances between two significant man-made features, such as bridges.

- Use the principle of “big to small” to lead the aircrew to the target.

There is no substitute for training. We need to ensure we are training to a common operational picture that comes as close to how we intend to fight as possible. (See Figure 2 for a list of execution tips for terminal controllers and attack aircraft.)

While we cannot predict what circumstances of mission, intent, threat and ROE might require our ingenious tactical inventiveness, we do know we must all show up at the fight with the same tactical foundation, regardless of service. From there we can adjust for new

technology, new joint organizations, etc. If we don’t understand the theory behind our science, there will be no way to achieve combat success with any modicum of efficiency.

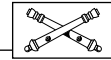
At the Post-Operation Anaconda CAS Conference in Kuwait, an F-15E pilot stood up to say his piece. In his right hand, he clutched a document of some sort.

“We ‘Strike Eagle’ guys don’t do CAS. It is not a primary mission for us. We do not train to CAS. For this operation, we figured out we needed to learn how to do it pretty quick. So we did some research, found some pubs and prepared ourselves. We thought we were ready.

“When we got in country, the operations were nothing like what we expected. We concur with almost everything that has been said here this morning. But we have a question. Is there any reason why we can’t just use this publi-

cation to fix the problems? Seems like most everything that folks have been talking about is covered in this pub.”

He raised the document in his right hand. It was Joint Pub 3-09.3.



Lieutenant Colonel John M. Jansen, US Marine Corps, is an F/A-18 pilot who served as the Executive Officer for Marine Flight Attack Squadron 314 flying combat missions off the *USS John C. Stennis* over Afghanistan in support of Operations Anaconda and Enduring Freedom. He attended the Post-Anaconda Close Air Support Conference (CAS) at Al Jaber Air Force Base in March 2002. He has flown combat missions in Operation Southern Watch over the No-Fly Zone in Iraq and Operations Deny Flight/Provide Comfort over Bosnia.

Lieutenant Commander Nicholas Dienna, US Navy, served as the Operations Officer in a VF-211 flying combat missions off the *USS John C. Stennis* over Afghanistan during Operations Anaconda and Enduring Freedom. He is a former Top Gun Instructor and currently serves as the Navy Executive Fellow at the Rand Corporation.

Major Wm Todd Bufkin II, US Marine Corps, is an AH-1W pilot who most recently served as a Marine Light/Attack Helicopter Detachment Officer-in-Charge with the 15th Marine Expeditionary Unit (Special Operations Capable), MEU (SOC), flying missions over Camp Rhino in southern Afghanistan in support of Operation Enduring Freedom. He is a qualified Forward Air Controller (FAC) and FAC (Airborne). He deployed with four Western Pacific MEUs, one as a Battalion Air Officer and three as an AH-1W pilot.

Major David I. Oclander, US Army, is a student at the Marine Corps Command and Staff College, Quantico, Virginia. Next year he will attend the Marine Corps School for Advanced Warfare, also at Quantico. He commanded B Company, 3d Battalion, 504th Parachute in the 82d Airborne Division, Fort Bragg, North Carolina.

Major Thomas Di Tomasso is a US Army Infantry officer with experience in Somalia, Bosnia and Afghanistan as a Joint Task Force Operations Officer. Currently, he is a student at the Marine Corps Command and Staff College.

Major James B. Sisler, USAF, is an F-15E Instructor Pilot with 13 combat missions over Afghanistan in Operation Enduring Freedom from October to December 2001. He is a qualified ground Terminal Attack Control Instructor and has been the mission commander as well as led combat missions in support of Operations Northern and Southern Watch over Iraq.

### Terminal Controllers

- If tempo, threat or the need for a volume of fires is high, use the 9-line briefing. Lines 1 through 3 are not only applicable, they are critical for an effective, efficient mission.
- Lines 1 through 3 allow the forward air controller (FAC) and pilot delivering the ordnance to account for the bomb fall line, given the terrain, laser target lines and impact angle. This is done to prevent fratricide and unacceptable collateral damage and ensure effects on target.
- Be as precise as possible when deriving target elevation, especially when constructing joint direct attack munition (JDAM) missions.
- Use a mark in a permissive environment if it is important to get the aircrew’s eyes on the target quickly, especially if the target is fleeting in nature.
- Use times-on-target (TOTs) in permissive environments if you want to create high-tempo fires by sequencing multiple sections of aircraft across the target area.
- When executing a talk-on, first construct the mission on a chart. Try to put yourself in the cockpit and visualize what the pilot is looking at.
- When appropriate, mark your own position with a signal mirror during the day or with an infrared (IR) strobe or pointer at night.
- Make sure your laser terminology and IR terminology are correct and that you do not confuse the two.
- Practice. Call your local USAF, USAF Reserve, Air National Guard, USN or USMC unit to support your training. Create airspace control measures (ACM). Develop 9-line briefs to reflect different types of threat scenarios and missions. Coordinate with your artillery and mortars to provide marks. If you do not have a local impact area, get a case of smoke grenades and use the smokes to simulate marks and bomb hits. Work talk-on missions. Debrief and analyze.
- Finally, as a terminal controller—*control*.

### Attack Aircraft

- Provide a sanity check for the mission—understand the friendly and enemy situation and be alert for confusing terminology. Given the time, refine the mission with the FAC to produce timely effects.
- Don’t automatically deliver on a “Cleared Hot” if you did not understand the brief or if the mission develops to the point of confusion. Given the significant friction on the battlefield, make sure you and the controller work as a team and you understand the nature of his mission.
- Execute the mission—*hit* the target.

Figure 2: Summary of JCAS Execution Tips for the Terminal Controller and Attack Aircraft



# Observation Planning

## Where Are the Eyes of Death?

Units today have become less focused on the importance of employing “eyes” on the battlefield. The planning process for Strikers, combat observation lasing teams (COLTs), company fire support teams (FISTs) and forward observers (FOs) is not thorough enough to employ them as deadly combat multipliers for the Army.

Even with a number of helpful systems at units’ disposal, such as Terrabase and Mr. Sids software and S2 intelligence assets, units still fail to ensure they have adequate eyes to observe templated named areas of interests (NAIs). This would allow the units to develop target areas of interest (TAIs) and triggers to help execute their essential fire support tasks (EFSTs) and fire support events.

The Army continues to expend millions of dollars’ worth of ammunition pounding dirt. Simply put, “the eyes” are not there to confirm the targets.

So where are our eyes, and why are we having only limited success employing indirect fire systems? One part of the answer is in observation planning. Maneuver staffs—and especially their fire support officers (FSOs) and fire support NCOs (FSNCOs) working in conjunction with the S2s and S3s—have to be more aggressive in the military decision-making process (MDMP) and position their eyes in the right place at the right time.

When selecting observers and their observation posts (OPs), several factors must be considered: the observer’s training, experience and equipment capability; communications; and Terrabase line-of-sight (LOS). The figure lists the steps in choosing OPs.

Once an OP is identified, the FSO or FSNCO must accomplish the following. He ensures the task force tactical operations center (TOC)/FA battalion TOC or retransmission site (RETRANS) is located within the line-of-sight fan of the OP. This impacts on FIST positioning.

The FSO or FSNCO then selects the route to the proposed OP and identifies the unit to travel with and the trigger to



move. He verifies tactical and technical triggers that are visible using Terrabase (LOS) shots. If the triggers are not visible, he determines who to pass the target to and establishes alternate triggers.

Next, he selects suitable areas based on the observer’s capabilities—does the observer have binoculars, a mini eye-safe laser infrared observation set (MELIOS) or a ground/vehicular laser locator designator (G/VLLD)? This consideration maximizes the effectiveness of indirect fire systems. Maneuver commanders also must consider providing a security element for the observers to ensure they can execute their mission.

Providing proper redundancy in an observation plan is essential. This al-

- Locate the target based on the situational template (SITEMP).
- Refine the targets.
- Using Terrabase software, check the line-of-sight from the target to the potential OPs.
- Eliminate unsuitable areas for the OPs.
- Identify suitable OPs.
- Select the observation post and alternate targets.
- Check communications and Terrabase line-of-sight from the observation post to the retransmission site or the FA battalion tactical operations center (TOC).

Steps in Choosing Observation Posts (OPs)

lows units to use “deep eyes” to execute tactical triggers and the “close eyes” to execute technical triggers.

A battle hand-off of target responsibility from the deep to the close fight must be planned and synchronized. Units often assign primary and alternate observers to targets but do not take the actions necessary to insert the observer onto the battlefield for target hand-off.

Most of the time, observers do not get to their planned OPs. Some factors contributing to that are poor route selection and map reconnaissance and limited interaction with other battlefield operating systems

(BOS) to maintain situational awareness. The result is units execute unobserved fires and miss the target—a waste of valuable indirect fire assets.

One typical example of wasting indirect fire assets is the emplacement of smoke. Using smoke to obscure enemy observation or screen a maneuver element’s movements is often critical to the task force’s success. More often than not, the smoke is not in the right place and there are no eyes to adjust it properly.

Once the EFSTs are identified, planners must start answering the questions of where the force will first detect the target, who will detect it and when, and who is responsible for tracking it and initiating fires. They also need to plan the weapon system that will attack the target and a backup system designated to detect and track the target and initiate fires on it. All these factors must be considered during the course-of-action (COA) development and wargaming portions of the MDMP.

