ARMOR

DIRECT FIRE PLANNING

PB 17-93-6

November-December 1993

We have many longtime readers of *ARMOR* who are familiar with its history and development. However, *ARMOR* attracts new subscribers and readers every week, so allow me to tell you something about the history of the magazine of mobile warfare. *ARMOR,* the oldest U.S. Army service journal, was founded in 1888 at Fort Leavenworth, Kansas. Its first masthead read the *Journal of the United States Cavalry Association.* It was not uncommon in those early days to find articles written by Civil War and Indian War veterans, detailing the proper treatment of one's mount and the efficient handling of one's carbine or pistol. After the turn of the century, our journal kept the fighting force informed about emerging new weapons, such as the machine gun and airplane. The Mexican punitive expedition of 1916, coupled with the Philippine insurrection, and the demands of the first World War, kept troopers so busy that publication was suspended for almost two years.

The publication cranked up again after the war with the new name *Cavalry Journal,* and its pages were heavy with soldiers re-evaluating the role and future of cavalry. Not only had horse cavalry been afforded a limited and non-definitive role in the trench warfare of France, but many of the leaders of the equine arm were courting a newer, heavier, louder, and more heavily armed mount — the tank. Thus began a debate that would rage for decades as the Army groped toward mechanization. Captain George S. Patton, Jr.'s name appeared in the journal calling for more and faster mechanization, while others touted the notion of armored cars. The role of the National Guard and reserve became a part of the *Cavalry Journal's* presentation, as well as regular tactical quizzes and questionnaires.

When Hitler crushed Poland and France, and threatened the rest of Europe, *Cavalry Journal* readers recognized a shift in focus—armored forces became the building block of future cavalry, and our journal led the way in critical thinking and planning for that force. Since then, through Korea, Vietnam, and DESERT STORM, our branch journal, having taken the name *ARMOR,* has been the bulletin board for discussion of issues and initiatives to make our combat arm of decision more efficient and professional.

But what makes *ARMOR* current and insightful, both then and now, is that the contributing authors for our journal are soldiers like you — men and women who see the problems and developing issues up close, firsthand, and who offer creative solutions. You continue to share your knowledge and experience with your fellow troopers to make all of us better soldiers.

You who have contributed to *ARMOR* can share in the pride that we here at the John Lannen House on Fort Knox feel when we are recognized for excellence. This past August, your branch journal, *ARMOR,* was chosen to receive an Editorial Excellence Award in the *Magazine Week/Folio* competition among national magazines. Competing with some 334 entries in 41 categories, *ARMOR* was cited for its competency in realizing the ideals set forth in the mission statement, as well as for its overall editorial excellence. The staff here at *ARMOR* — Jon Clemens, Vivian Thompson, Mary Hager and Jody Harmon, deserve great credit for their hours of dedicated service and their creative, stimulating layout and design. But I must also thank you, the readers and writers, for continuing to make us the best among the branch journals. You may expect *ARMOR* to be dealing with the critical issues of the Armor force well into the 21st century and, with your help, plus the talent of our outstanding staff, I'm confident that will happen.

— J.D. Brewer

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ARMOR

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Features

Departments

LETTERS

Keeping OPORDs Simple

Dear Sir:

The July-August issue was excellent. Every article, as the cover stated, was a winner. Each was interesting, enjoyable, and thought provoking. On that note, I would like to offer a couple of thoughts.

While I agree we should use any means necessary to ensure our subordinates understand the operation order, I believe we are spending too much time on ancillary methods of communication instead of building on those items which are the stock of our trade — the five-paragraph field order and accompanying overlays. To ensure understanding of the operation, develop a simple concept, and use clear and concise language to explain what you want done, from the current position to the objective, and beyond if necessary. Ensure your graphics are simple, clear, and convey exactly what you want them to. Do not clutter your map with so many symbols you cannot see the map underneath, as I have seen on many company commanders' maps. Checkpoints and TRPs work as well as battle positions, support-by-fire positions, and numerous other control measures. The order and the graphics each should stand alone for execution. If they don't, you probably haven't made the concept simple enough or communicated clearly enough. The maneuver sketch, sand table, graphics, as well as solid SOPs and well rehearsed battle drills, are but methods to ensure understanding of the operation. Use what works, but do not neglect the art of clear communication.

I also really enjoyed the article on hunter-killer operations. However, I have a distinct sense of deja vu. What is described by the authors looks suspiciously like an H-series TOE cavalry platoon to me, modified to ac-

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count for the better equipment we have today. For those who have never seen one, it consisted of a platoon HQ (M113-.50 cal), two scout tracks (M113-.50 cal), two M901 ITVs, four main battle tanks, and an M106 mortar carrier. Unusually flexible, this was the smallest combined arms team in the Army, and well-suited to exactly the type of operations described in the article. Unfortunately, the Army decided it was too difficult for young officers to lead. I did not believe it then, and do not believe it now. The proof is here for all to see; obviously, Captain Flynn's platoon leaders could handle it. It seems to me a revised organization consisting of three platoons, each with four M3s and three M1s, plus an M3 for the troop commander would be in order. This conversion could be accomplished at little expense for the Army and would pay large dividends in organizational flexibility.

Keep up the good work!

MICHAEL K. ROBEL
MAJ, Armor, USAR
Hoover, Ala.

More on Hunter-Killer Technique

Dear Sir:

The formations described in Captain Karl S. Flynn's article, "Hunter-Killer Operations," are applications of doctrine or techniques; therefore, I would like to add alternative hunter-killer techniques for anyone interested in applying these formations in their units. I will discuss hunter-killer organization, command and control, and screen line operations.

Instead of organizing the cavalry troop into three platoons as Captain Flynn suggests, other units may want to organize into just two hunter-killer platoons without the third platoon (tank pure). Each section in this hunter-killer platoon includes two Bradleys and a tank, or two Bradleys and two tanks. The section with two Bradleys and two tanks is usually, but not always, the scout platoon leader's section. If necessary, when another section is in contact, the scout platoon leader can give up one of his tanks to that section. This makes the scout platoon leader's section a "swing" section. The scout platoon leader may also task organize another section to have two Bradleys and two tanks. He would do this in anticipation of contact in another section's sector during a zone reconnaissance. All of this would depend on the IPB while maintaining a habitual relationship between the tankers and the scouts.

Hunter-killer organization leads to the much debated question of command and control during a zone reconnaissance. The article did not address this in great detail, but I will. I agree that the scout platoon leader is responsible for the hunter-killer platoon. However, these operations succeed at the section level. They also require split-second timing when under contact; therefore, the troop commander should understand that he is in fact in charge of six independent sections spread out across the battlefield. He must rely on the expertise and initiative of each section sergeant when they make contact with the enemy. He must also be able to communicate directly with the NCO going toe-to-toe with the enemy.

I agree with Captain Flynn's comments on hunter-killer counterreconnaissance operations. The tanks are valuable in adding depth to the screen. Nevertheless, I would caution hunter-killer platoons and sections against "maneuvers to engage and destroy the enemy while all other HK teams maintain the screen line." A well-concealed OP with a tank very close behind it can still litter the battlefield with dead BRDMs and BMPs. There should be very little movement on the screen line.

In the end, there are a number of keys to successful hunter-killer operations. First, a good IPB helps the troop commander and platoon leaders decide when and how to organize into hunter-killers. Next, a habitual relationship between tankers and scouts enhances the teamwork and lethality of each hunter-killer section. Third, decentralized command and control ensures the quickness and initiative required in these operations. Fourth, a series of well-hidden OPs will win the counterreconnaissance battle.

Finally, if you are interested in what hunter-killers can do, just ask the Krasnovians defending the Central Corridor during both NTC 92-1 and 93-1 and trying to penetrate the Whale Gap during NTC 92-1.

CESAR A. CRUZ
2LT, Armor
Fort Bliss, Texas

Placing the Blame for Huertgen

Dear Sir:

In the July-August 1993 issue, Harry J. Schute's "Forgotten Principles: The 28th Division in the Huertgen Forest" is an excellent example of the use of military history to teach current leaders how to avoid repeating the mistakes of the past.

However, I disagree with his statements made in the second, third, eighth and last paragraphs that the 28th Division violated the principles of war and was responsible for its decimation and mission failure. In the eleventh paragraph, Mr. Schute states that the 1st Army Commander decided that "the Huertgen must be physically taken" due to his concern about a German counterattack into the VII Corps flank. "He adjusted his Corps boundaries and gave the task to LTG Gerow's V Corps." Gerow assigned the mission to the 28th Division (paragraph 12) and assigned objectives to the division (paragraph 17). When Eisenhower delayed the date of the main attack by VII Corps, "no one from Hodges to Gerow or Cota suggested a new start date for the 28th attack." (paragraph 20)

The last three sentences of paragraph 27 state the most incredible fact about the entire operation — the 28th Division was conducting the only attack on the entire western front at that time.

Although the 28th Division may have violated some of the principles of war in mission planning and execution, it did so on the orders of its Corps and Army Headquarters. The blame for the failure of the 28th Division in the Huertgen Forest is shared by commands at least two and probably four echelons above the division.

LARRY L. ERDLEY
COL (Ret.), PAARNG
Lewisburg, Pa.

Reviving Old Concepts

Dear Sir:

An MBT and two CFVs in a hunter-killer section? Two MBTs and five or six CFVs in a hunter-killer platoon? And imagine — it has been found that an Armor lieutenant is able to control this mixed unit.

Sounds like a great configuration for covering force operations and defense. Now, imagine that our lieutenant is given an indirect fire weapon system (4.2 in.? 105-mm howitzer?) And, for OPs and night listening posts, as well as detailed recon in heavy cover or built-up areas, suppose we also give him an IFV with ten dismounts. Now he can engage OPFOR recon elements without exposing his direct fire assets, as well as man OP/LPs without dismounting his scouts. In movement to contact or attack operations the troop commander can consolidate the indirect fire weapons and/or MBTs to mass fires and shock effect.

Too bad that our young leaders must experiment through trial and error to find an efficient organization for combat operations

Continued on Page 50

MG Paul E. Funk,
Commanding General,
U.S. Army Armor Center

Information Age Warfare

It's been said that we always seem to begin our next war with the technology and tactics of the last war. Only after a few weeks or months of battle do we then realize the limitations of outdated thought and technology, so we modernize our approach. Historically, our opponents have been very forgiving of this tendency, for they have always allowed us enough time to reconfigure forces, revise doctrine, and rebuild equipment to meet a new challenge. But today, we find ourselves facing Information Age Warfare — a type of combat so fast, so lethal, and so precise as to leave no time for catching up. Sophisticated satellites can detect an enemy's slightest movement, and once we confirm that movement with ground-based reconnaissance assets, we can employ precision navigational technology (GPS and IVIS) for artillery or manuever forces to counterattack. Where in the past there might have been time to reposition or hide, now the enemy can only await a steady rain of DPICM or the anonymous zip of a sabot round coming from some unseen tank thousands of meters away.

What all this represents is a fundamental change in the way we armored soldiers do business. Not only has our technology changed, but the way we think about fighting must also change. To support our more rapid movement, our logistics must be faster and more responsive. For all of its timely, critical support of Patton's then rapid march of the Third Army in 1945, the old "Red Ball Highway" would be outdated and outmoded on the modern battlefield. We can be proud of our past, but we cannot live in it. The old methods are too slow and too limited. As our new FM 100-5 tells us, we must begin to see the coming combat in terms of battle space — that three-dimensional world of firepower, maneuver, time and space that allows us to dictate the terms of the fight. Our mental attitude must be more anticipatory than ever as we attempt to forge our influx of information into a tactical advantage. There are examples of thousands of dedicated soldiers and dozens of armies that possessed attitudes of determination and confidence, yet lost the war. Attitude doesn't win wars — it frees up talent and technology, and together they win wars.

Our soldiers have the talent, and this Information Age seems to be exploding with new technological systems that enhance our lethality, speed, and execution. Alvin and Heidi Toffler, in "War, Wealth, and a New Era in History," *World Monitor* (May 1991), indicate that Operation DESERT STORM ". . . was not simply the use of quantitatively better technology but a truly revolutionary infusion of knowledge into violence, forcing changes in organization, training, tactics, battlefield management, intelligence, timing, along with fundamental reconceptualization of the relative roles of firepower, mobility, logistics, time, space and communications" (52).

It is precisely this "infusion of knowledge," or the evolution of an Information Age of warfare, that causes us to rethink our approach to planning and executing a mission. Our total battle space becomes our focus, not some narrow sense of a sector or corridor or route of march. We get to the point of decision faster now than ever before, and we know more of what to expect when we arrive. On the other hand, the enemy is faster, too; thus we are more likely than ever before to have to react to changing conditions and circumstances more rapidly and decisively. All of this calls for the professional armor soldier to be a student of not only military history, but also of the military future — a soldier constantly searching for the newest technology, while remaining current with the daily changing status of information management. The Tofflers correctly argue that "Third Wave violence is the extension of the mind, not the fist." That mind — the combat mind and the attitude of winning — must be honed and sharpened to take full advantage of the the talent and technology in the modern armored corps. My belief is that leadership — in all its dimensions — will be even more important in "Third Wave war."

"Massing fires is not 14 vehicles all destroying one target

True massing of fires is 14 vehicles destroying 14 different targets..."

DIRECT FIRE PLANNING

by Major Derek Miller and Captain Rick Averna

A unit must be engaged in accordance with a definite plan. It must not be permitted to drift aimlessly into battle.

-Infantry In Battle

Introduction

Our doctrine provides no clear procedure specifying how direct fire is planned or controlled, leaving company team commanders in a dilemma. To a limited extent, there are techniques or methods that can assist the commander in controlling his fires in the offense or the defense. This article will discuss these concepts, principles, and techniques, and offer a logical procedure for a commander to follow in developing his fire plan. This plan must follow a logical process, based on METT-T, that maximizes the principles of fire control for each unique situation.

Concept

The ultimate goal of direct fire control is to mass fires, but the concept of massing direct fires is widely misunderstood. Frequently, it is mistaken for volume. **Volume of fires does not equal massing of fires. Massing of fires is defined by the terminal effect on the enemy, not the number of systems firing or the number of rounds fired.**

Mass is not parking vehicles hub to hub and all firing at the same target. If every vehicle in a CO/TM engages a single target simultaneously with five rounds per system, volume is achieved; mass is not. Rather, the result is overkill, which wastes ammunition and may allow other unthreatened enemy weapons systems to engage the CO/TM and inflict heavy losses.

Massing fires means placing accurate fires on multiple enemy threats simultaneously. Firing at multiple targets in depth prevents the enemy from dealing with any single threat and maneuvering or massing his fires against it. An enemy forced to respond to multiple threats simultaneously cannot mass against any single threat without ignoring another. As we force the enemy to face multiple threats and divide his efforts against each, we shatter his command and control, divide his mass, and - relatively - increase ours.

The fire control plan must allow the commander to focus and distribute the fires of all available friendly systems at all critical points, but especially at the most dangerous targets. Fires distributed throughout the enemy's formations or positions will destroy his systems, force him to react to the effects of our fires, and make him lose the initiative.

Developing a CO/TM fire plan to mass fires is based on the factors of METT-T. The commander must fully understand his mission, the enemy, terrain, own troops, and time. To achieve the required mass to accomplish his mission, the commander may have the majority of the force fight to get key systems in position where they can unquestionably influence the critical point. For example, a mech CO/TM may have the BFV platoons fight for key terrain, allowing the tank platoon (main effort) to occupy a position where it can accomplish the CO/TM mission of suppressing an MRP.

The basic objective of fire control at the company level is for the commander to control the fires of platoons and to mass them on the enemy.

In order to mass fires, the CO/TM fire control plan must clearly focus platoons on the enemy, to distribute the fires of the CO/TM over different parts of enemy formations or positions. Additionally, it must allow the commander to shift the fires of platoons to different enemy threats as initial targets are destroyed or the situation changes. At the same time, the CO/TM fire plan should allow platoons to fight their own battle against clearly defined targets so the platoon can exercise its own fire control.

Distributing fires is the process of engaging different enemy threats simultaneously, to avoid overkill by multiple systems engaging the same targets, and to degrade the enemy's ability to deal with single threats one

at a time. Proper distribution ensures critical targets are engaged first, and the enemy is engaged laterally and in depth. It determines which weapons will fire at which targets, and in what order fires will be initiated and sequenced. For example, instead of the entire CO/TM firing at the same or closest vehicle in an MRP, fires are distributed so each platoon fires at a different vehicle, engaging the entire MRP simultaneously.

To properly distribute fires, the fires must be focused or oriented on the area of the desired distribution. **Focusing fires** means accurately directing fires to hit specific targets, points, or areas, and is the most difficult task of controlling fires. The commander focuses fires by clearly conveying instructions (either preplanned, or hasty) to direct the fires of individual platoons on specific targets or areas that support his plan for distribution. For example, in the defense, the commander might focus one platoon on the left MRP in an MRC, and another platoon on the center MRP, etc. Platoons must be able to recognize the point at which to focus their fires. Failure will result in multiple platoons engaging the same targets, while other targets are not engaged. Focus is accomplished through the use of recognizable control measures that platoons can see and understand. Control measures to focus fires can be friendly-, enemy-, or terrain-based. Proper training, unit SOPs, and thorough planning are required to achieve successful focus. Training develops standard methods and a common language to describe control measures. OPORDs and rehearsals must paint the visual picture of how the commander wants the fires focused and what the platoons will see and use to focus their fires.

Shifting fires is the process of refocusing weapons systems to change the distribution of fires as targets are destroyed, or as the situation changes (i.e. the introduction of new forces on the battlefield). At the CO/TM level, this is accomplished by shifting the fires of platoons and focusing them on new areas to maintain the desired distribution. The commander must be able to accurately shift the required number of systems by identifying how to distribute fires and focusing platoons on new targets.

The objective of a platoon fire plan is essentially the same as a CO/TM fire plan; however, the platoon leader is distributing, focusing, and shifting the fires of either sections or individual systems. Once the CO/TM commander focuses the platoon on a specific area, the platoon leader must then distribute, focus, and shift his fires to mass fires on specific targets and be prepared to shift the platoons fires to a new area as directed by the commander. Platoon fire plans should include details of how a sustained rate of fire will be maintained (fire techniques), and types of weapons or ammunition, as applicable. Platoon leaders should follow the same logical process as the commander in developing platoon fire plans.

Principles of Fire Control

When developing a direct fire plan, the commander should attempt to maximize the principles of direct fire control. These principles are discussed in FMs 71-1, 23-1 and 17-12-1. Although the description and definition varies slightly between references, the general concepts are the same. Paraphrased from the above manuals and expanded to CO/TM level, the principles of direct fire are:

- Avoid target overkill.
- Use each weapon system in its best role.
- Concentrate on long range targets.
- Take the best shots and expose only those combat vehicles actually needed to fire.
- Destroy the most dangerous targets first.

Avoid target overkill. The direct fire plan must minimize engaging targets that are already destroyed or disabled. Avoiding overkill allows friendly weapons to engage multiple enemy targets simultaneously, saves ammunition, and prevents the unnecessary exposure of friendly combat vehicles. Avoiding overkill is key in defensive operations, but also important in the offense. It is best accomplished by a fire plan that evenly distributes fires by providing a clear technique to focus fires.

Use each weapon system in its best role. Different weapons systems and types of ammunition have specific characteristics which maximize their capability to kill specific enemy weapons systems at different ranges. The direct fire plan should direct the use of specific friendly weapons systems against specific enemy systems. Commanders can accomplish this by planning to initiate, sequence and distribute fires based on the factors of METT-T. For example, the commander might initiate with TOWs against tanks at 3750 meters, and at 2500 meters have tanks engage tanks and BFVs kill BMPs. While it may not assist in focusing fires, designating engagement priorities may help to maximize this principle.

Destroy the most dangerous targets first because they pose the greatest threat to friendly forces. A thorough estimate process considering range, terrain, and weapons capabilities allows the commander to determine which enemy weapons systems he must destroy first. Detailed planning is the preferred method to maxi-

mize this principle; however, in actions on contact, engagement priorities followed by a hasty estimate and FRAGO (fire command) may have to suffice. In either case, proper focus, distribution, and firing first are key to maximizing this principle.

It is important to remember that each of these principles of fire control are applicable at crew/soldier through CO/TM level. At the crew level, the most dangerous target may frequently be the closest, and the same enemy vehicle may be the most dangerous target for multiple crews in the CO/TM. Leaders must control fires to simultaneously engage different dangerous targets. Allowing individual crews to select their own most dangerous target will result in multiple systems engaging the same enemy vehicle, while leaving other dangerous targets free to maneuver and engage friendly forces.

Concentrate on long range targets to gain the advantage of stand-off and destroy enemy systems prior to coming under the effects of their fire. The commander uses this principle to his advantage by engaging with weapons systems matched to the capabilities of his crews, because not every crew can hit consistently at maximum range. During the development of the direct fire plan, the commander determines the range at which to engage, based on weapons capabilities versus gunner/crew proficiency. Maximizing this principle will increase the CO/TM's engagement window, and protect the force by destroying enemy targets before they can bring effective fire on friendly forces.

Take the best shots and expose only those combat vehicles actually needed to fire. This maximizes the probability of hitting and killing enemy targets and protects friendly forces as long as possible. The commander may maximize this principle by a detailed estimate process that develops a plan to sequence and time his fire and maneuver in accordance with the factors of METT-T. Control of vehicles firing, according to a definite plan, will allow the commander to determine the number of systems required for most engagements and order only those systems to engage. For example, as the CRP enters the CO/TM engagement area, only one platoon is required to destroy it. If the commander has considered this in his estimate, he is prepared for this event. As the CRP enters the EA, the commander directs only the platoon in the best position to kill the CRP to engage, and other platoons remain hidden.

Fire Control

Many of our doctrinal references contain sections on fire control. Few of them completely agree on planning, practice, or terminology. FMs 71-1, 71-2, 71-123, 7-7J, 17-15, 17-12-1 and 23-1 list some or all of the following in their sections on fire control:

- Target Reference Points (TRPs)
- Engagement Areas (EAs)
- Fire Patterns
- Fire Techniques
- Fire Commands
- Engagement Priorities

The above terms are found in doctrinal references as techniques or methods to control fire. They are actually tools to be used by a commander in applying or developing techniques to control fires.

These tools may be used to help control fires, either individually or in combination; **however, they do not alone constitute a fire plan.** The actual fire plan must explain how the commander intends to use these tools to direct his fires against the enemy, and must include the technique to be used to distribute and focus fires. Doctrinal references do not completely agree how each of these tools are used, or even what they are, but here are some basic ideas.

The Target Reference Point is a control measure that assists the commander in focusing fires at a specific point on the ground. TRPs are generally terrain oriented, but can be oriented on the enemy. The TRP aids in defining engagement areas, trigger lines (points), or maximum engagement lines (MELs). Trigger lines are specific places on the ground that are tied to an event in the fire plan (direct or indirect); crossing these lines by a friendly or enemy element triggers the firing event. MELs are the defined limits on the ground for the maximum range of a given direct fire weapon. MELs are based on the location of the weapon(s) and the planned maximum range of engagement.

Commanders can establish TRPs using a man-made visual aid (as in defensive engagement areas), an existing terrain feature, an enemy position or formation, or any other feature recognizable by platoons during the direct fire fight. TRPs may be designated during a battle by selecting a recognizable feature, or creating one (e.g. a burning enemy vehicle, or a ground burst illumination round). TRPs should be easily recognized by the crews of the weapons systems whose fires they control. This is a METT-T determination based on visibility, weather, weapons ranges and capabilities, etc. (e.g. tank and BFV TRPs should be visible through thermal sights to allow the weapons to engage in thermals, day or night).

Engagement areas are terrain oriented control measures. An EA is the area on which the commander plans to focus his fires according to his fire plan. Engagement areas may be either

offensive or defensive. Although a company EA may assist in limiting the fires of the CO/TM to a specific space, it does not assist the commander in focusing or distributing the fires of platoons. Engagement areas are selected based on the estimate process.

Fire Patterns are an enemy-oriented method of engagement by which focus and distribution are determined by the enemy's formations or location. Fire patterns determine the specific distribution and focus in relation to the enemy in both the offense and defense. The fire patterns are: frontal, cross, depth, and (near, far, left and right). Several manuals list fire patterns or discuss their use at platoon level. None, to include FM 71-1, does little more than hint application at the CO/TM level. Fire patterns are equally effective to control the fires of platoons within a CO/TM, and are essentially the same as they are for platoons. Note: The use of crossfire may achieve an oblique angle of attack, and hit the enemy from an unexpected direction; however, it may also decrease the actual effective range at which you engage the enemy, while providing the enemy an oblique angle of attack. Its use should be based on the factors of METT-T, not SOP for every situation.

Fire techniques are methods of controlling the volume or the rate of fire, and the numbers of vehicles firing. FMs 17-12-1, 23-1, 17-15, and 71-1 differ on the exact terms and definitions but, as synthesized from the above references, the fire techniques are: observed, simultaneous (volley), alternating, and mass. The method to use is a METT-T determination based on the balance required between accuracy, control, and rate of fire. Although fire techniques may be applied at the platoon or company level, they should normally be used only by platoons to control rate of fire once assigned a clear mission (task and purpose) by the CO/TM.

Fire Commands are verbal orders used to control direct fires. They are standard formats, rapid and concise, that articulate the firing instructions for single or multiple engagements. Fire commands are not used just once to initiate an engagement, but repeated or adjusted by the commander throughout the course of the battle. At the company team level, it is vital that commanders not assume that the command of "Fire!" issued to his CO/TM will suffice to synchronize his unit fight. If this one command is the extent of the CO/TM fire control, the result may be all elements firing at whatever they feel appropriate — usually the closest or most easily detected target. In this case, fire distribution has failed and mass cannot be achieved. Fire command procedures must be rehearsed and understood by all. FMs 23-1 and 17-12-1 contain a detailed explanation of fire commands for crews, sections and platoons. FM 71-1 has the following format for a company fire command to be used when two or more sections or platoons fires must be synchronized:

- **Alert (call sign)**
- **Weapon ammunition (optional, METT-T)**
- **Description**
- **Location/target, or method to focus platoon fires**
- **Control/pattern technique (optional, METT-T)**
- **Execution (my command, your command, event)**

The major difference between a CO/TM fire command and a platoon or lower level fire command is that the CO/TM must control the fires of multiple elements with different weapons systems (e.g. tank and BFVs). CO/TM fire commands should concentrate more on ensuring platoons are accurately focused and understand their portion of the CO/TM distribution, and less on ammunition, weapons, and fire techniques/patterns. Platoons will add the appropriate ammunition, weapons, etc. if they understand the focus and distribution. An example of a CO/TM fire command to control multiple platoons against multiple targets is shown in Figure 1, (the commander has omitted weapons and ammunition because the platoons already know that areas A1 and A2 are TOW/120-sabot EAs based on range).