Fire supporters at all levels must develop sound observation plans with redundant observation on the engagement areas. This will allow their commanders to take advantage of the full potential of their indirect fires and maintain the FA’s reputation as *The King of Battle*.

SFC Kevin M. Mitchell  
Task Force FSE Combat Trainer  
National Training Center  
Fort Irwin, California

# Targeting in the SBCT

## Taking Advantage of 1-14 Cav's RSTA Capabilities

By Lieutenant Colonel Steven A. Sliwa  
and Major Robert O. Kirkland

**T**he 3d Brigade, 2d Infantry Division, Stryker Brigade Combat Team (SBCT), Fort Lewis, Washington, participated in Millennium Challenge 2002 last summer at the National Training Center (NTC), Fort Irwin, California. The exercise explored joint concepts that may be applied to future operations throughout the Department of Defense.

The three-week experiment began on 24 July and involved more than 13,000 soldiers, sailors, airmen and Marines at the NTC; Suffolk, Virginia; Nellis Air Force Base, Nevada; and various other locations. The event featured both live field forces and computer simulations.

For the SBCT at the NTC, it was the first time it had tested its operational organization as a brigade outside of

Fort Lewis and Yakima Training Center in Washington. The brigade employed its tactical operations centers (TOCs), including the FA TOC, as well as one company of Strykers: A Company, 5th Battalion, 20th Infantry. The brigade learned many lessons from Millennium Challenge, lessons that are being incorporated into the brigade's tactical standing operating procedures (TACSOP) and doctrine in preparation for certification at the Joint Readiness Training Center (JRTC), Fort Polk, Louisiana, in May.

One of most important lessons learned in this experiment was the "transformation" of targeting, given the increased capabilities of the 1st Squadron, 14th Cavalry (1-14 Cav), the brigade's reconnaissance, surveillance and target acquisition (RSTA) squadron. These capabilities give the SBCT information superiority, enhancing its lethality as a combat force.

The main conduit for this information superiority—which leads to situational understanding—is the 1-14 Cav's intelligence, surveillance and reconnaissance (ISR) operations. Importantly, the brigade's targeting must be flexible enough to take advantage of the increased situational understanding to employ lethal and nonlethal means to defeat an enemy force in a rapidly changing scenario.

In this article, we describe the SBCT's 1-14 Cav organization and how it conducts ISR operations to increase the brigade's situational awareness. Then we examine the traditional targeting process and the impact of the "ISR Push" on that process. Finally, we discuss the changes to the targeting process implemented during Millennium Challenge to take better advantage of the RSTA capabilities.

**1-14 Cav and ISR Operations.** The RSTA brings a wide variety of assets to the SBCT. These include up to 18 sections of scouts (known as recce sections) that observe areas and collect combat information; each section has counterintelligence agents and tactical unmanned aerial vehicles (TUAVs) that report over-the-horizon real-time imagery intelligence and gain and maintain contact with the enemy. 1-14 Cav includes a ground surveillance radar (GSR)—not to be confused with the Q-36 and Q-37 Firefinder counterbattery radars in the FA battalion. The RSTA has remote battlefield sensors that locate, measure and report enemy signal



Stryker from Company A, 5th Battalion, 20th Infantry Regiment. Photo by Joe Barreline

signatures and the Prophet signals intelligence and electronic warfare (EW) system that locates and identifies enemy signal intelligence. In addition, the squadron has the Fox nuclear, biological and chemical (NBC) reconnaissance vehicle that detects the presence of NBC in the battlespace.

According to the SBCT's organizational and operational concept (O&O), the RSTA enables the brigade to achieve situational understanding to set the conditions for the brigade's success, allowing it to maneuver out of contact with the enemy and then engage the enemy at the time and place of its choosing. With the RSTA, the brigade can better meet the O&O's vision of this conditions-based organization.

All RSTA assets are interconnected through the Army battle command system (ABCS) and the Force XXI battle command brigade and below (FBCB<sup>2</sup>). Working together, these systems provide constant enemy and friendly information as well as allow the brigade to transmit orders to lower echelons rapidly. The addition of Trojan Spirit (intelligence dissemination satellite terminals) throughout the brigade allows collaborative planning and video teleconferencing among staffs and, with the terminals' increased bandwidth, gives reach-back capability.

The doctrinal term the 1-14 Cav uses for its reconnaissance operations is "ISR Push." This stresses "pushing" recon forces into the battlespace early in the planning process. The brigade staff, in turn, develops its plan from the information the recon forces provide.

But ISR push goes beyond traditional reconnaissance push operations by leveraging the connectivity provided by the ABCS. With increased connectivity with the RSTA, the brigade staff can adjust its plan during or after the military decision-making process (MDMP) to take advantage of the most current information. In some cases, a completely new plan may be required.

The goal is to target and attack the enemy at a time and place of the brigade's choosing with complete situation awareness—avoiding his strengths and attacking his weaknesses. The fires and effects coordination cell (FECC) at the brigade main command post employs lethal and nonlethal effects to attack the enemy's weaknesses. Clearly, the SBCT staff must be versatile enough



The ECOORD and DECOORD look on as the civil affairs officer, Major Glenn Tolle, coordinates CA operations.

to adjust to ever-changing conditions—must not become "wed" to the plan.

**SBCT Targeting.** The brigade targeting process focuses all collection and delivery assets to attack enemy targets critical to the success of the operation. The targeting process gives the commander a way to visualize the enemy's intent and capabilities 24, 48 and 72 hours in advance. This allows the commander to anticipate requirements, prepare orders, marshal additional resources and position assets for upcoming operations.

During Millennium Challenge, the brigade staff used the traditional daily targeting working group and targeting board to accomplish its targeting objectives via the *decide, detect, deliver, and assess* (D<sup>3</sup>A) methodology. The working group meetings took place at night at 2100 and prepared products for the brigade commander's or executive officer's (XO) briefing at 0900 in the morning.

The brigade followed the traditional targeting process in *FM 6-20-10 Tactics, Techniques and Procedures for the Targeting Process*. The FA battalion commander, the effects coordinator (ECOORD), or the deputy effects coordinator (DECOORD) chaired the nightly targeting meeting. Attendees included the brigade operations officer (S3), brigade intelligence officer (S2), air liaison officer (ALO), information operations officer (IO) and civil affairs (CA) officer (the IO and CA officers from the FECC) and the brigade engineer.

To set the stage, the brigade S3 provided an operations update by reviewing the commander's intent, assets available, friendly situation and operations in the next 24 hours. The S2 briefed the current enemy situation, high-value targets (HVTs) in zone, priority intelligence requirements (PIRs), and future

HVTs and courses of action (COAs). The DECOORD reviewed the current target synchronization matrix (TSM), proposed high-pay-off targets (HPTs) and gave the status of fire support assets. The IO officer explained the synchronization and integration of elements of IO and other nonlethal targeting, proposed brigade IO objectives and established the nonlethal collection plan. The CA officer advised on the effects of friendly operations on the civilian populace. The brigade engineer, EW officer, psychological operations (PSYOP) NCO and oth-

ers also recommended targets or asset utilization during the meeting.

Immediately after the meeting, the brigade S3 issued a fragmentary order (FRAGO). The FRAGO outlined the changes in the next day's tasking. The targeting officer in the FECC updated the advanced FA tactical data system (AFATDS) with the changes to the TSM and target list and submitted requests for Air Force support following the air tasking order (ATO) process. Each staff section updated its ABCS with the information gleaned from the meeting, as applicable. The targeting decisions made at the nightly meeting and any changes were briefed to the brigade commander or XO the next morning.

**Shifting the Paradigm.** The challenge for the brigade staff during Millennium Challenge was to adapt the targeting process to respond to the rapidly chang-



- 18 x Reconnaissance Section (Scouts)
- 1 x Tactical Unmanned Aerial Vehicle (TUAV)
- Remote Battlefield Sensors
- 1 Prophet Signals/Electronic Warfare Intelligence System
- 1 x Fox Nuclear, Biological and Chemical Detection Vehicle

Figure 1: The Intelligence, Surveillance and Reconnaissance (ISR) Capabilities of the Reconnaissance, Surveillance and Target Acquisition (RSTA) Squadron, Stryker Brigade Combat Team (SBCT), 2d Infantry Division

ing tactical situation as RSTA intelligence indicated. The problem normally was not 48 to 72 hours out but close-in targeting—48 hours or less. The question became not whether or not the brigade should conduct the meetings at set times, such as 0900 or 2100, but if the brigade needed additional targeting sessions.

In many cases, important information obtained from RSTA through ABCS came at night—during the time the recce troops were operating in the battlespace. In other cases, the TUAVs provided important information during the day as their prime hours of flying were late afternoon to end of evening nautical twilight. Direct feeds from the UAVs though the ground control station to the brigade TOC could change the enemy target set well after the targeting meeting. In the recce troop case, the target set would be completely different at 0300 than it was a few hours before.