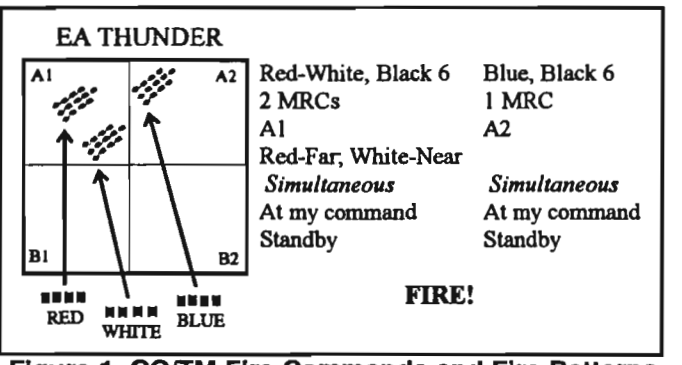


Figure 1. CO/TM Fire Commands and Fire Patterns

Engagement priorities are a means to distribute and focus fires in which specific friendly weapons are assigned priorities of engagement against specific enemy weapons systems by type. This tool attempts to maximize the principle of using each weapon in its best role. Engagement priorities are assigned as a product of the estimate process, not by SOP. It is important to note that engagement priorities may assist in controlling fires in some situations, but may not be effective in every situation. **Engagement priorities alone do not constitute a fire plan.** Commanders should not rely solely on this technique. Experience shows it is frequently difficult to identify targets by type, particularly at extended ranges. Failure to identify targets by type is almost always a contributing factor to fratricide, which demonstrates the difficulty of target identification by type on the battlefield. At close range (less than 1500 meters) tanks can probably be identi-

fied from BMPs and BRDMs, but little more; the difference between C2 vehicles and other vehicles is nearly impossible to determine at extended ranges through a thermal sight.

Procedure

The standard commander's estimate is a procedure applicable for every mission. It provides a logical process which guides planning at every level and in every situation. The estimate process (METT-T) guides direct fire planning in conjunction with and to support the scheme of maneuver.

Using the estimate process, the commander develops a scheme of maneuver as described in FM 71-1, Chapter 2. During the development of the scheme of maneuver — and particularly actions on the objective — the direct fire plan is designed to accomplish the mission.

During mission analysis, it is crucial that the CO/TM commander determines his unique mission (task and purpose). He must understand how his mission fits into the TF plan, the TF commander's desired effect of the CO/TMs fires, and the higher commander's intent. This guides the planning of the entire operation. For example, TM A's mission is to suppress a specific enemy force to prevent it from placing fires on TM B while TM B assaults. TM A's mission analysis should yield the following results to guide the direct fire planning process:

- **The desired effect of TM A's fires is to place fires simultaneously on all enemy elements in the assigned area capable of engaging TM B**
- **TM A does not have to destroy enemy weapons systems, only prevent them from placing effective fires on TM B**
- **Enemy systems which cannot range the friendly force do not necessarily have to be suppressed**
- **As TM B maneuvers, it will come within range of other enemy weapons and TM A will subsequently be required to suppress these systems.**

In this example, the TM A commander would plan his fires differently than the TM B commander, who would plan to destroy the force he is assaulting.

Detailed Intelligence Preparation of the Battlefield (IPB) — considering the weather, terrain, disposition of the enemy, his strength, and likely COAs — is the foundation for developing a fire plan. Based on this information, the commander determines the likely disposition of the enemy force, and plans how he will distribute, focus, and shift to mass his fires. The enemy situation dictates where and how to direct fires, and which fires to use. If the commander intends to engage most dangerous targets first, engage targets with a high probability of hit, concentrate on long range targets, and use each weapon or platoon in its best role, he must be able to determine each of these factors in relation to that enemy and that terrain. For a more complete discussion of IPB, see, FMs 71-1, 71-2, and 71-123, chapter 2, or FM 34-130.

FM 17-12-1 discusses the relationship between IPB and the fire plan; however, it leads us to believe that the TF level IPB by the S2 goes directly to the platoon leader for incorporation into his fire plan. In part, this is true. Platoons do consider IPB in their plan, but what is missing in our direct fire doctrine is the role of the commander in processing the S2's IPB products before the platoon gets them. The CO/TM commander must analyze the information provided to him by the TF S2 and determine how the enemy will fight, given his unique situation. For the purposes of direct fire planning, he must answer several specific questions regarding how the enemy will fight. For an offensive fire plan, the commander must determine as a minimum:

- **How long the enemy has been in position (the degree of defensive preparation)**
- **The location of enemy EA and which systems can hit where**
- **Key terrain considerations in and around the enemy's BP, including any terrain that may be used to control fire. Specifically, what is the actual key terrain for the CO/TM versus the TF?**
- **The location of enemy weapon systems by type (tank, BMP, dismounts, etc.) down to individual vehicle location. This last item is key in controlling and directing fires to maximize the principles of fire control; specifically, to ensure most dangerous targets are engaged first, and that the proper systems are used to engage them**
- **Expected range of engagement. (This helps the commander determine at what range to boresight and zero, and what range to index as battlesight.)**
- **Friendly avenues of approach**
- **Location of enemy obstacles**
- **Location and avenues of approach for enemy reserves.**

For a defensive fire plan, the commander must determine as a minimum:

- **Enemy avenues of approach**
- **Enemy rate of march, (which determines how quickly the enemy will enter and cross the EA)**
- **Key terrain at the CO/TM level that will allow for an advantage on specific avenues of approach**
- **What formation(s) the enemy will use, and at what point he is likely to change formation**
- **Expected range of engagement. (By considering the EA the CO/TM plans to fire into, the commander can determine ranges to zero, and index range for battlesight)**
- **When the enemy will begin engaging**
- **Use of enemy indirect fires, (effect of the fire plan)**
- **Tactics that the enemy will use, (firing lines, etc.)**
- **Where the enemy is likely to dismount and assault**
- **Where there is deadspace, and how it can it be covered by adjacent platoons.**

A thorough IPB allows the commander to determine his PIR. The selection of PIR is critical to the commander in determining the enemy's COA. The goal of IPB is not to guess exactly what the enemy is going to do, but rather to determine

what he might do, or is capable of. This analysis may yield several possible COAs for the enemy. The commander selects his PIR to provide him information which allows him to determine which COA the enemy will actually execute. For example, if the commander has two AoAs in his area, it is possible that the enemy may use either. For the commander to merely guess which one the enemy will attack on, and design his plan for just that AoA, would be a mistake. Rather, he determines the indicators that would signal one or the other AoA. He then designs his PIR to help him make the determination. In this case, presence of tanks on either AoA would indicate that a MRC or larger force, rather than just a CRP, has been committed in that AoA. Additionally, a FASCAM or persistent chemical agent on either AoA would indicate that the enemy did not intend to come that way. Considering this, the commander would select these indicators as PIR to help him decide which AoA the enemy will attack on, and adjust his fire plan accordingly.

Once the commander has determined these factors for his specific mission, he can plan which enemy systems to engage, from where, and in what order. The commanders IPB is continually updated as the situation changes, and his fire plan (and scheme of maneuver) should change accordingly.

One of the most important, but most frequently overlooked steps of the estimate is the consideration of friendly troops. To ensure adequate direct fire planning, the commander must consider the following factors concerning the available forces, before developing his scheme of maneuver and direct fire plan:

- **Task organization, available weapon systems, maintenance, and ammunition status. (A platoon with only two operational vehicles should not be assigned a mission as critical as a platoon with four.)**
- **Training level of his force**
- **Affect of weather and battlefield obscuration on his forces (I.e. if tanks and BFVs can shoot through smoke or darkness, will Dragons and small arms have the same capability? Are we attacking into the sun? Will it effect our target acquisition?)**
- **Number of rounds (length of time) before weapons must be reloaded (i.e. how many TOWs are available to fire? How long will it take to reload? Who can reload? How many tank rounds are in the ready rack? How many 25-mm rounds are uploaded? How long will it take to reload?**
- **Weapons control staus. What is the appropriate weapons control status for my CO/TM, and how will I control it?**
- **Support available from other units**
- **Combat support assets available, including type and quantity of ammunition, etc.**
- **Combat service support available and required.**

The commander must consider friendly troops when he develops his plan. For example, if the commander knows that he has only three operational tanks in one of his tank platoons, and each has 17 rounds in the ready rack, that means that platoon has 51 rounds ready to fire (*ready load*). Additional rounds will have to be loaded from the semi-ready rack or from prestock, both of which are time consuming. This consideration must enter into the commander's planning process, because it helps him determine the rate of fire his unit can sustain over time. Based on this analysis, he may want to include a reloading plan so one platoon will continue to fire while another platoon stops firing to replenish their ready load. This consideration applies at platoon level also. It is applicable for BFVs, tanks, and other weapons systems.

Additionally, the commander should consider the training level of his crews and platoons. Platoons and crews should be assigned tasks at ranges they can reasonably be expected to hit. For example, an M1 tank crew firing Distinguished has an 86 percent probability of hit/kill with training sabot against a T-72 frontal at 2000 meters; an average crew has a probability of 62 percent.[1] Although service ammunition in both M1s and M2s has a determined maximum range capability, the training level of the crews (reticle aim, etc.) may not be at the same level. Considering this, the commander would develop his fire plan and assign missions to platoons based on the probability of their hitting at a given range.

Weapons control status (WCS) is an important command and control consideration. Careful planning may assist in preventing fratricide by controlling when units are uploaded, and when they can shoot. This is also a consideration based on level of training. For example, when will tanks upload a round, and when will BFVs load rounds into the feeder? When will weapons be taken off safe? The commander should consider these factors and how he will communicate and control WCS in his fire plan.

Time is also a consideration of direct fire planning. The commander must consider:

- **How long will it take the CO/TM to achieve the desired effect of fires, (e.g. how much earlier must we arrive at the SBF than the company we will support)?**
- **How long will we be able to sustain fires on the enemy? (e.g., based on the expected rate of fire and target density, especially for a suppressive mission, our ready load of ammunition will determine how long we can continue to fire, and ultimately, how long we can maintain a terminal effect on the enemy).**
- **How long will it take for the enemy to cross the EA?**
- **How much early warning will I have for the enemy's COA/AOA (When do we leave the hide position)?**
- **When will the CO/TM be within range of enemy direct and indirect fires?**
- **How long can we stay in position before enemy reaction (artillery, counter attack, direct fire, etc.)?**
- **How much time will there be between echelons?**

Time considerations are key to every mission; failure to properly analyze time may result in a loss of synchronization. For example, the commander planning a support-by-fire mission with the task of suppress, must consider the amount of time his CO/TM will take to initially achieve suppressive fires on the enemy. Then, based on ammunition available and the enemy reaction to his fires, how long he can continue to effectively deliver suppressive fires? Arrival too late means the supported unit may come under effective enemy fires. Arrival too early may mean the CO/TM cannot continue fires long enough for the supported team to achieve its mission.

After the commander has analyzed the factors of METT-T he is prepared to select courses of action and develop his concept of the operation (scheme of maneuver). The direct fire plan should be made in conjunction with the scheme of maneuver because they are inseparable. If not developed together, each is likely to fail separately. When considering COAs, the commander must consider how his fire plan and maneuver will work against the enemy's likely courses of action, and how the enemy will react to the effects of our fires and subsequently alter his course of action (e.g., will our fires cause him to orient on and assault our position; if so, are we prepared for this?). The commander selects the best COA. This analysis forms the basis of the concept of the operation. From it he assigns missions (task and purpose) to platoons. Through course of action analysis and updated intelligence, the scheme of maneuver (including direct fire plan), scheme of fires (indirect), and other portions of the concept of the operation are refined.

The process should also be followed for contingency missions or alternate and supplementary positions at the appropriate level of detail as time permits. A scheme of maneuver and supporting fire plan should be developed for each.

When the direct fire plan is complete the commander should be able to answer the following questions:

- **What is our CO/TM mission and the desired effect of our fires?**
- **Where is the enemy, or how will he enter our EA?**
- **Where are his tanks or other dangerous weapons systems?**
- **How will I determine which COA he has selected? What is my PIR to determine his actions?**
- **Where are we going to kill the enemy?**
- **Where will we engage him from?**
- **Which enemy systems do we want to engage first?**
- **How will we initiate fires with each weapon system?**
- **Which weapons will fire first?**
- **What will each engage?**
- **What is the desired effect of fires from each platoon (platoon missions)?**
- **How will we distribute the fires of platoons to engage the enemy laterally and in depth?**
- **What will platoons focus their fires on? (How will platoons know where to engage? Will they be able to see and understand the control measures)?**
- **How will we mass fires to deal with multiple enemy threats and achieve the desired volume of fire?**
- **Where will I be positioned to control fires? Can I see the battlefield from there?**
- **How will we shift fires when necessary? How will we focus our fires on new targets?**
- **How will we deal with likely enemy reactions to our fires?**
- **At what range will we boresight and zero weapons? What range will we index as battlesight for each weapons system?**
- **How will we control weapons control status? When will we upload weapons? When will we take them off electical and manual safe?**
- **Does the plan avoid overkill? Use each weapon system in its best role? Concentrate on long range targets? Engage targets that have a high probability of hit? Take the best shots? Expose only those vehicles needed? Destroy the most dangerous targets first?**

Once the plan is complete and the commander is ready to issue his operations order, he must ensure that the OPORD clearly allows subordinates to understand the entire plan, including the control of direct fires. Because the control of fires involves spacial relationships between friendly and enemy units, it is important that the commander use graphic aids that allow soldiers to understand his visualization. Soldiers must understand how the enemy will fight, and the effects of the enemy's fires. They must be completely familiar with the aspects of terrain in the area of operation, so it is not a surprise to them when they get there. The better the commander can visualize the enemy, terrain, and friendly units, the higher the probability that his unit will be able to execute the plan. If soldiers are not adequately prepared to fight on a specific piece of terrain against a specific enemy, each will come as a surprise, and no matter how good the original plan, they will not be able to execute it.

Ideally, when soldiers finish OPORDs, recons and rehearsals, they should be prepared to fight the battle without looking at their maps or referring to their notebooks, as though they were fighting on familiar terrain. This internalization of the plan allows soldiers to fight the battle according to the plan without looking at maps, which frees them to fight their platoon or individual vehicle.

Defensive Fire Planning

Discussion

The goal of a CO/TM building the engagement area is to be able to mass two-thirds or more of the company's firepower in any part of that engagement area. The desired outcome is to destroy the maximum number of targets with the fewest rounds in the least amount of time.

Continued on Page 39

Cavalry Mortars

Training and Tactics

by Captain William W. Prior

The mortar section of the cavalry troop is probably the least used asset in the unit. Although most cavalry leaders appreciate their troop mortars, few train to use them to their full potential. The result is poor planning for mortar support of cavalry missions and neglect of the mortar section in cavalry operations.

This article seeks to provide cavalry leaders with some tips on training, procedures, and organization to help them better use their organic mortar sections. The focus is not on the gunnery skills or ARTEP missions of the mortar section itself, but on its training and organization within the framework of the cavalry troop.

The cavalry scout's weapon of choice is indirect fire. The devastating effects of accurate indirect fires and the ability of the scout to deliver them without revealing his position are ideal for reconnaissance and security operations. Recent combat experience in the Gulf War proved again the effectiveness of artillery directed by scouts. But the Gulf War may have also conveyed some false impressions. The relative abundance and superiority of friendly artillery is something we cannot count on in future conflicts.

Timely and accurate artillery fire can multiply the effects of the cavalry troop's direct fires many times and spell the difference between success and defeat on the battlefield. But, the focus of artillery planning and employment is usually on massed fires at deep targets and integration of supporting fires with direct fires in main battle area engagements. This process leaves little room for the scout and his enemy combat reconnaissance patrol in the counter-recon battle, or the lead scouts in a movement to contact who have outrun their supporting artillery.

This fire support void is filled by the mortars of the cavalry troop. The mortars can deliver a variety of munitions for a variety of missions. The mortarmen can give the air and ground scout HE for suppression, smoke for screening or marking, and illumination for observation or orientation quickly and accurately. These fires are exactly what the scout in contact needs at his disposal.

The mortar section, as an organic part of the troop, constantly moves with the unit. While the M106A2 mortar carrier is no faster than the M109 self-propelled artillery piece, and certainly no match for the M1 or M3 in terms of speed, the mortar's sole mission is to support the cavalry troop. The mortars have no logistical tail or reinforcing mission that may cause them to fall behind out of supporting range during fluid cavalry operations as is often the case with supporting artillery. General Heinz Guderian, the mastermind of German armored tactics during World War II, believed "that tanks would never be able to produce their full effect until the other weapons on whose support they must inevitably rely were brought up to their standard of speed and of cross-country performance."[1] With regard to modern armored cavalry's missions and capabilities, today's artillery simply does not meet that standard. The point is that the mortars can stay with their troop and will be there to fire when the troop needs them most.

Having said all of this, I wish to point out that there is not, and cannot be, competition between mortars and artillery. Neither weapon is "better" than the other, they are simply different systems with different strengths and weaknesses. Mortars and artillery complement each other well and both have an important role in the cavalry battle.

To this point, this article contains nothing that is not already widely accepted or written in cavalry manuals. But the importance of planning for and using the mortar section emphasized above is all too often lost in our training and tactical operations. The suggestions that follow can help cavalry leaders realize the potential of their organic mortar sections.

Live fire training between mortars and the scouts they support is absolutely essential. Yet, mortar live fire is usually adjusted by FISTs from supporting artillery units. This may not detract much from the mortar section's training, but the scouts and the troop suffer as a whole. Classes and call-for-fire trainers will never substitute for the experience the scout gains adjusting live rounds in an impact area. When the scout and the mortar section sergeant talk on the

radio and put mortar steel on target in training, they will be much more likely and able to do so in combat. Live fire training in adjusting indirect fire is nearly as important to scouts as is live direct fire training with their Bradleys. Yet, adjusting indirect is often viewed by cavalry leaders as good training "when we have the time."

Make the time! The scout on the ground or in the air will rely on mortar fire in combat. Make him train to use it in peace.

The mortar section of the cavalry troop should emphasize the hipshoot in its live fire training more than any other mission. This is not due to a lack of proficiency on the part of the crews but to the relative frequency that mortars will be called upon to hipshoot in support of their troops. In typical cavalry missions, such as a movement to contact or a moving flank screen, the troop is moving almost constantly. To keep within range, the mortars must move with it. Hence, the mortar section will be moving a great percentage of the time when it is called upon to fire. Peacetime safety requirements make the hipshoot an unpleasant live fire training mission because the section must take several minutes of "admin time" to lay deliberately before it can actually fire a round. But cavalry leaders should realize that, if this is the way we will fight, then this is the way we *must* train.

The mortar section sergeant should be allowed to command and control the mortar section independently in training operations. Some cavalry troops have the FIST control the movement of their mortar sections as FM 17-97, *The Armored Cavalry Troop*, suggests. Some may even link the movement of the section to that of the FISTV. But the FIST is not the best means of controlling the mortar section for two reasons.

First, the FIST should position himself where he can best provide and control troop fire support and, in some situations, use his laser. This usually translates to a place where he can see and influence the direct firefight. This is most certainly not the ideal place for the mortar section. Mortars should be behind the forward scouts in a position masked from enemy direct fire and able to provide fires ranging two to three kilometers to the scouts' front. Therefore, the mortars cannot and should not always move with the FIST.

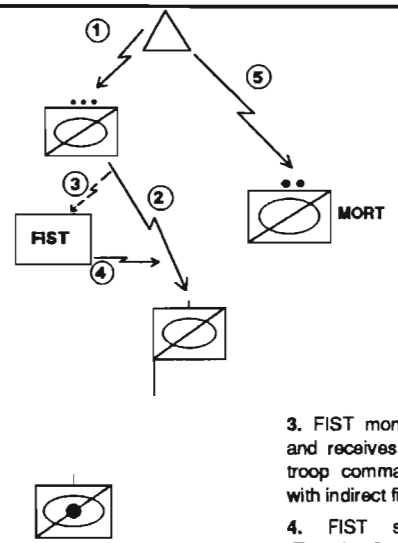
Second, the FIST may be unable to control the section via FM radio. The FIST must monitor troop command, squadron fire support and the supporting artillery digital radio nets simultaneously, and continually plan and control the fire support battle. If forced to control the movement and placement of the mortar section on a separate radio net, he can quickly become overwhelmed in battle and may neglect the mortars, usually when they are needed most. Thus, positioning on the battlefield and competing responsibilities severely limit the ability of the FIST to control the mortar section in tactical operations.

The best answer to the command and control question is to have the mortar section sergeant lead the section as a separate unit within the troop (as FM 17-97 also suggests). If the section sergeant has a secure radio to monitor the troop command net, he can independently maneuver his section to best support the troop. He probably knows best the capabilities of his weapons and his soldiers and can select the best firing positions on the ground. He can monitor the battle and anticipate and react to the needs of the scouts while freeing the FIST to concentrate on the fire support battle as a whole. The key is the training of that mortar section sergeant to act independently within the framework of the troop commander's intent.

This is not to say that the mortar section and the FIST do not have a unique relationship within the troop. The troop mortars are a key part of the troop's fire support, as mentioned earlier. The troop FIST must incorporate the mortars into the fire plan and ensure they are used effectively in battle. How the FIST and the troop leadership ensure effective use of the mortars is the next topic of discussion.

The key to effective and timely use of the mortar section lies in the configuration of the fire request radio channels and in who makes the decision to employ mortars on a specific target. FM 17-97 outlines the mortar fire request channel as seen in Figure 1. This system can be improved in two ways.

First, the scout platoon leader should make a preliminary "thunder down"



1. Scouts send spot report to platoon leader (Platoon Net).

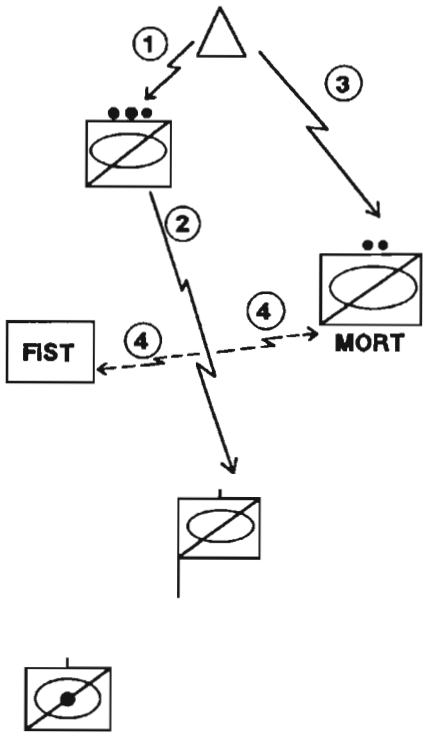
2. Platoon leader forwards spot report to CP (Troop Command Net).

3. FIST monitors spot report and receives permission from troop commander to support with indirect fires.

4. FIST sends message "Thunder Down" on troop fire support net. Scouts and mortars monitor.

5. Scouts call the mortars on troop fire support net to request indirect fires.

Fig. 1.
Mortar Fire Support Channel (from FM 17-97)



1. Scouts send spot report to platoon leader (platoon net) and platoon leader decides "Thunder Down" mortar mission.

2. Platoon leader forwards spot report to the CP (troop command net).

3. Scouts call the mortars (mortar internal net) to request indirect fires while platoon leader is on troop command net.

4. FIST and mortar section sergeant monitor spot report on troop command net.

Fig. 2.
Proposed Mortar Fire Request Channel

The scout in contact knows the value of his mortars. Don't let him forget it in training.

decision, if appropriate, and have his OP talk directly to the mortar section. The scout platoon leader knows the criteria for artillery employment, the urgency of the request and has a rough idea of the availability of artillery. While he is sending the spot report to the troop TOC, the OP and mortar section can prepare to fire the mission. Meanwhile, the FIST can monitor the report on the troop net and either alert the platoon leader that he is firing artillery, if appropriate and available, or approve the use of the mortars by default. If artillery is to be fired, the scout platoon leader and mortar section sergeant will hear it on the troop command net and check fire the mortar mission. If mortars are to be fired, valuable time will be saved and the mission may be fired as soon as the FIST or commander approves.

Second, the troop fire support net becomes a mortar internal net that scouts drop to for mortar support. As alluded to earlier, the mortar section sergeant needs a secure radio to monitor the troop net and operate his section independently. He needs another "internal" net to control his element and receive calls for fire from the scouts. The section sergeant will monitor the "lightning up, thunder down" decision on the troop command net and, thus, need not talk directly to the FIST on a troop fire support net (they can talk on troop command if absolutely necessary). This permits the FIST to monitor one less radio net while still controlling the fire support assets available to the troop. Additionally, the scouts can go directly to the mortar internal net to call for fire in an emergency. Figure 2 shows this revised mortar fire request channel. Again, the key to this process is the training of the mortar section sergeant. He must always know where he can and cannot fire, understand the commander's intent for the use of indirect fires and keep track of his ammunition status if this method is to work.

The organic mortar section is the cavalry leader's most responsive and dedicated means of fire support. Through better training and operational procedures, we can make the mortars a more lethal and useful tool in the cavalry battle. Emphasizing live fire training with the scouts and the hipshoot mission, allowing the section sergeant to command and control the section on his own, and streamlining the mortar fire request channel in the troop will improve our mortar support and the troop as a whole. The scout in contact knows the value of his mortars. Don't let him forget it in training.

Author's Note:

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To Avoid a Mistake We Made in WWII, Light Armor Needs to Train with Light Infantry

Basing Light Armor Battalions

by Captain (P) Peter R. Mansoor

Provided they survive future rounds of budget cuts, the three light armor battalions currently on the Army's drawing boards will add a vitally needed capability to our light contingency forces. The combination of mobility, firepower, armor protection, and deployability the Armored Gun System (AGS) brings to the Army's light contingency forces will better enable them to deal with the highly lethal forces around the world that the United States Army might one day face in a rapid deployment operation.

Both Operation JUST CAUSE and Operation DESERT SHIELD provided evidence of the need for more firepower in the Army's contingency forces. Currently, only the 82d Airborne Division possesses an organic light armor battalion (3-73 Armor), but its M551 Sheridan armored reconnaissance vehicles are badly outdated.

The situation our light forces face today is in some ways similar to that faced by American infantry divisions in the European Theater of Operations in World War II. American infantry divisions in that conflict lacked organic armor battalions; instead, commanders attached armor battalions to infantry divisions on an "as needed" basis. Armor and infantry units did not routinely train together prior to their task organization.

The result of this system was poor infantry-tank cooperation, especially in the Normandy beachhead. I feel the lesson for today is clear: we cannot base our light armor battalions at Fort Hood or Fort Knox and expect them to perform smoothly with light infantry forces stationed elsewhere. Instead, the light armor battalions should train as they will fight — alongside the light infantry divisions they will support in combat.

Lieutenant General Lesley J. McNair created the "pool" system that kept armor battalions out of the table of organization and equipment (TO&E) of the standard infantry division in World War II. Instead, tank battalions, along with tank destroyer and antiaircraft artillery battalions, were army or corps level assets that a commander could assign to lower levels of command as necessary to accomplish specific missions.[1] By economizing on manpower to create a pool of special units rather than making each type organic to a standard infantry division, LTG McNair saved tens of thousands of soldiers which Army Ground Forces could assign elsewhere.

The pool system operated at the expense of the combined arms team. Prior to the reorganization of armored divisions in September 1943, the Army Ground Forces only had a handful of separate armor battalions available for training with infantry divisions. Manpower and equipment shortages in the United States delayed the activation of other separate tank battalions. The result in many cases was a hasty mobilization followed by rapid shipment overseas and immediate introduction into combat.[2] One Sherman tank platoon leader who served in the 753d Tank Battalion (Medium) recalls:

"...the Sherman tank served a very useful purpose in supporting the infantry division and on many occasions was the only way the infantry made it to objectives without the loss of a great many soldiers. The team effort between the infantry and tanks would have been much better if there would have been combined training before being thrown together in a combat situation. I cannot remember ever training with the infantry before we were committed to combat as a team."[3]

Prior to 1944, only a few infantry divisions in the Army of the United States had the opportunity to work with armor battalions in combat. D-Day would change that statistic dramatically.

Infantry-tank training in the United States and England was almost uniformly abysmal prior to the Normandy invasion.[4] Regardless of the doctrinal strictures of FM 17-36, *Employment of Tanks with Infantry*, many infantrymen were simply ignorant of the capabilities and limitations of tanks. Tanks were critical to the success of the infantry in fighting through the tough hedgerows of Normandy, but the infantry and tanks had to form cohesive teams before they could act effectively. Tanks suppressed enemy infantry with high explosive and machine gun fire while the infantry protected the tanks from enemy antitank guns and other antitank weapons such as *panzerfausts*. Progress through the *bocage* (the thick hedgerow country of Normandy) was slow, engagements were fought at short range, and the use of massed armor formations in accordance with doctrine was impractical. Infantrymen and tankers paid the price in blood while the First (U.S.) Army adjusted its tactics and training to fit the situation on the battlefield.[5] By the end of July 1944, infantry-tank cooperation had improved as a result of new training and experience gained at the "sharp end."[6]

Equipment problems contributed to the lack of combined arms cooperation. Radios in armor, infantry, artillery, and tank destroyer units were not identical and rarely compatible. This

situation was worsened by the fact that combat in the *bocage* required the formation of small teams, such as a platoon of infantry supported by a squad of engineers and a section of tanks. Due to incompatible radios, the infantry platoon leader could not talk to the tanks, and if the tanks were equipped with only (Signal Corps Radio) SCR-538 receivers, the tankers could not talk with anyone.

To overcome this situation, the troops in the field improvised. Armor units borrowed infantry SCR-300 radios and operated them with the antenna sticking out of the tank hatch. The most common solution was to establish wire communications to the outside of the tanks through externally mounted handsets connected to the intercom system of the tank. In the long term, the U.S. Army developed the AN/VRC-3 radio for installation in American tanks. This radio was a vehicular version of the SCR-300 radio carried by the infantry.[7] Had armor and infantry units trained together prior to Normandy, these communications problems might have been solved before the first soldier set foot on the French coast.

Ultimately, LTG McNair's pool system failed in combat. The system made no provision for a situation in which every infantry division found a need for an armor battalion in combat. Tank battalions were not the interchangeable parts that LTG McNair envisioned when he created them. Each tank battalion had to learn to work with each different infantry division every time an army or corps commander shifted the armor to support a new unit. Cooperation was more than a matter of understanding combined arms doctrine; each unit had its own unique set of personalities and procedures, and a smooth working relationship only emerged over time.[8] Once a division established a working relationship with its supporting armor battalion, the division commander was loath to release "his" tank battalion back to the pool. Many divisions spent months at the front supported by the same armor battalion on a more-or-less permanent basis.[9]

Let us return to the issue of the Armored Gun System light armor battalions. Their purpose, according to the white paper distributed at the 1993 Armor Conference, is "to provide a strategically and tactically deployable, mobile direct fire weapons system to support light contingency forces." To accomplish this purpose, the light armor battalions must be able to work together with light infantry in a variety of combat environments. The experience of separate armor battalions in Europe in World War II suggests that a close working relationship will only be gained through continual close contact and training. This means that the light armor battalions should live and work with the units they will support. The 82d Airborne Division will have the advantage of having 3-73 Armor as an organic part of the division. Other divisions, such as the 10th Mountain Division, the 101st Airborne Division (Air Assault), or the 25th Infantry Division will not be so fortunate.

The Army does not need to make the light armor battalion an organic part of each light infantry division's TO&E, but the Army should colocate its light armor battalions with its light infantry divisions. Since there are not enough light armor battalions to assign one to each light infantry division, the choice of which light infantry divisions will receive a light armor battalion for habitual association should be based on the facilities available for armor training at the various light infantry divisions' locations. The Army can still deploy these light armor battalions to support different units, but at least the light armor battalions will be used to working with light infantry. Only through continual contact will the light infantry and light armor soldiers come to understand each other's capabilities and develop the kind of smooth working relationship so critical to success on the combined arms battlefield. We must train as we will fight — together.

Notes

[1]Kent Roberts Greenfield, Robert R. Palmer, and Bell I. Wiley, *The Organization of Ground Combat Troops*, Historical Division, U.S. Army, Washington, 1947, pp. 290-1.

[2]*Ibid.*, p. 412.

[3]Letter from Brigadier General (Ret.) Anthony F. Daskevich to the author, dated 29 March 1991. BG Daskevich served in the 753rd Tank Battalion during World War II, and fought in Africa, Sicily, Italy, France, and Germany. He earned the Distinguished Service Cross and two Silver Stars during his service with the Armored Force.

[4]12th Army Group, *Report of Operations*, Vol. XI, p. 34. See also U.S. First Army, *Combat Operations Data*, Governor's Island, N.Y., 18 Nov. 1946, p. 165; and H.L. Hillyard, "Employment of Tanks by the Infantry Division," *Military Review*, XXVII, No. 3, June 1947, p. 50.

[5]For an examination of the response of the First (US) Army to the problems of tank-infantry coordination in Normandy, see Michael D. Doubler, *Busting the Bocage: American Combined Arms Operations in France, 6 June-31 July 1944*, Combat Studies Institute, Ft. Leavenworth, 1988.

[6]G-3 Section, Supreme Headquarters Allied Expeditionary Forces, "Employment of Tanks and Infantry in Normandy," *Military Review*, XXIV, No. 9, December 1944, pp. 13-17.

[7]War Department, FM 17-36, Supplement No. 1, *Employment of Tanks with Infantry*, GPO, Washington, 7 July 1944, pp. 59-62.

[8]Jonathan M. House, *Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization*, Combat Studies Institute, Ft. Leavenworth, 1984, p. 107.

[9]*Ibid.*, p. 107.

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Force Projection and Combined Arms

by Colonel Donald Elder

There have been several watershed undertakings in recent history that have occasioned significant changes of direction for the U.S. Department of Defense. For example, at the outset of World War II, prominent citizens, soldiers, and government officials collaborated to engineer the wholesale transformation of our military and entire economy to a wartime footing, literally yanking our Army from horse cavalry to mechanization. Another watershed occurred immediately following the Vietnam War when senior military officers and defense planners undertook the task of analyzing that experience and thereafter determined what force-level corrective actions were needed. The watershed event of today is manifested in the June 1993 publication of FM 100-5, *Operations*.

Current circumstances differ considerably. This time, there is no one, distinct, monolithic threat (such as the Warsaw Pact or the Axis Powers before it) against which we can design our force structure. Military forces today are expected to be prepared for practically any contingency, from full scale war, through counterinsurgency and international peacekeeping, to local disaster relief. Domestic economic considerations dominate. Emerging technologies such as battlefield digitization, "brilliant" munitions, force protection, stealth, and others hold enormous promise and must be fully exploited.

Yet, we are scaling back, not building up. The foregoing are nothing more than some of the conditions under which basic judgments must be made. What force structure best meets the Nation's needs? What do we retain? What do we eliminate? What risks do we decide to accept? What do we expect of our military forces?

Warfighting is the Key. In times of great change, especially with so much at stake, it is wise to start by examining some fundamental truths that must be respected:

Military forces exist to serve many functions, but their fundamental reason for being is to fight and win the Nation's wars. Military force is a means by which the Nation influences behavior in the international arena. It can retaliate, punish, or demonstrate its preparedness and willingness to do so. It can restore order, deliver humanitarian aid, provide disaster relief, respond to any emergency. But all of that is peripheral — warfighting forms the core. Proficiency in battle is the only measure that counts.

Battles are fought and campaigns are conducted to force decision. When the Nation decides to undertake military action and commit its forces to battle, it does so with the full expectation that our decision will be forced upon the adversary. Combat operations will continue until that decision is achieved.

To force decision, the enemy's military forces must be defeated. As long as he has the means to carry on the fight and sufficient freedom of action to employ them, the enemy cannot be expected to yield.

To defeat enemy military forces, ground must be taken and held. Friendly forces must either destroy the enemy's forces or so completely dominate him that he has no choice but to capitulate. T.R. Fehrenbach had it right: "You may bomb it, atomize it, pulverize it and wipe it clean of life — but if you desire to defend it, protect it, and keep it for civilization, you must do this on the ground, the way the Roman Legions did, by putting your young men into the mud."[1]

The Example of DESERT STORM. History is replete with examples that confirm these basic truths. Operation DESERT STORM provides the most recent example, where:

The military was called upon to wage war. All branches of service — active forces, reservists, and National Guard — were engaged in the effort.

Battles and campaigns were fought to force decision. The decision forced in this case was for Iraq to evacuate its forces from Kuwait so that Kuwaiti independence could be restored.

To force that decision, the Iraqi military forces were defeated. Iraq began the war with a formidable army that was routed within the span of four days.

Iraqi forces were defeated only after coalition ground forces were committed. A month of continuous, merciless pounding from the air neither brought about the defeat of Iraqi forces, nor provoked any change in Saddam Hussein's behavior, nor forced upon him any decision. What the air campaign could not do in the span of four weeks, ground forces accomplished in little more than four days.

Essential Capabilities. But exactly which qualities and capabilities are at a premium, especially in light of 21st Century realities? What should the Nation expect of its armed forces? What combination best meets the Nation's needs? What can we afford? What should drive our priorities?

First, our forces must be capable of forcing decision. If it is ground forces — soldiers and Marines — that ultimately determine victory or defeat in war, then it is ground forces that should be the foundation upon which the Nation builds its defenses, prioritizes its attention, measures its security. Air and naval forces are crucial to a balanced national defense strategy and can accomplish extraordinary feats, but air power and naval power by themselves cannot achieve decision. U.S. Air Force AC-130 gunships and F-117 Stealth fighters nearly

wrecked General Manuel Antonio Noriega's Commandancia during Operation JUST CAUSE, but it was the infantry on the ground that forced PDF surrender. The mining of Nicaragua's harbors not only failed to change Sandinista behavior, it actually intensified their intransigence.

Second, our forces today must be capable of quick, decisive victory. Our Nation demands high standards — quick victory at minimal loss of life. This requires the application of overwhelming combat power that can totally dominate the adversary. Brute force counts.

Combat Power. Combat power, in the abstract, can be expressed as a function of three primary factors — *Lethality, Survivability, and Agility.* The force that overmatches its adversary in its ability to kill, while at the same time protecting itself from enemy weapons systems, enjoys a preponderant advantage — provided that it is capable of offensive action.

Lethality. Lethality overmatch is accomplished through a number of means. Some of these can be measured in terms of weapon system effectiveness. Detection, identification, acquisition, and destruction are important at every level from individual rifleman to corps. At the tactical level — indeed, as at all levels — the overwhelming advantage is to the force that can outrange an enemy's ability to detect his presence, that can positively identify the enemy force, take it under fire first, and confidently kill it beyond the effective range of the enemy's weapons.

Survivability. The nature of ground force battle is, ultimately, to close with and destroy the enemy. The more survivable the force, the more able it is to press the battle and complete the destruction of the enemy at an acceptable level of risk. Forces protect themselves by seeking first to avoid being detected, then to avoid being targeted by enemy weapons systems, to avoid being hit by enemy arms, and to emerge unscathed when hit by enemy fire. The force that can achieve this relative overmatch in comparison with his adversary — which amounts to a relative degree of invulnerability — will almost certainly prevail.

Agility. The concept of agility encompasses the realms of tactical and operational mobility, tempo, and battle command. Relative superiority in ability to gather intelligence on the enemy, to determine quickly its importance and potential for exploitation, to translate immediately the analysis into decisive action, to issue promptly understandable and accurate fragmentary orders, and to have those orders executed in keeping with the commander's intent is what every army in the world dreams of possessing.

But raw combat power alone does not assure quick, decisive victory. There are other factors that either serve to enhance or to diminish the combat power of any force engaged in combat operations. Among these are:

Staying Power. Once an attack is launched, it should be pressed relentlessly to its inevitable end. Forces engaged must be capable of continuous operations; they must have adequate organic logistical support to sustain campaigns almost indefinitely, never hampered by insufficient transport, ammunition, fuel, or rations.

All-Weather/Climate Capability. A reeling enemy must be given no time to regroup, no opportunity to rest, no chance to resupply, no hope of taking time to think or plan. War is not a part-time endeavor. In combat, games are never called on account of darkness or adverse weather conditions.

Dependability. Commanders at all levels must be certain of the reliability of their equipment. Every piece of equipment on the battlefield must function well, no matter how seemingly inconsequential it may be, or lives may be lost. Radios must communicate. Weapons must fire. Vehicles must operate.

To the above listed imperatives can be added yet three more qualities that today have a compelling importance all their own: *strategic mobility, economy,* and *versatility.*

Strategic Mobility. The concept of power projection has taken on enormous importance as U.S. forces withdraw from bases overseas. Deployability is a virtue; fighting forces have to be able to get to the fight, no matter where it may be, or they are of exceedingly limited value.

Economy. There is a limit to what the Nation can afford, both in monetary terms and in the potential cost of conflict as measured in numbers of casualties suffered. The survivability of the force, as noted earlier, helps keep the latter affordable. But skyrocketing costs of modern weapons, combined with an oppressive national debt, make the former a dominant consideration in any debate regarding national military priorities.

Versatility. Our Nation has turned toward a national military strategy that relies ever more heavily upon the concept of force projection. It must acknowledge that its military forces must perform missions that range from the most traditional to the most unfamiliar — from high-intensity combat, (potentially fought with nuclear, chemical, and biological weapons) to low-intensity conflict, counter-insurgency operations, peacemaking, peacekeeping, humanitarian aid, and disaster relief (operations other than war). Military forces must expect and prepare to operate in any environment, whether it be desert or jungle, mountains or flatlands, metropolitan or rural, populated or desolate, tropical or polar. They must be prepared to fight as members of a coalition, as a joint force, or to "go it alone."

The Options. All of this is much to ask of a fighting force. What force options are there? The options are many, yet if the field is limited to the ground gaining combat arms, the number is reduced to a manageable few — and all are organic to either the U.S. Army or U.S. Marine Corps. For purposes of comparison, it is convenient and proper to consider each type of force on relatively equal levels of organization; battalion level serves this purpose well.

Basically, the options are: Special Operations Battalions, Light Infantry Battalions, Airborne Infantry Battalions, Air Assault Infantry Battalions, Mechanized Infantry Battalions, Tank Battalions, Cavalry Squadrons, and Marine Amphibious Battalions. Each type battalion has unique capabilities and characteristics. Taken together, they provide to the nation an extraordinary variety of military options to consider if and when military action should be contemplated. Each has a vital role in military missions of every kind, from operations other than war (OOTW) to high-intensity conflict. But which type (or types), forces best meet the requirements established above? Which best incorporates the essential qualities of *Lethality, Survivability, Agility, Staying Power, All Weather/Climate Capability, Dependability, Strategic Mobility, Economy,* and *Versatility?*

Lethality. Measured in terms of weapons system effectiveness, it is the attack helicopter, the Abrams tank, and the Bradley Fighting Vehicle that head the list. All have the proven ability to detect, identify, and acquire targets well beyond the range of comparable enemy weapons systems. All can effectively engage with supporting indirect fires — and the field artillery, responding with MLRS and Paladin, unquestionably delivers the most devastatingly lethal fires of all. The Apache helicopter and the Abrams tank are able to engage and kill enemy systems at ranges that exceed the enemy's capability to even detect their presence. Best: Aviation, Armor, Mechanized Infantry, Armored Cavalry.

Survivability. Mounted combined arms forces, especially tank-mounted, are survivable where others are not. No other arm can dream of withstanding the ferocity of modern combat. Dismounted infantry (light, airborne and air assault), special operations forces, and aviation are vulnerable to artillery fire. Even when tanks sustain damage, their redundant systems often allow them to continue their mission at full capacity. The tank is also the best protected platform on any nuclear, biological, or chemical battlefield. And with a citizenry grown accustomed to having its armed forces win wars rapidly with absolute minimum casualties, the force protection capability of the tank is of paramount importance. Best: Armor, Armored Cavalry, Mechanized Infantry, Aviation.

Agility. Superior tactical and operational mobility are the hallmarks of aviation and modern combined arms forces. Air assault infantry has superior mobility, but relinquishes it when it dismounts from its helicopter transport. In the realm of command and control, digitization of the battlefield holds vast promise, and intervehicular information systems (IVIS) are already a reality in the M1A2 tank. Best: Aviation, Armor, Armored Cavalry, Mechanized Infantry.

Staying Power. Only U.S. Army armored forces are designed for continuous operations, with organic logistics capabilities built into battalion-sized maneuver elements. U.S. Marine Corps battalions are by design provided with only minimal support; their specialty is forced entry operations that permit Army forces to follow quickly behind and continue the fight for as long as necessary. Light infantry, lacking transport of its own, is heavily dependent upon supporting logistical units to keep it supplied and to move it around. For aviation, armor, and all infantry, day turns into night with little diminution of combat effectiveness; if anything, the tank and attack helicopter are even *more* awesome at nighttime. Of those two, however, only the tank can stay in uninterrupted contact to press the attack. The helicopter must break contact often to rearm, refuel, and refit the crew. Best: Armor, Armored Cavalry, Mechanized Infantry.

All Weather/Climate Capability. Armored forces are virtually unaffected by weather and climate. The same cannot be said of helicopter, airborne, or air assault forces, which often cannot respond due to high winds of poor visibility. On the second day of the ground war in Operation DESERT STORM — the day of heaviest fighting for many units — adverse weather conditions kept absolutely all aircraft on the ground just when they were most needed. It was on that day that the 2nd Armored Cavalry Regiment fought the Battle of 73 Easting and the Third Armored Division slammed into the Tawakalna Division of the Republican Guards — without air support. Best: Armor, Armored Cavalry, Mechanized Infantry, Light Infantry.

Dependability. Fortunately, all ground combat forces demonstrate extraordinary dependability. There was once a time when the operational readiness of armored and mechanized units could legitimately be questioned, but no more. During Operation DESERT STORM, the Third Armored Division — 350 tanks strong — lost not a single one to maintenance failure. Best: All Infantry, Armor, Armored Cavalry.

Strategic Mobility. Getting to the fight in keeping with a force projection strategy is of paramount importance. There is no more deployable force in the world than the 82nd Airborne, and light infantry battalions are equally ready. The Marine Corps can respond nearly as quickly, able to place amphibious forces practically anywhere in the world with little notice. Mounted combined arms forces, though transportable by air, require too much strategic airlift than can reasonably be allocated, and must be transported by sea. Helicopters are air transportable but require considerable preparation time. Best: Special Forces, Airborne Infantry, Marine Amphibious, Light Infantry.

Economy. This category is easy... or is it? In strict monetary terms, there is no better bargain than light infantry when it comes to outfitting and manning combat battalions. Measured in terms of combat power, however — how much "bang for the buck" the tax dollar buys — the matter is not quite so clear. Only four percent of the Army's total personnel strength is allocated to Armor/Cavalry, yet Armor

provides in return more than 40 percent of the Army's ground combat power. And in terms of materiel costs, one only need compare the price of an AH-64 Apache with that of an M1A2 Abrams. Best: Special Forces, All Infantry, Armor and Armored Cavalry.

Versatility. For so long have we designed and fielded forces with special capabilities in mind — (Special Forces, Airborne, Air Assault as examples) — that we tend to forget that we created them to meet a special need. They each possess a unique military skill that serves its specific purpose. But their very uniqueness limits their utility across the continuum of military conflict. Each may rightfully claim exclusive dominion over a particular military skill, yet none can properly claim exclusive dominion over any particular terrain, theater of operations, or type of warfare. The traditionally conventional forces — light infantry, mechanized infantry, armor and cavalry — configured for much less specialized a purpose, have far greater utility across the entire spectrum. No one questions the value of mounted forces in high-intensity conflict, but tend to neglect their value on other battlefields. The presence of conventional mounted combined arms forces has been instrumental in the conduct of Operation RESTORE HOPE, a peacemaking operation. Only one platoon of Sheridans participated in Operation JUST CAUSE, but *they expended every last main gun round they carried,* a clear indicator of mounted force value in MOUT. Another example is provided by the 4th Battalion, 6th Infantry (Mechanized), 5th Infantry Division, which was given what was arguably the most dangerous and difficult of missions in the entire operation. And tanks in a jungle? What about Vietnam? Best: Mechanized Infantry, Armored Cavalry, Armor.

Return to the Basics. Still, the arguments must always return to the matter of combat power. The unleashing of overwhelming combat power has come to be the American way of war. This principle was one of the bases upon which we formulated our campaign plans in Panama (Operation JUST CAUSE) and Iraq (Operation DESERT STORM. It presupposes complete domination of all battlespace — land, sea, and air. "The facts of war are often in total opposition to the facts of peace. The efficient commander does not seek to use just enough means, but an excess of means. A military force that is just strong enough to take a position will suffer heavy casualties in doing so; a force vastly superior to the enemy's will do the job without serious loss of men."[2] Again — brute force counts.

Curiously, the very words "Power Projection" present a significant challenge to national military strategic planners. The most overwhelming combat **power** available to the Nation is embodied most fully in those military forces that are most difficult to **project.** Conversely, the most easily **projected** forces are those that wield the bare minimum amount of combat **power.** In simple language, it would seem to boil down to this: We can either deploy relatively vulnerable forces very quickly to wherever they are needed, or we can instead deploy a potent force that takes somewhat longer.

But as General Nathan Bedford Forrest observed, the secret is to "get there first with the most." By opting for anything less than the mounted combined arms team, you might indeed "get there first," but you by no means have "the most" until the mounted combined arms team arrives. The answer is **not** to send light forces in harm's way simply because we can get them there on commercial aircraft; the answer is to acquire and maintain the wherewithal to get the mounted combined arms forces there first alongside them. That means increased sealift, airlift, and a U.S. Army heavy brigade, with all accompanying logistical support, prepositioned aboard ships at sea.

There is no panacea in war. No one branch of service is expendable any more than it is superior. From submarine-launched cruise missiles to SOF, each contributes something vital to the nation's defense. Nevertheless, it is the mounted combined arms forces that constitute the heart and soul of our Nation's military forces. "Armored troops are multi-purpose forces. Just as the tank is their backbone, the armored troops are themselves the backbone of the entire ground forces... Armor is the essence, it is in the center, it is the backbone and the power of war. Armor is not a subcontractor and it does not operate in the margins. Armor is the fist."[3] And that's the way it should remain.

Notes

[1]T.R. Fehrenbach, *This Kind of War: A Study in Unpreparedness* (New York: Macmillan, 1963).

[2]Mark Watson in his official history of WWII, as quoted by COL (Ret.) Harry Summers, *Washington Times,* 28 January 1993, p. G-4.) (Italics added.)

[3]MG (Ret.) Tal, Israeli Defense Forces, 5 May 1993, in a presentation to the Armor Conference at Fort Knox, Kentucky.

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Company Team Offensive Operations in Urban Terrain

by Captain Jefferson R. Panton

Worldwide urbanization has changed the terrain on which future battles will be fought. Military Operations on Urbanized Terrain, or MOUT, are inevitable. With recent conflicts such as Lebanon, Bosnia, and the deteriorating situation in the former Soviet Republics, it is time to review how to fight the combined arms team in an urban conflict.

Command and Control

Planning. Offensive urban operations are characterized by centralized planning and decentralized execution. Urban terrain tends to separate and isolate units from one another; therefore, soldiers will require detailed orders that are restrictive in nature to prevent fratricide. Some common graphic control measures include:

Assembly Areas	Contact Points
Attack Position	Passage Lanes
Assault Positions	Phase lines
Passage Points	Objectives
Line of Departure	Limit of Advance
Direction of Attack	Boundaries
Axis of Advance	Time of Attack
Check Points	

When planning MOUT, towns are divided into zones or areas. Buildings are assigned a letter or number identifier. Phase lines are assigned to all major streets running laterally to assist in controlling movement. Units are assigned successive objectives and given routes of advance. Unit boundaries must be identifiable and restrictive fire measures must be added.

Communication. Buildings degrade FM communications, which can seriously affect a company/team commander's ability to command and control. So he must consider wire and messengers as alternate means of communication when fighting in an urban area. He should designate specific personnel as messengers, and if feasible, advancing units should run wire. This will require that additional DR-8 wire rolls be carried by dismounted elements. In some cases, local telephone lines can be used. Hand and arm signals become extremely important as dismounted elements work with buttoned-up vehicles. Colored smoke, pyrotechnics, and flags can also be used as prearranged signals.

Intelligence

Commanders should seek to acquire civilian maps of all urban areas in the unit's area of operation. Such street maps are often more useful than standard military maps. Key items of information for commanders are: street plans, types of building construction, and underground plans. Reconnaissance in urban areas will be difficult. Most reconnaissance will have to be done from points of observation on the periphery. Helicopters, if available, can be used to gain deeper insights into built-up areas. Small scout teams can be infiltrated to upper stories and rooftops to overwatch enemy movements. Position GSRs to monitor routes in and out of the urban area or to detect movement along streets and alleys.

Maneuver

Infantry. Urban attacks are primarily carried out by mechanized infantry or light infantry with tank support. The combined arms team is built around this infantry force. Decentralized operations characteristic of urban fighting will require tanks and engineer assets to be task organized down to the platoon and squad level. Infantry platoons break down into squad and fire team size elements to act as assault and support elements. The assault element will again break down into two to three man teams for clearing room to room (**see Figures 1 and 2**). Assault elements will attempt to clear buildings from top to bottom while the support element suppresses the enemy with direct and indirect fires.