The argument for keeping the targeting meeting at set times was that it ensured a well-thought-out product to begin adapting—all players would come to the meeting prepared with their input and a productive meeting would ensue. There also continued to be a need for a set daily meeting to look 72 hours out so the brigade could submit air support requests in accordance with the 72-hour ATO cycle. The disadvantages of not having an additional ad hoc meeting were obvious—12 hours could pass between targeting meetings, and the RSTA could identify a lot of changes in that time. The enemy may have repositioned its assets in response to RSTA contact or TUAV detection.

Clearly, we needed targeting “huddles” with key players. The brigade XO, S3, S2, ECOORD and FECC huddled; often the RSTA S3, XO and FSO, who may have the most current combat information, were involved in the huddles via Trojan Spirit. In this way, the targeting team took advantage of increased situational awareness to retask assets and resources immediately. As necessary, the targeting huddle discussed the retasking of recce or UAV assets with the RSTA staff.

Another issue was adapting targeting to the proactive nature of the RSTA reconnaissance effort for future operations while the rest of the brigade was involved in “current” operations. By its nature, the RSTA was out front, performing route and area reconnaissance of the objective, while the rest of the

ECOORD
DECOORD
Brigade S3
Brigade S2
Air Liaison Officer (ALO)
Information Operations (IO) Officer
Civil Affairs (CA) Officer
Brigade Engineer
Electronic Attack Officer
Psychological Operations (PSYOP) NCO

Figure 2: Attendees of the SBCT Nightly Targeting Meeting. The effects coordinator (ECOORD) or his deputy (DECOORD) chair these meetings.

brigade’s maneuver battalions were preparing for decisive and shaping operations. In other cases, such as during decisive operations, the RSTA often was performing reconnaissance on the brigade’s next objective while the rest of the brigade was executing the current fight. In short, a new operation required a new fire and targeting plan.

The question became “How do we integrate the fire planning and targeting process to support RSTA during 1-14 Cav’s mission even while the brigade’s attention was primarily focused elsewhere?”

One targeting technique the brigade employed during Millennium Challenge was to have a recon/targeting huddle with the brigade commander, RSTA commander, ECOORD, brigade S2 and RSTA S3 before 1-14 Cav crossed the line of departure. During this huddle, the brigade commander reviewed the RSTA reconnaissance plan and, along with the ECOORD, approved the RSTA’s fire support plan that normally was developed by the RSTA FSO.

Once the RSTA began its operations, the RSTA targeting and fire plan became the de facto brigade fire plan for the operation, at least initially. The fire plan was changed once the brigade completed its current operations or if the RSTA recon effort refined the target set.

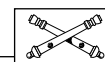
With ABCS, the brigade disseminated changes to the fire plan fairly easily. Normally, the brigade S3 wrote the FRAGO to instruct subordinate units to retask their assets. The S3 sent this plan via the maneuver control system-(MCS)-light to all subordinate elements and posted it on the brigade tactical website. Subordinate units could pull the FRAGO off the website moments after it was posted. The FECC simultaneously posted the changes to subordi-

nate fire support elements (FSEs) via AFATDS.

What proved more problematic was working within the joint task force ATO. The brigade had to submit ATO nominations 72 hours in advance. Based on the RSTA’s continual intelligence updates, the brigade targets previously submitted to the ATO often needed to be refined or deleted altogether—needed to be changed quickly after receiving new intelligence. The ATO was not flexible enough to accommodate the rapidly changing targeting situation.

The brigade is only starting to develop tactics and techniques to address its increased capabilities. With the continued fielding of equipment in FY03, the brigade will aggressively tackle the targeting challenges as it prepares for initial operational capability (IOC) in the middle of 2003.

It is an exciting time for the SBCT and transformation. The imperative of tailoring the targeting process to take advantage of transformation technologies and doctrine has never been greater.



Lieutenant Colonel Steven A. Sliwa commands the 1st Battalion, 37th Field Artillery, part of the Army’s first Stryker Brigade Combat Team (SBCT), 3d Brigade, 2d Infantry Division at Fort Lewis, Washington. He is also the SBCT’s Effects Coordinator (ECOORD). In his previous assignment, he was a Strategic Planner in the Directorate for Strategy and Policy, J5, Joint Staff at the Pentagon. Among other assignments, he was the Brigade Fire Support Officer (FSO) for 1st Brigade and Battalion Executive Officer (XO) of 3d Battalion, 6th Field Artillery, both in the 10th Mountain Division (Light Infantry) at Fort Drum, New York. He participated in Operation Desert Storm in the Gulf with the 3d Armored Division and in Operation Uphold Democracy in Haiti with the 25th Infantry Division (Light).

Major Robert O. Kirkland is the Deputy ECOORD (DECOORD) for the 3d Brigade, 2d Infantry Division (SBCT) at Fort Lewis. In his previous assignment, he was the Chief of the Individual Training Branch, G3, I Corps, also at Fort Lewis. He also served as an Assistant Professor in the Department of History at the US Military Academy at West Point. He commanded B Battery, 3d Battalion, 321st Field Artillery, part of the 18th Field Artillery Brigade, XVIII Airborne Corps Artillery at Fort Bragg, North Carolina. During Operation Desert Storm, he was the Assistant G3 Plans Officer for VII Corps. He holds an MA and PhD in History from the University of Pittsburgh.

# ECOORD vice FSCOORD

## More Than a Name Change

By Lieutenant Colonel Steven A. Sliwa and Major Robert O. Kirkland

**"Within the Stryker Brigade Combat Team (SBCT) there is only one 'fires and effects' organization and that is the fires and effects coordination cell (FECC), a standing organization within the SBCT headquarters. The FECC expands the functionality of the traditional fire support element (FSE)...The FECC is led and directed by the effects coordinator (ECOORD) for the SBCT, who is also the FA battalion commander. The FECC is the special staff through which the ECOORD plans, coordinates, integrates and synchronizes all fires and effects activities in support of SBCT operations."**

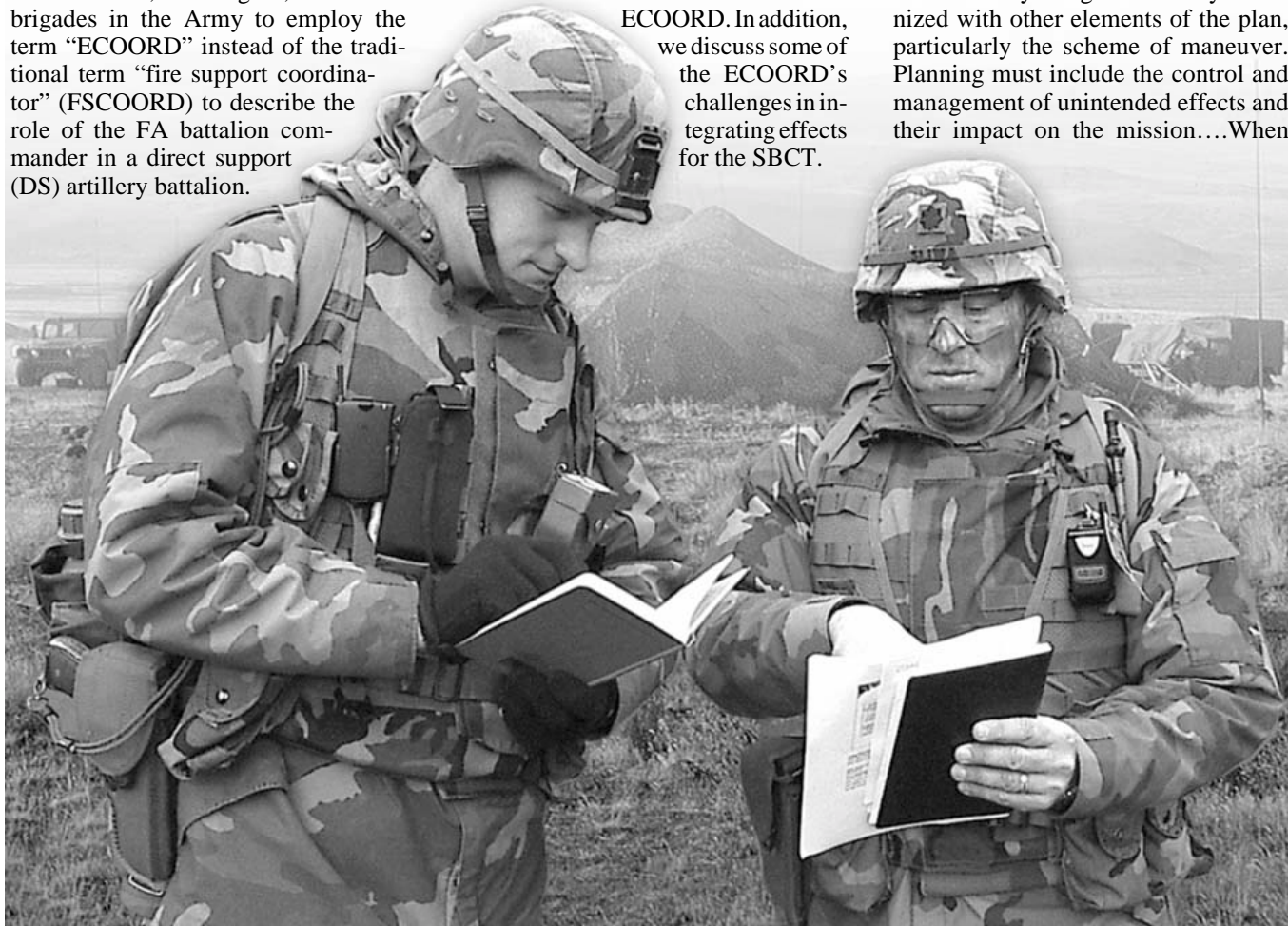
*BST 6-20-40 Tactics, Techniques and Procedures for Fires and Effects for Interim Brigade Combat Team (IBCT) Operations*  
Coordinating Draft, March 2002

**T**he SBCTs of the 2d and 25th Infantry Divisions located at Fort Lewis, Washington, are the first brigades in the Army to employ the term "ECOORD" instead of the traditional term "fire support coordinator" (FSCOORD) to describe the role of the FA battalion commander in a direct support (DS) artillery battalion.

This article discusses effects-based operations and compares the roles of the traditional FSCOORD and the ECOORD. In addition, we discuss some of the ECOORD's challenges in integrating effects for the SBCT.

**Effects-Based Operations.** The genesis of effects-based "fires" is in the initial BCT (IBCT) Organization and Operational (O&O) Concept dated 30 June 2000. In this document, the authors stress that the IBCT employs effects to protect the force, shape the battlespace and support decisive operations. The fundamental objective of the effects-based approach is to apply *capabilities* to achieve a specific effect in time and space.

The O&O defines "effects" in the following way: "Effects are the result of the directed application of lethal and nonlethal capabilities to achieve a desired purpose or outcome in support of the commander's intent. Effects are a component of the operations plan and must be fully integrated and synchronized with other elements of the plan, particularly the scheme of maneuver. Planning must include the control and management of unintended effects and their impact on the mission....When



fully integrated, effects and maneuver set the conditions for tactical success and combine to achieve the commander's intent."

In the past, fire support focused more on the allocation of resources, munitions and targets—namely, focused on platforms and systems. On the other hand, effects-based operations focuses on achieving specific *outcomes*, as specified in the commander's intent, in time and space rather than the systematic allocation of resources.

### **The Challenge of Integrating Lethal and Nonlethal Effects.**

In the past, FSCOORDs found that being good at the business of lethal fires integration was a tough enough job. Fire supporters sometimes have struggled to provide effective and responsive fires in support of maneuver.

The coordination and execution of fire support is by far the toughest task for DS battalions to train completely and sustain competence in because the coordination and execution rely so much on a complete tactical scenario to bring all the "pieces together." Typically, the only time the complete fire support system is challenged fully is in brigade-level operations in the field or at a combat training center (CTC). The question arises as to whether or not making the ECOORD responsible for nonlethal as well as lethal effects will diffuse his effort to get lethal fires "right."

Some argue that Field Artillerymen should focus solely on the lethal fight. A key point is that, in most cases, the lines are blurred between lethal and nonlethal fires. Experience demonstrates that the two cannot be separated.

For example, the proper application of nonlethal effects may cause the enemy to surrender, thus affecting the way one targets with lethal effects. An effective information operations (IO) campaign may negate the need for the application of lethal fires or point to better ways to focus lethal fires on an adversary.

The synergy of both lethal and nonlethal effects is a combat multiplier on the battlefield. The two must be integrated in one organization to ensure the plans are mutually supporting and synchronized. The person to do that is logically the ECOORD—a Field Artilleryman. It makes the DS FA battalion commander's job harder, but he ignores nonlethal effects at his unit's peril.

**The ECOORD and FECC Operations.** The ECOORD has additional re-



The ECOORD guides the Assistant ECOORD, Captain Matt Lawton, inside the brigade commander's Stryker vehicle.

sources to accomplish his mission of integrating the brigade's effects in the form of a nonlethal section in the FECC. In the past, when a FSCOORD had to integrate nonlethal fires during contingency operations, he often had to rely on ad-hoc assistance from civil affairs (CA), IO and psychological operations (PSYOP) personnel—people he had never worked with. Conversely, the IO section personnel are organic to the SBCT and the ECOORD works with them regularly.

In the SBCT, the FECC has lethal and nonlethal planners. The lethal cell of the FECC operates similarly to the traditional brigade FSE and will not be discussed in this article. The nonlethal section, referred to doctrinally as the IO cell, is embedded in the FECC and performs the missions outlined in the figure.

The IO cell consists of an IO major, who is in charge of synchronizing all IO elements; a CA major, who is the staff lead for planning and coordinating civil-military operations (CMO) in the area of operations; a PSYOP NCO, who plans and coordinates PSYOP support from attached PSYOP elements; and an electronic warfare (EW) officer, who works closely with the targeting technician in the lethal cell of the FECC to identify potential enemy command and control (C<sup>2</sup>) and intelligence surveillance systems for EW.

In addition, while not part of the FECC, the brigade operational law team (BOLT) works with the FECC. The BOLT consists of the brigade staff judge advocate and a paralegal NCO located in the FECC's area. The BOLT provides the brigade administrative and operational law advice, including during the military decision-making process (MDMP) with the aim of facilitating the rapid application of effects.

To a great extent, the IO cell parallels what the division FSCOORD might find on the division staff. The robust nature of the IO cell at the brigade level gives the ECOORD more resources to integrate nonlethal fires into the fight and allows him to train with the IO cell on a daily basis.

The FECC is located in the same area as the brigade tactical operations center (TOC). The IO and CA officer, for example, continually interface with the deputy ECOORD (DECOORD), a Field Artillery major, and the lethal

cell to integrate effects in the brigade. (The DECOORD manages FECC day-to-day operations and leads the FECC in the absence of the ECOORD.)

For example, before the daily FECC targeting working group, the IO cell forms an IO working group to formulate nonlethal products and actions to support brigade operations. The DECOORD or his lethal representative normally attends.

During the FECC targeting working group chaired by the DECOORD, the IO or CA officer briefs nonlethal considerations for the target synchronization matrix (TSM). Thus, by the time the brigade commander receives his targeting briefing during the brigade targeting meeting, the plan presented encompasses effects-based fires. After the brigade targeting meeting, the S3 produces a fragmentary order (FRAGO) with an Annex D (Effects).

**Other ECOORD Challenges.** The ECOORD faces a number of other challenges in the SBCT, a couple of which we discuss as follows.

- *Where should the ECOORD physically locate?* The ECOORD, like the FSCOORD, both commands the FA battalion and leads the integration of effects into combined arms operations. Traditionally, the FSCOORD splits his time between the brigade and his battalion TOCs. Normally, he is present at the brigade TOC or tactical command post (TAC) during the MDMP and the execution of the operation. He goes to the FA battalion TOC to provide guidance during formulation of the FA support plan (FASP), orders production and rehearsals.

However, the collaborative planning tools available to the FA battalion commander in the SBCT challenge this traditional model. Because the FA battal-

ion TOC is interconnected with the rest of the brigade via the Army battle command system (ABCS) and Force XXI battle command brigade and below (FBCB<sup>2</sup>), the ECOORD can maintain situational awareness of the battlespace wherever he is located. In addition, transmissions from higher to lower, including orders, occur rapidly. This interconnectivity and the speed of operations mean the FA battalion usually works its MDMP simultaneously with the brigade. In fact, both usually complete their orders at about the same time.

The challenge for the ECOORD is to determine where he should be for the MDMP—the brigade TOC or his battalion TOC. The answer is, “It depends on the situation.” But in most cases, the ECOORD will be in the brigade TOC where he can advise the brigade commander and his staff on effects. Depending on how far the FA battalion TOC is from the brigade TOC, the FA battalion S3 and executive officer can complete the battalion MDMP and publish the FASP without seeing the ECOORD.

• *What are the advantages and disadvantages of fire supporters’ being organic to maneuver units in the SBCT vice the FA battalion?* In the SBCT, fire supporters from the brigade to the platoon levels are organic to their respective maneuver units.

The DECOORD and FECC are organic to the brigade’s headquarters and headquarters company. The battalion fire support officers (FSOs) are organic to the maneuver battalions. The SBCT’s 13 company-level FSOs are organic to their maneuver companies/troops—a total of nine company FSOs in the three infantry battalions; three cavalry troop FSOs in the reconnaissance, surveillance and target acquisition (RSTA) squadron; plus one company FSO in the antitank company. The platoon forward observers are organic to their maneuver platoons.

At the maneuver battalion level and below, there are some advantages to this force structure. These include strengthened relationships between maneuver and fire supporters that day-to-day interaction fosters. Company FSOs, in some instances, have been challenged and developed by their maneuver brethren by being given additional duties and responsibilities that develop leadership skills. For example, some company FSOs have become the headquarters platoon leader with addi-

- Plans nonlethal effects to degrade the adversary’s informational environment.
- Leverages assets in response to security challenges, such as terrorism, international crime, computer hackers and genocidal violence.
- Advises the brigade leadership on cultural awareness to foster a positive relationship with the local civilian and military leadership in the area of operations.
- Manages the media to portray the unit’s best possible image.
- Integrates fully into all targeting meetings to bring the nonlethal capabilities of effects-based fires to the fight.
- Writes the nonlethal portion of Annex D of the operations order (OPORD), a portion that is fully nested with lethal fires.

#### Nonlethal Cell Missions

tional responsibility for company mortars.