Bradley Fighting Vehicles

The Bradley Fighting Vehicle (BFV) is employed as much as possible for close support of dismounted troops. Capable of +60 degrees elevation of the 25-mm cannon and the 7.62-mm coax, the BFV can engage targets on upper floors of tall buildings while tanks cannot. Due to its greater penetration capability, 25-mm APDS ammunition is used against enemy in buildings. The 25-mm HEI-T round

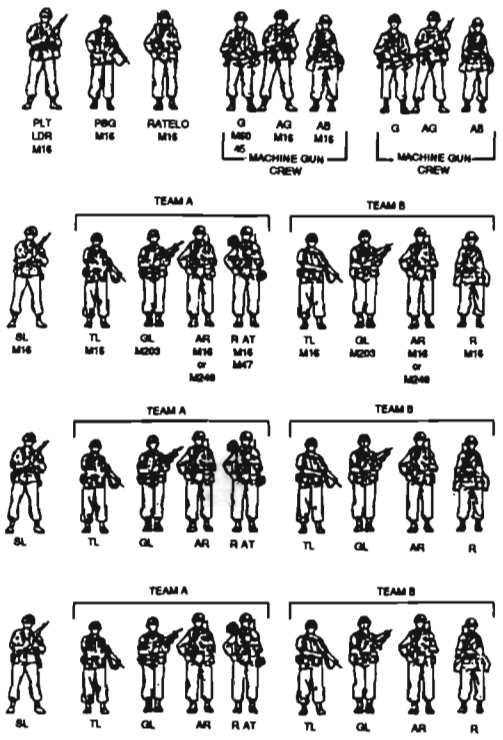


Figure 1. The Light Infantry Platoon

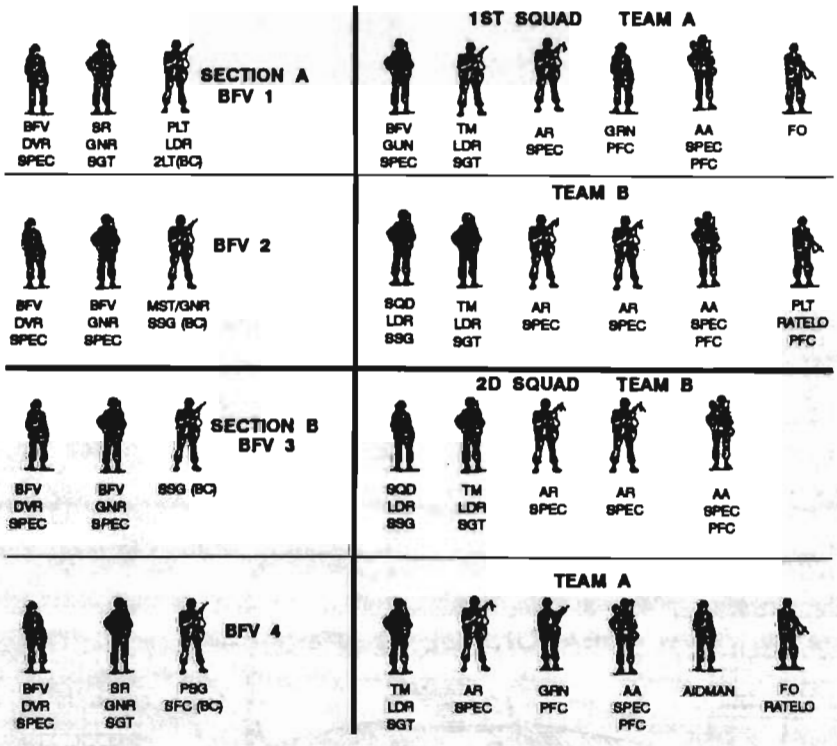


Figure 2. The Bradley Mech Infantry Platoon

arms within 10m and explodes on contact with a hard surface, making it less effective in urban fighting. Bradleys usually move in pairs behind dismounted infantry, staying close to buildings for protection, each covering opposite sides of the street with fires. Crews button up for protection but can communicate with dismounts via FM, visual signals, and field phone connections located on the right rear of the Bradley. Typical BFV missions include:

- Destroying enemy positions with 25-mm and 7.62-mm fires.
- Suppressing enemy gunners in buildings.
- Isolating an objective building with direct fires to prevent enemy withdrawal or reinforcement.
- Clearing and securing parts of an objective.
- Obscuring the enemy's view with the Bradley smoke generator (vehicles using JP 8 fuel will not be able to generate sufficient smoke.)
- Breaching walls using spiral firing pattern.
- Resupplying ammunition and explosives to dismounts.
- Evacuating casualties from the areas of a firefight.
- Evacuating EPWs to unit collection point.
- Establishing roadblocks or barricades.

A safety consideration for dismounts working around Bradleys is that 25-mm APDS rounds discard plastic sabots and require a 10-degree, 400m safety fan to the front of the gun.

Tanks

Tanks, the most effective weapon for heavy fires against structures, increase the firepower of dismounted infantry. Tank cannons produce the best effects when fired perpendicular to hard surfaces. Firing at angles reduces penetration and increases the chance of ricochet. APFSDS is the most com-

mon round carried on tanks, but 105-mm HEAT and 120-mm HEAT-MP are more effective against masonry. HEAT rounds can penetrate all but the thickest masonry and create enough spall to inflict casualties inside the building. Heat rounds cannot cut metal reinforcing rods found in reinforced concrete (See Figure 5). One employment consideration is that both 105-mm HEAT and 120-mm HEAT-MP have a minimum arming range of 25-30 feet and 36 feet respectively.

Tanks are usually used as the overwatch element in the initial assault on an urban area. Once the infantry has gained a foothold, tanks move in pairs several hundred meters behind, providing overwatch fires. The limited elevation — +20 degrees in an M1/M1A1 and +19 in an M60/48 — require tanks to have sufficient standoff to engage targets in upper stories (See Figure 3). Limited depression — -10 degrees in both the M1/M1A1 and the M60/M48 tanks — creates a 35-foot dead space around the tank that makes it vulnerable to antitank fire (See Figure 4).

Dismounted infantry is responsible for clearing routes and providing local security for tanks in urban areas. Dismounted guides bring tanks forward into preselected firing positions with sufficient cover to engage specific targets. Where feasible, tanks drive inside buildings or behind walls. Guides check to ensure buildings have been cleared and floors will hold the weight of a tank before tanks are brought forward. Tank missions include:

- Providing overwatch fire for infantry assaults.
- Neutralizing or suppressing enemy positions with high explosive and automatic fires.
- Destroying enemy tanks and armored vehicles with direct fires.
- Reducing or making enemy strongpoints untenable by fire.
- Smashing through street barricades or reducing them by fire.

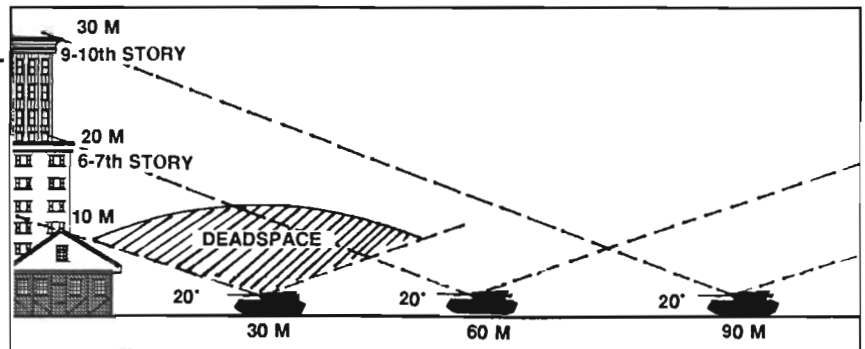


Fig. 3 - Tank Cannon Deadspace Above Street Level

- Blade tanks may be used to breach obstacles and clear rubble.
- Establishing road blocks.

There are safety considerations when dismounts are working with tanks.

- Fragmentation generated by AT rounds and ricochets off tank armor have historically been the prime cause of infantry casualties. All dismounts should wear kevlar helmet, protective vest, ballistic eye protection, and ear plugs when working around tanks.
- Infantry must avoid the tank's 60-degree frontal arc when firing.
- The extreme exhaust heat at the rear of M1/M1A1s prevents infantry from following close behind.
- When a tank is firing, its large fireball combines with loose dirt and masonry dust to create a smoke cloud that can degrade tank sight vision for as long as 2-3 minutes.
- Red phosphorus particles from tank smoke grenade launchers can start uncontrolled fires and injure dismounts. Smoke grenade launchers should only be used when cleared with the dismount leader.

Antitank Weapons. The LAW and AT4 are the primary portable antitank weapons in urban fighting. Wire-guided missiles such as the Dragon and the TOW are difficult to employ due to numerous obstructions, mini-

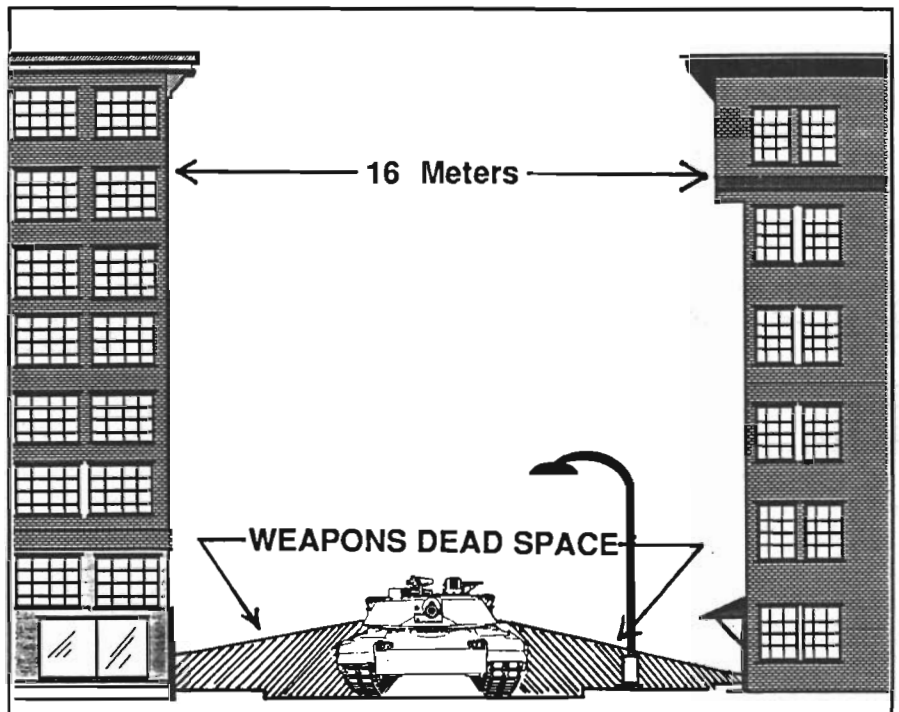


Fig. 4 - Tank Cannon Deadspace at Street Level

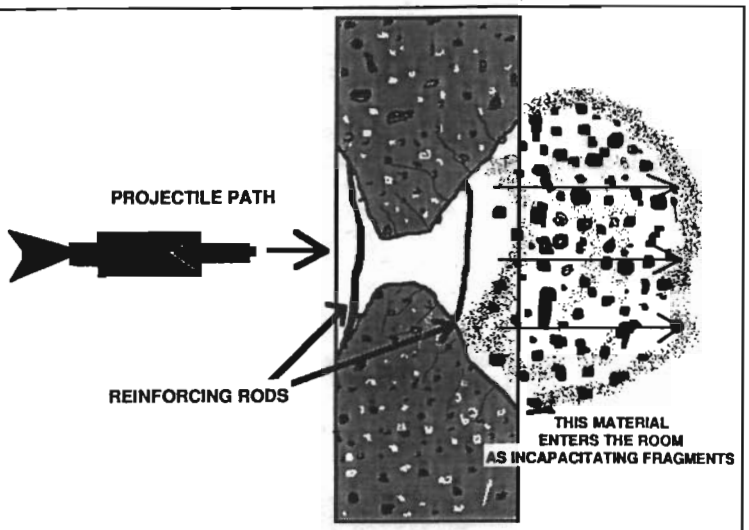


Fig. 5 - Tank HEAT Round Effects on a Reinforced Concrete Wall

mum arming ranges, and large backblast areas (see Figure 6). Wire-guided missile are best deployed on the outskirts of urban areas and not brought into built-up areas.

AT weapons are most effective when fired from upper stories. Firing from upper stories doubles the probability of a hit and exposes the vehicle's weakest armor. Safety considerations for firing AT weapons include:

- Clearing glass and small objects out of firing area. They can be caught up in the backblast and become lethal fragments.
- Both ear and eye protection should be worn.

Engineers

Engineers will normally be attached to units conducting MOUT. An engineer platoon attached to a company team consist of three M113s, one ACE, and 30 personnel organized into three squads of eight men with a six-man HQ section. Combat engineers are integrated with infantry in small 3-4 man engineer teams to form breach and search teams. Breach teams place explosive charges to gain initial entry into buildings and rooms. Search teams locate and disarm booby traps. Engineer missions include:

- Breaching walls
- Assisting with explosives
- Creating and breaching obstacles and barriers
- Maintaining routes.

The combat engineer vehicle (CEV) is extremely useful in urban areas and is often attached to units conducting MOUT. Its blade can clear away rubble and barriers. Its 165-mm main gun can destroy buildings and reduce obstacles. Very seldom will engineers totally destroy buildings because of the large amount of explosives and time needed to do the job. The 165-mm main gun has a maximum range of 900m and a minimum safe range of 1200m for exposed troops.

Although usually attached, company teams must be prepared to work without engineers. This will require extensive explosive training for dismounted elements.

Indirect Fires

Fires are planned to:

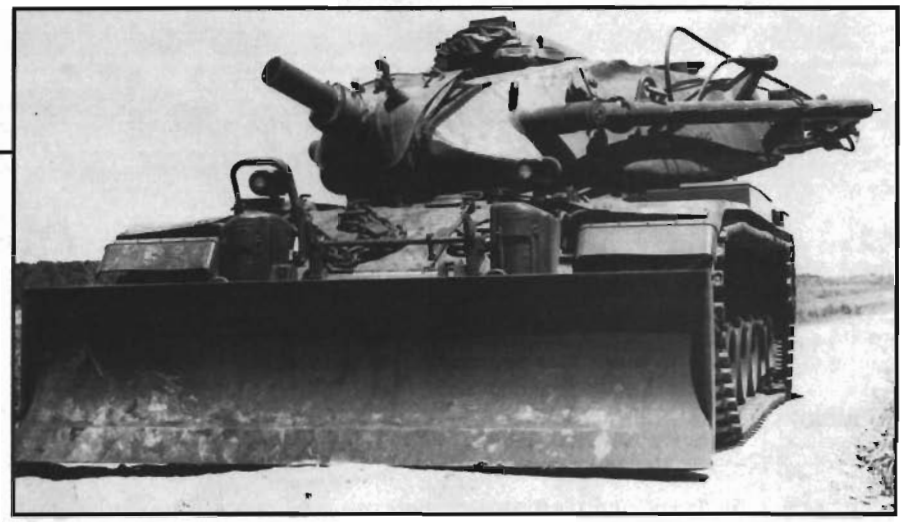
- Isolate objectives by preventing reinforcement and resupply.
- Neutralize known or suspected enemy command and observation posts.
- Suppress defending enemy.

Field Artillery. Artillery normally supports from outside a built-up area. High-angle fires are used because of the masking effect of high buildings. Forward observers are attached and move with lead dismounted units. Artillery fires make rubble and reduce mobility in the urban area; this must be taken into consideration when planning fires. Point-detonating shells tend to throw rubble outward onto the streets and create greater casualties.

Artillery can be used inside urban areas in a direct fire role against buildings containing enemy strongpoints or to breach walls for troops to enter. If used in such a role, dismounted infantry must protect the artillery systems.

WEAPON	ROOM SIZE	CEILING HT.	VENT SIZE	MUZZLE CLEARANCE
TOW	17 x 24 ft.	7 ft.	20 sq. ft.	9 in.
DRAGON/ 90mm RCLR	15 x 12 ft.	7 ft.	20 sq. ft.	6 in.
LAW	4 ft. to back wall	7 ft.	20 sq. ft.	

Fig. 6 - Minimum Dimensions for Backblast in Enclosures



Often attached to units in MOUT situations, the CEV's blade is useful for clearing debris and its 165-mm demolition gun is effective in destroying buildings and clearing obstacles.

Mortars. Mortars are usually the main indirect fire weapons system used within urban areas due to their responsiveness and high angle of fire. Light mortars have limited value because of their inability to breach walls and roofs. Mortars over 107 mm provide better fires and are able to penetrate most walls and rooftops. In Beirut, Lebanese commanders considered the mortar a highly valuable weapon capable of firing from one side of a building to another at ranges as short as 180m.

Smoke. Smoke should be used in the outskirts of urban areas when trying to gain the initial foothold. Its use is discouraged within the interior of urban areas because it degrades sight capability, allowing enemy as well as friendly forces to maneuver. It tends to increase confusion and increase the chance for short-range encounters. Hand-held smoke should still be used to obscure when crossing open areas.

Air Defense Artillery

Radar masking, degraded communication, and limited line of sight will degrade AD fires in built-up areas. Air defense assets are best deployed on the outskirts of urban areas. Stinger missiles can be used within the built-up area from positions on rooftops that dominate surrounding buildings.

Combat Service Support

Urban warfare is resource intensive. Some CSS considerations include:

- Supply priorities are ammunition, water, and food, not fuel.
- Ammunition requirements are heavier then normal.
- APCs and BFVs can be used to transport supplies.
- Supplies, especially class VIII, must be distributed down to the lowest level.

Special equipment requirements include:

- Portable flame throwers or M202 rocket launchers
- Grappling hooks
- Toggle ropes
- Ladders, both rope and metal
- Demolitions (Bangalore torpedoes, satchel charges, pole charges, etc.)
- Antitank weapons (LAW)
- Grenades (HE, Smoke, CN, CS, Concussion, WP)
- Sandbags for AFV protection
- Additional DR-8 wire rolls for communication.

The ideas presented in this article are not new. Most of the information can be found in FM 90-10 and FM 90-10-1. However, like most doctrinal information, it is useless unless it is trained. The chance of fighting a major urban conflict is only increasing with time. The question is, will our soldiers be properly prepared to fight one?

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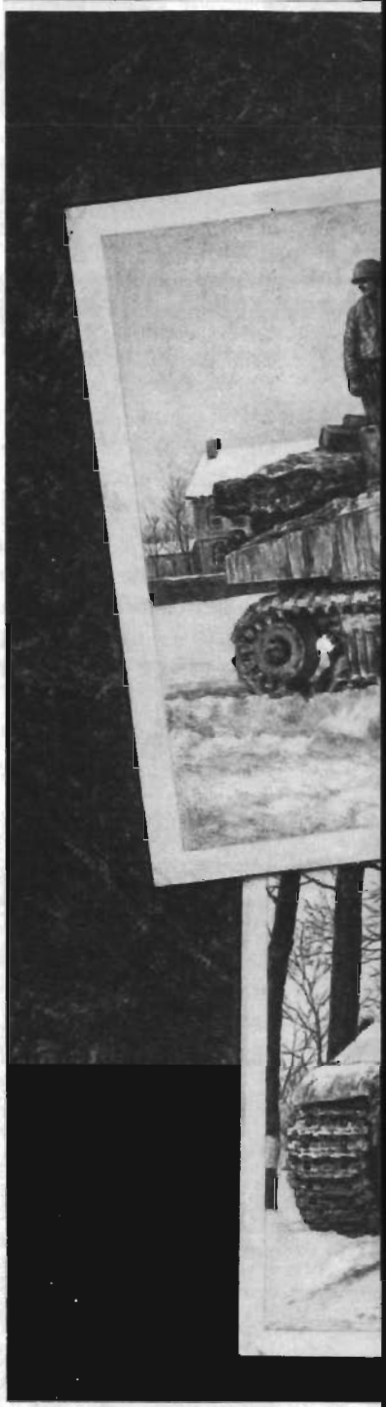
Decisive Leadership:

Brigadier General Bruce C. Clarke and the Battle of St. Vith

by Major John F. Antal



"Hold the reins loose, and let the armies race."[1] All along the 80-mile front, during the early morning hours of December 16, 1944, the screams of the German *Nebelwerfer* rockets and the crash of heavy German artillery, exploded the quiet of the early morning. Twenty German divisions, with almost 800 tanks, attacked west. The Wehrmacht was on the march again, and this time, they claimed, they would go all the way to Antwerp and capture the city as a Christmas present for their Fuehrer, Adolph Hitler. The fate of the fatherland was at stake, and the Wehrmacht, as in 1940, again seemed unstoppable. General Model's words on the eve of the assault were: "The first objective is to achieve liberty of movement for the mobile forces."[2] For the Germans, it was now or never.

It was a black day for the United States Army. Rumor dominated the battlefield. The enemy's unsuspected attack had unsettled the defending Americans. No one seemed to understand what was happening. Overwhelmed by the surprise and fury of the assault, Americans began to surrender and run. The 106th Division, nicknamed the "Golden Lions," a green division fresh from the United States, was shattered by the fury and skill of the attacking Wehrmacht. Over 7,000 soldiers from the 106th Division surrendered. Some small, isolated units held and fought bravely, but it was not enough. The front was disintegrating. Disaster was in the air. The scene was one of wild confusion and disorganization. The Allied high command, unable to develop an accurate picture of the situation, reacted slowly to the Wehrmacht's massive blow.

General Troy H. Middleton, VIII Corps Commander, was responsible for a a large portion of the Ardennes area. His information was sketchy. Rumors of German Panzers, overrunning everything in their path, were rampant. Recognizing the value of St. Vith, a vital road and rail center in the northern portion of the Ardennes (see map), General Middleton asked for reinforcements. He obtained the release of the 7th Armored Division from Army reserve and immediately deployed it to St. Vith.

The 7th Armored Division received its orders to move to St. Vith late on the evening of December 16th. The 7th was located to the north, near Heerlen, and was undergoing a "major shakeup in the command structure."[3] The 7th was a "hard luck" division. Its record of accomplishment on the battlefield was poor. The previous division commander had been relieved for incompetence. Its new commander, Major General Robert W. Hasbrouck, had only been in command since November 1, 1944. But the 7th would have to do. There was no one else.

The commander of the 7th Armored Division's Combat Command "B" was Brigadier General Bruce C. Clarke. He had enlisted as a youth in the New York National Guard and then received an appointment to West Point. Initially assigned as an Engineer, he had volunteered for service with tank-mechanized units as soon as the Army began forming them. After 20 years in the Army, he had earned a reputation as an excellent leader and a determined fighter. He took command of Combat Command "B" and was promoted to brigadier general, only 45 days prior to the German attack in the Ardennes.

Clarke arrived in St. Vith on December 17, 1944, ahead of his command,

with only his driver and his operations officer. The scene in St. Vith was sheer pandemonium. Clarke immediately reported to General Jones, the commander of what was left of the 106th Division. Jones was defeated. He talked only of retreat and disaster. He doubted that anyone could stop the Germans. His last words to General Clarke before relinquishing command of the area of operations were: "You take command, I've got nothing left. I've thrown in my last chips."[4] The sole responsibility for victory or defeat was now Clarke's.

With little over a month in command, and with his command strung out along 96 kilometers of congested, ice caked roads, Brigadier General Bruce C. Clarke was about to fight one of the most difficult battles in the history of American arms. He was outnumbered by the Germans more than eight to one. How was Clarke going to succeed against such odds? Why should his unit fight effectively while the rest of the American forces in the battle area were in head long retreat?

Before the Battle

Brigadier General Bruce C. Clarke took over the Combat Command "B" (CCB) of the "unlucky" 7th Armored Division on November 1, 1944. But Clarke was not new to combat. He was a veteran commander of the

Combat Command "A" (CCA) of the 4th Armored Division. His old unit had distinguished itself in combat since the early days of the Normandy landings, five months before the Battle of the Bulge. He had done a terrific job commanding CCA during General Patton's breakout from the Normandy beachheads. He had seen almost continuous combat since D-Day, June 6, 1944, and was awarded the distinguished Service Cross, the Silver Star with two Oak Leaf Clusters, the Bronze Star with Oak Leaf Cluster, and the Air Medal.[5]

Immediately after taking command of CCB, 7th Armored Division, Clarke worked and trained his command hard. His style of command was positive, proficient, and no-nonsense. The men of CCB were impressed with their big, barrel chested, six foot tall commander. Clarke later related: "It took a lot of training and coaching to turn this division around to play the key, successful role in stopping Manteuffel six weeks later at St. Vith.[6]

In the 4th Armored Division, Clarke had employed the techniques of command that were to be so successful in the St. Vith area. As a veteran of the 4th Armored Division, Clarke had learned the hard lessons of armored combat. His command style incorporated three essential pre-battle decisions: the decision to organize his forces in self-contained forces capable of independent action to the maximum degree possible; his decision to streamline the information flow to the maximum extent possible; and his strong belief in forward command.

Clarke recognized the value of self contained forces. He reorganized his command for built-in flexibility. He recognized the fact that mobile, armored formations required a quick decision cycle to take advantage of enemy mistakes and the fleeting opportunities of the battlefield. His intent was to make his armored combat command "seem like an armored corps."[7] He made sure that the subunits of this combat command, the battalions, had the necessary combat support and combat service support elements to fight independently, if necessary. This organizational decision gave Clarke's subordinate commanders the ability to act without active control from above. They had the organizational capability, and were given the operational flexibility, to achieve objectives within their scope of operations, without constant supervision.

Secondly, Clarke streamlined the flow of information up and down the chain of command. He employed mission-type orders. He believed that "mission type orders were a requirement if the most was to be obtained from a command.[8] His combat orders technique involved eyeball-to-eyeball verbal orders, issued from a vantage point overlooking the battlefield. His subordinate commanders were expected, and trusted, to make decisions within the guidelines established by his intent.

Clarke's intent was for this subordinate commanders to command their units, and not wait around for instructions. When decisions are made at the point of execution, it is possible to take advantage of battle opportunities as they occur, without losing time. "Time is always critical and mission type orders save time. The command style and staff functioning that contribute most to maneuver warfare is characterized by the application of "mission orders."[9]

Clarke's orders were usually oral, quick, and to the point. He told his commanders what to do, not how to do it. Clarke's technique of employing mission type orders was not new to the U.S. Army, but was particularly important in creating the short decision cycles demanded of fast paced, maneuver warfare. General Bruce C. Clarke, explained how to give mission type orders in his book, *Guidelines for the Leader and Commander*.

In May 1965, General Clarke places a wreath on the memorial at Vielsalm, Belgium honoring the men of the 7th Armored Division who died in the Ardennes Campaign.

To get maximum combat power, we must have plans flexible enough to meet rapidly changing situations. But careful planning is not enough; this must be coupled with the readiness to change and adapt to situations ***as they are,*** *not as they were* ***expected to be.***

Basically a mission type order needs to cover only three important things:

1. It should clearly state what the commander issuing the order wants to have accomplished.

2. It should point out the limiting or control factors that must be observed for coordinating purposes.

3. It should delineate the resources made available to the subordinate commander and the support which he can expect or count on from sources outside his command."[10]

Lastly, Brigadier General Clarke was a true believer in the concept of "forward command." "Forward Command" is an essential element for achieving tactical victory in maneuver warfare. "Forward command" calls for senior commanders to issue orders based upon personal observation and to actually assume command of a subordinate unit during a critical point in the fighting. This concept relies heavily on thinking, independent leaders; unflinching trust in subordinate officers to carry out the mission within the intent of the senior commander; and the clear understanding of the missions of the units two echelons down and two echelons up.

Clarke did not believe in a "systems" approach to war, a prescribed logical process leading to a quantified decision. He believed: "The commander should be forward as much as possible to detect early the critical situations in all fields and to render help quickly to his units when it is needed."[11]

At St. Vith, he seemed to appear everywhere there was a crisis. He frequently visited the front lines to get the true "feel" of the situation. Several times, he personally directed traffic. At the village of Commanster, when nine artillery battalions tried to displace at the same time, Brigadier General Bruce C. Clarke was there, unsnarling the mess, and getting vital combat power moving in the right direction.[12]

During the Battle

The defense of St. Vith was turned over to Brigadier General Clarke by Major General Jones on December 17, at approximately 1430 hours. Clarke was hardly in an enviable position. In St. Vith, he could hear the crash of artillery and the sound of machine gun and small arms fire. The roads leading to St. Vith were clogged with Belgium refugees and retreating American soldiers. Every kind of vehicle seemed to be heading west, away from the Germans. "...it was a case of every dog for himself; it was a retreat, a rout."[13] Movement towards the front was reduced to one mile an hour in many locations. Only a few units were standing to hold back the Wehrmacht, and his own forces were strung out along a 96-kilometer route of march. Clarke's first combat experience as a brigadier general seemed less than promising!

But Clarke did not give up. He took charge and organized everyone he could scrape up to defend the positions around St. Vith. "By midnight of December 17, a fairly cohesive defense had been established in front of St. Vith with three companies of armored infantry, a company of medium tanks, and a troop of cavalry..."[14] He adapted and improvised the defense of St. Vith as fast as his CCB units arrived. At 0200 on December 18, 1944, the Germans launched the first of many attacks against the St. Vith positions. "Throughout all this mayhem, only one thing was certain, General Bruce C. Clarke was the sole defending commander of St. Vith."[15]

Clarke did more than just defend. He aggressively employed small unit counterattacks and blunted one German attack after another. "General Bruce Clarke's 7th Armored men

showed that men in combat, confronted with a sudden and confused situation, could act aggressively, immediately and independently."[16] Clarke continued his mobile defense of St. Vith with determination and skill, giving ground, but killing and delaying the Germans in the process.

Brigadier General Bruce C. Clarke displayed decisive leadership during the Battle of St. Vith. His mission-type orders streamlined his command and control system and aided his efforts to employ his mobile reserves with decisive speed. His forward command during the battle ensured the timing of these vital counterattacks. His style of command allowed his subordinate commanders to act without active control. When communications were lost, they fought on, implicitly understanding what their commander expected, and continued the fight. In this fashion, Clarke's presence was felt everywhere throughout the battle.

Between December 17-23, 1944, Clarke's command fought off continuous German attacks. His aggressive tactics confused the Germans and made them believe that they were up against a much stronger force than merely one reinforced combat command. Clarke orchestrated massed artillery attacks on the advancing Germans, followed by extremely agile, mobile counterattacks. His counterattacks were often composed of as little as a company-size unit of tanks, which swept through the advancing enemy and returned to be used for further action. When General Ridgway questioned Clarke about giving up ground, Clarke replied:

"General, I don't think you know what they are trying to do. This terrain is not worth a nickel an acre to me. In my tactics, I am giving up about a kilometer a day under enormous pressure, but my force is intact, and I am in control of it. A few kilometers advance cannot be of any substantial value to my German opponent... He must, I believe, advance many kilometers to accomplish his mission. The 7th Armored Division is preventing him from doing that. We are winning, he is losing."[17]

On December 23, Clarke was ordered to disengage and withdraw from St. Vith. His men were fatigued from five days of continuous fighting. His ammunition, especially his artillery ammunition, was dangerously low. Issuing verbal orders to his command, Clarke disengaged his forces one at a time. H-Hour was set for 0600. No men or operational vehicles were left behind. By 2300, he had successfully disengaged his entire command and was regrouping, well behind American lines, in an assembly area in the vicinity of Xnoris, Belgium.

His disengagement was skillfully executed. "Covering forces to the east, west, and south fought bitter rearguard actions as the enemy pressed hard on the retreating division's heels."[18] Defiant, his Combat Command "B" had disrupted the German timetable and marched away, bloodied, but intact. He had lead his command in the most critical test of American arms in the Second World War.

Combat Command "B," under Brigadier General Clarke's command, was the mainstay of the defense of St. Vith. Because of his gallant stand in and around St. Vith, the Allies were able to regroup and hold at Bastogne. General Troy Middleton, recognized this and later said: "In my opinion, it was CCB which influenced the subsequent action and caused the enemy so much delay and so many casualties in and near this important area."[19]

Conclusion

"It was no small achievement in military history that a reinforced combat command of 10,000 American soldiers had warded off over 87,000

enemy troops and had prevented them from controlling St. Vith for a period of six days."[20] The defense of St. Vith was the turning point in the Battle of the Bulge. Before St. Vith, the Germans had everything their way. After St. Vith, the failure of the Wehrmacht's attempt to win a quick, decisive victory in the West was apparent to both sides. The 7th Armored Division held the German onslaught for six critical days. Those six days made the difference between victory and defeat.

Decisive leadership is often the key to victory. In this example, the leadership of one man had a decisive impact on the outcome of a battle and, perhaps, the final outcome of the Second World War. General Clarke's successful leadership depended on his actions **before the battle.** His organizational and information decisions before the battle, combined with an effective orders process technique, prepared his command for its decisive role at St. Vith. He molded Combat Command "B" into a flexible, self-contained fighting unit, capable of executing mission-type orders, in little more than a month.

Clarke trained his unit to conduct mobile operations before the battle. He had coached and developed his junior leaders to effectively employ the elements of combat power. Due to these organizational and informational decisions before the battle, his unit was prepared to conduct mobile, armored operations against the massed might of the Wehrmacht.

Brigadier General Bruce C. Clarke's actions at the Battle of St. Vith are now a part of the proud heritage of the United States Army. His deeds are a perfect example of the important impact that a commander can have on a combat unit. Guided by Clarke's leadership, Combat Command B and the other elements of the "unlucky" 7th Armored Division, held up the most formidable force the American Army has ever had to face. That's decisive leadership in action!

Notes

[1]Robert E. Merriam, *The Battle of the Bulge. Hitler's Last Desperate Gamble to Win the War!*, Ballantine Books, New York, 1957, p. 79.

[2]*Ibid.*, pp. 77-78.

[3]Stephen Dominic Borows, *Clarke of St. Vith: Brigadier General Bruce C. Clarke's Combat Command "B" of the Seventh Armored Division at the Battle of St. Vith, Belgium. Ardennes Campaign (Battle of the Bulge) 16 December - 23 December 1944*, University of Louisville, Louisville, Ky., May 1984, p. 46.

[4]*Ibid.*, p. 60.

[5]*Ibid.*, p. 45.

[6]*Ibid.*, p. 75.

[7]*Ibid.*, p. 44.

[8]General Bruce C. Clarke, *Guidelines for the Leader and the Commander*, Stackpole Books, Harrisburg, 1963, p. 95.

[9]*Ibid.*, p. 95. Clarke goes on to say:

"In World War II, those who served in armored divisions — and probably in other units as well — learned that mission-type orders were a requirement if the most was to be obtained from a command... As the battle becomes more complex and unpredictable, responsibilities must be more and more decentralized. Thus mission-type orders often will be used at all echelons of command and probably will be the rule at the division and higher levels. This will require all commanders to exercise initiative, resourcefulness, and imagination — operating with relative freedom of action.

In our tactical forces we have built-in organizational flexibility. We must recognize this and capitalize on it in our orders." p. 95.

[10]*Ibid.*, p. 95.

[11]Clarke, p. 106.

[12]Hugh M. Cole, *The Ardennes: Battle of the Bulge*, Office of the Chief of Military History, United States Army, Washington, D.C., 1965, p. 417.

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[16]Charles Whiting, *Death of a Division*, Stein and Day, New York, 1980, p. 76.

[17]Borows, p. 89.

[18]*Ibid.*, p. 96.

[19]U.S. Army Armor School, p. vi.

[20]Borows, p. 100.

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The Tactical Communications Revolution

by Second Lieutenant William D. McCormack

The introduction of IVIS (Intervehicular Information System) reflects the U.S. Army's grasp of the fundamental reality of the digital revolution, a revolution every bit as pregnant with possibilities as were the revolutions brought about by the introduction of printing, the internal combustion engine, and radio.[1]

The ability to command and control is a direct function of the efficiency of the mechanism of communication. Alexander the Great was a master of sophisticated tactics, strategy, and logistics, but his plans were set prior to battle and, once combat was joined, he had no control over his subelements.[2] The Romans' innovation of the battle standard increased a leader's ability to articulate his subordinate units, although still within the confines of a set-piece plan. Throughout time, runners provided commanders the ability to send orders and receive reports, but time spent traveling limited their tactical usefulness until the advent of enormous conscript armies. By that time, the sheer size of armies allowed slower reaction time and made runners a feasible communication mode.[3] Wire communication, beginning with the telegraph,[4] offered a vast increase in strategic command and control, but had only limited value in the tactical defense, and none in the tactical offense. The advent of portable, wireless, receiver-transmitters (radio) permitted both mobility and simultaneous communication.

Radio, while offering instantaneous voice transmission over great distances, is limited to verbal communication. But some things are better seen than explained. That's why we rehearse on the actual terrain, or at least a sand table. Moving blocks of wood around tends to remain in our minds because it is closer to what we will really be doing than simply hearing "we'll move in a wedge until phase line Blue." Similarly, using a map is easier when one can simply point and say, "I'm here." Now, for most professional soldiers, map location reporting is relatively quick. But what about updating a graphic overlay? Or changing an axis of advance? "A picture is worth a thousand words" is an overused, yet true, cliché.

The digital revolution brought about by the development of computers offers information that is accessible, readily editable, easily stored, transferable between various systems, displayed in a variety of formats (text, graphs, graphics, animation, video, sound), and disseminated via a variety of sending modes (wire, wave, magnetic media). Since IVIS represents the fruits of this revolution, what does it all mean for the armored force at the tactical level?

Let's look at the advantages of digital communications:

Access

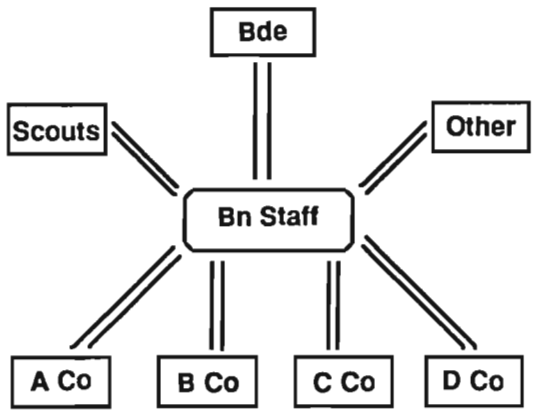
Information in digital form can be accessed on an "as-needed" basis. For example, instead of simply reporting and waiting for an update from battalion on the enemy situation, a company commander can have as much situational awareness as is available in the battalion data pool. He'll have the scout's latest report, appended with the S3's assessment, even if he missed the last voice transmission on the battalion net: the data will be in the system, and therefore available as he needs it. Besides tactical information, the data pool can provide access to supply status, MEDEVAC availability, replacement histories — any information which can be stored and retrieved on an "as needed" basis.

Edit

Changes in an electronic environment can be made and stored immediately. Anyone who has used a typewriter and a word processor knows the difference in editability! Up-to-the-minute changes may be incorporated into any document, picture, graphic, map, list, or order. This means operational graphics can be changed to reflect FRAGOs, TMs can be posted immediately, and map changes can reach the field in hours instead of years.

Store

One CD-ROM can hold literally thousands of pages worth of textual information, or hundreds of full-color images, or sounds, or video clips. In addition, other storage media are now available which can store gigabits and terabits of data, enough to



In the current model, each line represents a discrete exchange of information. There is no "hard" link to ensure all information is disseminated.

Current Tactical Information Model

hold all the FMs, TMs, ARTEP manuals, and SOPS in the armor force. And, as mentioned previously, all this information can be instantly accessible. In a tactical situation, reports can be stored to provide a steadily growing body of information about the enemy's whereabouts and intentions. Maintenance data can be collected on every vehicle in a battalion or brigade, stored on a single disk. In short, if it can be read, seen, or heard, it can be stored on magnetic media, which is more compact, and usually more durable, than paper.

Transfer

Once placed in digital format, data can be transferred to an unlimited number of display devices, whether terminals, handheld computers, fax machines, or televisions.[5] This means space will not be a problem. Chopper pilots and tankers, scouts and support platoon leaders, each can have a display device suited to his needs, and be able to display the data in the format he requires.

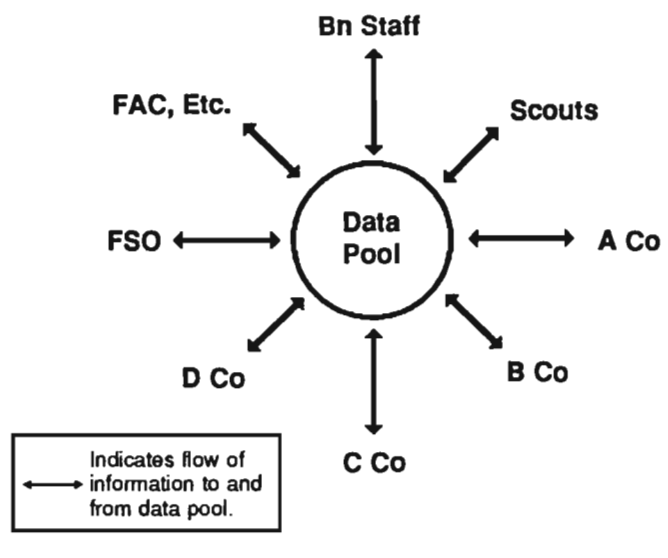
Display

As stated earlier, some information is better seen then said. Digital data can be displayed in any format supported by the display device. Overlays, enemy locations, obstacles, unit locations — all can be displayed and updated constantly, increasing situational awareness, and therefore multiplying combat effectiveness (with the ancillary, but by no means secondary, effect of reducing fratricide).

Disseminate

Perhaps the most promising feature of digital communications on the battlefield is the dissemination of information. Francis Bacon said, "Knowledge is power." S.L.A. Marshall, in his study of World War II combat effectiveness, *Men Against Fire,* wrote, "...Full and accurate information becomes most vital at the point of impact, for unless it is correctly applied there, the wisest plans of the ablest general will likely fail. But the organization of tactical information during combat runs directly counter to this principle, almost as if it followed an unwritten law — the lower the rank of the commander, the less he is entitled to know about his own affairs."[6] Digital data will help change this by reducing the darkness in which a lower echelon commander must operate, and by providing him with the information needed to apply his initiative with the assurance of understanding his unit's efforts within the "big picture."

In *Mask of Command,* John Keegan wrote, "Particular knowledge of the enemy's whereabouts, strength, state, capabilities and intentions is...the material on which effective command thrives."[7] S.L.A Marshall, in a similar vein, wrote, "...Action, if it is to be decisive, must develop according to the distribution of enemy forces... a first responsibility of a tactical commander at every level is to determine, as exactly as possible, by all means



New Tactical Information Model

S.L.A. Marshall spoke unwittingly of the advantages of the digital revolution when he wrote, "Information is the soul of morale in combat and the balancing force in successful tactics."

within his power, where that heart (of enemy force) is located, and then plan his battle or arrange his plan accordingly." Currently, if the enemy situation changes between the time the reports are received and the time the plan is disseminated (which is highly likely), the commander must depend upon reports being submitted to higher, received and analyzed, and then retransmitted to him (along with the accompanying FRAGO, without the benefit of updated graphics). Often what the company commander wants to know is not included in the S2's brief, for a variety of reasons. Yet, having all reports stored in a data pool will allow the company commander to add his own analysis to the IPB done by the battalion staff. This possibility vastly increases the ability of the company commander to adjust to and prepare for fighting his battle within the overall plan, of which he can now be aware. It became an axiom in the volunteer Army of the 1970s that volunteers needed to know not only how, but why. While often much more an ideal than a promise, the technological leap of digital data communication will help every commander, platoon leader, tank commander, and crewman understand his role in the "big picture."

If anyone still doubts the truly revolutionary nature of digital data communications, as represented by IVIS, and what it may mean in a future conflict, consider France in 1940. Despite having the largest, best-equipped army in the world, with excellent tanks (both the Char B and SOMUA were nearly impervious to the German PzKW III's 37-mm gun),[8] and despite defending a partly fortified border, France fell in weeks. While many historians argue over the cause of the fall, one tactical reality was certain: the French were not prepared for the speed of blitzkrieg. Each German tank had its own radio set, allowing for better command and communication control,[9] but few French tanks were equipped with radios. Commanders issued orders face-to-face, based on set-piece battle plans. They were attuned to the pace of World War I operations, and were, therefore, unprepared for the tempo of blitzkrieg.[10] The Germans' ability to maneuver was a direct function of their superior strategic and tactical communication distribution mechanism.

S.L.A. Marshall spoke unwittingly of the advantages of the digital revolution when he wrote, "Information is the soul of morale in combat and the balancing force in successful tactics."[11] Fortunately, forward thinkers in the armored force know this, and are working to harness the fruits of this revolution today.

Notes

[1]Major General Paul E. Funk, "The Right Technology at the Right Time," *ARMOR*, May-June 1993, p. 5.

[2]Jones, Archer, *The Art of War in the Western World*, 1987, Oxford University Press, NY, p. 82.

[3]*Ibid.*, p. 90.

[4]The first electrical signaling device used by the Army was the Beardslee Magneto-Electric Telegraph, nicknamed "The Flying Telegraph." It was a portable, hand-operated device that could send signals over several miles of insulated wire laid along the ground or strung aloft on poles, and was used extensively during the Civil War.

[5]Soon, these disparate electronic devices will be merged into a single device that will incorporate the advantages of the telephone, television, pager, cellular phone, modem, personal computer, and fax machine.

[6]Marshall, S.L.A., *Men Against Fire*, 1978, Peter Smith, Massachusetts, p. 101.

[7]Keegan, John, *Mask of Command*, 1987, Penguin Books, NY, p. 325.

[8]Macksey, Kenneth, *Tank Versus Tank*, 1991, Crescent Books, NY, p. 78.

[9]DiNardo, Richard, "The Armored Fist", *Strategy & Tactics*, Sep/Oct 1984, pp. 6-12.

[10]Macksey, p. 65.

[11]Marshall, p. 92.

Second Lieutenant William D. McCormack is currently a platoon leader in C Co., 6-68 Armor (Reserve) and served as his AOBC class leader. He is a 1991 Distinguished Military Honor Graduate from the Pennsylvania Army National Guard Academy OCS and holds a BA in history from Houghton College. He served four years on active duty in the Air Force as a nuclear weapons technician and six years in the Air National Guard as a command post controller. As director of software publishing for Continental Press, he is responsible for developing new products, and designing, maintaining, and upgrading the company's Macintosh pre-press and administrative network, which includes a cross-country link with the editorial office in San Francisco. He holds three copyrights: SchoolPRO: Student Data Manager; SchoolPRO: Discipline Monitor; and SchoolPRO: Elementary.

The M1A2, IVIS, and NTC — A Company Commander's Perspective

by Captain Wade L. McVey

The soldiers of A Company, 3-8 Cavalry, 1st Cavalry Division are testing the Army's newest main battle tank — the M1A2. They received 18 production M1A2s on 31 March 1993 and began New Equipment Training (NET) in early April. A Fort Knox team taught crew, organizational maintenance, and direct support maintenance over a 30-day period. In July 1993, A Company deployed to the National Training Center to participate in rotation 93-10 following an extensive gunnery and maneuver training period. The company was organized as a tank heavy team with two M1A2 platoons and one Bradley platoon (the platoon leader manned an IVIS-equipped Bradley). This was the first NTC rotation involving an M1A2 company/team. The TF commander, S3, TOC, and flank unit company commanders were also equipped with IVIS, enabling transmission and reception of digital information from the tank to the task force level.

A 1st Cavalry Division M1A2 moves out at the NTC during test rotation.

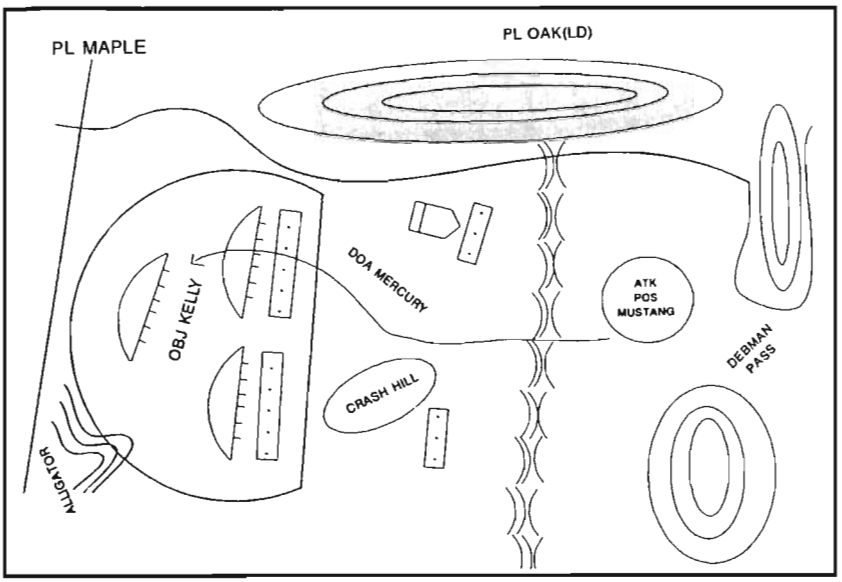
The Battle

The mission was the one we liked best — attack! The TF mission was to attack to penetrate an enemy obstacle belt in the vicinity of Crash Hill and to destroy an MRC in the vicinity of Objective KELLY along Alligator Ridge. My company, Company A, 3rd Battalion, 8th Cavalry, 1st Cavalry Division, was to secure the TF right flank, conduct a hasty breach, and penetrate rapidly to destroy the enemy.

Things looked tough from the start. At 0330 on 24 July 1993, the TF scouts encountered a persistent chemical agent strike in the vicinity of the TF direction of attack (DOA). There was a lot of confusion on the TF command net about the precise location and composition of the chemical strike. At 0500, as we were set in Attack Position MUSTANG North of Debnam Pass, I received an IVIS spot report from the TF on my Commander's Integrated Display (CID) advising me exactly where the persistent chemical agent was located — a safe distance from our planned DOA. As a result, we avoided the contamination and having to fight in a degraded mode.

As the front right company in the TF box, we began our move to the LD at 0530. We crossed the LD at 0600 and immediately began receiving indirect fire. We lost one vehicle to the enemy artillery. This, combined with the heavy dust created by the TF movement, caused confusion and significant obscuration. Yet we were able to maintain the company formation and continue to move at 15-20 kph because of the positional navigation systems (POSNAV) on the M1A2. We continued to move along DOA Mercury using IVIS waypoints toward OBJ KELLY.

At PL OAK, my right flank platoon began to take ineffective direct fire from North wall. We executed a contact drill and continued to move. The 2nd platoon leader immediately sent an IVIS contact report with enemy location, DTG, and number of dismounts. On my CID I could see where my platoon leaders and I were located in relation to the enemy and knew we could continue along the DOA, out of direct fire range. Using my platoon leader's contact report, I formulated a situation report for the TF commander and a call for fire requesting immedi-



ate suppression. We continued our mission unscathed.

At 0715, my lead platoon encountered an enemy minefield overwatched by a CSOP and dismounted ATGMs in the vicinity of PL MAPLE. I received a digital contact report from A31, the 3rd platoon leader, with the location of the minefield, enabling me to see exactly where it was in relation to me and my platoon leaders. I maneuvered 3rd platoon and my mech platoon to support by fire positions, and directed 2nd platoon to conduct a hasty breach.

Using their Commander's Independent Thermal viewer, A31 acquired the CSOP, a T72, on the far side of the obstacle and destroyed it. They also used the far-target designate capability to call for fire against the ATGMs while the gunner continued to scan and attack enemy targets. The company XO quickly moved through the breach site, sending an IVIS report identifying the entrance and exit points of the breach. This was sent digitally to the TF to vector follow-on units through the breach.

By 0730, A Company was clear of the minefield and moving along DOA Mercury toward OBJ KELLY. Our CSR was eight tanks and three Bradleys. We'd only lost two tanks and one Bradley since we crossed the LD. By 0740, the TF was through the breach and moving toward OBJ KELLY with its combat power largely intact. The tough fight was yet to come.

Almost immediately, we began taking losses from a reinforced MRC on Objective KELLY. After a hard fight, my lead and mech platoons were lost to the dug-in MRC. My XO and I became casualties shortly thereafter. My 2nd platoon continued to attack, with the mech team, C/1-9 CAV, as their right flank platoon. The 2nd platoon sergeant attacked the remaining enemy using the CITV in the Hunter-Killer mode to rapidly locate and destroy the tanks and BMPs. They continued to move along the DOA with TM C using POSNAV and digital waypoints to maintain stand-off distance, to skirt enemy engagement areas, and to navigate to the flanks of the enemy positions. They continued to send digital contact and spot reports to the company and TF showing the disposition of the enemy. This allowed the battalion commander to reposition his remaining forces to complete the destruction of the enemy on OBJ KELLY. We pressed the attack and fixed the enemy reserve while TF 1-9, our sister task force, maneuvered over Alligator Ridge to destroy them.

2nd platoon consolidated and reorganized at the conclusion of the battle, and, using IVIS, was able to report accurate ammo, fuel, and personnel status to the company and TF in minutes.

Perspectives

From my perspective, after using the M1A2 at the National Training Center, I believe it provides several significant advances in lethality and command and control over the M1A1.

Lethality

First, the CITV gave all my tank commanders the advantage of the Hunter-Killer capability. We were able to acquire targets more quickly because both the gunner and the TC could search separate sectors. We destroyed more targets in a shorter time period than we could have with M1A1s because TC to gunner hand-off times were almost instantaneous, thanks to the "target designate" function on the Commander's Control Handle Assembly (the old "TC override"). My gunners could also track moving targets more effectively because the Gunner's Primary Sight head mirror assembly is stablized on both the vertical and horizontal axes so the gunner doesn't have to dump lead while tracking targets. This feature came in real handy tracking targets at long range, and it worked well during both live fire and force-on-force MILES engagements.

Finally, the M1A2's lethality is increased by the ease with which leaders can call accurate indirect

fires. My platoon leaders continuously used Far-Target Designate to send an accurate 8-digit grid for indirect fire targets. Far-Target Designate works by lasing to targets and receiving a digital enemy icon on the CID (even out past 7000m). It worked very well in live fire when we could lase. During force-on-force, we used the CITV's choke sight or manually input an estimated range on the CID and still sent our calls for fire through IVIS. Calls for fire were sent digitally to the TF IVIS base station that passed them by hand to the FSO for input into TACFIRE. Currently no direct IVIS link has been established between the IVIS and TACFIRE systems.

Command and Control

Command and control and situational awareness are significantly improved with the M1A2 and Bradley-IVIS vehicles. The M1A2's POSNAV system allowed our platoons, CO/TM, and Task Force to maintain movement under a variety of visibility conditions because all the IVIS-equipped vehicles on a given radio net could see the other vehicle positions on their tactical screens.

My TCs could keep their heads in the battle even while buttoned up because the drivers had waypoints to assist their navigation to objectives or key positions, and the TCs didn't have to direct their every move. The TCs could also see the battlefield clearly through the 360-degree vision blocks on the Improved Commander's Weapons Station. They could even use binoculars through the vision blocks.

The Intervehicular Information System (IVIS) really played a key role in improving our situational awareness on the battlefield. The TF TOC (with the IVIS base station) sent us operational, obstacle, and enemy overlays, along with the TF fire support plan. I modified the overlays as needed and quickly sent the graphics to all the platoon leaders, which increased my own planning time. The TOC also sent digital updates to the overlay, such as exact locations of enemy minefields and contaminated areas.

As missions changed, the TF commander would also send us digital graphic FRAGOs, and I'd send them to the platoons. Everyone knew where we were, and where we needed to go. When we were in a fight, we could tell exactly where we were in relation to the graphic control measures, each other, and templated and actual enemy positions.

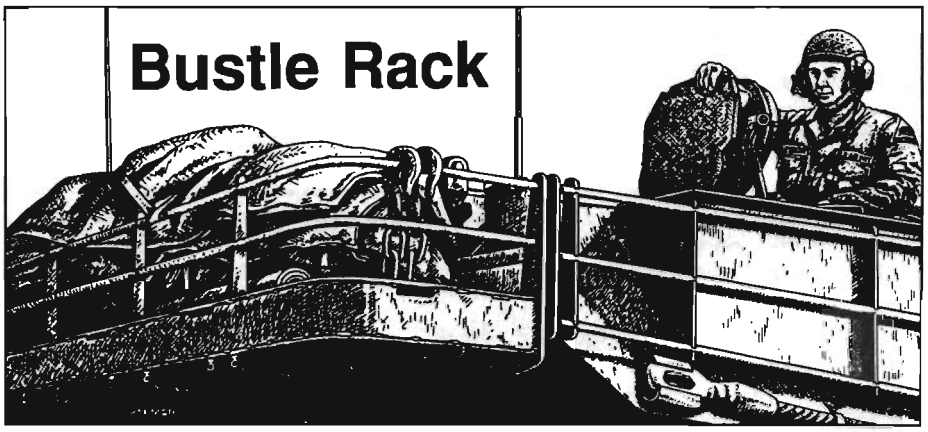
When it came time to mass fires on the enemy, whether it was in the offense or in the defense, we could do it easily, thanks to IVIS and POSNAV.