Disadvantages include limited opportunities to train these fire supporters as part of the brigade fire support system because the ECOORD does not control these assets. The result is varying degrees of competency across the fire support system; to overcome this, consolidated fire support training is required. The ECOORD also has little flexibility to reassign personnel on short-term notice from one FSE to another as he would if all fire supporters were organic to the artillery battalion.

A final disadvantage is the amount of time the ECOORD has to integrate a new officer or senior NCO into the brigade fire support system and establish uniform standards for all brigade fire supporters. Normally, the fire support officer or NCO goes directly to his maneuver unit without first coming to the artillery battalion.

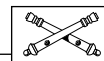
In the SBCT, the battalion fire support personnel are also the IOs for their respective maneuver battalions. This adds training responsibility on the ECOORD to ensure the fire support battlefield operating system (BOS) is prepared to execute nonlethal effects. Again, it can be a challenge to efficiently assemble and train fire supporters who are not in the FA battalion on IO to one standard. Fortunately, the IO proponent at Fort Leavenworth, Kansas, has been helpful in providing mobile training teams (MTTs) to train battalion and company fire supporters in IO at Fort Lewis.

At the same time, because fire supporters are maneuver assets, not all

maneuver commanders have their fire supporters manage IO in their battalions. Often the battalion S3 will execute some part of the IO campaign along with an assistant S3 or some other non-fire supporter.

It will take more training and operational experience before the maneuver commander will turn automatically to his fire supporter for information on nonlethal effects.

As the Army transforms to a more versatile and agile force, doctrine is evolving to deal with real-world contingencies. Challenges abound, but effects-based operations make sense, given the relative importance of nonlethal effects and the increased flexibility it brings to the battlefield. The symbiotic nature of both lethal and nonlethal fires and effects calls for an integrator at the brigade level and higher—and he is the ECOORD.



Lieutenant Colonel Steven A. Sliwa commands the 1st Battalion, 37th Field Artillery, part of the Army’s first Stryker Brigade Combat Team (SBCT), 3d Brigade, 2d Infantry Division at Fort Lewis, Washington. He is also the SBCT Effects Coordinator (ECOORD). In his previous assignment, he was a Strategic Planner in the Directorate for Strategy and Policy, J5, Joint Staff at the Pentagon. Among other assignments, he was the Brigade Fire Support Officer (FSO) for 1st Brigade and Battalion Executive Officer (XO) of 3d Battalion, 6th Field Artillery, both in the 10th Mountain Division (Light Infantry) at Fort Drum, New York. He participated in Operation Desert Storm in the Gulf with the 3d Armored Division and in Operation Uphold Democracy in Haiti with the 25th Infantry Division (Light).

Major Robert O. Kirkland is the Deputy ECOORD (DECOORD) for the 3d Brigade, 2d Infantry Division (SBCT) at Fort Lewis. In his previous assignment, he was the Chief of the Individual Training Branch, G3, I Corps, also at Fort Lewis. He has served as an Assistant Professor in the Department of History at the US Military Academy at West Point. He commanded B Battery, 3d Battalion, 321st Field Artillery, part of the 18th Field Artillery Brigade, XVIII Airborne Corps Artillery at Fort Bragg, North Carolina. During Operation Desert Storm, he was the Assistant G3 Plans Officer for VII Corps. He holds an MA and PhD in History from the University of Pittsburgh.

# Extending the Eyes of the ETAC via FO ECAS Training

## The 101st Joint Fires Training Strategy

By Lieutenant Colonel Kevin M. Felix and  
Lieutenant Colonel Zane W. Mitchell, Jr., USAF



Close air support (CAS) plays a major role in 101st Airborne Division (Air Assault) operations. Joint aircraft can provide lethal fires and mass effects rapidly across the *Screaming Eagle's* battlespace, complementing the division's organic fire support systems.

The recent combat experiences of the division's 3d Brigade Combat Team, the *Rakkasans*, in Afghanistan during Operation Anaconda illustrate the need for fire supporters—forward observers (FOs)—to be trained to help enlisted terminal air controllers (ETACs) by

serving as their eyes forward and conducting emergency CAS (ECAS). The Air Force requires a certified ETAC control joint CAS assets. However, constraints on the numbers of ETACs/tactical air control parties (TACPs) distributed in Army formations on a dispersed, noncontiguous battlespace, as well as in complex urban terrain challenge their abilities to positively identify both the aircraft and targets.

Thus, in the 101st Division, fire supporters and TACPs have developed a Joint Fires Training Strategy that fosters teamwork and cohesion between

joint units that will fight together. This strategy trains fire supporters to extend the eyes of the ETACs and ETACs in Army call-for-fire (CFF) procedures. Located with the division at Fort Campbell, Kentucky, the 19th Air Support Operations Squadron (ASOS) supports the 101st with ETACs and is the Air Force partner in this joint training.

In addition to the obvious benefits of this joint training, fire support teams (FISTs) and TACPs better understand the lethal fires each brings to the battle-



Senior Airman Edward W. Shulman, an ETAC at Camp Casey, ROK (Photo by TSGT Lance S. Cheung, 51st Communications Squadron)



field, enabling them to combine and complement each other's fires for synergistic effects throughout the division's spectrum of combat operations. It is important that TACPs and fire supporters understand not only the effects of joint fires, but their integration as well. Practice is the key to effective integration.

The intent of the joint training program for FOs is not to "certify" them as ETACs—that would require significant additional training and resources. Rather, the purpose is to ensure 101st fire support personnel can help ETACs and control aircraft in ECAS during close operations to satisfy warfighting necessities on the battlefield.

Implementing this Joint Fires Training Strategy helps transform joint mindsets and cultures. Rather than relying on "stove-piped" training within the fire support and TACP communities, the joint force can gain exponentially from harmonizing training efforts while still allowing for focused training within each skill set: Military Occupational Specialty (MOS) 13F Fire Support Specialist and Air Force Specialty Code (AFSC) 1C4 Enlisted Terminal Air Controller.

**Why We Train.** ECAS is a CAS mission conducted under emergency wartime conditions when a qualified terminal air controller is unable to provide attack control, as defined in *Air Force Instruction 13-102, Air Support Operations Center (ASOC) and Tactical Air Control Party (TACP) Training and Evaluation Procedures*, dated 1 September 1996. In the event an ETAC is not present (wounded, etc.), ground commanders can use ECAS to prosecute targets if they weigh the risk of fratricide against the danger posed by enemy forces being engaged.

Fire supporters are clearly the ground commander's best choice for ECAS control if an ETAC is not available. Training on ECAS procedures is crucial for all fire supporters to ensure mission success.

As a result, the 101st Division implemented an ECAS training program as part of its overall Joint Fires Training Strategy. This program satisfies [*Army Training and Evaluation Program*] ARTEP 6-037-30-MTP, *Mission Training Plan for Consolidated Cannon Battery, M102, M119, M198, M109A5, M109A6*, dated 1 April 2000, that requires fire supporters be proficient in requesting and controlling CAS missions.



One-on-one training—a certified 19th ASOS ETAC instructor trains a 101st Division fire supporter in ECAS control procedures.

Regulations do not allow Army fire support personnel to become certified controllers—there are limited training opportunities even for ETACs to be certified. Any non-certified controller is limited to facilitating indirect control of CAS aircraft through a certified controller (executed via radio) or executing ECAS.

Certified controllers normally are assigned call signs when deployed to theatres of operation. The air support operations center (ASOC) tracks these call signs to verify that legitimate controllers are submitting CAS requests. The theatre special instructions (SPINS) published in the air tasking order (ATO) normally provide information on procedures for non-certified controllers to perform ECAS. The SPINS are released by the joint force air component commander (JFACC), who usually is a flag officer from the service with the preponderance of air assets in theatre, most often Air Force.

Depending on the SPINS, FOs can attack targets using ECAS procedures, even without air liaison officer (ALO) or ETAC support, if their troops are in contact with the enemy.

**The Types of CAS.** According to *Joint Publication 3-09.3, Joint Tactics, Techniques, and Procedures for Close Air Support*, there are three types of terminal control: "positive direct," "positive indirect" and "reasonable assurance."

The ground maneuver commander should select the type of control used to bring CAS effects onto the battlefield,

based on his assessment of the target and the effects desired and the tactical risk involved. Positive direct control requires the terminal controller see both the target and the aircraft attacking the target.

Positive indirect control is when the terminal controller cannot see the target and (or) the attacking aircraft. An FO, combat observation lasing team (COLT) or even unmanned aerial vehicle (UAV) that can see the target can help the ETAC control CAS via radio. In both positive direct and positive indirect control, the ETAC passes the theatre standard CAS briefing to the attacking aircraft and transmits the release authority "Cleared Hot" before the aircraft engages the target.

The final procedure for the release of ordnance is reasonable assurance. With the concurrence of subordinate commanders, the joint force commander establishes the conditions for reasonable assurance. Normally, reasonable assurance is employed only when the risk of fratricide is low. In this procedure, the terminal controller gives the pilot clearance to engage a target versus a "Cleared Hot" call onto a specific target.

Currently, CAS terminal air controllers are in key command and control nodes in a ground maneuver unit. For conventional forces, this is down to the battalion level. Maneuver battalion commanders have at least one qualified terminal controller and at least one additional ETAC to task organize on the battlefield, as required.



Air Force MSGT Lonnie Eaker, an ETAC from the 57th Wing at Nellis AFB, controls CAS during an exercise at the National Training Center, Fort Irwin, California.

Given the urban sprawl worldwide, both heavy and light forces will fight many future battles in complex urban terrain. The compartmentalized urban terrain reduces the visibility of a terminal controller. In an urban environment, one city block or even one wall can degrade the ETAC's ability to maintain positive direct CAS control.

The techniques used to employ CAS in such terrain will be either through positive indirect or reasonable assurance control with a non-certified terminal controller, such as an FO, serving as the ETAC's eyes forward.

It is critical we train Army fire supporters in the doctrine and execution of terminal control of CAS to enhance the ETACs' capabilities. FOs trained in CAS help the ground maneuver commander identify potential CAS targets and help ETACs prosecute those targets in a timely fashion.

**Air Force ETAC Certification.** The 101st Division training qualifies fire supporters to conduct terminal control of fixed-wing aircraft in emergency situations, not become certified to USAF standards. The process the Air Force uses to certify ETACs is lengthy and requires a significant number of CAS assets dedicated to ETAC training and certification. (See Figure 1.)

After an airman completes technical school, he is assigned to an operational ASOS, usually on an Army post, where he begins training for "mission-ready status." This training focuses on communications and other equipment specifically associated with the career field

and the mission profile of the Army unit the ASOS will support in wartime. During this initial unit training, airmen become familiar with ECAS operations.

For the airman to achieve mission-ready status, he is evaluated on his ability to accomplish specified tasks. The time to complete a mission-ready evaluation ranges from six months to one year after the airman arrives at his duty station.

#### Pre-Tier Training (6 Months to 1 Year\*)

- Technical School
- Basic Skills Training
- ECAS Familiarization
- Mission-Ready Evaluation

#### Tier One: TAC Trainee (6 Months\*)

- Further ECAS Familiarization
- Terminal Air Controller Academics (Academic Evaluation and Task Certification)

#### Tier Two: ETAC Candidate (6 Months\*)

- More Terminal Air Controller Training/Proficiency
- Joint Firepower Course (Three Weeks)

#### Tier Three: ETAC (4 Months\*)

- Additional Terminal Air Controller Training and Evaluation

\*Typical Times

#### Legend:

- ECAS = Emergency Close Air Support
- ETAC = Enlisted Terminal Air Controller

After becoming mission ready, the airman enters "Tier Training" to become an ETAC, as shown in Figure 1. In addition to completing the three tiers, an airman must have maintained a mission-ready status for one year and have a minimum rank of E-4 to become a certified ETAC.

During Tier One, the terminal air controller trainee receives additional ECAS training and terminal air control academics. During the Tier Two ETAC candidate phase, the training is more intense and focused and the airman attends the three-week Joint Firepower Course at Nellis AFB, Nevada.

After an ETAC candidate graduates from the course and with his unit commander's concurrence, he enters Tier Three ETAC training. During this phase, the airman continues with supervised CAS control training until his proficiency has increased to the point his trainer(s) thinks he can pass the terminal air controller hands-on evaluation and written examination. Once he passes those and has his commander's concurrence, he is certified as an ETAC. This IC4 training takes a minimum of two years and, in most cases, substantially longer.

**Training 101st Division FOs in ECAS.** By comparison, the terminal control training for FOs takes three to four months. (See Figure 2.) The Joint Firepower Course taught at Nellis AFB or via a mobile training team (MTT) at Fort Campbell provides FOs basic knowledge about joint doctrine and the employment of Air Force assets. The 19th ASOS then conducts CAS labs that are classroom exercises covering the use of DD Form 1972 (CAS Request Form), CAS mission planning and aircraft "talk-on" procedures. This is entry-level instruction and provides repetitive training on battle drills for CAS control.

Next, division artillery fire supporters attend CAS training with 19th ASOS personnel at various CAS ranges where they watch TACP personnel conduct live CAS control. The two doctrinal methods of control taught are positive direct and positive indirect. FOs train on ECAS control under the supervision of a certified terminal air controller instructor.

As part of the division's overall Joint Fires Training Strategy, division personnel reciprocate by training TACP personnel during each CAS training exercise. Division fire supporters in-

Figure 1: Air Force Specialty Code (AFSC) 1C4 ETAC Certification

- Joint Firepower Course
- CAS Labs
- CAS Hands-On Control (On and Off Post)



Figure 2: *Screaming Eagle* ECAS Training for Fire Supporters. This training typically takes three to four months.

struct TACP personnel on call-for-fire (CFF) procedures for Army indirect fire systems. Air Force Instruction 13-102 specifies TACPs train on CFF procedures.

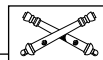
The division fire support element (FSE) has implemented a “crawl, walk, run” CFF training program. TACP personnel first receive classroom instruction on CFF procedures via the guard-unit armory device full-crew interactive simulation trainer (GUARDFIST) and conduct live CFF training at one of the Fort Campbell’s observation posts (OPs). ETAC joint fires training can include participation in a walk-and-shoot exercise, which is a tactical exercise without troops (TEWT) and the division’s premier fire support training event for company commanders and platoon leaders.

Reciprocal training between TACPs and fire support personnel increases joint force proficiency, satisfies regulatory training requirements and, most importantly, builds mutual respect among supporting services.

The division is codifying this strategy via a Division Artillery Standardization Memorandum and an Air Force Squadron Operating Instruction—a major step in changing service mindsets and cultures. On the practical side, the joint training involves the collective development of training and exchange of calendars to nest internal and command-directed training.

ECAS training for 101st Division fire supporters does not eliminate the requirement for Air Force ETACs. Special ETAC equipment and the ETAC certification process make that an undesirable and impractical goal. The ETAC training enhances Army fire supporters’ knowledge of joint ECAS procedures and confidence in their abilities to execute them, preparing soldiers for any contingency they might face on tomorrow’s battlefield. The ECAS training is to extend the eyes of the ETAC.

In the end, this training will ensure the *Screaming Eagles* are trained and ready to meet the challenges of their next *Rendezvous with Destiny*.



Lieutenant Colonel Kevin M. Felix is the Deputy Fire Support Coordinator (DFSCOORD) in the 101st Airborne Division (Air Assault), Fort Campbell, Kentucky. His previous fire support assignments include serving as a Company Fire Support Officer (FSO) for D Battery, 319th Airborne

FA Regiment (AFAR), assigned to 3d Battalion, 325th Airborne Battalion Combat Team (ABCT) in Vicenza, Italy. He also served as Targeting Officer for the 325th Airborne Infantry Regiment (AIR) during Operation Desert Storm; Battalion FSO for 4th Battalion, 325th Airborne AIR; Brigade FSO for the 504th Parachute Infantry Regiment (PIR); Assistant FSCOORD; and Commander of C Battery, 2d Battalion, 319th AFAR, all in the 82d Airborne Division, Fort Bragg, North Carolina. He has a master’s degree in International Relations from the University of Geneva in Switzerland. He will assume command of 2d Battalion, 320th FAR in the 101st Division this summer.

Lieutenant Colonel Zane W. Mitchell, Jr., US Air Force, commands the 19th Air Support Operations Squadron, Fort Campbell, Kentucky. He also serves as the 101st Division Air Liaison Officer (ALO). Before this assignment, he was the Deputy ALO for the 4th Infantry Division (Mechanized) at Fort Hood, Texas. He served as Deputy Director of the Air Support Operations Center (ASOC) and Division ALO for Coalition Joint Task Force-Mountain at Bagram AFB in Afghanistan from May to July 2002. In addition, he was the Chief of Combat Operations at the Combined Air Operations Center (CAOC), Joint Task Force-Southwest Asia. He holds an MS and PhD in Civil Engineering from Virginia Tech. Lieutenant Colonel Mitchell is a Command Pilot with more than 3,900 flying hours in bomber and electronic combat aircraft and flew 21 combat missions in a B-52 during Operation Desert Storm.

## USFAA Announces Three \$1,000 Scholarships for 2003

The US Field Artillery Association (USFAA) announces the inception of three annual \$1,000 scholarships to be awarded for the first time in August 2003. The scholarships are for worthy USFAA members and their immediate family members to help them attain their academic or vocational goals.

Scholarships will be awarded in three categories: USFAA members, immediate family members of enlisted members of the USFAA and immediate family members of officer members of the USFAA. The deadline for the scholarship applications is 1 July with the winners announced not later than 15 August.

Each applicant must fall in one of the three categories; be accepted for admission into an accredited university, college or vocational undergraduate program of study; and submit a signed application not later than 1 July to the US Field Artillery Association, P.O. Box 33027, Fort Sill, Oklahoma 73503-0027. Copies of the application are online at the USFAA homepage at [www.usfaa.com](http://www.usfaa.com), available at the USFAA office on Fort Sill at Building 758 McNair Road or by mail at the address listed in the



previous sentence. Applicants may call the USFAA for an application: (580) 355-4677.

The applicant must include recent transcripts from the high school from which he or she graduated (or will be graduated) and any colleges or technical schools attended with the application. In addition, each must attach a page to the application that explains personal educational goals and how the scholarship will help him or her meet those goals. The page explaining educational goals will be no longer than one double-spaced typed page with standard letter margins.