As the fight developed, my TCs and platoon leaders helped me paint a picture of the battlefield for the TF commander by sending digital contact and spot reports through IVIS. During live fire, every time a TC lased on a target he'd get an exact 8-digit grid on his screen with an enemy icon. With four keystrokes, he could send a contact report to his platoon leader, who could quickly send it to me. I consolidated these reports and sent them up to the task force so my boss could see exactly what we were facing and confirm templated positions. (This system worked less well in force-on-force because we lacked an effective eye-safe laser filter.) The M1A2s stayed in the battle thanks to the redundancy of key components and the short time it took to diagnose a fault. The built-in test (BIT) worked great. If a tank went down, the TC quickly knew which component had gone bad. The mechanics could move up with the right part, do a quick check with the Fault Isolation Test (also right in the tank), and replace the bad component with a good one. (The cumbersome M1A1 STE will be a thing of the past.) Also, the bad parts came back to the supply system quickly because the Direct Support Mechanics could figure out more quickly which cards to replace in the failed component thanks to the M1A2 DSESTS.

In all, the M1A2 worked very well for us at the NTC. It was reliable, easily maintainable, and lethal. There are still some things I'd fix — we need to be able to link up more quickly and more reliably (occasionally, vehicles lose their digital link during start-up or shut down procedures); POSNAV could stand a direct Global Position System Interface (GPSs were used to update the POSNAV system to maintain accuracy); graphic symbols need to be made smaller to reduce screen clutter; friendly icons need a position indicator arrow to show vehicle orientation or direction — but I'm impressed with what I see right now.

Captain Wade L. McVey was commissioned in Armor from California State University Sacremento (ROTC) in 1986 and is a graduate of the Armor Officer Basic Course, Armor Officer Advanced Course, and Airborne School. He served as an M1A1 tank platoon leader and XO in 3d Battalion, 77th Armor Regiment, Mannhiem, Germany. He is currently commander, A Company, 3d Battalion, 8th Cavalry, 1st Cavalry Division, Ft. Hood, Texas.

Bustle Rack



The Armor Hot Line: Your Armor Center Connection

The Plans, Programs, and Operations Division, Office of the Chief of Armor, maintains the Armor Hot Line as a medium for armor and cavalry units worldwide to communicate with the Armor Center. The Armor Hot Line can provide you with an answer to almost any question related to armor and cavalry issues.

A recent study of the Armor Hot Line showed the majority of callers had requested copies of current doctrinal manuals. Requests for information about maintenance issues were second and gunnery training third. Other questions were about changes in TOEs, Class IX supply system, UCOFT training, and BNCOC attendance.

While this is just a small sampling of the questions answered through the Armor Hot Line, the continued success of this initiative lies with the armor and cavalry soldiers around the world. Your use of this service will continue to make the Armor Hot Line an easy and efficient way to communicate with the Armor Center and Fort Knox.

When you dial the Armor Hot Line, you will hear a recording that describes how to leave messages. Popular subject areas have been assigned individual mailbox numbers. The initial recording you hear will explain how to access the individual mailboxes. If you are not sure what mailbox to use, leave a message after the initial recording and your question will be sent to the correct agency. Mailbox numbers are:

Box 10 — Main greeting and general inquiries
Box 11 — List of mailbox numbers
Box 13 — Combat development-related questions
Box 14 — Battlespace Lab-related questions
Box 15 — Maintenance-related questions
Box 16 — Weapons-related questions
Box 17 — Tank gunnery training questions
Box 18 — Tactics and doctrine-related questions
Box 19 — Armor Center and training questions
Box 20 — Safety-of-Use Messages

The Armor Hot Line is accessible 24 hours a day, seven days a week. Our goal is to respond to each question within 72 hours. You can contact the Armor Hot Line at: commercial (502) 624-TANK, DSN 464-TANK, or toll-free 1-800-525-6848. The Armor Hot Line is also available through your PC, PROFS - KNO1 (TANKHELP), DDN TANKHELP%KNO1@LEAV-emh.army.mil.

Safety Note:

Halon Users Take Notice

Recent feedback from Armor field units indicates that some of our soldiers are concerned about the use of halon as a fire suppression agent. These concerns relate to halon's toxicity and the fact that halon is being phased out of the inventory. Since we use halon in many different Army systems, it is important that we understand its use.

Halon Toxicity. There are many varieties of halon. Some are extremely toxic while others are not. The extremely toxic varieties are not used in human occupancy areas such as combat vehicle crew compartments. Halon 1301 is approved by the U.S. Army Surgeon General for crew compartment use because of its very low toxicity and its superior fire extinguishing characteristics. Exposure to Halon 1301 for short durations has little or no effect on humans. Exposures to concentration levels of over 5 minutes may result in some minor discomforts such as dizziness, nausea, and headaches.

Halon Phaseout. All varieties of halon are being eliminated. This is being done not because of toxicity to humans but because halon has been identified as an ozone-depleting chemical. An international agreement requires the elimination of halon by 1 January 2000. At this point, we do not know what agent will replace halon in our engine compartment fire suppression systems. Carbon dioxide will replace halon in handheld extinguishers. Many agencies, both in government and industry are diligently working this issue. Specific details will be made available as they are known.

Fort Knox OCS Graduates Wanted

During World War II, Korea, and Vietnam, more than 17,000 lieutenants were commissioned after graduating from OCS at Fort Knox. Unfortunately, little information about the school and the exploits of its graduates exists. If you have information about Fort Knox OCS graduates, particularly lists of names and accounts of their subsequent military and civilian achievements, please send it to the Director, Office of the Chief of Armor, U.S. Army Armor Center and Fort Knox, Fort Knox, KY 40121-5000.

Coming Soon to a TASC Near You!

The new boresight video, "Boresight the M1/M1A1 Tank," has just been approved and will be released to all local TASCs soon. This video will assist master gunners in training their crews on proper boresight procedures as outlined in the newly-released FM 17-12-1-1/2. We all know that boresighting is an Armor-wide weak area that needs to be trained and practiced repetitively. The video is step-by-step in accordance with chapter 4 of the FM, which will enable crews to see the procedures done properly before performing the steps on the tank.

The basis of issue for the video is set at one per battalion/squadron-size element. This issue is for the total armor force, which includes active, Reserve, and National Guard. To assist you in ordering your copy of the video, we provide the following information:

"Boresight the M1/M1A1 Tank"
TVT 17-156, PIN: 710294DA

Bustle Rack continues on Page 51

DIRECT FIRE PLANNING

Continued from Page 11

Distributing and focusing fires properly are the most difficult tasks in the defensive fire plan. Without them, mass cannot be achieved, nor can fires be easily shifted. Without a proper distribution of fires and a clear, easily recognizable method by which to focus fires at the desired point, numerous weapons will engage the same target while leaving others free to maneuver.

Defensive fire planning is difficult because most of the available tools employed to distribute and focus our fires are fixed on the terrain. They are static, emplaced, while we built our engagement area (TRPs, and the EA). The enemy forces, however, are not static; they will enter our EA and begin moving through it, and at some point, if we do not stop them, they will exit it. In defensive fire planning, the challenge is to maximize the principles of fire control and use our static fire control measures to orient our fires on the enemy while they continue to move.

Techniques

Techniques are the way that we actually use the tools of fire control (TRPs, etc.) to focus and distribute fires on the enemy. There is no single technique to do this in the defense, but there are several to choose from. We discussed tools for controlling fires earlier. Tools are of no use without a way to use them. We don't want to shoot at a TRP. We want to shoot at the enemy near it; therefore, we must have a way to use the TRP to focus our fires on the enemy. We will briefly discuss six possible techniques to control fires in the defense:

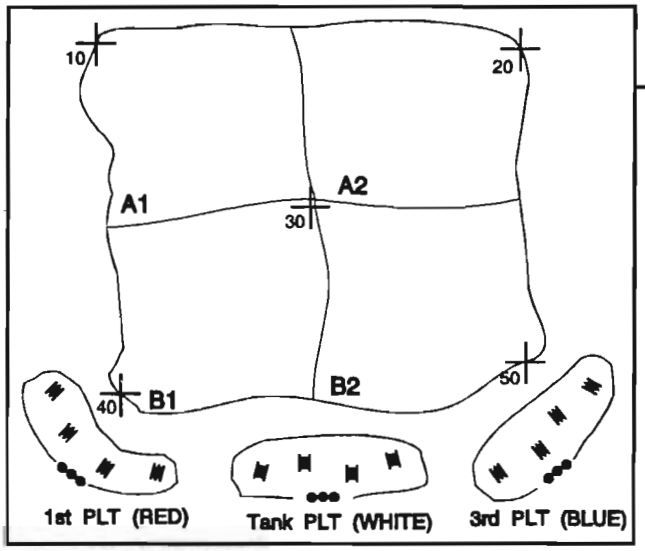


Figure 2. Dividing the EA into Sections

- Dividing the EA
- Sectors
- Closest TRP
- Target array
- Fire patterns
- Quadrants.

Which of these techniques to use is situationally dependent.

The first defensive fire control technique is **Dividing the EA.** This technique uses terrain to focus and distribute fires. Once we have selected an EA that we believe the enemy will pass through during their attack, we divide it into geographical regions in which to focus and distribute our fires. The number of areas is a METT-T determination. For our example, we will use four divisions: two far, and two near, labeling them A1 (far left), A2 (far right), B1 (near left), and B2 (near right), respectively. The regions are delineated on the ground either by marking boundaries (corners) with manually emplaced TRPs, by the use of available terrain that naturally divides the area (roads, etc.), or by other appropriate methods (obstacles, digging a furrow, etc.). This gives subordinates a basic orientation on which to focus fires, and assign primary and alternate areas of responsibility in the EA. Dividing the EA is generally predicated on range and terrain; the EA might be divided with a far area for TOWs, intermediate area for tanks and 25mm, and a near area for dismounted weapons.

The use of this technique to focus fires is demonstrated in Figure 2. The left BFV PLT (Red) is responsible for A2 long range with TOWs, and B1 short range with 25mm. The right BFV PLT, (Blue) has long range responsibility for A1 (TOW) and short range for B2 (25mm). The center tank platoon (White) has primary responsibility for B1 and B2. In addition to primary responsibilities, each platoon is assigned the alternate responsibility to fire into other areas of the EA, (i.e. Blue must be prepared to fire TOWs into A1 and 25mm into B2). If the EA has been built properly, and the vehicles positioned correctly, the majority of each

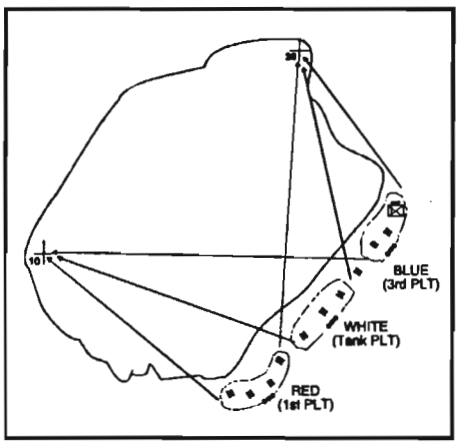


Figure 3. Sectors of Fire

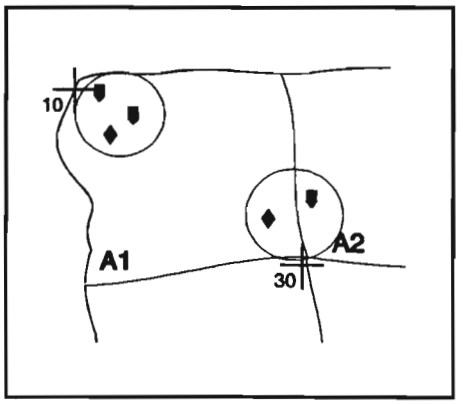


Figure 4. Closest TRP Method

platoon's systems should be able to hit anywhere in the EA.

The problem in using this technique alone to distribute and focus fires is that you cannot rely on the enemy to distribute his force equally in each of the areas of the EA. The direct fire plan must focus and mass fires, avoiding overkill even if the entire enemy force is in one area of the EA. The area that his formations cover are situationally dependent, and will be different if MRBs or MRCs are in column, pre-battle, or battle formations.

The **Sector Technique** for controlling fires is discussed in several doctrinal references, including FMs 71-1, 7-7J and 17-15. Sectors is a terrain-based technique that allows the commander to assign platoons responsibility for an area on the ground between two control measures (usually TRPs). This technique also allows the commander to specify alternate areas of responsibility to each platoon. Sectors may also be used to designate right and left limits to avoid fratricide of adjacent units.

Disadvantages of this method are that sectors do not provide the necessary flexibility and control required to accurately focus and distribute fires to achieve true mass. When platoons are assigned sectors that do not completely overlap, the commander may be unable to focus two-thirds of his combat power in the area of the EA where the enemy is; if sectors do overlap completely, then fires are not appropriately distributed, and target overkill may result. Sectors are useful in assigning responsibilities for scanning and security, but are insufficient when used as the sole technique to control fires in the defense. See Figure 3.

Another terrain-based technique, the Closest TRP method (Figure 4), allows the commander to plan fires or give fire commands based on the TRP closest to the enemy elements he desires to engage. In the fire comand to a platoon, he would include the type of enemy to engage, their distance, and cardinal direction from the closest TRP. Disadvantages of this method are there may be no TRPs in close proximity in a large EA, and it may be difficult to control the fires of multiple platoons from the same TRP.

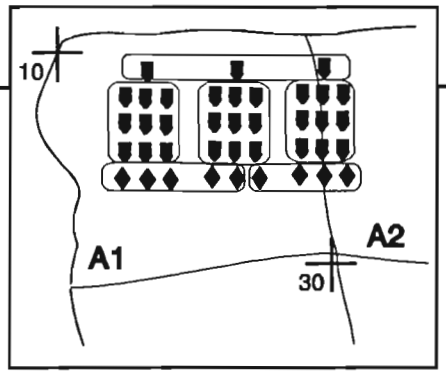


Fig. 5. Enemy Formation Method

Thus far, we have discussed terrain-based fire control techniques. Each has the disadvantage of requiring the commander to rely on static terrain to focus and distribute fires while the enemy continues to move. There are several techniques that allow us to distribute and focus fires directly on the enemy as he progresses through the EA. These techniques are enemy-based and use the location of the enemy to mass fires.

By using the enemy Target Array, the commander can control the fires he assigns to each platoon by basing target allocation on a location within the enemy's formation (see Figure 5). Initial platoon targets may be assigned during the OPORD and then varied as the situation changes. The commander should plan for each likely enemy formation, and assign platoons responsibility for targets within each of the formations. This method is generally preplanned with a FRAGO to confirm the enemy formation as it enters the EA, or as formations change. Fire commands are based on the IPB from the original plan, (e.g. Red, center MRC, tanks, then BMPs). Although this method solves the problem of orienting fires directly on the moving enemy instead of static terrain, it is not without its disadvantages. Once the enemy is taken under effective fire and begins to take losses, orderly formations will break up, and it will become hard to identify the original formation. This technique is useful to initially focus and distribute fires, but may require another method after the initial engagements. This method may be used to identify priority targets (tanks, C2, etc.) by their position in formations until formations break up.

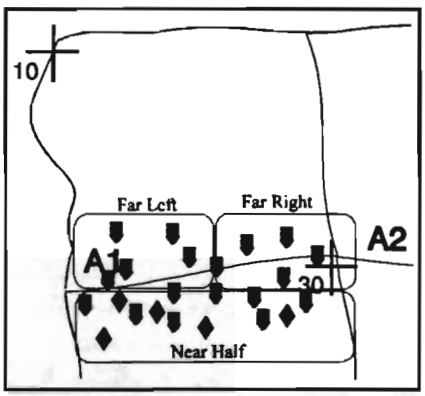


Figure 6. Fire Patterns

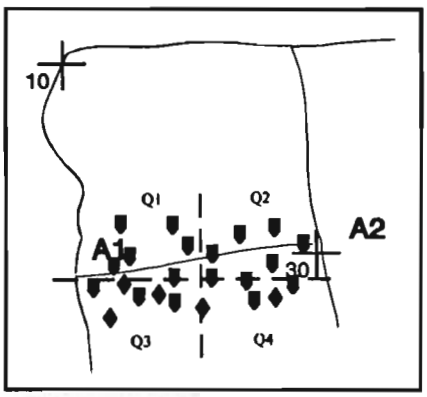


Figure 7. Platoon Quadrants

As discussed in the fire control section, CO/TM **Fire Patterns** utilize the same basic techniques as pattern firing for platoons; however, instead of orienting platoons based on friendly locations, it focuses them on the enemy target array. Whether the enemy is in a tight formation or an unrecognizable mob, this technique assigns responsibilities based on the enemy's location from the apparent center of the

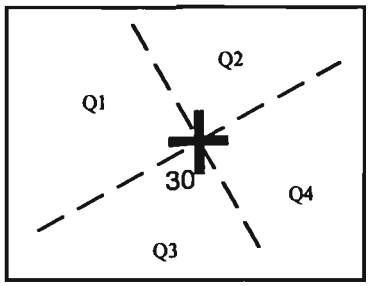


Fig. 8a. Quadrant on a TRP

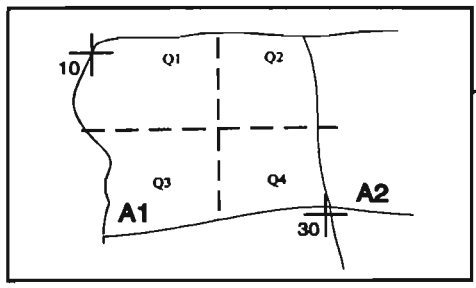


Fig. 8b. Dividing EA Using Quadrants

target array. Instead of commands for orientation based on friendly positions (frontal, cross, etc.) focus is provided using enemy locations, (i.e. left, right, near, far, etc.). (See Figure 6). One platoon may start at the far right, another from the far left, while the third engages all near-half targets. The platoon leader then must determine how to focus and distribute his firing from that point. Commands are issued by platoon and area of the target array, e.g. red, far-right; blue, far-left; white, near half. Disadvantages of this method are that it is effective only if the enemy is in a relatively tight area; if spread out throughout the EA, another method may be more effective, (i.e. division of the EA or closest TRP). Additionally, depending on positioning, each platoon may see the target array from a slightly different aspect ratio, (i.e. far-right may be observed differently from different positions of the BP). The enemy direction of movement may be used to maintain orientation (i.e. right for us is the left of the enemy moving body, regardless of the observer angle). The CO/TM must be well trained in using this method, and must have received a clearly communicated OPORD so subordinates can visualize what the commander sees occurring. This method may be used in conjunction with or following another method, like formations.

The last technique is **Quadrants,** and may be either terrain or enemy oriented. In this method, the unit mentally superimposes a quadrant over an enemy target array or terrain oriented control measure (TRPs or an EA). This technique allows the commander to control fires more precisely without additional control measures. Quadrants may be used in many different ways to refine focus, and aid in distribution. Here are three possible examples. The commander may use a quadrant as an enemy oriented technique by planning it on an enemy formation or position. As in fire patterns, the CO/TM must visualize the enemy target array, formation, or mob. A quadrant is mentally superimposed over the enemy target array, dividing it into four parts. Each platoon may be focused on one or more parts. See Figure 7.

The commander may also use quadrants as a terrain-oriented technique. By designating a TRP, and superimposing a quadrant over it, the commander can use a single TRP to delineate four separate areas. See Figure 8a.

Another terrain-oriented use of quadrants divides the EA, or further divides existing sections. This allows the commander to subdivide the existing regions of the EA without any additional control measures, and more precisely control fires within each area. In this method, we mentally superimpose a quadrant over existing EA regions, (i.e., area A1 is divided into four quadrants. The top right quad may be referred to as far-right, north-east, or quadrant II (Q2)). See Figure 8b.

The quadrants may be numbered, lettered, or colored, but to avoid confusion, should not use the same naming system as other fire control techniques (like dividing the EA). Additionally, the use of more than one technique that utilizes quadrants will confuse the CO/TM and should be avoided. Fire commands should include the quadrant as the location, and designate which platoons are responsible for which parts (e.g., Red, Q1; blue, Q2; white Q3 & 4).

Disadvantages of this method are that each platoon may see the EA differently from its section of the BP, and equal division of the quadrants may vary with each observer. To correct the observer angle problem, commanders may designate the orientation of a quadrant based on the enemy's direction of movement, or cardinal directions.

The techniques discussed above are only a sample of the numerous methods by which to focus, distribute and shift fires in the defense. They may be used individually, or in conjunction with one another. The commander should select techniques based on the factors of METT-T during development of the fire plan.

Example

Planning and Preparation

We will design a CO/TM fire plan using the procedures and techniques for fire control discussed above. For purposes of our example, we will use only primary positions and a primary engagement area. However in normal situations, alternate and supplementary positions and the appropriate EAs would also be considered.

The first step in building our fire plan is to conduct the commander's estimate, which will be abbreviated for this example. See Figure 9.

We are Team B, a Bradley infantry CO/TM. Our task within the task force mission is to defend from BP20, to retain the AOA that bypasses the TF main EA, and to deny the enemy use of it. We are a TF supporting effort. Two tank teams defend from BPs to our left rear (southwest) to destroy the MRR in the TF main EA, Swan.

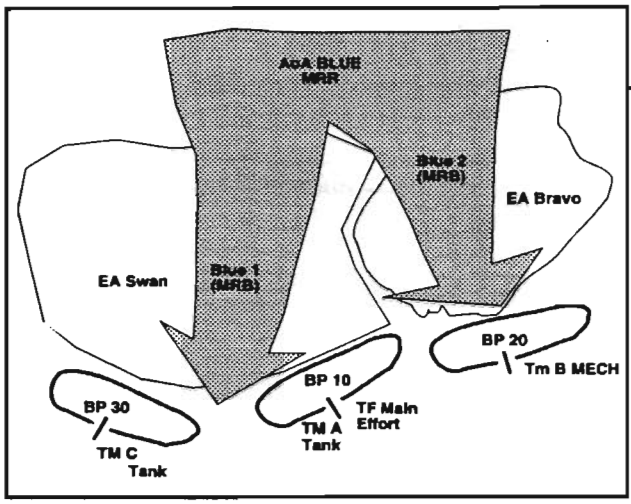


Figure 9. TF BPs, EAs, and enemy AOAs

Our mission analysis yields the following result:

- **Our task (the desired effect of our fires) is to allow us to retain BP20.**
- **Our purpose is to deny the enemy access to the AOA bshind BP20 so they cannot exit the TF sector without passing through EA Swan.**
- **To retain, we must destroy any enemy that threaten, or could threaten, our position.**
- **We do not have to destroy all enemy elements, just prevent them from bypassing. However, when possible, our fires should be used to assist the TF main effort by attritting enemy elements before they reach EA Swan.**

Analyzing the TF S2 products and conducting a thorough ground recon will clarify many of the details of terrain, particularly enemy avenues of approach. Driving the EA from the enemy side will help determine which AOA he will use and his most likely COA when he enters the EA. As a result of IPB, we determine:

- **We are facing an MRR with an objective to our rear (south). His desired route of march is through EA Swan.**
- **The MRR is T72- and BMP1-equipped.**
- **One mounted avenue of approach enters our sector (MRR size); two exit (MRB size).**
- **The enemy will travel at 20 kph.**
- **Each MRB will be at approximately 95 percent strength with approximately 9 tanks and 29 BMPs.**
- **He will attack 2 MRBs up, one back. His left MRB (east) will enter our EA in MRB battle, with MRCs in pre-battle. MRCs will transition to battle at 1500m.**
- **The MRB in our sector will attempt to suppress us with a firing line and allow the trail MRB to attack the flank of the tank team to our southwest.**
- **He will engage at 2500m with tanks.**

We look at our troops:

- **Third Platoon has 2 BFVs and 8 dismounts. First Platoon has 4 BFVs and 15 dismounts. Each mech platoon has four Dragon trackers. The tank platoon has 3 tanks. HQ has 1 BFV.**
- **All platoons have a full load of ammunition; ammunition for prestock is available.**
- **Our BFV crews are capable of hitting TOW targets at max range and 25mm at 2500m; the tank platoon can be expected to hit at 2500m.**

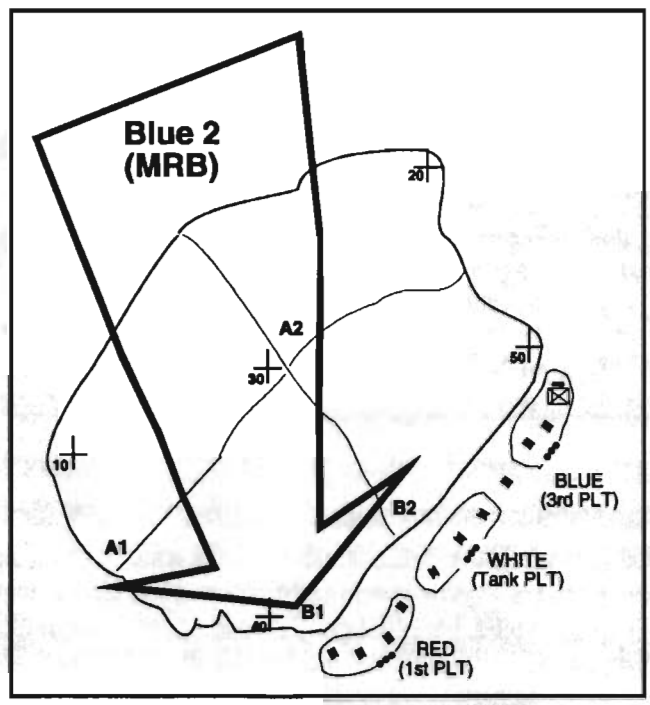


Figure 10. Platoon BPs and CO/TM EAs

- **As many as 14 TOWs can be fired before reloading.**
- **As many as 17 rounds per tank (51) can be fired from the ready rack, then they will have to get rounds from the semi ready rack;**
- **Each BFV has 300 rounds uploaded (all AP). After 300 rounds BFVs must reload.**

Time:

- **We will have 7 minutes to engage enemy as they cross my EA.**
- **Scouts are in position to report the enemy's formation and direction 15 minutes prior to the enemy reaching our EA.**
- **There will not be time to reload tank ready racks and BFVs between first and second echelon battalions if both are committed into our sector;**

Considering these factors, we select a COA to defend from the flank of the EA with BFVs on the flanks and tanks in the middle. All dismounted infantry will be assigned to one platoon to defend our right flank. Platoons are assigned the following missions:

- **The tank platoon (main effort) defends from the center platoon BP to destroy enemy tanks and BMPs within range of the BP.**
- **The north-east BFV platoon defends to retain, in order to deny access to the flank of our BP.**
- **The south-west BFV platoon defends to destroy enemy tank platoons to prevent them from advancing within range of the BP.**

Once platoon missions are determined, the missions are assigned to platoons. Since Third Platoon has only 2 BFVs, they are assigned the retain mission and all dismounted infantry attached. The other two platoons are assigned the remaining missions. See Figure 10.