Among other information, the applicant will have to provide an estimate of educational expenses and an itemization of income, including earnings and savings; other loans, grants and scholarships; government benefits, family support or other income.

In addition, the applicant will have to provide statements by three character or academic references. The application includes the USFAA Scholarship Program Reference Form for the three persons endorsing the applicant to fill out.

The USFAA Scholarship Committee will determine the scholarship winners. All decisions will be final.

The winners will have to provide proof of current enrollment in an accredited university, college or vocational institution in order to receive the scholarship checks.

# The Leaders' Reconnaissance: Company FSO Recon of an Objective



"You're dead....A forward observer (FO) just "killed" a platoon of his company while it was in the attack. The reason for this fratricide in the exercise: the FO called a planned target plotted on the company support-by-fire position, not the intended enemy bunker.

The FO's company fire support officer (FSO) easily could have prevented this if he had refined his target grids during the leaders' reconnaissance. Unfortunately, he did not realize he needed to until it was too late.

Bottom-up refinement is arguably the most important task for a company FSO. Successful clearance of fires and target engagement depend on it.

Unfortunately, only recently did the FA Officer Basic Course (FAOBC) at the FA School, Fort Sill, Oklahoma, begin teaching company FSO leaders' reconnaissance tasks.

**FSO Reconnoitering Tasks.** When reconnoitering, an FSO performs the steps in the figure. To refine targets, he must have his "eyes on" the objective. This allows the FSO to convert six-digit map spots into more precise grid locations with elevation. A fire support team (FIST) member gets at least eight-digit precision by lasing targets with a mini eye-safe laser infrared observation set (MELIOS) and entering the range and azimuth into the range calculation function of a precision lightweight global positioning system receiver (PLGR). The FSO also finalizes his primary and secondary observation post (OP) locations during the recon.

The recon may pass by a point with a good view of the objective. The FSO then pays attention to the cover and concealment the site will afford his FOs. He marks the grid on his map to pass on to his fire support NCO (FSNCO) back at the objective rallying point.

If the FSO sees enemy on the objective, he counts them and determines their degree of protection. Through his battalion FSO, he can request the shell-fuze combination that will be most effective against that target. For example, if the objective is believed to be a hasty defense but turns out to be a battle position with bunkers and trenches with overhead cover, high-explosive (HE) rounds with delay fuzes might be cho-

sen as opposed to time or variable-time (VT) fuzes.

Additionally, observing the terrain along the avenue-of-approach (AA) to the objective may help the FSO plan triggers to echelon fires: location, time, event or on-call triggers. Location triggers should be on easily identifiable terrain features. The FSO places these triggers to allow continuous indirect fire suppression by the largest caliber system possible, given the asset's safety factor and the terrain along the AA.

If the ground is uneven—has defilades, hills and ravines that could offer added protection from the effects of indirect fire—the FSO may suggest a "Cease load" on a target closer to the objective than normally would be safe.

**FSO Movement Options.** There are two reconnaissance movement options for the FSO. The first is to return with his commander to the rallying point. There he briefs his FSNCO on any changes to the fire support plan. The company FSO forwards the refined targets and OP data to his battalion FSO. While the company FSO is talking to battalion, his FSNCO passes the refined data on to the FOs.

## 1. Refine the target grids.

- Is the target grid as accurate as possible?
- What is the elevation of the target?
- What type of sheaf should the target be shot with?
- Should an area or a point target be planned?

## 2. Finalize observation post (OP) locations.

- Can the planned OP clearly observe the enemy?
- Does the planned OP have good cover and concealment?
- Does battalion know my OP grids?
- Do I have OP terrain sketches?

## 3. Note the attitude of the enemy on the objective. How many enemy soldiers are on the objective, and what is the enemy's protection?

## 4. Identify the triggers. Would location, time, event or on-call triggers best support the commander's plan?

Company FSO Leaders' Reconnaissance Tasks

The second option is for the FSO to add an FO to the recon party to leave forward of the company's position. The FSO asks his commander for a small security detachment to protect his FO while forward. Task organizing in this manner entails pulling an experienced FO from one of the platoons.

The FSO and FO move with the leaders' recon to the spot the commander designates as the release point. The FO stops there while the FSO continues on with the commander. Upon returning, the FSO quickly briefs the FO on what he saw and gives him guidance.

While the advance party returns to the rallying point, the FO stays forward with the security team. The FO moves to where he can observe the objective and refines the targets using the MELIOS-PLGR drill. He then radios the refinements in to the FSO or FSNCO who coordinates the changes with battalion and the other FOs.

One advantage to leaving an FO forward is that it gives the FO time to lase and refine targets. This proves particularly effective if the FSO has to make many adjustments. Staying forward also enables the company to maintain sight of the enemy on the objective.

However, by staying forward, the FO risks compromising the company's security. It also makes it difficult for the commander to exercise command and control over the entire company.

The commander determines the option based on mission, enemy, terrain, time and troops available (METT-T).

Without a good plan for the FSO to acquire information on the leaders' reconnaissance, fires may be inaccurate and ineffective. They also may kill soldiers in a friendly platoon.

CPT Colin J. Williams  
Captain's Career Course (CCC)  
CPT Timothy K. Hight  
Small Group Instructor, CCC  
FA School, Fort Sill, OK



# Forward Observer Battle Drills— The Time Is *Now*

By Majors Daniel A. Pinnell and Kelly W. Ivanoff

Units continue to struggle to employ indirect fires effectively in support of search and attack operations at the Joint Readiness Training Center (JRTC), Fort Polk, Louisiana. These operations are characterized by short, violent encounters at extremely close range (100 to 200 meters) with little or no warning.

**I**nfantry platoon leaders and forward observers (FOs) arrive at the JRTC unclear about how to help each integrate fires. This is generally the result of their not training together under realistic conditions at home station.

In the friction and confusion of the engagement, the platoon leader forgets to request fires, is afraid to call for them or simply finds the process too difficult or slow to work through, given his focus on maneuvering his platoon in combat. In some cases, he may approve unsafe target locations because he has failed to account for time-distance factors, he lacks tactical patience or he doesn't know what a safe employment distance should be for a given indirect fire system. (The safe employment distance is based on the five requirements for accurate predicted fire, ordnance effects radii and probable errors in range and deflection.)

On the fire support side, young, inexperienced and typically under-ranked FOs often are not the fire support advisors and executors the Field Artillery expects them to be. In many cases, FOs are mentally and technically unprepared to coordinate and deliver safe, responsive and effective fires. Too often, FOs don't practice calling for and controlling fires at the speed or closeness to friendly forces that a JRTC (or combat) engagement demands. They are unfamiliar with indirect fire planning factors, unskilled at land navigation and maintaining situation awareness, poor at locating targets in wooded environments and have trouble organizing their thoughts under the pressure of simulated combat actions.

The result of poor integration of indirect fires is a rate of five Blue Force casualties to every one opposing force (OPFOR) casualty. Fewer than 10 percent of the casualties inflicted on the OPFOR are due to indirect fires.

The effective delivery of fires at these ranges and speeds requires significant dry- and live-fire practice at home station. This practice must be driven by a systematic approach to integrating fires and maneuver at the platoon and company levels.

Maneuver units use battle drills to train their personnel in tried and true tactics, techniques and procedures (TTPs) for reacting to contact. *FM 7-8, The Infantry Platoon* provides that doctrinal training foundation for all infantry personnel. The Field Artillery needs

similar fire support battle drills for company and platoon fire support personnel.

Unfortunately, the artillery does not have such a doctrinal base that guides the immediate actions of the FO when his company makes contact with the enemy. So the JRTC Fire Support Division developed 12 fire support battle drills. (See Figure 1 for a list of the drills.) These drills were developed as outlined in *FM 25-101, Battle-Focused Training*.

FM 25-101 defines a battle drill as a “collective action rapidly executed without applying a deliberate decision-making process.” FM 25-101 then states that “all soldiers and their leaders must know their immediate reaction to enemy contact as well as follow-up actions. . . .drills are limited to situations requiring instantaneous response; therefore, soldiers must execute drills instinctively.”

In Figure 1, the first eight drills complement battle drills from Chapter 4, “Battle Drills,” of FM 7-8. These fire support drills are nested in the platoon actions and provide details for the FO and platoon leader.

Consider Fire Support Battle Drill #1 Platoon Attack that is based on the Platoon Attack battle drill from FM 7-8. In that drill, the employment of indirect

1. Platoon Attack\*
2. React to Contact\*
3. Break Contact\*
4. React to Ambush\*
5. Knock Out a Bunker\*
6. Enter Building/Clear a Room\*
7. Enter/Clear a Trench\*
8. Conduct Initial Breach of a Mined Wire Obstacle\*
9. FO Occupation of an Assembly Area
10. FO Occupation of an Observation Post
11. Employment of Close Air Support
12. Precision Lightweight Global Positioning System Receiver (PLGR)

\*Battle Drills designed to correspond with infantry battle drills on contact with the enemy.