We assume that our plan will generally work as developed, although we will build

flexibility through course of action analysis (wargaming) in the event of a change in the situation. Certainly, we cannot plan for every possible contingency, but we can plan for many of them. By seizing the initiative from the enemy, keeping him under simultaneous threats and accurate fire, we force him to fight on our terms and limit the number of options open to him. Problems arise when the commander fails to plan for contingencies, because he never wargames the enemy courses of action against his own. This is the best way to get surprised.

Before we decide how we will control our fires, we must figure out how we will use our fires. To do this, we must answer the questions from the process discussed earlier:

- **Our mission is to retain to deny a bypass.**
- **The enemy (1 MRB) will enter our EA from the north in pre-battle formation.**
- **His tanks will lead, followed by BMPs.**
- **We will kill him in the EA selected during our ground recon.**
- **We will engage him from high ground on his front left flank.**
- **We plan to destroy enemy tanks initially from our max range, before we are within their range. We want to use TOWs to accomplish this. Once we have destroyed all or most of his tanks, we then plan to concentrate on BMPs, and finally, other vehicles.**
- **Once the enemy tanks are destroyed, or when they are within 2500m, our tanks will engage with main gun, and BFVs will switch to 25mm.**

With the general fire plan designed, we must utilize the tools and techniques that allow us to control our fires, (distribute, focus and shift our fires):

- **We will initiate TOW fires with a CO/TM fire command (back up is when two tank platoons cross the max engagement line); tank and 25mm fires will initiate at their max engagement line.**
- **Having considered the way we believe the enemy will attack and our available techniques, we decide initially to distribute fires based on formations.**
- **When formations are no longer recognizable, we will use CO/TM pattern firing (because we believe the enemy will stay tight even when attritted). Tanks will take near targets, and BFV platoons far corners.**
- **We will perform final destruction of the enemy by using the closest TRPs.**
- **If a new force (a second MRB) enters our EA, we will use formations in the second echelon to engage with TOW from one or both BFV platoons, while tanks (and a BFV platoon) complete destruction of the initial elements.**
- **Platoons will keep a constant volume of fire on their target area and cross talk if they can't cover it adequately. The commander will direct platoons to shift as the situation dictates.**
- **The commander will position himself between the third BFV and tank platoons to assist the Third Platoon and control the battle.**
- **If the enemy orients and delivers effective fire on our position, we will shift fires of tanks, then Third Platoon to that area.**

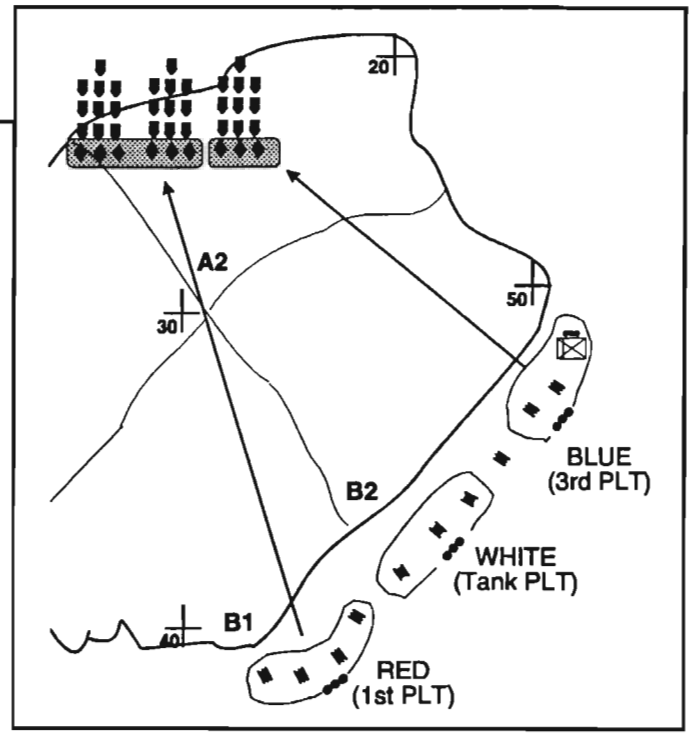


Figure 11. BFV Platoon Engages Enemy Tanks

Having completed our estimate, and performed our recon, we have the basis of our fire plan. Our next step is laying out and defining our EA. We will assume that we have begun standard preparation of our battle position IAW FM 71-1, chapter 4. Laying out the EA is important to the fire plan because it is during this step that the commander determines exactly where he plans to kill the enemy, where he will kill him from, and the control measures he will use to control his fires. For our example, we lay out our EA as in Figure 10.

We divide our EA with A1 and A2 as a TOW EA, and B1 and B2 as a 25mm and tank main gun EA. We delineate the areas of the EA and our max engagement lines using TRPs 10-50. Platoon leaders accompany the commander while he is reconning and building the EA. While in the EA, the commander should issue a detailed WARNO explaining the enemy situation and his fire plan. He should point out general platoon locations, providing the platoon leader latitude in positioning his vehicles. Completing this step with leaders present allows platoons to begin a parallel planning process, even before the OPORD. They already know platoon and CO/TM missions, the enemy situation, and the scheme of maneuver. This should enable them to prepare positions before the OPORD. The OPORD is issued when time permits.

When the OPORD is issued, the commander clearly conveys his visualization of the battle, explaining how the enemy will enter the EA, and how he will be engaged from start to finish. Using visual aids like a sand table, or a blow-up diagram, will help platoons clearly understand how to distribute and focus their fires.

Platoons position their vehicles in order to maximize their ability to hit

all areas of the EA. Survivability positions and other preparation are completed IAW the priority of work.

Obstacles are physically sited in the EA after the initial fire plan is developed. The location, type and composition of an obstacle is predicated on the desired effects of fires from the CO/TM. **Obstacles must be emplaced to enhance the desired effect of the CO/TM's fires.** They should never be placed in the EA, and then fires adapted to fit the obstacles. Siting obstacles in this way ensures they are fully integrated to support the scheme of maneuver and the CO/TM fire plan.

Squads, crews, and platoons make range cards and sector sketches. Platoon sector sketches are provided to the commander so he can verify the platoon's ability to hit and to transcribe data to the company fire plan. If there is time, the commander should personally inspect each vehicle position and verify its ability to hit the EA according to the fire plan. **Although a CO/TM fire plan can be sketched out on a piece of paper, the piece of paper is not a fire plan in and of itself.** If one is produced, it is the end result of the process that explains how the CO/TM is actually going to execute the fire plan of this unique mission. It is not an SOP diagram.

TF and CO/TM rehearsals are conducted IAW unit SOP. The commander goes to the TF rehearsal prepared to discuss his fire plan. If conducted on the ground, TRPs for the TF and CO/TMs are pointed out; if on a sandtable or terrain model, all CO/TM TRPs are emplaced on the model. In either rehearsal, fire plans for each CO/TM are discussed, and deconflicted by the TF S3 or commander. Adjustments are made as necessary. The TF or CO/TM conducts a drive-through rehearsal of the EA with all leaders in the positions from which they expect to fight the battle. Leaders rehearse exercising command and control, distributing, focusing, and shifting fires. Platoons rehearse the same areas and verify that weapons can hit targets in the EA according to the plan. Adjustments to the plan are made as necessary.

Preparation of the battle position is continued until the enemy is within artillery range.

Execution

We receive spot reports from the TF that the enemy is moving, and expected in one hour at EA Swan. We will be within artillery range in thirty minutes. Artillery prep of our positions begins; a non-persistent chemical agent is delivered with the artillery; 256 kits are initiated. Fifteen minutes later, scouts report that the enemy is approaching the TF sector, (2 MRBs up, 1 rear; MRBs are in column). Spot reports are passed to platoons. Ten minutes later scouts report lead MRBs transitioning to MRB prebattle (MRCs abreast in column). Spot reports are passed to platoons; The commander confirms the IPB from the plan. Second 256 kits read "all clear," and the TF commander authorizes unmasking procedures. Five minutes later, the CO/TM observes dust clouds to the north of EA, scouts report MRCs changing to pre-battle.

Commander issues initial fire command, *"Red, Blue, Black 6; MRB in pre-battle entering EA-A; simultaneous fire-TOW; Red left 2 tank platoons, Blue right tank platoon; at my command; standby!"* Platoons issue platoon fire commands to focus weapons to individual vehicles. The MRB enters the EA in pre-battle. See Figure 11. When the tank platoons are across the maximum engagement line by 400 meters, the commander issues the command, *"Red, Blue Fire!"*

BFV platoons engage with TOW. The team commander attempts to identify and engage the enemy commander's tank and then assists Third Platoon. Platoons initiate fire;

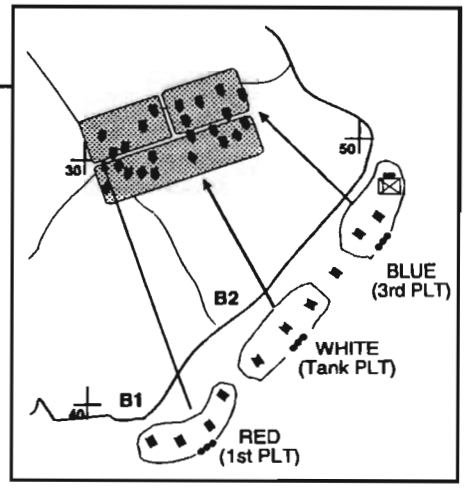


Figure 12. Platoons Engage Using Fire Patterns as Enemy Crosses 120mm/25mm MEL.

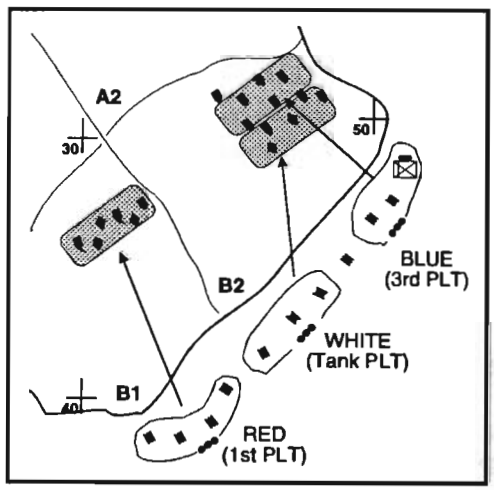


Figure 13. Red's Fires Shifted to B1.

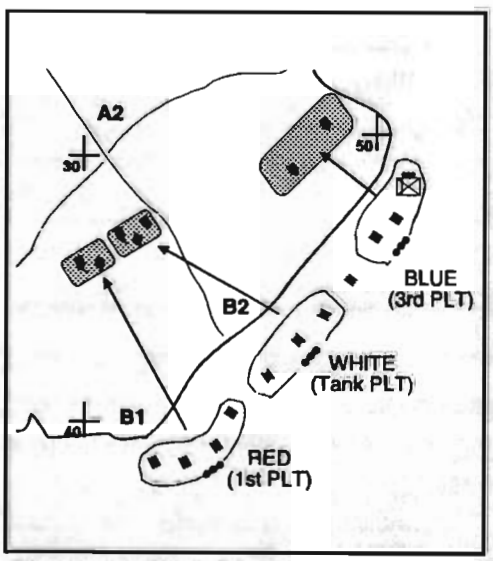


Figure 14. Tank Platoon Fires Shift to Assist Red.

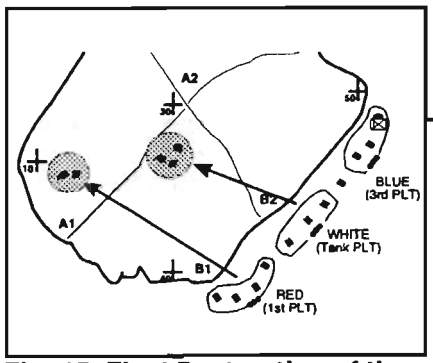


Fig. 15. Final Destruction of the Enemy using Closest TRP.

several enemy tanks are destroyed. The MRB continues to move. More enemy tanks are destroyed, and the enemy's formation begins to lose its identity. The MRB nears EA B1 and B2. The commander issues his next fire command:

"Guidons, Black 6; simultaneous fire-sabot, White near-half, Red far-left, Blue far-right; at your command; out!" Platoons know they may issue the command to fire when the enemy target array crosses the maximum engagement line between areas A and B. Platoons issue fire commands and begin engaging as the enemy crosses into area B. See Figure 12.

At 2000m, the MRB establishes a firing line with the left MRC, while the right two MRCs turn towards Third Platoon and continue to assault. The commander issues the command,

"Guidons, shift fire, Red left MRC, B1; White near-half, right MRCs, B2; Blue far-half; fire!" Platoons engage. See Figure 13.

At 1000m the remnants of the right two MRCs begin to assault. Combined fires of tanks and Third Platoon heavily attrit the assaulting MRCs, now within range of dismounted weapons. All enemy tanks are destroyed. The commander shifts the fires of the tank platoon to assist First Platoon while Third and dismounts destroy remnants of assaulting MRCs, *"Guidons, Black 6; shift fire; Blue B2; White, MRC in B1, tanks and right half; Red, left-half; fire."* The combined fires of the CO/TM destroy most of the remaining elements. See Figure 14.

Final destruction is accomplished by using the closest TRP method (see Figure 15), *"Red, White, Black 6; White, 3 vehicles 1000m southwest of TRP 30; Red, 2 vehicles 700m southeast of TRP 10."*

After completing the destruction of the MRB, the CO/TM requests instructions for the TF commander, and consolidates and reorganizes IAW unit SOP.

This concludes the discussion of a defensive fire plan and its execution. In this example, we make several assumptions: The example considers a T72- and BMP1-equipped MRR. BMP1s have a 73-mm gun and AT3 missiles (slow and inaccurate under fire, with a 3000m range) and, therefore, considerably less dangerous than tanks. The T72s in our example were not equipped with reactive armor and, therefore, can be destroyed by TOW. Had we been fighting BMP2s with AT5s, they would perhaps have been the most dangerous target at long range; if fighting tanks with reactive armor, the TOWs could not have been used with great reliability, and the plan would have had to support tanks destroying the T72s.

Additionally, in this example, we make the assumption that engagement priorities are not an effective method to control fires unless the vehicles can be clearly identified. Beyond 2000m, the only reliable way to identify vehicle type is by position in the formation. At 2000m and closer, engagement priorities and target assignment based on vehicle type may be effective, depending on level of crew training and other factors.

Each situation is different. This example is used to demonstrate the procedure used to develop a defensive fire plan and discuss some of the techniques available to control fires.

The authors will take up the development of the offensive fire plan in the next issue of ARMOR. - Ed.

Notes

[1]Distinguished Crew firing data extrapolated from CAT competition data. Average tank crew firing data is based on a sample of 1000 tank crews firing on TT VIII on Range 117 at Grafenwoehr.

Major Derek Miller is currently a student at CGSC. He graduated from USMA in 1982. He served his first tour in Germany with the 1-16th Infantry as a rifle platoon leader, scout platoon leader, and support platoon leader. Following IOAC, he served at Ft. Stewart, Ga., from 1986 to 1991, where he commanded a Bradley Infantry company and an HHC. Following DESERT SHIELD/STORM, he served for two years as an observer/controller on the Mechanized Infantry TF Trainer Team at the National Training Center.

Captain Richard Averna is currently an observer/controller on the TF Live Fire Combat Training Team at the National Training Center. He received his commission as an Infantry Officer from the New Mexico Military Institute and a BA from the University of Nebraska. He served in Germany with 4-41st Infantry (M2), 2d AD (FWD) as a rifle platoon leader and asst. S3. He commanded a Bradley Infantry company in 2-7th Infantry, 24th ID (Mech) during both Operations DESERT SHIELD and STORM.

Armor Pioneer Series - General William A. Knowlton

All He Ever Wanted to Be Was a Soldier

by Lieutenant Colonel Kevin Kelley

General Knowlton, when he was CG of NATO forces in Turkey.

In 1942, Cadet Knowlton (on the turret with fur collar) spends his spring leave with several West Point classmates at Pine Camp, N.Y., where the 4th Armored Division was training.

When one thinks of the pioneers of armor, names like Chaffee, Van Voorhis, and Patton frequently come to mind. However, another generation of officers, those who were the lieutenants of the fledgling armored forces during World War II, were, in a sense, the second generation pioneers of armor. They employed the early versions of iron horses in combat at the soldier level. Over the course of their careers, they forged the development of armor and armor tactics from rudimentary combat cars to the modern M1 tank.

This article will trace the career of one of these second generation pioneers of armor, William A. Knowlton.

For Knowlton, being a soldier was all he ever wanted to do. The Weston, Massachusetts, native gained his first Army experience at the age of 14. In the summer of 1934, he participated in recruit training with B Troop of the 3rd Cavalry in Vermont.

Knowlton recollected, "I would hang around watching the troopers work out and eventually they invited me to train with them. They issued me a horse and they had me doing basic horsemanship and cavalry training with them. Some of the troopers were veterans of World War I, and they were very good to us."

The following summer, Knowlton joined the 51st Field Artillery in the 26th Infantry Division as an underage private and participated in the Grand Maneuvers of Pine Camp, New York.

In 1938, after graduating with academic honors from St. Mark's School in Southborough, Massachusetts, Knowlton enlisted in the 298th Infantry in Hawaii and went to the Military Academy Prep School. At that time, the West Point Prep School was not one school but a series of schools in each Army area.

Knowlton recalled training with the 11th Tank Company on Oahu that year. "I gained a little experience with those old tanks where you wedged yourself up into the turret. You reached down to kick the driver in the head if you wanted to go faster. You put your foot in his back if you wanted to stop, kicked him in the right shoulder if you wanted to turn. When the turret turned, you had to adjust your whole position and move around and try to wedge your feet into some of the ammunition boxes to hold yourself up."

Knowlton entered West Point in 1939 with the intent of going into artillery. But armor had just arrived on the battlefield in a big way. The ex-

ploits of Rommel and German Armor led to a tremendous interest in armor on the part of West Point cadets.

In 1942, Cadet Knowlton volunteered to spend his Spring leave with several of his West Point classmates with the 4th Armored Division at Pine Camp, New York. While there, Knowlton was impressed with two young majors, one named Creighton Abrams and another named Delk Oden, who commanded battalions at the time.

"They gave us a jeep and had a lieutenant assigned to work with us. I remember getting into long discussions with Abrams and Oden about the Army and Armor." Knowlton recalled. "The units had medium tanks. I believe they were early versions of the M-4."

Through this training and the favorable impression of leaders like Abrams and Oden, Knowlton was convinced he wanted to join the mounted forces. He particularly wanted to go into light armor and reconnaissance. That summer (1942), he and two classmates spent several weeks as platoon leaders in the 77th Recon Troop at Fort Jackson, S.C., further influencing him toward reconnaissance.

The class of 1943 was accelerated to graduate in January instead of the traditional June week. Knowlton was graduated seventh in overall class ranking, fourth among the ground forces graduates. The top three ground forces graduates selected the engineer branch. Although there was no armor branch at the time, Knowlton took the first and only slot in the cavalry armored force that was offered to his class. His other classmates who wanted to join the mechanized forces had to choose from the ten armored infantry slots offered.

By virtue of his class rank, Knowlton was also able to choose his division of assignment. He selected the 7th Armored Division because it was training in the California desert at the time, preparing to deploy to Europe.

Lieutenant Knowlton reported in to 1/40th Armor in early May 1943 at the Desert Training Center. Knowlton remembered clearly the "officer professional development program" his battalion commander prepared for him as he arrived in the unit. Lieutenant Colonel Ed McConnell, whom Knowlton described as an officer of great intellect and an ability to outsmart the enemy beyond anyone he ever met, called the new lieutenant into his office and said, "You are going to take off those bars and I'm going to put you in the motor pool pulling engines in and out of tanks. You'll be under a T-4 (a soldier of rank equal to what is now a specialist) and he will train you."

In the summer of 1942, Cadet Knowlton was an acting platoon leader with the 77th Reconnaissance Troop at Fort Jackson, S.C.

Knowlton was deflated. He felt he had worked hard to earn those bars and now he was told to remove them and become subordinate to a young enlisted man. He spent the next two weeks pulling engines from M2 tanks, tearing them apart, reassembling them, and putting them back in the tanks.

LTC McConnell then gave his fresh West Pointer a new assignment. McConnell said, "OK, now I'm going to give you three officers, all of whom outrank you, and all of whom I'm having difficulty with. You're in charge of them and I want you to have them pull engines in and out of tanks for a week or two." Again Knowlton complied and worked with the recalcitrant officers.

Feeling that his new officer had "earned" a platoon, LTC McConnell told Knowlton he was giving him a tank platoon.

"There are five diesel light tanks in this division," McConnell said. "Nobody can make them run. That is now your platoon. It's Thursday, I want to see you Monday going out the gate with us when we leave on maneuvers.

Knowlton responded, "Sir, I don't have any soldiers."

McConnell told Knowlton, "Look out the window. Out there you have a platoon. Some of them are good soldiers; some of them are great troublemakers; one is the regimental barber who has claustrophobia and can't stand it in tanks. It's quite a collection, but I expect you to do great things with them."

Knowlton then asked, "Where are the five tanks?"

McConnell answered, "I don't know. They've been abandoned somewhere in the desert. Find them!"

When he got all the tanks recovered, young Lieutenant Knowlton realized why his commander had him do all that maintenance training. The first thing he had to do was pull the engines out and blow all the sand from the gearshift plates and put them back

together again. These were the only M2 tanks with diesel engines in the battalion; the rest were gasoline models, and this presented the young officer with unique challenges to get the tanks up and running. By Monday morning, Lieutenant Knowlton and his platoon were out on maneuvers with the battalion.

Lieutenant Knowlton was reassigned to the reconnaissance company as the division moved to Fort Benning in August. On June 6, 1944, the 7th Armored Division set sail from the states for England, just as the invasion of Normandy was getting under way.

Once the Seventh Armored Division arrived in England, his unit drew equipment and commenced training on the Salisbury Plain. In August 1944, they landed at Normandy and joined Patton's Third Army. Knowlton fought with the Seventh across Europe from Normandy to the Baltic Sea.

Knowlton's most famous achievement in the war came in May 1945 shortly before V-E Day. He was called to report to combat command headquarters in Ludwigslust and given these orders. "Take your troops and contact the Russians. They are somewhere to the east, between 50 and 100 miles, according to rumor. Get someone from their staff and bring him here. The German 12th Army lies between you and the Russians. If you get into trouble, we can send you no help. Do not get too entangled, and keep us informed of your progress. Good luck."

Knowlton briefed his reconnaissance troop on the mission and set out with only 65 men on a 60-mile trek through German lines to make the first Allied contact with the Russian Forces North of Berlin. He approached the German positions with such boldness that they could only think he was the lead unit of a much larger force. He ordered German soldiers to throw down their weapons and surrender, and they would comply. The Germans could not imagine a force as small as Knowlton's could possibly operate independently. In this way, Lieutenant Knowlton bluffed his way through German positions, even fooling a German corps commander, disarming several hundred thousand German soldiers, and taking over three cities enroute to his historic link up with the Russians.

Lieutenant Knowlton, on the right, and members of B Co., 87th Cavalry, on a German hillside in 1945. They were waiting for artillery fire to lift before moving dismounted into a village.

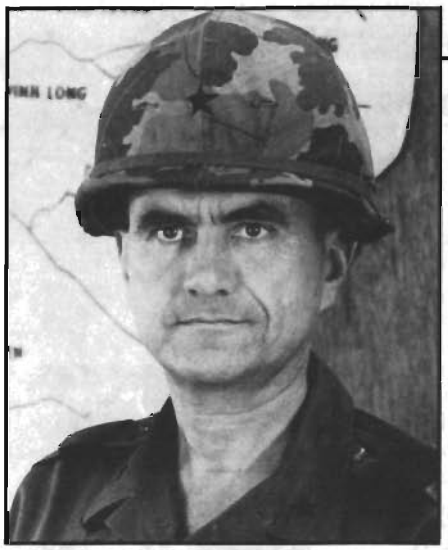
Knowlton was awarded the Silver Star for his heroic actions on this mission. The complete details of this daring dash across the Elbe to the Russian lines is recorded in the August 1945 *Reader's Digest* and was reprinted in the March-April 1989 issue of *ARMOR* Magazine.

In 1949, Captain Knowlton came to Fort Knox for the Armor Officer Advanced Course, and taught tactics at the Armor School for two months while awaiting an assignment to Yale for graduate school. But when hostilities in Korea flared, Knowlton was sent to Fort Sill to teach Armor tactics at the Artillery School. That assignment lasted only three months and he was called upon, by name, to serve on General Eisenhower's staff at Supreme Headquarters Allied Powers Europe.

In 1958, following an assignment as an associate professor at West Point, Lieutenant Colonel Knowlton was posted to Fort Meade to take command of the 1st Battalion, 3rd Armored Cavalry Regiment. This was the same unit he trained with in the summer of 1934 at the age of 14, 24 years earlier in Vermont.

When Knowlton arrived at Fort Meade, he recalled having a bunch of bright young West Point lieutenants in his unit. One was named Carl Vuono, who went on to become Chief of Staff of the Army; another was Dick Stevenson, an Army aviator who became a major general; and another was Tim Murchison, who became a highly decorated armored cavalry commander in Vietnam.

Following a tour as the military attache in Tunisia, Knowlton returned to



Seen at right as a brigadier general in Vietnam in 1968, General Knowlton was on General Westmoreland's staff and later commanded two brigades of the 9th ID in the Mekong Delta.
Below, he addresses troops of the Berlin Brigade.

Fort Knox in 1963 to command the First Armored Training Brigade. Knowlton's unit won the 2d Army maintenance inspection award.

"We were just getting the M60 tanks at the time so we had both M48s and M60s," Knowlton said. "We set up a program where the soldiers would prepare the tanks at their level for the maintenance inspection. Then I formed a team of about 35 sergeants to go through the tanks. Each sergeant was assigned to look at two or three of the common major deficiencies and he would check every tank for those deficiencies. After all the sergeants went through the tanks, we were ready."

In 1964, Knowlton went to work in the office of the Chief of Staff of the Army and, after a year there, was assigned to Secretary of Defense McNamara's office, replacing a lieutenant colonel named Al Haig who was moving on to the War College. After another year at the Pentagon, Colonel Knowlton "escaped" to Vietnam by way of a persistent volunteer statement.

Knowlton was promoted to Brigadier General in October 1966 and spent about a year and a half on General Westmoreland's staff working with the CORDS program. In 1968, he was named Commanding General of the 9th Division's two brigades in the Delta region of Vietnam. "One brigade rode in armored boats, and we tried armor tactics on the rivers down there," he recalls. Two more Silver Stars were awarded him in that period.

When General Westmoreland was named Chief of Staff, he brought Knowlton back to the Pentagon with him. Knowlton stayed there two years until Westmoreland named him, in 1970, to replace Lieutenant General Koster as Superintendent at West Point in the wake of the Mai Lai investigations.

Knowlton went on to become the Chief of Staff for European Command and later, the Commanding General of Allied Land Forces Southeast Europe. General Knowlton's final Army assignment was as the military representative to NATO's Military Committee. General Knowlton retired from the Army in June 1980, the senior armor officer on active duty at the time.

Since General Knowlton's retirement from the active army, he continues to serve the nation's industrial and military sectors. He has served on executive boards and as a consultant to a number of large corporations, and he continues to instruct at the National Defense University during the CAPSTONE course for newly appointed general officers.

General Knowlton is the Honorary Colonel of the 40th Armored Regiment and, in recognition of his lifelong contributions to the Armor Force, was awarded the prestigious Gold Medallion of the Order of Saint George at the 1988 Armor Conference.

Lieutenant Colonel Kevin T. Kelley was commissioned in Armor in 1976 from the U.S. Military Academy. A graduate of AOB, AOAC, and CGSC, he served as a tank platoon leader, scout platoon leader and company XO with 2-67 Armor; as C Co. commander and battalion opns officer, 1-32 Armor; as XO for 1-63 Armor (OPFOR), and as opns officer for 177th Separate Armored Brigade at the NTC; as asst. professor of Military Science at Ball State University in Muncie, Ind., where he earned a Masters Degree in Business Administration; and most recently, as Public Affairs Officer for the U.S. Army Armor Center. He currently commands, 5th Sqdn, 16th Cav at Ft. Knox.

LETTERS (Continued from Page 3)

when all they have to do is read some 20- to 30-year-old MTOEs and doctrine. This was a sound concept then and it still is.

A final note: From WWII up through the H-series TOE, Armor 2LTs assigned to armored cavalry were expected to command these combined arms platoons as a matter of routine. Is it surprising they have grown up to occupy a disproportionate share of the Army's general officer positions?

JAMES F. CRAWFORD
LTC, Aviation, USAR
Enterprise, Ala.

South Africa Armour Association

Dear Sir:

A long existing requirement for the establishment of an Armour Association was fulfilled during a founding meeting held in Bloemfontein, South Africa, on 30 April 1993.

The aim of the association is to be a voluntary organization of Armour soldiers, whether they be serving or ex-members. Persons eligible for membership shall be any man or woman, irrespective of race or color, who:

- Is or was a member of the SA Armoured Corps.
- Is or was a member of the SADF other than the SA Armoured Corps but who is or was attached to a unit of the Corps.
- Is or was a person involved in the SA arms industry in the public or private sector and was personally concerned with projects of importance and the SAAC and who shares the objectives of the Association.
- Is or was a member of the armoured corps of a foreign country which maintains friendly relations with South Africa.
- Is a prominent citizen regarded as "a friend of the SA Armoured Corps."

For more information contact: Secretary, Armour Association, c/o Directorate Armour, Private Bag X172, Pretoria, 0001, South Africa.

J. R. DUTTON
LTG, Retired
Chairman, Armour Association

Sees a Flaw In Contest Winner

Dear Sir:

When I opened the July-August edition of *ARMOR* and turned to page 7, I couldn't believe that the Armor School could make such a blunder. Your winning tank design has a major deficiency which makes it instantly obsolete even though the designer offers some excellent features. Most tankers will see this at first glance.

The world's terrain is not perfectly flat. Even on the prairies and farms, the land is full of undulations and irregularities where a good tank commander can move forward on the battlefield with minimum exposure until he has to face the enemy and fight. Then he moves carefully up the reverse slope of even the most minor terrain feature, DEPRESSING his main weapon until he can see the area in front of him through his sights and have full capability to engage the enemy. He must keep the tank hull in as much defilade as possible to make a minimum target without losing the effectiveness of the main armament.

The winning tank design has only the capability to depress the main armament 5 degrees from the horizontal. This will require the tank commander to expose his hull to enemy fire and probably require him to move down the forward slope to give him ability to see his battlefield by taking advantage of his capability to elevate the main armament 20 degrees. Howitzers do need the elevation capability to fire on targets from protected positions in the rear of the forward elements. It is axiomatic to say that the key design factor for a tank is the provision of at least 15 degrees depression from the horizontal for the main armament.

Right now I can hear Art Whitley screaming and kicking holes in the wall over this faux paux and he lives almost a thousand miles from me near El Paso, Texas. He was my partner in the Combat Vehicle Section of the Armor Board at Fort Knox in the early 50s. Back then, Ordnance actually built a tank that had zero degrees depression, which was completely worthless. We had to fight all the way to the Secretary of the Army to get it killed. (Didn't the Man say one time that he who doesn't study history is destined to make the same mistakes over and over?)

JOHN L. FELLOWS, JR.
Colonel, U.S. Army, Ret.
Monarch Beach, Calif.

Don't Forget the "Human Factor"

Dear Sir:

This letter is in response to your July-August tank design contest issue. I was both intrigued and delighted to see the innovation and sophistication of the entries for the next generation of main battle tanks. The rear-mounted turret of the first and second place winners seems a logical next step, as are many of other innovations, such as abandonment of the M2 submachinegun in favor of the MK-19 automatic grenade launcher. However, my concern lies in what I refer to as the "human factor."

First, survivability became a primary consideration during development of the M1 series. That concern has carried over to the proposed tank designs. Unfortunately, as we continue to emphasize survivability — such as by burying the crew deep in the recesses of an armored hull — we also force a greater dependence on electronics and gadgetry. I am sure secondary systems could be used to backup the virtual-reality based helmets used by the proposed tanks. But optics cannot completely take the place of visual scanning. The new tank designs do not address this point, nor do the pictures seem to include a heads-up capability.

Second, it was once thought optimal for a five-man crew to handle all the requisite duties assigned to tanking. This "Sherman-era" thinking was scaled back after World War II to a basic four-man crew. The proposed tanks all have either two- or three-man stations. Surely the designers of such grand projects have considered the complexities involved with such basic tanking endeavors as assembly area operations. The current four-man crew is barely sufficient to handle such duties. Reducing the number of able-bodied tankers by up to 50 percent must, of course, be followed by a similar reduction in the duties needed for assembly area operations. Such a reduction in requisite duties is unlikely. I suppose an option would be to place other crewmen in armored compartments on the tank and use them if an extra hand is needed. This may sound absurd, but no more so than asking a two-man crew to do what a four-man crew is hard-pressed to perform.

Notwithstanding these concerns, I look forward to the next generation of tanks. But I'd rather the above issues be taken into consideration before final design, lest we end up with after-the-fact shelf designs — such as the M1's Commander's Weapons Station.

STEPHEN J. SNYDER, Ph.D.
University of West Florida
2LT, C Co., 1st Bn., 131 Armor
Alabama Army National Guard

Problems with Winning Entries

Dear Sir:

I read with interest the articles on the tank contest over the last few months. I would have entered myself, given a little more time. I was, however, somewhat surprised at the first and second prize win-

ners. In the case of the former I note that there is no apparent method to aim the antiair/antihelo missile. There also appears to be a major problem with the autoloader mechanism. It appears that a section of the autoloader must be raised above the turret roof to extract a round from the magazine. If this is so, it would provide a visual signature to an enemy immediately after firing, even if the vehicle is turret down.

The second place vehicle amazed me for two reasons. The first was that you selected it with a major flaw, the second was that an engineering student designed it. The illustration shows the gun being several feet off the turret centerline. Even with my admittedly limited knowledge of engineering, I can imagine the enormous twisting force that would be generated by the firing of the 140-mm main gun. I recall reading horror stories about the M551 Sheridan firing conventional ammo causing injuries from torque as well as damage to the electronics. I also recall reading that there were problems with some cupolas that had side mounted M85 .50 caliber machine guns. I personally have never served in the military, but I do have some firearm experience and I cannot imagine how such a turret could be locked in place to prevent skewing under recoil. I would estimate that the recoil impulse from a APFSDS would be severe enough to shear the teeth from the ring gear of a normal turret. If the vehicle was firing on the move, the force might be severe enough to flip the tank.

I also have a request. I am currently volunteering my time to the Intrepid Sea, Air and Space Museum to restore an Iraqi T72M1 tank. This vehicle is on loan from the USMC. The T72 was repainted by the Marines at some point after its capture. Because we would like to restore and repaint it to the original Iraqi colors, I would be very interested in hearing from any personnel who came into contact with this vehicle before it was repainted. I would appreciate it if you could print a request for information in a coming issue so that it might reach such personnel.

This particular vehicle is a T72 M1 and has a few features that should help identify it to people who saw it. The rear turret stowage box is missing and presumed destroyed. Inside the turret, we have found the lid from that box and it has a semicircle area 'bitten' out of it. It shows signs of exposure to extreme heat as does the rear corner of the side turret stowage box. The antenna mount (which is located in that area) is also burned and melted. Another area of damage seems to have originated in the area of the laser rangefinder and traveled forward and crosswise to strike the main searchlight and gut it. This blast also shredded the canvas mantlet cover. This mark appears on the top of the turret as a roughly ladder pattern consisting of three slightly converging lines of pits approximately six inches apart. Between two of the rows there is a series of scrapes the full six inches wide and approximately one inch long. These marks terminate at the point where the curve of the turret drops away from the top level. The searchlight is slightly forward of this area and was pitted severely and smashed in two places — one above and the other below the level of the searchlight mount.

I also found what appears to be a 7.62-mm bullet hole in the lid of the side turret stowage box. I would be greatly interested in hearing the stories of the men involved in the capture and return of this vehicle. Any information about its original condition, especially any markings and what caused the damage would also interest me for my modeling.

It is my rough guess that the T72 was struck from the left rear by two explosive rounds. One struck something on top of the turret and caused the aforementioned scarring, and the second destroyed the stowage box and ignited some of the items stored on the vehicle.

I am a military buff who has been a civilian subscriber to *ARMOR* magazine for three years now and greatly appreciate reading the informative articles you publish.

KEVIN M. COYNE
Croton-on-Hudson, N.Y.

BUSTLE RACK (Continued from Page 38)

Prep School Offers "Chance of a Lifetime"

Soldiers chosen to attend the United States Military Academy Preparation School (USMAPS) at Fort Monmouth, New Jersey, receive 10 months of rigorous academic, military, and athletic training. About half of those soldiers earn appointments to the Military Academy at West Point, New York.

Of the 300 students who began the USMAPS Class of 1994 in July, 160 were Regular Army soldiers. The Prep School curriculum is designed to prepare them for appointments to and success at the Military Academy.

Primary emphasis is on academics (English and math), mixed with military training, physical conditioning, and the development of leadership traits and ethics. While the main focus is on preparation for passing the entrance exams for West Point, the course is also designed to prepare students to meet the rigors of cadet life. Students gain valuable leadership experience serving in the student chain-of-command, participating in one of 16 varsity sports or intramurals, conducting peer evaluations, training in military drill, and a variety of other experiences that follow the model that cadets undergo at West Point.

Since 1916, USMAPS has provided a stepping stone to West Point for thousands of enlisted men and women. Its distinguished lineage of graduates includes 64 general officers, Rhodes Scholars, and decorated veterans of four wars.

In terms of education, it is a "chance of a lifetime," comparable to Officer Candidate School, Warrant Officer Candidate School, and the Green-to-Gold program, but without any previous college-work requirements.

Training the Army's enlisted people to become West Point cadets and future officers, the Prep School route provides the Army with a pool of experienced soldiers as leaders. The only way by which many of the enlisted soldiers can survive at West Point is if they have the one extra year of preparation at USMAPS. And the only way for a majority of the soldiers to know about the program is through their troop-level leaders.

If you know of a quality young soldier, make him or her aware of this opportunity. A troop leader who recognizes special traits in a soldier and then acts to assure that the soldier competes for admission to USMAPS leaves a very valuable legacy — one that benefits both the soldier and the nation's future force structure.

To be eligible for USMAPS, a soldier must be a United States citizen or able to become one prior to entering the Military Academy; single with no legal obligation to support a child or children; a high school graduate or GED equivalent; medically qualified for admission to the Military Academy, with vision correctable to 20/20 with glasses; of high moral character, with no military or felony conviction or history of drug or alcohol abuse.

Further information can be obtained by writing the Commandant, USMAPS, Fort Monmouth, NJ 07703, or by calling DSN 992-1807/1808 or commercial (908) 532-1807/1808.

BOOKS

A Survey of Trouble Spots Emerging in a Multipolar World

Future Wars: The World's Most Dangerous Flashpoints by Colonel Trevor N. Dupuy, Retired. Warner Books, 1993. $21.95.

This is an interesting survey of the potential for trouble in the '90s. The ten scenarios presented are plausible and well thought out. From the India/Pakistan crisis that nearly became a shooting war to the threats of a resurgent North Korea, the situations are the stuff of our daily headlines.

If this type of book has a limitation, it is that it is always the war we least expect that creeps up on us. Interestingly, Dupuy does not postulate a widening of the Bosnian Civil War. He does catalogue the "usual suspects," the Arabs and Israelis, the Indians and Pakistanis, a civil war in Russia, South Africa, Iran and Iraq, Korea, Central America, Hungary and Rumania, Libya and Egypt, and the Chinese and the Russians. All of these possibilities share the danger of the use of weapons of mass destruction, either nuclear or chemical.

One of the primary strengths of the book is Dupuy's brief historical and geographical survey to set the background for his fictional political and military events. If nothing else, these provide a broad survey suggesting the inherent dangers in the multipolar world we now live in.

Dupuy takes the opportunity to once again revisit his theories of numerical and statistical predictability in combat, already familiar to readers of his earlier works. There are benefits and dangers in his system. The benefits are found in the idea of quantifying combat power and ratios of force. The dangers are an overconcentration on the hardware and too little attention to the software — doctrine, training, morale, and leadership.

This is an interesting book if your field of view is the geopolitical future and the operational level of war. If, however, you are fascinated by the tactical level of war and the gritty details of modern combat, you may not find enough meat here for your taste.

SFC JOHN T. BROOM
U.S. Army Armor School
Ft. Knox, Ky.

We Were Soldiers Once...And Young by LTG Harold G. Moore (Ret.) and Joseph L. Galloway, Random House, New York, 1992, 412 pages, $25.00.

I really did not cry as I read this book. I admit my throat tightened and eyes watered, but that must have been due to the reading lamp. This is a gut-wrenching tale of battle and courage. This book is a monument to the 305 brave men that fought and died in the la Drang Valley in 1965. LTG Moore, who commanded the 1st Battalion, 7th Cavalry during the fight, and Mr. Galloway, the only reporter on the ground during the fight, wrote a personal tribute to the soldiers they knew and loved. The authors bring us the story of the preparation for battle, the battle itself, and the aftermath of the battle.

The preparation for this battle is part of a larger story — the development of the 1st Cavalry Division (Airmobile). The 1st Air Cav entered the war in Vietnam and the battle in the la Drang as a proud unit. Moore tells us, he writes as the narrator, about the training, the people, and the leaders in the Air Cav. This unit was prepared for the war and to meet the enemy. Moore's battalion, a microcosm of the division, was filled with: OCS, ROTC, and West Point officers; long-service sergeants; and draftees. These soldiers were welded together by tough training and became a unit. This was the unit that Moore took into LZ X-Ray.

The battle at LZ X-Ray is described in intense detail. Moore and Galloway conducted hours of interviews with members of the unit. The two even visited Vietnam and talked with surviving members of the NVA units they faced on the battlefield. The view of both sides adds to the poignancy of this book. The detailed accounts of courage and valor are amazing. No one can ever doubt the gallantry of American arms. The acts of valor were supported by acts of leadership, also described in detail in the chapters on LZ X-Ray. Leadership and valor were also in evidence during the other battle in the la Drang Valley — LZ Albany.

The battle at LZ Albany was grim. The descriptions of the fight are dark and foreboding. The acts of valor and leadership in this fight were no less heroic than the one performed at X-Ray, but at this fight the battle was a draw. The American force was nearly defeated in detail during a meeting engagement. The efforts of the unit's leaders and men saved the unit, but at a tremendous cost. Albany was a killing ground. The NVA learned to "hug" American forces, that is get inside the danger close range of American supporting arms. The fighting at Albany was hand to hand. I turned the pages of these chapters rapidly, I could not put the book down.

Equally enthralling were the chapters on the families that bore the pain of the loss of loved ones. Moore and Galloway propose a medal for valor for the families that lose fathers, sons, daughters, etc. on the altar of freedom. The gathering of friends and veterans proved a means to sustain the victors of the la Drang. These men meet, talk, and share their lives. The NVA survivors also meet and talk in the cafes of Hanoi. The dust has settled on the Vietnam War and the differences between the warriors are now less distinct.

That the differences are less distinct is, perhaps, the reason this book was written. The authors wrote in the Prologue:

We knew what Vietnam had been like, and how we looked and acted and talked and smelled. No one in America did. Hollywood got it wrong every damned time, whetting twisted political knives on the bones of our dead brothers.

The book is a testament and a tribute to the living and the dead, not only of the Ia Drang but also of Vietnam. Buy this book and read it over and over. We who serve now, and those that follow us must never forget the men that served before us. This is a powerful book on leadership and valor.

KEVIN C.M. BENSON
MAJ, Armor
Fort Bragg, N.C.

Riviera to the Rhine by Jeffrey J. Clarke and Robert Ross Smith, U.S. Army Center of Military History, 1993 (from the series *U.S. Army in World War II*), Washington, D.C., 605 pages.

Concentrating on "Operation ANVIL," Jeffrey Clarke and Robert Smith have described the Allied drive from Marseille to Strasbourg and the Colmar Pocket. The narrative crackles with vivid descriptions of the hits, misses, hard knocks, and hard-won victories of countless soldiers, while also suggesting lost opportunities that might have accelerated the end of the war.

The first month went well, with ANVIL forces linking up with the Normandy invaders in mid-September. The American VI and XV Corps and the French II Corps then experienced greater difficulty as they advanced toward the Meurthe River. The story of the "lost battalion" of the 141st Infantry Regiment on Hill 645, in late October, with only one soldier finally reaching American lines, showed how the ANVIL force gained combat experience the hard (and painful) way.

In the November push (Operation DOGFACE) through the Vosges mountains, General Wade Haislip, trained in armor, led three infantry divisions to the town of Saverne, through which ran the highway leading to the Rhine fortress of Strasbourg. General Jean de Lattre de Tassigny's 2d Armored Division then liberated the city itself. On the eve of the Battle of the Bulge (December 1944), the Colmar Pocket loomed between the Allies and the Rhine — more a festering sore than a salient, not quite ready for the taking. Only in January 1945 was the Colmar Pocket finally taken. The story of the "quick fix" by engineers at Maison Rouge in Colmar, after a bridge collapsed under the weight of a tank, and the heroism of 2LT Audie Murphy when he fired on enemy tanks from a crippled tank destroyer, symbolized how far the 6th Army Group had come in combat readiness over the previous six months.

Clarke and Smith have shown how the 6th Army Group was poised to traverse the Rhine by 20 November 1944 — four months before Allied forces to their north finally made the crossing. However, as the Battle of the Bulge opened, LTG Alexander Patch's Seventh Army was summoned north to support Patton's Third Army. Perhaps, as suggested here, the 6th Army Group lost the opportunity to be first across the Rhine.

Clarke and Smith have composed a worthy finale to the World War II "Green Book" series. The virtues of the work are at least twofold: an often neglected phase of the invasion of France is revived; and the French organizational duplication of the American "Triangular" division overcame cultural and linguistic differences between the two armed forces.

JOHN CRANSTON
Armor Center Historian
Ft. Knox, Ky.

Lee's Terrible Swift Sword: From Antietam to Chancellorsville by Richard Wheeler. Harper Collins Publishers, Inc., New York, 1992, 430 pages, $14.00 (paper).

Lee's Terrible Swift Sword is the tenth book on the American Civil War by Richard Wheeler. Written as an "eyewitness history," it covers the Civil War period from July 1862 to May 1863, through the distinctive battles of Antietam, Fredericksburg, and Chancellorsville. Wheeler has done a marvelous job with the "eyewitness" theme, using it with skill and flair.

Richard Wheeler is a prolific historian, author of 15 books, ten on the Civil War, three on the U.S. Marine Corps, one on the American Revolution and one on pirates. His use of the "eyewitness" theme in *Lee's Terrible Swift Sword* produces a graphic, poignant, "felt" experience about the most significant war in our history. This book is filled with the personal glimpses and revelations of soldiers, civilians, and correspondents, drawn from newspaper accounts, journals, and memoirs. Tightly woven with the author's narrative, *Lees' Terrible Swift Sword* is insightful, exciting and thought-provoking.

While the foundation of the book is on the battles of Antietam, Fredericksburg, and Chancellorsville, much of its focus is on the general officers of both sides: Lee, Stuart, and Jackson performing brilliantly for the Confederates and McClellan, Burnside, and Hooker performing boorishly for the Union. Antietam was Lee's first invasion of the North, into Maryland. The battle provided horrific casualties, but no clear victor, despite McClellan's claims. McClellan is sacked by President Lincoln and replaced by General Ambrose Burnside who promptly leads the Army of the Potomac into a crushing defeat at Fredericksburg. Burnside is then sacked and replaced by General Joe Hooker, who quickly hurls the Union Army into another debacle at Chancellorsville. These three battles are particularly important because they laid the groundwork for Lee's second invasion of the North in June 1863, ending at the Confederates' high water mark — Gettysburg.

Through the eyewitness accounts, General Lee is portrayed as a compassionate, intense, and brilliant commander, "a great man and a true gentleman." General Stuart was a fearless cavalryman with "a weakness for the vanities of the military parade." "Stonewall" Jackson was probably Lee's best general, honorable, pious, stalwart, and humorless — "I like liquor, the taste and the effect — that's why I don't drink it." Jackson's men coveted his attention so much that even a dressing down by the general was cause for boasting.

The Union generals, on the contrary, were well-intended but inept. McClellan was adored by his men and fired by Lincoln for "not what he had done, but what he was about to do," which in Lincoln's eye was nothing. General Burnside was brave, but unimaginative, stubborn and without vision. And General Hooker was a great planner and terrible executor, indecisive and uncertain. Hooker's attack on Lee at Chancellorsville began "as a thunderbolt from Mars, ended as impotently as a baby's rattle." The Union generals made their soldiers "heroes of many defeats."

Amidst the horrors of war, Wheeler has found stories of genuine humor among his eyewitnesses. One is of a badly wounded Yankee who jokes that he must look like he had been "to an Irish wedding!" Another is the "fog of war" story of a Union corporal who, one dark night, single-handedly captured an entire Union infantry company!

Lee's Terrible Swift Sword is a Civil War treasure. It is well-written, richly supplemented with period drawings and numerous maps. If Wheeler's other Civil War books are this good, then I will read them all and heartily recommend them, too.

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Neat Idea: A Portable Boresight Panel

by Captain Bart Howard

The key to putting steel on target is disciplined, accurate boresighting. Nothing new here. As tankers, we've proved that time and time again — on the gunnery ranges of Grafenwoehr, Clabber Creek and the sands of Kuwait and Iraq.

The Problem

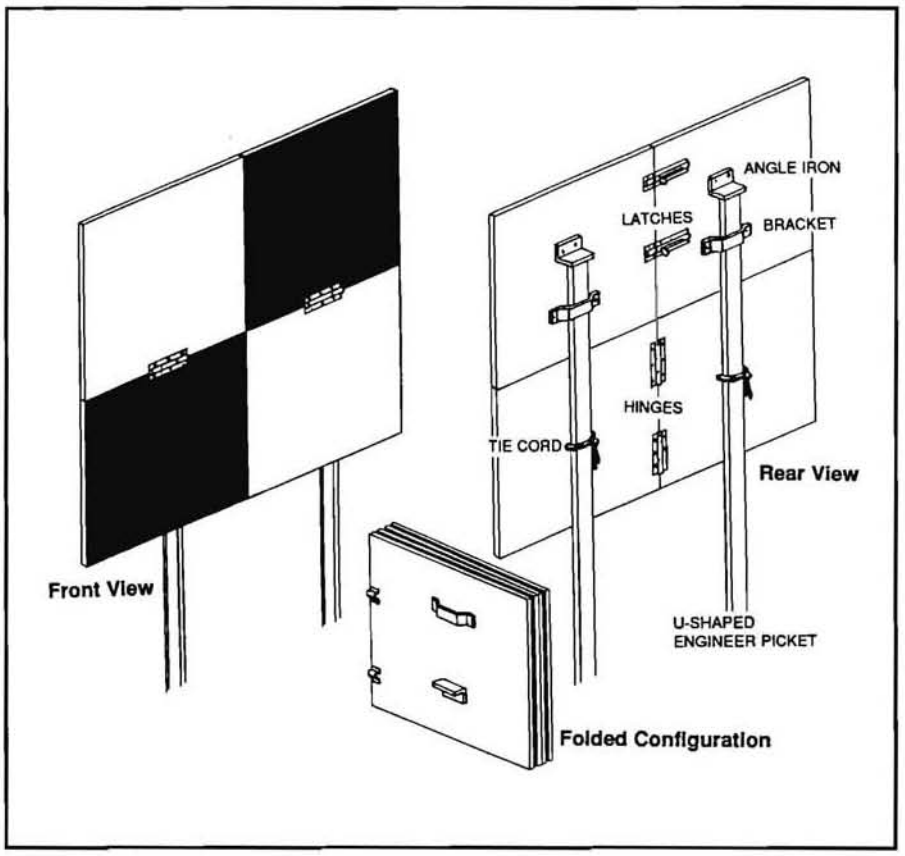
How do you boresight in combat? Scenario - An M1A1 tank company has just destroyed an enemy defensive position. It has been ordered to perform reorganization and consolidation on the objective. Ammunition and fuel is on the way. The attack will continue. The company has sustained no casualties, but two tanks report finding scars on the turret. They have taken direct hits. One vehicle has a possible fire control malfunction.

Enemy resistance is very light. There is time to boresight, but the horizon is featureless, except for a few burning vehicles. What can you boresight on? The doctrinal answer is any right angle you can get your sights on, but that is not the best answer. The best object to boresight on is a boresight panel.

At the recent Armor Conference, there were a number of TRP markers that could be used for mobile boresight panels, but I found nothing as effective as the panel constructed by SFC Richard Bean, Bravo Company, 3-67 Armor Master Gunner.

Most TRP markers or boresight panels acquired for DESERT STORM were made of a flexible material. In even a slight wind, the material flapped and was hard to make taunt. Testing at Fort Hood gave us an indication that canvas panels would not be as effective as wood, but a wooden boresight panel would be too large to transport. We wanted a panel that could be carried on a tank and quickly placed. We planned for the most austere conditions.

SFC Bean came up with a novel solution. He designed a panel that folded in four sections, using a number of common hinges and latches. Once folded the panel could be carried in a burlap bag on the bustle rack of a tank. When appropriate, a tank could move forward and within a few minutes place a sturdy boresight panel.



What about Thermal? A future model might have pockets to hold medic thermal packs, but we found that we could adequately heat the panel by merely backing up to it for a few minutes. When boresighting was complete, a crew could quickly police the panel up and stow it away.

The panel worked very well for Bravo Company during Operation DESERT STORM. The unit destroyed 58 combat vehicles from ranges of 2800 meters to as close as 400 meters on the Al Mutla intersection of the Basra highway. The panel was used extensively before the ground war and came in very handy up until the company redeployed to CONUS.

Although tank commanders can boresight on any right angle, the best boresight comes from a boresight panel. It's what we use in live fire training and in combat conditions. Using a panel reduces the chance of human error, i.e., "you mean that thing over there or the one behind it!" There is no question of where the reticle should be. It worked for us, and I know it will work for you.

Captain Bart Howard was a DMG of the University of Santa Clara and commissioned in Armor in 1984. He served as a tank platoon leader, scout platoon leader and company XO in the 5th Bn, 73rd AR, 194th AR Bde (Sep). Following AOAC, he served as S1, 1st Bn, 72d AR, 2ID. He also served as the asst. S3, 1st (Tiger) Bde, 2AD, and commanded B Co, 3d Bn, 67th AR during DESERT SHIELD/STORM and subsequently HHC, 3d Bde, 1CD. Currently he is serving as a team chief for the AOB Division, 2d Squadron, 16th Cav, Ft. Knox, Ky.

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