Figure 1: The 12 Fire Support Battle Drills. These battle drills are available on the Joint Readiness Training Center Fire Support Division’s website at <http://www.jrtc-polk.army.mil/OPS/Index.htm>. Click on the fire support icon

fires is not mentioned until Step Three of four. More specifically, there are 13 sub-steps in that battle drill before it mentions indirect fires. The point is the FO should be conducting parallel, simultaneous activities with the platoon

leader and both should arrive at sub-step 13 together, culminating in the FO’s giving the command to fire on his FM radio. (See the Battle Drill #1 Platoon Attack in Figure 2.)

The FO links the gun line procedures of a firing unit with the battle drill steps being taken by the maneuver element. At the point when the platoon leader directs the FO to fire the mission, the FO should be able to fire instantly with the platoon leader’s only having to wait for the round’s time of flight.

Developing battle drills is only part of a solution to make indirect fires more effective in the close fight—training is the other. The battle drills provide a doctrinal template for training. FO battle drills are not a revolutionary concept, but they are not common within divisions, let alone standardized between divisions. Additionally and most importantly, they are not integrated into the supported maneuver unit’s field manuals or local standing operating procedures (SOPs).

The JRTC Fire Support Division recommends these drills be embedded in Chapter 4 of FM 7-8, so maneuver leaders can access the drills easily and understand the nested integration of indirect fires into the maneuver drill. By codifying fire support battle drills in

**Situation:** Per *FM 7-8, The Infantry Platoon*, the platoon is moving as part of a larger force conducting a movement-to-contact or deliberate or hasty attack.

**Assumptions:** The platoon initiates the attack (otherwise, use FO Battle Drill #2 React to Contact Drill). This drill supports a movement-to-contact or deliberate or hasty attack.

### Step 1: Platoon FO Plans Fires

The FO plans fires along the route of march in accordance with the platoon leader’s guidance for fires.

A. In planning fires, the FO considers:

(1.) Current intelligence and reliability of the intelligence from higher command.

(2.) FO calls the company fire support element (FSE) to determine the following: assets available to fire for the FO, priority targets available to the platoon and an update of friendly unit actions around the platoon area of operations (this may help the FO understand how responsive the firing element will be to his call-for-fire).

(3) Development of a task and purpose for fires. Task and purpose should relate to the engagement of the anticipated size and type of enemy force the platoon expects to encounter. The FO ensures the platoon leader approves them.

(4) Integration of the higher headquarters fire plan. The FO must brief the plan to the platoon leader, and the platoon must rehearse it.

(5) Fire planning considerations for the offense. See Chapter 3, “Fire Support Planning for the Offense” of *FM 6-20-50 Tactics, Techniques and Procedures for Brigade Operations (Light)*.

(6) Communications plan and ranges. Before crossing the line of departure, the FO ensures he has good FM communications with the company FSE and mortars.

(7) Company mortar plan for support. The FO ensures the company mortars understand the route of march and have the target list to support the current mission. The FO must understand the mortar standard fire order for number of rounds in effect based on target description; he refers to the company or battalion fire support standing operating procedures (SOP).

(8) Target location error (TLE). In a deliberate attack, a larger TLE may have minimal impact on operations; whereas in a hasty attack, the FO may need to refine the target data or adjust fires before firing for effect.

B. The FO recommends to the platoon leader the development of specific fire support coordinating measures (FSCM) that facilitate rapid clearance and integration of fires into the contact. Additionally, the FO helps the platoon leader develop maneuver graphics. This coordination increases the FO’s understanding of the maneuver plan and increases battle tracking/situational awareness.

### Step 2: Actions on Contact

The FO’s radio-telephone operator immediately sends a spot report and observer location to the company FSE.

### Step 3: Provide Fire Support

A. The FO immediately initiates the precision lightweight global positioning system receiver (PLGR) battle drill (#12) to generate a fire mission: determine accurate target location, send initial call-for-fire in a "Do not load" status and conduct clearance of fires procedures with the platoon leader.

(1.) Depending on proximity of friendly forces to enemy troops, the FO may initiate the fire mission that enables maneuver to block, fix or isolate the enemy.

(2.) Upon confirmation with the platoon leader, the FO may employ creeping fires to achieve the desired effects on the enemy.

B. The RTO sends the mission to either the company FSE (centralized mode) or to the company/battalion mortars (decentralized mode) in an "At My Command" (AMC) status. According to FM 7-8, "The platoon leader does not wait for indirect fires before continuing with his actions." The FO increases the responsiveness of indirect fires by using AMC.

C. As the platoon FO keeps the platoon leader informed of the firing unit status, the company fire support officer (FSO) simultaneously keeps the company commander informed of the actions of the platoon and what the FO and FSO are doing to support the company in contact.

D. As the platoon FO integrates fires into the platoon fight, the company FSO immediately plans and coordinates to integrate additional assets to support the company. Should the company commander decide to reinforce the platoon in contact, the FSO already has begun coordination to integrate additional assets. If the company commander determines the platoon does not need additional support, the company FSO can pass control of any additional indirect fire assets to another FO for his platoon to use.

E. The FO notifies the platoon leader when the mortars are laid and ready to support the mission and tells him the proposed location for the rounds to impact.

F. The FO and platoon leader continuously track the location of friendly forces.

G. The FO fires the mission under the direction of the platoon leader. He uses first rounds to either adjust or fire for effect. The FO and platoon leader assess the effectiveness of the mission to determine if the mission should be repeated.

H. While the fire mission is in progress, the FO sends refinement data to the company FSE to develop firing data for a higher caliber system. (The company FSE develops this mission on an

alternate FM frequency while the FO continues to control the company mortars in the current fight.)

I. The RTO continuously updates the company FSE with friendly unit locations. The RTO updates the FO and platoon leader on all communications about battalion fire support assets on the company fire support net.

J. *One Option*—The FO may position himself with the platoon sergeant in the support-by-fire element. The platoon leadership must understand this option and rehearse it. The FO should position himself to best control the integration of indirect fires.

### Step 4: Attack

During this phase, the platoon leader directs the movement of forces on the ground. The FO shifts indirect fires to help suppress or destroy the enemy, allowing maneuver to fix or isolate the enemy position, per FM 7-8 Platoon Battle Drill #1 Platoon Attack, Step 4, A. (3).

### Step 5: Consolidate and Reorganize

A. The RTO sends a situation report (SITREP) to the FSE that includes battle damage assessment (BDA) and friendly locations.

B. The FO develops a fire plan to support the defense of the platoon in the consolidated location. The FO recommends a priority target or final protective fires (FPF) to the platoon leader and gains his approval. The FO requests FPF from the company FSE. If the FPF is granted, the FO coordinates with the platoon leader for the best location of the FPF or priority target.

C. The FO adjusts these targets as soon as possible to ensure accuracy and responsiveness in anticipation of a possible enemy counterattack.

D. The FO transmits the defensive quick-fire plan to the company FSE and mortars. The FO rehearses all targets with the company mortars.

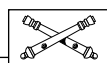
E. The FO walks the perimeter with the platoon leader and identifies squad members to serve as primary and alternate observers for each target and rehearses the call-for-fire with each observer. As the situation permits, the FO PLGRs-in each target in support of the platoon defense. The FO refines the target data and forwards it to the company FSE and mortars.

F. The FO identifies day and night triggers for each target to support the defense of the platoon position. The selected observers rehearse firing the triggers.

G. The FO begins developing a fire plan for the next mission (assuming the platoon will leave the consolidation and reorganization location in a relatively short time).

Figure 2: Fire Support Battle Drill #1: Platoon Attack. (For this and the other 11 battle drills, go to the Joint Readiness Training Center Fire Support Division's website at <http://www.jrtc-polk.army.mil/OPS/Index.htm>. Click on the fire support icon.

doctrine, we transmit the minimum Army-wide requirements to both the FO and infantry platoon leader and set the standard for home station evaluation/certification and for combat training center (CTC) mentors to support.



Major (Promotable) Daniel A. Pinnell is the Senior Brigade Fire Support Observer/Controller (O/C) for the Fire Support Division at the Joint Readiness Training Center (JRTC), Fort Polk, Louisiana. Also at the JRTC, he

was the Senior FA Operations O/C. His other assignments include serving as the Brigade Fire Support Officer (FSO) and Battalion Executive Officer for 2d Battalion, 3d Field Artillery, both in the 1st Armored Division in Germany and Kosovo; Commander of a Tactical Psychological Operations (PSYOP) Company in the 9th PSYOP Battalion and Commander of an Operational Detachment of the 6th PSYOP Battalion (Airborne) in Central Africa, both part of the Special Operations Command at Fort Bragg, North Carolina. He also commanded a firing battery in the 2d Battalion, 8th Field Artillery, part of the 7th Infantry Division (Light), Fort Lewis, Washington.

Major Kelly W. Ivanoff was the Senior Task Force Fire Support O/C at the JRTC. Currently, he is attending the Command and General Staff College at Fort Leavenworth, Kansas. His previous assignments include serving as Commander of Headquarters and Headquarters Battery of the Division Artillery; Commander of B Battery, 3d Battalion, 6th Field Artillery; and Task Force FSO for 2d Battalion, 22d Infantry, all in the 10th Mountain Division (Light Infantry) at Fort Drum, New York. He also was a Platoon Leader and Executive Officer for C Battery, 2d Battalion, 14th Field Artillery (Multiple-Launch Rocket System), 3d Infantry Division (Mechanized) in Germany.